

# FUTURE OF THE COMMUNICATOR

**The Communicator is a desktop communications, workstation designed by Acorn to be developed for business use by other manufacturers. How does it square up to its competitors in the market?**

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In case you hadn't heard, Acorn has designed and sampled a desktop communications workstation which it isn't going to sell to the likes of you and me. More fool them, since it takes Acorn's eight-bit 6502-based architecture to the logical 16-bit conclusion many Acorn supporters have been waiting for. At the same time it provides scope for exciting communications applications, and some of the possible peripherals are a dream come true.

The Acorn C-Series Communicator is designed as a building-block to which Value Added Retailers (VARs) could add their own peripherals, software and label. So far none of the major companies which have been shown the machine has taken up Acorn's offer (minimum order 500), and Acorn says that it has currently no plans to market the machine.

This review discusses the hardware and software design which makes the Communicator a serious rival to the QLs and One Per Desks of the business marketplace.

The Communicator is housed in a cool blue-grey low-profile box surmounted by a slightly cramped 90-key keyboard. It has a bracket at the left-hand end to support an optional pushbutton telephone, and a large Electron-style expansion connector (complete with nasty plastic protective cover) on the right-hand end. The back has all the standard sockets such as RGB monitor, Econet, parallel printer and LCD display (!) -- provision is made for an arbitrarily large liquid crystal screen, though Acorn did not show me one working. A monochrome monitor can be hooked up via the display socket.

The keyboard has a main qwerty typing area with a slightly different layout from that of the BBC micro's.

Separate numeric and cursor-key pads make life a little easier, but many of these keys have several legends printed on them which I found rather confusing. A number of special keys are also present, of particular importance the Help

and Stop keys, discussed in detail below. The expansion connector has two secure bolt-holes for fixing add-ons, about which Acorn has little to say except 'anything is possible'. Prototype peripherals considered by Acorn have included twin dictation cassette drives (for voice and data storage), a Euro-standard teletext decoder, a cable TV interface and a Euro-standard teletext decoder, a cable TV interface and a fully digital CODEC interface for speech storage and, possibly, recognition. The dictation cassette drives would allow the machine to act as a telephone answering machine for both human and electronic callers as well as providing the obvious office function of taking letters.

### **Integral modem**

One of the Communicator's central features is its self-contained auto-dial/auto-answer multi speed modem. This offers all the usual combinations of 75, 300 and 12000 bits per second (bps) data transfer, as well as having both pulse and modulated frequency tone dialling (the latter commonly used by office telephone exchanges). Having the modem built-in means that the RS423 socket is free for printers and other serial devices, and also allows Acorn to bring the telephone lines out on an expansion port for use by future peripherals.

Either 128k or 512k bytes of dynamic memory can be fitted inside the case 64k or 256k RAM chips. The screen memory is provided by a quite separate block of 32k of dynamic memory connected directly to the screen controller. Additionally, up to 32k bytes of battery-backed CMOS RAM may also be present. Up to a megabyte (!) of firmware can be installed in the four 128k byte ROM sockets, ensuring that applications' developers will not lack space.

The display is provided by Acorn's trusty semi-custom chip, 'Aberdeen', also known as the Electron ULA. This single chip contains all

the circuitry needed to generate BBC micro-compatible screen modes 0-6, though at the expense of some processor speed when display memory is accessed in modes 0-3. A software simulator exists to provide a monochrome version of mode 7 and this is used by the Prestel software discussed below.

The Communicator's Central Processing Unit (CPU) is the 65816, a 16-bit device designed as a fully compatible upgrade for the 6502, running at 2MHz. It has two modes of operation: an extended (16-bit) mode and a 6502 emulation mode. The latter allows it to run 6502 software without modification, though the Communicator does not make use of this feature. The processor has a 16-bit internal architecture, but in order to make it fit into a standard 40-pin package some of the address pins are multiplexed onto the data bus (rather like the Intel 8088). There are 24 address lines, providing 16 megabytes of address space which is divided into 256 'banks' of 64k bytes. An eight-bit Data Bank Register controls which bank is being accessed, but 'Long' instructions exist to access memory in the rest of the address space.

Internal registers include a 16-bit Program Counter (with an associated eight-bit Program Bank Register), a 16-bit Accumulator and two 16-bit index registers. The stack pointer is also 16 bits long, though the stack must always reside in bank zero. A 16-bit Direct Register allows any 256-byte section of bank zero to be treated as 'zero page', with consequently faster instructions, and so on.

There are 24 addressing modes, including the 6502's original 13, and a lot of new instructions including block moves, bit manipulation, and individual pushes and pulls for all the registers. The IRQ and BRK vectors have been separated, and there is a new 'software-interrupt' instruction COP (for CO-Processor), which is used by Acorn to rationalise the operating system interface.



Overall, this is the processor that most 6502 fans would like to have seen last year, but when it becomes available in faster versions shortly it will be an absolute knockout.

Acorn has employed Paul Bond, author of the original BBC micro MOS, to help write the Communicator's operating system. At the time of writing the OS provided primitive task switching to enable you to swap quickly between applications. This means you can leave an application by pressing the Stop key, start another task running with a few key presses and then return to your original application with everything 'untouched'. Acorn has hinted that a more sophisticated multi-tasking user-interface, possibly with windows, will be forthcoming.

The operating system in the Communicator makes use of the new COP instruction to provide a uniform way of making OS calls: the COP command is followed by a code indicating the function required, and then parameters are supplied as necessary. The operating system uses this technique for all calls, including input/output, task switching and memory

management. The OS has been extended to include the Acorn 40-bit Floating Point Arithmetic package, allowing any application access without the author needing to write his or her own package. Also new are memory management COP calls, which serve to allocate various sizes and kinds of memory to different tasks (particularly Direct Page memory, which is scarce).

The Communicator has its own version of Basic, curiously named Version 4.0 (curious because the Master also purports to run Version 4). It contains most of the extensions that the Master's Basic has, but its assembler and machine-code interfaces are quite different. Unsurprisingly, the assembler supports the full 65816 instruction set, and has a number of new pseudo-variables to represent registers and operating system vectors and calls.

#### Help key

Basic has one extension which stands out: it allows for a procedure called '@HELP' which is executed when the Help key on the keyboard is pressed. You may have noticed that until

now no mention has been made of file storage facilities: that's because the Communicator doesn't have any! However, it does have an Econet interface, and this is the technique that the user is expected to use. Acorn has designed a self-contained Econet file-server/printer server in the same style as the Communicator itself. It offers either 1.2 Megabytes of storage on two 3.5in floppies or 20 Megabytes on a hard disc and one 600k floppy. This device contains a 6512 processor, 64k of ROM, 64k of RAM, a disc controller and a Centronics parallel printer interface. It also contains a real-time clock of its own which is used to time-stamp files. To use it you simply plug a Communicator into it with a 5-pin DIN audio lead and go! For Econet buffs, it has an intelligent network clock generator which connects itself if no other clock is detected on the network. The file server is controlled by ANFS software in each Communicator, and offers a full hierarchical file structure much the same as the ADFS.

This approach to file storage reflects Acorn's feeling that the Communicator will be used in small offices where most file traffic is local to a few machines. An Econet Bridge costing £200 can be used to connect a small local Econet such as this to a larger backbone network and thus to the rest of the building. In this way huge networks can be built up without degrading performance: more expensive networks such as Ethernet cannot offer this kind of flexibility as cheaply.

It is a pity that more commercial users do not take advantage of the Econet; at present Redwood Publishing and Acorn are its only major business users.

The Communicator was supplied with some demonstration software in EPROM which was written in Basic. Intended to give an idea of the form typical applications would take, it included a Prestel terminal, glass teletype, address book and a full-screen memory calculator. Since this software was in prototype form and will not be available to end users it does not seem relevant to examine it further.

#### Conclusion

It seems to me a great pity that Acorn feels it should keep what must surely be one of its best-designed machines out of the hands of the public. Of course there is more to selling a machine than just pushing cardboard boxes out of the door, but they have already spent a medium-sized fortune developing the machine and I hope some VASR will give them credit by buying it up. Knowing Acorn though, it'll probably throw the computer away and use the case for something else!