



**HIGH PERFORMANCE COMPUTER SYSTEMS**

**300 SERIES**

**MODULE LEVEL**

**SERVICE MANUAL**

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\*SID is a direct dial viewdata system available to registered SID users. You can gain access to SID on (0223) 243642, this will allow you to inspect the system and use a response frame for registration.

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**WARNING: THIS COMPUTER MUST BE EARTHED**

Important: The wires in the mains lead for the computer are coloured in accordance with the following code:

Green and yellow	Earth
Blue	Neutral
Brown	Live

For United Kingdom users

The moulded plug must be used with the fuse and fuse carrier firmly in place. The fuse carrier is of the same basic colour (though not necessarily the same shade of that colour) as the coloured insert in the base of the plug. Different manufacturers' plugs and fuse carriers are not interchangeable. In the event of loss of the fuse carrier, the moulded plug **MUST NOT** be used. Either replace the moulded plug with another conventional plug wired as described below, or obtain a replacement fuse carrier from an Acorn Computers' authorised dealer. In the event of the fuse blowing it should be replaced, after clearing any faults, with a 5-amp fuse that is ASTA approved to BS1362.

For all users

If the socket outlet available is not suitable for the plug supplied, either a different lead should be obtained or the plug should be cut off and the appropriate plug fitted and wired as noted below. The moulded plug which was cut off must be disposed of as it would be a potential shock hazard if it were to be plugged in with the cut off end of the mains cord exposed.

As the colours of the wires may not correspond with the coloured markings identifying the terminals in your plug, proceed as follows:

The wire which is coloured green and yellow must be connected to the terminal in the plug which is marked by one of the following: the letter E, the safety earth symbol, the colour green, or the colour green and yellow.

The wire which is coloured blue must be connected to the terminal which is marked with the letter N, or coloured black. The wire which is coloured brown must be connected to the terminal which is marked with the letter L, or coloured red.

**GUIDELINES FOR SAFE OPERATION**

The equipment described in this guide is designed and manufactured to comply with International safety standards IEC65 (BS415) and IEC380 (BS5850), and is intended for use only as a desktop microcomputer. It should not be used for other purposes. It is most important that unpacking and installation is carried out in accordance with the instructions given in the Welcome Guide.

The equipment is robustly constructed but in the interests of continued safe and reliable operation, careful handling and the following guidelines should be observed.

- DO keep the machine within a room temperature of 5 to 35 degrees C (**41 to 95 degrees Fahrenheit**) and a relative humidity of 15% to 95% (non-condensing).
- DO avoid sudden extremes in temperature, exposure to direct sunlight, heat sources (such as an electric fan heater) and rain.
- DO make sure that the equipment is standing on a suitable horizontal flat surface, allowing enough space for air to circulate when the equipment is in use.
- DO ensure that wires and cables are routed sensibly so that they cannot be snagged or tripped over. Don't tug or twist any wires or cables, or use them to hang or lift any of the units.
- DO switch off and unplug the equipment and any accessories before opening any unit, to install an upgrade, for example. The main computer unit should normally be operated with the cover attached, but it can safely be switched on with the cover removed, provided that care is taken not to short circuit any connections or to allow any fingers or objects in the area of the fan or disc drives when these are running. Be especially careful with jewellery. Do not attempt to open any display or monitor unit, whether supplied with this equipment or not.
- DO make sure you have read and understood any installation instructions supplied with upgrade kits before attempting to fit them. If you have any doubts, contact your supplier.
- DON'T spill liquids on the machine. If liquid does spill, turn the machine off immediately and take it to your dealer for assessment.
- DON'T drop the equipment or subject it to excessive bumping and jarring. This is particularly important if you have a hard disc installed.
- DON'T poke objects through the ventilation openings in the computer casing, and don't let items such as necklaces or bracelets drop into the openings.
- DON'T exceed a maximum power consumption of 20 watts from the Podule backplane supply.
- DON'T balance any objects or stand other equipment not designed for the purpose, on top of this equipment.

# 1. Introduction

## 1.1. Nature and purpose of this manual

This manual is intended to provide the information required to diagnose and rectify faults in the Archimedes 300 series high performance computer system at module level.

The information contained in this manual is aimed at service engineers and Acorn dealers who will be servicing the Archimedes 300 series high performance computer system, at module level, on behalf of Acorn Computers Limited.

Details of service policy are as specified by Acorn Computers Limited in the Service and Support Strategy document.

Reference should be made to the Appendix at the back of this manual for latest Production and Field Change information prior to servicing.

## 1.2. Technical Specification

### GENERAL

A high performance, microcomputer system, using the Acorn ARM RISC chip set, comprising the ARM (2 $\mu$ ) processor, the MEMC memory controller, the VIDC Video/Sound controller, and the IOC Input/Output controller.

The 'three-box' system comprises:

A metal cased main unit, with plastic front and rear mouldings, housing the main PCB, a 1 Mbyte (unformatted) 3.5" floppy disc drive, the PSU and provision for expansion Peripheral Modules (Podules) when the optional backplane and fan are fitted. The model 305 is fitted with 0.5Mbyte of DRAM and can be upgraded to model 310 specification by the addition of a further 0.5Mbyte of DRAM.

A 103 key keyboard unit with system reset button, housed in a plastic case. Connection to the main unit is via a coiled-style serial cable and 6-way miniature circular plug. Function keystrips can be accommodated on the keyboard. The keyboard incorporates electronics for key scanning, mouse signal decoding and serial data transfer between the keyboard and computer main unit. An electronically readable 6 bit identification code is included in the keyboard to allow the computer to detect keyboard variants, such as foreign language versions.

A three-button 'mouse' pointing device connects to the system via a 9-way circular socket on the keyboard. The mouse uses two quadrature detector encoded signals for each axis of movement with a resolution of 10 edges per mm. In Mode 0, 64mm of movement traverses the display area - scaling set to 1.

The Archimedes 300 series may be supplied with one of four monitor options:

- a. No monitor
- b. Monochrome - analogue with 256 display lines at 50 Hz (TV format).
- c. Colour - analogue RGB with 256 display lines at 50 Hz (TV format).
- d. Colour - analogue RGB multi-sync type. Monitors automatically lock on to one of two display frequencies generated by the 300 series:
  - i) TV format, 256 display lines, 50 Hz non-interlaced.
  - ii) High resolution mode, 512 display lines, 50 Hz non-interlaced.

NB Colour composite video and UHF/VHF TV outputs are not provided.

### COMPUTER MAIN UNIT

**RAM Memory** , 512K standard, upgradeable to 1 Mbyte total, model 305 1 Mbyte standard,  
 model 310  
 120 nS access time  
 16 off 64K x 4 RAM fitted as standard  
 16 off 64K x 4 RAM optional upgrade, model 305

The Archimedes 300 series is supplied with 512K of ROM as standard.

ROM Memory	Four 32 pin sockets are fitted. The options are: 128K - 4 off 32K x 8bit ROM/EPROM (eg 27256) 256K - 4 off 64K x 8bit ROM/EPROM (eg 27512) 512K - 4 off 128K x 8bit ROM (eg 62301 ROM)		
Processor	24 MHz master clock oscillator. 4/8 MHz ARM (2 $\mu$ ) processor. System performance is typically 4 MIPS.		
Real-time clock	Powered by internal batteries when computer switched off		
Non-volatile RAM	240 bytes of static RAM which maintains preferred machine configuration, etc. Powered by internal batteries while the computer is switched off.		
Internal batteries	Two LR06 (AA size) 1.5 V Manganese Alkaline cells fitted inside computer main unit. Batteries require replacement once a year.		
Controls	Mains on/off switch at rear of unit, integral with PSU. Floppy disc eject button(s) on front panel. System reset button (on rear of keyboard unit).		
Indicators	Green LED on front panel indicates mains power on. Amber LED on floppy disc drive(s) indicates drive activity. Amber LED below power LED indicates hard disc drive activity (where fitted).		
Connectors			
Power inlet	IEC 320/CEE 22 power inlet connector.		
	Min.	Nominal	Max.
Operating voltage range	198	220/240	264 Vac
Frequency	47	50/60	63 Hz
Rating (no monitor)		0.4	A
(with monitor)		0.9	A
Power Outlet	IEC 320/CEE 22 power outlet connector.  This outlet is unswitched (ie not controlled by the PSU on/off switch) and is live whenever power is applied to the power inlet. Power rating 3 A max. continuous, 80 A max. surge.		
Podule Bus	64-way DIN 41612 connector on the main PCB for connection of Podule backplane.		
Parallel printer	25-way D type socket.		
Serial port	9-way D type plug.		
Colour analogue RGB video	9-way D type socket.		
Monochrome Composite Video	Phono (RCA) socket.		
Keyboard	6-way miniature circular socket for keyboard connection.		
Mouse	Three-button mechanical mouse connects via a 9-way circular connector on the keyboard.		
Audio	3.5 mm 32 ohm stereo jack socket for output to suitable personal-stereo headphones or hi-fi system.		

**DIMENSIONS**

Main Unit	Overall height - 97 mm (excluding feet) Overall width - 362 mm approx. Overall depth - 406 mm approx.
Colour	Two-tone cream/warm grey

Finish	Fine texture
Materials	Painted metal ABS, flame retardent to meet IEC 950
<b>Keyboard</b>	Overall height - 46 mm (excluding feet) Overall width - 485 mm Overall depth - 205 mm
Colour	Cream case with warm grey main keys (in two shades) and red function keys.
Finish	Fine texture.
Case material	ABS, flame retardent to meet IEC950
Function keystrip holder	Clear plastics flame retardent to meet IEC 950.
Weight:	1.75 Kg

**OPTIONS - (see Upgrading, section 4, for fitting details)****Podule backplane and fan**

The backplane plugs into the main PCB to enable Podules to be connected via two 64-way DIN 41612 connectors. The fan provides extra cooling required when Podules are fitted.

Econet interface Plug-in Econet module fits onto main PCB. Econet 5-pin DIN socket fitted as standard (may be fitted with blanking plug prior to upgrade).

Podules Mechanically identical to single or double width Eurocards, up to two Podules can be fitted at any one time, fitted one above the other within the rear of the main unit case. If an Econet module is fitted, a half-width only Podule (or one designed to fit around an Econet module, such as the I/O Podule) can be fitted in the lower position. Podules available and planned for the Archimedes system include:

ROM Podule (AKA05)

Provides a capability for plug-in ROM based software.

I/O Podule (AKA10) Reproduces the BBC Model B/Master Series A to D port, User Port and 1 MHz bus.

MIDI Podule (AKA16)

Provides a MIDI control interface with music synthesisers.

A MIDI module, AKA15, which can be added to an I/O Podule, is also available.

Hard disc

(part of Hard Disc Upgrade AKD52, see below)

The 300 Series can be fitted with most types of Podule designed for the Archimedes system but Coprocessor Podules, which need access to the main system data bus, are not supported by the 300 series.

Second Floppy Disc

Drive(AKD50)

A second 3.5" floppy disc drive can be fitted internally as a dealer upgrade. The upgrade consists of a disc drive, a new data cable assembly and front sub-moulding.

Hard Disc (AKD52) A 20 Mbyte (formatted) 3.5" hard disc can be fitted as a dealer upgrade, together with a Hard Disc Podule. A Podule backplane and fan is also required.

Either a hard disc upgrade or a second floppy disc upgrade may be fitted.

RAM (AKA51)

A 0.5 Mbyte RAM upgrade can be fitted to model 305 by inserting additional RAM chips, supplied as a dealer upgrade kit, into the unpopulated sockets on the main unit PCB.

**ENVIRONMENTAL****Operating****Temperature**

5 to 35° C

Humidity

10% to 95% at 35° C non-condensing

Altitude	0 to 2500 metres above sea level
Storage	
Temperature	-40 to 70° C
Humidity	10 to 95% RH non-condensing
Altitude	Up to 10,000 metres

**ELECTRICAL SAFETY**

Designed and manufactured to comply with the EEC Low Voltage Directive.

When fitted with PSU intended for 220/240 V operation:

BS415	(IEC 65)
BS5850	(IEC 380)

**OPERATING SYSTEM**

The Arthur Operating System is described in detail in the Archimedes Programmers' Reference Manual. A summary of the facilities offered by Arthur is as follows:

Screen modes Eighteen standard screen modes are supported, with three additional modes designed to take advantage of multi-sync higher definition monitors. The first eight modes provide compatibility with the BBC Microcomputer 6502 based range MOS:

Mode	Pixel Resolution	Logical Colours	Text
0	640 x 256	2	80 x 32
1	320 x 256	4	40 x 32
2	160 x 256	16	20 x 32
3	TEXT ONLY	2	80 x 25
4	320 x 256	2	80 x 25
5	160 x 256	4	20 x 32
6	TEXT ONLY	2	40 x 25
7	TELETEXT	TELETEXT	40 x 25
8	640 x 256	4	80 x 32
9	320 x 256	16	40 x 32
10	160 x 256	256	20 x 32
11	TEXT ONLY	80 x 25	
12	640 x 256	16	80 x 32
13	320 x 256	256	40 x 32
14	TEXT ONLY	16	80 x 25
15	640 x 256	256	80 x 32
16	TEXT ONLY	16	132 x 32
17	TEXT ONLY	16	132 x 25

The following modes are for use with multi-sync monitors only:

18	640 x 512	2	80 x 64
19	640 x 512	4	80 x 64
20	640 x 512	16	80 x 64

In all modes except Teletext, the colours can be chosen from a palette of 4096 colours, with some restrictions in the 256 colour modes.

**Graphics**

Extensions Modes 16 and 17, together with graphics extensions, enable VT 100 and VT 220 emulations to be implemented.

The GCOL primitive has been extended to cover transparency and additional raster operations. The GXR Sprite function has been extended to support WIMPS more fully and to provide BLITTER functions for animation.

Hardware cursor This is a user-definable 3 colour shape ( a sprite) which can be linked to mouse movement.

Window manager	This provides a ROM/Operating System based WIMP manager which can be used by applications programs. It manages up to 32 windows and provides a common user interface with the mouse across applications.
Alphabets	Five 8-bit (7-bit ASCII + extensions) alphabets are included in the ROM. These are based on ISO 8859 Parts 1, 2, 3, 4 and 7. Parts 1 through 4 support concurrent wordprocessing, etc in country groupings. Part 7 supports Greek and English. Optional alphabets based on Cyrillic, Arabic and Hebrew will be available.
Fonts	Alternative fonts are supported. These are defined in a file and cached as required in memory. The fonts are proportionally spaced and can cover a wide range of point sizes. Options for text justification are provided for use by application programs.
Command line interpreter	Allows parameters, conditionals, aliasing of commands, system variables and expressions.
Debug facilities	A Monitor program is provided which allows for debugging, ie breakpoints, disassembler, etc.
Sound	Extended features are provided to support the hardware capability. The Operating System sound code is split into three levels: Level 0    Sound DMA Buffer handler: Number of channels, sample rate, channel length. Program number of channels (max. of 8 - default 1) Enable/disable local speaker Enable/disable sound system Program stereo position (max. of 7 positions) Level 1    Sound Channel Controller: Sets loudness amongst many other characteristics. Level 2 Event Queue manager: Schedules events related to screen display, etc.
<b>BBC BASIC V</b>	Contains extended functions, including: <b>WHILE_____ENDWHILE</b> <b>CASE — WHEN — OTHERWISE — ENDCASE IF</b> <b>— THEN — ELSE_____ENDIF</b> Function and Procedure libraries Enhanced error handling Whole array operations Binary and unary operators Enhanced TRACE Improved PRINT accuracy Re-written string storage More line numbers and sophisticated tabulation Full ARM assembler
BASIC editor	An extended version of the Acornsoft 6502 based editor.
6502 Emulation Code	This code, which is supplied on the Welcome disc, provides a software environment in which to execute 'legally' written 6502 code.
Advanced Disc Filing System	An improved version of the 6502-based ADFS. User disc handling has been both extended and simplified. An additional 800K disc format is added which also provides a faster access time.

**Advanced Network**

**Filing System** An improved version of the 6502-based ANFS, it has been generalised to support a broader Networking base. Three code modules are included: Econet, NetFS and NetPrint.

**Floating Point**

**Emulator** The FPE code is supplied on the Welcome disc. This emulates hardware floating point units and is used with high level language compilers.

**1.3 Packaging and Installation**

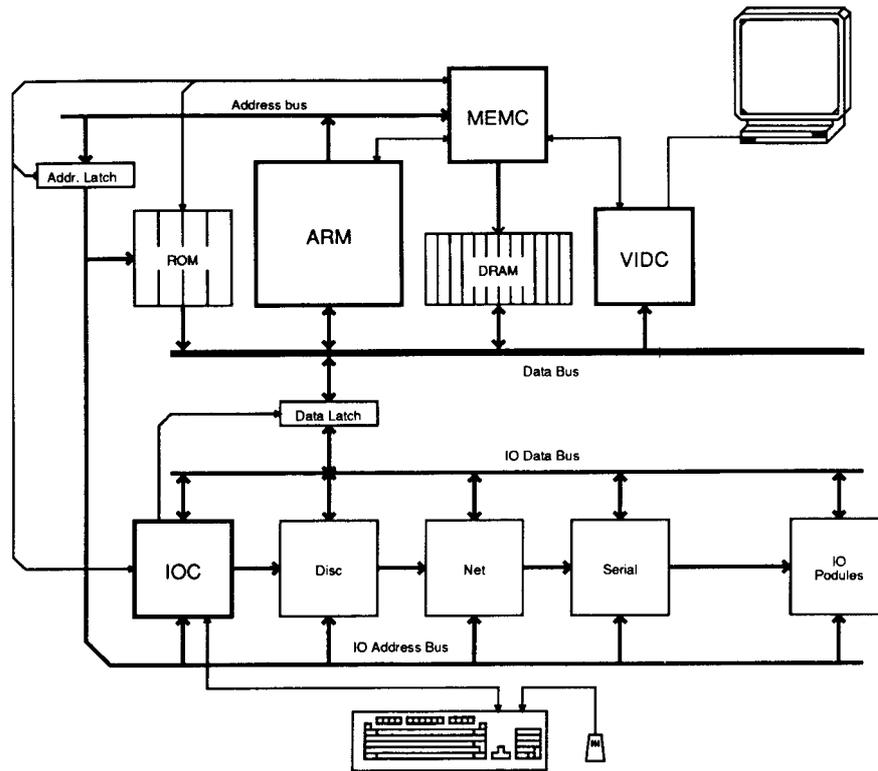
The computer main unit, keyboard and mouse are supplied in a moulded two-part polystyrene packing in a cardboard carton. Also included are a Welcome Guide, a Welcome/Utilities disc, a User Guide, a Keycard set and a guarantee card. An optional colour or monochrome monitor is supplied packed separately.

Do not use the computer system in conditions of extreme heat, cold, humidity or dust or in places subject to vibration. Do not block the ventilation slots in the main unit casing. Ensure that no foreign objects are inserted through any openings in the casing.

## 2. System Description

### Introduction

The Archimedes 300 series is built around the *A Series* chip set, comprising the Acorn Risc Machine (ARM), the Memory Controller (MEMC), Video Controller (VIDC) and Input Output Controller (IOC). A schematic of the Archimedes 300 series is shown below:



### General

The ARM (Acorn Risc Machine) IC is a pipelined, 32 bit reduced instruction set microprocessor which accepts instructions and manipulates data via a high speed 32 bit data bus and 26 bit address bus giving a 64 MByte uniform address space. The ARM supports virtual memory systems using a simple but powerful instruction set with good high-level language compiler support.

The Memory Controller (MEMC) acts as the interface between the ARM, the Video Controller, I/O Controllers, Read-Only Memory (ROM) and Dynamic memory devices (DRAM), providing all the critical system timing signals including processor clocks.

1 MByte of DRAM (0.5 MByte in model 305) is connected to MEMC which provides all signals and refresh operations. A Logical to Physical Translator maps the Physical Memory into a 32 MByte Logical address space (with three levels of protection) allowing Virtual Memory and Multi-Tasking operations to be implemented. Fast 'page mode' DRAM accesses are used to maximise memory bandwidth. The VIDC requests data from the RAM when required and buffers it in one of three FIFOs before using it. Data is requested in blocks of four 32-bit words, allowing efficient use of paged-mode DRAM without locking the system data bus for long periods.

MEMC supports Direct Memory Access (DMA) operations with a set of programmable DMA Address Generators which provide a circular buffer for Video data, a linear buffer for Cursor data and a double buffer for Sound data.

The Video Controller (VIDC) takes video data from memory under DMA control, serialises it and passes it through a colour look-up palette and converts it to analogue signals for driving the CRT guns. The

VIDC also controls all the display timing parameters and controls the position and pattern of the cursor sprite. In addition, it incorporates an exponential Digital to Analogue Converter (DAC) and stereo image table for the generation of high quality sound from data in the DRAM.

The VIDC is a highly programmable device, offering a very wide choice of display formats. The colour look-up palette which drives the three on-chip DACs is 13 bits wide, offering a choice from 4096 colours or an external video source.

The cursor sprite is 32 pixels wide and any number of rasters high. Three simultaneous colours (again from a choice of 4096) are supported and any pixel can be defined as transparent, making possible cursors of many shapes. It can be positioned anywhere on the screen. The sound system implemented on the device can support up to 8 channels, each with a separate stereo position.

The Input Output Controller (IOC) controls the IO bus, expansion Podules and provides basic functions such as the keyboard interface, system timers, interrupt masks and control registers. It supports a number of different peripheral cycles and all IO accesses are memory mapped.

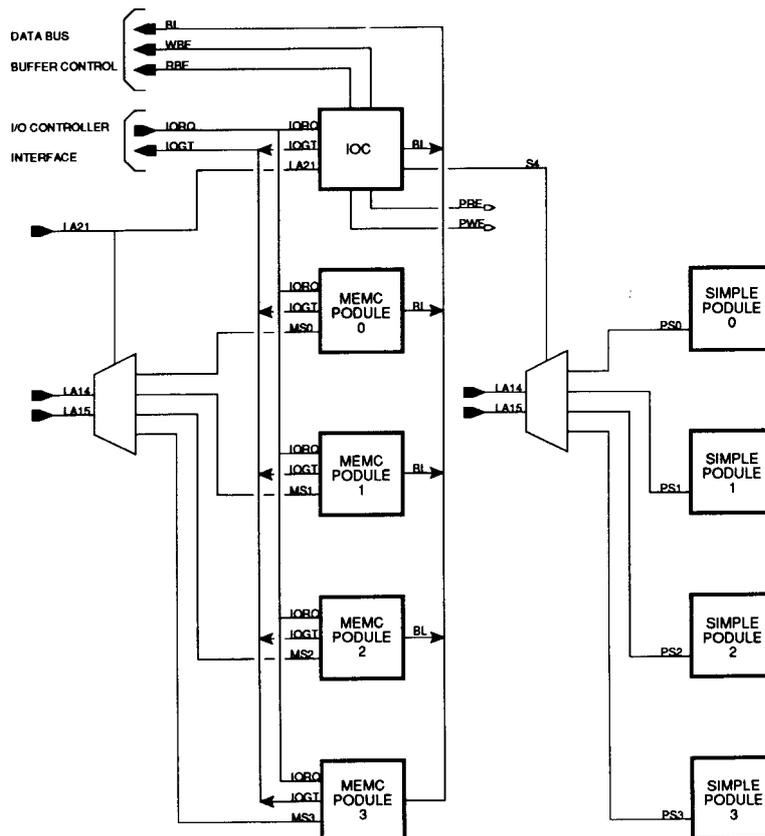
**The I/O system**

The I/O system is controlled by the I/O Controller IOC and the Memory Controller MEMC. The I/O Bus supports all the internal peripherals and the PODULE expansions. It is important to realise that it is up to the machine operating system, in conjunction with the Podule ID, to determine the address at which a Podule should be accessed.

**System Architecture**

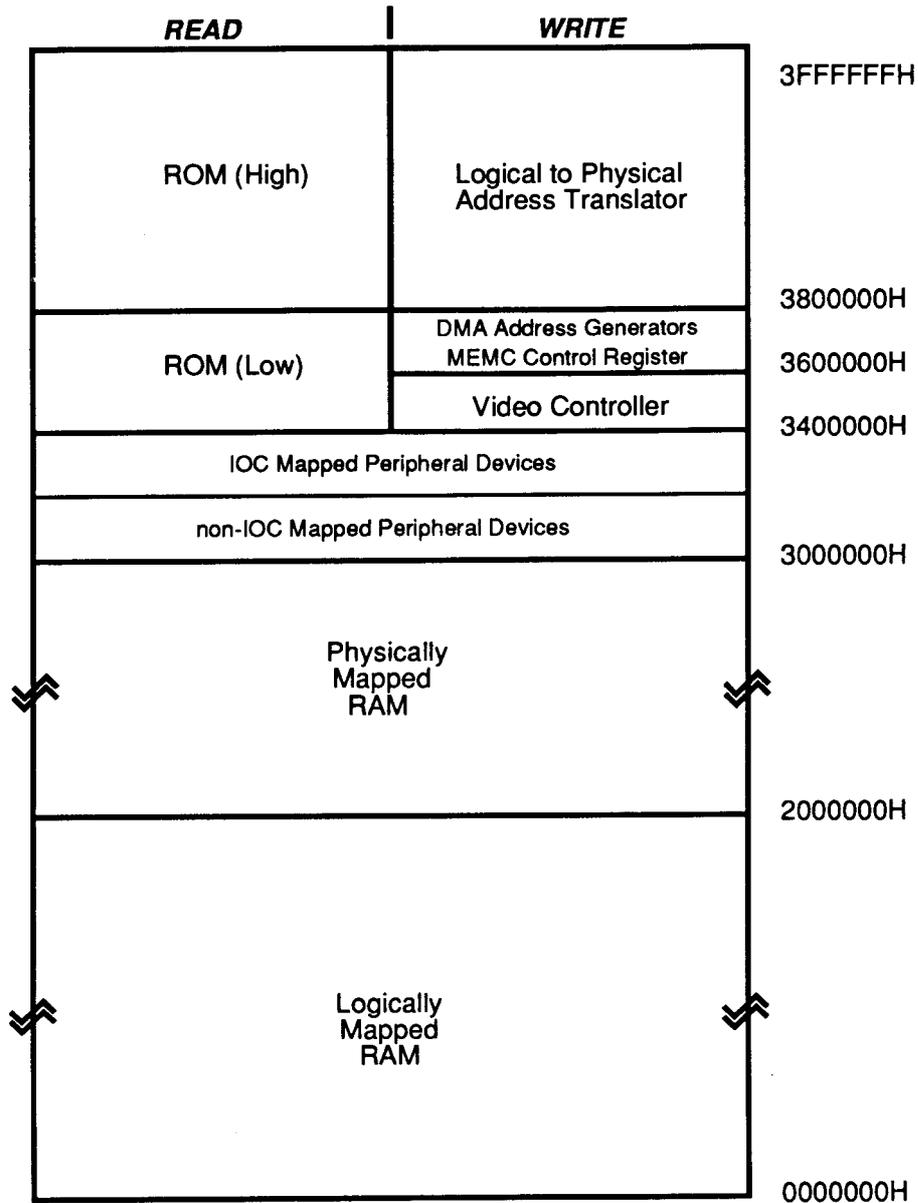
The I/O system (which includes Podule devices) consists of a 16 bit data bus (BD[0:15]) a buffered address bus (LA[2:21]) and various control and timing signals. The I/O data bus is independent from the main 32-bit system data bus, being separated from it by bidirectional latches and buffers. In this way the I/O data bus can run at much slower speeds than the main system bus to cater for slower peripheral devices. The latches between the 2 buses and hence the I/O bus timing are controlled by the I/O controller, IOC. The IOC caters for 4 different cycle speeds (slow, medium, fast and synchronous).

A typical 300 series I/O system with 'simple' Podules fitted is shown in the diagram below. The Podules are controlled by IOC. For clarity, the data and address buses are omitted from this diagram.



**System Memory Map**

The system memory map is defined by the MEMC, and is shown below. Note that all system components, including I/O devices, are memory mapped.



**The Sound System**

The sound system is based on the VIDC stereo sound hardware. External analogue anti-alias filters are used which are optimised for a 20 kHz sample rate. The high quality sound output is available at a 3.5mm stereo jack socket at the rear of the machine which will directly drive personal stereo headphones or alternatively an amplifier and speakers. A mono mix of the sound output is sent to the internal loud-speaker.

### 3. Disassembly and Assembly

The main unit houses the main PCB, the PSU and 3.5" floppy disc drive. Provision is made for the installation of a second floppy disc drive or hard disc unit plus a variety of Podules via a backplane board. A cooling fan may also be fitted with some upgrades.

The keyboard, mouse and monitor are separate units. See the appropriate third-party service information for the monitor. The mouse is a service replacement only item.

#### Main Unit

##### DISASSEMBLY

1. Disconnect the computer from the mains supply and all peripherals, including the keyboard.
2. Place the main 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):

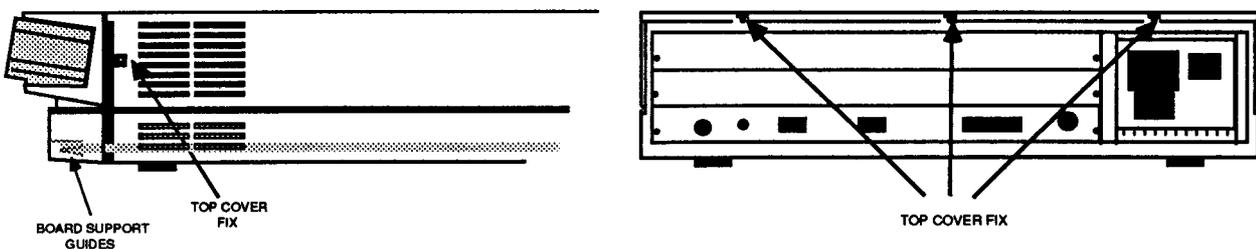


FIG. 1

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.

4. To remove the main PCB: Unplug the following cables from the main

PCB (see fig. 2):

Speaker/LED connector PL9.

Battery connector PL11.

Fan connector PL12 (if fitted).

Four power tags - PL5 (yellow, +12V), PL6 (black, 0V), PL7 (red, +5V) and PL8 (mauve, -5V).

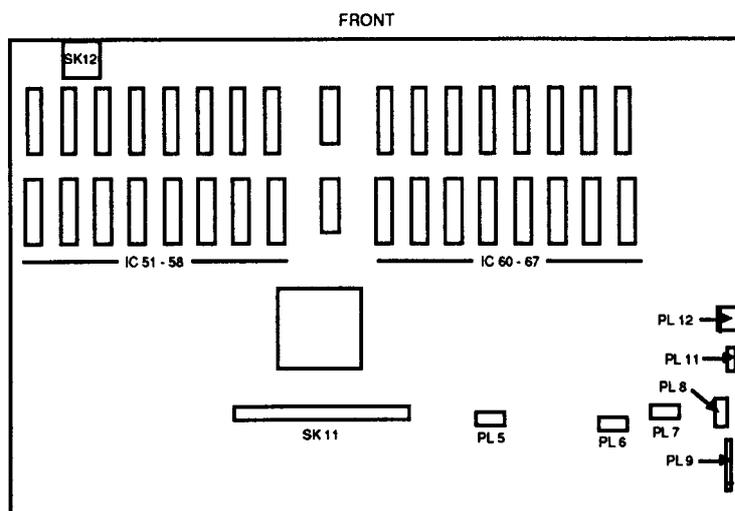


FIG. 2 MAIN BOARD

5. Unplug the floppy disc drive cable from SK11 on the main PCB. If a hard disc drive is fitted, unplug the 34-way (PL3) and 20-way (PL4) connectors from the Hard Disc Podule.
6. Unplug and remove any Podules fitted - see the relevant upgrade instruction in section 4, "Upgrading".
7. Unplug and remove the Podule backplane (if fitted) - see the relevant upgrade instruction in section 4, "Upgrading".
8. Stand the unit up on its left side and remove the two screws and star washers from the underside securing the rear bus bars (see fig. 3).

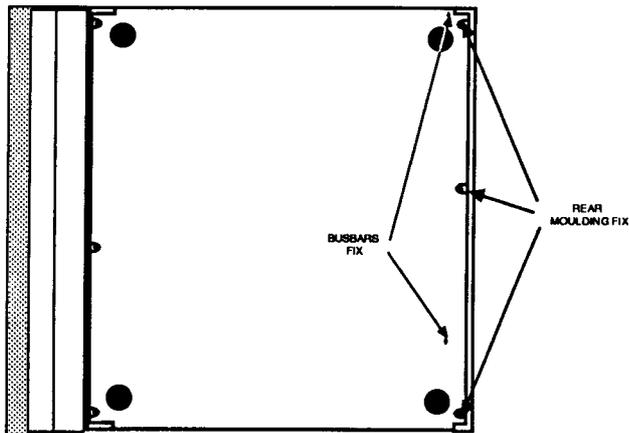


FIG. 3

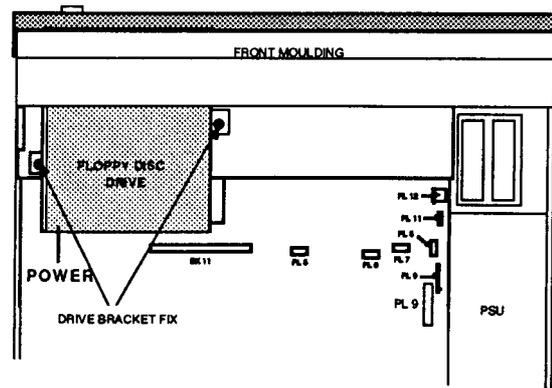


FIG. 4

9. Remove the 3 screws from the underside securing the rear moulding.
  10. Stand the unit back on its feet and begin to withdraw the rear moulding, with the main PCB attached, out of the case. Support the front edge of the PCB as soon as it is accessible.
- The optional cooling fan is mounted against the front left side of the casing (viewed from the front), alongside the battery holder. See section 4.4 for details.

#### FLOPPY DISC DRIVE

A single internal floppy disc drive is fitted as standard. To remove the drive, follow steps 1, 2 and 3 above in "Main Unit Disassembly" to gain access to the interior of the main unit. With reference to Figure 4, unplug the drive data ribbon cable from SK11 on the main PCB and the power cable connector from the rear of the drive. Locate and remove the two screws securing the disc drive mounting bracket to the saddle bracket and carefully withdraw the disc drive assembly from the main unit.

Before installing a replacement drive, remove the front fascia which is supplied clipped to the drive and fix the eject button to its shaft using cyanoacrylate adhesive (observe safety precautions on the adhesive pack).

Partially insert a disc before carefully placing the drive assembly in position. Guide the disc through the slot in the moulding and adjust the position of the drive until the eject button passes through its slot in the moulding. Insert and partially tighten the two drive bracket fixing screws. Push the disc fully into the drive. Check that the drive will accept and reject discs and that the eject button does not bind on the moulding. Adjust the position of the drive mounting bracket if necessary, then finally tighten the fixing screws.

For access to front case moulding assemblies, front panel LEDs and speaker, see the relevant disc drive upgrade instructions in section 4, "Upgrading".

**POWER SUPPLY UNIT****CAUTION: DOUBLE POLE/NEUTRAL FUSING**

The PSU is fitted with a double-pole switch and both the Live and Neutral lines are fused.

To remove the PSU, ensure that all low voltage captive leads are disconnected and free from restraints. Remove the fan (if fitted) then remove the four M3 x 6 mm fixing screws from the underside of the base metalwork. Slide the PSU forward to clear the rear moulding, then lift it clear. When installing a PSU, the system should be tested for satisfactory earth continuity in accordance with IEC 950\*.

NOTE: THE PSU IS A SERVICE REPLACEMENT ONLY ITEM.

**\*IMPORTANT NOTE**

**WHEN REFITTING OR FITTING A REPLACEMENT ASSEMBLY, CHECKS SHOULD BE MADE FOR EARTH CONTINUITY BETWEEN THE EARTH PIN OF THE MAINS PLUG AND THE FOLLOWING:**

**THE BASE METALWORK**

**THE REAR PANELS (INCLUDING BLANKING PANELS)**

**THE TOP COVER**

**USE AN EARTH CONTINUITY TESTER SET TO 25 AMPS.**

**MAIN UNIT ASSEMBLY**

Assembly is generally the reverse of the disassembly procedures, but take care with routing of cables and ensure that leads are not trapped when refitting assemblies to the main unit.

**Keyboard**

Two types of keyboard have been used in production - known as Keyboard Products (KPL) and Keytronics. These units house PCBs which are electrically compatible but physically different in construction. The two types are distinguished externally by the position of the LED in the Scroll Lock key; the KPL keyboard has this LED in the top left of the keytop, whilst on the Keytronics version it is in the top right corner. Keyboard PCBs must be replaced on a like-for-like basis, as follows:

**DISASSEMBLY - SEE FIG. 5**

Invert the keyboard and place it on a soft, level surface. Remove the eight Pozidriv screws securing the two halves of the case and carefully lift the base moulding away.

For a KPL PCB, remove the three No. 6 x 1/4" Pozidriv screws (A, B and C) securing the board to the top moulding and carefully lift the board clear. Note that seven plastic spacers are placed over the fixing bosses in the top moulding; three are clamped by the board fixing screws, whilst two at each end support the board without fixing screws. Ensure that the spacers are located correctly before replacing the PCB into the moulding.

The Keytronics board is fixed to the top moulding by four No. 6 x 1/4" screws, two at each end of the metal PCB support tray plus, on some units, three further screws at A, B and C as for the KPL Keyboard. Remove the three extra screws first, if fitted, then remove the two screws from the end nearest to the keyboard cable. Loosen the two remaining screws and lift the board clear.

Note that the reset switch cap must be removed from the original keyboard and fitted to the replacement.

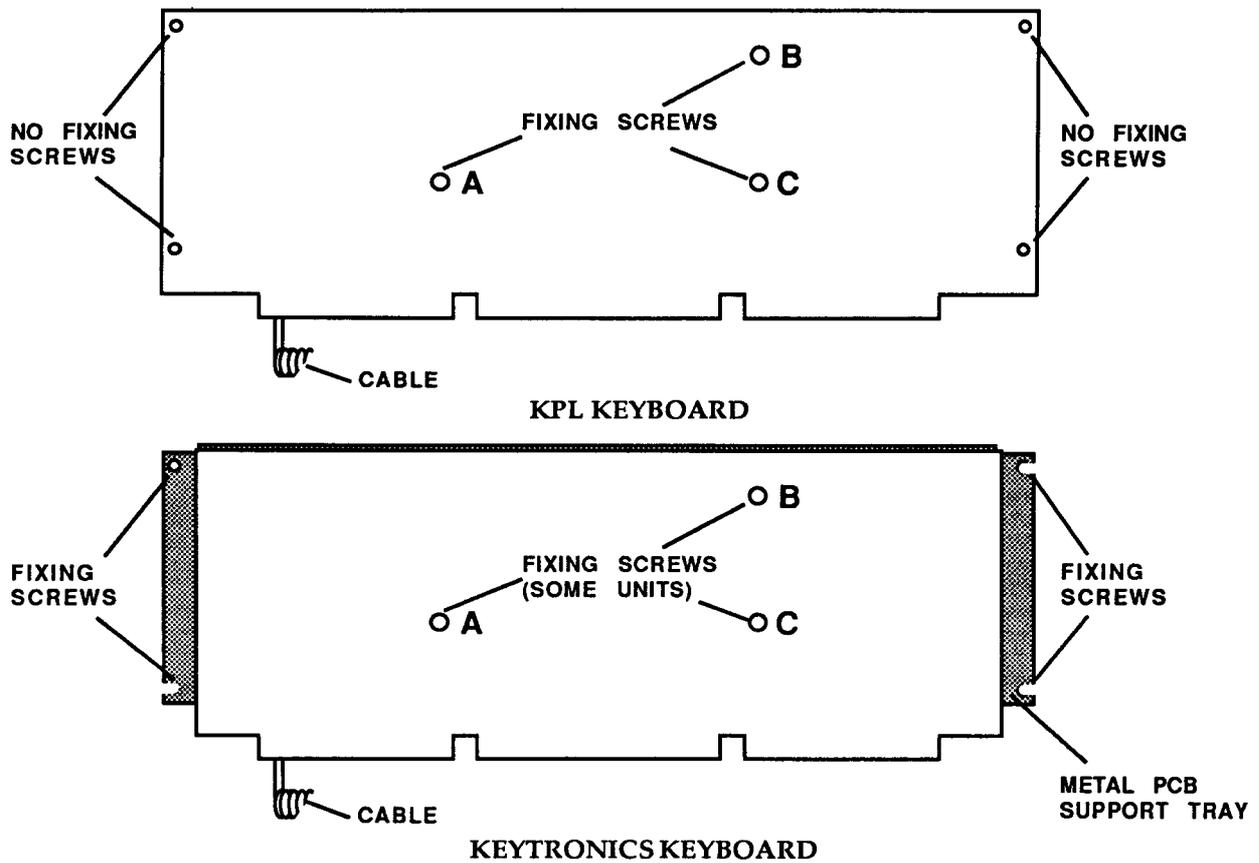


FIG. 5 KEYBOARD PCB DETAIL

**ASSEMBLY**

Keyboard assembly is generally in reverse order, with the following notes:

KPL - ensure all the spacers are in position before fitting the PCB to the moulding. Check that all keys clear the cutouts in the top moulding before finally tightening all PCB fixing screws.

Keytronics - Slot the PCB support tray under the two fixing screws at the end furthest from the Keyboard cable, then insert the remaining screws. Check that all keys clear the cutouts in the top moulding before finally tightening all PCB fixing screws.

**Mouse**

The mouse is a service replacement only item.

## 4. Upgrading

Any modification or upgrade carried out to the printed circuit board of any Acorn equipment is undertaken at the sole risk of the person carrying out the modification or upgrade. No claim for loss or damage to the equipment caused by the modification or upgrade by unskilled personnel shall be accepted by Acorn Computers Ltd.

Before commencing an upgrade, please read all of the instructions carefully. If you are in doubt about your ability to carry it out, the upgrade kit and computer should be taken to your nearest authorised Acorn dealer.

A charge may be levied by the dealer for installing the upgrade in the machine, such a charge shall be entirely at the discretion of the dealer.

The following are copies of the actual upgrade instructions. These instructions are the latest issues at the time this manual was prepared.

The backplane, podule, second floppy disc drive and MIDI module installation leaflets, together with the Arthur ROM fitting instruction, are supplied with the upgrade kits, giving instructions for fitting the upgrade by the user.

The hard disc upgrade leaflet is supplied with the kit and gives user information on the use and care of the hard disc.

The hard disc and RAM upgrade kit fitting instructions are supplied to dealers only for dealer-fitted upgrades.

# BACKPLANE INSTALLATION LEAFLET

## For use with the Archimedes High Performance Computer System

Any Podule is installed by plugging it into an adapter, inside the Archimedes, called the 'backplane'. This leaflet describes how to install the backplane as well as a cooling fan which is included with the kit. It is essential that the fan is fitted at the same time as the backplane to ensure that the machine remains within its specified operating temperature range.

The backplane fitting kit should contain the following parts.

For the backplane:

- 1 backplane PCB
- 1 mounting bar
- 2 hexagonal plastic spacers
- 4 self-tapping screws to fit the spacers
- 2 straight screws to locate the mounting bar
- 1 tie-wrap

For the fan assembly:

- 1 fan unit
- 1 filter clamp
- 1 fan filter
- 4 bolts and 6 nuts to locate the fan and filter

If any of these parts is missing then consult your supplier.

Fitting the backplane necessitates removing the lid of the Archimedes. The only tools required to do this are a medium Posidriv screwdriver (which is also needed to locate the mounting bar, the backplane PCB and the fan unit) and a M4 spanner. If you are not confident of fitting the backplane yourself, then please take your Archimedes and the backplane fitting kit to your dealer who will fit it for you.

## WARNING

Ensure that the Archimedes is switched off at the rear and that the mains supply cable is disconnected from the mains before removing any covers.

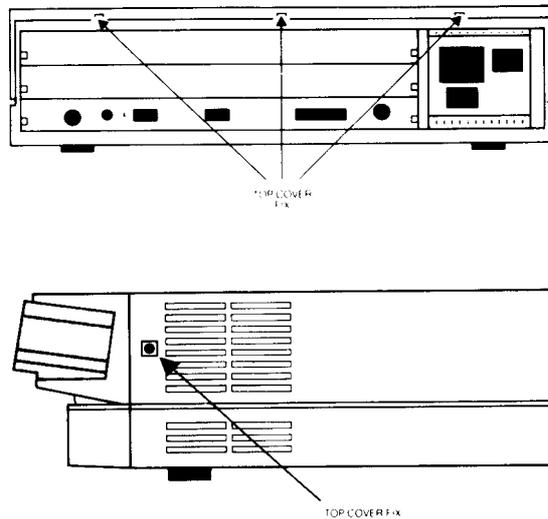
Under normal operation, hazardous voltages exist in the power supply unit. Do not push, dangle or drop objects through the ventilation holes of the PSU case.

If for any reason, the PSU is removed from the casework, then on reassembly, the system should be tested for satisfactory safety earth continuity as detailed in the *Archimedes Service manual*.

## DISASSEMBLY

First, make sure that the Archimedes is disconnected from the mains by unplugging the power supply cable, and remove any peripherals (including the keyboard) that are attached. Clear the Archimedes completely, that is, remove any monitor from on top and any other loose items.

The top case is held by three screws at the top rear of the unit and one screw on each side of the unit. These must be removed. The position of these screws are shown in figure 1.



**The position of the screws holding the top case**  
**Figure 1**

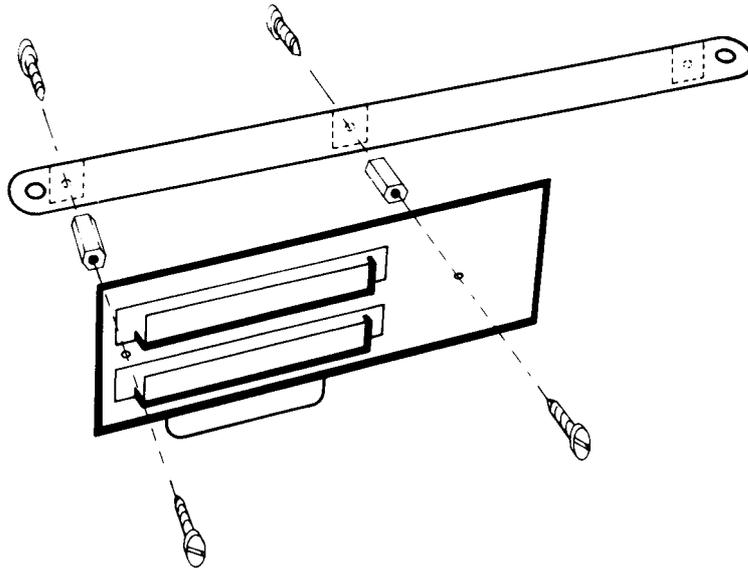
Once you have removed the five screws, the lid of the unit will slide back and off. Remove the lid from the unit completely.

The backplane can now be fitted.

## FITTING THE BACKPLANE

The first task is to affix the backplane PCB to the backplane mounting bar using the hexagonal plastic spacers and the four self-tapping screws.

It is vital to get the PCB and the mounting bar in correct relation to one another, and to use the correct two holes in the mounting bar. (See figure 2.)



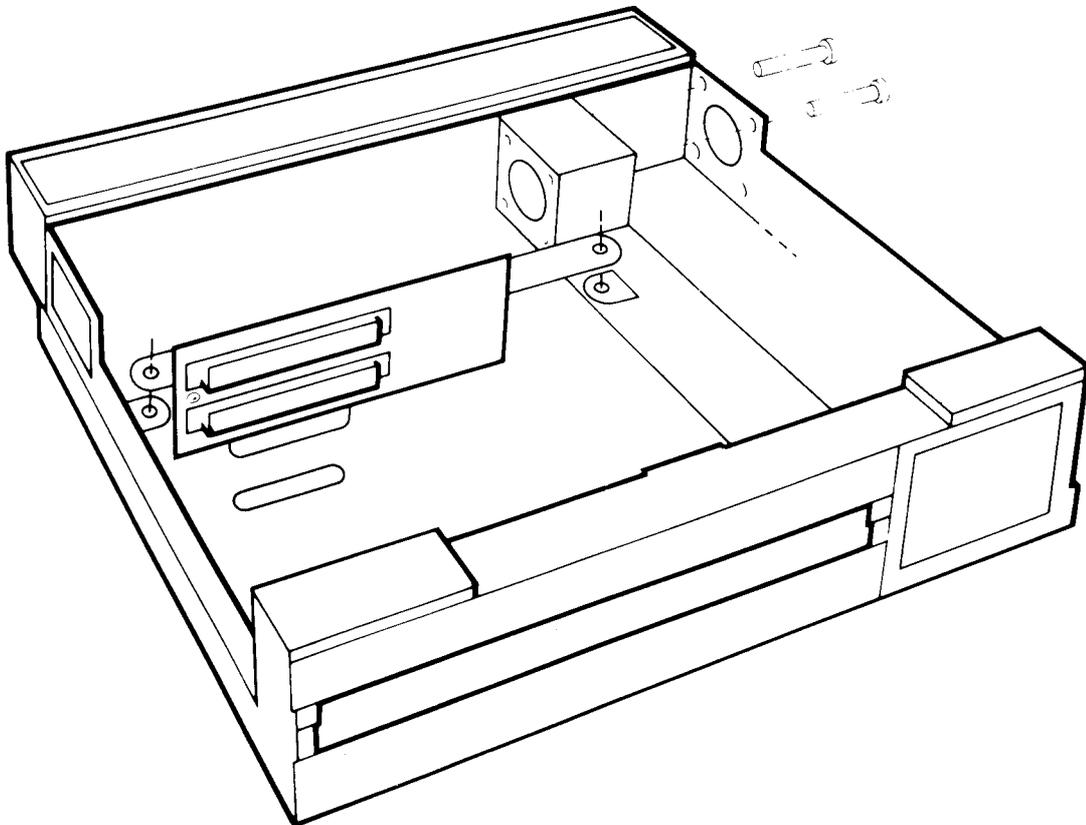
**The correct relation of the mounting bar and the backplane PCB**  
**Figure 2**

Following figure 2, use four self-tapping screws and the two hexagonal plastic spacers to mount the PCB on the bar. Tighten the screws until the assembly becomes a firm unit with no play.

On the Archimedes, there is a bunch of cables and connectors tie-wrapped to the side of the power supply unit. Some of these cables are needed to power the backplane, so cut the tie-wrap using a pair of scissors. Take care not to cut or damage any of the cables themselves.

The backplane mounting bar is located on two flanges. One is located on the power supply unit near to where the cables were tie-wrapped. The other flange is located on the opposite side of the unit. (See figure 3.)

Next, take the backplane PCB attached to its mounting bar and, with the mounting bar nearest the front of the Archimedes, plug the connector on the backplane into the connector on the Archimedes PCB. As you do this, ensure that the connector is aligned correctly and do not use any excessive force. If it is difficult to plug in, then it is not aligned correctly, so remove it and start again. Be careful that the mounting bar does not snag on any of the cables that you have just freed. All the cables must be loose and in front of the mounting bar. (See figure 3.)



**The backplane and fan assembly mounting points**

**Figure 3**

When the backplane is located on the Archimedes PCB, the backplane mounting bar should line up fairly closely with the flanges on the Archimedes. Use the two straight screws supplied and gently manipulate the Archimedes lower case and the backplane mounting bar until they locate through the bar and into the holes below. Tighten up the screws in such a position as the backplane PCB is as near vertical as possible. The holes in the backplane mounting bar are oval for this purpose.

Take the black single wire from the bunch that was freed and connect it to the tag on the backplane PCB labelled OV.

Take the red single wire and connect it to the tag on the backplane PCB labelled +5V.

Take the yellow single wire and connect it to the tag on the backplane PCB labelled +12V.

If a hard disc drive is already fitted to the Archimedes then the installation of the backplane is now complete.

If a hard disc drive is not fitted then the power supply cable used for it is still hanging free. This cable, which has a large plastic-covered connector on the end, must be tied out of harm's way to the backplane mounting bar using the new tie-wrap supplied. Make sure that there is no way that the live pins in the connector can come into contact with any surface in the Archimedes, such as the power supply unit, or the PCB, or the backplane mounting bar itself.

The backplane unit is now installed.

## **FITTING THE FAN ASSEMBLY**

The fan assembly locates on the left side of the Archimedes, just in front of the power supply unit. There are four holes in the case arranged in a square pattern. The fan assembly locates on four bolts through these holes. (See figure 3.)

First, examine the fan unit itself. There are two arrows inscribed on its case, one showing the direction of rotation, and one showing the direction of airflow. The arrow indicating the direction of airflow must point **into** the Archimedes case when the fan is installed.

Take the four bolts and insert them, from the outside, into the four holes. Place one hand over all four bolt heads to stop them from being pushed out.

Take the fan unit and, ensuring that it is the correct way round as described above, pass its mounting holes over the four bolts which protrude into the case.

Put a nut on each bolt, and, holding each nut in turn with one hand, use the Posidriv screwdriver to tighten the bolt from the outside.

Next, take the fan filter and pass it over the four bolts, being careful not to tear it. Locate the filter so that the nuts fit through the cutouts and the filter is flush against the face of the fan.

Take the filter clamp and pass this over the four bolts. Fit the two remaining nuts on to the top right and bottom left bolts (as viewed from inside the machine). Tighten the nuts, using an M4 spanner. Be careful not to trap the filter material between the filter clamp and the four fan-fixing nuts.

Finally, plug the power supply connector from the fan lead on to the connector labelled PL12 on the Archimedes PCB. This connector will only engage correctly one way round.

The fan assembly is now installed.

## **REASSEMBLY**

Once the backplane and fan unit are correctly installed, slide the top case of the Archimedes on from the rear, making sure that it is correctly located in the two slots, one on each side of the lower case.

First replace the three screws at the rear of the unit and tighten them up. (See figure 1.)

Finally replace the two screws, one on each side of the case and tighten them up. (See figure 1.)

## **REPLACING THE FAN FILTER**

To replace the fan filter, proceed as follows:

- undo the two M4 nuts retaining the filter clamp
- remove the clamp and filter
- replace the filter with a new one
- refit the clamp and the two M4 nuts

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# ECONET MODULE FITTING INSTRUCTIONS

## FOR USE WITH MASTER 128, MASTER COMPACT AND ARCHIMEDES 300/400 SERIES

These instructions explain how to install an Econet module into a Master 128, Master Compact and Archimedes 300/400 series microcomputer. After reading the *Introduction* you should then refer to the part of the instructions relevant to your machine.

### INTRODUCTION

Any modification or upgrade carried out to the printed circuit board of any Acorn equipment is undertaken at the sole risk of the person carrying out the modification or upgrade. No claim for loss or damage to the equipment caused by the modification or upgrade by unqualified personnel shall be accepted by Acorn Computers Limited.

Before commencing an upgrade please read all of the instructions carefully. If you do not feel confident to carry out this upgrade then take the upgrade kit and your computer to an Acorn Computers' authorised dealer for upgrade installation.

A charge may be levied by the dealer for installing the Econet upgrade in your machine, such a charge shall be entirely at the discretion of the dealer.

**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 personal static charge where possible
- avoid working in areas where there are manmade fibres, eg nylon carpets and nylon clothing
- after the computer is disconnected from the mains, touch the metalwork of the case while performing the upgrade to ensure that you and the computer are at an equal potential
- keep the IC(s) in anti-static foam until fitted
- avoid touching the pins of the IC(s) during fitting

This upgrade may require the installation of a ROM into your computer. It is important to be able to identify pin one on the ROM so that it can be installed in the correct orientation. Pin one is indicated in one of two ways. Either a small dot or dimple is placed directly above pin one, or a horseshoe shaped indentation is cut into the pin one end of the IC with pin one always being to the left of the indentation. In some instances both of these indicators will be present.

# ARCHIMEDES 300/400 SERIES

## Disassembly

To remove the top cover of the Archimedes, proceed as follows:

- 1 Switch the computer off and disconnect it from the mains supply by unplugging the power supply cable.
- 2 Disconnect and remove all peripherals, including the keyboard and the monitor.
- 3 Place the computer, with the rear panel facing you, on a worksurface with a clean, soft covering.
- 4 Locate and remove the three screws along the top of the rear panel.
- 5 Locate and remove the two screws (one in each side of the top cover) immediately behind the front moulding.
- 6 Remove the top cover by sliding it off from the rear of the computer.

## Installing the Econet module

Included in the Econet module upgrade kit are two plastic printed circuit board support posts. These must be fitted to the main printed circuit board before installing the Econet module.

The positions at which these posts are to be fitted are shown in **figure 1**.

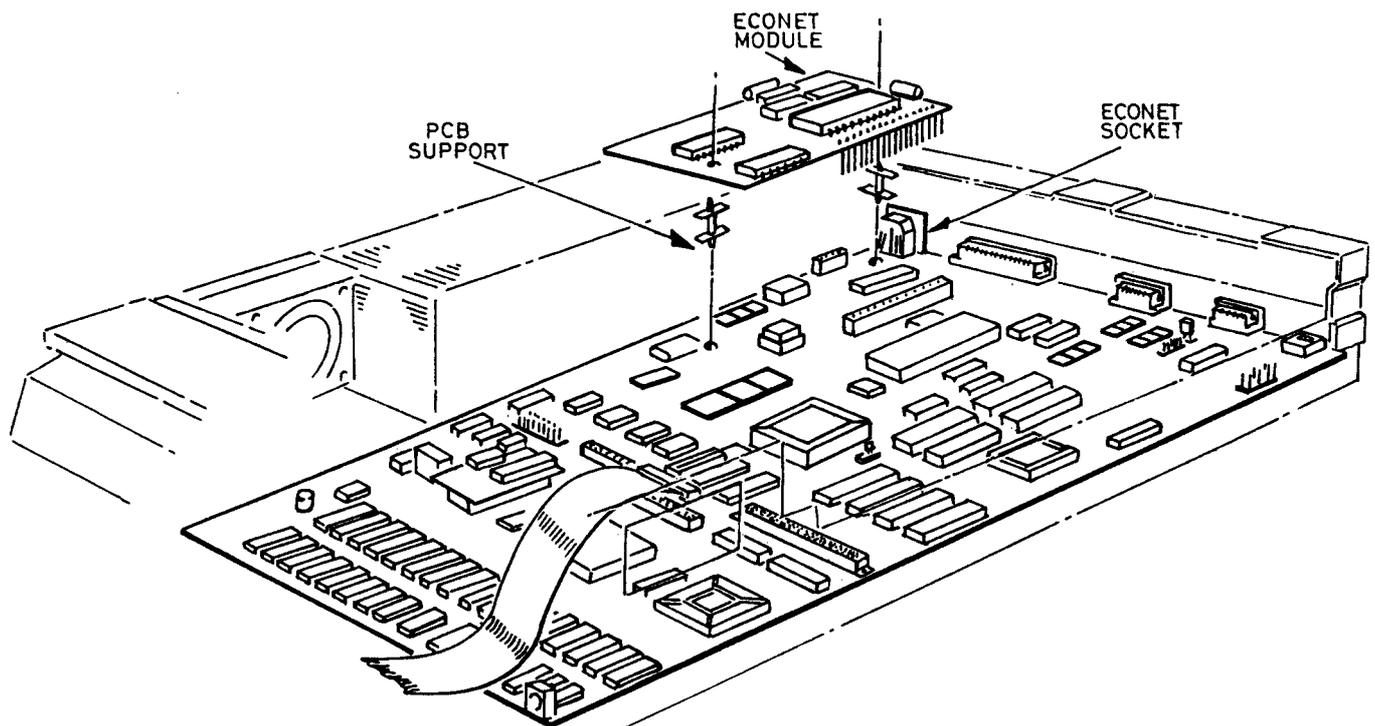


Figure 1

When fitting the PCB supports, ensure that the base flange does not interfere with any component on the PCB. To fit the support, insert one end into the hole in the PCB and press down gently. When the PCB supports are installed on the main PCB, the Econet module should be placed in position ensuring that:

- 1 The pins of PL1 on the Econet module are aligned with the corresponding holes in the socket SK5 on the main PCB.
- 2 The pins of PL2 on the Econet module are aligned with the corresponding holes in the socket SK6 on the main PCB.
- 3 The PCB supports are aligned with the corresponding holes on the Econet module PCB.

When you are satisfied that all the pins and supports are correctly aligned, the Econet module PCB may be pressed gently into place. The Econet module is correctly seated when the barbs on the tips of the PCB supports have cleared the surface of the Econet module PCB. An audible click should be heard when the barbs spring into place securing the PCB.

Take care not to exert too much pressure when pressing home the Econet module PCB, this may lead to damage of the various connectors.

Visually check that all is well and re-assemble the computer unit by refitting the top cover and inserting the five fixing screws, three in the rear panel and one at each side of the computer.

## **Network Software**

The ANFS ROM supplied with the Econet module upgrade is not required in the Archimedes. An enhanced version of the ANFS software is incorporated into the Arthur operating system ROM already installed in the Archimedes 300/400 series.

The Archimedes is now ready to be connected to an Econet network. See your Network Manager who will assign and set your station number.

If you have a version of the Arthur operating system earlier than 1.2 then contact your supplier for information on how to obtain an upgrade

## **MASTER 128 AND MASTER COMPACT MICROCOMPUTERS**

### **Machine orientation**

Within this fitting instruction, the points of the compass are used to indicate the way in which components are oriented. With the machine positioned such that the keyboard is nearest you and uppermost, the nearest edge is designated to be SOUTH, the rear NORTH and right and left are designated EAST and WEST respectively.

The Econet module will be installed in the NORTH-EAST corner of the printed circuit board on both the Master 128 and Compact machines.

## Upgrading the Master 128

Before attempting to fit the Econet module to your machine first ensure that the unit is disconnected from the mains power supply. The upper half of the case must be removed from the unit to allow access to the main printed circuit board. To do this, turn the computer upside down and place it on a firm, flat surface; locate and remove the four fixing screws that hold the upper half of the case in place. These screws are located on the underside of the unit, two at the rear and two at the front of the machine, and are labelled FIX. Note that the two fixing screws fitted to the rear positions are longer than the front two.

When the screws have been removed, carefully turn the computer over again (whilst holding the two halves of the case together) and remove the upper half of the case by lifting it directly upwards from the machine.

Included in the Econet module upgrade kit are two plastic printed circuit board support posts. These must be fitted to the main printed circuit board before installing the Econet module.

The positions at which these posts are to be fitted are shown in figure 2. When fitting the PCB supports, ensure that the base flange does not interfere with any component on the PCB. To fit the support, insert one end into the hole in the PCB and press down gently.

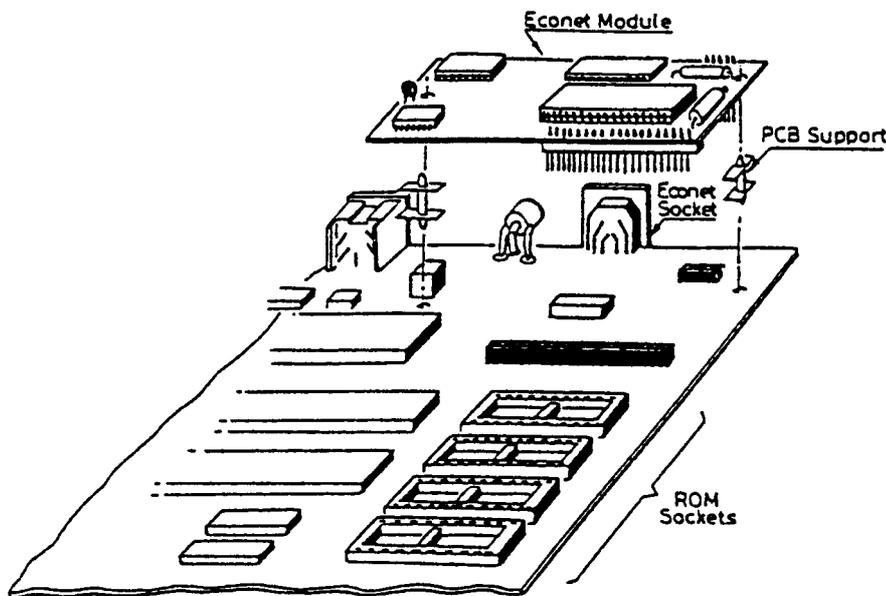


Figure 2

When the support is correctly fitted, it will not be possible to withdraw it from the hole in the PCB. Care must therefore be taken to ensure the correct positioning of the PCB support before pressing it home.

When the PCB supports are installed on the main PCB, the Econet module should be placed in position ensuring that:

- 1 The pins of PL1 on the Econet module are aligned with the corresponding holes in socket SK5 on the main PCB. The two WEST most holes of SK5, labelled 'A' and 'B', are not used.
- 2 The pins of PL2 on the Econet module are aligned with the corresponding holes in socket SK6 on the main PCB.
- 3 The PCB supports are aligned with the corresponding holes on the Econet module PCB.

When you are satisfied that all the pins and supports are correctly aligned, the Econet module PCB may be pressed gently into place. The Econet module is correctly seated when the barbs on the tips of the PCB supports have cleared the surface of the Econet module PCB. An audible click should be heard when the barbs spring into place securing the PCB.

Take care not to exert too much pressure when pressing home the Econet module PCB, this may lead to damage of the various connectors.

### **Installing the ANFS**

Having fitted the Econet module, it is necessary to fit the Advanced Network Filing System (ANFS) ROM.

The ANFS ROM must be inserted into one of three sockets, IC27,37 or 41. It is recommended that socket IC27 should be used where possible. If it is not possible to use socket IC27 then one of the other two sockets may be used, but it will be necessary to change the position of a link on the main PCB (see **NOTE 1**).

To insert the ANFS ROM, hold the ends of the IC between thumb and forefinger, and line up all the pins over the destination socket. The pin one end of the IC should face to the WEST. If you are unsure of which way round the IC should be installed, refer to the other ICs on the main PCB which all face WEST.

Apply firm pressure to the IC, but do not force it. When the chip is in place it may appear to be slightly raised. Check that all the pins have entered the socket and that none are bent either outwards or under the body of the IC.

When the Econet module PCB and the ANFS ROM have been installed, the re-assembly procedure is the reverse of the dismantling procedure.

### **Setting the station number**

Before attempting to add a machine to an existing Econet, the station number must be set. The Network Manager should **be** asked to carry out this operation.

**NOTE 1:** Sockets IC37 and 41 share the same address space as four sideways RAM pages. The position of links LK18 and LK19 determine whether the address space is claimed by ROM or sideways RAM.

These two links are located close to the WEST side of ICs37 and 41, LK18 is used with IC41 and LK19 is used with IC37. These links consist of a three pin plug with a connector which may be push fitted onto two pins of the plug to make a connection. There are two possible positions for this connector:

EAST - the connector joins the central pin to the right hand pin (enables sideways ROM)

WEST - the connector joins the central pin to the left hand pin (enables sideways RAM)

The use of one of the sockets with a ROM will preclude the use of 32K (two 16K pages) of sideways RAM. If both IC37 and IC41 are used in conjunction with sideways ROMs, all four of the 16K sideways RAM pages will be unavailable.

If IC27 is already occupied and you need all four pages of sideways RAM, you will need to fit the ANFS ROM into an EPROM cartridge which can then be plugged into one of the cartridge sockets.

Further information about the use of sideways RAM/ROM may be obtained from *Part 1* of the *Master 128 Reference Manual*.

## Upgrading the Master Compact

Unplug all peripherals and remove the power lead from the computer.

Lay the computer face down on a flat surface and undo the four case fixing screws. Gently turn the computer over allowing the screws to fall free. Put them in a safe place until required again.

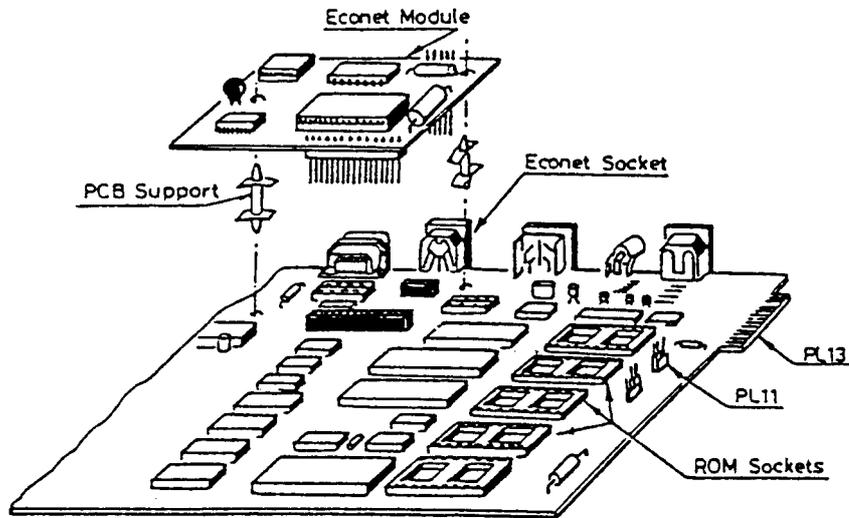
Lift the top case including keyboard away from the base of the computer - (taking care not to strain the ribbon cable) and lay it in front of the machine.

## Installing the Econet Module

Included in the Econet module upgrade kit are two plastic printed circuit board support posts. These must be fitted to the main printed circuit board before installing the Econet module.

The positions at which these posts are to be fitted are shown in **figure 3**. When fitting the PCB supports, ensure that the base flange does not interfere with any component on the PCB. To fit the support, insert one end into the hole in the PCB and press down gently.

When the support is correctly fitted, it will not be possible to withdraw it from the hole in the PCB. Care must therefore be taken to ensure the correct positioning of the PCB support before pressing it home.



**Figure 3**

When the PCB supports are installed on the main PCB, the Econet module should be placed in position ensuring that:

- 1 The pins of PL1 on the Econet module are aligned with the corresponding holes in the socket SKT4 on the main PCB.
- 2 The pins of PL2 on the Econet module are aligned with the corresponding holes in SKT5 on the main PCB.
- 3 The PCB supports are aligned with the corresponding holes on the Econet module PCB.

When you are satisfied that all the pins and supports are correctly aligned, the Econet module PCB may be pressed gently into place. The Econet module is correctly seated when the barbs on the tips of the PCB supports have cleared the surface of the Econet module PCB. An audible click should be heard when the barbs spring into place securing the PCB.

Take care not to exert too much pressure when pressing home the Econet module PCB, this may lead to damage of the various connectors.

### **Installing the ANFS**

Having fitted the Econet module, it is necessary to fit the Advanced Network Filing System (ANFS) ROM.

The ANFS ROM should be inserted into one of three sockets, IC 17, 23, or 29.

Although it may be inserted into socket IC38 if PL11 is made South (refer to **figure 3**) it must be noted that fitting ANFS in this way will disable selection of external ROMS via PL13.

To insert the ANFS ROM, hold the ends of the IC between thumb and forefinger, and line up all the pins over the destination socket. The pin one end of the IC should face to the WEST. If you are unsure of which way round the IC should be installed, refer to the other ICs on the main PCB which all face WEST.

Apply firm pressure to the IC, but do not force it. When the chip is in place it may appear to be slightly raised. Check that all the pins have entered the socket and that none are bent either outwards or under the body of the IC.

When the Econet module PCB and the ANFS ROM have been installed, the re-assembly procedure is the reverse of the dismantling procedure.

Your Master Compact is now ready to be connected to a network, see your Network Manager who will assign and set your station number.

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# MODULE INSTALLATION LEAFLET

## For use with the Archimedes High Performance Computer System

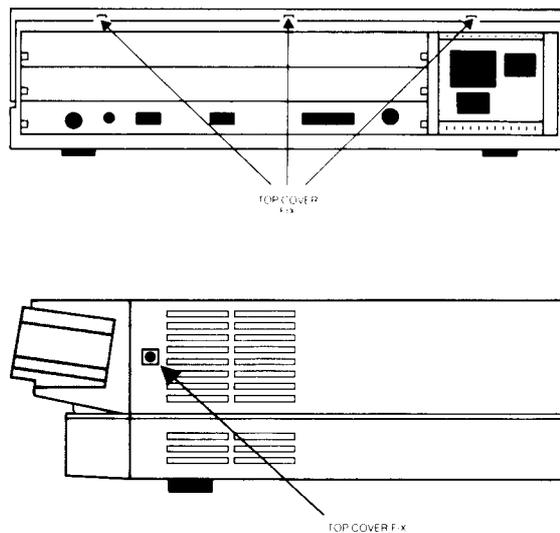
To install a Podule in the Archimedes you will require an adapter called a 'backplane'. The backplane is available separately and must be installed before you attempt to install the Podule. Full instructions for installing the backplane are supplied with it.

In order to fit the Podule you will have to remove the lid of the Archimedes and one of the blanking plates at the rear of the machine. The only tools you will require for this are a No. 1 and a No. 2 Posidriv screwdriver. If you do not feel confident about performing this operation, you can take the computer and the Podule to your dealer.

### DISASSEMBLY

First, disconnect the Archimedes from the mains by unplugging the power supply cable. Then, remove any peripherals that are attached and clear the Archimedes completely, ie remove any monitor from the top of the Archimedes and any other loose items.

Locate the screws holding the top case in place (see figure 1). First, remove the three screws at the top rear of the unit. Then remove the single screw on each side of the unit.



The position of the screws holding the top case.

Figure 1

Once you have removed the three rear screws and the two side screws, slide the top cover to the rear of the machine and then slide it off. You should remove the top cover completely.

Check that the backplane is fitted to the Archimedes. The backplane consists of a small printed circuit board mounted vertically on the main PCB. If the backplane is not fitted, then you will have to purchase one and install it, according to the instructions which are supplied with the backplane, before you can continue with the installation of the Podule.

On the Archimedes 300 series, the optional backplane has two Podule slots capable of holding up to two single width or two double width Podules. On the Archimedes 400 series, the backplane (fitted as standard) can hold up to four single width or two double width Podules.

If the backplane is fitted, but has no free Podule slot, you will have to remove one of the Podules in order to install the new one.

The backplane has an upper and lower Podule slot(s). These correspond to the two full-width blanking plates fitted to the unexpanded machine. Each blanking plate is held in place by screws, one at each end. Choose one of the Podule slots and remove the corresponding blanking plate by unscrewing the two screws holding the plate in position.

You can now fit the Podule.

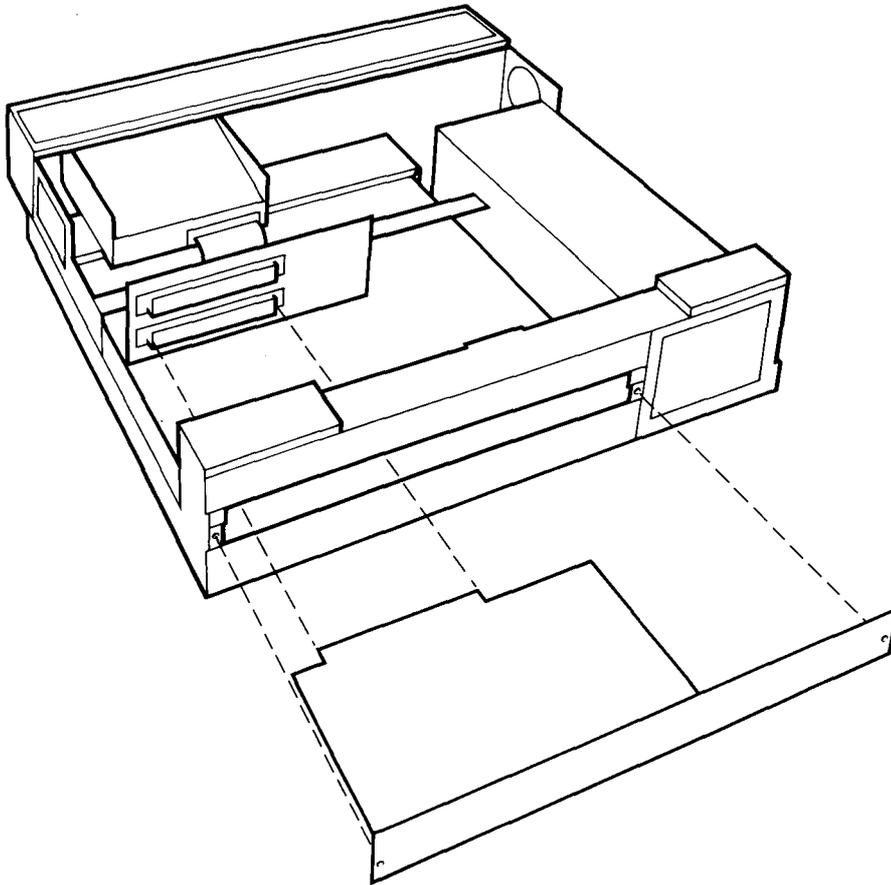
## **FITTING THE PODULE**

Before fitting the Podule, examine it to see whether it is a full-width or a half-width Podule.

A full-width Podule has a plate at the rear which extends the full width of the Archimedes. If the plate on the rear of your Podule does not extend the full width of the machine then you are supplied with a blanking plate along with a T-piece and two screws. Use these to make the Podule up to full width of the machine.

Once you have made the backplate of the Podule up to the correct width, you can install it in the Archimedes.

Figure 2 shows where the Podule locates on the Archimedes.



**Locating points of BBC I/O Podule on Archimedes**  
**Figure 2**

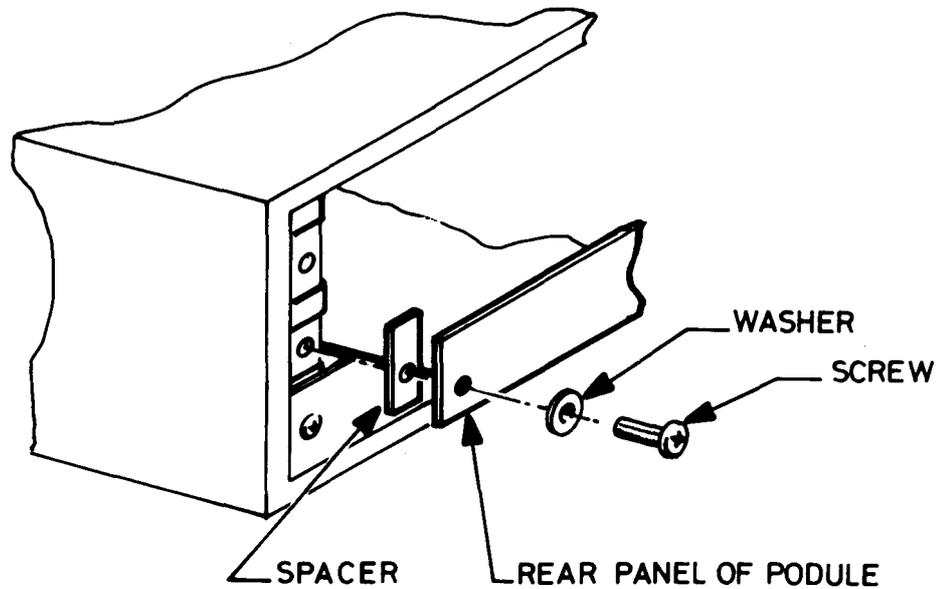
Support the backplane firmly with one hand and push the connector on the Podule into one of the sockets on the backplane. The connector should be securely seated, ie the rear plate of the Podule should be flush with the rear of the Archimedes case. It is important that you offer the Podule up to the backplane at right-angles to it and that you align the connectors, otherwise, you may bend

the pins or break or disconnect the backplane itself. It does not require great force to install the Podule correctly. If the Podule will not seat easily, remove the Podule and start again.

When you have fitted a backplane and Podule to your Archimedes, you should find that the backplane is vertical, assuming that the Podule is fully inserted and screwed to the rear of the Archimedes.

For some combinations of machines and Podules, however, the top of the backplane may appear to 'lean' towards the front of the machine.

If this is the case, you must insert the two spacers found in this package. Each spacer should be inserted between the internal face of the Podule backplate and the metal clips on the rear plastic moulding of the machine, so that the fixing screws pass through both the backplate and the spacers (see figure 3). This should result in the external face of the Podule backplate panel being



**Figure 3**

When you have done this, you may find that you need to 'straighten' the backplane, to ensure that the connectors are correctly mated. To do this, take the following steps:

- 1 Slacken off the two screws fixing the backplane support metalwork to the base metalwork and power supply.
- 2 Holding the Podule stationary, ease the backplane back towards a vertical position until the faces of the interlocking connectors on the Podule and backplane are touching.
- 3 Re-tighten the two screws slackened earlier.

If you do not require to fit the two spacers, simply secure the Podule to the rear of the Archimedes case by inserting a screw at each end of the Podule backplate.

## **REASSEMBLY**

Once the Podule is correctly installed, slide the top case of the Archimedes on from the rear. Replace the three screws at the rear of the unit and tighten them up. See figure 1.

Finally replace the two screws, one on each side of the case. See figure 1.

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Part number 0476201, Issue 2



**High Performance Computer Systems  
Model 305 0.5 Mbyte RAM Upgrade Kit**

**AKA 51**

**Fitting Instructions**

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Issue 3

March 1988

## **Contents**

1. Introduction
2. Upgrade Kit List
3. Fitting the Upgrade

## **1. Introduction**

This document details the installation of an additional 0.5 Mbyte of RAM in an Archimedes model 305, thereby upgrading it to a model 310.

The kit includes all the components needed to complete the installation in model 305 machines.

**IMPORTANT:** Any machine configurations currently stored in the CMOS RAM may be lost during this upgrade. Refer to the Archimedes Service Manual, section "Test Instructions" for details of how to save and reinstall machine configuration before starting the upgrade.

## **2. Upgrade Kit List**

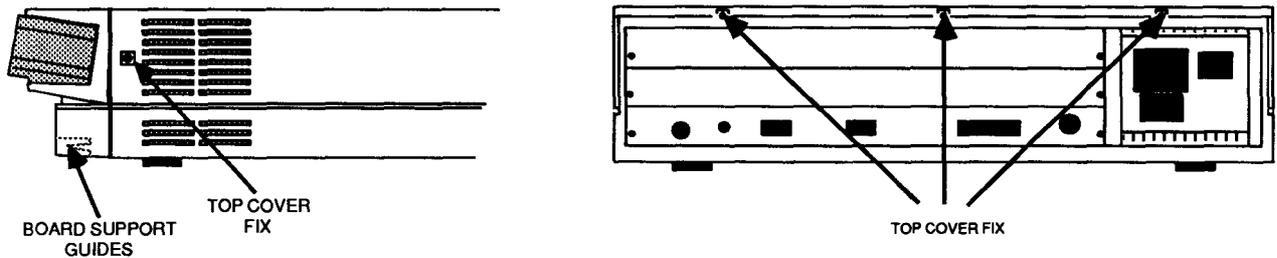
<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
1	0704,105	IC 4464 DRAM	16
2	0276,071	Label, 310 (Hard disc)	1
3	0276,315	Label, 310	1

### 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):

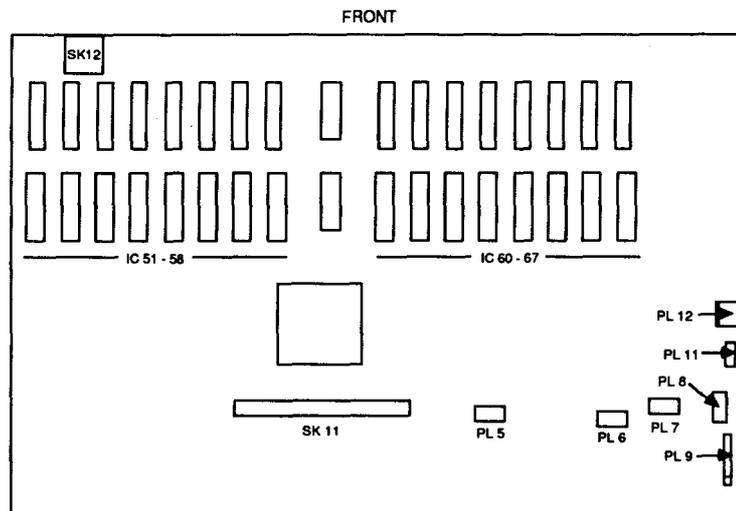


**FIG. 1 REMOVING THE TOP COVER**

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.

4. Unplug the following cables from the main board (see fig. 2):
  - a. Speaker/LED connector PL9.
  - b. Battery connector PL11.
  - c. Fan connector PL12 (if fitted).
  - d. Four power tags - PL5 (yellow, +12V), PL6 (black, 0V), PL7 (red, +5V), PL8 (mauve, -5V).
5. Unplug the floppy disc drive data cable from SK11 on the main board. If a hard disc drive is fitted, unplug the 14-way (PT 31 and 20-way (PL4) ribbon connectors from the Hard Disc Podule.



**FIG. 2 MAIN BOARD**

6. Unplug and remove any Podules fitted - refer to the relevant upgrade instructions.
7. Unplug and remove the Podule backplane (if fitted) - see the relevant upgrade instructions.
8. Stand the unit on one side and remove the two screws and star washers from the underside securing the rear bus bars (see fig. 3).

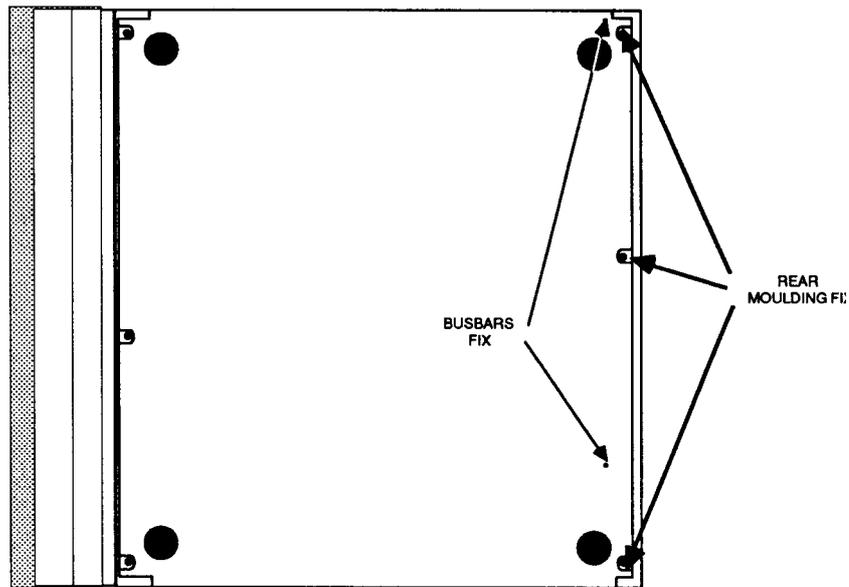
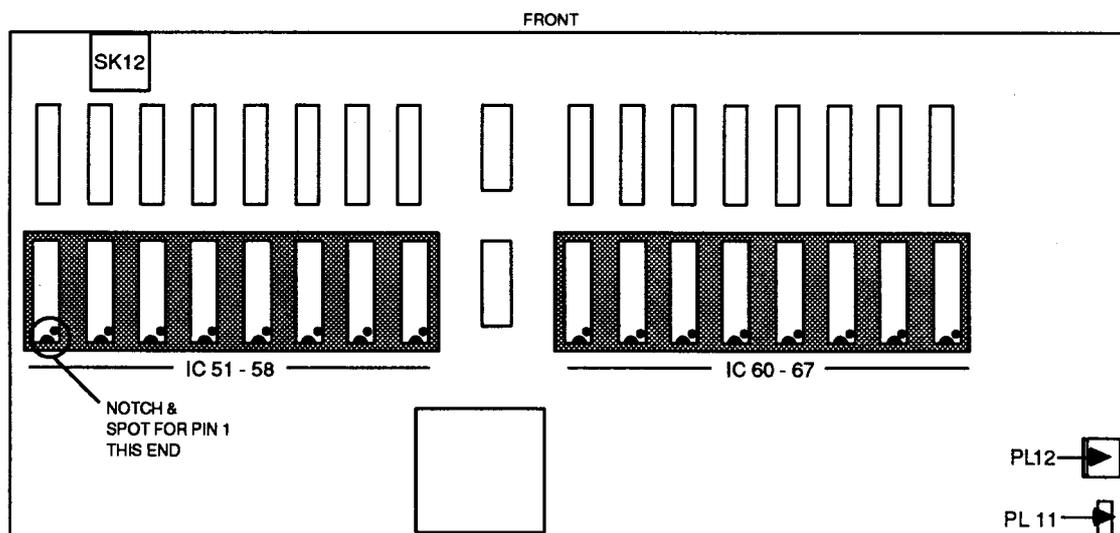


FIG. 3 UNDERSIDE VIEW

9. Remove the 3 screws from the underside securing the rear moulding.
10. Stand the unit back on its feet and begin to withdraw the rear moulding, with the main board attached, out of the case. Support the front edge of the main board as soon as it is accessible.
11. Place the board/rear moulding assembly on the worksurface. Some boards have support pillar(s) attached to the underside. To avoid flexing of the board, ensure that the front half is supported by a pad of anti-static material of suitable thickness (approx. 8 mm) to match the height of the support pillar(s).
12. Insert the 16 RAM ICs into the two banks of 8 sockets IC51 - 58 and IC60 - 67 on the main board with the notches (for pin 1) in the ICs facing the rear panel. Ensure that all the pins have entered the sockets and that none are splayed out or bent underneath (see fig. 4).



13. Visually check that all is well, then carefully refit the board/rear panel assembly back into the unit and observe that:
  - a. The leads from the LED/speaker and batteries are not trapped by the board and that all other cables are held clear.
  - b. The board engages with the support guides on the lower inside edge of the front moulding (see fig. 1) and the two guides at the side of the base metalwork (if fitted).
14. Reconnect the cables and connectors as detailed in sections 4 and 5 above. If a hard disc drive is fitted, do not refit the Podule(s) and backplane yet.
15. Visually check that all is well, then connect the unit to the mains supply and peripherals. Power up and, following the " R Power-up" instructions, test the unit as detailed in the Archimedes Service Manual, section "Test Instructions".
16. Refit and conned the Podule backplane and Podules, if fitted. Refit the top cover.
17. Using a scalpel blade or similar, carefully lift one edge of the model 305 label on the front moulding and remove the label. Affix the appropriate 310 label in its place.
18. Note: It is recommended that any Podules which have been removed and re-fitted are tested for correct operation. See the Archimedes Service Manual, section "Test Instructions".

# SECOND FLOPPY DISC DRIVE INSTALLATION LEAFLET

FOR USE WITH ARCHIMEDES PERSONAL WORKSTATIONS

These instructions detail how to install a second floppy disc drive upgrade in an Archimedes computer system.

In order to fit the upgrade, you will have to remove the lid of the computer unit. The only tools you will require are a No. 1 Pozidriv screwdriver and a small flat-bladed 'electrical' screwdriver.

Please read through the following instructions carefully before you start. If you do not feel confident about carrying out this installation, take this upgrade and your Archimedes computer unit to your supplier who will fit it for you. A charge may be levied by the supplier for installing the upgrade; such a charge shall be entirely at the discretion of the supplier concerned.

Please take care whilst fitting this upgrade – the disc drive unit and cable assembly are delicate. Any damage caused whilst fitting this upgrade is unlikely to be covered by the guarantee.

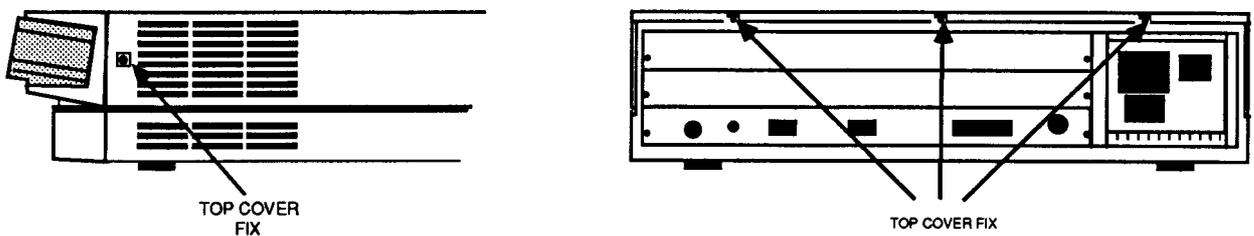
## PARTS LIST

In the upgrade package you should have:

- One 3.5" Disc Drive
- One dual disc drive cable assembly
- One drive bracket
- One dual disc drive sub-moulding assembly Model
- number labels for the front panel Six M3 x 6 mm Pan
- Head Pozidriv screws

## DISASSEMBLY

1. Switch off the computer at the rear and disconnect it from the main supply by unplugging the power supply cable. Then, remove any peripherals that are attached and clear the computer completely, ie remove any monitor from the top of the unit and any other loose items.
2. Locate the screws holding the top case in place (see Fig. 1 below). Remove the three screws at the top rear of the unit, then remove the single screw on each side of the unit.



**Fig. 1: The position of the screws holding the top case.**

3. Once you have removed the three rear screws and the two side screws, slide the lid of the unit to the rear of the machine and then slide it off. You should remove the lid completely.

## FITTING THE UPGRADE

The second floppy disc drive (drive 1) fits alongside the original drive (drive 0) on the disc drive support bracket, as follows:

1. 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).
2. 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.

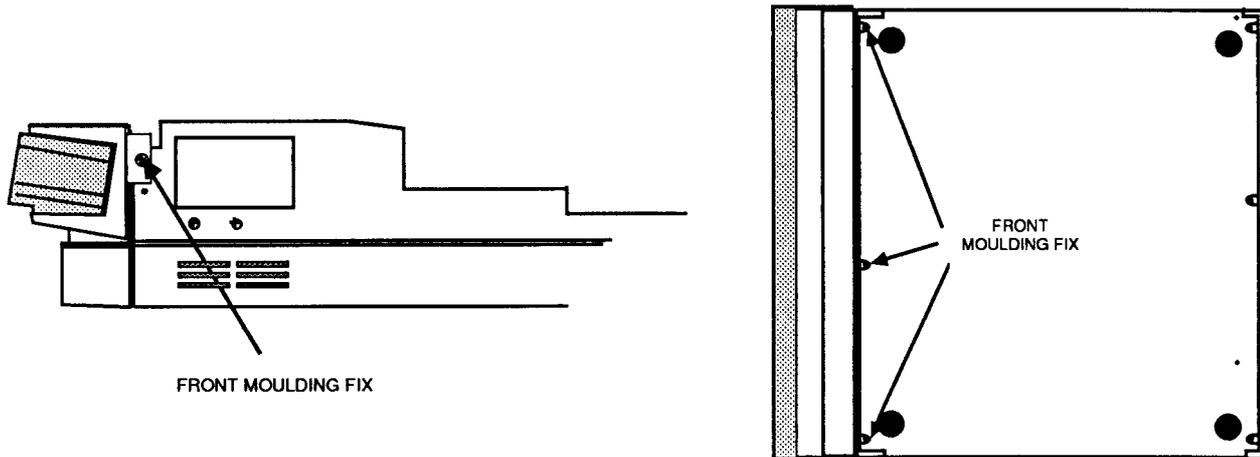


Fig. 2 - Removing the front moulding assembly

3. Unplug and remove the ribbon-type data cable which connects between connector SK11 on the main printed circuit board and the connector on the rear of the original disc drive 0. Connect the centre connector on the new dual drive cable assembly to drive 0 and the end connector to SK11 (see Fig. 3).
4. The new disc drive comes with a front fascia panel attached. This fascia is fitted to protect the unit in transit and is not required when the drive is installed in an Archimedes system. The fascia is held in position by two clips, one on each side of the drive. These may be levered carefully out of position using a small screwdriver and the fascia removed. Take care not to dislodge the drive eject button while removing the fascia.
5. Before fitting the new drive, it must be configured as drive 1. To do this, set the small slide switch on the side of the drive to position "1" (see Fig. 3).

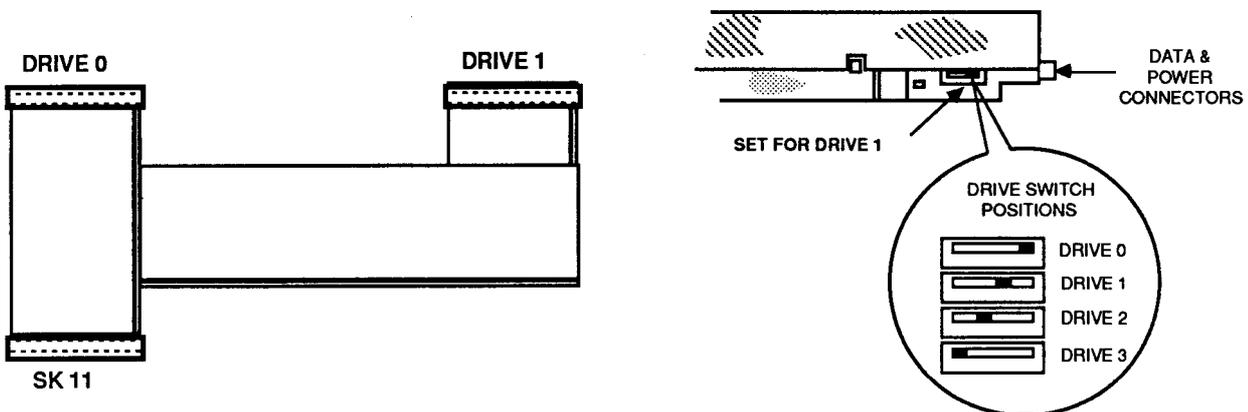
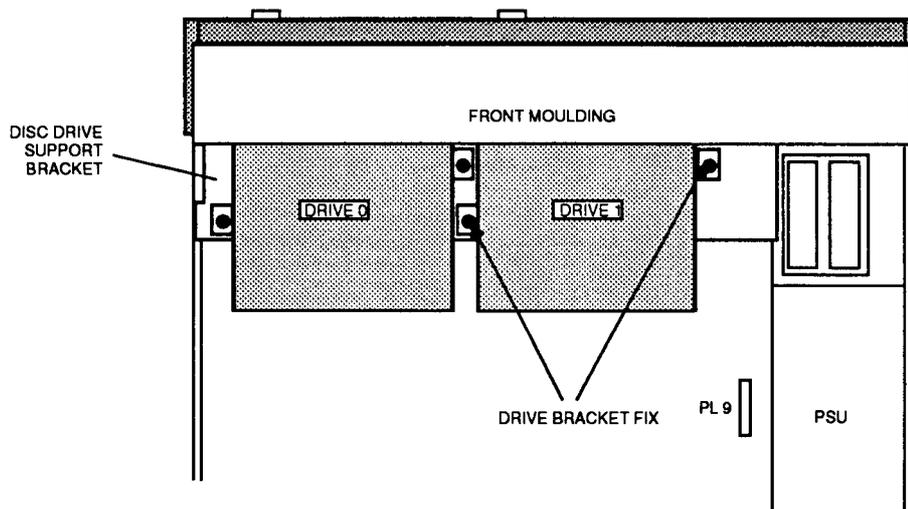


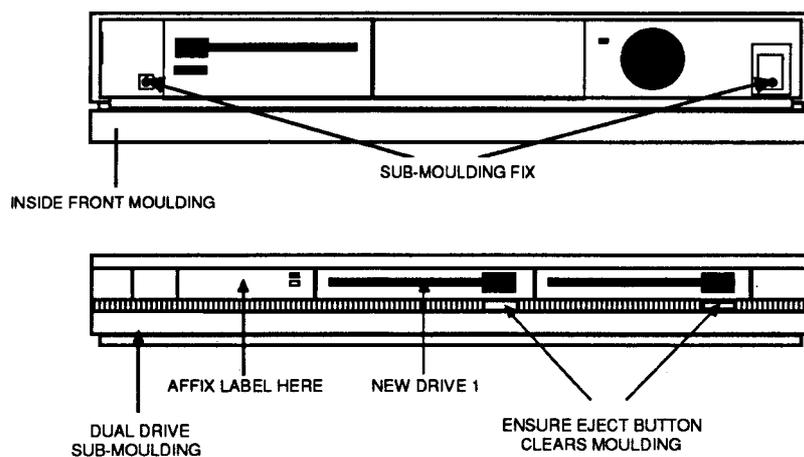
Fig. 3 - Dual drive data cable details & configuring the new drive as drive 1

6. Assemble the drive to the drive bracket with 4 of the M3 x 6mm screws supplied, using the original drive 0 assembly as a guide to orientation.
7. Assemble the drive bracket to the disc drive support bracket with 2 of the M3 x 6mm screws supplied.



**Fig. 4 - Installing the new Drive 1**

8. Connect the centre connector on the disc drive power cable and the end connector on the disc drive data cable to the new drive.
9. 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).



**Fig. 5 - Front moulding assembly details**

10. The leads from the speaker in the main moulding and the LED in the sub-moulding share the same connector. The new dual-drive sub-moulding has an LED already fitted to it. You will need to remove the existing leads from the connector and replace them with those from the new LED, as follows:

- Using a small electrical screwdriver or similar, depress the barbs on the LED wire contacts in the LED/speaker connector (red and black wires) and withdraw the contacts from the connector, noting the polarity of the LED wires (see Fig. 6, steps 1 and 2). Place the old front sub-moulding to one side.

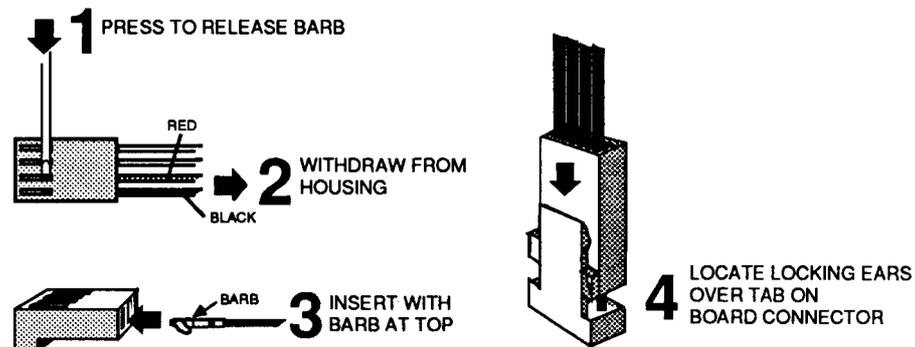


Fig.6 — Removing/inserting LED wires in LED/speaker connector

- Offer up the new dual drive sub-moulding 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.
- Insert the LED wire contacts into the LED/speaker connector so that the barbs on the contacts engage in the slots in the connector housing (see Fig. 6, step 3). Observe correct polarity - make sure that the red and black wires are the correct way round, as shown in Fig. 6, step 2.
- Insert a disc into both drives, then offer up the front moulding assembly to the main unit, ensuring that the LED/speaker cables pass over the top of the new drive 1. The discs will aid alignment of the disc eject buttons in the apertures in the front moulding.
- Insert the front moulding assembly fixing screws and fully tighten them. Check that both drives will accept and reject discs, that the eject buttons do not bind on the moulding and that an inserted disc clears the front moulding.
- Provided that its position has not been disturbed, the original drive 0 should align correctly; if necessary, loosen the new drive 1 bracket fixing screws and adjust carefully for correct alignment. Tighten both disc drive 1 bracket fixing screws.
- Plug the LED/speaker connector to PL9 on the main board, ensuring that the locking ears on the connector locate either side of the locking tab on the board-mounted connector (see Fig. 6, step 4).
- Visually check that all is well, then refit the top cover and tighten all fixing screws.
- Carefully fix the appropriate model label to the new front sub-moulding.
- Reconnect the keyboard, monitor and peripherals to the computer unit. Reconnect the system to the mains supply and switch on. QUIT the desktop (if necessary), then enter:

\*CONFIGURE FLOPPIES 2

Refer to the User Guide for further guidance.



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

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**Contents**

- 1. Introduction
- 2. Upgrade Kit List
- 3. Fitting the Upgrade

**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:**

<b>Item</b>	<b>Part No.</b>	<b>Description</b>	<b>Qty</b>
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 x1/: 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

HARD DISC UPGRADE ISSUE 2

### 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):

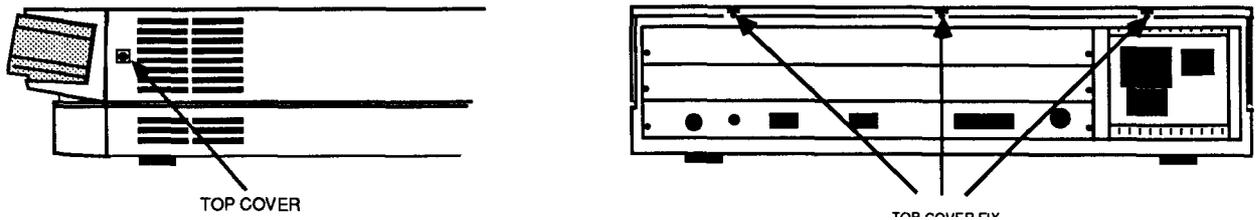


FIG. 1 REMOVING TOP COVER

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

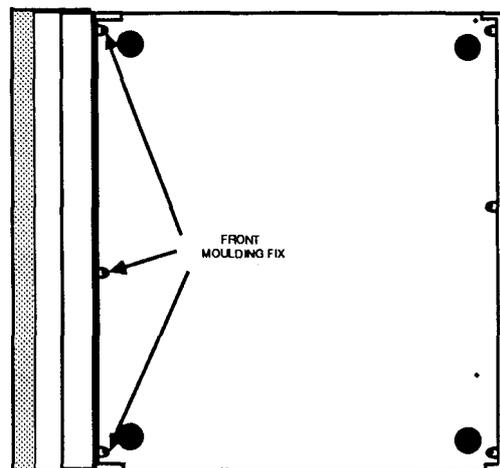
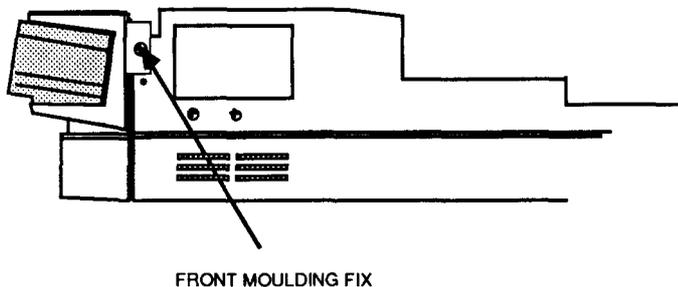
Remove the three screws along the top of the rear panel and remove the top cover by sliding it off from the rear of the unit.

#### 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'.

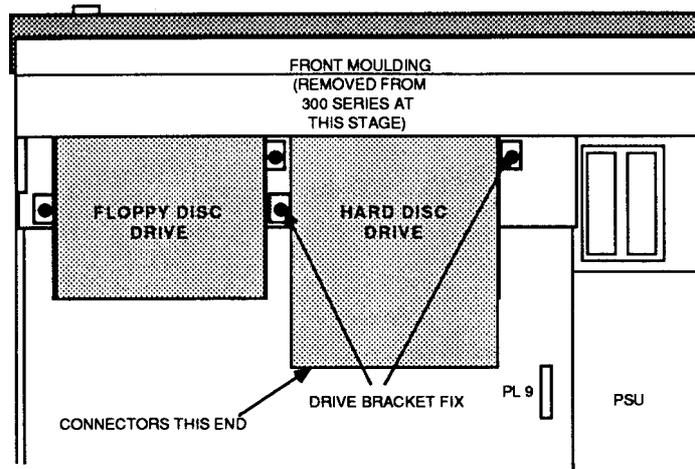
#### Model 410:

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.



**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 ¼" 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**

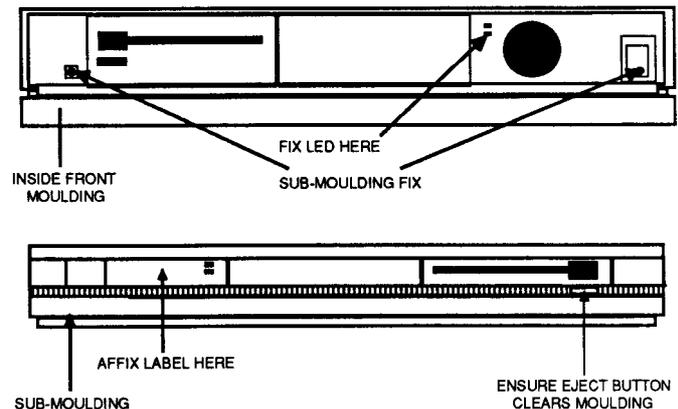
**Model 305 and 310:**

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:**

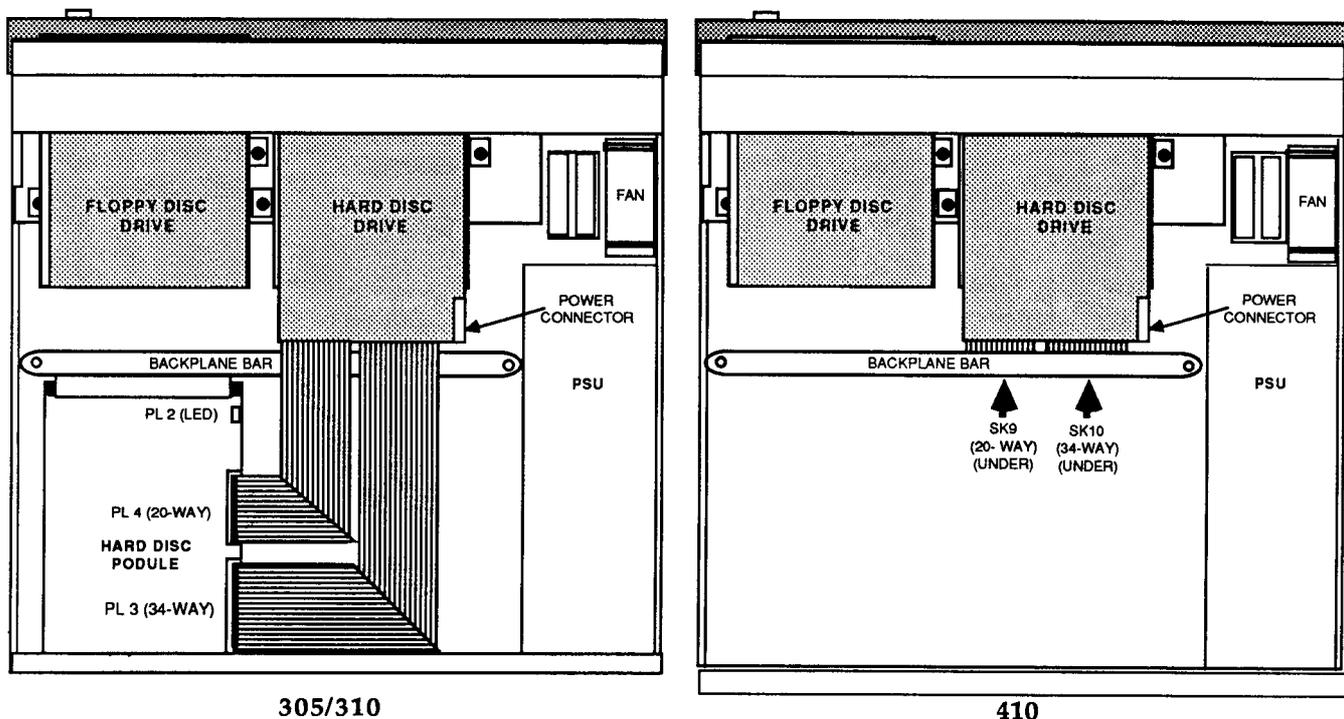
15. Connect the hard disc drive LED connector to PL2 ( adjacent to the 64-way connector) on the Hard Disc Podule, ensuring that the locking ears on the connector locate either side of the locking tab on the board-mounted connector.
16. Connect the hard disc drive power cable, coming from the PSU, to 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.



**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 20 Mb 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 *ADFS Demo* 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 'map' of defects which is then stored on the hard disc itself. The ADFS can then consult this 'map' to determine where the defects on the hard disc are located and hence where not to store data.

It may be necessary therefore to occasionally reformat the hard disc. 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 [Return]

\*BYE [Return]

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 its original 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 should be formatted and ready for use. The hard disc formatting utility, a BASIC program called WFORM, will be supplied on the hard disc in the Library directory. It is recommended that you copy WFORM 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 WFORM program from either the hard disc or from your backup copy on floppy disc. WFORM can be accessed from either the desktop ( double-click select on WFORM) or from BASIC (CHAIN "WFORM").

WFORM will prompt you for various parameter values as follows:

NOTE: default values for the parameters are given when you run WFORM. These default values are appropriate for the hard disc supplied as standard by Acorn with the hard disc upgrade, ie the TANDON model TM362.

Press !I to confirm each value.

1 Format which drive (4 or 5)? 4 [Return]

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 Sectors per track? 32 [Return]

3 Heads? 4 [Return]

maximum value = 8

4 Cylinders? 615 [Return]

5 Low current cylinder? 1023 [Return]

6 Precompensation cylinder? 1023 [Return]

7 Parking cylinder? 663 [Return]

WFORM 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 directly in WFORM 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 defects 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 WFORM 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 [Return] when prompted.

WFORM 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 [Return] when prompted. WFORM will then repeat the formatting and verification process in order to include the new defects.

The formatting process will now be complete.

# MIDI MODULE INSTALLATION LEAFLET

## FOR USE WITH ARCHIMEDES HIGH PERFORMANCE COMPUTER SYSTEMS

The MIDI Module is an upgrade to the I/O Podule which must also be installed in your Archimedes for MIDI to function. The I/O Podule must be fitted into a backplane, which is available separately. Full instructions for fitting the backplane and the I/O Podule are supplied with their respective packages.

In order to fit the MIDI Module you will have to remove the lid of the Archimedes unit. The only tools you will require are a No.1 Posidriv screwdriver and an M2 spanner.

If the I/O Podule and the MIDI upgrade are to be installed at the same time, the alterations to the I/O Podule should be made before it is installed in the Archimedes. If the Podule has already been fitted it will have to be removed.

If you do not feel confident about carrying out the installation, you can take the Archimedes and the Module to your dealer.

## DISASSEMBLY

First, switch off the Archimedes at the rear and disconnect it from the main supply by unplugging the power supply cable. Then, remove any peripherals that are attached and clear the Archimedes completely, ie remove any monitor from the top of the Archimedes and any other loose items.

Locate the screws holding the top case in place (see Fig. 1 below). First, remove the three screws at the top rear of the unit. Then remove the single screw on each side of the unit.

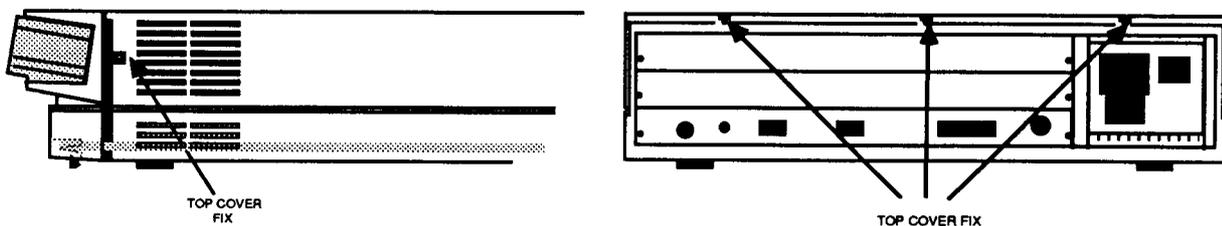


Fig. 1: The position of the screws holding the top case.

Once you have removed the three rear screws and the two side screws, slide the lid of the unit to the rear of the machine and then slide it off. You should remove the lid completely.

To remove the I/O Podule, if it is already fitted, undo the screws at either side of the rear plate and ease the Podule out of its connector on the backplane, pulling it gently towards you. Make a note of which connector it was plugged into. Remove the Podule completely from the computer.

## PARTS LIST

In the MIDI package you have:

Four ICs (Integrated Circuits) packed on anti-static foam.

Two five pin DIN sockets mounted on a small circuit board with a flying lead and a plug. These are the MIDI IN and MIDI OUT sockets.

A tiny connector or 'jumper'.

Four nuts, bolts and washers in a plastic bag.

## FITTING THE MIDI MODULE

The four integrated circuits are plugged into sockets on the I/O Podule. There are three empty sockets, for which the correct ICs can be identified by the number of pins. (see Fig. 2). You must take care to put the ICs in the right way round. Pin one is marked by an indent or a spot at one end of the IC which should line up with the indent drawn on the printed circuit board ( see Fig. 2). Also take care not to bend the pins; if they are splayed out too wide for the socket, press the whole row of pins on one side VERY GENTLY against a flat surface until they fit.

Fit the ICs by holding the body of the device. In order to minimise any possible damage to the IC from static electricity, do not touch the pins.

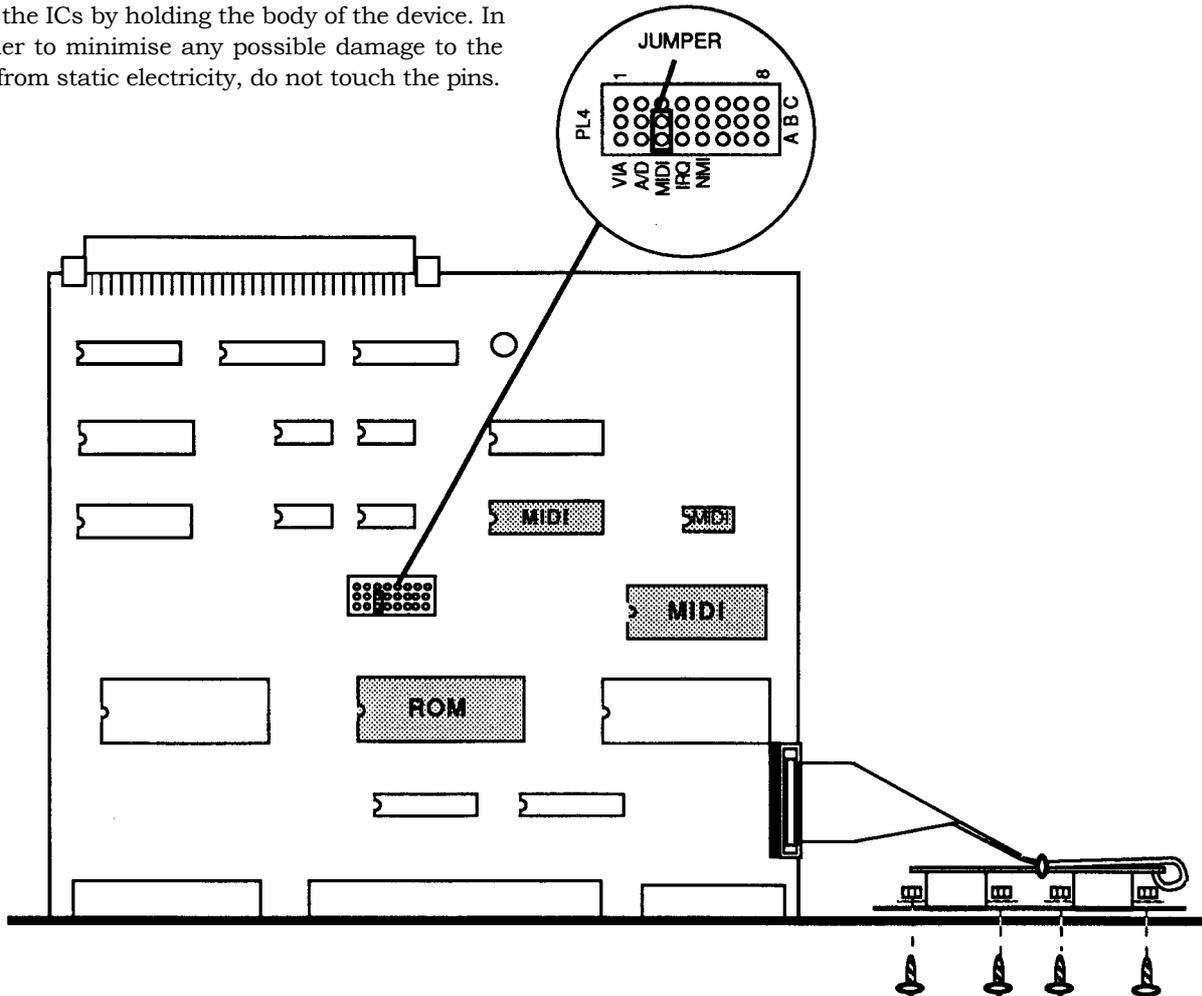
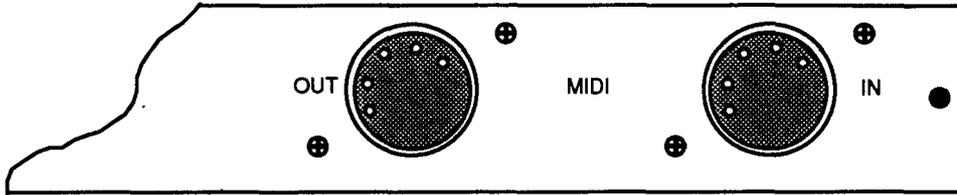


Fig. 2: I/O Podule showing MIDI Module

The fourth IC replaces the ROM supplied with the I/O Podule. This is the central integrated circuit in the row of three large ICs (see Fig. 2). You must remove this IC and replace it with the IC supplied with the MIDI Module. Take care not to get them mixed up. You will have one IC left over when you have finished.

The jumper must be inserted over the two pins next to the word MIDI on the Podule circuit board (see Fig. 2).

Next, the MIDI IN and MIDI OUT sockets are bolted into place on the rear panel of the Podule. First, remove the two rubber bungs by pushing them through from the circuit board side. The termination of the flying lead goes behind the IN lettering on the rear plate of the Podule (see Figs 2 and 3). Take care to get these sockets the right way up. Bolt the sockets in position using the Posidriv screwdriver, preventing the nuts from turning with your fingers or an M2 spanner.



**Fig. 3: Alignment of MIDI IN and MIDI OUT sockets**

Plug the connector on the other end of the lead into the pins on the right hand side of the circuit board (when you are looking from the rear, see Fig. 2). This will only go in one way round, don't force it.

### **REASSEMBLY**

You can now fit the I/O podule into the Archimedes according to its fitting instructions.

If you had to remove the Podule from the computer, support the backplane with one hand and push the connector on the Podule into the socket on the backplane from which you removed it. The connector should be securely seated, that is the rear plate of the Podule should be flush with the Archimedes case. It is important that you offer the Podule up to the backplane at right angles to it and that you align the connectors, otherwise you may bend the pins or break or disconnect the backplane itself. It does not require great force to install the Podule correctly. If the Podule will not seat easily, remove the Podule and start again.

When the Podule is positioned correctly, secure the Podule to the back of the Archimedes case by inserting a screw at each end of the Podule rear panel.

Once the Podule has been replaced, slide the top case of the Archimedes unit on from the rear, making sure that it is correctly located in its slots. These slots are positioned one on each side of the lower case.

Replace the two screws that you removed from the front sides of the Archimedes case and tighten them up (see Fig. 1).

Replace the screws at the rear and sides of the unit and tighten them up, (see Fig. 1).

# ARCHIMEDES ARTHUR ROM FITTING INSTRUCTIONS

This leaflet tells you how to upgrade your Archimedes 300 series to version 1.2 of the Arthur operating system. It is not difficult to carry out the upgrade. All you need to do is to:

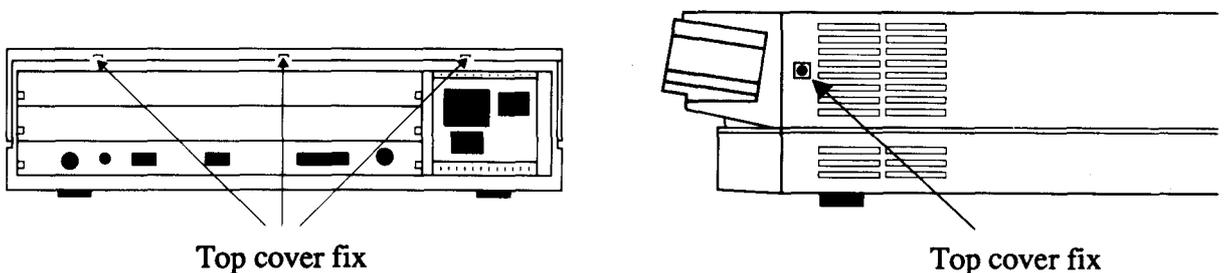
- Remove the top cover of your Archimedes
- Remove the system ROMs (four integrated circuits)
- Carefully insert the four new ones.

The only tools you will need for this are a medium Pozidriv screwdriver and a small flat-bladed screwdriver or IC extraction tool. You will, however, need to take care to **protect the ROMs from static electricity** as this can seriously damage them. However, if you are unhappy about upgrading your Archimedes yourself then your Acorn supplier will be able to do it for you.

**ATTENTION! Arthur 0.2 owners - please insert your old 0.2 ROMs into the protective foam which carried your new 1.2 ROM set, and return the 0.2 ROMs to Acorn using the envelope and reply paid label provided in this pack. This request does not apply to Arthur 0.3 owners.**

## REMOVING THE TOP COVER FROM THE COMPUTER

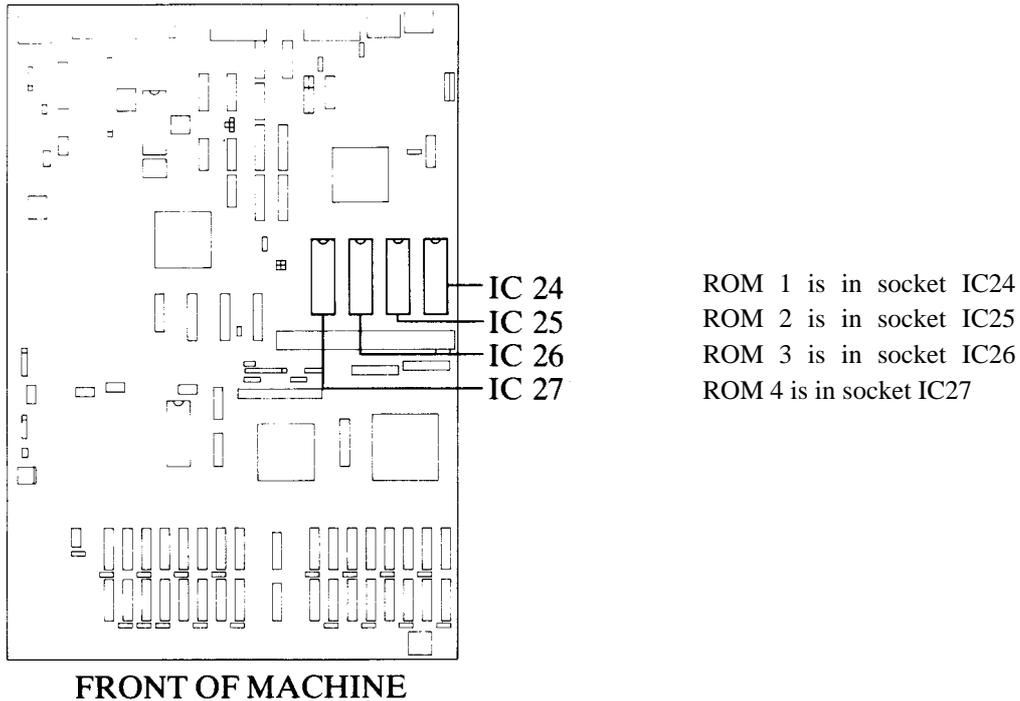
- 1 Switch off your Archimedes and disconnect the unit from the mains by unplugging the power supply cable.
- 2 Unplug any peripherals that are attached and remove any monitor or other loose items standing on the top of the case.
- 3 Locate the screws holding the top cover in place. (See figure 1.)
- 4 Remove the three screws at the top rear of the unit and the single screws on each side of the unit.
- 5 Slide the top cover to the rear of the machine and then slide it off. You should remove the cover completely and set it carefully to one side.



The position of the screws holding the top cover  
Figure 1

## LOCATING THE SOCKETS ON THE BOARD

Position the machine so that you are facing the front. The sockets will then be located halfway along the right-hand side of the main printed circuit board. They are labelled: IC24, IC25, IC26 and IC27. (See figure 2.)



### The position of the four ROM sockets

Figure 2

**Note:** If you have any Podules installed you will need to remove them in order to gain access to the ROM sockets.

## REMOVING THE OLD ICs

You must remove the existing ICs in sockets IC24, IC25, IC26 and IC27. To do this, take an IC extraction tool or a flat-bladed screwdriver and gently prise up each end of the IC, a bit at a time.

It is important that you remove the ICs extremely gently otherwise you may bend the pins or damage the sockets. If you are using a screwdriver, be careful not to catch the ribs of the sockets.

## IDENTIFYING THE ICs

The upgrade kit consists of four ROMs. The way in which the ICs are labelled and their appearance depends on the manufacturer. Before inserting the ICs it is important to clearly identify the type of ICs you are supplied with.

Using the table below, identify which IC is which by examining the markings on

them. ROM	Markings	or	Markings	or	Markings *
1	0277,022		MB831000-20P-700		1
2	027,023		MB831000-20P-701		2
3	0277,024		MB831000-20P-702		3
4	0277,025		MB831000-20P-703		4

\*Note: The ROM set numbered 1,2,3 and 4 although labelled Arthur 1.1 is in fact Arthur 1.2.

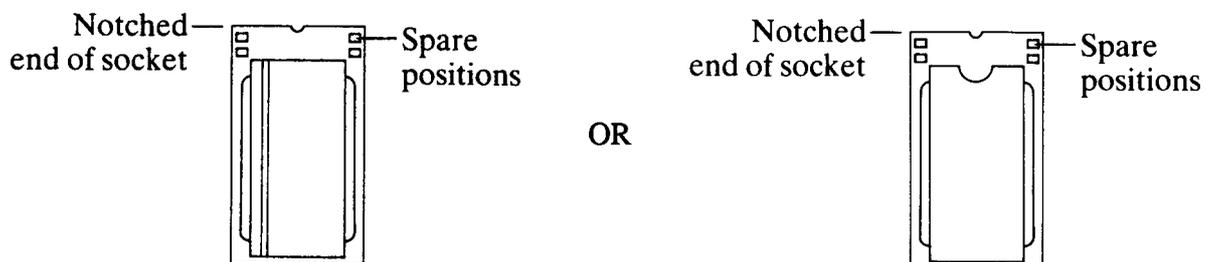
You may find it easier when you come to install the ICs if you make a note of which IC is ROM 1, ROM 2 and so on.

The ICs will be one of two types. These either have a distinctive semi-circular notch at one end of the IC or a long groove down one side.

### INSERTING THE ICs

You are now ready to insert the ICs. When you handle the ICs, it is very important that you avoid touching the pins and that you protect the ICs from static electricity.

- 1 Remove the ICs from their packaging, holding the IC between finger and thumb.
- 2 Check that all the pins on the IC are straight. If they appear crooked or splayed, you will need to realign them. To do this, hold the IC sideways-on and press it gently against a firm flat surface.
- 3 Repeat for the other row of pins as necessary.
- 4 Identify socket IC24.
- 5 Take the IC which you have already identified as ROM 1.
- 6 The new ICs each have only 28 pins so four of the pin positions in each of the 32 pin sockets will be unused. Position the end of the IC with the semi-circular notch towards the notched end of the socket. If you have grooved ICs you should position the IC so that the groove is on the left-hand side of the IC. In either case, the four free positions should be left at the notched end of the socket. (See figure 3.)



**A 28 pin IC in a 32 pin socket  
Figure 3**

- 7 Line up all the pins over socket IC24. Ensure that the notch on the IC points towards the notched end of the socket (or that the groove is on the left-hand side of the IC). Also, ensure that you have left four free pin positions at the notched end of the socket.
- 8 When you are sure that the IC is the correct way round, apply firm pressure to the IC until you feel it click home, but do not force it. When the IC is in place it may appear to be slightly raised.
- 9 Check that all the pins have entered the socket and that none are bent out or caught underneath.
- 10 Insert the remaining ICs. Ensure that the IC which you have identified as ROM 2 is inserted into socket IC25, ROM 3 into socket IC26 and ROM 4 into socket IC27.

## **REASSEMBLING THE ARCHIMEDES**

Now reassemble the Archimedes:

- 1 If you have removed any Podules, re-install them in accordance with the supplier's instructions.
- 2 Slide the top cover of the Archimedes unit on from the rear, making sure that it is correctly located in its slots. These slots are positioned one on each side of the lower case.
- 3 Replace the screws at the rear and side of the unit and tighten them up. (See figure 1.)
- 4 Connect up the monitor and keyboard etc and then plug in the mains supply. The

installation is now complete.

In the Desktop, use the mouse (as described in your new Welcome Guide) to select operation.

**Note:** To go straight to BASIC (rather than the Desktop) set the configuration to LANGUAGE 4.

## 5. Connectors, interfaces, links and test points 5.1

### Archimedes 300 series options and test points

LinkNo.	Status*	Function
LK 1	NF	Not applicable to A305/310
LK 2	NF	Selects ROM size for ICs 24 to 27 in combination with LK6. Tracked in position b = 27512 EPROM, see also LK 12 and silk screen table.
LK 3	NF	Not applicable to A305/310
LK 4	NF	Not applicable to A305/310
LK 5	NF	Not applicable to A305/310
LK6	NF	See LK 2
LK 7	NF	Can be used to ground RDY signal in floppy disc interface for test purposes.
LK 8		By fitting both in position 3 to supply PL 4 with power, the disc
LK 9		drive may be powered via the ribbon cable.
LK 10	NF	West selects SK2 pin 4 to be HSYNC. East selects SK 2 pin 4 to be CSYNC (tracked East).
LK 11	NF	West selects SK2 pin 5 to be VSYNC East selects SK 2 pin 5 to be a mode control AMODE. PCB is not tracked in either position - feature unused.
LK 12	NF	Selects type of 1 Mbit EPROMs/ROMs. DEFAULT: Links set 1 to 2 and 3 to 4 for EPROMS up to 0.5 Mbit, 1 Mbit ROMs and 1 Mbit ROM-type EPROMS, eg 27C301. Links set 1 to 3 and 2 to 4, JEDEC 1 Mbit EPROMS, eg 27C101.
TP 1		Access to real time clock oscillator
TP 2		Indicates system access to disc drive.

\*NF = Not Fitted

## 5.2 Plugs and sockets

PL 1	Serial line
PL 2	Auxiliary audio connector. 10 way 2 row 0.1" pitch For pin out see silk screen on PCB. <ol style="list-style-type: none"> <li>1. Unfiltered left channel output</li> <li>2. 0V</li> <li>3. Filtered left channel output</li> <li>4. 0 V</li> <li>5. Auxiliary input (feed to internal amplifier and speaker)</li> <li>6. 0 V</li> <li>7. Filtered right channel output</li> <li>8. 0V</li> <li>9. Unfiltered right channel output</li> <li>10. 0 V</li> </ol>
PL 3a	Internal clock selection. 4 way 2 row 0.1" pitch. For pinout see silk screen on PCB; shunts fitted 1 to 2, 3 to 4. <ol style="list-style-type: none"> <li>1. CKSYS 24 MHz system clock.</li> <li>2. Feed to VIDC clock</li> <li>3. Sync signal</li> <li>4. 0 V</li> </ol>

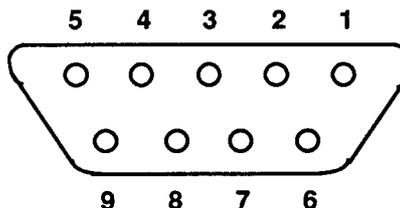
- PL 3b Internal Video 10 way 2 row 0.1" pitch - NF
- 5 VEDO (inverse of red data bit 0)
  - 6 VED1 (inverse of red data bit 1)
  - 7 VED2 (inverse of red data bit 2)
  - 8 VED3 (inverse of red data bit 3)
  - 9 SUP (supremacy output control for external video mixing)
  - 10 HI (horizontal interlace marker)
  - 11 HS(horizontal sync)
  - 12 VS (vertical sync)
- PL 4 Floppy disc power connector - NF  
Used in conjunction with LK8 and LK9 to power floppy drive via ribbon cable.
- PL 5 Power supply connector +12 V
- PL 6 Power supply connector 0 V
- PL 7 Power supply connector +5 V
- PL 8 Power supply connector -5 V
- PL 9 Front panel connector, pins 1 to 4 fitted only
- 1 Speaker connection
  - 2 0V
  - 3 Power on LED connection
  - 4 0V
- PL 10 Auxiliary I/O connector - NF
- 1 0V
  - 2 Aux 2
  - 3 Aux 1
  - 4 C4 Bidirectional IO line
  - 5 NVM alarm signal
- PL 11 Battery connection
- PL 12 Fan connection

**ANALOGUE RGB**

The red green and blue signals are analogue outputs each designed to drive a 75 ohm terminated line.

Composite sync is also available on the H/CSYNC output. This pin can be link selected to carry the Horizontal sync. The VSYNC/MODE output is normally unconnected and may be link selected to carry Vertical sync. so long as VIDC is reprogrammed. To maintain high picture quality each signal lead should be an individually screened co-axial cable of 75 ohms characteristic impedance.

- 1 RED
- 2 GREEN
- 3 BLUE
- 4 CSYNC
- 5 n/c
- 6 0V
- 7 0V
- 8 0V
- 9 0V



Red, Blue and Green into 75 ohms

- 0 volts Minimum Level (Black)
- 0.7 volts Maximum Level (White)

H/Csync or Vsync/Mode into 75 ohms

- <0.2 volts Sync LOW
- >0.3 volts Sync HIGH

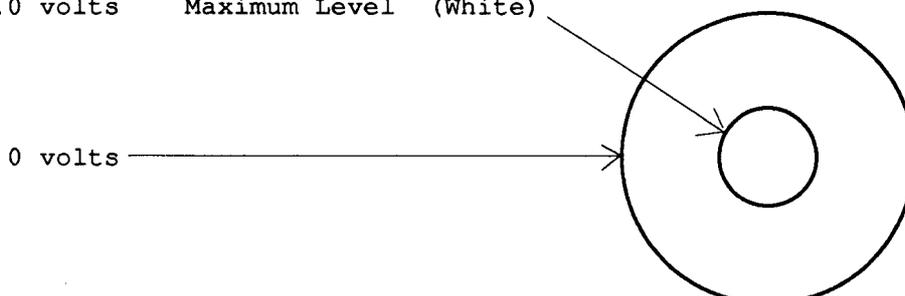
H/Csync or Vsync/Mode unterminated

- <0.2 volts Sync LOW
- >2.4 volts Sync HIGH

**MONO VIDEO**

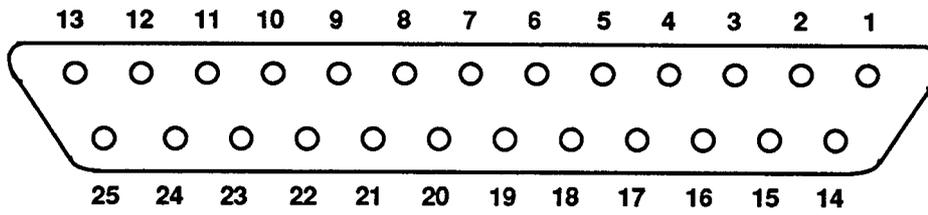
The monochrome video is available on a Phono Socket. This is a mix of the Red, Green and Blue signals with a Sync pulse:

- <0.2 volts Sync
- 0.3 volts Minimum Level (Black)
- 1.0 volts Maximum Level (White)



Socket viewed from mating side

**PARALLEL PRINTER**



1	STB	13	n/c
2	DO	14	n/c
3	D1	15	n/c
4	D2	16	n/c
5	D3	17	0V
6	D4	18	0V
7	D5	19	0V
8	D6	20	0V
9	D7	21	0V
10	ACK	22	0V
11	BSY	23	0V
12	n/c	24	0V
25	0V		

Vol = 0.5 volts at 24 mA  
 Voh = 2.4 volts at 24 mA

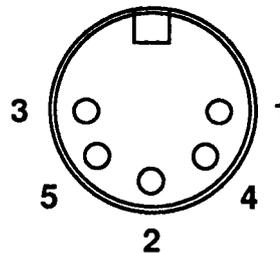
ACK and BSY

Vol = 0.8 volts  
 Voh = 2.4 volts

**ECONET**

This socket provides the standard Econet interface.

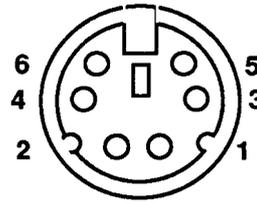
1	Data	+
2	0v	
3	Clock	-
4	Data	-
5	Clock	+



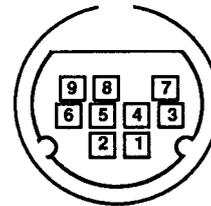
Sockets viewed from mating side

**KEYBOARD CONNECTOR**

Signal name	Pin number
5 volts	4
0 volts	3
Serial Data out (to K'board)	6
Serial Data in (from K'board)	5
Reset	1
-Not connected-	2

**MOUSE CONNECTOR**

Pin function	Pin number
5v supply for Mouse	6
0v return for Mouse	4
Switch 1	2
Switch 2	3
Switch 3	8
X Reference	1
X Direction	5
Y Reference	7
Y Direction	9



Movement signals are T.T.L. level with a fan out of 1 LS load.

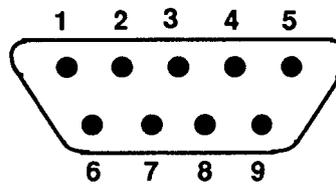
Vol = 0.5 volts at Tout of 0.4mA

Voh = 2.4 volts at Tout of -0.1mA

Rise and fall time 20 maximum, Vol to Voh or Voh to Vol. Each mouse switch operates with a contact closure to 0 V. The switch debounce period is 20 ms minimum.

**SERIAL PORT**

1	DCD
2	RxD
3	TxD
4	DTR
5	0 Volts
6	DSR
7	RTS
8	CIS
9	RI

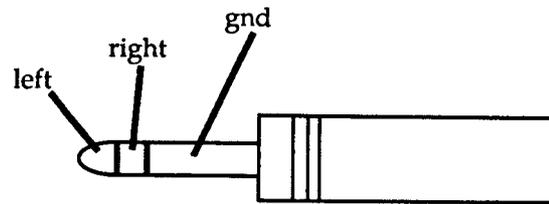


See also the Serial Port Application Note in the Appendix.

**Sockets viewed from mating side**

## HEADPHONES

The headphone socket is designed to drive 1 V maximum into a 32 ohm personal stereo headphone.



## INTERNAL PLUGS AND

### SOCKETS Floppy disc drive

#### connector

This socket is used to connect to the floppy disc drive. Power may be supplied via this cable or separately. See LK8 and LK9.

Pin	Function	Pin	Function
1	disc eject	18	DIR
2	n/c	19	V
3	5V or V	20	STEP
4	in use	21	0V
5	5V or V	22	Write Data
6	SEL 3	23	0V
7	5V or V	24	Write Gate
8	index	25	V
9	5V or V	26	Track 00
10	SEL 0	27	V
11	5V or V	28	Write Prot
12	SEL 1	29	12V or 0V
13	V	30	Read Data
14	SEL 2	31	12V or 0V
15	0V	32	Side Sel
16	Motor On	33	12V or V

## 6. Fault-finding information

The purpose of this fault-finding information is to enable the engineer to trace faults to module level, the modules being defined as the:

- Main PCB
- PSU
- Floppy disc drive(s)
- Podule(s), as fitted
- Podule backplane
- Keyboard assembly
- Mouse
- Monitor

It is important to determine as closely as possible the nature and location of the fault to ensure that only faulty modules are replaced.

Basic test equipment required:

- 100 MHz oscilloscope DC
- Voltmeter
- Continuity tester

plus additional items according to the test routine.

In addition, reference should be made to the circuit diagram in Appendix 7.11 and PCB test point and layout diagrams in Appendices 7.8 and 7.9.

It is advisable to substitute known good units/modules in order to isolate faults before carrying out detailed tests.

In all instances, follow through the checks until the fault is located and identified, then change the appropriate module. For information on module replacement procedures, etc., see the Acorn Service and Support Strategy document.

### IMPORTANT NOTE

**WHEN REFITTING OR FITTING A REPLACEMENT ASSEMBLY, CHECKS SHOULD BE MADE FOR EARTH CONTINUITY BETWEEN THE EARTH PIN OF THE MAINS PLUG AND THE FOLLOWING:**

#### THE BASE METALWORK

THE REAR PANELS (INCLUDING BLANKING PANELS)

THE TOP COVER

USE AN EARTH CONTINUITY TESTER SET TO 25 AMPS.

## 6.1 Basic checks

### 6.1.1 FIRST, CHECK THE OBVIOUS:

With both the monitor and the computer switched on, check for POWER ON indications (computer and monitor ON LEDs). If neither have power, check the main fuse in the wall plug.

If the computer is powered but not the monitor, check for power on the AC outlet socket at the rear of the computer main unit by plugging in a known good monitor. Should this also fail, replace the computer power supply.

If the monitor is powered but not the computer, an internal power supply fuse may have blown. Replace the PSU.

If both have power, check by substitution that the monitor and the interconnection cable are serviceable. Check for the correct power supply output voltages on the main PCB:

PL5 = +12 V; PL6 = 0 V; PL7 = 5 V and PL8 = -5 V

If the power supply is emitting a clicking sound, this indicates either a short between two of its outputs or a faulty power supply.

Make sure all of the ROMs are inserted correctly and that the relevant links (LK2, LK6 and LK12) are correct for the type of ROMs used. The options and settings of these links are detailed in section 5, "Connectors, interfaces, links and test points".

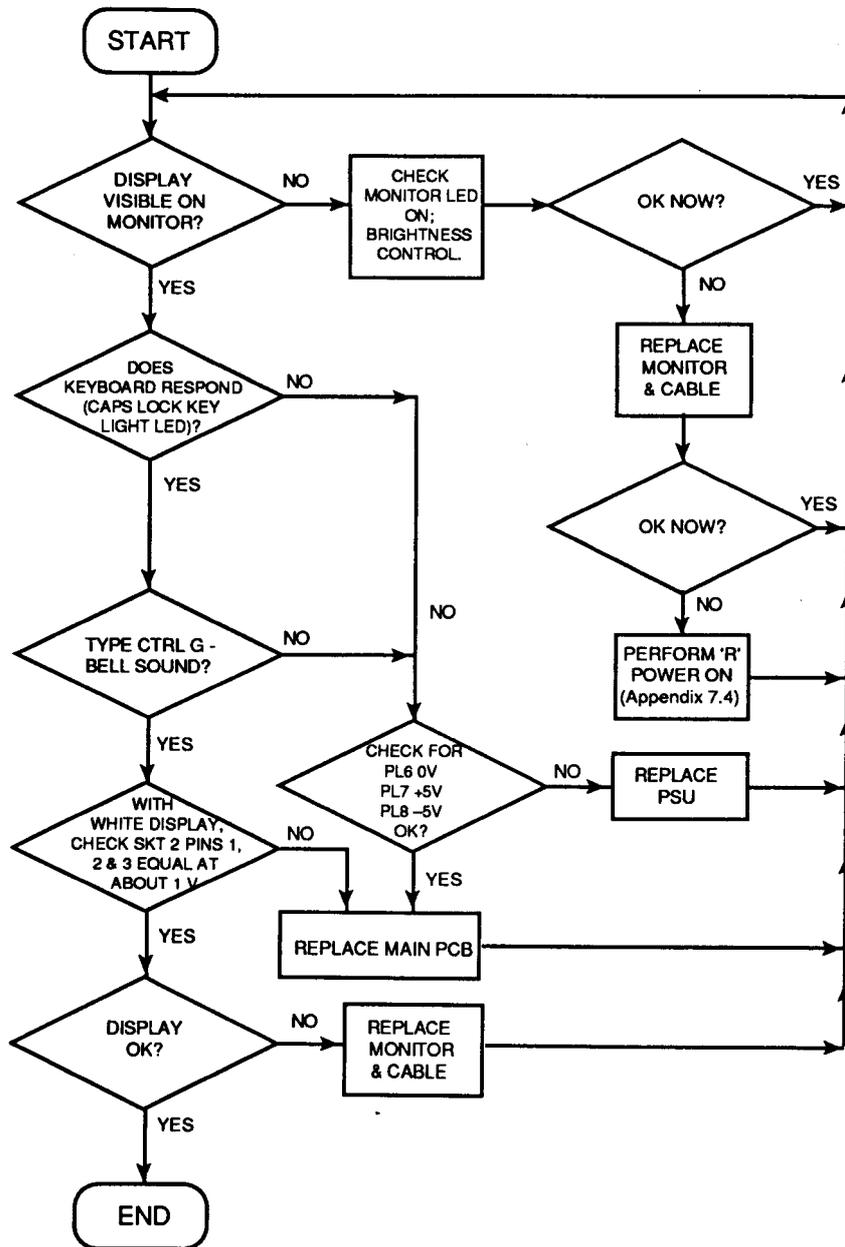
The keyboard CAPS LOCK light should toggle on and off when pressed and assuming a disc is present, the disc drive light will glow after a \*CAT command. If so, this indicates that the system is alive and that the failure is confined to the video circuitry. Try an 'R' power up (see Appendix 7.4.1). If this has no effect, change the main PCB.

If there is no response, substitute a known good keyboard and repeat the check. *If* there is still no response, there is a system failure - change the main PCB. *If* the substitute keyboard restores normal working, change the original keyboard PCB.

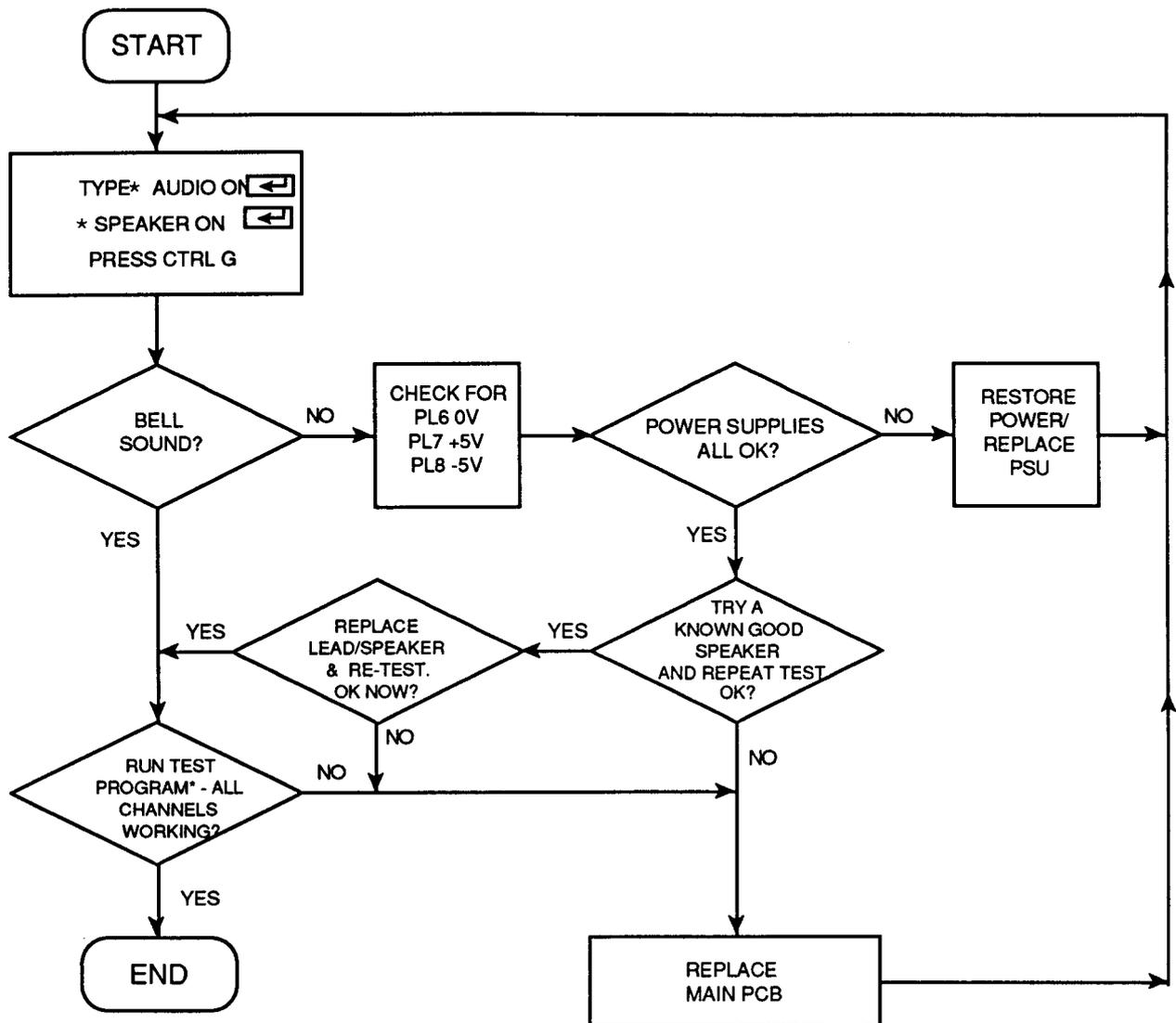
### 6.1.2 FLOWCHARTS

The following flow charts will be useful aids to basic checks:

#### NO DISPLAY



**NO SOUND**



**\*TEST PROGRAM:**

```

10 REM > Check all channels
20 VOICES 8
30 FOR channel=1 TO 8
90 OSCLI ("Channelvoice "+STR$(channel) +" "+STR$(2) )
50 NEXT
60 FOR channel = 1 to 8
70 SOUND channel, -15, 100,29
80 PRINTchannel
90 k=GET
100 NEXT
    
```

**RUN PROGRAM.**

**PRESS A KEY AND REPEAT 8 TIMES.  
PRINTS CHANNEL NUMBER ON SCREEN AND  
PLAYS VOICE 2 FOR EACH CHANNEL.**

## 6.2 Run main PCB Functional Test (see Appendix)

The following notes refer to the test procedures on the PCB functional test disc, as detailed in section 7.4 "Archimedes Test Instructions", and the action which should be taken as the result of a test failure.

<b>Type/Model:</b>	Memory area fault - If model 305, change the main PCB  If model 310 with 0.5MByte RAM Upgrade, replace upgrade and retest. If it still fails test, change the main PCB, using a replacement 310 board, or transferring the original RAM upgrade to the new board. If model 310 with factory-fitted RAM, replace the main PCB.
<b>Memory:</b>	Repair as above.
<b>Battery-backed RAM:</b>	Check batteries, battery holders and connections. Re-run the test.  If test still fails, replace the main PCB.
<b>Loudspeaker:</b>	If no sound, check speaker connections. Substitute a known good speaker and re-test. If OK, replace speaker. If test still fails, replace main PCB.
<b>Headphones:</b>	If no sound or poor/faulty sound on known good headphones, replace the main PCB.
<b>Monitor Screen:</b>	If display rolls or is unstable, perform 'R' power-on until correct default value obtained. If no improvement, check/change the monitor cable. If still no improvement, change the main PCB.  If the display breaks up around its edges and spurious characters appear suspect the system oscillator. Change the main PCB.
<b>Colours incorrect or missing:</b>	With a full white screen, VIDC IC 17 pins 39, 40 and 41 should all have the same signal on them. If not, change the main PCB.
<b>Floppy Disc:</b>	If test fails, check that the configuration for 'STEP' and 'FLOPPIES' is correct. Check the disc drive ID switch is set to the correct position - normally '0' for single (or first) floppy drive, '1' for second floppy drive.  Swap the cable and drive for known good examples. Check power to to drive. If fault persists, change the main PCB.
<b>Serial port:</b>	If test fails, after you have ensured that the loopback plug is functional on another unit, change the main PCB. If a fault is reported but the test is passed, see the Serial Port Application Note in the Appendix for possible explanations.
<b>Printer:</b>	If the test fails with a known good printer and cable connected, check the configuration settings for 'PRINTER' and 'IGNORE' are correct. If fault still persists, change the main PCB.

## 6.3 Hard Disc

Carry out the hard disc and Podule interface tests. **IMPORTANT**

**THE HARD DISC AND PODULE INTERFACE TESTS WILL DESTROY ANY DATA ALREADY STORED ON THE DISC.**

Check that the configuration settings are correct.

If drive is faulty, replace it using the Hard Disc Upgrade instructions as a guide. Replace a faulty

Podule using the Podule installation leaflet as a guide.

## **6.4 Podules**

Run basic checks first - see section 6.1.

Run the relevant Podule test; if it fails, substitute a known good Podule. If the test still fails, replace the main PCB.

## **6.5 Keyboard**

Make sure that the configuration items 'DELAY' and 'REPEAT' are set to sensible values - eg DELAY 32, REPEAT 4.

Perform the basic checks first - see section 6.1. Run the keyboard functional test. If the keyboard

PCB is replaced, re-run the keyboard functional test.

## **6.6 Audio**

Run the main PCB Functional test - see Appendix 7.4 for details.

## 7. Appendices

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### 7.1 Modules/Dealer Serviceable Parts

The main PCB currently supplied as a replacement is the model 305 board with 0.5 Mbyte RAM and without ROMs fitted.

See the Acorn Service and Support Strategy document for details of replacement PCB availability.

The following is a list of modules and dealer-serviceable parts available for module-level repairs:

<b>Part Number</b>	<b>Description</b>
TBA	Arthur ROM set (4 x ROMs)
0704,105	4464 RAM available as 0.5Mbyte upgrade kit (AKA 51)
0176,100	Keyboard Assembly
0176,002	Power Supply Unit
0176,003	Mouse
0176,004	Floppy Disc Drive
0176,005	Single Floppy Disc Drive Data Cable
0176,006	Speaker/LED assembly
0376,340	PCB A Spares kit (305 PCB only with 0.5Mbyte RAM, no ROMs)
0999,438	Keyboard Curly Cable
0870,353	Power Lead (white, 2m long, 13A)
0890,009	Rubber Feet
0276,002	}
0276,003	) Main Unit Moulding Set
0276,004	)
0276,006	Top Metalwork
0276,007	Bottom Metalwork
0276,015	Front Label
0276,017	Base Label
0276,029	)
0276,030	)Poly Packing
0276,019	Cardboard Carton
0277,220	Welcome Disc
0476,000	Welcome Guide
0476,002	User Guide
0276,017	Base Label (common 305/310)
0276,318	Front Label
<b>Keyboard</b>	
0276,101	Top Case
0276,102	Bottom Case
0276,103	Leg Moulding (set of 2)
0276,105	Friction Pads
0276,106	Name Label
0276,107	LED Label
0276,104	Window Moulding (function key strip)
0890,011	Rubber Feet
0276,108	Reset Keytop Moulding
TBA	Keytop Set

## 7.2 Production and Field Changes

The following information gives changes and deviations made to the Archimedes 300 series during production and is the latest available when this manual was compiled. It will be updated accordingly as information becomes available.

### Main PCB

#### MONO VIDEO OUTPUT

Some issue 2 boards may have a mono video output fault. If other checks do not reveal the cause, check for the presence of insulation tape beneath the RGB video connector mounting bracket. If no tape is fitted, suspect a short circuit on the mono video track; check for a short circuit to earth (NOT Ov) and, if found, replace the main PCB.

#### SOUND OUTPUT FAILURE

Insertion of the jack plug into the audio output socket SKT1 causes a temporary short of both audio output devices Q9 and Q11 to OV. If the audio output is not working, check for BC239s fitted at Q9 and Q11. If so, change the board. On later boards, Q9 and Q11 are 2N3904s - these will tolerate the momentary short and are therefore unlikely to be the cause of audio output failure. Note that the two types are fitted differently to the board - see Fig. 6.

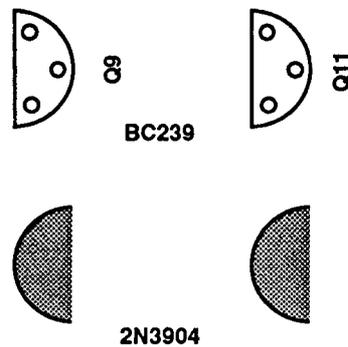


FIG. 6 VIEW OF ALTERNATIVE TYPES Q9, Q11 AS SEEN FROM ABOVE.

#### SERIAL PORT

On issue 1 boards only, two wire links are fitted around ICs 7 and 15, as follows:

IC7 pin 3 and IC15 pin 10 are not inserted into the pcb and are connected by a wire link across the top side of the PCB.

The second wire link is fitted between IC7 pins 1 and 4 on the underside of the PCB.

#### EXCESSIVE BACKGROUND NOISE ON SPEAKER (Acorn FCO E008 refers)

Later boards have a modification to reduce hum from the internal loudspeaker caused by acoustic pickup.

The modification comprises a 10 V or higher 100 $\mu$ F capacitor fitted between pins 7 (+ve) and 4 (-ve) of IC68. The capacitor should be fitted as close as possible to the IC and should be secured to the PCB using glue or hot wax. RS part number 104-449 or 103-957 are suitable capacitors.

Machines in the original serial number range 27-AKB10-1000001 to 27-AKB10-1001277 and 27-AKB15- 1000001 to 27-AKB15-1001752 were not fitted with this modification in production. However, machines outside this range may, on subsequent repair, have been fitted with circuit boards which are not modified.

Note that the noise on earlier computers when BREAK or ESCAPE is pressed is due to a software problem with earlier versions of Arthur, and will be cured when Arthur 1.20 is fitted.

**RGB OUTPUT VOLTAGE LEVELS (ACORN FCO E009 REFERS)**

The RGB output voltage levels have been raised in production to improve compatibility with certain types of multi-sync monitors. In addition, sync on green is no longer provided. Where problems are experienced with RGB levels being too low for a given monitor, change the values of 0.25W 1% resistors R20, R41 and R59 to 43.2Ohm and remove R39. If 43.2Ohm resistors are not available, 43Ohm 1% 0.25W, Farnell part number MRS2543R or RS part number 148-168 may be used as an alternative.

Note: There are problems inherent with removing components from four-layer boards. Components should only be desoldered from the board using vacuum desoldering equipment. An acceptable alternative would be to cut the wires to the components concerned, leaving enough of the wire on the board to allow the new resistor wires to be soldered to them. The new wires should be cropped close to the resistor, but allowing the new solder joint to be effected. On removing R39, which is no longer required, crop the wires back to the board.

**VIDEO NOISE (ACORN FCO E011 REFERS)**

Breakthrough of system noise occurs onto the screen. This shows as rippling on screen and is particularly noticeable with colour monitors. This seems to be particularly prevalent when running 'Arcwriter'.

If this occurs, solder a 1N4148 diode in parallel with R67 (adjacent to VIDC IC17) with the cathode (dark stripe) at the end nearest Q13. Remove the decoupling capacitor 'A' nearest to IC17, between it and Q12 either by using desoldering equipment or by cutting the capacitor out, leaving wires long enough to attach a new component. Replace this capacitor with a 22µF 6.3 V or higher axial lead electrolytic capacitor, eg Farnell part number 030 34229. Observe polarity - positive end furthest away from Q12.

**PCB MOUNTING**

There have been several methods employed of mounting the main PCB in the case.

- i. 8 support pillars fixed to the case. The board rests on these pillars, and is attached to the rear panel.
- ii. Later boards are supported by finger grips in the front moulding, with 3 support pillars under the PCB, plus the rear panel. On some units, the 3 support pillars are attached to the board.
- iii. The PCB is supported by finger grips in the front moulding and attached to the rear panel. Two PCB slide guides support the board along each side of the case, plus one central support pillar attached to the board.

In all instances, exercise extreme care when removing the board from the case, so as not to snag supports or damage the board.

**Link 12**

Link 12 enables selection of ROM device types. The default setting is for EPROMs up to 0.5Mbit, 1Mbit ROMs and 1Mbit non-JEDEC EPROMs. Changing link 12 would allow the use of 1Mbit JEDEC EPROMs.

Issue 1 boards do not have the link fitted.

Issue 2 boards have a link consisting of either four pads or pins and shunts. The tracking is as for an issue 1 board. If the shunts are reversed, this may stop the machine functioning. Tracks need to be cut to change the link.

**Phono socket (mono video)**

Issue 1 boards have a mono video phono connector fitted to the PCB rear panel, with flying leads from the PCB.

Issue 2 boards have a board-mounted socket. As the back panel is changed with the board, this difference does not cause a problem with board change.

**Battery holder**

The battery holder is riveted to the base metalwork. If the battery holder is replaced, care must be taken to ensure that the fixing rivets are fitted to the two holes originally used. Only two of the four possible holes hold the battery holder assembly rigid.

**Saddle**

The disc drive support 'saddle' is fixed to the base metalwork by either screws or, on later units, rivets. All replacement base metalwork will have a saddle riveted in position.

**PSU**

Power Supply Units manufactured by Sanken have a screw head in the case which may foul the rear panel busbar. If fitting a Sanken PSU as a replacement, it may be necessary to modify the busbar by filing a piece out of it to clear the screwhead.

### 7.3 Archimedes Serial Port - Application Note

The Serial Port electrical interface is based on the American EIA (Electronic Industries Association) standard RS423. The interface functionality is based on the RS232 standard.

The RS232 standard defines the interface between Data Terminal Equipment (DTE) and Data Communication Equipment (DCE) employing serial binary data. In the case of an Archimedes system using a modem, the computer is the DTE and the modem connected to the Serial Port is the DCE. When a serial printer is used, or another computer is connected to the Archimedes computer, both devices may appear as DTEs and the interconnections will be different.

The RS423 standard defines the electrical characteristics of an unbalanced digital interface circuit such as the Archimedes Serial Port.

The RS232 standard is very broad-based in its scope, and defines the use of a 25-way connector with many connections between the DTE and DCE. In practice, many equipment manufacturers have found the only a small sub-set of these connections is necessary and connectors with far fewer pins have been used. Unfortunately, the selection of the sub-set is often arbitrary and there may confusion over how to make the best use of the connections provided. Only two wires (plus ground) are actually needed, theoretically, to make a two-way serial data connection between the DTE and the DCE. The additional connections are primarily used to carry out "hardware handshaking". The "handshaking" enables the two pieces of equipment to exert some direct control over each other to allow synchronisation of data flow. This synchronisation is necessary to avoid data loss. Increasingly, "software handshaking" is used instead of "hardware handshaking". In this case, whilst data is transmitted along one data line, the other line is used to carry control information that allows the sender and the receiver to synchronise via software control at each end.

The Archimedes Serial Port uses a 9-way connector (D-type plug) that is similar in function, but is not identical, to the 9-way port on the IBM PC/AT or derivatives. The same connecting lead can normally be used as that supplied for the PC/AT.

The pin connections for the 9-way connector are as follows:

Pin	Function	Voltage & Logic State
1	DXD Data Carry Detect	+ve - On (Detected)
2	RXD Receive Data	+ve - Logic "0"
3	TXD Transmit Data	+ve - Logic "1"
4	DTR Data Terminal Ready	+ve - On (Ready)
5	GND Ground Return (OV)	
6	DSR Data Set Ready	+ve - On (Ready)
7	RTS Request To Send	+ve - On (Send)
8	CTS Clear To Send	+ve - On (Clear)
9	RI Ringing Indicator	+ve - On (Ringing)

**ERRATA**

**Pin 3 (TXD Transmit Data): positive voltage level corresponds to Logic "0", not "1".**

The Archimedes Serial Port applications include:

#### Connection to another computer

In this case, both devices behave as DTEs and the RXD and TXD lines need to be transposed between the computers. Software handshaking will often be used, with some hardware control "loop-back" locally:

Connect pins 1, 4 & 6 (DCD, DTR and DSR) together

Connect pin 2 (RXD) of the DTE (Archimedes) to TXD of the DCE (modem) Connect pin 3 (TXD) of the DTE (Archimedes) to RXD of the DCE (modem) Connect pin 5 (OV) of the DTE to OV of the DCE

Connect pin 7 (CTS) of computer A to pin 8 (US) of computer B Connect pin 8 (RTS) of computer A to pin 7 (CTS) of computer B

#### Connection to a modem

In this case, the computer is the DTE and the modem is the DCE. The RXD and TXD lines are not transposed and the DCD, DTR & DSR lines may be brought into use. The TXD, RXD, CTS, DCD, DTR,

**Pin 7 (of both computer A and computer B) should read RTS, not CTS. Correspondingly, pin 8 (of both computer A and computer B) should read CTS, not RTS.**

DSR and 0V lines of one device are connected to the same pins on the other device.

Note: In both of the above arrangements, the CTS line does not behave in quite the same way as for the existing Master Series or BBC Model B computers. The CTS line on the Archimedes computer, when disabled, will cause an immediate cessation of data flow. For byte-oriented protocols, this may be undesirable as the last character may be corrupted. For applications where this is likely to be a problem, the DSR input should be used instead of CTS (ie the functions should be reversed). The DSR input, when disabled, allows completion of the current character.

### **Connection to a serial printer**

Both devices will typically be DTEs and some hardware handshaking may be needed. Connections will be similar to the "computer to computer" method, but will vary between printer types. The printer manual should be consulted for guidance.

### **Baud Rate**

The serial controller chip within the Archimedes computer provides one internal timer for baud rate control. If the Receive and Transmit rates are programmed to be the same, then this timer is used for both. If different baud rates are needed for Transmit and Receive, then the internal timer is allocated to a system timer. This system timer is not an exact multiple or sub-multiple of the internal timer. The use of different Receive and Transmit rates is therefore only recommended for lower speed usage, eg 1200/75 Viewdata. If only Receive is being used, it is important to program Transmit to the same rate, even though it is not being used. This ensures that Arthur allocates the internal timer to Receive.

### **Versions of Arthur**

Early versions of Arthur, ie those prior to version 1, have a problem which can affect Received data. If it becomes necessary for Arthur to signal to a sender to stop sending data, due to a full buffer etc., then Arthur fails to re-enable the sender when the problem clears. A patch is supplied on the Welcome disc for machines supplied with Arthur version 0.3.

Copies of the RS232 and RS423 standards may be purchased from the BSI in Milton Keynes, UK, or direct from the EIA in Washington DC, USA. There are related European and International standards as indicated below:

- RS232 - Interface between data terminal equipment and data communication equipment employing serial binary data exchange
- RS423 - Electrical characteristics of unbalanced voltage digital interface circuits
- CCITT V24 - Interchange circuits
- CCITT V28 - Electrical characteristics
- ISO 2110 - Pin connections for V24 circuits with V28 characteristics

This information is subject to change without notice. No responsibility can be taken for any errors or omissions. The user or program writer should verify that any application program or connection is suitable for the intended environment(s).

## 7.4 ARCHIMEDES TEST INSTRUCTIONS

### Contents

- 1 General test procedure
- 2 300 series main PCB Functional test
- 3 300 and 400 series keyboard Functional test
- 4 Dual floppy drive test
- 5 Hard disc format and hard disc interface Podule tests
- 6 ROM Podule test
- 7 I/O Podule and MIDI upgrade test
- 8 MIDI Podule test
- 9 Backplane test

Note: Please read the following section 'General test procedure' before you carry out any of the tests.

# 1. GENERAL TEST PROCEDURE

## Contents

1	Safety
2	Connecting and disconnecting the power
3	Validating the test equipment
4	Before you start
5	The test disc
6	Carrying out the tests
7	Error messages
8	Performing Soak tests
9	Repairing faults

### 1. Safety

Some of these tests require that you remove the top cover of the Archimedes computer. Although the power supply unit is designed to comply with BS415 Class 2, you must still take care to ensure that no metal objects fall (or are put) into the power supply unit through the ventilation holes.

### 2. Connecting and disconnecting the power

- You must CONNECT the power only when you have made all the other connections
- You must DISCONNECT the power before removing any other connections.

### 3. Validating the test equipment

Before carrying out any of the tests in this section, validate the test equipment using a known good part. If the test equipment fails, you should repair the test equipment and retest on a known good part.

### 4. Before you start

Before the start of each day or testing session, you must first:

- Adjust the colour monitor to ensure adequate contrast
- Inspect all the mechanical parts of the test equipment and replace any parts as necessary.

Also, if required:

- Ensure that the printer has sufficient paper
- Connect the printer and monitor to the mains supply. Do NOT turn on.

### 5. Saving and restoring the CMOS RAM

The tests alter the contents of the battery backed RAM that holds the Archimedes' configuration data. These must be saved before any of the tests are run, and restored when the last test is over.

- 1 Insert the Test disc into the floppy disc drive.
- 2 If your screen is showing the desktop environment, use the mouse to click on the 'EXIT' icon, otherwise, type \*GOS.
- 3 At the Arthur supervisor prompt (an asterisk) type the following;

```
DRIVE 0  
CMOSLS
```

- 4 When prompted, replace the Test disc with an ADFS 800k write enabled disc, the data disc.
- 5 Type 'S' to save the contents of the RAM, or 'L' to load a previously saved copy of the RAM.
- 6 Type the filename to use.
- 7 When prompted, replace the Test disc in the drive and press the space bar to continue.
- 8 Put the data disc in a safe place. Do NOT use this disc for the later floppy disc test.
- 9 Type 'Q' to quit this option. The Dealer Test Menu is displayed; select the 'Quit' option.

## 5. The Test Disc

The test disc contains various options which are selected from menus e.g:

Dealer Test Menu

- 1 A300 Tests
- 2 A400 Tests
- 3 Podules & Upgrades
- 4 Load/Save CMOS RAM
- 5 Keyboard Test
- 6 Quit

SELECT OPTION :

To select an option, type its number. Some options lead to further menus, other options run tests immediately.

## 6. Carrying out the tests

There are two types of tests - subjective and non subjective. The test program passes or fails the equipment on the non-subjective tests; however, you must judge whether the equipment passes or fails the subjective tests.

## 7. Error messages

- If a message is expected and has not appeared within 30 seconds, you must record the fault, disconnect the machine and repair before retesting
- If a test fails, then you should record the fault and attempt to continue with the tests. You should also note any other failures, but bear in mind the possibility that these failures are caused by the first recorded failure.

## 8. Performing Soak tests

At the end of each test, you should carry out a Soak test. To do this, leave the unit under test powered up for eight hours or alternatively overnight. After carrying out the Soak test, it is advisable to retest the unit.

## 9. Repairing faults

When repairing the Archimedes 300 series, you should repair the faults in the order in which they occurred during the test ie repair the first recorded failure FIRST.

For further information on checking for faults and carrying out repairs, refer to the appropriate module section of this manual.

A list of part numbers for products necessary to make module level repairs may be found in Section 7.1.

**TEST INSTRUCTIONS: 1****ARCHIMEDES 300 SERIES MAIN PCB FUNCTIONAL TEST Contents**

1	Introduction
2	Equipment required
3	Connecting up the equipment
4	Powering up
5	300 Series main PCB Functional test
5.1	Computer type/model
5.2	Memory
5.3	Battery-backed RAM
5.4	Time
5.5	Loudspeaker
5.6	Headphones
5.7	Standard monitor
5.8	Floppy disc drive
5.9	RS423 port
5.10	Printer
5.11	On completing the tests
6	Disconnecting the equipment
7	Packing

Note: Please read all the instructions before you start.

**1. Introduction**

The Archimedes 300 series main PCB Functional test should be carried out after ANY repair to the machine and consists of the following individual tests:

- Computer type/model
- Memory
- Battery-backed RAM
- Time
- Loudspeaker
- Headphones
- Standard monitor(s)
- Floppy disc drive
- RS423 port
- Printer.

## 2. Equipment required

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

- Archimedes computer with pcb to be tested
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- ADFS 800k formatted, write enabled, 3.5 inch discs
- serial port 'loopback' plug
- Epson FX80 or Olivetti JP101 printer
- pair of 32Ohm stereo headphones
- monochrome monitor
- analogue RGB monitor

The Archimedes computer, keyboard, Test disc, ADFS 800k formatted disc and serial port loopback plug are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

Note: You can replace the specified printers with any other manufacturer's direct functional equivalent (in terms of BOTH hardware interface and software).

## 3. Connecting up the equipment

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

- keyboard to the front panel connector
- serial port 'loopback' plug to the 'RS423' socket
- printer to the 'Parallel Printer' port
- headphones to the 'Headphones 32Ohm' socket
- monochrome monitor to the 'Mono Video' socket
- analogue RGB monitor to the 'Analogue RGB' socket
- monitors to the mains supply
- Archimedes computer to the mains supply.

## 4. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the computer on. If the 'R' Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.  
Normally, you need to execute the 'R' Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

## 5. Running the tests.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'A300 Tests'. The next menu is displayed:

```
A300 Test Menu

1 All Tests Except Printer
2 All Tests and Epson Printer
3 All Tests and JP101 Printer
4 Return to main menu
```

Select the tests for the printer connected to the Archimedes computer.

Note: If you do not want to test the printer and do not need a print-out of the results, you can select the 'All Tests Except Printer' option.

### 5.1 Computer type/model

After loading the test program, the Archimedes computer cycles through a series of tests beginning with the Computer type/model test. This test is extremely fast and the type and model number of the computer is displayed immediately:

```
This computer is an
ARCHIMEDES nnn

CHECK FRONT LABELS
THEN PRESS <SPACE> TO CONTINUE
```

You should:

- 1 Check that the number displayed on the screen is the same as on the label on the front of the Archimedes computer.
- 2 If the number is NOT the same, check inside the machine for the amount of RAM fitted. If the test is giving the wrong result there is a fault in the memory areas.
- 3 If the number IS the same, press the Space Bar to continue with the next test.

## 5.2 Memory

The Functional test continues by testing the memory. The screen clears and displays the following messages:

```
Memory test

Phase one: Incrementing pattern ....
Phase two: Cycling bits .....

PASSED/FAILED message
```

A failed message will end the tests. If the test has PASSED, press the Space Bar to continue the test.

## 5.3 Battery backed RAM

The test continues by testing battery backed RAM. The following message is displayed on the screen:

```
Battery Backed Ram (BBR) test running.

Reading BBR into main memory.
Checking read/write function of BBR.
Re-loading configuration parameters.

PASSED/FAILED message

PRESS <SPACE> TO CONTINUE
```

Press the Space Bar to continue the test.

## 5.4 Time

The Functional test continues by testing the time and date settings. A series of options are displayed on the screen:

```
DO YOU WANT TO ?

1. CHECK THE DATE AND TIME

2. SET THE DATE AND TIME

3. CHECK THEN SET THE DATE AND TIME

PRESS 1 OR 2 OR 3
```

The normal procedure is to select option 1. If you want to reset the time or date you would select 2 or 3. For example, you can:

- 1 Type 1 to check the date and time.
- 2 Check that the time is correct and the seconds are incrementing correctly.
- 3 To continue with the test, press the Space Bar.

## 5.5 Loudspeaker

The Functional test continues by testing the operation of the loudspeaker. A short repeating sequence of five musical notes is played and the following message is displayed:

```
      LOUDSPEAKER TEST  
  
      LISTEN AND CHECK SOUND  
  
      THEN PRESS <SPACE> TO CONTINUE
```

You should:

- 1 Listen to the sequence of notes.
- 2 This is a subjective test, so if you detect any deviation, make a note of the fault.
- 3 To continue with the test, press the Space Bar.

## 5.6 Headphones

The Functional test continues by testing the 'Headphones 32Ohm' socket. The following message is displayed as the test proceeds:

```
      HEADPHONE TEST RUNNING  
  
      LISTEN AND CHECK SOUND  
  
      THEN PRESS <SPACE> TO CONTINUE
```

The test consists of a repeating sequence of eight musical notes. The first four notes are played on one headphone and the next four notes on the other headphone.

- 1 Put on the headphones.
- 2 Listen to the sequence of notes.
- 3 This is a subjective test, so if you detect any deviation in either headphone, note down the fault.
- 4 To continue with the test, press the Space Bar.

## 5.7 Standard monitor

This test consists of a series of screen displays. You proceed through the test at your own pace.

The first display consists of a series of white lines radiating from the top-left corner. A cursor, in the shape of a three-coloured acorn, travels across the screen, starting from the bottom left and finishing at the top right. The features to check are:

- the accuracy of the lines
- the movement and integrity of the cursor
- the transparency of the acorn image as it moves across the lines.

This is a subjective test, so make a note of any faults.

When you have finished looking at the screen display, press the Space Bar to move to the next display.

The next screen displays consist of four test cards. There is a test card for each of the three colour guns, and a 'grey scale' to test the three guns. The four test cards are:

- Red scale
- Green scale
- Blue scale
- Grey scale.

Each test card consists of 16 concentric circles beneath a horizontal band which is divided into 16 sections. A pale border highlights the leftmost eight sections of the band in order to distinguish the band from the background. The whole test card is surrounded by a contrasting border.

The purpose of the cards is to display 16 shades with the shade of the border as the middle of the range. You should observe:

- the 16 shades displayed
- the mid-coloured border
- the quality of the 'grey scale' display
- the integrity of each test card.

This is a subjective test, so make a note of any faults which you detect and when you are ready to continue press the Space Bar.

### 5.8 Floppy disc drive

The Floppy disc drive test consists of two parts. The first part of the test checks the write protect mechanism. The test disc must be write protected for this test to work. If the Archimedes disc drive passes the following message is displayed:

```
Insert Test disc 2 in drive 0
Then press SPACE
```

Replace the Test disc with an ADFS 800k write enabled disc, the scratch disc. Any data already on this disc may be destroyed, so it is best to use a blank disc.

The test continues with disc Read, Write and Erase tests. Each test gives a PASSED/FAILED message.

### 5.9 RS423 port

The RS423 port test is carried out automatically and gives a PASSED/FAILED message.

### 5.10 Printer

The Printer test sends a test pattern to the printer. The pattern comprises a repeated series of stepped lines each representing bits 0 to 7. You should look for missing or corrupted pattern. As this is a subjective test so make a note of any faults that you detect.

### 5.11 On completing the tests

On completing the tests the screen displays:

TESTS COMPLETE

and outputs a message to the printer. This indicates that the Archimedes computer has passed all the non-subjective tests. However, the message Tests Complete should NOT necessarily be interpreted as a PASS, since you may wish to fail the computer on one of the subjective tests.

If a failure has been found during the non-subjective tests, the screen displays a FAILED message and lists the failures on the printer, assuming that the printer is functioning and that you did not select the 'All Tests Except Printers' option from the menu.

### 6. Disconnecting the equipment

1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).

2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the computer in the correct order, ie disconnect the:

- Archimedes computer from the mains supply
- monitor from the mains supply
- monochrome monitor from the 'Mono Video' socket OR
- analogue RGB monitor from the 'Analogue RGB' socket
- headphones from the 'Headphones 32ohms' socket
- printer from the Parallel Printer' port
- serial port loopback plug from the 'RS423' socket
- keyboard from the front panel connector.

### 7. Packing

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

## TEST INSTRUCTIONS: 2

### ARCHIMEDES 300 & 400 KEYBOARD FUNCTIONAL TEST

#### Contents

1	Introduction
2	Equipment required
3	Connecting up the equipment
4	Powering up
5	Running the test
5.1	Keys stuck
5.2	LED
5.3	Mouse
5.4	Keys
6	Disconnecting the equipment
7	Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

This test should be carried out whenever you repair or replace either a 300 or a 400 Series keyboard. The test checks that:

- the keys are open and functioning
- the LEDs are functioning
- the mouse buttons are functioning

#### 2. Equipment required

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

- Archimedes keyboard to be tested
- Archimedes mouse to be tested
- Archimedes computer
- known good Archimedes mouse
- 3.5 inch Test disc which is write protected
- monochrome monitor OR
- analogue RGB monitor

The Archimedes computer, keyboard, mouse and Test disc are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

### 3. Connecting up the equipment

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

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

### 4. Powering up

Before beginning the test, ensure that you have saved the contents of the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the computer on. If the 'R' Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.

Normally, you need to execute the 'W Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

### 5. Running the test.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Keyboard Test'.

#### 5.1 Keys stuck

During this test, any keys or mouse buttons which are in a permanently closed position (ie stuck down) are displayed on the screen. If any keys are permanently closed, then it will be IMPOSSIBLE to continue the test.

If everything is normal and no keys are stuck then nothing is displayed on the screen and the Test program passes straight on to the next test.

## 5.2 LEDs

This test checks that the LEDs on Caps Lock, Scroll Lock and Num Lock are working. To carry out this test:

- 1 Follow the instructions which appear on the screen. These tell you when to check that each LED is ON and OFF.
- 2 Note down any LED failures before continuing the test.
- 3 After each set of instructions press Break to move to the next instruction.

## 5.3 Mouse

This tests the three buttons on the mouse and the movement of the mouse to the left, right, up and down. Each of the mouse buttons (ie left, middle, right) are displayed on the screen in turn, together with a pointer. You should:

- 1 Move the mouse until the pointer is within the displayed button on the screen.
- 2 Press the corresponding mouse button. The button displayed on the screen should disappear and the next button appear.

If the button cannot be made to disappear then it will be IMPOSSIBLE to continue the test. You should repeat the test with the known good mouse to isolate the fault to either the keyboard or the mouse. Make such repairs as are necessary, then retest.

If everything is normal, the program moves on automatically to the next test.

## 5.4 Keys

The screen clears to show a representation of keys in the main keyboard area. You need to test each key in turn in the correct order ie work from the bottom line of the keyboard and from left of the keyboard to the right:

- 1 Press Caps Lock.
- 2 Check that the picture of the Caps Lock key disappears from the screen.
- 3 Press Shift and check that the picture of the Shift key disappears from the screen. If the picture of the key does not disappear from the screen then leave a small delay before pressing the next key.

If the screen stops clearing the characters as you press the keys, go back to the lowest, leftmost key remaining on the screen and start again from there.

- 4 Continue working along the bottom line. Then, start working from left to right along the next line up.

**Note:** If you accidentally press two keys together, you will see both keys displayed on the screen. You should press Break to continue.

If the same fault occurs repeatedly or the picture of the depressed key refuses to disappear, then it will be IMPOSSIBLE to continue the test. You should repair the keyboard and start the whole test again.

- 5 When all keys in the main keyboard area have been pressed successfully the screen clears and displays a diagram of the rest of the keyboard area. Again, press each key in turn, following the guidelines above.

6 When all the keys have been successfully pressed, the screen clears and displays the following message:

```
MOUSE TEST - PASSED  
MAIN KEYBOARD TEST - PASSED  
NUMERIC KEYPAD TEST - PASSED  
PRESS RESET BUTTON TO END TEST
```

Press the Reset button on the back of the keyboard. You have now finished the keyboard functional test.

## 6. Disconnecting the equipment

- 1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).
- 2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

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

## 7. Packing

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

## TEST INSTRUCTIONS: 3

### ARCHIMEDES DUAL FLOPPY DISC TEST

#### Contents

1	Introduction
2	Equipment required
3	Connecting up the equipment
4	Powering up
5	Running the test
6	Disconnecting the equipment
7	Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

The Dual floppy disc test should be carried out whenever you install, repair or replace a second floppy disc.

Note: These instructions assume that the second floppy disc drive upgrade has already been correctly installed. Please refer to Section 4, 'Upgrading', if you need instructions for its installation or removal.

#### 2. Equipment required

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

- Second floppy disc drive upgrade to be tested, which should be fitted already
- Archimedes computer
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- ADFS 800k formatted, write enabled, 3.5 inch disc
- monochrome monitor OR
- analogue RGB monitor

The Archimedes computer, keyboard, Test disc and second floppy disc upgrade kit are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

#### 3. Connecting up the equipment

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

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

#### 4. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
  - 2 Insert the Test disc into the floppy disc drive.
  - 3 Whilst holding down the 'R' key, turn the computer on. If the 'R' Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
  - 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.
- Normally, you need to execute the 'R' Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

#### 5. Running the test.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Podules & Upgrades'. The next menu is displayed: Archimedes

```
Podule Tests

1 I/O Podule & MIDI Upgrade
2 Hard Disc Upgrade
3 MIDI Podule
4 ROM Podule
5 Dual floppy disc test
6 Return to main menu
```

- 1 Select the option 'Dual floppy disc test'. The program loads and displays the following:

```
DUAL FLOPPY DISC DRIVE TEST
Insert Test Disc 1 in Drive 0
Insert Test Disc 2 in Drive 1
Then Press SPACE
```

- 2 Leave the test disc in drive 0. Insert in drive 1 an ADFS 800k write enabled disc, the scratch disc. Any data already on this disc may be destroyed, so it is best to use a blank disc.
- 3 The first part of the test checks the write protect mechanism. The test disc must be write protected for this test to work.
- 4 The test continues with disc Read, Write and Erase tests. Each test gives a PASSED/FAILED message.
- 5 When prompted, swap the discs in the drives, then press the space bar. The tests in 3 and 4 above are then repeated, using the opposite drives.
- 6 When prompted, replace the test disc in drive 0

You have now completed the Dual floppy disc test. Return to the main menu and select the 'Quit' option to finish.

## 6. Disconnecting the equipment

- 1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).
- 2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

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

## 7. Packing

Finally repack the Archimedes computer in its box.

## TEST INSTRUCTIONS: 4

### ARCHIMEDES HARD DISC & HARD DISC INTERFACE PODULE TESTS

#### Contents

1	Introduction
2	Equipment required
3	Removing the top cover of the Archimedes
4	Connecting up the equipment
5	Powering up
6	Running the tests
6.1	Formatting the hard disc
6.2	Verifying the hard disc
6.3	Soak test
7	Disconnecting the equipment
8	Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

The hard disc tests should be carried out after you have performed the hard disc upgrade or when you have repaired or replaced a hard disc. These tests enable you to check the formatting and operation of a hard disc and its interface.

Note: These instructions assume that the hard disc upgrade has already been correctly installed. Please refer to Section 4, 'Upgrading', if you need instructions for its installation or removal.

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.

Warning: The test requires that the Archimedes computer be run with the top cover removed. Although the power supply unit is designed to comply with BS415 Class 2, take care to ensure that no metal objects fall (or are put) into the power supply unit through the ventilation holes.

## 2. Equipment required

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

- Hard disc upgrade to be tested, which should already be installed
- Archimedes computer
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- monochrome monitor OR
- analogue RGB monitor.

The Archimedes computer, keyboard and Test disc are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

## 3. Removing the top cover of the Archimedes

- 1 Remove the lid of the Archimedes computer by undoing the five retaining screws and sliding the lid off over the back of the machine.
- 2 Ensure that the hard disc upgrade is fitted correctly.

## 4. Connecting up the equipment

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

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

## 5. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the unit on. The screen will momentarily display a red border before displaying the Desktop environment (or the Arthur supervisor prompt if the computer has not been upgraded to Arthur 1.2).
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.

Normally, you need to execute the 'R' power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

## 6. Running the tests.

To run the test program you should:

- 1 Hold down Shift .
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Podules & Upgrades'. The next menu is displayed:

```
Archimedes Podule Tests

1 I/O Podule & MIDI Upgrade
2 Hard Disc Upgrade
3 MIDI Podule
4 ROM Podule
5 Dual floppy disc test
6 Return to main menu
```

Select the option 'Hard Disc Upgrade'. The next menu is displayed:

```
Test Options

1 Hard Disc Format
2 Hard Disc Verify
3 Hard Disc System Soak Test
4 Park Hard Disc Heads and Exit
```

These four options should be run in the same order as they appear on the menu.

## 6.1. Formatting the hard disc

Select the option 'Hard Disc Format'. After asking which disc is to be formatted an attempt is then made to recognise the hard disc. If the program cannot identify the disc then it is probably unformatted. Choose the correct make from the list given.

Default values for the disc format are then supplied by the program and should be used:

```
Format which drive 4 or 5 ?4
The shape written on the disc matches that of a 20Mb Tandon
Do you wish to retain this shape (Y/N) ?Y
Sectors per track ?32
Heads ?4
Cylinders ?615
Low current cylinder ?1023
Precompensation cylinder ?1023
Parking cylinder ?663
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?
```

If no defects are displayed then the hard disc is unformatted. (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.

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

- 3 Type A. The screen then displays the message:  
Are you certain you want to format drive 4 (Y/N)?
- 4 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, in the following order, the cables, the Podule or the hard disc with a known good part in order to locate the fault.

## 6.2. Verifying the hard disc

Once the hard disc is formatted it must be verified. Select the 'Hard Disc Verify' option from the menu. A message is given indicating the success or failure of the verify.

### 6.3. Soak test

After verifying the disc the 'Hard Disc System Soak Test' option should be selected. 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) are 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 (WFORM) onto the hard disc. You can remove the floppy Test disc while the Soak test is running, but you should not:

- subject the Archimedes computer to any mechanical shock or movement
- turn off the computer unless the test has terminated, ie the PASSED/FAILED message is displayed and you have copied WFORM 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 Seek errors
Heads                         Re-reads Required
Cylinders                     Reformats required
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 Seek errors, Re-reads required, Reformats required, 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 will 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 WFORM onto the hard disc

After a successful test, the test program:

- creates a directory called LIBRARY on the hard disc
- copies the file WFORM into it

The following prompt will appear, in white, on the screen:

```
Copy file adfs::0.WFORM as adfs::4.LIBRARY.WFORM (Y/N/Q/A)?
```

You should:

- 1 Check that the Test disc is in the floppy disc drive. If you have removed the Test disc from the drive, replace it.
- 2 Copy WFORM by typing Y

You have now completed the Hard disc and Interface tests. Select the option 'Park Disc Heads and Exit' to exit the hard disc tests. Return to the main menu and select the 'Quit' option to finish.

## 7. Disconnecting the equipment

- 1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).
- 2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

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

Replace the top cover of the Archimedes computer by sliding on the lid from the back of the computer, then doing up the five retaining screws.

## 8. Packing

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

## TEST INSTRUCTIONS: 5

### ARCHIMEDES ROM PODULE TEST

#### Contents

- 1 Introduction
- 2 Equipment required
- 3 Removing the top cover of the Archimedes
- 4 Connecting up the equipment
- 5 Powering up
- 6 Running the test
- 7 Disconnecting the equipment
- 8 Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

The ROM Podule test should be carried out whenever you install, repair or replace a ROM Podule.

Note: These instructions assume that both the Podule and the backplane holding it have already been correctly installed. Please refer to Section 4, 'Upgrading', if you need instructions for their installation or removal.

Warning: The test requires that the Archimedes be run with the top cover removed. Although the power supply unit is designed to comply with BS415 Class 2, take care to ensure that no metal objects fall (or are put) into the power supply unit through the ventilation holes.

#### 2. Equipment required

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

- ROM Podule to be tested, which should be fitted already
- Archimedes computer
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- 2-way backplane which should be fitted already OR
- 4-way backplane if fitted as an alternative
- monochrome monitor OR
- analogue RGB monitor.

The Archimedes computer, keyboard, Test disc, backplane and ROM Podule are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

### 3. Removing the top cover of the Archimedes

- 1 Remove the lid of the Archimedes by undoing the five retaining screws and sliding the lid off over the back of the machine.
- 2 Ensure that the backplane and its support bar are fitted correctly.
- 3 Ensure that the ROM Podule is fitted correctly.

### 4. Connecting up the equipment

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

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

### 5. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the computer on. If the 'R' Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.

Normally, you need to execute the 'R' Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

## ERRATA

- |           |   |
|-----------|---|
| Section 2 | In addition to the equipment defined in section 2, you will require a ROM Podule test EPROM (Acorn Part No. 0276,230).                    |
| Section 3 | In addition to installing the ROM podule, you will first need to fit the test EPROM in socket 6. Also, set LK1-6 to 'C' and LK2-6 to 'A'. |
| Section 7 | Don't forget to remove the test EPROM from socket 6 of the ROM Podule. Reset the links LK1-6 and LK2-6 as appropriate.                    |

## 6. Running the test.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Podules & Upgrades'. The next menu is displayed:

```
Archimedes Podule Tests

1 I/O Podule & MIDI Upgrade
2 Hard Disc Upgrade
3 MIDI Podule
4 ROM Podule
5 Dual floppy disc test
6 Return to main menu
```

Select the option 'ROM Podule'. The Test program is then loaded and automatically runs. When the test is finished a message is displayed to tell you whether the ROM podule has passed or failed.

You have now completed the ROM Podule tests. Return to the main menu and select the 'Quit' option to finish.

## 7. Disconnecting the equipment

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

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

Replace the top cover of the Archimedes computer by sliding the lid on from the back of the computer, then doing up the five retaining screws.

## 8. Packing

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

## **TEST INSTRUCTIONS: 6**

### **ARCHIMEDES I/O PODULE TEST & MIDI UPGRADE TEST**

#### **Contents**

1	Introduction
2	Equipment required
3	Removing the top cover of the Archimedes
4	Connecting up the equipment
5	Powering up
6	Running the tests
7	Disconnecting the equipment
8	Packing

Note: Please read all the instructions before you start.

#### **1. Introduction**

The I/O Podule test should be carried out whenever you install, repair or replace an I/O Podule.

The MIDI Upgrade test should be carried out whenever you install, repair or replace the MIDI Upgrade for the I/O Podule.

Note: These instructions assume that the I/O Podule, the MIDI upgrade to the Podule (if fitted), and the backplane holding it have already been correctly installed. Please refer to Section 4, 'Upgrading', if you need instructions for their installation or removal.

Warning: The test requires that the Archimedes computer be run with the top cover removed. Although the power supply unit is designed to comply with BS415 Class 2, take care to ensure that no metal objects fall (or are put) into the power supply unit through the ventilation holes.

#### **2. Equipment required**

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

- I/O Podule to be tested, which should be fitted already
- Archimedes computer
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- 2-way backplane which should be fitted already OR
- 4-way backplane if fitted as an alternative
- monochrome monitor OR
- analogue RGB monitor

To test the I/O Podule you will require the following additional equipment:

- Port Tester assembly

from which only the following parts are needed:

- Port Tester main PCB
- 34way IDC skt to 34way IDC skt cable assembly
- 20way IDC skt to 20way IDC skt cable assembly
- 15way IDC D type plug to 15way IDC D type plug assembly To test

a MIDI upgrade you will require the following additional equipment:

- MIDI upgrade which should be fitted already
- Acorn Econet cable

The Archimedes computer, keyboard, Test disc, backplane, I/O Podule, MIDI upgrade and Port Tester assembly are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes computer.

### **3. Removing the top cover of the Archimedes**

- 1 Remove the lid of the Archimedes computer by undoing the five retaining screws and sliding the lid off over the back of the machine.
- 2 Ensure that the backplane and its support bar are fitted correctly.
- 3 Ensure that the I/O Podule is fitted correctly.

### **4. Connecting up the equipment**

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

- keyboard to the front panel connector
- monochrome monitor to the 'Mono Video' socket OR
- analogue RGB monitor to the 'Analogue RGB' socket
- Port Tester '1MHz Bus' socket to the Archimedes '1MHz Bus' socket, using the 34way IDC cable
- Port Tester 'User Port' socket to the Archimedes 'User Port' socket, using the 20way IDC cable
- Port Tester 'A/D Port' socket to the Archimedes 'Analogue Port' socket, using the 15way IDC D type cable
- MIDI IN socket to the MIDI OUT socket, using the Econet cable
- monitor to the mains supply
- Archimedes computer to the mains supply.

## 5. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the computer on. If the 'R' Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.  
Normally, you need to execute the 'R' Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

## 6. Running the test.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break .

The 'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Podules & Upgrades'. The next menu is displayed:

```
Archimedes Podule Tests
1 I/O Podule & MIDI Upgrade
2 Hard Disc Upgrade
3 MIDI Podule
4 ROM Podule
5 Dual floppy disc test
6 Return to main menu
```

Select the option 'I/O Podule & MIDI Upgrade'. A further menu is displayed: Archimedes I/O

```
Podule Test Menu

(c) Acorn Computers Ltd. Version 4.1D

1) I/O Podule Test
2) I/O Podule Soak
3) MIDI Upgrade Test
4) MIDI Upgrade Soak
5) I/O Podule and MIDI Upgrade Test
6) I/O Podule and MIDI Upgrade Soak
7) Return to Main Menu
```

Select the appropriate test from the menu, then follow it with the corresponding soak test. All the tests load and run automatically, giving a PASSED or FAILED message at the end.

Note: The MIDI upgrade can be tested regardless of whether the I/O Podule passed its test or not.

You have now completed the I/O Podule and MIDI upgrade tests. Return to the main menu and select the 'Quit' option to finish.

## 7. Disconnecting the equipment

- 1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).
- 2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

- Archimedes computer from the mains supply.
- monitor from the mains supply
- Econet cable from the MIDI upgrade.
- Port Tester IDC cables from the Archimedes
- monochrome monitor from the 'Mono Video' socket OR
- analogue RGB monitor from the 'Analogue RGB' socket
- keyboard from the front panel connector

Replace the top cover of the Archimedes computer by sliding the lid on from the back of the computer, then doing up the five retaining screws.

## 8. Packing

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

## TEST INSTRUCTIONS: 7

### ARCHIMEDES MIDI PODULE TEST

#### Contents

1	Introduction
2	Equipment required
3	Setting up the MIDI Podules
4	Connecting up the equipment
5	Powering up
6	Running the test
7	Disconnecting the equipment
8	Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

The MIDI Podule test should be carried out whenever you install, repair or replace a MIDI Podule.

Warning: The test requires that the Archimedes be run with the top cover removed. Although the power supply unit is designed to comply with BS415 Class 2, take care to ensure that no metal objects fall (or are put) into the power supply unit through the ventilation holes.

#### 2. Equipment required

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

- Archimedes computer
- Archimedes keyboard
- 3.5 inch Test disc which is write protected
- 2-way backplane which should be fitted already OR
- 4-way backplane if fitted as an alternative
- MIDI Podule under test
- a second, known good, MIDI Podule
- 2 Acorn Econet cables labelled IN and O/P
- monochrome monitor OR
- analogue RGB monitor

The Archimedes computer, keyboard, Test disc, backplane, MIDI Podule and Econet cables are designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn. All items should be complete with the correct cables so that you can connect them to the Archimedes.

### 3. Setting up the MIDI Podules

For this test to function correctly, the MIDI Podules MUST be installed in these positions:

- The MIDI Podule under test must be in the upper socket of the backplane, labelled Podule '0'.
- The known good MIDI Podule must be in the lower socket of the backplane, labelled Podule '2'. It will therefore be necessary to rearrange the Podules in the Archimedes computer. Note the following:
- A record should be made of the positions of any Podules already fitted, so they can be replaced in their correct sockets after the test has been run.
- Section 4, 'Upgrading', has full instructions for the installation or removal of Podules. Please refer to it.

Proceed as follows:

- 1 Remove the lid of the Archimedes computer by undoing the five retaining screws and sliding the lid off over the back of the machine.
- 2 Ensure that the backplane and its support bar are fitted correctly.
- 3 Remove any Podule already in the backplane socket labelled Podule '0'.
- 4 Remove any Podule already in the backplane socket labelled Podule '2'.
- 5 Install the known good MIDI Podule in the backplane socket labelled Podule '2'.
- 6 Install the MIDI Podule under test in the backplane socket labelled Podule '0'.

### 4. Connecting up the equipment

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

- keyboard to the front panel connector
- monochrome monitor to the 'Mono Video' socket OR
- analogue RGB monitor to the 'Analogue RGB' socket
- one end of the Econet cable marked 'IN' to the 'IN' socket of the (uppermost) MIDI Podule under test AND
- the other end of this cable to the 'OUT1' socket of the (lower) known good MIDI Podule
- one end of the Econet cable marked 'O/P' to the 'IN' socket of the (lower) known good MIDI Podule
- monitor to the mains supply
- Archimedes computer to the mains supply.

Note: At this stage the cable marked 'O/P' is only connected at one end. You will be prompted to connect the other end as necessary.

### 5. Powering up

Before beginning the test, ensure that you have saved the CMOS RAM. Then:

- 1 Turn on all equipment EXCEPT the Archimedes computer.
- 2 Insert the Test disc into the floppy disc drive.
- 3 Whilst holding down the 'R' key, turn the computer on. If the Power-up is successful, a red border appears momentarily on the screen before the Desktop environment appears. (The Arthur supervisor prompt appears if the machine has not been upgraded to Arthur 1.2.)
- 4 If the display is not stable, switch off the computer and repeat the procedure described in step 3.

Normally, you need to execute the 'R' Power-up procedure twice in order to display the correct screen. This is because the software toggles between two 'SYNC' options.

## 6. Running the test.

To run the test program you should:

- 1 Hold down Shift
- 2 Press and release Break . The

'Dealer Test Menu' is displayed:

```
Dealer Test Menu

1 A300 Tests
2 A400 Tests
3 Podules & Upgrades
4 Load/Save CMOS RAM
5 Keyboard Test
6 Quit
```

Select the option 'Podules & Upgrades'. The next menu is displayed:

```
Archimedes Podule Tests
1 I/O Podule & MIDI Upgrade
2 Hard Disc Upgrade
3 MIDI Podule
4 ROM Podule
5 Dual floppy disc test
6 Return to main menu
```

Select the option 'MIDI Podule'.

- 1 Once the test program is loaded and the first part of the test has been run, the screen displays the following:

```
ARCHIMEDES MIDI PODULE TEST
(c) Acorn Computers Ltd. Version 1.00
Podule ROM test..... ...Passed
IN socket test..... ...Passed
Move Test Cable to THRU and press SPACE
```

- 2 Plug the free end of the cable marked 'O/P' into the THRU socket of the (uppermost) MIDI Podule under test. Press the space bar to start the test. A PASSED or FAILED message appears.
- 3 When prompted, move the cable from the THRU socket to the OUT1 socket, then press the space bar. A PASSED or FAILED message again appears.
- 4 When prompted, move the cable from the OUT1 socket to the OUT2 socket, then press the space bar. A PASSED or FAILED message again appears.
- 5 A final message appears telling you whether the MIDI Podule has passed or failed.

You have now completed the MIDI Podule test. Return to the main menu and select the 'Quit' option to finish.

## 7. Disconnecting the equipment

- 1 Switch OFF the power to the Archimedes computer (at the mains switch on the rear of the machine).
- 2 Switch OFF the power to the rest of the equipment.

It is important to disconnect the equipment from the Archimedes computer in the correct order, ie disconnect the:

- Archimedes computer from the mains supply
- monitor from the mains supply
- Econet cables from the Podules
- monochrome monitor from the 'Mono Video' socket OR
- analogue RGB monitor from the 'Analogue RGB' socket
- keyboard from the front panel connector.

Now:

- 1 Remove the upper MIDI Podule from the Archimedes computer (the unit under test).
- 2 Remove the lower known good MIDI Podule from the Archimedes computer.
- 3 Replace the Podules removed at the start of the test in their original sockets.
- 4 Replace the top cover of the Archimedes computer by sliding the lid on from the back of the computer, then doing up the five retaining screws.

## 8. Packing

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

## TEST INSTRUCTIONS: 8

### ARCHIMEDES BACK PLANE TESTS

#### Contents

- 1 Introduction
- 2 Equipment required
- 3 Removing the backplane
- 4 Testing the backplane
- 5 Replacing the backplane
- 6 Packing

Note: Please read all the instructions before you start.

#### 1. Introduction

The backplane should be tested if you suspect it is faulty. Likely symptoms of this are:

- All installed Podules fail their tests
- Podules fail their test only if installed in a specific slot
- A known good Podule fails a test, but then passes the same test on another Archimedes computer.

#### 2. Equipment required

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

- 2-way backplane OR
- 4-way backplane
- Continuity/isolation tester

The backplane is designed and specified by Acorn Computers Ltd and may not be changed without written consent from Acorn.

#### 3. Removing the backplane

The backplane must be removed for testing. Note the following:

- A record should be made of the positions of any Podules already fitted, so they can be replaced in their correct sockets after the test has been run.
- Section 4, 'Upgrading', has full instructions for the installation or removal of Podules and of the backplane. Please refer to it.

Proceed as follows:

- 1 Remove the lid of the Archimedes computer by undoing the five retaining screws and sliding the lid off over the back of the machine.
- 2 Ensure that the backplane and its support bar are fitted correctly.
- 3 Ensure that all Podules are fitted correctly.
- 4 If no fault was visible, remove all Podules from the backplane.
- 5 Remove the backplane from the Archimedes computer.

## 6. Testing the backplane.

The backplane PCB should be electrically tested using a suitable continuity/isolation analyser and wire harness to suit.

Note: Due to the presence of an active device no pin on any connector may be subjected to a voltage greater than 300mV with respect to any other pin on any other connector.

## 7. Replacing the backplane.

- 1 Replace the backplane in the Archimedes computer.
- 2 Replace the Podules removed at the start of the test in their original sockets.
- 3 Replace the top cover of the Archimedes computer by sliding the lid on from the back of the computer, then doing up the five retaining screws.

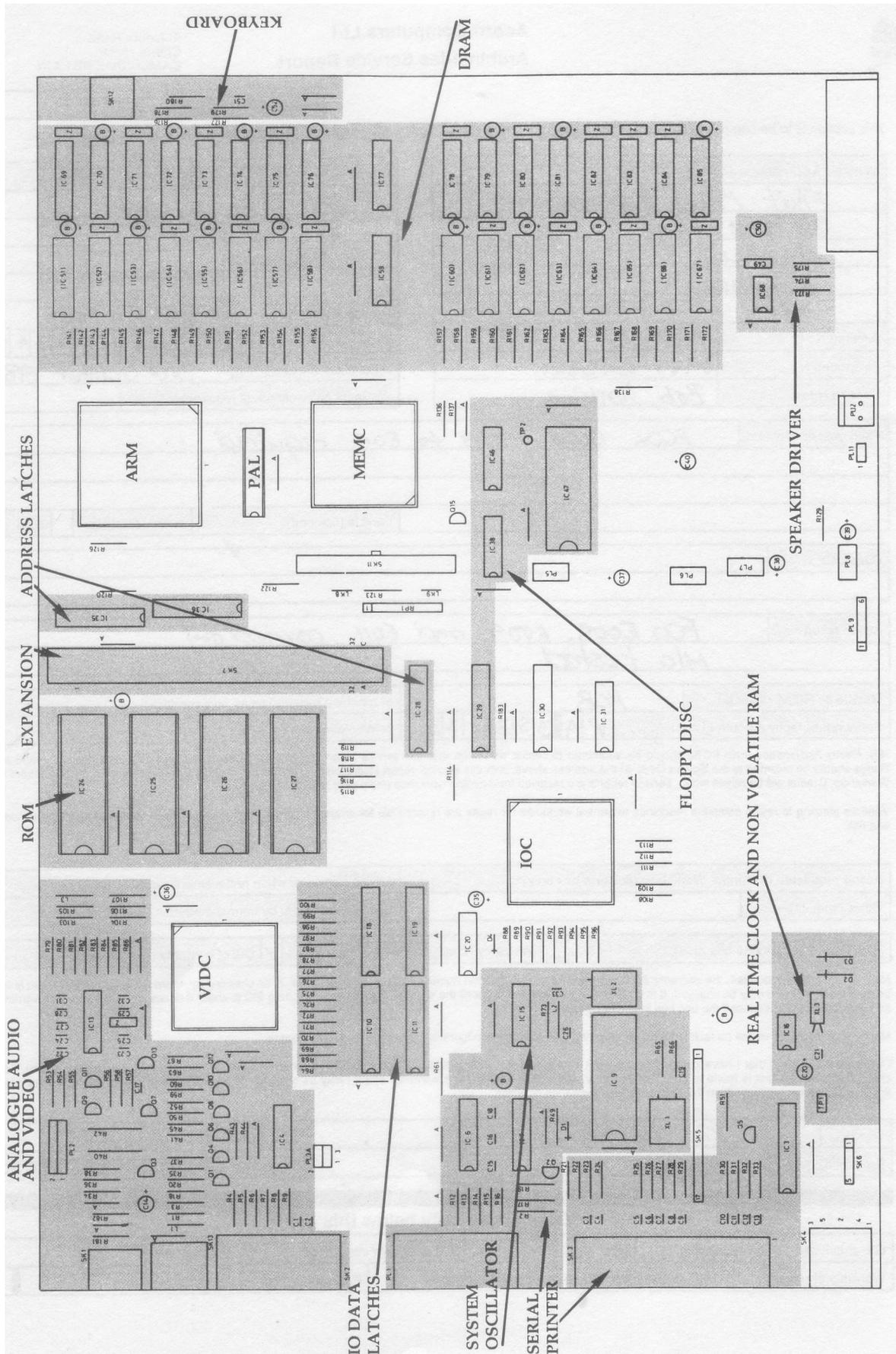
## 8. Packing

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

7.5 Sample Service Report

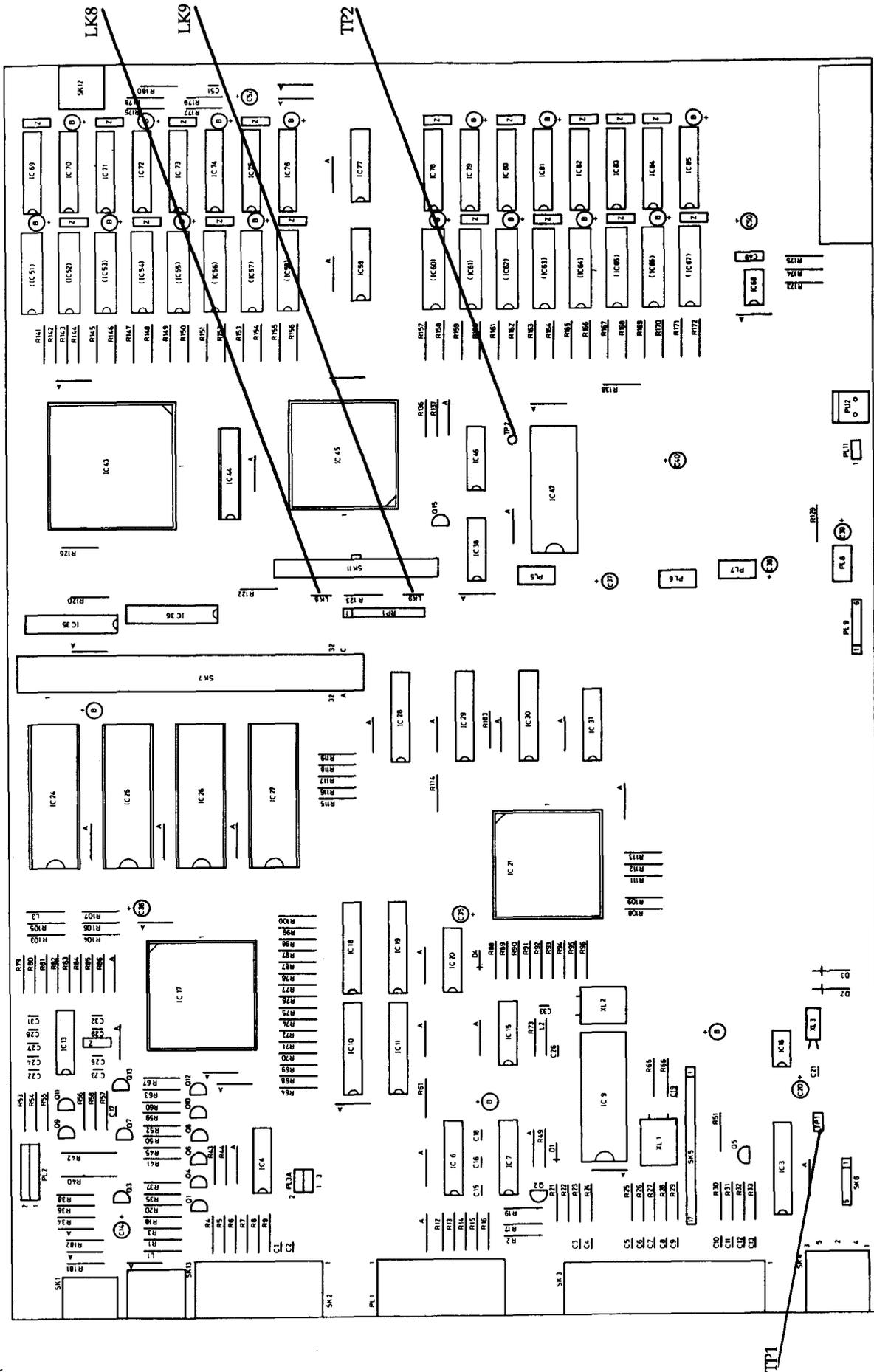
 <b>Acorn Computers Ltd</b> <b>Archimedes Service Report</b>		Fulbourn Road Cherry Hinton CAMBRIDGE CB1 4JN	
		Your reference no.	<b>R181</b>
This section is to be completed by Archimedes approved vendor / Archimedes approved service centre. Mark only in the unshaded boxes.			
Vendor / ASC name + address		Customer name + address	
Fixit Micro Repairs 26 The Street Newtown Anywhere		Mr R.M. Loader 41 The Road Newtown	
Account No	123456	Date of repair	6th February 1988
Telephone No	0987-645321	Serial No.	27 AK B10 0123456
Contact Name	Bob Jenkins	Date of Purchase	3rd October 1987
		Warranty authority no. (if required)	
Fault description		FC0 E008, E009 to E011 required	
		Fault is (tick one)      intermittent      solid	
Diagnosis			
Action taken		FC0 E008, E009 and E011 carried out M/c tested	
Module or fitting replaced	PCB	or machine repaired using no parts (tick)	
Serial no. of faulty module (if any)	PA3831234	or Whole machine returned to Workshop (tick)	
N.B. Faulty Archimedes main PCBs should be submitted to central workshop with this service report using the pre-paid labels provided. All other faulty modules and fittings should be returned to the Spares Dept. at the address above, with this service report. Replacement Archimedes main PCBs will be supplied by return from Central Workshop. Credits will be raised when service reports are received from central workshop (main pcb) or direct from yourself.			
Vendors electing to return complete machines to central workshop for repair are responsible for arranging carriage into and out of central workshop at the vendors cost and risk.			
Action requested of Central Workshop (tick one box only)		Advise originator when replacement ready	
Other (specify)		Send replacement by normal method	
Type of action (tick one box only)		Warranty repair	<input checked="" type="checkbox"/> Out of warranty (chargeable)
Note: If warranty is stipulated, the warranty details or a warranty authorisation number must be marked above. If, on checking by Acorn Computers Ltd the unit is found to be out of warranty you may be charged. It is therefore in your interest to check the warranty status carefully, using SID to check if necessary. Be aware that warranty may be invalidated by a customer if the unit has been mistreated.			
Machines or modules where no fault is found, or requiring only software configuration are not covered by warranty.			
Declaration: I confirm that I have carried out the work shown above. I understand that if the module returned as faulty is found to have no fault on testing, I may be charged. Also, if the unit is found to be out of warranty, and I have claimed for a warranty repair, I may be charged. If the box marked 'Out of warranty (chargeable)' is ticked, I will accept a charge from the central service workshop or Acorn.			
Signed	<i>RS Jenkins</i>	Date	6.2.88
Print name	JENKINS	Credit requested	2000
<b>Official use only below this line</b>			
G.I. check qty	packing	New module sent	Info checked / completed
Warranty checked	Replacements entered	Fault logged	Passed for credit
		Job no:	C.Code

### 7.6 ARCHIMEDES 300 SERIES MAIN PCB FUNCTION MAP

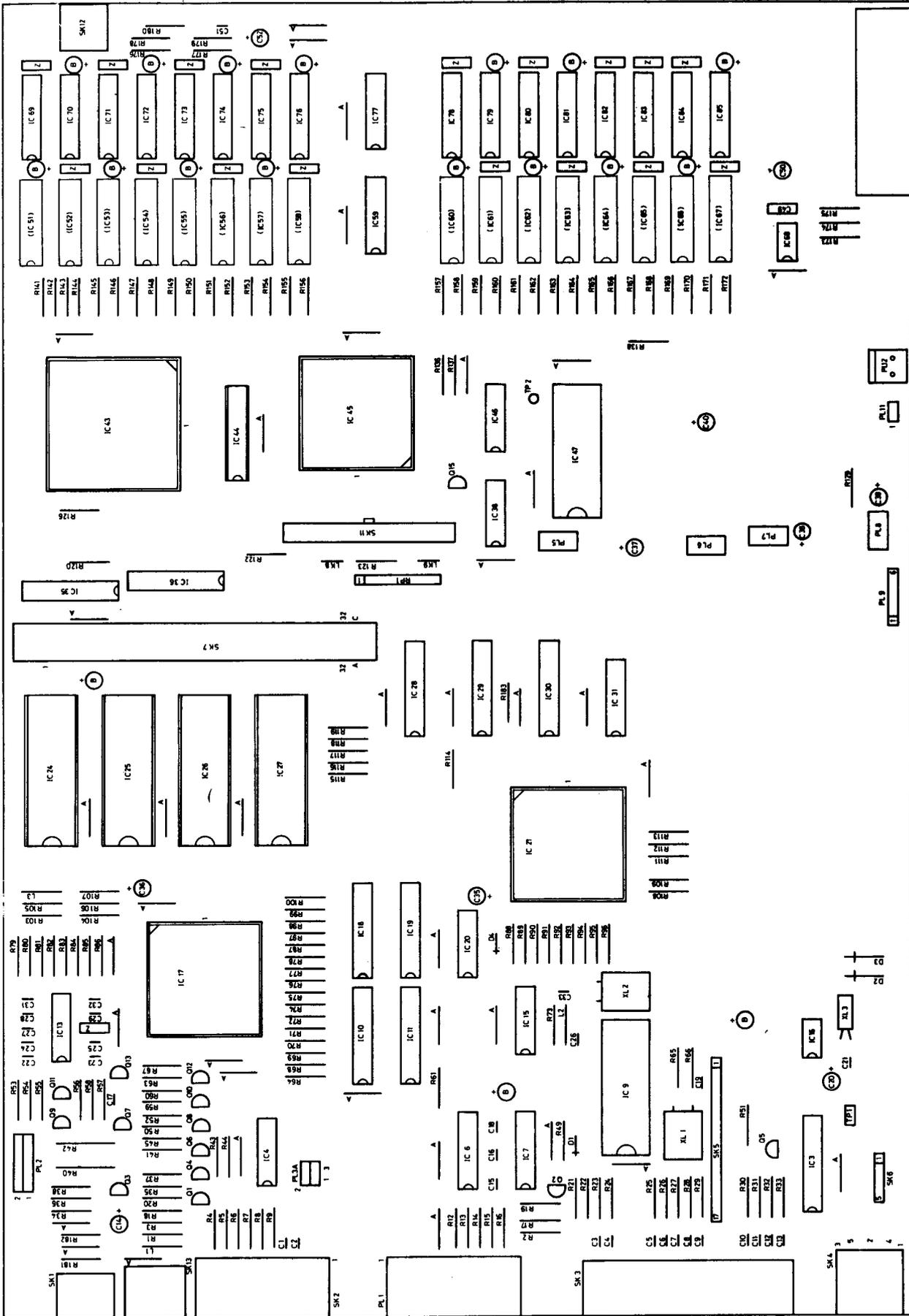




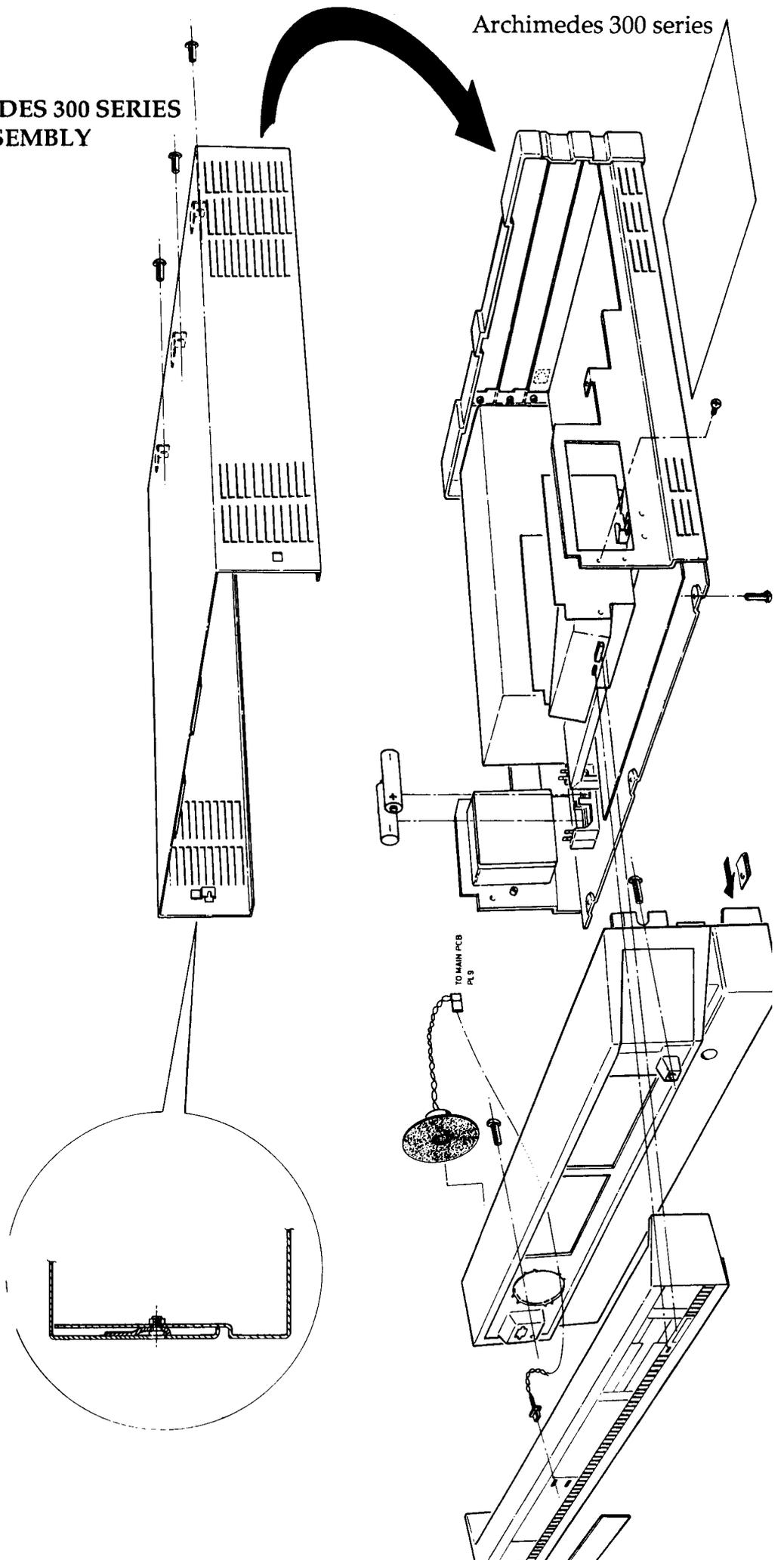
### 7.8 ARCHIMEDES 300 SERIES LINKS AND TEST POINTS



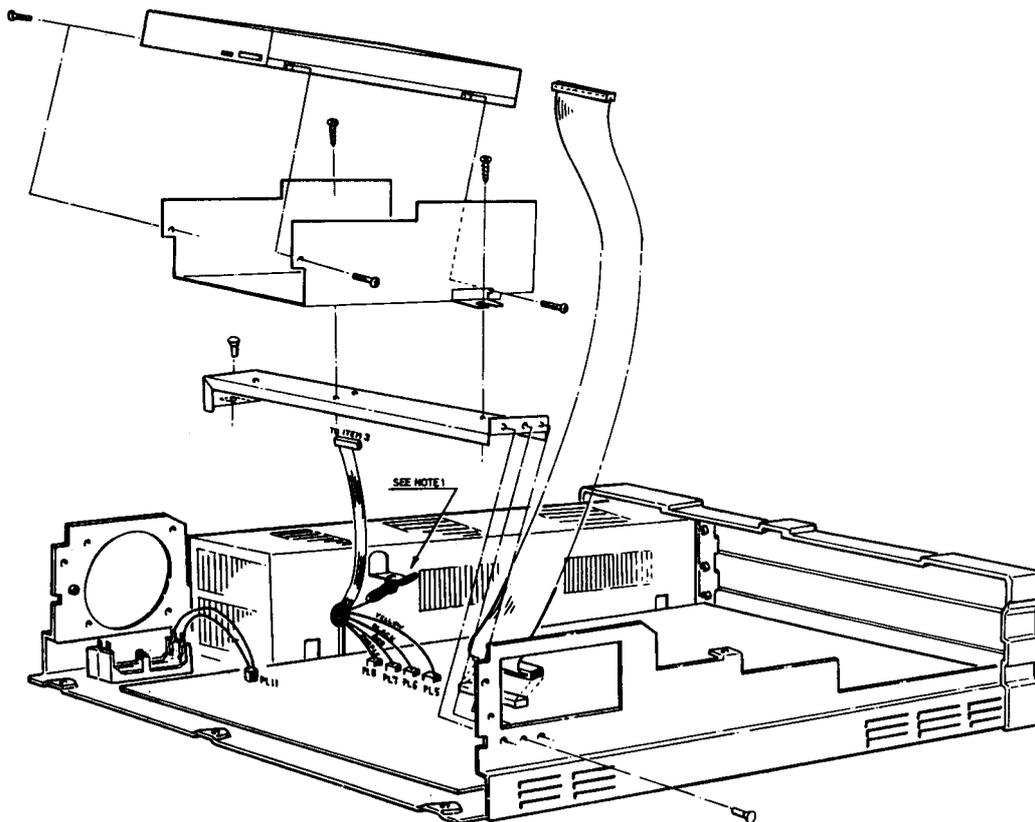
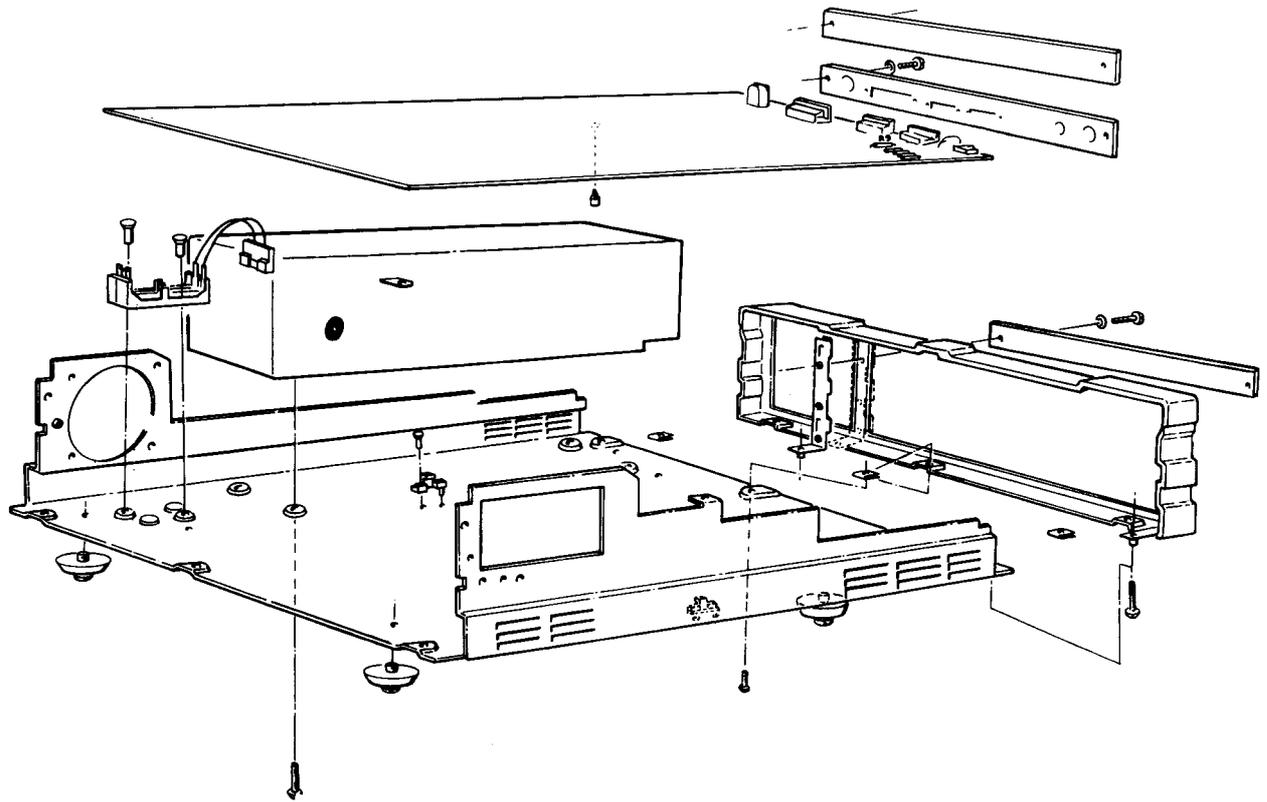
ARCHIMEDES 300 SERIES MAIN PCB COMPONENT LAYOUT

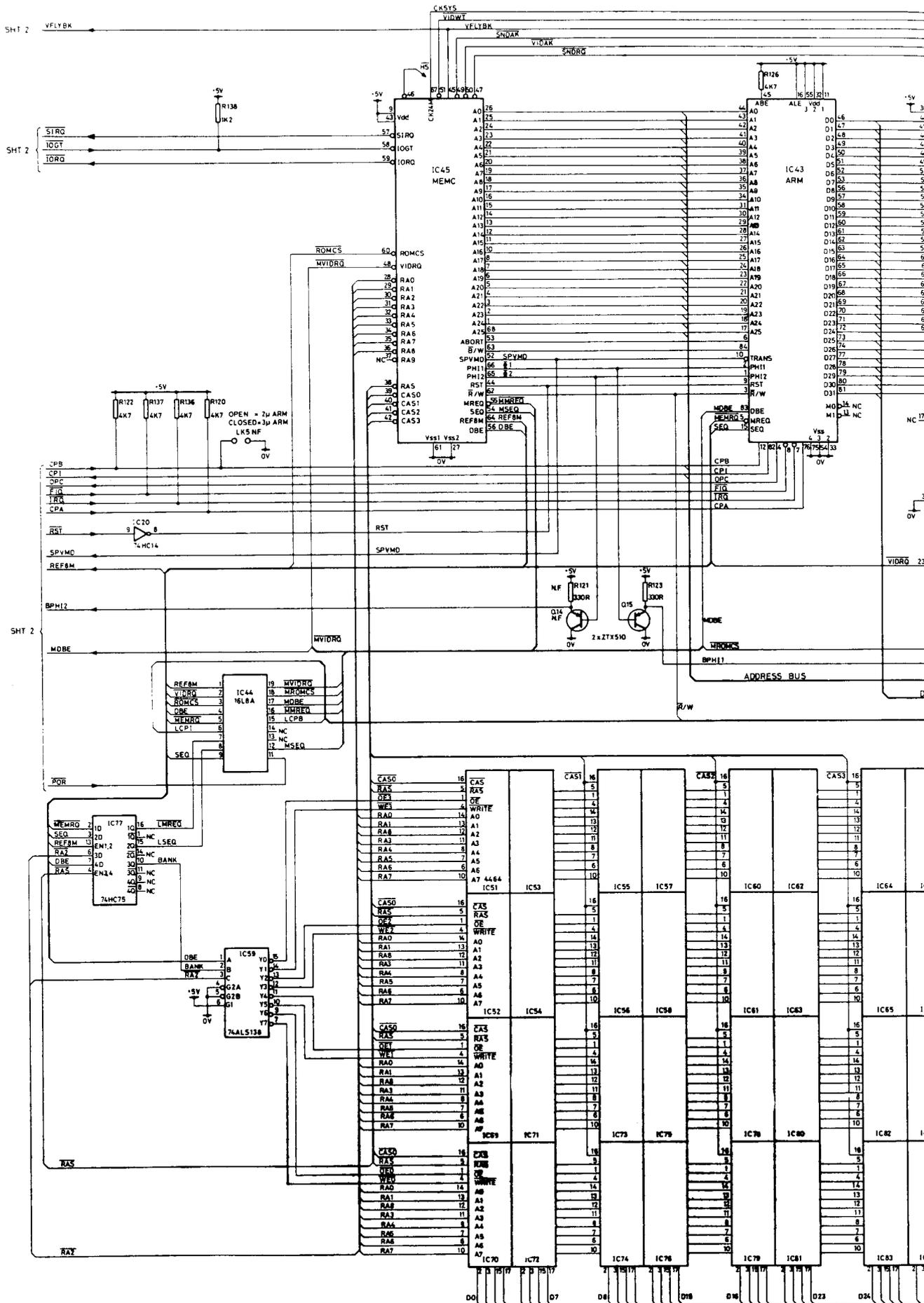


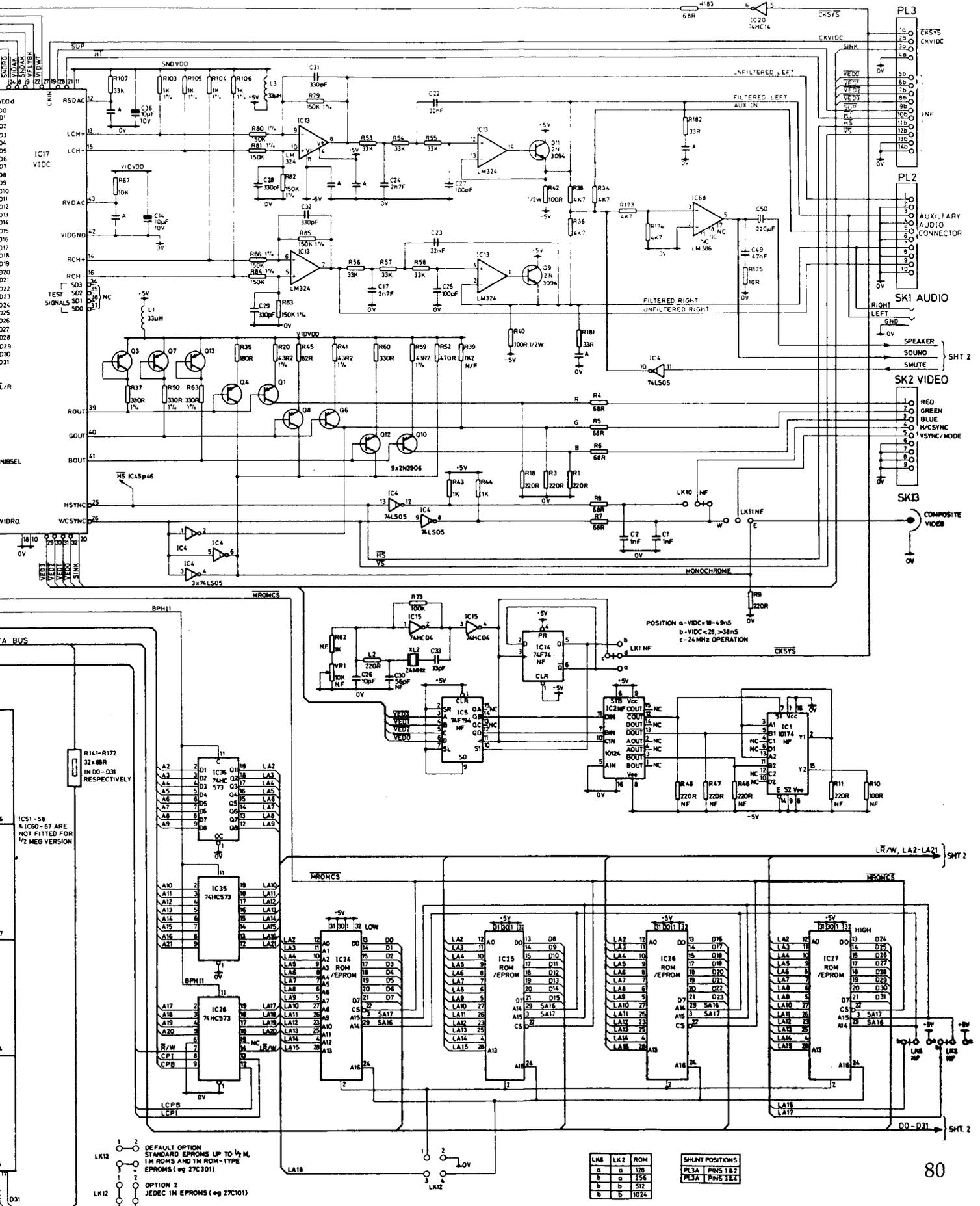
7.10 ARCHIMEDES 300 SERIES  
FINAL ASSEMBLY

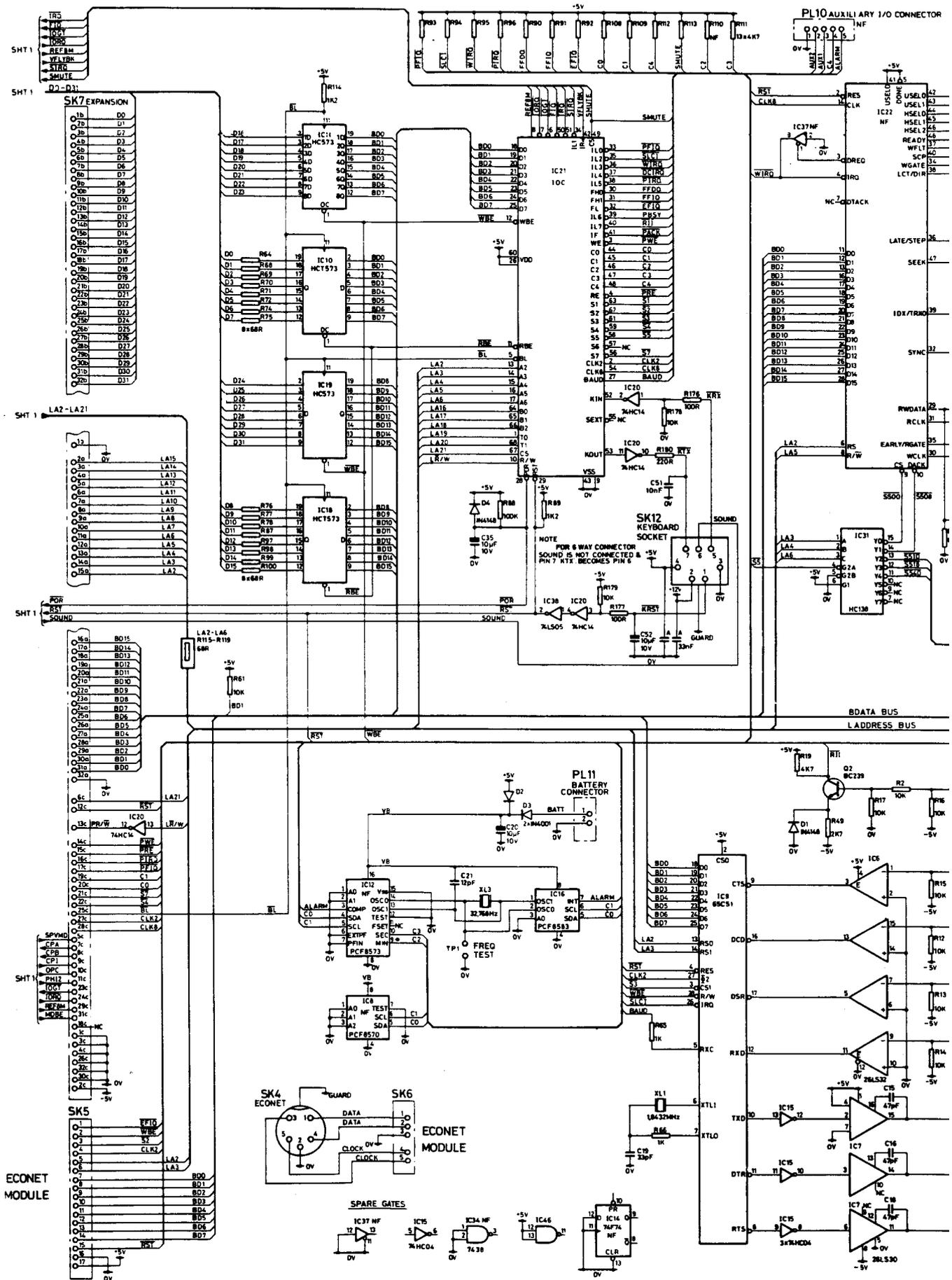


### 7.11 ARCHIMEDES 300 SERIES LOWER CASE ASSEMBLY



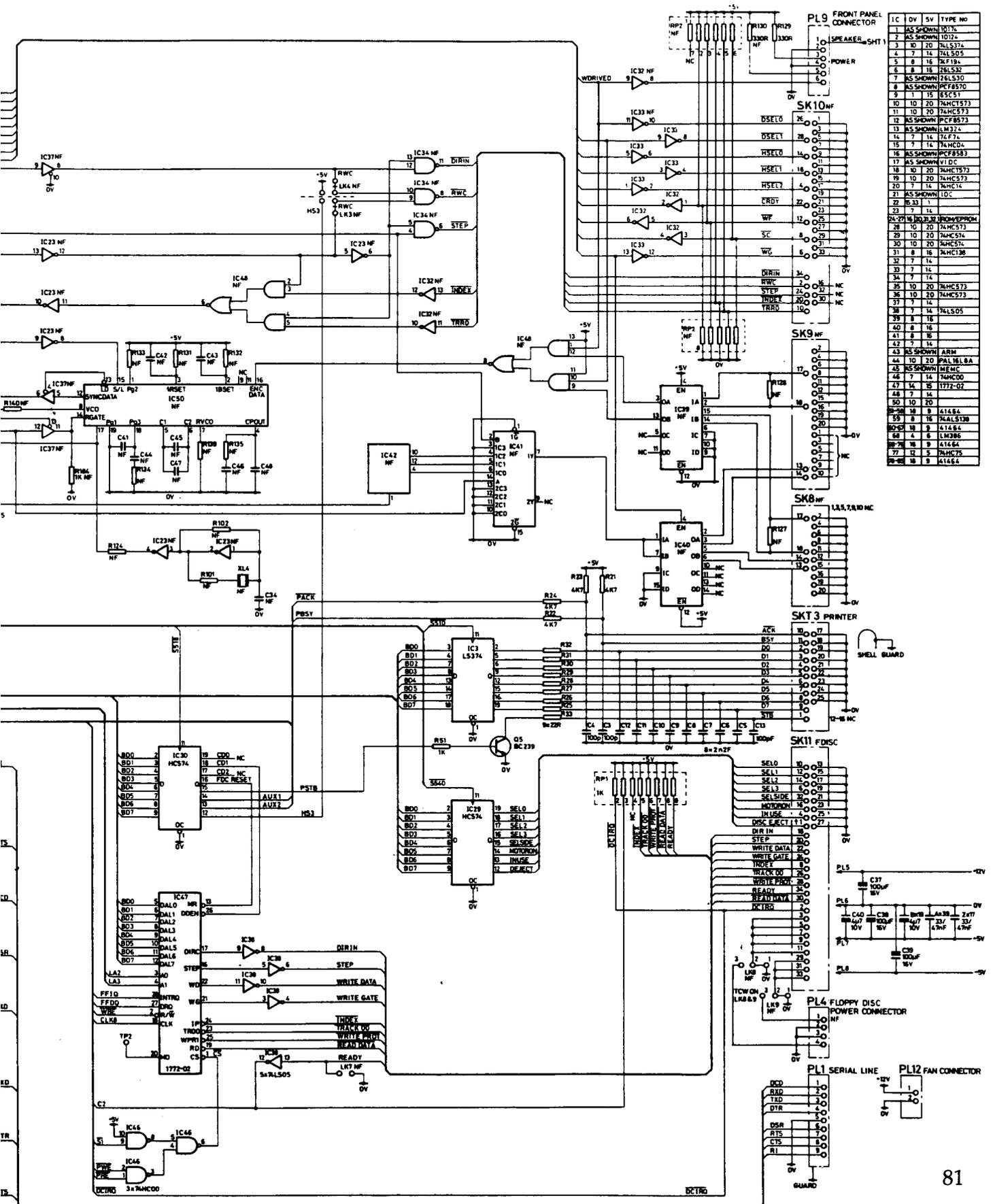






0 SERIES CIRCUIT DIAGRAM

PAGE 2 OF 2



• REMOVE PIN 9 ON IC17 IF FITTED  
 † SOME DRIVES TAKE PIN 1 TO GND. PREFERRED MODIFICATION IS TO 'BREAK' OFF DRIVE PIN 1 TO AVOID SHORTING DIRECT