Developer Application Note
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Writing applications for the Acorn A4

This application note outlines what the application author needs to take into account when writing applications for the Acorn A4 computer.

Applicable Hardware : Acorn A4 computer

Related Application Notes: None

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1. Introduction

The Acorn A4 computer is the first RISC OS portable computer to be produced by Acorn. It is essentially an A5000 in a smaller portable box. Being a portable computer, the Acorn A4 has significant differences in hardware compared with other systems that Acorn have produced, with the differences being associated with portability.

This document outlines some of the differences and points out certain aspects that application authors should consider when developing software for use on the hardware platform.

2. Machine user interface

The Acorn A4 computer has a different user interface, regarding the screen and the keyboard, to other machines that have been produced.

2.1 Screen Display

The screen display for the Acorn A4 is an edgelit LCD (Liquid Crystal Display), 182mm × 137mm viewing area, with a *fixed* dot pitch of 0.27mm². It is a negative display (white dots on a black background), and it provides a 15 grey scale palette and a resolution of 640×480 dots at a frame rate of approximately 85Hz. The default – *and the only intended* – mode for the display is Mode 27 which is a 16 'colour' VGA mode, although other RISC OS display modes are emulated in letter box formats and/or by pixel doubling. The screen itself has the same 4:3 aspect ratio as a standard VGA monitor. The colour to greyscale translation is based on luminance, in accordance with a 4G + 2R + 1B rule. The exact mapping from the derived luminance level to the 15 grey scales is still being refined.

Note that LCD displays are relatively 'slow' i.e. they have a considerable persistence which causes the display to appear smeared if objects are dragged rapidly or animated. This persistence increases at lower temperatures.

A 15pin VGA D-type connector is provided for connection to an external monitor, although only one of the monitor or the LCD can be active at any one time.

2.2 Keyboard

The keyboard in the portable has some differences that the application author will need to take into account. The keyboard has [only] 83 keys; a numeric keypad is embedded and there are only ten physical function keys. The functionality of F11 and F12 and the numeric keypad are accessible via an additional special shifting key (FN). The logical layout is exactly as a UK PC, i.e. not identical with the Acorn Archimedes [US] layout and the PC Emulator, for example, requires a 'KEYB UK' or equivalent command at an appropriate point in its start-up.

With the implementation of the FN key, the use of keyboard short cuts can become more complicated. On a standard RISC OS 3 machine, the following key sequence causes the machine to shutdown:-

shutdown = Ctrl + Shift + F12

On the portable, the shutdown sequence needs an extra key as follows:-

shutdown = Ctrl + Shift + FN + F2

The application author needs to check that the keyboard short-cuts implemented are not too tortuous for the average user to employ. Special attention needs to be made by authors who are aiming their software at the special needs market.

Developers should not make use of the 'FN' key for keyboard shortcuts in their own software. However, if you are developing portable specific software and wish to make use of the 'FN' key then you should contact developer support detailing which keyboard combinations you wish to use. This will prevent confusion if Acorn wish to assign 'FN' key combinations in the future.

A connector is provided for the connection of an external PC/AT keyboard with a 6 pin miniDIN connector. External Archimedes keyboards are not supported.

2.3 Mouse

A standard Acorn mouse is supplied with the Acorn A4. The mouse plugs into the main unit via a 9 pin miniDIN plug, the same connector as that of an Archimedes. However, although unsurpassed as a pointing device, operation of the mouse when away from a suitable flat surface may not always be convenient. Hence, it is important that applications software has adequate keyboard short-cuts to enable the user to drive the majority of common tasks from the keyboard. The portable does have the ability to 'emulate' the mouse from the keyboard using the FN key and the cursor keys, although this does require a little practise and is not a total substitute for a mouse. All keyboard short-cuts should follow the rules laid out in the RISC OS Style Guide.

2.4 Sound

The Acorn A4 has a very small internal mono speaker. The actual sound produced by this speaker is quieter and of subjectively lower quality than an Archimedes speaker. A 3.5mm stereo jack socket (32Ω) allows personal headphones or other amplification equipment to be connected directly. The sound quality via the jack socket is at least as good as that produced by standard Archimedes computers.

3. Programmers interface

The actual programmer's interface has not changed for the portable. RISC OS 3 Version 3.10 is provided as the operating system and all interfaces are still supported. However, certain rules need to be followed to ensure that the software runs as effectively on the Acorn A4 as on any other RISC OS platform.

3.1 Colours

As the Acorn A4 displays 'only' in one mode and in 15 greyscales it is important that the application author produces mode independent software. The generation of software that relies on running in mode 12 with 16 true colours is not likely to be accepted by users and may not run in an effective way on the portable machine. The rendering of sprites for filer viewers and iconbar sprites will have their colours automatically translated by the Window Manager. However, the application author should always use ColourTrans when dealing with colours (i.e. when rendering sprites in windows the programmer should call ColourTrans_SelectTable for mode- independent sprite rendering).

Application developers should always supply a !Sprites22 with their application. The high resolution sprites look better in grey-scale.

4. Battery

The Acorn A4 is powered by a Nickel Cadmium Battery that has an average useful life of approximately 3 hours from fully charged. The portable is supplied with a mains power supply / charger unit that connects via a 9 pin D-type connector at the back of the machine. When the portable is connected to the PSU during normal operation, the battery is automatically charged whether the machine is in use or not.

An interface is provided to the user/programmer by an application called the Battery Manager. The Battery Manager will provide constant feedback of battery power remaining to the user via an icon. This will be a sliding bar whose indicated level will indicate the proportion of nominal full capacity that remains in the battery.

4.1 Running out of power sequence: inside the desktop

The application author needs to understand what series of events will occur when the battery level has run down to a level that will require a re-charge. This series of events consists of three different thresholds (T1, T2 and T3) which are as follows :-

At point T1 (as defined above), the Battery Manager will flash the screen repeatedly, accompanying each flash with two short beeps to indicate that the battery is nearly discharged and the Battery Manager will display an error box indicating this. When the user next presses a key, this flashing will stop and the machine will return to normal use and the user will have to acknowledge the error box. The user will be expected at this stage to complete whatever he is doing and shut the machine down.

At point T2, the Battery Manager will attempt to shut down the machine. This will cause each application that is aware of the auto-shutdown mechanism to save its data to a safe place (at the moment, the safe place is defined as '<Wimp$ScrapDir>.AppName.data').

Applications that are not aware of the auto-shutdown mechanism will still be shut down and any unsaved data will be lost. At the end of a T2 forced shutdown, a CMOS flag will be set. On the next occasion the Wimp is activated, it will detect this flag and issue a warning box "the last shutdown was a forced shutdown", and clear the CMOS flag. This will remind the user to retrieve data which may have been auto-stored by a knowledgeable application in some default or particular place. If the application wishes to be 'clever' it may try and re-load any data that was saved due to a low power forced shutdown.

When the auto-shutdown has completed, the Battery Manager will tell the BMU to switch off the computer, so preventing the user from resuming activity when there is insufficient battery charge remaining to support it.

It is intended that point T3 will never be reached as the Battery Manager should have commanded the BMU to remove the power before then. It may, however, be reached under exceptional circumstances: e.g. machine crash. At point T3 the Battery Manager Unit will immediately assert the reset line and then remove all power. If the machine does reach this stage there is nothing that the application can do.

4.2 Running out of power: outside the desktop

At point T1, the Battery Manager will flash the screen and generate a double bleep accompanying each flash (even if the speaker is disabled). The flashing will stop once the user presses a key. This action is the same as the desktop action, except the user won't be given an error box.

At point T2, the Battery Manager will *ShutDown the machine and command the BMU to remove the power.

4.3 Auto-shutdown mechanism

It will be of considerable benefit to the user of the application if it is aware of the auto-shutdown mechanism. This enables the application to save its data in a safe place if the machine runs out of power unattended, and should prevent the user from losing his data.

The auto-shutdown mechanism is a broadcast message that is sent by the task manager. The message is as follows:-

Message_Shutdown 14
Data field: None

This message will enable applications which know about it to perform some pre-determined action such as saving any modified data in a known place.

When this message is broadcast, the Task Manager will claim the UpCall 'Media Search' and if any discs need to be changed (i.e. to save data in a safe place) an error 'disc not found' will be returned. In this instance, the application should not display the error message. The shutdown save should be automatic and require no user intervention.

5. Machine expansion

The Acorn A4 has a limited expansion capability. The base model is a single floppy disc 2MByte RAM system, up-gradable to 4MByte and an internal hard disc. The high-end model has 4MByte RAM and an internal 60 MByte hard disc. Econet networking is provided by an optional module that is internally fitted. There is no backplane or internal expansion bus available for expansion cards.