

ACORN COMPUTER, best known as maker of the BBC Micro, is fast becoming a major force in computing. Next year turnover will probably exceed £30 million and the company plans a major assault on the American market.

Compared to its Cambridge-based rival Sinclair Research, Acorn does not generate the same almost fawning coverage in the computing and general press, and the personalities behind the company are certainly less well known. Chris Curry, who with Hermann Hauser founded Acorn Computer, does not find this at all surprising.

"Apple is much more our competitor than Sinclair. We have a fairly wide base compared with Sinclair's monolithic, product-based approach, so we will never make such dramatic impacts. Clive brings out one product and pushes that straight towards whatever sector of the market is appropriate. Generally speaking for him it is the consumer market. Whereas ours is a company with diverse interests, having customers in the consumer, development, education and office sectors."

Chris Curry worked for Clive Sinclair for 13 years, first in hi-fi at Sinclair Radionics, then calculators, and finally computers at Science of Cambridge, which Chris Curry set up for Sinclair. "To start with I was the only person there. We

Chris Curry

Acorn is a company to be reckoned with in computing, yet the forces behind it are not so well known. Ian Stobie meets Chris Curry, one of Acorn's founding fathers.

were producing a little gadget, a wrist calculator, a ghastly thing. I used to do everything; placing the ads; packing kits; taking them to the post office; mending some of them; answering technical queries; absolutely everything. Later on there was a secretary, then more and more people were involved. By the time the MK14 came out I think there were about five or six people there."

The MK14 was one of the very first cheap computers. It cost £39.95 in kit form and came with 256 bytes of RAM, a hex keypad, an eight-digit display, and was based around the National Semiconductors four-bit SC/MP chip.

"It was quite a successful computer. The next step was obviously a version that ran Basic instead of just machine code. That was where our ways sepa-

rated, because Clive didn't want to do it and I did. So I set up Acorn Computer with Hermann Hauser."

Their first product was the Acorn System One, which came out in January 1978. "We chose the word Acorn because it was going to be an expanding and growth-oriented system." The System One was a semi-professional 6502 development system aimed at engineering and laboratory users, but priced low enough, at around £80, to appeal also to the more serious enthusiast.

One thing that stands out about Acorn is how consistently the company has stuck with the philosophy that the design must generally take into account future developments. By the same token a new Acorn product usually has some continuity with its predecessors.

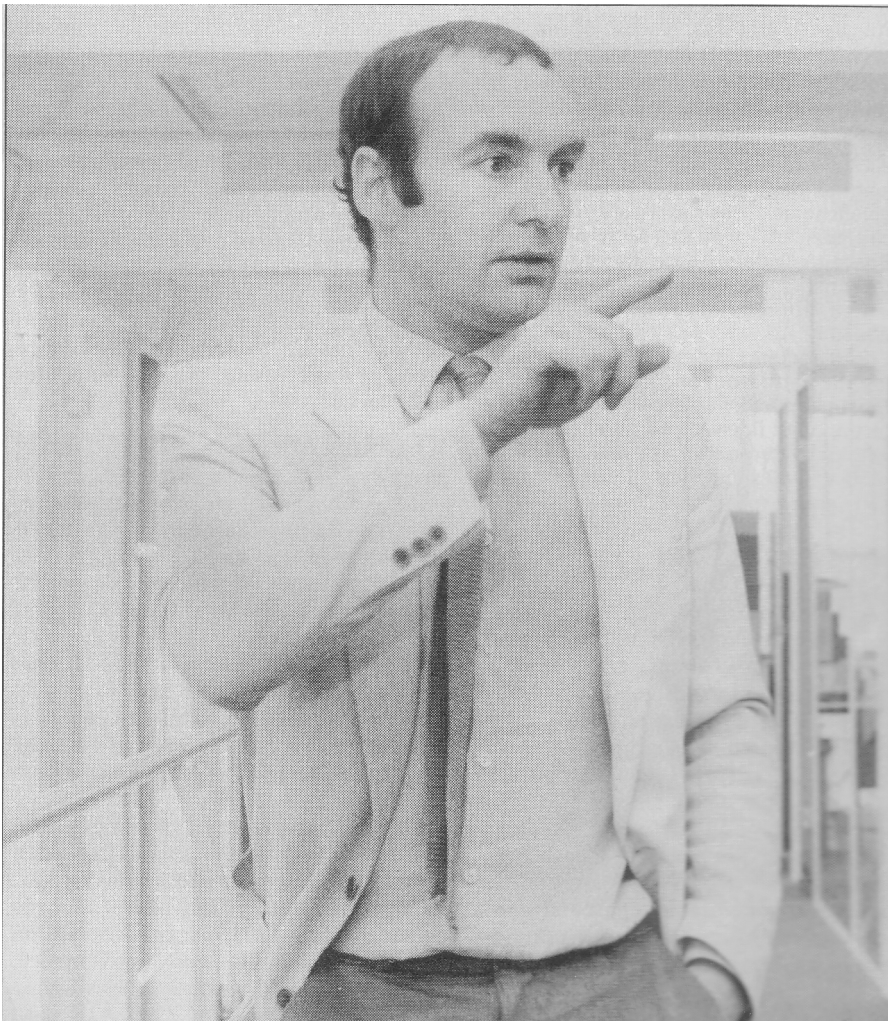
We still use parts of what you could call the System One, the Eurocard system, as our rack-mounted file server for Econet systems. The Basic that went into the Atom was a slight variation of the Basic that was written for the System One, a fast, control-oriented Basic." The System One established the 6502 as Acorn's standard processor, to be used later in the Atom and BBC machine, and the Torch and Electron.

Hermann Hauser and Chris Curry met through Cambridge University while Curry was still at Science of Cambridge, and the university connection has been very valuable to Acorn.

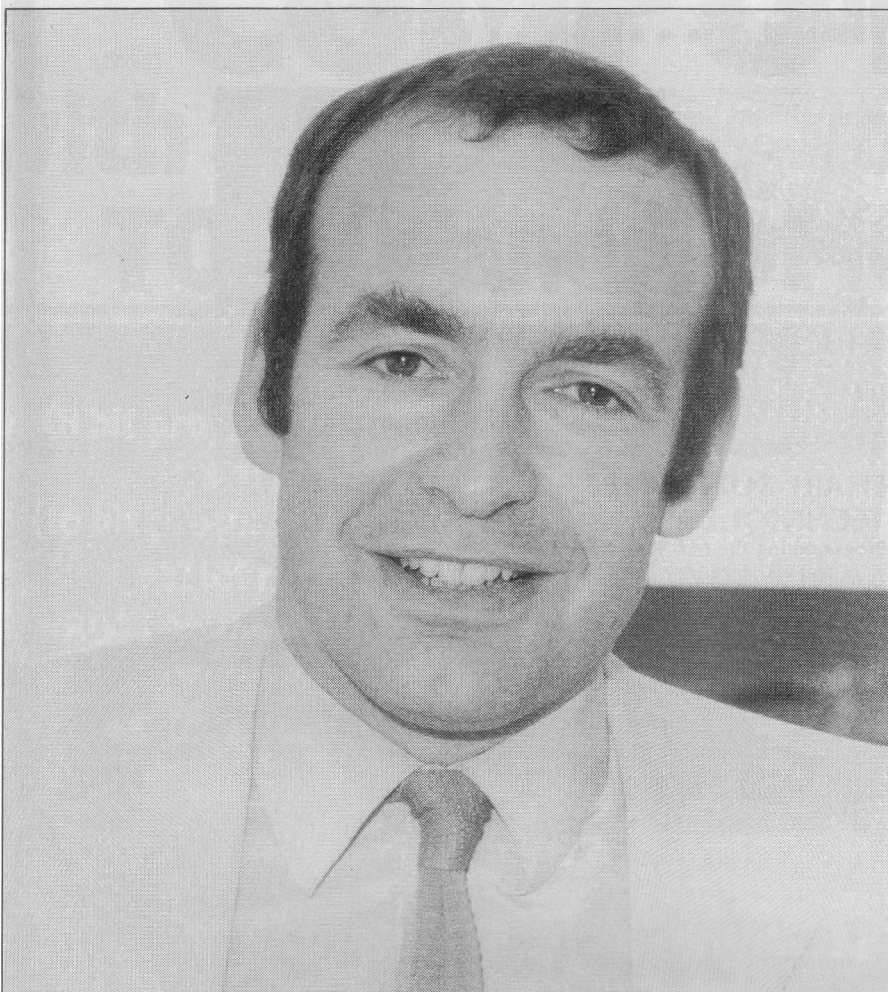
Glittering prizes

We are in Cambridge because the university processor group, or its computer lab, has maintained Cambridge as one of the leading universities in computer science. So there is a good supply of bright people to go into the industry. One of our directors is a lecturer at the computer lab, and he is on the watch for good people about to leave that might want to work for us. And of course an awful lot of hobbyists come out with software that they have written in their spare time to sell us, and we make contact that way. Cambridge is a fairly small town; people know each other. There are lots of small software houses, all closely interlinked with the university, and we all talk to each other. To move out of this area would be a major disadvantage."

Acorn's current products are: the Atom: the BBC Microcomputer model A



of Acorn



and B; and Econet, Acorn's low-cost networking system. A division of Acorn called Orbis deals with the high-performance networking system, the Cambridge Ring. In addition Acorn supplies Torch Computers with boards to go in the office-oriented Torch machine. Acorn helped set up Torch, and Chris Curry was a director, but this link has now been severed and Torch is supplied on a straightforward OEM basis.

A new version of the rack-mounted development system, called the System Five, is due soon, continuing the System One tradition. But the major new products from Acorn are the consumer-oriented low-cost Electron, and the top-end add-on processor system, the Gluon.

"The Electron is designed to compete with the Spectrum. The idea is to get the starting price very low, but not preclude expansion in the long term. It runs the same Basic as the BBC machine. We anticipate it having just an extension bus, and the extension bus will have modules plugged into it to give you whatever interfaces you want. So an Econet inter-

face would be a plug-in module, a printer interface would be a plug-in module." The Electron is due out in the late autumn. The price is not yet announced but it will probably be under £200 to compete with the Vic and Dragon, as well as the Sinclair Spectrum.

Chris Curry clearly thinks that BBC Basic has a good chance of becoming a world standard. "An awful lot of work has gone into that language, almost to the extent of having committees deciding things. The Electron will be very useful for people to get in at a lower cost level, and gradually more and more people will adopt our language."

Acorn plans to start a major assault on overseas markets with the Electron and BBC machines. "We are actually doing very little exporting at the moment because of the backlog on the domestic market. Our production levels are very high indeed, and when we have cleared it we will be producing far more than we are selling in the U.K., so we will be making a very heavy push overseas. There will be very heavy advertising in

America in the Autumn when the Electron comes out. The English-speaking countries, Australia, New Zealand, South Africa, are our best bets as all the course material and software is immediately appropriate. But I have no intention of just limiting it to those markets. We have already made arrangements with people to translate all our documentation into Italian and Spanish."

The Acorn philosophy is to look well ahead, but not lightly to throw away tried and tested systems. So it comes as no surprise that Chris Curry intends the Atom to have a continued life even when the Electron becomes available.

"The beauty of the Atom is that you can get inside it, you can tack bits on to it, you can use it as part of another, larger, piece of kit. The Electron will be a fairly finite system, and because it will have, like the BBC machines, ULAs and so on, it will be very closed to an electronics engineer who might want to use it. The Atom is still a fine machine for tampering with hardware."

Long-term strategy

The Gluon is an interesting system as it uses the 32-bit processor chip from National Semiconductors, the 16032. Superficially this looks like an aggressive attempt by Acorn to leapfrog the competition, who are mostly migrating from eight-bit processors to 16-bit chips, principally the Motorola 68000. But Chris Curry's explanation shows that the usual long-term and even slightly defensive Acorn strategy is being followed in this case as well.

"We chose to go with National Semiconductors, who we have been working with very closely, rather than with the 68000, Z-8000 or 8086, some time ago. I think we have made quite a good choice, because there are already many people on the bandwagon who we could be competing with if we went towards the 68000 or one of the others. But we are in with a head start with the 16032, which happens to outperform the others pretty heavily anyway. National Semiconductors have set up a package deal called the EP2 scheme, which ties in a lot of suppliers of software and hardware to provide the chip with the support it needs. At the end of this year we will be able to offer a whole range of languages and programming tools, all that you need to start developing systems."

The Gluon comes in two versions, one intended as an add-on box for the BBC machine, the second as an add-on for the popular commonly available, eight-bit microcomputers. The BBC Gluon comes with 0.25Mbyte of RAM and the 16032 processor. It sits in a box beside the BBC machine connected by the Tube, the very high speed data highway used in the BBC machine which gives the system much of its long-term expandability. In effect the

(continued on page 69)

(continued from page 63)

6502 in the BBC machine becomes a front-end I/O processor and all the language processing is done in the 16032.

Version two, the Universal Gluon, cannot use the Tube because it is unique to the BBC machine, but will connect via some serial or parallel interface, probably



initially the RS-232. It will be a bigger package, comprising a 16032, up to 1Mbyte of RAM, and 1-, 2- or 5Mbyte Winchester hard-disc drives. It comes with terminal emulation software, so in effect your Apple, Tandy or Pet becomes just a terminal connected to the Gluon 32-bit computer, where the real action is.

The Gluon will be making its appearance, vaguely scheduled for the end of this year, at the same time as major computer companies such as DEC and IBM enter the U.K. microcomputer market. Part of the appeal is the very high standard of the display and keyboard, and this may well encourage the raising of ergonomic standards generally.

The Gluon, using say a Tandy or an Apple as a terminal, will have imposed on it the ergonomic limitations of the older machine. But Chris Curry does not think this will limit the Gluon's appeal.

"Apple and Tandy owners want to maintain the usefulness of their equipment, they don't necessarily want to change over completely to a 32-bit computer. Remember that a very large proportion of the existing installed user base of things like Apples are in the hands of home users, and those people don't want to lash out enormously on a completely new system."

This version of Gluon is best understood as a migration tool, intended to pick people up from other manufacturers' existing user base and move them on to Acorn kit. The price has not been announced yet, but it is clearly crucial to the success of the strategy.

Acorn will be offering two different operating systems for the Gluon; its own very minimal operating system, and a version of Unix. "We always see ourselves as supplying development-hardware for people in the systems house business, and that is what these small operating systems are for. It also gives us an intimacy with the product that a lot of other people who buy in system software do not have. To do serious commercial applications software people can go for

the more expensive option — Unix."

Many of the new 16-bit machines from other manufacturers run Unix, which has a good chance of becoming the standard 16-bit operating system in the same way CP/M has become the eight-bit standard. To the computer user, and more so to the programmer, the operating system defines a computer system, usually much more strongly than any hardware feature. So the Gluon will be another Unix system as far as the potential buyer is concerned, and probably one of the cheapest.

What price performance?

Chris Curry believes Acorn has another advantage. "There have already been some 68000 add-ons provided for the Apple so we know we are competing with people using the other 16-bit processors. But because we know that our one, with the 16032, outperforms them, we feel that we have got a fairly clear technical edge."

Practical Computing has been a bastion of scepticism as to how far the performance of the chip at the heart of a system actually concerns the end-user, once all



the other hardware and software factors have been taken into account. Systems are rarely CPU-bound. So how far does Chris Curry think the fact that the 16032 outperforms the 68000 really matter?

"Probably not as much as one can imply. It is a matter of presentation, advertising. You can say this will run three times as fast as a 68000. Now whether or not that is desperately important in real terms I don't know, I am not a user myself. I know that if I went up to the labs and asked someone that they'd say of course the speed of operation is vitally important. It means you can do things which you wouldn't be able to do otherwise. This certainly is the case when it is part of a total system, with its own screen, doing its own graphics. Where it is on the end of an RS-232 perhaps it is a little less important. Nevertheless, I think it appeals to people, that they are getting the latest, in that terrible phrase, 'State of the Art'."

Both versions of the Gluon, and the Electron, which is really a cut down BBC machine priced to appeal to the consumer market, demonstrates the flexibility Acorn's systems approach gives them.

"Because of the way we have designed things it is particularly easy for us to bring out a machine for a particular market. We can both spread them out and add more facilities, or we can prune them down dramatically to produce a much cheaper machine."

It is one reason why Chris Curry does not fear a price war, which seems more and more likely as new companies enter the increasingly defined market and production capacity builds up. "If we need to go to a lower price we bring out a new product that costs us less, we don't cut prices."

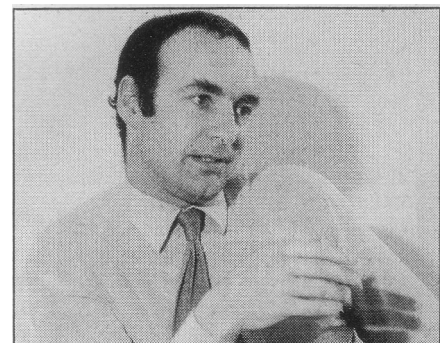
One of the most successful recent computers is the Osborne 1, a cheap portable computer with everything, including screen and discs, in a single carrying-case. Given its flexibility, why had Acorn not done it first?

"We thought about it, and always considered that the sort of small screen that you could put in the thing was not really practical. What we did not really expect was that the very notion of a complete box with everything in it would be so attractive. And it obviously has been because it seems to be very successful. Mind you we are aware of its success and there are products in the pipeline."

Take-away Electron

The likely date for Acorn to bring out its first portable machine is June 1983. "It won't look much like an Osborne but it will be a machine that includes its own display facilities. Because it will have limited interfaces and it must be as small as possible, it will be based on the Electron rather than the BBC machine. It will have a very strong emphasis on communications. If it is used in an office it will expect to see a local file station acting as its storage. It will have an Econet local area network interface and Modems for the British Telecom network."

Success brings with it new problems. Apple's success has made it the target for piracy, in the form of cheap imitation machines which pass themselves off as

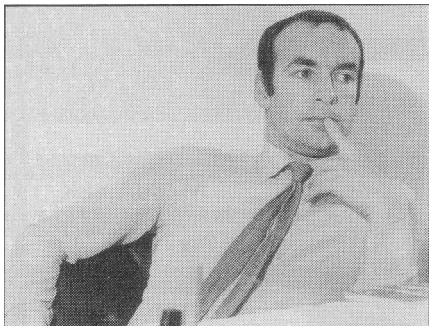


Apples, and legitimate competition from manufacturers of plug-compatible machines such as the Dutch Pearcom and German Basis 108. They are intended to be sufficiently similar to the Apple to accept all hardware and software add-ons yet use different circuit boards and have

(continued on page 71)

(continued from page 69)

some significant additional features. The BBC machine would seem a tempting target for copiers if it proves as successful as Chris Curry hopes. "You would have a job to do it with the BBC machine because it uses ULAs, and these are not so easy to copy. If you have a



design the main blueprint of which is the printed-circuit board, then this gives the circuit away and there is no way of protecting it. The point about the Apple is that it is all standard components on the PCB so it is a prime opportunity for somebody to copy."

The circuit is burned into ULAs late in the production process and cannot be discovered by physical examination. The functions of the circuit would need to be analysed and a similar circuit designed to carry them out — a lengthy process. "That is why Sinclair can be relatively safe with the ZX-81. It is the perfect thing to copy in Taiwan, but for the fact it has ULAs in it."

Acorn has been expanding fast. "We don't make the sort of profits that Sinclair makes but we are putting a lot more back into the company." With expansion has come reorganisation. "We started out with a lot of bright young chaps up at university doing design work, and found that we were, as we always intended to be, heavily research and design oriented. But with substantial production we have found that there is quite a lot of management to be done. So quite recently we have installed a financial controller, a software manager, and a chap in charge of Orbis Computers to look after networking.

"One of the things that we have to expand enormously is our marketing ability. The Sinclair type of marketing approach is almost entirely mail order, plus one mass merchandiser. It is very simple to organise with a minimum of staff. We are now going to go into having mail order, mass merchandisers, dealerships, and direct institutional sales on quite a large scale. So our marketing side is being expanded very dramatically."

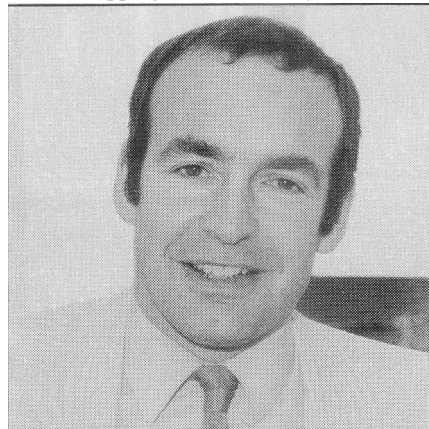
By the meagre standards of a high-technology computer company Acorn is becoming a major employer. Most of this is in design, marketing and administration. "Out of our total workforce of about 75 people only about eight or nine are actively putting things together. We

do not do any assembly work ourselves except the final configuration of systems. There are four production lines making products for us in the U.K.: ICL at Kidsgrove; Race Electronics and AB Electronics in South Wales; and RH Electronics in Cambridge — about another 220 people."

Dangerous business

Acorn also has a Hong Kong supplier. "They make 50 percent of the Atoms that we build at the moment, and they are also a source of components from the Far East. We have known them a long time and can trust them not to go into Taiwan for any of those awful copies they make. We have to provide detailed listings of the operating system software to our sub-contractors to enable them to do testing properly, and that is a fairly dangerous business, especially if it is going overseas."

The main reason for assembly in Hong Kong is to supply the Far East market. "The cost of shipping becomes a very



significant factor. Completed units are fairly bulky, which is why we are not desparately opposed in the long term to local assembly overseas where it is desirable on political grounds. If we can get just casing and final packaging done overseas, and ship tested boards in bulk packs, that would mean the majority of the work, in value terms, is done in the U.K."

Acorn does come up against barriers abroad. "There is a strong requirement for local assembly in an awful lot of countries; certainly in America. We have not started marketing in North America yet, but when we do we will find that in a very short time it will be in our interests to do at least some local assembly and deal very closely with an American company. In South America it is very largely required that local, or at least part local, assembly is done. Europe is OK. France is of course extremely partisan; it is difficult to sell anything into France, at least in the education field."

On the other hand Acorn has been the beneficiary of U.K. government policy, in particular the Department of Industry scheme to put one micro in every primary

school. The machine had to be British. Chris Curry does not think this has helped Acorn much: "I am a free market person and absolutely against all forms of protectionism. The Americans practise it against U.K. products, incidentally, so I suppose it is only fair that there is a little bit done here. But is it beneficial? The education market for us has been quite a small proportion of our business; so far it hasn't made a lot of difference to Acorn."

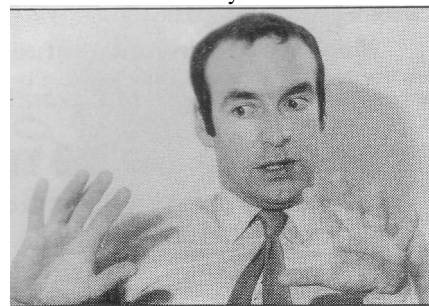
The market Acorn is in would be a difficult one for an entrepreneur in any country. It is changing rapidly, with very large companies moving into it with new products and attempting to force the market towards paths that suit them. As the market stabilises around a predictable range of defined products the massive electronics production facilities in the Far East can be brought to bear on particular, attractive market segments.

Not like calculators

"If the consumer end of the personal-computer market ends up like the calculator market then I don't suppose we would bother to be in it, because there won't be any reward. I am not sure whether it will, because the software aspect of personal computers does protect it from the Far East onslaught to quite a large extent."

Apple has been making predictions of a major crisis in 1984, when all the curves on its graphs lead to an expectation of massive overproduction. Only five or six companies are expected to survive with any appreciable market presence.

Acorn emerged in the early days of small computers, the days of a general excess of demand over supply. It was a period typified by tiny companies, long waiting lists for products and forgiving, enthusiastic consumers. Chris Curry's



strategy for Acorn in the coming brave new world of computing is to concentrate on building an organisation sufficiently large and sufficiently flexible to survive. "For the next year we will grow as much as our profits will allow us to grow — wide growth in all directions that we are technically capable of going into. Then we will select whatever sphere of operation is the best bet for us. I don't think just, one, but we will select perhaps three areas to concentrate on. We will survive by having lots of strings to our bow."