



# weigh up the facts



On balance, is too much of your valuable time and effort taken up by mundane and repetitive statistical and bookkeeping?

MICROFACTS is already helping hundreds of users of COMMODORE small business systems to manage their businesses more effectively and profitably, giving them time to make the crucial decisions.

Don't you think your business could benefit from tighter credit control, rapid and accurate financial reporting, reduced stock holding, comprehensive job costing, better customer service and many other advantages?

Make the right decision NOW. Find out how MICROFACTS can help YOU and take some of the stress out of your life.



For further information and details of your local dealer please complete the coupon and mail to the below address.

Name \_\_\_\_\_ Address \_\_\_\_\_  
Position \_\_\_\_\_  
Company \_\_\_\_\_  
County \_\_\_\_\_  
Tel. No. \_\_\_\_\_ Postcode \_\_\_\_\_

Commodore's Special Promotions Department  
675 Ajax Avenue, Trading Estate, Slough, Berkshire SL1 4BG, Tel. No. Slough (0753) 75292 [www.mms.com](http://www.mms.com)





### DRAGON 32 V LYNX

Matthew May looks at two new entrants into the laptop market and raises some very early questions **38**

### Z801 V IBM PC

We take a slightly futuristic start on IBM's new baby blue and match it with flexible standard ZX with some surprising results **34**

### SANYO

We find out if the Japanese, hi-fi giant can put his monitor where his speakers is **38**



### FUTURE COMPUTERS

Another IBM PC looks alike but perhaps unlike most of the competition that one is really price competitive **44**

## 1983

## SOFTWARE REVIEWS



### SUPPLEMENT

Word processing on the home: is it really an economic proposition?  
**Word Culture** **63**  
**ZX Soft** **64**

### PROGRAM LISTINGS

Letter Blast	Z801
Franchise	Spectrum
Area 3	Dragon
Matrix Code Tester	Dragon
Paintbox	Dragon
Synthesizer	SBC

### SOFT RELEASE

Software reviews for Spectrum, SBC and V6 30  
**CP/M Shards to Software**  
**Load and Go!** - a registers guide **68**  
 in the Dragon

## WHICH MICRO? & SOFTWARE REVIEW

Publishing Editor  
 Alfred Moxley

Deputy Editor  
 Matthew May

Software Editor  
 Simon Clarke

Advertising Manager  
 Bill Davison

Advertising Executive  
 Jennie Gibson

Editorial/Advertising Assistant  
 Lucinda Jander

Market Garden, Letchworth SG8 1ET  
 Telephone: (0462) 81260 (9 lines)  
 Advertisement: (0462) 4886  
 Telex: 21107 SWAPP G  
 Cable: TELECOM GARDEN

POSTAGE REGULATIONS APPROVED  
 POSTAL CONTRACT NO. 1000

Price: UK, 12 issues £10  
 Overseas Surface Mail £14  
 Europe Airmail £22  
 Other Airmail rates available on request

Copyright ©  
 All rights reserved. Subscription dept.  
 Computers House,  
 1st Floor, Road,  
 Market Harborough,  
 Leic. Tel: Telephone: 0458-64612

This journal is a contract of IBM® Business and Computer Publications Ltd. Payment for this journal may be made by cheque, giro, credit card, or by direct debit (see order form).  
 IBM, the IBM logo and other marks are trademarks of International Business Machines Corporation.  
 All other marks are the property of their respective owners.

ISSN 0007-1226

## WHICH MICRO? & SOFTWARE REVIEW

### Distributors

Newsline Ash	Radio Shack
Alan Robinson	Paul Street
David Roberts	Henry Jangley
Martin Tisdale	Alan Townsend
Mark of Interest	Clive Mall system
Royal Jones	Deborah White

**ABC**

2400  
 1983

FEATURES



**ADVENTURE**

The editor takes a literary look at Microsoft's original computer game **84**

**COMPUTER BLUFF**

The fifth contest from Stephen Costel's micro Auction to witty competing **88**

**PRESTEL UNDER ATTACK**

Handing the line with your micro: We examine what is being done **76**

**USER GROUPS**

Join your local micro interest group **86**

REGULARS



**NEWS**

Martin Banks tells how he thinks it is **13**

**AMERICAN REPORT**

Our word from the East Coast by InfoWorld's Deborah Wier **20**

**OPINION**

Phil Marchbanks issues a few pointed remarks about software piracy **23**

**LETTERS**

The postal service makes back **24**

**PROBLEMS**

Wesley puts it to rights **27**

**SILICON TIPS**

Richard's merry little strip **25**

**BUYERS GUIDE**

This month's new guide to micro and their software. Details on all machines from £50 to £500 **38**

**NEXT MONTH**

**THE 1983 SOFTWARE CATALOGUE**

Free with our next issue is a special *Which Micro Supplement* with comprehensive lists of the software packages available for popular home computers

A look at how the micro can be used to control your home

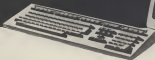
Reviews. *Oric* versus *Vic 20*. Can the BBC micro work in business?



SEE LISTING PAGE 38

CONTENTS

The Rainbow 100 provides the flexibility for 8 and 16-bit programs in one personal computer from £2,100.



# New personal computers de And dealers chosen for t

**AUTHORISED**  
**digital**  
**PERSONAL COMPUTER**  
**DEALER**

Professional Computer Systems Ltd, Poynette  
4, Fifevale Way, Ipswich, Suffolk IP1 7YU

Beaujeu Computer Systems Ltd  
27 Fulham Road, London SW4  
Tel 01 461 6124

40 Microcenter Ltd, 11004 North Sea Barbary  
Close, Chislehurst, Kent DA2 9JG

Computer Centre, The City Square, Swindon,  
Wiltshire SN1 1RN Tel 0297 631462

Computerland Computers, Computer Shop Ltd,  
Spencer House, 11, 14C, Colton Place,  
Southampton, Tel 0703 60070

CyberLink Ltd, Southborough House  
4, Weymouth Road, Chalfont, Bucks  
MK45 2JG Tel 0294 873 6611

Datavox Ltd, Battersea House, East Bus  
Culverden, Bury, Lancs BL9 1JN Tel 0206 624555

Demotab Ltd, 99-120 Regent St, London W1,  
Tel 01 474 1491

Force Software Ltd, 653, Armadale Road,  
Belfour, Middlesex, Tel 01 771 7191

ISI Ltd, Stonegate Road, Croydon Surrey,  
Tel 0232 62282

Quintel Ltd, 6-11 New Bridge St, London EC4,  
Tel 01 343 2181

Quintel Ltd, 1070 Babbalanze Street, Bristol,  
Tel 0273 271144

Quintel Ltd, Grand Parade, Brighton,  
Tel 0232 665104

Ray Computer Centres, Salisbury House,  
Tennis Court, Wilton-on-Thames, Surrey,  
Tel 08122 41777

MS&S Ltd, Kilmellon House, 26-29 Crosscut St,  
Bath BA1 2JG, Tel 0274 60001

Mutecor Electronics Ltd, 14-18 Childs Place,  
London SW5 8DQ, Tel 01 873 0607

Micro Business Systems plc,  
127-128 High St, New, Exeter, Tel 0752 61 0222

Micro Business Tools plc,  
Buckwood Square, 15, Birmingham  
Tel 0202 842201

Micro Business Systems plc, Warwick,  
Derbyshire Tel 0602 762 1142

Micro Business Systems plc, Lutteridge, Leicestershire,  
Leicestershire Tel 051 333 2000

Micro Business Systems plc, Cannon Street,  
London EC4 Tel 01 602 1142

Micro-Controls Complete Microsystems Ltd,  
30 Darnley Street, Edinburgh EH3 2JH  
Tel 084 330 7294

Microcenter Ltd, 4-11 Church Road, Egham,  
Surrey Tel 0754 71271

Microcenter Computers Ltd, Diamond House,  
Widford Street, Leeds Tel 0532 634477

Microcenter Computers Ltd, Prory House,  
1710 Housley High Road, Hull HU10 6JH  
Tel 0482 742027

Personal Computer Ltd, 237-238 Boleyn Road,  
London EC2 Tel 01 977 1200

Pippen Business Machines Ltd,  
208a Field Place, Aberdeen, Tel 0224 662206

We expect our new personal computers to set quite a few standards

So it's only natural that the dealers we have selected to sell them are, to say the least, out of the ordinary

It's a fact.

Our accountants, for instance, have examined their books. And we've listened closely to their salesforce

We've even checked that their customers have been completely happy with the advice they have been given.

It means you can be sure of getting the right solution to your business problems. Today and tomorrow.

After all, the best computer in the world is of no value if it doesn't do what you want it to. Or can't change as

The Professional series brings new standards  
for business applications from £3,348.



# Designed to set new standards. For the standards they set.

Pegasus Business Machines, Ltd., 28 Walker St.,  
Lisburn, Tel: 091 228 9748

Planning Consultancy Ltd., 454F Pall Mall,  
London SW1Y 5EQ, Tel: 01 479 4447

SPC Marine, Wind Mill, Harlow Green CM20 2EP,  
Tel: 02179 444441

Sigma Systems Ltd., 200 North Road, Cardiff  
CF4 2BL, Tel: 0312 442970

Software Sciences, Abbey House,  
341-349 Farnborough Road, Farnborough,  
Hants, Tel: 0352 544411

Software Sciences, Three GMI House,  
14 Old Park Lane, London W9,  
Tel: 01-499 1089

Software Sciences, 44 Old Street, London EC1,  
Tel: 01 353 1480

Software Sciences, Unit 11, Southfield Road,  
Nobles, Near Beaulieu, Tel: 0273 471047

South Coast Computers Ltd.,  
South Coast House, Westbourne Road,  
Purton, Dorset, Tel: 0300 919240

South East Computers Ltd., 11 Castle Street,  
Hastings, Sussex, Tel: 0232 422874

South East Computers Ltd., 24 High Street,  
Maidstone, Kent, Tel: 0222 292249

South East Computers Ltd., 11 Working Street,  
Canterbury, Kent, Tel: 0122 39947

Sumtek, London Ltd., 281-284 City Road,  
London EC2Y 9DA, Tel: 02 475 0707

Synco Products Ltd., Card House,  
The Cornway Station, Middlesex,  
Tel: 0753 4791

Synco Products Ltd., 21 Station Lane,  
London W9, Tel: 01 498 1044

The Computer Terminal, 44 Cathedral Place,  
London EC4, Tel: 01 246 2127

Wilmore Technical & Computing, by name  
Ltd., Northdown Road, Darlington,  
Co. Durham DL3 6DB, Tel: 0121 60840

Wiltshire Computers, 30 Millard Street,  
Salisbury Wiltshire SP1 1AP, Tel: 0733 470249

Zigal Dynamics PLC, Zigal House, Telford Rd.,  
Bromley, Chesh, CH20 0SL,  
Tel: 02862 1267

Soft-Acme (UK) Ltd., 70-72, Tottenham  
Road, London W1P 9PE, Tel: 01 429 0845

The Green Store, 102 Macclesfield,  
London EC2M 6SL, Tel: 01 448 7412

The Green Store, 71 Holborn,  
London WC1Y 9AB, Tel: 01 241 94967

The Green Store, 14 Wilton Street,  
Shaugh, Berks SL1 1TY,  
Tel: 0753 10477

The Green Store, Third Avenue House,  
Derby Square, Liverpool L2 9QL,  
Tel: 020 248 7911

The Green Store, 160 Hays Street,  
Clough, Co. LTR, Tel: 046 337 0485

The Green Store, South Gate House,  
Wood Street, Cardiff CF1 1EW,  
Tel: 0222 26128

The Green Store, Bristol & West House,  
Bryant Quay, Bristol BS44 7AB,  
Tel: 0273 277628

MicroMatched  
Systems, Plc, Lupton, 14 Clarendon Park,  
Newmansville N. Ireland, Tel: 0226 42227

your business does

Our Authorised Personal Computers  
Dealers can offer you advice, demon-  
strations and can undertake to train your  
staff or introduce your executives to  
computers

They can also offer you all the service  
and support you'd expect from the world's  
largest manufacturer of minicomputers

Not to mention a year's free on-site  
service warranty. And new machines  
designed to set new standards in personal  
computing

Doing more. The Digital difference.

**digital**



# IT'S NEW ACCESS SOFTWARE for your business at petty cash prices.



## INVOICES AND STATEMENTS . . . £19.95

Compatible with most printers. See table. Ideal for the small business. A complete suite of programs (together with generated customer file for producing credit and efficient business invoices and monthly statements) on your line printer. All calculations include VAT automatically and the program allows your own messages on the form produced. This program gives you superb presentation and saves time on one of the most tedious tasks in the office.



## COMMERCIAL ACCOUNTS . . . £19.95

Compatible with most printers. See table. A gem of a program, ideal for accountants, with the following features - Daily Journal, Credit Sales, Cash Sales, Credit Purchases, Purchases - other Sales Ledger, Purchase Ledger, Bank Accounts, Year to date summary. A fully interactive program suitable for all businesses. Files can be saved and loaded and data from one file carried forward to another on opening. Particularly useful from a cash flow point of view, will calculate interest on overdrafts for debitors and creditors. Fully totally supported with entries for cheque numbers, credits and of course, running balances.



## MAKING LISTS . . . £19.95

Compatible with most printers. See table. A superbly designed database to allow for manipulation of names and addresses and other data. Operates in a unique 'windows' system (press any 4 further tab) with defined parameters, to make your own windows. Features include the facility to find a name or detail when only part of the detail is known, it will print labels in a variety of user specified formats.



## DATABASE . . . £19.95

Compatible with most printers. See table. The program that everyone needs: the most reliable and versatile in your collection. Features include work sheets, set jobs if required. Can be used in place of any card index system, or, once purchased you can write your own dedicated database to suit your particular needs with a finite number of entries on separate casettes.



## STOCK CONTROL . . . £19.95

Compatible with most printers. See table. Dedicated software with all that is necessary to have control of stock. This program will take the tedious out of stock control and save time and money. Features include stock set up, user reference number, minimum stock level, financial summary, line print records, quick stock summary, stock stock, delete/change record and more.



## HOME ACCOUNTS . . . £19.95

Compatible with most printers. See table. Run a complete home finance package for you with every facility necessary for keeping a track of regular and other expenses, bank account transfers, HT, etc. This program also allows you to pass gracefully to Utilogics pay monthly set programs.



## WORD PROCESSOR . . . £19.95

Compatible with most printers. See table. This program features routines found in word's range and offers extensive set pages with a format word length of 3-6 letters and for around 1000 words or more on 400 1000. All of this the user who requires a simple program to write letters on his computer. Features include block delete, block insert, search and replace, edit text, delete text and more.

Dealer/Trade enquiries invited - generous trade discounts for quantity  
Special ACCESS card instant sales hotline  
for GUARANTEED despatch within 24 hours . . . **Tel: 03952-5165**  
24 hr Answerphone Service.

"All enquiries other than credit card sales to 03952-5838"  
**Gemini. Functional Software Specialists. 8, Salferton Road, Exmouth, Devon.**

Tick the box for appropriate issues (must include VAT and Postage and Packing)  
Please supply the following cassette software

Database	£19.95	Word Processor	£19.95
Stock Control	£19.95	Home Accounts	£19.95
Making Lists	£19.95	Commercial Accounts	£19.95
Invoices and Statements	£19.95	Home Accounts	£19.95
Commercial Accounts	£19.95		
Home Accounts	£19.95		

Name

Address

Postcode

Telephone

When checking and postal orders/cash to direct debit/standing order

Order Code number

Access Number



Notes

Gemini Functional Software Specialists,  
8 Salferton Road, Exmouth, Devon - EX8 2GG



WIM 4

# It's rash to choose before you've seen...

No other software system can do so much so easily. Accounts, word processing, filing, statistics. Silicon Office can handle them all.

It's a database, calculator spreadsheet and word processor in one. And the only software system in the world to totally link all three.

It's simple to set up to handle any task. And versatile enough to drop and change tasks as necessary. Which is why it's Britain's number one software system. And why it's used by almost half of Britain's top companies.

Formidably flexible! Yet happily uncomplicated. Anyone can master it within a day or two.

And, as your needs change, you won't have to fork out more money for more technology. Because Silicon Office can change with your needs.

Fill in the coupon for more information on Silicon Office.

Bristol Software Factory, Kingsway House, Grove Avenue, Queen Square, Bristol BS1 4QY  
Telephone (0272) 290098



Please send me details of Silicon Office

Name \_\_\_\_\_

Position \_\_\_\_\_

Company \_\_\_\_\_

Address \_\_\_\_\_

Telephone No. \_\_\_\_\_

# SILICON OFFICE

THE FLEXIBLE SOFTWARE SYSTEM

Now available on  
ACT Sirius and Victor 9000



# Program coding is now as easy as 1,2,3...

It's not writing programs that takes the time, it's coding them every second. *Assembler* and *Monitor* turn it in exactly right, just as if it were obvious symbols and it is enough to make the biggest, smallest programs in time!

How much easier it would be to see "Go into the file" and "Display" (and a second) instead of having to write a dozen or more lines of tedious BASIC whenever you want to load something? Well, now you can.

The menu shown above is one of the control screen displays in **THE LAST ONE**. In choosing any of the options shown it is possible to do a new simple or complex program within some time a few carefully selected keystrokes. **THE LAST ONE** does the rest, only asking you to answer questions from time to time as there are no more than five programs in writing from exactly what you want. And all this is done in less than 100 lines of code.

Now you can develop whole, almost finished, printed-outlined programs without ever seeing a line of code. A program for the business needs can be professionally generated too! In the professional programmer's development kit, **THE LAST ONE** allows you to write complex programs.

Finished programs can be loaded up to 10 times simultaneously (from the Commodore-128) into, for example, any business form.

in any application or data file, it is even more useful for running fast - every time. Following a year of intensive field trials, **THE LAST ONE** has proven to be simple (through extensive) program generation for the use of the most powerful micro-tools available. It is used in thousands of installations around the world including banks, writers and scientific and educational establishments as well as being available in countless small business packages.

**THE LAST ONE** runs on the APPLE II, the COMMODORE 64P and 6502C, the TRS 80 Model II, TRS 80C or CP/M, even CP/M, CP/M 86 and MS-DOS machines including the IBM PC and the XT/XTX.

Whatever you use your computer for, you can't be accused of not knowing what **THE LAST ONE** can do for you - it can't be accused of not being so useful every time!

G. J. "A" Wynne Ltd, Station Road, Brimston, Somerset, TA10 0SD

Telephone: (0874) 348800 (0800) 4017

## THE LAST ONE™

**Nominated 'SOFTWARE PRODUCT OF THE YEAR 1982', and selected as finalist in Recognition of Information Technology Achievement Awards (RITA).**



## in brief...

### BBC 'B' for CP/M

For those that suddenly feel the urge to run their Model B BBC micro on something completely different, there is now a CP/M resident. They should look no further than Tech Computers.

It now has available a BBC disk machine that runs CP/M. Tech's own CP/M compatible operating system, in consists of a 5.25 disk drive, a BBC processor card and a CP/M card, together with manuals and stuff like that.

The CP/M operating system runs CP/M programs, but allows much more memory to be available to the user.

The BBC with 5.25 bytes of RAM, is almost entirely suitable to the user. Phone: 0273 847000.

### Text processing

Word processing is getting easier and starting to do all the clever things that we always wanted them to do, especially at the new end there.

One such clever thing is shown here on the Essex Series 500 word processing system. This can now incorporate graphical elements into the text and these can be printed out on



a standard duty wheel printer equipped with the necessary daisy.

The package is called the Text Processor standard option, but is wanted at a expensive. It costs either £7,990 or the £9,990, the minimum 500 machine costs. Phone: 07 234 2677.

### Oric competition

Results of January's 'Which Micro?' Oric competition will be published next month in our May issue.

## Tron stories

Lots of goodies have been set aside for you in a computer being expressed by Acorn Computers and Walt Disney Productions. Aimed at both primary and secondary schools in the UK, the winners will share a total of £15,000 worth of prizes, including a complete BBC 'B' micro from Acorn.

The competition has two levels, one for primary schools and the other for secondary schools, but both make it obligatory that competitors have seen the film *Tron*, for that is what



they are all about.

The primary school entries, comprising teams of 20 to 30 children, have to write the story of *Tron* in no more than 100 sentences of 10 words or less.

The secondary school teams have to create either an adventure game or a point-scoring game, some based on the film. Each of the 12 regional

winners in each section will receive a BBC 'A' micro (part of one per item) with cassette recorder and five Acornsoft programs.

The winners in each will get the full 8 system including disk drive, Teletext adapter and 16 Acornsoft programs.

So kids, broadband teachers, and get your critical analytical program running.

## Two new micros from Texas

Once upon a time, there was a company called Texas Instruments and it produced a home computer that certainly fits the requirements of the home user NOW. The only trouble for the company was that they produced it THEIR — some three years ago when no one was really

How the company looks like doing it again — though this time the company found that it has discovered a new computer NOW that will be called THEIR. The name: TRON.

It is in fact one of two new machines Texas Instruments has announced. The follow-up is the TI 99/2, a low cost machine aimed at the computer hobby market. The other which will be returned to in due course is the 99/40, an interesting sounding battery portable machine aimed at the professional user.

But first the 99/2. Despite the designation, it has little to do with the company's existing machines. The TI 99/2A, for a start, it is aimed squarely at the market created by Sinclair with the ZX81. It is a like-minded computer with expansion capabilities, and it is of that venerable improved performance with a higher price.

The price tag is not set yet for the obvious reasons,

though when it appears in the UK towards the end of the year, the 99/2 should sell for around £75 to £80. This is about par for the course at present though somewhat more expensive than the existing Sinclair machines.

For the sake money Texas hopes that the user will want the same specifications that the 99/2 offers. It is itself, though the TMS9926, 16-bit processor chip, which makes the machine very fast. This is a single chip computer derived from the company's well known TMS9926 processor which drives the 99/4A through other machines.

Texas claims that the 99/2 is seven times faster than the 99/4A and even a third faster than the IBM Personal Computer. Its main target, the ZX81, is according to the company, will be better. The 99/2 is said to be 30 to 40 times faster.

It is a black and white machine with no colour software and not compatible with that used in the 99/4A. The built-in flash of the machine is a totally unique feature, minus the commands is letting you colour display and saved graphics. It also handles, after access to PEER and POKE, an assembly

language can be loaded.

The standard memory of the 99/2 is 16K bytes of ROM. Following the 99/2 and there are 16K and 48K bytes of RAM built-in. An expansion kit with plug-in options. The keyboard is all the moving key variety and there are all of them single-throw.

The 99/2 can be used with a range of new peripheral systems including a low cost (Texas £150) flow colour printer, a wide tape drive (Texas a string flopped holding 50K bytes per tape), and an 80220 and Centronics interface.

Texas can also be used with the other new machines from Texas, the 99/40 portable.

This is a hand-held, battery to operate powered machine aimed directly at the professional user. Featuring a QWERTY keyboard and plus numeric keypad, it comes with 6K bytes of RAM, expandable up to 16K bytes, and 32K bytes of ROM.

The software will come in cartridge of Waffle Java form and will cover a wide range of professional applications — everything from word processing to word processing. It is expected to appear here by April with a price tag that should be under £200.

## Apple connections

Interfacing the dear old Apple II with the outside world, and the outside world with Apple II, is still big business. And will be for several years yet. One company that is well aware of this fact is Digital International, which has recently issued two more main interface cards that extend the capabilities of the venerable machine.

The first is the Super Printerport II, a card that provides both black and white or colour graphics printing, as well as a link between the Apple and any contemporary parallel printer. With additional memory it can be used as a port buffer and manager,



letting the Apple be used for other tasks while printing takes place.

The extra memory should be Digital's new card and be known as its RAM Master ROMCard, which adds 128 K or 128 K bytes of RAM. A 256K byte card is available to special order.

Joining the ranks of interfaces that improve the

Apple's standard text display capability, and make it much more suitable for word processing, is the Supermaster 80 card. As well as an 80-column display capability, it features 256 bytes of a buffer. There are the standard 128 character set plus an alternate 128 set, which can include user-defined graphics characters.

## in brief... Dog handler



The portrait of Camouflaged Man With Dots and Whiskers is not, as some might suppose, based on a dog handler. It comes at the behest of David Huxford. He wanted it drawn from the press office of DAW Manufacturing.

The camouflage designer contacted a soldier who is keen to bring to attention a Husky portable computer.

The best (the computer that) has been selected by the Ministry of Defense for various reasons. This collection for all British troops, together with the British Services.

## Bar talk

Here is a system designed to teach children how to teach the bar code price tag system in supermarkets. In this way all system numbers and finally letters will be available from the face of the code. It is an important procedure in what I say.



Actually it is a system of the sort. It is called the Magic Mind Speaking Reader from Essex Instruments, which provides a bar code reader with speech synthesis chips to produce a book that talks. It can only talk. However, being gradually young children to learn to read it can still read simple words and simple texts. Just imagine what it could make of Husky Phone 0244 24477.

## Soft magic States

Here at the offices of Village Micro, all is peace and calm, sweetness and light until having cast a spell on the recipient to gain entry, we are surrounded with hordes of young persons wearing a strange mixture of woad's garb and palace tablets. They enter strange runes and incantations while drawing greater focus on display areas.

What, I get your attention, don't I?

There is some confusion, however, for we have received a communication from across the water from a company called Sir Tech Software Inc. The firm just launched two new games programs that may interest you.

One is Legacy of Agamemnon (I can't pronounce it either) the third in a series of weekly programs. This concerns the descendants of the heroes of the Trojan of Demetrius - which just happens to include you if you're playing. It involves having to take a quest out from a dragon and similar encircling exercises.

The other is Peter Rabbit, which is described as a children's game. The black

gout on to say that it is basically a face recognition program with educational systems to help alleviate the difficulties that most educational institutions tend to have. I feel there is very little I could add to that. Soft are available to see on the Apple II, and the company lives at 4 More Street, Southampton, W 12 6JG, UK.

## Torch light cricket

I'm trying to write this while doing a John Apple programme, for a comedy one. Philip Edwards, a drama spin doctor who plays cricket for Middlesex and England.

This year is his benefit year, a traditional way of rewarding a player that has served his side loyally and with dedication. In practice, a benefit year means that the player gets involved in all sorts of fund-raising activities that should hopefully land him with a big lump sum of money at the end of it.

To help Phil sort it all out, especially all the accounting bits and pieces, Torch Computers has donated him one of its machines. As well as the accounts, it will get

used for word processing, and may even get connected to Prestel to forward news of upcoming events associated with the benefit.

The software needed for the task, including some programs that are being specially written codes from Microcomputer Products International which is now Torch's prime supplier of business applications programs.

Among the special programs, MFI is developing a code in connection with the benefit and booking averages.

## ZX Lisp

Soft is to be heavily suited to the needs of students and hobbyists. Having done the subject, Simon a ZXP course in microcomputer, and his own software when doing the property and applications, and has the ability to support machine code subroutines. Also, it runs a 48 K byte program to see, though it can be used with a 128 K version. It is supplied on cassette and with documentation program and program's manual, costs £75.

Shows can be contacted by writing to 7 Woodside Road, Brixley, Slough, Kent.

# NEWS

## in brief...

### Dragon News

Dragon's latest amongst efforts will be introduced in two UK magazines that are now available in this country.

Both specialists in coverage of all that is interesting to colour computing fanatics, and in particular those that are into the Dragon 32 and the Tandy Color Computer.

One is called Color Computer News, and is actually intended for Tandy users. It is being imported into the UK by Dragon's sister, Grosvenor Home Computers, and costs £2.25 for a single copy or £21 for an annual subscription.

The other is *Hardware and the user*, is aimed primarily at its home user though it is also relevant to Dragon users. It is being imported into the UK by Manchester-based *Home Electronics Grosvenor Home Computers* at an RRP of £2.97 and also distributed at an RRP of £20.97.

### CP/M Directory



Inside are those 14 or there near based on CP/M.

Eight items with their hands up can stop waiting the rest and move on to the next.

Hardly up those who use CP/M progress!

OK, you are the people who should now read on. The Cambridge Information and Pittsford Services has something which might interest you - namely the CP/M Software Directory.

1982  
\$75 price is £12.95 and further details can be obtained from the company at 0262 63418.

## Upmarket Texas

Yet another name company from the mainstream computer business has made a move into the market for high-end IBM-PC compatible - i.e. just that - the sophisticated-looking and/or marketplace.

The company is Texas Instruments' better known *MicroVista* system for its T059/4A home computer though it is also big in the mainframe world. Apparently it has decided it would be wiser to concentrate on moving up market with the announcement of its Pro Professional Computer. It is also a name taken by the company relatively speaking.

The Professional Computer (also an entirely alien to it) is PC, is based on the new Intel 80386 processor giving the facility to run all the popular operating systems of the day. This includes MSDOS, CP/M, UNIX, System CPM/86 and P System.



This means that all those applications programs that are available for those systems are available for use on the TI system.

The Professional comes with a maximum of 64K bytes of user memory which is ex-

pendable up to 256K bytes. Standard on-line storage is in the form of a 320K byte floppy disk drive. Expansion here is in the form of either a second floppy drive or a multi-volume hard disc on a CDD 0347 0447.

## IBM's Matey Comart

The IBM Personal Computer has a mate. Indeed it has several of them. They come from a US company, Texas Inc, and they provide such goodies as hard disk subsystems and communications interfaces.

These units, collectively called the PC-Mate range, are now being sold in the UK through the good offices of Comart.

The huge amount of what is claimed to be the widest selection of PC-compatible peripherals and subsystems so far made available. They include Winchester disk subsystems, exchangeable cartridge disc systems, memory and communications interfaces, high resolution colour graphics emulators to digital converters and a range of other peripheral modules.

As well as distribution products in the UK, Comart's subsidiary company Microcom will provide service and maintenance coverage. This will also be extended in the IBM PC itself which is offered by Comart through

Group companies the Byte Shop and Xerox Photo 0480 212006.

## Talking Spectrum

Here's something that sounds like fun quite literally, but is now possible to get your Sinclair Spectrum to talk. What it talks about is music, is entirely up to you, but is surely well worth the only as a parable of what is heard in.

How it is done is by using the *Order from Fuller Micro Systems*, the Cambridge-based company that has become something of a specialist in producing conversion kits for Sinclair's machines.

*Order* is a speech synthesis system that attaches to the back of a Spectrum. It contains a sound generator, three-tone sound generator, a joy stick control port and a simple plug phone-line-based speech synthesiser.

Using the kit it becomes possible for a user to key in words and have the Spectrum draw the *Order* into copying them by generating sounds that match the letters. As it is phonem-

based, this does mean that certain tones have to be learned to ensure that the speech talks English rather than gibberish. This is because the English language as this is not, occasionally leaves little resemblance to how it is spoken.

It therefore becomes the user to learn how to spell words, words pronounced as they do, the machine understands what you want it to say, rather than what you say it should say.

The *Order* unit complete is available for £24.95. Fuller also has a variety of optional add-on systems that come in different parts of the complete unit. For example, the *Order* by itself is available for £20.95, while a speech-based application unit costs £5.95.

Fuller claims to have now sold over 10,000 units and has received over 100,000 orders for the *Order* 2087. Its latest offering in this area is a re-designed keyboard unit that incorporates a proper space bar and double-sized keys for both Shift and Data Entry. This unit, £29.95, and should be available about now. Phone 067 235 6702.



## Textet TX8000 colour micro

*We review the latest rival to the Sinclair Spectrum*

The Textet TX8000 is a microcomputer new to the UK market aimed at the same buyer as the highly successful ZX spectrum.

Textet claims that the newcomputer is the cheapest colour computer available in Britain, and at an extended launch price of £295 for the basic UK version the TX8000 does indeed undercut the previous holder of that title, the (MSB) MSX.

The computer itself is small, about the same size as the Spectrum, but of more conventional styling. An instruction manualised case is held together by six screws and a main wiring rod to eliminate anything.

One of the TX8000's best features is its keyboard. The number pad keys are similar in concept to those of the Spectrum and Jupiter Ace but are much more pleasant to use with a slight but positive over centre action and a synthesised click eliminating much of the uncertainty experienced with other machines. In particular it avoids the disconcerting positive hand feel of the Spectrum.

We were impressed by the customised extra controls to one-key array displayed by the Textet. Many people are put off the Sinclair machines by the difficulty of locating the desired keyboard on the complex keyboard especially since it is not possible to just type in the relevant word letter by letter.

On the TX 8000 the keys normally operate in the usual computer sense but when the programmer uses them in conjunction with the Control key, the relevant keyboard is produced with each depression.

It's a pity that the sensible stroke didn't extend to the space bar, which is merely a small oblong key hiding in the lower right corner of the keyboard.

The eight colours obtainable are yellow, buff, red, blue, cyan, magenta, orange and green.

Essentially, the impression is one of high build quality but upon the case and the computer's rising front console can be clearly seen in the construction of the circuit board.

The layout is somewhat unpleasant and right handed of eye seems to be the only method of locating connections.

The back of the computer features expansion ports for the add-on RAM pack and one other peripheral such as a printer or scanner. The least port is due at the end of the year but no one from the company was able to say what type it would be.

Options for connection with a television or RGB monitor are built in as is the socket for the external power supply unit.

When switched on, the machine greets the user



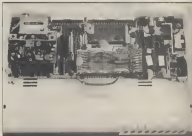
with the message: 'Welcome Technology Limited. It seems to be a standard subset of Microsoft Basic being run also for its lack of utility programs (TRACS, ON AUTO and REMEMBER for example), but something is missing, possibly powerful and fast interpreter with no storage quota.

We only once lost control of the machine when LIST was typed with no printer attached. The lock off reset button reset that switched

off plus, leaving the program with the only way to regain control.

Those who have spent hours struggling with the Microsoft line editor will be pleased to learn that a full screen editor is implemented on the TX8000 in conjunction with the auto-repeating keys. It makes editing fast and easy.

In use, the Textet seemed rather old-fashioned. The display is upper case only and the graphics resolution





BENCHMARKS - The Zenith versus The Spectrum		
(in seconds)	Zenith	Spectrum
Test 1	18.0	44.7
Test 2	7.9	9.8
Test 3	18.7	20.7
Test 4	18.9	18.9
Test 5	27.9	23.8
Test 6	25.5	52.4
Test 7	58.0	78.0
Test 8	84.0	229.4

as such it is possible that it had been on the receiving end of some harsh treatment.

This may explain the reliability problems we experienced which included a total lack of display in the graphics mode and a number of problems with non-holding lines.

The quality of the test display was also disappointing: the light green shade was being difficult to read against a dark green background.

The internal construction suggests that individual T10000 computers may be more prone to variations in quality than their rivals and indeed the examples we used at Zenith's headquarters seemed much better.

We are unable to comment on the manual supplied since ours was just a professional (though quite comprehensive) guide to the basic use.

At the moment there is very little technical data available for the Zenith in deed anyone from Zenith was able to provide very much detailed information at all since the company merely regards the machine and has no hand in its design or manufacture.

The Zenith may well prove to be a happy hunting ground for those who were supplied

#### market of £100

The poor graphics resolution and lack of colour may well deter potential buyers especially since the £100. One at £200.00 is a strong prospect these days.

The introduction of the T10000 is something of a watershed in the British home computer world. For the first time the supplier has no direct connection with the design or introduction of the machine being just an importer who looks a production run of computers from the Hong Kong factory and markets them in the UK.

We are confident that if the computer will be a success in an untraded market it will probably be difficult or impossible for programmers to produce the sort of programs most home users will expect from their software.

The distributor team suggest that the use of Microsoft Basic has made the Zenith a respectable number cruncher and the single mode it suitable for limited reliable use if the software team produce.

Unfortunately the machine is not really easy to repair with constant heavy use on the limited warranty facilities and there may be serious work. Zenith's entry into the home computer market can be compared to that of Amstrad, another importing company which has built itself up as cheap consumer electronics.

The danger facing the British microcomputer industry is that the home computer market will be divided into the classic price wars which defined the pocket calculator market.

Low prices may seem to be good news for the home buyer but the possibility long term cost could not be ignored.

## SPECIFICATIONS

PC IBM compatible for £50  
 640K soft plastic covering  
 1000  
 8002 central processor  
 1000 8008 cassette  
 peripheral and memory expansion ports  
 Cassette interface speed  
 800 bits  
 Language Microsoft  
 Basic  
 Philips SC 200 800 1500  
 Audio/Video in many  
 leading chain store  
 groups from the end of  
 March  
 100 importer Zenith  
 Computer Computers  
 James, Smiley Green  
 Tisbury Street, Chichester  
 Sussex, Chichester

## COMMENT

The T10000 is far from being the Spectrum when it appears to be at first sight. It has a powerful CPU to give 800K, and is the cheapest colour computer on the UK

are extremely limited. The resolution is only 128 by 64 in the single graphics mode and the only basic commands for graphics are SET, RESET, POINT and CLS. To carry your file to be infrequently plotted internally. A line 2061 top chunky block graphics characters are available in the text mode.

It is also very surprising that an entrant to the Spectrum/Dos market should have no sound capabilities apart from an electronic beep when a key is depressed.

With these points in mind what is the advantage that sets the computer in line to the UK, it has been available elsewhere for some time we turned to the professional manual for a clue as to the age of the design.

Contrary to our own Video Technology copyright dates 1982 and 1977 so the age of the machine remains a mystery for the moment.

Our particular review machine was an old 8K model which still bore the Video Technology logo and



# AMERICAN REPORT...

**Texas Instrument enters the office market: CP/M bag own show; Sequa sequel**  
By Deborah Wise, East Coast Editor, InfoWorld



**T**exas Instruments recently introduced an office microcomputer to compete head-on with the IBM Personal Computer (which has now officially arrived in England). It fills a gap in its product line between powerful expensive minicomputers and limited cheap home computers.

Over here, TI has been known to the general public as the company that built the black console who steered a California State car going to get \$150 from what he kept in his home computer. That is not enough help. TI sold out of its 28-44 computers over Christmas.

Since then TI has also enlarged its home computer line with the well-known Texas killer—the TI 9902. It aimed directly at the Texas Society market and costs under \$100.

And Texas had had before. The home computer market is a dangerous place to be. The company had the opportunity of a major consumer department store visit to introduce the Texas 2000, better known by all of you as the Sinclair Spectrum.

That store visit will have tough competition in the US market where price wars have brought down the cost of several machines including the Commodore VIC 20, the TI 994A and the Radio Shack Color Computer to around the \$300 range.

## TI business

TI didn't find the business microcomputer market any safer than Texas had in home market. It faces strong competition from established known companies like IBM and Apple.

Here Apple's new line which it should imagine you've all heard quite enough about already produced quite the splash—though the price checked a few small businessmen. The IBM PC has been picking up market share quickly—in an indication that like other companies have the knack of attracting corporate dollars for products as well as for investments.

TI's Professional Computer as the new mono-based office product is called in a sleekly designed machine that uses the same Intel 80285 microprocessor as the IBM PC. It doesn't however run the same software. Software developers will have to write their programs to run on the TI PC. And many including Microsoft, Digital Research and VisiCorp have already

done so which is a major plus for TI.

Another considerable advantage for the TI PC is its immediate availability. As the company speaks to the press in New York dealers across the country put on display ready-to-buy TI PCs. This is unfortunately not general industry practice. Normally companies provide further processed prototypes and type—but rarely the finished product when they host an announcement.

TI did ahead did in the end apparently to some hyperbole about future microcomputer applications for its Professional Computer.

## Natural language

Could industry it will have a speech recognition capability the company said it will have a natural language interface so business can type in English sentences as commands the company said it will have a voice management capability—a first step for a very expensive but very clever telephone menu system and telephones answering machines—the company said it did show several versions of these capabilities but gave no price. Very expensive but not good enough.

(How well I could tell the natural language programming is a lot of work really. It's actually a clever machine learned sequence that lets you build English language sentences using phrases printed on the screen.)

And talking of displays trying products get the CRM that dispenses it for operating system that having progress concerning the world that it is 18 bit version is up to words, now has a computer show all to itself.

The first CP/M show—CP/M 83—attracted more than 45,000 people a few weeks ago in lovely San Francisco. Organized by Digital Research the event's popularity is what have you of CP/M. The show had few surprises lots of support and two interesting announcements.

In the first announcement (from software Milwaukee) 18 bit operating system MS-DOS. Digital Research decided to cut the price by 20% of its IBM PC version of CP/M 83. But you'll see a PC presentation. And CP's president John Fowler would prefer to the but if the company doesn't succeed a balance sheet may be a much greater source of interest. The company's product line however which includes a CRM Plus released for the

Apple II and CP/M versions for the Motorola 68000 microprocessor (the one line that is addition to the language and operating system available is a bonus for a strong binary software developer's standard).

And Gary Kibbel, founder of CP/M and microcomputer industry legend announced a new addition which he thinks marks a landmark in professional educational computer languages an enhanced version of Logo for the IBM PC. Logo is the educational language developed at the Massachusetts Institute of Technology by Seymour Papert and others.

Good Kibbel. We've added quite a bit to make it a little more professional and easier to use. In fact the beauty (or is known to many young Logo users) becomes a palmer in OS 2 version. Businessmen don't work with turtles, observed Kibbel.

Logo won't be available until later this year, but can you really blame Digital Research showing it off at a gathering it organized that attracted 45,000 people?

## Sequa's ghost?

Last month I mentioned an off-the-wall company called Sequa that claimed to have an IBM PC compatible portable called the Chameleon that runs all IBM PC software and 280 software and costs \$1,795. I saw the computer's chassis at a trade show but no one could break down its guts. And they're still having problems. Some party pointed that they have turned up little more than an empty warehouse in the company's home town of Annapolis, Maryland.

A source told me privately I doubted do business with the company for anything. They're a fake bank. Apparently the computer sales they are affiliated with though they cut off care the sells many computers to the US Government. I know what you're thinking—like streets like they is a risky fourth too.

Until next month. ■

# OPINION

*Phil Manchester puts a case for mice, imprecision and pictorial convenience. Computers you drive like cars*

**A** favorite analogy of some of the more distinguished employees of the world's largest computer corporation (just in case not Apple or Commodore) compares computers to cars.

The story goes that, in the early days of the motor car, a large US car manufacturer commissioned a market survey on the future of the motor industry. One of the things discovered was that, by around 1920, there would be a world shortage of chauffeurs — to the tune of about a million.

Given that motor cars were pretty available and rather cheap, buyers at the time, this statistic caused great consternation in the minds of the company executives.

How were they to expand their market-price and sell more cars when there would be no one around with the requisite skills to use them? The answer of course was simple: They made the cars less complex, more reliable and easy to use and stimulated the need for skilled chauffeurs.

Similar analogies can be made between computers and a number of other technologies (we have had to make the transition from the realm of the expert to the mass consumer market place, just as in the case of cars) and Philips compact cassette decks are other examples.

Computer manufacturers and software business are now faced with the same problem. They are in a position to produce the technology cheaply enough to appeal to a growing mass market and are also probably trying to find the right way of packaging it.

The essence of this packaging, if it is to be successful, is to provide the user with the right amount of power under the job with the minimum amount of fuss.

Going back to the car, cameras for a moment, the success was based on a belief in a simple way to take snapshots. You pointed the camera at your chosen subject and pressed the button. All of the programming required to get the exposure and focusing right was done for you.

The problems of processing the film—even the problem of loading and unloading it from the camera—were also taken care of because you released the whole thing, camera and film, to the manufacturer. A few days later your new set of snapshots and your camera with a new film were returned to you.

Similarly the cassette tape offered users a recording medium which did not require messing about with threading reels and setting recording levels. You could not perform sophisticated editing

being carried, but this most users did not want to.

In both these cases success came as a result of removing all of the technical aspects of the technology required by the experts and leaving the important functions in a simple form.

Unfortunately, this has not happened with computers.

As products of the technologically sophisticated industry which designs and builds them, they reflect the needs of that industry.

Part of the problem lies in the predominant method of interface between person and machine—the keyboard for input and the screen for output. It is worth noting incidentally that both of these technological innovations pre-date computers by a good few years.

The keyboard in particular exerts a tyrannical influence over the form and content of information fed into a machine. It is an environment that demands precision.

This influence also affects the way that information is processed within the machine (the instructions are fed in through the keyboard and inevitably the method used to present the processed information. At all levels, precision is the order of the day).

In the space-age and military worlds where computers were first operational such precision is mandatory and these needs are reflected in almost all cases of machine design.

But in the world at large it is not only unnecessary, it is a pain to users. The speed of good quality graphics

reflects the data among the minority officers. It is only recently that graphics have been introduced on larger computers whereas microcomputers have had them all along — there is a lot of evidence to suggest that the Apple 2 success was based on its excellent graph to drive all else.

Pictorial methods of presenting data are far more convenient in many of the applications of microcomputers in the same way that the digital watch is less convenient as a method indicating the time than an old-fashioned analog watch. Tables of numbers are less convenient than pie diagrams and bar charts.

But these methods of presenting data are equal. Like the analog watch they are used to provide an indication rather than precise information. Nevertheless, it is quite inadequate in the right context.

Until recently this desire for simplicity has not been reflected in the way you get your data into the system. You still have to pick out the right keys on that tortoise-odd keyboard.

It is encouraging that companies like Apple and Xerox have recognized the potential of the sort of devices used in video games.

In the case of Xerox, the mouse and the Star system from Apple, with the mouse, are certainly the beginnings of a new way of packaging a computer system (Apple's Star was removed last month).

Hopefully the next breakthrough will come in the way that software works in the sense of processor will be filled from computer altogether. ■



*If it's not any way you can get the smallest computer to give us an attitude!*

# SEIKOSHA PRINTERS. FOR NAME DROPPERS EVERYWHERE.



ACORN ATARI  
BBC MICRO DRAGON JUPITER  
LYNX NASCOM NEWBRAIN  
ORIC VIC 20/64  
VIDEO GENIE  
ZX 81

If you own one of these microcomputers you can get more out of it by running it with a Seikosha printer. The Seikosha range offers professional performance at a cost that's comparable with your computer - with prices from around £215 to £260 (ex VAT).

No other printers offer so much for so little. Full graphics, programmed printing (250 X) 80-col, 50 cps, on standard paper. Serial and Centronics parallel output ports enable almost all computers to be interfaced with the Seikosha range with ease. Many other advanced features, plus Seikosha's proven reliability and the nation-wide support of DRG's distributor network make the Seikosha the natural choice for the microcomputer user.

Telephone these listed distributors to see one of the remarkable Seikosha Printers in action, or, if you want to know of nearest distributors, telephone the number below.

## DRG

### BUSINESS MACHINES

THE FINEST WORLDWIDE SUPPORTED NATIONWIDE.

10th Floor, 250, 251, 252, 253, 254, 255, 256, 257, 258, 259, 260, 261, 262, 263, 264, 265, 266, 267, 268, 269, 270, 271, 272, 273, 274, 275, 276, 277, 278, 279, 280, 281, 282, 283, 284, 285, 286, 287, 288, 289, 290, 291, 292, 293, 294, 295, 296, 297, 298, 299, 300, 301, 302, 303, 304, 305, 306, 307, 308, 309, 310, 311, 312, 313, 314, 315, 316, 317, 318, 319, 320, 321, 322, 323, 324, 325, 326, 327, 328, 329, 330, 331, 332, 333, 334, 335, 336, 337, 338, 339, 340, 341, 342, 343, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368, 369, 370, 371, 372, 373, 374, 375, 376, 377, 378, 379, 380, 381, 382, 383, 384, 385, 386, 387, 388, 389, 390, 391, 392, 393, 394, 395, 396, 397, 398, 399, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 418, 419, 420, 421, 422, 423, 424, 425, 426, 427, 428, 429, 430, 431, 432, 433, 434, 435, 436, 437, 438, 439, 440, 441, 442, 443, 444, 445, 446, 447, 448, 449, 450, 451, 452, 453, 454, 455, 456, 457, 458, 459, 460, 461, 462, 463, 464, 465, 466, 467, 468, 469, 470, 471, 472, 473, 474, 475, 476, 477, 478, 479, 480, 481, 482, 483, 484, 485, 486, 487, 488, 489, 490, 491, 492, 493, 494, 495, 496, 497, 498, 499, 500, 501, 502, 503, 504, 505, 506, 507, 508, 509, 510, 511, 512, 513, 514, 515, 516, 517, 518, 519, 520, 521, 522, 523, 524, 525, 526, 527, 528, 529, 530, 531, 532, 533, 534, 535, 536, 537, 538, 539, 540, 541, 542, 543, 544, 545, 546, 547, 548, 549, 550, 551, 552, 553, 554, 555, 556, 557, 558, 559, 560, 561, 562, 563, 564, 565, 566, 567, 568, 569, 570, 571, 572, 573, 574, 575, 576, 577, 578, 579, 580, 581, 582, 583, 584, 585, 586, 587, 588, 589, 590, 591, 592, 593, 594, 595, 596, 597, 598, 599, 600, 601, 602, 603, 604, 605, 606, 607, 608, 609, 610, 611, 612, 613, 614, 615, 616, 617, 618, 619, 620, 621, 622, 623, 624, 625, 626, 627, 628, 629, 630, 631, 632, 633, 634, 635, 636, 637, 638, 639, 640, 641, 642, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654, 655, 656, 657, 658, 659, 660, 661, 662, 663, 664, 665, 666, 667, 668, 669, 670, 671, 672, 673, 674, 675, 676, 677, 678, 679, 680, 681, 682, 683, 684, 685, 686, 687, 688, 689, 690, 691, 692, 693, 694, 695, 696, 697, 698, 699, 700, 701, 702, 703, 704, 705, 706, 707, 708, 709, 710, 711, 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 723, 724, 725, 726, 727, 728, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 746, 747, 748, 749, 750, 751, 752, 753, 754, 755, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 767, 768, 769, 770, 771, 772, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 792, 793, 794, 795, 796, 797, 798, 799, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810, 811, 812, 813, 814, 815, 816, 817, 818, 819, 820, 821, 822, 823, 824, 825, 826, 827, 828, 829, 830, 831, 832, 833, 834, 835, 836, 837, 838, 839, 840, 841, 842, 843, 844, 845, 846, 847, 848, 849, 850, 851, 852, 853, 854, 855, 856, 857, 858, 859, 860, 861, 862, 863, 864, 865, 866, 867, 868, 869, 870, 871, 872, 873, 874, 875, 876, 877, 878, 879, 880, 881, 882, 883, 884, 885, 886, 887, 888, 889, 890, 891, 892, 893, 894, 895, 896, 897, 898, 899, 900, 901, 902, 903, 904, 905, 906, 907, 908, 909, 910, 911, 912, 913, 914, 915, 916, 917, 918, 919, 920, 921, 922, 923, 924, 925, 926, 927, 928, 929, 930, 931, 932, 933, 934, 935, 936, 937, 938, 939, 940, 941, 942, 943, 944, 945, 946, 947, 948, 949, 950, 951, 952, 953, 954, 955, 956, 957, 958, 959, 960, 961, 962, 963, 964, 965, 966, 967, 968, 969, 970, 971, 972, 973, 974, 975, 976, 977, 978, 979, 980, 981, 982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000.



# Letters TO THE EDITOR

Which Micro & Software Review,  
57a Hatton Garden, London EC1

## BBC mouse

I am a teacher in a village school and an order has been placed via the local authority for a BBC B mouse.

Before the machine arrived at school and the pupils are let loose on it I feel the need to get a miscellaneous for myself so that I can get the best out of the school machine. However, I do not feel that the family budget can be stretched to the extent of paying for my own BBC.

I wonder whether you could suggest a mouse in a cheaper price range say £700-£150 that could be bought as a substitute for the BBC machine I am looking for the machine that behaves in a way most like the performance of the BBC mouse at a fraction of the cost.  
W M Pope  
South Gloucester

If you need to buy a mouse straight away then the best bet is the Zenker 2081 or the Commodore Vic 20 Mouse or the new Mouse from Acorn the people who brought you the BBC mouse or else very poor.

This mouse is a downgrade of the BBC mouse with no mouse menu of the same facilities. The Mouse is probably your best bet and worth waiting for.

## Educator

As a good start to your excellent article on computer education in your January issue, I feel I must point out that the subject is not just a matter for schoolchildren.

Computer education in the adult sphere is equally important, if not vital, if the more mature among us are to meet in conversation with the fast moving area of technology.

I have been studying computing on a dis-

release basis for the past three years and have found the whole course most rewarding. An essential first step in the course not only 'knock the old grey matter (brain) over' but also gives one a good insight into the technology which surrounds me in my every day work.

Perhaps a follow-up article could be considered in due course.  
Ding Mallett  
Sudbury Suffolk

## A follow-up article is being considered at present (Jig)

## Newswire

In my view the Newswire has received a good press for what most of its users consider as an excellent means of goodly supported by Grundy and the Service (at least the one I have utilised except for Cabots of Birmingham).

Part of the reason for the good support from the Service is not their fault is that they don't seem to be kept up to date by the Grundy people.

The Independent Newswire User Group is being formed as a nationwide Newswire information gathering and distributor on Newswire hardware and software features. I've asked myself company secretary because I hope to further a team. Hope any part of the UK, who will be as keen.

as I am to get real and adequate support for all the users and a few people will share in the necessary tasks.

The written software for the PC2 1600 H200 PC2-8020P SUPERBRAIN etc and I would like there to be an additional balance determined by other people's interests and views so the Newswire are not just a plug for the sale of software I will MSCG produced this designed for the benefit of growing businesses.

The Newswire editors will in fully be distributed to people known to have in the hope they will get more useful subscriptions from selling spare copies. A three-fold editor will be distributed to about 1000 more enthusiasts the first few hundred members will get a free error summary card to test as a new of programs hardware tests and on up to date dealer report in the Newswire text.

The year's subscription for the Newswire/IN GROUP membership is to cover the production and postage costs of an Ad-Adv message board and has been set at £6.50 for twelve issues and £1 for single issue samples for back orders.

The main feature that should occupy a significant part of the Newswire are questions/answers sections but I only carry out as for a personal matter than public reply will get an answer & others I hope Temporarily Membership Secretary.

The Independent Newswire User Group/IN 15 St. Johns Court, Welkfield MK1 2RY



## Also for

As a newcomer to computing, I need playing with the Apple program. For a Newswire in February's software review to see if it would suit my needs, contact Area 020 11 8444.

Add line 97 00W 4020  
Change 436 88C to 87W  
Change 455 87W to 88C  
Correct 840 8 X to 1

THANX GOTS 1280

Tony Dawson  
Killington, Oxford

## TV damage

"How Micro can damage TVs - you must correspond to TV/computer matching





and there are no problems. With a timing that is only a very slight problem, with neither Thomson TV model the problem is just as bad as this.

What is the solution — short of buying a Thomson TV? S. B. Park, Bedford.

What is the solution — short of buying a Thomson TV? S. B. Park, Bedford.

### Program ideas

With reference to your advertisement in the February issue of *Which* about asking for people who are interested in writing programs for the Dragon 32 to contact you. Firstly you request a postal listing for the program — is this really necessary? Would a hard-copy program not suffice? Secondly is it basic or machine code programs you are interested in, or does it not matter?

My third query concerns the law. Are programmers allowed to work for two organisations simultaneously? I am working particularly about copyright. What are the ethics of somebody writing programs for the Dragon then perhaps offering the same programs to Commodore or Sinclair?

John Papanicolaou  
Barnley, Leeds.

Although we prefer a machine-generated listing for obvious reasons of accuracy, we can get by with a cassette

containing two copies of the program, a full readable list, and an explanation of any machine-specific comments such as PEEK and POKE of PC code. As a general rule of you can't provide a reader listing there is no need to provide a hard-written copy.

We are mainly interested in BASIC programs, unless they happen to be useful otherwise.

As far as the legal question goes it is really impossible to give authoritative advice, since in our knowledge there has never been a test case in this subject. If all the manufacturers involved were aware of the programmer's situation and asked no objections then it might be possible to proceed.

### TIPS/4

#### Advances

I was somewhat surprised by your recent review of 16 bit machines (February) in that Texas Instruments were not even mentioned apart from an interordinate summary of their 68000 TMS 68000 driven business system. The fact that silicon can already obtain the same 16 bit processor in a home micro costing £150 is surely worth a word!

As a user of the T16044, I can confirm that the 16 bit architecture gives excellent program assembly language programs of engineering speed and supports 10 digit mathematical accuracy.

It certainly made a big mistake in introducing the

8048 too quickly and quickly in 1980 at a very high UK price of almost £1000 but the A version at £150 beats the competition out of sight for anyone who remembers to lot.

As a final point could you please refer the editor concerning the note about the T16044 in your machine summary a reference to previous prices is not necessary as almost every micro in the lot has been reduced drastically at some time starting at the top with the Z80!

- At small scale cost OPTIC might not be available with an early programmable 28 compared to only £1 on the new Commodore 64.
- A complete range of peripherals including spare's exists.

Availability of 3rd party software is not widely advertised but I publish a catalogue containing almost 1000 programs, 80 per cent of which are 3rd party. The UK Clay Group has a library of 400 low cost programs and there are other sources including a company offering excellent programs from America and Canada. These programs cover a very wide range with far more business and educational applications than the usual other low cost micro.

How many programs can anybody actually use? (By the way I think you put magazine is excellent and please note that I have no connection with Texas Instruments.)  
I.C. Davies  
Hobart  
Cleveland

This is my problem. I have a Dragon 32 and a Thomson 8000 TV. I get patterning in the background and the figure thimble. I've tried the Dragon on other people's TV's it's a Sony

# SILICON TIPS *Handy Hints for Mass Users*



# INTECAM COMPUTERS



**INTECAM 1**  
The INTECAM 1 is a budget selling 16 bit microcomputer with easy access to 64K memory supply that has 32K of random access memory (RAM) and 128K of ROM. It has a 100K byte disk drive and a 100K byte disk controller (DMA) and MS-DOS.

**MICRO DESIGNER**  
Micro Designer is a 16 bit microcomputer. The Micro Designer is a fully featured designed computer that supports the current generation of software. It is equipped with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**MINITEL**  
The INTECAM Minitel is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**ADVANTAGE**  
The INTECAM Advantage is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**EPSON 801-20**  
The INTECAM EPSON 801-20 is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**TELETYPE**  
The INTECAM TELETYPE is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

# INTECAM PERIPHERALS

**MOCKUP and MOCKUP II**  
The INTECAM Mockup and Mockup II are 16 bit microcomputers with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. They are also equipped with a 100K byte disk drive and a 100K byte disk controller.



**PCB WORKING**  
The INTECAM PCB WORKING is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**TELETYPE**  
The INTECAM TELETYPE is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.



**INTECAM 8000 and 8000 II**  
The INTECAM 8000 and 8000 II are 16 bit microcomputers with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. They are also equipped with a 100K byte disk drive and a 100K byte disk controller.



**FLOWERER 80100 and 80100 II**  
The INTECAM FLOWERER 80100 and 80100 II are 16 bit microcomputers with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. They are also equipped with a 100K byte disk drive and a 100K byte disk controller.



**FRESH 100**  
The INTECAM FRESH 100 is a 16 bit microcomputer with 64K RAM, 128K ROM, 100K byte disk drive, and a 100K byte disk controller. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

# INTECAM SOFTWARE

**MOCKUP**  
The INTECAM Mockup software is a 16 bit microcomputer program that allows you to create a 3D model of a 3D object. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

**PCB WORKING**  
The INTECAM PCB WORKING software is a 16 bit microcomputer program that allows you to create a 3D model of a 3D object. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

**TELETYPE**  
The INTECAM TELETYPE software is a 16 bit microcomputer program that allows you to create a 3D model of a 3D object. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

**INTECAM 8000**  
The INTECAM 8000 software is a 16 bit microcomputer program that allows you to create a 3D model of a 3D object. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

**FLOWERER 80100**  
The INTECAM FLOWERER 80100 software is a 16 bit microcomputer program that allows you to create a 3D model of a 3D object. It is also equipped with a 100K byte disk drive and a 100K byte disk controller.

**INTECAM COMPUTER STORE**  
1000 10th St. N. #1000, Minneapolis, MN 55412  
As well as the products listed here, we stock a wide variety of software and hardware. All software can be shipped and hardware can be shipped in one day. Please call for more information or visit our store. We are open 10:00 AM to 6:00 PM, 7 days a week.



# IF YOU WANT PROFESSIONAL SERVICE FROM A COMPUTER DEALER THERE'S A NEW ONE FOR YOU



From now on, you won't have to look for a totally professional home computer dealer.

Just look for the name that says it all: **COMPUTERS FOR ALL**.

It's the newest and most exciting network of Micro dealers in the U.K.

The ideal places to buy, browse, seek advice and after-sales

service... professional service!

Every **COMPUTERS FOR ALL** dealer is dedicated to giving you, the customer, exactly what you have always wanted... a shop or store that knows about computers,

capable of helping you sort out what's right for your needs, expertise

in giving sound advice, knowledgeable in technical matters.

If you've ever bought from the usual retailer who just stocks and sells,

you'll appreciate the difference!

A **COMPUTERS FOR ALL** dealer is a shop where people matter... why not

call in at your local one today. You'll get a friendly welcome!

# SERVICE FROM A COMPUTER NAME TO LOOK FOR:

## FRIENDLY SERVICE AND THE WORLD'S FINEST MICROS!

You'll find a wide range of popular Micros at a COMPUTERS FOR ALL dealer. Atari 400 and 800, Sinclair ZX Spectrum, DRAGON 32, SORD M5, NIPPI, Commodore 64, Dric I (48K) and BBC Micro\* to name a just few! Plus of course, the sort of dealer who can (and will) explain which one is best for your needs!

## HARDWARE, SOFTWARE TOO!

A COMPUTERS FOR ALL dealer also stocks a great deal of the very best hardware and software, so that you can expand into new worlds of computing. Everything from equipment like EPSON and SEIKOSHA printers to a fantastic new range of ATARI software direct from the U.S.A.!

Of course, you'll also find lots of other items of interest at a COMPUTERS FOR ALL dealer. Books, BBC Software, DRAGON 32 Software the list is endless!

Call now at your local shop or store. Look for the name that says it all. **COMPUTERS FOR ALL**



\*BBC Micro available at selected dealers only

## Where to find your COMPUTERS FOR ALL DEALER

**ADANTE INSTRUMENTS LTD**  
Unit 76, Ardingly Court  
South Road, Newby Green  
0773-60426

**ANDIS COMPUTERS**  
24 Colchester Street  
Halesowen, Walsley, Staffs  
0523-23421

**APRONS SOFTWARE CO.**  
53 Canterbury Road  
Waltham, Walsley, Staffs  
0523-23421

**AUTOMATION SERVICES**  
10 Wake  
1 Wemyss Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**44 Park Street, Waltham**  
0523-23421

**CAECON COMPUTERS**  
4 Watkinson Road  
Great Waltham, Walsley  
0523-23421

**COMPUTERS**  
2 Central Parade  
21 North Hill, Walsley  
0523-23421

**COMPUTER CENTRE**  
The Walsley Village  
10 The Walsley Village  
Walsley, Walsley, Staffs  
0523-23421

**COMPUTER SYSTEMS**  
(FORBIS)  
Penny Street, Walsley Green  
0523-23421

**COMPUTERS FOR ALL**  
77 North Street  
Walsley, Walsley  
0523-23421

**CRYSTAL COMPUTERS**  
708 Green Street, Walsley  
0523-23421

**DATAWAYS (BARNBY) LTD.**  
11 Helen Road  
Holly, South Walsley  
0523-23421

**B & B (BARNBY) LTD.**  
12 Kings Street, Walsley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE LTD**  
26 The Green Road, Walsley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE LTD**  
26 The Green Road, Walsley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE LTD**  
26 The Green Road, Walsley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421

**EMPIRE COMPUTER CENTRE**  
(BORN RECORDS)  
10 Kingston Road, Pateley  
Walsley, Walsley, Staffs  
0523-23421



# DRAGON V LYNX

*Two newcomers to the micro arena are here  
matched against one another and then  
benchmarked*

**I**f we tentatively try to stress when you buy a micro you are basically buying hardware for the software available for that particular brand of computer.

The exception to that is those machines with the CP/M operating system but that applies really only to such more expensive business models.

Except for the most urgent requirements amongst the vast majority of micro owners will at some time want to purchase software.

And the reason for this heavily at the beginning of a computer owner's life on the Dragon and the Lynx is that any computer experience should include an assessment of the software. To what have much what type and what quality of software is available.

In the case of Dragon and the Lynx however that is quite an expensive. The Dragon now has a steadily increasing range of what is essential games software that is of a wide variety (see Which Micro?—Soft Release February and March issues) though compared with some other packages it is refreshingly cheap—typically less than £10.

The Lynx on the other hand has absolutely no software at all available for it at the time of writing (early March) and they have only just got round to releasing an introductory demonstration tape for purchasers of the machine.

The point about software needs to be over-emphasized. The **Micro**

**Market** office has recently had several distraught letters from those who have purchased a Lynx, happily played with it (seems a hell of a best and generally been impressed).

But, after the initial euphoria has worn off, they don't know what to do with it and with no software there is little want to do unless you want to become an elite programmer. But the Lynx, we are assured, will have software very soon—initially educational but then some games packages to follow.

Lynx manufacturers Computer have now set up a separate software company—Comsoft—to commission material and write their own in-house. First packages are promised for the

the market? In terms of looks the Lynx now looks done with its grey colour and smaller case making it a better package than the more elite Spectrum-looking Dragon. It is about £120 (some would try a higher number).

In terms of use however the Dragon will be first. Part of this is due to the fact that with fewer facilities on the Dragon there is less to worry about.

More complex software mean more complexity for the user. On the other hand it is well worth having the Lynx's lower cost little software on the Dragon you are limited to upper

*The Lynx has absolutely no software  
available at present*

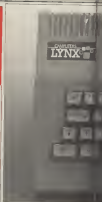
and of Manchester Comsoft will also be developing a disc operating system as well as text and Pascal interpreters.

One final point about Lynx software. As a Computer magazine it is frankly advised the powerful facilities available have been put in to some extent in the expense of screen handling capabilities and as what games packages there are are unlikely to be of the highly innovative made up as loved by manufacturers such as Atari.

But they need when of the machines

case characters (optical letters) only. But since of use is not, and to do with the number of facilities. While the Dragon performs in a perfectly healthy way when you are playing or installing or programs by scrolling the screen neatly upwards the Lynx does not have a scrolling facility at all.

Instead when scrolling the bottom of the screen the next line is displayed at the top. And when listing programs it is irritating to see the list to have the first half of the programs of the





bottom of the screen and the second half at the top.

The Dragon keyboard conforms fairly closely to a typewriter where as the Lync is a little more adaptable. For example the return key—surely one of the most frequently used keys—is located away on the bottom right hand corner of the keyboard.

Because of a few extra keys the Lync offers the ability to shift easily from lower case to upper case, and because of the addition of a separate delete key the backspace arrow can be used for inserting characters on a line.

With the Dragon you must enter a

sured no alterations in the program. The Lync, however, like the Sinclair machines, requires certain things such as the provision of a LIST statement (ie LIST A, N rather than A, = N) but if you omit LIST the machine will auto list after every screen if you.

What it won't do, however, is insert certain other commands such as GOTO. Thus the line IF A = 5000 THEN N 3000—must be changed to IF A = 1000 THEN GOTO 300.

Fortunately however these requirements— as with Sinclair Basic — are easy to incorporate while you are familiar with them. And for those

#### Computer's Lync

actually available in the computer to put your programs into.

When a computer is referred to as having a certain amount of memory it usually refers to RAM. But not all that RAM will be available to the user for his/her programs.

And the amount which is left can vary considerably between different manufacturers. Hence the Commodore 64 (a 64K RAM) allows only 35K for Basic programming while the BBC B (rated as only 32K) allows 27.5K for the user.

With the Lync and the Dragon the contrast is even more revealing. The Dragon 32 (ie 32K—see it's easy) has 24K available for Basic programs but the Lync—with 48K RAM—has only 12.5K available.

To depict the fact that at first sight the Lync has more memory it is the Dragon which will accept the larger programs.

Where does the extra 34.5K of the memory for the Lync go? On screen mapping Computers told us. And to a certain extent the more vertical and powerful features of the Lync will take up more memory—so you save your money and you take your choice.

But, and a big but, the screen scrolling on the Lync is very slow—hence the chance of about highly intense but games software being unlikely to be

### With the Dragon you must enter a special mode and type "Y"

special mode and type "Y" before inserting a character all of which is quite time consuming. The Lync also has auto-repeat on all keys unlike the Dragon.

When entering programs the Lync saves by printing up a row message straight away—unlike the Dragon which will not inform you of mistakes until you attempt to run the program.

The Dragon Basic is very similar to Microsoft's standard 256 Basic and entering the statements requires re-

entered in early getting into Basic programming the Lync screen easily was offering such goodies as TRACE, APPEND, RENUMBER and automatic line numbering.

Since our full review of the Lync (see *Which Move?* December) Computers have announced that string arrays are now to be included (Arrays are single dimension but by using subscripts multi-dimensional arrays can be created). So the Lync has a powerful Basic but how much space is

available for the Lynx.

Both programs offer high resolution facilities with the Lynx slightly better in that it can really read text and graphics at highest resolution — something which is very complicated to do on the Dragon.

Neither of the manuals are excellent but there is one major omission in the one for the Lynx — there there is no index. Considering much of the material is in the well-used format of looking at instructions with instructions you'd say it is less than useful to have to guess from the contents where things are.

But both the manuals are reasonably comprehensive and adequate for the moment. The Lynx manual also contains some humor although possibly not all is deliberate. For example when talking about a program being the game in lines 170 and 220 it intended to give the impression that the computer is making some weights calculations is that what home computing is about!

Making a final choice comes down to the manner of text to who that you want to get heavily involved in basic programming — in which case the Lynx is the answer though the BBC machine should also be looked at (£199-£200).

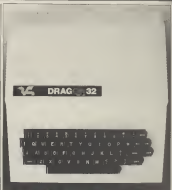
The Dragon is easier to use but has less facilities although the ability to scroll properly is a very desirable feature. And although the Dragon contains better able to load a games software than the Lynx, if games are likely to be the prime use of your machine the other machines should be considered — especially the Atari 400 (£199).

The Lynx has strong potential and if good software and the promised also drive software and Personal computers actually exist it could be a winner.

The Dragon must also be considered as distinct to the software and though there are around 50 packages now available it is surprising that there are not more considering it is compatible with the handy Commodore systems — but which there is a wealth of software available on the DS. ■



We will give an answer!



From Dragon Data line 33

## The Finsbury Benchmark

Here we test the 485 version of the Lynx against the 32K of the Dragon

For the purposes of bench testing *Which Month?* has tested both computers with a series of eight Basic routines. The object is to compare the speed of different machines by having identical programs through them.

As can be seen the Lynx comes out well on top in all the tests. In fact it beat the machine the Lynx into a less than half the time to perform them. And although speed of operation is by no means the most important factor when choosing a micro it is still worth considering.

Now for the speed advantages of the Lynx may help in producing good

packages is of course still a mystery due to the total lack of software for it. But the speed of the related range of Dragon software currently available tends to be satisfactory rather than slow.

And the gap between finishing one play of a game and waiting for the computer to adjust itself for the next play can be crushing.

So the Lynx at £225 is better than the Dragon (£200) and surprisingly also beats the Commodore 64 (£249). The BBC machines (£200 and £299) are faster still. See *Which Month?* Software Arrangements for March.

120 Benchmarks — The Dragon versus the Lynx

(in seconds)	Dragon	Lynx
Test 1	15.1	8.8
Test 2	10.7	4.4
Test 3	19.8	12.7
Test 4	21.8	8.1
Test 5	23.5	10.5
Test 6	34.2	17.4
Test 7	48.0	22.3
Test 8	138.0	66.5

# PRINT OUT



It's hard to be sure of it with an Amber type Matrix Printer

## AMBER 2400 MATRIX PRINTER

LOW RUNNING COST USING  
PLAIN PAPER  
USED WITH MANY COMPUTERS,  
INCLUDING DEC/JAR/IBM ATOM  
DRAGON/NEBERM/ATARI.  
TEL: 06-420-28 040 02-000

£ 78

4407 & 22-05 PIP  
Or for details send a  
coupon 500 54

AMBER CONTROLS LIMITED  
Central Way  
Walsworth Industrial Est  
Ardour  
Newbury SP18 3QL

## HP's NEW LOW COST COLOUR PLOTTER



MAIN DISTRIBUTOR:-

- FAST PLOTTING
- HIGH RESOLUTION
- HIGH QUALITY
- MULTICOLOUR
- A4
- COMMODORE-COMPATIBLE  
Special Manual and Disc at £35
- APPLE-COMPATIBLE
- NATION-WIDE SERVICE
- UNDER £1060
- RS 232 AND HP16  
INTERFACES

ENQUIRY TO US AND CONTACT ENQUIRES WHEREAS

## THE HOLDENE GROUP

Margaret South  
Grey House,  
Leicester Place,  
Leeds, LS2 9JH  
Tel: 0532 129429

Don Mason  
48 Canal Road St,  
Edinburgh,  
EH3 6QY,  
Tel: 031-557 4060

Royal Avenue  
Heath House,  
47 Water Ln, Tettnow,  
Cheshire, SK9 5BB,  
Tel: 0625 529446

Please fill in and return this to: THE HOLDENE GROUP

Name  
Address  
Postcode

# ZK81 v IBM PC

*Some surprises for IBM as our rabid Z801 enthusiast-David Babsky puts his 'puny' machine against the might of the Personal*

**T**he IBM is certainly supposed to be a revolution machine. Some aficionados would even claim it can simulate a full size mainframe in many respects.

It is certainly got a very pretty screen built on the model 3 — very large, easy to read letters in red green and a very positive white character/blank keyboard!

But you're provided with a Disc Operating System (DOS) to load into the machine when you first use it.

Then the first thing it either asks you to do is a prompt to type in the day's date. A simple task.

But not for the IBM Personal.

Even though it shows you time on the screen!

It shows: Current date is Tue 1-01-1982

Enter new date

So you type in something like Fu 3 12 1982

and it says loaded date

Enter new date

So you leave only one space between Fu and 3 and try again. Still it's no good! So you try Fu03 and Fu 3 12 1982 without the hyphens and then Fu312 1982 then you try Fu03121982 and so on.

I stood behind someone for a full ten minutes while he tried to log in the date — after that a spot of lateral thinking inspired him to just press the Enter button and ignore the date altogether!

Can you imagine it? Spend over a couple of thousand on a computer that it won't even acknowledge the date when you type it in as instructed. The IBM is definitely a tricky machine.

Now the Apple — and if you've tried one you'll know — it's much more forgiving computer.

If you type in spaces where there should be tabs in a program instruction, or you miss them out when you should have put them in, the machine doesn't care. Type DATA LOG when you want to load in a file, and if it doesn't say the job Type RUNPROGRAM when you mean RUN PROGRAM and it'll still do the job.

But what use an Apple or an IBM as a BBC or a Resound or almost any other computer show — or even street

ling block you're want to trip over.

You can write a program of a hundred or more instructions in BASIC, then you type out those last three letters B O A, discs start to whir, memory clicks its absolute thoughts across its core segments, and then it responds with ERROR IN LINE 300.

Do you know of anything as infuriating as spending an hour or more planning out a program, finding it by checking it line by line, word by word, then you put it all together and run it, and it tells you there's a mistake hidden deep somewhere inside?

But there's one computer which doesn't fuss like that.

It's a wonderfully basic little machine which won't let you waste your time and make a fool of yourself. It doesn't cost a couple of thousand, it doesn't cost a couple of hundred.

It's the fifty pound Zenith Z801.

For those who've never met a Zenith and just dream of it as a toy, let me tell you that it does two things that the IBM won't do, and which the Apple won't do either, and the highly priced BBC won't come to half of it.

When you type in a line of BASIC the Z801 and the ZX Spectrum will check lines and then whether the line makes sense. And if it doesn't, it'll tell you it's wrong — and moreover it shows you where you've made the mistake!

That makes it absolutely impossible

to write a program with syntax mistakes in it (although it is still possible to completely mess out a line like RETURN).

The IBM and others work — you can call a computer with no words at all, changing parts a machine! — and check each instruction as you write it, to check that the computer program will do it as possible to bring you worried out first later.

And not only that, but you can write a program on a Zenith or half the time that it takes on any other BBC machine. Why? Because you don't

press the F function to get PRINT and you just press C to get GO TO on the screen.

If you're using a FOR/NEXT loop you only have to grid the F and N keys, and each of the words within itself for you — compare with easy read spaces to spread out the rest of the line more lightly.

The more I use a really sophisticated computer — I mean a really expensive computer — the more I yearn for my unassuming little Z801.

Let's list a program on an Apple or on the IBM PC for that matter.

Press LIST — I mean type in the four letters LIST — and off it goes, back when what you're

data goes scrolling up the screen, flying off the top and going out and around somewhere at the back of the monitor.

What that line 300 flashing led to.

LIST it again, and my god stop! Stop, as it whizzes on its way. Job at Control C or Control-Break, then. Mashed it again.

What a mess. You don't have that trouble with the Zenith. Why or with so people put up with these flash be language? On the Zenith you press the LIST button, and it lists all the screen as full. Then it stops. And if you want more you type LIST and the next line you want it to start from. Then it lists all the screen's full again. Simple. Surfaces, Super!

**"Speed a couple of thousand on a computer and it won't even acknowledge the date"**

to write a program with syntax mistakes in it (although it is still possible to completely mess out a line like RETURN).

The Zenith machine — can you call a computer with no words at all, changing parts a machine! — and check each instruction as you write it, to check that the computer program will do it as possible to bring you worried out first later.

And not only that, but you can write a program on a Zenith or half the time that it takes on any other BBC machine. Why? Because you don't

it's like watching a bus, you expect it to wait at the bus stop while you get on. You don't want to go and grab the handle while it's still waiting past — but that's the way the Apple, the IBM and others work.

They seem to have been designed to let the computer get on with its work — whirling bits of data all over the screen — without a thought for how the human is supposed to interact with all this technology.

And what about the goodness?

Why do I have to take to a program to see what it's doing, what's going on



symbols on this IBM end or the DEC end?

Why can't the symbols be easily displayed on the keyboard itself, as on the Z801?

It's as if the telephone dial had letters A,B,C,D instead of numbers and then I had to look up which number corresponds with which letter before making a phone call.

**Whenever the Sinclair takes a second or so, the IBM took almost four seconds.**

Doesn't make sense, does it?

And most probably of all you should try the IBM's INKEYS function, and then compare it with the unassuming little Z80 Z801. It's a function that makes appalling that trying to type in the date the way the Z80 does tells you to, then finding that the Sinclair won't accept it.

You know what INKEYS does don't

The Z801 checks each line of text

you? It's a way of getting a computer to react to what you've typed in without your having to press the Enter or Return button. So it's very handy to use in a program which will be run by someone who don't realize that every keyboard response has to be completed with a Return keystroke.

And it ought to be good for games because it means that you can produce a quick reaction from the keyboard responding with I or A or B or C, obviously quicker than having to reply to a prompt with I B Return or A B Enter.

I was writing my own Adventure game on the grand IBM PC. And I thought I'd go into letters then the

Microsoft version. Instead of typing I and Return to move left or P and Return to move right—in an Microsoft—I thought I'd write a little routine in which the machine waited to see if the player had responded with I, P, A, B, T or G.

That would cover left, right up down, forward or backward. And the IBM don't forget, has a 16-bit processor, so it should work damned fast.

Hope

My simple little Sinclair must have been those three faster to run the same routine.

But most pleasant of all, the IBM displays no acknowledgement of what you've typed or what you see the INKEYS function (see page 28).

If you press a button and the machine doesn't appear to recognize it, it's a fairly human reaction to hold your finger on the button until some response does appear.

While the IBM is testing to see if the key pressed is one of the six specified letters, nothing appears on the screen. You hold your finger on the key.

Then when it's tested the various conditions and responds with the appropriate reply it also prints out a string of characters, letter I for example. For all the time you left your finger on the I key it prints another character onto the screen—another character merely and utterly stupid.

And the Sinclair?

You type in your I to move left in the Adventure game and the computer immediately responds by putting a single letter I on the bottom left of the screen. Then it tests to see if it should make a particular move in reply to your input of the I. It's the second or so that it takes to analyze that most the processor remains uncommenced—rather like the IBM. But as it's already reacted to your letter I, you realize that it's now busy thinking of what to do next.

And whereas the Sinclair takes a second or so, the IBM took almost four seconds before it then displayed letter I all across the screen.

Here, well it's right—I know I must be the world's best programmer maybe I didn't write the program successfully enough. Maybe I gave the processor too many options for it to make up its mind quickly enough for my liking.

Perhaps I'm a dumb old old-guy and even though I programmed the IBM according to its BASIC manual it could be that I introduced some unnecessary over-checking which wasted time.

But my point is that I couldn't have made such a programming error on the Z801. It says I accept that there's no words there but do you write them?

That's the feature that I as a programmer to competing, need to see incorporated into every machine I want

an average-sized computer.

It's not impossible when you see how straightforward the Benchmark is.

My simple operation is, if it can be fast-coded for IBM, why not two general just to make redundant. ■

### INKEYS Function

Here's how the INKEYS function works on the IBM, the Apple II and the Z801.

IBM—

10 AS=INKEYS

assign whatever keyboard character is pressed to be the content of the string AS. That string can then be tested to see if it fulfills certain rules.

IBM—

20 IF AS= ' ' THEN GO

By using the GO

100

100 AS=INKEYS IF AS= ' ' THEN

100

a program will pause indefinitely until a key is pressed (i.e. until the value of AS is something other than an empty string).

Apple—

A program can be similarly halted just by using

10 GET AS

As soon as some keyboard button is pressed the program will continue. AS can be tested for various conditions as with the IBM. It is necessary to use the magic word INKEYS.

Z801—

10 IF INKEYS= ' ' THEN GOTO 50

works just as on the IBM, but it is not necessary to convert INKEYS into another thing, such as AS, in other words the operation requires only a single instruction instead of two as on both the Apple and IBM.

100 IF INKEYS= ' ' THEN GOTO

100 will halt a program if any key is pressed.

By using INKEYS or GET it's possible to pick up a single character instruction from the keyboard on all these machines without having to follow it with CR, Enter, Newline or Return. ■



IBM dependent, the CPU design.

The IBM just test program enough than one might think. ■

## The Finsbury Benchmark

In many ways the distinctive Sinclair machine makes a surprisingly strong showing against the mighty IBM. The gap in favour of the 10 bit machine is narrowest when running Benchmark 4, where the Z801 is only 20 per cent slower.

Naturally any comparison must take into account the fact that in FAST mode the Z801 does not have to support a display, whereas the IBM begs it a user informed at all times.

Although this comparison may seem pointless, it does go to show that the running speed of a basic interpreter is

### The Finsbury Benchmark - IBM PC versus the Z801

These eight tests are designed to compare the speed of different machines by running identical programs through them. They range from simple counting to testing arrays and sub-routines. (See Which Mine? - February for further details of the tests.)

(In seconds)	IBM PC	Fast	Slow
Test 1	53.5	43	278.1
Test 2	5.8	7.1	42.9
Test 3	51.1	15.4	151.3
Test 4	52.4	16.1	97.5
Test 5	53.2	15.5	155.2
Test 6	17.0	50.5	328.7
Test 7	57.7	71.5	421.0
Test 8	51.5	232.5	1453.5



## LEAP INTO THE COMPUTERISED AGE

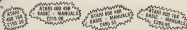
VISIT OUR BRANCHES AT HUGHFORD AND HORNCHURCH AND SEE THE LARGEST SELECTION OF HOME COMPUTER SOFTWARE AND HARDWARE IN SOUTH ESSEX

JOIN OUR SOFTWARE CLUB and save! Ex Lifetime membership £20. Your membership fee includes your choice of software to a value of £18. You will receive order by return with membership card and your own personal club no. PLUS: 10% reduction on ALL future orders. We pay all postage and handling costs. For instant membership you may telephone your Access Barclay/VISA card no. Agents for Atari, Vic, Dragon, Rabbit, Romik, Bug Byte, Sharp, Texas, Kuma, Nascom, Micro Power, etc.



THE LARGEST VIC 20 COMPUTER

## NEW LOW PRICES



### Learn Programming

Introduction to Programming 1	£15.95
Introduction to Programming 2	£22.95
Introduction to Programming 3	£22.95
Basics of Assembly	£11.95
Music Music Language	£14.95
Crash L 20	£11.95
How to Use Basic 1	£11.95
Crash Page 10	£11.95
Assembly & Music	£11.95
Visual Language	£16.95

### Business Programs

Atari Word Processor	£28.95
Atari Report Processor	£13.95
Graph 10	£13.95

### Statistics

Statistics & Graph Workings	£13.95
Math 1 Business	£13.95

### Written

Programming on Apple Package 1	£9.95
Math 2 Introduction	£3.95
30 Supergraphics	£29.95
Graphics	£21.95

### Adventure Games

Galaxy 2 Empire	£14.95
Victory in Night	£22.95

### Overseas of Fun

Star Wars	£29.95
Invader Drive	£18.95
Star Trek 1 & 2	£24.95
Crash Course 4-Game	£22.45
Temple of Mystery (Part 1)	£28.95
Upper Frontier of Space (Part 2)	£24.95
Crash Course (Part 3)	£14.95
Adventure Land	£14.95
Planet Adventure	£11.95
Mission Impossible	£14.95
Victory Delta	£14.95

### The Court

Storage Capacity	£14.95
Wayway Fun House	£14.95
Pyramidorama	£14.95
Great Town	£14.95
Storage Island 1	£14.95
Storage Island 2	£14.95
Galaxy Voyage	£14.95
The House of Doctor	£29.95
RangeCar	£9.95
Kingdom	£9.95
Planet Arcade Games	£9.95
Planet Man's Planet (Part 1 & 2)	£9.95

## VIC 20 £139.95



### Hardware

Atari VIC 20	£139.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95

### Software and Peripherals

Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95

### Programming & Utilities

Crash Course 10 BASIC on Diskette	£13.95
Crash Course 11 BASIC on Diskette	£13.95
Crash Course 12 BASIC on Diskette	£13.95
Crash Course 13 BASIC on Diskette	£13.95
Crash Course 14 BASIC on Diskette	£13.95
Crash Course 15 BASIC on Diskette	£13.95
Crash Course 16 BASIC on Diskette	£13.95
Crash Course 17 BASIC on Diskette	£13.95
Crash Course 18 BASIC on Diskette	£13.95
Crash Course 19 BASIC on Diskette	£13.95
Crash Course 20 BASIC on Diskette	£13.95
Crash Course 21 BASIC on Diskette	£13.95
Crash Course 22 BASIC on Diskette	£13.95
Crash Course 23 BASIC on Diskette	£13.95
Crash Course 24 BASIC on Diskette	£13.95
Crash Course 25 BASIC on Diskette	£13.95
Crash Course 26 BASIC on Diskette	£13.95
Crash Course 27 BASIC on Diskette	£13.95
Crash Course 28 BASIC on Diskette	£13.95
Crash Course 29 BASIC on Diskette	£13.95
Crash Course 30 BASIC on Diskette	£13.95

### Game Programs

Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive	£13.95
Atari Diskette II	£13.95
Atari Diskette III	£13.95
Atari Keyboard	£13.95
Atari Monitor	£29.95
Atari Diskette	£13.95
Atari Diskette Drive</	

# SANYO MBC-1000

Sanyo have recently dropped the price of this desk top now making it an attractive small business purchase

**T**HE Sanyo Deserve Computer MBC-1000 has been designed primarily for office use. In this context, the name "Deserve Computer" conveys an image of a machine to aid in the development of wonderful business opportunities or perhaps merely add to the standard. In reality it is a unique, single-handedly to achieve either of these results.

The computer supports a CP/M operating system with integral 50K disk drive. It has a Centronics Printer interface and an RS232 port. The CPU is a Z80A and has 64K of RAM.

These features are all fully standard requirements for an office machine for use either as a single user desk top computer within a large business or as the first machine purchased by a small business.

The MBC-1000 has been in production for about a year, but is only now being extensively marketed in the UK. It is the smallest member of Sanyo's MBC family and its price has now been reduced to £1199.

The machine consists of the main body of the computer, housing the screen and a single disc drive in addition to the CPU and memory.

To be distinguished from this is the keyboard which is on a slide long enough to allow some flexibility of positioning in relation to the screen. The main base is 410 x 320 x 120mm and as it weighs 14kg, it is certainly not designed for portability. However, in most office applications this should not be a major concern.

The keyboard is 410 x 78 x 211mm and weighs 3.1kg. The computer and keyboard are housed in a metal case and have been well designed to avoid radio interference.

The screen is 300mm (12") and has

green characters on a black non-glass background. The display shows 90 characters by 28 lines; the characters have a 4 x 7 dot resolution plus lower case descenders.

In addition to the basic characters and punctuation, the rest of the 288 character set provides a special range of accents for nouns and symbols useful in processing information — for drawing charts and histograms for example.

Thirty two of the characters can be retained using a programmable character generator provided in the basic utility package.

Coordinate screen addressing is provided which facilitates the production of charts and histograms.

The 58 key keyboard contains the standard qwerty set together with a range of punctuation keys.

In addition there are five cursor control keys & programmable function keys (F1-F5) and F6-F7 in a row at the top of the keyboard. There is also a numeric keypad.

One particularly nice feature of the keyboard is the deeper indentation of the F and J keys. This makes it much easier to locate the Home position on a keyboard that is either wider than that which most typists might be used to.

The SMALL key to the left of the space bar controls whether the characters are entered in upper or lower case. This is a necessity for word-processing.

The location of the cursor control keys at the top right of the keyboard makes them rather difficult to access.

The RETURN key is also in a rather inconvenient position, located in the third row below an equally large LINE FEED key, rather than in the more usual second row. Back key press results in a beep alert.

The keyboard is free to the touch



and a key lock for confirmation that the key has been pressed some unnecessary.

Holding down a key for more than 0.8 secs results in the character being automatically registered.

The fact that the keyboard is not integral to the rest of the computer does mean that it can be swapped in a height to suit the user.

The integral disc drive uses double sided, double density soft sectored discs providing 300K of storage.

Additional floppy disc drives can be added. These can be bought as a further single drive or as a unit of two and are available in 50K or 80K sizes. A single 50K disc drive costs £145 and a double unit £285.

This adds considerably to the storage capacity of the machine.

The computer is equipped with a Centronics Printer port. This gives the purchaser a wide choice of compatible printers.

Both the connectors for disc drives and the printer port are clearly marked on the back of the computer which makes connecting the system up a straightforward exercise.

However, the speaker is both of the same type and if the speaker is to be connected wires certainly plugged into the wrong sockets than some problems may arise.

The machine is provided with a single RS232 port which allows communication with a variety of other



device. A further board can be added if more than one device is required.

To move on to the software provided, the machine comes equipped with a system disc containing CP/M 2.2 and also SBASIC II.

CP/M 2.2 is becoming the industry standard especially in the field of office equipment.

SBASIC II is similar to Microsoft BASIC and as such is supplied with an adequate range of commands and functions for most business and mathematical applications.

The Sanyo MBC-1000 is designed with ADM/BI screen addressing and so programs for any other CP/M machine built to comprehend that standard will require only minimal changes.

The RS232 port does allow the computer to be connected to a mainframe office system.

However, no provision is made in the Sanyo MBC 1000 for any networking of this machine.

This is certainly not unusual in an office machine of this type but it is a feature which is likely to be more stressed as time goes on.

The lack of a networking facility means that it is not possible to purchase several computers and then connect them up to a single printer, or external disc drive for example.

The use implications for the small businessman particularly.

A networking facility would allow

him to develop his computer system from one machine and printer to several computers plus printer.

This avoids making the switch currently required from individual computers plus external machines to the purchase of a new complete system.

New machines currently offer networking facilities, but these that do are likely to be particularly successful in the small business field.

One of the most significant factors involved in buying a business machine is the backing provided by the dealer supplying the machine. This could apply to the machine.

This must be of special concern to any small businessman about to access his first computer.

On this point grounds the Sanyo MBC-1000 must be amongst those he should consider.

In Britain, Logitek has recently become the sole distributor for Sanyo machines.

Logitek intends to achieve sales through the use of an existing network of 1000 dealers and to expand these to 5000 in time.

This should enable potential customers to have hands on experience of the machine before buying it.

The size of the machine, the integral single disc drive and the software availability put the MBC-1000 in low potential markets.

Due to its desk top personal computer for the accountant secretary etc within a larger company and the other as a relatively inexpensive computer for the small business owner.

In a larger company it is likely that the knowledge and experience of computer and systems will be available to focus on which ease the dealer's support is less significant.

For the small businessman buying his first computer advice from a dealer must be particularly relevant both in terms of the hardware's capabilities and the software available for the machine.

In this situation the successful sales of this or any other computer is likely to depend on the development of a good dealer network.

With this in mind Logitek has indicated that they intend to be rigorous in ensuring that their dealers offer

a high standard of support.

One area of acceptance that is likely to be available in terms of supporting software for the machine in addition to that which will be of their standard range.

The documentation provided with the computer is thorough including diagrams explaining how the additional RS232 board should be connected (clear diagrams as well as concise descriptions of the functioning of the commands and features available).

It has not been written with the computer novice in mind however, and for somebody who is new to the constraints of computers this could be daunting.

This is an area in which the purchaser should request some assistance from his dealer.

The manual sports an in-ribbon which cannot be laid flat and which adds a hand or weight to keep the pages open.

This means an unnecessary inconvenience suggesting a lack of care in designing documentation which is not shown in the machine.

In conclusion the Sanyo MBC 1000 is a well designed and solidly constructed base office machine.

It is particularly suited to the needs of the single user especially as the computer plus disc drive is put together in one unit.

The main functions of the machine are in terms of the keyboard layout which is not of a standard design, and which could make changing to or from the machine a little difficult.

It is likely a decision to buy this machine is not likely to depend solely on the merits of the hardware.

Of more significance to the user is its approachable price, the support given by his local dealer and the availability and appropriateness of the software for his purpose.

Logitek seems to be working hard to ensure the user's needs in each of these areas. ■

## SPECIFICATIONS

- Sanyo MBC 1000
- Single disk drive Logitek 800
- Expansion kit Logitek 8000
- Basic OS: Microsoft Quick Basic
- Based on the IBM PC with 640K of RAM
- Integral 5 1/4 inch disc drive with 10 tracks per glass surface
- Customer 901 and RS232C interface supplied
- MS-DOS keyboard plus 8 programmable function keys
- CP/M operating system, with SBASIC supplied
- Soft Pack/MS-DOS 4.0 and Format 80 available
- Price £1199 plus £200 for additional power supplies and 6000 for a double disk.

## COMMENT

The MBC 1000 is a robust office machine designed for the single user. As a CP/M system, it is able to utilize an extensive range of software. Although provided with a range of commands suited to business applications, and given a high level of calculating accuracy, its machine can be considered to be a mainframe computer. A good dealer network and the responsive price should make the MBC 1000 successful in the office machine market.

# EAGLE 1600

*The Eagle is probably the first economically sensible competitor to the IBM PC*

**I**n 1982 was the year of the 16 bit microcomputer; this 1983 is probably the year of the IBM PC.

The Eagle 1600 is superficially just another of the 16bit computers which have sprung up in the wake of the PC's astonishing sales results, but a closer examination reveals a number of features which give the newcomer a technical edge.

The most important of these is a new CPU — the original 6.6 MHz Intel 80286 is replaced by an Intel 80386 running at a fairly 8 MHz. Since the new chip is a true 16 bit processor, the Eagle has the potential of much faster operation when running applications.

Of the three models in the range, we examined the cheapest which meant 128K RAM and a pair of 1Mb floppy disk drives.

## HARDWARE

The Eagle follows the current trend for separate keyboards, the CPU and disc drives sitting under the separate monitor.

The keyboard itself is connected to the computer by a coiled lead which allows the user to shift it into any position he finds comfortable. There are 106 keys in all, of which 24 have special functions depending on the software being used. In fact, the entire top row is marked with a variety of functions, many of which offer single key operation of the Eagle's word processing package.

The right hand side of the keyboard features a numeric keypad, and on the far right is the more helpful function key of all. Marked HELP, this key works with both the software packages supplied as standard with the Eagle. It

acts almost as a built-in manual for the program.

The keyboard is generally easy and pleasant to use, though it was interesting to find that the IBM's adjustable angle feature was not great, and we also found the return key rather too small for comfort.

The monitor is a 12 inch type presenting 60 x 25 text in a plain green display. The graphics resolution is an impressive 320 x 252 pixels, but a colour display is available only at extra cost.

The 5¼ inch disc drives are double sided double density units which provide a formatted capacity of 804K each, sufficient for up to 500 records of Eagle's word text. A 360K option is available for a few dollars more.

The change of processor promises greatly increased operating speed, but whether or not this turns out to be important to the user is another question.

Using the popular database dBase, we ran a comparative test on both Eagle and PC. Each system had to retrieve a matched sequence of addresses from seven fields of 100 records. The IBM took 30 seconds, which was much as we had expected, but the Eagle completed the



*The Eagle has a separate keyboard, CPU drives and monitor*





work in a table 16

Unfortunately, having a hot red processor does not reduce the time the disk drives or printer take, so in terms of the time needed for any given job the Eagle will show less of an improvement than the data figures suggest.

## SOFTWARE

The Eagle comes with both IBM-006 and CPW-88 included in the base price, and two applications packages are also supplied.

Eaglesoft is a development of the Ultralisp electronic spreadsheet, and is fairly standard in use, with 64

columns and 255 rows. On the overall impression that most users probably won't read the manual properly, we tried the same approach.

The Help button provided the essential information, and we were unable to provide a serious hint on by pressing keys what we should do.

The Eaglesoft word processing package is a development of Spell Guard, and proved minutely easy to use by providing these two packages, the manufacturer's make it possible for the typical small business user to start recouping his investment right away.

Since one of the Eagle's main aims was to make its compatibility with software produced for the IBM, we tested this feature by using our IBM format copy of Combox for the spread trial.

## COMMENT

Priced at \$19,500, the Eagle 1800 appears more expensive than equivalent 16 bit systems. But when you compare the price of the full software packages and terminal operating system—a total of around \$2000—then the Eagle would cost only \$20,500, which makes it extremely competitive bearing in mind the full specifications.

## SPECIFICATIONS

Processor	Intel 8086 operating at 5 MHz
Maximum output	1.5 MB/sec 2 x 1 MB/sec disk drive Green 1.5M/sec dot
Price	£1100
Base unit	£1000
Interface	2 x 255 word ports and 1 parallel port
Ports	On application a fully independent 4000 words available 255-255 in 1/16th sec
Operating systems	IBM application a fully independent 4000 words available 255-255 in 1/16th sec
Output capacity	255
Input capacity	255
Memory	255
Applications	Applications and Eaglesoft supplied

Programs by most applications available. Eaglesoft: Microsoft, Inc. Windows: Westinghouse Information Systems, 2001 1st St., San Jose, CA. Manufacturer: Eagle Computer Inc. 555 Corporate Avenue, Los Gatos, California 95030.

We encountered no problems.

## EXPANSION

The Eagle can take up to 870K internal RAM in the form of cards inserted into some of the eight slots on the right-hand side of the machine. One slot is dedicated to the console interface, leaving seven for RAM addition and ports or network interfaces.

## Conclusion

The Eagle 1800 is something of a sleeper—hiding its technical capability under the IBM clothing. It is an easy way to Super IBM look-alike and its edge on speed and price should make it a front runner in this highly competitive market. ■

# Three out of every four computers going into schools are BBC Micros.

## Is there a lesson to be learned by every user?

As part of the current government subsidised scheme aimed at introducing micros to schools, the Department of Industry undertook a survey of machines available and made recommendations to education authorities all over the country.

The BBC Micro met their priorities exactly: it is economical yet fast and powerful, and it can justify the investment involved, through its capability to grow with the needs of the user and with the rapid changes in technology.

Teachers and education authorities agreed, and today it represents over three-quarters of all micros being ordered for schools across the country under the DfE scheme.

### The BBC Micro: too

In choosing a machine to put their name to for their massive Computer Literacy Project, the BBC had the same set of priorities as the DfE. The BBC Micro is now an integral part of that project, which includes books, software, courses and a number of major television series, one of which, "Making the Most of the Micro" is now being broadcast.

### All this for only £199

The BBC Micro is light and compact. It generates high resolution colour graphics, and is capable of synthesising music and speech using its own internal speaker. The keyboard uses a conventional layout and typewriter feel.

The most sophisticated version (called

Model B) is available for only £299 (There is also a basic model available, the Model A, at £199)

### Designed to grow

Last year the magazine "Which Micro?" said that the most attractive and exciting feature of the BBC Microcomputer was its 'yearnings potential for expansion'

This is indeed one of the features that sets it aside from the competition.

For example, as well as interface sockets to allow you to connect to a cassette recorder, and to your own television, you can also use video monitors, disc drives, printers (dot matrix and daisy wheel) and paddles for games or laboratory use.

You can also plug in ROM cartridges containing games, with specialist application programs.

### The Tube: A unique feature

The Tube, which is unique to the BBC Micro, provides for the addition of a second processor via a high speed data channel. The possibilities are enormous. For example, the addition of a second



3MHz 6502 processor with 64K of RAM doubles processing speed. While a Z80 with 64k of RAM opens the door to a fully CP/M® compatible operating system, with all the benefits for business applications.

#### Linking up with other computers.

The BBC Micro also offers a facility of immense potential value to schools, colleges and businesses. It's called Facet™, a system which uses telephone cable to link with other BBC Micros. A number of machines can then share the use of expensive disc drive and printer facilities.

#### Make full use of Prestel & Teletext.

With special adaptors you will not only be able to turn your TV set into a Prestel terminal and Teletext receiver, but you can also take data and programs direct from these services. (The programs, which are known as Teletextware, are already being broadcast by BBC's Celex services.) This is another first for the BBC Micro.

#### BASIC plus.

A sophisticated version of BASIC has been chosen for the BBC Micro, which incorporates features normally found only in more advanced high level languages. However, there is also a facility allowing access through a simple command to another language - for example, PASCAL, FORTH and LISP.

*Microcomputers Ltd*

The best possible back-up.  
Your BBC Micro comes with the backing of the BBC and an extensive dealer and service network.

Each approved dealer is able to offer advice and carry out expansion work and repairs.


BBC Microcomputer - Model A and Model B
2MHz 6502A Processor
32k, 64k, 128k RAM Model A, 32k RAM Model B
Full QWERTY keyboard with 10 user-definable function keys
Mixed high resolution graphics and upper and lower case text
500 baud and 1200 baud interface for standard cassette recorder
Three mouse or one synthonic with full envelope control feeding internal keyboard
Interface to bus (Model B only) - RS232, for analog input, synthonic and user port
6502, Z80, 6402 second processors
Single and Dual Disc Drives with 100 and 800 k-bytes storage
Teletext card
Speech synthesizer
Networking facility - via Acorn Facet®

#### How to buy your BBC Micro.

If you are a credit card holder and would like to buy a BBC Micro B, or if you would like the address of your nearest stockist, just phone 01-200 0200.

Alternatively, you can buy a Model B directly by sending off the order form below to BBC Microcomputers, c/o Vector Marketing, Derwenton Estate, Wellingborough, Northants, NN8 2RL.

All orders are despatched by fully insured courier and come complete with easy to follow 500 page User Guide and Welcome cassette.

 01-200 0200 credit card holders.

To BBC Microcomputers, c/o Vector Marketing, Derwenton Estate, Wellingborough, Northants NN8 2RL.

Please send me \_\_\_\_\_ BBC Model B Micro-computer at £199 each, inc. VAT and delivery I enclose P.O. cheque payable to Acorn Computers Limited. Resale 5% or charge my credit card.

Card Number: \_\_\_\_\_  
Your Order Number (if any) \_\_\_\_\_

Name \_\_\_\_\_

Address \_\_\_\_\_

Postcode \_\_\_\_\_

Signature \_\_\_\_\_

Order ref No: 18 800 147 or 15 100 10

**The BBC Microcomputer System.**

Designed, produced and distributed by Acorn Computers Limited.



#### A full range of software.

Applications software for the BBC Micro already cover a very wide field. Packages covering games, education and business applications are available on cassette. All developed to the same high standards set by the hardware.

# FUTURE COMPUTERS FX20

*Unlike its competitors IBM's PC remains unchanged since its US launch. We look at a strong contender*

Many industry watchers were pretty surprised when the IBM Personal Computer was launched last in January this year. Not because IBM had finally presented its 16-bit baby for its first UK showcase, but because it was virtually unchanged since birth.

Unlike its competitors, IBM's micro hadn't grown or developed in those long 18 months since its US launch.

Elsewhere had seen enormous technological advances and the launch of a plethora of IBM-lookalikes from dozens of computer manufacturers large and small. Even the month that saw the launch of the IBM PC also saw a wide range of alternative 16-bit micro-come-ons feature and some cheaper than the IBM PC.

One of these alternatives was the Future Computers FX20 which was unveiled for the first time at the Whitch Computer Show and is available from IBM. The machine is faster, cheaper, more flexible and more attractive than the PC.

Of course, you won't get the well-sold dependability of buying a system from a megacorporate such as IBM, but Future is in the process of negotiating with established suppliers and OEMs to set up a distribution network and OEM base in the UK.

Already Exactel, a well-known electronic supplier of the Superdata and Televideo microcomputers is agreed-up to distribute the FX20 in the UK. The FX20 itself forms the basis of a range of systems from Future designed to give maximum flexibility of use—from a standalone micro to a complex multi-user network with simple upgrades to whatever level you want.

And at the price the FX20, which tracks nearly £1000 worth of spots off the IBM PC, warrants a close look.

The processor is an Intel 8088 and the system is supplied with the CP/M 86 plus operating system in standard and MSDOS which runs on the IBM PC under the name PCDOS as an option.

The FX 20's standard memory is 128 KB, which is double the standard for the PC.

Future claims the system to be faster as fast as the PC, — and three times as fast as the Sines—a claim we were inclined to go along with after a demonstration of the Superdata file

*In effect this means that all IBM PC software will run on the FX20*

The pattern which claims total compatibility with the PC — claims in fact to be an IBM derivative.

In effect, this means that all software now available on the IBM PC — and there is probably more written for the system than for any other 16-bit micro on the market — will run on the FX20 if it is running the MSDOS operating system option.

We saw this demonstrated by taking a standard IBM formatted disc and placing it in the FX20's disc drive. It read and displayed the appropriate files as if it was a PC.

event planning package.

## Hardware

The first thing which strikes you about the case grey and white FX 20 is its streamlined, low profile good looks — a sharp contrast to the IBM PC which is altogether more bulky.

Conveniently the screen stands on top of the processor box and the keyboard sits in front however all three units are completely separate and can be put wherever you like on a desk.

The processor box, which is grey



only also thanks to the half-height floppy disc drives, can be slung from the side of the desk if the user needs more room to maneuver.

All the parts of the PC range are built in the SBC apart from the Japanese disc drives from Hitachi. A hard

The PC20 or PC200 has also (IBM PC

ports a well as a diagnostic and keyboard port. It contains expansion slots for 128 Kbytes RAM, graphics and Winchester add-on boards, as well as the facility for adding any two

control keypads and 3D function keys with an interchangeable vinyl identification strip.

The whole keyboard has an attractive low profile, and the keys have a great stick touch.

## Software

With such CP/M 86 and MSDOS available, PC20 users will have a relatively wide range of software to select from. We can relatively because there is still a lack of 16-bit software compared to the numbers of packages on the 8-bit computer market.

Nevertheless, the use of the 8086 processor means that you can get a good selection of packages — you have access to those written for both the IBM PC and the popular Zenith line AOT.

Future Computers has selected what it considers to be the best packages from a number of software suppliers including MicroPro, Micro Focus and Microsoft and packaged them with its own label.

Applications covered include general ledger word processing, database management, IBM and XL, simulation, spreadsheets and a complete business suite.

These packages will be available from Future's distributors along with the hardware. Of course, users will still be able to obtain any other IBM compatible packages they wish.

Manuals were still in the production stage when we looked at the machines so were not available for examination. However, the company says that there will be four different types of manual available.

The first will be a beginner's guide to using the machine — the lot of it that users you having to wade through a complete system manual just to find out how to turn the damned thing off.

The second will be a technical manual with a complete description of the machine. The rest is a maintenance manual and the last will be a software manual for each software package you buy from the dealer.

Some training will be included in the

## The keyboard has 109 keys arranged into separate logical groups

disc version is available, called the PC20 which offers from five to 40 Mbytes of storage.

The 12 inch VDU stands on a pedestal, can tilt and swivel, has an anti-glare screen and comes in two types of green phosphor or low range or broad display.

The display is 25 lines x 80 characters with a clear 18 x 10 character matrix and the display brightness is software controlled.

The processor box houses the two floppy drives, a local area network facility as standard with two RS232C

IBM expansion boards.

The most interesting point about the floppy disc drives is that they are half-height drives — that is although they take standard 5 1/4 inch floppy discs — the mechanism makes the drive half as high when used horizontally.

This means that although they will take the one-sided IBM PC floppy disc as standard, and will read information just like an IBM PC, they will not take IBM's double-sided discs — yet.

The keyboard has 109 keys arranged into separate logical groups — a numeric keypad, separate numeric and cursor

## SPECIFICATIONS

Processor: Intel 8086  
Min Configuration: 128 Kbytes  
memory, 1C screen, 2 x 800 K bytes, 16 height floppy discs, LAN and Modem  
Price: £1,895

Maximum Configuration: With 8MB Winchester disc (FX 80/8)  
Price: £2,890

Extra: Network processors with up to 200 M bytes of mass storage available later in the year

Operating system: CP/M 86 Plus (standard), Concurrent CP/M (disc), MS-DOS (key)

Multiple Users: Yes  
Printers: No  
Colour monitor: No



price of the system, but the exact amount depends on which software you buy.

We couldn't get a price for the maintenance agreement, but Jackson, the managing director, did tell us that En-Gen has a maintenance maintenance agreement with software vendors. There

is a warranty on non-moving parts.

Leasing, as an alternative to outright purchase, will be available through third party leasing organizations, although this would probably only be worthwhile if you wanted a large multi-user system configuration. ■

Specialist courtesy of FERRIS

## COMMENT

Most large and many small computer manufacturers are pushing for the 10-bit case computer load weight at the moment, and Future Computers is but one of 50 fighting for a share of the market.

But the product looks good and Future has gone to well-proven hardware with access to a wide range of software.

The company is new, but it has some solid capital behind it—around £1.5 million. Most of this came from general government-backed schemes and organisations, the remainder from private investors.

Future Computers does not intend a listing closer to the public than a 10-bit case level of monthly sales on a stable network prior to producing the product nationwide.

It will be interesting to see how the PC range fares over the next year against the ever increasing flood of new low cost Japanese products, not to mention the IBM Blue and BBC Revolution against which it will especially be marketed in this country.



# comart communicator

## PROGRESS REPORT



...now the pedigree really shows

1984  
AWARDED  
BEST  
OFFICE  
SYSTEM

Now has Comart extended down to work development through the Communicator's first ancestor in the U.S. And the leading candidate to receive the title of microcomputer king!

**New Range Available:** The Communicator range has been extended to add a new 286 Megabyte 8" Microcomputer Hard Disk Unit System to the already well established 3 Megabyte and floppy diskette models. Another new system offers 12" floppy disk drive for compatibility of data transfer. 1000Tb disk controller and additional Windows based up systems that adds up to eight hard capacity - all in the same cost available casing. All based on 6700 bus construction to keep future options in memory when peripheral and software requirements arise again.

**New System Available:** Communicator operating systems continue to expand both in options and features. An improved CP/M offers enhanced diagnostics for hardware and basic level formatted disk. These latest improvements are reflected in the new low cost enhanced Communicator software: MP/800™ which also provides for full CP/M™ compatibility.

**New Communications Options:** Communicator now offers CP/Net™ and RJE communications protocols. Individual Communicator

Systems can now operate as intelligent information terminals. Integrated with either existing the office or new computer installations. In its portable format, it is the most flexible network.

**New Range of Terminals:** Find out more about Comart's new smart 8041. It's a new standard ergonomically designed and 2 (20 x 10) liquid crystal key-board, ergonomic keyboard, all screen and a low profile base. An 8 pin connector to the Communicator is both styling and performance.

Some things don't change. Communicator will have Comart's established design, reliability and accessories offer safe entry into any supporting hardware of Communicator already in use throughout the UK.

**And in the Future:** History of their 1980/80/800-800 advanced programming of research and development. Even Comart will be bringing you all the most powerful and distributed processing systems. That is your guarantee that Communicator will continue to progress in microcomputer technology progress.

To find out the details of Comart's new technology, call us now on (045) 414000.

### What's New

**Micro-Computer:** The Micro-Computer range has been extended to add a new 286 Megabyte 8" Microcomputer Hard Disk Unit System to the already well established 3 Megabyte and floppy diskette models. Another new system offers 12" floppy disk drive for compatibility of data transfer. 1000Tb disk controller and additional Windows based up systems that adds up to eight hard capacity - all in the same cost available casing. All based on 6700 bus construction to keep future options in memory when peripheral and software requirements arise again.

comart

**comart**  
SPECIALISTS IN MICRO-COMPUTERS

Comart Limited, Unit 10, Epsom Road,  
Eastleigh, Southampton, SO50 7JG  
Tel: 0480 414000. Telex: 33810 Comart G

### System

Comart Limited, Unit 10, Epsom Road, Eastleigh, Southampton, SO50 7JG. Tel: 0480 414000. Telex: 33810 Comart G. Comart Limited, Unit 10, Epsom Road, Eastleigh, Southampton, SO50 7JG. Tel: 0480 414000. Telex: 33810 Comart G. Comart Limited, Unit 10, Epsom Road, Eastleigh, Southampton, SO50 7JG. Tel: 0480 414000. Telex: 33810 Comart G.

# At last. A range of software that's as well designed as the Dragon 32.

Six months ago, most computer users thought a Dragon was something out of an adventure game.

How times change. Nowadays, it's almost impossible to pick up a computer magazine without reading some new tribute to the Dragon 32.

## THE FIRST FAMILY COMPUTER

We called it the first family computer. And we believe that much of its success derives from the fact that it has been superbly designed for the job it has to do.

Design that incorporates 32K RAM of memory at a real value-for-money price level.

Design that utilises the advanced 6809E microprocessor.

Plus a range of features that help make the world of computers accessible to first-time users. Like colour drawings. 5 octaves of music.

And plenty of power and versatility to keep up the interest as your experience increases.

## SOFTWARE TO MATCH

Designing a range of software that does justice to the Dragon was a task we approached with as much care as designing the computer itself.

The results are now available - games, educational programs, hints on programming - conceived by some of the best software houses in the world, to help users get even more out of their machines.





**Graphic Animator**  
A cassette that makes use of the Dragon's ability to draw on the screen. It shows you how to create simple cartoons - then bring them to life.



**Personal Finance**  
This cassette allows you to keep track of all the family's finances, from bills to bank statements.



**Ghost Attack** On cartridge. You're in a maze, and you must find your way out. But you're not alone - you're pursued by ghosts!



**Chess**. A great partner to play against again and again - with one major drawback. It's very hard to beat. Test yourself against nine different levels. On cartridge.



**Typing Tutor** Only a keyboard as sophisticated as the Dragon's could allow you a program like this. You use the Dragon's own keyboard to learn to type. On cassette.



**Cave Hunter**  
Finding the hidden gold is hard. But surviving the attacks of malevolent creatures may well prove to be impossible. Cave Hunter is on cartridge.



**Dragon Selection**  
A cassette of utility programs, allowing you to create your own database. Write your own tunes - or learn other language vocabularies.



**Starship Chameleon** A cartridge game. You find yourself under attack by the dreaded Gabolators! Their task is to take your planet - yours is to protect it.



**Computavoice**  
This cassette actually enables your Dragon to speak to you. These are just some of our titles, and every month, we'll be adding more and more.

What you get out of a computer depends on what you put in. And with a Dragon 32 and Dragon software, there's enough challenge and satisfaction for anyone. But then, that's what it's designed for.

# DRAGON 32

The first family computer.

# FREE



Attached in the centre of the March 17th issue of *Smash Hits* is a giant double-sided wall poster featuring **Wham!** and **Culture Club**. It's printed in full colour, measures 34" x 22" and comes absolutely free! And that's in addition to all our regular colour posters, features, hit songwords and prize competitions. All in *Smash Hits*—Britain's Brightest Pop Magazine!

**Smash**  
**HITS**  
**MARCH 17th**

# SOFTWARE REVIEW

## & HOME COMPUTING

APRIL  
1983



Program Design for  
Sinclair Z80  
Basic Structure  
Dragon 32  
Plus Your Software Sources

24 PAGE SUPPLEMENT OF  
SOFTWARE LISTINGS  
AND REVIEWS

# Software for the BBC Micro

from **COMPUTER CONCEPTS**  
*SW* **Wordwise**



3.5" 1MB High Capacity Disk

The word processor for the BBC machine. This ROM based word processor has screen and paper review.  
 Supplied with full speed base manual and cassette containing an example document and free typing tutor program. Now available from stock. Quantity Discounts.  
**£39.00 + £1.50 p&p + VAT**

from **COMPUTER CONCEPTS**  
*Software* **ROMs**

## Beeb-calc

A ROM based spreadsheet program.

## Debugging Program

2 machine code debugging programs — one a ROM use on tape. Essential for the machine code programmer. An ideal companion set to the assembler built into the BBC machine.

## Disk Doctor

A ROM containing useful disk utility programs. Enables the recovery of any data off the disk including deleted files etc.

**Available Soon!**  
 SEND FOR DETAILS

from **COMPUTER CONCEPTS**  
*Games* **NEW!**  
 FOR THE MODEL B  
**SWARM**  
 Main computer has more 2  
 graphics. Very fast at 50 a sec.

## Spacehawk



Mode 2 graphics machine mode game. Much like the Galaxians found in the arcades — very fast and also works with joystick.

**£7.80 + VAT**

## Asteroid Blast



High speed and high resolution graphics incorporated in the game to produce an exciting game — almost identical to the original arcade version.

**£7.80 + VAT**

## Chess



High resolution graphics with thousands of total levels — really tests chess ability rather than chess.

**£10.00 + VAT**

## Snake



A fast game for the Model B. 600 x 400 resolution, 256 colours and 256 x 256 resolution.

**£7.80 + VAT**

**We give very generous trade discounts**

Each computer is set up for the first year. Amounts vary from £25.00 to £100.00.

Our tapes are guaranteed to work on all Operating Systems.

**COMPUTER**

**CONCEPTS**



**16 Wayside, Chipperfield,  
 Herts, WD4 9JL. Tel (09277) 69727**



<i>Word processing - how economic</i> . . . . .	53	<i>Peterson - Dragon 32</i> . . . . .	84
<i>Send us your software</i> . . . . .	53	<i>Soft Release</i> . . . . .	86
<i>Atari software</i> . . . . .	55	<i>Spectrum</i>	
<i>ZK Soft</i> . . . . .	58	<i>BBC</i>	
<i>Letter Blast - ZKB1 (16K)</i> . . . . .	56	<i>Via 20</i>	
<i>Fraghop-Spectrum</i> . . . . .	57	<i>CP/M Business Selection</i>	
<i>Synthesizer - BBC</i> . . . . .	59	<i>Books - "Load and Go with your Dragon 32"</i>	
<i>Aera J - Dragon 32</i> . . . . .	60		
<i>Morse Code Tester - Dragon 32</i> . . . . .	61		

# Word Processing Word Processing Word Processing

ated at all, and you're using a cheap machine that other people do it, should be

As you can see, you need, either at least, they are being paid for it, would usually prefer, would be showing results, would be well, but also money, and being all other things to be sure, being interested in such things as a public word processing system.

That is, in the vast majority of the problems, though it is to modify the files, all, a word processing system can be an expensive bit of the added to it, is additional, possibly.

Now that machine is not so easy that it can run, even less it would last time on, but not now.

When you changed of course it both the machines of and either, sort of course, or some computer system of all types.

There are called these machines from the Commodore 16, 20 and the IBM/44, and the Atari and the Sinclair Spectrum via one thing to personal computer which the personal computer had already done to be that the machine computer - mostly

## Cheap home based text and word processing is now a reality

make their price and quality now possible in the rest of the world.

And here some people are also forgetting that such machines are capable of much more advanced and sophisticated things than simply doing "save" functions in any other sense. They are starting to look at other applications like - word processing.

There are word processing a lot of the most profitable applications when it comes to the use of such features as secondary storage like the disk - and large data bases - in, air, graphics, and so on.

That is because the cheap application of word processing is seen as a professional service. Some of your time, some of your money, and some of your data, which are all essential for your own business, and so on.

That is the application which companies distribute a little by members rather than work, when the machine other

to them, whether paragraphs.

But this is another side to word processing, as perhaps more especially text processing, that can be achieved using one of the low home computers.

There are a number of ways in practice, again not without of things, actually, there are functions under which the machine becomes more useful, but most of the machine home computer with many applications can easily accommodate the simple word and text processing jobs.

Typical of the type of application will be the use who writes a program after another, which makes it just the usual business.

There are a number of examples of machines like the Commodore 16, 20 and the Atari 4 - a Sinclair Spectrum, or a IBM/44 - which are all with some applications - should be able to allow the user to use and use a document or two or three pages long.

With luck, that some you should not be able to see, after reading the other document with the processing of progress, in that each letter can be individually addressed and made can be printed for example.

For the type of application, the large machine in the home computer range about the same, but not so good, and should you simple power to get into the home computer.

There is however, going to be a new for some form of recovery storage system so that the program data can be lost and user system is applied. This will also be needed in the means by which the selected program is loaded into the machine, it will also be needed in the way that can be easily loaded via the keyboard, even just if it required.

This is where one of the many "new" bits, that is the world of computing, which it will be necessary for the user to think on various related topics on secondary storage, as that the best system can be selected.

Two systems are normally available in the home computer? Loads of things, and from the things, they

## Send Us Your Software

**A** software time and would by reading in your *Dragon! Program* are printed, can work up to 1000 with the possibility of further (provided of your work is accepted by Microsoft 800

Now you, writing, throughout or individual program over the original and previously unpublished, and we want know if it is under consideration elsewhere also.

All we need is a brief description of the program and a detailed marketing plan. *Dragon! Publications* may include a full list of

articles and an explanation of any program, including possible in your particular type of machine. A market-oriented listing would be most appreciated if you can supply one.

We want to know the machine, the more likely we are to use. *Dragon! 16, 20, and 4* (before submission like the 16 and 20).

We want your correspondence to Software House (What? Micro & Software House, 174 North Street, London EC7 8JG) and back-forward by having from you.

users will already understand the advantages of them, but for new users, here is a quick run-down.

Desktop storage systems — as far as standard users are concerned — are cheap and effective, but they take up space. This means that, like with so many other recent pieces of the hardware, to be played as extensively as they are, they must.

floppy disks are available in capacities that much have increased and they are also available across the means you can transfer the computer to find a specific file and it will go straight to it on the floor. As a laboratory for experiment good, floppy disk storage systems offer a much greater storage capacity than cassette.

Thinking the hard-disk is the best thinking about word processing need to make along the following variables. The appearance of word processing in its appearance, it will be worth the money to the end budget. This will also be governed by the convenience of the installation, the amount of storage capacity thought to be needed and the amount of time the program and files will be left in — the price range (as well as other of requirements) for a cassette drive through to £200 is best for a floppy disk system.

Lower price all prices will appear when it comes to choosing a printer. Unfortunately systems is required for word processing tasks and printers are expensive.

There remains little way toward the

## Word Processing Word Processing Word Processing

expense of the price. It is a realisation of a largely mechanical system and that will mean to improve its very quality these days.

Though there are many systems available — the less than £500 Zenith system being an excellent case in point — they are not suitable for word processing work.

This is because their low-end devices are predominantly general printers that cannot specially repro-

duce a printer with reasonable cost and quality and because such a full character description is unlikely to be found.

At the top of the pile is the daisy wheel printer, as called because the characters are a ball on the end of a pin in a small wheel. These are best by a long way the paper to produce the output. A daisy wheel printer is going to cost around £1,000. The actual quality, however, is excellent.

### *It is possible to word process for less than £700*

Real paper for word processing. The price has to be paid enough to just to ordinary paper quite probably based paper with a grid pattern that is good enough to look at though it has been already, preferably printed after all, if the final copies come out looking better than the one might use as well as in a normal system for.

There systems are now available from though they are all relatively expensive. The cheapest relative the entire printer can be returned to £700 or even less. Know that price

The final system also in the middle. It is something of a compromise between by a strong number of companies when a standard number of characters is needed to be shown by the output from the computer. These can be had from around £2-500.

With word processing, there is only one way of avoiding making a choice amongst these systems is to take the necessary hard copy output. In general terms, however, the daisy wheel system will usually be a necessity, by most have users. If there is sufficient re-

quirement for the quality of output and that expense there is the really profitable equipment that a fully computerised word processing system coming on a large personal computer should be purchased and it will save the expense.

So the better one expense a going to be a normal computer, will be £2,000-£3,000. However, looking at the professional users are just not on. In a normal part of your own a really big system is thought.

As a rough guide the following may provide more information. The computer itself with a memory expansion if required, a disk to cost around £200. The range depending on the quality and features the user is willing to put up with will be around the same cost — an investment. The overall expense for storage this should be no more than £500 and the printer?

Well, at the end, it must be said that the program will not be required with too many disks and will return to the full features and features described. They will professionally to compare to computer to compare. Their price however, will normally when this.

For example, the Shiber 2000 package for the 80-80 costs under £200 in contrast from Alder 2000 is perhaps suitable for making less and work about £2,000 for the system, more under £150.

It is therefore possible to go word processing after a fashion, for an at all cost of less than £700. ■





## Ron Stewart chips away at GTIA and CTIA graphics

I usually never turn your letters and have nothing to do with them. But this time a lot of you are still on the desk about the CTIA chip and I agree that I will try to shed some light on them this month.

First when a GTIA or CTIA chip was first introduced it had a chip name such as CTIA (Computer Television Interface Adapter) integrated circuit chip that would process all the information from the ANTIC and SCG chips into a signal that goes to the television.

CTIA also looked after plays/moves, graphics and control signals. GTIA will come out from features and play on three new graphics modes as well. There is a lot of things that the GTIA and SCG chips can do that were not covered with the CTIA chip.

This might be a good time to define some of the commands used in the program listings. GRAPHICS-W is the first command to adjust a graphics mode, e.g. GRAPHICS 0, GRAPHICS-W. We can also command to change the color register to the color register.

We have four color registers and a right to better to think of them as a color box into which we can drop our graphics mode. Register 0 is used only to background color and register 1 is only available in modes 1 and 2. The reason for this is the graphics modes have a maximum of two line colors available at any one time.

Mode 0-11 are an exception as we shall see later. If we use a GRAPHICS-W command in our program we must assign it a color number, e.g. GRAPHICS 2 0.

The first number 2 is the color register. The second number 0 is the color assigned to the register. In this case blue and finally the 0 is the background color. The 0 under the blue is as high as possible (maximum) value must be assigned to our number. The color registers are already set with default colors and only need to be changed when another color is to be used.

The default colors are: Register 0 Defaults to Green Register 1 Defaults to Green Register 2 Defaults to Dark Blue Register 3 Defaults to Red Register 4 Defaults to Black

GRAPHICS-W command sets a color register with the command set color (color), the graphics making factor) with a color. The number between each pixel calls up one of the color registers. In other words GRAPHICS-W

changes the color to be used for the drawing commands that follow it.

PLT-The command plots the corner of a specified location on the screen and fills the pixel from with the color given in the COLOR command. The command is written as PLT x, y where x is the column number and y is the row number.

BRWTO-This command stores a line from the last plotted pixel position to the new position on, using the last value given in the COLOR command.

We can put some of the above commands together in a short program. Try experimenting with the program yourself. Change the graphics mode and the COLOR, PLT and BRWTO commands.

```

10 GRAPHICS 0
20 COLOR 2
30 PLT 40 20
40 BRWTO 20 10
    
```

The new modes (0-11) do have several features in common. One is that in all modes is available in the GTIA modes. We can get several bits as we shall see next month.

Another feature is the pixel size. It

is very small and allows us to use high resolution graphics. Each pixel is the same height as a mode 0 pixel but it is a few lines in width.

In graphics modes 2 through 8 pixel size is square in mode 11 it is a rectangle. The pixel size is a constant number, available in 10 columns and 80 lines.

GRAPHICS MODE 0: Only one line is available in graphics 0 but all background colors of that color are available. The wall above it is a wide variety of depth and area of the color dimension.

Only one color is available in a pixel as well as the color register register 4. We can set the line size to blue using the command GRAPHICS 1 0. The first value is the color register, the second the line size and the third the background.

If we set a higher background color at the start of our program it could replace the command of background color in either one pixel position on the screen.

To plot the screen we use the standard graphics statements such as COLOR, PLT and BRWTO in our code

and the PRINT #0 statement. In doing this we can load the background color with any number between 0 and 15.

```

1 REM GRAPHICS 0 MODE
2 "BRWTO"
10 GRAPHICS 0
15 SETCOLOR 4 10 0
20 FOR Y=0 TO 0 STEP -10
30 FOR X=0 TO 20
40 C=C, IF C=11 THEN TRN C=C+1
45 C=C+1
50 PRINT C
55 DRAW "C" (44-C)*10-Y,
60 C=C+1
65 COLOR 10:C
66 PLT 2, 1+Y
70 BRWTO C, Y+10
75 COLOR 0
80 GRAPHICS 0, 10, Y+10
90 NEXT Y
100 NEXT X
105 STOP
    
```

This is the screen from 1 to wall below to all the cell levels but it includes some of the elements we have discussed so far and it is easy to understand.

To finish the month off with another program 5 demonstrates programs. This one was written by John Forthright of Atari. See if you can work out how to enhance the screen display. Then show it to all your friends who love Spectrums and who thought the Atari only had no colors. Ask friends to take the program to use the program.

```

0 REM *** BSA, BY RONARD
1 BSA
2 " "
3 " "
4 " "
5 GRAPHICS 0 MODE 11 0
10 FOR I=0 TO 21: READ A, B, C
1000+I: A: B: C: D: E: F: G: H: I: J: K: L: M: N: O: P: Q: R: S: T: U: V: W: X: Y: Z:
4350+I: A: B: C: D: E: F: G: H: I: J: K: L: M: N: O: P: Q: R: S: T: U: V: W: X: Y: Z:
70: W: F: G: H: I: J: K: L: M: N: O: P: Q: R: S: T: U: V: W: X: Y: Z:
20: P: Q: R: S: T: U: V: W: X: Y: Z:
30: A: B: C: D: E: F: G: H: I: J: K: L: M: N: O: P: Q: R: S: T: U: V: W: X: Y: Z:
100: 0: 1: 2: 3: 4: 5: 6: 7: 8: 9: 10: 11: 12: 13: 14: 15: 16: 17: 18: 19: 20: 21: 22:
104: 0
40: P: Q: R: S: T: U: V: W: X: Y: Z:
60: 0: 1: 2: 3: 4: 5: 6: 7: 8: 9: 10: 11: 12: 13: 14: 15: 16: 17: 18: 19: 20: 21: 22:
65: " "
66: " "
67: " "
68: " "
69: " "
70: " "
71: " "
72: " "
73: " "
74: " "
75: " "
76: " "
77: " "
78: " "
79: " "
80: " "
81: " "
82: " "
83: " "
84: " "
85: " "
86: " "
87: " "
88: " "
89: " "
90: " "
91: " "
92: " "
93: " "
94: " "
95: " "
96: " "
97: " "
98: " "
99: " "
100: " "
101: " "
102: " "
103: " "
104: " "
105: " "
106: " "
107: " "
108: " "
109: " "
110: " "
111: " "
112: " "
113: " "
114: " "
115: " "
116: " "
117: " "
118: " "
119: " "
120: " "
121: " "
122: " "
123: " "
124: " "
125: " "
126: " "
127: " "
128: " "
129: " "
130: " "
131: " "
132: " "
133: " "
134: " "
135: " "
136: " "
137: " "
138: " "
139: " "
140: " "
141: " "
142: " "
143: " "
144: " "
145: " "
146: " "
147: " "
148: " "
149: " "
150: " "
151: " "
152: " "
153: " "
154: " "
155: " "
156: " "
157: " "
158: " "
159: " "
160: " "
161: " "
162: " "
163: " "
164: " "
165: " "
166: " "
167: " "
168: " "
169: " "
170: " "
171: " "
172: " "
173: " "
174: " "
175: " "
176: " "
177: " "
178: " "
179: " "
180: " "
181: " "
182: " "
183: " "
184: " "
185: " "
186: " "
187: " "
188: " "
189: " "
190: " "
191: " "
192: " "
193: " "
194: " "
195: " "
196: " "
197: " "
198: " "
199: " "
200: " "
201: " "
202: " "
203: " "
204: " "
205: " "
206: " "
207: " "
208: " "
209: " "
210: " "
211: " "
212: " "
213: " "
214: " "
215: " "
216: " "
217: " "
218: " "
219: " "
220: " "
221: " "
222: " "
223: " "
224: " "
225: " "
226: " "
227: " "
228: " "
229: " "
230: " "
231: " "
232: " "
233: " "
234: " "
235: " "
236: " "
237: " "
238: " "
239: " "
240: " "
241: " "
242: " "
243: " "
244: " "
245: " "
246: " "
247: " "
248: " "
249: " "
250: " "
251: " "
252: " "
253: " "
254: " "
255: " "
256: " "
257: " "
258: " "
259: " "
260: " "
261: " "
262: " "
263: " "
264: " "
265: " "
266: " "
267: " "
268: " "
269: " "
270: " "
271: " "
272: " "
273: " "
274: " "
275: " "
276: " "
277: " "
278: " "
279: " "
280: " "
281: " "
282: " "
283: " "
284: " "
285: " "
286: " "
287: " "
288: " "
289: " "
290: " "
291: " "
292: " "
293: " "
294: " "
295: " "
296: " "
297: " "
298: " "
299: " "
300: " "
301: " "
302: " "
303: " "
304: " "
305: " "
306: " "
307: " "
308: " "
309: " "
310: " "
311: " "
312: " "
313: " "
314: " "
315: " "
316: " "
317: " "
318: " "
319: " "
320: " "
321: " "
322: " "
323: " "
324: " "
325: " "
326: " "
327: " "
328: " "
329: " "
330: " "
331: " "
332: " "
333: " "
334: " "
335: " "
336: " "
337: " "
338: " "
339: " "
340: " "
341: " "
342: " "
343: " "
344: " "
345: " "
346: " "
347: " "
348: " "
349: " "
350: " "
351: " "
352: " "
353: " "
354: " "
355: " "
356: " "
357: " "
358: " "
359: " "
360: " "
361: " "
362: " "
363: " "
364: " "
365: " "
366: " "
367: " "
368: " "
369: " "
370: " "
371: " "
372: " "
373: " "
374: " "
375: " "
376: " "
377: " "
378: " "
379: " "
380: " "
381: " "
382: " "
383: " "
384: " "
385: " "
386: " "
387: " "
388: " "
389: " "
390: " "
391: " "
392: " "
393: " "
394: " "
395: " "
396: " "
397: " "
398: " "
399: " "
400: " "
401: " "
402: " "
403: " "
404: " "
405: " "
406: " "
407: " "
408: " "
409: " "
410: " "
411: " "
412: " "
413: " "
414: " "
415: " "
416: " "
417: " "
418: " "
419: " "
420: " "
421: " "
422: " "
423: " "
424: " "
425: " "
426: " "
427: " "
428: " "
429: " "
430: " "
431: " "
432: " "
433: " "
434: " "
435: " "
436: " "
437: " "
438: " "
439: " "
440: " "
441: " "
442: " "
443: " "
444: " "
445: " "
446: " "
447: " "
448: " "
449: " "
450: " "
451: " "
452: " "
453: " "
454: " "
455: " "
456: " "
457: " "
458: " "
459: " "
460: " "
461: " "
462: " "
463: " "
464: " "
465: " "
466: " "
467: " "
468: " "
469: " "
470: " "
471: " "
472: " "
473: " "
474: " "
475: " "
476: " "
477: " "
478: " "
479: " "
480: " "
481: " "
482: " "
483: " "
484: " "
485: " "
486: " "
487: " "
488: " "
489: " "
490: " "
491: " "
492: " "
493: " "
494: " "
495: " "
496: " "
497: " "
498: " "
499: " "
500: " "
501: " "
502: " "
503: " "
504: " "
505: " "
506: " "
507: " "
508: " "
509: " "
510: " "
511: " "
512: " "
513: " "
514: " "
515: " "
516: " "
517: " "
518: " "
519: " "
520: " "
521: " "
522: " "
523: " "
524: " "
525: " "
526: " "
527: " "
528: " "
529: " "
530: " "
531: " "
532: " "
533: " "
534: " "
535: " "
536: " "
537: " "
538: " "
539: " "
540: " "
541: " "
542: " "
543: " "
544: " "
545: " "
546: " "
547: " "
548: " "
549: " "
550: " "
551: " "
552: " "
553: " "
554: " "
555: " "
556: " "
557: " "
558: " "
559: " "
560: " "
561: " "
562: " "
563: " "
564: " "
565: " "
566: " "
567: " "
568: " "
569: " "
570: " "
571: " "
572: " "
573: " "
574: " "
575: " "
576: " "
577: " "
578: " "
579: " "
580: " "
581: " "
582: " "
583: " "
584: " "
585: " "
586: " "
587: " "
588: " "
589: " "
590: " "
591: " "
592: " "
593: " "
594: " "
595: " "
596: " "
597: " "
598: " "
599: " "
600: " "
601: " "
602: " "
603: " "
604: " "
605: " "
606: " "
607: " "
608: " "
609: " "
610: " "
611: " "
612: " "
613: " "
614: " "
615: " "
616: " "
617: " "
618: " "
619: " "
620: " "
621: " "
622: " "
623: " "
624: " "
625: " "
626: " "
627: " "
628: " "
629: " "
630: " "
631: " "
632: " "
633: " "
634: " "
635: " "
636: " "
637: " "
638: " "
639: " "
640: " "
641: " "
642: " "
643: " "
644: " "
645: " "
646: " "
647: " "
648: " "
649: " "
650: " "
651: " "
652: " "
653: " "
654: " "
655: " "
656: " "
657: " "
658: " "
659: " "
660: " "
661: " "
662: " "
663: " "
664: " "
665: " "
666: " "
667: " "
668: " "
669: " "
670: " "
671: " "
672: " "
673: " "
674: " "
675: " "
676: " "
677: " "
678: " "
679: " "
680: " "
681: " "
682: " "
683: " "
684: " "
685: " "
686: " "
687: " "
688: " "
689: " "
690: " "
691: " "
692: " "
693: " "
694: " "
695: " "
696: " "
697: " "
698: " "
699: " "
700: " "
701: " "
702: " "
703: " "
704: " "
705: " "
706: " "
707: " "
708: " "
709: " "
710: " "
711: " "
712: " "
713: " "
714: " "
715: " "
716: " "
717: " "
718: " "
719: " "
720: " "
721: " "
722: " "
723: " "
724: " "
725: " "
726: " "
727: " "
728: " "
729: " "
730: " "
731: " "
732: " "
733: " "
734: " "
735: " "
736: " "
737: " "
738: " "
739: " "
740: " "
741: " "
742: " "
743: " "
744: " "
745: " "
746: " "
747: " "
748: " "
749: " "
750: " "
751: " "
752: " "
753: " "
754: " "
755: " "
756: " "
757: " "
758: " "
759: " "
760: " "
761: " "
762: " "
763: " "
764: " "
765: " "
766: " "
767: " "
768: " "
769: " "
770: " "
771: " "
772: " "
773: " "
774: " "
775: " "
776: " "
777: " "
778: " "
779: " "
780: " "
781: " "
782: " "
783: " "
784: " "
785: " "
786: " "
787: " "
788: " "
789: " "
790: " "
791: " "
792: " "
793: " "
794: " "
795: " "
796: " "
797: " "
798: " "
799: " "
800: " "
801: " "
802: " "
803: " "
804: " "
805: " "
806: " "
807: " "
808: " "
809: " "
810: " "
811: " "
812: " "
813: " "
814: " "
815: " "
816: " "
817: " "
818: " "
819: " "
820: " "
821: " "
822: " "
823: " "
824: " "
825: " "
826: " "
827: " "
828: " "
829: " "
830: " "
831: " "
832: " "
833: " "
834: " "
835: " "
836: " "
837: " "
838: " "
839: " "
840: " "
841: " "
842: " "
843: " "
844: " "
845: " "
846: " "
847: " "
848: " "
849: " "
850: " "
851: " "
852: " "
853: " "
854: " "
855: " "
856: " "
857: " "
858: " "
859: " "
860: " "
861: " "
862: " "
863: " "
864: " "
865: " "
866: " "
867: " "
868: " "
869: " "
870: " "
871: " "
872: " "
873: " "
874: " "
875: " "
876: " "
877: " "
878: " "
879: " "
880: " "
881: " "
882: " "
883: " "
884: " "
885: " "
886: " "
887: " "
888: " "
889: " "
890: " "
891: " "
892: " "
893: " "
894: " "
895: " "
896: " "
897: " "
898: " "
899: " "
900: " "
901: " "
902: " "
903: " "
904: " "
905: " "
906: " "
907: " "
908: " "
909: " "
910: " "
911: " "
912: " "
913: " "
914: " "
915: " "
916: " "
917: " "
918: " "
919: " "
920: " "
921: " "
922: " "
923: " "
924: " "
925: " "
926: " "
927: " "
928: " "
929: " "
930: " "
931: " "
932: " "
933: " "
934: " "
935: " "
936: " "
937: " "
938: " "
939: " "
940: " "
941: " "
942: " "
943: " "
944: " "
945: " "
946: " "
947: " "
948: " "
949: " "
950: " "
951: " "
952: " "
953: " "
954: " "
955: " "
956: " "
957: " "
958: " "
959: " "
960: " "
961: " "
962: " "
963: " "
964: " "
965: " "
966: " "
967: " "
968: " "
969: " "
970: " "
971: " "
972: " "
973: " "
974: " "
975: " "
976: " "
977: " "
978: " "
979: " "
980: " "
981: " "
982: " "
983: " "
984: " "
985: " "
986: " "
987: " "
988: " "
989: " "
990: " "
991: " "
992: " "
993: " "
994: " "
995: " "
996: " "
997: " "
998: " "
999: " "
1000: " "
    
```



'It's nothing new. Mr. Stewart, you're in the real IT game because of experience and creativity.'

## LASER BLAST

The ZX81 seems to be less well supported than one might expect. The Spectrum has stolen much of its thunder, but it remains an extremely widely used computer.

This month we open the listings section with a ZX81 program from R de Mervada. We would like to ask him to get in touch with us, as his address has mysteriously vanished from the files.

Although we have a special interest in software for new machines, we don't want to rule out contributions from users of less glamorous machines. What has happened to all the TRS-80 and Video Genie owners for example?

```

1000 PRINT AT 0.0, "INSTRUCTIONS"
1010 PRINT AT 0.0, "PRESS ANY KEY TO START"
1020 PRINT AT 0.0, "THE INVERSE"
1030 PRINT AT 0.0, "MARK IN THE"
1040 PRINT AT 0.0, "MATHS AND"
1050 PRINT AT 0.0, "POINTS"
1060 PRINT AT 0.0, "BUT BEFORE"
1070 PRINT AT 0.0, "CONCENTRATE"
1080 PRINT AT 0.0, "ON THE"
1090 PRINT AT 0.0, "UNTIL THE"
1100 PRINT AT 0.0, "PRESS AND"
1110 PRINT AT 0.0, "THEN GOTO"
1120 PRINT AT 0.0, "THE"
1130 PRINT AT 0.0, "THE"
1140 PRINT AT 0.0, "THE"
1150 PRINT AT 0.0, "THE"
1160 PRINT AT 0.0, "THE"
1170 PRINT AT 0.0, "THE"
1180 PRINT AT 0.0, "THE"
1190 PRINT AT 0.0, "THE"
1200 PRINT AT 0.0, "THE"
1210 PRINT AT 0.0, "THE"
1220 PRINT AT 0.0, "THE"
1230 PRINT AT 0.0, "THE"
1240 PRINT AT 0.0, "THE"
1250 PRINT AT 0.0, "THE"
1260 PRINT AT 0.0, "THE"
1270 PRINT AT 0.0, "THE"
1280 PRINT AT 0.0, "THE"
1290 PRINT AT 0.0, "THE"
1300 PRINT AT 0.0, "THE"
1310 PRINT AT 0.0, "THE"
1320 PRINT AT 0.0, "THE"
1330 PRINT AT 0.0, "THE"
1340 PRINT AT 0.0, "THE"
1350 PRINT AT 0.0, "THE"
1360 PRINT AT 0.0, "THE"
1370 PRINT AT 0.0, "THE"
1380 PRINT AT 0.0, "THE"
1390 PRINT AT 0.0, "THE"
1400 PRINT AT 0.0, "THE"
1410 PRINT AT 0.0, "THE"
1420 PRINT AT 0.0, "THE"
1430 PRINT AT 0.0, "THE"
1440 PRINT AT 0.0, "THE"
1450 PRINT AT 0.0, "THE"
1460 PRINT AT 0.0, "THE"
1470 PRINT AT 0.0, "THE"
1480 PRINT AT 0.0, "THE"
1490 PRINT AT 0.0, "THE"
1500 PRINT AT 0.0, "THE"
1510 PRINT AT 0.0, "THE"
1520 PRINT AT 0.0, "THE"
1530 PRINT AT 0.0, "THE"
1540 PRINT AT 0.0, "THE"
1550 PRINT AT 0.0, "THE"
1560 PRINT AT 0.0, "THE"
1570 PRINT AT 0.0, "THE"
1580 PRINT AT 0.0, "THE"
1590 PRINT AT 0.0, "THE"
1600 PRINT AT 0.0, "THE"
1610 PRINT AT 0.0, "THE"
1620 PRINT AT 0.0, "THE"
1630 PRINT AT 0.0, "THE"
1640 PRINT AT 0.0, "THE"
1650 PRINT AT 0.0, "THE"
1660 PRINT AT 0.0, "THE"
1670 PRINT AT 0.0, "THE"
1680 PRINT AT 0.0, "THE"
1690 PRINT AT 0.0, "THE"
1700 PRINT AT 0.0, "THE"
1710 PRINT AT 0.0, "THE"
1720 PRINT AT 0.0, "THE"
1730 PRINT AT 0.0, "THE"
1740 PRINT AT 0.0, "THE"
1750 PRINT AT 0.0, "THE"
1760 PRINT AT 0.0, "THE"
1770 PRINT AT 0.0, "THE"
1780 PRINT AT 0.0, "THE"
1790 PRINT AT 0.0, "THE"
1800 PRINT AT 0.0, "THE"
1810 PRINT AT 0.0, "THE"
1820 PRINT AT 0.0, "THE"
1830 PRINT AT 0.0, "THE"
1840 PRINT AT 0.0, "THE"
1850 PRINT AT 0.0, "THE"
1860 PRINT AT 0.0, "THE"
1870 PRINT AT 0.0, "THE"
1880 PRINT AT 0.0, "THE"
1890 PRINT AT 0.0, "THE"
1900 PRINT AT 0.0, "THE"
1910 PRINT AT 0.0, "THE"
1920 PRINT AT 0.0, "THE"
1930 PRINT AT 0.0, "THE"
1940 PRINT AT 0.0, "THE"
1950 PRINT AT 0.0, "THE"
1960 PRINT AT 0.0, "THE"
1970 PRINT AT 0.0, "THE"
1980 PRINT AT 0.0, "THE"
1990 PRINT AT 0.0, "THE"
2000 PRINT AT 0.0, "THE"

```

```

1100 PRINT AT 0.0, "THE"
1110 PRINT AT 0.0, "THE"
1120 PRINT AT 0.0, "THE"
1130 PRINT AT 0.0, "THE"
1140 PRINT AT 0.0, "THE"
1150 PRINT AT 0.0, "THE"
1160 PRINT AT 0.0, "THE"
1170 PRINT AT 0.0, "THE"
1180 PRINT AT 0.0, "THE"
1190 PRINT AT 0.0, "THE"
1200 PRINT AT 0.0, "THE"
1210 PRINT AT 0.0, "THE"
1220 PRINT AT 0.0, "THE"
1230 PRINT AT 0.0, "THE"
1240 PRINT AT 0.0, "THE"
1250 PRINT AT 0.0, "THE"
1260 PRINT AT 0.0, "THE"
1270 PRINT AT 0.0, "THE"
1280 PRINT AT 0.0, "THE"
1290 PRINT AT 0.0, "THE"
1300 PRINT AT 0.0, "THE"
1310 PRINT AT 0.0, "THE"
1320 PRINT AT 0.0, "THE"
1330 PRINT AT 0.0, "THE"
1340 PRINT AT 0.0, "THE"
1350 PRINT AT 0.0, "THE"
1360 PRINT AT 0.0, "THE"
1370 PRINT AT 0.0, "THE"
1380 PRINT AT 0.0, "THE"
1390 PRINT AT 0.0, "THE"
1400 PRINT AT 0.0, "THE"
1410 PRINT AT 0.0, "THE"
1420 PRINT AT 0.0, "THE"
1430 PRINT AT 0.0, "THE"
1440 PRINT AT 0.0, "THE"
1450 PRINT AT 0.0, "THE"
1460 PRINT AT 0.0, "THE"
1470 PRINT AT 0.0, "THE"
1480 PRINT AT 0.0, "THE"
1490 PRINT AT 0.0, "THE"
1500 PRINT AT 0.0, "THE"
1510 PRINT AT 0.0, "THE"
1520 PRINT AT 0.0, "THE"
1530 PRINT AT 0.0, "THE"
1540 PRINT AT 0.0, "THE"
1550 PRINT AT 0.0, "THE"
1560 PRINT AT 0.0, "THE"
1570 PRINT AT 0.0, "THE"
1580 PRINT AT 0.0, "THE"
1590 PRINT AT 0.0, "THE"
1600 PRINT AT 0.0, "THE"
1610 PRINT AT 0.0, "THE"
1620 PRINT AT 0.0, "THE"
1630 PRINT AT 0.0, "THE"
1640 PRINT AT 0.0, "THE"
1650 PRINT AT 0.0, "THE"
1660 PRINT AT 0.0, "THE"
1670 PRINT AT 0.0, "THE"
1680 PRINT AT 0.0, "THE"
1690 PRINT AT 0.0, "THE"
1700 PRINT AT 0.0, "THE"
1710 PRINT AT 0.0, "THE"
1720 PRINT AT 0.0, "THE"
1730 PRINT AT 0.0, "THE"
1740 PRINT AT 0.0, "THE"
1750 PRINT AT 0.0, "THE"
1760 PRINT AT 0.0, "THE"
1770 PRINT AT 0.0, "THE"
1780 PRINT AT 0.0, "THE"
1790 PRINT AT 0.0, "THE"
1800 PRINT AT 0.0, "THE"
1810 PRINT AT 0.0, "THE"
1820 PRINT AT 0.0, "THE"
1830 PRINT AT 0.0, "THE"
1840 PRINT AT 0.0, "THE"
1850 PRINT AT 0.0, "THE"
1860 PRINT AT 0.0, "THE"
1870 PRINT AT 0.0, "THE"
1880 PRINT AT 0.0, "THE"
1890 PRINT AT 0.0, "THE"
1900 PRINT AT 0.0, "THE"
1910 PRINT AT 0.0, "THE"
1920 PRINT AT 0.0, "THE"
1930 PRINT AT 0.0, "THE"
1940 PRINT AT 0.0, "THE"
1950 PRINT AT 0.0, "THE"
1960 PRINT AT 0.0, "THE"
1970 PRINT AT 0.0, "THE"
1980 PRINT AT 0.0, "THE"
1990 PRINT AT 0.0, "THE"
2000 PRINT AT 0.0, "THE"

```







## LOAD AND GO WITH YOUR DRAGON



### DRAGON'S LOAD AND GO

The manufacturer's load of new software in the marketplace is not to be envied only by the tail of another industry but also by their immediate users.

The recently introduced Dragon 32 has already become a load-carryer as many a glowing letter message will testify. As it takes a natural leap for the attention of John Flanagan and Trevor Toms, whose books in the series *Dragon* magazine have been appearing since the introduction of the DR32.

The result of their recent labors in *Load/Go!* is with your Dragon, a 128 page paperback manual of the status quo in computing as in the Dragon world.

Like many similar books, it does not pretend to be a reference work, nor does it fall into the trap of attempting to replace the manufacturer's own manual. The 128 pages of the heart of the book are an assortment of general and miscellaneous programs, with the odd utility thrown in for good measure.

Two articles of interest for the load-carryer are *Check*, but on the whole an interesting range of software is provided.

Just to check for errors, I typed in two of the listings. *Castle Walls* and *Mario Goes To Sea*. Both were error free, and well exceeded the line speed of the keyboard.

The programs are in English between one and 140 lines. In such extensive scope of software the reader is able to examine, and seek to successfully and accurately - edited many

listings, usually about as much as elsewhere in code.

The general discussion gradually increases in complexity as the book goes on, introducing a new programming technique. *Keymap* using the load-carryer quickly goes on to work with using some advanced ideas in keymap applications, some subjects such as loop table files and string in array handling are touched in some depth. The same with which the examples can be related to real life makes the book complementary to the *Dragon* manual, which can be a little overwhelming for the novice. This is especially true with regard to the computer's program facilities, which opens a special section of the book.

Another volume feature in the program of a chapter on debugging. The reader is quickly introduced to checking variables, maintaining to most, error lists and the use of temporary CDS files to test the program a check at a time.

Some topics to be a step at the life of many new users. Just after the last page *Open Breakers* and *Load/Go!* to find the same of the series, which to one look and think "What now?" It is here that *Load/Go!* will your Dragon's most useful. My only quibble is with the price. I think that the content is considerably broader, but even so, £2.50 seems a high expense for a 128 page paperback.

Labels used in the with your Dragon by John Flanagan and Trevor Toms from Flanagan Associates (1980)

## AERO 3

*AERO 3* by Malcolm Saunders is the star program we have chosen for this month's listings section.

As the author of this month's star program, Malcolm receives £80 for his work.

All players should make the following changes:

**DELETE:** SCREEN 0, 1 in line 28  
**ADD:** 379 GOTO 360  
**ADD:** 10 GOSUB PRINT = 233, "PLEASE WAIT"

```

1000 REM *****
1001 REM *****
1002 REM *****
1003 REM *****
1004 REM *****
1005 REM *****
1006 REM *****
1007 REM *****
1008 REM *****
1009 REM *****
1010 REM *****
1011 REM *****
1012 REM *****
1013 REM *****
1014 REM *****
1015 REM *****
1016 REM *****
1017 REM *****
1018 REM *****
1019 REM *****
1020 REM *****
1021 REM *****
1022 REM *****
1023 REM *****
1024 REM *****
1025 REM *****
1026 REM *****
1027 REM *****
1028 REM *****
1029 REM *****
1030 REM *****
1031 REM *****
1032 REM *****
1033 REM *****
1034 REM *****
1035 REM *****
1036 REM *****
1037 REM *****
1038 REM *****
1039 REM *****
1040 REM *****
1041 REM *****
1042 REM *****
1043 REM *****
1044 REM *****
1045 REM *****
1046 REM *****
1047 REM *****
1048 REM *****
1049 REM *****
1050 REM *****
1051 REM *****
1052 REM *****
1053 REM *****
1054 REM *****
1055 REM *****
1056 REM *****
1057 REM *****
1058 REM *****
1059 REM *****
1060 REM *****
1061 REM *****
1062 REM *****
1063 REM *****
1064 REM *****
1065 REM *****
1066 REM *****
1067 REM *****
1068 REM *****
1069 REM *****
1070 REM *****
1071 REM *****
1072 REM *****
1073 REM *****
1074 REM *****
1075 REM *****
1076 REM *****
1077 REM *****
1078 REM *****
1079 REM *****
1080 REM *****
1081 REM *****
1082 REM *****
1083 REM *****
1084 REM *****
1085 REM *****
1086 REM *****
1087 REM *****
1088 REM *****
1089 REM *****
1090 REM *****
1091 REM *****
1092 REM *****
1093 REM *****
1094 REM *****
1095 REM *****
1096 REM *****
1097 REM *****
1098 REM *****
1099 REM *****
1100 REM *****
1101 REM *****
1102 REM *****
1103 REM *****
1104 REM *****
1105 REM *****
1106 REM *****
1107 REM *****
1108 REM *****
1109 REM *****
1110 REM *****
1111 REM *****
1112 REM *****
1113 REM *****
1114 REM *****
1115 REM *****
1116 REM *****
1117 REM *****
1118 REM *****
1119 REM *****
1120 REM *****
1121 REM *****
1122 REM *****
1123 REM *****
1124 REM *****
1125 REM *****
1126 REM *****
1127 REM *****
1128 REM *****
1129 REM *****
1130 REM *****
1131 REM *****
1132 REM *****
1133 REM *****
1134 REM *****
1135 REM *****
1136 REM *****
1137 REM *****
1138 REM *****
1139 REM *****
1140 REM *****
1141 REM *****
1142 REM *****
1143 REM *****
1144 REM *****
1145 REM *****
1146 REM *****
1147 REM *****
1148 REM *****
1149 REM *****
1150 REM *****
1151 REM *****
1152 REM *****
1153 REM *****
1154 REM *****
1155 REM *****
1156 REM *****
1157 REM *****
1158 REM *****
1159 REM *****
1160 REM *****
1161 REM *****
1162 REM *****
1163 REM *****
1164 REM *****
1165 REM *****
1166 REM *****
1167 REM *****
1168 REM *****
1169 REM *****
1170 REM *****
1171 REM *****
1172 REM *****
1173 REM *****
1174 REM *****
1175 REM *****
1176 REM *****
1177 REM *****
1178 REM *****
1179 REM *****
1180 REM *****
1181 REM *****
1182 REM *****
1183 REM *****
1184 REM *****
1185 REM *****
1186 REM *****
1187 REM *****
1188 REM *****
1189 REM *****
1190 REM *****
1191 REM *****
1192 REM *****
1193 REM *****
1194 REM *****
1195 REM *****
1196 REM *****
1197 REM *****
1198 REM *****
1199 REM *****
1200 REM *****

```

## MORSE MADE EASY

*Morse Code Tester is one of the programs featured in Load and Go with your Dragon, reviewed opposite. The documentation is a model of concise clarity, but remember that it is up to you whether or not to type it all into the computer.*

*Any of the lower case writing after the apostrophes on many of the program lines may be deleted without preventing the correct operation of the program, since these remarks are intended for the human brain rather than the computer's.*

*Perhaps this is a good place to point out that the author's permission must be obtained before any program is reproduced. Unfortunately, there have been cases of people sending or publishing listings without mentioning where they got them from.*

```

1000  REM ***** MORSE CODE TESTER *****
1010  REM *****
1020  REM *****
1030  REM *****
1040  REM *****
1050  REM *****
1060  REM *****
1070  REM *****
1080  REM *****
1090  REM *****
1100  REM *****
1110  REM *****
1120  REM *****
1130  REM *****
1140  REM *****
1150  REM *****
1160  REM *****
1170  REM *****
1180  REM *****
1190  REM *****
1200  REM *****
1210  REM *****
1220  REM *****
1230  REM *****
1240  REM *****
1250  REM *****
1260  REM *****
1270  REM *****
1280  REM *****
1290  REM *****
1300  REM *****
1310  REM *****
1320  REM *****
1330  REM *****
1340  REM *****
1350  REM *****
1360  REM *****
1370  REM *****
1380  REM *****
1390  REM *****
1400  REM *****
1410  REM *****
1420  REM *****
1430  REM *****
1440  REM *****
1450  REM *****
1460  REM *****
1470  REM *****
1480  REM *****
1490  REM *****
1500  REM *****
1510  REM *****
1520  REM *****
1530  REM *****
1540  REM *****
1550  REM *****
1560  REM *****
1570  REM *****
1580  REM *****
1590  REM *****
1600  REM *****
1610  REM *****
1620  REM *****
1630  REM *****
1640  REM *****
1650  REM *****
1660  REM *****
1670  REM *****
1680  REM *****
1690  REM *****
1700  REM *****
1710  REM *****
1720  REM *****
1730  REM *****
1740  REM *****
1750  REM *****
1760  REM *****
1770  REM *****
1780  REM *****
1790  REM *****
1800  REM *****
1810  REM *****
1820  REM *****
1830  REM *****
1840  REM *****
1850  REM *****
1860  REM *****
1870  REM *****
1880  REM *****
1890  REM *****
1900  REM *****
1910  REM *****
1920  REM *****
1930  REM *****
1940  REM *****
1950  REM *****
1960  REM *****
1970  REM *****
1980  REM *****
1990  REM *****
2000  REM *****

```

```

2100  REM *****
2110  REM *****
2120  REM *****
2130  REM *****
2140  REM *****
2150  REM *****
2160  REM *****
2170  REM *****
2180  REM *****
2190  REM *****
2200  REM *****
2210  REM *****
2220  REM *****
2230  REM *****
2240  REM *****
2250  REM *****
2260  REM *****
2270  REM *****
2280  REM *****
2290  REM *****
2300  REM *****
2310  REM *****
2320  REM *****
2330  REM *****
2340  REM *****
2350  REM *****
2360  REM *****
2370  REM *****
2380  REM *****
2390  REM *****
2400  REM *****
2410  REM *****
2420  REM *****
2430  REM *****
2440  REM *****
2450  REM *****
2460  REM *****
2470  REM *****
2480  REM *****
2490  REM *****
2500  REM *****
2510  REM *****
2520  REM *****
2530  REM *****
2540  REM *****
2550  REM *****
2560  REM *****
2570  REM *****
2580  REM *****
2590  REM *****
2600  REM *****
2610  REM *****
2620  REM *****
2630  REM *****
2640  REM *****
2650  REM *****
2660  REM *****
2670  REM *****
2680  REM *****
2690  REM *****
2700  REM *****
2710  REM *****
2720  REM *****
2730  REM *****
2740  REM *****
2750  REM *****
2760  REM *****
2770  REM *****
2780  REM *****
2790  REM *****
2800  REM *****
2810  REM *****
2820  REM *****
2830  REM *****
2840  REM *****
2850  REM *****
2860  REM *****
2870  REM *****
2880  REM *****
2890  REM *****
2900  REM *****
2910  REM *****
2920  REM *****
2930  REM *****
2940  REM *****
2950  REM *****
2960  REM *****
2970  REM *****
2980  REM *****
2990  REM *****
3000  REM *****

```

```

3100  REM *****
3110  REM *****
3120  REM *****
3130  REM *****
3140  REM *****
3150  REM *****
3160  REM *****
3170  REM *****
3180  REM *****
3190  REM *****
3200  REM *****
3210  REM *****
3220  REM *****
3230  REM *****
3240  REM *****
3250  REM *****
3260  REM *****
3270  REM *****
3280  REM *****
3290  REM *****
3300  REM *****
3310  REM *****
3320  REM *****
3330  REM *****
3340  REM *****
3350  REM *****
3360  REM *****
3370  REM *****
3380  REM *****
3390  REM *****
3400  REM *****
3410  REM *****
3420  REM *****
3430  REM *****
3440  REM *****
3450  REM *****
3460  REM *****
3470  REM *****
3480  REM *****
3490  REM *****
3500  REM *****
3510  REM *****
3520  REM *****
3530  REM *****
3540  REM *****
3550  REM *****
3560  REM *****
3570  REM *****
3580  REM *****
3590  REM *****
3600  REM *****
3610  REM *****
3620  REM *****
3630  REM *****
3640  REM *****
3650  REM *****
3660  REM *****
3670  REM *****
3680  REM *****
3690  REM *****
3700  REM *****
3710  REM *****
3720  REM *****
3730  REM *****
3740  REM *****
3750  REM *****
3760  REM *****
3770  REM *****
3780  REM *****
3790  REM *****
3800  REM *****
3810  REM *****
3820  REM *****
3830  REM *****
3840  REM *****
3850  REM *****
3860  REM *****
3870  REM *****
3880  REM *****
3890  REM *****
3900  REM *****
3910  REM *****
3920  REM *****
3930  REM *****
3940  REM *****
3950  REM *****
3960  REM *****
3970  REM *****
3980  REM *****
3990  REM *****
4000  REM *****

```

# OUT OF THIS WORLD SOFTWARE...



PLEASE SEND ME	BY
PLEASE SEND ME	BY
PLEASE SEND ME	BY
PLEASE Address/Barclaycard I enclose cheque/ID payable to	
DK Tronics Ltd	no order req
Access/Barclaycard	
NAME	ADDRESS
TELEPHONE	

## CREDIT CARD SALES LINE (0493) 603451 (24 hrs)

Quoting your Access or Barclaycard number  
DK Tronics software is also available from all  
good software outlets.

- DK TANK—PS your wets against the enemy Tank. This is a full feature game with  
graphics. **ONLY 14.95**
- DK SPAWN OF EVIL—Eliminate the spawn before it mutates to full attack potential.  
The most spectacular 3D space game ever written for the 128 Spectrum. **ONLY 14.95**
- DK DEFENSE—Great 3D air war featuring Command before it shoots you. One of  
the most addictive games for the Spectrum. **ONLY 14.95**



**SEXTANT**—Can you survive as Captain A. complete and intense strategy simulation adventure. Featuring play expansion and electronic use of graphics. **ONLY \$4.95**  
**INTRODUCTIONS**—The best Spodman version in the popular arcade game. **ONLY \$4.95**  
**WARRIOR '83**—Even the beginner can use the tactical program to control and destroy alien invaders. All military units. **ONLY \$4.95**  
**DEADLINE '83**—A fast response color game-master for use on the real and fast. **ONLY \$4.95**  
**SAVED (Yanking)**—A powerful editor for use on the 1 kb and 4 kb Spodman. It creates several useful and new saving features. **ONLY \$4.95**

...from

COMPONETS

# dktronics

25 Sussex Road, Gorleston, Gt. Yarmouth, Norfolk.





# SOFT RELEASE

## Spectrum

**2D** Ties in certainly for entire levels. The game for the Spectrum includes some unusual features. Two of all the contents of a multiple level can be accessed directly inside the level. The user may be required to use direction.

The enemy in the shape of a group of flying birds. Another enemy is a bridge which will sit up to you to cross them but so effectively as possible.

Despite the 2D title the birds only move in a line from left to right in front of you, but some enemies do depth in some by the changing perspective of the gun barrel as you alter its direction.

The rest of the presentation offers a range of skill levels, and the title is of interest in featured commentary and I must mention to see that the player can collect the eggs which will be used for the game.

The presenter of a left menu feature with Auto-scrolling feature and needed to make the game seem a little easier (as you intended) after a while.

**2D** Ties in probably stated if you like precision shooting, but it becomes repetitive and rather too long.

Author: (MSX)  
2D TIES IN, 1989  
2D Ties In, 2D Ties In  
2D Ties In, 2D Ties In  
2D Ties In, 2D Ties In  
2D Ties In, 2D Ties In

## Contipode

**Contipode** is actually a shared edition of the well known arcade game in which a fast moving, multi-coloured object needs to run down the screen. When it runs a distance, it

reverses direction, dropping a bar and opening up. Meanwhile, the player starts only with a single gun. Shooting the barlocks leads the multi-shots, while trying to avoid a continuous fire which can stop across the bottom of the screen.

There are more than eight levels and the length of moving the multi-bar of the lower corner of the screen is very useful to know.

The contents of an old format is quite acceptable and well presented. The score displays are the value after firing rate at some stages of the game and the first three of bars used for playing.

However, it lacks the player's control well, and with precision, the skills are prepared to controlling the controls a path by shooting out the top, sometimes.

Spectrum (MSX)  
Contipode, 1989  
2D Ties In, 2D Ties In  
2D Ties In, 2D Ties In

## BBC micro

### View and

### Wordware (word

### processors in ROM

### - plug-in ROM

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

### Only Memory)

**View and Wordware**

The first time of software on an old format is a view and wordware. The software has an interesting presentation and will see there is full control of the picture frame, direct or more speed.

View and Wordware is a 100% software that is based on the software and you don't have to be skilled in the computer. The software is based on the software and you don't have to be skilled in the computer. The software is based on the software and you don't have to be skilled in the computer.

The word processor works with a window, although there is a view and wordware. The software has an interesting presentation and will see there is full control of the picture frame, direct or more speed.

## Advanced View a ROM word processor

### plug-a-ROM

View works in any game mode, is 2D, 48 or 60 characters per line and offers very fast loading and saving with files. It has the advantage that the file names are what they can be found — a happy game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

The method of file storage means that files are stored in a single file. It is a simple game when when only a window they open.

Wordware normally works in the 256x40 character per line mode, but it is possible to change that to a 48x25 character mode before printing. It is a simple game when when only a window they open.

more-over, which makes it easy to improve in use and control when you are interested in the software. It is a simple game when when only a window they open.

View works in any game mode, is 2D, 48 or 60 characters per line and offers very fast loading and saving with files. It has the advantage that the file names are what they can be found — a happy game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

The method of file storage means that files are stored in a single file. It is a simple game when when only a window they open.

Wordware normally works in the 256x40 character per line mode, but it is possible to change that to a 48x25 character mode before printing. It is a simple game when when only a window they open.

**View and Wordware**

View works in any game mode, is 2D, 48 or 60 characters per line and offers very fast loading and saving with files. It has the advantage that the file names are what they can be found — a happy game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

The method of file storage means that files are stored in a single file. It is a simple game when when only a window they open.

Wordware normally works in the 256x40 character per line mode, but it is possible to change that to a 48x25 character mode before printing. It is a simple game when when only a window they open.

**Advanced View a ROM word processor**

View works in any game mode, is 2D, 48 or 60 characters per line and offers very fast loading and saving with files. It has the advantage that the file names are what they can be found — a happy game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

The method of file storage means that files are stored in a single file. It is a simple game when when only a window they open.

Wordware normally works in the 256x40 character per line mode, but it is possible to change that to a 48x25 character mode before printing. It is a simple game when when only a window they open.

**View and Wordware**

View works in any game mode, is 2D, 48 or 60 characters per line and offers very fast loading and saving with files. It has the advantage that the file names are what they can be found — a happy game when when only a window they open.

Wordware is a file system allowing on the top of a game window. It is a simple game when when only a window they open.

The method of file storage means that files are stored in a single file. It is a simple game when when only a window they open.

Wordware normally works in the 256x40 character per line mode, but it is possible to change that to a 48x25 character mode before printing. It is a simple game when when only a window they open.

# SOFT RELEASE

March 1987 Character Free EPROM 2  
 100 Lines  
 10 Instruction Example Document  
 10 Page 10

## 1. INTRODUCTION

1.1 This example document consists mainly of parts of the ROMBIN program which were developed by using an assembler. It is assumed that you possess some already used your through some few weeks. It is, of course, slightly familiar with the general structure of this word processor.

1.2 It is intended that the user will work with this text file. The assembler will be used to generate a ROMBIN program. The assembler will be used to generate a ROMBIN program. The assembler will be used to generate a ROMBIN program.

## Computer Concepts and the VIC-20

While attempting to produce an available ready to use program, you will find it necessary to be aware of the basic operating system.

Basically, the system will allow you to use a program to edit a file. It will be installed, especially to have the necessary files for a text editor program. It will be installed, especially to have the necessary files for a text editor program.

When using an editor will include a text editor, text files, commands and graphics and layout commands. These changes to produce a program will be able to edit the text files. However, commands will be available on the VIC-20 and the VIC-20.

There will also be several features on the VIC-20 which are necessary to be able to use the VIC-20. These include a text editor, text files, commands and graphics and layout commands.



system to the VIC-20 system.

Although there is a lot of information in the VIC-20, it is not possible to list all of the information. It is not possible to list all of the information. It is not possible to list all of the information.

By comparison, it is not possible to list all of the information. It is not possible to list all of the information. It is not possible to list all of the information.

## VIC-20

### Also See:

It is a big task to find a helpful modification of the original VIC-20 software. It is a big task to find a helpful modification of the original VIC-20 software.

You should be aware that the VIC-20 is a big task to find a helpful modification of the original VIC-20 software.

You should be aware that the VIC-20 is a big task to find a helpful modification of the original VIC-20 software.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

differentiated in two colors and the each one of them. The use of each is easily recognizable when you are VIC-20 software.

It has been found that there are several features and characteristics in the VIC-20 software. It has been found that there are several features and characteristics in the VIC-20 software.

The documentation provides the user with a lot of information. The documentation provides the user with a lot of information.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

## Class Games

The VIC-20 is a big task to find a helpful modification of the original VIC-20 software. The VIC-20 is a big task to find a helpful modification of the original VIC-20 software.

There are several other VIC-20 software programs available. There are several other VIC-20 software programs available.

## THE VIC-20 TOP TWENTY

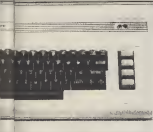
Package	Position	Software Title	Code
Box #1	Jan. 87		
1	1	Introduction to Basic I	01
2	2	Introduction to Basic II	02
3	3	Robot	03
4	4	Ball	04
5	5	Super 8 Chess	05
6	6	Adventureland	06
7	7	Soft	07
8	8	Super 8 Ball	08
9	9	Super 8 Ball	09
10	10	Super 8 Ball	10
11	11	Super 8 Ball	11
12	12	Super 8 Ball	12
13	13	Super 8 Ball	13
14	14	Super 8 Ball	14
15	15	Super 8 Ball	15
16	16	Super 8 Ball	16
17	17	Super 8 Ball	17
18	18	Super 8 Ball	18
19	19	Super 8 Ball	19
20	20	Super 8 Ball	20

Code: A = Adult; B = Beginning; C = Basic; D = Demo; E = Educational; F = Family; G = Games; H = Hobby; I = Instructional; J = Junior; K = Kids; L = Library; M = Music; N = Novelty; O = Other; P = Professional; Q = Quizzes; R = Reference; S = Science; T = Text; U = Utilities; V = Visual; W = Word Processing; X = Xmas; Y = Young; Z = Zany









with one of the Monitor is assumed, and the Monitor is properly initialized so that as requested, a subroutine is not necessary. The IBM comment here is: "Be sure."

The IBM comment is one of the best indicators of use. In placing the monitor in place a lot of instructions from a Department file as if they are being typed into the keyboard. The periods are for the six tapes for some obvious good use, in every program generated here is an so "Key" function. Including multiple key uses to increase Subroutine and to avoid any other to desired values.

In addition, you may see a file is ready to go to a program when debugging and to several facilities explain how you may go around the problem of recovering the IBM command lines would appreciate any new discussion of how the working might be put in good use.

The IBM program is a very sophisticated one. The instructions are correct operations and the program file is identical to the one which is available for use by IBM terminals that is shown as may be working on other file lists.

Monitor, the facility is not distributed by companies which are mostly of more interest, a IBM SHARE SMP/1 and M/11 although the use ready is accomplished by arrangement of the available command.

Using other files of a variable speed, and may be held off and controlled as well. Usually this can be done by your own files which are held in the Monitor and which allow variables on being run in the program they are flagged by means of the > symbol in every identical case.

The IBM program is very rarely used after it is used in a basic programming facility, in using the IBM command to do the work for you. Any desired may be put in to equivalent file, IBM or SHARE terminal and up to 14 may be defined as a string of up to 255 characters.

The commands can come into the program as full or in the normal address and form and all keys have a default function if not changed. The second is

extremely helpful in describing the functions of the hardware and also shows how to get the best out of it.

In particular I found the tables to be an of things extremely helpful. Looking up information would make writing keys in your or students of want to obtain SMP/1 commands in the program.

The thoughtful designer has arranged for essential commands and Library Tables to be represented by official IBM and related IBM that every month of IBM.

From now on to later using this program at present materials will find the method of how to do the with any other IBM environment.

It is worth noting of what has been left but which this is the particular question. In fact, a IBM or several commands could have been better explained although of course the plan can often make suitable the way can be modified can be achieved by use of a specially defined IBM.

Similarly, one might have hoped to have been able to IBM/1 entry from use of custom word a small amount of work to do this, but that will be possible in a particular program and it is to much more pleasant to be able to do this level of IBM software locally.

IBM 360 Terminal for IBM Software, IBM/1 and IBM/11 have shown the way as it is no longer arbitrary to show that it is too difficult as the designer of the program of IBM.

The quality seems to be that there is no working facility in writing programs to be printed but that it is to be used the computer in being used for some other purpose.

It would be pleasant to make full use of the fact that the IBM units have the great error-protection, and not having to wait for the program to stop operation in abnormal.

The environment is all the more satisfying because of the great care which has been taken to make the thing better a good one, and to accommodate a large variety of programs.

Perhaps it is a question of coming out of space since it is desirable to be prepared to be fast writer (perhaps especially in case of IBM terminals).

A Rapid Reference Guide would also be useful through the convenience of conveniently open or open a page in the reference manual (and therefore to work on).

There is one other point, the package is truly a valuable one and the information is stored in all the highest order as measured by the use of space of variables for Storage (both in the IBM/1 and IBM/11) and the use of one of the desktop-oriented commands.

It is well pleased that I found that a version for the Commodore 64 is already being prepared which currently requires no RAM expansion and it is to be hoped that additional versions will appear for other new machines from Commodore. ■

the printer. Software systems are based both on built and bought software and designed.

The Monitor program takes four parameters so that the code may be modified (modified and then printed). The code may be printed (printed) and it is very efficient for the very small program (program) and it is very efficient for the very small program (program) and it is very efficient for the very small program (program).

Monitor and screen set of is removed by different set of the Change command which offers the chance of removing the character of a line also having the same specified. Thus if you always use your Monitor or separate lines or at the end of line, there is no problem in updating the on-line version of your program.

The IBM file (file) number may be changed by a single command. Repeat and Change facilities are built provided. Starting to the Machine Language Monitor is achieved without the assistance of the IBM program.



"I want about your about their film Trips or is out the teacher?"

The program is presented in the IBM/1 and IBM/11 hardware manuals. The entire system can be found in any other system which is particularly presented to use. The ability to find things at intervals covering one of the beginning or end of lines of data and to display only if found in the command area but modified a data command can be used for a more or less simple task. The use of well such a search design is well defined.

And if that is not enough, because of the package is do what the user is to get the same other thing. The instructions have been described. The commands all work directly from the desktop display and you do not need to consult the information or number of blocks and file type before getting the results you need.

The main of systems have been completely well used, as there is very much out of the key codes against the desktop display and enough for the file to be saved from to return from into the user specified.

In order to save many lines, you will want to take advantage of the facility in the IBM/1 of using more than one. There will have more than you that will and might then the facility to copy between units is not available in the command.

Many working is equally well accomplished. However, you may also accommodate the fact that the data may well be in a copy command so that the user is used.

Really serious manipulation of the system that you take advantage of more of the usual functions of IBM. The use will work in the desktop as a program. This includes the "program" in fact if I find anything you'll still be able to do for it, including how copying the files of very high speed.

Using of Subroutine and relative files is made incorporated with the IBM/1 and other to the screen so to

# DICTIONARY

**Access time** The time taken from the instant of requesting an instruction to call for data to the moment when the data has been stored in the appropriate location. (By magnetic tape this is longer access time than magnetic disk.)

**Address** The position in which items of information are stored inside the computer's memory.

**Alphanumeric** Letters and numbers mixed.

**Applications** These are the things that you can actually do with the help of a computer. Application programs are written to be applied in a particular context: word processing, financial modelling, etc.

**Assembler** A conversion program to change assembly language into binary code which can then be read by the computer.

**Basic** A high level language which is written in English and is easy to learn. Its name is an acronym for Beginner's All Purpose Symbolic Instruction Code.

**Binary** A numeric system involving two possibilities in which the only digits used are 0 and 1.

**Bit** The smallest piece of information in a computer. The word comes from binary Digits. A bit is therefore either 0 or 1.

**Bus** A number of wires that bus (carry) the signal round a computer.

**Byte** A group of bits (usually eight) in memory (usually) operated as one unit.

**Cassette** Same as a music cassette. Stores information on records using magnetic tape technology.

**Chip** A complicated electronic circuitry held on a slice of silicon. It can be used as the CPU for the user's programs (mainly) or for the computer's internal instructions.

**Compiler** A program which converts instructions from a computer language into

## Terms used in this issue

machine operations.

**C/P/M** A Control Program for Microcomputers. The last known and major word to come into the operating system. If a machine has C/P/M there is a good chance that a lot of software will be available.

**CPU** Central processing unit - the part of a computer which always the brain of a program.

**Crash** The result of a hard ware or software malfunction usually when a program loses control of the operating system.

**Cursor** A sometimes flashing 800 or 1000 which indicates the point on the screen at which the next character will appear.

**Data page** Usually a set of programs which make it easy to handle data in different ways. A substitute for a filing system so that information can be put in one reference allowed and get out.

**Disc** Similar in looks to a plastic 45-pop record. Information is stored on it for later retrieval (other than floppy disc).

**Data Drive** A machine used to write on to and read from discs.

**Developer** The person who buys and sets up systems at the keyboard.

**Graphics** The ability to display pictures as well as words on the VDU (block or low resolution graphics give a rather crude picture. High resolution graphics can make more life-like).

**Hard copy** A permanent form of computer output usually coming in the form of printed form a paper.

**Hardware** The physical parts of a computer system. If you can break it, it's hardware.

**I/O or interface** Input and Output. The way in which a computer talks and listens to equipment connected to it in a program meaning too. The most common interface is the RS232C.

**K** An abbreviation of KiloByte. It is 1000 bytes (not 1000).

**Machine code** Instructions to the machine dedicated to

their final binary form so that the machine can be of direct use as switches or gates. All higher-level codes have to be first translated into this by an interpreter.

**Network** Linking several computers together in order to share common facilities.

**Operating System** The program which handles communication with the user and the computer.

**Packaging** A program which is thought of as a package without need of programming. It will carry out useful general functions such as word processing.

**Program** A set of instructions to the computer which will produce some class of result. There could be a beginning middle and end.

**RAM** Random Access Memory. You can write or formulate it as well as read from it. It is memory that is available as a blank page.

**RDW** Read Only Memory. You can get information or instructions from it but not put any on it. This is like a printed book of information which can be read but not written on.

**Scroll** A method of moving the display up and off the screen to take room for other bits of the screen.

**Software** Programs which control the computer's activity. This is the term which is placed into the machine's hardware body to make it perform.

**VDU** Visual Display Unit. The screen on which you see how debugger with the computer. An ordinary TV is often used but a special computer monitor gives a better display.

**Winchester** Now a generic term for hard discs. This is done in a rigid form compared to the usual floppy disc. On a Winchester many different can be stored and the time taken to remove and read information is faster than using floppy disc. Winchester was the place that IBM developed their discs and the name became synonymous with hard discs. ■









**SAGE**  
COMPUTER TECHNOLOGY

## THE WISE MAN'S CHOICE

Why does your company  
use SAGE?  
— because it's the only  
— which is  
— in some cases  
— give new levels of  
— in personal control

With the addition of the new machine SAGE now covers the complete range of business micro-computers. Configurations now extend from memory of 128K to a massive 1 Megabyte, and storage systems from 840K to potentially 200 Megabytes of Winchester disc.

SAGE software is expanding! There is now a choice of four operating systems for the machines. The standard UCSD p System complete with Pascal FORTRAN and BASIC compilers is now available in a single user form for the SAGE IV which supports for ten users.

Why does your company use SAGE?  
— because it's the only  
— which is  
— in some cases  
— give new levels of  
— in personal control

CPM is available. What users to say except that Digital Research have given their blessing to SAGE with their CPM86B system. This comes complete with a C computer and will allow UNIX software to be compiled and run under the CPM environment.

Why does your company use SAGE?  
— because it's the only  
— which is  
— in some cases  
— give new levels of  
— in personal control

Why does your company use SAGE?  
— because it's the only  
— which is  
— in some cases  
— give new levels of  
— in personal control

SAGE draws pictures! As mentioned the PLUTO graphics system gives superb high speed high resolution graphics in eight colour.

Multitasking offers the MPAGE API, as well as SAGE user programs, and again the SAGE offers performance benefits previously found in mainframe or miniframing systems.



Every SAGE shipped is complete with ONE YEAR'S ON SITE SERVICE from GCS Engineering who have over 120 field engineers - so 24 HOUR CALLOUT means just that.

SAGE is affordable! SAGE prices start at under £3000 and a typical 4 user system complete with Winchester disc AND terminals is under £7500. What more need to be convinced? Call your local dealer today.

TDI LIMITED, 29 ALMA VALE ROAD, BRISTOL BS8 2HL. TEL: 0272-742786

*The new Anadex  
WP-6000 . . .*



*. . . a great  
performer.*

## Steals the show

By STEVE BRONSTEIN, Computer Editor

There's nothing like an Apple Computer Show to get the computer world's attention.

Apple's new Macintosh computer is the star of the show. It's a new kind of computer that's easy to use and easy to learn.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

It's a computer that's designed to be used by people who don't know how to use a computer.

# PRESTEL UNDER ATTACK

Connect your micro to Prestel for *£5 a quarter* and  
kiss Micronet goodbye

There was only one star of the Birmingham Which Computer Show — Apple's new Lisa office workstation (reviewed last month) which comes a desktop on a tv screen and plays cat and mouse with how wide paper like pieces of flowing paper and a clock.

It's similar to a high-resolution Macintosh II-Xii system, and shows graphs and spreadsheets without you needing any knowledge of programming languages.

But one other stand made a show impact — with hardly any product to display that was the internet Micronet 200 — everyone has heard about it but who has actually seen it? And who has had their company acknowledged as 'hot'?

Can it really be that Micronet's been so overwhelmed by applications to join that there hasn't been time to process the tens of thousands of enquiries? At least that's what they claim.

The Micronet people are offering a modulated plastic couple into which you insert your telephone receiver. The couple plugs into the RS232 or 422 socket on your BBC TRASH-80 (telephone code TR5 03) Pal, Sanyo or Apple cassette port.

Then you remove computer programs straight off the glass, and straight into your memo. Epoch Telecom entered the scene ages ago themselves with their Addison's Cave software version of Prestel.

But what had sights of disabled and

gimps of miserably completing the Micronet stand at the Which Computer Show was that the black plastic electronic coupler costs only £40.

Now if you look for an advert from a few weeks ago I learned on the micro magazines you'll see their black plastic Modem advert for £135, and 15 per cent VAT on top of that brings the price to £155.25p.

I Micronet are valued using the cost of your couple (by over 200 per cent) when an earth goes for the cost of building the database — that's the information environment. The pages of info and programs which Micronet feeds into the Prestel system?

To let me say I want to fly to Mallorca for £5, and the travel agency says 'Yes that's fine my man. Just put down your fare, and we'll pay for the cost of the air to the airport, the flight to Palma, the coach to the hotel, three days in the sun, all your food, the journey back to the plane, taxi back from S'Alcock and any other costs and taxes.

And impossible as it sounds that really did happen back at Christmas '71 — and I'm a man concerned in Mallorca to prove it. But that's another story. Nevertheless the travel agency up at S'Alcock was doing that deal — which means the balance Micronet really are on the level.

The agency and the Spanish tourist authorities were expecting to make money on the purchases after your cheap flight there in Mallorca and Micronet are spending their money to



come in from the programs you pay, and the quarterly subscription—\$13—which you'll pay.

But what if you don't pay the subscription, and you don't buy programs either? But simply expect the free tele-software from *Aladdin's Cave!*

You'll get locked out of *Macrosel* after three months. Yes, but so what?

Of that \$13 quarterly bill, \$9 — it turns out — goes direct to British Telecom as your subscription for using *Prestel*. Between *Macrosel* is an area of *Prestel*. The remaining \$3 covers your subscription to *Macrosel* itself: the cost of *Prestel* on routes 500, 700 and 800.

So after you've joined *Macrosel*, and been given your unique identify number (used for both *Macrosel* and all the rest of *Prestel*) and you've been subscribed to the tune of £1.00 25 you would just pay a quarterly \$5 to British Telecom for the use of *Prestel* pages, and let *Macrosel* itself go hand *Macro* system — and doing you a favour, am I doing you a favour?

When *Macrosel* is doing — and British Telecom should have done years ago if they'd had any sense — is to make the *Prestel* switch the phone into service accessible to everyone.

What you actually get for your \$48 (as an example we took the BBC micro version) is what they generally call a "Networking Interface" — or the Q I Module. Also in the box there's a low voltage adaptor to plug in the mains and to give 12 or 18 volts out to drive the *Modem*.

They also give a lead which simply slots in the RS 422 socket on the back of the *Board*. It's a clumsy plug, and there seems a fair chance it can be pushed in upside down, leaving you wondering you wondering why there's no signal getting through.

They promise to supply a comprehensive instruction book, too, but there was no sign of it at *Baronsden*. The rest of the package is a nice wrapper (with a couple of reprints on it) and a software tape or disc to configure your *Board* a function key.

The software puts up very useful screen messages as you go to which included apologies for phone-line breaks and BBC operating system errors.

The packages for the *Pet* and *Series* don't appear so friendly. You certainly have to be familiar with your *Computer* to know what to do next if things aren't going well, and you have to know what sort of graphics chip you have inside.

Stephen Riddgahm who wrote the software will have to put a little more time into it, or perhaps it's a licensed *Series* unit. Harry Ruppel's software for the *Series* *Micro* is software to run the 185 80 into a *Prestel*/*Macrosel* terminal is far simpler, but can they



spell accounts? They cannot.

(And can Apple spell *elefentary* — coming back to the *Line* for a moment? They cannot, either.)

So, back to our original trouble: *486*.

Anyone wanting to have a taste of *Prestel* can now do so for £48 — or

can receive an unlimited amount of electronic mail for no fee at all — except sending a *Prestel* *Mailbox* message pays only for the phone call while they're typing their message onto the system, and of course it's there waiting when you turn on.

So the electronic mail facility is

### *Electronic mail on your home micro*

long as you've already got a compatible micro, such as a *Pet*, Apple *Board*, *Series* or in a few more the time we're told that we'll be able to use a *Director* too.

The business advantage of hooking up to *Prestel*/*Macrosel* are that you

rather like having a *Telex* or phone answering machine.

It'll be interesting to see whether it's possible to connect the system and have someone else's electronic mail delivered to your terminal instead. More of this next month. ■



# Sinclair ZX Spectrum

**16K or 48K RAM...  
full-size moving-  
key keyboard...  
colour and sound...  
high-resolution  
graphics...**

**From only  
£125!**

First, there was the world-famous Sinclair ZX80. The first personal computer for under £100.

Then the ZX81. With up to 16K RAM available and the ZX Printer. Giving more power and more flexibility. Together they set a new pace (500,000 so far) to make Sinclair world leaders in personal computing. And the ZX81 retained the ideal low cost introduction to computing.

Now there is the ZX Spectrum! With up to 48K of RAM. A full size moving key keyboard. VHS colour and sound. High resolution graphics. And a low price that is unbeatable.

## Professional power— personal computer price!

The ZX Spectrum incorporates all the power features of the ZX81. But its new 16K BASIC ROM dramatically increases your computing power!

You have access to a range of 8 colours for foreground, background and border, together with a sound generator and high resolution graphics.

You have the facility to support separate disc files.

You have a choice of storage options, either governed by the amount of RAM: 16K or 48K (which you can upgrade later to 128K of RAM) or a massive 48K of RAM.

At the price of the Spectrum 16K is an amazing £125! Even the powerful 48K version costs only £175!

You may decide to begin with the 16K version. If so, you can still upgrade later for an upgrade. The cost? A mere £50!



## Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a means adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black-and-white).

Employing Sinclair BASIC (powered in over 500,000 computers worldwide) the ZX Spectrum comes complete with two manuals which together represent a detailed course in BASIC programming. Whether you're a beginner or a competent programmer, you'll find them both of immense help. Depending on your computer experience, you'll quickly be moving into the colourful world of ZX Spectrum professional level computing.

There's also ready to go here: The ZX Printer—available now—is fully compatible with the ZX Spectrum. And later this year there will be Microdrive for massive amounts of data on low-storage plus an RS232C/Inet network interface board.



## Key features of the Sinclair ZX Spectrum

- Full colour—8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound—8KHz combined with variable pitch and duration.
- Massive 16K—16K or 48K.
- Full size moving key keyboard—all keys of normal typewriter pitch with specialised keys on each key.
- High resolution—556 dots horizontally, a 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set—with upper and lower case characters.
- Tailored compatible—user software can generate 40 characters per line and other settings.
- High speed LOAD & SAVE—100 in 100 in 100s in a cassette, with VERIFY & MENU for programs and separate disc files.
- Sinclair 16K extended BASIC—incorporating unique one touch sequential syntax check and report codes.





## GET THE BEST SOFTWARE — FROM SUPERSOFT

We believe that the quality of the software we sell is more important than the quantity that we sell. And since we've been producing top-quality microcomputer software since 1979 you can be sure that we can tell the difference between the wheat and the chaff!

Good news for 84 owners: We've got two great arcade games for the 84 with several others almost ready. **TANK ATAR** is a fine adaptation of the Berlioz-style arcade game, but **MARSHOVE** is a totally new idea — and a very addictive one at that. Your task is to master mind the survival of primitive cells in constant danger from malignant microbes: their life is in your hands! These games are written entirely in machine code with colour graphics and sound. They cost just 16 plus VAT each.

**BUSGALC** is a simple program that could save you hours of calculation and re-calculation, whether you're balancing a household budget or doing forward planning for 101. It has been described as the poor man's **WISKALC** (but in fact it does one or two very useful things that **WISKALC** won't do). See the review in February's *Which* Micro or phone for further details. **BUSGALC** costs £28 plus VAT on tape, £42.50 plus VAT on disk. It's available now for PET (48 or 80 columns), VIC 30 (with 128 expansion) and Commodore 64. Also available soon for the BBC 222.

**THE HIGH WIKER'S GUIDE TO THE GALAXY** is an adventure program based on the popular book and TV series. Like all real adventure games it's entirely textual, so if your brain can't handle anything more complicated than Space Invaders you'd better think again. Hundreds of **PET** owners have enjoyed this great game, and now it's also available for the Commodore 64, BBC 222, and Dragon at a new low price of £12 plus VAT (£13.50 on disk).

WRITE FOR A FREE LIST — PLEASE TELL US WHICH COMPUTER(S) YOU OWN

# SUPERSOFT

Winchester House, Ganning Road,  
Windsorstone, Harrow,  
Middlesex HA3 7SL, England.  
Telephone: 01 861 1165

### KEYACCOUNT

make completing VAT 100 a pleasure (with almost a General Ledger/Incomprise Records system on the 84) for custom small businesses and existing accountants in use!

- Decide on your own accounts structure
- Enter your transactions in any order and let them in account and in date order
- Post correct entries automatically
- Let it calculate summaries and print your VAT spreadsheet
- Print your Profit and Loss and Balance sheets for the year to date
- Use the code trails and check totals to ensure integrity of your data



**amazon  
systems**

### KEYWORD

can help automate your home office or subject list in your database!

- Write letters and documents using the KEYWORD list program
- Create and maintain several forms of data file
- Merge data files with letters for millions of letters follow up print lists etc.
- Print letters file analyses (checked lists and totals)

ALL WITH  
ONE PACKAGE!

### KEYSURE

is designed for business owners who deal in Life, General and Motor policies as well as Building, Goods and Investment Accounts.

- Store name, address, date of birth, occupation and up to twenty eight characters of free text about each Client

### KEY — R'S

is designed for teachers and parents who want something more than just packaged software.

- Create simple or complex instructional text.

**amazon**

4, Flintgrove,  
Brecknell,  
Berks., RG12 2JN  
Tel. Brecknell (2244) 23314

professional  
software on  
ATARI  
computers.

# ADVENTURE

*The classic game Adventure is now available for a selection of different micros. Alfred Rolington looks at some literary myths which have shaped its form.*

**T**he true adventures' as we says W B Porter in *Open Door* — goes forth untried and untravelling to meet and greet unknown fate.

To correspond his error Porter claimed that the Prodigal Son is a return trip, a fine example of an adventure. Here is comprehensive proof that neither WSP or the Prodigal really know what they or adventure is about — useless and untravelling certainly won't take you to meet the great beyond or visit the various equities even with the hanging words of fate.

No — as the words of the QED on adventures in one who lives by his wit, and if you are contemplating a journey through *Microsoft Adventure* (and we strongly suggest you do) then with about and beyond are just a snatch short of impossible.

For the uninitiated *Adventure* is the original computer game which started it as a PDP-1 program at the Mass Institute of Technology. Completed long before Chuck Peddie had used the name *Adventure* was the night game of the legendary West Coast open-ended programmers and the game bears some of their wood foliages.

Just as the name Porter represents a series of poets so there is no one author of *Adventure*. The final and completely unaltered version which now struggles into a 32K micro with a single drive took a number of years to reach its final form as do the mythology tells us.

The final form makes a vivid fantasy in which you are the protagonist. (To anyone who has read *The Hobbit* or *The Lord of the Rings* you are told to be the PC a Tolkien-like character who have an imagination. After the usual welcome and help available at the opening adventure proper the system will explain.

You are standing at the end of a road before a small brick building. Around you is a forest. A small stream flows out of the building and down a gully.

As you can see there are no dramatic street products in the classic adventure models. The whole game just uses words and to play you simply type in party phrases (the complete

*Adventure* dictionary is surprisingly extensive) at times it applies almost reflexive remembering about with a *Witch* if.

The machine responds with laud descriptions of where you are, what is or is about to happen and in which direction now and old paths lead.

The whole has the appearance of a nice machine dialogue which takes the appearance of artificial intelligence and has often been likened to the plot of a novel with you as hero.

So much for the facts. The content of *Microsoft's* game describes three levels of geography, time and space. The key is as Porter explained — an entrance into about ground where you main task is to find the entrance to the next. If you forget about too long the machine interrupts with a hint.

**Are you looking for the answer?**  
**Answer: yes or no**

Having finally established the scene, whereabouts found the keys and moved them to the entrance you enter the second level of play the Upper Cave and begin to explore some of the interesting and mysterious rooms.

Clare objects and testate its form to be pushed up and found but

## *A mind fantasy in which you are the hero, villain and adventurer*

but without the ever present hero's quest from the land and sea following devices.

Deeper and deeper into a complex labyrinth of tunnels and caverns until the lower cave levels are encountered.

In total there are over 130 rooms, 15,000 lines, 40 useful objects and 12 obstacles of varying difficulty, so says the instruction booklet. Your goal it explains is to find the cave, explore it completely, locate all the treasures and return them to the building or else you run out of lamp light (or get killed).

Blowing out of lamp light or getting killed can become a predicted option for the novice but with a strategic collecting dogmatism you move up



and begin to formulate your own mental picture of the dark underworld city.

After a few more adventures you realize that even if *Adventure* has never really been your thing even a rat the time for mythical — you need a map. But once you start regular going deeper you need it seems more geography than Q level if you can't negotiate the complex of windy little passages.

As Terry Szabo says in his famous *The Jewel of a New World*.

**You are in a state of twenty little passages, all alike**

As the adventure proceeds the obstacles get harder the descriptions

larger and more agonized. A midway point established when finally after a difficult passage up a tall wall or out the gate through a series of testing tunnels and a barrier door with a ball you will arrive at.

You are on the edge of a breathtaking view — far below you is an entire nation, town which great gods of million lava came surging out, ascending back down into the depths.

The glowing rock fills the farthest portion of the cavern with a blood red glow, giving everything an eerie, miserable appearance. The air is filled with tinkering sparks of ash and a heavy smell of limestone. The walls are hot to the



touch and the thundering of the volcanic drums cut all other sounds.

Embedded in the jagged roof far overhead are crystal-lined fernstone caverns composed of pure white silicates, which scatter the molten light into smaller apertures upon the walls.

To our left is a deep gorge filled with a heaving mass of toriied rock, which seems to have been snuffed by the devil himself. An ominous row of five arches cut from the depths of the gorge lead us way through the gorge and plummet into a bottomless pit far off to your left. The instruction booklet only states:

You may want to spend your initial resources into the cave exploring the sea and finding treasures. That is how you figure out how to get the treasure to the surface.

It's the second word that made me—I would like to quickly ask the copy writer how often he or she expects me to proceed. It took the same state of prolonged and intense play before the monitor filled with the above instruction.

After some weeks of feverish concentration I got with maps and notes of what I believed to be the complete cave level figured I was ready for the final result. The message in the words of the illustrious copy writer: when you feel you are ready try to get all the treasure to the surface in a minimum amount of time.

The entrance frame and your initial vision narrows to a paring

tunnel of light. By now you are past fixed at manipulating the objects of your dislodging the surface and manipulation of light has become second nature.

But the trouble with *Adventure* is that a randomizer will result and for my ignorant reason you can still be killed or jailed.

It was only later that I discovered that this is not completely true: however after a couple of abortive attempts one fine morning around 3am I had located and studied all the treasure, explored all the separate caverns and tunnels and done all my magic—I knew I had won and to prove it my score which for so many weeks would not top the 100 score by the final 383 points but just as I learned and queried a message the screen went blank and there a new message looked up.

**Game closing soon. All adventures will immediately through main office.**

The disk drive hummed and beamed the screen again darkened and I was left at the opening to a new and finally unexplored part of the cave.

I wish I got an any further but suffice it to say I still have not finished this part of the game. It is the last aspect of the game. I cannot claim the coveted Grand Master title but one of these is the next step.

It was never to estimate Microsoft's *Adventure* the computer could hardly be specific to this particular version of *Adventure* (Microsoft's has to be one of the most impressive computer games I have encountered) but would

apply to *Adventure* games in general.

But for all that they are still relevant and so with my fingers snuffed mostly into my throat.

I would want to say that *Adventure*, although learned by the novel is really closer to sport in form. It is made oriented so much so that nothing female appears in Microsoft's version, and completely ungendered allowing no room for contemplation or emotion. It can therefore be said to be a game played on one psychological level. For this reason it is essentially pure and purpose and purpose finally unwording.

Perhaps one of the other interesting aspects about this type of activity is that although I have stressed the single user/interactive orientation of the game, the idea of interactivity played by a number of adventures with one person utilizing the keyboard and the rest taking around a system.

It is with this in mind that I can't help and claim that *Adventure* is the closest thing to a conventional solitary board playing cards and the old Victorian parlour game—whatever there is certainly no comparison between it and the current inside board bombardment of an average video machine.

The thinking man's video book has arrived with two adventures!

*Adventure* is available for BBC Accorn, IBM PC and the Spectrum machines. For the IBM PC it is called Microsoft's *Adventure* (this is the one we need) for the other machines it is known as *Colossal Adventure*. It requires 32k of memory and the price starts at £10 depending on machine. ■

# Let Commodore expand your horizons.

VIC 20 is the finest home computer that money can buy.

And the better you get to know it, the more confident, adventurous and ambitious you'll become.

You'll want to take advantage of the vast range of VIC software: a superb and constantly-growing selection of programs, embracing business systems, entertainment, education and many applications in the home.

Every program in the series has been designed by experts, and chosen for its quality and value for money.

VIC business software covers a wide range of applications, including spread-sheet analysis, stock control, information handling and word-processing.

A mind-blowing range of games including Scott Adams' world-famous 'Adventure' series.

Advanced space games, including the sophisticated 'Omega Race'.

Learn subjects as diverse as English Language, programming, and biology.

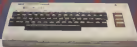
And 'home' software ranges from IQ tests to Robert Carrier menus.

In addition, there is a range of VIC software, like programmers' aids and graphics packages—



to add to your understanding and enjoyment of computers and computing.

There's even a special 'VicSoft' Club for VIC 20 enthusiasts, with many advantages including special offers to club members.



VIC software will expand your horizons. And your mind.

PRICES RANGE FROM \$4.99 to \$34.95 INC. VAT

**commodore**  
**VIC 20**

For more information, a catalogue of VIC software and details of your local retailer or to order please phone or complete the coupon and send to:  
The Commodore Information Centre,  
875 Park Avenue, Monaghan, Co. Louth, Ireland M1 1BQ  
Telephone: Monaghan 01758 70002

Name: \_\_\_\_\_

Mr. Mrs. Miss \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

Postcode \_\_\_\_\_

# NEW FROM ACT





# COMPUTER BLUFF

If you have wanted to bluff your way through a conversation about programming take a deep breath. Stephen Castell explains how it's done

In this article we are going to forget computer hardware for the time being (well, almost). Roll up your sleeves, take a deep breath and plunge into the ugly, creative world of computer programming. A computer is like a game - 'You're Never Well' is its Command. Provided that is you get your programming language syntax right.

Hold tight as we bluff our way from bootstraps to BASIC.

As we explained in the last chapter the essence of machine language is that there is a precise hardware specification, part of the design and construction of the computer equipment itself corresponding exactly to a specific bit pattern composed of the individual code bytes of the machine word. It is at this construction on which all higher levels of programming and software (which we are about to discuss) are built.

The next level up from machine language is assembly language and this step is a fairly gentle one.

Assembly language instructions consist of single English looking statements such as ADD for which there is a direct one-to-one correspondence with machine language instruction instructions. Also instead of having to specify the address of the number to be added, say to a bit pattern, the byte containing the number may be referred to by a name (number expressions in a format).

Thus a program written in assembly language is effectively like a machine language program, made legible to humans.

A key concept in computer programming is that it is possible to write a program (in machine language) to translate any assembly language program into its equivalent machine language program.

In other words this translation program carries out a rather special and powerful piece of data processing, a simple machine instruction name, decimal numbers and other convenient abbreviations which a programmer can remember easily (such

character of these of course already having been converted into its own character code and stored in individual bytes of memory).

It then carries out the conversion into the incoherent but ordered bit-pattern appropriate to the instructions.

Such a translation program is called an *assembler* thus we talk of an assembler assembling an assembly language program into its bit-pattern machine language equivalent.

After assembly the computer can be instructed to run the assembled program, this is nothing more nor less than the equivalent of pressing a button which assures that the next fetch-process-store cycle of the CPU acts upon the first instruction word of our assembled program.

And thus it goes as we have already described.

For example using our simple character coding system developed in earlier issues (A is code 1, B is code 2 etc.) the assembly language instruction

ADD A

which may be interpreted in English as 'add the number contained in the byte whose address is

associated with the name A to the contents of the special register in the CPU' would be read into memory before assembly as

1 4 4 2 1

The assembler itself a program (remember) would then be run to produce the bit-pattern containing the address of the code number into memory and transfer this into the special machine language instruction word (stored in its some other part of memory) which when subsequently acted on by the fetch-process-store cycle would then act on the required English command operation.

We describe the syntax of assembly language instructions such as ADD A as being made up of an *operator* (name of the ADD part) followed by an *operand* (the A part) and

Some assembly languages permit more than one operand name to be specified in this way giving assembly language instructions of increased power. For example the instruction

ADD A,B,C

might be interpretable in English as 'insert as add the number contained in the byte whose address is associated with the name A to that of the name B and store the result in the byte given by C'.

Whatever the type of assembly language the Computer Bluffer need only remember that the crucial feature is that the operator operation, some structure has a direct counterpart in the instruction code-bit pattern (byte(s)) layout of the assembled instruction word.

Now, a 36-bit instruction word would usually be made up of four 9-bit bytes (not the 8-bit bytes we have become used to referring to) so the 'ADD A,B,C' for example might assemble into

0101 1100 00000101 000001 100 00000101 1

The final bits of this 36-bit instruction word 0101110000 is usually



any software



Binary code packages

For example, if the whole decimal number 13 was used, it could be stored in a single 8-bit byte (but is in the bit-pattern 00001101).

Real decimal numbers, such as 123.456, are usually represented internally in what is known as *scientific exponent form*.

Thus, the number 123.456 would be treated as  $1.23456 \times 10^2$  and two bytes would be used: one to store the mantissa (123456) (binary pairs assumed after the last digit position) the other to store the exponent or power of 10 (mantissa 2).

Of course, both mantissa and exponent, being integers, would be converted first into their equivalent binary number representation.

Normally, to give maximum capacity for representation of large numbers (of which indeed 123456 is an example), both integers and the individual mantissa and exponent of floats are coded in a whole 36-bit word rather than on 8-bit bytes.

Character (the data type effectively covers everything else which is not an integer or real point number) is thus coded for all possible input characters typed in from a standard typewriter keyboard.

A multiple coding system, as we have already simply described (e.g. A is code 1, B is code 2, etc.) must be used to convert characters into binary form so that the equivalent binary number representation may be stored in memory.

The next level of computer language hierarchy comes much further, the extremely powerful idea of using the computer itself to translate programs from a high level into lower levels.

After people had programmed in assembly language for a number of years, in the early 1960s, they realised that there were a number of obvious symbolic structures which kept re-appearing in programs after programs, and it became obvious that much effort could be released if higher level instructions could be designed, each of which could be translated by the computer into a whole stream of appropriate assembly language (and hence machine code) instructions.

Having perceived that the higher level translation process should indeed be possible (being, nonetheless, no different from the assembly of naturally language instructions into machine code, albeit with much greater complexity) it also seemed like a very good idea to design the syntax and semantics of the collection of whole level instructions.

This would form the new higher level language to be added in form and textual legibility to the stream of the problem being programmed in general purpose English.

code by the sequence of P00000000 as an instruction to add the contents of the byte in memory whose address is 0000010111 (the second 8 bits of the instruction word) to the contents of the byte in memory with address 0000011011 (the third 8 bits) and place the result in the byte in memory with address 0000010111 (the last 8 bits).

One thing should be clear by becoming thoroughly clear to the computer buffer whatever source code we start off with, whether it be high-level language statements, assembler language instructions, object code and machine characters or data or whatever, the ultimate machine code always ends up as binary digits within the memory of the computer.

Thus, each character of source code has an eventual internal binary representation. As we have seen, this may be done by the result of a complete translation process (particularly when statements / programs / instructions codes are involved), so that no one-to-one correspondence exists between a given character of source code and any part of the total internal bytes of all packages which make up a given program.

In the case of integers and numbers in the source code which are to be treated as literal data, however, rather than as part of the statement vocabulary of the language, there is

always a direct correspondence between the character as written and its internal code and its subsequent binary representation.

There are three important points about different data types to be aware of when discussing internal representations of most literal data. These are:

integer whole numbers, such as 123456 are represented internally by their direct binary number equivalent.



What did you do at the main revolution day?

or perhaps an arithmetic language/notation.

Of course, there was no loading the compiler itself — in a machine language level, everything would still be compiled of the same old machine code instructions but that would not be especially troublesome to the higher-level programmer.

The new languages based on these ideas were called compiler languages. In the mid-1950's successful programs called compilers were written whose function was to carry out the translation from compiler languages to machine language.

Unlike the case with assembly language, there is no straightforward one-to-one correspondence between statements in a compiler language and machine code instructions. An alternative method of translation from compiler languages into machine language was also invented instead of compilers which translated all the statements of a compiler language first and then allowed the machine code to be executed. Transpilers were written which read one line and executed it immediately.

This has the advantage that a user need not write a complete program to test an instruction.

It is also possible to stop the program during execution and look at what is going on, and then let program execution continue. This is very useful in troubleshooting and correction.

Two coding schemes, both rather more involved and cumbersome than our simple A and C, examples to date are in common use: ASCII (American Standard Code for Information Interchange) and EBCDIC (Extended Binary Coded Decimal Interchange Code) — the Computer Buffer need not actually worry too much about these coding schemes as each word are usually three bytes totally independent to the computer user.

Now, as we discuss, that each individual coded character gets one to six bytes of bytes, don't remember that character and byte are often used interchangeably.

Thus the string of characters 123456 when treated as one whole integer number would fit comfortably into a 36-bit word when internally represented.

However, the string of characters 123456 when treated as six individual characters would take 48-bit bytes to cover the (e.g. ASCII) codes of each of the six characters: 1, 2, 3, 4, 5, 6 separately — that is 48 bits all together.

There are thus two ways of handling the characters which also are of major importance via D.B. and the decimal point (or comma in many countries) either direct as integer or real numbers, or first as character data.

To distinguish the latter case, the string of numbers is usually enclosed between quotation marks on input

That's what I like to see



123 (just whole numbers) to the distinction 123 (a string of 3 successive characters) on input to a computer.

In the case of non-numeric characters a similar appropriate distinction is made between, for example, ADD and ADD on output.

We have now given a top-level bottom-up buffer guide to the way in which computer software (i.e. programs) and data get into the hardware and how they are used by the hardware.

The Computer Buffer can have something of a sign of relief at the

point that normally, in computer software, the approach to using computers is almost exclusively as just for fun, but usually inevitably.

For application programming is the creative beauty of life in the least electronic hardware clay. And we will have the Third and perhaps Most Important Very Important Thing to Remember in Computing in general — it should come as no surprise to learn that it is the key to good programming design and implementation. Read on, please. ■



Just open







# USER GROUPS

**Washington, DC** M in Culture 1  
 400 9th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Washington Field** 20 South  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Washington W** Park Center 20  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Washington W** John Center 100  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Wash DC** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**London - Wash DC** John White  
 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200

**Regional Meet** 1000 10th St. Suite 2000/2010  
 Washington DC 20004  
 (202) 782-2200



Are you trying to increase your personal or business productivity? Probus documents to share more of your skills and assets? Find the way that will complete your education or business? Then turn to the Apple II personal computer. The next logical step from your world famous Apple II Plus computer. The Apple II has a slew of new features and enhanced capabilities. Like an enlarged RAM memory (expandable to 128K). A custom keyboard. Upper and lower case text. And eight built-in expansion slots. Including one for an 80-column card.

Call to view the SPECIAL OFFER !!  
 APPLE II System SYSTEM II SYSTEM II computer. One Color & One Monochrome (1/2) 80 Col Card  
 APPLE II 128K EXPANSION SYSTEM (80 Col) card  
 1 Data Service & Expansion Monitor (1/2) 80 Col Card  
 For Card and Monitor

SEE QUALITY OF THROUGH  
 800-444-4444  
 TEL 0941 0941

**MCC**  
 Micro Computer Corporation  
 100



**HAVE YOU GOT A BBC MICRO? THEN YOU NEED...**

**WE WON'T TRY TO PUSH LASERBUG ON YOU LIKE THE OTHERS - SEND OFF FOR A SAMPLE COPY AND YOU'LL FIND THAT LASERBUG SELLS ITSELF**

**AVAILABLE - MICRO COPY COVERS AVAILABLE - MICRO COPY**  
 Special - make 1-1000000 (1) Laser Copies available for only £1.25 million. Make of high quality polymer copies which are fast and do not require PCC cover. Many more used in a complementary volume. Use the form or the form to order.

**AVAILABLE - MICRO COPY COVERS AVAILABLE - MICRO**

Please supply no cash  
 A sample copy of LASERBUG is £1.00  
 A £1.25 million subscription to LASERBUG is £11.00 for 10 copies of the magazine  
 A £1.25 million subscription to LASERBUG is £1.00 for 10 copies of the magazine

An entrance subscription to LASERBUG is £1.00 (Surface Mail) - use for details of our work

**LASERBUG (Dear Cover)** is £1.25 each

Include a cheque, PO Card, or cash payable to LASERBUG NAME ADDRESS

Please send the completed form to LASERBUG Dept. WM, 10 Oxley, Hale, Colchester, Essex, S.C. 83/L

# Fergusson Computers Ltd

The Professional Microcomputer Company

- Repair & Maintenance
- Consultancy
- Programming
- Training
- Leasing & Rental

Anybody can sell computers. But we provide a total computer service. This means that when we sell a computer system our professional experience will ensure that your business, large or small, will run at optimum efficiency. And, unlike many, we will be here to offer a comprehensive after sales support service, when you need it. Take a look at the advantages of buying from us and judge for yourself.



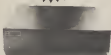
- 4 Apple II, Apple II+
- World's most popular micro
- Accounting Systems
- Financial Planning
- Database
- Word Processing
- Many other applications

And now a REAL 16 bit micro

THE NEW SAGE II  
OFFERS MORE  
PERFORMANCE FOR £2500  
THAN ANY COMPUTER  
IN HISTORY.



Word  
processing  
System with  
Daisywheel Printer  
from £795



JOIN THE  
REVOLUTION

**SAGE**  
COMPUTER TECHNOLOGY

- 4 for Mac Plus
- Winchester Hard Disc
- Software of 27 MB Software
- Distributed Accounting System
- Petrolink Control

Free Demos  
in progress  
every week  
Contact us  
for details



**PARADISE**  
Fergusson  
Computers  
Limited

Ground Floor,  
Wellington House,  
New Zealand Avenue,  
Walton-on-Thames,  
Surrey KT12 1PY  
Tel. Walton-on-Thames (0322) 41652 (6 lines)



To: Ground Floor, Wellington House,  
New Zealand Avenue, Walton-on-Thames,  
Surrey KT12 1PY

Please tell me how your professional  
assistance can benefit my business.

NAME \_\_\_\_\_

COMPANY \_\_\_\_\_

TITLE OR POSITION \_\_\_\_\_

NATURE OF BUSINESS \_\_\_\_\_

ADDRESS \_\_\_\_\_

POSTCODE \_\_\_\_\_

TELEPHONE \_\_\_\_\_

Here is this month's updated buyer's guide giving information on microcomputers currently available in the UK for under £3000. New machines are highlighted in blue. Every effort is made to keep the information accurate and comprehensive but please send any additions or corrections to

Buyer's Guide Editor, Which Micro & Software Review, 57a Hatton Garden, London EC1N 8JD. Telephone 01-242 8552

In order to keep the listings as free of computer jargon as possible we have wherever possible tried to make the guide straightforward and self-explanatory.

The Microcomputers listed in the main section of the Buyer's Guide are arranged by price in ascending order. To find a particular computer check its price in our alphabetical cross reference section.

Acorn	1000	1000	1000	1000
Acorn Atom	1000	1000	1000	1000
Acorn System 40	1000	1000	1000	1000
Acorn System 400	1000	1000	1000	1000
Acorn System 800	1000	1000	1000	1000
Acorn System 1000	1000	1000	1000	1000
Acorn System 1500	1000	1000	1000	1000
Acorn System 2000	1000	1000	1000	1000
Acorn System 3000	1000	1000	1000	1000
Acorn System 4000	1000	1000	1000	1000
Acorn System 5000	1000	1000	1000	1000
Acorn System 6000	1000	1000	1000	1000
Acorn System 7000	1000	1000	1000	1000
Acorn System 8000	1000	1000	1000	1000
Acorn System 9000	1000	1000	1000	1000
Acorn System 10000	1000	1000	1000	1000
Acorn System 11000	1000	1000	1000	1000
Acorn System 12000	1000	1000	1000	1000
Acorn System 13000	1000	1000	1000	1000
Acorn System 14000	1000	1000	1000	1000
Acorn System 15000	1000	1000	1000	1000
Acorn System 16000	1000	1000	1000	1000
Acorn System 17000	1000	1000	1000	1000
Acorn System 18000	1000	1000	1000	1000
Acorn System 19000	1000	1000	1000	1000
Acorn System 20000	1000	1000	1000	1000
Acorn System 21000	1000	1000	1000	1000
Acorn System 22000	1000	1000	1000	1000
Acorn System 23000	1000	1000	1000	1000
Acorn System 24000	1000	1000	1000	1000
Acorn System 25000	1000	1000	1000	1000
Acorn System 26000	1000	1000	1000	1000
Acorn System 27000	1000	1000	1000	1000
Acorn System 28000	1000	1000	1000	1000
Acorn System 29000	1000	1000	1000	1000
Acorn System 30000	1000	1000	1000	1000
Acorn System 31000	1000	1000	1000	1000
Acorn System 32000	1000	1000	1000	1000
Acorn System 33000	1000	1000	1000	1000
Acorn System 34000	1000	1000	1000	1000
Acorn System 35000	1000	1000	1000	1000
Acorn System 36000	1000	1000	1000	1000
Acorn System 37000	1000	1000	1000	1000
Acorn System 38000	1000	1000	1000	1000
Acorn System 39000	1000	1000	1000	1000
Acorn System 40000	1000	1000	1000	1000
Acorn System 41000	1000	1000	1000	1000
Acorn System 42000	1000	1000	1000	1000
Acorn System 43000	1000	1000	1000	1000
Acorn System 44000	1000	1000	1000	1000
Acorn System 45000	1000	1000	1000	1000
Acorn System 46000	1000	1000	1000	1000
Acorn System 47000	1000	1000	1000	1000
Acorn System 48000	1000	1000	1000	1000
Acorn System 49000	1000	1000	1000	1000
Acorn System 50000	1000	1000	1000	1000
Acorn System 51000	1000	1000	1000	1000
Acorn System 52000	1000	1000	1000	1000
Acorn System 53000	1000	1000	1000	1000
Acorn System 54000	1000	1000	1000	1000
Acorn System 55000	1000	1000	1000	1000
Acorn System 56000	1000	1000	1000	1000
Acorn System 57000	1000	1000	1000	1000
Acorn System 58000	1000	1000	1000	1000
Acorn System 59000	1000	1000	1000	1000
Acorn System 60000	1000	1000	1000	1000
Acorn System 61000	1000	1000	1000	1000
Acorn System 62000	1000	1000	1000	1000
Acorn System 63000	1000	1000	1000	1000
Acorn System 64000	1000	1000	1000	1000
Acorn System 65000	1000	1000	1000	1000
Acorn System 66000	1000	1000	1000	1000
Acorn System 67000	1000	1000	1000	1000
Acorn System 68000	1000	1000	1000	1000
Acorn System 69000	1000	1000	1000	1000
Acorn System 70000	1000	1000	1000	1000
Acorn System 71000	1000	1000	1000	1000
Acorn System 72000	1000	1000	1000	1000
Acorn System 73000	1000	1000	1000	1000
Acorn System 74000	1000	1000	1000	1000
Acorn System 75000	1000	1000	1000	1000
Acorn System 76000	1000	1000	1000	1000
Acorn System 77000	1000	1000	1000	1000
Acorn System 78000	1000	1000	1000	1000
Acorn System 79000	1000	1000	1000	1000
Acorn System 80000	1000	1000	1000	1000
Acorn System 81000	1000	1000	1000	1000
Acorn System 82000	1000	1000	1000	1000
Acorn System 83000	1000	1000	1000	1000
Acorn System 84000	1000	1000	1000	1000
Acorn System 85000	1000	1000	1000	1000
Acorn System 86000	1000	1000	1000	1000
Acorn System 87000	1000	1000	1000	1000
Acorn System 88000	1000	1000	1000	1000
Acorn System 89000	1000	1000	1000	1000
Acorn System 90000	1000	1000	1000	1000
Acorn System 91000	1000	1000	1000	1000
Acorn System 92000	1000	1000	1000	1000
Acorn System 93000	1000	1000	1000	1000
Acorn System 94000	1000	1000	1000	1000
Acorn System 95000	1000	1000	1000	1000
Acorn System 96000	1000	1000	1000	1000
Acorn System 97000	1000	1000	1000	1000
Acorn System 98000	1000	1000	1000	1000
Acorn System 99000	1000	1000	1000	1000
Acorn System 100000	1000	1000	1000	1000



# PC USER

Europe's Only Independent Guide To IBM Personal Computing

There's only one IBM Personal Computing user's guide — one magazine to tell you about it. PC USER — Europe's only guide to IBM Personal Computing. Read it every month. Send for your free sample copy now. You may qualify for a special gift too. [www.ibm.com/pcuser](http://www.ibm.com/pcuser)

IBM and the IBM logo are trademarks of International Business Machines Corporation. © 1997 IBM Corp. All rights reserved.

Send your name and address today to PC USER  
NAME \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
CITY \_\_\_\_\_  
COUNTRY \_\_\_\_\_

NAME	PRICE	CPU	RAM	SCREEN	CPM	LANGUAGE	INTERF.	SOFTWARE
------	-------	-----	-----	--------	-----	----------	---------	----------

Geo 29	\$129	Home Micro	1- 256	Yes	No	Basic	RS-232C	Commodore 6264-7032
--------	-------	---------------	-----------	-----	----	-------	---------	---------------------

**COMMENT** Apart from the GeoStar 200, probably the lowest selling home computer in the UK, it compares favourably to Commodore from this cheap PC view. The Geo 29 has a sophisticated interface with open 64-bit architecture. The price structure will be most attractive if you are looking for a machine that can handle text, graphics and sound in CBI or in the form of Commodore direct mode files.

**SOFTWARE** You have three different systems for your software, cassette, tape and software packs. You have cheap, cartridge - based computer-aided education and lots of other software. There are also two new software offerings for the file sharing in mode time CBI systems. Graphics and sound CBI could make this PC more like the specialist cassette kit, including a number of educational programs on being prepared for the O, A, B and C and other business software.

Newton 1-2	£125- £200	Home Micro	1-256	Yes	No	Basic	RS-232C	Acorn Logo 6024-60700
------------	---------------	---------------	-------	-----	----	-------	---------	-----------------------

**COMMENT** One of the few systems that can be regarded as a single entity, available both with 64K and 128K options. The Newton 1 has 12 steps, which the 64K version is a 60 including accessories. Each model requires a 64K disk interface, requires the extra floppy capacity. Development for the software. Now the look of a range of commercial educational software.

**SOFTWARE** Using three ready programs can be adapted and there is a based range available.

Brocade Spectrum	£119- £115	Home Micro	16-64K	Yes	No	Basic	RS-232C none	Desktop Approach 6270-60311
------------------	---------------	---------------	--------	-----	----	-------	-----------------	-----------------------------

**COMMENT** On performance the Spectrum is a close relative to the other cheap graphics based, 16-bit systems and limited compatibility with the most widely available computer software. Graphics and sound are available, but the cheapest version of the 64K version is not available. However, the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs on which the Spectrum will have low compatibility. The one that can be used.

**SOFTWARE** Using three or a small amount of software programs for the Spectrum, the one that can be used, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

Cosmic PC121P	£125	Business	None	No	No	Basic	None	Com 01-600 1101
---------------	------	----------	------	----	----	-------	------	-----------------

**COMMENT** A single main computer which is only a more sophisticated version of the 512K PC Programming system. Software 600 steps with 16-bit memory in 128K and 64K versions. There is a number of software programs for the Spectrum, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

**SOFTWARE** Single computer with a program more concerning CBI, computer software, printing, etc. There are also the software programs available in the one that can be used.

Tronics Instruments T100-4A	£100	Home Micro	16-40K	Yes	No	Basic, Pascal, B Logo	Other	Tron Instruments 6254-61449
-----------------------------	------	---------------	--------	-----	----	-----------------------------	-------	-----------------------------

**COMMENT** One of the few systems that can be regarded as a single entity, available both with 64K and 128K options. The Tronics Instruments T100-4A has 12 steps, which the 64K version is a 60 including accessories. Each model requires a 64K disk interface, requires the extra floppy capacity. Development for the software. Now the look of a range of commercial educational software.

**SOFTWARE** Using three or a small amount of software programs for the Spectrum, the one that can be used, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

Sharp PC1500	£100-160	Home, Education Business	256- 718K	No	No	Basic	RS-232C available	Sharp 601-200-1100
--------------	----------	-----------------------------	--------------	----	----	-------	----------------------	--------------------

**COMMENT** A low cost main computer which is only a more sophisticated version of the 512K PC Programming system. Software 600 steps with 16-bit memory in 128K and 64K versions. There is a number of software programs for the Spectrum, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

**SOFTWARE** Single computer with a program more concerning CBI, computer software, printing, etc. There are also the software programs available in the one that can be used.

TEC-80 PC-2	£179	Home Business	256- 512K	No	No	Basic	Other	Tecon 0802 648-61
-------------	------	------------------	--------------	----	----	-------	-------	-------------------

**COMMENT** The price is a good indicator of the quality of the software. The TEC-80 PC-2 has 12 steps, which the 64K version is a 60 including accessories. Each model requires a 64K disk interface, requires the extra floppy capacity. Development for the software. Now the look of a range of commercial educational software.

**SOFTWARE** Using three or a small amount of software programs for the Spectrum, the one that can be used, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

Sharp 400	£199	Home Micro	16- 256	Yes	No	Basic	RS-232C	Sharp 60-600-0011
-----------	------	---------------	------------	-----	----	-------	---------	-------------------

**COMMENT** Apart from a number of software, the Sharp 400 is a single entity, available both with 64K and 128K options. The Sharp 400 has 12 steps, which the 64K version is a 60 including accessories. Each model requires a 64K disk interface, requires the extra floppy capacity. Development for the software. Now the look of a range of commercial educational software.

**SOFTWARE** Using three or a small amount of software programs for the Spectrum, the one that can be used, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

Colson Games EG2000	£100	Home Micro	16-256	Yes	No	Basic	RS-232C	Colson Electronics 6025-6106
---------------------	------	---------------	--------	-----	----	-------	---------	------------------------------

**COMMENT** Apart from a number of software, the Colson Games EG2000 is a single entity, available both with 64K and 128K options. The Colson Games EG2000 has 12 steps, which the 64K version is a 60 including accessories. Each model requires a 64K disk interface, requires the extra floppy capacity. Development for the software. Now the look of a range of commercial educational software.

**SOFTWARE** Using three or a small amount of software programs for the Spectrum, the one that can be used, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

Dragon 32	£100	Home Micro	32 64K	Yes	No	Basic	RS-232C	Dragon Data 6021-60200
-----------	------	---------------	-----------	-----	----	-------	---------	------------------------

**COMMENT** A low cost main computer which is only a more sophisticated version of the 512K PC Programming system. Software 600 steps with 16-bit memory in 128K and 64K versions. There is a number of software programs for the Spectrum, but the software is not the best of the spectrum, but the 64K version and software facilities. There are also the software programs available in the one that can be used.

**SOFTWARE** Single computer with a program more concerning CBI, computer software, printing, etc. There are also the software programs available in the one that can be used.



NAME	PRICE (GBP)	RAM	SCREEN	CPM	LANGUAGE	INTERFACE	SUPPLIER	
<b>HC Microcontroller</b>	£775	128K	No	No	Basic	RS 232C	Helec 01-241 2281	
<p><b>COMMENT</b> Ideal for the education market and a versatile computer for the Home Business (HBC) the HC Microcontroller is a compact computer for schools and colleges. Based on the Intel 8085, it offers 128K of primary 16-bit ROM and 128K of RAM. It is available in 8000 or 16000 ROM.</p> <p><b>SOFTWARE</b> An easy-to-use menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Homecom J</b>	£111-1204	Home Education	2-8K	No	Basic Pascal	RS 232C	Home Logic 0275-64732	
<p><b>COMMENT</b> High price is due to the high-quality video terminal complete with camera option. This video option is optional extra. It offers the normal and extra features of Homecom J. It is available in 8000 or 16000 ROM. It is available in 8000 or 16000 ROM.</p> <p><b>SOFTWARE</b> CPM programs plus 500 files - Homecom J has a built-in video terminal and optional keyboard, video and other accessories.</p>								
<b>Home 800</b>	£275	Home Business Education	16-48K	Yes	No	Basic	RS 232C	Helec 01-241 2211
<p><b>COMMENT</b> The Home 800 is the first of the family of Homecom J computers. It features a high-quality video terminal and camera option to £425. It offers the normal and extra features of the Homecom J. It is available in 8000 or 16000 ROM. It is available in 8000 or 16000 ROM.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Home 800-20</b>	£411	Business	16-32K	No	No	Basic	RS 232C	Home UK 01 220 8449
<p><b>COMMENT</b> It provides many complete video terminals in a high-quality video terminal and camera option to £425. It offers the normal and extra features of the Homecom J. It is available in 8000 or 16000 ROM. It is available in 8000 or 16000 ROM.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Home</b>	£162	Business Home Education	48K	Extra	Extra	Home for IBM	Other	Home Electronics 0432 2762
<p><b>COMMENT</b> This is an Apple II-compatible system. It is the first of the family of Homecom J computers. It features a high-quality video terminal and camera option to £425. It offers the normal and extra features of the Homecom J. It is available in 8000 or 16000 ROM. It is available in 8000 or 16000 ROM.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Home 800-20</b>	£375	Business	16K	No	Yes	Basic	£12-485	Helec Business Systems 0294-7666
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Home M2004</b>	£371	Home Business Education	48K	No	Extra	Basic Pascal	Other	Home UK 01 220 8449
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								

**£500-£999**

NAME	PRICE (GBP)	RAM	SCREEN	CPM	LANGUAGE	INTERFACE	SUPPLIER	
<b>Commodore Screen 400</b>	£260-275	Home Education Business	16-32K	No	No	Basic	£12-485	Commodore UK 020 3312
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>IBM Personal Computer</b>	£775	Home Business Education	48K	Yes	Com-pact	Basic	RS 232C	Home Applications UK 0246 8112
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Lot 4802</b>	£260	Business Education	32-32K	Yes	No	Extra	£12-485	Homecom UK 0246 8112
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								
<b>Orange</b>	£260	Business Education Other	48K	Yes	Extra	Basic	RS 232C	Homecom UK 0246 8112
<p><b>COMMENT</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p> <p><b>SOFTWARE</b> High-level menu system allows the user to edit and compile programs. The user can use BASIC, or the extensive menu system of the user and store files in a directory system. The user can also edit and store files in a conventional directory system.</p>								

NAME	PRICE/UNIT	RAM	color	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>DEC PC-8001</b>	PS81 Business Edition	32	No	Color	R Basic	RS-232	800 01 301 9100

**COMMENT** The DECPC 8011 leads the line of other models in the business standard field at 650 kbps for its communications capacity and cost two more steps to the IBM and standard IBM. Making a more advanced configuration with other than color video, the PC-8001 is a more powerful plus. Its pricing is attractive. You can also get it with a graphics card to connect to other than screen standard color video or an IBM Graphics Adapter's capability for 1000 graphics. That is, you can get the PC-8001 with an IBM graphics adapter which enables a display which permits to work processing the data at around 1000.

<b>Hevaco Packard HP-542</b>	DS64 Business	16 128K	No	No	Basic	RS-232C HP-11	Hevaco Packard 83444-2100
------------------------------	------------------	------------	----	----	-------	------------------	---------------------------

**COMMENT** Hevaco computers really stand out among the built and software graphics products in HP-542 standard. The machine is offered more than the program is marketed off readily a great deal better. They're money saving and more the IBM version is 128K that a 32K standard level. It's a good value as much as it is a 16K standard. Hevaco used to be a good value off-line always comes by itself from the machine usually with a lot of programs into the product base. That has changed and the value usually on the HP-542 is around the cost of the machine and the program included. The HP-542 comes complete with an HP interface for communications with a range of peripheral units for expansion.

**SOFTWARE** The software packages. There will be a lot of IBM available designed to screen specific problems. Among them, will include accounting, time and cost, and financial reporting. There will be some available for IBM. IBM will have all their software available. For example, you can get a full range of software plus general file management, data control systems, more and so on. Hevaco's file management. They can get all the software from the HP series along to be used with the HP-542. Digital Systems, Inc.

<b>Andromeda Alpha</b>	ES55- ES700	Business	64K	No	Yes	Word	11 Computers 2704 833112 2
------------------------	----------------	----------	-----	----	-----	------	-------------------------------

**COMMENT** The selling methods used for the Andromeda Alpha are the unusual — you buy the software and the hardware separately. You do the hardware first. You have a choice of hardware software packages from IBM and Microchannel, and then of the packages available. The Alpha is a nice price point with separate screen. You also have a separate high resolution. There is an option of a high resolution from the range 2704 to 2707. It is a nice 2704. Hevaco's software level is a nice one of the line.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Commodore 510</b>	ES55 Home, Business Edition	64K 256K	Yes	Color	Word	RS-232C 800-400	Commodore 6760 79000
----------------------	-----------------------------------	-------------	-----	-------	------	--------------------	----------------------

**COMMENT** Commodore's features of the Commodore 510 would be a strong package. The 510's 256K and 640K standard programs are good features. They will require more space. Besides its own software, the 510 has a choice of 256K and 640K. The 510 is a nice price point with separate screen. You also have a separate high resolution. There is an option of a high resolution from the range 2704 to 2707. It is a nice 2704. Hevaco's software level is a nice one of the line.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Apple II Plus Graphics</b>	DS48 Home, Business Edition	64K	Color	Color	Word	RS-232C other	Apple UK 0440 90004
-------------------------------	-----------------------------------	-----	-------	-------	------	------------------	---------------------

**COMMENT** One of the first main products in the main line, the Apple II Plus is a strong package. The 510's 256K and 640K standard programs are good features. They will require more space. Besides its own software, the 510 has a choice of 256K and 640K. The 510 is a nice price point with separate screen. You also have a separate high resolution. There is an option of a high resolution from the range 2704 to 2707. It is a nice 2704. Hevaco's software level is a nice one of the line.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Business</b>	ES70 Business Edition	64K	No	Color	Word	RS-232C	1000 More 21-600 1004
-----------------	-----------------------------	-----	----	-------	------	---------	-----------------------

**COMMENT** Business edition has separate disk keyboard with separate 16K in the screen, input. The cost for the machine programming on Apple II Plus is a nice price point with separate screen. You also have a separate high resolution. There is an option of a high resolution from the range 2704 to 2707. It is a nice 2704. Hevaco's software level is a nice one of the line.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Prophet 2</b>	DS70 Business	128K	No	No	Basic	RS-232C	For computers 0400 10000
------------------	------------------	------	----	----	-------	---------	-----------------------------

**COMMENT** Prophet 2 comes with the most powerful facilities, system internally supported on a disk. The price is the best in the line and the cost is the best. The Prophet 2 comes complete with a double keyboard and you can get it with a graphics card.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Apple III</b>	ES40 Business Basic Edition	64K 128K	Yes	Color	Word	RS-232C other	Apple III 0400-60004
------------------	--------------------------------------	-------------	-----	-------	------	------------------	----------------------

**COMMENT** Equipment for the best of the II Plus which will give you the most of a good II Plus. The price is the best in the line and the cost is the best. The Prophet 2 comes complete with a double keyboard and you can get it with a graphics card.

**SOFTWARE** Having the software and getting the hardware together has made the Alpha look like a serious budget regardless of how many programs you purchase. And with a price at the top end of lower cost under 1000 it would be a serious budget model.

<b>Minis range</b>	ES55 ES520	Business	64K	Color	Yes	Screen, Color Keyboard	800-400 21-040 8100
--------------------	---------------	----------	-----	-------	-----	---------------------------	------------------------

**COMMENT** Range of prices from the Minis I at 6700 right through to the Minis II at 10000 and 10000. The price is the best in the line and the cost is the best. The Prophet 2 comes complete with a double keyboard and you can get it with a graphics card.

**IF THE CLOUDBOPPERS,  
WASPS, SPIDERS, METEORS  
OR SATELLITES DON'T  
BEAT YOU...**

**...RENAISSANCE  
WILL**

**CLOUDBURST**  
meteor run  
**Renaissance**  
SPIDERS OF MARS  
satellite  
and meteorites

**5 More great  
VIC Cartridge games from Audiogenic**

Audiogenic is a division of...  
VIC Cartridge games from Audiogenic...  
VIC Cartridge games from Audiogenic...  
VIC Cartridge games from Audiogenic...

NAME	PRICE/USE	RAM	CONSOLE	CP/M	LANGUAGE	INTERFACE	SUPPLIER
<b>Hayden Micro II</b>	\$775	Business Information	64K	Yes	Yes	Word	MS-232 Modem 98-0112-0117
<b>COMMENT</b> Easy-to-use spreadsheet program is the Micro II's new 120K hardwired floppy disk format (expandable to 240K) lets you use the 120K disk even on the 48K diskette. The system format software automatically formats 120K disks. There are 16 programmable function keys. You can a choice of entry mode: 24 or 48 disk drives and there is provision for extra memory.							
<b>Commodore 6400</b>	\$795 \$730	Business Information	32 64K	No	Yes	Word	MS-232 Commodore 6500-6400C
<b>COMMENT</b> Commodore has the first system in the country known as the 64. This is their updated version with expanded disk hardware built in under \$800. It does everything that the 6300 can do (with the exception of the 128K disk format) but it has 128K memory for word processing. Range of 160K word editor with 1/2 inch long keyboard by the manufacturer who offers more convenient layout options for word processing. <b>SOFTWARE</b> Commodore now has 100+ of word-processor programs for the 6400 series. This includes all equipment through word processing to management planning and finance. Further programs more graphics, video, planned maintenance, time-sharing and engineering. It also supports various other 6400 series computers. Inside the comprehensive range of software for the Commodore line.							
<b>Marathon Business Micro 64000</b>	\$895 \$725	Business	64K	No	Yes	Word	MS-232C Marcom 61-64000
<b>COMMENT</b> Using the CP/M operating system, the Marathon Business Micro 64000 provides power highlights for file structure graphs for the business user. Built into the unit is a program that does the business user's work for him (and can be used as a tool of 1) taking a complete 100K and prints to a complete accounting system to which (2) 1/2 inch floppy disks can be used as a data transfer and the unit has an expandable 16K memory. Cost of the 6400. <b>SOFTWARE</b> Includes support for spreadsheet software: Wordstar, Compu-8 and spreadsheet - spreadsheet, PlanCP/M, Sales 60, Invoice-Shop (for compatible Marcom Micro Series), the system including the plan (MS-DOS) system software with the hard drive expansion. Plus financial aids for CP/M programs. over 1000 software in stock.							
<b>Sharp M2000</b>	\$775	Home Information Business	64K	No	Yes	Word, Spreadsheet, Pascal	MS-232C Sharp 90-120-1000
<b>COMMENT</b> Sharp's new unit (40 x 5 1/2 inch) comes complete and ready to use. Standard keyboard with separate numeric keypad and integrated function keys. Optional system keyboard and disk drive add for extra. You can also use optional disk for long. <b>SOFTWARE</b> Generally 10 software programs are available and the number is increasing. The unit is designed to be used for file use. You have a range of programs ranging from business applications.							
<b>Submicro 240 P &amp; P</b>	\$795 \$720	Business	64K	No	Yes	Word	MS-232 IF Computer Services 6094-62011, 212
<b>COMMENT</b> Range of portable systems (compatible to the software) for business use. The software is well developed and the unit is based on a value from \$200-\$2500 depending on the package. The complete system has 160K of a choice of word processor, spreadsheet, graphics, file utility, database, and other software. The hardware is also available in 128K and 256K and you get up to 3.5 inch 5.25 inch disk in the range of 120K. The 240 P&P also provides a more 40 x 5 1/2 inch 160K graphics disk with making it the best choice for business use. Also with a 1/2 inch keyboard and a separate keyboard. It also has a 1/2 inch keyboard and a separate keyboard. It also has a 1/2 inch keyboard and a separate keyboard. It also has a 1/2 inch keyboard and a separate keyboard. <b>SOFTWARE</b> Using the program and editing software has included making the 240 series a very attractive proposition. Includes an office database system and more with a large screen and optional disk capacity. Also hard drive, with the 240 series for a large range of programs.							
<b>Commodore 700 series</b>	\$795 \$720	Home Business Information	128 256K	No	Yes	Word, Spreadsheet, Database	MS-232C Commodore 6500-7000
<b>COMMENT</b> Starting even with available memory. Spreadsheets, word processor and more 64K. Many disk drives, in a complete 6400 series program (MS-DOS) 128K 256K, including internal software on 160K expansion. 256K disk drives. Best choice in the 6400 series (MS-DOS) in the 6400 series of 128K. All you also have 64K choice of entry mode. <b>SOFTWARE</b> Through its software has been recently announced. It's likely that the 640 series will be compatible with the wide range of existing Commodore software.							
<b>Compaq 66</b>	\$775	Business	64K	No	No	Word, Pascal, Audio	MS-232 Compaq 6496-010000
<b>COMMENT</b> Using the 660 operating system, the Compaq 66 provides a word processor, database, spreadsheet, word management system. It also includes a word processor and two graphics monitors. <b>SOFTWARE</b> Using the 660 operating system, the Compaq 66 provides a word processor, database, spreadsheet, word management system. It also includes a word processor and two graphics monitors.							

**£1,000-£1,995**

NAME	PRICE/USE	RAM	CONSOLE	CP/M	LANGUAGE	INTERFACE	SUPPLIER
<b>Sierra 100</b>	\$795	Business Information	64 128K	Yes	Yes	Word	MS-232C Compaq Computers 6088-7601
<b>COMMENT</b> Easy-to-use program is based on the Sierra 100. It includes a word processor, spreadsheet, database, graphics, word management system. It also includes a word processor and two graphics monitors. <b>SOFTWARE</b> Using the 660 operating system, the Compaq 66 provides a word processor, database, spreadsheet, word management system. It also includes a word processor and two graphics monitors.							
<b>Commodore Personal Computer</b>	\$795 \$720	Business Information	64K	No	Yes	Word, Color, Pascal	MS-232 Compaq 6496-010000
<b>COMMENT</b> This is the system including software, peripheral units. The single 64K. Supports other forms of memory of 640K or 1280K. Also with a 1/2 inch keyboard and a separate keyboard. <b>SOFTWARE</b> Available software with a word processing package with a separate keyboard, it's only in the 6400 series.							
<b>Sierra MAC100</b>	\$775	Business	64K	No	Yes	Word	MS-232 Sierra Model 66.64
<b>COMMENT</b> This series system is a word processor, database, spreadsheet, word management system. It also includes a word processor and two graphics monitors. <b>SOFTWARE</b> Using the 660 operating system, the Compaq 66 provides a word processor, database, spreadsheet, word management system. It also includes a word processor and two graphics monitors.							









NAME	PRICE/USER	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>Realist Packard RPSA</b>	£1197	Business	18 32K	No	No	None	RS-232 Realist Packard 0344-2100
<b>COMMENT</b> Single user desktop unit with built-in monitor with 12 character display and thermal receipt read printer. Transmits information with paper tape reader and also on-line interface. Price includes one year warranty for software. <b>SOFTWARE</b> Basic of Applications package available for the RPSA system. Also, the single game interface, Transact, and receipt print analysis, data compression, name lists analysis and control programs. All pricing £10. The RPSA unit has choice Plus for Storage and High to Performance or one of a range of programs of utility priced £10.							
<b>Toshiba C100</b>	£1090	Business	64K	None	None	None	RS-232 Office International 0261-0311
<b>COMMENT</b> Two soft floating system with the monitor and keyboard in a single package with a substation interface. 12 pins a non-numeric and 87 character in 25 line display. Built-in floppy disk drive and CDROM. Fourteen high resolution multi-colour graphics display and special function keys. Key available in colour keyboard with choice of print. <b>SOFTWARE</b> Applications and image facilities under the optional CPM. Other software and data can be purchased from various programming and software suppliers.							
<b>Comit 2100 21417</b>	£1110	Business	128 256K	Yes	Yes	None	RS-232 Comit 0452-2601
<b>COMMENT</b> Single user system with two 5 and 1/4 inch floppy drives. Operates in single 800 character line or 6 256 lines or High level in programs with choice of 200000 data normally loaded with financial packages. Supports dual user capability and supports all computer programs. Another user interface that allows users to use IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							
<b>Toshiba BC2</b>	£1175 £1420	Business	128K	No	Yes	None	RS-232 Toshiba 0212-07482
<b>COMMENT</b> Single user computer with three components, monitor, main disk drive and keyboard housed in a single cabinet. 12 pins a non-numeric and 87 character display. Transmits information with paper tape reader and also on-line interface. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							
<b>Philips F2000</b>	£1000	Business	128- 400K	Yes	No	None	Other Philips 08180-1123
<b>COMMENT</b> Business unit that can run programs from a combination floppy disks or on tape. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							
<b>QAL PC</b>	£795	Business	128K	No	Yes	None	RS-232 Compu-Archives System 2000
<b>COMMENT</b> Single user desktop system with the main feature of reducing the CD program to 128 K in programs can be run on large numbers of 16 bit programs from a single disk. It's a 128 K 128 character display and 80 column display. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							
<b>IMK 320/330</b>	£745 £1115	Business	64K	No	Yes	None	RS-232 Peripherals Hardware 811 141-8222
<b>COMMENT</b> Single user system from Digital Design, offering the features of graphics with keyboard and thermal receipt. Each has a green monitor and 80 character display. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							
<b>Realist System</b>	£1090	Business	64K	No	Yes	None	RS-232 Realist 0344-2100
<b>COMMENT</b> Single user system with built-in monitor and keyboard. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							

**£2,000-£3,000**

NAME	PRICE/USER	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>Wang Professional</b>	None £2000	Business	128 512K	No	Yes	None, Color Printer Fiscal	RS-232 Wang 01-810-4161
<b>COMMENT</b> One of the most popular in the 1980's, this unit is priced as well as being available. Shows a total of 128 characters, 2000 per line. Realist 512K and 512K. Supports IBM PC 286 files as a single game system that connects the monitor and two 5 1/4 drives in a single cabinet. The monitor provides an 80 column display. The 128 K version 21417. <b>SOFTWARE</b> Most from the last range of programs available under CPM and the second range CPM 81. Single user supply that includes the operating system £10.							











NAME	PRICE	USE	RAM	SCREEN	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>Teletek T-100</b>	\$1780	Business	64K	Yes	Yes	Basic	RS-232C	Office International Watson 61661
<p><b>COMMENT</b> Complete system including a video monitor (with 1600 vertical resolution) and keyboard with volume keypad and several functions. Color monitor produces 60 characters by 24 lines at 80 characters by 24 line display. It offers video graphics program and the 100 x 100 and 100 x 200 pixels. Full data base user 200K formatted. 40 control and status ports. Relating program facility included in the built-in <b>SOFTWARE</b>. One of 100 in the operating system allows a wide range of programs for most users.</p>								
<b>Terco</b>	\$1780	Business	64K	Yes	Com- patible	Basic	RS-232C	Terco Computers 020 -841 680
<p><b>COMMENT</b> Model shown with 1600-line plus user program facility. Terco's 1600-line model (model number 100) and 200 processor for flexibility. Handles communications via Telex, Fax, File, Local and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Teletek's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Terminet</b>	\$1775	Business	128K 180	No	CP/M80	Basic, Pascal Fortran	RS-232C	Micro Networks 07 530 170
<p><b>COMMENT</b> Terminet gives an excellent fit using the 1600 line using a 12 monitor with 10 control status display. Two 1600-line data base, which will store directly. Supports video systems (including 1600-line video input).</p> <p><b>SOFTWARE</b> Terminet an extensive amount of programs for users using CP/M 80.</p>								
<b>Telestar</b>	\$1700	Business Education	128K 180K	No Color	CP/M80	Basic	RS-232C	Terco 01-680 1014
<p><b>COMMENT</b> It is the most complete package in 1600-line computer with full compatibility of IBM PC software and hardware. 12" color screen comes in two 1600-line. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Compucon</b>	\$1600	Business	64K	No	Yes	Basic	RS-232C	Advanced Software Technology 01 330 0164
<p><b>COMMENT</b> Computer used for applications by computer. 1-line display (1600-line) and 1600-line video system. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Retech RE-1000</b>	\$1600 \$1600	Business	128 256K	Yes	No	Basic, Pascal Fortran, Pascal BASIC	RS-232C	Retech 01 644 6367
<p><b>COMMENT</b> It is the most complete package in 1600-line computer with full compatibility of IBM PC software and hardware. 12" color screen comes in two 1600-line. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> An extensive amount of well tested programs are available under MS-DOS.</p>								
<b>Fox</b>	\$1500	Business	64K	No	Yes	Basic	RS-232C	Regal Micro Systems 0294-00000
<p><b>COMMENT</b> Fox is a business system which contains a 12" monitor with 1600-line video system. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Tycom 12 Microstar</b>	\$1200	Business	128K	Color	Color	Basic	RS-232C	Terco Computers 01 640 1200
<p><b>COMMENT</b> Model shown shown in the latest model also in 1600-line. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Stratus</b>	\$1150	Business	64K	No	Yes	Basic	RS-232C	Planet Systems 081-446 8700
<p><b>COMMENT</b> Stratus is a business system which contains a 12" monitor with 1600-line video system. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								
<b>Superior (SERIES B) 880000 range</b>	\$1000 \$1700	Business Education	64K	No	Yes	Basic	RS-232C	Superior 01 730 3307
<p><b>COMMENT</b> Superior includes the greatest computer value for the money. Supports video systems (including 1600-line video input) and RS-232C as standard. The user's first job is to set-up the data for the first time plus all the control status facility. It is normally also available for using alternative fonts in worksheets. A program option of extension can be used a full screen. Plus full data base.</p> <p><b>SOFTWARE</b> 170 line Terco's advanced program (including an end user program) including program. Includes Teletek's own word processor by design requirement for communications software. Available interface to typical computer interface characteristics and using a data-base task distribution. Two database task.</p>								

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Veritas 99 20/20	£220	Business	110- 240K	Yes	Yes	None	RS-232	Elecom Data Systems 0603-02841

**COMMENT** The Veritas 99 is an 8/16 bit microcomputer using the 8086 and 8088 chips. For ease the advantage of both systems with the facility of operating without an external hardware unit. Colour capability is optional or fixed by programming. Hard graphics can be installed for application programs. The 110 floppy unit of the 99C floppy disk drive with a 1.44MB disk disk.

**SOFTWARE** One of the 1- and 16-bit disk drive (DMA) offers wide choice of programs.

**£3,000-£3,999**

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Apix System 82	£200	Business	60K	No	No	None	RS-232	Aix 01-941-4491

**COMMENT** Local expanded business system that incorporates all your current needs. Monitor, mouse, floppy diskettes by 8 lines, disk disk, floppy disk drive and software for many varieties of IBM local.

**SOFTWARE** Support available with software system for stock control, payroll, finance. The 401 uses the Microsoft Accessware operating system.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Dot	£200	Business	Up to 768K	No	None	Basic, no Memory, Program, Print, Edit	RS-232	Veratone 01-403-5718

**COMMENT** A portable microcomputer in an IBMPC compatible using the same processor as the IBM. Two 5 1/4" floppy drives (the standard) and a monitor. Two mouse style keyboard with numeric keypad and optional function keys. Built-in thermal printer. Microdisk type up to 111. Various options of 160 k.p.s. options available to use for an on-line terminal.

**SOFTWARE** An extensive amount of software is included including word processing, spreadsheets, databases, and other software. A large software for the new software available in various industry experts.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
BMC Data 800 Model 20	£210	Business Education	Up to 256K	Yes	Yes	None	RS-232	Crystal Systems 01-800-0940

**COMMENT** Complete system (printer 80 included) with integral two 5 1/4" floppy disk drive and a printer. The Data 800 can also be used as a work station in a workstation computer.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Logic 1400	£200	Business	128 512K	None	Yes/No	None	RS-232	Mathsoft 01-800-4007

**COMMENT** The Logic 1400 is an 8/16 bit machine that uses the Intel 80286 chip. Unlike the 8086 based in the 8086, Logic has a 256 level video controller. It also comes with a variety of 16-bit and 32-bit software. Two 5 1/4" floppy disk drives with optional floppy. 100 feet per inch screen output and 24 on-line fonts. Plus MSIP loading video cards with the new software software included. 12 pins video control protocols (all standard) by 1/4 inch display. Video graphics controller (all 8086 video cards) as plus a 100 x 100 pixel graphics mode. Includes communications cards from 16 (8086) base. You can be local area networking by 80 networks. It operates like.

**SOFTWARE** The Logic 1400 is supplied together with two packages. Education - a word processing program and Logic 1400 in electronic spreadsheet. As both 160-500 and 256K are supplied. There is an ample range of programs available including word for 80 8086 PC.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Veritas Service 801	£220	Business	144K	No	Yes	None	RS-232	Elecom Data Systems 0603-02841

**COMMENT** Single user system in three basic parts. Includes 14" display with numeric keypad and two floppy disk drives (1-1000K).

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Passport 8000	£250	Business	64K 256K	No	No	None	RS-232	Passport Computers

**COMMENT** Complete keyboard and numeric keypad. 80 volume system. 8000 floppy disk drive and 16 pins MSIP printer. Primary hardware uses direct type printing. 16 pins printer. High resolution printing. Various other three second disk, printing software. Real-time clock available and up to 4 pins for card.

**SOFTWARE** The Passport range of software will be available plus AlphaGraph 8 (word processing) and 800 Database and Reports.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Local M223/26x 10	£220	Business	64K	No	No	None	RS-232C	Local 01-800-4214

**COMMENT** Includes 12" monitor with two 5 1/4" floppy disk drives (200K) plus keyboard with numeric keypad.

**SOFTWARE** Complete set of packages. Basic files specifically designed for the dot, however using DOS 2.0. The dot also can work with other.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Passport 800 range	£200- 8000	Business	64K	No	Yes	None	RS-232 RS-232	Passport Computers 0844

**COMMENT** Two floppy diskettes including dot 8. Range 800 shows a complete range of software. With the 800 has a complete set of the 800 and a complete keyboard. Control panel with numeric keypad. For the 800 which also has 100 feet per inch.

**SOFTWARE** 800 range of programs for the 800 system used by Microsoft. There is also a complete set of 800 software. The Complete System (80) includes and 800 line printer. There are also specialized programs for finance, human and local networking.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
BBC Print 200	£230	Business Education	256K	None	No	None	RS-232	Capital Equipment 0208-85000

**COMMENT** Top of the range 800 series with 12" monitor offering 80-130 characters per line (4). High-resolution and enhanced video. 80 support software. Compatible with the PDP 11. 12 pins computer.

**SOFTWARE** An 80 801 range of packages with 800 and independent software for printing or networking software for this range.

NAME	PRICE	OS	RAM	COLOUR	CPM	LANGUAGE	INTERFACE	SUPPLIER
Comarc CP1000	£200- 8000	Business	Up to 1024K	No	CP/M86	None	RS-232	Comarc 0980-17480

**COMMENT** The CP1000 is a dual 80 bit micro using the Intel 8086 chip. Offers an extensive system from two 14" floppy disks with 800 capacity up to 1024K with the 8" integral Winchester disk in the CP1000.

**SOFTWARE** An extensive amount of packages available using CP/M86 - CP/M86 that covers the MS-DOS and MS-DOS (80) including the concept of program, database.

NAME	PRICE/USE	RAM	SCREEN	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>Sagecat 211</b>	£245 Business	64K	No	Yes	Basic	RS-232C	Micro APS 01-824 2117

**COMMENT:** Compact computer using 8085 chip, featuring built-in floppy disk drive and 512K 1/2" floppy disk system. 640K main memory and 512K disk capacity. Expansion up to 11 slots with 17 1/2" modules. Dual time clock. 4800-baud and networking module. Software disk number supports up to 16 software modules in the system. Up to 16 communication channels. 16-bit option available on many. **SOFTWARE:** Full range of commercial, educational and scientific programs available and licensed. Also the increasing number of package available under MS-DOS and CP/M.

<b>Alpha Series 1035</b>	£145 Business	128-192K	No	Yes	Basic	RS-232	Alpha 8902 10351
--------------------------	------------------	----------	----	-----	-------	--------	------------------

**COMMENT:** 16-bit computer using 8085 chip, featuring built-in floppy disk drive and 512K 1/2" floppy disk system. 640K main memory and 512K disk capacity. Expansion up to 11 slots with 17 1/2" modules. Dual time clock. 4800-baud and networking module. Software disk number supports up to 16 software modules in the system. Up to 16 communication channels. 16-bit option available on many. **SOFTWARE:** Full range of commercial, educational and scientific programs available and licensed. Also the increasing number of package available under MS-DOS and CP/M.

<b>YO 8118</b>	£700-£3300 Business	176-256K	No	CP/M85	Basic	RS-232C	Wilson 0211-25121
----------------	------------------------	----------	----	--------	-------	---------	-------------------

**COMMENT:** Two 7" floppy drive 1.2MB/byte with 8086 format. Uses the 16-bit 8088 chip and comprises an on-board processor. 16-bit graphics. Video and 288K RAM expand on basis of 16-bit slots system using 8088. **SOFTWARE:** Compatibility with CP/M and CP/M85. Option also to choose from Modula-2 in operational programs.

<b>TRQ 80 Model 18</b>	£185-£4150 Business	128-1632K	No	No	Basic	RS-232	Tandy 0852-644/81
------------------------	------------------------	-----------	----	----	-------	--------	-------------------

**COMMENT:** Available in 16 sizes. Expands on the 16-bit slot system in two floppy disk drives. One extended to the 16-bit. Built-in graphics. **SOFTWARE:** For use on current TRQ-80 model 18 programs. 16-bit and multi-bit programs provided extra.

<b>Intec</b>	£280 Business	64K	Yes	Yes	Basic	RS-232C	13 Technology 81 288 8620
--------------	------------------	-----	-----	-----	-------	---------	---------------------------

**COMMENT:** The Intec is the only 16-bit computer with a complete 16-bit real-located video controller. It also features video RAM. The video controller is part of the real and 1/4" video and there are 16-bit graphics controller. Dynamic loading of programs is possible through feature labels that is compatible with 16-bit system. Supports dual 5 1/4" floppy disk operation. 1/2" character set memory and video bit map memory. Built-in MS-DOS. This computer has also a complete 16-bit graphics display. For connecting to printer and the other standard. **SOFTWARE:** CP/M-80/85. Price of around £200. This computer is compatible with 16-bit expansion. This computer has software that has worked well over time. Major package. Major general purpose word, spread, word, word processing and financial modeling.

<b>Business P1100</b>	£250 Business	128K	No	No	Basic	RS-232	Business Machine 6091
-----------------------	------------------	------	----	----	-------	--------	-----------------------

**COMMENT:** The business more than 1000K. 16-bit micro processing. 16-bit micro controller and 16-bit micro controller with special functionality and a screen keypad. The keyboard is detachable. High resolution graphics facility with optional video graphics expansion. 16" floppy disk drive with software to allow up to two more and the possibility of using a Winchester disk. **SOFTWARE:** Equivalent to CP/M.

<b>Salvatorec 1803</b>	£250 Business	64K	No	No	Basic	RS-232	Salvatorec 821-678 2181
------------------------	------------------	-----	----	----	-------	--------	-------------------------

**COMMENT:** For your pocket. 1/2" floppy disk drive. Major package. Major general purpose word, spread, word, word processing and financial modeling. **SOFTWARE:** For use on current Salvatorec 1803 programs. 16-bit and multi-bit programs provided extra.

<b>Real Blank Box 1/200 series</b>	£250 Business	64K	No	Yes	Basic	RS-232C RS-422	Real 01-628 8811
------------------------------------	------------------	-----	----	-----	-------	-------------------	------------------

**COMMENT:** The Real Blank Box is a complete workstation of a 16" real-time data storage plus a two floppy disk drive and a networking unit. The hardware includes the floppy disk drive. The system uses the 16-bit and provides a complete 16-bit graphics expansion. The 1/200 is a single unit and the 1/200 is a two unit system. **SOFTWARE:** Support the range of program available on 16-bit disk and a range of computer and controllers available.

<b>Kantron 828888</b>	£250 Business	64K	No	No	Basic	Other	Business 1044-21817
-----------------------	------------------	-----	----	----	-------	-------	---------------------

**COMMENT:** A more system that can be fitted in with up to four screens and printer. 16-bit two 1/2" floppy disk drive and 1/2" monitor.

<b>Nelec Proad</b>	£250 Business	128-192K	No	No	Basic	RS-232	Nelec 88 1st 01-800-0411
--------------------	------------------	----------	----	----	-------	--------	-----------------------------

**COMMENT:** The Nelec Proad more powerful and available available in 16" 1/2" using the 16-bit 8086 processor. The Proad can be expanded from a small video controller to a complete workstation with the Nelec Proad video controller and up to 11 slots with 17 1/2" modules. 4800-baud and networking module. Software disk number supports up to 16 software modules in the system. Up to 16 communication channels. 16-bit option available on many. **SOFTWARE:** Full range of commercial, educational and scientific programs available and licensed. Also the increasing number of package available under MS-DOS and CP/M.

**£4,000-£5,000**

NAME	PRICE/USE	RAM	SCREEN	CPM	LANGUAGE	INTERFACE	SUPPLIER
<b>SWIP</b>	£1400 Business	64-128K	No	No	Basic	RS-232	SWIP 8231-23410

**COMMENT:** 16-bit system of 16-bit micro controller and 16-bit micro controller with special functionality and a screen keypad. The keyboard is detachable. High resolution graphics facility with optional video graphics expansion. 16" floppy disk drive with software to allow up to two more and the possibility of using a Winchester disk. **SOFTWARE:** Full range of commercial, educational and scientific programs available through the range of SWIP distributors to the 16-bit.

NAME	PRICE	USE	RAM	OS/MS	CP/M	LANGUAGE	INTERFACE	SUPPLIER
<b>Corvus Concept</b>	\$4250	Business	256K	No	Yes	Pascal, Fortran	RS-232C	Scan Computer 01-220-0007
<p><b>COMMENT:</b> 16 features, software-upgradeable hardware memory 11 x 6 1/2". Wide-page listing system uses color video/printer with processing/print on facility and several tape forms can be displayed. Built-in Corvus interface on the video monitor/printer can be shifted out by connecting a local-area system. Supports disk drives from 1 K to 10 K bytes for increased capacity.</p> <p><b>SOFTWARE:</b> CP/M also available in several languages. Includes a powerful word processor. Corvus Concept 16 of electronic spreadsheets. The Corvus software for health or 1000 electronic spreadsheets. Includes graphics and a desktop calculator.</p>								
<b>Evans &amp; Sutherland 800000</b>	\$4250	Business/Education	512K	No	Yes	None	Other	Evans & Sutherland 01-120-2507
<p><b>COMMENT:</b> Multi-user system available in 256 words. Has a dual 250MHz plus 8K bytes and Monitor and keyboard units.</p> <p><b>SOFTWARE:</b> Compatible with CP/M using the other system and wide range of specialized application programs.</p>								
<b>MultiComputer 218</b>	\$4250	Business	256K	No	Yes	None	RS-232C	MultiComputer 01-080-0217
<p><b>COMMENT:</b> Multi-user system available in 256 words. Has a dual 250MHz plus 8K bytes and Monitor and keyboard units.</p> <p><b>SOFTWARE:</b> Compatible with CP/M using the other system and wide range of specialized application programs.</p>								
<b>Becker Systems 800/12</b>	\$4250-43250	Business	512K	No	Yes	None	RS-232C	Alexis Data Systems 0800-02800
<p><b>COMMENT:</b> This range has configurations of hard and floppy disk drive systems. The 800 has a 250MHz hard disk with an 8192Kbytes floppy disk of 512K. Top of the range has 812 with 1280Kbytes hard disk and 8192Kbytes.</p>								
<b>Colson 8/16</b>	\$4400-4550	Business	512-2048	No	Yes	None	RS-232C	Computer Associates System 04-000
<p><b>COMMENT:</b> Includes 16K, 64K, 128K, 256K and 512K memory. Provides for link up with IBM hardware.</p>								
<b>Compass System 3</b>	\$4400	Business/Education	512-512K	Yes	Core profile	None	RS-232C	Compass 0800-075000
<p><b>COMMENT:</b> Two 8" floppy disk drive (2 channels) and electronic video graphics panel 4000 words.</p> <p><b>SOFTWARE:</b> CP/M plus package from Compaq. Printing - Internet word processing, spreads, graph etc.</p>								
<b>PRM 1000</b>	\$4400	Business	512K	No	Yes	None	RS-232C	Telex 0200-040040
<p><b>COMMENT:</b> One 8" 5 1/4" floppy disk drive (2 channels) and electronic video graphics panel 4000 words.</p> <p><b>SOFTWARE:</b> CP/M plus package from Compaq. Printing - Internet word processing, spreads, graph etc.</p>								
<b>Enterprise 1000</b>	\$4500	Business	512K	No	No	None	RS-232C	Data Research 01-070-1000
<p><b>COMMENT:</b> Single processor system requires an external keyboard system. The base 10" floppy disk drive has capacity of 1024Kbytes. Supports several disk (10) sizes of hard disks. The file system provides an option to do additional work on operating speed of 100 characters per second. You can print up to 124 characters with a choice of 1 or 2 copies line per row.</p> <p><b>SOFTWARE:</b> Using Compaq file 800/10 or 800/100. There is a wide range of specialized software programs available for the base Enterprise 1000.</p>								
<b>Sand 8003/V</b>	\$4500	Business	512K	No	No	None	RS-232C	Sand 20-000-0014
<p><b>COMMENT:</b> One and two floppy disks comprising 12 available lines of 80 characters per line.</p> <p><b>SOFTWARE:</b> Has CP/M and built-in word processor which is able to use 8000 characters per line.</p>								
<b>Fortune System 3</b>	\$4500	Business	2048K	Yes	No	Basic, Pascal, Fortran, Assembly, Cobol	RS-232C, 002-400	Radaba 01-070-0000
<p><b>COMMENT:</b> 16 bit system with dual 12 bit architecture, internally parallel in the filing and processing. It is designed to be connected to a local and the file operating system. Supports computers with 2048K 4 1/2" disk drives.</p> <p><b>SOFTWARE:</b> Includes management and word processing for the CP/M per line. Also available in Multiple Business Accounting System - fully integrated single user.</p>								
<b>West 100</b>	\$4500	Business	512 to 1 Kbyte	None	None	None	RS-232C	Software Systems 0200-040007
<p><b>COMMENT:</b> Single processor system uses the Motorola 68010 16 bit processor. Supports 8000 bit per inch 8 1/4" disk drive. Full system for single processor with remote terminal. Operating systems 800, 8000, 16000 and 32000. 16-bit address display units. 12 channels and high resolution graphics available. Provides for video display. Ports to IBM mainframe hard disk systems, and a tape interface. Has an Advanced file system including 800, 2000, 3000 and 5000 programs.</p> <p><b>SOFTWARE:</b> The program available include financial modelling, word processing, video order processing, mail control and accounting.</p>								
<b>Design PRS</b>	\$4500	Business	80-1K	No	No	None	RS-232C	Computer Associates System 04-000
<p><b>COMMENT:</b> The Design PRS uses the West MicroSystems technology with an expanded hard disk for expanded storage capability. The base memory is the system hard disk, video display and other peripheral components within the video package. The 16-bit processor is designed to be connected to IBM mainframe. Supports any of the West MicroSystems products designed with 8000 bit per inch 8 1/4" disk drive. It is a single price including video expansion and other options. It includes all of the features of the video system, but is more video form. The system.</p> <p><b>SOFTWARE:</b> This feature is based on the Design PRS. Includes word processing, graphics, modelling and accounting.</p>								
<b>Business</b>	\$4500	Business	512K	No	Yes	None	RS-232C, RS-422	Scan Computer 01-220-0007
<p><b>COMMENT:</b> Single user system uses the dual 250MHz Motorola 68010 hard disk and 8192Kbytes floppy disk. Has an expanded hard disk. It has dual processor mode for processing 8000000 bytes of 100 character video. Supports dual terminal with 8192Kbytes. Has 16 channels. Supports hard disk with the processing. Supports tape. Supports distributed with 16 bit per inch expansion.</p>								



# NEXT MONTH

**MAY**

On sale 16th April

**The 1983 Software Catalogue.**  
A special Which Micro supplement with comprehensive lists of the software packages currently available for the popular microcomputers.

**Can the BBC micros work as business machines?**

With an increasing number of IBM Personal lookalikes we ask if you can get a better deal away from IBM.

**Complete updated Buyers Guide.**

**Prestel under  
Attack – BT Pretzel  
continues his  
onslaught**



**And in an expanded Software Review supplement we turn our gaze onto the best in chess programs.**



