

Spot the difference. The two-tone grey Elan in the foreground is the original wooden dummy, while the dark grey machine in the background is the finished product

As the countdown continues till the £200 Elan hits the shops Meirion Jones finds out how a new computer is designed



PANIC HIT the Elan team just three days before the press launch of their new computer. A vital component of the keyboard, a rubber mat cushioning the plastic keys, was not ready but the show still had to go on.

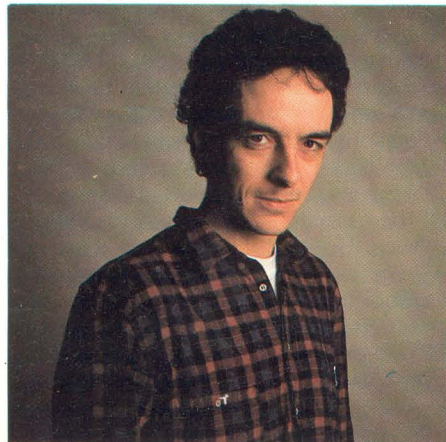
Geoff Hollington and Nick Oakley who designed the case and keyboard spent 72 hectic hours chopping up rubber membranes from old intercoms and supergluing them into place beneath the keyboards of the demonstration machines. As often as not they found themselves glued to the keyboard, the case or the table but with the help of an out of work designer they dragged off the street, by the morning of the launch they were able to get themselves unstuck and turn up with enough machines to show the press.

What made the biggest impression though, was not the stylish looks of the Elan but the specification. No wonder Robert Madge the team leader of the whole Elan project was smiling as he outlined the capabilities of his micro.

With 64K RAM, full size keyboard, built-in

word processor, four-channel stereo sound, the highest resolution and choice of colours of any home micro, 80-column display plus a built-in joystick and all the interfaces you could want for £200 even the most hardened computer journalists were impressed. It was

Nick Oakley, a man who sticks to the case.



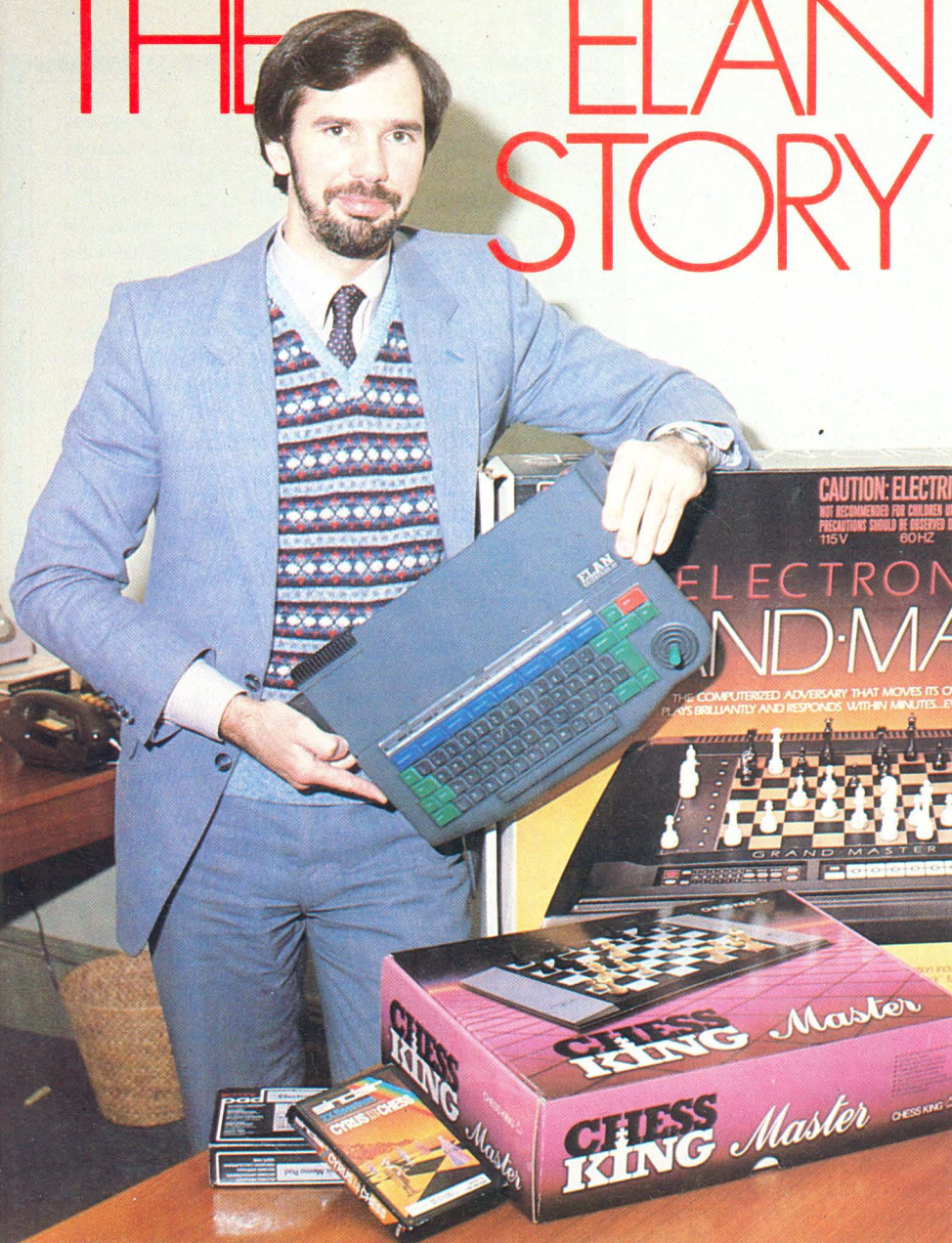
only when Madge announced that the machine would not be on sale till April that the cynical smiles returned to their faces.

Until the press launch the Elan had been the best kept secret in home computing. The story started in the Summer of 1982 soon after Sinclair launched the Spectrum. David Levy of Intelligent Software, IS, was approached by a bank on behalf of a mystery backer which wanted IS to design a home computer to rival the Sinclair.

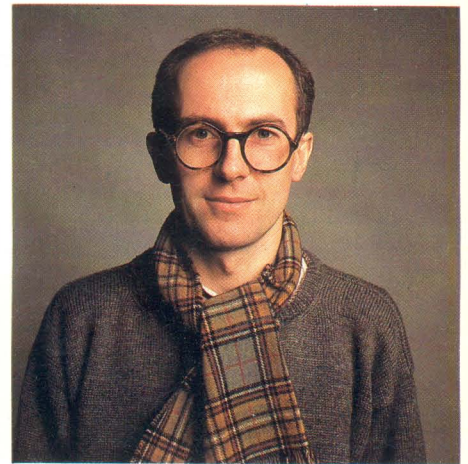
Intelligent Software is best known for producing programs like Cyrus IS Chess which is the toughest chess game on any home computer, and no wonder since David Levy made his name as a chess grandmaster. But IS has produced programs for all the popular home computers and also has considerable hardware design expertise.

Past work includes designing a pocket chess game for Computer Games Limited and the massive Electronic Challenger chess robot. IS had also designed the Biztek pocket calculator, which includes an electronic diary, for

THE ELAN STORY



Robert Madge, left, is the project leader of the Elan development team most of which was drawn from Intelligent Software, IS. Although IS had not produced a computer before it had written popular home micro programs like *Cyrus*, *IS Chess* and designed products like the Biztek electronic diary, and *Chess King* and *Electronic Grand Master* chess machines which are on the table. While IS designed the insides Geoff Hollington, below, designed the outside.



By October 1982 the project had a code name, DPC — Damp Proof Course, in case anyone dropped the plans on a bus, and an outline specification, The DPC which was eventually to become the Elan would have at least 64K of RAM, full-travel keyboard, built-in joystick, ultra-high resolution graphics and as many colours displayed on screen as possible. A 64-track connector would be linked to an expansion box capable of running twin microfloppy disc drives or taking add on RAMpacks.

In great secrecy the outline was taken to three teams of designers to put forward their ideas for what the "DPC" should look like. "It was shrouded in mystery" says Geoff Hollington, who was impressed by the masonic air of conspiracy of the whole proceedings "it could have been P2". Madge asked how long it would take Hollington's firm to produce initial sketches. "We very stupidly said seven days".

That week Geoff and his associate Nick Oakley found themselves working all hours. Neither of them had ever designed a computer before but they were both convinced that it was time to get away from "current bun" designs. Hollington calls them current buns because most home computers are just a "printed circuit board sandwiched between two sheets of cream plastic, with a few keys sticking out of the top."

"We're coming out of that phase. I cannot see the next Acorn being a boring old box with keys on like the Electron." Hollington thinks that computers are now becoming an ordinary household item which people expect to look good around the house. He wanted to make the appearance of the "DPC" seduce people into buying the machine yet say a little about the technology."

His approach paid off when he and Oakley returned to show their sketches. Although they were so tired that "neither of us" was capable of coherent conversation" Madge told them "you have got the job."

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Domicrest, an Anglo-Indian trading company which is involved in the Elan project.

When the approach came from the bank IS had to ask themselves "could we design a successful mass-market home computer". They had already drafted an outline for a video games machine and in the course of rewriting programs for different computers

"Could we design a successful home computer?"

had worked out their own ideas for what they would and would not like to see in a micro.

As Madge says "the Spectrum is a very good product indeed"; so the first idea was to produce something like a Spectrum but with a better keyboard and interfaces for around £100. Madge found himself "going down the same sort of path Oric went down" but felt

that by the time his machine came out it would be outdated.

Having rejected the Oric-style solution the IS team thought things through from scratch — "if we could have everything what would we have." Obviously such an ideal machine would be too expensive for most buyers but by making a few compromises Madge felt that there was still "a technological window for a product which answered most people's complaints about existing home computers at a reasonable price." Interfaces and expandibility were a priority from the outset because IS wanted to make a machine "which would still be wanted four or five years after the original design decisions were taken."

"We had reverse engineered many machines" says Madge "so we could learn the lessons of other people's successes or mistakes." For instance "the Apple had a few too few keys and we had seen the advantage of products like the Atari which give a wide colour choice. We are a programming house so we wanted a nice machine to program with."

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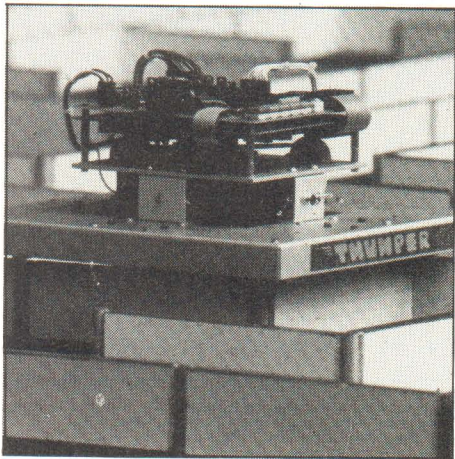
The "DPC" project was still being run from the IS office — the gnomes in Tottenham Court Road — as Hollington calls them, although by now the team involved was quite large. They had opted for a Z-80 central processor on the grounds of compatibility because it would allow them the option in future of running CP/M business software.

They wanted to use standard components wherever possible "there is no point in reinventing the wheel" as Madge says but they found that there was no good chip set which would allow them to do everything they wanted on graphics and sound. Madge regards the MSX chip set for instance as a "low-quality standard" which may allow the Japanese to break in at the bottom end of the market but which is "fundamentally limiting".

Instead he used Nick Toop, who helped create the Acorn Atom, to design a custom graphics chip. The idea was to create a "soft chip" which could be controlled as easily as possible from programs. Fixed items were kept as small as possible.

This "Nick" chip as Elan now calls it allows the machine to display up to 256 colours on screen and gives a resolution of up to 672x512 — although not at the same time. It is possible to mix modes on screen and to create windows on to areas of text or graphics as on the Atari. With one exception the "Nick" chip has allowed Madge to achieve his ambition of combining "good graphics on different systems and putting them all together."

You can use character mapped or pixel mapped graphics or parallel attributes as on the Spectrum. The only thing missing is sprites. Madge explains that they had the choice of ultra-high resolution or sprites and in the end they decided to make sprites available later as an add-on cartridge.



Thumper — chip man Dave's micromouse.

"You're always making compromises" as Madge says, and although the original idea was to build both an assembler and a simple word processor into ROM limitations of space led to the assembler being left out. The word processor takes advantage of the Elan's 80-column display while the assembler will be available later on cartridge.

While Nick Toop was working on the "Nick" chip Dave Woodfield was designing the sound chip which needless to say was



"With obsolescence built out" is Elan's slogan emphasizing expandability — unfortunately this mixed bunch of IS programmers who worked on the Enterprise only help to obscure the message.

christened "Dave", Stereo sound was one of the features built-in — you do not need a stereo television — a pair of Sony Walkman headphones will plug straight into the back.

Dave Woodfield last appeared in the pages of *Your Computer* as 1981 Micromouse Champion returning to defend his title at our 1982 Computer Fair. Unfortunately his Micromouse, "Thumper", after setting an "unofficial lap record" in practice mistook a piece of tape for a wall of the maze and failed to reach the centre.

"The "DPC" meanwhile needed a name of its own. After much debate it was decided to call it the "Samurai home computer". Although the general appearance and specification of the machine had been settled there were still details which needed sorting out. The keyboard was a particular problem.

A conventional typewriter keyboard with 69 individually sprung keyswitches would have pushed the price of the Samurai over the £200 mark yet Spectrum style rubber keys would not be good enough for word processing. The eventual solution was to use relatively cheap injection mouldings for the keys on top of a carefully designed rubber mat with a sprung section underneath each plastic key. Surprisingly this feels like a real keyboard.

The cartridge port was another difficult area. Hollington thought about slotting cartridges in on top or perhaps under a pop up plastic lid. In the end, fear of coffee being spilt into the machine led him to opt for a recessed port at the side.

By February 1983 the shape was settled and a model maker was commissioned to produce a wooden mock-up of the finished product, painted two-tone grey — dark at the back, light at the front — which was supposed to symbolise the difference between the heavy processing power of the micro and the friendly interface with the user.

Meanwhile the "DPC", now the Samurai, was about to change its name again. Although Madge says they had gone through "all the correct procedures — registering a trademark and so on" another company started using the name for computers.

In a desperate attempt to get in before they did Madge placed teaser adverts in April's *Your Computer* saying "The Samurai home computer is coming" but in the end decided to

change the name — first provisionally to Oscar and then finally to Elan.

Technically the machine itself is called the Enterprise and it will be made in two versions, 64K for £200 and 128K for £300. "It is a model range" says Madge "just like the Ford Sierra".

Over a long Easter weekend Oakley produced drawings for the model maker to produce moulds for final production of the case. The model maker, "he understands shape" says Oakley, has to carve the form of the computer out of solid blocks of graphite which then go to the toolmakers.

The job was too big for any one toolmaker so Nick Oakley had to commute between seven different firms checking that the bits that each was producing would all fit together in the end and expecting disaster at any moment "I was living in a car, thinking when's it going to happen?".

Sure enough it did — the base component was nearly a quarter inch too long and it was too late to get the mould remade. Fortunately the toolmaker was able to shave a section out of the mould and the only sign that all is not quite as the designer intended in the finished machines is that one of the ridges on the base is slightly wider than the others.

"Learn the lessons of other people's mistakes"

As the workload increased Geoff Hollington and Nick Oakley delegated more of the technical jobs to Beverley Hobson. In all areas the team working on the Elan project increased in size until before the press launch there were 50 people working on it.

Elan brought in a graphic design consultant to advise on colours for the keys and the case. He advised against the two tone grey because it looked "too specialist" for a home computer. He picked out the eight programmable keys in blue, the Stop key in red, the main keyboard dark grey like the case, and other keys in green.

From the outside the Elan Enterprise looked
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complete by the beginning of September and it was time for the press launch which went smoothly — apart from the crisis caused by the late arrival of the rubber membranes.

But although the case and the hardware inside were ready at the launch there was a limit to what could be demonstrated beyond the range of colours available on screen and how smoothly they could be scrolled. The Basic, which has taken two years to write to try to meet the specifications of the American National Standards Institute, was running on other machines but had not yet been implemented on the Elan.

"There is a shortage of design expertise"

It is more structured than most Basics and it also has a higher level of arithmetical accuracy. Again there has been a trade off between these advantages and speed. The Elan Basic will not be as fast as BBC Basic. On the other hand Elan expects to have Forth, Lisp and assembler available when the Enterprise is launched together with a clever piece of software which will convert programs for the BBC and Electron to run on the Elan.

At the moment Elan is trying to implement the Basic on the first few prototype machines. The peripherals which will be available by late Summer are being prepared also. The original idea of connecting the peripherals side by side next to the computer was rejected because by the time you had the expansion box and disc drives "you were off the end of the table."

Instead Hollington opted for a stacked hi-fi solution. The expansion box which should you ever need it can take up to 4 megabytes of RAM would act as a base unit with the twin 3.5 in. Sony disc-drives on top and further units — such as a Modem on top again.

One of the most difficult problems when you are designing a new computer is allowing for what machines other companies might release in the time between you sketching out your plans and finally producing a micro. It can take as little as nine months for a computer to move from the drawing board to the point of sale but a year is more common.

The specification of Acorn's Electron, for instance, was known in computing circles in April 1982 and *Your Computer* published an exclusive photograph of it in December 1982 yet it was August 1983 before the machine was launched and there are still production difficulties.

Robert Madge has been pleasantly surprised how few new computers have been launched in the 18 months since the Elan project started. "There is a shortage of design expertise".

*Beverley Hobson, another of
Hollington's team.*



The Elan Enterprise appears to have met the original design criteria of being able to "play the best video games around yet still be respectable for education and home use" and the specification looks tremendous today yet no-one can predict what it will look like in April when it goes on sale.

Sinclair's long-awaited ZX-83 may be out by then and commodore has a new 64-style machine on the stocks called the 444.

The Japanese MSX machines could also be on sale by Spring and though none of them appear to match the Elan head on it will be a nailbiting few months for the Elan team. ■

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