Support Group Application Note
Number: 208
Issue: 2.0
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Adding External Floppy Disc Drives to the RISC OS family of machines.

This application note describes how to fit external 3.5" or 5.25" floppy disc drives to the RISC OS family of machines. It also describes the types of disc format supported by a particular drive when using RISC OS 2 and RISC OS 3.

NOTE: New A3000/A4000 series computers cannot be fitted with an extra floppy disc drive (see section 4).

Applicable Hardware :
- A5000 series
- A3000
- A300 series
- A400 series
- A440
- A540

Related Application Notes: None

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1.0 Introduction

This application note describes how to connect external 3.5" or 5.25" floppy disc drives to the RISC OS range of machines. It also covers the disc formats supported by a particular disc drive when used under RISC OS 2 and RISC OS 3.

2.0 RISC OS 3 machines

2.1 Supported disc formats

Filing System	Format	Size	Read	Write	Format
Archimedes ADFS	F	1.6 Mb	✔	✔	✔
	E	800K	✔	✔	✔
	D	800K	✔	✔	✔
	L	640K	✔	✔	✔
PC DOS	5.25"	360K	✔	✔	✔
	3.5"	720K	✔	✔	✔
	5.25"	1.2 Mb	✔	✔	✔
	3.5"	1.44 Mb	✔	✔	✔
Atari	3.5"	360K	✔	✔	✔
		720K	✔	✔	✔
DFS⋆	5.25"	100K	✔	✔	✘
		200K	✔	✔	✘

⋆ To be able to read/write to DFS format discs, you need to acquire a DFS reader utility.

3.0 A5000 series

3.1 Floppy disc interface

The A5000 floppy disc interface is designed to support a wide range of floppy disc drives. A total of four drives can be supported through the use of two 34 way floppy disc connectors provided on the main PCB. Two drives can be connected to each connector. Connector A can support a maximum of two internal floppy disc drives. Connector B allows you to connect up to two drives externally.

Connector A (PL10)

This connector can support:

* standard PC-AT type 1MB/2MB floppy disc drives
* PC - XT type drives that automatically sense media type from the disc holes for 3.5"

Two DRIVE SELECT signals (0 and 1) are provided on this connector. The internal floppy disc drive(s) are fitted to this connector.

Connector B (PL11)

This connector can support:

* standard PC-AT type 1MB/2MB drives
* PS/2 type 1MB/2MB drives
* older 1MB 3.5" drives
* various 5.25" drives (as used with the BBC B/Master)
* 5.25" 1.2Mb PC-AT (single speed) drives

The DRIVE SELECT 2 and DRIVE SELECT 3 signals from the main PCB connect to DRIVE SELECT 0 and DRIVE SELECT 1 on the floppy disc drives. This allows for disc drives with only a 0/1 ID setting.

3.2 Drive/Format chart

The following chart describes how to make the link settings, depending upon your particular type of floppy disc drive. You should configure the step rates using the *CONFIGURE STEP command (this command is fully documented in your User Guide).

DRIVE TYPE			FITTING CONFIGURATION				FORMATS SUPPORTED			
Size	**Tracks**	**Density**	**Links LK18**	**LK19**	**LK21**	**Configure Step**	**Filing System**	**Format Size**	**Disc Density**	**Step Rate**
3.5"	80	Double	A Any	1-2	2-3	3	DOS	720K	DS/DD	Single
			B Any	None	1-2					
							ADFS	800K E	DS/DD	Single
A For drives with DISC CHANGE on pin 2, READY on pin 34								800K D	DS/DD	Single
B For drives with DISC CHANGE on pin 34								640K L	DS/DD	Single
3.5"	80	Double/High	C 1-2	2-3	1-2	3	DOS	1.44 MB	DS/HD	Single
			D 2-3	2-3	1-2			720K	DS/DD	Single
C For a PC-AT type drive							ADFS	1.6 MB	DS/HD	Single
D For a PS/2 type drive								800K E	DS/DD	Single
								800K D	DS/DD	Single
								640K L	DS/DD	Single
5.25"	40	Single	Any	None	2-3	6 or 12	DOS	360K	DS/SD	Single
							DFS	100K	SS/SD	Single
5.25"	80	Double	Any	None	2-3	3 or 6	DOS	360K	DS/SD	Double
* Note: Double-sided discs can be used as separate drives.							DFS	100K 40T	SS/SD*	Double
								200K 80T	SS/SD*	Single
								400K 80T	DS/DD	Single
							ADFS	800K E	DS/DD	Single
								800K D	DS/DD	Single
								640K L	DS/DD	Single
5.25"	80	High	1-2	2-3	1-2	3 or 6	DOS	1.2 MB	DS/HD	Single
							ADFS	Cannot be used for ADFS formats		

3.3 How to fit an external drive

CAUTION: Damaging any components of the A5000 may invalid your warranty. If you do not feel confident about carrying out this operation, contact your local Acorn Dealer who may be able to connect the drive for you.

Disassembly

1) **Safety Warning! Switch off and disconnect the computer from the mains supply, then switch off and disconnect all peripherals (including the keyboard).**

2) Place the computer on a work surface with a clean, soft covering (e.g. a blanket) and turn it over so that it rests on its top cover.

3) Remove all six screws holding the metal lid in place. Store them somewhere safe.

4) Rest the computer on its base again and slide the lid backwards to the rear of the computer. Remove the lid completely.

5) External drives should always be connected to Connector B (PL11), as this connector allows for longer startup time etc. You should keep the data cable length as short as possible (approx 24" max), to ensure reliable data transfer. You are advised to fit a panel mounted connector on one of the expansion slots at the rear of the computer. You should not let the cable hang out of the rear of the machine. Contact your local dealer who may be able to supply such a panel.

NOTE: In some circumstances, a disc buffer card may be required. For instance,

a) to provide EMC filtering in those countries where this is required.
b) to protect devices on the main PCB where high levels of static electricity are encountered.
c) to protect devices and improve reliability where long cables are used.
d) to support a panel mounted connector allowing the drive to be disconnected easily.

6) The external drive(s) should have their ID numbers set to 0 and 1 respectively.

7) Towards the bottom right hand side of the machine (looking from the front), you will find three links (LK18, LK19, LK21) and 2 connectors, A (PL10) and B (PL11). Refer to the chart in the next section on how to make the link settings.

8) Slide the lid back on the computer and insert all screws holding the top case in place. Reconnect all peripherals and the A5000 to the mains supply.

9) The external floppy disc drive(s) should be powered externally, either through their own power supply if fitted, or by purchasing one from your local electronics supplier.

4.0 New A3000/A4000 series

4.1 Floppy disc interface

Though the floppy disc controller hardware in the new A3000/A4000 is essentially the same as the A5000, it is only possible to have ONE floppy disc drive connected, ie. the one fitted to the machine as standard. This is designed to support a single PC-AT style disc drive. The floppy disc drive attaches to a 34-way connector.

This connector (PL9) will only accept

* standard PC-AT 1MB/2MB drives
* PC-XT drives that automatically sense media type from the disc cut-outs.

5.0 RISC OS 2 machines

5.1 Supported disc formats

Machines fitted with RISC OS 2 as standard are not capable of utilising the high density disc formats supported by RISC OS 3. This is due to the 1772 disc controller hardware which can only support 1Mb maximum discs. Therefore, RISC OS 2 machines are capable of supporting only the following ADFS formats with the standard internal 3.5" disc drive:

ADFS E 800K new map
ADFS D 800K old map
ADFS L 640K
ADFS S & M read only

DOS 720K using !MultiFS or similar software

With an external 5.25" drive, it is also possible to read/write:

DOS 360K
DFS 100K/200K using suitable DFS reader software.

5.2 Extra formats provided by upgrading to RISC OS 3

Upon upgrading your machine with RISC OS 3, you are also provided with support for the following disc formats from the standard internal 3.5" disc drive:

DOS 720K
Atari 360K
Atari 720K

If you have an external 5.25" floppy disc drive then the following formats are also supported:

DOS 360K without additional software (e.g. !MultiFS)

NOTE: You cannot use the following high density drive formats:

ADFS F 1.6Mb (3.5" High Density floppy discs)
DOS 1.2Mb (5.25" High Density discs)
DOS 1.44Mb (3.5" High Density discs)

It may be possible in the near future however, using a third party upgrade, to attach a high density drive to your machine, which would enable you to read from/write to the above formats.

5.3 How to fit an external drive:

It is not possible to directly connect an external drive to any of the systems described in the following section without additional hardware. The additional hardware required is often referred to as a 'Disc drive buffer board'. Acorn does not produce such an upgrade, hence a number have been produced by various third parties (some addresses are supplied in the Appendix).

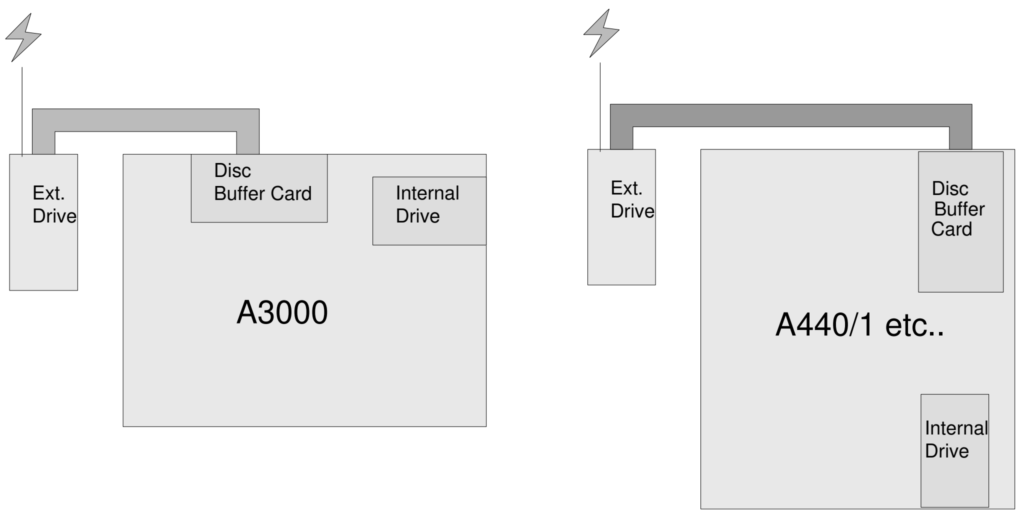
NOTE: None of the boards have been audited by Acorn and we are unable to comment on their suitability.

5.4 A300 series/A400 series/A440/A540 and BBC A3000.

Full fitting instructions will be supplied with the upgrade, but you need to choose the correct upgrade for your machine.

Single width podule Disc buffer cards for the Archimedes range will fit in the A300 series, A400 series, A440 and A540 computers. As the A3000 has a mini-podule slot which cannot house standard single-width podules, a number of third parties have produced 'A3000' specific disc buffer cards.

You will also need to obtain an external power source for the additional disc drive(s).



6.0 Appendix

The following third parties supply a combination of the products discussed in this application note:

DFS Reader	DFS Reader	
Disc Buffer Card	Disc buffer card	Disc buffer card
RISC Developments	PRES Ltd	Watford Electronics
117 Hatfield Rd	PO Box 319	Finway
St. Albans	Lightwater	Dallow Road
Herts	Surrey	Luton
AL1 4JS	GU18 5PW	LU1 1TR
Tel: (0727) 40303	Tel: (0276) 72046	Tel: (0582) 487777

Disc Buffer Card	Disc Buffer Card	Disc Buffer Card
Morley Electronics	CJE Micros	HCCS Ltd
Morley House	78 Brighton Road	575-583 Durham Road
West Chirton Ind.Est.	Worthing	Low Fell
North Shields	West Sussex	Gateshead
Tyne and Wear	BN11 2EN	Tyne and Wear
NE29 7TY		NE9 5JJ
Tel: (091) 257 6464	Tel: (0903) 213361	Tel: (091) 487 0760

High Density drive interface

Arxe Systems
PO Box 898
Forest Gate
London
E7 9RG

Tel: (081) 534 1198