



BENCHTEST

THE TORCH

David Tebbutt investigates an interesting and very versatile British micro with built-in comms and colour.

Cambridge-based Torch Computers has produced a very interesting machine which combines the ability to run standard software products with high resolution colour graphics and in-built communications capabilities. My first impression was one of surprise, since I hadn't really expected to evaluate a machine with such features for some little time yet.

Owned by the Climar Group, Torch is a young and very aggressive company, determined to secure a niche for itself in the world markets. With American and Canadian offices and exhibits at the NCC in Houston and Comdex in Amsterdam, Torch evidently means business — and I wish it every success.

At the time of this review, Torch had got most of the hardware sorted out but there

were still some serious gaps in the promised software offerings. Fortunately, its operating system (CPN) is compatible with CP/M and, providing that you can get it on Torch format disks, a wealth of software is available.

Hardware

My first impression of the machine was that it was very plain, if not downright ugly. The welded sheet metal construction has led to a very rectangular design which makes the machine appear a lot larger than it really is. In fact, it is just about the same size as a Superbrain but without the curves. I understand from Torch that an injection moulded casing is being designed which should make it look a lot better as well as reducing the

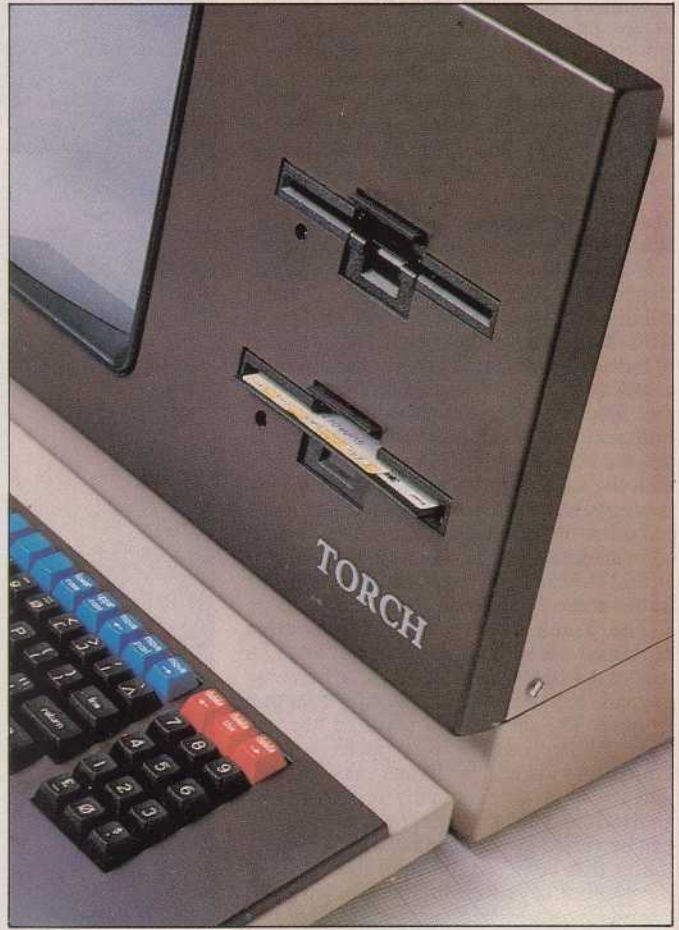
weight somewhat. On my bathroom scales, the Torch came near to 14 kilos!

The main unit comprises the screen, disk drives and processors while the keyboard is separate and attached to the main unit by a coiled black lead. The screen is a good quality monitor made by NEC and the disk drives vary. The first review machine had Tandon drives, one of which gave me trouble. The second machine had Mitsubishi drives which behaved perfectly. The review machine contained a 6502 processor and a Z80 processor. Future 'super-Torches' will run a Motorola 68000 processor *as well* as the two current processors. The 6502 processor board is, in fact, the one which drives the BBC machine.

The screen is a high resolution, colour monitor which can handle eight different



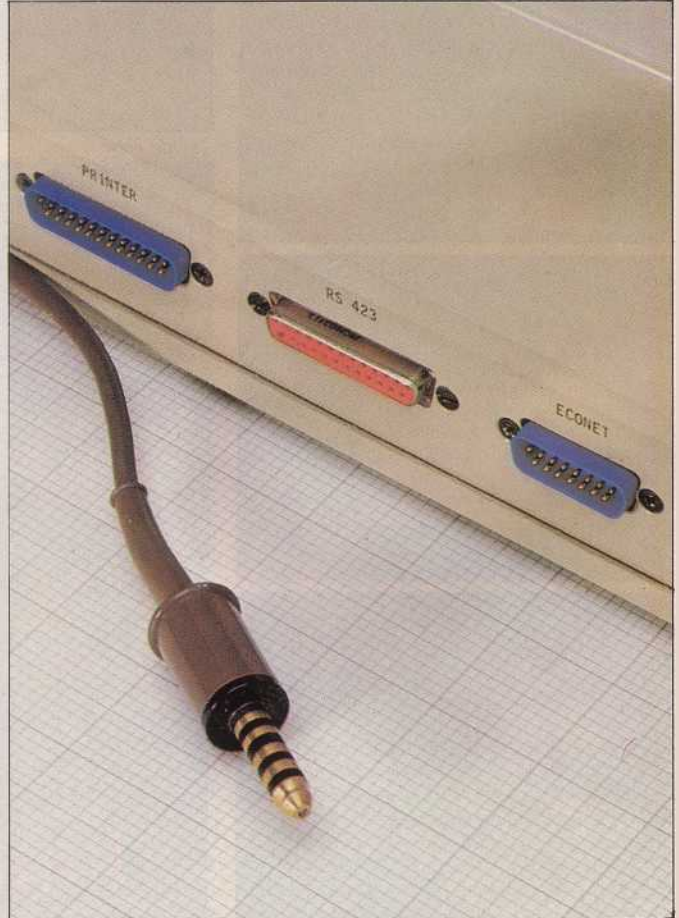
Detachable keyboard.



Twin disks are standard



Built-in editing pad.



I/O includes direct-connect modem.

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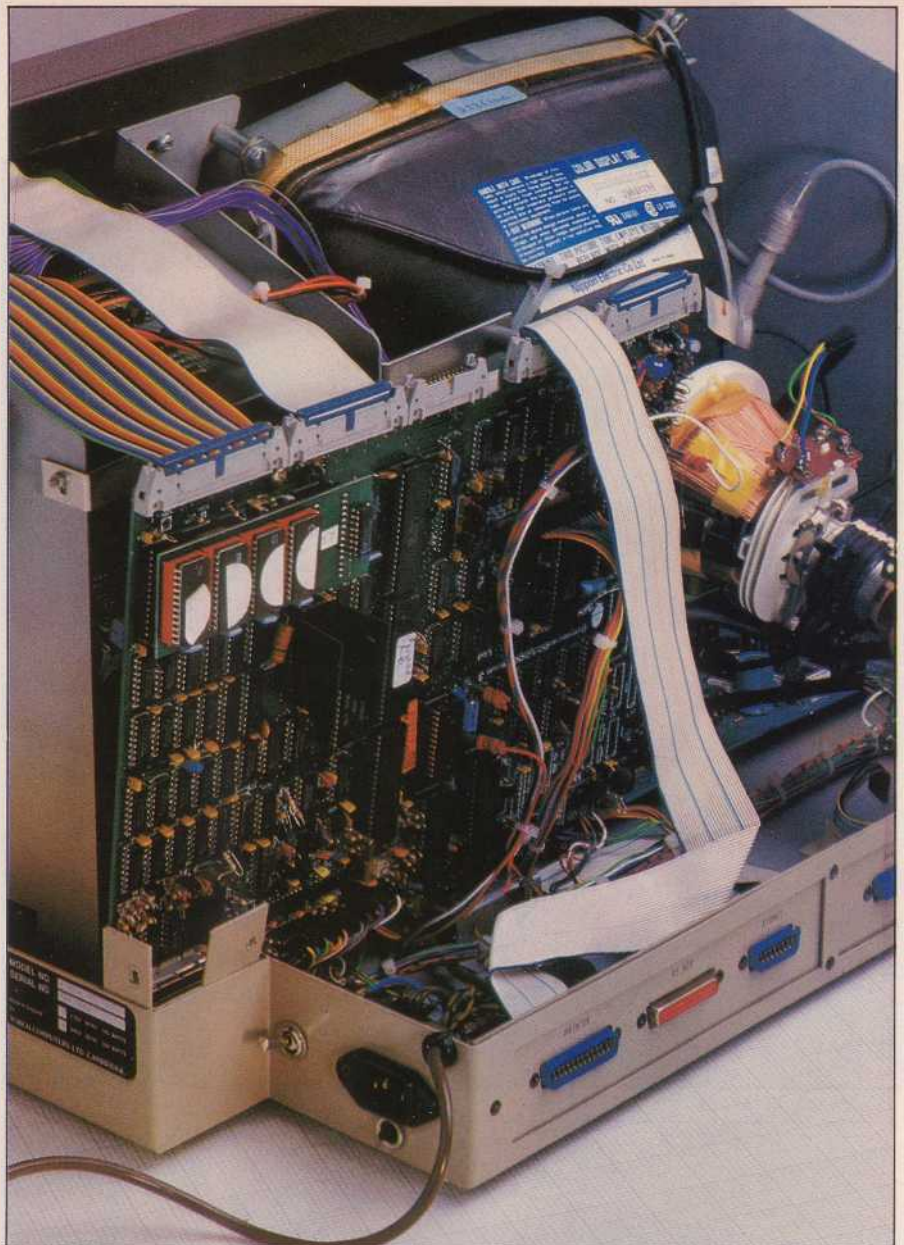
resolution/colour combinations — see Figure 1 for the details. You'll notice that up to 16 colour modes are available. Eight of these relate to plain colours, while the others refer to flashing colours. Although yellow/blue flashing would appear to be the same as blue/yellow flashing, the separate modes are useful since if each is being used at the same time one would be displaying blue while the other displays yellow. Whichever way you look at it, I think the sales literature is naughty when it refers to '16 colours'. See Figure 2 for the details. All this activity is handled at present by the BBC board inside the Torch.

Individual pixels may be given a different colour to their adjacent neighbours to give the illusion of further colours such as orange. I think that the screen characteristics are very good. They will certainly cope with the vast majority of applications over the next few years. I did notice, when I was programming, that it would accept logical screen addresses up to a resolution of 1280 x 1024 which probably bodes well for future screen developments.

The Torch has a very comprehensive keyboard comprising the normal keys, a row of 14 userdefinable keys, a numeric keypad and a word processing function keypad. The dished and textured keytops give the keyboard a very pleasant feel. Upper and lower case letters may be used and the keys automatically repeat after a short while. I didn't bother to time it since it can be varied by the user anyway. The only things that bothered me were that some of the symbol keys were in unexpected posi



Impressive colour graphics



Inside view.



Z80 comms card

Lions and use numeric keypad the Prestel '#' and '*' keys. Fashionconscious ladies who like using detachable keyboards on their laps may find the cold steel casing a little unpleasant. I did, and I wasn't wearing a miniskirt! (*Liar — Ed.*)

The keyboard contains a number of editing keys — one set operates on the current line while another set allows you to move a 'shadow' cursor to a different line so that relevant parts of the other line could be embodied in the current line. Does that make sense? It overcomes CP/M's inability to allow cursor movement to previous screen lines. I found it very useful anyway, and a pleasant change from having to retype CP/M commands whenever I made a trivial mistake.

Setting up the userdefinable keys is a doddle. You simply type the word KEY followed by its number and contents. <cr> can be included using the stretchedout colon (:), followed by M. Use <cr> to finish the entry and the new function is attached to the key. I found this particularly useful when initialising and copying disks since it is so easy to mess up these commands. This is the sort of command I encoded:

FORMAT B: M: COPY A: TO B:

Each Torch is supplied with two 400k disk drives or a single 400k drive coupled with a hard disk of either 10 or 21 Mb capacity. As I

Mode	Colour Modes Available	Text	Resolution
0	2	80x32	640x256
1	4	40x32	320x256
2	16	20x32	160x256
3	2	80x25	
4	2	40x32	320x256
5	4	20x32	160x256
6	2	40x25	
7	Teletext	40x25	

Fig 1 Screen modes

	2 Colour	4 Colour	16 Colour
0	Black	Black	Black
1	White	Red	Red
2		Yellow	Green
3		White	Yellow
4			Blue
5			Magenta
6			Cyan
7			White
8			Black/White
9			Red/Cyan
10			Green/Magenta (light)
11			Yellow/Blue
12			Blue/Yellow
13			Magenta/Green
14			Cyan/Red
15			White/Black

Fig 2 Colour modes

B. BACKGROUND	Colour
BASIC	BBC Basic
C. COMMAND	Submit a file
COPY	File
DEL DELETE	File
DIR DIRECTORY	List of files
DUP DUPLICATE	A disk
H. HELP	List these options
INPUT	Type into a file
KEY	Define a key function
MODE	Screen attributes
PRINT	A file to the printer
REN, RENAME	A file
TYPE	A file to the screen
USER	User number (0-31)
VDU	Screen control codes
VIEW	A graphics file on the screen

Fig 3 Resident commands

said earlier, one of the Tandon drives gave me trouble whereas the Mitsubishi drives were fine. Whether this is a reflection on the drives or not, I have no idea. I understand that Tandon drives are used in plenty of other microcomputers so perhaps something came loose in transit. If you're not familiar with disk drive capacities then you should know that 400k is quite respectable. It is roughly equivalent to 100 A4 typewritten pages. The disks are double sided single density with 80 tracks per side.

A number of connections to the outside world are provided at the back of the Torch. A DIN socket is used for plugging in a cassette player. Incidentally, this is the only way of saving programs written in the built-in BBC Basic. It gave completely trouble-free operation when I used it with a Sanyo Slim 3G recorder. An RS432 port allowed me to connect up to another computer (a Superbrain) and, by connecting the 'Ready to Send' and the 'Clear to Send' pins to each other, I was able to fool the Torch into exchanging files with the Superbrain. In fact I took a CP/M program (Cardbox) and its associated data files from the Superbrain and got it running successfully on the Torch. I'm sure that I could have attached my printer too, but I couldn't fathom out the appropriate connections. A Centronics interface is provided for those who need parallel connections.

An external UHF monitor socket allows you to connect a display screen which echoes

the information on the computer screen. This would be useful for exhibitions and talks, for example. I tried it on a portable black and white TV and the picture disappeared off the edge of the screen but I presume this sort of thing can be adjusted. An RGB output socket is also provided but it wasn't connected to anything inside the review machine.

An Econet connector suffered the same fate. It disappeared into the bowels of the Torch where it wasn't connected to anything either. More usefully, a flying lead attached to an internal modem allows you to plug into the telephone system and communicate over the line with other computers. I used this to great effect as you will see later in the Benchtest.

An internal analogue to digital converter allows you to accept signals from up to four analogue devices through the connector supplied. Each analogue signal is converted to 12 bits. The only other external sockets and controls are the power socket, the keyboard socket, a contrast control, a reset key and a rather old-fashioned looking on/off switch.

A 3/2in, 8 ohm speaker receives signals from the four-channel (three music, one noise) sound synthesiser and, thanks to the ability to vary amplitude and envelope shapes, it is possible to get the machine to make some

fairly pleasant sounds. The BBC board contains a speech synthesis unit which one of the demonstration programs used to produce rather slow American speech. Apparently this part of the BBC machine is being improved in revision 4 to give the speech more natural speed but no doubt the American accent will remain.

Overall, the hardware seemed very good quality and it was certainly robust. As we go through this review it will be hard to tell whether we're reviewing the BBC machine or the Torch, so dependent is it on the BBC base board for all its peripheral handling activities. No doubt Torch is planning to replace the board in the long term with one of its own. First, though, we can expect to see the 68000/Z80 board mentioned earlier. People who buy the current model should be able to upgrade to the SuperTorch without any problem.

Firmware

The Torch has two main firmware elements — BBC Basic which is on the BBC board and CPN, the operating system. Try saying CPN over the phone to a friend and see if they think you're talking about some other, well-known operating system. It makes me feel uneasy that Torch deliberately chose this selection of three letters when there are over 16,000 other three-letter combinations to choose from. CPN, by the way stands for Control Program Nucleus. Since it is in ROM, it doesn't intrude too much on the memory associated with the Z80. In fact 63k is available for application programs. The screen memory (20k) is on the base board so graphics do not interfere with memory availability either.

As if to confuse the public further, Torch has called the console command processor (CCP in CP/M) CCCP, which stands for *Cambridge Console Command Processor*. I suppose all this is pure accident or it is to stop people like me saying 'Oh no, not another new operating system'? In fact I wouldn't say that Providing people give a perfect emulation of an existing standard operating system then I think the user wins both ways. He can run popular software while taking advantage of the additional facilities offered by the new system. The people who are mad are those who decide that CP/M is rubbish and then introduce their own operating system which bears no resemblance to any other operating system, living or dead. Oddly enough, they

are often companies who don't expect to sell more than a few hundred machines a year and therefore end up charging the earth for software which has to be specially commissioned. At least Torch didn't fall into that trap.

What Torch has done is to produce a machine which is very easy to use because so much is sitting there in ROM from the moment you switch on. For example, you can format disks and copy files using programs resident in memory; see Figure 3 for a list of resident commands.

One direct command not on the list is FX which is used to set internal attributes of the Torch — things like printer port details, flashing speed, baud rates and so on. This command actually brought home one of the frustrations of having the Torch for review. Since the base processor board is the BBC board, many of the things I wanted to do were implemented on this. Torch is not allowed to sell the BBC manual so I had great difficulty finding out how to write programs and access the internal workings of the equipment. I could not get a BBC manual for love nor money. In the end I phoned one of Acorn's directors early one Saturday for a telephone course in using the BBC machine. It was a bit silly and a bit irritating for both of us that this was even necessary, so I used PCW's BBC articles from earlier this year to do most of the work.

Software

Like so many computer manufacturers, Torch managed to get its hardware act together more quickly than its software. One product, called Executive Aid, is claimed to comprise three elements — a card indexing system, a word processor and a diary system. Only one of these was available at the time of review. A Torchlink program was supplied which allowed me to access and exchange files with other computers. After succeeding only occasionally, I called Torch and mentioned my inconsistent results and they informed me that there was no CRC (a checking system) in the Torchlink program and it was about to be replaced by Torchmail which would be much better. I understand that Torchmail is in the post to me and I am sure that it, will be much better because Torchlink came close to being very useful. Torchtel, the program supplied to allow access to Prestel, worked very well indeed and I'm rather dreading my next 'phone bill since I was hooked up to Prestel for several hours.

At first I thought that Prestel was boring and amateurish but once I got away from the 'what's on in Brighton' type of screen, I found plenty to interest me. Mind you, it was all frustratingly slow. For me the most relevant items were the Viewtel microcomputer news pages. Since they invited users to write to them, I even got round to using the mailbox facilities. I know my letters were sent; I wonder whether they arrived — there's no way of telling. Electronic Insight too had quite a bit of microcomputer information but I think it has to take second place to Viewtel at the moment. I must confess that, although I found Prestel interesting, I would be hard pushed to justify using it myself. It ties up the telephone and costs a fair bit of money purely in connect time, never mind the other charges associated with it. I can see the day not very far off though when instant access to relevant information will become even more important than it is now and that, coupled with things like telesoftware and access to interesting private databases, will increase Prestel's popularity providing the Source, or something like it, doesn't get in first

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I couldn't use the Telex or Datal facilities which are offered by Torch so I can't pass comment on them. I asked Torch whether UHF broadcasts could be received so that Ceefax and Oracle facilities could be used. The answer is that, since the BBC board is in there, all you have to do is add the Acorn Teletext board and you could do this. Other communications programs which I didn't get to see were Torchtalk for communicating with other micros, Torchterm to allow the Torch to act as a terminal to IBM computers and Torchnet for local networking. I read in one of the manuals that the Torch could handle communications in 'background' mode while the user got on with some other job. This is apparently an intention rather than an actuality at the moment.

I was sent some interesting stuff on a music package but, since the package wasn't supplied, I can't comment. It's a shame, since that was one area I'd have enjoyed playing with. In fact, I'm beginning to wish I'd bought myself a BBC machine. All I managed with music was some envelope shaping and simple tunes through the BBC Basic thanks to an article in good old PCW. At least it worked and it showed great promise. I even programmed some of the user-definable keys to play set tunes! Hardly the thing to do on a business machine, perhaps.

Wordstar, Mailmerge and Supercalc were supplied and they all worked just fine. A financial accounting package came with the machine but I didn't try it out. I read the documentation and it looked OK. You really need to spend several days at least to get a true feeling for such a package. Cardbox worked just fine on the machine so I don't think anyone will have much trouble implementing CP/M programs on the Torch providing they can configure the screen controls and get the appropriate format disks. MBasic was supplied too and that worked well, both interpreted and compiled. Compiled, of course, was faster than interpreted and, on the whole, Microsoft's Basic ran faster than the BBC version. You will notice that I only checked a couple of the compiled Basic figures simply to give a comparison; see the Benchmarks timings table.

Other languages which are said to be available are Fortran, Pascal, Cobol, BCPL, Algol 80, C, Lisp and Forth.

Documentation

Two manuals were supplied with the machine — a user guide and a programmer's reference manual. The user guide is a delight. It is well written and entirely appropriate to get you over those first few hours while you explore your new machine and its capabilities. The programmer's manual was very good in its way, very well written and comprehensive but, I found, nigh on impossible to use because there was no bridging documentation to put everything into context. I see from the various documents supplied that there is another manual called a systems manual. Perhaps that's the missing link. If I had been prepared to write a few programs in assembler, I think the programmer's guide would have served me very well. It is really written for people programming at that level, or people who have learnt from elsewhere exactly what bits are relevant to a programmer in a high-level language. All round I had a pretty frustrating time, eventually finding things out by trial and error.

For example, I learnt most of the high resolution graphics commands by writing a simple Basic program which sent various combinations of control codes to the screen until I hit on those which had some effect. Later, Maggie Burton extracted me from the mire by digging the codes out of a BBC book. I'm back to that silly business of Torch not being able to supply BBC manuals. Such a manual at the right time would have shortened this Benchtrest by about 10 hours.

My conclusions on documentation are that Torch is doing a conscientious job on its manuals. The lack of a BBC manual or equivalent is likely to prove very frustrating for programmers working in high-level languages. Looking at the outline contents of the Systems Guide I'm not at all confident that it will be the answer.

Potential

There's no doubt about it: this is a business machine which can handle most, if not all, current CP/M applications. It goes beyond that, though. The high resolution colour graphics give a potential for presenting statistical information in a far more easily digested way than the common rows of figures. It also allows users to store and view graphic information as well as text and numbers. All that's needed is for the software industry to catch up with this type of machine. I'm certain that they will be very common in a year or two, but right now it poses a headache for people looking for packaged solutions for their graphic software problems.

The communications facilities are very good and, once again, provided the software is made available this probably gives the Torch its greatest advantage over its competitors at the moment. Torch has seen this and its main emphasis on software has rightly been on the communication package mentioned earlier.

So, if you need a machine which can run a wide range of proven software, which has communication facilities and which offers high resolution colour graphics then you should take Torch very seriously indeed.

It's not a pretty machine but functionally it's very good.

Expansion

A 68000 based machine is on its way. It will keep the Z80 processor too, so no systems investment will be lost. The new machine will run DAVROS, an all British operating system developed by Torch. I found that statement pretty depressing until I went on to read that it will support Unix programs. Once again Torch has recognised what's happening and taken steps to improve things but without putting itself out on a limb. There's talk of Torch taking on APL and the UCSD p-System too. Reading between the lines, Torch seems to believe that the 8086/8088 based systems are a temporary phenomenon devised to take advantage of existing software

availability. All I can say about that is that they're not alone. I do believe that Apple has bought quite a large number of 68000 chips too. We shall see.

Prices

At first glance the price of the Torch looks high. I think it's important to bear in mind that it has an in-built modem which would cost in the region of £300 if it was bought separately. It has high resolution colour graphics and reasonably high capacity disk drives. Against this, it is currently a 6502/Z80 based machine and prices of these are dropping like stones. You must decide for yourself what you consider is important to you. If you'd never use graphics or communications in a month of Sundays then perhaps this isn't really your machine.

Hardware

Basic Torch	£2795
with 10Mb plus 1 floppy	£4995
with 21Mb plus 1 floppy	£5495
Light pen	£ 60
Dot matrix printer	650
Daisywheel printer	£1350

Software

Basic 80 interpreter	£215
Basic compiler	£237
Torchlink/Torchtel	£400
Wordstar	£275
Mailmerge	£ 90
Calcstar	£175
Financial accounts	£600
MCS fully int accounts	£1250
Maintenance contract 14 percent of purchase price pa.	

A basic Torch includes colour, high resolution graphics, inbuilt modem and twin 400k floppy disks. (Incidentally, Torch also supplies a Z80 processor board and twin disk drive for the BBC machine at £780).

Conclusions

For anyone who needs a high resolution colour graphics, communications oriented, CP/M compatible machine, the Torch should be considered among their options. I get the feeling of 'almost ready' on the software and documentation front which is a pity — it spoils an otherwise fairly professional approach. The machine is heavy and not very good looking but it offers an impressive range of capabilities. END

Benchmark timings

Benchmark	BBC Basic	Interpreted MBasic	Compiled MBasic
1	1.4	1.5	
2	5.4	4.2	
3	14.4	10.6	
4	15.3	10.4	
5	16.1	11.6	
6	24.9	21.1	
7	38.4	33.0	9.2
8	8.9	5.5	4.9

For a full explanation of Benchmark timings, see PCW, Nov 82.

Technical specifications

Processors:	Z80A (6 MHz), 6502 (2 MHz)
RAM:	Main system: 64k; peripheral processor: 32k
ROM:	4k bootstraps for main system; 32k inc Basic, operating system and comms software for peripheral processor.
Display:	12in colour monitor (optional monochrome); 8 text modes, 3 graphics modes, up to 16 colours.
Keyboard	Expanded qwerty with cursor control, editing & numeric pads, 16 user-definable keys.
Disk drives:	Twin double-density, double sided 5¼in, 400k each.
Interfaces:	Centronics parallel, RS232 serial, 4 12-bit A/D inputs, modem for comms in Prestel.
Systems software:	CPN (CP/M — compatible) operating system.
Languages:	BBC Basic in ROM