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SOLVES YOUR MICRO QUERIES & PROBLEMS

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Measure the size of your programs...
Maggie: builds a nest for your data?



BATTLESHIPS

WORLD FIRST: program listing for playing Battleships on two Vics and for 64s wired together.

SINCLAIR

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BBC

Search for the pirates using routines that keep your printer from livings private.

DRAGON

The Dragon's 6809 processor revealed, plus programming hints.

GAMES CHARTS



The top ten games for the Spectrum, Commodore Vic and 64, BBC and Dragon, plus reviews of the top three and fast movers.

MSX MICROS



Do they set new standards?

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CYPHER RESULTS

We reveal the winner of the toughest decoding exercise outside GCHQ, plus a listing to send secret messages.

DISK DRIVES

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KEEP IT CLEAN

Will cassette, disk and screen cleaners keep your system running reliably?

SUPERCHARGED 68000

The QLs and Macintosh's chip offers a new order of power to the people.

CROSSWORD

A program listing for the Orion and Dragon to help you solve crosswords.

OPERATING SYSTEMS

Details on the differences between disk operating systems.

CABB

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CABB: UP AND BUZZING!

Get into Computer "Answers" Bulletin board with this simple step-by-step guide.

1 Check the references on your system. It must have an RS232C (or, in the case of the Apple II/III/IIIe) serial port. If it has it, then go to step 2, else stop.

2 If you haven't got an RS232C port you will have to buy one to plug in. For a good source of these:

3 Get a suitable modem. If your phone connects to the wall via a standard British Telecom jack-plate, go to step 3a. Otherwise:

4 Get a BT jack-plate, either standard (usually will work) or 25 ohm (rare) and go to step 3, or if you can't afford it, buy an internal straight modem (which you have a Telephone at which you will have to get the plug). Go to step 3.

5 As they're cheap these days (£20 instead of £150 +), your best bet is to buy a direct connect or "hard-wired" modem like the Bulletin:

6 Get the correct type of modem. It must be either 300/300 baud, CCITT (V21), synchronous, full duplex, computer-used to communicate with bulletin boards and we have the others, or 1200/1200 baud (two-way), CCITT (V22) asynchronous, full duplex, computer-used to communicate with Proseal and Muzart and a few online databases.

It is useful but not necessary to have options for answering pages and mail/full duplex.

7 Check you have connection software. If not, see March issue (page 146) for examples that will run on popular modems. If you have a problem loading the right program go to step 8. Otherwise:

8 Contact the supplier of the modem to find out what software is available, armed with the specifications given below, if no luck contact your own group, if no luck contact us.

9 The software must support the board name used by your modem (check against step 6). If you are simply wanting to chat with the board, find out what mail you're to get and place orders like a game step 11, else if you want to download files (including programs listings) then go to 10.

10 Your software must sup-

port the following protocol set: 0 user file, 8 data file, 1 stop file, no parity. You will need an error checking protocol on streams about 1000 bytes.

We recommend that you get software that supports the Comshare (also known as Sinclair's) protocols, which is supported by CABB. These aren't necessary if you only intend to download straight text (ASCII) files to a local computer.

11 Your software must support the following settings: 1 user file, 7 data file, 1 stop file, no parity.

12 If you want to download text files, check that your software supports the 3, 20 X CDP software handshaking protocol and that it has built-in file download/uploading files.

13 Your Computer Answer Bulletin Board (CABB) on 045 411 8816/18 (local service).
By Tony Dennis, forestry editor.



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Apple 400, 500, 800, 900, 1000 etc.	800 int./ext.	£110	Apple dealers
Commodore 16, 64	RS232C int./ext.	£75	Wear Supplies, PO Box 48, Ipswich IP4 3AD, Tel: 0479 82884
68 only	Modem/RS232C	£85	Commodore dealers
Osprey 22, 64	RS232C interface	£47.50	Osprey Computers, 644 dolls. row, Chipping Norton, Oxfordshire
Lynx	Hardware inter. face card		See forthcoming issue 1
Orin/Atlas		£21.50	Medular Concepts/Peripherals, 13 High Street, Clybeith, Swansea SA1 3BF, Tel: 0752 84444
Tandy TR-80/85/100	RS232C board	£77.50	Tandy dealers
Texas SI-80/84	Superminicomputer + RS232C	£111	Parker Supplies, 4 Dorset House, New St, and Fenwick, Dover SE11 6DQ, Tel: 0333 44433
2400	Universal modem adaptor	£29.95	Microcomputer Resources, 4 Brook Road, Fox Street Village, St Albans, Herts, Tel: 04721 7217
ES Spectrum	Atari/MS-DOS interface + 17 software	£26.50	PC 'Y Software, 199 All Saints Drive, Stroud, Glos

MSX HEADS WEST

Athough all month, business promises to be brisk in the U.S. for MSX from a new parallel to that of the Spectrum's to an exempted country, Japan.

There are now 11 monthly issues building MSX machines and just three months left and that they are expected to get out of their homebases.

With a range of MSX machines poised to enter the Western market, what exactly are we looking forward to? What is it about MSX that has impressed everyone within the region now? The most likely to find out, and returned with details of several MSX

THE FIRST PART OF A LOOK AT THE FOLLOWING RANGE OF JAPANESE MSX MICROS

machines, one of which will be looking up this month (Sony and Hitachi), and the rest to next month's issue.

MSX computers and the 286 CPU, TMS 9918A (by Texas Instruments) and Matsushita's MSX Home. Going on the specifications, many in this country have dismissed them as low performance machines, but having been in Japan to see the actual machines, we are sure you that for a £190 to £200 computer, they are very good value - if only for the fact that they are all extremely well

built on the expected Japanese standard.

When ASCII Monthly of Japan posted the MSX standard to the manufacturers, it insisted that all MSX machines are built to the full MSX requirements, so that they are backwards and forth were compatible. All MSX machines have the same basic hardware with a note, however, they may have different software. The MSX machine is built so that it is as flexible and expandable as possible.

There has a link on this link

UPGRADE

When this month you can plug in an external expansion RAM to a disk operating system. The cartridge slot can be expanded to take up to 16 peripherals. The RAM can be increased up to 1 Mbyte in steps of 64K, by plugging into the cartridge slot (the Micro Warehouse). The maximum memory requirement for a MSX was put at 256 Kbytes. Some ROM and more than 512K of RAM, however, most have at least 128 Kbytes.

MSX graphics can handle up to 1024x512 with 16 colours and 32 points. The good thing about the TMS 9918A graphics chip is that it can do some video RAM (VDRAM), so graphics do not need up the user RAM. In colours are some.

That Sony, known to us for good designs, is bringing together more digital looking MSX computers. The word Hit Bit was put on the Japanese word for 'people', and it certainly is a friendly-looking computer, advertised more like this.

The Hit comes in a choice of two colours, red and silver. Its body is well-shaped, with a very conspicuous shiny black screen behind the keyboard which contains the on/off switch and the cartridge ROM slot. It has a coach-type keyboard with large and clearly marked keys, making it easy to use, with the function keys and colour keys slightly raised above the rest, the rest key is thoughtfully protected in permanent recessed area.

You could say that Sony Hit is to do about the most complete MSX machine, as the basic model comes with all the necessary interfaces there are: UART and video outputs for the display, two sets come up to two Atari type protocols, and there is one 50 pin I/O bus, a cartridge slot at the top, and a Centronics port.

The Sony Hit has come with 128 Kbytes of memory, plus a 4K byte volatile RAM cartridge. When the machine is switched on a menu is displayed so you can choose which of the four features option you require, as well as MSX files. The computer is equipped with an address manager, Schedule menu and Home program. The CMOS RAM cartridge can be used with three programs (or you can store your friends' address and telephone

SONY HIT BIT 55



THE HIT BIT MAINTAINS SONY'S TRADITION OF GOOD-LOOKING MACHINES - WHAT ELSE HAS IT TO OFFER?

memory, for example). The cartridge can hold up to 60 names and addresses.

The good thing about it is that it is very accessible cost

priced with top type of 8086 with software - plug and play cartridge and that it is. The software programs will certainly may to use but it is not really all the

sophisticated.

The Hit Bit is a machine for games playing on control keys are large, well spaced and arranged on a neat square. The optional joystick is robust but much too long (the longest version just making two finger-point).

Sony is one of the few manufacturers companies which also sells games software, such as *Goldenrod* and *Double Dragon* (a 3-D Defender-type game). Sony has several forms with a number of arcade game manufacturers to convert video games to MSX machines. Unlike (which unfortunately is the proper version), as an ROM cartridge to work all Sony software. It plays a rather weak game at level one, but level it is very tough. Unlike a very short version in playing a game is shown using control keys can make an error and when you play a video cartridge device is usually expensive.

One of the strong points about MSX computers is, of course, software compatibility. Over 100 software titles have been published, and you are assured of high quality since the software houses have to compete with reputable companies like Sony, only 30 per cent of a market in arcade forms (prices ranging about £5-50, and normally £24-50).

For a computer which has almost complete range of interfaces (except BSCSI) and built-in software, the Sony Hit Bit is a bargain - definitely one of the cheapest MSX machines. If you don't mind that having a proper keyboard, this machine is well worth considering.

SONY HIT BIT 55 SPECIFICATION	
CPU: MSX	
ROM: MSX Basic, ROM 256 and 1K 15 utility with ROM 6K	
RAM: 128	
Video: VGA, RGB	
Screen: 32 x 24 or 40 x 24 text, and 228 x 172 in colour graphics	
Sound: 8K	
Keyboard: Touchtype	
Interfaces: compatible video and TV output, cassette 1200/2400 baud printer Centronics matrix menu 1/24, one 50 pin expansion port and a cartridge slot (one 50 pin port (Atari type))	
Addressable RAM: CMOS (see above page)	

MULTI-INTERFACED AND HIGH BUILT IN SOFTWARE. THE HIT BIT IS A BARGAIN.

UPGRADE

what gets you the 1195 and under MSX Model. We are unsure whether this is due to the Japanese TV system or because of the graphics chip, but they are excellent if used with a monitor.

The graphics are suitable for drawing letter patterns on screen, and some MSX code pages include coding facilities to do so. There are enough codes to do mathematics, and there can be constructed fairly good flow statements. There are also some handling facilities which allow basic programs to be interrupted when spaces, carriage, keys are pressed, errors occur and so on.

The reactive interface has two basic pages (100 based and 200 based). When creating documents, the first one is automatically detected so that the user does not have to specify the base rate for the cassette. The primary interface is the usual Commodore type interface and there are MSX pointers which carry for all graphics elements (but only in systems with a Commodore interface can be used).

MSX Base is an extended version of Microsoft Basic version 4.5, has generally 19448 mg is designed to follow the CVC three which is a standard Base in the 16-bit machine

MSX MODELS ARE EXCELLENT FOR THEIR PRICE, THE HARDWARE AND MSX BASIC WORK WELL, AND EXPANSION FACILITIES ENSURE WIDE RANGE OF ADD-ON SUPPORT.

MINIMUM MSX SPECIFICATION (SET BY ASCII MICROSOFT)

CPU	1MHz
RAM	128K Bytes
Display Controller	4096 Pixels
Storage	128K Bytes
Mass Store	500K Bytes
Audio output	
Video output	
Carriage control	
On-line storage	
On-line print	

Do like minimum spec, but machine has at least 128 of both and more interfaces.

world. Although it does not have the sophisticated character set of MSX Basic, we feel that MSX Basic is about the best version of Basic Microsoft has produced. MSX Basic is limited with up to 14 digit accuracy - which is not accurate than most 8 bit machines. You can specify whether you want single precision or double precision, and what numbers are printed they can be formatted to a number between 0 to 99999.

The graphics commands are similar to that of the Intertex 16-bit graphics environ-

ment and commands such as DRAW, ERASE and PAUSE (PA), however, it is expanded to cater for 16 colours and 16 sprites.

There are two chips which can be inserted instead on top of the main system so they can be used for line copying and colour. These are not considered to be set and priority given to which system appears in line and which is selected.

Unlike Spectrum or Amiga machines, MSX computers do not use totally up to their capabilities - in fact, it appears as if that they have gone out of

the way to make it obsolete. There are a couple of reasons for this. First, because MSX was to become the industry standard, it had to be made with chips which are widely available (chips like Z80 have so many second source manufacturers, that it is a chip and they are guaranteed line chip shortage problems, which have been getting worse recently). Second, the chips chosen are those which have been proven to be successful and that most systems are familiar with. The MSX computers are designed to be as compatible as possible, and because the chips are the familiar Z80 and TMS9918A, the peripherals are easy to build.

So where does the limit lie for the average customer? There are a number of progressive benefits. The increasing number of manufacturers will ensure high standards, and because the peripherals can be made in the MSX standard, you get a huge choice of add-ons to give a number of manufacturers.

By the time you read this, the MSX D04 (disk operating system) controller and floppy disk will be out in Japan. When we reviewed the article a prototype of MSX D04 was in working order, and we were told that it was up to the disk drive manufacturer to adapt to their disk.

Hitachi's entry into MSX can only be described as cautious, and a little strange. One of the biggest chip and mainframe manufacturers in Japan they have not made much impact on the home computer market.

The MB H1 is designed as a portable computer of the Epson HX-20 model. Usually 16120 bytes, with carrying handle and a detachable power pack. Why a home computer would want to be portable is a point well beyond us, but it certainly is a fall of surprise.

Inside the machine as you will see a Hitachi logo and an introduction with a menu of options as to the graphics - a nice touch. From the Spectrum key M1 and you get a machine made machine, Hitachi is the only manufacturer to provide such a safety software. There are 13 commands, and this machine was used to develop the MSX machine and its software framework by Hitachi per-

HITACHI MB H1

RATHER AN ODDITY IN THE MSX WORLD, HOW DOES THE MB H1 COMPARE TO WESTERN LAP-TOP MICROSP?

graphics, 16-bit video, and 128K RAM.

If you print the machine requires to you have to see it.

With carrying handle, 16-bit video and 128K RAM, it is a graphics program which allows you to draw pictures on

HITACHI MB H1 SPECIFICATION

CPU	Z80A
RAM	128K Bytes
RAM	128K
Video	16-bit
Screen	320 x 240 or 240 x 240 (with 320 x 192 character graphics)
Graphics	16
Keyboard	40-key
Interface	compatible video and TV output, cassette 1200/1400 baud, audio mini line CD, no carriage data, no parallel port
On-line print	

WITH UNCONVENTIONAL BUT INTERESTING FEATURES, THE MB H1 IS IDEAL FOR THE MICRO ADVANTURER.

screen using the cursor key, 16-bit video program which also has a simple manual keyboard (the display shows the keyboard and how the keys correspond to each).

The utility software included is not that sophisticated, but interesting and simple enough to get a new piece of hardware to a computer and to see how it works.

After that all the standard features of MSX computers and software described, the little machine has one special point, a Commodore type, and one feature really unusual of the MSX - a switch to determine the speed of the Z80 processor. When we first heard about it, we thought about the computer does, that's only because it is not as fast as possible! But we realize it is intended for the slow of response, who need to play the computer music games at a more leisurely pace?

By Tom Ross, a Japanese computer journalist

Overing \$1,000 of the value of your buy a \$1,000 machine, as the makers of the new Wren machine long, much more debate, but the deal really is a good one.

Take another look at the full power of the computer that covers five screens from disk, 427 M business machines at any where time that your eyes without software, so if the package is as useful to you, the Wren offer represents a real bargain.

After a year of development, a team of experts have fulfilled their mission of producing a strong and innovative machine, based on proven technology, sensitive price and capabilities. And here's why.

HARDWARE

The Wren is what you'd call a computer that is different from any other portable, such as the factory operated L420 top top computer like the Tandy 300 and Spore H200. The portable machine is designed to be ready to handle from office to use and go home, in one convenient package.

A big reason that many manufacturers make with this type of machine is to compromise the working features such as screen size, number of disk drives and so on. For portability, that is, but, as the carrying time is only a few minutes of the machine's use.

Thankfully the Wren has not fallen into this trap. It achieves an extraordinary in a very unusual way instead of the common fold-up-keyboard, the computer folds forward on its base to automatically cover the keyboard and reveal the carrying handle.

The keyboard has a 40 key QWERTY layout with a separate cursor key (and function) pad and the two Frenet keys (F and C). An additional five function key pad, capable of 15 programmable screens, is provided on the left of the main board. The screen itself is good and the mouse and its settings are in the best position for operation with the base key.

The processor is the 8 bit 2868 running at 6MHz. The standard disk memory is 64K RAM which is expandable to 256K using memory banking techniques. There are enough of these in the basic machine to enable the screen to have 10

WREN



IS THE NEW WREN AND ITS \$1,000 WORTH OF
COMPLEMENTARY SOFTWARE, REALLY AS
GOOD A DEAL AS IT SOUNDS? WE FIND OUT.

over 10K of RAM for the program without occupying the main store. There is an additional 64,000 for power on diagnostics and 50 bytes of CMOS RAM with battery backup to store time, date and Frenet code. For a single user machine it is loading with resources to the extreme world. A lot of obvious parts, over 8,000 ICs (2000 total (lower than most)), and Commodore for parallel printers.

The rest is much less obvious, an analogue system that can be used with any joystick and the included BBC News. However, the machine

will fit into a convenient sized case, a hard disk option system, a scanning lens, light and microphone.

Communications are already built-in and British Telecom-approved, using an auto dial system with 1200, 1200 and 1200/15 (Frenet) baud options. For users of the BBC model the sound can be produced internally (through a small speaker) or fed out through a DIN connector. Colour output is via the RGB socket to a variable monitor or can be fed to a normal TV using a RGB to RF converter. Lastly, by those who who

could have thought that the biggest offer, a range of Wren software are available. This option is covered by a modest, already present and it is not the usual position for the device feature. There are two purchased 10MB (at \$1,995), 10MB (at \$1,795) and 10MB (at \$2,495). The standard disk and half length 5 1/4 inch with a total of 100K storage - a double sided option will be available in version 2.

The display is a 7 inch screen with a fine line and is easier. This may seem fairly small, especially in these hard to find size screens, but there is no need to worry as the characters are clear and well formed, and it presents no problems in use. In the three selectable modes: 60 x 24 (teletext TV) 100 columns, 40 x 24 (Frenet) and 50 x 20 (graphics).

On powering up, the check key lights up and the dog cursor are performed on a few seconds. If all is well, the main power light goes on and the Wren logo appears on the screen with an instruction to load the operating system disk into the top drive. Shortly after loading, the main "Wren Moves" display, and at the top right is a programmed display of day, date and time (even this feature responsibility was more visible on the operating system has gone in the factory loaded-up and test check for an error message).

Most machines have to prompt the user on power up for the disk. The best way to describe the rest of the screen layout is to imagine 10 playing cards laid out in two rows of five starting at the top center and moving to the bottom right. Each card is laid down half covering the previous card. The card itself is not labeled options are on each card.

The software is made by using the left and right arrows, confirming the option by pressing return. On the last line no function key effects, which are -F1 or -on time, F2 and F3 directory for disks A and B, F4 on disk and F5 is an extra CP/M.

SOFTWARE

The software options provided on the system are: Executive Desk top, Communications, Perfect Wren, Perfect Calc, Perfect Plot, Addressal Software, Programming, Disk Drive (Basic Disk), Format B

WREN SPECIFICATIONS

Price \$1,200 (base), \$147 (including software)

Memory 64K RAM expandable to 256K (64K 640K display, 256 bytes CMOS RAM -in battery for permanent time, date and Frenet code storage)

Keyboard 40 key QWERTY, cursor keys, separate Frenet keys (F and C) and five function keys (capable of 15 programmable screens)

Processor 2868 6MHz

Interfaces RS232C/75 (Frenet) out, Commodore (parallel) port, 4 analogue inputs, video out, auto disk loader, 80 (approved) 1200/1500/1200/15 (Frenet) out, serial and RGB video output

Data file full width 1/2 inch 200K storage per disk. Optional double density

Display 7 inch fine line screen with 284 characters and 100 columns (max) - 60 x 24 (teletext TV) 100 Columns, 40 x 24 (Frenet) and 50 x 20 (graphics)

A WEALTH OF FACILITIES AND GOOD
PRICE FOR ITS RANGE. MAKE THE
WREN WELL WORTH CONSIDERING

UPGRADE

Desk Top (Desk Edition)

First way of key feature method, as well as the software in a desktop division, as it is presented in the three boxes.

On selecting this option a similar menu to the main one is displayed and contains the Time Management, Address, Desk File, Phone, Calculator, Utility Backup, and Patch options.

This system as a whole is designed to be incremental and, as electronic replacement for the traditional office worker's tools such as diary or calculator were used. It is written in the C language and is for the moment a Windows-compatible application package. Certain features of the system are screen-throwable. For example, the typewriter and calculator can be invoked from the menu or anywhere in the system. What is not a wonder is made which shows where you have finished. In addition, a telephone number can be automatically dialed (using the normal method) simply by placing the cursor over the number and pressing a couple of keys.

The Time Management system is built around a day diary in the afternoon, appointments, things to do and events. The event list is very useful, as it not only shows fixed date fields but also has the ability to enter mail card dates. For example, 20/07 - Christmas Day will generate every year, and 15/08 - storage papers will generate every month. It also has good general purpose search facilities, and also gives you a search in advance (using afternoon events).

The Address system, as you would imagine carries addresses, but in addition, phone numbers, group (personal and company) is on the list and telephone numbers and group labels and contact address.

The Desk File is an inverted system, comprising a personal address system, and a document system. The latter part allows the building of skills with headings and sub-headings to which the system automatically jumps, which can be used for contacts, agendas, expenses (it has automatic receipt facilities), and diary when appropriate.

The Mail system is not what you would expect by its name. It is a very of systems, fully ordering your essential things, up to case major headings can be created, to each of them a further sub-heading can also be added to those yet another sub-heading - therefore, a maximum of 999 things inside items can be created. When something has to be filed, the system leads you through the classification, continuing with a descriptive and numbered label ready for filing.

The Calculator (which can be recalled from any screen where it is running) is a four function, but memory facility which can, on command, store the result into a document. The Typewriter, in the same way as the Calculator, is called directly anywhere in the electronic system, can control the dumping of pages, and act as a simple and fast filing system. The Utility Backup routine's price program is to create backups and format new disks, and, when required, create new partitions for the formatted Desk Top hardware. In addition, it allows system configurations such as label format, printer type and whether the phone numbers should be provided with a '0' (for an outside line) as would be required in an office environment.

The Patch option allows you to the main menu. Throughout the system many details were provided - such as approximate time and date every - and as a whole the system fulfilled its function. However, there were one or two slight anomalies and bugs. One that is to be expected in early in a system's life - papers in the address system can have both a 'blank' for the name or two pages the same name. There is also some slight 'fuzz' handling of screen updates. For example, after a calculation has been called and selected some of the box edges of say the diary page may be lost. The data is not corrupted in any way, but it looks a rather untidy appearance.

Two features which would be of great use, but did not appear to exist, were the ability to take a phone number from the address file into the diary to build up a list of calls to be made for/brought in, and the ability to list off the complete diary for a number of weeks ahead. In theory available on more one able to fill the

system, and you wish to check out the specifics of these systems settings in so as to a desktop device.

COMMUNICATIONS

The communications with the system are simple and to be driven. The main is a 16-bit logging on and off using four per cent numbers as manual data. There is a sub-menu list of the range of phone numbers and their descriptions. For example, the Personal History number is not stored on disk, but in the 640KB RAM for security reasons but can be changed as required. Once on line, frames can be viewed in the normal way and can be saved for future use. What of course there are no to be viewed from a disk file. With the address of a suitable provider, hard copy of the frames is available.

Programs (such as loading (telecommunications) is available and a number of Wren programs are already in Microsoft MS-DOS (see page 40). The Wren is also capable of message preparation, reading and receiving. The colour graphics of Paint are represented on the Wren screen as 'grey' lines, but full colour is possible by the addition of a suitable monitor (RGB) or a converter (RGB to B/W) and a normal colour TV.

Programming is a facility to load BBC Basic (200 version) for programming and execution of Basic programs. The manual provides summary of the added commands unique to the BBC interpreter over and above BBC Basic.

The Disk Copy (Basic Disk) and Personal Disk (Basic Disk) utilities are provided to manage drive formatting and disk copying (the latter format prior to copy). Both work well, but lack an alternate and option at the start should you enter them by mistake.

A utility menu is provided to interface with CP/M to mass drive or hardware such as remote, which makes life much easier for the first time user. In addition, some features often only found on the more up-market systems are provided, such as Design Characters Sets, Delete Keys and Configure System.

CP/M 3.0 Commodore format to CP/M plus, the operating system supported, is the most advanced 16-bit version from the Digital Research stable. This arrived a while after the 16-bit versions such as

CP/M 3.0, illustrating the company's continuing commitment to 16-bit machines. It offers considerable software scope and added features over the CP/M 80 system version 3.0. The first noticeable advance is the improved speed of the resident file disk system.

Included along with the Wren user pack are the three 'Perfect' manuals, it is also possible to purchase the full CP/M 3.0 manual, an 80-page guide to BBC Basic and a Wren technical manual. The user guide introduces the hardware and software concepts, provides an overview of the 'Perfect' user and is a depth coverage of the Communications and Licenced Desk Top options. A second is devoted to the operating system and software information is provided (if you already program in Basic) to work with the BBC Basic. The manual was good, providing useful training and some support for the first time user, and reference information for the more experienced. It was one of the few manuals that control the very important area of backup and recovery.

The only obvious criticism of the Wren is that it is not 16-bit - but if it is a good price or working, then you will have to think again after contacting the manufacturer - the Wren has been seen of its so-called better bit relatives.

When considering a machine to complete it in the only one that seemed appropriate was the IBM PC. Both machines are used for business and personal will be used for home and 'fun' use. They both have excellent screen operating systems and yet also have colour sound and potential capability.

So the Wren is a machine with a wealth of features at a good price which is clearly aimed to a wide range of applications, and equally as good operating in a desk top business system for screen applications, as it would be a business machine.

By Keith Humphrey of the National Computer Centre From Business Systems.

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DOT-MATRIX COMES OF AGE

CAN THE LATEST RANGE OF DOT-MATRIX PRINTER ACHIEVE QUALITY ON A PAR WITH DAISSY-WHEELS? WE FIND OUT

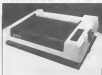
A new generation of dot-matrix printers have gone some way to overcoming many of the traditional shortcomings associated with the technology. Latest models on the market are not only able to produce colour graphics, but also can create print that's sharp enough to compare with the most traditional look-alikes.

In the January issue of *Computer Associates* we saw how daisy-wheel printers are excellent for producing smart print, but because of the way they produce an image on paper they're not suitable for drawing graphics. If you want to produce nice screen dumps and pretty presentations, as well as text, the type of printer used will have to be a dot-matrix, either in daisy-wheel or dot-matrix.

Unlike daisy-wheel printers, which print using a hammer to strike an arm with the character on it, (see *Computer Associates*, January '84 issue), dot-matrix printers use a matrix, or 'bank' grid. By forcing pins through the grid and across a ribbon, the dot-matrix printer can produce virtually any shape, not being confined to any set characters. As the resolution of your display on how close together the holes on the grid are, or how many pins the bank uses, the print is not usually better quality, although reasonably nice prints.

Especially in the home most people associate with colour, budget printers and only a few hundred a new machine is the HP Price, like LQ1700.

For right the letter for HP700A - also looks, shows about the price right the letter using with the Japanese technology before Epson/Sharp - some letter quality print at low price



The LQ is a real beauty, and even as well as a price of £1,200, it'll print a nice sharp print, as a table top printer not used to clear prices. All the features anyone could want have been included. It is a 24-pin and a 24-pin dot-matrix printer, so it's a quality print mode, proportional spacing (important when producing letters), and a fairly efficient way of doing character sets (it's downloaded).

The machine is quite complex, so Epson supply with a suitable comprehensive manual that reads *How and How to use*. Every feature is explained in detail, and starting off with the mode as a very straightforward. Like the daisy-wheel printer looked in the January issue, all the special effects on the LQ1700 are accessed through the HP codes, as we used a BBC Micro with the printer, all the special codes look the form of VDU2 a system. Although these can look a little mind-boggling and long-winded, they are quite easy to see when it's printed. All the commands used are placed in a VDU1 command, the code that causes the new characters to be downloaded.

The great best of the LQ was under £500, for the home mode, and letter-quality print can be obtained, as good as some daisy-wheel (see *PC*), but in clear comparison it does tend to struggle a little and become fuzzy around the edges. However, if you're in the market for a printer, the quality is quite high, right in all the important parts of your letter quality.

For example, if you want a fast print out there is a dual print mode that prints at 360 cps rather than 90, a vast improvement, though the price is very dirty.

One feature that stands out on the LQ, as well as the new letter quality print, is the ability to accept user-defined characters and use them with character codes already used. Up to 128 user-defined characters can be downloaded to the printer and stored in its RAM (the RAM is not normally used by the printer as it usually contains its characters from one of eight character sets (also in ROM).

Before defining a character, a location in RAM must be used to tell the printer where it's stored, as it is to be stored. Once the location is specified and the character designed, it can be sent to the printer. It is not possible to print the character until the RAM is stored in the place where the character is stored. This is done using another ESCAPE code (ESC

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EP 11/85

UPGRADE



Allow the SP7000 printer's putting a new slant on things. Below: printer prices and features compared.

It is then possible to print the character by sending it to a dot-matrix printer.

Another handy mode gives the user the ability to print on single or dot-matrix using only 8, or 8x24 pins. There are six 8-pin and three 24-pin image modes. By using the various bit-image modes, simple dot-drawings and icons can be constructed in different print densities, EPO 2 even gives a quadruple-density mode.

Included in the IQ's ROM are 11 character sets including Japanese, German and Danish, each of which is software selectable using EPO 4. Using EPO 5, it is also possible to put any of the sets into a download character set so that they could've been downloaded.

To complement its excellent printing ability, the IQ also has a good external design, with some handy features: a removable interface card on the rear is a very handy facility, as is a lower Commodore, EPO 10 and IEEE 488 interface to be easily accessed post. The operation of the machine can be changed by dipswitches, as well as through software control, and three or four wheels are easy to reach—you don't have to spend time undoing bits of screws and removing half of the printer's body. Three seats or drawers can, the IQ is a surprisingly quiet machine, that lets out a soft purr from its internal fan.

Although the facilities offered by the IQ are very comprehensive, they are not enough to justify the high price, unless you are fast paying for a robust design that should give the printer a long life. For most people a vast majority of the features will be unused so there are just many more processors than can handle them. If you're one of the most popular word-processors, cannot be recommended to use all the features, and if you're not, with which the article was written certainly isn't.

The Tandy King RPS 10 is a dot-matrix printer far cheaper than the IQ, but still produces some very favourable print. Virtually all the features on the IQ including near letter quality mode (see Fig

4), merged and condensed pairs, and extra and subscripts are available on the RPS 10 and they are all scanned in the same way using RPS mode (NLQ mode can be switched into slowly by holding down the FORM FEED key on power-up, it is then possible to define your own RAM character set (128 characters in all) in the same way and download the ROM set. Data Memory are also working on a ROM that will allow you to download) ■

Printer	Speed (lines)	Serial Data	Bit-rate	Price	Supplier
C-100	48	Commodore 8510 (100, 85) 85100 (100, 100)	9600 (10, 85) 14400 (10, 100)	173,95	Intertec
CP-7000	18	IBM 5310 5310 (10, 85) 5310 (10, 100)	9600 (10, 85) 14400 (10, 85) 14400 (10, 100)	199,95	Ashco
CP-400	140	Commodore 8510 (10, 85) 8510 (10, 100)	14400 (10, 85) 14400 (10, 100)	143,95	Data Efficiency
EP-100	100	Commodore 8510 (10, 85) 8510 (10, 100)	As above	158,95 (1000) (1000) 1200	Data Efficiency
IQ-1000	100	Commodore 8510 (100, 85) 8510 (100, 100)	7200 (10, 85) 14400 (10, 85) 14400 (10, 100)		Spans

Prices figures do brackets denote price of options. A/C means the price was not available at the time of writing or press.

Printer	Resolution	Response time (spacing)	Graphics mode	Costed	Supplier
C-100	720	80	815	110	Intertec
CP-7000	80	80	815	110	Ashco
CP-400	720	80	815	110	Data Efficiency
EP-100	720	80	815	110	Data Efficiency
IQ-1000	720	700	815	80	Spans

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EPSON 485I	545.00
EPSON 485J	550.00
EPSON 485K	555.00
EPSON 485L	560.00
EPSON 485M	565.00
EPSON 485N	570.00
EPSON 485O	575.00
EPSON 485P	580.00
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The printing speed is slower than the LQ flow over, being 140 (slower in NLQ mode), compared with LQ's very fast 300 rps. The KPSB's real possibility to format for the home user because of its small size and modest price. Setting on your desk next to your work, it won't take up room that is best occupied by a spare of magazines and some beverages.

There are various cheap printers on the market that not only print out graphics but also colors, making them a good proposition for the home user. One of the best is the Integras Colorpage printer. Unlike a dot-matrix printer, the Colorpage actually sprays ink onto the paper from several nozzles located in the machine's main body. The nozzles hold a cyan-blue cartridge, one containing magenta/black ink, and the other yellow/black.

A flap on the front of the printer can be opened to reveal two slots into which the cartridges are fitted, one cartridge contains cyan/black ink, while the other has all the colors. There shouldn't be any worry about constantly having to replace the ink cartridges as Integras draws each one well less for eight sets of pages, as four million characters (instead of up to one thousand) are used on this? Up to eight different colors (one of which is white) are available on the Integras, giving the user a full lot of scope when it comes to printing out screen dumps.

Those users with a BBC Micro are particularly lucky, as the printer manual contains a listing for a BBC screen dump program. As well as handling screen dumps, the Integras has some functions that allow the user to perform special effects on text.

Various things such as double density printing, enlarged print, print width and colour change can all be done on one, and the real beauty is that when something is finally printed on the whole process is virtually silent—no real drill noise. Finally, unlike the Integras as mentioned earlier, has the capacity to print out graphics characters which, by setting the printer into colour graphic mode, can be multicoloured, however, image quality has to be entered in hexadecimal, so a list of knowl-

edge of this machine is required.

All things considered, the Integras is a better printer as it is not one of the basic printers at 77 rps, it provides good price, a compact design and a pleasant finish during printing (instead of a plain, poor impression).

A colour printer that hasn't upset the quality of print, in comparison of the Integras, is the Berkeley GPTM. One first looks with the GPTM as trying to get different colours, but it is a confusing manual does not help, but once we'd sorted out the required codes, all worked perfectly.

The price however, was, in all of the seven colours, very reasonable due to the multi-coloured ribbon being strung across the paper as the print head moved along the paper. The manual pointed out why this could be happening, but our attempts to remedy it using the methods proposed did not make any difference, though a slight one to a Japanese user. When the GPTM comes over the Integras with a price speed, but the user's much of an advantage given the quality of print. All the effects available on the Integras are possible on the GPTM, and are all executed in the same way using ESCAPE codes. The graphics mode is also the same.

If you are looking for a colour graphics printer and have sifted through the advertisements in various magazines, you could well have the GPTM as your short list. Out of the Integras and GPTM, we would certainly recommend the former, but because of the price quality of the GPTM it is very hard to give a reason why it should be purchased.

From the printer looked at, it appears that the dropouts could at last be getting some serious competition from the dot-matrix corner. Using hardware such as the LQ and RP 810 printers, it is now possible to produce some very acceptable letter-quality print, at a lower price and much faster print speeds than most good quality dot-matrix or equivalent printers. And for the user who likes a quality of colour to keep things up, the Integras will fulfil most people's needs.

By Steve Applebaum, staff writer on Computer Associates

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28 Hunt Hill Row
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Tel: 0275 60201
Integras
Model 10
Midlands Ave
Market Harborough
Leics NN17 1JZ
Tel: 0442 61152

Open
Surrey House
128 High St
Weybridge
Tel: 044 951 8492
Integras
Chartwell
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Staffs ST1 1PT
Tel: 0522 2 1642

Fig. 3 shows cheap print from the Integras 147-150
Fig. 4 shows from Texas' Edge

THIS IS AN EXAMPLE OF THE LQ'S NEAR LETTER QUALITY PRINT

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THIS IS AN EXAMPLE OF THE LQ'S PROPORTIONAL SPACING

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DRIVE AHEAD WITH DISKS

ADDING A DISK DRIVE CAN GIVE YOUR MICRO A NEW LEASE OF LIFE... BUT WHICH IS THE BEST FOR EACH SYSTEM? WE FOUND OUT

Disk drives can change the whole character of your micro - not only do they provide fast access to masses of data, but with a good DCS, can give a machine a new lease of life. Computers and offices, they can free you from the drag of cassette.

In the last issue of *Computer Upgrade*, we took a look at ways of linking disk drives to the more popular micros, so let's take a closer view of the drives themselves. The systems we'll be looking at are those with a 16-way pin connector, the SBC, and the Spectrum (with disk controller).

Since the early days of the home office micro, the 5 1/4 inch disk has been regarded as the most popular standard, but this is now being superseded by the 3 1/2 inch and 5 1/8 inch drive. Most of the popularity of the smaller drive comes from its compact design, but there is an advantage that 3 1/2 inch disks have over their larger relatives - that of strength. Unlike larger drives, 3 1/2 inch ones are disks that are located in a sturdy plastic casing, protected from prying fingers and the hazards of bending.

The Micro Pulse, from Northern Computers, is one such rugged format in a casing made with Northern Computer's own plastic front. The 3 1/2 inch Minicore drive comes complete with power cables, a format disk and an interesting little piece of software called the Mirror. The Micro Pulse is compatible with the Acorn interface, so there are no hassles trying to get it DFS-80M.

The capacity of the 3 1/2 inch drives compares favourably with that of the larger ones. For instance, when a disk is formatted to 40 tracks on the Micro Pulse, the capacity per side of a double-sided disk is 180K bytes. This increases to 300K

when it is formatted for 70 tracks, 40 x 16-bit format disks, those on the Micro Pulse, 120 16-bit up into a total of 360K bytes, used for a BBC disk.

If your drive has the Acorn DFS, you will also have the Acorn utilities disk, but on a 5 1/4 inch disk. As a result, a software disk supplied with the Micro Pulse has all the formatting and verifying programs on it. These include both 40 and 80 track versions. If, on the other hand, you have the Worked Electronics or Pure AMCCOM DFS, then there is no need for a utilities disk, as everything is contained in ROM.

The Mirror, an interesting utility, enables the user to transfer virtually any BBC program from cassette to disk, something which neither DFS-80 nor Knowledge offers. By following three easy steps, programs could be loaded back to disk, with an option provided with several levels, and at a far higher speed.

After starting the Mirror, the user is asked the

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Tel: (0223) 243000.

IFE, Ruffell,

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Tel: (0634) 813404.

Northern Computers,

Churchfield Road,
Fradley,
Queens Walk 64D.
Tel: (0918) 33170.

Open Supplies

158 Colindale Road,
London SE5 8DE.
Tel: (01) 701 8888.

Pace Data Systems,

93 New Cross Street,
Woodford RM2 6DR.
Tel: (0374) 799306.

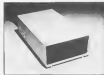
Purdon Microsystems,

208 Crystal Road,
Avenley,
London W20 7YB.
Tel: (011 639 7131) 7779.

Worked Electronics,

Dept BIC,
Carriff Road,
Welford, North.

Tel: (0933) 40388.



ments of the game to be copied, and how many copies it wants it. Then you insert the program in its (2-1/2", 5.25", or 8-1/4") case, the tape, and hit **enter**—the program transfers one disk. Although this is an extremely useful utility that could attract users, it should be borne in mind that the use of the program could reduce the copy capabilities concerning the passing of software.

Open Supplies is another company that produces a disk drive almost identical to the first Northern Computers. It is again made of metal on the same creamy cabinet as the BMC model. The capacity is exactly the same and it uses the Access interface, though in this case you do not get the Micro for transferring your programs from one storage medium to another.

Perman Microsystems has not gone for the Hitachi standard but rather for the Magnetics as the Scopy. The drive is together with the DELTA disk interface incorporated disk system for the Dragon 32. There are several versions of the DELTA system available, coming with either a 40 track drive with a storage capacity of 16KB, or an 80 track version with 32KB.



Perman has housed two 3 1/2 inch Scopy drives in a large plastic case—giving them full protection.

Perman has housed two 3 1/2 inch Scopy drives in a large plastic case—giving them full protection.



Though they look more of them is important, the two drives do give somewhat in weight. With its weight, they have a good steady feel and a robust look, giving the impression they will last for a long time, and stand up to the local banking crowd.

As well as disk drives, disks, and tapes, Perman supplies a host of disk systems for the Dragon that is written in conjunction with Comma, another company that sells its DELTA interface. Everything about the Dragon Disk Operating System (DOS) is explained in the book, along with how data is set out on the disk and how the interface can be customized by the user, to make software drives.

Unlike the BMC that uses the RDT controller chip, the DELTA interface allows the Dragon to read double-density disks. Like the BMC, each sector on a formatted disk contains 256 bytes, but instead of 18 sectors, there are 18. This means that a formatted, single-sided, 80 track disk, has a storage capacity of 300KB, while the 80 track version has 400KB.

The DELTA disk system comprises disk controller circuitry, and an 8K ROM containing the DELTA DOS. Perman says that its main market is using a ROM to store the DOS, as that it uses only around 1KB of user RAM, a very small amount compared to the over 12K of the system.

The DELTA system stands in comparison with a wide range of competitors. In the very near future the type of disk drive used on the current Dragon 32 is

(Left) The BMC from Northern Computers - 4770. (Far left) The drive with some Micro-RTS software.

Opposite page (above) certainly not one of the no-fapors from Open; (below) that thingy comes in several guises - the Micro Pulse from Northern.

Left: Perman Microsystems double drive (below), a drive comparison to a



Drive	Capacity	Tracks	Head	Interface	Price	Comments
max 8000	5-15	800	one	one	£75-85	7750 8000/1000
max 16000	3	400	one	one	£60-80	£75 8000/1000
max 16000	1-5	400	one	one	£60-80	£11 80 8000/1000
max 16000	3	400	one	one	£60-80	£15 90 8000/1000
max 16000	3-15	400	one	one	£60-80	£15 90 8000/1000

track users for example. Promax has introduced a (optional) function that configures the computer to read a certain disk when it is located. Its parameters go with the (CMOS) controller, each of which specifies a different characteristic of the disk, drive letter, number of heads, number of sectors, number of tracks, step rate (given in the context), and disk size, are also given. Once all the requirements have been fulfilled, the computer then can be accessed via disk with the set command. Anytime the already has a drive and wants to build up more systems, but doesn't want to get rid of any current hardware, could find this a rather handy function.

There is another useful command which provides the ability to search through both installed systems system files for a specific name. This can be used to search through whole, or parts of a file, and is compatible with itself, will search the start of the string in the start of the word, increasing the string.

One of the best features of the IBM TGA system is the ability to allow the length of random access files to remain across file (i.e. where a file is spread over a disk in several different records, each one independently accessible). The industry standard for the length of a record is 128 characters, but with DEL TGA a "SMART" feature, which is a combination of themselves per record, the length can be expanded and restricted between 1 and 320 characters in the way is better.

The DEL TGA controller currently looks the Dragon to a disk drive that only, with the help of an EPROM, that to provide the accessing tool, also provide a fairly substantial toolkit. Although Promax's Trek is available in both disk and cartridge, it is not compatible with Dragon Data's own disk system, so Promax's own must be purchased. Some of the

features provided by the Trek are full screen editing, programmable function keys and a facility that is designed to recover crashed programs, in case that have been lost using the set command.

For anyone looking for a disk system for their Dragon, the one from Promax Microsystems is probably the best bet, although at £113 (the cost may be raised, 40-track drive not included) it could be considered too expensive.

The Ryle drive 580 and Hybrid cable (already mentioned in the April issue of Computer Associates), could prove to be a revolutionary advance in the world of home static disk systems. At a time of saving, the device was available to run with the EPC, Ove 1 and Accus. The Ryle-Hybrid cable is only needed with the Ove system, due to the Ove's lack of a disk controller, a cassette of a 54-way cable with disk controller and ROM, all equipped into a unit that just connects into the Phoenix port (8).

As far as the Ove system is concerned, the Ryle drive gives the machine a couple of benefits, adding much more than just a convenient means of mass storage. For those using just a drive, the system, known by ITL, Kaufhaus, gives the machine a totally new dimension. Commands that were left out (such as Basic such as WINDOW, VIEW, and save lists of records), allowing the user to view any memory. The 1244 also has the programmable sector release (with disengagement and provided) by means of using control codes.

From what we have seen, things are certainly changing in the world of the disk drive. Not only do they provide a system for mass storage, but so to the case of the Ryle drive and Ove, they can change the whole character of a machine, allowing it to provide a real, adult machine.

By Steve Appleby, staff writer

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The more games created, the more progression of packages that help design games are a professional—the sheer of having to learn how before you can use your own—your is future potential can be a real stumbling block. HURGL, from the Australian software company Melbourne House, takes the guess a step forward.

Unlike some of the previous attempts, HURGL (High Level User Interface) Next-Gen Game Designer for the IBM Spectrum, tries to fix the programmer of the non-removal of the old character names (flow to other) (Delenda and so on) and offers a package which makes almost anything possible. This might sound ambitious to the Melbourne House has created a off-gate will.

It is interesting to refer to HURGL as a programmer's tool, as there is absolutely no programming involved. All the HURGL has to do is fish through the program, read by menu, selecting various options to make up the game. However, some programming might be necessary to design a background, which means using Basic, or a commercial design package.

The HURGL way to cover left chess of screen, and options. One menu, the player's chess table, has nine options above. The player's chess table control the movement, as a green screen to the stage generator for all the characters that will appear in the game.

The rest of the player's figure can range between a character 4 x 3 and 0 x 1 square, and two take up of the right colour available on the Spectrum. Before designing a character, the user is asked of the name, character is to be used in each direction, and if not, is there going to be any movement. If the name character is used to call characters, a total of eight different characters can be compared to form a complete movement. On the other hand, when a different design is used in each direction, two figures are used per movement. Although this only gives a single movement, it can still be quite effective.

After designing a character for the player, the object menu is entered and the user does for the chess and other colors. This is the same as the player menu with the exception of no option to design a user-defined path for the chess.

HURGL



WHY? DOES TO MAKE THE HURGL GAMES DESIGNER ONE OF THE BEST IN ITS FIELD? WE FIND OUT.

In an arcade game the movement of the chess should be made as unpredictable as possible to human interest, and HURGL has a very clever system to do this. A movement table that refers to the chess has the designer give each character a weighting, or value, that will determine how likely a character is to move in any one direction. Paths can also be defined for a knight, and a jump path for the player's character. Each of these are executed during play by pushing the fire button on the joystick, or after, depending on which is being used.

As well as a weighting system for chess movement HURGL has a powerful collision table (chess a boy) which can be used for both player and chess characters. The table consists of an 8 x 8 grid with each column representing a different colour. Along the top of the grid are all the possible FIRM colours, while all the rest read down the right hand side. Symbols at the top right of the table denote each thing is (1), 00 (0), 00 and (0). By placing data on a different, or within, combi-

binations it is possible to say what will happen when the colour combination occurs. As there are 64 different positions on the grid, every movement combination is available.

Various other combinatorial items can be added to make a game more exciting. These include the boundaries within which a player and object can move, where pre-defined explosions will take place and the resistance of a player or object. As each stage of the design is in turn to have any data using the BASIC GRAPHICS facility in the screen, because creating good chess screens can take some time.

While trying to design a game, we took advantage of a PLAN game system as the main menu. With this the game can be placed in any position through-out development. In most of the cases we used in the game did not perform the way it was supposed to, this could be more due to bad design on our part rather than HURGL itself. No matter, it shows that it is not so easy to use as it is used to be. Sometimes the results was different colored characters moving randomly around the

screen, making obviously an error of all.

Like some of the other game designer packages looked at in the January '81 issue of *Game Developer*, HURGL has some draw backs that may be being the perfect program. While HURGL is looking—compared to Quade's *Chess Designer*—is in the class of a second order. In *Chess Designer* sounds could be changed by moving slide controls displayed on screen, which made it very easy to use.

The other shortcoming is the lack of a library to design backgrounds, though the manual says this can be done through Basic and LDraw and a game—however, if you have ever tried to do screen designs using similar graphics commands, you will know just how time-consuming it can be. Melbourne House mention that they produce a design package called *Melbourne House* (see *Computer Games*, April '84 issue)—maybe it's worth a try.

Melbourne House hopes HURGL will appeal to a large number of programmers in comparison who bought screens for *Chessman*, and want to recreate their own games without having to go to the trouble of learning Basic. HURGL are fairly generous but facility—but don't believe a game can be designed within minutes as the editors suggest. However, compared to designing a game in Basic, from scratch, the time is very close.

If HURGL had come out before *Chessman* it would have been a sure-fire winner, but because of the launch of *Chess Designer* it will not rise to software "super stardom" as quickly as it might have. Of the two packages, we would recommend HURGL because of the greater variety it allows. There is also the added bonus of being able to sell any games screen using HURGL, though these would be confined to other people with the package, as it may be used as the master program.

By Steve Applebaum, staff writer.

AS FAR AS GAMING DESIGNERS GO, HURGL IS THE MOST COMPREHENSIVE WE'VE SEEN. BUT WHEN IT COMES TO ADDING BACKGROUND AND SOUND, ITS LIMITATIONS ARE APPARENT.

HURGL priced \$14.95 (PC) and available in Atari, Melbourne House, Castle Yard House, Castle Yard, Richmond T10 0AT Tel: (01) 940 886-4

MOTOROLA - THE CHALLENGING CHIP

WILL THIS BE YOUR FAVORITE ANSWER? SUCH INTEREST? WE LOOK AT THE CHIP THAT'S GIVEN THE QL AND MACINTOSH THEIR EDGE

Comparing a contest in the computer world - but really over the technical aspects of a processor - Motorola will call it an 8-bit chip, because calls it a 32-bit chip, Motorola's data manuals refer to it as one of a family of 16-bit chips, and one magazine described it as a "32-bit processor with a 16-bit mode".

The 68000 is one in a family of microprocessors - the others are the 68008, the 68010 and 68012. The parts set on the opposite page shows a blow-up of the 68000, as called because it contains over 60,000 electronic components. The use of the 68000 in Sun's new QL and the 68010 in the Apple Macintosh has given this family a terrific boost - most other manufacturers are on double-wide thinking twice about sticking in the Intel 8088, the chip that made the way for its own in the IBM PC.

The 68000 is known to be more popular with programmers than almost any other processor, in fact it is so common of name of the feature it offers, and some might say that it is the real reason.

First the question of compatibility: the 68000 writes, although allowing some translation to the

68010 units, it will cooperate, or use, through chips produced by others. Making this special compatibility would mean making compromises in the design, which would affect the performance and the "cleanliness" of the new instructions. This is something Motorola has been anxious to avoid.

However, compatibility within the family is maintained. The 68000 and 68010 have identical instructions sets, and programs written on one processor will run on the other. The 68010 has a few more instructions than the other two, but will run programs produced on them. Likewise, the 68020 will run code from all the other three, but again will meet instructions that have added. As the result only the 68000 and 68010 are available for exclusive ownership - that is, the other two will only begin to appear when the cost of 1984.

Only the 68010 is a full 32-bit processor. That is, supporting both 32-bit internal registers and a 32-bit data bus. This chip will not first appear on a single, although Motorola does not see pair there will occur a case when it will. Considering that it will support such things as virtual memory and run at about 16MHz, the good old 68000 and 286 are going to appear possibly producers. Virtual memory, by the way, is a system that allows the user to play with a memory that appears "virtually" to increase (that is, a great deal bigger than the actual physical memory unit), but back in the present.

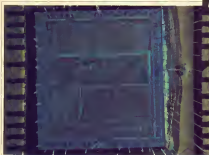
The main difference between the 68008 and 68010 is that the former has an 8-bit data bus and the latter a 16-bit data bus. Both have 26-bit address buses. A 26-bit address bus means that the processor can directly access (without any paging operations, bank switching or anything complicated) one Megabyte of memory. Why not 32 bits? Because 26 address bits mean that the number of accessible addresses is two to the power of 26, which equals 1,048,576 bytes. In the processor's, the address bus is to the memory which is to access it seems to read from, and, after a very short period of time, the contents of that address will appear on the data bus. The significance of having only an 8-bit data bus is simply that long memory, and data take several accesses before it all arrives at the processor. For example, a 32-bit memory will take 4 accesses by the 68008 8-bit bus, 1 by the 68010 16-bit bus and only one by the 68020. Data is divided into two categories: a byte, a 16-bit data (16 bits), a word (16 bits) and long words (32 bits). The 68008 will, therefore, slow down if a lot of word or long word data manipulation is done. As microprocessors also have to be fetched from memory, long words seem will also be less efficient than shorter ones.

The advantage is a manufacturer of using the 68008 is out of one and one. The chip is smaller than the other three, and requires simpler and cheaper circuitry to handle its 8-bit "mode". The one saving is partly because most currently available TTL chips (the ones that surround the processor chips) are designed for 8-bit systems.

Fig 1 shows a programmer's model of the chip 68000 or 286 processors will not double by showing

Fig 1 (Below) shows a model of the 68000's register set, one of its dual registers features





It's a regular photograph of the 48606 chip—so called because it contains 48,000 effective transistors.

over the number of registers will do it for you (they should be). The more registers you've got to play with, the easier it is to write them and the programs. Like any type of new currency, you just can't have too many of them!

A register is a unit of data that resides on the processor. The 486 has only three 8-bit data registers and the instructions that can be performed using two of these is limited. This means that there is one single 8-bit register that has to do almost all the work. It also means data has to be constantly read into the processor and stored back into memory. This is where the 48606 really shines: there is no single register register (which isn't its processor's called the accumulator), almost all of the instructions access manipulate the eight data registers. The 8-bit address registers can be used to store base addresses or software stack pointers and can be used. This sort of flexibility means a lot of systems and assembly language programmers, by saving a vast amount of machine code.

Assembly language is that there is only 36 instructions codes to remember. As there are few special cases, and many different ways of combining instructions with their parameters to address the memory, there are, in fact, many thousands (probably millions) of different possible commands to the processor. Fig 2 shows the 36 instructions that each can change at 32-bit multiply and divide, but using and multiple moving of registers. These are not as themselves unique, it is the flexibility with which they can be used that is attractive.

An often quoted, and important, specification of a processor is its clock speed (MHz, GHz) or whatever. The number of instructions performed per second is directly proportional, but not equal to, this speed, for example, three million instructions take two or three clock cycles to complete, so on a processor running at 1MHz, the number of instructions executed per second is usually between 400,000 and 600,000. The 48606 on the Amstrad UC runs at 7.5MHz, although the chip itself is capable of working up to around 12-12MHz. This will mean that several million instructions could be completed in a second. We say could, because if a lot of

long instructions and long words are used, this figure would drop to around half or one million.

A programming principle on the 48606 would appear to be to try to manipulate data in bytes, to keep to short instructions where possible, but

ADD	Add Constant With Index
ADD	Add
AND	Logical And
AS	Arithmetic Shift Left
ASL	Arithmetic Shift Right
ADC	Branch/Conditionally
ADCF	Set Flag and Change
ADJ	Set Flag and Clear
ABA	Branch/Move
ABT	Set Flag and Set
ABR	Branch to Subroutine
ABT	Set Flag
CHK	Check Register Against Bound
CLR	Clear Register
CMF	Compare
CMC	Toggle Condition, Deassert and Branch
CMV	Signed Compare
CMV	Unsigned Compare
PCF	Exclusive Or
EXG	Exchange Registers
EXT	Sign Extend
INT	Jump
JMP	Jump to Subroutine
EA	Load Effective Address
INC	Increment
IN	Logical Shift Left
IR	Logical Shift Right
MOV	Move
MOVW	Move Multiple Registers

48606 instructions and constants included

intensive use of all the external registers, for example, if a 32-bit number needed to be temporarily stored, it would be quicker to bring it into an address register, rather than use a RAM.

However, it is important to note that a program running on the QL at 7.5MHz could run even faster than 7.5 times the speed of an (algorithmically) identical program on a 1MHz 6502 micro. This is because fewer lines of 6502 code would be required to perform the same task as the equivalent 6502 program. So, in addition to the 7.5-fold speed advantage, the 6502 should require only one half to one third of the number of lines of code.

This would mean the QL has an increased speed advantage over the 1MHz 6502 BBC of anything from two to 18 times! The register layout of the 6502 looks very promising compared with P/P 1.

Whereas the QL will be competing against 6502 machines (such as the BBC, Amstrad and Commodore), the Apple Mac will be competing against the IBM PC and the new range of home computers currently appearing, all using the Intel 8086/8088 processors. In this competition there is no clear speed advantage to the Apple's 6502, as the Intel chips are quite capable of working up to 10MHz, so a speed comparison has to be based on the efficiency of the instruction sets. For a true application, the 6502 on the Apple is likely to run an equivalent program up to twice as fast as the IBM PC, the speed advantage being possible because fewer lines of code would be required to do the 6502 instructions intelligently than others.

But to end by quoting a press release from Motorola (see Reader's), the performance of the MC68000 is higher than any 8-bit microprocessor and superior to several 16-bit microprocessors, as 32 bit power is not yet available in the home.

By Dr Peter Tunnicliffe, oxford.ac.uk/ee/ee10



MC67	Motor Peripheral Data
MU2	Speed Multiply
MU1	Unsigned Multiply
MBCD	Hexagon Octaloid with Forward
MBC	Hexagon
MOP	No Operation
MOI	One's Complement
OR	Logical Or
RA	Push Effective Address
ROBT	Reset State and Branch
ROL	Rotate Left without Extend
ROB	Rotate Right without Extend
ROBL	Rotate Left with Extend
ROBR	Rotate Right with Extend
RSI	Return from Interrupt
RSB	Return from Branch
RTS	Return from Subroutine
SBCD	Subtract Octaloid with Forward
SCC	Set Condition
STOP	Stop
SAB	Subtract
SWAP	Swap Data Register/Stack
TST	Test and Set Overflow
TSTP	Test
TSTPV	Test on Overflow
TSTI	Test
UNIK	Unlink

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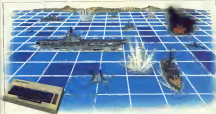
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BATTLE STATIONS!

GOT TWO VICs AND A SPARE FRIEND? THEN YOU'RE READY TO SET SAIL FOR BATTLESHIPS—OUR COMPUTER VERSION OF THE TRADITIONAL GAME.

Battleships has been a game-and-paper contest for years—but now's here all you Vic 20 owners can pass those rainy afternoons playing the game on your steering station.

Part of the design of the Vic allows the user port to be configured as an RS232C serial console output port, which is normally used to connect a printer or a modem. Under these conditions it is necessary to use an interface to convert the Vic's signal voltages, 0 and 5V on the RS232C standard voltages, -12 and +12V. However, if all you want to do is to connect two Vics together, then a third piece of cable is really all you need. Having done this you have the steel set up for Battleships. The game is executed in real on two Vics back to back at 9600 baud, but will also run on a 64 (although the screen messages aren't quite so fast).

The principle of the game is quite simple: the two players each have a Vic hooked by a cable and arranged so that they cannot see each other's screen. Each player has a number of ships (in this game he has one carrier, two destroyers and three frigates) arranged over a square board area, and he has to guess the location of his opponent's ships before his own are destroyed.

As a search carrier covers four squares, a destroyer two and a frigate only one. The board area is divided into 64 squares, each of which has a co-ordinate to identify it. The top row are A1, B1, C1 to H1, the next row are A2, B2, C2 to H2 down to the bottom row H8 to H9.

Each player has to set up his own ships, then when both are ready, they start to see how they attack each other's ships by typing on the co-ordinates of a square where they think a ship may be lurking. After a player has made a shot, the screen tells him whether he has scored a hit or not, and the square he shot at is changed (usually video on his screen, so that he knows which squares he has already tried). In order to keep the pace of the game down, some things are left to the honour of the players. You

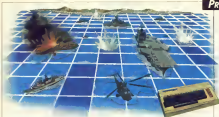
should never have shot the squares forming your own defence as a straight line, and the two players are advised to battle blind.

It takes just two (not one) of the optional squares) to make an "attack" carrier, two for a destroyer and only one for a frigate. The first player to sink all his opponent's ships has won the battle.

Before you can construct battle you need a cable to connect the two user ports together—Fig. 1 shows the construction required. You should be able to get all the bits from your Commodore dealer, who will also make the cable up for you if you are not an expert at soldering. The cable itself should be proper computer-quality screened cable or ribbon cable and should not be too long (not that it probably the maximum) and it should be kept well clear of mains leads, and TV antennas. Fig. 2 shows the layout of the program. If you are running on a small Vic you should have at least a Commodore 51000, which replaces how to play the game.

Line 100 opens the channel to the RS232C port, and lines 110 to 130 set up a few variables. Line 2000 to 2080 get the co-ordinates of the ship, line 1100 to 1180 get the battle area on the screen, and lines 1200 and 1300 prepare for a ship type (A, D or F). Depending on which ship was selected, the program jumps to 1500, 1550 or 1600 to make the co-ordinates of each square for the ship. Changes of life and large Vics may also require some more code in order to keep people shooting and spreading their search cones all over the screen instead of in one uniform square. As each square is scored, an 'X', 'D' or 'F' is put into the corresponding element of the array B(8) (The symbol 'L' is not convenient for referring to a two dimensional array).

Lines 2090 to 2099 check whether the setting up phase is complete. Line 2040 is quite interesting because we are not using a true RS232C link, it is possible that once you had opened the channel, some garbage will come down the line before the



other means is ready to transmit, if so, the K6250 software will think that there is a half-assaulted character in the buffer, and will give a warning tone when the next few characters appear. It also tests to see if this has happened, and if so, a CRT refresh clears the buffer. ST will show an error after this, but that doesn't bother us.

The game proper starts at 2300, which prompts the player for the coordinates of the square he wishes to attack, and line 2310 starts the cursor flashing. Line 2320 tests if a key has been pressed, if so, the player is making an attacking move and the program jumps to 2360. Line 2330 tests if the move has fired a shot. If so the program loops back to 2310. It's a double fire shot, so assumes the X co-ordinate of the square under attack and line 2340 gets the Y co-ordinate. Line 2350 stops the cursor flashing and the program comes to line 3000.

If the player is keying the co-ordinates of a square he wishes to attack, the program comes to line 2360, which inputs the co-ordinates. Line 2370 sends data to the other computer, and line 2380 waits for a message to come back giving the result of the shot. If 'C' is 'M', then the shot missed, if 'R', then a hit was scored. A 'W' means that all the other ships have been lost and the player has won. Lines 2390 and 2400 tell the player whether he has hit or missed, and lines 2370 and 2380 change the square he hit or missed to reverse video so that he knows that he has already attacked that square. The array A_(1,1) normally contains zeros, a -1 in an element means that the corresponding square has already been fired at, and subroutine 3000, which displays a character at that square on the screen, will print an inverse video.

When the enemy fires a shot, the program comes to line 3000, which determines whether a ship has been hit or not. If a ship is hit, that square on the screen is blanked out, and the corresponding element under array W(4); character is blank by line 3010. Line 3020 decrements N, the count of the number of squares left, and if it is zero it tells the player that he has lost the game, and sends a 'W' back to the other computer to tell it that it has won. If the other player has been scored, then an 'R' or 'M' respectively is sent back.

The program contains a number of subroutines. 10000 displays the board area on the screen, 11000 gives the instructions on how to play. Subroutine 12000 uses the cursor flashing, waits for a key to be pressed and then turns the cursor off and displays the character on the screen. The key pressed is

returned in A. Subroutine 3000 inputs the co-ordinates of a square, verifies that they are legal, and puts them into X(1) and Y(1). Subroutine 30000 tests if a square is occupied by looking in the relevant element in array; Subroutine 30400 puts a new character into an element of array; and displays the character at that square on the screen. If the square has already been shot at by the player, then the corresponding element of A(4) will be set, and the character is displayed on the screen in reverse video. Subroutine 40000 displays a message on the last line of the screen.

Now you know how it all works, you're ready to have fun playing—and maybe tinkering with—the 30 displays program, which is covered on page 33. By Clark Proctor, a computer programmer.

See *Fast Forward* on page 122 of the *Success Manual*.



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EXTENDED ANIMATION

THE FIRST PART OF A LOOK AT GETTING THE MOST OUT OF YOUR SPECTRUM'S UDG FACILITIES TO ACHIEVE ANIMATED EFFECTS

Around 8K Spectrum owners are likely to be amazed only at Basic, exploring the computer's early abilities to handle user-defined graphics can be fun too.

The two programs in this article enable you to draw frame pictures, one line, one character on the screen, almost instantaneously, during the running of your Basic program. You can achieve cartoon animation, using Basic only, with no knowledge of machine-code.

There are two ways of drawing detailed pictures using Basic: the first way is to use a sequence of PLOT, GOTO and GOSUB commands—a good method for drawing boxes, circles, hand legs and so on, but not for anything more complex. The second way of drawing detailed pictures in Basic is to use UDG characters.

To draw a whole row two characters high and four characters long, you need $2 \times 2 \times 4$ UDG characters. This amounts making out 16 numbers (2 characters \times 2 lines per character \times 4). You could enter data on UDG on tape, or to gain more speed, use the UDG characters, but you will need to keep changing the UDGs, as there are only 74 altogether, and that is enough for only three or four pictures.

So if you want to use Basic commands alone to draw detailed pictures there are two problems—difficulty and slowness. The two programs, GR3 and STORE, which we will be looking at, make the drawing of detailed pictures much easier and quicker.

The techniques we needed for the 48K Spectrum, but you can apply it to the 16K Spectrum if you replace all occurrences of 30000 with 20000, and replace 30000 with 10000. Also, type in the 16K version of the program GR3DRAWER (Fig. 7), not the 48K version (Fig. 4). Both versions are listed at the end of the article. The program STORE (Fig. 8) is suitable for the 16K, and 48K Spectrum.



GR3DRAWER is a Basic program which makes a machine code program when you run it called GR3. GR3 is a substitute for accompanying your own Basic program. GR3 draws a picture any size from 1×1 characters up to the full screen of 32×24 characters, almost instantaneously, whenever it is called.

STORE is a Basic program which you use to transfer your drawings from paper to computer memory. Once you have stored these drawings, save them on

tape. GR3 uses the picture data generated using STORE to display the picture on the screen.

Your Basic program now occupies part of the computer's memory. In another part you GR3, and in another part the data for the drawings.

During the running of the Basic program, you GR3 and the data to draw pictures almost instantaneously on the TV screen. To begin with make a drawing of your profile on paper for 2×2 grid-papers, not 10×10 like ordinary graph paper. An example is shown in Fig. 1.

Now it's time to fit the program components in memory. Type CLEAR then: Now everything above address 30000 is safe from being overwritten by a Basic program which fits below 30000. GR3 and the picture fit above 30000. GR3 consists of 75 numbers, and each occupies one address. The addresses are 02280-02354. When you run GR3DRAWER, it puts the 75 numbers into three addresses to make GR3. The picture consists of lots of numbers, each between 0 and 153, and each occupying one address. The addresses are 20000 onwards. Between 20000 and 20099, and the start of GR3, there are 10277 unused 30000-15379 spare addresses which can be used for pictures. The program STORE puts the numbers for a picture into addresses 30000 onwards. The car drawing in Fig. 1 occupies 48 addresses. You cannot have GR3DRAWER and STORE in memory at the same time, so you use them one after the other.

GR3 works in the following way: suppose you have a 2×2 characters drawing of a car stored in memory at addresses 30000 onwards, and GR3 is also in memory. You cannot use the car, but if you type a few lines of Basic and call the subprogram GR3, it will copy the 48 numbers which define the car into another part of memory, the screen-display area of memory, and you will be able to see the car. This is because the screen-display area of memory is numbered 30 every 2 rows; so when you use the car, you are not looking at 48 numbers which were previously not visible because they were elsewhere in memory. If the rest of the screen is blank, you are looking at 48 numbers which define the car, and 8000-number screen. The procedure for using GR3 is



Fig. 1 (left) shows a preliminary grid design of a car picture.



Fig. 4 (above) shows an animated response taken from the 'Oliver's Dinner' package. Animation for all the family? The picture list shows a SMP produced by the package 'Cartoon Animation', which employs many of the techniques mentioned here.

and STORES are shown in Fig. 2.

Remember that you could include **GRABBER** as a storage block programmed your own, at an stage 8 in Fig. 2. Alternatively, since you have **GR3** at memory, one of your tape using the command **SAVE GR3 CODE 0000 10**. When you meet a task necessary after the computer hardware is installed, use the command **LOAD "" CODE**.

To use **STORE** to store your picture, type **CLR3 0000**, type **LOAD STORE**, then **FIN**. When asked for the start address, type **0000** (the **GR3**). Specify the length (L) and height (H) of your picture. You are now provided with a grid L characters long and H characters high. Altogether there are L x H character locations or 'spaces'. Choose one of these using the direction keys, then press L when you have selected one. This square is magnified 64 times, and drawn as a large square block in the map to the left of the grid. Fill in each line of space (L long, altogether). Press B for a black line, W for a white line (strictly speaking 'ink' not 'black'), and paper on 'white'. Press L for a carriage line. If you press L, then you will have to make a complete line from 0 to 63. Back hit can be black or white, so eight times you

are asked to choose a letter for a black bit.

STORE provides you with 20 **SAVE** statements for each drawing, which it writes on the screen for you to type in. Suppose the instructions for the first two drawings are **SAVE NAME CODE 0000 00** and **SAVE NAME CODE 0000 0**. You can save the pictures one after the other on tape using these **SAVE** statements, or alternatively, you could save them together using the line **SAVE NAME CODE 0000 0**. Note that the individual lengths have been added together, to give a new length of '0'.

When you type **FIN**, **GRABBER** will give 75 numbers and addresses **0000-0074**. These numbers form the machine-code addresses **GR3**, which has just been used as a picture memory.

As well as making **GR3**, **GR3M-GR3A** provides a few lines of **Block** to set it out. In fact you have not got a picture stored above **RAMTOP** in the map, **GRABBER** draws part of the computer base (a section of **RAM**). To do this **GR3** is used for the start address of the picture to save. As you work in **RAM** memory, and **RAM** provides us with the best language. In terms of characters of statistics between 0 and 255. When the bit is treated as data for a picture, we get a picture of 'and'.



RAMTOP is set to 30000



Switch the computer on CLEAR 0000
Load STORE
FIN



Use STORE to store one or more pictures above **RAMTOP**



Draw the pictures on tape using the line **SAVE NAME CODE 0000 0** length. The one has a length of 68 (square you can switch off the computer)

It sets a grid to a **GRABBER**



Switch on the computer
CLEAR 0000
LOAD GRABBER
FIN



LOAD in the picture using the line **LOAD CODE**. This stage can be omitted if you will the computer switched on before stage 3 and 4.



Add some **Block** of your own to **GRABBER** to make your own **Block** program. Press B in transfer C to D. It is a character. A picture appears in a grid (length of 10)

GRM will draw your own picture on line as it draws the road. You could experiment by using different values for height, length, view distance and so on. It is important that you do not draw below the bottom line of the screen. You can draw as low as row 20 (there are 25 rows), and 20-21 (but not lower), or you will draw off the screen (see Basic program).

If you use GRAMAKER then open the screen as in Fig. 3, then type `GRM 100` and you will see a demonstration of the drawing code to which the computer can incorporate 8194 numbers, which is its total number in the screen display. You also see what happens when the computer sees an error screen display on the first pass.

To call GRM during the Running of a Basic Program (in order to Draw a Picture) first press `+` with the following information about the drawing using the term of Basic in Fig. 4.

Note that the address of the pointer is split into two numbers called 'height' and 'width', there can be variations from the address as follows: `LET address = INT (address/256)`

`LET address = address - height * 256`

To call GRM after all this information has been coded, use the command: `LET address = GRM`

If you had a Basic program where line 200 was `GRM 100` and `LET address`, then when the program reaches line 200 it will draw a picture, and then go on to line 201 as the Basic program (or the next higher line if there is no line 201).

There are two ways of achieving cartoon animation: the first is to move a picture around the screen, suppose you want to move a car from left to right. To the rear of the picture of the car include a column of blank spaces, equal in height to the height of the car. Now place the appropriate values for height, length, 'Y' co-ordinate, height, and width, then set the loop which starts at line 200 in Fig. 5, to move the car. The blank spaces are the process of drawing. If you did not have the blank spaces, you would end up with 20 car-wide of cars.

The second way of achieving cartoon animation is to draw different pictures at the same place.

For the drawing with a children's path, called Chase a Deer. The program is for the game using the number 8194 (number of screen draw units), 8194 (8194 drawing units), and 8194 (8194 drawing units). Fig. 6 shows the game used for two months plus all the other parts used to construct the game.

In next month's issue of Computer Answer we'll be looking at how you can incorporate colour into these techniques.

By Stephen Fowler, author of the Spectrum packages Graphics Subsystems, Draw 15 and Chase a Deer.

```

100  PRINT "DRAWING CODE"
101  PRINT "DRAWING CODE"
102  PRINT "DRAWING CODE"
103  PRINT "DRAWING CODE"
104  PRINT "DRAWING CODE"
105  PRINT "DRAWING CODE"
106  PRINT "DRAWING CODE"
107  PRINT "DRAWING CODE"
108  PRINT "DRAWING CODE"
109  PRINT "DRAWING CODE"
110  PRINT "DRAWING CODE"
111  PRINT "DRAWING CODE"
112  PRINT "DRAWING CODE"
113  PRINT "DRAWING CODE"
114  PRINT "DRAWING CODE"
115  PRINT "DRAWING CODE"
116  PRINT "DRAWING CODE"
117  PRINT "DRAWING CODE"
118  PRINT "DRAWING CODE"
119  PRINT "DRAWING CODE"
120  PRINT "DRAWING CODE"

```

```

100  PRINT "DRAWING CODE"
101  PRINT "DRAWING CODE"
102  PRINT "DRAWING CODE"
103  PRINT "DRAWING CODE"
104  PRINT "DRAWING CODE"
105  PRINT "DRAWING CODE"
106  PRINT "DRAWING CODE"
107  PRINT "DRAWING CODE"
108  PRINT "DRAWING CODE"
109  PRINT "DRAWING CODE"
110  PRINT "DRAWING CODE"
111  PRINT "DRAWING CODE"
112  PRINT "DRAWING CODE"
113  PRINT "DRAWING CODE"
114  PRINT "DRAWING CODE"
115  PRINT "DRAWING CODE"
116  PRINT "DRAWING CODE"
117  PRINT "DRAWING CODE"
118  PRINT "DRAWING CODE"
119  PRINT "DRAWING CODE"
120  PRINT "DRAWING CODE"

```

```

100  PRINT "DRAWING CODE"
101  PRINT "DRAWING CODE"
102  PRINT "DRAWING CODE"
103  PRINT "DRAWING CODE"
104  PRINT "DRAWING CODE"
105  PRINT "DRAWING CODE"
106  PRINT "DRAWING CODE"
107  PRINT "DRAWING CODE"
108  PRINT "DRAWING CODE"
109  PRINT "DRAWING CODE"
110  PRINT "DRAWING CODE"
111  PRINT "DRAWING CODE"
112  PRINT "DRAWING CODE"
113  PRINT "DRAWING CODE"
114  PRINT "DRAWING CODE"
115  PRINT "DRAWING CODE"
116  PRINT "DRAWING CODE"
117  PRINT "DRAWING CODE"
118  PRINT "DRAWING CODE"
119  PRINT "DRAWING CODE"
120  PRINT "DRAWING CODE"

```

Fig. 3 contains the GRAMAKER demo lines, Fig. 4 is the GRM drawing information, Fig. 5 car moving technique

Fig. 6 shows the 8194 version of GRAMAKER Fig. 8 the 48K version.

```

100  PRINT "DRAWING CODE"
101  PRINT "DRAWING CODE"
102  PRINT "DRAWING CODE"
103  PRINT "DRAWING CODE"
104  PRINT "DRAWING CODE"
105  PRINT "DRAWING CODE"
106  PRINT "DRAWING CODE"
107  PRINT "DRAWING CODE"
108  PRINT "DRAWING CODE"
109  PRINT "DRAWING CODE"
110  PRINT "DRAWING CODE"
111  PRINT "DRAWING CODE"
112  PRINT "DRAWING CODE"
113  PRINT "DRAWING CODE"
114  PRINT "DRAWING CODE"
115  PRINT "DRAWING CODE"
116  PRINT "DRAWING CODE"
117  PRINT "DRAWING CODE"
118  PRINT "DRAWING CODE"
119  PRINT "DRAWING CODE"
120  PRINT "DRAWING CODE"

```

```

100  PRINT "DRAWING CODE"
101  PRINT "DRAWING CODE"
102  PRINT "DRAWING CODE"
103  PRINT "DRAWING CODE"
104  PRINT "DRAWING CODE"
105  PRINT "DRAWING CODE"
106  PRINT "DRAWING CODE"
107  PRINT "DRAWING CODE"
108  PRINT "DRAWING CODE"
109  PRINT "DRAWING CODE"
110  PRINT "DRAWING CODE"
111  PRINT "DRAWING CODE"
112  PRINT "DRAWING CODE"
113  PRINT "DRAWING CODE"
114  PRINT "DRAWING CODE"
115  PRINT "DRAWING CODE"
116  PRINT "DRAWING CODE"
117  PRINT "DRAWING CODE"
118  PRINT "DRAWING CODE"
119  PRINT "DRAWING CODE"
120  PRINT "DRAWING CODE"

```

In further issues of Computer Answer we will be looking at how to employ colour with the technique techniques outlined above.

THE HEART OF THE DRAGON

WHAT ARE THE ADVANTAGES OF THE DRAGON'S MOTOROLA 6809 CHIP?
HOW CAN IT HELP YOU TO PROGRAM DIRECTLY IN ASSEMBLY?

Despite being rather unflashy, the Dragon II's Motorola 6809 is a very sophisticated device. The 6809 chip offers the Dragon user more advanced Assembly programming facilities than the popular 6800 or 6801 processor.

At the assembly level, the user has the opportunity to learn about the structure of Basic machines at a much more fundamental level, but before going on to explore its potential, let's take a brief look at the history of the 6809, a bit of a courtesy to the hardware world.

When the Dragon II was originally put together, the designers adopted the Motorola 6808, which was (and still is) an unflashy-but-processor. In many ways it was a final step, while there were many software writers prepared to turn their hand against working for the price-conscious 6801 and 2801 based machines, very few had an investment in the Motorola chip or demonstrated programming applications.

Perhaps of greater importance, it was more keen to adopt existing assembly programs to 6808 and 6801 based machines, such as the Spectrum and the Vic 20, that was either that code or a significantly different microprocessor—thus giving the machine a larger well worn base than the 6809.

This is not to say that there is anything wrong with the 6809 chip. It is loaded by some programmers, students and consumers if you read its price guide in the last 18 months (approximately) ever marketed. Given the processor's obvious virtues, it is curious as to why the 6809 has not, in the home market. Essentially it was simply a matter of timing; all the competitive chips had been firmly established long before the arrival of Motorola's offering. So what gave the Motorola device combatsible head and shoulders above its rivals?

Presumably, it is the programming facilities directly available from the chip itself. The opportunity is advanced; the assembly language is composed of 34 basic instructions, which when given the complement of 16 addressing modes and 24 indirect sub-modes bring the total number of instructions to a potential 1646. Combine the 16-bit mode-8-bit and four 16-bit registers, plus a range of sophisticated device handling facilities and the 6809 has the potential to rival the performance of many 18-bit processors. Fig. 1 gives a programming model of the 6809.

However, the Dragon's performance does not really match that of a 16-bit business machine, at least in terms of speed. This is mainly related to the means in which the resident Basic interprets the 6809 assembly code during program execution. To execute a Basic command, it has to be translated line by line from the 6809 into understand (that is 6809 assembly language) or more precisely, a binary representation of the assembly code! Where the Basic is interpreted, as in the case of the Dragon, the command has to be translated every time it is executed—clearly an wasteful process, especially when stack overflow.

However, because the interpreter never finishes

when Basic is executed it is going to be available only. The resulting assembly code will eventually be, itself, directly executed. The method of translation of Basic is, by no means unique to the Dragon, it is shared, together with the inherent problems, by almost every home main.

By programming the Dragon directly in assembly language you can bypass the Basic interpreter, and in the process have the opportunity to harness much of the power not afforded to the Basic.



Fig. 1 (left) gives a programming model of the Motorola 6809 chip. Fig. 2 (right) Assembly definition program.



Separating the program assembler does not have to be as horrendous as you may imagine. The best introduction is to purchase an Assembler. This is a program similar to a compiler, which converts assembly language programs directly into binary form. Although it might seem that an Assembler seems not to utilize the Basic interpreter, there are fundamental differences. The Assembler only translates the text of the assembly program once, and it is the programmer who maintains the code directly to test the assembler.

We looked closely at one Assembler package in particular, the MACE editor/assembler/inserter from Windows International. This comprises a editor for the creation of assembly programs, an Assembler to generate the machine instructions, and a monitor for testing and debugging the program—typed in the more or other/assembler package, see *Computer Access*, (January 1984).

MACE is ROM based, so as with any such package, care should be taken when previewing on the Design with the cartridge in place. After power on, you are greeted by the familiar Basic copyright message on the VCR. To avoid Basic simply type BASIC INTR (which to be proved an assembly language number). You are then within the MACE editor command level, denoted by a 'Z' prompt. At this level, an 'I' is typed and you start entering the text (lines of assembly code) of the program. After completing that task, pressing the enter key will return you to command level.

In itself, the editor is not bad, offering strong features, line editing as well as the normal tape backup/review. Once entered, you'll want to check the contents or address of the program. Typing 'W' will run the Assembler, attempting to translate your code into 8080 machine instructions. Any errors encountered will be picked up here. The error messages generated by the assembler can be fairly informative, if you know what they mean, but the beginner they will be infamously obscure—like any error message.

During this fit, the binary image of your code must be placed in the Design's memory. Here your code is directly accessible to the 8080 for the assembly operation. The 'see' command achieves this.

Now the painful part begins—running the program is the only way to find out if your code has the desired effect. Unfortunately, the 8080 always does exactly what you tell it, and an assembly code you can tell it to do almost anything. Nevertheless, the MACE monitor allows the user to run their program in a fairly fault tolerant environment, assisting closely at how the 8080 and memory are affected by the program.

Typing 'H' at editor command level gets you into the monitor. Here, by typing 'J' plus the start address of your program, starts the 8080 running. In the monitor, two of the most valuable debugging tools are the 'V' and 'B' commands. 'V' allows you to look at a block of memory, the content of which can be played in both ASCII and hexadecimal (numbers to the base 16) sequence, so if you think some variable should contain the character 'A' after a program run, this can be easily verified. The memory location will be displayed as 'H' and 'A'. The 'B' command is often used in conjunction with 'V'. When an error of the program is suspect, a break point can be set to stop the program at mid-execution, while preserving the values of all variables and registers for inspection.

As with any language, assembly is no exception when it comes to not-out-the-bugs, it can be difficult. One possible reason, however, is a very few higher order languages such as Basic and Pascal offer such advanced on-screen debugging facilities when

used in on-screen mode.

A nice touch to the MACE package is the inclusion of a hexadecimal calculator, which would certainly become invaluable to the beginner and needs appreciated by a debilitated assembly/bug.

Now let's move on to the assembly language itself. Assembly statements are composed of three fields, namely label, OPERAND, OPERAND and COMMENT. A typical statement might be: `L1 DS DB 255` (comment: constant A with 255).

The label field is equivalent to the line numbers in Basic so that it provides a point of reference for assembly's jump instructions. With MACE, the field can be up to eight characters long, and consist of any combination of numbers and letters—with the proviso that the label must start with a letter or full stop. The operand field should contain one of the 80 instructions, selected from those available on the 8080.

The operand is the most involved of the four fields. In simple terms, it contains assembly's equivalent of Basic variables and constants. As in Basic, they can have symbolic names, as just be numbers, however, the operand field carries two additional sets of information, the first being a form of CPU declaration. As in other languages, assembly can have several types of variables and constants, the most commonly used being hexadecimal and binary. The declaration usually takes the form of a single character which performs the operand name, for instance, a 'V' means that the variable is hexadecimal, a 'B' means that the variable is binary.

Second, the operand field contains information about the addressing mode of the operand. As an easy example, this again takes the form of a character prefixing the operand, but there are other notations available. Here the character is 'a'. In the case of the 'a', if it's directly it means that the value of the operand is directly used by the 8080 instruction, if it's absent, then the value of the operand is an address of a memory location containing the value to be used. The latter may sound complex, but it is the same principle as in an array variable, where the index of the array (say, `i`) is not actually the value needed, but tells us where it is located in the array. To give you some idea of the flexibility of the assembly, there are eight other methods of addressing values in memory other than these mentioned above.

Finally, the comment field in the assembly statements is used for a meaningful remark about the code, just like any other programming facility in a language. But unlike Basic, these comment statements do not flow down an otherwise affect the running code in any way. They only exist in the source file, and the assembled code. It's a good idea to comment extensively on an assembly program.

Don't let all these options put you off—a few hours with the manual and you'll be reviewing all your Basic programs in assembly code. To put MACE and the 8080 to work, we typed in a short assembly code program, and compared it with the equivalent Basic program. Although not yet getting complex and hardly touching on the true 8080 power, it may serve to give a full low assembly programming technique on the Design.

In *Line 2* the program tests about seven seconds to run. We found using the assembly program almost instantaneous—around 5:1 of a second for total execution time was the best guess. So with a bit of time investment it's possible to have your Design breathe life—assembly.

By Adrian McKie, a scientific officer at the National Physical Laboratory, and Graham Skand, of Tees 198.

By programming the Design directly in Assembly language you can bypass the Basic interpreter and in the process have the opportunity to harness most of the power not afforded to them.

NEVER A XWORD

WE PRESENT CIRCLES - A CROSSWORD-CREATING PROGRAM FOR THE APPLE II/III AND DRAGON MACHINES.

PROGRAMMING

Crossword puzzles are fun - I don't know any words. American puzzle fans, and thinking programs of the like, tends to make them as easy as my 10th grade class could handle.

However, as crossword puzzle prices are soaring (and, as W.C. Fields said, "wording words having a much different feel"), we set out to drive a simple computerized aid to solving crosswords. Nothing that would help solve cryptic clues, but a program that would take away some of the word list making that crossword puzzle fans were prone to go through. The final program was called *Crossword Circles*, rather a misnomer, as we have's was a punny thing any crossword computer. Nevertheless, here is the program for your enjoyment and improvement.

The *Cross* system basically consists of a large dictionary of words, and a number of routines to search through them in a number of ways. The words are held in a special order so that it is so easy to type in more plants or 'D' answers. There are many ways in which crossword puzzle may wish to search through a word list, but two methods stand out as the most useful. First, the program should be able to find all letters, regardless of any given set of letters. Second, given a complete set of letters and empty spaces (for example --A--B--C) the program should be able to find all words that match.

The word dictionary has different words for each word length. The shortest possible length being three letters, and the longest around 15 letters.

Each word length is further divided into three

sections to take account of allowable single letter extensions. Almost all words start and to End with a D and S extensions, many words take an S but not D, but very few take a D but not an S. Because of this, the dictionary is organized into the sections shown in Fig. 1 and a word can be added by following the procedure in Fig. 2. The idea behind this is

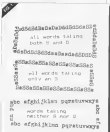


Fig. 1 shows the organization of the word dictionary. Fig. 2 shows some sample *Cross* output. Fig. 3 follows the procedure for adding a word to the *Cross* dictionary.

```

*****
* COMPUTER ANSWERS *
* CIRCLES *
*****
ENTER SEARCH TYPE -
A: ANAGRAM
T: TEMPLATE
G: GUT

```

```

SEARCH (A, T, G): T
TEMPLATE: -C-D
ACID ICEP
READY (PRESS RETURN):

```

```

SEARCH (A, T, G): A
ANAGRAM OF: DICE
ICEP
READY (PRESS RETURN):

```

```

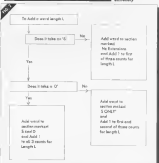
SEARCH (A, T, G): T
TEMPLATE: -----D
ADVANCED ADVISED
ADMITTED ADJUTANT
READY (PRESS RETURN):

```

```

SEARCH (A, T, G): G

```



SHORTCUTS TO SECURITY

WE PROVIDE SOME SIMPLE TIPS TO HELP PROTECT YOUR VALUABLE BASIC PROGRAMS

Most of us worry about the security of our software at some time—even if it has no commercial potential. If you belong to a club or write software for a friend, or perhaps have written something you hope to market, you should consider some facets of basic-program security—and here are a few hints, based around the BASIC menu, to help you.

We realize that no software is truly secure, at least, not to the satisfaction of even Lockheed, all the other companies defend with effective measures in the User Guide). However, by incorporating the rules described here, you could confer would-be attackers enough to make them give up, or, ideally, you could do things to your own software that defeat their skills (whereby, it must be stressed that if someone really wants to take a look at your program, they will).

In order to offer some degree of protection, you must have an understanding of how the BASIC menu flows in its memory, and also some understanding of hexadecimal. One of the best tools for this type of work is a hex (hexadecimal programmer's) calculator. As long with such an aid you can avoid being stuck in hex. The Texas Instruments model is good (of a few expenses), but Giga has a similar product in half the price, alternatively, you can use the number base conversion program published in the April 1984 issue of *Computer Access*.

Though the hex addressing system has been covered in past *Computer Access*, for the most understood form is a fixed address. Hexadecimal is a numbering system that uses numbers and letters. It is a shorthand in any sense, as they only "authenticate" binary. Hex makes large binary numbers easier for people to contend with. Fig. 1 shows a table showing the hex (A0-hex), and the equivalent decimal and binary.

Representing 1's hex (0x01) in terms of binary is not usually difficult. As you can see, with only sixteen characters, the most we can count to is 16 and 15. For practical purposes we will at least be looking at one byte (8 bits), in this case the maximum is decimal 255 or hex FF. To convert binary to decimal, the binary is first split into nibbles, from the right, and the hex code of each nibble is written down, producing the hex value.

Take a look at Fig. 1. Suppose we have a number in decimal 41804. Each nibble is considered the same as that in the hex equivalent; here, in other words, it has a maximum possible of hex FF, so the number 8004 may be expressed as A0004. You can see that in order to contain exactly two in binary representation. From now on we adopt the BASIC convention and prefix all hex numbers with the \$ sign—thus, \$A004 = \$A000.

Now let's look at how the BASIC menu basic is memory. This is the address for a line of BASIC, as stored in RAM. Take a look at Fig. 2. The start of each line is marked by a memory address—4000. Next come two bytes that contain the line number. The byte after that contains the length of the line, from 4003 to the last byte. Then comes the formatted

At the line length is a constant 10-bit byte, the maximum amount of characters in a single BASIC line number is decimal 255. Should the first byte (high byte) of the line number be \$FF, it indicates the end of the program. At the back of the User Guide is a list of BASIC tokens. This list shows what is actually stored when certain words, keywords, etc. are used. Suppose we had a line of BASIC to PRINT BASIC MENU: REM TITL

```

10 0000 07 F1 00 00 00 00 00 00 00 00 00 00 00 00
      00 00 00 00 00 00 00 00 00 00 00 00 00
      0A F4 00 00 00 00 00 00
      T I T L E
  
```

FIG. 1: The lines to PRINT and REM TITL

The actual memory addresses of the BASIC menu change under certain circumstances. If you have a disk interface, your program has started from \$4000 onwards (the upper limit varies with the model), with the BASIC DFS, it starts at \$4000, and with the Amoson DFS at \$4000. For the sake of convenience, the routines described herein use with page \$4000 as the start point for these programs. This was to save writing the lines to load each time the routines did their job (in our opinion from disk). The majority of users will be using memory, so the page starts at \$4000. We recommend you load a short program, then examine its representation with LIST to ensure you have done this.

In our case, we loaded a short program called "BASIC" which loaded the menu shown, \$4000, 00 BASIC \$0040 is the length of the program. We could use this and page to work out the memory location at the end of the program (page + \$4000 - 1 = last byte), but there is an actual variable to do this in the type PRINT TOP = \$4000. Remember, use the dollar sign to get the value in hex.

The hex code returned is the first line memory location after the program. Page is our case is \$4000, so the code displayed is \$4000 + \$0040 - \$4000 (obviously, it will differ for your own program). You may now subtract 1 from the value that page TOP has displayed, in this case \$4000 - 1 = \$3FFF. Now type PRINT \$4000 - \$4000. This will print the value of the byte at location \$4000, in this case \$FF, the byte indicating the end of the program.

Now type PRINT 0. This program will still run—try it. It will not list—the old buggy \$4000. Other appears, just one thing—at most I can edit.

In order to view a BASIC program, you will have to start with the clean program and do the following first, print the hex value of TOP using PRINT TOP. Add a line at the beginning of the clean program which sets LOCLEN to the hex value of TOP (see, 2000). Type LOCLEN = 2000. Remember, the line number 5 is only an example, use whatever number will put the line at the beginning of the program.

PRINT TOP again. Note that it has changed (as a result of the address of the new line). Edit line 1, replacing the =4 TOP value to our example, 2000 with the new one. Remember to put the \$ sign before the number to denote hex value.

Now's the time to delete the program. PRINT 4-

The software is truly secure. As always, by incorporating the tricks described here, you could at least make would-be attackers give up.

In order to affect some degree of protection, you must have an understanding of how the BASIC menu flows in its memory, and also some understanding of hex.

Described in this column as a clean, readable, and efficient way when you get down to building systems, the assembler is one of the very useful tools that perform many sophisticated operations.

the contents of TOST cursor 8 as above. It should be PP. Change the value to 0E5F, return as above, and the program ends there.

The next stage is to save the program. Type `SAVE` (with `1000 000 0000 00010000 1000` as the hex value of `PROG`, and `0000` the hex value of `TOST`) (you can find your own adding one-on-one value, for example, hex `0000 + 1` doing a carry `0000`, hex `0001`). The values are all differ if you're using a different CPU or even as all, and according to the length of your program.

Your basic program is also saved as a block of memory from page 0 to the length of the program. To load and run this now, we have to type:

```
LOAD 0000 1000 0000 00010000 1000 00010000
```

In order to dispense this, we need to load it from another program. This short block of memory should be well protected. There is nothing to stop you processing both together into one file, but for devices:

Let's consider a small loader to obtain our main program. Initially, we will suppose we have a basic program containing a code and perhaps a constant, and a hex mask in `LOAD` (maybe `1000 PROG`) that will not work. Initially, we'll arrange to load on top of themselves, and diversity it.

This is how we could construct a loader for our own program:

```
LD 0000 TO 000
R0 LOAD 000000L 000
SUBPAGE -01000 0L0
SPRINT A: =0TO 000000000A 0000000 000000 A: 0000
00000 PAGE -0000 PAGE
```

`mask` is the number of bytes occupied by lines 20 to 30, and `addr` the address of the first byte of line 20. When run, line 100 moves lines 20 and 30 to page 0000, and away from the end of line 0. Page 0 then sets its `0000` and `0000` is loaded into `0000`, then line 0000 does its bit test and mask. As ever, the address is on the `CLRG` cursor. Type `KEY` `B PAGE 0 = 00000 0000` `A = 0` `SPRINT` `A:` `= 00000 0000`, then line 0 `1000 = 00000000` (or `0000` if you have not done).

His function key 0, and the screen will display memory addresses on the left and the octal code on the right, starting from 'A', as this case from 0000 back where a line has a constant. We see look up for `000` followed by `000` in the display, and the screen does not show, so all you get is 0). This is line 20. The address on the left of the '00' at the start of line 000 is `00000000`.

Given the number of bytes, then the program and you reach the end of line 30 (you stop here, to change 'A' to the next line). Then the code as hex as usual. Now run your loader. This is fine, but if the basic program is loaded and stored, a problem when has happened to the main program.

Below we look at how to protect memory, make, but's step with the page concept to introduce more problems for the second part. Set up `hexmask` key 1 as follows:

```
KEY B PAGE 0 = 000 00000000 = 000 00000 = 00000  
 = 000 000 0000000
```

`mask` and `addr` the same code that we have used as line 100. His function key 1. Line 20 and 30 are now on page 0000. Default all the program memory, and make up your table and instructions. For reasons that will be explained shortly, start at a random byte of above 20000, and make each byte (or some odd figure such as 20000, 20000, 20010, 20007, 20000), then should be our program. When your loader is complete and this is a test line (and your own line number):

```
run A: = 0000 0000 0000 A: 00000 = 000  
0000 = 0000 0000 Page = 00000 PAGE
```

Now, our loader program needs to include `000`

HEX	CHARACTER	HEX VALUE
0		0000
1		0001
2		0002
3		0003
4		0004
5		0005
6		0006
7		0007
8		1000
9		1001
A	10	1010
B	10	1011
C	12	1020
D	13	1030
E	14	1110
F	15	1111

programmer and so that you first, written. For the short routine in page 0000, if page is 0000 then this routine is 000000. 1 on a up to 1000 bytes long, the command will be: `LOAD 0000000 0000 000 = 0000000`

When 'load' the value of `load` or `hex` in a three program. There is one more level to do apply before looking at how to stop the loader from loading. Remember how we discussed: Initial `APP` was successful? Assign a hex mask to the bit:

```
KEY B PAGE 0 = 0000 0000 0000 0000 000 = 000
```

The `LOAD 00000L` is used in the main program. When loaded, the function key 0, and this is one with `0000`. You now have a memory dump in use that is not good. The next code you use will differ from your page map will be `0000`, and the end of your program (line 000 is `0000` will differ. The sign in this constant was `000` (function 00). You can use any hex code you like, but to make sense of the program, the more operators more to find understanding. How?

Refer to the original routine we have put into page 0000. A hex mask to be added is `000000 = 00000000000000000000 000 = 000 000 000000000000`. This means you add 000000, or you will have to start again to find out what you do, and to move 20, 25 and 30 to page 0000.

Now we reach the first and most interesting (interesting) part - how to stop the program from loading as all. Early, we need to use `key` `hexmask` with a constant instruction. Add this line to your loader: `KEY 1 = 0000 0000 0000 00000000`. Now check the screen after the `KEY`.

This line will now be in the last memory location. Any lines will now be in the last memory location on. Any lines you add will also not add and so. Remember key 1 as already shown, if you have 'load'.

As always, each (with or hex numbers), key at `hex` `0000` (or page page 0000) and the function key 0. The screen display will be something like this:

HEX	CHARACTER	HEX VALUE
0000		00
0001		01
0002		02
0003		03
0004		04
0005		05
0006		06
0007		07
0008		08
0009		09
000A		0A

1506	DA
1507	DA
1508	DA
1509	DA
150A	DA
150B	DA
150C	DA
150D	DA
150E	DA
150F	DA
1510	D
1511	B
1512	B
1513	F

(1504 contains the REM as line 0)

Now, in the direct mode, type "A 100 A 17" and check the value of location 8100 as it will be zero. Do this one location at a time, "A 1000 - 0". Let your program "don't worry" - the timer from your TV or monitor are not causing damage. When you have done it, just a "NMI 00" command to reply into memory in the case the command that allows you to enter the CRT display on the BBC. Since you have followed with all zero bytes, the chip runs out of control and you go on video. (Sigh)

Let's put in another line, "A 10000 1". Run one line 0 as you will see, the effect of line 100. Use key F and A1 to find the start of line 100. After the address containing F4 will be two bytes containing 42. Because 424 is the first value of ASCII character "L". Change these bytes to 480 and 476. In memory, after line should now be

```
01 005487 F48C 15
```

Use the program. This isn't it! Nothing on the screen and the keyboard will not work. Don't forget we have only to remove the 0 at the program end, and your only escape - break - will give you the program.

What has happened here is that the control code to clear screen mode and control code to disable video output, have been executed. When part of a program gets destroyed after, because of the REM.

The possibility is to prevent, hardly to prevent, high line numbers you have used for the read and/or write. One more thing we can do is to bring before what we've done previous. Type

```
000 150
```

```
000001 150000 0000
```

```
000002 800000 1000000 0 - GO TO 0
```

```
000
```

After you have used shift and function key 3 you will not see the character key type. Be sure you

PIRACY TIPS

For additional products, because we've provided guidelines to help combat piracy.

Make the purchasing experience and piracy being as possible. Make it look as if you're buying a genuine software package.

For each copy you make, use a different label for each, like a serial number form, book (write via The Mailer), and so on. Use well produced materials.

Include as many bugs in the software as you know and give the user a way to report them.

Put one copyright notice into the software, and another that only covers up relative copyright information. Use one of the many types of name software piracy, as if you do have the copyright notice, and the copyright notice is not "this is still a clone of your own software's program".

DECIMAL	BINARY	HEX
00000	00000000	0
00001	00000001	1
00010	00000010	2
00011	00000011	3
00100	00000100	4
00101	00000101	5
00110	00000110	6
00111	00000111	7
01000	00001000	8
01001	00001001	9
01010	00001010	A
01011	00001011	B
01100	00001100	C
01101	00001101	D
01110	00001110	E
01111	00001111	F

NO.	NAME	LINE	CONTENTS
00	NAME	1	CONTENTS
01	NAME	2	CONTENTS
02	NAME	3	CONTENTS
03	NAME	4	CONTENTS
04	NAME	5	CONTENTS
05	NAME	6	CONTENTS
06	NAME	7	CONTENTS
07	NAME	8	CONTENTS
08	NAME	9	CONTENTS
09	NAME	10	CONTENTS
10	NAME	11	CONTENTS
11	NAME	12	CONTENTS
12	NAME	13	CONTENTS
13	NAME	14	CONTENTS
14	NAME	15	CONTENTS
15	NAME	16	CONTENTS
16	NAME	17	CONTENTS
17	NAME	18	CONTENTS
18	NAME	19	CONTENTS
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42	NAME	43	CONTENTS
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90	NAME	91	CONTENTS
91	NAME	92	CONTENTS
92	NAME	93	CONTENTS
93	NAME	94	CONTENTS
94	NAME	95	CONTENTS
95	NAME	96	CONTENTS
96	NAME	97	CONTENTS
97	NAME	98	CONTENTS
98	NAME	99	CONTENTS
99	NAME	100	CONTENTS

your program. All program memory is 16384 bytes. To control the display - use all memory from 16384 to 16399. This is the memory used for the main contents of the tape.

Now for the final instruction generated. Memory location 8170 currently contains 87 (the letter for print). When handling create files it may contain the letter for load, store, save, and so on. You will always extract a one to check your program, if only because of the letter.

Add this line to your loader (we will experiment with the loader because we don't have so long to wait when loading).

```
001 8100 -> 801 1000 PRINT 1 TOLD YOU TO SHOW  
01 8100 -> 8000 Now load and run it. Control  
again 801 is the letter for clear. You loaded and  
run, the letter was not in 8170.
```

```
Change line 10 to: 801 8100 -> 801 1000 CALL  
10 Add this line: 10 000000 CALL 10
```

CALL 10 is necessary, a bad call. If the program is not cleared, or maybe used, the controls are wrong, and the whole thing crashes. Again.

We now reach the general finish, and a routine we use particularly often at Types.

```
000001 150000 0000  
000002 800000 1000000 0 -> NEXT  
000003 1000000 0 000000 0 -> NEXT  
000
```

Any attempt to escape from the program will cause the first 100 bytes (or more if you exercise 80000) to be overwritten with zero, even a flag through memory will be zeroed out.

Thus, then, are some of the ways you may make your software secure. Use them liberally, and as any individual you see it. Always remember that these simple routines are only meant because you cannot think of any more ways you may be better. For example, consider changing a section between the loader and main program 80000. Simple to do, but if the thief cannot see what has happened, the program is closed.

Finally, we need to note you will not find someone who is really determined to protect your software. Let's hope that the people who do this work only to broaden their own knowledge and not make any profit on the hard work of others.

By Mike Houghton, a retired engineer.

COMPUTER CROZZLE—WIN £15!

A range of a programmed solution to last month's August Crozzle, together with the computer which makes program right (the correct value for I was 60, when using going varying degrees of failure). In fact, apart from the constant going the answer for the hidden languages, the patterns are different, but the programs involved are exactly the same. A solution grid showing the positions of the languages is also given below.



		C				B	
	F	O	R	T	R	A	N
L	B					S	
O	P					I	
L	G	A				C	H
O	S						T
	C					R	
	A			O			
	L	F					

THIS MONTH'S PUZZLE

Each clue for the crossword is an English and comes in three parts set below. The crossed part gives the letters for the English, and the designations straight clues for the meaning of the solution. The problem is to find where the solution fits into the grid (there are 15,360 possible fits), which defines the first part of the clue again.

To find the associated puzzle set of each clue, take the ASCII values of the letters in the program, and subtract the value from the number to the first part of the clue. Here is an example.

DIAPHRAGM
= ASCII(A) + ASCII(B) + ASCII(C) + ... = 65 + 66 + 67 + ... = 604

- 039 BUBBLE 1. To spray; to discuss
- 040 COMPTON 2. To have a name
- 041 BUBBLE 2. To have a name
- 042 COMPTON 3. To have a name
- 043 BUBBLE 3. To have a name
- 044 COMPTON 4. To have a name
- 045 BUBBLE 4. To have a name
- 046 COMPTON 5. To have a name
- 047 BUBBLE 5. To have a name
- 048 COMPTON 6. To have a name
- 049 BUBBLE 6. To have a name
- 050 COMPTON 7. To have a name
- 051 BUBBLE 7. To have a name
- 052 COMPTON 8. To have a name
- 053 BUBBLE 8. To have a name
- 054 COMPTON 9. To have a name
- 055 BUBBLE 9. To have a name
- 056 COMPTON 10. To have a name
- 057 BUBBLE 10. To have a name
- 058 COMPTON 11. To have a name
- 059 BUBBLE 11. To have a name
- 060 COMPTON 12. To have a name
- 061 BUBBLE 12. To have a name
- 062 COMPTON 13. To have a name
- 063 BUBBLE 13. To have a name
- 064 COMPTON 14. To have a name
- 065 BUBBLE 14. To have a name
- 066 COMPTON 15. To have a name
- 067 BUBBLE 15. To have a name

LCRCH 16. To have a name

LCRCH 17. To have a name

LCRCH 18. To have a name

LCRCH 19. To have a name

LCRCH 20. To have a name

LCRCH 21. To have a name

LCRCH 22. To have a name

LCRCH 23. To have a name

LCRCH 24. To have a name

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LCRCH 56. To have a name

LCRCH 57. To have a name

LCRCH 58. To have a name

LCRCH 59. To have a name

LCRCH 60. To have a name

LCRCH 61. To have a name

LCRCH 62. To have a name

LCRCH 63. To have a name

LCRCH 64. To have a name

LCRCH 65. To have a name

LCRCH 66. To have a name

LCRCH 67. To have a name

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LCRCH 197. To have a name

LCRCH 198. To have a name

LCRCH 199. To have a name

LCRCH 200. To have a name

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Computer Gazette
Stratton
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London NW9 1DS

The editor will be grateful
to receive solutions from a full
range of devices to this
Crossword (July 1982).
The solution will appear in the
next issue, and we'll announce
the winner in the July issue.

NAME: _____

ADDRESS: _____

64

hardware

For more information on the software listed in this section, see the "Software" section on page 57. For more information on the hardware listed in this section, see the "Hardware" section on page 58.

Product	Manufacturer	Price	Comments
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible
286/386/486/586	IBM	\$1,200	IBM PC compatible

software selection

There were only a few software titles selected for this special issue. The titles were selected from a list of software titles submitted by readers. The titles were selected from a list of software titles submitted by readers. The titles were selected from a list of software titles submitted by readers.

WORD PROCESSING

WORDSTAR 5.0 (Lotus Development Corp., 360 Lakeside Drive, Fremont, CA 94539) is a word processing program that is easy to use and powerful. It has a wide range of features, including a built-in spell checker, a thesaurus, and a grammar checker. It also has a built-in mail merge feature and a built-in page numbering feature.

UTILITIES

DISK COPY (IBM Corp., 389 South Broadway, Armonk, NY 10504) is a utility program that allows you to create a backup of your hard disk. It is easy to use and powerful. It has a wide range of features, including a built-in compression feature and a built-in encryption feature.

DATAFILES DATABASES

DATAFILES (Datafiles Inc., 10000 Wilshire Blvd., Suite 1000, Beverly Hills, CA 90210) is a database management system. It is easy to use and powerful. It has a wide range of features, including a built-in query language and a built-in report generator.

MS-DOS 5.0 (Microsoft Corp., One Microsoft Way, Redmond, WA 98073) is a operating system. It is easy to use and powerful. It has a wide range of features, including a built-in file manager and a built-in command prompt.

FINANCE & BUSINESS

QUICKEN (Intuit Inc., 220 California Street, Berkeley, CA 94704) is a personal finance manager. It is easy to use and powerful. It has a wide range of features, including a built-in budgeting feature and a built-in investment tracking feature.



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It's easier to manage it when you're prepared to take program name, your credit card number and expiry date, your address and telephone number.

For more information on the software listed in this section, see the "Software" section on page 57. For more information on the hardware listed in this section, see the "Hardware" section on page 58.

RECREATIONAL

THE SIMS (Maxis Inc., 360 Lakeside Drive, Fremont, CA 94539) is a simulation game. It is easy to use and powerful. It has a wide range of features, including a built-in city builder and a built-in economy simulator.

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the six-four supplies company

P.O. Box 18, Whiteville, Kent. CTS (U) Incorporated by The Royal Software Centre, Ashford, Kent is division of T. Davies & Sons (Ltd)

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EASTER SATURDAY

APRIL 21ST 10-6

EASTER SUNDAY

APRIL 22ND 10-6

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The winner of our encrypting competition will get the Compaq Portable PC supplied by our UK distributor Mullertron. This is IBM PC compatible, featuring 1.6Mbit 8088 processor, 256 Kbytes of RAM, two 320 Kbyte disk drives and a luxury nine inch green screen. There's also a built-in 8232 serial card. Controls parallel port.

Software provided includes Mullertron and IBM Basic. (Manual costs £3.45.)

Mullertron,

Mullertron House,
Northampton Road,
Beacons, Derby DE5 1JZ
Tel: 02071 3612 6811



COMPETITION CRACKED

FIG. 1: THE ENCRYPTING PROGRAM.

```

100  REM *****
101  REM *****
102  REM *****
103  REM *****
104  REM *****
105  REM *****
106  REM *****
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109  REM *****
110  REM *****
111  REM *****
112  REM *****
113  REM *****
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With over 500 entries, many involving "brackets", no bugs in the language (phee!) and a good price, our Cypher puzzle is set up to bring a cracking competition.

All you have to do was decode the message (Fig. 2), and receive a question contained within it. An encrypting little event in the competition was that the decoding was contained in the message itself, in the middle of late entries we happened to see the shoulder (carry-over) value!

So how could the message be solved? The encrypting program is based on Fig. 1. A message is typed in to the program, then the letters are coded according to a number (the "rotator factor"). If the letter was a consonant then the rotator was forward, if a vowel, then it was backwards. The message was further punched by two three-letter keywords. There was probably many ways in which the problem of deciphering the message could be tackled - here are a few of them.

With a success it was possible to alter the program slightly so that the coded message could be typed in, and then we used by different amounts. It was then possible, with a sharp eye, to pick up the common factor by missing logarithms later combinations, despite the punching done by the keywords. Our problem with this technique, though, was that it was not possible to rotate the message out as a one (this is, rotate by one, assume correct, rotate by another one and so on), for example, the letter D would become E, then the rotator would rotate and it would become F again! It was necessary to start from the original message each time and make breaks, then two, then three, and so on.

We thought most people would start off by trying in this way. Obviously other methods were discovered, and were necessary if you had some special functions. One was to rotate the rotator of the word OPTL, and to take the first three from the message.

up there may be written as a message. This implies that punctuation would be split out, so ASCII becomes STOP, and the rotation device can be substituted.

Repeating the procedure gave away another hint, that a date was included in the message. Given that the date would probably include a month, there must be only a limited number of words in the message that could have been the month. Other limits of captured plaintext were probably also used, but most relevant got the correct rotation factor of 22. By moving every letter in the opposite direction to the one in the program it was then possible to pick out those letters that made up the keywords. Some messages obviously got concluded at this point, perhaps not knowing that the keywords affect the message after the rotation = so, so find out the letters making up the keywords, those letters had to be taken from the rotated message, not the "rotated back" message. Nevertheless, soon people got it right, the letters being E, L, N, S, T and X. It didn't take a cryptographical genius to guess that those letters make the words "SIX" and "TEN", the two keywords.

The original message falls out as "ADD THE SUM OF THE TWO THREE LETTER KEYWORDS TO THE YEAR OR WILL STOP TILL WE START HAPPENING THEN STOP AGAINST BY THE TWENTY SIXTH OF FEBRUARY STOP". With the mass of publicity surrounding Craveil's HWT, it wasn't difficult to get 1984 + six + six = 2000.

Unfortunately, some requests left their mark at that, simply "2000" has the air of not answering the question "what happens then?" ... well, not so many interesting suggestions.

Mr Love of Surrey told us we'd celebrities as Computer Assistants would be 14 year old Sharan Fort - not just answering Z621 leading problems questions! A Mr Major of Birmingham told us all the planets of the solar system line up - not the year of astronomy we were looking for, but answering nonetheless. And Mr Horvat of England will be having his Six Starlikey Computations in advance. Mr Horvat, and we certainly hope you make it to 21, as Mr Hamilton of Ladbroke, among others, informs us that it will be the end of the world (according to some date called Nostradamus).

On a lighter note, a C.J. Copley-May thanks Scatter for advice about a delivery date of 26 January does - that is, an unspecified period, not less than a couple of months, and Mr Dubois of Nottingham went to spend all the fun, making that computer magazine will print programs without bugs.

Back on the same track, Mr Woodhury tells us that February will only have 28 days, despite it being a leap year, but Mr Woodhury of Shirefield says that must be, provable since by MSN one leap year except when this divisible by 400. Returning to the astronomical theme, Mr McLennan from Harvey says that there will be a conjunction and three solar eclipses (what a lot we have looking forward to).

You will notice the male one (like to the editors, so put it down though up the teacher of computer studies at the Queen Katherine School informed us that Bado, a 12-year-old pupil, almost completely solved the problem without a computer - and some hints.

However, back to basics. All we really wanted is "what happens then" was simply that it is the start of a new century and millennium (a 1,000 year period). We for the bulk of course gave out or both of instructions on the answer.

As we like it, would be unfair to put too much emphasis on the solving part of the competition.

We looked at the entries that made to receive offers as to what happens in the year 2000 (was a big Computational bit, and the randomly selected winner is Mr Robert Elyak from Hull: "Well done, Mr Elyak, you have earned my award to lunch with us [at your nearest computer] sometime near Christmas please".

And like it? Many thanks to everybody who who sent us an entry - we'll need a factory full of Craveil to give all the correct scores a prize. Another component, the code based on programming, will appear in our June issue, but to finish this one off (Fig. 3) shows a suitable algorithm integrating programs for building GCCHH employees. Don't start as it's called Straight though - we'll only find them on the computer.

By Dr Peter Thomson, technical editor.

FIG. 2: THE CODED MESSAGE

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11 2000
12 2000
13 2000
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FIG. 3: SUPPLEMENTARY PROGRAM

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100 REM ***** MESSAGE *****
110 REM ***** ALPHABET *****
120 REM ***** ROTATION *****
130 REM ***** ROTATION *****
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190 REM ***** ROTATION *****
200 PRINT "COMPUTER ASSISTANTS MESSAGE"
210 PRINT
220 REM ***** ROTATION *****
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1030 ***** ROTATION *****
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1040 ***** ROTATION *****
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TOP

TEN

SPECTRUM

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↓ 3	MONARCH (SPECTRUM)	↓ 8	MONARCH (SPECTRUM)
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↑ 5	MONARCH (SPECTRUM)	↓ 10	MONARCH (SPECTRUM)

HUNCHBACK

Playing *Ocean's Hunchback* is a definite lesson between skill and frustration. The addition comes from a detectable improvement in performance the more you play, as the frustration comes from making use in a high level and having to return to the beginning. More levels for fewer points would have been appreciated. The graphics and speed are excellent.

(You can read details on how the game works on the Commodore game review page.)

MANIC MINE

Manic Mine started life on the Spectrum, distinguished by good graphics and one of the widest collections of characters you've ever likely to meet in a game. It has 30 levels (including The Gold Room, Manic Mine, Manic the King, Manic, the Manic Telephone, and the Attack of the Manic Telephone), each with its own bosses, including dodos, penguins, maniacs, elephants, blinking eyes and more and more. Each level is a different challenge.

The game is basically of the 'King' variety, with you as Manic Mine competing between levels (some of which collapse as you walk over them), avoiding the bosses and poisonous patterns, and trying to distribute the gold.

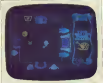
It's a rough game, and gets tedious when you are stuck at a level, lose your last life, and have to start all over again. The graphics on the Spectrum are excellent, and it is easy to see what each keyboard key does.

ADC A DAC

ADC A DAC is a truly graphic adventure game - it needs to worry about it. It is also one of the most complicated games for the Spectrum.

You can use one of three characters: Knight, and you can use. You start off in a normal room in The Castle (it doesn't say which) which has a number of exits. The goal is to get the magic key which will let you through these doors. The more you see take through the Castle changes according to which character you are playing.

You search through a variety of rooms, and



then shoot, picking up various objects, food and a number of significant clues. You're surrounded by a group of ghosts and ghouls, which you'll avoid and die. You can use a hammer and pickaxe to dig up treasure and to dig up the bones of the dead.

The graphics are great, the idea intriguing, but I must admit, we were never quite sure what we were doing. The game demands some thought, for example, there are a lot of objects to pick up, but you'd then get to work out how to use them.

SHOWMAN

There's the book (beautifully illustrated), the list of the book (beautifully annotated), and now the game of the book. But though *Showman's Showman* game for the MSX Spectrum bears that same name as Raymond Briggs' children's children's book, it has nothing to do with it.

It's a *Monkey King*-type game which involves wandering around and between various levels collecting materials (jewels, stones, and so on) to build a structure. Your progress is hampered by obstacles which will either prevent you from collecting the Showman's components, or send you to sleep (the game's equivalent of losing a life, represented by falling into bed at the bottom of the screen). It's also not easy if you fall off one of the levels.

This game offers nothing new. It's game reviewing, but gives us a package which offers deep thought.

By David James Woodley, editor.

FAST FORWARD:
Neil (Bones Medical),
Dorothy Castle
Penny, The Scientist
(DuckDive), White
(Mongoose), Snake Drive
(Dore), Space Shuttle
(Riviera).

Right: *Manic Mine* on a screen from *ADC A DAC* (see below)

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Manic Mine (Arted)
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8/8/85

DuckDive,
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13 Palmerston Road,
San Francisco SO1 7LL
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TOP

TEN

BBC	
↑ 1	THE KINGDOM VALLEY
↑ 2	CHUCKLE EGG
↑ 3	THE GREAT ESCAPE
↓ 4	THE GREAT ESCAPE
↑ 5	THE GREAT ESCAPE
↑ 6	THE GREAT ESCAPE
↓ 7	THE GREAT ESCAPE
↑ 8	THE GREAT ESCAPE
↑ 9	THE GREAT ESCAPE
↑ 10	THE GREAT ESCAPE

THE KINGDOM VALLEY

Life in *Warrennot* is hard for a greedy, adventurous seeking treasure hunter - not only do you have to contend with the dragons, but with the fury of a host of wind and wonderful monsters.

Warrennot is the location for the action in *Five Kingdom Valley*, a new adventure game from Big Byte. Also notable has dated simulation *The Matrix*, *TOP* has full screen graphics for business - 175 of them - and the ability to talk to some of the characters who live in *Warrennot*. Although not quite in *The Hobbit's* class, it is a worthy contender.

There is no real story behind the game, but there is supposed to be two kings in the valley, each of whom hates the other. Most of the time is taken up by various rivers and lakes, the targets of which is sea, though local grass given at the start of the game, to have magical powers along with the secret of life nearby. All the player has to do is stay alive as long as possible whilst trying to collect pieces of treasure, each of which can be used in 'The Great Esc' - *Warrennot's* local.

With a good vocabulary, one using graphics and plenty of video, *Five Kingdom Valley* is a well-made screen on the adventure genre, and should not lose of entertainment to adventure-minded Bob users, a 'level-10' class of BBC adventure software well worth looking at.



Left: river settings from Big Byte's *Five Kingdom Valley*.

CHUCKLE EGG

Chuckle Egg (from A&P Software) is yet another variation on the ladder-and-ladders theme. You play the ladder, who goes this up and down the various ladders and elevators collecting eggs, whilst avoiding a host of mad chickens. What there is in the way of documentation also gives a warning on getting a crazy duck, caged in the top-left hand side of the screen, until the times we played *Chuckle Egg*, the cage contained a cloud and the weird, forced final video looked up - more of a dead duck than a crazy one.

Although *Chuckle Egg* is scored on our BBC list of two stars, it is certainly not one of the best games for the Beeb and it is slow speed/very managed to go through three levels (but total will take its speed to new levels) game play. To the last level game play *Chuckle Egg* will prove to cause that a slow 'Space Invaders' style game. Not much of a challenge.

TAT FLIGHT SIMULATOR

TAT, from Decora Soft, is a flight simulator for those who would like to fly, but get none standing on top-ice. The screen display shows a control panel at the top and view through the cockpit window. As the pilot, it is your job to land the plane safely and gently, to make it the passengers spill their in-flight food.

Like so many flight simulators, *TAT* is complex, using many of the BBC's keys, and quite dull. It is also only under documentation. However, of flight simulators are your thing (there aren't many others for the BBC), *Decora Soft's* offering is probably worth looking up.

By Steve Applebaum, staff writer.

Five Kingdom Valley (priced £9.99) from Big Byte.
Tel: (261) 700 7071.
Chuckle Egg (priced £7.95) from A&P Software.
Tel: (37061 341) 11.
TAT Flight Simulator (priced £8.95) from Decora Soft.
Tel: (39001) 330076.

TOP

TEN

ON A GOOD 10

- | | | | |
|-----|-----------------------|------|-----------------------|
| ↑ 1 | PROBABLY THE BEST | ↓ 6 | THE HOUSE OF THE DEAD |
| ↑ 2 | THE HOUSE OF THE DEAD | ↓ 7 | THE HOUSE OF THE DEAD |
| → 3 | THE HOUSE OF THE DEAD | ↓ 8 | THE HOUSE OF THE DEAD |
| → 4 | THE HOUSE OF THE DEAD | ↑ 9 | THE HOUSE OF THE DEAD |
| ↓ 5 | THE HOUSE OF THE DEAD | ↑ 10 | THE HOUSE OF THE DEAD |

FAST MOVIES
 Phobos (Microsoft),
 Shuttle For Dummies
 Dem., Space Fighter
 (Microsoft)

For right from 'Frogger',
 licensed programmer by
 Cable Software, right
 tracks gambling from
 Microsoft's
 Hungry Horace



HUNGRY HORACE

Hungry Horace (from Microsoft) is a 'Pac Man' game-it's close enough to be recognizable, but different enough to be legal. You control Horace as he eats round a path that has a variety of items (they are listed on the screen as one level) choosing flowers and being chased by guards as usual. Horace is a large (and fat) blob with no legs, while the guards are heads on wheels looking feet.

As well as gaining points for choosing flowers, Horace gains extra points for eating up all the guards' heads that they suddenly drop from their sides. These extra bonus points can be accumulated by eating the alien ball, and then eating flowers and guards in range, guards go back for a short while after the ball goes off. Horace appears first in one only to the other boys, but none of the path items are a little unexpected, and become visible after playing a few times.

PACBALL

Pacball (from Microsoft) has three levels of skill—which is really the only variable feature in the game. Other than that, you simply masterfully lead the 'P' ball to flip a square ball round an uncompassionate guard's machine simulation. The ball sometimes hits the spring and the trigger. The ball moves rather automatically up the spring itself, but then makes a reasonable approximation of the ball thing which is bouncing around and so the simulation (though it's nothing to compare with the excellent Pacball Construction Set on the Apple). More you feel than anything else—dislike down.



DRAGONLINE

Dragonline (from Cable Software), number 1 on our 'The Last' chart, is a 'Frogger'-type game, except Sidney has to be guided through a maze—over the way. It is not as well you're told to the general when the place is, because the obstacles are fairly irregular, which can only be controlled by a joystick, which is a pity as we think it is much more friendly in other both keyboard and joystick options. The movement of the joystick controller lets it rather why, nevertheless, the game is good fun, and a fairly well deserved award.

KING OF DARKNESS

The King of Darkness (by Westwood) is a game that plays more strange kind of maze, again, again and again. As far as old-fashioned, playing King was far from the point of going as very early on.

The game begins with the player having to guide a 'K' around a maze. Small black squares represent the different locations are found around the screen. Going to the different places is not easy, as well as going and heading have to be constantly looked at. Attacks are frequent, and generally less and rather expensive has been mentioned to the point of death, sometimes can win an. Another major hurdle relating to removal and related the top after having several of the locations—but as most of them are the same, there seems little point in trying each them.

Compared to such as Black Crystal (for the Spectrum), King of Darkness is possibly a better one.
 By Dr Peter Turner, technical editor

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COMMODORE 64

- ↑ **1** **WARRIOR WAGON**
BY TERRY ANDIAN (PENTACON/AT&T)
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- ↑ **3** **THE MONKY POLYX**
- ↑ **4** **REARVIEW MIRROR**
BY MARY NIELSEN (AT&T)
- ↑ **5** **WARRIOR WAGON**

- ↑ **6** **WARRIOR WAGON**
BY TERRY ANDIAN
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BY TERRY ANDIAN
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BY MARY NIELSEN
- ↑ **9** **WARRIOR WAGON**
- ↑ **10** **WARRIOR WAGON**
BY TERRY ANDIAN

MUNCHBACK

Already a popular Spectrum game, Ocean's *Munch* has now made a fairly successful transition to the Commodore 64. The object is to guide your fly Quasmode through the 15-screen game without hitting. Emergible from the previous comic, jumping insects invade both horizontally and vertically, using the fiery pit and waiting upon the wing guide, to get into your nest and devour it.

Although the Commodore version lacks some of the smoothness of working of the Spectrum counterpart, it's still good fun—part from the fact that most obstacles, such as catching the eye to over the pit, are now easier to see and deal up repeatedly within the safe range of the game.

CHINESE WARRIOR

Chinese *Jaggle* (another Doni Ocean) is a game where you get your skills against the vapours of unbalanced gravity. You have to shuffle an overall plane player round a gravity government stage in an effort to get eight planes spinning simultaneously on rods before the first one drops and falls off, manage to do this in the allotted time, and you win—no, but with less spin and less time.

The graphics are well the equal to give some impression of dimension and stage 7, and the spinning plane movement effective. You can even do a bit of the spin timing—although if you throw the controller too high it does have a tendency to disappear too, not so, and so. Chinese *Jaggle* provides the fun in an unusual format, and can be played with other keyboard or joystick.

THE MONKY POLYX

But food starts software in Ocean's *Mr. Monkey* and proves to be a fairly respectable attempt. Introducing the *Monkey* (Mr. *Wingy*) in his intention to make hamburgers, first assembling the ingredients. Chopped by Marvin the Monkey and White the Burger. Then, after mixing some, the taster to cook them, avoiding the Ketchup Bots. If you get stopped by the robot you can proper them something to your taste, determined by gathering brown spots, coffee or sun cream.

The only annoying feature we found about *Mr. Wingy* was the way in which the quality of the game is always referred to the background the background—no, not the background.

MINI-MONKEY

Another in Ocean's mini-series, *Mini-Monkey* (Ocean Software/Pentac) is a game like the Commodore one. The game really offers nothing very exciting in the way of challenge—you have to take your prize *Willy* through several chambers (rooms) of unbalanced adjustments, as he reconstructs the remains of an earlier civilization's more workings. The object of each screen is to chamber round the obstacle gathering keys and avoiding various hazards as *Mini-Monkey* (Ocean, Pentac) (Ocean, Pentac), *Mini-Monkey* the hit, once you've collected all the keys you can move on to the next chamber. Screens include Oil Refinery, Diamond Workshop, Redwood Forest, and Skislope Landing Bay's, and so on—all percentages of two or three basic features.

We found *Mini-Monkey* rather unexciting, partly because if you get caught having gathered all the keys, you're brought back to square one, and have to go through the whole rigmarole again—which you very seldom after the first two doors get.

However, as the designer of the *Warrior Wagon* game it's fairly good. A notable feature is Spectrum-like looking form—a fitted presentation, as Commodore games usually have the screen *Munch*, which was more an attempt to avoid jumping in a crash.

SCRAMBLING

Can't afford that week-long holiday in the Seychelles this year? Then why not stay at home with your Commodore 64 and splash a few pounds (or a few Dollars if you're Down Under) on the fun of the game in a good title to entertain you down through the *Scrambling* (Ocean) of unbalanced weights, or until it reaches the top of the page and you sink or break in the bottom where your carter is dragged away by a scavenging octopus. Here there you can collect pearls that either return to the yacht and some points, or change the deep sea coral—though with garden machines and piston cars—to find the treasure chest, which brings your score up and replenishes your car supply for more adventures.

So if you fancy yourself as the Commodore of the Commodore, good and well, *Scrambling* is available through *Wingy* goes to make *Scrambling* a worthwhile look.

By Jim Hayes, sub-editor

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WIZARD & PRINCESS

The Wizard of the Princess for the VHS 26 (Epic Telefilms Home) lets you experience (probably because it has been well reviewed) an unerring good machine. It is an adventure using graphics rather than text, a game that has already won more.

There are five chapters for text which make up the whole adventure. If you finish for abandon any chapter you then wait for the text to load. It is a feat to understand the first chapter, or escape from the labyrinth in the third. By contrast, solving the ball and dagger seemed worryingly easy. Another disappointment.

JETPACK

Jetpack (from Ultimate Plus The Game), is an another 'blast-the-screen' game for the MSX V60, and a good example of the genre as than Jetcracker. Jetpack is fast moving and usually difficult, which means you won't be laid up within 30 minutes. The aim is to get your jetpack in to land up the three stages of a rocket ship, but it isn't very nice at all in such of body in such games. The ship will change shape and colour as you change planets, however, the spaceship's recovery when firing systems instead. Navigator-type, designed fun.

JETPACK

Years ago there is the same game that everyone seems to enjoy watching on TV. A reasonable conversion for the MSX V60, the game seems to be done by the graphics (presumably a colour TV is needed). There are two colour sets (one different balls, one hard to distinguish, and often changed colours when moving). We found a copy because of using the joystick playkey board to play the game.

By Tony Martin, deputy editor.

TOP



VIDEO

1 **WIZARD OF THE PRINCESS**

2 **WIZARD OF THE PRINCESS**

3 **WIZARD OF THE PRINCESS**

4 **WIZARD OF THE PRINCESS**

5 **WIZARD OF THE PRINCESS**

TEN



6 **WIZARD OF THE PRINCESS**

7 **WIZARD OF THE PRINCESS**

8 **WIZARD OF THE PRINCESS**

9 **WIZARD OF THE PRINCESS**

10 **WIZARD OF THE PRINCESS**

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Jetpack priced £8.95, available from
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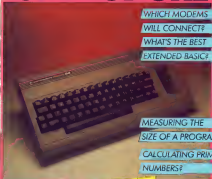
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The 286 Value Plus (left) and the Commodore 64 (right) are the C/P/M software available from Impact at £1,999.99999.

TELEPRINTER IMPRACTICABLE

I have been given an 800-0170-7636V.

Teleprinter and serial interface, which had worked previously, I believe, from a 286 to my Commodore 64 which I would like to use with it.

Teleprinter is the year of any software which would do it? Can you tell me the cost of Commodore 64 286, so that I can see this cartridge is viable with serial interface and software?

J.P. Clark, Beverly

We think it unlikely that anybody would have produced commercial software to drive a teleprinter, because the potential market would be so small. The 286 cartridge for the Commodore 64 is well served

also (however, Impact produces a 286 Value plus - see above). In any event, it wouldn't represent a cost-effective solution to your problem, because the 286 cartridge will be marketed with CP/M (which is the main reason for its existence), so you would be paying not only for the hardware, but also for the operating system.

The real cost would be close to that of the cheapest of the currently available dot matrix printers, any of which would run around ten times faster, occupy less than a quarter of the space, have many more features, and you wouldn't need air protection every time you used it.

So we're afraid that any thing you do which involves an expenditure of more than a few pounds will exceed the value of the teleprinter.

BK DOWNGRADING?

I'm wanting to play BK games on my VHS 20 with 16K RAM packs so is it possible to downgrade to 4K, and if so could you give me the necessary program (as should I buy a

reliable 16K RAM pack)?

Kenneth Walker, Edinburgh

There is no need to downgrade your VHS, as programs written for an 16K machine will work equally successfully with 16K expansion.

MODEM MANIA

Which modems can be used with Commodore 64 Target Plus Manager? 500? How do you point? What software is required? Is it available on cartridge? Will the unit have to be machine dependent? What will a complete package cost? Will I be able to access CANH using my Microsoft 680 modem? Are there any Commodore-approved units?

D.W. D'Aglio, Cleveland

At present, Focus has not released a package to allow access to Microsoft for the 64. However, Tandy has the TM300 plus software which will allow access to Personal Computers, including Microsoft. The software should be

available on cassette, disk or ROM from Tandy.

Commodore itself has plans to launch its own modem plus cartridge-based software for around the £100 mark, but we can't say for certain that it will have Personal Computers.

Armed with the Tandy modem you can access Personal for £5 per quarter at both Personal and Microsoft for £13 per quarter. We don't know if Tandy's software will be compatible with CANH (Commodore Auxiliary Interface Board), but armed with the correct software you could use the TM300 to access our board.

Tandy Marketing

Albert Road, North
Molwyn, Warrington W9 4TT
Tel: 0563 54021

ANY ROM COMMS?

I have a VHS 20 can you tell me if there is a ROM chip to be used in conjunction with a modem so, communication is possible between an act and/or other computers and could you suggest a suitable modem?

C. Edwards, Mid

We know of no ROM chip which communicates software for the 64 for the moment. See page 114 of the March issue of Computer Answer for a range of variable modems. You will need an RS232 interface from either Oxford Computer Systems or Minor Micros computer.

MEMORY CHECKING

Is there a quick and easy way to ascertain the size of a program in Kbytes?

Also, what is the storage capacity of one side of a C10, C12 and C15 cassette?

P.O. Fisher, Devon

There are a number of system variables whose contents can be printed to give you almost any information you could want about the size of your programmed routines.

First there is a variable called `lines` at locations 45 and 46, which prints to the screen the Basic program. So `PRINT PRINT@45 - 255 * PRINT@46` will give you the memory location in decimal. Similarly, the `lines` 2849, which is one line further on from where the

routine sets the program itself, appears to contain a null byte. A second variable called `RAM%`, pointing to the start of your variable area, appears in the next row (locations 50 and 48). So you can write `PRINT PRINT@48 - 255 * PRINT@50` to determine this value.

The trouble is one byte after the end of the program itself, so you subtracting the two numbers printed on press the length of the program area. `PRINT@48 - 255 * PRINT@50` tells you where any arrays used begin, so subtracting `PRINT@48` from `PRINT@50` in the same way gives the space occupied by simple variable arrays (49-50) given the end of the array (-1), and `PRINT@51 - 255 * PRINT@52` shows the end of string storage.

If you need to know how much memory is left - amount 150-50 will give you the highest address used by Basic.

As far as tape storage expansion is concerned, it's difficult to give hard and fast replies, because it all depends on how many programs or files you are saving on a tape. Each file will have a header and trailer label which occupies quite a lot of space, so to increase the physical gaps between files. As a rough rule of thumb, assume that you are saving about 100 bytes/sec, so that the maximum of tape will save $5 * 60 * 100 = 300,000$ bytes.

This means that one side of a C10 cassette will hold about 300K, a C12 cassette about 750K, and a C15 cassette about 900K.

PRINTER POSSIBLES?

I am an Open University student and intend using my Commodore 64 with a laser-type laser writing capabilities. Can you advise me on a suitable A4-compatible printer for this purpose?

David Fisher Bradford

Most of the current generation of dot-matrix printers such as the Shiva CP90, the Rev Gemini II and Delta 10 models, and the Epson FX80 will produce acceptable quality output in a number of modes, for example, double strike, emphasized and italic scripts are now common, and the printer requires only an appropriate sequence of control characters to be used to these to initiate (or cancel) these modes. All of them will handle 7 inch wide (A4) and landscape orientation.

You don't say how much you are prepared to pay, or how important print speed is to you, and this is the primary one for a write-off. The cheaper printers (such as the CP80) print at about 30 characters per second, while

the most expensive (FX80 and Delta 10) operate at twice that speed, however, this doesn't necessarily mean that a great document will take twice as long to print on a CP90 as on an FX80, and the quoted price speeds do not include the time taken for line feeds or page load increments or at where space. These differ with the printer design.

Another factor you will have to consider is the interface of your Commodore 64 to the printer. Most printers have only a Commodore interface as standard with an RS232 as an option (an exception in this rule is the Rev Delta 10, which has two on board, together with a proprietary 64 byte buffer). Unfortunately, Commodore interfaces for the Commodore 64 are a little different to those available from Microsoft in the US, and there is a universal interface system called Interlog available from Oxford Computer Systems. The alternative is to go for an RS232 system on the printer, which will probably cost £20-£30 more in this



The Commodore 64 computer has good 'write' capabilities for generating student documents. Look at prices of peripherals.

case you will need an RS232 adaptor from Commodore, because although there is an RS232 interface built into the 64, it is not conventional and uses different voltages from the normal standard.

Unless you are familiar with the operation of Interlogs, it is a good idea to buy the whole package from a dealer and

note that the Commodore 64 working with a Commodore 64 before you part with your money. Otherwise, there are a great many varieties which do not conform with Murphy's law, will generate

Oxford Computer Systems,
Hornby Road
Woodstock, Oxford

MORE BASIC COMMANDS

I recently bought a Commodore 64, and after experimenting with an somewhat limited Basic, am very interested in finding a good extended version. Could you please comment on the merits of various packages. I've been recommended **Screen Basic**, but at a cost of over £50, what advantages does it have over the cheaper version? I am also interested in **Master Code**—and could you recommend the best assembler/disassembler for the Commodore 64?

Richard, Wrexham

You're right—Commodore's BASIC Basic interpreter is called **Monitor's Basic** given you an extra 104 commands. The most significant additions are in the areas of graphics (color and 3D) options (using particularly useful), and programming tools such as **Monitor** and **TRC**. This is a somewhat self-contained attempt to build these great ideas into Basic, but it is not possible to put parameters in procedures and this is a major limitation.

Currently, there are two features are useful, but the

third is not a match for BBC BASIC. **Approved Basic** (also Commodore 64) is also available from Home and Shack.

As for assemblers concerned, there is an element of personal preference about the display format, editing facilities and so on, which makes recommendations difficult. It helps if you can talk with one before purchasing. In the market the **Master Code Assembler** (which has changed its name to **64 Basic**), and this is related through Home and Shack, to you should have a chance to see a working. Many assemblers are available only on disk, but **Aslogic** produces a cartridge version at £29.95. It includes a limited Basic reader, and it could easily be a very useful. However, they are available very cheaply. Again, you should be able to get it through Home & Shack or on disk. Assemblers appeared on our January cover, which are recommended to you.

Home Computers Ltd,
11 North Road
M20 6BQ London
Master Computer Services,
290-292 Derby Road
Buxton
Derbyshire DE25 2BN

PRIME EVALUATE

There's a Commodore 64, and would like to write a program to deduct the prime numbers from 1 up to 1000. I've almost worked it out, but wanted to know if there was a special command for it. Basic, something like **IF** (not, are there any other variants I could use, or the one I'm using at the moment is rather long and cumbersome).

GJ Fleming, Birmingham

There is no standard Basic function for the evaluation of prime numbers. The obvious technique for evaluating tests of primes is to create an array of primes, only the first 1000 (and that divide every odd number in the required range (except 2) even number can be prime) by all the numbers in the array for 47. When a number which is not evenly divisible by any of

these factors appears it is a new prime to add to the array. Here is the code:
10 DIM A(1000)
20 A(1)=1
30 FOR B=2 TO 1000:STEP 2
40 A(B)=1
50 FOR C=2 TO B/2
60 A(C)=1
70 NEXT C
80 NEXT B
90 PRINT A

This will execute fairly slowly, and there are more sophisticated ways to speed it up a little. For example, there's no point in testing a number to see if it is divisible by any number greater than its own square root, so you could replace the inner FOR loop (lines 60-69) with a manual loop which continues when $(C)^2 > B/2$ (or, however, make sure that you continue $(B/2)$ outside the loop, if you don't, it never stops because $(B/2)$ never goes beyond $(B/2)$.

TV OK FOR INDIAN TAKEAWAY

A friend of mine from India would like to buy a Commodore 64, but the Indian TV is Pal M and the sound is different frequency — will the 64 work with Pal M if not, is there any other home computer suitable for use in India?

D. J. P. Chester, London

We think it is unlikely that a British standard Commodore 64 will run properly on PAL M, and the same will go for any other PCs with UHF standard output. There are two solutions: first, replace the monitor with a local one (this will, however, contradict the guarantee); second, use the composite video output if a monitor rather than a television.

Since several colour monitors are now available at a similar price to a portable colour television, this is not an expensive solution, and the picture will, of course, be higher quality.

CAN I SAVE MY CODING!

I follow one programme using machine code routines with Basic loaders. I would like to be able to save the machine code to tape or disk for future use, rather than always have to use the Basic loader program — can this be achieved?

R. J. Miller, Coventry

Any program must be loaded by some other program (unless of course, it is held in ROM), so whatever technique you come up with the use of a loader of some sort. The more basic routines chosen a Basic loader is because everybody has Basic, and it is easy to do. An assembler will produce machine code save and load routines, and, if you propose to do much work at machine level, will be an invaluable aid to writing code to write.



The backbone of a PC 26 — the usual question before the one in the title

▲ MAKING MODEM CONNECTIONS

I am thinking of buying a VIC 20. I would like use it to store information such as names and addresses, files of books, author and publishers — possible on this machine?

Also, is there a modem suitable for the VIC, and do I need to buy an RS232 interface?

Alison Lupton, Swindon

To store your second question first, you will need an RS232 interface in order to use the VIC 20 with a modem. Microware is planning to release an RS232 for the VIC

ground just in an £200, making it to use these new (and improved) modems. Otherwise you could use the Interlog from Oxford Computer Systems (priced £99.95), or build your own interface for around £30 using the articles we printed in the November '83 and January 84 issues of Computer Users' Company. Also UK has no plans for a VIC 20 RS232 interface yet.

RT-approved modems, like DataSaver's Modems, cost from £90 upwards.

For an interesting selection of software applications, directory enquiries and other

add-ons, contact Sock Computers who have a large range of extras.

Oxford Computer Systems,

Highgate Road
Woodstock Oxford
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Microware, Inc.,

PO Box 45
1000 W. 4th Street
Tel: 0473 5004

Sock,
202 286 Davis Road
Bosch

I request 126 B/N
Tel: 021 331521

'MOON BUGGY' SPLASH

I have made many attempts at loading Astron's Moon Buggy on my Commodore 64. I have tried switching off speakers and using different methods of loading, but still to no avail. I would be grateful if you could suggest other methods of loading.

David P. M. Northampton

Assuming that your Commodore 64 loads other programs

successfully, there can be no fault with the cassette version, so it can only be that there is some fault with the tape itself.

Whatever reason you use when loading, the computer should not indicate that it has found a program, and display the usual screen on the screen. In fact, the only thing to do is type LOAD. If you are unsure of a program name, because the Commodore 64 will show load the next program on the tape reference to name.

We did consider the price policy that you had been told a version of Moon Buggy for some other machine is correct, but as far as we can tell Astron has no other record of the Commodore 64. We suggest you request a copy from some tape store, your dealer, or some Amiga group!

Astron Software,
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IS THE 64 A GOOD BEGINNERS CHOICE? ▼

The Commodore 64 is a special computer, particularly in the BBC — well worth considering as a first computer.

Originally I was going to get a BBC B, but later I thought the Commodore 64 a better buy for the average user. Could you give me your thoughts on this?

Could you also tell me if a Commodore 64 starter kit will come out in the near future?

Christopher Dale Clark
Broadly, the BBC Model B and the Commodore 64 have pretty similar features, and in the face of it, that makes the latter a good buy on price grounds. You'll pay around half as much again for a Model B as for a 64.

However, there are differences worth pointing out. In particular, BBC Basic is a very simple and fast implementation. It allows for powerful handling and automatic parameter passing, features which are very unusual. In contrast, the Commodore Basic looks very easy to use: it doesn't even have built-in features for handling bit-res graphics or reserved chips. Consequently, programs can frequently consist of lots of apparently meaningless FOR loops. On the other hand, the 64's sound chip is more sophisticated than those for the BBC Basic, and can be programmed independently.



sound characteristics.

Back on the BBC's side of the fence, the highest cost good graphics modes are much higher than that of the 64, and, to the same general area, the resolution modes are incredible.

In the end, it all depends on what the 'average user' wants to do with his machine. If, for instance, good sound is more important than very large graphics, then the 64 has the edge. You should start by making a list of the general areas you're most likely to be

interested in, and match those to the computer you ultimately buy.

One other consideration is software. The best range of software (and the cheapest) is always going to be that available for the most popular

machines because of the potential market. Worldwide, the BBC is pretty small here compared to the 64, so that would be another reason for choosing the 64. Lastly, we don't know of any plans for a 64 starter kit.

ERROR FAULTS

When I try Unifile II, a problem arises when loading data I get a blank message. It says to long (then on 2016) — can you help?

Edmond Leach

We haven't used Unifile, and since it's quite a complex piece of software, we'd suggest you write to David Lawrence, author of *The Working Commodore 64*, at *Sanctus Books*. As the author, he's most likely to be able to put his finger on the problem.

However, you could do a little detective work yourself first. The line on which the error occurs is accepting single

characters in TL, using them to see if a carriage return code (control) has been reached, and if not, adding them to a list. Try putting a stop to this line and program +620. Then continue and report it. This way you can see how the string is being built up, and so when (and the other message occurs). You'll probably get some clues as to why the problem is happening, and perhaps, even how to solve it.

Sanctus Books,
Holtspur Court
17 Winton Road
London WC2J 3JF

LISTENING BANK?

Agent from your own CASH, I would like like the services my bank account out of normal hours (due to the nature of my work) with my Vic 20. I have found that the Bank of Scotland operate such a scheme, due to their lack of high street branches. Could you tell me what modes I would require, bearing in mind a possible and long lead up time to a V.C. Also, are other banks operating or can you put me with operators?

R J Chelmsford Supply
The Bank of Scotland's service is offered to companies with the Nottingham

Building Society. It is part of Pretext, called HomeLink, and can be accessed with a 1280/15 bank mode. You should be able to obtain a variable modem and software for the 64 or Vic 20 from Telexnet. The modem is the same, T24160 for both machines.

We believe that the Midland Bank is also working with the idea of offering banking facilities to Pretext users. HomeLink should be on Pretext page 1000.

Nottingham Building Society,
Newspaper House
2-3 Upper Parliament Street
Nottingham NG1 2BX

Telexnet Marketing,
Alford Road North
Mablethorpe Wain 1612P
Tel 02425 5242

ADDRESS ERRATA

In the Commodore Clinic of the February issue of *Computer Answers*, we mentioned an account package from the specific software company, but printed a wrong address.

Their correct address is given below. Our apologies for any inconvenience this may

have caused them or their customers.

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EXPLOIT YOUR UPGRADE POTENTIAL

THE COMMODORE 64 IS A MACHINE WITH GREAT ADD-ON POSSIBILITIES

WE SURVEY THE MARKET.

There's one question in the Commodore 64 office: plenty of "what-if" questions, you can without adding a minute of actual work into the busy day above the floor of the low machine. However, the real work often isn't possible in this world in higher price range; the advantage being the name of Commodore and its increasing number of independent companies providing a diverse set of hardware.

Essentially the Commodore 64 seems lacking in features which are just often for granted by users in a serious application. But as shortcomings can be corrected. When using word-processing and database packages, the speed of loading and finding data really requires a disk drive. With word processing, the facility for saving files enhances the screen makes things the mean (so that what is seen on screen can be the user in the printed output).

Business users really need the opportunity of using the CP/M operating system with an almost unlimited choice of programs, and for getting started a simple program editor proved in proportion to the Commodore 64 would be very useful, and add-ons to provide all these facilities are around.

DISK DRIVES

Floppy disks have the advantage of making access for loading data fast—and the drawback of costing as much as the original Commodore 64. The Commodore 1541 disk drive uses 5 1/4 inch disks and has a capacity of 170K—no large by today's standards, but larger than the drive supplied as standard for the Apple II. The drive just plugs into the back of the Commodore 64 using the 15.25 inch socket with a cable supplied. There are drives looking virtually identical with just one difference, the number 1540. They were originally intended for use with the Mac II, so make sure you get the 1541.

Using just a single disk drive as a backup or transient environment makes it more difficult to make copies and back-ups, so a second 1541 drive could be fitted into the expansion just fitting a cable from the drive into the back of the first one. This is technically known as "daisy-chaining." If the capacity of the Commodore 1540 drive just isn't enough, one use of the floppy disk drives designed for other microcomputers is the Commodore Mega.

Your first step will be to buy an interface, as the standard on the rest of the Commodore drives is the IEEE 488. Here there is a choice which depends basically on how much you want to spend and the amount of versatility required. By far the most sophisticated (and the most expensive) is the Interport from Oxford Computer Systems (model 291). This accessory plugs in to the back of the Commodore 64, and has both RS232 and IEEE ports available. Not only is the Interport virtually transparent to the user, it also doesn't take up room from the computer and has its own range of commands.

Another interface is available from Datac with just the IEEE 488, model 294 95. Analogous

interfaces have been designed for other microcomputers, but with a floppy controller hidden allowing the Commodore 64 to remain in touch with the 488, using the good old Commodore 64 connector. Another interface is available from Datac, and provides just the basic interface.



interface has been selected, the choice of drive is only Commodore. The independent disk drive market doesn't seem to have expanded for Commodore as much as for the Apple and IBM users, probably as a result of the demand.

Commodore do produce a 4090 disk system, which is a double drive unit with each drive having the same 170K capacity as the 1541 model (made sure here that the system uses the latest version of Commodore's disk operating system). However it costs around the £300 mark—less than two 1540s, but 50 per cent more than the cost of a Commodore 64 alone. There is a good case here for disk drive price to drop with the rapid increase in sales to people who can't afford doubling the price of their system by adding a disk drive—and tripling it if they need a two drive system. If the capacity of the 4090 is still insufficient, then the model 6090 is available. This will provide around 300K per drive, but the price is going to be in the £200 area, but uses the one of a Commodore 64. This isn't the final size of drive available which could be used with the 64, but there is the constant difference type of system probably makes more sense.

In any case the cost of the interface must be added to the cost, outside Commodore's 64, make the drive should be used to work with a program before purchasing it. Currently the Commodore 1541 disk drive offers complete write a word-processing package. This is in form of charge.

PRINTERS

Commodore do produce their own range of printers, more priced in proportion to the success like the Commodore 64. There is a choice really depending on whether the Commodore printer meet your budget and technical needs or not—if they don't, then you can look to the market as mentioned to open the door for using brands like Epson, Seiko, and so on.

The range from Commodore includes the 1215, a dot-matrix printer operating at 30 cps with reader

The Impact Data 20 Video Fax (right) is a plug-in cartridge 300 volume series a printer and terminal emulator that enables the Commodore 64 to act as a dumb terminal. It's priced at £280 (See right) The Commodore 1541 uses 5 1/4 inch drives, and has a capacity of 170K

(See right) The Commodore 1226 is a dot-matrix printer manufactured with a speed of 30 cps

level mechanism. This model costs £160. Factor up the costs that it is the 1500, which is rated at 40 cps, and a 15-dimensional. However, the 1500 printer/punch costs just £169.99, and plus graphics, and has space for four colors, plus letters and numbers at 14 cps.

If you use another make of printer, an interface will be required. Further examples of interfaces are the Commodore parallel supplied by Shack (priced £10) or 80-column cassette for the Commodore but also alternatively Shack can also supply an IBM and RS/232 interface of £79 and £79 respectively.

Amalgam's cable costs £19.99 for Commodore, and it holds the complete software software RAM. Edinmont provide a Commodore add-on which includes automatic conversion into readable characters of the 80's control codes. Commodore themselves also produce an RS/232C interface at



The latest parallel printer interface can translate the interface set to ASCII, and print through graphics characters, priced £19.99



£14.95

Adding another manufacturer's attitude to yet another company's printer has all the good habits of things going wrong with nobody taking the blame—so make sure you see the computer working before parting with money. Most people have problems with interfacing printers to monitors, then almost any other problem—don't try to set screens, saving what have and a lot more.

SPT supply a Commodore printer program on separate disk, priced £19.95 each. £10 without.

MONITORS

The downsized TV set was never really intended for use with a screen, though it does work acceptably,

but if this type of work is to be done with the Commodore 64 monitor figures, you need a display of 80 columns then you will need a monitor. Using a monitor has the added advantage of forcing the domestic television set (by the rest of the family, making you far more popular).

But before you start considering an outlay of around £270 from Commodore (or at least £199 from other suppliers) it's best to make your needs. For example, do you really need colour?—one of the suppliers of 80 columns attachments for the Commodore 64 specifies the use of a monochrome monitor. The extra cost will be around £80-£100, plus more cable which will be under £10.

In the main on TV sets, there is a form of composite when a colour TV set that has direct video input can be used (but also with the 80 column attachment and EPROM screen, we have mentioned here). This input is used when a film from a video recorder is shown, and can give a better result than a composite video set.

80 COLUMN DISPLAY

By adding this feature to the Commodore 64, it can compete with the far more expensive macro systems. The system we mentioned came from Impos Design and is called VideoFax 80. Adding the plus-in cartridge replaces the original 64 boards, and provides clear characters in either 40 or 80-column mode. There is a tremendous increase in the screen area too, which means that the up-

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The Commodore 64 look-alike monitor (right) runs on and drives just \$14.95—but before buying, ask yourself if it isn't really necessary.



grade needs a monochrome monitor (instead of a color TV).

Adding the facility for 40 columns on screen (with 80/160 columns) is an equally useful, however, Video Pak 64 (three inputs) offers the most. Included in the package is the Word Manager, a word-processing package with Mailmerge facilities (retail costs £14.95 on its own). There is also Plus Manager, an easy-to-use spreadsheet which can run up to 64 rows and 254 columns. The package includes communications software which allows screen image capture on the ready at a handsome £20.00 type printer. With the Video Pak 64, the use of a disk drive is optional, though it will improve the effective speed of operation. Complete, the package costs £125, if the cost of the software supplied with the system is subtracted, the sum of the base 60 column machines (if available on its own) will be very low. However, a similar sum to have the package alone.

SPT electronics also do an 80 column unit, which costs £118, or, with two disks and SPRINT, £138.

ADDING CP/M

With the more popular operating systems of all, but likely to be overtaken by PC DOS, CP/M is a planned product (according to the current Commodore-64 price list). No firm price and availability are known to yet, however, there is a form of CP/M available, not from Commodore, but, again through Input Design.

Called the 280 Video Pak, this plug-in cartridge (sometimes has a built-in 280 microprocessor designed to run any CP/M 2.2 program in 60 columns. As long as the data have been formatted for use with Commodore disk drives, and according to Input, programs formatted for the 64 are available through Lifestar. Above it, the same time as the acquisition became available, Microsoft announced that Multiplan would be available for the Commodore 64, so this could be the first of many programs available in Commodore disk format.

The 280 Video Pak also contains a disk-based version of an improved word (family) version of V.I.P. (V.I.P. 80-80) by the IBM CTR, which is a word processing suite to your choice of printer. Again the upgrade must be used with a minimum two screen, for TV, an extra be added to the cost of using CP/M with the Commodore 64. An external power supply is also required, and is included in the price of £120.

Again bearing in mind that the add-on also includes the features of the Video Pak (the Plus Manager spreadsheet and Word Manager word processor, the actual list cost of adding CP/M is just £180—so although this machine is virtually the same price as a complete Commodore 64 computer, the improvements it brings make it, roughly a different system altogether, with just the same old sum.

CP/M from Commodore themselves is likely to be available soon, and probably from other sources eventually. One thing that is certain is that there will be no shortage of programs for the Commodore 64 over these machines because there were widely available.

GRAPHICS ATTACHMENTS

Although there is a printer plugin available for the Commodore 64 for creating charts, graphical images and presentations, a graphics tablet is extremely useful. With use of clear acetate, the user 'draws' using a stylus and the whole system should come complete with software.

Once available from Autodesk for use on PCs, called the Kauls Pad (maximum size: 8.5x11 inches and weighing just 100g). The active pad surface is a slightly recessed five-inch square with red and blue buttons located above it. The Kauls Pad is held up by the left hand, with the left thumb pulling out of the buttons, and the right hand using a stylus along the central drawing. The Kauls Pad also has a couple of other features, Command, and the Command Palace, so that the user can build up a picture using traditional drawings combined with different the pen combined on the screen.

By Neville Ash, a Computer Consultant

SUPPLIES OF DISC
DRIVES FROM/885
AT/194C/25

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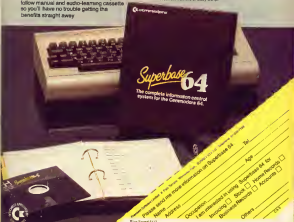
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MAGPIE: A USER-DESIGNED DATABASE?

A desktop program called Magpie sounds slightly worrying—will it nibble at your valuable data and hoard it in some inaccessible and deep woods the system? However, this new package from AcadianaSoft for the Commodore 64 is nothing if not user-friendly, and in some respects quite innovative.

Magpie uses the unusual combination of a language for the program and data to store the data and applications. The package contains the cartridge, which has the Help screens for the commands, and two example applications and the manual.

One of Magpie provides several pop-up menus, something which is more often found with the now mouse-operated systems like Macintosh and Lisa. The second difference is the cursor: instead of a square and ready, the option selected is shown in red on a white background, and the space is selected the chosen character color to black.

After entering the cartridge the main cursor appears on the screen. There are five choices for positions, the calculator, file system, Com64 system, and last and not least (see above right).

The Commodore 64's special function keys are used to manipulate the screen. F1 brings the cursor to the top of the line, F2 moves the cursor up by one option at a time, F4 operates the chosen selection, F6, produced with shift lock, produces the Help facility for the particular option being used, and F7 moves the selection down one option at a time.

Before reaching the main menu, Magpie wants to know which disk drive is being used. The program can be used with the 1541 drive, and also with the 4040, 4050 and 4050A with a suitable interface like the Intertek's or Teac's.

Taking the second option of the menu, Calculators, brings up Magpie's calculator. Again it is disk-drive sensitive, user selected. This option can also be used as a conventional calculator.

The third option, System, offers you complete applications which will be held on disk, loaded onto the 64 when required. As each option is taken, a second menu appears



which overwrites the original one, the chosen selection appears in white on a black background.

Making list is an example of an application produced using Magpie and the menu has eleven options: Add names, delete names, delete name, find name, insert name, list names, new name, new name, new name, new name, new name, new name, and delete name.

All applications using Magpie start with a form (one page) which will contain the base for all the information that is to be used. Magpie can have two of these pages (forms) active at the same time, and each can have its own database.

Once this form has been entered, it can be reviewed as a number of ways: sequential access can be used where the program starts at the first record and works its way through to the end of the file, natural access where the natural position of the information is used, searched access

where Magpie works through according to systems that you have already defined.

Indexed access can be used with a named field as the key. So that when the key is entered Magpie can find the appropriate record, sorted access can be used where one of the special characters of the codes like a or sorted order. With the system records can be created in sections, and Magpie finds them in order.

The various components of Magpie are controlled by Procedures. That is just another name for a group of commands which, linked together, perform a specific job. The user selects the procedure into the menu, and Magpie enters this command, then returning to the menu and display end of procedure.

By using Magpie a whole sequence of commands can be used with the Begin and Repeat structure available, and

a procedure can be based on a set number has been reached, or change made to allow multiple decisions. If this wasn't enough to a sophisticated database, Magpie can also produce graphics—such as horizontal bar graphs, vertical bar graphs, and pie charts.

Magpie must be the most advanced type of database currently available for the Commodore 64. In any event, explore the latest state-of-the-art systems with its pop-up menus, has password security, and is truly programmable. The package can be as simple or as sophisticated as the user requires, or flat, the only main drawback could be the speed of operations of the 1541 disk drive.

By Neville Ash, a computer consultant.

Magpie is priced £99 from AcadianaSoft, PO Box 50, Reading, Berks. Tel: 0734 614444.

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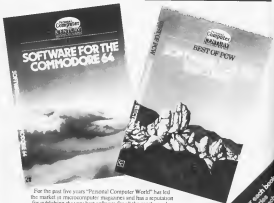
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WHICH VDU COMMAND

Acorn's ViewRAM supports

programmable highlighter, E-post printer driver supports enhanced 80 character typewriter. What is the ViewRAM for this effect?

Geoff J. Pevsner, Reading

The following line, copied from *View*, will put the Epson 630 132 character mode (VDU 37 132 1 34):

Unfortunately, you cannot enter this command once you are in *View*, and to top it all, the Epson printer-driver resets the printer back to its default setting when every time a print is begun. This means that it is hard to 80 columns mode. We obtained Acornsoft's Epson printer driver, and it is a very complete piece of code. It would have been nice to be able to extend it so that the 132 column option would be one of the highlighter codes, but we were unable to achieve this. However the following steps will convert an Epson driver that does not reset the printer back to 80 columns:

*Codepage 800

04,000-1

*Character 1320 = 130

The procedure will then be to enter the new command above (which you could "hide" in a "HIDE" file), then once you are in *View* command mode, enter printer driver.



Is it all dead or is it just a dodgy ROM? (Photo courtesy of BBC.)

▲ CAN ROMS DAMAGE?

There are an ever-increasing number of ROMs coming on to the market for the BBC Micro. Provided the instructions are strictly adhered to, the fitting seems to be simple enough however, opinions seem to vary as to whether any damage can be done to a

computer if one of these ROMs is defective, either because of the program itself or due to a production fault, or by misbehaving during the fitting of the ROM. Obviously there is no way of testing beforehand. Any news? *St. Aidan, Southampton*
We haven't (0202 62705 80)

case of dodgy ROMs causing damage since they are only temporary devices, it would seem unlikely that damage would do anything more serious than crash the system. If you are really nervous, you could install a RAM board in a subways ROM socket, and copy your ROM software onto it. Damage could, however, be done by incorrect insertion of ROMs, loading or breaking legs, and so on.

Both the BBC and ROMs are supposedly 5 volts, but any sensitive device should be willing to fit a ROM for you if you are worried. All the ROM based software that we have seen has been supplied with clear fitting instructions.

ACADEMIC CHOICE

Am going to do some Open University computer courses over the next two or three years. I am willing to spend up to about £1,500 on hardware and £400 on software. I must be able to program in UCSD Pascal, structured BASIC and assembly language. I am also interested in Lisp - what machine would you recommend? Also, how does the BBC's Pascal-T to UCSD Pascal?

Dr. Barbara Blyth

A BBC Model B with two disk drives and printer would be a good choice and will hold your budget, but wouldn't quite meet your specifications. BBC Basic offers programming in the form of REPORT, LISTS, loops and files and powerful procedures in the form of a 1500 character built-in for Basic interpreter.

We haven't come up with anyone offering UCSD Pascal for the BBC yet. BBC's Pascal-T is a Pascal subset in ROM, and doesn't support records, sets or files. It compiles down to translated-interpreter code, and if it sounds like Fortran it's not surprising, as this Pascal compiler was written in Fortran.

Acornsoft's 5 Pascal is also a subset, compiling down to 6502 machine code, rather than the UCSD P-system. It is not yet available in the time of writing. However, Acornsoft's Lisp is available at £14.95 for software, and £29.95 for the diskettes.

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DRIVE SWAP

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A. G. G. G. G. G.

We have been (possibly) approached to find that disk drive.

From other companies have worked successfully with our BBC Micro. Drives that have been used with a Maxion and with a Pan (using a Commodore disk system) were able to be plugged straight into the BBC disk carrier and used. All the drives used were 4040s needed, and it may be that your drives are the same. Trying to use the 1MBits bus would save you down a very non-standard road. If your drives don't work, then remember the drives are getting cheaper all the time, so you may soon be able to afford them.

SCROLL INFO SOURCES

I have a 48K Spectrum on which I'm writing an arcade-style game, and am after getting continuous slide-way scrolling such as in *KnightRider* and a constant background sound. How do I achieve these effects?

Also, could you recommend some books on programming the Spectrum which include keyboard graphics, sound and Machine code?

Andrew Parsons, Brighton

A book would probably be the best source for finding the information you require, as you need a machine code routine which covers the screen data sheet. We suggest you buy a book called *Learning Z80* from your ZX Spectrum by Dave Jones (published by Interface), priced £7.95. This contains all the information you should need to get the effects you require.

RAMPANT GRIZZLY CURE

I have a problem with any copy of *Imagae's* *At* (adventure) game.

When I tap out something the keyboard the bear character hits a sound off its ears and goes starting around the screen. Can you help me?

P. Hunter, Kent

It sounds as if you either have a bad copy (if the rest of the ZX Spectrum works normally) or you are affected by the 'Wired' Syndrome' or Model 3 Syndrome, the EAR socket (the 4 of the keyboard type) is now Binary 3 the Machine Code and Two, it was Binary 0.

This crash-up of the keyboard checking routine changes the effect you describe. Send the program back as both cases will go in up-to-date copy which should work on all models.

FINDING FUNCTIONS/ MODEM CHOICE

On the ZX Spectrum there is no scroll function neither is there any 'line' or 'clear', so on the ZX81. Can you give me the Spectrum equivalent? Will this allow me to use many ZX81 programs on my ZX Spectrum? Also, could you tell me how to use a modem on a Spectrum, and how much would it cost?

Al Sarge, Essex

The Spectrum equivalent of SCROLL is HANG (see page 76) There is no fast or slow mode on the Spectrum, it is always fast in comparison with the ZX81. Simply quote three statements when you are ordering from ZX81 in

Spectrum Mode.

As the Spectrum has no serial port you will need an RS232C interface in order to use a modem. To allow Spectrum users the facility to access Microsoft Personal, Pison has produced the VTX5080 which is software, modem and software on ROM all in one unit and costs £70.00.

If you wish to make other decisions, such as our CAME, then the Micro Menu interface is available, priced £10.50. With regard to software for communications using the Micro Menu interface, we printed a program called Spectrum in the March '84 issue of Computer January 1984 Software has two pro-

grams to run with the same interface and will give software plus interface at £35.50.

Using the Micro Menu interface, any conveniently available modem can be used. As yet, we have produced the software to allow the Pison VTX, so be sure order in a 1200 half duplex modem (also on ROM) or in a 1200/75 baud modem for Personal in computer boards like our own CAME.

Micro Menu,
230 Colchester Road
London N1 1EN
Tel: 01-637 3037

1984 Software,
138 Alford Drive
Stroud, Kent

ACCOUNTING FOR TASTE?

I have a 48K ZX Spectrum could you suggest a program for invoicing?

J. Stevens, Yorkshire

I am a 48K Spectrum owner; could you please tell me: How could help me keep a daily account, with up to 100 entries for a whole year, and then work out the total loss/profit?

Also, could I subscribe to *Micro Menu* - my choice of the pages which can be accessed free of charge?

C. D. Moore, Middlefield

Your number of entries (500 a day) is quite high, but *Micro Menu*, like some of the other programs, will be able to provide a suitable program. The data can be stored on tape or disk, but disks are more expensive to store.

To subscribe to *Micro Menu* you must first obtain an adapter like their VTX5080 in which you can add a Personal. This costs approx £90. You then have to have a suitable front to take the adapter by British Telecom, and pay annual charges for the modem and the telephone line at £7

and a three-monthly subscription charge to Microsoft for access Personal and Microsoft. The price change comes on top of this. Most of the pages are free, and there is plenty of warning before you pay for a page.

Tomahawk,

41 Keston House

Franklin Road

Brighthelm Kent

Kemp, 45A Wood Hill

London N10 3PN

Halsbury, 10 Parkway

Brighton Park

London NW11 3AA

Micro Menu, PO Box 17

Brighton, Sussex

Book 11/1/83

MONOROOM

I have a ZX Spectrum, which I use with my colour TV, but I struggle (and it's a long, slow white display). What's wrong?

Jonathan Comp, Essex

The ZX Spectrum needs time to warm like any other device, by adjusting the TV control after it has been on for about half an hour.

GETTING TO DATA FASTER

Could you explain how a Microdrive and interface would make a difference to using a database (as opposed to just using a Spectrum 48K and cassette system)? I know that a Microdrive can hold just under 100K, it is usually 48K (or under) (can be held on RAM, I don't quote me any advantages).

Eric Brown, London

The single advantage to speed databases need to access information quickly. Entering a tape from beginning to end can take a few minutes, but any information on a Microdrive can be found and loaded in 30 seconds.

In any database the information is held in files which on tape or Microdrive can be up to 15K long. Only the section of the file required at the time is loaded onto the ZX Spectrum (as you say, a maximum of 48K). The sections need to be swapped on the fastest speed possible, hence the improvement by using the Microdrive. Files can also be opened much quicker and more using routines

The BBC Micro can now give your children a private education.

The BBC Microcomputer now accounts for 80% of the computers being ordered under the current DSO1 Primary School Scheme.

It's also the computer which a rapidly increasing number of people are choosing for their homes.

One of the reasons for its success is that it makes learning highly entertaining for everybody from children who are getting to grips with the alphabet, to adults who want a gentle but intensive introduction to the complex world of computing.

Now, there's a substantial new catalogue of educational programs specially for the BBC Microcomputer.

It has been developed by Acornsoft, the software division of Acorn Computers who make the BBC Micro.

Make faces without getting scolded.

With the new **FaceMaker** program, your children can make over a million faces. It's like an artist's kit, allowing them to depict anyone they want. They start by choosing the eyes. Then they can choose the mouth, the ears, the nose, the hair outline and the hairstyle.

And if they really fancy dressing up, they can add earrings and hats.

In doing all this, they learn to read and spell, as well as developing their powers of description.

The money program, two parts for the price of one.

Mr T is an engaging little figure in a tin who can teach your children all the complexities of our money system.

His **Money Box** program has two games, each of which can be played at different levels.

In **Money Match**, the challenge is to collect a set of coins, matching them according to shape, size and value.

In **Money Box**, you can give your child and Mr T a helping hand to get all the coins on the screen into the box. (It's always difficult, because the coins on the screen are based on the small change you have to handle)

A chance to teach the Micro a thing or two.
With the **Animal Vegetable Mineral** program, the children can get the computer guessing.

They think of an object. The BBC Micro has to decide what it is.

If it doesn't come up with the answer, the children can keep giving it hints.

In doing so, they are encouraged to question the difference between such things as crocodiles and alligators, or whether oil is vegetable or mineral.

The program also encourages them to consult refer-



ence books so that they can ask the computer increasingly tough questions.

Questions on Julius Caesar from J. Julius Norwich.

Julius Julius Norwich's **History Quiz** is one of the new BBC Micro Grandmaster quiz series which also covers theatre, crime and detection, music, science fiction and royalty.

On the history front, there are 100 hours' testing questions, covering all aspects of British history from Julius Caesar to Margaret Thatcher.

And to increase the educational value, Mr Norwich has posed the questions from angles which will give a broader understanding of events.

For the full catalogue, clip the coupon.

There are thirty more new BBC Micro programs in Acornsoft's new catalogue.

For a free copy, complete the coupon, or telephone 0932-79400. Or ask your local BBC Micro dealer.

If you've not yet a BBC Micro owner, you can get full details of the computer at the same time.

To Acornsoft, via Nicker Marketing, Herringwood Lane, Weymouth, Dorset DT9 2BL. Please send me the new Acornsoft catalogue "The Home With The BBC Microcomputer"

I would also like details of the BBC Micro

Name _____

Address _____

Postcode _____



ACORNSOFT

CUSTOM CASSETTE

I understand that it is possible to make your own leads to use an ordinary tape recorder with the Commodore computer; is the same thing possible with the new Atari, and if so, how?

C.T. Price, Apts.

The 410 cassette recorder is not just any old recorder with an expensive lead hanging out—apart from the fact that it has a two-track head, it is also modified internally. The Atari computer record data using a method known as Frequency Shift Keying, so the Atari error rate the required sound frequencies and sends them out

to the recorder and these frequencies are sent out in a very fine waveform. The 410 receives the signals and records them on tape.

This may seem a little like my other computer's recording method, but the system above slightly when the data is sent from the 410 to the computer. The 410 listens to the tape

and interprets the frequencies that were recorded onto the tape, either high or low frequencies. After listening to the sounds, the 410 sends out an electrical current to the computer, which is either zero voltage for a binary zero or 5 volts for binary 1.

No other commercial tape recorder will have the same accuracy installed. Commercial tape recorders are only able to send out sound frequencies and not the straight voltage required by the Atari, an advantage to this is a more reliable lead.

Adapters are available to produce the circuitry inside the 410 but we have only from those advertised in the US. You could buy one from the UK, but by the time you have paid for it and shipped a return you may as well have bought the 410 or 1010 recorder.

Katellady is such a simple-minded consideration, that we think paying the extra is probably worth it.



800 in the family—the Atari 800 is able to use VCS peripherals.

JOYSTICK DIVISION?

Can the Atari 800 take the Atari VCS video games and joystick?

Steve Adams, Herts., Atari
The Atari 800 will accept any of the joysticks in addition that are available for the VCS machine. It will not, however, be able to use the cartridge. The VCS and 800 use different processors, and apart from anything else, the physical size of the things is too big for the 800.

DRAGON

WHICH IS BEST DOS?

I run both Dragon and Commodore 64 systems now. I hear that the Dragon disk system will run DOS and Plus, and that these have advantages over CP/M and the Commodore operating system I use now. Is this so? (If principal use is for a small business.)

Graham Smith, Ipswich

Plus and DOS do have advantages over CP/M, largely due to the fact that they were designed later and take advantage of advances in software technology. However, CP/M has one enormous advantage over both these operating systems—a few years around the world that there are literally hundreds of application programs which will run under it. A comparison of Wordstar and dBase II will cope with the word-processing and file handling demands of a small business, but there are plenty of other packages to choose from. The choice for users of Plus and DOS is more likely to be more limited.

DOUBLE DRIVE COSTS

I am interested in purchasing a Dragon disk drive. How much would a double disk drive cost, and what makes are available?

Also, what is the cheapest graphics printer on the market for the Dragon?

Stephen Roberts

Dragon Drive's disk drives cost £175 for a single drive and £350 for a dual. An alternative

option is the Quantum drive which works with the Debiton systems (cost £200 for a single drive and £375 for a dual). The two systems are comparable in terms of disk capacity, but the Debiton system is more user-friendly and versatile than Dragon Drive's disk extensions to the Marantz disk supplied.

As disk drives for the Dragon are a relatively new product, disk-based software

is fairly scarce at the moment, but this situation is likely to change rapidly. The cheapest graphics printer for the Dragon currently available is the MCP 60 colour printer (this offers low colour printing using standard halftone pens, and costs £149.95). All the more sophisticated models should be available from your local Dragon dealer.

The quality of print is quite reasonable.

MEMORY ADDITIONS

Can you add RAM chips to a circuit board via the Z801 card edge board to a Dragon 31?

Could you tell me how to add it to the existing Dragon memory? Also, is there a compiler for the Dragon 31?

Andrew Wilson, Essex

It is possible to add extra memory to the Dragon via the cartridge socket, as all the necessary address, data and R/W lines are brought out at the connector. The cartridge socket connections are exactly the same as those in the Tandy Colour Computer and are

described in the Colour Computer Technical Reference Manual (available from Tandy at 750) 48 and 148. RAM packs for the Dragon are also advertised by Soft Shop, priced £24.95 and £44.95 respectively.

One word of warning—top extra RAM attached to the cartridge port will not increase the amount of memory available for these programs, as it is not contiguous with the basic program area. It will only be useful for data storage and machine code storage.

The Spring Basic compiler is an integral subset of Dragon

Basic, and it is claimed that programs written for it will run 5-10 times faster than the interpreted equivalent programs. It costs £24.95 and is available from Data Software.

Other software also makes a Pascal compiler, called Pasa Pascal, worth looking at.

Soft Shop,

66 Colindale Avenue,

Saltchips-on-Town,

Northwood, Middlesex TW20 2NU.

Data Software,

Altrincham Parade,

Widnes, Greater Merseyside,

Area 0527 1521.

COLOURJET

7 COLOUR INK JET PRINTER

Logic seeking in
dot address mode

£499 + VAT

With Centronics parallel interface
and free BBC Micro dump listing.
Also prints overhead transparencies.

Options available:

- Ballbed POSTD interface
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- Apple II interface
- IBM PC dump

Specifications

640 dots/inch, 1200 dots/line @ 60

64 dots/inch touch scan.

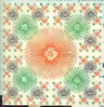
Prints lined rollpaper with single sheet
feed A4.

30cps in full colour.

Ink cartridges, 4 million character life.



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DISPLAY IS DIS-ARRAYED

I own an Oric 1, and am having difficulty tuning it in to a 24 inch Pye colour TV.

There are two problems: matter how much I fiddle with fine tuning, colour and contrast controls, I cannot get a clear picture free from interference plus, every second the video produces screen jump. I have tried two other TV sets with no improvement.

The Oric 1 has two outputs for video display via a television and the other to a monitor. An RGB (red, green, blue) DIN socket allows users to use a rock-steady colour picture as contrast a suitable monitor to their Oric 1, alternatively, you could try a composite video signal fed into the UHF modulator, and a lead is provided with the Oric 1 to connect the modulator output to a UHF receiver. A set tuned to channel 36 will normally give a clear picture, but adjustments can be made using the control screws.

Two small holes on the base of the Oric 1 case give access to these screws. The colour screw controls the hue on the signal fed into the TV modulator, while the focus screw controls colour contrast by adjusting the frequency of the colour subcarrier. Many TVs give a good picture without these screws being touched, but adjustments can be necessary with some sets. To carry out such adjustments, first set up a colour picture on the Oric 1. Next, using a fine screwdriver, adjust the silver screw until the picture is properly centred on the screen. Finally, turn the focus screw until a satisfactory colour contrast is achieved.

The interference to the display caused by sound components should disappear once the display is properly centred. If not, the Oric itself could be faulty, and you should seek help from your dealer.

MANUAL UNMANGLED

I'd like to know whether to issue a corrected printing. I've done of the Oric user manual (with full 400 instruction code listing), but, could you tell me where I can obtain the new copy on ROM, and how much will it cost? Is there a book on machine code programming on the Oric?

L. Lomas, Clevedon
Oric Products International has already issued a number of corrections to the Oric 1 User Manual, but a new edition will not be produced. There were a number of typographical errors in the guide, and

many Oric owners found the details on advanced use of the machine easily lacking.

However, the new Oric manual is eight years ahead of both its style and content. Written by Ian Adams, and published by Paul the Oric, its approach is much less code-oriented and its 13 chapters contain fascinating facts on ROM entry points, system variables, use of the VISA chip and such more.

The new ROM is at present only obtainable by buying an Amstrad. However, Oric does have plans for an upgrade service whereby Oric 1 owners may use an Oric machine to get a new keyboard and ROM.



The Oric 1 user manual (Oric Products International) is a user's manual.

DOS COMMANDS REVEALED...

Could you explain a few of the separate Oric disk operating system commands, and how (if possible), could I use them on a Hard?

Philip Peter, Newcastle

The 13 disk operating system commands of the Oric 1 are designed to be used by release very quickly. The disk operating system provides a selection of 13 commands, summarized below:

- BACKUP copies a disk on disk to a file on disk.
- DIR displays the directory of a disk.
- DIRSET sets the default drive number.
- FORMAT formats and initializes a disk.
- INITIALS sets the drive disk.
- PRINT changes the print command file.
- RECALL recalls a disk entry from

- disk.
- SET sets a file to disk.
- SETUP sets a disk entry on disk.
- UNRECALL recalls the disk configuration.

The commands DIR and DIRSET are the most basic equivalents of the commands DIR and DIRSET respectively. Similarly, the BACK and RECALL commands are the same as the Oric 1 commands for saving and saving a disk entry.

The PRINT command is used to set the Oric 1 to the Oric 1's own command file. This part contains commands from which recall the disks on the Oric 1. The Oric 1, and provide many new features. Therefore the DOS instructions above will be available from Basic.

final. Earlier reports from the computer that this would be around £20 have subsequently been denied, apparently Oric is currently finalizing plans for the upgrade facility, and the upgrade will depend on the amount of new materials. It is expected that the service will be available from the early summer of this year.

We have the Oric 1 manual, my books, especially aimed at machine-code programming on the Oric 1, through John Programming the Oric 1 (published by Sybex) is a good general-purpose manual, and available from most good computer bookshops.

SOFTWARE SOURCES SEARCH

Could you tell me if the number of Oric software companies will increase? Also, could you let me know what books are available for the Oric.

Gary Fisher, Banbridge

Although not much software has been produced specifically for the Oric 1, many software houses have announced their intention to produce software for the Oric 1, the largest Oric-only software houses, and details of its products can be found by writing to the address below.

A number of publishers have released books on the Oric 1. A few notable titles are: *The Oric 1 Companion*, by Bob Mangan (published by Lucas at £1.95), *The Oric 1 and How to Use It* (More from £1), by Ian Sutherland (published by Gemma at £2.95), *Basic Programming for the Oric 1*, by Ian Stewart and Robin Jones (published by Stone at £1.95), and *The Oric Handbook*, by Peter Loompton and Peter Robinson (published by Gemma at £2.95).

All of the books mentioned here should be available from good bookshops.

Timothy,

Unit 10

London Park

Newcastle Rd

Coventry CV3 5PP

Free software, only £225.

If you own a BBC Micro, you can now download, store and run programs (transmitted free of charge via Ceefax) with the new Teletext Adaptor, priced £225 inc. VAT.

These programs make up the BBC Telesoftware Service (which is intended to become a computer software broadcasting channel) and although primarily educational, they will soon develop into general interest and business areas.

And, as they will change every two weeks, you'll soon be able to build up a vast bank of top quality software without ever having to put your hand in your pocket.

But that's not all the adaptor has to offer. It also enables you to gain access to the normal teletext store of data. This is different to simply having a teletext TV because it means

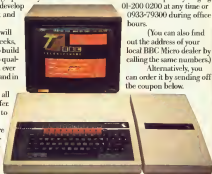
this data can now be transferred to memory and manipulated in any way you wish (making graphs or bar charts for instance).

It's yet another development in our programme to help you fully realise your BBC Micro's potential.

If you're a credit card holder you can order the Teletext Adaptor by ringing 01-200 0200 at any time or 0933-79300 during office hours.

(You can also find out the address of your local BBC Micro dealer by calling the same numbers.)

Alternatively, you can order it by sending off the coupon below.



Technical Specifications

Access to Teletext and Telesoftware Services broadcast on UHF channels E20 to E69

Speed of max. data capture rate approx. 128k baud.

5 lines of Teletext per frame.)

Height 300mm, Width 280mm, Depth 120mm, Weight 2kg.

Colour: BBC Computer colours.

Construction: Moulded top and bottom to match BBC

computer profile. ABS injection moulded plastic.

Controls: Four tuning potentiometers on rear panel.

Blank on/off switch on rear panel.

Power on 240v, 50/60Hz, 15w.

Operating Temperature: 10° to 35°C.

Designed and manufactured to comply with BS455 Class 1 standard.

To: BBC Microcomputers, c/o Vector Marketing,
Deception Estate, Welthamplough, Northants NN6 2PH.
Please send me _____ BBC Teletext Adaptor at £225
each, inc. VAT and delivery. I enclose P/B cheque payable to
Readers A/C, Acorn Computers Ltd, or charge my credit card.

Card Number _____

Acorn Personal Purchase Order

Name _____

Address _____

Postcode _____

Signature _____

Approved by 001-000 000 to 20-000000

The BBC Microcomputer System.

Designed, produced and distributed by Acorn Computers Limited.

ZODIAC

COMMODORE

64

An arcade adventure of awesome proportions. The evil powers of hell have scattered the signs of ZODIAC in the 400 chambers of THE ABYSS. You have to find and recover these magical creations and fight all the way by annihilating all those who stand in your way.

J.S.

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ANIROG

King Features 1988

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UPGRADE TO WHERE?

APPLE! 3

I have had an Apple II for four years, and have been very pleased with it. I want to upgrade to another Apple, as I'm impressed with the reliability and software available. I have thought about a IIe and III. What do you think?

Philippine Tava

Of the three newer machines from Apple, only the IIe seems to have been a success. The Apple III got rather a bad reputation here, didn't catch the imagination of the independent software companies, nor hold its own among members. We suspect the Apple III is often used simply to emulate the Apple II, which is rather pointless.

Prices of the IIe seem to be falling again, and we have found it down to £495 if it is correct to fall it may be a better bet, because of the software and hardware support, than the BBC II. However, it's difficult to see why you'd want to upgrade.

The IIGx got the most critical reviews when it was first launched - reviews, except in the press it was generally priced around £2,000, which is now higher than Apple is offering. The price has dropped a lot, but it can't drop too much too quickly because of the lack of credibility and confidence that such a change of price engenders.

We have not used the Lisa extensively, but have used the Xerox Star system based on a similar idea, and was in fact available quite a bit before the Lisa. The machine and software is very impressive, and part of current cheaper models well on the way (except the price).

Apple seem to have gone directly got round the problem by launching a new series, the Macintosh. This is a new design Lisa, at the far more expensive and unstable price of around £1,700.

We covered the Macintosh in the April issue of Computer Abuse (page 18), and suspect that this machine is probably your best bet.

RS232 TRANSFER CONNECTIONS



RS232C software transfer is a really fast operation

How can I transfer files between an Osborne portable, IBM PC, and a T1090A, via a RS232C?

VR Jones, Brighton

Of your three machines, communication to the T1090A is likely to present the most problems. The transfer of files, both programs and data, is a daily business, more between quite different character machines. Obviously trouble may well occur if you try to translate a program to a computer with an operating system in which it was not designed to run.

However, data can be successfully communicated to virtually any computer. If your IBM PC has the CP/M operating system, you can get quite a way using the provided or third party utilities. With these it is possible to re-assign drives to such a way that data can be sent via the serial connector to server.

This is an extension of the ability that CP/M normally used. In transferring a group of saved files from one disk to another on the same machine. If you have not yet recognized the full range of facilities of these two wide ranging programs, then this would be a worthwhile

Even so, CP/M does not utilize its limitations and it can be re-

written in the slot of programs it can transfer. In addition, it is not very good at coping with groups of files. These problems are overcome by a transfer of programs that can be performed specifically in-file transfer. A simple standard is the package ESTAM, which is available from many good dealers. It is very simple to use as both the computers have ESTAM installed (one is set to receive files on a named disk and the other is set to transmit a named file or wild card group of files. Forwarding such things as hard news and party are set to search there will be no problems).

The main draw-back though is that both machines have to have ESTAM installed. ESTAM has to be purchased for each machine at a cost of

reasonable programming which may well be beyond the average user. The normal way is to get the dealer who has already done the work and has a system available for the machines you want to use. A more sophisticated package without this need to reassemble and possessing other additional facilities, is the package Supplier Link from Suppliers Systems Communications. The T1090A may well require a small specially written program, but to the first contact by Trues Instruments that solves.

Supplies Systems,

12 Park Avenue,
Wood Lane IG1 4JF
Tel 01 594 8820

Trues Instruments,

Tel 0253 67434

MEMORY EXPANSION?

DRAGON 3

Which is the best hardware expansion for under £200?

Is there a disk drive for the Dragon? Is there a UK memory expansion, and optional CP/M?

Which is the best printer for the Dragon?

Which is the best word-processor under £50?

Philippine Tava

Nevertheless, the term "business computers" were applied to many models to mean either a dedicated machine with two floppy disk drives, with disk data running CP/M, or a 16-bit-based machine with two floppy disk drives, IBM International's BMM, running under MS-DOS. Inevitably, some sort of system are used with hard disk drives to overcome the data storage limitation.

Let's try to help you that you will be able to buy neither of these configurations for under £200, so we are looking at some computers with the capability to be used as business machines. Without doubt, the best value for money should be the recently announced Sinclair QL at £199 - although at the moment the only software available for it is the fact file package which comes with the machine.

As regards the printer, the QL has two RS232C ports, so you choose of printer in your opinion. The reason that disk drives are common in business machines is that because floppy disk drives are often of limited capacity (although this is improving by leaps and bounds), and that drives enable you to have your programs on one disk and data files on the other, and second, to allow the backing of impor-

tant data files.

Some disk operating systems (such as Acorn's DFS) allow you to back up files with only one drive, but CP/M or MP using require a dual drive for disk operation. There is a disk drive for the Dragon which is available from Dragon Data, also a disk upgrade on a per-exchange basis. CP/M is not available, as this requires a 8088 compatible processor (the Dragon uses the 8085).

You can use any printer with a Commodore interface with the Dragon, Epson printers are considered for reliability and other reasons (but for money). As regards word processors for the Dragon, Teletext is a highly popular of its own £29.95 and is available from Mercury.

Microsoft,

41 Turn Road,
St Austell Cornwall

**HEARTH DRAWING PROGRAM**

A comprehensive drawing program for the BBC Micro. It allows you to draw a house on the screen and then print it out on a dot-matrix printer. The program is available on cassette tape or diskette. Price £19.95. Tel: 011-266 2222.

**Teletext Display**

A teletext display program for the BBC Micro. It allows you to view teletext pages on the screen and print them out on a dot-matrix printer. The program is available on cassette tape or diskette. Price £19.95. Tel: 011-266 2222.

**HEARTH**

A drawing program for the BBC Micro. It allows you to draw a house on the screen and print it out on a dot-matrix printer. The program is available on cassette tape or diskette. Price £19.95. Tel: 011-266 2222.

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The program program, user manuals, software and hardware are available in cassette, diskette, floppy diskette and printed form. Contact Dataopen for details.

PRICE £25.00

The program program, user manuals, software and hardware are available in cassette, diskette, floppy diskette and printed form. Contact Dataopen for details.

For more information, contact Dataopen at: Dept 4, Dataopen/Microtechnology Ltd, Kingsley Road, Ipswich, Suffolk, IP2 3JL.



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FIG. 1

- INP 1 —change input or output device
- INQ —find out its device
- CP —compare input and output files
- CDP —copy files
- DEL —delete output files
- DIR —list any directory
- DIS —list files in a directory
- LSP —print files in a directory
- PR —print any directory
- PRC —print any directory
- PRD —print output volume translations
- PRF —print files in a directory
- PSL —remove volume from scratch protection
- PSM —remove files
- PSY —remove files from scratch protection
- QCP —query output volume
- QCD —query files with command
- SET —set old and new password
- WR —verify any output volume
- WRV —verify by file(s)

protected, and is not a full protected protection system. The two commands PSL and QCD can support a disk, and the direct input from a disk offers simple direct copying.

BCS

BCS (Business Operating System) is a sophisticated, multi-user and network operating system with many facilities. It would be impossible to cover to any depth all the options provided (the company we might succeed in doing that) in a short article. The system (like many others) has logical and physical addresses, a summary of these used is given in Fig. 2.

BCS has many commands but in general the system is menu driven — command it goes and you can also opt out to an old menu screen of prompts which may require more commands or simply the number of which ever suits you with the command to act upon. A list of commands is given in Fig. 3.

Some of the 'menu' commands have a range of sub-commands, the B* file utility is one of these. It has a total of 18 options, we have listed some of these of more interest to casual user of the system.

FIG. 2

- B* without base
- B* —name characters after volume & create to access
- B* —volume base speeds
- B* —partition files from user number &
- B* —volume base operation
- B* —volume base of location (B* and base on B)
- B* —convert program volume name
- B* —do volume destination device
- B* —type of file as output device
- B* —page from after device
- B* —put copy after finding string
- B* —read with copy use file
- B* —read copy after finding strings
- B* —append links to volume
- B* —append links to volume name
- B* —verify the copy
- B* —write copy read only files
- B* —write high order bit
- B* read only —old info for volume utility
- B* write info —new program (B* type) volume utility

[B*] info —same options (B* type) volume utility

FIG. 3

Number	Function
LOGICAL —	
000	console
101	Logical unit — printer
102	Serial information — paper tape punch
103	Serial information — paper tape reader
104	—
105	Serial information — console out
106	LSF
107	Console (Console Day Table)
108	Printer
109	Paper tape punch
110	Paper tape reader
111	New console
112	User defined console
113	User file device
114	User punch number 1
115	User punch number 2
116	User reader number 1
117	User reader number 2

FILE ASSIGNMENT

CON = B* 00001 00111 01020

LSI = 001 00101 00111 00101

PUR = 111 00111 00101 00101

PRR = 111 00111 00101 00101

QPR — Display of files on logged drive

QPRB — Display of files on drive B

QPRC — Display of files on drive C

QPRD — Display of files on drive D

QPRF — Display of files on drive F

QPRG — Display of files on drive G

QPRH — Display of files on drive H

QPRI — Display of files on drive I

QPRJ — Display of files on drive J

QPRK — Display of files on drive K

QPLR — Display of files on drive L

QPLS — Display of files on drive M

QPLT — Display of files on drive N

QPLU — Display of files on drive O

QPLV — Display of files on drive P

QPLW — Display of files on drive Q

QPLX — Display of files on drive R

QPLY — Display of files on drive S

QPLZ — Display of files on drive T

QPL1 — Display of files on drive U

QPL2 — Display of files on drive V

QPL3 — Display of files on drive W

QPL4 — Display of files on drive X

QPL5 — Display of files on drive Y

QPL6 — Display of files on drive Z

QPL7 — Display of files on drive [

QPL8 — Display of files on drive \

QPL9 — Display of files on drive]

QPL0 — Display of files on drive ^

QPL1 — Display of files on drive _

QPL2 — Display of files on drive `

QPL3 — Display of files on drive ~

QPL4 — Display of files on drive {

QPL5 — Display of files on drive |

QPL6 — Display of files on drive }

QPL7 — Display of files on drive ~

QPL8 — Display of files on drive ^

QPL9 — Display of files on drive _

QPL0 — Display of files on drive `

QPL1 — Display of files on drive ~

QPL2 — Display of files on drive {

QPL3 — Display of files on drive |

QPL4 — Display of files on drive }

QPL5 — Display of files on drive ~

QPL6 — Display of files on drive ^

QPL7 — Display of files on drive _

QPL8 — Display of files on drive `

QPL9 — Display of files on drive ~

Fig. 1 (left) shows a summary of BCS utilities, Fig. 2 (left) contains the main BCS commands, Fig. 3 (left) shows the BCS sub-commands, Fig. 4 (left) shows CP/R 3.4 command functions and assignments.

One of the major facilities of BCS is the ability within the operating system to produce a screen-based menu. This makes the design of a menu system very easy.

CP/R 3.4 OPERATING SYSTEM

The single user single tasking version from Digital Research have many useful options. DR has the same basic effect across the whole range, however in most versions a command may have more than one facility, CP/R 3.4 for example, appends this to the powerful CP (P.L.I.) option. A B-

Fig. 3 (left) contains a list of CP options.

COPY FILE -- copies CP/Maplets to a new disk -- menu-driven DATE -- shows display date (see comment) DEVICE -- the development module for CP/M 3 facility for analyzing logical and physical device-related software configurations.		
Inquest Device: CONSOLE CONSOLE ALUIN ALUOUT LIST	Device Type: CONSOLE INPUT CONSOLE OUTPUT ALU INPUT (P/P) T ALU INPUT (P/P) F LIST OUTPUT	Device Assigned Assignment: KEYBOARD SCREEN NULL PRINTER
DEVICE -- displays change system logical and physical assignments DEVICE NAMES -- displays physical devices with their associated DEVICE VALUES -- displays current logical assignments DEVICE obj -- displays the addresses of the nonphysical devices DEVICE log -- displays the assignment of the named logical device DEVICE log = on (optional) -- prints device DEVICE log = off -- de-fines device DEVICE obj (not on) -- sets attributes DEVICE PAGE -- DISPLAY -- n -- display and set controller log		
Device options are: BOI (sets BOI/OFF printer), PBOOK (turns off the printer) and load vars from BOI (PBO)		
DWRITE -- The same effect as DIR but also displays files with the DYS attribute		
DIR and DWRITE have in CP/M 3.0 some extra options if used with the future option DIR [n] attribute (optional)		
DP options ATT -- displays user attributes P1-P4 BANE -- stop key for data and time stamping if set BR -- displays file with only option sets an all-logged driver BRVE -- (A-P) P -- sets an specified range of drives sets no drive if --Displays files containing the attributes paper from lead P -- displays a P or attribute (directory information control order, file name, size, attributes, password) marks time stamps and the disk label --display in flow before a table formatting --display drives and user numbers to be deleted or used. HCPAGE -- continued over of listing HDOFF -- omitted display PD -- stops to copy files not to load only PW -- displays only file name (lead)/size SIZE -- displays file name and size. SYS -- displays only file name sys. USER -- ALL -- searches all user numbers. USER = n -- searches user number n USER = (A-P) [S] -- searches all user numbers specified		

Fig. 2 (continued) contains a list of CP/M 3.0 commands.

The BSA command is executed by executing a screen option. GET	
HELP -- the help utility for the CP/M operating system works externally with facilities made your time help file INTRAP IP	
INTRAP -- relative directory for absolute prompting on CP/M 3.0 (optional). A/C or combine system and C or combine for relative flowery, and if the file is not entered include the password back on P/P -- to activate pass (option) PUT -- supports get: allowing control to print output to a disk file RENAME -- drive supported by a name driver system (just RECALL is entered) SET -- this option controls most of the attributes setting in CP/M 3.0. After the following option: SET (option) SET O (optional) SET attribute (optional)	
Set Option: D/R -- DIR attribute S/R -- S/O attribute P/R -- read only F/R -- read/ write -- attribute off B/attribute -- OFF ARCHIVE -- ON P1 -- Q/OFF P2 -- Q/OFF P3 -- Q/OFF P4 -- Q/OFF	
SET (NAME) -- disk label SET (PASSWORD) -- pass SET (PROTECT) -- no set SET (table) (PASSWORD) -- pass	-- disk label -- password/protect a disk label -- enable/disable protection password of protection on file(s) the disk must be protected and protected and enabled before file can be used
SET drive(s) (P/P/O/T/... mode) -- indicates mode file powers, these can be read, write, delete or none	
Two of the following file and date stamping modes can be assigned SET (DATE) -- ON SET (P/C) -- ON SET (P/T) -- ON SET (S)	
SHOW SHOW A SHOW [A,P]	The control details each order and the control display of system messages. -- shows log file of file location of DATE and date a few of them -- displays logged drives, read/ write a command to use left -- displays label of all attributes -- displays some user-related files -- displays user directory set files -- displays other system files
SHOW [A,P]	-- displays label of all attributes
SHOW [S,P]	-- displays some user-related files
SHOW (P)	-- displays user directory set files
SHOW (P/N)	-- displays other system files

connected story by replacing an attribute. For example, the BPAT command of CP/M 3.0 flag displayed and displayed upon by the contents of SET and the CP/M 3.0 CP/M 2.1 is changed to have four logical drives, which perform copy on read function -- the user can address. Each without worrying about the entire methodology. Fig. 4

In addition, there are 12 physical device, some of which will never be possible to reach all the necessary and complex driver systems for hardware con-

textual data required. Whether this be prior, several of the sites in 3.0. Therefore, the user can manage a part of drive, one logical and one physical and communicate with the development of products P/P, the Peripheral Interchange Program (which is in most installations), a only user used as a transfer form, as with copying disk, however, as its main complex, it can be used to copy more powerful users. It can send a file to address, transfer data from a device and convert it to a file, edit,



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series. A batch job is a file of DOS commands with the extension **.BAT** which is executed by typing in the file name minus the extension. The same commands will be described in the next series along with the other new MSDOS 3 commands.

P System

The screen on the **LI/MS-D** option of your own will concentrate on the various defaults for the Apple II as that is the machine that most people are likely to come across. The system is menu driven, and therefore as the commands that the option depend on given rather than the full command. On loading the system, the user is presented with a series of options. These are selected by pressing the first letter of the response option. If the Apple is not in a 40 column screen, there is only the first three 'P' lines to be hit. The options are summarized in Fig. 9.

The **P** list option covers all the commands to be added in the screen. The options available are contained in Fig. 10.

PCL

The Converter (PCL) like the Apple, is a simple machine with few operating system commands, a file has its own personalization not 'slots' in this case, but the IEEE 448 communication bus. All the system commands, **BACKUP**, **DTYPE**, **COPY**, **REBAR**, **RENAME** and **REFORMAT** will be covered in the conversion table next issue.

RENAME

The **RENAME** operating system **RENAME** has for a simple system many useful commands. It is especially unusual in having a help facility. Its address in the system page is '**RENAME**' to mark the start of the file and the shell debugger is '**RENAME**' and not 'R'. The option has a string of password protection features, which can protect whole disks and individual files. On formatting a disk, a user password can be assigned, if an individual file can be protected by the full command (if protected) by the command below:

```
format/r/r password/r  

The password is set by the ATIME command  

ATIME file (file,ACC = pass,UPD = pass, PROT = level)
```

Pack	Degree of protection
Full	Full access protection
All	WR, WRONLY, read, execute and write - total system
None	execute, read, execute and write
Write	read, execute and write
Read	read, and execute
Exec	execute only

The **BACKUP COPY DATE ON** option format **HELP**, **ALL**, **LIST** (**RENAME**) and **level** will be covered in the conversion table next month. Its address here are the commands given in Fig. 11.

SPAT

This is a complex and sophisticated operating system with many commands, most of which other people will never use. The majority of the commands have been summarized in the tables, however, there are quite a few extra options that do not fit so to the categories of the chart and some that do have extra options that need expanding upon.

Use this as a tree directory structure and the ability to **FREE** - send the output of one process to the input of another. The simple commands that will

Fig 9

BLANK (DOS)	→ blank disk (high frequency)
CHANGE	→ rename file or disk
DATE	→ display and enter date
EXTENDED DIRECTORY LIST	→ list file characteristics
GOTO	→ goto work file
REMOVE	→ locate disk (two-to-one unattended)
LAST DIRECTORY	→ simple directory listing
MOVE	→ produce dummy disk file
NEW	→ clear work file
PREFIX	→ change the full work file
QUIT	→ exit from file to extension
REMOVE	→ delete disk file
SAVE	→ create work file
TRANSFER	→ copy file (to be saving/printed)
WOLLAM	→ file extension assignments
WOWAT	→ name module of work file
WOWME	→ flag on work file/extension
WOWD	→ create and remove a disk directory
Yell	file name
CONSOLE	input/output device
Y2	SYSTEM
Y3	
Y4	DOS NAME
Y5	DOS NAME
Y6	PRINT
Y7	REMOVE
Y8	REMOVE
Y9	DOS NAME
Y10	DOS NAME
Y11	DOS NAME
Y12	DOS NAME

Fig 10

AUTO command	→ auto local or file load up
BLK file	→ listing of information on file
BACKUP (COPY)	→ toggle read file disk connectivity
CG file	→ create the file (creating file)
CLASS (COPY)	→ dump to printer of screen contents
EMERGE	→ display description of screen number
FORMS (MODE = n), SET (n)	→ forms set up
FREE (COPY)	→ disk free space map
LR	→ successful file
LIST file (COPY) (DIR NAME)	→ file a file screen (or printer)
REMOVE (COPY) = d	→ erase master drive
PROT (COPY) (LOOK)	→ use to change master password (see → allow to change master password, lock change master in unprotected area)
PULSE (type) (SYSTEM)	
ALL	→ total definition
ROUTE (copy = user = n)	→ input/output routing, also data for use of the two to their collective
CG = create	
FF = Printer	
RE = Keyboard	
RS = Read/Write	
RG = Read/Write	
SET (COPY) (WORD = n), BACK (n), PRNT (n), MODE = port setting	
OP	→ name 1232 off
WORD	→ number of file (bit)
BACK	→ GO-1400
STOP	→ step file 1 or 2
PRIORITY	1 = 1 - end 2 = even 3 = none
MODE	→ well on screen
RP (WRITE) = d	→ add/generate disk of
WP	→ end/generate off

be covered in the table in next month a host of Converter Accessory are **REAR**, **ROUTE**, **ROP**, **RM** and **RMU**. The rest are given in Fig. 12.

Fig. 11 (cont) lists P System commands Fig. 12 (linked) lists 125000 additional commands.

PROFESSIONAL

Fig. 18 (24M) gives a list of basic operating commands

Fig. 18

Set Time (day) (time)	→ set command or specified time	ECOM (date)	→ compare the information and differences between two entries
BCA (month)	→ print a calendar for a single month	ECOPY (day)	→ process (reconstruct) a description file
year	→ print a calendar for a single year (years 1-1999)	EMO	→ automatically for searching utility
BCAT (file)	→ display file contents	EMAP	→ search file for a specified string
BCD	→ display the user directory	EMUL	→ set process number in system and device files for printing
BCDD	→ change working directory to file	EMZ	→ directory file
BCWDD	→ [date] set working directory file	EMZL	
BCW		EMZLL	
+	→ begin new line	EMZML	→ table or treatment
^	→ begin new line	EMZMR	→ table manual
~	→ end of line	EMZMS	→ create directory
~	→ end of line	EMZM	→ copy a file
~	→ end of line	EMZ	→ control of table generation
~	→ end of line	EMZL	→ print names of working directory
~	→ end of line	EMZM	→ search utility with entry system
~	→ end of line	EMZML	→ search table from an English word
~	→ end of line	EMZM	→ set terminal port and options
~	→ end of line	EMZM	→ copy
~	→ end of line	EMZM	→ compare to compressed
~	→ end of line	EMZM	→ copy compressed source file in system file
~	→ end of line	EMZM	→ control with character, word and file system
~	→ end of line	EMZM	→ write in another terminal

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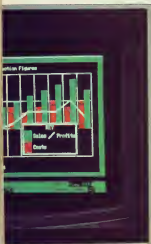
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New-Sinclair QL

There's no comparison chart, be



The Sinclair QL, the new computer. Not just a new Sinclair computer but a truly new sort of computer - and you'll like it exactly anywhere.

It's not just a bit better than the QL, or a bit cheaper than the QL - it's a computer that's very hard to compare with anything. Just check the features below - and if you don't agree, take up the challenge at the end of the advertisement.

If you do agree, there's only one version of what you can take - get yourself a Sinclair QL, at the earliest possible moment.

The Sinclair QL has 128K RAM. Big deal?

Several options offer 128K RAM or more - or almost 1M. What's the deal? Well, for December 1983 less than 100 of them - but 40% of the Sinclair sales cost over £2500!

The Sinclair QL offers you 128K RAM for under £400 - and an option for up to 640K. That's a lot of bytes for the price!

The Sinclair QL has a 32-bit processor. Who else?

Under £2750 nobody else! The new generation of business computers, such as the IBM PC, usually cost beginning to use 16-bit processors.

All years like the, the 16-bit 68000 family - widely regarded as the most powerful microprocessor available - will remain a luxury.

So with the Sinclair QL, the 12-bit Motorola 68008 is available for less than £400.

You can't believe that the QL will not become outdated. It's got architecture a future-proof.

12-bit processor architecture, 128K RAM, and GCOS combine to give the QL the performance of a micro-computer for the price of a micro.

Exclusive: new GCOS operating system

No competitor GCOS offers a new standard in operating systems for the 68000 family of processors and may well become the industry standard.

GCOS is a single-user multi-tasking, time-sharing system using Sinclair's new language BASIC as a command language.

Overall, it's a significant feature - a very powerful multi-tasking capability - the ability to run several programs individually and simultaneously. It can also display the results simultaneously in different portions of the screen. These are features not normally available on computers costing less than £2000.

Seven input/output ports

QL ROM Cartridge slot

2 x parallel ports 1 x RS232C



New professional keyboard

The QL keyboard is designed for fast word processing and programs.

It's a full-size DVORAK keyboard with 40 keys, including a space bar (left and right hand sets), five function keys, and four separate cursor controls - key action a positive and precise.

A non-tilted format: the keyboard protects the machine from dust (and coffee!) and is especially fine on angled keyboard mice. Comfortable, the computer keyboard is designed slightly at the back by small adjustable feet.



£399

...because there's no comparison!

Advanced new friendly language - Sinclair SuperBASIC

The new Sinclair SuperBASIC combines the familiarity of BASIC with a number of major developments which allow the QL to be programmed to be efficient.

Unlike conventional BASIC, its procedure facility allows events to be written in clearly-defined blocks, so readability allows new procedures to be added and old ones removed as easily as any program. The cost-effective procedure built into the ROM, and its efficient execution speed means that SuperBASIC does not get slower as programs get larger.



Two 100K microdrives built in

The Microdrive in the Sinclair QL is an optional upgrade to the popular and proven 100-Megabyte, but you increase capacity to at least 200 bytes each and a faster data transfer rate. Typical access speeds are 1.5 seconds, and loading is of up to 100 bytes per second. The Sinclair QL has two built-in microdrives. It requires a further upgrade can be connected.

Your Mark cartridges are supplied with the machine.

Included - superb professional software

The suite of four programs is written by those specialists for the QL and incorporates many major developments. All programs are full colour and data is transportable from one to another. (For example, figures can be transferred from spreadsheet to graphics for an instant visual presentation.)

Word-processing



Outlets of a new standard of excellence. QL Quill searches pages of text. It also scans the screen exactly what you key in and lets you edit exactly what you see on the screen.

A beginner can be using QL Quill for word processing within minutes.

QL Quill brings you all the features of a very advanced word processing package.

Spreadsheet



QL Account makes simultaneous calculations and 'what if' model calculations easier than they've ever been. Simple applications are presented including budget planning and cash flow analysis. QL Account allows you to enter rows, columns and cells by name, not just letters and numbers. Function keys can be assigned to change a number and carry out a complete 'what if' calculation with a single key stroke.

Business graphics



QL Graphs is a high resolution colour program using four or you probably won't refer to the manual. It handles anything from bars, shaded curves or heliographs to overlapping or stacked bars or pie charts. QL Graph does not require you to format your display before entering data. It handles Graphs and saving automatically or under your control. Text can be added or altered as easily as words.

Database manager



QL Address is a very powerful filing system which sets the standard. Using a large easy to use Sinclair QLASIC. It contains more of use for simple applications - such as card index - with huge power in a multi file data processor.

An easy-to-use labelling facility means that you don't have to use for your files to full name - a few letters are enough.

New - the Sinclair QLUB

The QLUB is the QL Users Bureau. Membership is open to all QL owners. For an annual fee of only £10, QLUB members receive one free update for each of the four programs supplied with the QL, and six free monthly newsletters. Sinclair has also made a number of arrangements for QLUB members to obtain software assistance on QL Quill, Account, Address or Graph by writing to them.

The Sinclair QL challenge

If you're already considering any other computer, post the coupon for a free by-mail comparison. We'll take a published comparison of the machine you're considering and we'll see how we compare. We'll give you the Sinclair QL figures, data by detail.

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KEEPING IT CLEAN

IF YOUR SYSTEM IS CRUNGED WITH GRIME AND GRIFFED WITH GRIND, WHAT'S AROUND TO HELP CLEAR IT OUT? WE FOUND OUT...

It is amazing how surprising a sparkling clean drive can be—just minutes before you first get it. A clean system can literally be less of a headache than a filthy one, however, the biggest advantage to be gained from a well-maintained drive, apart from peace of mind, is reliable data loading.

The most surprising part of our investigation concerned data recorder cleaners. The majority of those are quite understandably regarded by the same manufacturers who service the radio market, and the difference between these markets is significant: while the radio world places a great deal of emphasis on the tone head, the phonographic and cassette are more important in the computer world. If dirty, these two parts of the recorder can affect tape speed and prevent accurate data recording. A clean tone head wins no contest.

The cheapest form of data (cassette) recorder cleaner is the cloth-wiped cassette (CPC). These tend to get dirty very quickly and therefore need frequent replacement. There is also a danger that the cleaner action of rubbing previously collected dirt across the head will scratch it. With Scotch Vite®-made data-recorder head cleaner which comes with a small tube of cleaning fluid, Al (J) 99 (the VAT), it represents a reasonable compromise between the dry and wet aspects of cleaning. Presumably, if your cloth/cassette comes out before you run out of fluid you could buy just the cassette and save even more money.

A rather different approach to head cleaning is taken by Alltop (available from Three Marketing). It has a cassette disk cleaner in the form of a transparent cassette case, covered in a cloth tape, the cleaner has one of 500 pads onto which the unit sprays the special cleaning fluid supplied. A series of wags cause the tape head pad to systematically wipe off the debris. While we tested the Alltop cleaning system we found that it became dirty very quickly, therefore, if you are serious about keeping your data recorder clean, we'd recommend Alltop's water version, water pads are replaceable and so free of any data recorder have been reported, you in effect already have a spare. Alltop states that radio systems deliberately use the cassette pad-clip in reverse, making them replaceable.

Despite the praise just heaped on Alltop products, a system had existed as a good cleaning fluid could not find quite that the cassette had missed, but the store recommended the cleaning cassette was found down. Good news for Sigma HX200 users is that Alltop also makes a more extensive version of its cleaning system.

Micro-cassets with more money can afford disk drives instead of cassettes, and the same reflects in the price of drive head cleaners—the cheapest complete system we spotted was around £100 or £150 for just a disk (just the cassette cleaners, completely dry disk drive cleaners are available). Inexpensive ones, which don't require the user to add solvent. The 'dry' method of cleaning has its advantages in that the user doesn't get out any solvent.

On the other hand, the danger with dry cleaning is again obvious—particles of dirt cleaned off will

resettle the drive head. The way out of this is generally disposable cleaning disks which slip inside the disk holder. The cleaning disk can be sprayed by the user or more pre-soaked in a tank (the latter being more expensive).

When buying, ask whether the cleaning disk is suitable for double-sided disk drives. Few manufacturers seem to make one-sided cleaners, but it is a point to check. Automation Products, which makes the Flapjack® head cleaners, claims that other manufacturers use too thick a layer on the double-sided drives. This can lead to the cleaning disk failing to clean a single drive properly. To overcome this Automation uses a post-wipe label. Presumably, no other firm is doing this problem ourselves.



The Clean Cooks (by John Lewis) / Photo © J.P.

There is no doubt of value in using disposable disk drive cleaners so that the cleaning disk might disintegrate and break up on the drive. It is also important for the solvent to be cleaned off the head thoroughly. For this reason repeated use of the same drive cleaner is not recommended—if the cleaner looks filthy it should be thrown away regardless of how many times it has been put through.

An interest only 14 inch and 8 inch disk drive cleaners are on the market. The big cleaning companies are developing ones to cope with the case 5-1/2 to 14 inch drives (many of which are now available for the Mac). Automation told us that it expects to have a disposable disk which fits inside a cartridge and should be suitable for machines like the Apollo. For the present, a company like MAF will clean the Sony 5-1/2 inch drive for you, should you require.

Finally, there is an interesting cleaner now available for disk cleaners—obviously they can't all have the only product approved by the big disk drive manufacturers (Ironstrongly, MAF and this one had made up supplying IM cleaning has because of the experience at our distributor department had when trying various makes on approximately 50 machines).

It was nice to find heads along with cassettes and disk drive cleaners, but unless you can't wait to



Automation Facilities' personal computer accessories. Six inch floppy disk drive cleaner (price £175.00)

along else (unless we come to trying the products for ourselves). For a start nothing seemed to work on the main screen that covers our Brno monitor ACE said it used foam cleaners, but we came to the small conclusion that actually taking the cover off was the only way to clean this particular monitor. We did try a roller cleaner from Avon but that worked well on a normal desk, but not computer desk.

On CRT (glass) screens the purpose-made cleaning fluids we tried seemed to work perfectly adequately. Denis Mansfield of Space Systems explained in some depth why he thought specially formulated screen cleaners should be used. One problem with using washing-up liquid (detergent) solutions is that everybody likes having smelly eyes removed! On a more technical note, it is difficult to prevent screen wash washing-up liquid into the dust, dirt, dirt/dusts almost inevitably contain oils, which is corrosive.

Brno Mansfield also put a persuasive argument against using the same kind of solvents used for disk drives onto the VDU screen. Most drive solvents are caustic, which is both inefficient and some will do us the kind of thing you want to spray all over yourself on the screen. His own company's product is formulated to be non-flammable and non-toxic, as well as including copes and inhibitors. When you consider that at Glass Screen restorations £2.00 is asked worth the trouble. Automation makes our screen screen wipers which are reasonably good.

The majority of cleaning equipment manufacturers avoid selling their computer products as second hand. For two good reasons. The most important for the many users is that screens mess up the controlled environment so beloved by manufacturers, more important is that screens often have precious gases which are inflammable. The by-product of using pump sprays or just simple bottles instead of the your jet gun may not be your money.

The same sort of argument can be made for hard hat for clubs which cleaning companies supply. Although they work, such clubs take up the same position as a cleaning kit than they work, and therefore cost more than they are really worth. Unless you are really busy, using standard means to make rollers be used as good. The shaver does not really apply to

cleaning screen boards, as they can be extremely expensive. In reality a tool like the Dust Off! from Friling & Cross would be the ideal piece of equipment to use. It uses a canister of pressurised gas to blow away debris, and is good around £20.

For general cleaning there are a variety of cleaners available for removing the dirt from the keyboard and body of the screen. The foam type cleaners seemed to work very well but a lot did depend on personal preference. For instance, one cleaner did a very effective job, but left behind a rather unpleasant smell. Again, the special cloths provided for this kind of job seemed very expensive for what they were, and most of all would appear to be just as good (and less likely to scratch).

Part of the reason for keeping your screen bright and sparkling is to reduce the chances of dirt and dirt leading to 'key' noise your disks or monitors, thus, it does make sense to take advantage of the state-of-the-art and solutions on the market to get down the amount of dirt and static around your screen. However, while the dust-free roller DTF for your monitor frame comes, people who work in noisy, exposed offices might find this useful.

So far so good, attention has been made of how to clean phosphor like printers. For the cleaning, the same foamed spray cleaners appeared for standard use to be used. To clean the type face there are a variety of products that you can use. Some provide a special fine brush for removing the heavy deposits, lighter deposits could then be removed with one of the cleaning wands (a heavy-duty cotton bud) applied as advised. A more sophisticated method would be to buy special spray wheel, double end polished cleaning kit from company the GMS or Avon, ground around £30.

When buying cleaning materials it does pay to shop around. Specialist shops sell a Leds disk case in which includes a VDU cleaner and an inkjet around as well as disk cleaner for £12.95 (see VDU), which seems good value.

Those micro-computer who need to be thoroughly disassembled the screen to clean it, should by screen shops for up buffers and low-foam cleaners, while water shops are alternative sources for quality computer level cleaners.

By Tony Daniels, deputy editor

CLEANERS

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Buckton, Peterborough
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Interior Team Road
Alington
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Herts
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Exactly what been looking

A microcomputer is only as useful as the software package run on it. And - until now - finding the package tailored to your needs (or your customers') hasn't been too easy.

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Each entry gives the package name, function, supplier, cost and also tells you which machines it will run on.

Matching with your machine

If you already have a machine, you'll want to know about compatibility. So we've included an index by machine make and model. And, just to make life even stiffer, we also cross refer machine type with operating systems.

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Professional Services	DEF Software Corp.	\$180	MS-DOS 2.0
Industry & Manufacturing	GHI Software Inc.	\$220	CP/M 3.0
Retail & Distribution	JKL Software Ltd.	\$190	MS-DOS 2.0
Scientific	MNO Software Corp.	\$210	CP/M 3.0
Educational	PQR Software Inc.	\$170	MS-DOS 2.0
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Knowing where to go

There's little point in identifying the perfect package unless you know where to go for it. Our separate alpha listing of suppliers provides all the information you need: addresses, phone numbers, who to speak to, and an outline of which other packages are available from them. This section could save you a few fruitless journeys.

Pinpointing special needs

Some packages may be tailored to the unique requirements of your business or profession. The quick reference Occupation Index at the back of the book can cut your search time to minutes. And if you already know of a package by name, just go straight to it. They're all indexed by title and acronym in the A-Z index.

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Commodore 64 Machine Code Master, by D Lawrence and H England

Machine code programming is one of those things that either fits you well or it doesn't. To explore the last byte and microsecond out of your program — or borrow you said.

For many applications, only machine code is good enough. The trouble is that programming in assembly language is a very time-consuming affair without the right support software — a monitor and assembler.

Commodore 64 Machine Code Master aims to provide three essential pieces of system software for users of the Commodore 64. It also gives some examples of machine code in the form of modifications to the Basic interpreter. It is not, as the subtitle claims, a library of machine code routines, save those not some machine code routines is there, but primarily the book is about an assembler. Neither is it an introduction to assembly language or assembly language programming for the 6502 or 6510 micro processor if you don't already know how to program in assembly language, you'll have to look elsewhere.

The first chapter of the book covers a monitor program. This is a piece of software, as that name implies in Basic, which lets you examine and alter the contents of memory in the old days, using a monitor was the only way of communicating with memory — with tedious fussiness it was. Monitors will have their uses if you're programming in machine code, though.

The next section covers a disassembler program, which means machine code programs can assembly language if you know what you're doing. Programs are increasingly more comprehensible in that format as a screen of hex — a handy utility book for checking your own programs and taking apart other people's.

The rest of the first part of the book covers the assembler program itself, along with an associated editor. Again, for which thing is it Basic, which point that it is possible to write an assembler in Basic. It also shows that it's not a very good idea even with the full explanations provided, the program is very difficult to follow. This is due to lack of effort on the part of the authors,

Commodore 64 Professional Problems

Doing it right the first time

About Microsoft Basic expert



ers, although a few diagrams or flowcharts might have helped to illustrate some tricky points. The problem lies to part with the difficulty of the concepts — an assembler is just a complicated program, mostly, though, the trouble is the primitive unadorned Basic of the Commodore 64, which hides the concepts as a mass of line numbers.

One interesting point is the provision of alternatives for each line of the program, along with a means to check them. This should help trap some of those typing errors that always seem to creep in.

The second part of the book provides some machine code routines which carried the commands available in Basic. Reversing programs which have been wondrously deleted, removing superfluous RSTs and spacers and defining multiple locations some of the address. In the process you can learn a lot about how the Basic interpreter works, though again some diagrams might have helped.

The book will give you an independent assembler for the 6502 and a good idea of what a complex program an assembler is. Once you've got it running, the fun has only just begun. **Professional Basic Programming, by PE Gilling.**

Once you've learned to program, but before you've passed the critical eye needed to critique or writing your own programs, you might want some pointers on implementing "real life" problems in Basic. The aim of this book is to show the reader how to write practical and useful Basic programs.

The first chapter gives a brief survey of the features of Microsoft Basic, which is used throughout the book. A lot of the more "standard" Basic

around, Microsoft Basic should present few problems, but it's as well to start off with a clear idea of the language we're using.

The next chapter contains a very useful set of programs which help in three — debugger traps, that is, which it's your task to spot. Some of the programs are quite complex, doing things like hash coding and string processing. It's therefore a challenge to get them sorted out. For the more difficult programs simple input is given, along with the required output.

This would seem to be a good way to get to grips with Basic. You don't have to write the whole program yourself, but you certainly need to understand what's going on if you're going to find the bugs. Unfortunately no solutions are provided. It would have been nice to have had some suggested solutions, both for comparison with your own and for reference if's suggested.

The next two chapters, which together form about half of the book, consist of a number of problems. These are essentially a business or data-processing type, and range from simple calculations of trials and means to more complex processing of names and address list information. In each case a statement of the problem is given. This is followed by some general suggestions as to how it might be solved, along with fragments of code where appropriate. Test data is provided, as is a sample of what the final output might look like (some of this is a bit over the top — with almost two pages of information on imaginary houses to illustrate a program for estate agents).

The techniques suggested for solving the various problems are quite valid, but perhaps more space could have been devoted to explaining them more fully, the book seems to concentrate on the provision of the problems rather than the specifics of how they might be implemented. This is not necessarily a bad thing, it just means that you'll need to be quite familiar with the mechanics of programming to be able to take advantage of the book.

If you want to look at "business" applications this could be the right approach for you. **By Alan Yevonin, a research scientist at inter-patentational physics.**

DATA FILE

BOOKSHELF



WE LOOK AT

A BOOK ON

MACHINE CODE

ON THE

COMMODORE 64

AND ONE FOR

THOSE WANTING

TO WRITE YOUR

OWN BASIC

PROGRAMS

Commodore 64 Machine Code Master, by D Lawrence and H England (Comdex), 111 pages, priced £6.95

Professional Basic Programming by PE Gilling (Macmillan), 156 pages, priced £3.95

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'SHARKS' BITE BACK

I t was the French philosopher President who introduced the phrase "property is theft", 124 years later Malcolm X expressed these same sentiments in a rather more forceful tone. Show me a capitalist, and I'll show you a bloodsucker!

It is obvious that many of our readers share the same sort of views about the software industry, looking back through 11 months of Legal Files. You, and again problems have arisen in which users have lawfully defended themselves in conflict with software houses over the ways in which they use their programs.

So are software houses really nothing more than a bunch of sharks who exploit the laws of the land in order to rip off the consumer? Should we in this country get behind the general view that is now being advocated as a law in the Australian State—that software should not be protected by copyright, as programs are for the general good and should be made freely available to anyone who wants them? Does the language of a lion-dar President, like the word "bloodsucker" come over as a "modified property theft"? Or could it just be that software houses do actually have some objectives in their lives, and are not just steep in the wool of those who some people might have you believe?

Without getting too bogged down in all the minutiae of this country's intellectual property laws (which are in a sense anyway), there are clearly a number of ways in which a range of legal devices to help manufacturers protect the fruits of their labors from unauthorized reproduction—or piracy, as it is more frequently termed. Patents, trademarks and copyright are just three of them. Although each one is aimed at protecting a different aspect of intellectual property they all share the same ultimate objective—to enable the creator to reap the maximum rewards for his efforts by being able to commercially exploit his or her creation, whatever or wherever, for a specified period of time—without competition.

Now obviously it may be morally difficult to justify the

stealing of patent rights—which normally last for 16 years—being regarded to cover an invention which could help benefit of mankind amongst the world's poorest billions. But that is certainly not the case



with most computer related products. Despite patents and the education field, most computer programs, whether hardware or software, are sold at the consumer and not wholesale markets. Thus, they are primarily commercial products and, which laws do not depend and protect, if we are going to the family business, most relatively recently most people could do without altogether. There can therefore not be no "moral" objections to, say, a software house commercially exploiting a word-processing program for all its worth.

Clearly stated in the software house which has to be taken into account if you are to understand why the software industry attempts to protect—and actually—to prevent them covers the fact that the computer market is highly volatile. Thus, unlike many other products (such as, for example, the appliances which has enjoyed a relatively long life despite numerous revisions prompted by the vagaries of fashion), with computers the life expectancy of a specific product is usually very limited.

Take, for instance, something as trivial as games software. In 1981-82 Atari's Pacman was the undisputed market leader, yet had it been launched a few months later, by which time another game might have caught the public's imagination, or it had simply failed to catch-on, Pacman would have sunk almost imme-

diately obscurely.

The lesson, then, is simple: the only computer related products that are so second hand of the cherry. The manufacturer—often a hardware company or a software house—

either gets the product right the first time around and exploits it for all it is worth, or the duration of its short life, or the product fails and completely fails without trace.

Having in mind the development costs and the vast professional budgets most companies within the computer industry now invest, it is hardly surprising that when they do make a success, they are highly motivated and whip out the big legal stick against anyone whose activities may have an adverse effect upon their profits margins.

It is also worth bearing in mind that "profitability" means a lot more than just keeping company directors in cars and yachts without profit companies do not have the funds to invest in the development of new product lines, or expand their production facilities. And they do not have the returns to maintain the confidence of their owners. Doubtless profits—in other words—not only make their banks but also their managers, but can also have an adverse effect upon the health of the UK computer industry generally—which is something we're sure you care about.

Protecting profits then may well be one of the considerations when organizations like software houses make such an effort to fight piracy, but simple greed is certainly not the sole motivating factor behind their actions.

DATA FILE

LEGAL FILE



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AS BLACK AS

THEY ARE

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THEIR CASE

Charles Christie (left) is a qualified barrister and a computer writer, who will be using his

knowledge of Britain's legal system to answer your complaints and queries in a comprehensible way. If you want access to the legal file use the question card found in with this issue.

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FRESH MODEM 1000

We have at last had a chance to properly see the Modem 1000 from Prism. It is provided as part of the package to allow for BSC to access Front-End Systems included in the cost (£2149 (inc. V.A.T.) is the Microsoft software to ROM, as well as first installation of a Telecom coding socket (if you buy to suit). Unlike the Networking Interface previously provided by Prism, the Modem 1000 is direct connect rather than asymmetric coupled.

Incidentally, if you already have a Networking Interface for the BSC and wish to upgrade from cassette to ROM, the latter can be purchased separately from Microsoft for £240.

Having visited ourselves for the Modem 1000 worked efficiently on Microsoft, we were pleased to find out that the Modem 1000 did indeed work at 1200/1200 half duplex in order to do this we used the disk provided being present in our June '83 issue, reconfiguring a 1200-based operation, then:

MO-1000
MO-1000

Using two separate BSC Micros both attached to Modem 1000s, it was clear indeed you can run modems on Te (terminal) while the other was not to the (receive). After that it was a matter of course moving a la 'wally-wally' using the word 'over' and

PRISM MULTI-MODEM — HERE AT LAST



The BSC is shown with the Modem 1000 (left), Teletex, Front-End, the Modem 1000 (center), and the Telecom coding socket (right).

communications had ceased. We then simply reversed settings so that the other micro could begin communicating.

The same modem is used for Microsoft's Apple package at 1200/1200 half duplex operation will be possible. It is in fact able to use Prism software to access other compatible 1200/1200 databases but sadly CALL is not one of them, however, Bulletin Board software is almost always compatible with Prism if you aren't worried concerning above graphics.

There are a few free public access 1200/1200 databases

which can be accessed with Prism software. I refer to (BSC) 944775 is one of them (the others were printed in the April issue of Computer Access).

At the time of writing it is not possible to use the Prism VTX3000 or the 1200/1200 half duplex manner is essential, but Prism will have a deal less than the appropriate software will cost.

However you can help when installing a Modem 1000 drive from the manufacturer, BPT, the G4 BPT, has provided an easy installation and settings for the BSC, Bases, Apple II, Tandy Model III, Commodore 64, 8000, 4080, and 8000 Prism runs from 475 to 498. Again the GEL Terminal 2 is capable of only 1200/75 or 1200/1200 half duplex operation but it does have BT approval.

GEL will also be selling the 1200/1200 half duplex program for the VTX 5000.

modems, along with the software packages it required.

Unfortunately, it does remain possible to use the TM100 along with other communications software, such as Prism's Comshare ROM, which would have allowed sophisticated file transfer.

The other problem with Teletex's software was that not all the bugs were to have been covered. As you may find the software created using all the numbers we'd find our money. It would have been interesting to have experimented with 1200/1200 half duplex communications, but the software located around us isn't forthcoming. As 475-498 (inc. V.A.T.), the TM100 takes jobs but needs to be tested.

Other packages available now include Apple, Commodore 64 and Pro, and IBM PC. Future releases will cover the Vic 30, CPM machines and especially Diango, Biscuit, Spectrum, Microsoft and Q-Point depend on the machine used.

MORE MODEMS

When it comes to multi-modem or asymmetric modems which can be used to access CALL or Microsoft. As 2 gives some typical examples. We have not had the chance to fully test the Asymmetric modem yet, but it looks good value if the price really will be £79 (inc. V.A.T.) the cheap.

SPECTRUM MODEM SELECTION

Can one obtain a modem for the £5. Spectrum? Yes, would it be possible to give details of price and use. Also, is there a disk drive available for the same machine? The Disk Command

There are two clear choices of modem either a Prism VTX3000 which allows you to access Front-End Systems and also 1200/75 half duplex, or a 800/800 full modem to access Bulletin Boards.

For the latter you need a RS232 interface such as the one from Micro Main and priced at £53.50. The Prism costs £79.95, while 800/800

based modems cost from £70 (DataCom Executive) onwards. A new generation of multi-based into systems are coming, but as yet the cheapest one will not have BT approval.

You'll also need a communications software package such as Andrew Chinn's Spectrum (included in the March 84 issue of Computer Access), the software for accessing Microsoft comes with the VTX on ROM, though.

As for a disk drive go, we are aware on the same at our AppleLink.

Wally Munn,
270 Colindale Road
London N1

DATA COMMAND 1000 MODEM

Another great Computer friendly feature is that the TM100 from Teletex which is again a 1200/75 (asymmetric) modem. The one we tested was supplied for the BSC. Called a 'smart' modem, the TM100 is BT approved and can act.

The software supplied on cassette also allowed storage of some expensive telephone

OB.

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Jonathan Sanders is the system operator of the 100 Southern 800 on (044) 51107, which has plenty of storage capacity of Ask machines (see table on the left).

For information on advertising in the Bulletin, or arranging contracts for the Bulletin, please contact the Bulletin Manager. Leave a message to him and he'll call you back to discuss it.

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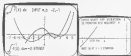
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and support 1000 (1000) 1000 (1000)
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Typical configurations may include:
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✱ **PRINTER BUFFER**

The **DATA LINK 32** provides a printer buffer
has a 1000 (1000) 1000 (1000) 1000 (1000)
and can be used to store data in a buffer and
provide a 1000 (1000) 1000 (1000) 1000 (1000)
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✱ **MESSAGE STORE AND FORWARD SYSTEM**

The **DATA LINK 32** is capable of 1000 (1000)
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On the really nice... with the... error... number of loops... System Error on the... to the last loop.

Second, the... because it makes... advantage of the... says I'll... be found... the FOR... performs... every loop... to... There's... The correct

algorithm of how:

```

A(I) = V
I = I + 1
WHILE A(I) < V
  I = I + 1
WEND
  
```

One important... to the first occurrence of 'V' in the array A. We may then make... already... and perform the... of 'V'. If 'V' is 'A', then... method... search... error... primary.

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Then on page 149... of... the... of... for the... As I... also... through the... .

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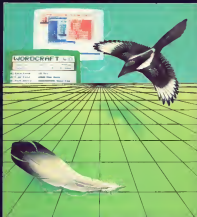
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