Personal Computing Today

FEBRUARY 1983
65p

Software Checklist Inside

Does the new Sord have the edge?

Slay the dragon in our adventure Gamesboard

Programs to run for VIC 20, ZX81, TRS-80, BBC, Spectrum

The BBC disc system

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Computer Factfile

Helpful hardware data

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Editor:
Elspeth Joiner

Editorial Assistant:
Chris Palmer

Advertisement Manager:
Beverley McNeill

Advertisement Executive:
Kevin Lyneds

Managing Editor:
Ron Harris

Origination and design by:
MM Design & Print

Managing Director:
T J Connell

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Welcome again to PCT. Now that you have all recovered from the Christmas and New Year festivities you can all sit back and get down to testing out any new computer goodies received.

You may, or may not, have noticed in the last couple of issues that PCT is now selling some of the games we have published in the magazine. So far on our list we have plumped for VIC-20 and BBC games. Ladders and Walkways and Melody Maker are the two games for the VIC taken from our December issue, and Pete the Plastered Postman with Asteroid Lander came out of our last issue. This month two Spectrum games, Spectrum Zap and ZX Reactor are featured on tape.

Spectrum Zap is an alien invasion game which not only teaches you how to go about programming this classic arcade game on your own Spectrum computer, it also makes full use of the machine's colour and graphics facilities. Spectrum Zap needs 16K of memory space to run it, as does the accompanying game ZX Reactor which appeared in September '82's PCT.

Just to re-cap, ZX Reactor was a game of danger and daring. You take the part of a man in a mythical nuclear power station where nine reactor cores are on the verge of 'critical'. You have to move round the reactors in numerical sequence and deactivate them. In your wake you leave a tell-tale trail behind you which you must not cross over. Quick forethought is what's required in ZX Reactor in order to work out your route successfully.

The two programs on one tape are selling for £8.50 and are available from ASP Software. Watch out for ASP advertisements in each issue of PCT for details of the games available on tape for your computer.

Each month at least one of the programs printed in the current issue will be available on tape with another piece of software not necessarily printed in the same issue. This move is aimed to help you — instead of spending hours keying in a listing just buy the program from us.

All the tapes are available from our specially-formed firm, ASP Software which is at the same address for PCT offices. To get your copy of one our games just send a cheque or postal order to us and we will send you your software within three weeks, (although often it reaches you sooner).

ASP Software arose after our sister magazine Computing Today wrote and published a massive and challenging adventure game called The Valley which is available on tape for a wide variety of machines including the TRS-80, BBC, Spectrum, Atari, Sharp MZ80K, VIC-20, /PET.

Another important feature included in this issue is our READERSHIP SURVEY. This is where we give you the chance to voice (or at least write down) your views on the magazine so that we can sort out what you believe are its good and bad points. Turn to the contents page to find out where it is in the magazine and fill it in.

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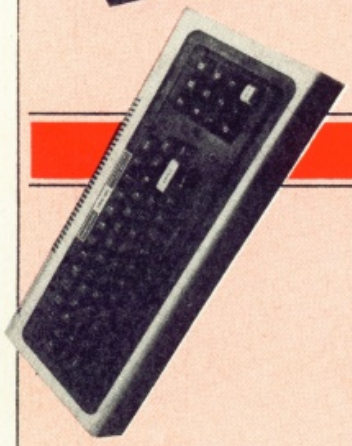

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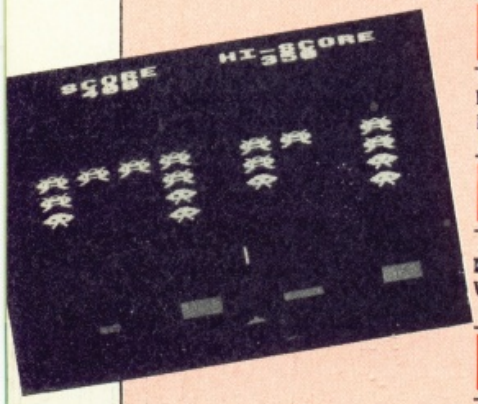

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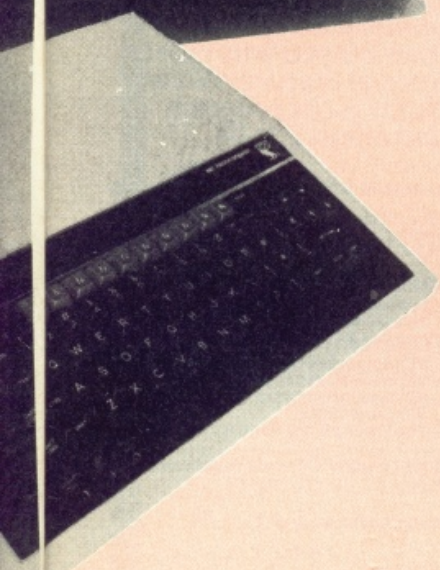

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Amazing arcade action for the standard VIC 20 with 5 new exciting games from Clifford Ramshaw: ALIEN BLITZ*, INVADERS*, GROUND ATTACK, STORM and SPACE ROCKS* (games marked * contain machine code). You must have the VIC GAMES PACK cassette - only $5.95.

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Software News

INNOVATIVE
TRS 80·GENIE SOFTWARE

from the professionals

TRIAL PACKAGE

The Snapp utilities Extended Basic, Built In Functions, Mapping Support, Autofile and the Garbage Collector are all described in our catalogue. Literature is also available from us on request. These programs are available for the machines listed below.

All of this software is installed into the Disk Basic interpreter of the host machine and thereafter is fully integrated into TRSDOS Basic. Once installed it is entirely transparent to the user.

Extended Basic has six separate utilities within it, including cross reference; variable dump (including values), compression, string and keyword find.

Built In Functions contains a large number of new commands and utilities to aid the programmer, the exact number depending on the machine. For instance, one can POKE up to 255 bytes at one time, sort a number of arrays, erase any or all arrays from the Array Table, PEEK multiple bytes at one time, calculate passwords, exchange the contents of variables and so on.

The Garbage Collector gets over that big failing of Microsoft Basic whereby the machine appears to hang from time to time whilst it sorts out its string area.

Automap is a product designed to automate for the Basic programmer the tasks of presenting information on the VDU and accepting information from the keyboard operator.

Autofile carries out very similar tasks to Automap, but instead of interfacing between the keyboard and the VDU, it interfaces between the keyboard and a file.

These utilities are hard to describe but once you use them, then like us, you will never let them go. They are almost miraculous in their use and are the greatest programming time savers that we have ever seen. They are, however, expensive. This Trial Package has, therefore, been produced to provide a "sample" of these utilities for a very low price. The catch is that this sample can only be installed on one of your disks containing Disk Basic and can only be accessed on that disk 99 times. This is more than sufficient to give the user an idea of the very real and very important advantages of using these utilities.

Model I & III (LDOS)	**£ 7.00**	Model II (TRSDOS 2.0)	**£25.00**
Model III (TRSDOS)	**£17.50**	Model II (TRSDOS 4.1)	**£37.50**

All the above plus V.A.T. ..... p & p 75p

other machines

We have started to supply some of our more popular programs in non TRS-80 format for other machines as follows:

BBC (MODEL B)

JUMBO

The 747 simulation that has swept the TRS-80 community worldwide! So memory tight that there was no room for full colour.

Cassette **£17.25**

MYSTERIOUS ADVENTURES

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The Golden Baton

The Time Machine

Arrow of Death Part I

Arrow of Death Part II

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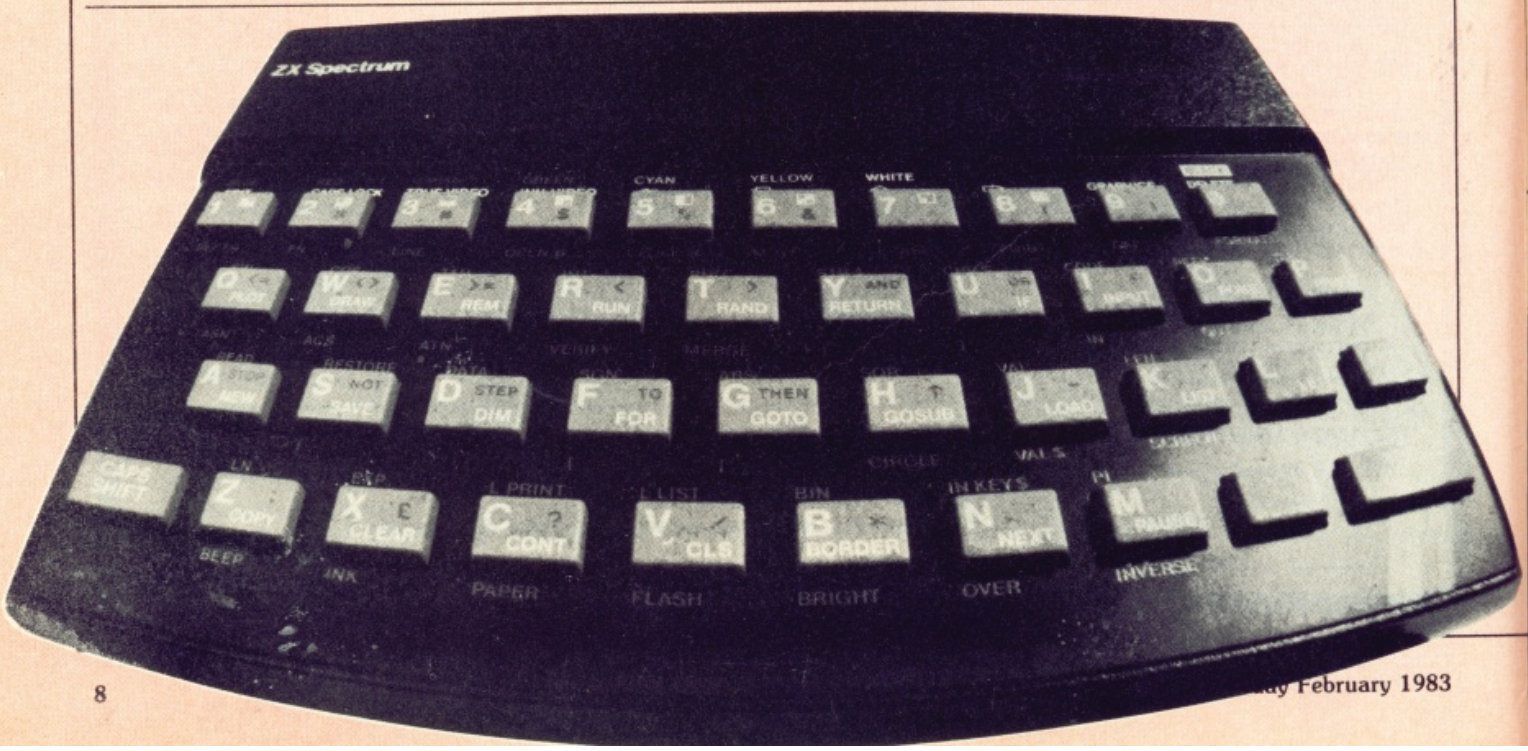
TRS-80 & VIDEO GENIE SOFTWARE CATALOGUE £1.00 [**refundable**] plus £1 postage.

SPECT ZAP

Anhiate aliens as they descend from the skies in this fast-moving Spectrum game from Eric Smith.



TRUM

At the start of this game you are given three lives, with your laser base positioned at the bottom of the screen.

The alien appears at the top of the screen and moves down towards your base line in one of three directions; either straight down, vertically left, or vertically right.

The screen is wrapped round from the alien's point of view, but not from the player's. You fire at the alien by pressing the '0' (zero) key and move left and right by pressing the '5' and '8' keys respectively. If, however, on your third shot you miss the alien then it can change direction, but will still approach your base line.

If the alien touches your base line then you lose one of your lives (you are on your last life the game ends). When you destroy the alien then you gain up to 2000 points, depending on how far down the screen it was when your laser gun obliterated it.

Throughout the game 'Mystery Ships' will wander across the screen. If you hit them then you gain up to 10,000 points and a free life. (But you have to hit them in exactly the right place for the laser bolt to take effect!!!). You are allowed only three shots at them then your laser base becomes ineffective and the ship passes across the screen whereupon you lose a life, (this only applies if you have one life to spare: i.e. missing a ship cannot put you out of the game.)

The game ends three aliens land. However, if you get over 100,000 points the aliens wrath arises and they start to descend not from the top of the screen, but slightly further down so as to catch you out at the wrong side of the screen.

Throughout the game sound effects are produced as the alien descends, when you fire your laser bolt, when you hit the alien, when the alien lands, when the 'Mystery Ship' appears and when the game ends.

The program runs quite quickly even though the program contains no machine code. The 'Mystery Ship' routine was written out with the main printing loop as a separate routine so that the speed of the program was not impaired. The highest score obtained so far is 110,349 before three aliens landed. Let us know if you top that score.

HOW IT RUNS

Lines 1-3	Produce the instructions if necessary.
Lines 5-70	Produces the user definable space invader, spaceship explosion and laser base.
Lines 100-115	Reset the game.
Lines 120-160	Reset the screen for another alien
Lines 170-280	Are the main screen print and the exit to the fire routine.
Lines 400-490	Are the fire routine which draws and undraws the laser bolt. This also provides the exit to the scoring routine.
Lines 500-540	Contains the scoring routine and the exit to the 'Mystery Ship' routine. It also increases the print position of the alien if the score is over 100,000 and RND is greater than 0.7.
Lines 600-895	Produces the whole 'Mystery Ship' routine: i.e. the moving of the spaceship and the base, the firing of the laser base and the explosion the points scored and the free life.
Lines 900-940	Deals with the loss of a life if the spaceship was missed.
Lines 980-990	Ends the game.
Lines 1000-1050	Produce the random movement for the alien.
Lines 1100-1110	Produce the effect of the wrapped round screen.
Lines 2000-2160	Are the instructions.

HINTS ON CONVERSION

This program should be able to be converted onto most machines that allow text and high resolution graphics to be mixed onthe same screen. This is neccessary because the laser shots are created using high resolution line graphics while the laser base and invaders are made up of user defined graphics characters. These are placed on the screen by using a PRINT AT statement and can be replaced by a screen POKE on any machine that doesn't support this, but does have a memory mapped screen.

The screen on the Spectrum is 255 pixels by 175 pixels with the origin (0,0) in the botom left corner. The character screen is 32 × 22 with the origin for PRINT AT commands at the top left of the screen. It is worth noting that the Spectrum's PLOT and DRAW statements work differently to most machines. If you want to PLOT at a point (50,50) and then DRAW to the point (100,100) you would have to use the form PLOT 50,50 : DRAW 50,50. This is because the co-ordinates in the DRAW statement are offsets from the PLOT statement, not a direct reference to a screen location.

If you have a machine that is capable of producing definable graphics the conversion of the Spectrum's definable characters is simple. The BIN statements in lines 20-70 contain all the information for but patterns of the characters, expressed in binary form. For your own machine either convert them into their decimal equivalents or leave them as binary, depending on which method your machine uses.

SPECTRUM ZAP

PROGRAM LISTING

```
   3 GO SUB 2000
   5 INK 9: BORDER (RND*7): PAPE
R (RND*7): CLS
  10 FOR k=1 TO 6: FOR n=0 TO 7:
 READ a: POKE USR (CHR$ (143+k)
+n,a: NEXT n: NEXT k
  20 DATA BIN 00011111,BIN 00100
000,BIN 01111111,BIN 10100100,BI
N 10100100,BIN 01111111,BIN 0010
0000,BIN 00011111
  30 DATA BIN 11111111,BIN 0,BIN
 11111111,BIN 10010010,BIN 10010
010,BIN 11111111,BIN 0,BIN 11111
111
  40 DATA BIN 11111000,BIN 00000
100,BIN 11111110,BIN 00100101,BI
N 00100101,BIN 11111110,BIN 0000
0100,BIN 11111000
  50 DATA BIN 00111100,BIN 01111
110,BIN 01011010,BIN 01111110,BI
N 00111100,BIN 01000010,BIN 1000
0001,BIN 10000001
  60 DATA BIN 10000001,BIN 01011
010,BIN 00100100,BIN 01000010,BI
N 01000010,BIN 00100100,BIN 0101
1010,BIN 10000001
  70 DATA BIN 00010000,BIN 00010
000,BIN 00010000,BIN 00010000,BI
N 0101000,BIN 01111100,BIN 01111
100,BIN 11111111
 100 LET life=3
 105 LET s=2
 110 LET sc=0
 115 LET a=19: LET b=13
 120 PRINT  AT 0,25;"    ";AT 0,
25;"↑↑↑↑"( TO life-1); FLASH 1;
AT 0,0;"SCORE ";sc
 130 FOR z=0 TO 31: PRINT AT 19,
z;"_": NEXT z
 150 LET c=s: LET d=INT (RND*22)
+4
 160 GO SUB 1000
 170 PRINT  AT a,b;"_F_"
 180 PRINT AT c,d;"_D_";AT c-1,d
;"  "
 190 BEEP 0.005,c
 200 LET b=b+(INKEY$="8" AND b<2
8)-(INKEY$="5" AND b>0)
 210 IF INKEY$="0" THEN GO TO 40
0
 220 IF fr=3 THEN GO SUB 1000
 230 LET d=d+m
 240 LET c=c+1
 250 IF d<=2 THEN GO SUB 1100
 260 IF d>=28 THEN GO SUB 1110
 270 IF c>=20 THEN GO TO 900
 280 GO TO 170
 400 LET w=8*(b+1)+3
 410 LET fr=fr+1
 420 PLOT w,24
 430 LET q=(18-c)*8
 440 DRAW 0,q
 450 PLOT OVER 1;w,q+24
 460 DRAW OVER 1;0,-q
 470 FOR l=20 TO 25: BEEP .005,l
: NEXT l
 480 IF b=d THEN GO TO 500
 490 GO TO 220
 500 PRINT AT c,d;" E ": FOR l=4
0 TO 50: BEEP .01,l: NEXT l: PRI
NT AT c,d;"  "
 510 LET sc=sc+INT (99.9*c): PRI
NT AT 0,0; FLASH 1; BRIGHT 1;"SC
ORE ";sc
 520 IF RND>.95 OR RND>.85 AND s
c<80000 OR RND>.7 AND sc<20000 O
R RND>.5 AND sc<3000 THEN GO TO
500
 530 LET s=s+(sc>100000 AND RND>
.7)
 540 GO TO 120
 600 FOR z=0 TO 31: PRINT AT 19,
z;"_": NEXT z
 610 LET cs=0
 640 LET u=2: LET t=0
 650 PRINT AT u,t;" ABC";AT a,b;
"_F_"
 670 BEEP 0.05,t+20
 680 LET b=b+(INKEY$="8" AND b<2
8)-(INKEY$="5" AND b>2)
 690 IF INKEY$="0" AND cs<3 THEN
GO TO 730
 700 LET t=t+1
 710 IF t>=27 THEN GO TO 890
 720 GO TO 650
 730 LET e=8*(b+1)+3
 740 LET cs=cs+1
 750 LET ans=INT (RND*3)+1
 760 PLOT e,24
 770 LET q=16*8
 780 DRAW 0,q
 790 PLOT OVER 1;e,q+24
 800 DRAW OVER 1;0,-q
 810 FOR l=20 TO 25: BEEP 0.005,
l: NEXT l
 820 IF b=t+ans THEN GO TO 840
 825 LET t=t+1
 830 GO TO 650
 840 PRINT AT u,t;"EEEEE"
 850 LET sc=sc+INT (RND*10000)
 860 LET life=life+1*(life<5)
 870 PRINT AT u,t;"     "
 880 GO TO 120
 890 LET xb=8*(b+1)+3: LET yb=15
2: PLOT 240,155: DRAW (xb-240),(
-142): FOR l=1 TO 50: NEXT l: DR
AW OVER 1;(240-xb),(142): PRINT
AT u,t;"     ": LET life=life-((
life>1)
 895 GO TO 920
 900 PRINT FLASH 1;AT 10,10;"ALI
EN LANDED": FLASH 0
 910 LET life=life-1
 920 IF life=0 THEN GO TO 980
 930 FOR l=1 TO 15: BEEP 0.1,(RAN
D*20)+5: NEXT l
 940 CLS : GO TO 120
 980 PRINT AT 10,10;"GAME OVER,
";AT 12,12; FLASH 1;"A L I E N
S"; FLASH 0
 990 FOR l=10 TO 50: BEEP .1,l:
NEXT l: STOP
1000 LET rnd=RND
1010 IF rnd<0.333 THEN LET m=-1
1020 IF rnd>=0.333 AND rnd<=0.66
6 THEN LET m=0
1030 IF rnd>=0.666 THEN LET m=1
1040 LET fr=0
1050 RETURN
1100 PRINT AT c-1,d;"   ": LET d
=27: RETURN
1110 PRINT AT c-1,d;"   ": LET d
=3: RETURN
2000 PRINT BRIGHT 1; FLASH 1;AT
5,10;"A L I E N S": BRIGHT 0: PR
INT FLASH 1;AT 10,0;"Do you want
 the instructions ?";AT 11,12;"(
Press y/n)": FLASH 0
2010 IF INKEY$="n" THEN RETURN
2020 IF INKEY$="y" THEN GO TO 20
40
2030 GO TO 2010
2040 CLS
2050 PRINT "In the game of ALIEN
S the objectis to blast as many
aliens off  the screen before th
ey touch theground.
            You move right by pr
essing the  '8' key and left by
pressing the'5' key, to fire you
r laser you must press the '0' k
ey."
2060 PRINT "The aliens come in t
hree         directions: straight
 down,       vertically right and
 vertically  left. Up to 2000 poi
nts may be   scored by hitting th
e aliens,    however if on your t
hird laser   bolt you miss the al
ien then thealien may change dir
ection."
2070 PRINT : PRINT FLASH 1;"Pres
s ENTER to continue.": FLASH 0
2080 IF CODE INKEY$<>13 THEN GO
TO 2080
2090 CLS : PRINT "Each time an a
lien touches the  base line then
 one of your livesdisappears. Th
e number of lives you have in re
serve is the      number of arro
ws at the top     right hand sid
e, your score is  on the top lef
t hand side.      On the third a
lien landing the  game ends suit
ably."
2100 PRINT "A 'Mystery Ship' wil
l appear to move  across the scre
en. If this is hit then up to 10
000 points  will be won and an e
xtra life   (upto a maximum of f
ive lives)  willbe added. Howeve
r you are   only allowed three s
hots at the ship (any more are i
gnored)"
2110 PRINT : PRINT FLASH 1;"Pres
s ENTER to continue.": FLASH 0
2120 IF CODE INKEY$<>13 THEN GO
TO 2120
2130 CLS : PRINT "However if you
 miss the ship     then you lose
a life(only if youhave one life
or more in        reserve.)
                  The game conti
nues until three  invaders land
with something of interest in st
ore for those who score very hig
h."
2140 PRINT : PRINT : PRINT FLASH
 1; BRIGHT 1;"PRESS ENTER TO BEG
IN GAME!!!": FLASH 0: BRIGHT 0
2150 IF CODE INKEY$<>13 THEN GO
TO 2150
2160 RETURN
```

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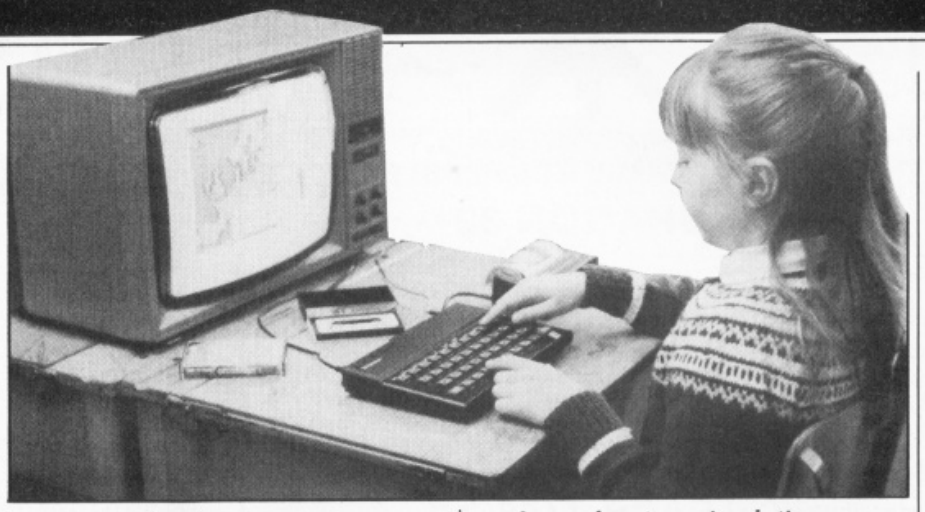
Blackboard Programming



Chalksoft started work on the blackboard and now is bringing software into the schoolroom selling educational packages.

The firm has been formed to produce software for schools which can be used in the home too. Aimed at children of primary and middle school age, 5-11 and 9-13, the firm's software packages now numbers eight including two currently under development. The packages are all learning aids with a fun-to-play angle incorporated so that children are only half aware that they are actively learning while they are playing.

All the programs written have been specially developed for use by sometimes heavy-handed children and are free from finger bounce and protected from keying-in errors. So far the computers with compatible software are the VIC-20 6.5K model and the 32K BBC B, although plans are afoot to bring out versions for the 48K Spectrum.

Prices for the tapes are very competitive ranging from a meagre £6 to £10. All the packages are in full-colour and incorporate sound effects where applicable. Chalksoft hopes to produce two new tapes a month and all will be available either mail order from Chalksoft or via authorised dealers.

Included in the catalogue are Metrics, Invisible Man, Sequences (a number pattern game), Angle, and an adventure simulation game called Inkosi.

Now in the production stage are reading and writing tapes including a version of the best-selling Pacman game in which the 'gobbler' eats up and spits out basic punctuation marks. Sounds interesting? Contact Chalksoft at Lowmoor Cottage, Tonedale, Wellington, Somerset TA2 10AL, or telephone 082 347 7117.

Program Of The Month

Good news for software searchers now that the Program of the Month Club will be up and running in January.

It sounds something like the nationwide book club service and has the same aims, except there's no obligation to buy. Club members can choose software for their micro from the Club at cut-prices. A wide variety of software is on offer from the Club as well as a recommended 'program of the month'. Membership is free and there is no obligation to buy the software — unlike a book club.

The idea behind the formation of the Club is to provide a service which gives the buyer a clear idea of the actual goods he is purchasing. Very often people buy untried software based on a description included in the packaging only to discover that the game bears little resemblance to the accompanying write-up. Very frustrating and a waste of memory.

When you join the Program of the Month club you automatically receive a monthly newsletter containing accurate and detailed descriptions of each program on offer.

The catalogue contains selected software for computers including the BBC models A and B, the Spectrum, ZX81 and Dragon with the VIC-20 under consideration. There is to be a recommended list of programs as well as the Program of the Month which will be a brand new piece of software. The rest will not necessarily be new.

Software included in the catalogue is coming from a variety of software firms ranging from one-man-bands to large commercial concerns. One hundred and fifty were contacted in total, and the response from them has reportedly so far been good.

If you buy software through the Club you can make a saving of about 20% on the 'standard league' software and between 10 and 20% on the recommended titles.

For further information about the club or if you want to be added to the mailing list write to The Microcomputer Software Club, PO Box 166, Oxford 0X2 9JB.

Course Corner

With the ever-increasing popularity of computers and computing many more courses in programming and computer literacy have sprung up.

Latest to come to light are a number of one day courses, which means you don't have to spend days and money away from home, run by the Polytechnic of the South Bank in London. The Local Government Training Unit is responsible for the courses held at the Poly which begin at the end of January. Courses include computer appreciation, BASIC programming, word processing, Superbrain application packages, Visicalc/Supercalc, record handling/management, PET application packages, Apple application packages. The courses run through till the end of March, and cost £45 each.

For further information on these courses and their contents contact Mrs Sally Justice on 01-928 2790, or write to her at the Polytechnic of the South Bank, Local Government Management Training Unit (LRMC), Faculty of Administrative Studies, London Road, London SE1 0AA.

Dates of computer programming weekends using the ZX81 and Spectrum have now been released. Basic details of the course to be held at the Gainsborough House Hotel, Kidderminster were given in a previous issue of PCT. These courses begin on January 28/29/30 and are then to be held on February 4/5/6, March 4/5/6, March 11/12/13, April 1/2/3, April 8/9/10, April 29/30/1 May, May 6/7/8, May 27/28/29. Each weekend course costs £55 inclusive and booking can be made through the managing director, Christopher Dale, who can be contacted on 0562 754041.

Atari Mail

Rumour has it that Atari VCS club members are likely to be at the receiving end of a rival club magazine by Activision.

Atari's mailing list for the VCS club magazine has mysteriously got into the hands of Activision's mail order house (which produces Atari VCS compatible cartridges). And it seems that Atari owners on the mailing list have been receiving unsolicited copies of the Activision club magazine. Lucky them!

Atari and Activision's UK distributor Computer Games (CGL) were handled by the same publicity firm, Ray Hodges Associates. Atari ended their contract with Ray Hodges some months ago but for a short period the PR firm held some details of both accounts.

Obviously sales of Activision cartridges would rise with the larger audience the firm's goods reached. So, Atari owners everywhere, don't be surprised if you get a present in the form of this month's copy of the Activision club magazine, as well as Atari's.

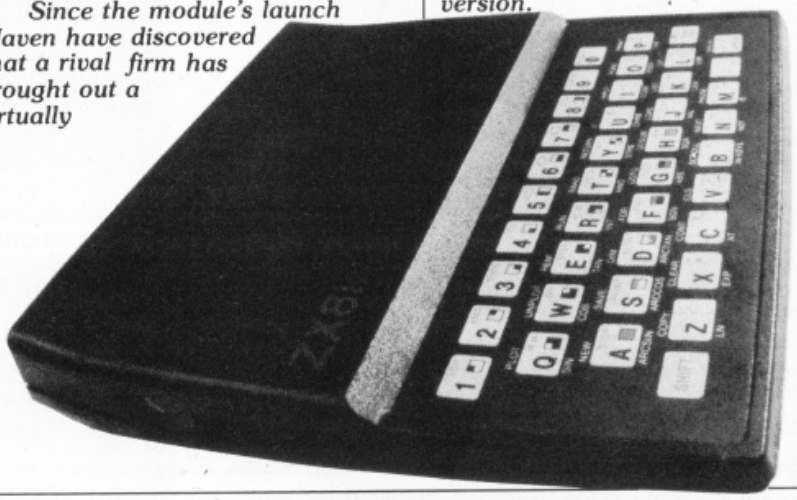
Copyright Claims

ZX81 owners who want a repeat key module beware.

The makers of this add-on, Haven Hardware, claim that this is unique to them and are following in Atari's footsteps pressing for a copyright contravention claim. Haven originally launched their repeat key module in June 1981 and are currently applying for a patent for the module.

Since the module's launch Haven have discovered that a rival firm has brought out a virtually identical device onto the market. Haven claim that Kempston Electronics' version is an 'exact copy' of its module and is now pressing for sales of this piece of hardware to be withdrawn from the market.

This case, presuming it will go ahead, will be a test case in the computer industry. So, ZX81 owners in search of a repeat key module be warned. Make sure you buy the correct, and legal original version.



Games Galore

Jumping on the games gravy train are two with a living theme.

Outworld is a planet protection game. You have been charged with the responsibility of protecting your civilisation from meteorites and armed flying saucers. Sounds a bit complicated this one but here goes. In order to continually bombard the rock storm and blast the saucers the planet has to use energy sources from another planet with which to fuel the protective shield.

Each time a meteorite hits the sheild your energy bank's power diminishes. Watch out for the flying saucers; their bombs get through without much difficulty and destroy the city without fail. Your energy supply can be replenished using the fuelship but when it leaves the planet it too must be protected by your weapon stations.

Outworld runs on the VIC-20 and comes in cartridge form from Audiogenic for £24.99.

In Evolution you haven't even reached the stage when you can defend a city. This second game's name speaks for itself. The concept is that the player controls the growth of an amoeba (makes a change to space invaders) into various forms, finally ending up as a man.

During the physical changes the amoeba undergoes it also experiences numerous hassles and hazards. At the amoeba stage you have to fight off bacteria as you search for food and if you succeed in staying alive you turn into a tadpole, which is being chased by a fish.

In the next stage you become a rat that is fleeing from snakes, after which you turn into a beaver crossing alligator-infested waters.

From there you become a gorilla harrassed by monkeys and finally become a man under laser attack.

Evolution runs on the Apple II and has a stunning 99 levels of play. It marks the entry of Sydney Development Corportation into the games software market. Until now the firm has dealt only with only business software. Evolution costs £30.00 + VAT and SDC can be contacted at 13 Wilton Place, London SW1X 8RL, or telephone 01-235 2939.

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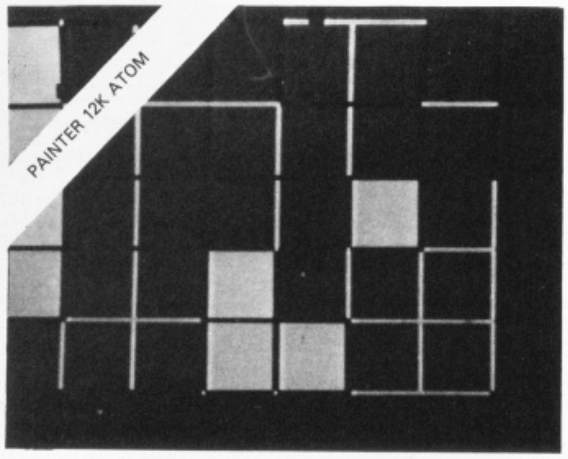

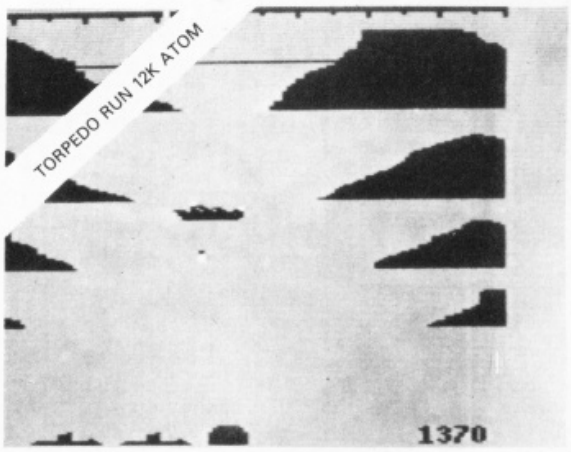

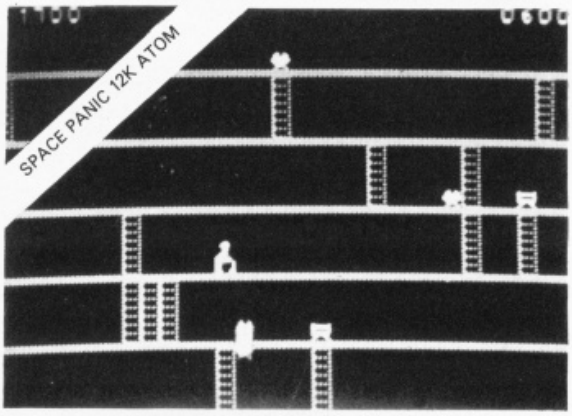

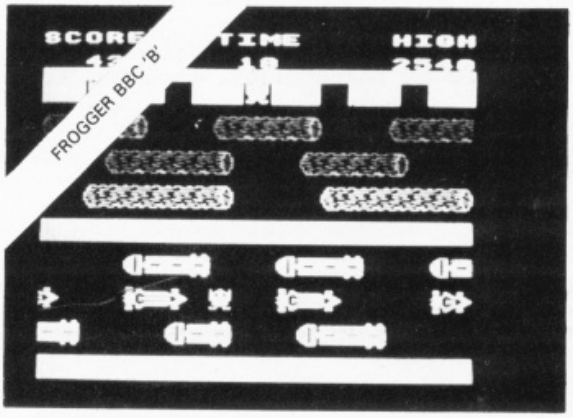

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YOUR LETTERS

This page is where you get the chance to put your opinions in print. Personal Computing Today welcomes letters from you on any aspect of microcomputing and views in general — as long as they're printable!

Please drop us a line to: The Editor, Personal Computing Today, 145 Charing Cross Road, London, WC2H 0EE.

Dear Sir,

I have a VIC-20 at home and hope to have a BBC B in school early in 1983. I find your magazine excellent value with its clear presentation of news, features and program listings. The presentation of programs with an introduction, 'how it runs', and 'hints on conversion' is an example to all other magazines.

Is Micro Factfile too regular a feature though, maybe you could use the space for other purposes some months?

A E Dennis
Louth

Editor's reply: We try and publish as many program listings as possible each month and I believe that the Factfile is so useful for people either buying their first computer or upgrading that it must be a regular monthly feature of the magazine. Thanks for your suggestions though, and keep them coming.

Dear Sir,

I am going to tell you a story. I decided to buy a personal computer the BBC 'B'. I searched through Personal Computing Today looking for advertisers I found several companies that advertised they had these computers in stock.

After spending days on the phone I found very few people had anything and none had the peripherals in stock that they advertised. Finally by luck I found Micro Style Daventry Computer Centre. Mr Mike Griffin dealt with my query on a Thursday afternoon and I received my computer on Saturday lunchtime. This is quite remarkable as I live 500 miles from the shop.

I have had minor problems with the computer, but I believe a vast majority of Model B owners have and found Mr Griffin very helpful and always willing to assist. I feel that service of this kind is very rare and believe recognition is in order.

Yours
M S Duncan
Aberdeenshire

Editor's reply: I quite agree. It's a shame that more dealers don't offer the same sort of service and follow Micro Style's good example.

Dear Sir,

I read with interest your letter in the November issue from Mr Allen on his experiences with a Sinclair computer and his disappointment with British sales service.

I would like to point out to him that in buying a Sinclair computer and 'backing Britain' he has done considerably better than I have. I bought an Atari 400 computer console.

I have had four new computers with various faults from blurring of the figures, a broken lid and packing materials sealed in the console. My present console is at the moment awaiting repair. After waiting two weeks from the date of sending the computer I 'phoned and was told the repair could take anything up to 90 days to carry out.

I discovered no acknowledgement of receipt had been made, I was told there was nobody to unpack the good received. When I asked for a refund I was told this was not possible.

From my experience and Mr Allen's it seems that there is a lot of room for improvement in the after sales care of computers. If only the repairs department could be as efficient as the sales promotion department.

Yours faithfully
A Charles
Hatfield

Sir,

I ordered my ZX Spectrum on 10 May 1982 and I'm still waiting . Is this a record?

John Mayall
Droitwich

Editor's reply: You could be in the running for the prize for being the most patient Sinclair customer. I only hope it's arrived by now.

Dear PCT,

I would like to express my thanks to you in bringing out a magazine worth buying! I like your 'Factfile' and this has helped me a great deal in choosing the best computer for me. I would like to give a suggestion to improve PCT. Like many of your readers I am baffled with peek and poke commands, could you include a page explaining the BASIC used in computer programming? Keep up the good work, you can count on me to pay 65p for such a good interesting magazine.

Dane Smith
Tottenham

Editor's reply: Glad to hear you enjoy PCT, and thanks for your suggestions. I am considering running a BASIC programming series because so many readers have written to say how useful it would be. Any more ideas on the subject from anybody and I would be only too pleased to hear them. Write in and let me know.

Dear PCT,

While on holiday recently I found a copy of your magazine and it proved to be good value for money.

Having owned an Acorn Atom since March 1981 (optimistically ordered to arrive for Christmas 1980!) I was pleased to see you published a program for the Atom.

However, there is one aspect of your magazine that I feel 'lets you down' slightly and that is your practice of not using computer printout listings of your programs. In my experience your present method allows errors to creep in and tends to make the listing difficult to read.

For instance, neither 'Worm' nor 'Trang' would function properly and 'Trang' contained serveral noticeable errors including mysterious quotation marks and references to non-existent lines.

I feel this small problem is the only 'black mark' against what is an excellent magazine.

Yours faithfully
Keith Harcus
Shetland

Editor's reply: You're quite right in saying that errors creep in when program listings are type-set rather than photographed from the original. We do this because often the quality of original listings submitted to us is so poor that it would be pointless publishing them. So help us to help you by sending us the best quality program listings possible.

Dear PCT,

I am interested in buying a Commodore 64 and was wondering whom I should contact. Should I write to Commodore direct? When is it coming out? Also, do you sell back numbers? If so at what price?

Yours
Mark Little
Northumberland

Editor's reply: The best thing to do is write to Commodore Business Machines at 675 Ajax Avenue, Slough, Berkshire and ask for a list of the firm's distributors stocking the 64. Then you can find out the nearest dealer to you. Rumour has it that the machines themselves won't be on the shop shelves until the New Year at least, although the first batch was supposed to arrive in November.

Back issues of PCT can be obtained from our Subscription Department at 513 London Road, Thornton Heath, Surrey CR4 6AR. The cover price remains the same, 65p.

Dear Sir,

Congratulations on producing a fine magazine, PCT must be the best on the market!!

But where is the Tandy TRS-80 Colour Computer? I have been reading your magazine for the past two months and I haven't seen one program or feature for it. I am saving up for the Tandy Colour Computer and seeing no articles is very disturbing.

Yours faithfully
Steven Buckley
Sutton Coldfield

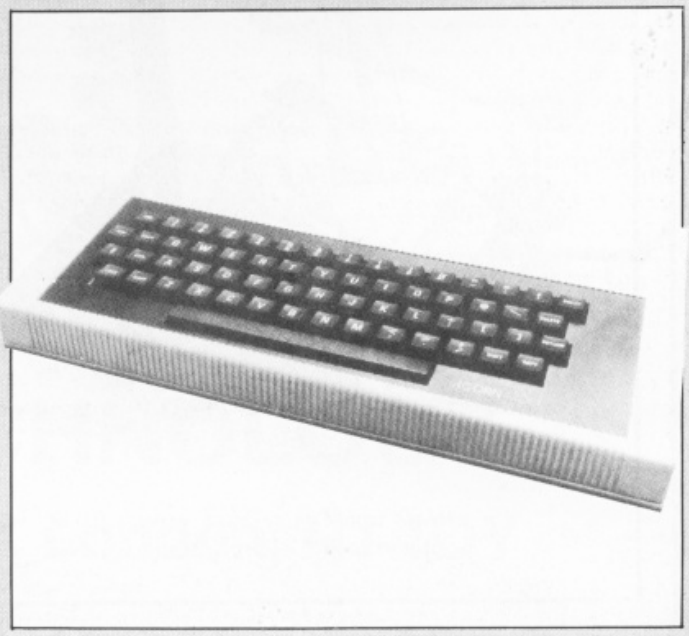
Editor's reply: The simple answer Steven is that we haven't had any programs for the Tandy Colour Computer submitted to us. But hopefully now that the Dragon 32 is out on the market and selling well we should get some sent in to us (Tandy Colour Computer software is compatible with the Dragon 32's).

Dear Sir,

I would be most grateful if you could supply me with the name and address of any firms that manufacture a Teletext converter as a separate unit to enable me to obtain 'Ceefax' and 'Oracle'. I understand a decoder of this nature is available in kit form also. In anticipation of a prompt reply.

Yours faithfully
B Aylward
Deeside

Editor's reply: The firm to get in touch with is Bradley Marshall, which can be contacted at 325 Edgeware Road, London W2 1BN. Or telephone them on 01-723 4242 for more information.



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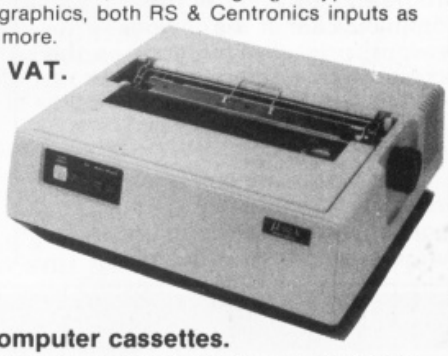

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SPELLING TEST

Improve your spelling with this Tandy program from J.H. Bamber.

Spelling Test is a straight-forward question and answer type of program. However, as the computer cannot for obvious reasons, print the questions on the screen, the cassette recorder is pressed into use to ask the words, so the computer is used as a switching device.

The words are stored on tape, first as a data file, and then as spoken words. When the test is run, the list of words is entered into a string array, and as the recording of each word is played, the computer asks for it to be typed in. The usual tests to see that it has been spelt correctly are made.

Full instructions are given within the program, but two further points may be useful. When recording the speech allow a short pause before speaking, this helps to avoid synchronisation problems. If the program is altered to allow more words, it may be necessary to adjust the synchronisation. This is acheived by altering the J loops in lines 230 and 380.

VARIABLES USED

Q$(N)	Word array
Q	Number of words
A$	Users answer
S	Number of correct answers
I & J	Loop indices
A	General numeric input

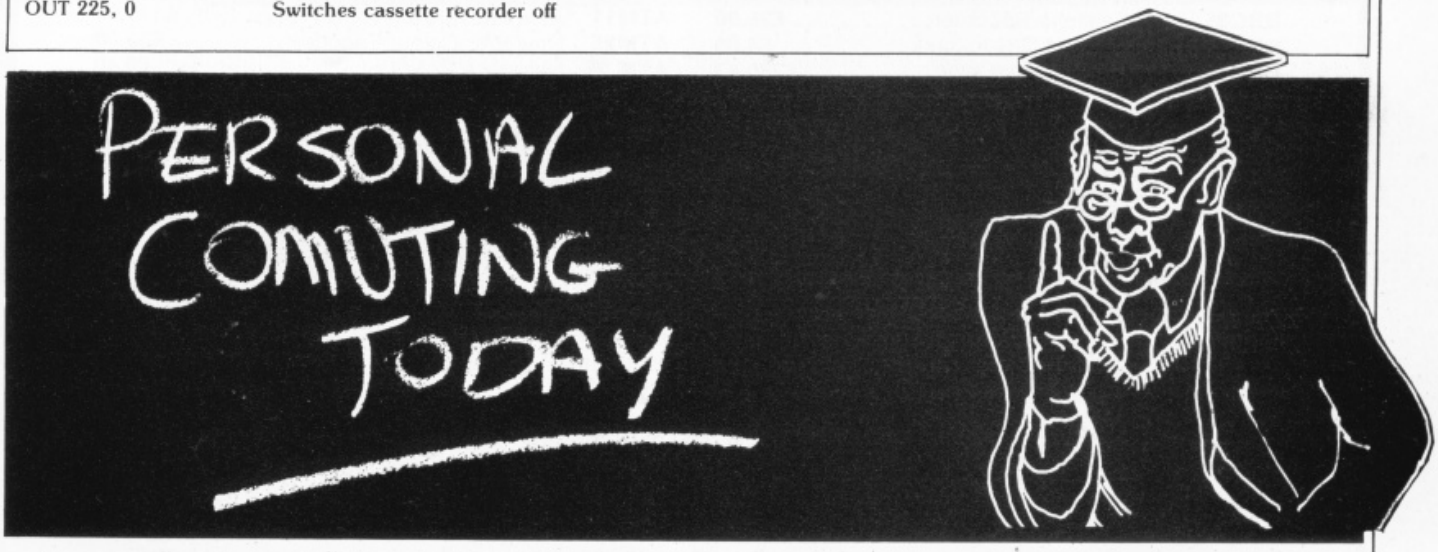
HOW IT RUNS

Line 10	Sets 1000 bytes of memory for strings, dimensions question array.
Lines20-50	Menu printout.
Line 60	Checks input.
Line 70	Selects appropriate section of program.
Line 80	Inputs number of words for new data tape.
Line 90	Sets up loop for inputting new word data.
Line 100	Inputs word data.
Line 110	Returns loop.
Line 120	Prints cassette recorder information.
Lines 130-150	Saves number of words and word data on tape.
Lines 160-180	Prints cassette recorder information.
Line 190	Sets up loop for sound recording of words.
Line 200	Goes to wait subroutine.
Line 210	Prints sound recording instructions.
Line 220	Switches cassette recorder on.
Line 230	Recording time loop.
Line 240	Switches cassette recorder off.
Line 250	Returns loop.
Line 260	Prints instructions.
Line 270	Wait subroutine, returns to menu.
Lines 280-290	Cassette instructions, wait subroutine.
Line 300	Informs user what is happening.
Line 310	Inputs number of words from tape.
Line 320	Inputs word array from tape.
Lines 330-350	Prints user information.
Line 360	Sets up question loop.
Line 370	Acts as cassette playback switch.
Line 380	On, time loop, off, control of cassette by computer.
Line 390	Inputs users answer.
Line 400	Correct answer routine, increments number of correct answers, returns loop.
Line 410	Incorrect answer routine.
Lines 430-470	Prints score and cassette information, returns to menu
Line 480	End.
Lines 490-500	Wait subroutine.

HINTS ON CONVERSION

The program is written for use with the TRS-80/Video Genie, but it should not be too difficult to convert to other systems which support tape files. Here is a list of non-standard commands used in the program, to help make the conversion.

PRINT # – 1	Saves variables on tape, cassette motor switched automatically
INPUT # – 1	Inputs variables from tape, cassette motor switched automatically
OUT 225, 0	Switches cassette recorder off
OUT 255, 4	Switches cassette recorder on
PRINT @ 384,	Puts the cursor halfway down the screen.
CLS	Clear screen, home cursor.
PRINT CHR$(23)	Puts the computer into double width character mode (32 per line) The – 1 in the # – 1 command refers to which cassette to switch, as Level II Basic can control two.



PROGRAM LISTING

```
  5 REM * * SPELLING TEST  J.BAMBER
 10 CLEAR 1000 : DIM Q$(25)
 20 CLS : PRINT " 1) RECORD DATA TAPE"
 30 PRINT " 2) SPELLING TEST"
 40 PRINT " 3) END PROGRAM"
 50 PRINT : INPUT "WHAT DO YOU WANT TO DO (1-3)
    AND PRESS 'ENTER' "; A
 60 IF A<1 or A>3 THEN 20
 70 ON A GOTO 80,280,480
 75 REM * * RECORD DATA & SPEECH
 80 CLS: INPUT "HOW MANY WORDS (MAX. 25)"; Q
 90 FOR I = 1 TO Q
100 CLS : PRINT @ 384, "TYPE IN WORD NO.";I;"AND
    PRESS 'ENTER'":INPUT Q$(I)
110 NEXT I
120 CLS: PRINT @384,"PUT TAPE IN RECORDER, NOTE
    TAPE COUNTER, PRESS RECORD & PLAY"
130 GOSUB 490 : PRINT "SAVING WORDS ON
    CASSETTE" : PRINT # – 1, Q
140 FOR I = 1 TO Q : PRINT # – 1, Q$(I)
150 NEXT I
160 CLS : PRINT @384, "THE WORDS ARE STORED ON
    TAPE, NOW FOR THE SOUND"
170 PRINT "DETACH EAR & AUX. LEADS FROM THE
    RECORDER"
180 PRINT "RECORD & PLAY STILL DEPRESSED"
190 FOR I = 1 TO Q
200 GOSUB 490
210 CLS : PRINT @384,CHR$(23);"SPEAK WORD NO.";I
220 OUT 255, 4
230 FOR J = 1 TO 1000 : NEXT J
240 OUT 255,0
250 NEXT I
260 CLS : PRINT @384, "THAT'S ALL, PRESS RECORDER
    STOP & RECONNECT THE LEADS."
270 GOSUB 490 : GOTO 10
275 REM * * SPELLING TEST
280 PRINT "PUT DATA CASSETTE IN RECORDER,
    WOUND TO START POSITION"
290 PRINT "ALL LEADS CONNECTED, PRESS PLAY" :
    GOSUB 490
300 PRINT "LOADING WORDS FROM CASSETTE"
310 INPUT # – 1,Q : S = 0
320 FOR I = 1 TO Q : INPUT # – 1,Q$(I) : NEXT I
330 CLS : PRINT @384,"THE WORDS ARE IN MEMORY,
    DETACH EAR & AUX. LEADS OF RECORDER"
340 PRINT "PLAY STILL DEPRESSED" : GOSUB 490
350 CLS : PRINT @384,CHR$(23);"THERE
    ARE";Q;"WORDS TO SPELL"
360 FOR I =1 TO Q
370 INPUT "PRESS 'ENTER' TO HEAR NEXT WORD";A
380 OUT 255,4:FOR J = 1 TO 1000 : NEXT J : OUT 255,0
390 CLS : PRINT @384,"";:INPUT "TYPE WORD AND
    PRESS 'ENTER' ";A$
400 IF A$ = Q$(I) PRINT "CORRECT" : S = S+1 : GOTO
    420
410 PRINT "WRONG, THE CORRECT SPELLING IS :—
    ";Q$(I)
420 NEXT I
430 PRINT "THAT'S ALL"
440 GOSUB 490
450 CLS : PRINT @384,CHR$(23);"YOUR SCORE
    IS";S;"OUT OF";Q
460 PRINT : PRINT "PRESS STOP"
470 PRINT "RECONNECT EAR & AUX. LEADS": GOSUB
    490 : GOTO 10
480 END
490 INPUT "PRESS 'ENTER' TO CONTINUE";A
500 RETURN
```

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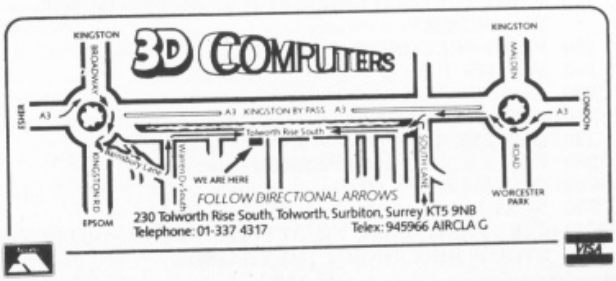

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SQUASH

Learn how to progam moving graphics on your BBC with this fun game from Mike Berry.

"He marks, not that you won or lost, but how you played the game" — so wrote one Grantland Rice. As a home computer owner, you are probably more concerned with how you *write* the game.

Writing graphics programs to emulate arcade and home TV games is an objective shared by many new personal computing enthusiasts, but just how do you get it all moving? Well, it's not as difficult as it may at first seem. Let's take for example the most basic game found on the early video games machine — Squash Practice.

Here a ball appears from the far wall, ricochets off the sidewalls, and is either returned by your bat, or falls through the wall behind your bat. The game usually lasts until 15 balls have been missed.

To reproduce this game, we need to solve the following problems, which are common to all 'moving ball' games of this type:

- Draw the walls of the squash court
- Make a ball bounce around this court
- Move a bat backwards and forwards across the rear of the court, bouncing the ball back if it is hit
- Record the 'score' when a ball is missed
- Emit appropriate sounds whenever a ball bounces, is hit or is lost.

The program listed here is certainly not the most sophisticated ever written, but it has been deliberately designed to provide an excellent spring-board for more advanced video games programs. It aims to show you how to go about designing 'moving ball' programs on any computer, although it has been specifically written for the BBC Micro.

To play the game, you use key 'A' to move the bat to the left, and key 'I' to move it to the right.

HOW IT RUNS

70-210 Contains the main logic of the program. The outside loop executes 15 times, because 15 misses are allowed. The current 'score' is displayed at line 80. Line 90 sets up the initial values for the X and Y co-ordinates of the ball, and of the increments of X and Y used to create the new ball positions. The mathematics are there to ensure that the ball starts at a random position in the back wall, but this random position is adjusted to make sure that it is an exact multiple of the X increment from either side of the court, so ensuring that the ball can bounce exactly when it touches the side wall.
The 'VDU5' at line 120 enables text to be written at the graphics cursor position. In this program, the ball and the bat are printed as text characters.
The main loop calls PROCBALL (to move the ball), PROCBAT (to move the bat) and PROCHIT (to bounce the ball off the bat) until you miss the ball, which drops through the Y = 0 position.

220-260 'After 15 balls, the program asks if you would like another game. Line 230 causes the keyboard to be scanned for the letter 'Y'. If 'Y' is pressed, then the program is 'RUN' again. Otherwise, line 240 puts the machine back into teletext mode and page mode. Line 250 is required after a keyboard scan, to flush the keyboard buffer of any surplus characters, such as repeated 'Y'-s.

270-300 The procedure PROCDRAWWALLS draws the squash court in yellow (the statement GCOLO,2 defines the graphics foreground colour as 2, yellow).
The latter part of line 290 displays the playing instructions, which are that key 'A' moves the bat left, and key ']' (shown in BBC teletext mode as ' ') moves the bat right.

310-340 This procedure uses the ability of the BBC machine to allow you to redefine text characters. Each character is made up from an 8 × 8 matrix of dots, and you specify the 8 lines as 8 numbers, where each number is the decimal equivalent of the binary number obtained by treating a dot as '1' and all other positions as '0'. Following this principle, line 320 sets up the ball, and line 330 the bat.

350-410 This procedure makes the ball move. Line 360 deletes the ball from its old position by printing it in the background colour. Note that 'VDU240' is

HINTS ON CONVERSION

The basic logic of the program is similar to that commonly employed in moving ball games on all computers.

The particular BBC facilities used are:

(a) User defined characters. If you don't have this facility, you could instead call a routine to plot a cluster of dots.

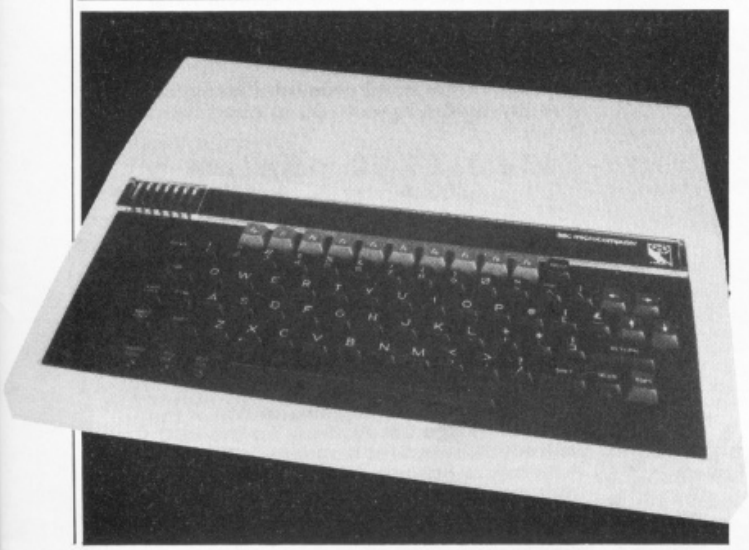
(b) Colour re-definition, using 'GCOL'. There are other ways of deleting the old ball or bat e.g. you can over-print with blanks.

(c) REPEAT.....UNTIL loops can be replaced with blocks terminating with 'IF (condition not satisfied) THEN GOTO (start of block).'

(d) PROCs can be replaced with GOSUBS.

(e) Statement 90 is not as complicated as it looks. RND(816) returns a random number between 1 and 816. DIV is a function which returns the whole number portion of the result of dividing two integers.

(f) On the BBC Micro, variable names ending in '%' are integer variables.



exactly equivalent to 'PRINT CHR$240'. Line 370 tests to see whether the next move would put the ball outside the side walls, and if it would, emits a suitable sound, and reverses the horizontal direction by inverting the sign of the X increment. Line 380 performs a similar task with respect to the vertical movement and the Y increment. In line 400, the foreground colour is reset to white and the ball is printed in its new position.

420-490 This procedure moves the bat in response to your key depressions. Line 430 deletes the bat from its old position, in a similar manner to the ball above. Lines 440 and 460 respectively test the keyboard for the 'A' key (ASCII code 66) or the ']' key (ASCII code 89) respectively, and lines 450 and 470 say "if the specified key is depressed, i.e. '-1' is returned by the function INKEY, then change the bat position by the bat increment accordingly". Then, line 480 prints the bat at the new position.

500-520 This procedure tests to see whether the new ball position coincides with the surface of the bat, and if it does, reverses the vertical movement by inverting the sign of YINC%.

Variables Used

B% = Bat position
X% = X (horizontal) ball coordinate
Y% = Y (vertical) ball coordinate
XINC% = Amount by which X% will be changed each cycle
YINC% = Amount by which Y% will be changed each cycle
BINC% = Amount by which B% will be changed each cycle

PROGRAM LISTING

```
10   REM  * * * * * * * * * * * * * * * * * * * *
20   REM * EMBRYO SQUASH GAME by Mike Berry
30   REM  * * * * * * * * * * * * * * * * * * * *
40   REM
50   MODE5
60   B% = 450
70   FOR I% = 1 TO 15
80   GCOL 0,3: PRINTTAB (16,8); I%
90   XINC% = 10:YINC% = - 10:X% = RND(816):X%
     = XINC% *(X% DIV XINC%):Y% = 990:BINC% = 40
100  PROCDEFINECHARS
110  PROCDRAWWALLS
120  VDU5
130  GCOL 0,3
140  REPEAT
150  PROCBALL
160  PROCBAT
170  PROCHIT
180  UNTIL Y% = 0
190  SOUND 0, - 12,1,5
200  GCOL 0,0:PRINTTAB(16,18);I%
210  NEXT
220  MODE5:PRINTTAB(5,16);"Another game?"
230  A$ = GET$:IF A$ = "Y" THEN RUN
240  MODE7:VDU14
250   *FX 15,1
260  END
270  DEF PROCDRAWWALLS
280  GCOL 0,2:MOVE 0,0:DRAW 0,1000:DRAW 880, 1000:
     DRAW 880,0: DRAW 0,0
290  PRINTTAB(14,0);"SQUASH";TAB(14,1);"____"; TAB
     (14,4);"Score:"; TAB (14,20);" <  - 'A'";TAB (14,22);
     " - >'  '"
300  ENDPROC
310  DEF PROCDEFINECHARS
320  VDU23,240,32,112,112,248,248,112,112,32
330  VDU23,241,255,255,0,0,0,0,0,0
340  ENDPROC
350  DEF PROCBALL
360  GCOL 0,0:MOVE X%,Y%:VDU240
370  IF X% + XINC% = 0 OR X% + XINC% = 850 THEN
     SOUND 1, - 10,53,1:XINC% = - XINC%
380  IF Y% + YINC% = 990 THEN SOUND 1, - 10,5
     7,1:YINC% = - YINC%
390  X% = X% + XINC%:Y% = Y% + YINC%
400  GCOL 0,3:MOVE X%,Y%:VDU240
410  ENDPROC
420  DEF PROCBAT
430  GCOL 0,0:MOVE B%,50:VDU241
440  A% = INKEY( - 66)
450  IF A% = - 1 AND B% > 10 THEN B% = B% - BINC%
460  A% = INKEY ( - 89)
470  IF A% = - 1 AND B% < 810 THEN B% = B% + BINC%
480  GCOL 0,1: MOVE B%,50:VDU241
490  ENDPROC
500  DEF PROCHIT
510  IF Y% = 80 AND X% > = (B% - 20) AND X% <
     (B% + 50) THEN SOUND 1, - 10,65,1:
     YINC% = - YINC%
520  ENDPROC
```

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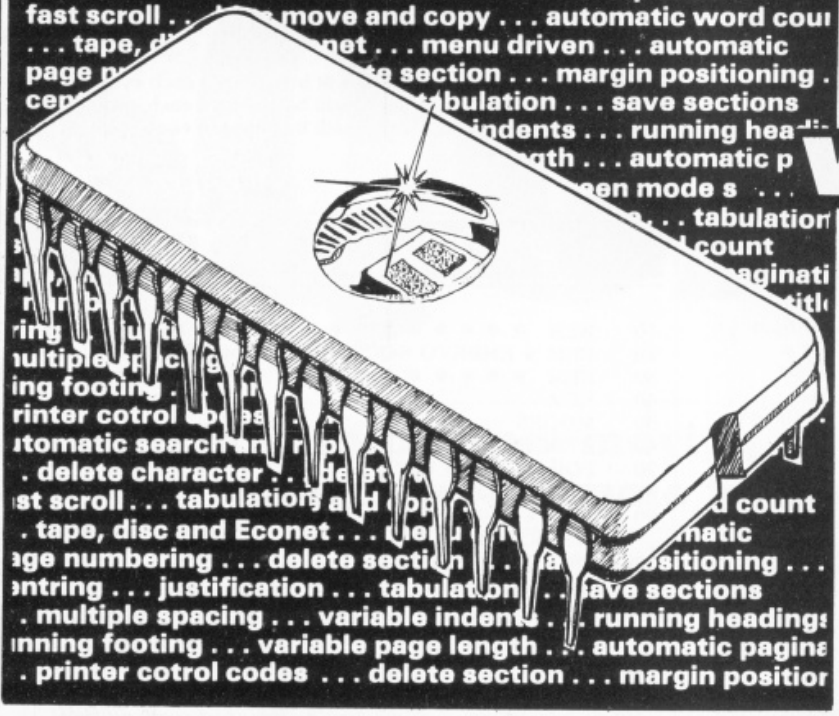

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Model B

Without doubt the most sophisticated piece of software yet written for the BBC Micro. Wordwise contains all the usual word processing features enabling characters, words, sentences or any defined section of the text to be deleted, moved or copied from one part to any other part of the document. The more complex facilities such as search and replace or file handling commands are menu driven so that even a beginner can understand how to operate them.

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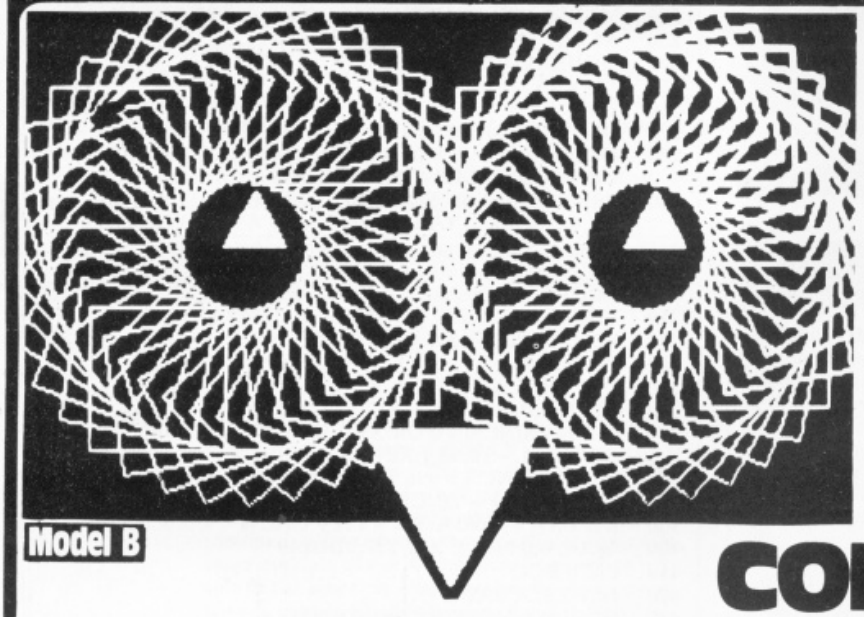

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The most complete implementation of the LOGO language yet available for the BBC Microcomputer. This language is now popular in American schools as an ideal educational program.

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Personal Computing Today

COMING NEXT MONTH
On sale from February 4

Don't miss the March issue of Personal Computing Today when our Commodore 64 winner will be revealed. Along with a list of correct answers to our space invader shaped giant crossword will be the name of the lucky winner.

The competition closed on the 31st December so if you didn't buy your December PCT you will have missed the chance of a lifetime.

So far we've been inundated with entries and the total is nearing the 1,000 mark. Unfortunately, we can offer only one prize but we would like to thank everyone for taking the time and trouble to enter PCT's first competition.

If you were too late to catch this competition, don't worry. In future issues of the magazine we intend to run competitions and dangle equally alluring carrots in front of you.

BOOK REVIEWS

For the first time PCT will carry a couple of pages devoted to book reveiws. New books for programming are coming onto the market at a frighteningly fast rate and at a price. We thought it was time to sort out the dross and tell you what to expect from a variety of Spectrum books that are now on sale.

Don't rush out and buy any now — wait until you read our special report.

PCT's hardware review this month is dedicated to the long-awaited Oric 1, the brainchild of Oric Products International which has ties with Tangerine Computer Systems.

Providing the firm sticks to its delivery date, we will give you an in-depth of one of the new batch of computers likely to closely compete with the ZX Spectrum.

Two versions will be on sale, one 16K and the other 48K. Both will have 16 colours available for your use and will run in the almost standard Microsoft BASIC. Price-wise the machines will weigh-in at £99 and £169 respectively. Oric has high hopes for its new computer with a predicted sales figure of 50,000 in the first year.

The Oric should come complete with what are now virtually standard features including a Centronics printer interface, high resolution screen display, a keyboard 57 moving keys, upper and lower case characters and a dedicated sound generator chip if you want to give your games a touch of realism.

So watch out next month for the low-down on how the Oric compares to the Spectrum.

PROGRAMS TO PLAY WITH

Programs gracing our pages in March cover our usual variety of computers with games including the traditional 'billiards' game which runs on the VIC-20, a fast action game for the Video Genie entitled 'Sniper' that will really keep you on your toes, a domestic program for the ZX81 to help you iron out any cash-flow problems you might have. Helping out Spectrum owners with perplexing peeks and pokes is a special routine in Microspot, and a memory check program to sort out BBC owners.

Note: At the time of going to press this information is correct but may be altered for unavoidable reasons.

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QUICK ON THE DRAW

For fast and effective displays on your Atari follow these tips from John Hodgson

Atari BASIC can access up to 12 graphics modes, (0 to 11). PLOT and DRAWTO commands can be used to form patterns and shapes, but only in modes 3 to 11.Or at least, that's the impression you might get from your manual. It tells us that graphics 1 and 2 can only be used in text mode. By using a COLOR command, and choosing a number from 0 to 255, (except 125), we can actually PLOT and DRAWTO with any of the upper case alphabet, numerals, and punctuation marks, in up to four colours.

By using POKE 756,226, we can adjust the 'Character Base Register', (CBR), which changes the shape of the text characters. Now we can PLOT and DRAWTO with lower case letters, and control graphics characters. This does make things more interesting, but unfortunately, in deferred mode, this POKE fills the screen with orange hearts. To remove them, we have to POKE 708, and 712 to the same value. Therefore, we effectively lose the use of one screen colour.

POKE 756,212 adjusts the CBR in such a way, that it converts the text characters into solid blocks. i.e. very large pixels. This allows us to use PLOT and DRAWTO to fill the screen with solid designs, much faster than in any other graphics mode.

We can have up to five colours on the screen at once, including the border. We can also use four different 'FIZZY COLOUR MIXES' and four 'STATIC COLOUR MIXES'. There is even a COLOR command which er .... clears the screen!

Here is a simple example of what we can do. Enter the following in direct mode:

```
GRAPHICS 1:COLOR 0:PLOT 0,0:DRAWTO 10,0
```

That will give you a black screen, with a blue text window, (saying 'READY'), but as yet, no graphic display. Now enter:-

```
POKE 756,212
```

Hey presto! You've now got a yellow line, on an orange background. You'll also see that the writing in the text window has become distorted. That's because the text characters in graphics 0 are also adjusted by this POKE. You can carry on using PLOT and DRAWTO, but you won't be able to see if you've keyed in any wrongly spelled commands. So be extra careful. Now key in COLOR 128, and do some more PLOTs and DRAWTOs. The try the same with COLOR 160. COLOR 32 can be used to draw over, and erase any part of the graphics display, as it is the same colour as the background.

The Plot Thickens

By now the screen will be covered with yellow, purple and blue lines. To clear the screen, simply key in GRAPHICS 1, and we're back to square one. Now use POKE 756,212 and do some PLOTs and DRAWTOs using COLORs 64, 97, 192, and 224.

When you've filled the screen with nice fizzy patterns, key in COLOR 125, and PLOT it at 0,0. That clears the screen for you, and allows you to carry on using PLOT and DRAWTO, without starting from scratch. Now try COLORS 1, 33, 129, and 161. A full list of COLOR values can be found in FIGURE 1.

In a program format, add 16 to the graphics mode number, to remove the text window.

Not content with being able to draw faster, because of the large pixels, the following program makes use of POKE 559. This is the 'Direct Memory Access', and allows us to control 'ANTIC'. ANTIC controls the screen picture. By turning ANTIC off, the picture is turned off. We can then clear the screen, and draw a new picture 'behind the scenes'. It also allows us to draw a screen display up to 30% faster. The display can then be flashed on to the screen, by turning ANTIC back on. It makes things look much tidier.

This program will first draw a series of vertical coloured lines, using POKE 756,212, and then rotates the colours. It will then clear the screen, and revert to normal text mode, in order to draw a text display.

LIST OF COLOR VALUES

	COLOR STATEMENT NUMBERS			
COLOUR (DEFAULT)	KEY	RANGE		POKES/NOTES
YELLOW	0	EVENS	0 to 30	709
BLACK/YELLOW STATIC	1	ODDS	1 to 31	712/709
ORANGE	32	EVENS	32 to 62,155	708-
BLACK/ORANGE STATIC	33	ODDS	33 to 63	712/708
BLACK/ORANGE FIZZY	64	ALL	64 to 96	712/708
BLACK YELLOW FIZZY	97	ALL	97 to 124,126,127	712,709
CLEAR SCREEN	125			SEE'CLEAR SCREEN' BELOW
PURPLE	128	EVENS	128 to 158	711
BLACK/PURPLE STATIC	129	ODDS	129 to 154,156 – 159	712/711
BLUE	160	EVENS	160 to 190	710
BLACK/BLUE STATIC	161	ODDS	161 to 191	712/710
BLACK/BLUE FIZZY	192	ALL	192 to 223	712/710
BLACK/PURPLE FIZZY	224	ALL	224 to 255	

Clear screen

If COLOR 125 is plotted anywhere on the screen, it will clear the screen of all graphics.
COLOR commands can be altered at any time, to produce multicoloured lines, etc.

Other things to POKE

BACKGROUND 708(Same as COLOR 32(ORANGE))
MARGIN 712(Same as BLACK parts of mixed colours)

DRAWTO A Conclusion

Well the pixels are rather large, and therefore lack a certain amount of versatility. But what is important, is that they allow us to fill the screen with our designs much faster than we could in any other graphics mode. By turning ANTIC off and on, we can draw a new screen image every few seconds. Don't forget. We've only used graphics mode 1. Graphics mode 2 has pixels twice the size, and can therefore draw even faster. But alas, it's a bit less versatile.

The fizzy, and static colour mixes can add new dimensions to your screen displays. For example, you can draw trees which appear to have their leaves shimmering in a breeze.

To have the columns in fizzy colours, make the following adjustments:

LINE 40 — Adjust COLOR 0 to COLOR 97
LINE 50 — Adjust COLOR 32 to COLOR 64
LINE 60 — Adjust COLOR 128 to COLOR 224
LINE 70 — Adjust COLOR 160 to COLOR 192

HOW IT RUNS

Line 10	Enters into graphics mode 1. Adding 16 removes the text window.
Lines 21 to 24	Set variables for adjusting the COLOR REGISTERS
Line 25	POKE 559,0 turns off ANTIC. POKE 756,212 adjusts the CBR.
Lines 30 to 70	This part of the program draws the first section of the screen display. X is the column number,(from 0 to 19). Lines 40 to 70 sort out which colour each column should be, and then line 30 draws it, and increases X by 1, thereby sending it to the next column.
Lines 80 to 140	Line 809 jumps out of the first section, when the screen is full, and turns ANTIC back on. The image is then flashed on to the screen. Lines 100 to 115 rotate the colours of the columns, by changing the values in the COLOR REGISTERS. ie. POKEs 708 to 711. Line 140 causes a time delay, to allow the colour rotation to proceed smoothly, and also increase skip by one, after each change. When SKIP = 25, line 130 jumps to next section.
Line 200	ANTIC is once again turned off, and POKE 756,224 returns the CBR to normal.
Lines 210 to 290	Whilst ANTIC is off, line 210 clears the screen. (In this program format, this method of screen clearance uses the least memory). Line 220 draws a rectangle composed of asterisks, (COLOR 10). Lines 230 to 270 set up an upper case text display. Line 290 flashes the new display onto the screen. Line 280 prevents the display from appearing too soon, as that would make things look messy. Try it without.
Line 300	Holds the text on the screen for a while.
Line 310	Jumps back to line 25, thereby creating a loop.

List Of Variables.

X	– COLUMN NUMBER
YELLOW) ORANGE) PURPLE) BLUE)	– COLOR VALUES TO POKE INTO COLOR REGISTERS
DELAY	– TIME DELAY
SKIP	– COUNTS THE NUMBER OF COLOR ROTATIONS IN THE PLOT/DRAW TO SECTION, AND AFTER A PREDETERMINED NUMBER, JUMPS TO THE TEXT MODE SECTION

PROGRAM LISTING

```
10   GRAPHICS 1+16
20   REM SET VARIABLES FOR COLOR REGISTERS
21   YELLOW=202
22   ORANGE=40
23   PURPLE=70
24   BLUE=148
25   POKE 559,0:POKE 756,212
26   POKE 709,YELLOW:POKE 708,ORANGE:POKE
     711,PURPLE:POKE 710,BLUE
27   GOTO 40
30   PLOT X,0:DRAWTO X,23:X=X+1:REM DRAW
     COLOURED COLUMNS
40   IF X = 0 OR X = 4 OR X = 8 OR X = 12 OR X = 16
     THEN COLOR 0:GOTO 30
50   IF X = 1 OR X = 5 OR X = 9 OR X = 13 OR X = 17
     THEN COLOR 32:GOTO 30
60   IF X = 2 OR X = 6 OR X = 10 OR X = 14 OR X = 18
     THEN COLOR 128:GOTO 30
70   IF X = 3 OR X = 7 OR X = 11 OR X = 15 OR X = 19
     THEN COLOR 160:GOTO 30
80   IF X = 20 THEN X = 0:POKE 559,34:GOTO 105
90   REM LINES 100 TO 140 ROTATE COLOURS
100  POKE 709,YELLOW:POKE 708,ORANGE:POKE
     711,PURPLE:POKE 710,BLUE:GOSUB 130
105  POKE 708,YELLOW:POKE 711,ORANGE:POKE
     710,PURPLE:POKE 709,BLUE:GOSUB 130
110  POKE 711,YELLOW:POKE 710,ORANGE:POKE
     709,PURPLE:POKE 708,BLUE:GOSUB 130
115  POKE 710,YELLOW:POKE 709,ORANGE:POKE
     708,PURPLE:POKE 711,BLUE:GOSUB 130
120  GOTO 100
130  IF SKIP = 25 THEN SKIP = 0:GOTO 200
140  FOR DELAY = 0 TO 50:NEXT DELAY:SKIP = SKIP +
     1:RETURN
200  POKE 559,0:POKE 756,224
210  ?#6;"(CLEAR SCREEN)":REM CLEAR SCREEN = ESC
     + CTRL/CLEAR
220  COLOR 10:PLOT 2,1:DRAWTO 18,1:DRAWTO
     18,17:DRAWTO 2,17:DRAWTO 2,2
230  POSITION 8,3:?#6;"hello":REM LOWER CASE
240  POSITION 7,7:?#6;"this is":REM LOWER CASE
     INVERSE VIDEO
250  POSITION 5,11:?#6;"PLOT/DRAWTO":REM UPPER
     CASE
260  POSITION 4,15:?#6;"IN GR.1 AND 2":REM UPPER
     CASE INVERSE VIDEO
270  POSITION 3,23:?#6;"BY JOHN HODGSON":REM
     UPPER CASE
280  FOR DELAY = 0 to 100:NEXT DELAY
290  POKE 559,34
300  FOR DELAY = 0 to 900:NEXT DELAY
310  GOTO 25
```

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PCT 1

SOFTWARE REVIEWS

This is the place to find out more about the software for your micro. Each month we review a hat-full of tapes and bring you the results.

Piles of programs are released every day and here's where you can find out just what they are like.

Our team of reviewers thoroughly tests each program they are given and complete a star ratings table to give you a clear idea of what to expect if you buy that tape. Star ratings are given out of five.

We try to bring you a selection of software for different computers each month so watch out for games to run on your own computer. If you would like to review programs for PCT just drop us a line giving details of the system you own and what sort of games you would like to review.

We are always pleased to see software arrive on our doorstep for review too, so software firms don't hesitate to send in any new programs you have brought out.

Our 'Ratings Table' headings are:

Program Quality

Here we look at the way the program has been written and what sort of use has been made of the computer's facilities and capabilities.

Value For Money

Just what the heading says. Some software is vastly over-priced and here we tell you what the software's worth.

Presentation On Screen

Graphical representation on-screen is very important and varies greatly from program to program and machine to machine. Many games rely heavily on graphics to make them more interesting. We tell you how good they are.

Supplied Instructions

Sometimes instructions aren't explicit enough and other times they are too complicated to get to grips with. We like to see them as clear and as concise as possible.

Ease of Use

This heading is reserved for actually playing the program. How easy is it to use the keys specified in the game? Often the keys used are so bunched together that they are too difficult to use and detract from the game.

Crashproofing

Some programs are so poorly written that the slightest error on the user's part, like pressing the wrong key, causes the program to crash. Here we are trying to find out how tolerant each program is of us normal fallible human beings.

Title:	**Caverns of Mars**
Type:	**Disc**
Supplier:	**Atari distributors**
Machine:	**Atari 800 16K**
Price:	**£29.99**

Leading deep into the planet Mars is a twisting, tortuous tunnel at the bottom of which is a space craft landing pad.

Fly your ship into the caverns of Mars and I guarantee the next few minutes of your life will be one mad, exciting yet concentrated rush. There are several stages to this vertically scrolling game each one increasing in difficulty.

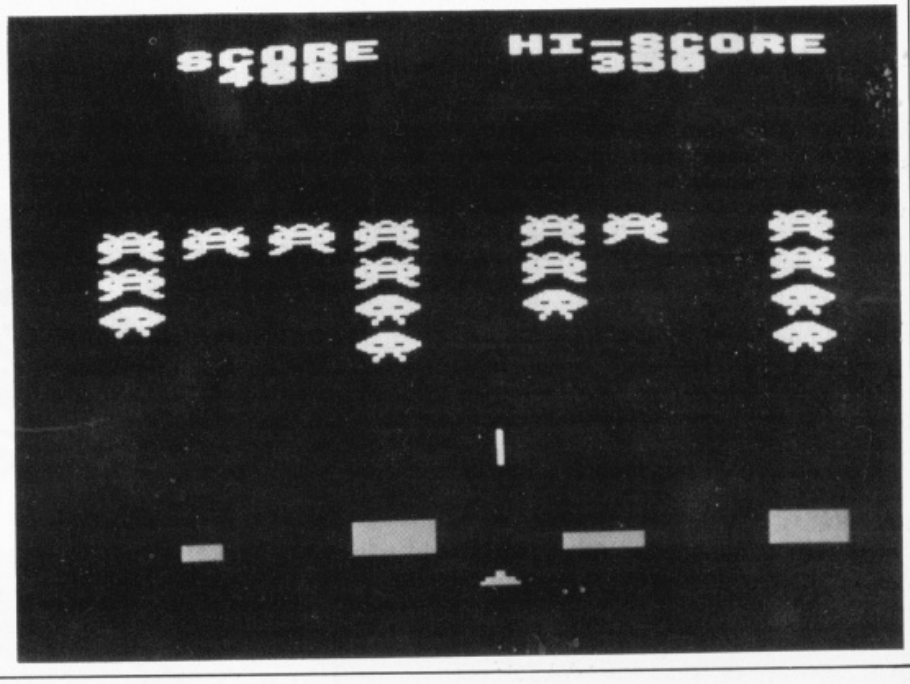
Boosting your fuel supply is your first task by navigating your ship through a narrow shaft, which requires plenty of concentration, and bombing the fuel dumps positioned on the jagged sides of the tunnel, which calls for split-second timing.

Once you have successfully travelled through that stage without crashing into the rocky sides, stage two awaits you. Now the screen gets really hectic with alien creatures swarming through the shaft. You must avoid their flight path or kill them with your laser guns. This stage of the game is really tricky and it's very easy to lose a life here.

Section three has the cavern narrowing more. It is now divided into sections which are accessed by barriers that you must cross when open. These have a nasty habit of appearing suddenly at random taking you, sometimes fatally, by surprise.

Three more phases remain which are again more difficult to navigate. If you successfully do so your chance to complete the game is in sight. But you could lose everything if you don't land your space ship accurately on the landing pad.

Then it can be so frustrating you want to throw your Atari through your television screen. That's probably what makes it one of the most compulsive and



challenging games Atari's APX catalogue has produced.

Ratings Table

Program Quality	* * * *
Value for Money	* * *
Presentation On-screen	* * * * *
Ease of use	* * * *
Crashproofing	* * *
Supplied Instructions	* * * *
Overall	95%

E.J.

Title: Jumbo
Type: Tape or disc
Supplier: Molimerx
Machine: TRS-80 I & III
Price: £17.25 (T), £19.55 (D)

Strap yourself to your seat and sit back safely in anticipation for a rocky ride in this Jumbo Jet.

The latest version of this flight navigation game from Molimerx proves to be one of the more exciting and comprehensive on sale. Called simply Jumbo the object of the game is to climb courageously into the cockpit of your plane, man the controls, take off, fly and land the massive aircraft at one of a number of chosen airports.

Sounds simple enough in theory, but first you have to wade through the 39 page manual to work out what the numerous controls are for. It is much more complex in practice.

What makes this a cut above other cockpit simulation games is the use of extensive instrumentaion inside the aircraft rather than trying to present a visual intepretation of the outside world. Incorporating an artificial horizon guage is another out-of-the-ordinary feature. This shows an outline of a plane and a line indicating where the horizon is in relation to the plane, thereby allowing you to see what you're actually doing with the plane (which will often give you a nasty shock).

Another feature I like is the navigation beacon landing simulation. As you approach your destination runway symbols appear on the screen to assist in your corrrect touchdown.

Some of the instruments that confront you are a clock, fuel gauge, altimeter, vertical speed indicator, flap setting, stall speed indicator, power indicator, elevator indicator, attitude indicator, aileron setting, turn indicator, compass and air speed indcator.

What I didn't like about this program was the slow response to some of the controls and it seemed impossible to press two controls at the same time. The latter would not normally be important but combined with the slow reaction speed it did cause problems.

Ease of use is not a strongpoint of this game mainly due to the huge instruction manual you have to read before starting the game. Nevertheless Jumbo will give you a sense of achievement once you've got the hang of it, if you want a complex flight simulation.

Ratings Table

Program Quality	* * * *
Value for Money	* * *
Presentation On-screen	* * *
Ease of use	* *
Crashproofing	* * * *
Supplied Instructions	* * * * *
Overall	85%

D.B.

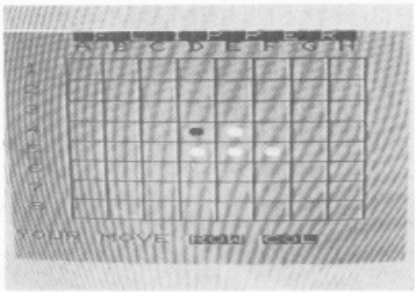
Title: Starwar
Type: Tape
Supplier: The Software House
Machine: BBC Model A or B
Price: £5.95

You're at the mercy of waves of yellow perils instead of the standard green meanies in this space attack game following the invaders vein.

True to form your task is to wipe out hoardes of aliens which rain down upon your missile cruiser in deadly formation. This game has another slight variation on a theme in that the yellow perils drop two bombs at a time instead of the usual one. Something of a death wish is on you and your red bases, because these bombs seem to be of the 'smart' variety only dropping shells where your cruiser is positioned. These invaders aren't daft.

Making your job more difficult is that you only have one life so take extra care and fewer dare-devil risks when you launch into attack. You are provided with four protective shields which allow you to work up quite a high score as long as you move at the speed of light.

Controls are via the keyboard, specifically the left and right arrows for your cruiser's movement



and the space bar for your weapon control. Again these are standard keys for this type of game and present no real problem.

The name of this game, Starwar, is slightly misleading as it conjours up visions of a trench-like game based on the ever popular movie Starwars. In reality it's nothing like it.

Full marks for the price of £6. It really is good value for money.

Ratings Table

Program Quality	* * *
Value for Money	* * * *
Presentation On-screen	* * *
Ease of use	* * *
Crashproofing	* * * *
Supplied Instructions	* * *
Overall	70%

Title: Timetrek
Type: Tape
Supplier: Program Power
Machine: BBC Model B
Price: £7.95

This game is a version of one of the oldest computer games in existence Startrek.

If you're unfamiliar with the Startrek type setting and game concept here it is. You man the controls of a space cruiser journeying around the galaxy. On your travels you have to track down and destroy the evil enemy force, the Klingons. You're armed with a cache of weapons including phasers and photon torpedoes as well as protective shields which can withstand some but not all Klingon batterings.

A nice feature of this game is the special 'battle computer' which enables you to calculate the energy needed to make hyperspace jumps if the going gets a little too hot to handle.

If you're about to be blown up by Klingon fire there is always the panic button you can resort to if need be. But choose your moment carefully, you can only use it once.

Unfortunately, before you can

get to grips with the Klingons you have to wait about five minutes for the tape to load into the computer as it is 21K long. Once it has loaded you are given a brief introduction and skill level selection (between one and 20).

The program has been written in Mode 7 graphics resulting in unstunning pictures.

My review copy didn't include written instructions but these are given quite comprehensively on the screen as part of the program. A function key overlay board comes with the game from which the phasers and other weapons are accessed.

Overall the game is entertaining and vary fast for a BASIC program. The lack of good graphics is compensated by the availability of many different features included in the game.

Ratings Table

Program Quality	* * * *
Value for Money	* * *
Presentation On-screen	* *
Ease of use	* * *
Crashproofing	* * *
Supplied Instructions	* * *
Overall	83%

Title: **Nightmare Park**
Type: **Tape**
Supplier: **Macronics**
Machine: **ZX81**
Price: **£4.95**

An adventure (!) game with a difference. You merely have to walk from one end of the park to the other...well I suppose *someone* might have got there, but it's really suprising that one can move anywhere for all those dead bodies!

Every few steps the screen display showing the plan of the park disappears and you know your life is in the balance again. It might be a plague of zombies or muggers, fromwhich you can only escape if you guess the right number before they get to you, or it might be an egotistical ogre who wants you to type in his name. Oh yes, he did flash it on the screen somewhere for all of a tenth of a second... was that when you blinked? Alternatively you might be asked the sum of about nine numbers (you have ten seconds to answer) or...

A very interesting game that I think could become quite addictive providing you have the right masochistic tendencies. I personally (I have to stress it's my opinon not the entire editorial staff, you see!) that the game could be made a lot more attractive to all the family if:

1) you could adjust the timing of some of the brief clues that are given (make them visible for longer for us old bifocal foggies).
2) If you had a graphic representation of your life forces gradually diminishing rather than the all too regular "HA,HA...YOU'RE DEAD" type message.

With these mods I'm sure you would still fade away before you got to the finishing straight, but you would at least feel slightly more satisfied. A good idea — well presented — but a little too quick to terminate!

Ratings Table

Program Quality	* * *
Value for Money	* * *
Presentation On-screen	* * *
Ease of use	* * *
Crashproofing	* * * *
Supplied Instructions	* * *
Overall	60%

P.F.

Title: **Winged Avenger**
Type: **Tape**
Supplier: **Workforce Ltd**
Machine: **Spectrum**
Price: **£6.95**

A Spectrum version of the 'Galaxians' type arcade money machine, in which wave after wave of 'baddies' come screaming down the screen determined to kill off your lone, heroic defender. The more you kill, the more you have to kill next time round.

Avenger has three 'phases' in which the types of attacker changes with each stage. Once all three are completed, you go back, to the start and do it again... and again... and again... and...until you run out of fuel and are therefore unable to defend yourself any longer.

Phase One attackers are little circles, Phase Two produces some pretty bird-type 'nasties' and Phase Three is a static mother ship which has to be destroyed to recharge your fuel level and to continue the game.

You can choose the speed of action and control your base lasers and shield using the keyboard. From the look of the tiny graphics characters, this could be a ZX81 program converted up using the Spectrum's user definable graphic capability. The birds in Phase Two are well done, but look very silly flapping around like crippled budgies with one wing shot off! (It takes three hits to kill them).

Ratings Table

Program Quality	* * * * *
Value for Money	* * * *
Presentation On-screen	* * *
Ease of use	* * * *
Crashproofing	* * * *
Supplied Instructions	N/A
Overall	60%

R.H.

Title: **Flipdisc**
Type: **Tape**
Supplier: **The Software House**
Machine: **VIC 20 + 8K expander**
Price: **£5.95**

Also known as Flipper and Othello, this is a board game played on your VIC. Though it looks just like draughts or checkers, its an electronic version brought right up to date.

You have a board of eight squares marked A — H and 1 — 8. On these squares are circular black or white discs. Your object is to fill the board with your own colour, playing against the computer. To achieve this result you must convert your opponents discs to your own colour by careful, strategic play.

To make this conversion the computer first asks you whether your want it to work at its fastest speed. If you don't, you are told snappily that you are taking the easy way out. Then you tell the computer, the position in terms of the appropriate box, to place a disc alongside your opponents. The rest of the discs in the same line will be converted to your colour.

Ratings Table

Program Quality	* * * *
Value for Money	* * *
Presentation On-screen	* * * *
Ease of use	* * * *
Crashproofing	* * *
Supplied Instructions	* * *
Overall	70%

N.A.

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MICROSPOT

INSTRING ROUTINE

If your computer does not have an Instring Function then use Chris Evans' routine to simulate it.

The Instring subroutine allows you to search for the presence of a string inside another. For instance, you could use it to search out a street name inside a string which contains the whole address, e.g. SMALL STREET inside 144a SMALL STREET, LONDON W1. This routine is invaluable if you are writing any sort of database program.

Entry

Before the subroutine is called from BASIC (using the GOSUB statement), the variable SHORT$ should contain the 'sub-string' to be found, and LONG$ should contain the string to be searched.

Note that if the BASIC implemented on your machine recognises only the first two characters of a variable name as significant, then no other variable in your program should begin with LL,LS, or SP (for numeric variables), or with LO,SH (for string variables); otherwise their contents will be altered by this routine. The variables LONG$ and SHORT$ are given these long names simply for clarity; A$ and B$ would, of course, do just as well. This is of particular importance for those users with a BASIC that allows a maximum of only two characters in variable names, in which case alteration is essential.

Exit

The subroutine will RETURN with the position of the start of the sub-string SHORT$ in the string LONG$, contained in SP. If SHORT$ is not contained in LONG$ then the value of SP will be zero. It will also be zero if for any reason LONG$ is shorter than SHORT$.

Assuming your BASIC does not already have an INSTR statement! Your BASIC should have the two string operators: MID$ and LEN. The three arguments of MID$ function used are the variable name, the starting position, and the number of characters to be extracted, respectively. Almost all computers support these funtions; the ZX Spectrum and the Atari have alternatives to the MID$ function.

Program Listing

```
 990 REM "Instring Subroutine"
1000 LL=LEN(LONG$):LS=LEN(SHORT$)
1010 IF LL<LS THEN SP=O:GOTO 1060
1020 FOR SP=1 TO LL LS+1
1030 IF SHORT$=MID$(LONG$,SP,LS) THEN
     1060
1040 NEXT SP
1050 SP=O
1060 RETURN
```

OPERATION

LINE	FUNCTION
1000	Stores the lengths of the strings in LONG$ and SHORT$ in LL and LS respectively.
1010	Avoids an illegal function call in line 1030.
1030	Searches for the sub-string starting at position SP.
1050	Sets SP to zero if the sub-string is not contained in LONG$.

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So that you know how we like to submit programs for use in the magazine printed below are guidelines which we would like you to follow.

What To Do

There are two kinds of program feature carried within our pages. The first is the brief "Micro-Spot":A page in total containing a brief description of the software, notes on its usage and a full listing.

These are designed to be short and to the point and are not primarily intended for the beginner in programming. Thus the explanation does not have to be totally explicit.

The second method of presentation is that of a full article. This can run anywhere in length from two pages to four pages and is formatted to a rigid style of presentation.

Because PCT is aimed at the newcomer to computing, our main software has to be extremely well documented and explained. We have decided upon the following method of publishing programs and would ask authors to submit material in this form whenever possible.

1. The article is broken into four parts.
   (a) Introductory Text
   (b) Program Listing
   (c) How It Runs
   (d) Hints on Conversion

2. The Introductory Text should contain an explanation of what the program is designed to do, what is to be expected on-screen when it is run, any problems the author overcame in producing the program, and any background necessary to enable our readers to use the listing. For example, if it is a games program, state the rules of the game, win conditions, 'good score' level etc., etc.

3. Programs should preferably be run out on a printer straight from the computer. In this way less errors creep in. Otherwise typed or handwritten is acceptable but must be double-spaced and DOUBLE CHECKED! A tape containing the stored version of the program must also be enclosed in order to thoroughly test your program as quickly as possible.

4. HOW IT RUNS should be as near to a line-by-line, or block-by-block description of the program as is possible. In this way people can learn more easily how to produce programs of their own to your standards.

5. Each computer on the market has its own little foibles and oddities. No one knows those of your machine better than you. Tell people about them in HINTS ON CONVERSION. How would someone wishing to adapt your program go about untangling the various intricacies? What special use have you made of your computer's special abilities? Graphics? Sound? Memory Saving?

Always include a full list of variables, too, for fellow users to get the full benefit from your program.

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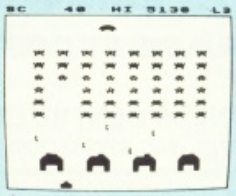

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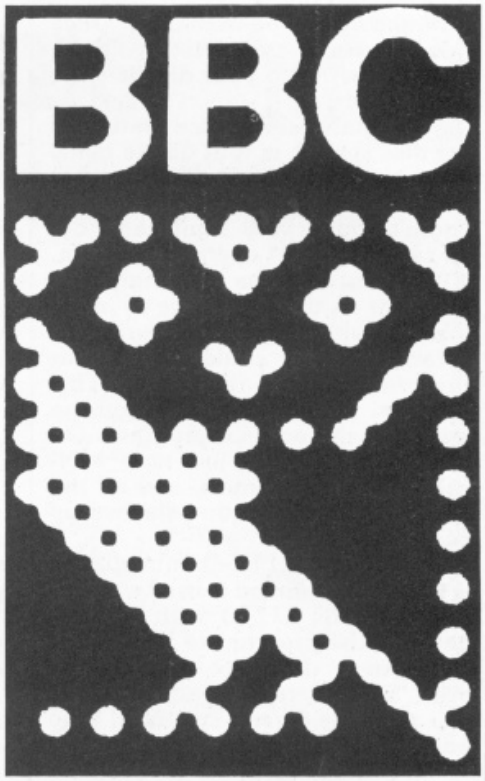

Jeremy Ruston assesses the new BBC Disc Drive system and takes a peek at the revised Users' Guide.

When delivery of the BBC Microcomputer started in January of this year, only a provisional copy of the User Guide (manual) was issued. This was generally accepted to be pretty awful — but how good is the new User Guide? Less well known to those people who have not actually got their computers is the presence of a provisional operating system. The new operating system has now been launched — to coincide with the availability of disc drives.

For those who are unfamiliar with a disc drive system here is an explanation. A disc drive is a small metal box containing the electronics and mechanics to rotate a small magnetic disc and position a stylus anywhere on it's surface. This stylus can read or write to any point on the drive. Because the disc rotates extremely fast, it is possible to position the disc head very quickly. Once it is in position, it can digitally read the data at that point on the disc. The net result is an extremely fast (by cassette standards) and reliable storage and recall device.

Looking Good

Physically, the BBC Micro's disc drives are similar to the Apple II drives — they are even the same colour. There the similarity stops, since the BBC disc system must rate as one of the easiest to use yet introduced on a computer of this size.

When you get your disc drive, you will be supplied with an updated version of the 'Welcome Pack' on disc, together with some utilities and the drive itself. Fitting the drive to the computer takes approximately 30 seconds — provided you have the internal disc expansion option fitted (a dealer does this for you).

A power cable and a data cable connect to sockets under the computer. These are then fed out at the back where they disappear into the back of the drive itself. The drive can then be put on top of the machine's casing.

About here I met my first problem — the rubber feet on the bottom of the drive overhang the back of the computers case by a few centimetres, making the above arrangement not quite as elegant as it could have been.

Having installed the drive, you insert the Welcome disc into the drive and turn the computer on. The instructions in the manual for inserting the disc are clear and concise, for which I am thankful, since a wrong insertion can sometimes ruin a disc.

Upon turning on the system, this message appears on the screen:

```
BBC Computer 32K
Acorn DFS
BASIC
>
```

The DFS part of the message tells you that all future LOAD and SAVE operations will be directed towards the disc. If you wish to use the cassette system, the command *TAPE will make the cassette interface the default.

Making A Save

Before you can do any SAVEing of programs, however, you need to initialize a blank disc to accept programs. While there are many commands relating to the disc system built into the computer, some operations which are seldom carried out have to be done using one of the utility programs on the Welcome disc.

The FORMAT program thus run by inserting the Welcome disc, typing *RUN FORMAT and then in-

serting a disc to be formatted. Once this process is completed, you can read and write to your disc to your hearts content.

The particularly nice feature of the disc system is that unlike many other systems, nearly all of the disc related commands are built in. This doesn't sound very significant, but on say the CP/M operating system, if you want to know the length of a program on disc you have to insert the disc with a specific program on it (and this disc could easily be at the other side of the room). This program is then run to tell you the length of the original program. On the BBC Micro you just type *INFO <program name> and all the information you require flashes up on the screen.

One feature I liked immediately is that if a command is used wrongly (for example, LOAD with out the name of the program to be loaded) the system does not just beadily print 'Syntax error', it actually tells you what the correct syntax is! Why hasn't anyone else thought of that?

In addition, there is a HELP command, which gives an instant breakdown of the commands available.

Speed And Size

The most important reason most people would consider buying a disc system is speed. I have a 28K program I use quite often, which was on cassette, I had time to go for a quick walk round the block while it was saving — on disc, it loaded in the time it takes to light a cigarette.

Each disc of the current system can hold 100K. That is 100,000 characters, which is quite incredibly large to most of us. Dual disc systems offering 800K are promised shortly! 100K sounds like a lot, but I find I fill up a disc every three days or so, then I have to weed out some of the programs I don't want to keep. The reason is obvious — SAVEing is painless on disc, you tend to save every program written.

A disadvantage is that a maximum of 32 programs is allowed per drive. Again, 32 sounds like a lot, but one soon fills that amount up. In addition, to fill up a disc with the 32 programs requires each one to be 3K long.

The disc system is obviously a desirable product, but not everyone can afford to own one at £1,000 a throw. On balance, I think a printer is a more useful peripheral, but once a printer has been aquired, think hard about a disc system.

Alternative Systems

A point to notice is that it is likely that third parties will be offering cheap alternatives to the official Acorn drives in the near future. This arrangement would require you to buy a disc interface from Acorn (at about £70).

Before you buy any software, it is worth checking if it is compatible with the new operating system and the disc system — just in case you do upgrade.

The New User Guide

The provisional User Guide arose because of the need to get the machine onto the market in unseemly haste (to ensure that people had it in time for BBC TV series). The powers that be realised that due to the complexity of the BBC Micro, only a very complete and thorough manual could possibly do justice to it. There simply was not time to produce a manaul of sastisfactory quality, so the provisional Guide was issued as a stop-gap measure.

The BBC was heavily critised for this, but the options were so limited, I believe that the action they took was best in the circumstances. The options available were (a) to delay the launch of the computer till a new manual could be developed (b) to quickly put together a low quality manual to serve the computer through its whole life.

The provisional User Guide's faults were that it was full of silly errors, it was not a suitable tome for learning to program with, it did not cover many of the more interesting features of the machine and, worst of all, the method of getting the computer to utter sounds was completely ignored.

Many of these faults would only affect 'boffins', but the lack of information resulting from the Guide could have been a contributing factor to the slow arrival of outside software for the machine. Who can write games for a machine when the sound commands are unknown and the built in assembler is not described at all?

Vast Improvement

The new User Guide does not suffer from these faults, at the expense of being over 500 pages long!

The Guide is split into several sections: three 'teach-yourself-programming-in-five-easy-lessons' type sections, a description of the 'structured statements' (ie PROC, REPEAT etc) and a huge reference section.

The programming sections cover 200 pages — quite enough space to teach programming in. Written by John Coll (one of Acorn's non-boffins) it is of a very high standard.

It is interesting to compare the User Guide with the documents Sinclair provides with the ZX Spectrum, since both books will be used by beginners on their respective computers.

The Spectrum manual is written by Steve Vickers, and edited by Robin Bradbeer. The information covered is much the same in both manuals, but the Spectrum manual tends to use many little five page chapters each imparting a little more information than the previous one, so the book gets quite complex towards the end.

Sadly lacking in the BBC User Guide are the exercises at the end of each chapter in the Spectrum manual. Sadly lacking from the Spectrum manual are the answers to the same exercises! As far as teaching programming is concerned, the BBC Guide uses a more intuitive approach — rather than the vaguely condescending manner employed by the Spectrum tome. The conclusion to arise from our comparison was that whatever computer you get, supplement the manual with a recognized BASIC book for the fundamentals, and then progress into the manual for the more esoteric functions.

The reference section of the BBC guide consists of some advanced material for the sort of people who like to get caught up in their machine's innards and a page-a-keyward descripton of every BASIC word — complete with example.

To conclude, the Guide is as complete as required by most people and is very well written into the bargain. It is, as I said, still advisable to supplement it with a recognized book on programming, such as Tim Hartnell's 'Let Your BBC Micro Teach you to Program', or Neil and Pat Cryer's 'BASIC programming on the BBC Microcomputer'. The former is chattier, and benefits from being written after more experience of the machine was gained — however the latter is probably more rigorous. Other titles are likely to appear, and with the increasing acceptance of computing as a hobby, you may not have to travel far to get them. ■

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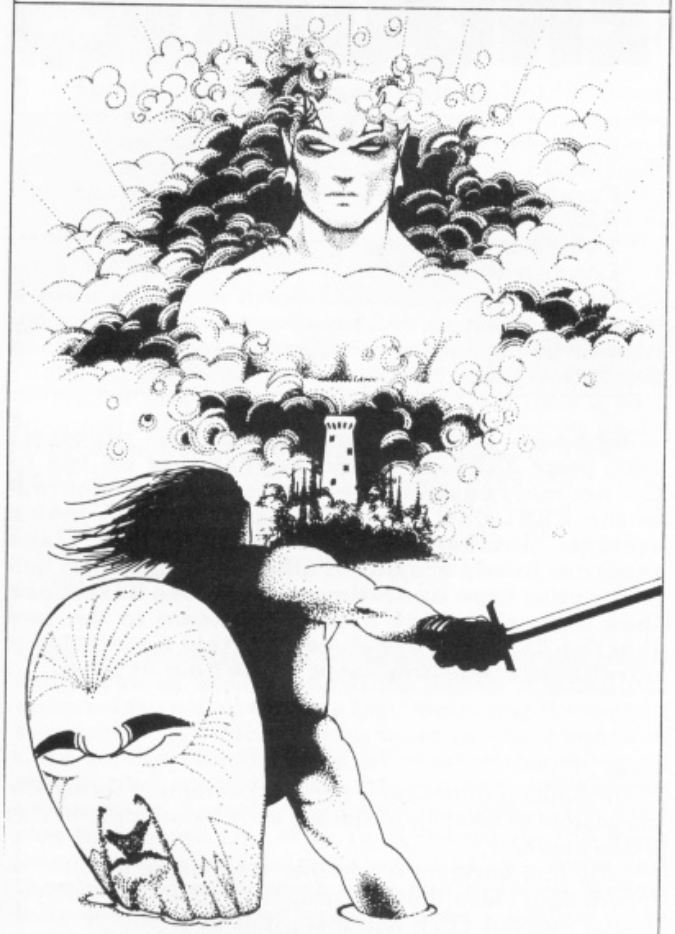

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Dear PCT
I'm going to the Canary Islands for my holidays in January. I've sent off for a ZX Spectrum (which should arrive eventually), and I wanted to take it with me to use there.

I've been told that the islands use the 'PAL' system so I can use the television out there OK, but their voltage is 110 volts. I should imagine that the Spectrum only works on 240 volts, so is there a transformer or voltage regulator I can get to provide the correct voltage?
Michael Hill
London

The Spectrum comes already supplied with a 220/240 volt transformer and to enable you to run this on a 110 volt supply you will have to buy a stepping transformer. The people I suggest you get in contact with are ILP Transformers, who make a large variety of differing transformers. If you get in touch with their technical department on (0227) 64723, they should be able to advise you on the type of transformer you will need and what it will cost you. But remember that transformers are heavy so if you are flying out there this might cost you extra in excess baggage.

Dear PCT
I am a ZX81 owner and I am having problems of interference from my neighbours washing machine, lawn mowers and I suspect CB Radio and motor vehicles. This is causing severe glitches and crashing problems when I run programs immediately after loading. Is there anyway I can shield or combat these nuisances please?

I know how to rescue the programs but I do not know how to prevent the interference from upsetting my computer programs during the Save and Load operation.

Two months ago I purchased a Data Recorder from Monolith Limited in order to cure save and loading difficulties. At first this machine worked perfectly loading and saving every time, just as the makers claim. Suddenly without warning, the signals became very weak and the tapes would not load at all.

I contacted the manufacturers and they say that this is due to the head of the recorder moving during transit, and told me how to adjust the setting — do you think this could also be caused by interference as well.
B.A. Moon
Essex

Having talked to people in electronics and C.B. they all agree that it is highly unlikely that your neighbours activities are causing the problems with your ZX81. It would appear that on top of the normal reliability problems that are inherent in the ZX81 you might have trouble with mains voltage fluctuations. Certainly if your tape recorder heads are out of alignment then this will make your tape operations even more hazardous than normal. I think it all boils down to the fact that the ZX81 has acheived a certain notoriety for unreliable operation, even at the best of times.

Dear PCT
I am thinking of buying a personal computer for a) The purpose of producing graphics, b) Programming and c) Video games.

My first question is whether it would be possible to record onto video tape the graphics output as displayed on the monitor (TV), and if so, how does one go about setting this up.

I am considering an MFP II, which I believe has a ROTATE function. Other machines I am considering are an Atari 400, a Dragon 32 and an Oric I (48K), none of these, as far as I know, have ROTATE functions. Is it difficult to produce rotation on these machines? Also could you advise which of these or any other similarly priced machines would be best suited for producing high resolution, multi-coloured graphics.
J. Aizpurvs
Milton Keynes

In answer to your first question there should be no problem in connecting your computer to a video recorder and providing that you tune the VCR properly then you should be able to capture the computers output on video tape.

None of the computers you listed have a ROTATE function built in, but if you want a computer to do some serious graphics work I would suggest buying the Atari. Despite its relative age it still has some of the best graphics facilities of any machine and it is the most likely to have software that is dedicated to the manipulation of graphics.

Programming graphic rotations and translations is a difficult task and when it is achieved on computers it is usually done in machine code because the number of calculations required for each movement makes using BASIC very slow. However, as a start I would suggest getting your computer and then finding a book in the library to give some information on the theory of

rotating shapes. Try then to apply this theory to your computer in BASIC as this will give you a good understanding of how to rotate objects before attempting this in machine code, as this is difficult in itself.

Finally I would suggest getting hold of some of the back issues of BYTE magazine, as this American publication dedicates whole issues to the subject and you might find some useful background information here.

Dear PCT
I have an unexpanded VIC-20 and have used it to open data files on magnetic tape. I have no difficulty in opening the file, using a program containing the OPEN statement, nor do I have any difficulty in reading back any information that I want from files. However once a file is open and has been closed at the end, I have been unable to devise a program to re-open the file to amend or add more data. I wondered if it is possible to re-open a file for the purpose of adding or deleting data and if so do you have a program I could use?
Brain Hodgson
Northallerton

With this problem you have uncovered the major drawback in using tape files. When a computer stores data on a cassette tape recorder it stores it sequentially, so that if you want to add a piece of data to the file there is no way of opening up space and slotting the information in without overwriting part of the existing data. The only way to achieve this is to read the entire file back into the computer's memory, add the data and then write the file back onto the tape. So unfortunately the only way round your problem is to read the data into an array in the computer's memory, add or amend it and then write it back out again. This is not a problem with just the VIC but it applies to any machine that uses standard tape recorders as a storage medium.

Dear PCT
I recently bought a VIC 20 and have been delighted with it so far. However looking at some programs, especially for the PET, I have noticed certain commands which are printed in square brackets. Please could you tell me how to punch them on my keyboard and what they do.

Thank you for your attention to this problem.
P.T. Alderton
Norwich

As a rule these commands in square brackets are representative of graphics symbols the computer uses. The reason for opting for this representation is that when a listing is printed these graphics symbols are very indistinct and are difficult to read. To help decipher these consult the table below for their meanings.

Symbol	Meaning	Keyboard Entry
[CLS]	Clear screen	SHIFT & CLR/HOME
[HOM]	Home the cursor	CLR/HOME
[5CD]	Five cursor downs	CRSR(UP/DOWN) * 5
[3CL]	Three cursor lefts	SHIFT & CRSR (LEFT/RIGHT) * 3
[7CU]	Seven cursor ups	SHIFT & CRSR(UP/DOWN) * 7
[REV]	Reverse field on	OFF/RVS
[OFF]	Reverse field off	SHIFT & OFF/RVS

Dear PCT
I feel I must put pen to paper in response to Mr D.A. Churchward (Technical Queries, October issue 1982, page 62) and his quandry regrading the degree of knowledge that he needs to enable him to make the right choice of machine, and whether a machine is going to suit him.

I found myself facing the same problem recently, as I am considering treating myself. While in Bradford town centre I noticed a sign for computer training courses in the window of the Tandy Computer Centre, so I went in to enquire further.

For only £24.95 I enrolled on their "Computer Appreciation Courses" and had two very enjoyable afternoons exploring the in's and out's of micro computers.

They have a full time instructor and we all had our own micro for the duration of the course, they also offer courses in BASIC programming by the way. I felt it was money well spent having seen the facilities that Tandy offer at their centres I bought a Color Computer!

Even those of you who aren't considering purchasing a Tandy machine I'm sure you'll find the course very, very useful. I was also told that the courses are run at their other Computer Centres.
G. Sully
West Yorkshire

PRIORITY REPLY

February 1983 Issue

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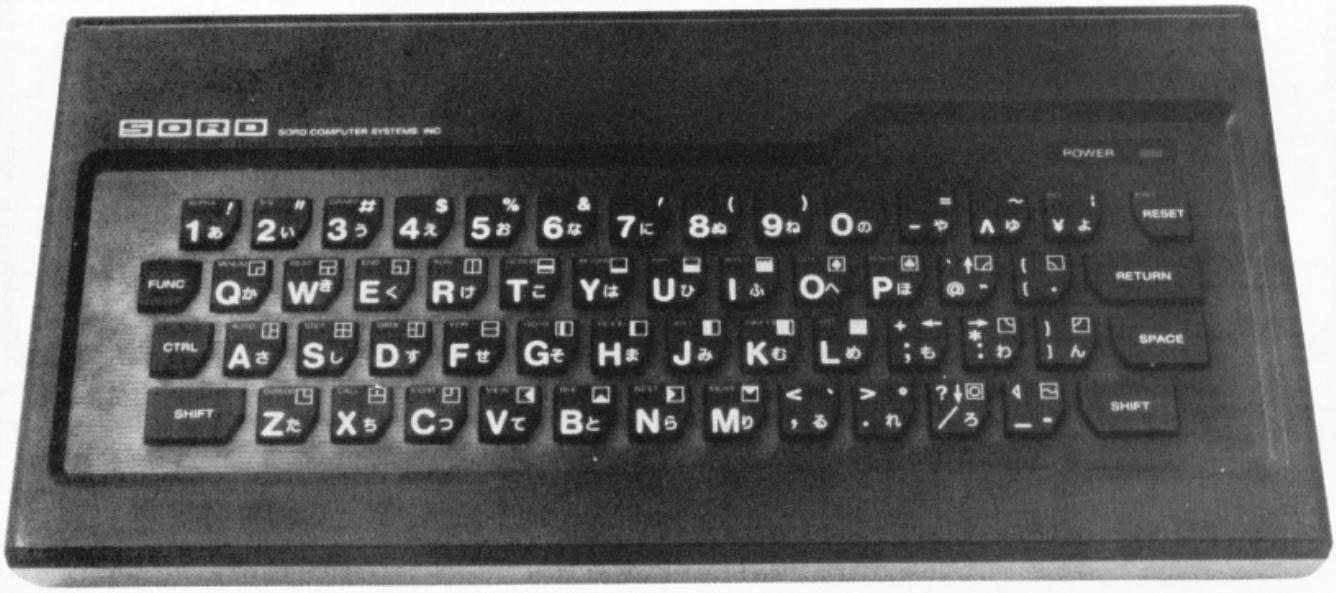
SORD M5

THE SORD'S EDGE



This month Chris Palmer takes a look at one of the first Japanese computers destined for the British market.

Since the beginning of the home computer industry there has been one question that keeps cropping up. When are the Japanese going to appear?

With American and English firms taking the lion's share of the market it could only be a matter of time before our inscrutable friends on the other side of the world decided to redress the balance. And so, from the land of the Bonsai and the Samurai come the first of the Nipponese home computers.

But enough of this economic doomwatching, it's time to take a look at the computer. One of the machines to grace our shores in the new year is the Sord M5 and this is the machine we have chosen for our first look at Japanese computing. Before we actually start, here is a brief word of explanation as to why some aspects of the machine might appear a little less detailed than others. This is due to the fact that the machine I was let loose on to review had only recently arrived from the land of the rising sun, and as is customary with early models, it had no documentation, save for a couple of sales brochures printed in Japanese.

As my knowledge of Japanese is nil, most of the facts contained here were gathered by actually playing with the machine and then extrapolating these to provide an overall picture of what the machine will be like when the UK version arrives.

The Outside Edges

In appearance the Sord M5 looks rather like an executive Spectrum, sporting a similar rubber keyboard. It is finished in an attractive charcoal grey case. It's dimensions are 258mm X 182mm X 33mm. Around the back are the peripheral sockets, from left to right these are: power socket, cassette interface, printer interface, two joystick controller sockets, video out, sound out and the RF television output.

With these sockets you will be

able to connect the M5 to a normal colour television or a colour monitor using the composite video output. With the separate sound channel as well, you should be able to connect the Sord to your Hi-Fi system and experience ear-shattering sound effects as you battle against your favourite invaders.

Supplied with the computer are a large external power supply and a pair of joysticks, as well as the necessary connecting leads. The joysticks are not joysticks in the accepted sense, but bear closer resemblance to the game controllers issued with the Intellivision games computer which have a circular disc not a stick.

The controllers for the Sord are slightly bigger than a cigarette packet and about half as thick. Control is acheived by pressing down on the edge of a disc which is situated on the top of the unit. A fire button is also present at the top-left of the unit. I am told by people who use the Intellivision that this system is far better than normal joysticks once you have got used to it.

Keyboard Queries

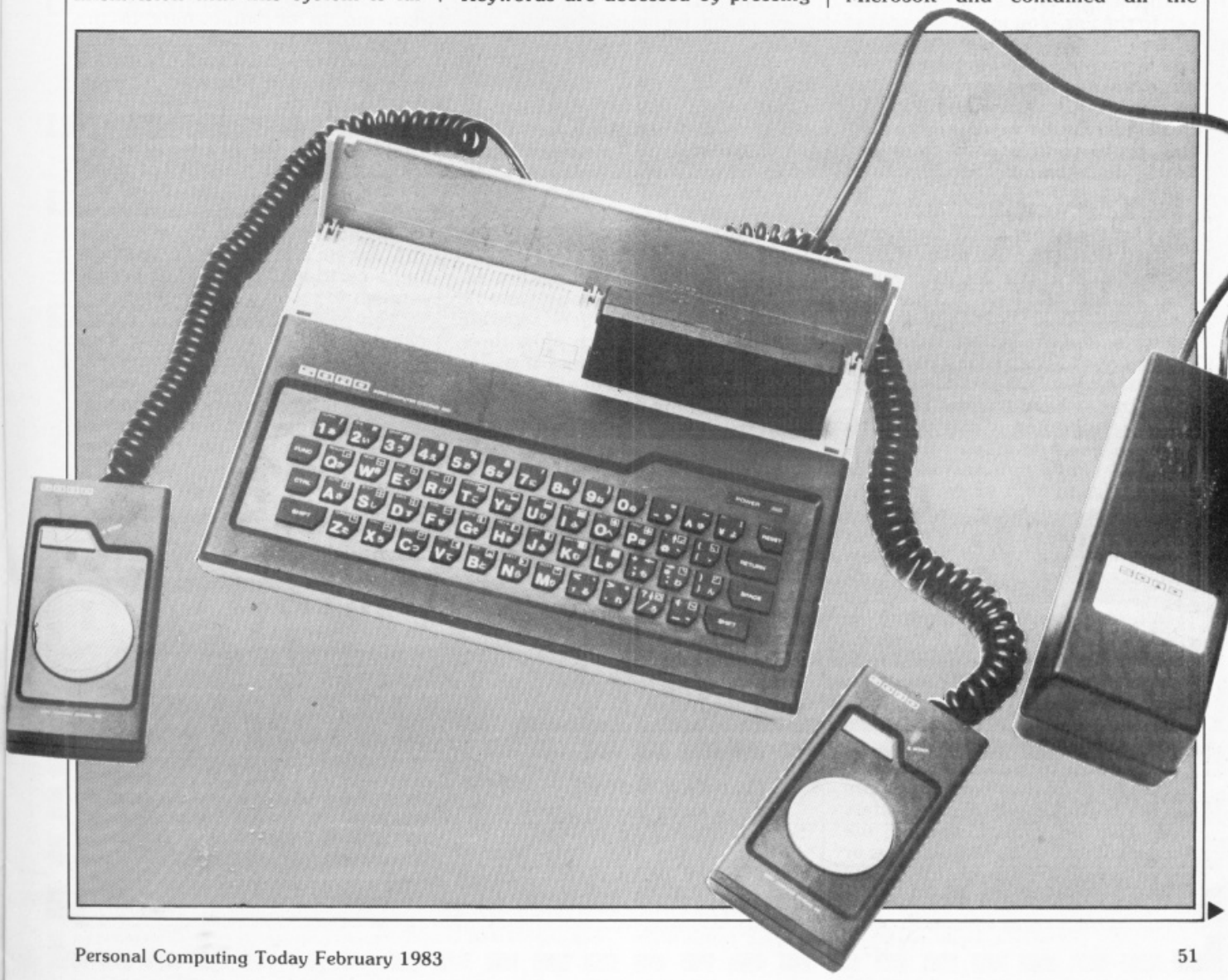
My first impressions of the Sord were mainly expletives aimed at the rubber keyboard. Having been totally un-impressed by the Spectrum's keyboard I feared the worst. It was a pleasant surprise when I actually started using the Sord's keyboard as it had the feel of a very good typewriter and not at all sloppy or unpositive. The keyboard is marked out in standard QWERTY format and it has the RETURN and SHIFT keys in the normal positions. The keyboard doesn't sport a proper space bar but instead has a space key situated under the RETURN key.

Along with the alpha-numerics, each key has a graphic symbol, a keyword and a Japanese pictogram symbol, although these will most probably be replaced by graphics symbols on the UK models. Keywords are accessed by pressing the FUNC key and then pressing the relevant key. The keyboard also includes a CTRL key and a RESET key. A complete set of the keywords can be seen in figure one.

ROM And RAM

The M5 is based around the ZX80A processor which looks like becoming a standard for this size of machine. Its operating system takes up 8K in ROM which is supplemented by a further 16K or 8K when the BASIC is plugged in. 20K or RAM comes as standard with the machine and this is divided into two sections, a 16K section that is devoted to the screen and graphics, the 4K which is left over is used for storing programs and variables. The BASIC cartridges F and G also carry an extra 4K of RAM.

Unfortunately I only had the BASIC I cartridge to look at and even that did not have any instructions or a manual. The BASIC seemed to be a fairly standard Microsoft and contained all the



SORD M5

usual commands such as LEFT$, RIGHT$ and MID$.

One particularly useful command was HEX$(). With this command you can change a decimal number into its hexadecimal equivalent. This will be of great use to anybody working with machine-code, where this is one of the most annoying tasks around.

The editing is straight forward and uses the cursor keys to move the cursor around the screen allowing you to insert or delete on the program lines. The screen does not scroll in the normal sense but instead wraps round from top to bottom in a similar fashion to the Atari.

In playing about with the BASIC I found a couple of interesting control codes that give a hint at the sort of graphics capability we can expect from the Sord. By printing CHR$(6) the whole screen area moves one character cell to the right and by printing CHR$(4) the whole screen moves one character cell to the left. You might not realise at first the significance of this, but you will realise that the biggest hurdle to overcome is how to get the screen scrolling sideways. With the Sord this can be acheived by printing these control characters and letting the computer do the hard work.

On Screen

The Sord M5 offers four different display modes. The first is purely a text screen. It has a character resolution of 40 X 24 and it only allows one of the sixteen colours to be displayed. The second display is another text only, but it allows each character to be a different colour.

The resolution of this display is 32 X 24. The next display mode is a low resolution graphics mode. It has a resolution of 64 X 48 picture cells, each picture cell being made up of 4 X 4 pixels. Each of these picture cells can be any one of the sixteen colours available.

The final mode has the highest resolution graphics, offering a resolution of 256 X 192. It can support two colours per eight horizontal dots out of the sixteen colours. As well as offering these graphics facilities the Sord M5 also has the ability to run Sprites.

For those of you who have never encountered Sprites before they are small high-resolution characters that can be moved around the screen without distrubing any text or graphics that are already there. The Sprites can also have their priority set so that they can be used to simulate 3D effects and they are very useful for writing games programs.

The Sord with games controllers

The Sord will support 32 of these Sprites on the screen at any one time and these Sprites can be made up of either an 8 X 8 or a 16 X 16 matrix of dots. If you need bigger shapes then it is quite easy to combine two or more Sprites to make a larger one. It looks like these facilities will only be available with the BASIC-G cartridge.

The sound on the Sord is provided by an internal programmable sound generator. It offers separate volume control for each of its three voices which overall gives it a surprisingly good sound quality. All the sound is fed out through the television speaker although there is a separate sound output on the back of the machine to allow the signal to be fed into an external amplifier or Hi-Fi.

Having played with some of the demo cartridges that were available with the Sord I was quite impressed by the quality of the machine in both its graphics and sound roles. For those people who need a little more incentive to buy this sort of computer there are also some financial and business packages based around the PIPS program that will be available.

Coming Soon

If you fancy having a look at the Sord it should be arriving in the country during the early part of 1983. It will be marketed through high street stores and certain Sord computer dealers. The price has not yet been fixed but hopefully it will turn out to be somewhere in the region of £150-£200. Any comparisons drawn will undoubtedly be with the Sinclair Spectrum.

Despite my limited time using the Sord I was impressed and it could be that the M5 will give the Spectrum some healthy competition. From what I gather it will surpass it in the graphics and sound roles and, with the ability to change the system's langauge by unplugging a cartridge, it should be flexible enough to move with the times.

My main criticism is one that can be levelled at most machines and that is a lack of on-board memory. Only offering 4K of usable memory is a very serious crime indeed and I hope that Sord will make provisions for expanding this cheaply. As the Japanese have a talent for making good products on the cheap I think it is going to be very difficult in the future to remain partriotic and buy British!

Figure 1

SINGLE KEY ENTRY KEYWORDS

ALPHA	GRAPH	DEL
HALT	RENUM	READ
END	RUN	GOSUB
RETURN	INP(	INPUT
OUT	PRINT	AUTO
STEP	DATA	FOR
GOTO	HEX$	JOY(
INKEY$	LIST	CURSOR
CALL	CONT	VIEW
BYE	NEXT	MOVE

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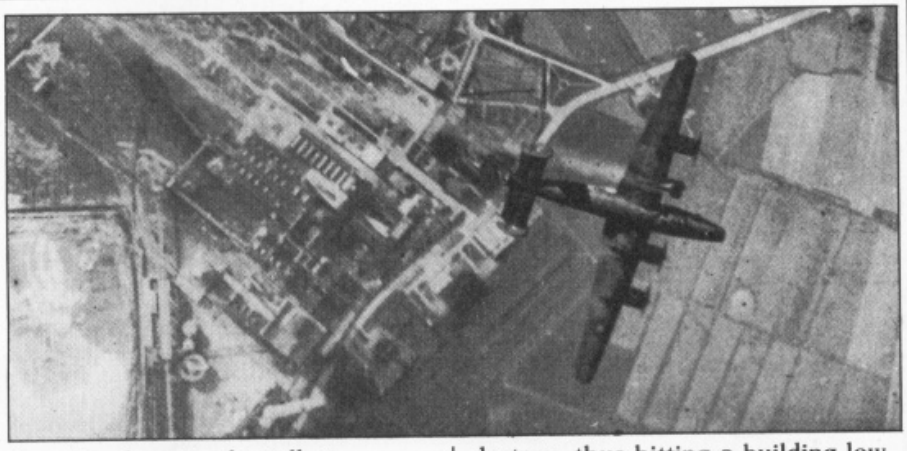
SOFTWARE

U.K. BLITZ

Take the joystick of your plane and blitz an enemy city with a bomb raid. To save your skin you must destroy the skyscrapers and create an emergency landing pad. Christopher Dupp takes you into the cockpit through his UK101.

With the arrival on the market of newer, colour and sound capable, home computers, us UK101 owners face the choice of keeping our trusty 'old' computer, or, venturing into the uncertain world of the modern micro. But before giving up and sending in your ad of 'UK101 FOR SALE', look again at its capabilities. A computer is only as good as its programmer, and it is certainly possible to write realistic, and good graphical, versions of programs available for computers like the VIC-20, BBC and Spectrum. The 8K BASIC in the UK101 is very fast compared with the VIC and other computers and so, even arcade programs may be written, to an extent, in BASIC.

UK Blitz is not, however, an arcade game, but my version of the popular VIC game. The principle is simple, your plane is circling lower and lower over a city, whose skyline is dominated by towering skyscrapers. The only way to avoid hitting these is to drop bombs onto the tallest buildings below your current position and work your way down, to find a suitable landing spot.



The key to activate the bomb bay is key #1, and as the bombs do not fall vertically, but at a realistic angle, it is a good test of timing for the player.

You score 10 points for each building section you successfully destroy, thus hitting a building low at its base scores more than a hit towards the top of the building. A bonus of 1000 is added to your score when the game is completed to give your final score.

To give you an idea of the difficulty of the game I have yet to land the plane, scoring an average 1410, before I hit a building. So good luck and happy landings!

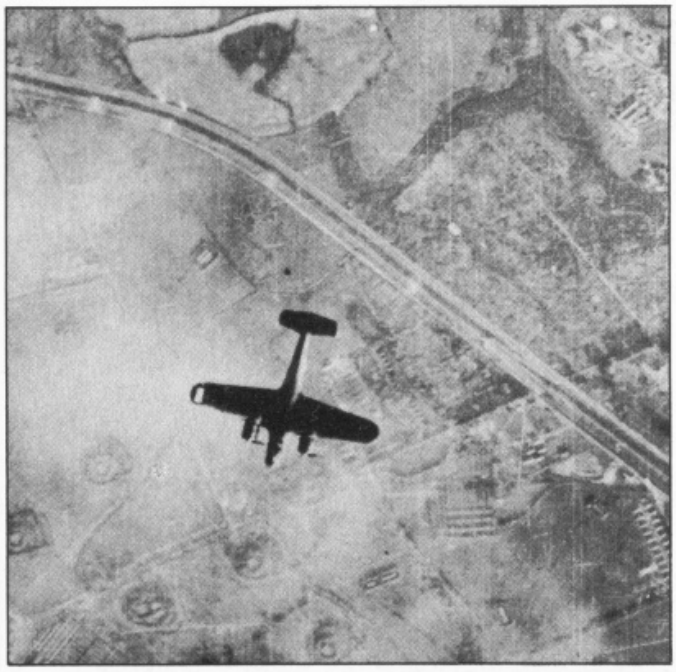
HOW IT RUNS

Line By Line Description Of Program

10-15	Set up screen.
3000-3050	Draw skyline.
20	Sets plane's start position.
25	Sets new plane's position.
26	Checks for hitting building.
27	Checks for plane landing.
30	Plots plane.
40	Delays and unplots plane.
50	Keyboard routine.
60	If key 1 is pressed sets bomb flag.
70	If bullet flag set go to plot routine.
80	Bomb delay line.
1000	Sets new bomb drop position.
1050) 1070)	Unplots, plots and checks for bomb hitting building or going off bottom of screen.
5000) 5020)	Plots, unplots plane exploding.
10000) 10015)	If building is hit, destroy building and increment score.
10017) 10020)	Move cursor and print score.
11000 11100	Program initial display (random star pattern).
19000 19030	End routine.

Variables Used

PP	Plane position.
BP	Bomb position.
SC	Current score.
BF	Bomb flag 0 = no bomb 1 = bomb.
HI	Hi score.



HINTS ON CONVERSION

This program should be easy to convert to any machine with cursor controls and a memory mapped screen.

Below is a list of the strings and their appropriate functions.

CHR$ USAGE OF CHARACTER

12	Clears screen
6	■
32	Space
213	• Large dot
46	Full stop
187	■ Half tone
226	○ For explosions
214	⩚ only

UK101 Screen Map

Screen size = 16 rows x 48 columns.
The actual size is 16 x 64 but only 48 are visable.
Top location is 53261.
Top right is 53309.
Add 64 to these for each line down the corresponding side of the screen.
For example:
Left side, fifteenth line down = (15x64) + 53261 = 544221 etc)

Pokes Used

520	Sets vertical cursor position.
519	Sets horizontal cursor position.
530,531	Disables CTRL C to allow keyboard scan.
57088	Key row select.

530 and 57088 are the UK101's keyboard scan pokes, so replace these with your computer's equivalent.

PROGRAM LISTING

```
1       REM * * * * * * * * * * * * * * * * * *
2       REM UK B L I T Z
3       REM BY C . J . D U P P 1 9 8 2
4       REM * * * * * * * * * * * * * * * * * *
5       GOSUB 11000
10      PRINT CHR$ (12);
11      PRINT "SCORE     ";
12      PRINT "     HI SCORE     "; HI
15      FOR I = 54221 to 54270:POKE I, 187: NEXT
18      GOSUB 3000
20      PP = 53323
25      PP = PP + 1
26      IF PEEK (PP) = 6 THEN 5000
27      IF PP = 54167 THEN 19000
30      POKE PP, 237
40      FOR T = 1 TO 100: NEXT: POKE PP, 32
50      POKE 530, 1: POKE 57088, 127: V = PEEK (57088)
60      IF V = 127 and BF = 0 THEN BF = 1: GOSUB 1000
70      IF BF = 1 AND CF = 2 THEN CF = 0: GOSUB 1050
80      CF = CF + 1: IF CF = 4 THEN CF = 0
1000    BP = PP + 65: POKE BP, 213
1010    RETURN
1050    POKE BP, 32: BP = BP + 65
1060    IF PEEK (BP) = 6 OR BP > 54221 THEN BF = 0
1070    POKE BP, 213: RETURN
3000    FOR U = 54157 TO 54205
3010    G = INT(RND(1) *8) + 2
3015    IF G = 6 OR G = 3 THEN 3040
3020    G = U - (G *64)
3030    FOR T = U TO G STEP - 64: POKE T, 6: NEXT
3040    NEXT
3050    RETURN
5000    POKE PP, 32: POKE PP, 214: FOR U = 1 to 500: NEXT
5010    NP = NP + 1 (NOT REQUIRED)
5020    POKE PP, 226: FOR U = 1 TO 500: NEXT:POKE PP,
        32
5030    IF SC > HI THEN HI = SC
5039    PRINT CHR$ (12)
5040    PRINT: PRINT TAB (10) "YOU SCORED "SC"
        POINTS"
5045    PRINT: PRINT: SC = 0: BF = 0
5050    INPUT "ANOTHER GAME"; Y$: IF LEFT$ (Y$,1) =
        "Y" THEN 10
5060    PRINT: END
10000   IF BP > 54221 THEN RETURN
10005   POKE BP, 32
10010   RE = 0: FOR G = BP TO 53389 STEP - 64: IF
        PEEK(G) = 6 THEN RE = RE + 1: POKE G, 32
10011   NEXT
10015   FOR Y = 0 to RE: SC = SC + 10: NEXT
10017   POKE 520, 0: POKE 519, 11: PRINT SC
10020   RETURN
11000   PRINT CHR$ (12): PRINT
11005   FOR U = 1 TO 50: POKE INT
        (RND(1) *1000) + 53261, 46: NEXT
11010   PRINT TAB (10) " * * *UK BLITZ * * *"
11020   PRINT: PRINT: PRINT
11030   PRINT: PRINT TAB (8) "HIT KEY #1 TO DROP
        BOMB"
11040   PRINT "  HIT 'RETURN' TO START GAME  ";
11060   POKE 530, 1: POKE 57088, 223
11070   B = B + 1
11080   IF B > = 300 THEN B = 0: GO TO 11000
11090   IF PEEK (57088) = 247 THEN RETURN
11100   GO TO 11070
19000   PRINT CHR$ (12): PRINT: PRINT
19010   PRINT TAB (10) "WELL DONE!! YOU MANAGED TO
        LAND": PRINT
19025   PRINT TAB (8) "YOU'VE EARNED 1000 BONUS
        POINTS": SC = SC + 1000
19030   GO TO 5040
```

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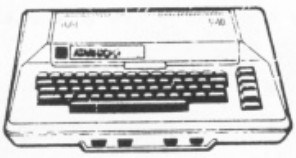

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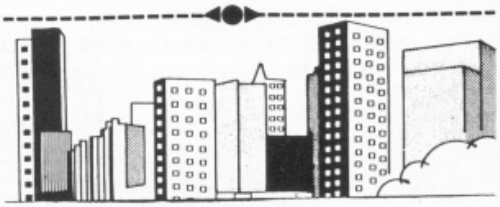

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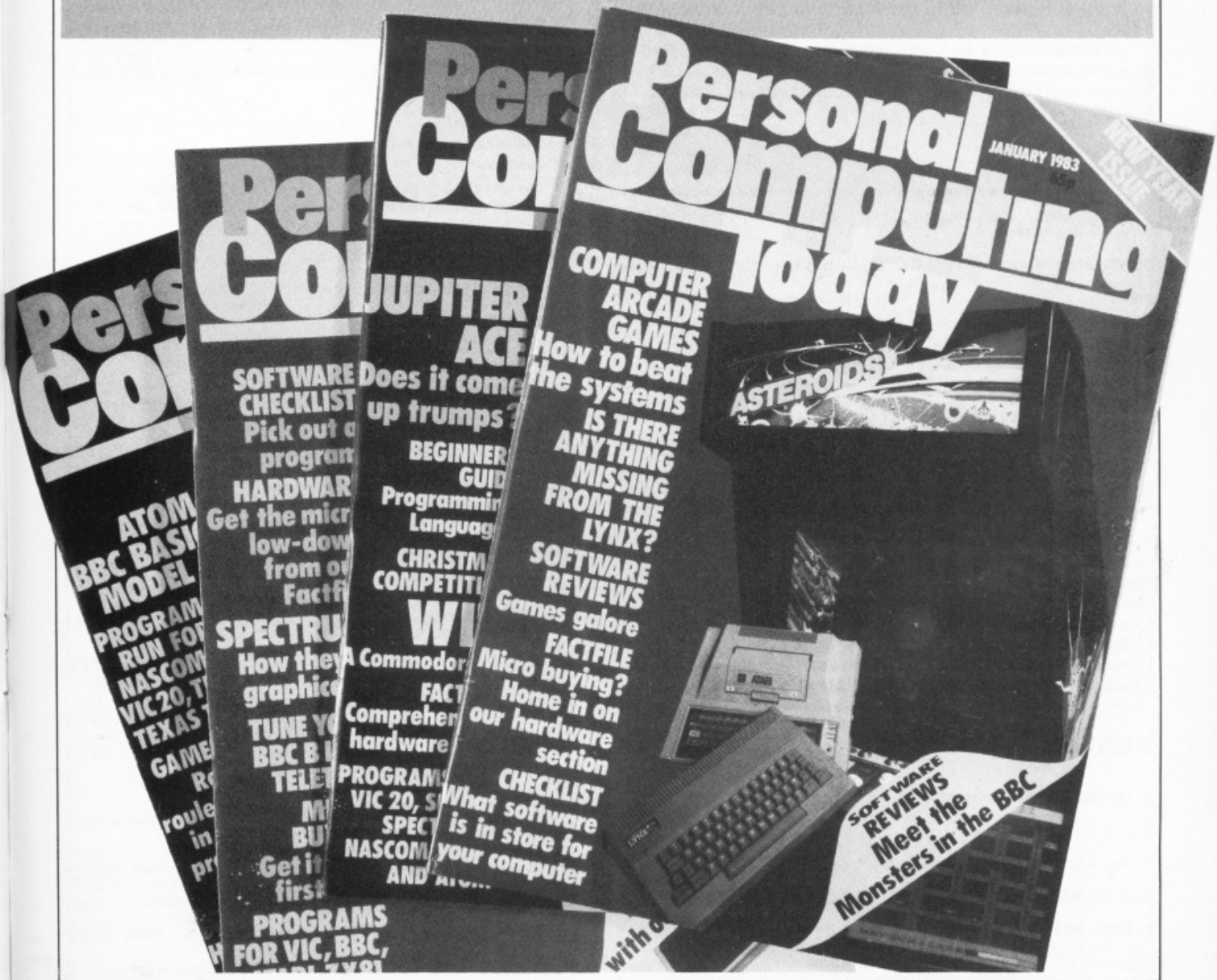

READER SURVEY

Now that we've been on newsagents' shelves for seven months we thought it was time to ask you, the readers, exactly what you think of PCT.

By filling in the questionnaire below you have the chance to influence what we print in the magazine. You don't need a stamp — just poise your pen, put on your thinking cap, fill in the form and pop it in the post.

It's vital for us to know what you think in order to give you what you want to read and make Personal Computing Today a better publication. Please help us to help you.

INSIDE PCT

1. Please rate the following articles on a scale of 1-9. If you didn't read the article score 0.

FEATURE	SCORE	FEATURE	SCORE
News		Look Before You Leap	
Gamesboard		Clubhouse	
Software Reviews		Software Checklist	
Hardware Factfile		Micro Terms	
Your Letters		Hardware Reviews	
Micro Answers		Program Listings	

2. Which feature/s do you read regularly in PCT each month?

. . . . . .

3. A wide variety of topics are covered in PCT. Which of the following do you think we should pay more, or less attention to:

Programming technique features	☐		
Hardware features	☐	News	☐
Games software reviews	☐	Technical queries	☐
Educational software	☐	Book reviews	☐
Utility software reviews	☐	Software checklist	☐
Hardware Factfile	☐	Games program listings	☐
Educational program listings	☐	Utility program listings	☐

READING

4. Do you buy PCT every month?

Yes ☐ No ☐

If Yes, which issues have you bought?

Aug ☐ Sept ☐ Oct ☐ Nov ☐ Dec ☐ Jan ☐ Feb ☐

5. Since PCT was launched do you think it has

Improved ☐ Worsened ☐ Remained the same ☐

6. How long do you keep copies of PCT?

1 month ☐ 3 months ☐ 6 months ☐

7. Do you have an annual subscription to PCT?

Yes ☐ No ☐

If No, is there any particular reason for not subscribing?

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If you aren't a subscriber do you buy your copy

At a local newsagent ☐
On your way to work ☐
Have it delivered by a newsagent ☐
Buy it when you see it ☐

During which week of the month do you usually buy your copy of PCT?

2nd week ☐ 3rd week ☐ 4th week ☐ Later ☐

How many other people read your copy of PCT? . . . . . .

COMPUTER TALK

8. Do you own a computer?

Yes ☐ No ☐

If Yes, which type do you own? . . . . . .

Does anyone in your family own a computer. If so, who?

. . . . . .

Do you intend to buy a computer in the future?

Yes ☐ No ☐

How much will you spend when buying a computer?

Under £100 ☐ £100-£200 ☐ £200-£300 ☐ £400-£500 ☐ More ☐

9. Did you own a computer before reading PCT?

Yes ☐ No ☐

If No, has PCT helped you make a choice?

Yes ☐ No ☐

Has the Factfile helped you make a choice?

Yes ☐ No ☐

10. Are you considering upgrading your computer system?

Yes ☐ No ☐

How much will you spend . . . . . .

11. What do you use your computer for?

Entertainment/games ☐ Education ☐
Business ☐ Scientific ☐

12. Do you use a computer in your job?

Yes ☐ No ☐

Do you use a computer at school?

Yes ☐ No ☐

If Yes, which type is it

.....

13. How much computing experience do you have?

None ☐ A little ☐ A lot ☐

14. Do you own any add-ons for your computer?

Yes ☐ No ☐

Are you considering buying any of these add-ons?

Printer	☐ Cassette recorder	☐ RAM pack	☐
Joystick	☐ Monitor	☐ Sound board	☐
Typewriter keyboard	☐ Disc drives	☐ Discs	☐
Colour boards	☐ Graphics boards	☐ Other	☐

ADVERTISING

15. Do you read the advertisements in PCT?

Yes ☐ No ☐

16. Have you ever ordered any of the following goods from an advertiser in PCT?

Computer	☐ Graphics Unit	☐ Games Software	☐
Memory	☐ Disc Drive	☐ Business	☐
Modem	☐ Printer	☐ software	
Systems software	☐ Other	☐	

EDUCATION

17. To which of the following standards were you in full-time education?

CSE ☐ O level ☐ A level ☐ ONC ☐ HNC ☐
TEC ☐ Degree ☐

If still at school which of the above levels are you currently at?

.....

Does your course involve computing?

Yes ☐ No ☐

YOUR JOB

18. Occupation: .....

19. Do you work in the computer industry?

Yes ☐ No ☐

If Yes, please indicate which area your job covers

Hardware ☐ Software ☐ Support ☐ Other ☐

20. If you answered No to the above question does your job involve the use of computers?

Yes ☐ No ☐

If Yes, in what capacity? .....

PERSONAL

The questions in this section are of a personal nature and all replies are treated in the strictest confidence. If you would rather not answer them please move on to the next section.

21. What sex are you? Male ☐ Female ☐

22. Please indicate your age bracket

Under 18 ☐ 18-30 ☐ 31-45 ☐ 46-30 ☐ Over 65 ☐

23. Please indicate your income bracket

Under £4000 ☐ £4,000-£7000 ☐ £7,000-£10,000 ☐
£10,000-13,000 ☐ Over £13,000 ☐

24. Do you hold any of the following credit cards?

Access ☐ Barclaycard ☐ Diners Club ☐ American Express ☐

OTHER MAGAZINES

25. Listed below are our competitors. On a scale of 1 to 100, with PCT rated at 50, please indicate what you think of them.

	Score
Your Computer	
Computer and Video Games	
Practical Computing	
Personal Computer World	
Which Micro?	
Micro Decision	
Computing Today	
Sinclair User	
ZX Computing	
Micro Computer Printout	
Popular Computing Weekly	

26. Do you read any of the weekly or trade publications?

Yes ☐ No ☐

Please indicate which

Computer Weekly ☐ Computing ☐ Computer Talk ☐
Datalink ☐ Popular Computing Weekly ☐ Other ☐

27. Do you read any of the American publications? If so, please specify which .....

28. Do you read a daily newspaper?

Yes ☐ No☐

If Yes, which .....

29. Do you read a Sunday newspaper?

Yes ☐ No ☐

If Yes, which one? .....

30. Do you have any comments on how we could improve PCT regarding both contents and presentation?

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Name .....
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Thank you for taking the time and trouble to fill this in.

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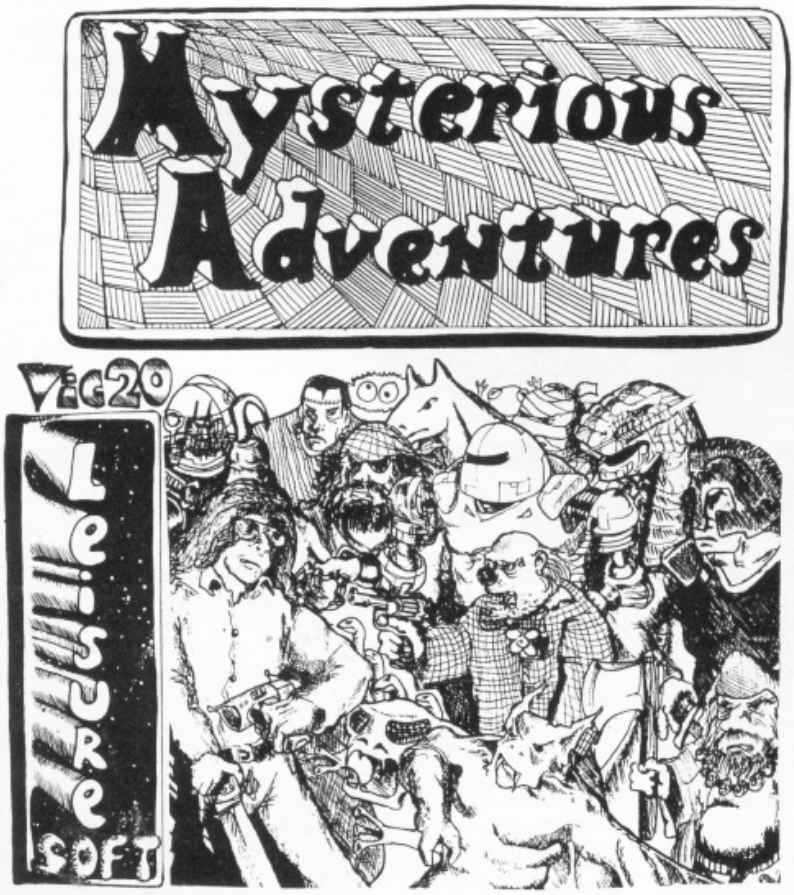

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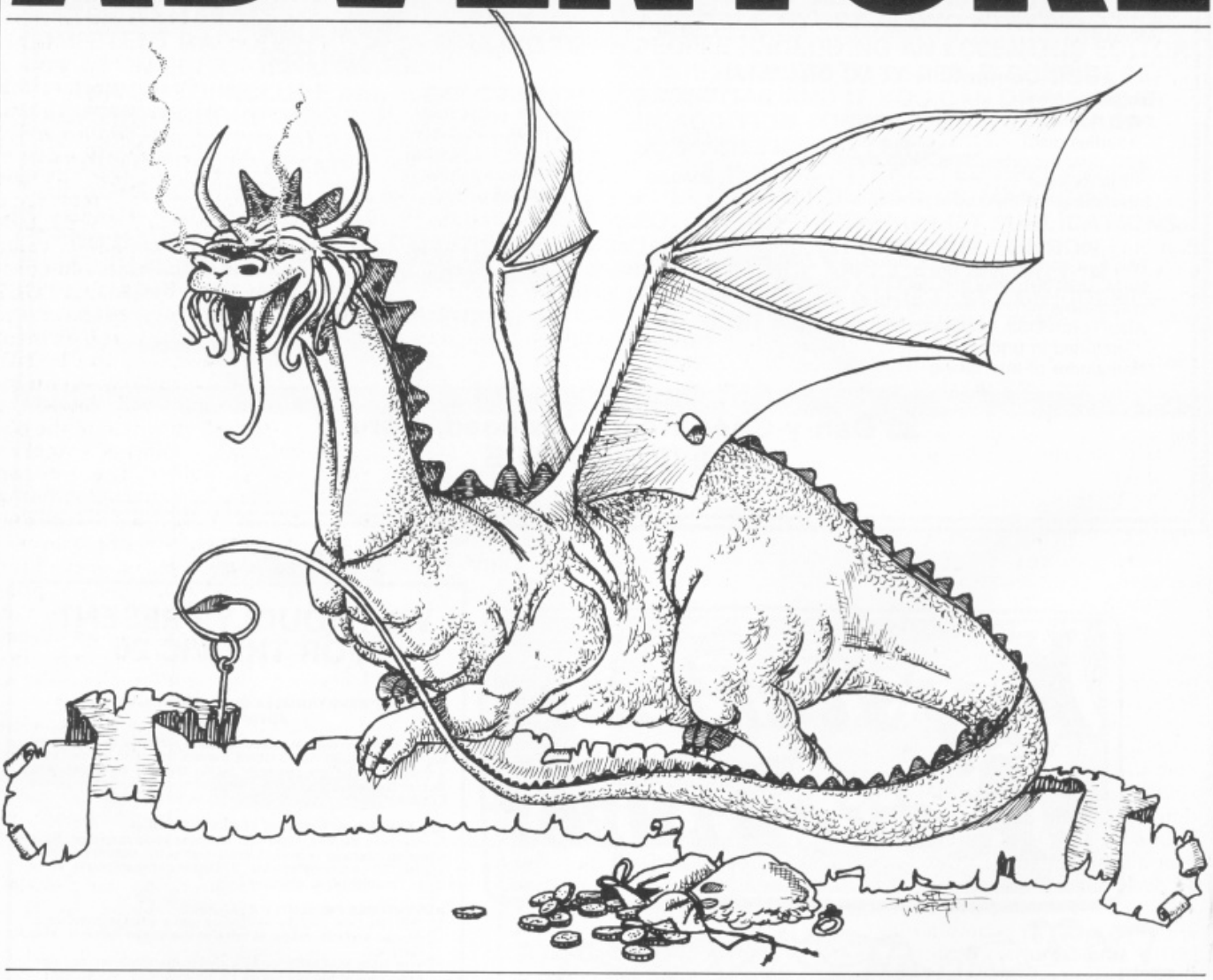

Learn how to slay the dragon and collect the treasure in this month's adventure gamesboard.

Many of you will have, no doubt, encountered the game of Adventure in one of it's many and varied forms. Ever since two gentlemen named Crowther and Woods wrote the original "Colossal Caves" Adventure on a mainframe computer some years ago, there have been many derivatives written and played on microcomputers.

In various parts of the world, Adventure has even developed a cult following with groups of avid fans greedy for new Adventures to become available. Most people, given an opportunity to play Adventure on a computer, would testify to it's strangely addictive qualities. Nowadays we are seeing more and more innovative Adventures becoming available for personal computers, indeed there are even adventures available that talk!

Despite various differences in presentation, most Adventure programs adhere to a definite structure. To show this structure we can split the whole thing into three basic components which are as follows:—

1) REQUEST INPUT FROM PLAYER — This request usually takes the form of a short message i.e. WHAT SHALL I DO NOW! At this stage the player will type a one or two word command such as GET LAMP.

2) ANALYSE PLAYERS INPUT — This section is the real nucleus of the program and as such we shall look at it in detail.

The first thing the program

must do is to split up the string that has been input, into a VERB followed by a NOUN and also to recognise if only one word has been input. In BASIC we could do this as follows:-

```
100 INPUT "WHAT SHALL I DO NOW ?";
    INPUT$
110 FOR X = 1 TO LEN (INPUT$)
120 IF MID$ (INPUT$,X,1) = " " THEN
    GOTO 140
130 NEXT X: VERB$ = INPUT$:GOTO160
140 VERB$ = LEFT$(INPUT$,X - 1)
150 NOUN$ = RIGHT$(INPUT$,LEN
    (INPUT$) - X)
160 REM REST OF PROGRAM
```

This subroutine searches for a space (" ") in the input strng, if it does not find one it can be assumed that only one word has been input so we will classify it as a verb. Otherwise the string will be split into a verb and a noun.

We can now take the verb and compare it against a list of known verbs that we have previously placed into an array:—

```
200 FOR X = O TO NV: REM NV IS
    NUMBER OF VERBS IN OUR AR-
    RAY
210 IF VERB$ = NV$(X) THEN GOTO
    230
220 NEXT X : PRINT"NO MATCH":END:
    REM VERB NOT IN OUR LIST
230 VERB = X:REM VERB IS NOW
    GIVEN A VALUE
```

Similarly, we can obtain a value for our noun. There are a number of ways that we can use the values we have obtained to produce a response to the action that they represent. One method used is to combine the two numbers into a single value which represent the action and then compare this value against a list of values which represent all the actions that can possibly be performed. This may seem like a formidable task when one considers all the possible combinations of verbs and nouns. A little more thought though, will reveal that we only have to provide our "Action Table" with the combinations that will actually do something. For instance we may type in something like "LIGHT LAMP" — this is a normal type of action therefore we will have an entry in our "Table" for it. On the other hand we may type in something like "LIGHT TABLE" which is nonsense. Our routine will search the "Table" for this verb-noun combination without success. Now if at the end of our list we put an error trap such as the message "THAT DOES NOT MAKE SENSE", we can cope with all input combinations that are not in our "Table".

Assuming that our routine has found a verb-noun combination that IS in our list, before we an actually perform the action we have to satisfy a number of conditions. To this end we will create a parallel list of "Conditions" which correspond to the verb-noun values. For example we have typed in, "LIGHT LAMP" — Our conditions are as follows:—

1) We must be carrying the LAMP
2) We must have a means of lighting it (Matches etc.)
3) It must not be already lit!

If all the conditions we have specified are satisfied we can now go ahead and perform that action. Staying with our example we must do a number of things to actually get our lamp lit. Firstly we must change the unlit lamp for the lit lamp. Secondly, if we were in a dark location we must now set a flag which will allow the description of our surroundings to be displayed. Thirdly we must set a counter which will keep track of the number of turns elapsed since the lamp was lit. (A lamp cannot burn forever!). Again we can translate these actions into numerical values which can be stored in another array which is arranged in parallel to our "Table". The final "Action Table" would look something like this:—

VERB	NOUN
LIGHT	LAMP

COND1	COND2	COND3
HAS	HAS	LAMP
LAMP	MATCH	OUT

ACTION 1	ACTION 2	ACTION 3
SWAP	SET FLAG	START
LAMPS		COUNTER

If we give all our "objects" a number and all our "locations" a number, it is clear then, that all aspects of our "Table" can be reduced to numeric values which are faster to work with than strings.

As well as actions that are invoked by a player's input, we can also have "automatic actions" which will take place (providing that the attached conditions are satisfied) without any prompting. For example, the player may be sinking in Quicksand...when we write our Adventure we decide to be lenient and give him four turns to get out before he drowns. Our automatic action would be to decrement a counter and test for zero as long as the player is still in the quicksand.

3) The third aspect to consider in our analysis is the response to whatever action the player has typed in. As shown above, we have in our "action table", a number of responses if all the conditions of that action were satisfied. Again we can reduce these responses to numercial values in order to speed things up a little. If the player has typed GET LAMP for instance and all the conditions for getting the lamp have been satisfied, we can do the following:—

Assume that the LAMP is object number 4 on our list, we will have to place a value against this object which will determine it's new location. We can say that a carried object will have a location value of - 1. In our "Action Table" we will have a number which represents the general command, "GET OBJECT" and from our NOUN value we will find that the object in question is object number 4. Our "GET OBJECT" routine will now insert the value - 1 against the fourth element in the Object list, i.e. the LAMP. From then on we can request an Inventory and this will invoke a routine which simply lists all the objects that have a value - 1 against them. In a similiar way we can "Move around" by simply updating a "Location Flag" with a value which corresponds to our location.

This is a simplified view of the whole process but the general principle is very valid and by using this technique you can create an adventure system in which only the Database must be altered in order to creat a totally new scenario.

Just to recap then, here is a list of the components which are neeeded to create an Adventure game:—

1) An array containing the descriptions of all possible locations in this scenario.
2) An array containing the descriptions of all the objects in this scenario. In parallel with this array, we need a numeric array which gives the initial locations of all the objects.
3) An array containing all the messages which will be returned to the player. In this way we can use a routine that obtains a number from the "Action Table" and prints the appropriate message.
4) An array containing all the VERBS and NOUNS that will be needed for this scenario.
5) The "Action Table". As we have said, this is the real nucleus of the Adventure and as such deserves a good deal of thought.
6) Various flags and counters. These will be used to keep track of the player's current status. ie current location, number of turns left before lamp runs out, night or day etc.

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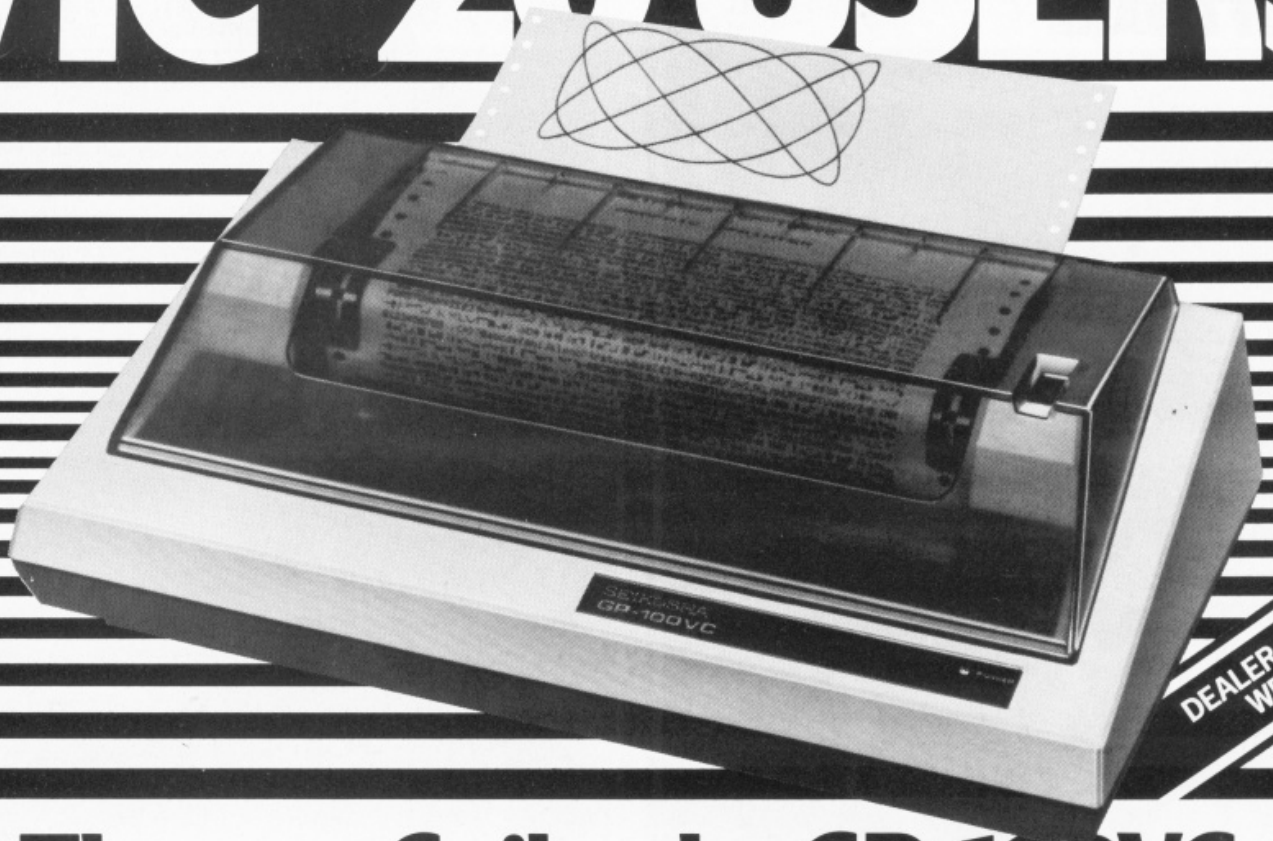

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ONE TOUCH ENTRY

Put a single key entry system on your VIC-20 with this useful utility from P. Hintjens.

The 'single key' entry system on Sinclair and other micros is often cited as being one of their strong points. The VIC-20 does not offer such a system beyond a limited abbreviation shorthand and the ability to define function keys when using a £35 cartridge.

But fret no longer, because here is a short 322 byte routine that sits at the top of memory (or anywhere else you like) and which allows you to access a range of BASIC words and special characters by using the CTRL key. You can define for yourself the word for each key or use the ones given in the program.

The machine code part of the program becomes part of the system IRQ interrupt and is called 60 times per second, where it can check the keyboard for certain characters.

Enter the program exactly as it is printed and check it carefully, especially the machine code data in lines 100 to 180. Note that the strange characters in the DATA statements in lines 740 to 860 are abbreviated forms of keywords. More about that later.

SAVE the program before running. When you RUN it, you will be asked to choose the start location for the code. As the code is relocatable you may choose to put it at 'the top of memory' or 'somewhere else'. In most cases, you will choose the first. When the code is loaded, you will be told the start. Make a note of this number as to prime the code (eg. after STOP-RESTORE) you must type 'SYS' start number' (RETURN).

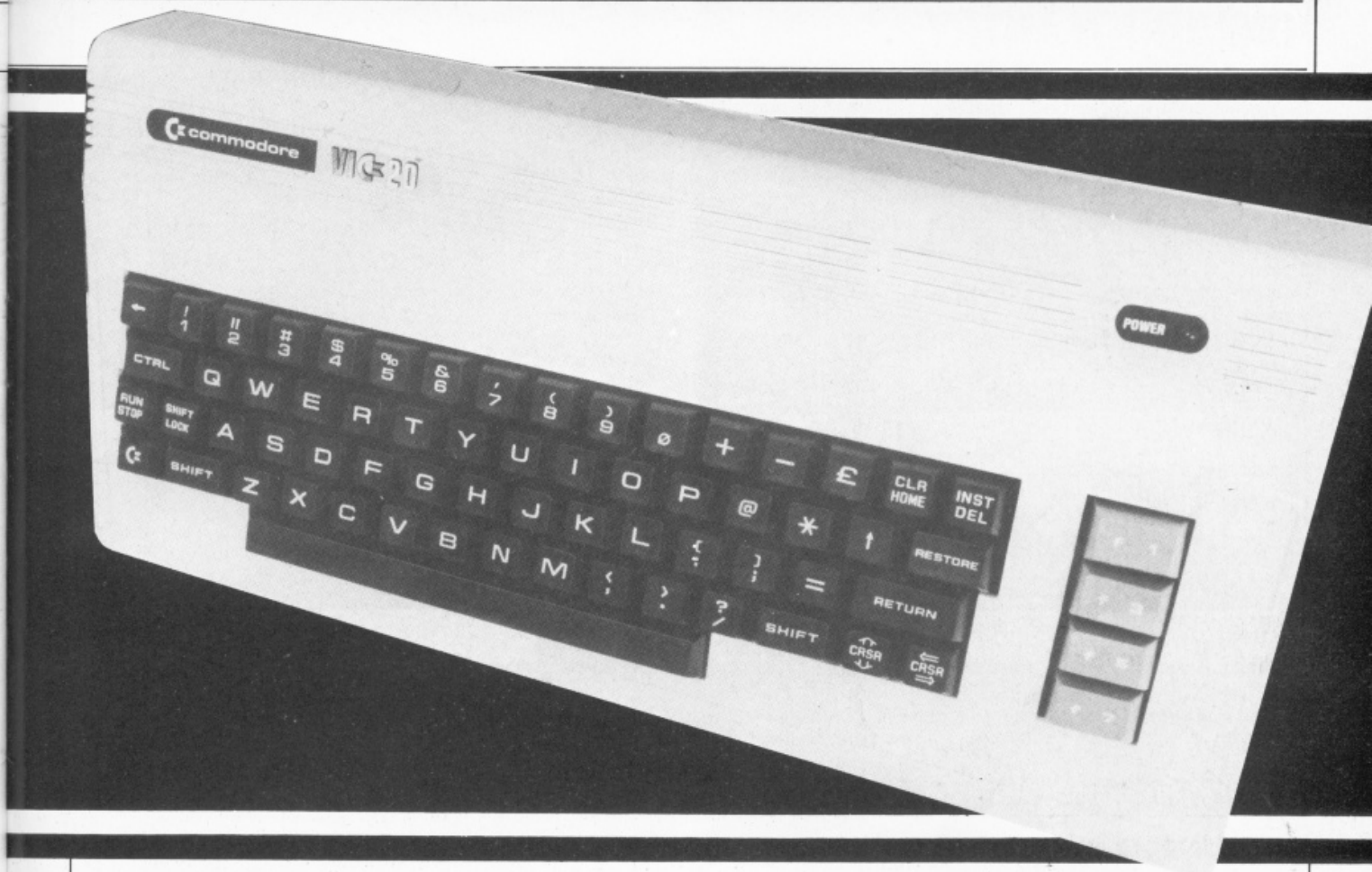
Assuming you entered it all correctly, after the program has run you will find that pressing CTRL and another key will give a keyword, as shown in the diagram. For example, CTRL-T will cause the letters 'THEN' to be printed. Only 4 characters are available for each key, so some of the keywords must be abbreviated. Where appropriate, the keyword is followed by '(' or '"" or a carriage-return. See page 133 of your user's guide for details of abbreviations.

If you should want to alter the keywords for some or all the letters, simply change the data statements in lines 740 to 860. Each data line is followed by the keys that match. Eg. line 840 DATA THEN, USR(, OPEN, ASC(, ... :REM T, U, O, @ shows that CTRL-T generates 'THEN'.

Some of the characters in the data statements act a little strangely. Because it may be desirable to have a carriage-return or quote character within a keyword definition, but DATA statements may not contain such characters, they are represented by others and changed as the keyword data is POKED into memory. A back-arrow signifies RETURN and a single quote signifies a double quote. An up-arrow signifies a special control character – see later.

Where the data is "" (a null string), there is already a pre-defined control character and any extra keyword would cause confusion. Eg. CTRL-1 gives 'BLK' – this key could also be programmed to give 'RUN' but the end result would be 'BLK' RUN.

You can see in the diagram the assigned keywords for each key – keep it beside you when you're programming. You will notice that not all the keys are programmed with BASIC keywords – there are several special control characters that are useful which are normally



accessed by CHR$(. .) commands. These are represented in the data statement by ' letter' where 'letter' is the character with ASCII value 64 higher than the control character. For example, 'switch-to-lower-case' is CHR$(14) and is shown as ' N' (N has ASCII value 78). See page 30 of the Programmers' Reference Guide for more information. The special characters are shown in Table 1:

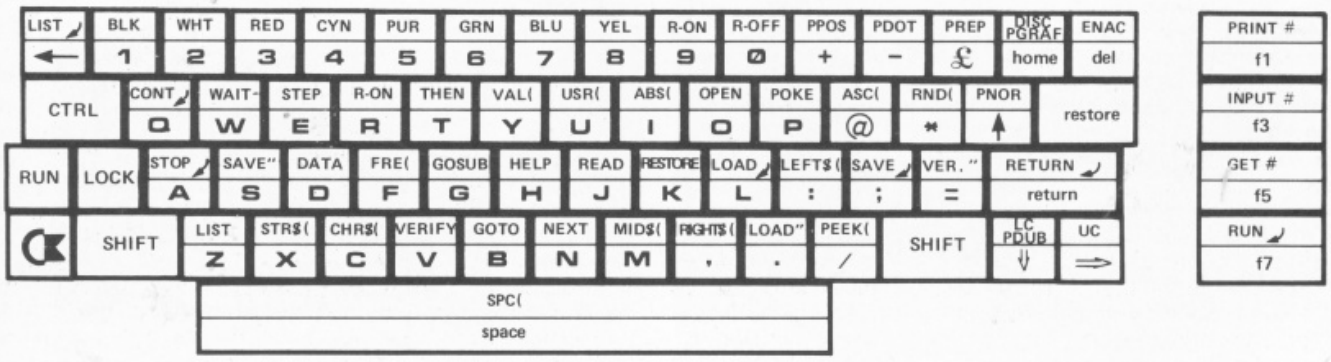
These characters are meant for use from within a program PRINT statement, but much like colour controls can be used directly.

The error messages generated by the program are:

'OUT OF MEMORY' – there is not enough room above BASIC for the code – you have run the program too often and the top-of-memory pointers have been decreased too far. Assuming you have 3.5K or 6.5K only, type 'POKE 56, 30: POKE 55,0' (RETURN) to correct the situation.

'OVERLAPS PROGRAM' – you specified a start address that clashes with BASIC.
'NO SUCH LOCATION' – the start address specified was not in memory.

PPOS	CHR$(16)	specifies printer start position	
PDOT	CHR$(27)	printer start positioning by dot	
PREP	CHR$(26)	sets printer repeat graphics mode	
PGRAF	CHR$(8)	sets printer graphics mode	
DISC	CHR$(8)	disables case switching keys	
ENAC	CHR$(9)	enables case switching keys	
PNOR	CHR$(15)	sets normal printing	
PDUB	CHR$(14)	sets double width printing	
LC	CHR$(14)	switches to lower case	
UC	CHR$(142)	switches to upper case	



ONE TOUCH ENTRY

'DATA STATEMENT' – you entered the machine code data incorrectly.
'KEYWORD TOO LONG' – up to 4 letters are allowed for every keyword.

While the normal place for the code is at the top of memory, if you are using high-resolution graphics or machine code subroutines, this area will probably be needed, so you will need to specify some where else in memory.

Another case where you will want to place the code somewhere else is if you have both 3K and 8K (or 16K) of memory attached, in which case the area from 1024 to 4095 will be unused by BASIC and is perfect for such a purpose.

The major limitation of the program is that to alter the words assigned to the keys you have to reload and run it. However, if just a few alterations are required, use this sequence of direct commands:

KEY = (value for key as given on page 197 of the P.R.G)
A$ = "...desired keyword..."
CS = (original starting location for code)
FOR I = CS + 66 + KEY *4 TO CS + 66 + KEY *4 + 3: POKE I, 0: NEXT
FOR I = 1 TO LEN(A$): POKE CS + 66 + KEY *4 + 1, ASC (MID$(A$, I, 1)): NEXT

Note that there is no provision for any special characters above.

HINTS ON CONVERSION

Because this program uses machine-code and accesses specific VIC features (CTRL key flag, shorthand BASIC notation) it is very difficult to transfer the code onto any other machine, apart from maybe a PET or a Commodore 64. The best way to achieve this system on a different micro would be to study the How It Runs section in order to gain an understanding of how the program functions and then start from scratch and write your own version for your machine. To do this you will need a good understanding of machine code and a detailed memory map of your machine.

HOW IT RUNS

Lines 10 – 90	REM title.
Lines 100 – 180	DATA for the machine code routine.
Line 190	Defined function for assembling a decimal address.
Lines 200 – 260	Position of code menu.
Lines 270 – 280	Works out position of code for top of memory.
Lines 290 – 350	Checks to see that there is enough memory left in the machine to enable the routine to be placed at the top of memory.
Lines 360 – 370	Makes sure that the machine-code routine will not overlap a program already in memory.
Lines 380 — 430	Checks to see if the desired position in memory is actually present.
Lines 440 – 450	Prints out start position of the machine-code.
Lines 460 – 510	Reads the DATA for the machine code routine and POKEs it into memory.
Lines 520 – 540	Clears memory area prior to storing the keyword DATA.
Lines 550 – 660	Reads keyword DATA, checks it and POKEs it into memory.
Lines 670 – 690	Alters the variables that are memory position specific.
Line 700	Activates the machine-code routine.
Lines 710 – 720	Error messages.
Lines 730 – 860	DATA for keywords.

PROGRAM LISTING

```
10 REM ***************
20 REM ONE-TOUCH ENTRY
30 REM
40 REM        BY
50 REM
60 REM   P. HINTJENS
70 REM
80 REM
90 REM ***************
100 DATA 120,169,28,141,21,3,169,13
110 DATA 141,20,3,88,96,72,138,72
120 DATA 152,72,173,141,2,201,4,208
130 DATA 33,165,197,197,181,240,27,133
140 DATA 181,201,64,240,21,10,10,170
150 DATA 160,0,189,0,29,240,9,153
160 DATA 119,2,232,200,192,4,208,242
170 DATA 132,198,104,168,104,170,104,76
180 DATA 191,234
190 DEFFNP(A)=PEEK(A)+256*PEEK(A+1)
200 PRINT"□**  ONE-TOUCH ENTRY **"
210 PRINT"▪▪SHOULD THE CODE BE AT "
220 PRINT"▪1 - TOP-OF-MEMORY"
230 PRINT"2 - SOMEWHERE ELSE"
240 PRINT"▪"
250 GET A$:IFA$<>"1"ANDA$<>"2"GOTO250
260 IFA$="2"GOTO350
270 REM ** CODE REQUIRES 322 BYTES
280 CS=FNP(55)-322
290 REM ** CHECK FREE MEMORY
300 IFCS<=FNP(49)THENPRINT"▪OUT OF MEMORY":GOTO710
310 POKE55,CS AND255:POKE51,CS AND255
320 POKE56,CS/256:POKE52,CS/256
330 CLR:DEFFNP(A)=PEEK(A)+256*PEEK(A+1)
340 CS=FNP(55):GOTO450
350 INPUT"▪CODE START",CS:CS=INT(ABS(CS))
360 REM ** CHECK THAT THE CODE WON'T CLASH WITH BASIC
370 IFCS>=FNP(43)ANDCS<=FNP(49)THENPRINT"▪OVERLAPS PROGRAM":GOTO710
380 REM ** CHECK THAT THE SPECIFIED MEMORY IS PLUGGED IN
390 A=PEEK(CS):B=PEEK(CS+321)
400 POKECS,123:POKECS+321,123
410 MT=(PEEK(CS)=123)AND(PEEK(CS+321)=123)
420 POKECS,A:POKECS+321,I
430 IFMT=0THENPRINT"▪NO SUCH LOCATION":GOTO710
440 PRINT"▪PROTECT MEMORY AS     REQUIRED"
450 PRINT"□CODE STARTS AT"CS
460 REM ** LOAD AND CHECK CODE
470 PRINT"▪LOADING CODE..."
480 B=0:FORI=0TO65
490 READA:B=B+A
500 POKECS+I,A:NEXT
510 IFB<>7777THENPRINT"▪DATA STATEMENT":GOTO710
520 REM ** CLEAR KEY-WORD AREA
530 FORI=CS+66TOCS+321
540 POKEI,0:NEXT
550 REM ** ENTER KEYWORD DATA
560 PRINT"▪LOADING KEYWORDS..."
570 FORI=0TO63:READA$
580 IFLEN(A$)>4THENPRINT"?▪KEYWORD TOO LONG":GOTO720
590 IFA$=""THEN660
600 FORA=1TOLEN(A$)
610 B=ASC(MID$(A$,A,1))
620 IFB=95THENB=13:REM ← = RETURN
630 IFB=39THENB=34:REM ' = QUOTES
634 REM** CHECK FOR A CONTROL CHARACTER (↑)
635 IFB=94THENB=ASC(MID$(A$,A+1,1))-64:POKECS+65+I*4+A,B:GOTO660
640 POKECS+65+I*4+A,B
650 NEXTA
660 NEXTI
670 REM** ALTER POSITION-SPECIFIC VALUES
680 POKECS+2,(CS+13)/256:POKECS+7,(CS+13)AND255
690 POKECS+43,(CS+66)AND255:POKECS+44,(CS+66)/256
700 SYSCS:END
710 PRINT" ERROR":END
720 PRINT" ERROR IN"FNP(63):END
730 REM ** DATA FOR KEYWORDS      CORRESPONDING KEYS:
740 DATA "","","","","":REM              ** 1,3,5,7,9
750 DATA "P","Z","L","L+","WAIT":REM     ** +,E,DEL,←,W
760 DATA "","VAL(,ABS(,PEEK,RND(":REM    ** R,Y,I,P,*
770 DATA "REM←","SI←","D* ","GO*":REM    ** RET,--,A,D,G
780 DATA READ,"LΓ←","S*←","↑↓/","":REM   ** J,L,,,CRS->,--
790 DATA "","ST-(","VE-←",NEXT,"PR(":REM ** --,X,V,N,/,/
800 DATA "P"(",IN,SPC(,LIST,"CLR":REM    ** /,CSRDN,SPACE,Z,C
810 DATA GOTO,"MR(","LΓ","","P-":REM     ** B,M,,,--,F1
820 DATA "","S* /","FRE(,HELP,"RE*":REM  ** --,S,F,H,K
830 DATA "LE-(","VE-/","I/","CΓ←",STEP:REM** ↑,=,F3,Q,E
840 DATA THEN,USR(,OPEN,ASC(,TO:REM      ** T,U,O,@,↑
850 DATA GET#,"","","","":REM            ** F5,2,4,6,8
860 DATA "↑↓↑,↑↓,TH,RUN←:REM             ** 0,-,HOME,F7

READY.
```

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ZX Spectrum
BLUE EDIT 1 ! DEF FN
RED CAPS LOCK 2 @ FN
MAGENTA TRUE VIDEO 3 # LINE
GREEN INV. VIDEO 4 $ OPEN #
CYAN 5 % CLOSE #
YELLOW 6 & MOVE
WHITE 7 ' ERASE
8 (POINT
GRAPHICS 9) CAT
BLACK DELETE 0 _ FORMAT
SIN Q ⇐ PLOT ASN
COS W <> DRAW ACS
TAN E >= REM ATN
INT R < RUN VERIFY
RND T > RAND MERGE
STR$ Y AND RETURN [
CHR$ U OR IF]
CODE I AT INPUT IN
PEEK O ; POKE OUT
TAB P " PRINT ©
READ A STOP NEW ~
RESTORE S NOT SAVE |
DATA D STEP DIM \
SGN F TO FOR {
ABS G THEN GOTO }
SQR H ↑ GOSUB CIRCLE
VAL J − LOAD VAL $
LEN K + LIST SCREEN $
USR L = LET ATTR
ENTER
CAPS SHIFT
LN Z : COPY BEEP
EXP X £ CLEAR INK
LPRINT C ? CONT PAPER
LLIST V / CLS FLASH
BIN B * BORDER BRIGHT
IN KEY$ N , NEXT OVER
PI M . PAUSE INVERSE
SYMBOL SHIFT
BREAK SPACE

Sinclair ZX Spectr

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First, there was the world-beating Sinclair ZX80. The first personal computer for under £100.

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Yet the price of the Spectrum 16K is an amazing £125! Even the popular 48K version costs only £175!

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Ready to use today, easy to expand tomorrow

Your ZX Spectrum comes with a mains adaptor and all the necessary leads to connect to most cassette recorders and TVs (colour or black and white).

Employing Sinclair BASIC (now used 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.

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Key features of the Sinclair ZX Spectrum

- Full colour – 8 colours each for foreground, background and border, plus flashing and brightness-intensity control.
- Sound – BEEP command with variable pitch and duration.
- Massive RAM – 16K or 48K.
- Full-size moving-key keyboard – all keys at normal typewriter pitch, with repeat facility on each key.
- High-resolution – 256 dots horizontally x 192 vertically, each individually addressable for true high-resolution graphics.
- ASCII character set – with upper- and lower-case characters.
- Teletext-compatible – user software can generate 40 characters per line or other settings.
- High speed LOAD & SAVE – 16K in 100 seconds via cassette, with VERIFY & MERGE for programs and separate data files.
- Sinclair 16K extended BASIC – incorporating unique 'one-touch' keyword entry, syntax check, and report codes.

rum

The ZX Printer – available now

Designed exclusively for use with the Sinclair ZX range of computers, the printer offers ZX Spectrum owners the full ASCII character set – including lower-case characters and high-resolution graphics.

A special feature is COPY which prints out exactly what is on the whole TV screen without the need for further instructions. Printing speed is 50 characters per second, with 32 characters per line and 9 lines per vertical inch.

The ZX Printer connects to the rear of your ZX Spectrum. A roll of paper (65ft long and 4in wide) is supplied, along with full instructions. Further supplies of paper are available in packs of five rolls.

The ZX Microdrive – coming soon

The new Microdrives, designed especially for the ZX Spectrum, are set to change the face of personal computing by providing mass on-line storage.

Each Microdrive can hold up to 100K bytes using a single interchangeable storage medium.

The transfer rate is 16K bytes per second, with an average access time of 3.5 seconds. And you'll be able to connect up to 8 Microdrives to your Spectrum via the ZX Expansion Module.

A remarkable breakthrough at a remarkable price. The Microdrives will be available in the early part of 1983 for around £50.

ZX Spectrum software on cassettes – available now

The Spectrum software library is growing every day. Subjects include games, education, and business/household management. Flight Simulation...Chess...Planetoids...History...Inventions...VU-CALC...VU-3D ...Club Record Controller...there is something for everyone. And they all make full use of the Spectrum's colour, sound, and graphics capabilities. You'll receive a detailed catalogue with your Spectrum.

ZX Expansion Module

This module incorporates the three functions of Microdrive controller, local area network, and RS232 interface. Connect it to your Spectrum and you can control up to eight Microdrives, communicate with other computers, and drive a wide range of printers.

The potential is enormous, and the module will be available in the early part of 1983 for around £30.

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Sinclair Research Ltd, Stanhope Road, Camberley, Surrey GU15 3PS.
Tel: Camberley (0276) 685311.

How to order your ZX Spectrum

BY PHONE – Access, Barclaycard or Trustcard holders can call 01-200 0200 for personal attention 24 hours a day, every day. BY FREEPOST – use the no-stamp needed coupon below. You can pay by cheque, postal order, Barclaycard, Access or Trustcard.

EITHER WAY – please allow up to 28 days for delivery. And there's a 14-day money-back option, of course. We want you to be satisfied beyond doubt – and we have no doubt that you will be.

To: Sinclair Research, FREEPOST, Camberley, Surrey, GU15 3BR. **Order**

Qty	Item	Code	Item Price £	Total £
	Sinclair ZX Spectrum – 16K RAM version	100	125.00	
	Sinclair ZX Spectrum – 48K RAM version	101	175.00	
	Sinclair ZX Printer	27	59.95	
	Printer paper (pack of 5 rolls)	16	11.95	
	Postage and packing: orders under £100	28	2.95	
	orders over £100	29	4.95	
			Total £	

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Sinclair ZX Spectrum–technical data.

Dimensions

Width	233 mm
Depth	144 mm
Height	30 mm

CPU/ memory

Z80A microprocessor running at 3.5 MHz. 16K-byte ROM containing BASIC interpreter and operating system.

16K-byte RAM (plus optional 32K-byte RAM on internal expansion board) or 48K-byte RAM.

Keyboard

40-moving-key keyboard with full upper and lower case with capitals lock feature. All BASIC words obtained by single keys, plus 16 graphics characters, 22 colour control codes, and 21 user-definable graphics characters. All keys have auto repeat.

Display

Memory-mapped display of 256 pixels x 192 pixels; plus one attributes byte per character square, defining one of eight foreground colours, one of eight background colours, normal or extra brightness and flashing or steady. Screen border colour also settable to one of eight colours. Will drive a PAL UHF colour TV set, or black and white set (which will give a scale of grey), on channel 36.

Sound

Internal loudspeaker can be operated over more than 10 octaves (actually 130 semitones) via basic BEEP command. Jack sockets at the rear of computer allow connections to external amplifier/ speaker.

Graphics

Point, line, circle and arc drawing commands in high-resolution graphics.
16 pre-defined graphics characters plus 21 user-definable graphics characters. Also functions to yield character at a given position, attribute at a given position (colours, brightness and flash) and whether a given pixel is set. Text may be written on the screen on 24 lines of 32 characters. Text and graphics may be freely mixed.

Colours

Foreground and background colours, brightness and flashing are set by BASIC INK, PAPER, BRIGHT and FLASH commands. OVER may also be set, which performs an exclusive–or operation to overwrite any printing or plotting that is already on the screen. INVERSE will give inverse video printing. These six commands may be set globally to cover all further PRINT, PLOT, DRAW or CIRCLE commands, or locally within these commands to cover only the results of that command. They may also be set locally to cover text printed by an INPUT statement. Colour-control codes, which may be accessed from the keyboard, may be inserted into text or program listing, and when displayed will override the globally set colours until another control code is encountered. Brightness and flashing codes may be inserted into program or text, similarly. Colour-control codes in a program listing have no effect on its execution. Border colour is set by a BORDER command. The eight colours available are black, blue, red, magenta, green, cyan, yellow and white. All eight colours may be present on the screen at once, with some areas flashing and others steady, and any area may be highlighted extra bright.

Screen

The screen is divided into two sections. The top section – normally the first 22 lines – displays the program listing or the results of program or command execution. The bottom section – normally the last 2 lines – shows the command or program line currently being entered, or the program line currently being edited. It also shows the report messages. Full editing facilities of cursor left, cursor right, insert and delete (with auto-repeat facility) are available over this line. The bottom section will expand to accept a current line of up to 22 lines.

Mathematical operations and functions

Arithmetic operations of +, –, ×, ÷, and raise to a power. Mathematical functions of sine, cosine, tangent and their inverses; natural logs and exponentials; sign function, absolute value function, and integer function; square root function, random number generator, and pi.

Numbers are stored as five bytes of floating point binary – giving a range of $+3 \times 10^{-39}$ to $+7 \times 10^{38}$ accurate to $9\frac{1}{2}$ decimal digits.

Binary numbers may be entered directly with the BIN function. =, >, <, >=, <= and <> may be used to compare string or arithmetic values or variables to yield 0 (false) or 1 (true). Logical operators AND, OR and NOT yield boolean results but will accept 0 (false) and any number (true).

User-definable functions are defined using DEF FN, and called using FN. They may take up to 26 numeric and 26 string arguments, and may yield string or numeric results.

There is a full DATA mechanism, using the commands READ, DATA and RESTORE.

A real-time clock is obtainable.

String operations and functions

Strings can be concatenated with +. String variables or values may be compared with =, >, <, >=, <=, <> to give boolean results. String functions are VAL, VAL$, STR$ and LEN. CHR$ and CODE convert numbers to characters and vice versa, using the ASCII code.

A very powerful string slicing mechanism exists, using the form a$ (x TO y).

Variable names

Numeric – any string starting with a letter (upper and lower case are not distinguished between, and spaces are ignored).
String – A$ to Z$.
FOR-NEXT loops – A-Z.
Numeric arrays – A-Z.
String arrays – A$ to Z$.

Simple variables and arrays with the same name are allowed and distinguished between.

Arrays

Arrays may be multi-dimensional, with subscripts starting at 1. String arrays, technically character arrays, may have their last subscript omitted, yielding a string.

Expression evaluator

A full expression evaluator is called during program execution whenever an expression, constant or variable is encountered. This allows the use of expressions as arguments to GOTO, GOSUB, etc.

It also operates on commands allowing the ZX Spectrum to operate as a calculator.

Cassette interface

The ZX Spectrum incorporates an advanced cassette interface. A tone leader is recorded before the information to overcome the automatic recording level fluctuations of some tape recorders, and a Schmitt trigger is used to remove noise on playback.

All saved information is started with a header containing information as to its type, title, length and address information. Program, screens, blocks of memory, string and character arrays may all be saved separately.

Programs, blocks of memory and arrays may be verified after saving to confirm successful saving.

Programs and arrays may be merged from tape to combine them with the existing contents of memory. Where two line numbers or variables names coincide, the old one is overwritten.

Programs may be saved with a line number, where execution will start immediately on loading.

The cassette interface runs at 1500 baud, through two 3.5 mm jack plugs.

Expansion port

This has the full data, address and control busses from the Z80A, and is used to interface to the ZX Printer, the RS232 and NET interfaces and the ZX Microdrives.

IN and OUT commands give the I/O port equivalents of PEEK and POKE.

ZX81 compatibility

ZX81 BASIC is essentially a subset of ZX Spectrum BASIC. The differences are as follows.

FAST and SLOW: the ZX Spectrum operates at the speed of the ZX81 in FAST mode with the steady display of SLOW mode, and does not include these commands.

SCROLL: the ZX Spectrum scrolls automatically, asking the operator "scroll?" every time a screen is filled.

UNPLOT: the ZX Spectrum can unplot a pixel using PLOT OVER, and thus achieves unplot.

Character set: the ZX Spectrum uses the ASCII character set, as opposed to the ZX81 non-standard set.

ZX81 programs may be typed into the ZX Spectrum with very little change, but may of course now be considerably improved. The ZX Spectrum is fully compatible with the ZX Printer, which can now print out a full upper and lower case character set, and the high resolution graphics; using LLIST, LPRINT and COPY. ZX81 software cassettes and the ZX 16K RAM pack will not operate with the ZX Spectrum.

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ZX Spectrum

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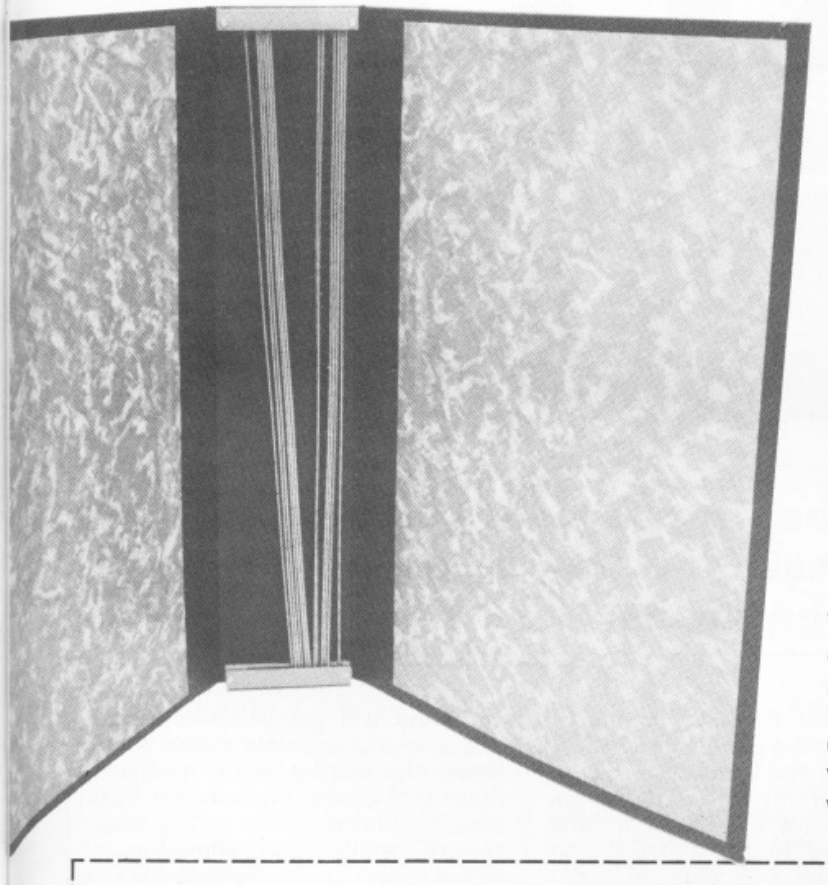

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USING CASSETTE RECORDERS

Having problems choosing or using a cassette recorder? Paul Richardson has some useful suggestions.

Most cassette recorders can be connected to the BBC microcomputer. However, differing features on the recorders make some more suitable than others. The Plymouth Regional Information Centre has had experience with mainly two types.

1. Hitachi TRQ — 295R £37
2. Boots CR325 £24

These two recorders have "piano key" type transport controls, automatic recording level and a tape counter. These are essential for reliable use with a microcomputer. Additionally both types have connection facilities via either a 5 pin DIN socket or mini jack plugs, and both feature volume and tone controls for use on playback only.

Connection to these recorders may be made by three possible lead combinations:

1. 5 pin DIN plug alone.
2. 5pin DIN plug with 2.5 mm jack plug for motor stop/start.
3. Three jack plugs, two at 3.5 mm and one at 2.5 mm diameter.

Wiring for the first two types follows the same pattern as in the 7 pin DIN plug and lead supplied with the computer. In type 1 the green and black leads are out short and not connected. In type 2 they are extended for the DIN plug and connected to the jack plug. See Diagram 1a.

The third type of lead requires an in-line junction. This may be effected by soldering 10 cm lengths of single core screened lead to the appropriate wires in the supplied cable, insulating each join with a small piece of PVC tape (NOT sellotape), and then encapsulating the whole junction in Silicon Rubber. See Diagram 1b.

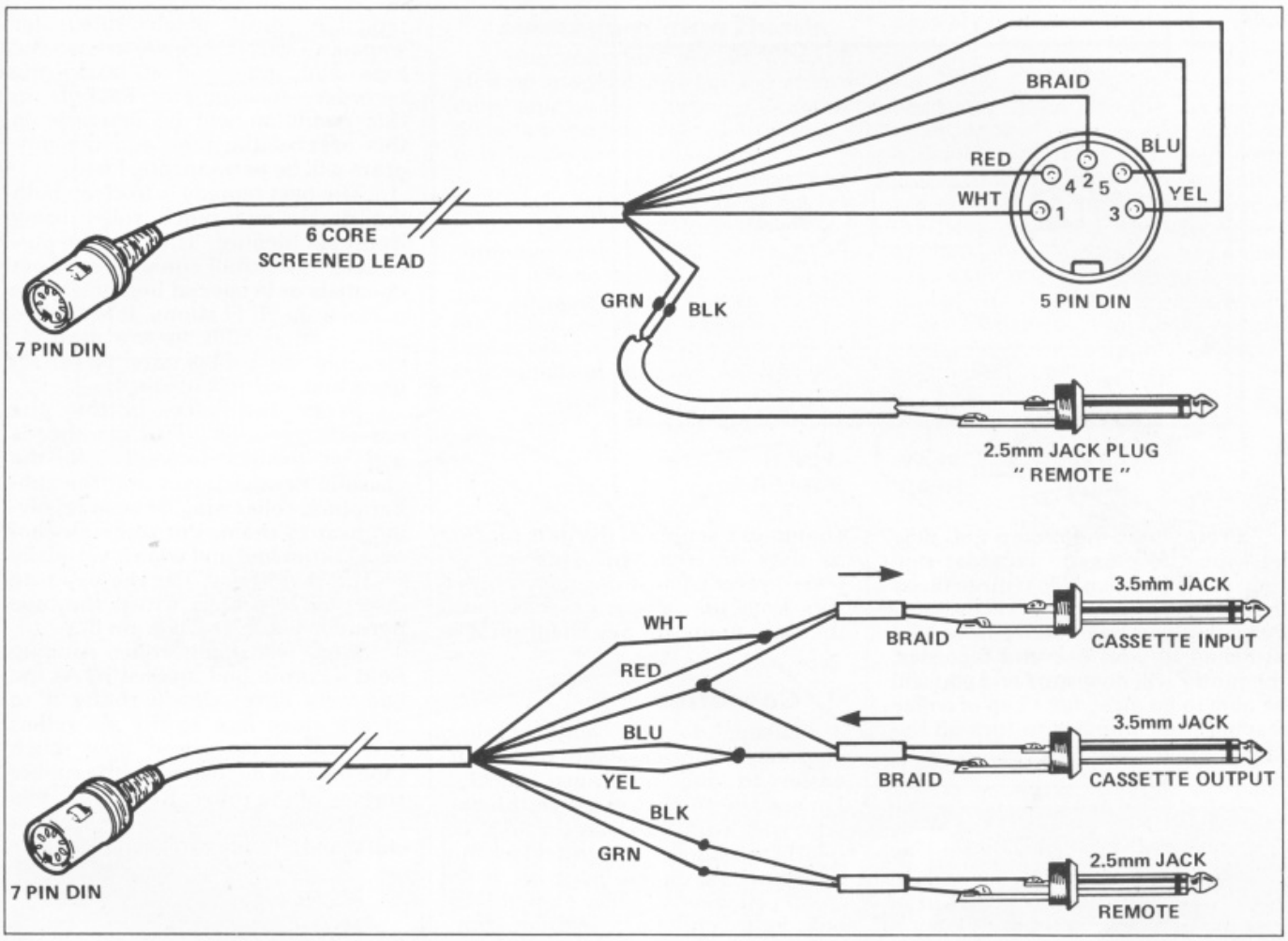
The green and black leads may be interchanges. The blue and red leads may be left unconnected in all types of lead.

Recording

All three types of lead are equally effective. The "remote" lead connected to the 2.5 mm jack plug need not be used but if it isn't then the computer will not be able to stop and start the cassette motor drive. Using the third type of lead with three jack plugs, the cassette input plug (with connection to the white core of supplied lead) should be inserted in the socket marked AUX or RADIO. On the Boots type recorder there is no auxillary input so the socket marked MIC should be used.

On the Hitachi type of recorder (and also the Boots type if using the 5 pin DIN connector) it is *essential* that a blanking plug or a matchstick (as used!) is inserted in the socket marked MIC. Failure to so this will result in the resident internal microphone being used instead of recording the desired computer data.

Remember that if the computer has shut off the cassette motor via the remote lead, then it is impossible to fast forward or to reach the desired recording. The answer is to remove this remote plug temporarily. Don't forget to replace this lead or the computer will lose control of the tape and you may have to start all over again.



Playback

All cassette recorders have priority of playback. This may be noted by playing a cassette and listening to it on the speaker. Insertion of a plug into the earphone socket will 'mute' the speaker. Additionally in most cassette recorders, insertion of the DIN plug will have the same effect. This is true of the Hitachi type.

Generally, on cassette recorders volume and tone controls only affect the loudspeaker and EAR outputs not the DIN socket output. Since use of volume and tone controls can enhance the readability of a computer cassette program, it is obviously better to use the EAR output. On the Boots machine if using the DIN socket for playback, the loudspeaker will be activated. Since this sounds horrible, insert a blanking plug or matchstick in the EAR socket.

When using the lead type with jack plugs, insert the cassette output plug (connected to the yellow core of the original lead) into the EAR socket. The 2.5 mm jack plug may be inserted into the REM socket to provide computer control of the cassette motor.

For those who have mastered loading and saving programs on cassette, it will not be long before you will need to make several copies, perhaps just a couple as 'back-ups' or gifts to friends, or may be a school 'class set' of 30 tapes.

There are two main methods of copying computer program cassettes. The first is to 'load' the programs one at a time and then 'save' them back onto the same cassette recorder with a fresh cassette. This is generally trustworthy but slow.

The process may be made quicker by copying cassette to cassette, i.e. without going through the computer. This has problems too, but not insurmountable ones. We will return to this method later.

Copying Via The Computer

Apart from the obvious advantage of only needing one cassette recorder, using computer as an intermediate data store means that the data is guaranteed 'fresh' when output onto the new tape. Since any signal stored onto a tape is degraded in quality, it is an added bonus to use the computer to check the data stream for errors when loading the program before 'saving' it again.

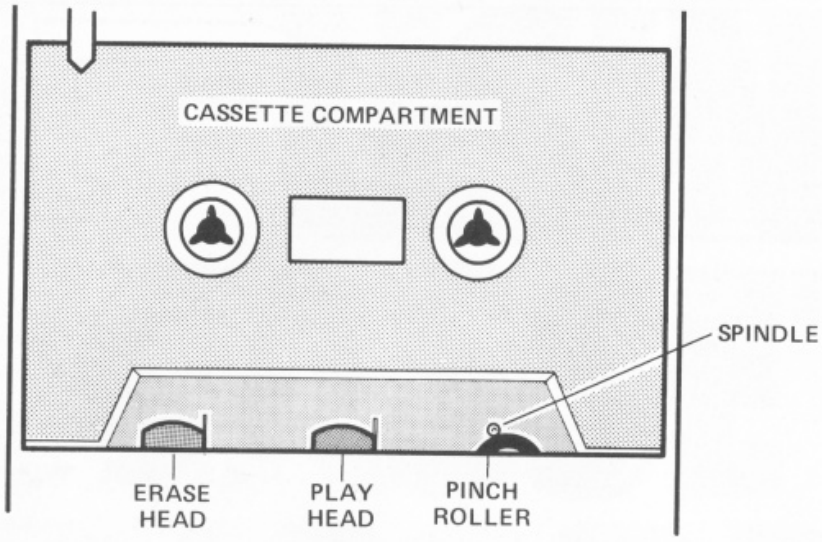
The BBC computer has three error messages: Block ?, Data ? and Header ! Since the data is memory location specific, it is only necessary to re-load the faulty blocks not the whole program. Increasing the tone control setting will usually aid the readability of worn patches on the tape.

When saving the program onto a new tape, make two or three copies onto the same tape if possible. Thus, if the first recording gets worn out in future, the missing blocks can be added from the next recording.

There is no need to stand beside a machine while it does three 'savings' of a long program. You can avoid having to press the 'RETURN' key twice at the start of each recording by using the following:

```
* KEY * SAVE "TEST" M M
```

USING CASSETTE RECORDINGS



Press down the record and play keys on the cassette recorder and then press function key 0 three times in succession for three recordings. Providing you have the remote lead attached to your cassette recorder, the motor will now start and you will be able to go away for a cup of coffee leaving the computer to turn off the motor when it has finished.

Copying Cassette To Cassette

Using two cassette recorders it is possible to connect the ouptut of one to the auxillary input of the second. If you are using a five pin DIN to five pin DIN lead, it must be a 'mirror' type, available from most Hi-Fi shops.

The disadvantage of this method is that the copy cassette is a degraded reproduction of the master cassette which is in turn a degrade version of the original computer output. In other words we are multiplying the errors. Since we will be using the automatic recording level on the second recorder there is little that can be done to enhance the signal here.

On the first recorder, which will be in the 'play' mode with the master cassette, use the 'EAR' output and increase the tone control to about two thirds of its travel. If this first recorder is of the Boots CR 325 type, using the DIN socket will not cut off the EAR output. This is a distinct advantage. Take another lead from this DIN socket to the computer cassette input. Now type:

* CAT <ret>

As the master cassette is playing there will be a visual check on the computer's screen of the data blocks as they are reached. This will at least prevent you from copying errors from the master cassette onto the slave unoticed. See Diagram 2.

Cassettes

Lastly, do use good quality cassettes. Shorter lengths make it easier to find programs quickly. Longer length cassettes use thinner tape which causes 'print through' of information from one track to the adjacent ones on the spools.

If you want to order cassettes in bulk for a school or computer club, try writing to CAVS Ltd., at 1 St. Michael's Terrace, Wood Green, London, N22 4SJ who will sell boxes of 100 special computer cassettes with considerable savings. I have successfully used their cassettes for high speed copying of computer programs with no errors!

And on the subject of cassettes, do remember that magnetic recording tape is affected by magnetic fields. If you wish your programs to remain 'clean', keep the cassette away from alternating magnetic flux as is found on top of television monitors or next to electronic clocks and loudspeakers.

Servicing The Recorder

The most important aspect of servicing a cassette recorder is cleaning the tape transport and heads. Dirty heads will give poor tone quality in playback and hence computer programs will have missing data. This can be rectified by cleaning the heads with a tape cleaning cassette.

This does not however, clean the pitch roller and spindle, since these move at the same speed as the tape. A dirty pinch roller (or 'capstan') will eventually crease the tape and may pull it inside the recorder. A computer cassette in this condition will be unusable in this area of the tape and the program will be permanently lost.

The best remedy is to clean both the heads and pinch roller using isopropyl alcohol. This may be purchased in small quantities from chemists or in special head-cleaning packs from Hi Fi shops. It is applied using cotton buds as are used for cleaning out babies ears! Never reuse a bud — throw it away!

Press the play button the cassette recorder. The two heads will be pushed forward into the cassette compartment and the rubber pinch roller may be seen revolving next to them. Put some alcohol on a cotton bud and wipe it vertically on the two heads, i.e. the opposite direction to that in which the tape normally lies. See Diagram 3.

With the pinch roller rotating hold a cotton bud against it. As the bud gets dirty, slowly rotate it to give a clean face to the pin roller. You will be surprised how much tape oxide is deposited on the rubber surface of the roller. Remember this also means worn tapes. Inferior ones will tend to shed more oxide.

Motor Fuses

Most cassette recorders have separately fused motors, apart from the main input fuse. If the recorder is being turned on and off by the computer via the remote lead, this fuse is put under increased strain and can blow.

More complex tape recorders, such as those made by Hitachi, National Panasonic and Philips in the £30-£50 price bracket, have hard-to-get-at fuses. The recorder case is filled with so much electronics and mechanics that it can easily take 20 minutes to get to the motor fuse. This is generally of the 20 mm glass construction and rated at about 1 amp. There is little advice I can give but to tell you to turn the recorder on its front and approach gradually through the back.

The Boots CR325 mentioned earlier is in complete contrast to most recorders. Taking the base from the recorder reveals a half empty inside. It is a real joy to work on. Fuse replacement takes about 3 minutes to complete. Additionally I noticed the rubber drive belt has been replaced by a clever fabric type. This means no more squeaky drives, perished or stretched belts.

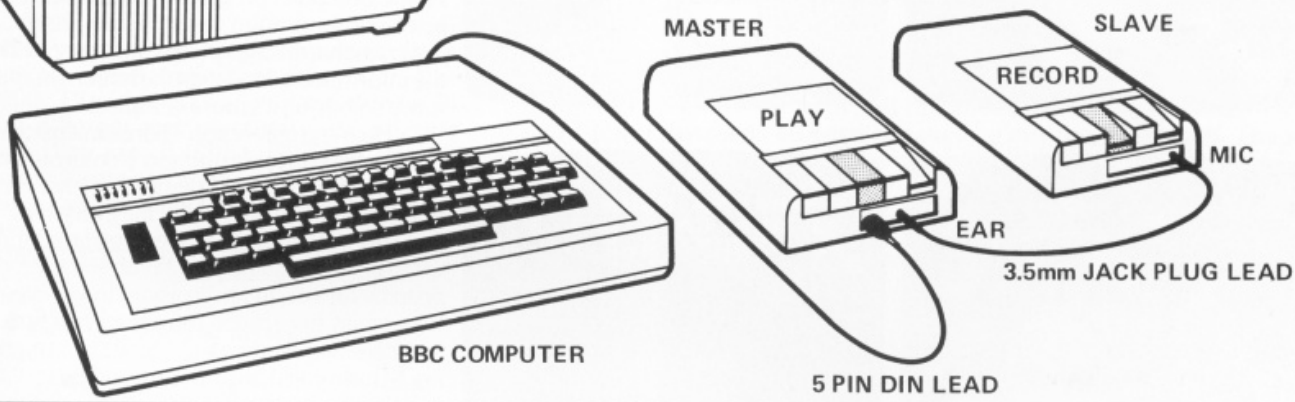
Demagnetising Heads

After prolonged use, tape heads pick up magnetism from the recording tape. This causes a lack of definition on the recording, hence data blocks are corrupted.

Tape head demagnetisers can be bought for as little as £4 and it would be a good investment for computer clubs to buy. Some Hi Fi shops will do a demagnetising service, although some 'sharks' tell you the head is worn and must be replaced. Until the head is demagnetised this is almost impossible to discern, so if you get that answer, try another shop!

And Finally

Properly looked after, a cassette recorder will give many years of satisfactory service with your computer. Since recorders and cassettes are each about 10% of the cost of the BBC disc drive and discs, they are likely to be around for some time especially on the domestic market. And if you do get a disc system in your Christmas stocking, simply change style to Bach and "header?" to Haydn. Happy listening!



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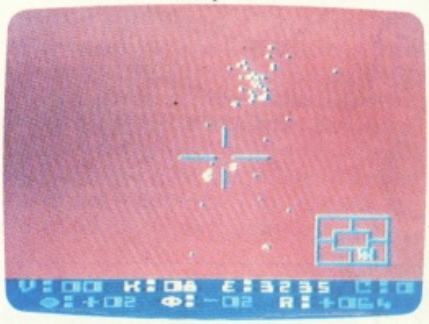
Intro to BASIC 1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European Countries

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FACTFILE

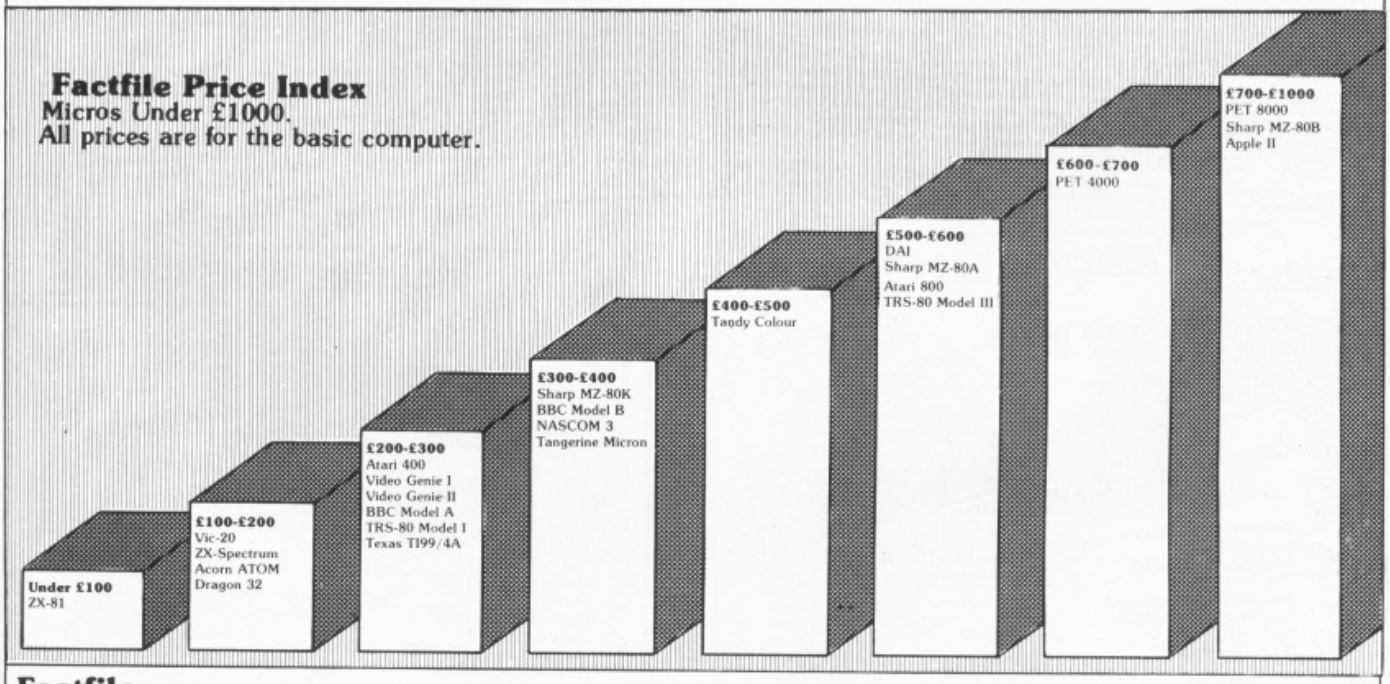
MICRO FACTFILE

Factfile is our regular buyer's guide to microcomputers. Herein you will find all the important facts and figures on 29 of the most important micros on the market under £1000. The idea is that you are able to directly compare what different manufacturers are offering you and how much they are charging you for it. Many brochures and adverts bury the reader in a mass of irrelevant facts and figures, which make it difficult to judge one against the other.

Factfile sorts it all out for you!

Just look down the price index to discover which machines are in your price-range and then consult the 'cards' on each. All the information is in a standard form and has all been checked by our technical staff. The section is presented alphabetically.

As new machines become available, we will add them into the FACTFILE as soon as we can.



Factfile

RAM: Stands for Random Access Memory and it is in there to accept the user's programs. Amount of memory is measured in "thousands of bytes" or "K" ie, 8K. A byte is a computer 'word' or single piece of information, made up of eight 'bits' which are just 1 or 0. Hence you need thousands of bytes to store a reasonable size program, since each letter, number, full stop, comma, line number, etc, uses up computer 'words' quite rapidly.

As a guideline – you can get about 50 program lines into 1K and 250 into 8K. This is a rough estimate – don't take it literally! The figures are not straight multiples, because you need to allow the machine space to work on your listing, once you've typed it in.

ROM: Read Only Memory. The machine can look and see what is stored in the memory, but it cannot alter the contents, nor store anything new. Generally used for control programs, where the micro consults the memory to see what to do next at various points in the program. Languages, such as BASIC, are stored in ROM and allow the machine to interpret what you type in, in terms of its own 'machine code'.

SIZE OF BASIC: The number of bytes occupied by the BASIC language is important, as it is an approximate guide to the BASICs versatility. The more powerful the language, the easier it should be to use.

BUS CONNECTION: A socket on the micro which allows it to be linked up to various add-ons. This can take the form of many various items, ie, expansion box, printer, disc drives, plotting device. In short a BUS is an information 'window' through which the micro communicates with the outside world.

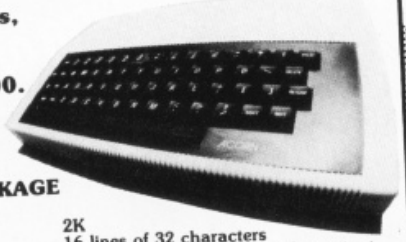
SERIAL/PARALLEL OUTPUT: This refers to the manner in which the micro transmits data to other units. If it puts out information in a long string, one bit after another, down a single wire or connector, it is a serial output. Parallel output is where pins or wires carry information simultaneously and are 'read' together as a block by whatever it is the micro is communicating with.

VIDEO OUTPUT: an output which will drive a monitor, as opposed to a TV set, allowing it's use as a screen for the computer.

FACTFILE

ACORN ATOM

Acorn Computers,
4A Market Hill,
Cambridge.
Tel: 0223-245200.



STANDARD PACKAGE

Memory Size (RAM)	2K
Screen Size	16 lines of 32 characters
Expansion Sockets	BUS connector, Printer, Video output
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£140 kit, £174.50 built**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	12K internal, 32K external options	£45-149
Printer	Yes	£232
Monitor	No	—
Disc Drives	Yes	£299
Other Languages	Yes	£11.50
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	Yes, BBC BASIC	£50

OTHER ADD-ONS:

Centronics-type connector, Technomatic Ltd, 17 Burnley Road, London NW10, £8.50; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **DUO-1 64K add-on,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £64 kit, £70 built; **MZ163 RAM expansion boards,** Timedata Ltd, 57 Swallowdale, Basildon, Essex SS15 5BZ, £59.50-76.

APPLE II

Apple Computer (UK) Ltd,
Finway Road,
Hemel Hempstead,
Herts, HP2 7PS

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 40 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£812**

MANUFACTURER'S EXPANSIONS

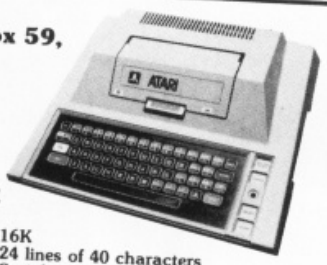
	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£200-1700
Monitor	Yes	£134
Disc Drives	Yes	£379
Other Languages	Yes	£84-500
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£26

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Multifunction Card,** Datex Micros, 193 Touring Road, Worthing, W. Sussex, £85; **5¼" Winchester disc drive,** Independent Computer Engineering Ltd 16/18, Littleton Road, Ashford, Middlesex, TW15 1UQ; **16K RAM Board,** DDP Research & Marketing, 17 Novel Square, Basildon, Essex, SS13 1LP, £75; **U-port, 8 serial interfaces,** U-Microcomputers, Ltd, Winstanely Industrial estate, Long Lane, Warrington, Cheshire, WA2 8PR, £195.

ATARI 400

Atari UK Ltd, PO Box 59,
Alperton Lane,
Wembley, Middx.



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£199.95**

MANUFACTURER'S EXPANSIONS

	DETAILS	RICE
RAM	No	-
Printer	Yes	£265
Monitor	No	—
Disc Drives	Yes	£345
Other Languages	Yes	£39-79
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microctonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95

ATARI 800

Atari UK Ltd,
PO Box 59
Alperton Lane,
Wembley, Middx

STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 40 characters
Expansion Sockets	Serial output, BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£599.95**

MANUFACTURER'S EXPANSIONS

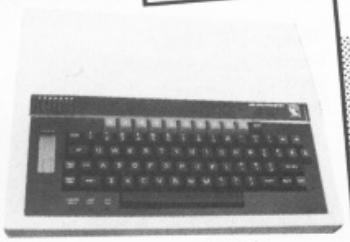
	DETAILS	PRICE
RAM	optional 16K RAM packs (to 48K Max)	£65
Printer	Yes	£265
Monitor	No	—
Disc Drives	Yes	£345
Other Languages	Yes	£345
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	TBA

OTHER ADD-ONS:

TMS 5100 Talking Board, GM Microtonics Ltd, Unit 14, Godinton Way Industrial Estate, Godinton Road, Ashford, Kent, £82.95; **Carrying case,** CJE Microcomputer, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50

BBC MICROCOMPUTER

BBC Model A,
BBC Microcomputer Systems,
PO Box 7,
London W3 6JX.



STANDARD PACKAGE

Memory Size (RAM)	16
Screen Size	32 lines of 40 characters (max)
Expansion Sockets	Parallel serial output, analogue output, Bus connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

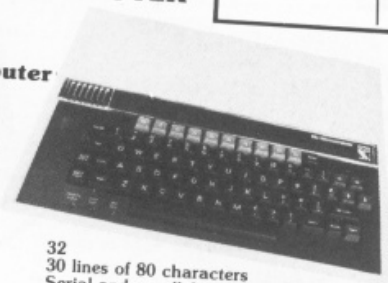
	DETAILS	PRICE
RAM	up to 32K	£100
Printer	TBA	—
Monitor	Yes	£200
Disc Drives	TBA	—
Other Languages	TBA	—
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Street Close, Guildford, Surrey GU1 4UN, Tel: 0483 50321, £199-799; **BBC Cassette Recorder,** Microage Electronics, 135 Hale Lane, Edgeware, Middx, £28; **Colour Monitor,** PortaTel Conversions Ltd, 25 Sunbury Cross Centre, Staines Roach West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Newitt House, Northgate Street, Bury St. Edmunds, Suffolk IP33 1HQ, £42.50.

BBC MICROCOMPUTER

BBC Model B
BBC Microcomputer Systems,
PO Box 7,
London W3 6JX



STANDARD PACKAGE

Memory Size (RAM)	32
Screen Size	30 lines of 80 characters
Expansion Sockets	Serial and parallel output, analogue output, printer BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£399**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	TBA	TBA
Monitor	No	—
Disc Drives	TBA	TBA
Other Languages	TBA	TBA
Multi-user Capabilities	Yes	—
BASIC extensions (Toolkits)	TBA	TBA

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, Tel: 0483 503121, £199-799; **BBC Cassette recorder,** Microage Electronics, 135 Hale lane, Edgware, Middx, HA8 9QP, £28; **Colour Monitor,** Portatel Conversions Ltd, 25 Sunbury Cross Centre, Saires Road West, Sunbury-on-Thames, Middx, TW16 7BB, £299; **Floppy Disc Controller Kit,** Midwich Computer Co Ltd, Hewitt House, Northgate Street, Bury St. Edmunds, Suffolk, IP33 1HQ, £42.50; **Carrying Case,** CJE Microcomputers, 25 Henry Avenue, Rustington, W. Sussex, BN16 2PA, £18.50.

COMMODORE PET 4000

Commodore,
675 Ajax Avenue,
Slough, Berks

STANDARD PACKAGE

Memory Size (RAM)	16 or 32K
Screen Size	25 lines of 40 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£632.50, £799.25**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes several	£454-1604
Monitor	N/A	—
Disc Drives	Yes	£396
Other Languages	Yes, single or dual	£454-1029
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Burnley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Estate, Ashford, Kent, £82.95; **64K DRC Module,** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

COMMODORE PET 8000

Commodore,
675 Ajax Avenue,
Slough, Berks

STANDARD PACKAGE

Memory Size (RAM)	32K or 96K
Screen Size	25 lines of 80 characters
Expansion Sockets	IEEE 488 standard, parallel output
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£980, £1374**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£454-1604
Monitor	N/A	—
Disc Drives	Yes single or dual	£454-1029
Other Languages	Yes	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Universal Interface, Technomatic Ltd, 17 Bunley Road, London NW10, £149; **TMS 5100 Talking Board,** GM Microtronics Ltd, Unit 14, Godinton Way industrial Easte, Godinton Road, Ashford, Kent, £82.95; **64K DRC Module** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea SS5 2JJ, £70 kit, £80 built.

FACTFILE

SHARP MZ-80A

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE
Tel: 061-205 2333

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SHARP MZ-80B

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester M10 9BE

STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£990**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	Yes	£120
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Multi-vision and triple-vision, Datron Micro Centre, 2 Abbeydale Road, Sheffield S7 1FD, £35-79

SHARP MZ-80K

Sharp UK Ltd,
Thorn Road,
Newton Heath,
Manchester
M10 9BE

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	12K
Average Price	**£350**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£450-800
Monitor	N/A	—
Disc Drives	Yes, dual	£600
Other Languages	Yes	£45 upwards
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None Reported

SINCLAIR ZX 81

Sinclair Research,
6 Kings Parade,
Cambridge CB2 1SN

STANDARD PACKAGE

Memory Size (RAM)	1K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£49.95 kit, £69.95 built**

MANUFACTURER'S EXPANSIONS

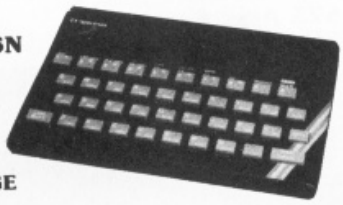
	DETAILS	PRICE
RAM	16K RAM pack	£29.95
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	No	—
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Memory expansion unit 16K or 64K, Memotech Ltd, 3 Collins St, Oxford OX4 1XL, £39.95-79; Memory Expansion 64K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey; £59.95; **Key Bleep Unit,** Microtronix, 3 Buxton Avenue, Coulton, Nottingham, N94 3RR, £8.85 kit, £9.95 built; **Maximem 1.1,** East London Robotics, Finlandia House, 14 Darwell Close, East Ham, London, EB4 BT, £93.50; **Music Synthesiser + 16 line control port,** William Stuart Systems Ltd, Dower House, Billicicay Road, Herongate, Brentwood, Essex CM13 3SD, £19.50; **Full-size keyboard,** Protos Computer Systems, Frome Computing, 20 Ashtree Road, Frome, Somerset, BA11 2SF, £64.95; **ZX99 Automatic tape control,** Data-cassette, 44, Shroton Street, London NW1 6UG, £59.95.

SINCLAIR ZX SPECTRUM

Sinclair Research,
6 Kings Parade,
Cambridge, CB2 1SN



STANDARD PACKAGE

Memory Size (RAM)	16-48K
Screen Size	24 lines of 32 characters
Expansion Sockets	BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	**£125 or £175**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	48K RAM for 16K version	£60
Printer	ZX Printer	£59.95
Monitor	No	—
Disc Drives	ZX Microdrive	TBA
Other Languages	No	—
Multi-user Capabilities	No	TBA
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Memory Expansion 32K, Downsway Electronics (UK) Ltd, Dept M, Downsway House, Epsom Road, Ashtead, Surrey: £42.50

TANDY TRS 80 I

Tandy Corporation,
12th Floor,
Tameway Tower,
Walsall,
West Midlands
WS1 1LA.

STANDARD PACKAGE

Memory Size (RAM)	4 or 16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8 or 12K
Average Price	**£229 or £339**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	32K extra in expansion unit	£349
Printer	Yes	
Monitor	Yes	£239-1200
Disc Drives	Yes	£100
Other Languages	Yes	£369
Multi-user Capabilities		£100
BASIC extensions (Toolkits)	No Yes	— £100

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kran Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC) 46 Middle Street, Blackhall, Marlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY TRS 80 III

Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands,
WS1 1LA

STANDARD PACKAGE

Memory Size (RAM)	4-48K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connection, parallel & serial output
Tape Included?	No
Display Unit Included?	Yes
Usable Domestic TV?	No
Size of BASIC	16K
Average Price	**£599-1799**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	16K modules	£70
Printer	Yes various	£239-1200
Monitor	N/A	—
Disc Drives	Yes	£600
Other Languages	Yes	£100
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

Disc drives, Cumara Ltd, 35, Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17, Highcross St, Leicester LE1 4PF, £179-349; **48K internal RAM,** General Northern Microcomputers, (GNOMIC), 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 + VAT; **32K RAM card,** Audio Computers, 87 Bournemouth Park Road, Southend on Sea, SS5 2JJ, £40 kit, £46 built.

TANDY COLOUR

Tandy Corporation,
12th Floor,
Tameway Tower,
Bridge Street,
Walsall,
West Midlands
WS1 1LA

STANDARD PACKAGE

Memory Size (RAM)	16-32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Serial output, ROM pack, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-16K
Average Price	**£499**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes various	£239-1200
Monitor	No	—
Disc Drives	Yes	£439
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

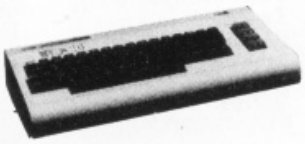
OTHER ADD-ONS:

Olivetti disc drives single and dual, Kram Electronics, Victoria House, 17 Highcross St., Leicester LE1 4PF, £179-349.

FACTFILE

COMMODORE VIC20

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	5K
Screen Size	23 lines of 22 characters
Expansion Sockets	BUS connection, Disc, Printer, Serial output, joystick
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£169.99**

MANUFACTURER'S EXPANSIONS

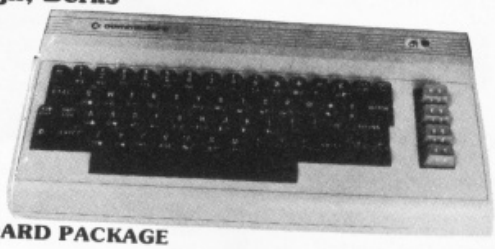
	DETAILS	PRICE
RAM	3K,8K,16K expansion options	£30,£45,£75
Printer	Yes	£270
Monitor	No	—
Disc Drives	Yes	£396
Other Languages	Yes	£38.95
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

VCR-20, 20K RAM cartridge, Audio Computers, 87 Bournemouth Park Road, Southend on Sea SS5 2JJ, £39 kit, £45 built; **Expansion Board,** 3K-16K, Arfon Microelectronics Ltd, Gibyn Industrial Estate, Caernafon, Gwynedd, Wales LL55 2BD, £220. Languages: VIC Forth, Adda Computers, 154 Victoria Road, Acton, London, W3.

COMMODORE 64

Commodore,
675 Ajax Avenue,
Slough, Berks



STANDARD PACKAGE

Memory Size (RAM)	64K
Screen Size	25 lines of 40 characters
Expansion Sockets	BUS, Serial, Video
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£350**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	No	—
Printer	Yes	£230-276
Monitor	No	—
Disc Drives	Yes	£299
Other Languages	Yes	—
Multi-user Capabilities	Yes	—
BASIC Extensions	Yes	—

DAI

Data Applications UK Ltd,
16B Dyer Street,
Cirencester,
Gloucestershire,
GL7 2PF

STANDARD PACKAGE

Memory Size (RAM)	48K
Screen Size	24 lines of 60 characters
Expansion Sockets	BUS connection, Serial output, joystick socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£575**

MANUFACTURER'S EXPANSIONS

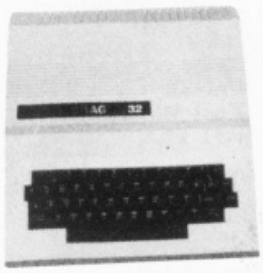
	DETAILS	PRICE
RAM	No	—
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes, maths pack	£149

OTHER ADD-ONS:

None Reported

DRAGON 32

Dragon Data Ltd
Queensway,
Swansea
Industrial Estate,
Swansea, SA5 4EH



STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	16 lines of 32 characters
Expansion Sockets	Yes
Display Unit Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	16K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	—	—
Printer	No	—
Monitor	No	—
Disc Drives	No	—
Other Languages	Yes	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

None reported

JUPITER ACE

Jupiter Cantab
22 Foxhollow
Bar Hill
Cambridge
CB3 8EP

STANDARD PACKAGE

Memory Size (RAM)	3K
Screen Size	24 lines of 32 characters
Expansion Sockets	Not known
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	Resident language is FORTH at 8K
Average Price	**£89.95**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	TBA	–
Printer	TBA	–
Monitor	TBA	–
Disc Drives	TBA	–
Other Languages	TBA	–
Multi-User Capabilities	TBA	–
BASIC extensions (toolkits)	TBA	–
	N/A	–

OTHER ADD-ONS:

None Reported.

NASCOM 3

Lucas Logic, NASCOM Microcomputers Division, Welton Road, Wedgenock Industrial Estate, Warwick, CV34 5PZ. Tel: 0926-497733

STANDARD PACKAGE

Memory Size (RAM)	0-48K
Screen Size	25 lines of 40 or 80 character
Expansion Sockets	Parallel & serial outputs, BUS connections
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8-10K
Average Price	**£549**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	up to 48K (max)	£130
Printer	Yes	£215-1285
Monitor	Yes	£99-120
Disc Drives	Yes, single or dual	£470-685
Other Languages	Yes	£50
Multi-user Capabilities	No	–
BASIC extensions (Toolkits)	Yes	-15-50

OTHER ADD-ONS:

Olivetti disc drives, single and dual, Kram Electronics, Victoria House, 17, Highcross St., Leicester, LE1 4PF, £179-349; **A/D Board,** 10, Research Ltd, 6, Laleham Avenue, Mill Hill, London NW7 3HL, £120 + VAT; **Hobbit – mini-cassette system,** Ikon Computer Products, Kiln Lane, Laugharne, Carmathen, Dyfed, £99 + VAT; **Disc drives, single and dual,** Micro-Spares, 19, Roseburn Terrace, Edinburgh, EH12 5N9, £199-279.

NEWBRAIN

Grundy Business Systems Ltd, Grundy House, Somerset Road, Teddington TW11 8TD.

STANDARD PACKAGE

Memory Size (RAM)	32K
Screen Size	25 lines of 40 or 80 characters
Expansion Sockets	Printer, serial, video, data bus
Tape Included?	No
Display Unit Included?	No (Single line option on model AD)
Usable Domestic TV?	Yes
Size of BASIC	18K
Average Price	**£199 model A, £299 Model AD**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	64 – 512K,	£75 – £445
Printer		
Monitor		
Disc Drives	NYA	–
Other Languages	NYA	–
Multi-user	NYA	–
BASIC extensions	NYA	–

OTHER ADD-ONS:

None Reported.

ORIC 1

Oric Products International, Coworth Mansion, Coworth Park, London Road, Sunninghill, Ascot, Berkshire, SL5 7SE.

STANDARD PACKAGE

Memory Size (RAM)	16K, 48K
Screen Size	28 X 40
Expansion Sockets	Yes
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	8K
Average Price	**£99, £169**

MANUFACTURER'S EXPANSIONS

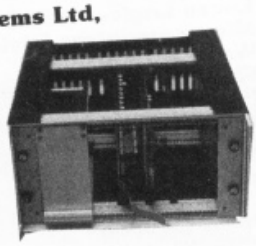
	DETAILS	PRICE
RAM	N/A	–
Printer	TBA	–
Monitor	No	–
Disc Drives	TBA	–
Other Languages	N/A	–
Multi-user Capabilities	No	–
BASIC extensions	TBA	–

OTHER ADD-ONS:

FACTFILE

TANGERINE MICRON

Tangerine Computer Systems Ltd,
The Science Park,
Milton Road,
Cambridge
CB4 4BH



STANDARD PACKAGE

Memory Size (RAM)	8K
Screen Size	16 lines of 32 characters
Expansion Sockets	Parallel & serial output, BUS connection
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	10K
Average Price	**£395**

MANUFACTURER'S EXPANSIONS

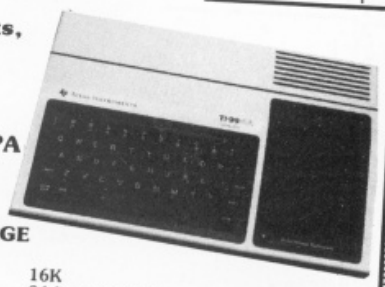
	DETAILS	PRICE
RAM	48K in system rack	£144
Printer	No	—
Monitor	No	—
Disc Drives	Yes	TBA
Other Languages	Yes	£40
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Sound Board and Graphics Board, Bulldog Video Ltd, 52, Nash Square, Birmingham, B42 2EX, £49-£179; **Toolkit,** Microtanic Software, 235, Friern Road, Dulwich, London, OBD, £22.50.

TEXAS TI 99/4A

Texas Instruments,
European
Consumer
Division,
Manton Lane,
Bedford MK41 7PA



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	24 lines of 32 characters
Expansion Sockets	ROM pack, Bus connector, joystick, socket
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	14K
Average Price	**£199**

MANUFACTURER'S EXPANSIONS

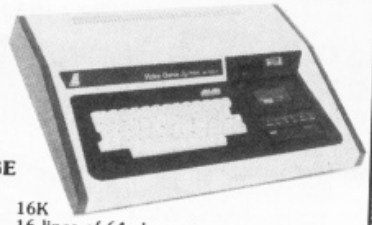
	DETAILS	PRICE
RAM	up to 48K (max)	£300
Printer	Yes	£275
Monitor	No	—
Disc Drives	Yes	£300
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	Yes	£100

OTHER ADD-ONS:

None Reported

VIDEO GENIE I

Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire,
DE4 5LE



STANDARD PACKAGE

Memory Size (RAM)	16K
Screen Size	16 lines of 64 characters
Expansion Sockets	BUS connector
Tape Included?	Yes
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	12K
Average Price	**£279**

MANUFACTURER'S EXPANSIONS

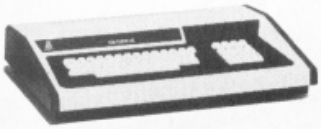
	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumara Ltd, 35 Walnut Tree Close, Guildford, Surrey GU1 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leiscester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213 **48K Internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Martlepool, Cleveland, £70+VAT: **32K RAM Card** Audio Computer, 87 Bournmouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.

VIDEO GENIE II

Lowe Electronics,
Bentley Bridge,
Chesterfield Road,
Matlock,
Derbyshire DE4 5LE



STANDARD PACKAGE

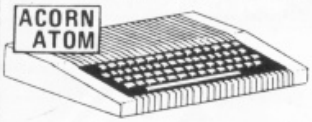
Memory Size (RAM)	16K
Screen Size	16 lines of 32 or 64 characters
Expansion Sockets	BUS connector
Tape Included?	No
Display Unit Included?	No
Usable Domestic TV?	Yes
Size of BASIC	13K
Average Price	**£299**

MANUFACTURER'S EXPANSIONS

	DETAILS	PRICE
RAM	optional 48K in expansion unit	£200
Printer	Yes	£210
Monitor	Yes	£69-99
Disc Drives	Yes, single and dual	£220-375
Other Languages	No	—
Multi-user Capabilities	No	—
BASIC extensions (Toolkits)	No	—

OTHER ADD-ONS:

Disc drives, single and dual, Cumana Ltd, 35, Walnut Tree Close, Guildford, Surrey, Gul 4UN, £199-799; **Olivetti disc drives single and dual,** Kram Electronics, Victoria House, 17 Highcross St, Leicester LE1 4PF, £179-349; **EG3014 Expansion box with 16K/32K RAM,** Swanley Electronics, 32 Goldsel Road, Swanley, Kent BR8 8EZ, £199-213; **48K internal RAM,** General Northern Microcomputers, GNOMIC, 46 Middle Street, Blackhall, Hartlepool, Cleveland, £70 +VAT; **32K RAM Card** Audio Computers, 87 Bournemouth Park Road, Southend-on-sea, SS5 2JJ, £40 kit, £46 built.



VIC-20

	£
ATOM 8K + 2K Kit	110.00
ATOM 8K + 2K Assy.	140.00
ATOM 8K + 12K Ass.	172.00
ATOM 12K + 12K Ass.	180.00
ATOM Power Supply	8.00
ATOM Disc Pack	275.00
ATOM/BBC ROM (Nov.)	43.00
Prog. Power Toolbox	23.00
2114L Memory Chips	0.85

*10% off Acorn and Bug Byte ATOM Software

	£
VIC 20 CPU	£130.00
VIC 20 C2n Cassette	34.00
VIC Printer	187.00
VIC Floppy Drive	304.00
VIC Memory Exp. Board	98.00
VIC 3K RAM Cartridge	23.50
VIC 8K RAM Cartridge	35.00
VIC 16K RAM Cartridge	56.50
VIC Programmers Aid Cartridge	27.00
VIC Super Exp. High Res.	27.00
VIC Machine Code Cartridge	27.00
VIC Joystick	6.50
VIC Paddles (per pair)	11.70

*10% off VIC Tapes and Games Cartridges

BBC

A — B Expansion & Test	90.00
32K RAM + Printer I/face Expansion & Test	46.00
RAM Expansion Kit	22.00
Printer Interface Kit	9.83
Bus Expansion Kit	8.65
Analogue Input Kit	9.90
B.B.C. Joysticks (per pair)	16.90

B.B.C. SOFTWARE

Games Pack 1 — Bomber, Crash Spacebattle, Minefield and Music — Model 'A'	6.50
Games Pack 2 — 3D-Maze Monster, Dodgems and Cube — Model 'B'	6.50
Educational Geographic Quiz — Capitals & Towns — Model 'B'	6.50
Utility Programme — Disassembler and Character Builder	5.50
Acorn Soft, Bug Byte and Programme Power Games Cassettes	
Beeb Invaders	7.00

PERIPHERALS

Printers — ATOM or B.B.C.

Epson MX80T/3	299.00
Epson MX80FT/3	340.00
Epson MX82	330.00
Epson MX82/FT	362.00
Epson MX100/3	440.00
Seikosha GP100	192.00

Monitors — B.B.C.

BMC 12" black/green screen	79.00
Sanyo 12" black/green screen	99.00
Microvitec Colour	260.00
Ferguson Colour TV	198.00

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NEW!

QUALITY SOFTWARE FOR THE BBC MICRO

GALAXIANS (32K) £6.50
Fast action version of the popular arcade game. 4 types of Galaxian (in 3 initial screen formations) swoop down individually or in groups of two or three. 6 skill levels, hi-score, rankings, bonus laser bases, increasing difficulty, superb graphics and sound.

CENTIPEDE (32K) £6.50
Incredible arcade type game featuring mushrooms, flies, snails, spiders, and the centipedes of course. Excellent graphics and sound. 6 skill levels, hi-score, rankings, bonuses, and increasing difficulty as the spiders become more active and the mushrooms increase.

FRUIT MACHINE (32K) £6.50 *** NEW RELEASE ***
Probably the best fruit machine implementation on the market. This program has it all . . . HOLD, NUDGE, GAMBLE, moving reels, realistic fruits and sound effects, multiple winning lines. This is THE fruit machine program to buy.

ALIEN DROPOUT (32K) £6.50 *** NEW RELEASE ***
Based upon the arcade game of ZYGON, but our version improves upon the original arcade game itself. You have to shoot the aliens out of their "boxes" before the "boxes" fill up. Once full, the aliens fly down relentlessly, exploding as they hit the ground. Suitable for use with keyboard or joystick.

INVADERS (32K) £6.50
Superior version of the old classic arcade game including a few extras. 48 marching invaders drop bombs that erode your defences, and 2 types of spaceship fly over releasing large bombs that penetrate through your defences. Hi-score, increasing difficulty, superb sound effects and graphics.

SPACE FIGHTER (32K) £6.50
Arcade-style game based upon features from DEFENDER and SCRAMBLE. 5 types of menacing alien fire at you and may attempt to ram you. Separate attack phases, fuel dumps, asteroids, repeating laser cannon, smark bombs, hi-score, rankings, 6 skill levels, bonuses.

* WE PAY 25% ROYALTIES FOR HIGH QUALITY PROGRAMS *
Please add 50p per order for postage & packing. *** Dealer enquiries welcome.

SUPERIOR SOFTWARE
Dept. PCT3,
69 Leeds Road,
Bramhope, Leeds.
Tel: 0532 842714

SPECIAL OFFER! Deduct £1 per cassette when ordering 2 or more programs!

Go on a computer date

(and take along the wife and kids)

Friday 7th January '83
(10.00am-6.00pm)
Saturday 8th January '83
(10.00am-6.00pm)
Sunday 9th January '83
(10.00am-4.00pm)

SAVE 50p
Present this token duly completed when buying your ticket for a 50p reduction. Only 1 token allowed per person.

Name Mr./Mrs/Miss .....

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.....

Signature .....

These are the dates of the London Home Computer Show.

On display will be a complete cross section of the hard and software available to the home-user.

The emphasis is on the lower end of the price bracket, with computers from £50-£300.

You will be able to chat to the manufacturers and play with the computer before you buy.

So bring along the wife and kids (who'll probably be more of an expert on what you're buying than you)

Admission £1.50p (Children under 8 and O.A.P.s FREE)

*And if you're in a party of 20 or more, there's a 25% discount.

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Royal Horticultural Society's Old Hall, Vincent Street, London SW1.

**For advanced bookings for parties of 20 or more, please send cheques payable to Argus Specialist Publications Ltd. (Dept. LHCS), 145 Charing Cross Road, London WC2H 0EE. Telephone 01-437 1002.*

NEW! ZX SPECTRUM TAPE NOW READY!
NEW! EXPANDED DISC VERSIONS FOR APPLE, PET AND SHARP!

SOFTWARE FROM PCT

THE VALLEY

© ASP LTD 1982

What are you . . . Barbarian or Wizard?

Choose your character type carefully . . . Barbarians recover quickly but their magic doesn't come easily. A Wizard? Slow on the draw and slow to mature . . . but live long enough and grow wise enough and your lightning bolts are almost unstoppable . . .

The Valley is a real-time game of adventure and survival. You may choose one of five character types to be your personal 'extension of self' to battle and pit your wits against a number of monsters. Find treasure, fight a Thunder-Lizard in the arid deserts of the Valley, conquer a Kraken in the lakes surrounding the dread Temples of Y'Nagioth or cauterise a Wraith in the Black Tower. In fact live out the fantasies you've only dared dream about. BUT BEWARE . . . more die than live to tell the tale!

You've read the program (Computing Today — April '82) . . . Now buy the tape. Tape versions (£11.45 each inc P&P and VAT) available for: ZX Spectrum (48K), Atari 400 and 800 (32K), Tandy TRS-80 Model 1 Level 2, BBC Model B, Sharp MZ-80A, Sharp MZ-80K (18K), VIC-20 (with 16K RAM pack) and PET (New ROM, 16K RAM minimum).

Disc versions (£13.95 each inc P&P and VAT) available for: Apple II (DOS 3.3), Sharp MZ-80A, Sharp MZ-80K and PET 8032 (8050 drives).

Fill in the coupon and return it to CT Software, ASP Ltd., 145 Charing Cross Road, London WC2H 0EE and become one of the many to play . . . The Valley . . .

Please send me the following versions of The Valley Tape . . . . . @£11.45 all inclusive of P&P and VAT.
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Address . . . . . .

. . . . . Postcode . . . . . .

Signature . . . . . Date . . . . . .

Please allow 21 days for delivery

ASP SOFTWARE

SOFTWARE LISTING

Looking for a program to buy? Look no further! If it's available, it's listed here in our exclusive and comprehensive software checklists.

Looking through any computer magazine can be a bewildering experience if you're in search of a program. Count the hundreds of ads and thousands of titles on sale and it would be easy to lose heart!

We've tried to sort out the confusion, and the sheer numbers, to present an easily understood list for each machine. Where possible, we have eliminated duplications, so that the same tape with a different label is not listed twice. Rather it should be credited once, with as many suppliers as we could find.

Table Codes

In order to fit as many programs as possible into our pages, we have had to use codes for some columns, considerably shortening the wording.

The information given for each program is: Title, memory required to run it, company producing it, whether tape/cartridge or disk, type and supplier and price.

The codes we have used are:

Program Type

GM = Game
BS = Business routine
UT = Utility (ie. programming aid)
DO = Domestic
ED = Educational

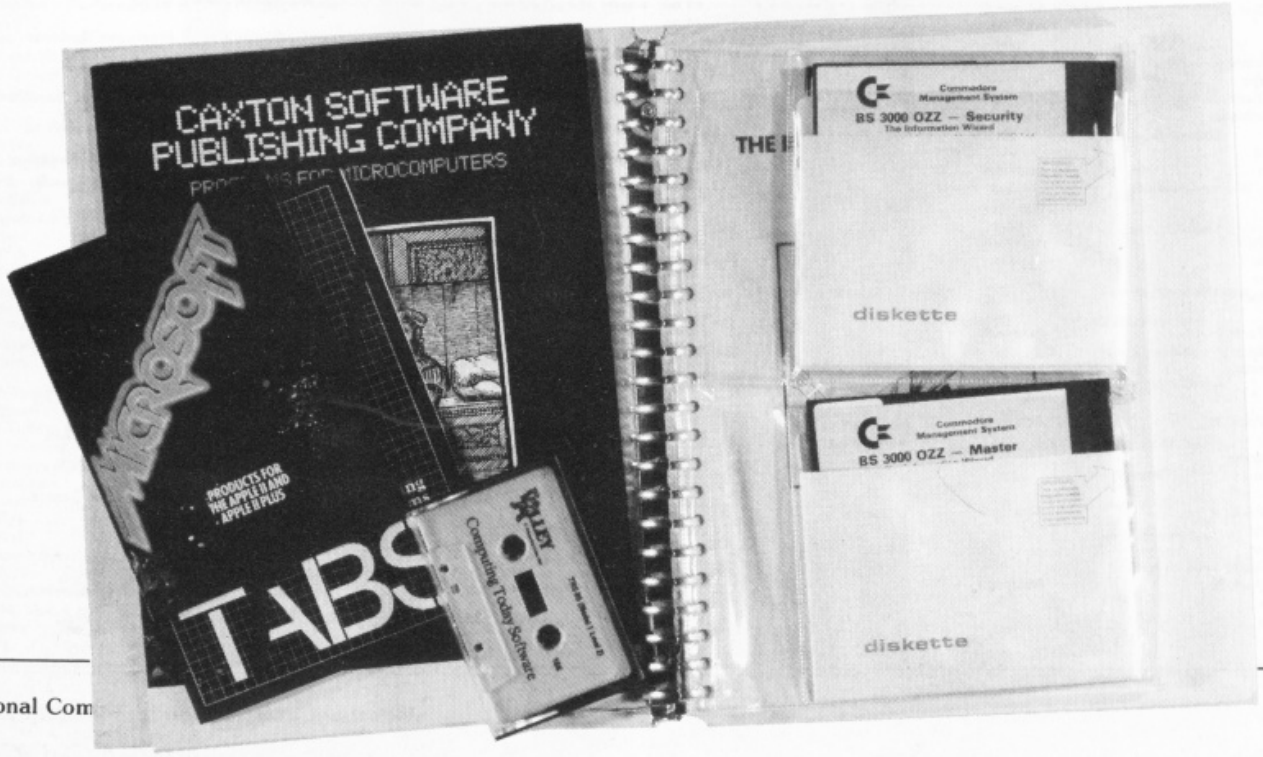
How Sold

R = Cartridge (may include memory)
C = Tape (cassette)
D = Disc (for expanded systems)
L = Listing (sold as print-out)

Due to overwhelming response we have been forced to alternate machines included in our checklist each month. Out this month are the Atari, Spectrum and ZX81. But don't panic, they will be featured in December for you to make your software selection.

Not Here?

To companies whose products are not listed herein we can only say TELL US ABOUT IT! This applies particularly to the smaller retailer who may sell only half a dozen or so programs for one machine. If you produce software for *any* of the machines on the market today, then we would love to include your wares in our checklists. Send it in to us, marked for the attention of the Editor (in our format *Please*!) or ring Chris Palmer on 01-437 1002 as soon as possible.



SOFTWARE LISTING

ATOM

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
3-D Asteroids	Gm	Program Power	5K	C	GK	£6.85
747 Flight simulator	Gm	Bug Byte	12K	C	CH,GA,GB	£8.00
Adventure	Gm	Program Power	12K	C	CH,GK	£9.15
Adventures	Gm	Acornsoft	12K	C	EJ	£30.00
Air Attack	Gm	Program Power	12K	C	CH,GK	£9.15
Air Attack	Gm	Program Power	12K	C	GK	£7.95
Alien Maze	Gm	Program Power	8K	C	GK	£5.69
Astrafire	Gm	Program Power	5K	C	GK	£4.54
Astro Birds	Gm	Program Power	12K	C	CH,GK	£9.15
Atom Adventure	Gm	Acornsoft	12K	C	GA,AL	£11.50
Atom Adventure	Gm	Hopesoft	12K	C	JV	£6.75
Atom Breakout	Gm	Bug Byte	4K	C	HO	£4.00
Atom Business Games	B/G	Program Power	12K	C	GK	£7.99
Atom Business Cassette	Bs	Acornsoft		C	AL	£7.50
Atom Business Pack	Bs	Acornsoft		C	AY,FA	£11.50
Atom Chess	Gm	Acornsoft	12K	C	GA,EA,AL	£11.50
Atom Chess	Gm	Acornsoft	12K	C	GK	£11.44
Atom Forth	Ut	Acornsoft		C	GA,EJ,AL	£11.50
Atom Invaders	Gm	Bug Byte	12K	C	HO	£8.00
Atom Life Category	Bs	Acornsoft		C	AL,GA	£11.50
Atom List	Ut	Acornsoft		C	AL	£17.25
Atom Man	Gm	Hopesoft	12K	C	JV	£6.75
Atom Store	Bs	Program Power	12K	C	GK	£9.15
Atom Synthesiser	Gm	Acornsoft	12K	C	AL,GA	£11.50
Atomic Cube	Gm	A&F S/W	12K	C	GE	£4.95
Backgammon	Gm	Bug Byte	7K	C	GA	£7.00
Blitz	Gm	Rucksoft	4K	C	KO	£2.65
Chaser	Gm	Hopesoft	4K	C	JV	£3.75
Chess	Gm	Bug Byte	12K	C	CH,GA,GB	£9.00
Chess	Gm	Program Power	12K	X	GK	£9.15
Constellation	Gm	Program Power	12K	C	GK	£7.99
Constellation	Gm	Program Power	12K	C	GK	£7.99
Colour Invaders	Gm	Hopesoft	12K	C	JV	£3.75
Cowboy Shootout	Gm	Program Power	12K	C	CH,GK	£7.99
Cylon Attack	Gm	A&F S/W	12K	C	GE	£4.95
Dambusters	Gm	Program Power	10K	C	GK	£5.69
Data Base	Ut	Acornsoft	6K	C	EJ,FZ,FA,GA	£11.50
Death Satelite	Gm	A&F S/W	12K	C	GE	£6.00
Demon Dungeon	Gm	Program Power	5K	C	GK	£6.85
Derby, Blitz and Rat Race	Gm	Program Power	12K	C	GK	£6.84
Desk Diary	Bs	Acornsoft	12K	C	FA,EJ,AL,GA	£11.50
Disassembler	Ut	Hopesoft	3K	C	JV	£1.75
Disassemble Program	Ut	Program Power	4K	C	GK	£6.85
Dragon's Lair	Gm	Program Power	12K	C	GK	£6.85
Early Warning	Gm	A&F S/W	12K	C	GE	£4.95
Earth Rescue	Gm	Rucksoft	6K	C	HO	£2.80
Easy Talker	Ed	Acornsoft	16K	C	AW	£5.00
Escape	Gm	A&F S/W	8K	C	GE	£4.95
Fall of Rome	Gm	Program Power	12K	C	GK	£7.99
Forth Tape	Ut	Acornsoft		C	FA	POA
Forth, Theory & Practice	Bs	Acornsoft		C	AL	£6.00
Fruit Machine	Gm	Bug Byte	8K	C	HO	£4.00
Galactica	Gm	Program Power	12K	C	GK	£5.69
Galaxian	Gm	Bug Byte	12K	C	CH,GA,GB	£8.00
Galaxian War and Invasion	Gm	Program Power	2K	C	GK	£6.84
Golf	Gm	Bug Byte	6K	C	HO	£5.00
Games Pack 1:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Asteroids			10K		EJ,AL,CH	
Sub Hunt			6K		FZ	
Break Out			4 K			
Games Pack 2:	Gm	Acornsoft		C	AY,FA,GA	
Dog Fight			10K		EJ,AL,CH	
Mastermind			4K		FZ	
Zombie			4 K			
Games Pack 3:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Rat Trap			10K		EJ,AL,CH	
Lunar Lander			6K		FZ	
Black Box			1 0 K			
Games Pack: 4	Gm	Acornsoft		C	AY,FA,GA	£11.50
Star Trek			8K		EJ,AL,CH	
Four Row			12K		FZ	
Games Pack 5:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Invaders			10K		EJ,AL,CH	
Wumpus			3K		GZ	

SOFTWARE DEALERS

Supplier Code			
AA	Micro Centre Ltd	CD	Omega Plus
AB	Micro and Video Palace	CE	Southern Software
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AD	Datarite Terminals Ltd	CG	Planet Software
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AF	MicroComputerLand	CI	Picturesque
AG	Comart Ltd	CJ	ACS Software
AH	Cream Computer Shop	CK	Chrisalid
AI	Microvalue	CL	MED
AJ	Molimerx Ltd	CM	Simple Software
AK	GW Computers Ltd	CN	Buffer Micro Shop
AL	Acornsoft Ltd	CO	Pixel Productions
AM	Acorn Computers	CP	Computics Microsoft
AN	Microcomputers Products Int.	CQ	KW Software
AO	Xitan Systems	CR	Sideline Freepost
AP	KGB Micros Ltd	CS	IQ Services
AQ	Broadside	CT	Willow Software
AR	Software Ltd	CU	Level 9 Computing
AS	Lucas Logic Ltd	CV	J Purves
AT	Atlantic Micro System	CW	Cambell Systems
AU	TCL Software	CX	Microdeal
AV	I A S	CY	Prof. F H George
AW	Intelligent Artefacts Ltd	CZ	J Wolstencroft
AX	Kuma Computers	DA	Ground Control
AY	Microstore	DB	Mick Bignell
AZ	London Retail	DC	Giltrole Ltd
BA	Micro-Spares	DD	Deep Thought Software
BB	CAPS Ltd	DE	Silversoft (Dept PCW)
BC	Maplin	DF	Michael Orwin
BD	Caxton Software	DG	Hisoft
BE	Cornshall Ltd	DH	The Soft Option
BF	Micro Technology	DI	Wild Bills Computer Rodeo
BG	Elcon Research Ltd	DJ	Microcomputer Spacedrome
BH	Avalon Hill Games	DK	Spider Software
BI	Call Apple (UK)	DL	Xavier Business Systems
BJ	Lifeboat Associates	DM	Camden Electronics
BK	L & J Computers	DN	Sumlock Electronic Services
BL	Peach Tree Software	DO	Microstyle
BM	ACT (Microsoft) Ltd	DP	Small Systems Engineering
BN	Personal Computer Palace	DQ	Woodland Software
BO	Sinclair Software	DR	Telesystems Ltd
BP	Leicester Computer Centre Ltd	DS	Macronics
BQ	TABS Ltd	DT	Hewson Consultants
BR	IBR Microcomputers	DU	Silicon Office Services
BS	Computer Plus	DV	Sirton Computer Systems
BT	The Essential Software Co.	DW	Psion Ltd
BU	Guestel	DX	JRS Software
BV	Lowe Electronics	DY	Calisto Computers Ltd
BW	Gate Micro System Ltd	DZ	Micro Gen (Dept PCI)
BY	Almarc Data Systems Ltd	EA	Anglia Computer Centre
BZ	Interam Computer Systems Ltd	EB	SBD Software
CA	Terodec Ltd	EC	Abacus Software
CB	Poolsoft	ED	Qdos Business Software
CC	Highlight Software	EE	dK'tronics

Reversi			5K			
Games Pack 6:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Dodgems			10K		EJ,AL,CH	
Simon			8K		FZ	
Amoeba			6K			
Games Pack 7:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Life Forms			8K		EJ,AL,CH	
Ballistics			10K		FZ	
Snake			10K			
Games Pack 8:	Gm	Acornsoft		C	AY,FA,GA	£11.50
Star Date			8K		EJ,AL,CH	
Gomoku			8K		FZ	
Robots			10K			
Games Pack 9:	Gm	Acornsoft		C	AY,FA,FA	£11.50
Snapper			8K		FJ,AL,CH	
Minotaur			12K		FZ	
Babies			8K			
Games Pack 10:	Gm	Acornsoft	2K	C	AY,FA,GA	£11.50
10 Games for minimum					EJ,AL,CH	
Atom					FZ	
Games Pack 11:	Gm	Acornsoft	12K	C	AY,FA,GA	£11.50
Missile Base					EJ,AL,CH	
Snooker					FZ	
Dominoes						
High Stats	Bs	Program Power	12K	C	GK	£7.99
Hyper Fire	Gm	Program Power	12K	C	GK	£9.15
Introductory Pack	Ed	Acornsoft	3K	C	GA,FA,AL	£23.00
Invader Force	Gm	Program Power	12K	C	GK	£9.15
Invaders	Gm	Bug Byte	12K	C	CH,GA,GB	£8.00
Labyrinth	Gm	Bug Byte	12K	C	Ho	£6.95
Last Run	Gm	Bug Byte	7K	C	HO	£3.00
Lunar Lander	Gm	Program Power	12K	C	GK	£7.99
Martians	Gm	Program Power	12K	C	GK	£7.99
Maths Pack 1:	Ed	Acornsoft	4K	C	EJ,FA,FZ,AL, GA	£11.50
Maths Pack II:	Ed	Acornsoft	6K	C	EJ,FA,FZ AL,GA	£11.50
Maze Ball	Gm	Program Power	12K	C	GK	£5.69
Microbudget	Bs	Program Power	12K	C	GK	£9.15
Mine Field	Gm	A&F S/W	6K	C	GE	£4.95
Missile Command	Gm	A&F S/W	12K	C	GE	£4.95
Mode 4 VDU	Ut	Program Power	12K	C	GK	£7.99
Moon Lander	Gm	Rucksoft	6K	C	HO	£2.25
Munchy Man	Gm	Program Power	12K	C	GK	£5.69
Music Box	Gm	Program Power	12K	C	GK	£7.99
Parachute	Gm	Rucksoft	5K	C	HO	£2.25
Peeko Computer	Ed	Acornsoft	6K	C	GA,FA,AL	£11.50
Pinball	Gm	Bug Byte	6K	C	HO	£4.50
Pirate Island	Gm	Hopesoft	12K	C	JV	£6.75
Polaris	Gm	A&F S/W	12K	C	GE	£3.95
Polecat	Gm	A&F S/W	12K	C	GE	£4.95
Pontoon	Gm	A&F S/W	12K	C	GE	£3.95
Programmer's Toolkit	Gm	Program Power		C	GK	£28.15
Reversi	Gm	Program Power	8K	C	GK	£5.69
Rhino and Wiggle	Gm	Bug Byte	10K	C	Ho	£5.00
Robot Control	Ed	Acornsoft	16K	C	AW	£35.00
Robot Nim	Gm	A&F S/W	6K	C	GE	£3.95
Sketch Pad Program	Gm	Program Power	5K	C	GK	£5.69
Softscreen	Ut	Computer Concepts	12K	C	GJ	£11.50
Space Fighter	Gm	Program Power	12K	C	GK	£9.15
Space Invaders	Gm	Computer Concepts	12K	C	GJ	£7.80
Space Storm	Gm	Program Power	4K	C	GK	£5.69
Spirographics	Gm	Rucksoft	8K	C	HO	£2.45
Star Raid	Gm	Rucksoft	11K	C	HO	£3.30
Star Trek	Gm	Program Power	5K	C	GK	£6.85
Star Trek	Gm	Bug Byte	12K	C	HO	£5.00
Statistics Pack	Ut	Bug Byte	12K	C	Ho	£20.00
Stockbroker	Gm	Program Power	5K	C	£4.54	
Super Race Track	Gm	Program Power	12K	C	GK	£5.69
Squares, Simon and Parachute	Gm	Bug Byte	7K	C	HO	£5.00
Sketch Pad Program	Gm	Program Power	5K	C	GK	£5.69
Softscreen	Ut	Computer Concepts	12K	C	GJ	£11.50
Space Fighter	Gm	Program Power	12K	C	GK	£9.15
Space Invaders	Gm	Computer Concepts	12K	C	GJ	£7.80
Space Storm	Gm	Program Power	4K	C	GK	£5.69
Spirographics	Gm	Rucksoft	8K	C	HO	£2.45
Star Raid	Gm	Rucksoft	11K	C	HO	£3.30
Star Trek	Gm	Program Power	5K	C	GK	£6.85
Star Trek	Gm	Bug Byte	12K	C	HO	£5.00
Statistics Pack	Ut	Bug Byte	12K	C	Ho	£20.00
Stockbroker	Gm	Program Power	5K	C	£4.54	
Super Race Track	Gm	Program Power	12K	C	GK	£5.69
Squares, Simon and Parachute	Gm	Bug Byte	7K	C	HO	£5.00

SOFTWARE DEALERS

EF	Computech Systems	GH	Microtanic Software
EG	Electronics Experts	GI	Lander Microsystems
EH	Artic Computing	GJ	Computer Concepts
EI	Knights TV & Computers	GK	Program Power
EJ	Microage Electronics	GL	Syrtis Software
EK	Holly Products	GM	Lutterworth Software
EL	I O Systems	GN	Collins Computing
EM	Merton Electronics (Dept PW)	GO	Datafax (Dept CT)
EN	Davinci Computer Shop	GP	CCSoft
EO	Calco Software	GQ	Microx
EP	Richard Francis (Dept PCW)	GR	Pro Software
EQ	Microtek Ltd	GS	Sussex Software
ER	Diskwise Ltd	GT	Rose Cassettes
ES	Control Technology	GU	Axis (YC2)
ET	Comp Shop	GV	PR Software
EU	Micro Computer Prods	GW	Bridge Software
EV	GW Computers	GX	Video Software Limited
EW	C/WP Computers	GY	J M Steadman
EX	Metrotech Mail Order	GZ	Transform Ltd
EY	Microsystems Ltd	HA	Baust Computing Consultants
EZ	Superior Systems Ltd	HB	University Computers
FA	Control Universal Ltd	HC	Educare
FB	Pete & Pam Computers	HD	Simon Software
FC	Zenith Data Systems	HE	Docimodus
FD	Commodore Information	HF	M C Associates
FE	Logic Computers	HG	Addictive Games
FF	Overseas Computer	HH	J K Greye Software
FG	Blyth Computers	HI	John Prince
FH	Taurus Computer Design	HJ	Titan Programs
FI	HITEC (Austria)	HK	Micro Computer Software
FJ	Graffcom Systems	HL	Phipps Associates
FK	Electronic Aids (Tewkesbury)	HM	Gemini Electronics
FL	BUG-BYTE	HN	The Vic Centre
FM	Learning Computer Systems	HP	R & R Software
FN	Jentech Services Ltd	HQ	Town Book & Toys
FO	Dept ZM Work Force	HR	Screen Scene
FP	Twickenham Computer Centre	HS	Software Masters
FQ	Sbd Software	HT	John Prince Software
FR	Beebug	HU	Nick Godwin
FS	RAM Computer Services Ltd	HV	A.Parsons
FT	Ozwise Computers	HW	Bryants (Educational) Software
FU	Compusense	HX	Abersoft
FV	The Avery Computer Company	IC	Ogre Games & Software
FW	Hilderbey Ltd	ID	Tridata Micro's Ltd
FX	Micromedia	IE	Plympton Computer Services
FY	Wida Software	IF	Electronics Applied
FZ	Superior Systems Ltd	IG	Emjay
GA	Eletec Serives Limited	IL	V&H Computer Services
GB	Anglo American Software	IM	AVC Software
GC	Castle Electronics	IN	Computator
GD	Quicksilva	IO	Ohmega Electronics
GE	A&F Software	IP	A.V.O. Software Distribution
GF	SRS Microsystems	IQ	Big Softie
GG	Stirling Microsystems	IR	Adamsoft

REFERENCE

SOFTWARE LISTING

ATOM

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Tangle	Gm	A&F S/W	6K	C	GE	£3.95
The Soft VDU	Gm	Acornsoft	8K	C	AY,FA,GA EJ,AL,CH,FZ	£11.50
The Park	Gm	Program Power	12K	C	GK	£5.69
Time Tutor	Ed	A&F S/W	6K	C	GK	£3.95
2K Programs (1)	Gm	Bug Byte	2K	C	HO	£4.50
2K Programs (3)	Gm	Bug Byte	2K	C	HO	£4.50
Typist	Ut	Bug Byte	6K	C	HO	£4.00
Tunnel	Gm	Rucksoft	6K	C	HO	£2.65
UFO Bomber	Gm	Bug Byte	7K	C	HO	£4.00
Utility Pack 1	Ut	Acornsoft	2K	C	FA,GA,AL,GA	£11.50
Warlords	Gm	Program Power	12K	C	GK	£7.99
Word Pack ROM	Ut	Acornsoft	8K	C	AJ,EJ,GA	POA
Word Processings Pack	Bs	Acornsoft	8K	C	FA	POA
Word Tutor	Bs	Acornsoft	12K	C	GA,EJ,FA,AL	£11.50
Write Your Own Adventure	Ut	Hopesoft	12K	C	JV	£5.75
Yan	Gm	Program Power	3K	C	GK	£5.69
Yellow Pearl	Gm	Rucksoft	7K	C	HO	£3.30

BBC

Action of the Heart	Ed	Garland Comp.	32K	C	JX	£11.76
Algebraic Manipulation	Ut	Acornsoft	16K	C	AL,GA	£9.95
Algebraic Manipulation	Ut	Acornsoft	32K	C	AL,GA	£9.95
Asteroids/Frong	Gm	Aardvark Software	16K	C	IU	£4.00
Asteroid Belt	Gm	Electronics Appplied	32K	C	IF	£11.50
Backgammon	Ut	Bug Byte	32K	C	EA	£8.00
Battlefield	Gm	Micro-Aid	32K	C	IZ	£2.50
Banner	Do	Micro-Aid	16K	C	IZ	£2.95
Beebmunch	Gm	I.J.K. S/W	32K	C	IT	£5.95
Beebtrek	Gm	Software for All	16K	C	KN	£7.95
Bounty Pirates	Gm	Aztec S/W	16K	C	IB	£5.50
Break-Up	Gm	Miking S/W	32K	C	KC	£3.95
Breakout	Gm	I.J.K. S/W	16K	C	IT	£3.95
Breakout	Gm	Bryants S/W	32K	C	HW	£3.75
Bridgeman	Gm	Bridge S/W	32K	C	KJ	£7.90
Carbohydrate Metabolism	Ed	Garland Comp.	32K	C	JX	£18.24
Cashbook A	Do	Micro-Aid	16K	C	IZ	£3.95
Cashbook B	Do	Micro-aid	16K	C	IZ	£3.95
Cells & Serpent	Gm	Hexagon S/W	16K	C	JA	£5.00
Centipede	Gm	Superior S/W	32K	C	KH	£7.00
Characters	Ut	Computer Concepts	32K	C	GJ	£6.67
Character Generator	Ut	MP S/W	32K	C	JZ	£3.00
Character Generator	Ut	Software for All	32K	C	KN	£4.95
Characters	Ut	Computer Concepts	16K	C	GJ	£6.67
Characters & Envelope Definer	Ut	Electronics Applied	32K	C	IF	£5.50
Chess	Gm	Bug Byte	32K	C	EA	£11.50
Claws	Ed	Bryants S/W	16K	C	HW	£3.75
Cards	Gm	Micro-Aid	16K	C	IZ	£2.95
Cobra/Robo-Swamp	Gm	Software for All	16K	C	KN	£6.95
Cobra/Robo-Swamp	Gm	Software for All	32K	C	KN	£6.95
Code Race	Gm	Computer Concepts	16K	C	GJ	£6.67
Code Race	Ut	Computer Concepts	32K	C	GJ	£6.67
Creative Graphic Pack	Ut	Acornsoft	16K	C	AL,GA	£9.95
Creative Graphics	Ut	Acornsoft	32K	C	AL,GA	£9.95
Crossed Words	Ed	Aztec S/W	16K	C	IB	£6.50
Data-Quiz	Ut	Bryants S/W	32K	C	HW	£4.88
Database	Bs	Computercat	16K	C	IJ	£11.95
Database	Bs	Software for All	16K	C	KN	£9.95
Defchr	Ut	Micro-Aid	16K	C	IZ	£2.95
Defender	Gm	Acornsoft	32K	C	AL,GA	£9.95
Desk Diary	Bs	Acornsoft	32K	C	AL,GA	£9.95
Desk Diary	Bs	Acornsoft	16K	C	AL	£9.95
Distances	Ed	Micro-Aid	32K	C	IZ	£2.95
Digital X-Word Compiler	Gm	N. Darwood	16K	C	JB	£6.00
DNA Replication	Ed	Garland Comp.	32K	C	JX	£17.65
Drawing	Ut	B.B.C.	16K	C	KB	£10.00
Early Learning	Ed	B.B.C.	16K	C	KB	£10.00
Early Numbers	Ed	Bryants S/W	32K	C	HW	£4.80
Early Warning	Gm	A&F Software	16K	C	GE	£6.00
Eldorado Gold	Gm	Program Power	32K	C	GK	£7.99
Firien Wood	Gm	MP S/W	32K	C	JZ	£6.50
Flags	Ed	Micro-Aid	16K	C	IZ	£2.95
Flush	Ut	Micro-Aid	16K	C	IZ	£1.00
Frenzy	Gm	Persoft	16K	C	IY	£5.75
FORTH	Ut	Acornsoft	32K	C	AL	£16.85
Fun Games	Gm	B.B.C.	16K	C	KB	£10.00
Galaxians	Gm	Superior S/W	32K	C	KH	£7.00
Game of Logic	Ed	N. Darwood	16K	C	JB	£8.00
Games of Strategy	Gm	B.B.C.	16K	C	KB	£10.00
Genetic Code	Ed	Garland Comp.	32K	C	JX	£17.65

SOFTWARE DEALERS

IS	Microcomputer Applications	DB	Mick Bignell
IT	I.J.K. Software	DC	Giltrole Ltd
IU	Aardvark Software	DD	Deep Thought Software
IV	James Hager	DE	Silversoft
IW	Simon Hessel Software	DF	Michael Orwin
IX	Mayday Software	DG	Hisoft
IY	Persoft	DH	The Soft Option
IZ	Micro-Aid	DJ	Microcomputer Spacedrome
JA	Hexagon Software	DK	Spider Software
JB	N. Darwood Ltd	DL	Xavier Business Systems
JC	Futura Software	DM	Camden Electronics
JE	Ultra-Tech Services	DN	Sumlock Electronic Services
JF	9 Franklin Road	DO	Microstyle
JG	Gary Smith	DP	Small Systems Engineering
JH	Aquarius Software	DQ	Woodland Software
JI	Precision Software Engineering	DR	Telesystems Ltd
JJ	Spectre Soft	DS	Macronics
JK	Cornhill Services	DT	Hewson Consultants
JM	Morris Associates (Computing)	DU	Silicon Office Services
JN	Terminal Software	DV	Sirton Computer Systems
JO	Mossoft Microcomputer Software	DW	Psion Ltd
		DX	JRS Software
JP	Romik	DY	Calisto Computers Ltd
JQ	David Computer Software	DZ	Micro Gen
JR	Creative Software	EA	Anglia Computer Centre
JS	Allrian Data Services	EB	SBD Software
JT	Apex Trading Ltd	EC	Abacus Software
JU	TX Software	ED	Qdos Business Software
JV	Hopesoft	EE	dK'tronics
JW	CT Software	EF	Computech Systems
JX	Garland Computing	EG	Electronics Experts
JY	Corona Software	EH	Artic Computing
JZ	MP Software & Services	EI	Knights TV & Computers
KA	Ludinski Computer-Assisted Learning	EJ	Microage Electronics
		EK	Holly Products
KB	B.B.C. Publications	EL	I O Systems
KC	Miking S/W	EM	Merton Electronics
KD	Inverse	EN	Davinci Computer Shop
KE	Alan Turnbull	EO	Calco Software
KF	Chromasoft	EP	Richard Francis
KG	Llamasoft	EQ	Microtek Ltd
KH	Superior Software	ER	Diskwise Ltd
KI	Earthshock Software	ES	Control Technology
KJ	Bridge Software	ET	Comp Shop
KK	ME&P Micro Products	EU	Micro Computer Prods
KL	Calpac Computer Software	EV	GW Computers
KM	KCET Software	EW	C/WP Computers
KN	Software for All	EX	Metrotech Mail Order
KO	Rucksoft	EY	Microsystems Ltd
DA	Ground Control	EZ	Superior Systems Ltd

Geography Italy	Ed	Corona S/W	32K	C	JY	£5.00
Ghost Maze	GM	Software for All	32K	C	HN	£6.95
Grand Prix	Gm	Software for All	32K	C	HN	£5.95
Golf	Gm	Bryants S/W	32K	C	HW	£4.88
Golf	Gm	Bug Byte	32K	C	GA,EA	£7.00
Graph and Charts Pack	Bs	Acornsoft	32K	C	AL,GA	£9.95
Graph and Charts Pack	Bs	Acornsoft	16K	C	AL,GA	£9.95
Great Britain Ltd	Gm	S.W. Hessel S/W	32K	C	IW	£5.95
Hangman	Gm	Aztec S/W	16K	C	IB	£5.50
Hangman	Gm	MP S/W	32K	C	JZ	£4.00
Home Accounts	Do	Persoft	32K	C	IY	£12.50
Home Finance	Do	B.B.C.	16K	C	KB	£10.00
Invaders	Gm	Superior S/W	32K	C	KH	£7.00
Invaders	Gm	Software for All	16K	C	KN	£6.95
Invaders	Gm	Hexagon S/W	16K	C	JA	£6.00
Invaders	Gm	MP S/W	32K	C	JZ	£6.50
Inheritance	Gm	S.W. Hessel S/W	32K	C	IW	£5.95
Inheritance	Ed	Garland Comp.	32K	C	JX	£34.70
J.R.	Gm	Software for All	32K	C	KN	£6.95
Jumbles	Ed	Bryants S/W	32K	C	HW	£4.88
Landfall & Serpent	Gm	GT Software	32K	C	JW	£6.50
Lisp	Ut	Acornsoft	32K	C	AL,GA	£16.85
Lisp	Ut	Acornsoft	16K	C	AL,GA	£16.85
Mailing A	Bs	Micro-aid	16K	C	IZ	£3.95
Mailing B	Bs	Micro-Aid	16K	C	IZ	£3.95
Micro Maths	Ed	LCL	16K	C	KA	£24.50
Maths Translation	Ed	Corona S/W	32K	C	JY	£5.00
Minefield	Gm	A&F Software	16K	C	GE	£6.00
Mission Impossible	Gm	Aztec S/W	16K	C	IB	£6.50
Mixed Games	Gm	I.J.K. S/W	16K	C	IT	£3.95
Model A Invaders	Gm	I.J.K. S/W	16K	C	IT	£4.95
Model B Invaders	Gm	I.J.K. S/W	32K	C	IT	£6.95
Money Box	Ed	Bryants S/W	32K	C	HW	£4.88
Monsters	Gm	Acornsoft	32K	C	AL,GA	£9.95
Monster Battles	Gm	Bryants S/W	32K	C	HW	£4.80
Multifile	Bs	Bug Byte	16K	C	EA	£25.00
Music	Do	B.B.C.	16K	C	KB	£10.00
Musical Numbers	Ed	Bryants S/W	32K	C	HW	£4.88
Musical Number Box	Gm	Bryants S/W	16K	C	HW	£3.75
Mutant Invaders	Gm	I.J.K. S/W	16K	C	IT	£5.95
MX 80 Type 3 Screen Dump	Ut	Software for All	16K	C	KN	£6.95
Othello	Gm	Computer Concepts	16K	C	GJ	£8.95
Othello	Gm	Computer Concepts	32K	C	GJ	£8.95
Othello	Gm	Computercat	16K	C	IJ	£8.95
Parity	Ed	N. Darwood	16K	C	JB	£6.00
Payroll	Bs	Micro-Aid	32K	C	IZ	£5.95
Payroll 2	Bs	Micro-Aid	32K	C	IZ	£5.95
Peeko Computer	Bs	Acornsoft	16K	C	AL,GA	£9.95
Picsave	Ut	Hexagon S/W	16K	C	JA	£6.00
Painting	Ut	B.B.C.	16K	C	KB	£10.00
Peeko Computer	Ut	Acornsoft	32K	C	AL,GA	£9.95
Procvar	Ut	Micro-Aid	16K	C	IZ	£1.95
Princess	Gm	Aztec S/W	16K	C	IB	£6.50
Punctuation	Ed	Bryants S/W	32K	C	HW	£4.88
Robot	Gm	Miking S/W	32K	C	KC	£4.95
Searchbas	Ut	Micro-Aid	16K	C	IZ	£1.95
Skwosh	Gm	Miking S/W	32K	C	KC	£3.95
Seed Germination	Ed	Garland Comp.	32K	C	JX	£18.82
Sheepdog Trials	Ed	Bryants S/W	32K	C	HW	£4.80
Shootout	Gm	MP S/W	32K	C	JZ	£5.00
Snake	Gm	Computer Concepts	32K	C	GJ	£6.67
Snapper	Gm	Acornsoft	32K	C	AL,GA	£9.95
Sort M/C	Ut	Micro-Aid	16K	C	IZ	£1.00
Sortbas	Ut	Micro-Aid	16K	C	IZ	£1.00
Soundplan	Ut	ME & P Products	16K	C	KK	£10.00
Spacefight	Gm	Miking S/W	32K	C	KC	£7.95
Space Warp	Gm	Bug Byte	32K	C	GA,EA	£11.50
Space Fighter	Gm	MP S/W	32K	C	JZ	£8.50
Space Fighter	Gm	Superior S/W	32K	C	KH	£7.00
Space Games Pack 1	Gm	Futura S/W	16K	C	JC	£3.99
Space Games Pack 2	Gm	Futura S/W	16K	C	JC	£3.99
Speechparts	Ed	Bryants S/W	32K	C	HW	£4.88
Squash	Gm	Aztec S/W	16K	C	IB	£5.50
Startrek/Candy Floss	Gm	I.J.K. S/W	16K	C	IT	£5.95
Star Treck	Gm	Hexagon S/W	16K	C	JA	£5.50
Statpack	Ed	Micro-Aid	32K	C	IZ	£7.95
Storybuilder	Ed	Bryants S/W	32K	C	HW	£4.88
Stats 1	Bs	ME & P Products	16K	C	KK	£15.00
Super Hangman	Gm	I.J.K. S/W	32K	C	IT	£3.95
Tables Test	Ed	Bryants S/W	32K	C	HW	£4.88
Teacher's Toolkit	Ed	Wida Software	32K	C	FY	£30.00
The Frog	Gm	James Hager	32K	C	IV	£6.50
3D Maze	Gm	I.J.K. S/W	32K	C	IT	£3.95
Touch Typist	Ed	Computercat	16K	C	IJ	£9.95
Towns of Britain	Ed	Aztec S/W	16K	C	IB	£6.50
The Computer Programme Programs Vol 2	Do	B.B.C	32K	C	KB	£10.00
The Computer Programme Programs Vol 1	Do	B.B.C.	16K	C	KB	£10.00
Threed OXO	Gm	Micro-Aid	16K	C	IZ	£2.50
3-D Maze	Gm	Hexagon S/W	16K	C	JA	£6.00
3D Maze	Gm	Earthshock S/W	16K	L	KI	£3.00
Utility A	Ut	Micro-Aid	16K	C	IZ	£4.95
Valley, The	Gm	CT Software	32K	C	PF	£9.95
Varkman/Meanies	Gm	Aardvark Software	16K	C	IU	£4.00
Water Relations of Plant Cells	Ed	Garland Comp.	32K	C	JX	£18.82
Wordwise	Gm	Computer Concepts	32K	C	GJ	£74.75

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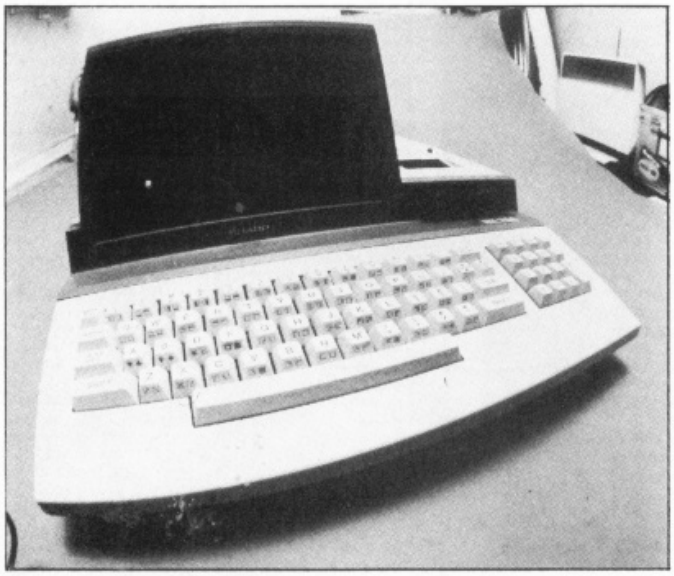
3-D Basic	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Address Book	Gm	Highlight S/W	4K	C	CC,AB	£4.60
Agent 007	Gm	DCS	24K	C	JQ	£3.00
Aladdin's Cave	Gm	Kuma		C	AX,CH	£6.32
Aldebaren I	Gm	Sharpsoft	20K	C	CH	£5.85
Alien Attack	Gm	J Wolsencroft	24K	C	CZ	£4.60
Analysis Book	Bs	Microtek	48K	C	EQ	£95.00
Animate	Gm	Kuma	48K	C	AX,AB,AO	£9.20
Apollo Front Panel	Bs	Kuma	20K	C	AX	£14.35
Apolloword	Bs	Kuma	48K	C	AX,AC,AO	£28.70
Apolloword	Bs	Kuma	48K	D	AX,AC,AO	£63.25
Ardensoft Toolkit	Ut	Kuma	20K	C	AX	£40.25
Artillery/Biorythms	Gm	DCS	24K	C	JQ	£3.00
Asteroids	Gm	Sharpsoft	20K	C	CH	£5.85
Astro Dodge	Gm	Kuma		C	AX,CH	£6.32
Auto Cross	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Backgammon	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Bank Account	Do	Highlight S/W	6K	C	CC,AB	£4.60
Basic Compiler	Ut	Sharp	48K	C	AB	£34.50
Basic Extensions	Ut	Kuma	20K	C	AX,AO,AB	£14.95
Basic Plus	Ut	Kuma		C	AX	£13.80
Battleships	Gm	DCS	24K	C	JQ	£3.00
Bean Feast	Gm	DCS	24K	C	JQ	£3.00
Bio-Rhythm	Gm	Highlight S/W	6K	C	CC,AB	4.60
Block QC	Gm	Sharpsoft	20K	C	AB	£3.50
Block Stop	Gm	J Wolstencroft	24K	C	CZ	£4.60
Blockade	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Bomber	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Breakout	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Breakout	Gm	Sharpsoft	20K	C	AB	£5.75
Bridge	Gm	Highlight S/W	22K	C	CC	£12.95
Brownian Motion	Ed	Kuma		C	AX	£12.00
CPM	Ut	Chrystal	48K	C	AX,AO	£172.50
Calc II	Bs	Kuma	20K	C	AX,AO,FZ	£39.65
Camelot	Gm	Kuma	48K	C	AX,AC,AB AO,FZ	£6.32
Carols	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Cash Book	Bs	Microtek	48K	C	EQ	£95.00
Casino	Gm	Kuma		C	AX	£6.32
Catch 2000/Invader	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Cesil III	Ed	Kuma	20K	C	AX	£17.20
Chase	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Chess	Gm	Kuma	12K	C	AX,AO,FZ,CH	£12.00
Children's Maths	Ed	Kuma		C	AX	£6.32
Chrystal Basic	Ut	Chrystal	48K	C	AX,AO	£46.00
Colditz	Gm	Sharpsoft	20K	C	CH	£8.46
Combat	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Combat	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Commands	Gm	Sharpsoft	20K	C	AB	£5.85
Composer	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Concentration	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Connect 4	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Connect Four	Gm	DCS	24K	C	JQ	£3.00
Cosmiad	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Cosmiad	Gm	Kuma	12K	C	AX,AC,AO,AB	£9.20
Count and Add	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Cribbage	Gm	Kuma	12K	C	AX,AO	£12.00
Cricket	Gm	Kuma		C	AX	£6.32
Cursed Chambers	Gm	J Wolstencroft	48K	C	CZ	£5.75
Data Base	Bs	Kuma	48K	C	AX,AO	£33.95
Data File	Gm	Gamer	48K	C	CZ	£29.95
Deferment Allowances	Bs	DCS	32K	C	JQ	£3.00
Demons Castle	Gm	DCS	48K	C	JQ	£3.00
Demon Drive	Gm	DCS	24K	C	JQ	£3.00
Disassembler	Ut	Kuma	20K	C	AX,AO,AB	£12.00
Donky Derby	Gm	Kuma	12K	C	AX,AO,AB	£6.32
Double Precision Basic	Ut	Sharp	48K	C	AB	£28.75
Double Precision Basic	Ut	Sharp	48K	D	AX	£46.00
Drunken Driver	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Dybug	Ut	Kuma		C	AX	£16.65
Editor Assembler	Ut	Sharp	48K	C	AB	£15.50
Editor Assembler	Ut	Sharp	48K	D	AX	£51.75
Election '84	Gm	Sharpsoft	20K	C	CH	£8.45
Electronic Organ	Gm	Kuma	12K	C	AX	£6.32
Electrons I	Ed	Kuma		C	AX	£12.00
Electrons II	Ed	Kuma		C	AX	£12.00
Empire II	Gm	Sharpsoft	20K	C	AB	£5.85
Enigma	Gm	Kuma	12K	C	AX	£6.32
Escape Forth	Gm	J Wolstencroft	24K	C	CZ	£4.60
Evasion	Gm	Kuma	6K	C	AX,AO	£6.32
Executive	Gm	Kuma	6K	C	AX,AB	£9.20
Exploring Africa	Gm	Kuma	6K	C	AX,AB	£6.32
F DOS	Ut	Sharp	48K	C	AB	£57.50
Fall Out	Gm	Kuma	6K	C	AX,AO	£6.32
Fireballs	Gm	Kuma	6K	C	AX,AB	£6.32
Football Manager	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Forth	Ut	Kuma		C	AX	£40.20
Foundry Package	Bs	Microtek	48K	C	EQ	POA
Four in a Row	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Fox and Geese	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Fruit Machine	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Full Accounting	Bs	Microtek	48K	C	EQ	POA
Guess Word	Gm	Kuma	6K	C	AX,AB	£6.32
Hangman	Gm	Kuma	6K	C	AX,AO,AB	£6.32

REFERENCE

SOFTWARE LISTING

SHARP

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Head On	Gm	Highlight S/W	10K	C	CC,AB	£6.90
Head On	Gm	Kuma	6K	C	AX,AO,AB	£6.32
Head On	Gm	Sharpsoft	20K	C	CH	£5.85
Hissing Sid	Gm	Kuma		C	AX	£6.32
Home Budget I	Do	Kuma	6K	C	AX,AC,AO,AB	£6.32
Hunter Killer	Gm	Kuma	48K	C	AX,AB	£6.32
I Spy	Ed	Highlight S/W	22K	C	CC	£5.75
Instant Addition And The Four Rules	Ed	Kuma		C	AX	£6.32
Intruder	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Invaders	Gm	Kuma	20K	C	FZ	£6.30
J S Line 4	Gm	Kuma	48K	C	AX,AB	£6.32
Junior Maths and Stepping Stones	Ed	Kuma		C	AX	£6.32
Juntori	Gm	Sharpsoft	20K	C	AB	£5.85
Kentucky Derby	Gm	Kuma		C	AX	£6.32
Knights Commander	Ut	Knights	48K	C	AX	£28.75
Khights Commander	Ut	Knights	48K	D	AX	£74.75
Knights Fortran	Ut	Knights	48K	C	AX	£34.50
Knights Wee Pascal	Ut	Knights	48K	C	AX	£23.00
Large Display	Gm	Kuma	48K	C	AX	£6.32
Las Vegas	Gm	Sharpsoft	20K	C	AB	£5.85
Life	Gm	Kuma	48K	C	AX,AO,AB	£9.20
Lunar	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Lunar Lander	Gm	Kuma	48K	C	AX,AO,AB	£6.32
MZ Othello	Gm	Kuma	48K	C	AX	£12.00
Madness	Gm	J Wolstencroft	24K	C	CZ	£4.60
Maniac	Gm	Highlight S/W	6K	C	CC,AB	£5.75
Map of England	Gm	Kuma	48K	C	AO	£6.32
Map of Englad	Gm	Kuma	48K	D	AX	£12.00
Mastermind	Gm	Highlight S/W	6K	C	CC,AB	£4.60
Mastermind	Gm	Kuma	48K	C	AX,AO,FZ,AB	£6.32
Match the Character	Ed	Highlight S/W	22K	C	CC,AB	£4.60
Match the Word	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Maths	Ed	Highlight S/W	22K	C	CC	£5.75
Melody	Gm	Kuma	48K	C	AX	£6.32
Memory Tests	Ut	Kuma	20K	C	AX,AO,AB	£6.32
Minefield	Gm	Kuma	48K	C	AX	£6.32
Miz-Maze	Gm	Kuma	48K	C	AX,AO	£6.32
Monkey Climb	Gm	Kuma	48K	C	AX,AO	£6.32
Moonlander	Gm	Highlight S/W	10K	C	CC,AB	£5.75
Mortar Attack	Gm	Kuma	48K	C	AX,AO	£6.32
Music Composer/Editor	Ed	Kuma	48K	C	AX,AC,AB	£12.00
Narpex	Ed	Kuma		C	AX	£28.70
Newton/Conservation	Ed	Kuma		C	AX	£12.00
Pac Man	Gm	Kuma		C	AX	£9.20
Pascal	Ut	Sharp	48K	C	AB	£34.50
Patience	Gm	Kuma	48K	C	AX,AO	£6.32
Payroll	Bs	Microtek	48K	C	EQ	£65.00
Payroll	Bs	Tridata	48K	D	ID	£170.00
Picture Count	Ed	Highlight S/W	22K	C	CC,AB	£5.75
Pilot	Ut	Kuma		C	AX	£17.25
Poker	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Pontoon	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Poseidon	Gm	Highlight S/W	6K	C	CC, AB	£5.75
Princess & Monster Maze	Gm	Kuma	48K	C	AX,AB	£6.32
Program Filing Index	Bs	Kuma	20K	C	AX	£6.32
Quadrax	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Quest	Gm	J Wolstencroft	48K	C	CZ	£4.60
Race Track	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Racing	Gm	Kuma	48K	C	AX	£6.32
Raider	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Reactor	Gm	Kuma	48K	C	AX,AB	£6.32
Rhymes	Gm	Kuma	48K	C	AX,AB	£6.32
Road Hunter	Gm	Kuma	48K	C	AX,AO,AB	£6.32
Rocket	Ed	Kuma		C	AX	£6.32
Tank Wall	Gm	Kuma	48K	C	AX,AO	£6.32
Tenpin Bowling	Gm	Kuma	48K	C	AX,AO	£6.32
Timetabling Aid	Ed	Kuma	20K	C	AX	£22.45
Towering Inferno	Gm	Sharpsoft	20K	C	CH,AB	£5.85
Towers of Hanoi	Gm	Kuma	48K	C	AX	£6.32
Track Layer	Gm	Kuma	48K	C	AX,CH	£6.32
Trader Smith	Gm	Kuma	48K	C	AB	£6.32
Tycoon	Gm	Kuma	48K	C	AX,AO	£6.32
UFO	Gm	Kuma	6K	C	AX,AC	£6.32
Waves I	Ed	Kuma		C	AX	£12.00
Waves II	Ed	Kuma		C	AX	£12.00
Wordpro	Bs	Kuma	48K	C	AX,AC	£45.45
Wordpro	Bs	Kuma	48K	C	AX,AC	£91.95
Zen Dos	Ut	Kuma	4K	C	AX	£66.16
Zen Editor Assembler	Ut	Kuma	20K	C	AX,AO,AB	£22.45
Zenmod	Ut	Kuma	4K	C	AX,AB	£12.00



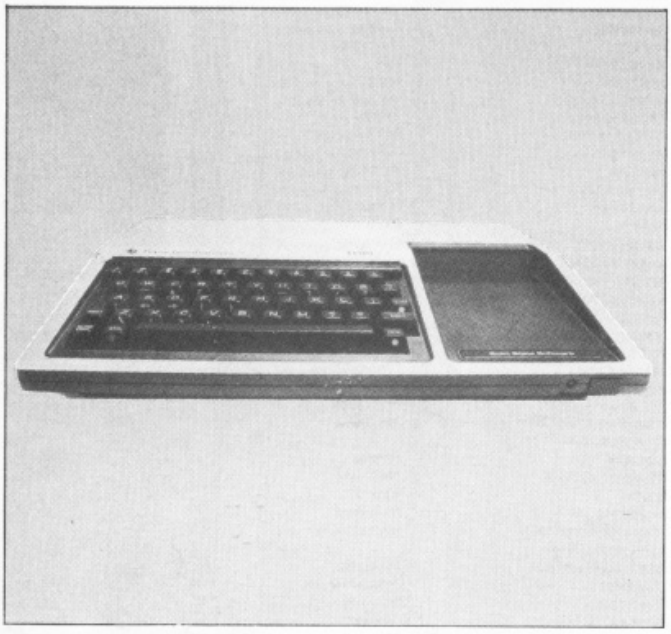
TANDY COLOUR

Alcatraz II	Gm	Spectral Assoc	16K	C	IA	£8.95
Artillery	Gm	Spectral Assoc	16K	C	IA	£7.95
Battlefleet	Gm	Spectral Assoc	16K	C	IA	£13.95
Black Sanctum	Gm	Mark Data Prods.	16K	C	IA	£17.50
Bugoutc Monitor	Ut	Spectral Assoc	4K	C	IA	£19.95
Calixto Island	Gm	Mark Data Prods.	16K	C	IA	£17.50
Cave Hunter	Gm	Mark Data Prods.	16K	C	IA	£19.95
Chromasette	Gm	Cload Inc	16K	C	IA	£5.95
Color Beserk	Gm	Mark Data Prods.	16K	C	IA	£19.95
Colour Invaders	Gm	Spectral Assoc	16K	C	IA	£19.95
Compuvoice	Ut	Spectral Assoc	16K	C	IA	£44.95
Croid	Gm	Spectral Assoc	16K	C	IA	£11.95
Editor Assembler	Ut	Spectral Assoc	16K	C	IA	£34.95
Game Of Life	Gm	Spectral Assoc	16K	C	IA	£13.95
Graphic Animator	Gm	Spectral Assoc	4K	C	IA	£9.95
Laser Command	Gm	Spectral Assoc	16K	C	IA	£9.95
Lothars Labyrinth	Gm	Spectral Assoc	16K	C	IA	£13.95
Madness & Minotaur	Gm	Spectral Assoc	16K	C	IA	£17.95
Magic Box	Ut	Spectral Assoc	16K	C	IA	£24.95
Magikube	Gm	Computer Ware	16K	C	IA	£17.50
Mazerace	Gm	Computer Ware	16K	C	IA	£14.95
Meteoroids	Gm	Spectral Assoc	16K	C	IA	£19.95
Scarfman	Gm	Cornsoft	4K	C	IA	£11.95
Secs	Ut	Datasoft	16K	C	IA	£19.95
Sigmon	Ut	Datasoft	16K	C	IA	£19.95
Sound Source	Ut	Spectral Assoc	16K	C	IA	£24.95
Space Traders	Gm	Spectral Assoc	16K	C	IA	£13.95
Space War	Gm	Spectral Assoc	16K	C	IA	£19.95
Storm	Gm	Computer Ware	16K	C	IA	£19.95
Sub Hunt	Gm	Spectral Assoc	16K	C	IA	£13.95
3D Drawing Board	Gm	Computer Ware	16K	C	IA	£19.95
Typing Teacher	Gm	Spectral Assoc	16K	C	IA	£19.95
Voyager	Gm	Avalon Hill	16K	C	IA	£14.95

TEXAS

3D O's and X's/Mastermind	Gm	Apex S/W	16K	C	JT	£4.95
A-Maz-Ing	Gm	Texas	8K	R	AB,CH	£24.00
Addition, Subtraction I	Ed	Texas	8K	R	AB	£35.00
Addition, Subtraction II	Ed	Texas	8K	R	AB	£35.00
Attack	Gm	Texas	8K	R	AB	£30.00
Adventure Land	Gm	Texas	8K	C	AB	£24.95
Battlefront	Gm	TX Software	16K	C	JU	£6.00
Beginning Grammar	Ed	Texas	8K	R	AB	£20.00
Blackjack Poker	Gm	Texas	8K	R	AB	£24.00
Blasto	Gm	Texas	8K	R	AB	£25.00
Car Wars	Gm	Texas	8K	R	AB,CH	£25.00
Chequebook Manager	Bs	Texas Max	16K	D	AB	£19.00
Chess File	Gm	TX Software	16K	C	JU	£6.00
Connect 4	Gm	Texas	8K	R	AB	£24.00
Early Reading	Ed	Texas	8K	R	AB	£35.00
Editor Assembler	Ut	Texas	8K	R	AB	£115.00
Electrical Eng'g Library	Bs	Texas Max	16K	C	AB	£24.00
Electrical Eng'g Library	Bs	Texas Max	16K	D	AB	£35.00
Extended Basic	Bs	Texas	8K	R	AB	£100.00

Four in a Row	Gm	TX Software	16K	C	JU	£6.00
Gamestape 1	Gm	Apex S/W	16K	C	JT	£1.95
Gamestape 2	Gm	Apex S/W	16K	C	JT	£3.95
Gamestape 3	Gm	Apex S/W	16K	C	JT	£4.95
Ghost Town	Gm	Texas	8K	C	AB	£24.95
Golden Voyage	Gm	Texas	8K	C	AB	£24.95
Golf	Gm	TX Software	16K	C	JU	£6.00
Graphing Package	Do	Texas Max	16K	C	AB	£14.00
Graphing Package	Do	Texas Max	16K	D	AB	£19.00
Hangman	Gm	Texas	8K	R	AB	£24.00
Haunted House	Gm	Apex S/W	16K	C	JT	£5.95
Household Money Management	Do	Texas	8K	R	AB	£25.00
Hunt The Wumpus	Gm	Texas	8K	R	AB,CH	£25.00
Hustle	Gm	Texas	8K	R	AB	£30.00
Lunar Lander	Gm	Apex S/W	16K	C	JT	£4.95
Mailing List	Bs	Texas Max	16K	D	AB	£60.00
Market Simulation	Bs	Texas	32K	C	AB	£9.00
Market Simulation	Bs	Texas	32K	D	AB	£19.00
Maths Routine Library	Ed	Texas Max	16K	C	AB	£24.00
Maths Routine Library	Ed	Texas Max	16K	D	AB	£35.00
Maze/Towers of Hanoi	Gm	Apex S/W	16K	C	JT	£5.95
Mind Challenges	Gm	Texas	16K	R	CH	£24.95
Minimemory	Ut	Texas	8K	R	AB	£89.95
Minimemory	Ut	Texas	8K	C	C	£89.95
Mission Impossible	Gm	Texas	8K	C	AB	£24.95
Multiplication	Ed	Texas	8K	R	AB	£35.00
Munchman	Gm	Texas	8K	R	AB	£29.95
Music Makers	Do	Texas	8K	R	AB	£35.00
Music Maker	Ed	Texas	16K	D	AB	£14.00
Music Skills Trainer	Ed	Texas Max	16K	C	AB	£19.00
Music Skills Trainer	Ed	Texas Max	16K	D	AB	£24.00
Mystery Funhouse	Gm	Texas	8K	C	AB	£24.95
Nim/O's and X's	Gm	Apex S/W	16K	C	JT	£4.95
Number Magic	Ed	Texas	8K	R	AB	£18.00
Oldies but Goodies	Gm	Texas Max	16K	C	AB	£9.00
Oldies but Goodies	Gm	Texas Max	16K	D	AB	£14.00
Othello	Gm	Texas	8K	R	AB	£40.00
Personal Financial Aid	Do	Texas	8K	C	AB	£9.95
Personal Record Keeping	Do	Texas	8K	R	AB	£50.00
Personal Report Generator	Do	Texas	8K	R	AB	£70.00
Physical Fitness	Do	Texas	8K	R	AB	£20.00
Pirate Adventure	Gm	Texas	8K	R	AB	£39.95
Pre-School Learning Fun	Ed	Texas	8K	R	AB	£17.00
Programming Aids I	Ut	Texas	16K	C	AB	£9.00
Programming Aids I	Ut	Texas	16K	D	AB	£14.00
Programming Aids II	Ut	Texas	16K	D	AB	£24.00
Programming Aids III	Ut	Texas	16K	D	AB	£19.00
Pyramid of Doom	Gm	Texas	8K	C	AB	£24.95
Roulette/Craps	Gm	Apex S/W	16K	C	JT	£4.95
Savage Island I	Gm	Texas	8K	C	AB	£29.95
Savage Island II	Gm	Texas	8K	C	AB	£29.95
Saturday Night Bingo	Gm	Texas Max	16k	C	AB	£14.00



Soccer	Gm	Texas	8K	R	AB,CH	£30.00
Sorcerers Castle	Gm	Apex S/W	16K	C	JT	£5.95
Speech Editor	Ut	Texas	8K	R	AB	£35.00
Statistics	Do	Texas	8K	R	AB	£45.00
Strange Odyssey	Gm	Texas	8K	C	AB	£24.95
Structural Eng'g Library	Bs	Texas	16	C	AB	£24.00
Structural Eng'g Library	Bs	Texas Max	16K	D	AB	£35.00
TI Logo	Ut	Texas	48K	R	AB	£160.00
TI Invaders	Gm	Texas	8K	R	AB,CH	£40.00
TI Trek	Gm	Texas Max	16K	D	AB	£14.00
Teach Yourself Extended Basic	Ed	Texas	32K	C	AB	£20.00
Teach Yourself Extended Basic	Ed	Texas	32K	D	AB	£29.00
Teach Yourself Basic	Ed	Texas	32K	C	AB	£30.00
Teach Yourself Basic	Ed	Texas	32K	D	AB	£40.00
Terminal Emulator	Ut	Texas	8K	R	AB	£57.00
The Count	Gm	Texas	8K	C	AB	£24.95
Tombstone City	Gm	Texas	8K	R	AB,CH	£40.00
Tunnels of Doom	Gm	Texas	8K	R	AB,CH	£40.00
UCSD PASCAL 4	Ut	Texas	48K	D	AB	£380.00
US Football	Gm	Texas	8K	R	AB	£24.00
Video Chess	Gm	Texas	8K	R	AB,CH	£50.00
Video Games I	Gm	Texas	8K	R	AB,CH	£25.00
Video Games II	Gm	Texas	8K	R	AB	£25.00
Voodoo Castle	Gm	Texas	8K	C	AB	£24.95
Yahtzee	Gm	Texas	8K	R	AB	£30.00
Zero Zap	Gm	Texas	8K	R	AB	£24.00

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A-Maz-Ing	Gm	Molimerx	4K	C	AJ	£6.33
Acquire	Gm	Avalon Hill	16K	C	IA	£13.95
Adventure I	Gm	Adventure Int.	16K		AJ	£13.77
Adventure III	Gm	Adventure Int.	16K	C	AJ	£13.77
Adventure III	Gm	Adventure Int.	16K	D	AJ	£13.77
Adventures No I	Gm	Cload Inc	16K	C	IA	£11.95
Advanced Programming Aid	Ut	Kansas	16K	C	IH	£12.50
Adventureland	Gm	Adventure Int.	16K	C	IS	£12.50
					AJ	£18.99
Adventure Mysterious	Gm	Adventure Int.	16K	C	AJ	£10.06
Adventure Mysterious	Gm	Adventure Int.	32K	D	AJ	£13.50
Air Raid	Gm	MA	16K	C	IS	£7.50
Air Traffic Control	Gm	MA	16K	C	IS	£9.50
Airflight Simulation	Gm	Instant S/W	16K	C	GB,AB	£9.95
Airmail Pilot	Gm	Instant S/W	16K	C	GB,AB	£8.50
Ajedit	Bs	Molimerx	32K	C	AJ	£49.95
Aladdin	Ed	Bryants S/W	16K	C	HW	£3.75
Alien Armada	Gm	Molimerx	16K	C	IS	£11.50
					AJ	£10.06
Alien Armada	Gm	Molimerx	32K	D	AJ	£13.23
Alien Attack Force	Gm	Instant S/W	16K	C	GB,AB	£8.50
Alien Attack	Gm	Kansas	16K	C	IH	£9.50
Alien Defence	Gm	Soft Sector Mkting	16K	C	IS	£11.50
					GB	£15.50
Alien Defence	Gm	Soft Sector Mkting	16K	D	IA	£11.95
All Stars	Gm	Instant S/W	16K	D	GB	£26.50
					AB	£28.95
All Turret Gunner	Gm	Instant S/W	16K	C	GB,AB	£8.50
Amateur Log	Ut	Molimerx	32K	D	AJ	£18.40
Amazing Maze						
Touchdown	Gm	Kansas	16K	C	IH	£7.50
Angel Worms	Gm	Adventure Int.	8K	C	AB	£14.35
Animation	Ut	Molimerx	16K	C	AJ	£17.20
Animation	Ut	Molimerx	32K	D	AJ	£20.65
Android Nim	Gm	Molimerx	16K	C	IS	£7.50
					AJ	£10.06
Arcade Invaders	Gm	Kansas	16K	C	IH	£9.50
Arcade Scramble	Gm	Kansas	16K	C	IH	£9.50
Armoured Patrol	Gm	Adventure Int.	16K	C	IS	£15.00
					GB	£15.00
Armoured Patrol	Gm	Adventure Int.	16K	D	AB	£18.99
Ascertain	Ut	Kansas	16K	C	IH	£6.25
Assembly Package	Ut	Molimerx	32K	D	AJ	£74.75
Asteroids	Gm	Molimerx	16K	C	AJ	£10.06
Asteroids	Gm	Molimerx	32K	D	AJ	£13.50
Astro Navigator	Gm	Molimerx	16K	C	AJ	£14.95
Astroball	Gm	Molimerx	16K	C	AJ	£13.77
Astrolog	Ed	Molimerx	16K	C	AJ	£10.93
Astronomical Calendar	Ed	Molimerx	16K	C	AJ	£10.93
Asylum	Gm	Med Systems	16K	C	IS	£9.50
					BT	£12.00
Atlantian Odyssey	Gm	Guild	16K	C	IS	£11.50
					GB	£19.75
Atlantian Odyssey	Gm	Guild		D	GB	£21.50
					GB,BT	£10.95
Attack Force	Gm	Big 5 S/W	16K	C	IS	£11.50
BI Nuclear Bomber	Gm	Instant S/W	16K	C	GB	£12.50
					BT	£12.95
BQ81	Bs	Baust Computing	48K	D	HA	£79.95
Back 40	Gm	Molimerx	16K	C	AJ	£10.06

SOFTWARE LISTING

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Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Back 40	Gm	Molimerx	32K	D	AJ	£13.50
Back 40 III	Gm	Adventure Int.	16K	C	AB	£14.35
Backgammon	Gm	Adventure Int.	16K	C	IS	£7.50
					AB	£7.99
Backgammon	Gm	Kansas	16K	C	IH	£8.50
Balrog Sampler	Gm	Adventure Int.	16K	D	AB	£33.70
Bandito	Gm	Acorn	16K	C	AJ	£7.49
Barricade	Gm	MA	16K	C	IS	7.50
Bandit/Maze Chase	Gm	Kansas	16K	C	IH	£7.50
Banner	Ut	Kansas	16K	C	IH	£7.50
Basic Bidding	Gm	Bryants S/W	16K	C	HW	£9.00
Basic Compiler Accel.	Ut	Microsoft	16K	C	AJ	£22.94
Basic Compiler Accel. 3	Ut	Microsoft	16K	C	AJ	£45.95
Basic Compiler Accel. 3	Ut	Microsoft	16K	D	AJ	£49.95
Basic Insert	Ut	Molimerx	16K	C	AJ	£10.95
Basic Insert	Ut	Molimerx	32K	D	AJ	£14.39
Basic Programming System	Ut	Instant S/W	16K	C	AB	£12.50
Basketball	Gm	Molimerx	16K	C	AJ	£10.95
Basketball	Gm	Molimerx	32K	D	AJ	£14.39
Battle Bastogne	Gm	MA	16K	C	IS	10.50
Battle St. Vith	Gm	MA	16K	C	IS	10.50
Battle of Britain	Gm	Molimerx	16K	C	AJ	£15.55
Battle Ground	Gm	Instant S/W	16K	C	GB,AB	£8.50
Bearings	Ed	Bryants S/W	16K	C	HW	£3.75
Bedchest III	Gm	Adventure Int.	16K	C	AB	£20:95
Beewary	Gm	Molimerx	16K	C	IS	£7.50
					AJ	£10.06
Beginner's Russian	Ed	Instant S/W	16K	C	GB,AB	£8.50
Biorhythm	Ed	Molimerx	16K	C	AJ	£8.63
Biorhythms	Do	Kansas	16K	C	IH	£7.50
B-I Nuclear Bomber	Gm	Avalon Hill	16K	C	IA	£11.95
Blackboard	Ut	Molimerx	16K	C	AJ	£10.06
Blackjack Master	Gm	Molimerx	16K	C	AJ	£21.15
Blackjack Master	Gm	Molimerx	32K	D	AJ	£25.42
Blink 1	Ut	Molimerx	32K	D	AJ	£17.00
Blockade	Gm	Molimerx	16K	C	AJ	£7.48
Bradley Estate Mystery	Gm	Ogre	16K	C	IC	£10.00
Bridge Partner	Gm	MA	16K	C	IS	£13.50
Bridge 2.0	Gm	MA	16K	C	IS	£13.50
Bright & Early	Ed	Molimerx	16K	C	AJ	£8.90
Build High						
Knights Tour	Gm	Kansas	16K	C	IH	£7.50
Business Analysis	Bs	Instant S/W	16K	C	GB	£59.25
Business Analysis	Bs	Instant S/W	16K	D	GB,AB	£82.00
Buzzword	Ed	Molimerx	16K	C	AJ	£5.75
Byte Saver	Ut	Kansas	16K	C	IH	£6.25
CTN Stock	Bs	Baust Computing	48K	D	HA	£79.00
Calendar	Ut	Molimerx	16K	C	AJ	£10.29
Car Doctor	Do	Kansas	16K	C	IH	£7.50
Cash Register	Bs	Molimerx	16K	C	AJ	£10.29
Catalogue	Do	Bryants S/W	16K	C	HW	£3.75
Character and Monster Generator	Gm	Ogre	16K	C	IC	£12.00
Checker King	Gm	Personal S/W	16K	C	AJ	£16.10
Chemical Formulae	Ed	Molimerx	16K	C	AJ	£10.95
Cheque Book	Dm	Molimerx	16K	C	AJ	£15.53
Chess Partner	Gm	MA	16K	C	IS	£9.50
Claws	Ed	Bryants S/W	16K	C	HW	£3.75
City Encounters	Ut	Molimerx	16K	C	AJ	£17.20
Climate Comp	Bs	Instant S/W	16K		AB	£20.50
Cload Cassette	Gm	Cload Inc	16K	C	IA	£5.75
Cloze	Ed	Bryants S/W	16K	C	HW	£3.75
Code Breaker	Gm	Molimerx	16K	C	AJ	£7.49
Combat	Gm	Adventure Int.	16K	C	AB	£12.50
Company Director	Gm	Molimerx	16K	C	AJ	£17.19
Compression Utility	Ut	Instant S/W	16K	C	GB	£15.75
					AB	£16.50
Comproc	Ut	Molimerx	16K	C	AJ	£15.80
Comput-A-Organ	Ed	Molimerx	16K	C	AJ	£6.85
Computer Acquire	Gm	Adventure Int.	16K	C	IA	£10.15
Computer Acquire	Gm	Avalon Hill	16K	C	IA	£17.25
Computer Pools	Do	Molimerx	16K	C	AJ	£16.68
Conflict	Gm	MA	16K	C	IS	£10.50
Conflict 2500	Gm	Avalon Hill	16K	C	IA	£12.95
Consequest of Chester Wood	Gm	Adventure Int.	16K	C	AB	£18.99
Constellation	Ed	Molimerx	16K	C	AJ	£14.30
Constellation	Ed	Molimerx	32K	D	AJ	£17.83
Conv/CPM	Ut	Molimerx	32K	D	AJ	£20.70
Convoy Raider	Gm	Avalon Hill		C	IA	£10.95
Cop 16K	Ut	Molimerx	16K	C	AJ	£12.95
Copsys	Ut	Molimerx	16K	C	AJ	£12.95
Corplan	Gm	Molimerx	16K	C	AJ	£32.79
Cosmic Fighter	Gm	Big 5 S/W		C	IA	£10.95
Cosmic Fighter	Gm	MA	16K	C	IS	£11.50
Cosmic Patrol	Gm	Instant S/W	16K	C	GB,AB	£12.50
Cosmic Patrol	Gm	Instant S/W	16K	D	GB,AB	£16.25
Cowboys	Gm	P.C.S.	8K	C	IE	£4.25
Creole Lobster Catcher	Gm	Molimerx	16K	C	AJ	£10.06
Cribbage Player	Gm	MA	16K	C	IS	£9.50
Cribbage	Gm	Molimerx	16K	C	AJ	£14.38
Crocodiles	Ed	Bryants S/W	16K	C	HW	£3.75
Cross Reference	Bs	Molimerx	16K	C	AJ	£8.45
Crowley Manor	Gm	MA	16K	C	IS	£15.00
Crown of CWL IMDRAS part I	Gm	Ogre	16K	C	IC	£10.00
Crown of CWL IMDRAS part 2	Gm	Ogre	16K	C	IC	£10.00
Crusaders	Gm	Molimerx	16K	C	AJ	£13.51
Cube Hunt	Gm	Molimerx	16K	C	AJ	£10.35
DLDIS	Ut	Instant S/W	16K	D	GB	£15.50
					AB	£16.50
DSM	Ut	Racet Computers	32K	D	AJ	£46.00
D-Day	Gm	MA	16K	C	IS	£10.50
Danger in Orbit	Gm	Instant S/W	16K	C	AB	£12.50
Danger in Orbit	Gm	Instant S/W	16K	D	GB	£15.50
Daredevil	Gm	Instant S/W	16K	C	IA	£8.50
Dark Void	Gm	Molimerx	16K	C	AJ	£10.06
Darts	Gm	Molimerx	16K	C	AJ	£10.06
Data Base Management	Bs	Hubert Howe	32K	C	AJ	£28.75
Data Base Management	Bs	Hubert Howe	32K	D	AJ	£32.20
Datadisk	Bs	Kansas	32K	D	IH	£24.50
Data File	Bs	Kansas	16K	C	IH	£9.50
Datestone of Ryn	Gm	Automated Simulation	16K	C	GB	£13.50
Datestone of Ryn	Gm	Automated Simulation	16K	C	IS	£14.50
Dataquiz	Ut	Bryants S/W	16K	C	HW	£3.75
Day of the Week	Bs	Molimerx	4K	C	AJ	£5.75
Death Dreadnaught	Gm	MA	16K	C	IS	£10.50
Deathmaze	Gm	MA	16K	C	IS	£10.50
Deathmaze 5000	Gm	Med Systems	16K	C	IA	£10.95
Decision Master	Ut	Sytonic S/W	32K	D	GB	£35.50
Decimal Dan	Ed	Bryants S/W	16K	C	HW	£3.75
Defence Command	Gm	Big 5 S/W	16K	C	IS	£11.50
					GB,BT	£10.95
Defend	Gm	Molimerx	16K	C	AJ,CH	£14.95
Defend	Gm	Molimerx	32K	D	AJ	£18.40
Deflections	Gm	Adventure Int.	8K	C	AB	£14.35
Delay	Ut	Kansas	16K	C	IH	£6.25
Demo II	Gm	Instant S/W	16K	C	IE	£6.50
Descriptive Statistics	Bs	Molimerx	16K	C	AJ	£15.40
Differential Equations	Bs	Molimerx	16K	C	AJ	£16.10
Direction Finder	Ed	Molimerx	16K	C	AJ	£15.40
Disassembler	Ut	Molimerx	16K	C	AJ	£10.35
Disassembler	Ut	Buy Byte	16K	C	GB	£8.25
					AB	£8.50
Diassembler	Ut	Kansas	16K	C	IH	£8.50
Disc Directory	Ut	Molimerx	32K	D	AJ	£20.13
Disc Editor	Ut	Instant S/W	16K	D	GB	£30.50
Disc Scope	Ut	Instant S/W	16K	D	GB	£15.50
Discaid	Ut	Molimerx	32K	D	AJ	£19.49
Discator	Ut	Molimerx	32K	D	AJ	£29.90
Dnieper River Line	Gm	Avalon Hill	32K	C	IA	£12.95
Dnieper River Line	Gm	Avalon Hill	32K	D	IA	£17.55
Doctor Chips	Gm	Instant S/W	16K	C	GB	£12.50
Doctor Chips	Gm	Instant S/W	16K	D	GB	£14.75
Domes of Kilgari	Gm	MA	16K	C	IS	£11.50
Dominoes	Gm	Molimerx	16K	C	AJ	£9.15
Dominoes	Gm	Molimerx	32K	D	AJ	£12.65
Doomwatch	Do	Kansas	16K	C	IH	£7.50
Dosort	Ut	Molimerx	32K	C	AJ	£27.60
Double Take 3741	Ut	Molimerx	64K	D	AJ	£44.85
Double Up	Ut	Kansas	16K	C	IH	£6.25
Dragon Quest	Gm	Instant S/W	16K	C	IS	£10.50
Dragon Quest	Gm	Instant S/W	16K	D	GB	£17.50
Dragons of Hong Kong	Gm	Adventure Int.	32K	C	AB	£18.99
Draughts	Gm	Molimerx	16K	C	AJ	£14.95
Draughts	Gm	Molimerx	32K	D	AJ	£18.40
Draw and Graphics Resolver	Bs	Molimerx	16K	C	AJ	£10.95
Dreamworld	Gm	Molimerx	16K	C	AJ	£10.06
Driver	Gm	Molimerx	4K	C	AJ	£6.33
Duel-n-Droids	Gm	Molimerx	16K	C	IS	£9.50
Dungeon Escape	Gm	Computer Shack	16K	C	GB	£11.95
Dungeon Escape	Gm	Computer Shack	16K	D	GB	£15.50
Dynamic Device Driving	Ut	Instant S/W	16K	D	GB	£20.50
Dynamic Device Driving	Ut	Instant S/W	16K	C	GB	£15.50
					AB	£16.50
Early Numbers	Ed	Bryants S/W	16K	C	HW	£3.75
Edas	Ut	Molimerx	32K	D	AJ	£53.49
Edit	Ut	Molimerx	16K	C	AJ	£20.13
Editor Assembler Plus	Ut	Molimerx	16K	C	AJ	£24.95
Editor Assembler and Debugger	Ut	Kansas	16K	C	IH	£19.50
Edjust	Ut	Molimerx	32K	D	AJ	£18.40
Eights	Gm	Emjay	16K	C	IG	£7.00
Electric Accountant	Bu	Molimerx	48K	D	Aj	£28.75
Electronic Breadboard	Ut	Instant S/W	16K	C	GB	£39.75
					AB	£40.95
Elemental Maze	Ed	Molimerx	16K	C	Aj	£10.93
Eliminator	Gm	Adventure Int.	16K	C	IS	£15.00
Eliminator	Gm	Adventure Int.	16K	d	AB	£18.99
Emperor	Gm	Molimerx	16K	C	AJ	£15.53
Empire	Gm	MA	16K	C	IS	£10.50

Empire of the Overmind	Gm	Avalon Hill	48K	C	IA	£17.95
Enhanced Basic	Ut	Molimerx	16K	C	AJ	£27.60
Enhanced Basic	Ut	Molimerx	32K	D	AJ	£31.05
Epson Patch	Ut	Molimerx	16K	C	Aj	£13.80
Epson Patch	Ut	Molimerx	32K	D	Aj	£17.25
Escape from Tramm	Gm	Adventure Int.	16K	C	IS	£15.00
					AB	£18.99
Everest Explorer	Gm	Molimerx	16K	C	AJ	£10.06
Escape	Gm	Kansas	16K	C	IH	£7.50
Everest Explorer	Gm	Molimerx	32K	D	AJ	£13.50
Everyday Russian	Ed	Instant S/W	16K	C	GB,AB	£8.50
F for Freddie	Gm	Kansas	16K	C	IH	£9.50
Facto Bingo	Ed	Bryants S/W	16K	C	HW	£3.75
Facto Finder	Ed	Bryants S/W	16K	C	HW	£3.75
Fairytale Adventure	Gm	Molimerx	16K	C	AJ	£10.06
Fastgammon	Gm	MA	16K	C	IS	£14.00
Family Tree	Do	Molimerx	32K	D	AJ	£20.70
Farmer Brown	Gm	Molimerx	16K	C	AJ	£7.49
Fed	Ut	Molimerx	32K	D	AJ	£27.60
Fetch	Ut	Molimerx	32K	D	AJ	£15.53
File Handling for Cassette	Ut	Molimerx	16K	C	AJ	£15.93
File Handling for Disc	Ut	Molimerx	32K	D	AJ	£28.75
Filter Package	Ut	Molimerx	32K	D	AJ	£40.25
Financial Analysis	Bs	Molimerx	32K	D	Aj	£46.00
Find it Quick	Ut	Instant S/W	16K	D	GB	£39.75
					AB	£40.95
Flight Path	Gm	Instant S/W	16K	C	GB,AB	£8.50
Flight Plan	Ut	Molimerx	32K	D	AJ	£20.70
Flippy	Gm	MA	16K	C	IS	£10.50
Flight Simulator	Gm	MA	16K	C	IS	£20.00
Flying Circus	Gm	Instant S/W	16K	D	AB	£24.50
					GB	£25.00
Forbidden City	Gm	Fantastic S/W	16K	D	IA	£24.95
Forbidden Planet	Gm	Fantastic S/W	48K	D	IA	£24.95
Forest of Mordor	Gm	Molimerx	16K	C	AJ	£8.63
Fortran	Ut	Molimerx	32K	D	AJ	£74.75
Fortress	Gm	Soft Sector Mkting	16K	D	IA	£15.50
Fortress	Gm	Soft Sector Mkting	16K	C	IA	£11.95
Fortress	Gm	MA	16K	C	AJ	£10.50
Fox and Hounds	Gm	Molimerx	16K	C	AJ	£7.48
French Vocabulary	Ed	Molimerx	16K	C	AJ	£17.19
Frog	Gm	Adventure Int.	16K	C	AB	£12.50
Frog	Gm	Kansas	16K	C	AJ	£7.48
Frogs/Logic	Gm	Kansas	16K	C	IH	£7.50
Galatic Empire	Gm	Adventure Int.	16K	C	IS	£10.50
					AJ,AB	£9.78
Galatic Firebird	Gm	Kansas	16K	C	IH	£9.50
Galactic Revolution	Gm	Adventure Int.	16K	C	AB	£18.99
Galactic Revolution	Gm	Adventure Int.	16K	C	IS	£10.50
Galactic Trader	Gm	Adventure Int.	16K	C	IS	£10.50
Galactic Trader	Gm	Adventure Int.	32K	D	AB	£18.99
Galaxy Invasion	Gm	Big 5 S/W	16K	C	IS	£11.50
Game Of Life	Gm	MA	16K	C	IS	£6.50
Gammon Challenger	Gm	MA	16K	C	IS	£10.50
Gammon Challenger	Gm	Molimerx	16K	C	AJ	£10.06
Gammon Challenger	Gm	Molimerx	32K	D	AJ	£13.51
Gauntlet of Death	Gm	Programmer's Guild	16K	C	GB	£15.50
Gauntlet of Death	Gm	Programmer's Guild	16K	C	GB	£15.50
G.C.E. O'Levels						
Tape 1	Ed	Bryants S/W	16K	C	HW	£9.00
Tape 2	Ed	Bryants S/W	16K	C	HW	£9.00
Gencop	Ut	Molimerx	16K	C	AJ	£10.06
Geography Explorer	Ed	Instant S/W	16K		AB	£40.95
Ghost Town	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Golfers Challenge	Gm	MA	16K	C	IS	£10.50
Golden Voyage	Gm	Adventure Int.	16K	C	IS	£15.00
					AB	£18.99
Golf	Gm	Molimerx	32K	D	AJ	£17.19
Good Games No.I	Gm	Cload Inc	16K	C	IA	£11.95
Guns of Fort Defiance	Gm	Avalon Hill	32K	C	IA	£12.95
Guns of Fort Defiance	Gm	Avalon Hill	32K	D	IA	14.95
Gun World	Gm	Ogre	16K	C	IC	£10.00
Graphics Assembler	Ut	Kansas	16K	C	IH	£7;50
Graphs	Ed	Bryants S/W	16K	C	HW	£3.75
Graphit	Ut	Molimerx	48K	D	AJ	£19.55
Gridref	Ed	Bryants S/W	16K	C	HW	£3.75
Hellfire Warrior	Gm	MA	16K	C	IS	£21.00
Highway Code	Do	Bryants S/W	16K	C	HW	£3.75
HMS Impetuous	Gm	Adventure Int.	32K	D	AB	£18.99
Home Budget Planner	Bs	Emjay	16K	C	IG	£8.00
House of 30 Gables	Gm	Instant S/W	16K	C	AB	£8.50
Hyperlight Patrol	Gm	Fantastic S/W	16K	D	GB	£11.25
ID Mailing List	Ut	Instant S/W	16K	D	GB	£19.50
					AB	£20.50
IRV	Ut	Instant S/W	16K	D	GB	£23.75
IRV	Ut	Instant S/W	16K	C	IS	£16.50
					AB	£20.50
Infinite Startrek	Gm	Kansas	16K	C	IH	£9.50
Inventory Control	Bs	MA	16K	C	IS	£11.00
Inventory Control	Bs	MA	32K	D	IS	£50.00
Inventory'S'	Bs	MA	16K	C	IS	£17.00
Invoicing	Bs	Tridata	48K	D	ID	£140.00
Instant Calculator	Do	MA	16K	C	IS	£8.50
Interlude	Gm	Syntonic S/W		C	GB	£20.25
Interlude	Gm	MA	16K	C	IS	£14.00
Invaders From Space	Gm	MA	16K	C	IS	£10.50

Invasion Orion	Gm	Automated Simulation		C	IS	£18.50
Invasion Orion	Gm	Automated Simulation		D	GB	£15.75
Investor's Paradise	Gm	Instant S/W	16K	C	AB	£8.50
Jabbertalky	Gm	Automated Simulation	16K	D	GB	£18.95
Jet Fighter Pilot	Gm	Instant S/W	16K	C	GB,AD	£12.50
Jumbo	Gm	Molimerx	16K	C	AJ	£17.25
Jumbo	Gm	Molimerx	32K	D	AJ	£19.55
Jumbles	Ed	Bryants S/W	16K	C	HW	£3.75
KFS-80	Ut	MA	32K	D	IS	£75.00
Keyboard 80	Do	MA	16K	C	IS	£7.50
KVP	Ut	MA	16K	C	IS	£10.50
KVP Disk	Ut	MA	16K	D	IS	£18.50
Keyspeed	Ut	Kansas	16K	C	IH	£6.25
Kid's Gallery	Gm	Instant S/W	16K	C	AB	£8.50
Kid Venture I	Gm	MA	16K	C	IS	£12.50
Kreigspiel II	Gm	MA	16K	C	IS	£10.50
Label	Gm	Instant S/W	16K	C	GB	£18.75
					AB	£20.50
Labyrinth	Gm	Med Systems	16K	C	IA	£11.75
					BT	£10.95
Labyrinth	Gm	MA	16K	C	IS	£10.50
Laser Defence	Gm	Med Systems	16K	C	GB	£11.95
Laser Defence	Gm	Med Systems	16K	D	GB	£14.50
LED	Ut	Molimerx	48K	D	AJ	£19.55
Life Two	Gm	MA	16K	C	IS	£7.50
Little Red Riding Hood	Gm	Adventure Int.	16K	C	AB	£14.35
Local Call for Death	Gm	Adventure Int.	32K	D	AB	£18.99
Lords of Karma	Gm	Avalon Hill	40K	D	IA	£14.95
Lord of the Rings	Gm	Kansas	16K	C	IH	£9.50
Lost Dutchmans Gold	Gm	MA	16K	C	IS	£9.50
Lunar Lander	Gm	Adventure Int.	16K	C	IS	£11.50
					AB	£12.50
Lunar Lander	Gm	Adventure Int.	16K	D	AB	£18.99
Lprint	Ut	Kansas	16K	C	IH	£6.25
Magic Paper Calculator	Do	MA	16K	C	IS	£9.50
Mail File	Ut	Instant S/W		D	GB	£75.25
Maillist Mod III	Bs	MA	48K	D	IS	£55.00
Martian Adventure	Gm	Emjay	16K	C	IG	£12.00
Master Cab	Ut	Bryants S/W	16K	C	HW	£3.75
Master Directory	Ut	Instant S/W	16K	D	GB	£21.00
Master Reversi	Ut	Instant S/W	16K	D	GB	£23.75
Matchmaker	Gm	Adventure Int.	16K	C	AB	£14.35
Maths Master	Ed	Instant S/W	16K	C	AB	£8.50
Maxi-Micro Manager	Bs	Adventure Int	48K	R	AB	£84.50
Memdump	Ut	MA	16K	C	IS	£6.00
Mean Checkers	Gm	MA	16K	C	IS	£11.50
Merge	Ut	Kansas	16K	C	IH	£6.25
Meteor Mission	Gm	Big 5 S/W	16K	C	IA	£10.95
Meteor Mission II	Gm	MA	16K	C	IS	£11.50
Microcosm I	Gm	Basic & Beyond	16K	C	IA	£11.95
Microcosm 2	Gm	Basics & Beyond	16K	C	IA	£19.95
Microcosm 3	Gm	Basics & Beyond	16K	C	IA	£19.50
Microtype	Do	Kansas	16K	C	IH	£12.50
Midway Campaign	Gm	Avalon Hill	16K	C	IA	£10.95
Minicrossword	Ed	MA	16K	C	IS	£12.50
Minotaur	Gm	Instant S/W	16K	C	AB	£8.50
Missile Attack	Gm	Adventure Int.	16K	C	AB	£12.50
Mission Impossible	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Model 1 to 3	Ut	Kansas	16K	C	IH	£8.50
Monopolist	Gm	Baust Computing	4K	C	HA	£7.95
Monopolist	Gm	Baust Computing	4K	D	HA	£10.95
Morloc's Tower	Gm	MA	16K	C	IS	£14.50
Mortgage Calculator	Do	MA	16K	C	IS	£5.00
Mountain Shoot	Gm	Adventure Int.	16K	D	AB	£18.99
Multiple Choice Creation	Ed	Kansas	16K	C	IH	£12.50
Multiprint	Ut	Kansas	16K	C	IH	£8.50
Music Master	Gm	Instant S/W		C	GB,AB	£8.50
Musical Yat-C	Gm	Adventure Int.	16K	C	AB	£12.50
Money Box	Ed	Bryants S/W	16K	C	HW	£3.75
Mystery Funhouse	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Newdos-80 Ver 2.0	Ut	MA	16K	D	IS	£110.00
Newdos +	Ut	MA	16K	D	IS	£45.00
Newdos + 40 Track	Ut	MA	16K	D	IS	£47.50
News 80	Bs	Baust Computing	48K	D	HA	POA
Night Flight	Gm	Instant S/W	16K	C	GB,AB	£8.50
Nominal	Bs	Tridata	48K	D	ID	£170.00
Norton Forth	Gm	Adventure Int.	32K	D	AB	£33.70
North Atlantic Raiders	Gm	Tridata	16K	C	IA	£11.95
Number Bonds	Ed	Bryants S/W	16K	C	HW	£3.75
Number Series	Ed	MA	16K	C	IS	£12.50
Nuke War	Gm	Avalon Hill	16K	C	IA	£10.95
Office Accouting	Bs	MA	16K	C	IS	£15.00
Oil Tycoon	Gm	Instant S/W	16K	C	AB	£8.50
					GB	£9.95
Old McDonald's Farm	Gm	Adventure Int.	16K	C	AB	£14.35
Olympic Decathlon	Gm	MA	16K	C	IS	£15.50
On Guard	Ed	Bryants S/W	16K	C	HW	£3.75
Pascal-80	Gm	MA	48K	D	IS	£75.00
Paraform	Ut	Molimerx	32K	D	AJ	£18.98
Patience	Gm	Bryants S/W	16K	C	HW	£3.75
Payroll	Bs	Tridata	48K	D	ID	£170.00
Perfect Pong	Gm	Instant S/W	16K	C	GB,AB	£12.75
Periodical X-Ref	Do	MA	16K	C	IS	£9.50
Personal Bill Paying	Do	Instant S/W	16K	C	AB	£6.50
Personal Accounts	Do	Kansas	16K	C	IH	£9.50

SOFTWARE LISTING

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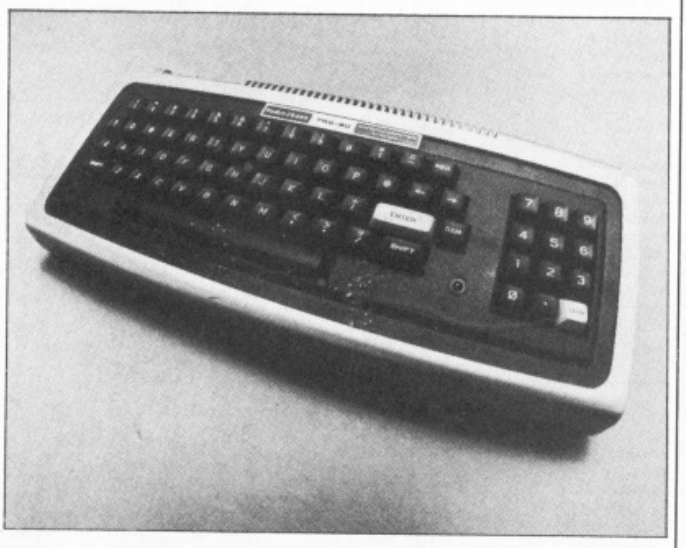
Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Personal Finance	Do	MA	16K	C	IS	£8.50
Pinball	Gm	MA	16K	C	IS	£10.50
Pinball Bounce/Robots	Gm	Kansas	16K	C	IH	£7.50
Pirate Adventure	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Pilot	Ut	MA	16K	C	IS	£23.00
Pits of Angband	Gm	Kansas	16K	C	IH	£9.50
Planet Miners	Gm	Avalon Hill	16K	C	IA	£10.95
Planetoids	Gm	Adventure Int.	16K	C	IS	£15.00
					AB	£12.50
Plus Sound	Ut	Kansas	16K	C	IH	£7.50
Pre Flight	Do	MA	16K	C	IS	£7.50
Programmer and Primer	Ut	Instant S/W	16K	C	AB	£8.50
Programmer's Converter	Ut	Instant S/W	16K	C	AB	£8.50
Pontoon	Gm	Kansas	16K	C	IH	£8.50
Pork Barrel	Gm	MA	16K	C	IS	£6.50
Punctuation	Ed	Bryants S/W	16K	C	HW	£3.75
Purchase	Bs	Tridata	48K	D	ID	£170.00
Pyramids of Doom	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
QSL Manager	Do	Instant S/W	16K		AB	£16.50
Quick Change	Bs	Baust Computing	16K	C	HA	£9.95
Quick Change	Bs	Baust Computing	16K	D	HA	£12.95
Random Dungeons	Gm	Ogre	16K	C	IC	£10.00
Random Dungeons	Gm	Ogre	4K	C	IC	£5.75
Renumber and Compress	Ut	Instant S/W	16K	C	AB	£8.50
Renumber	Ut	MA	16K	C	IS	£6.50
Re-Number	Ut	Kansas	16K	C	IH	£6.25
Remodel & Proload	Ut	MA	16K	C	IS	£26.00
Repeat	Ut	Kansas	16K	C	IH	£6.25
Rescue	Ut	Kansas	16K	C	IH	£6.25
Rescue At Rigel	Gm	MA	16K	C	IS	£18.50
Road Safety	Ed	Bryants S/W	16K	C	HW	£3.75
Robot Attack	Gm	Big 5	16K	C	IS	£11.50
Roots	Do	MA	32K	D	IS	£17.00
RPN Calculator	Do	MA	16K	C	IS	£7.50
RSM 2 Monitor	Ut	MA	16K	C	IS	£16.00
RSM 2D Monitor	Ut	MA	16K	D	IS	£20.00
SDM	Gm	Adventure Int.	16K	C	AB	£20.12
Sales	Bs	Tridata	48K	D	ID	£170.00
Santaparavia	Gm	Instant S/W	16K	C	AB	£8.50
Sargon II	Gm	MA	16K	C	IS	£20.50
Sargon II Disk	Gm	MA	32K	C	IS	£23.50
Savage Island I	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Savage Island II	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Scarfman	Gm	Cornsoft	16K	C	IS	£11.50
Scientific Calculator	Ed	MA	16K	C	IS	£14.50
Screen Print	Ut	Kansas	16K	C	IH	£6.25
Screenhold	Ut	MA	16K	C	IS	£6.00
Seadragon	Gm	MA	16K	C	IS	£15.00
Sea Wolf	Gm	Kansas	16K	C	IH	£9.50
Sea Wolf	Gm	Molimerx	16K	C	AJ	£10.06
Sea Wolf	Gm	Molimerx	32K	D	AJ	£12.65
Semi Conductor Theory	Ed	MA	16K	C	IS	£9.50
Showdown	Gm	Adventure Int.	16K	C	AB	£12.50
Silverflash	Gm	Adventure Int.	16K	C	AB	£12.50
Simutec	Gm	Adventure Int.	16K	C	AB	£12.50
Simplify It	Ut	MA	32K	D	IS	£12.00
Six Microstories	Gm	Adventure Int.	32K	D	AB	£14.35
Skirmish 80	Gm	Instant S/W	16K	C	IA	£8.50
Sky Warrior	Gm	Adventure Int.	16K	C	IS	£11.50
					AB	£18.99
Slag	Gm	Adventure Int.	16K	C	IS	£10.50
					AB	£14.35
smal-LDOS	Ut	Molimerx	16K	D	AJ	£43.70
Smartwork	Gm	Instant S/W	16K	C	IA	£8.00
Snake Eggs	Gm	MA	16K	C	IS	£7.50
Space Castle	Gm	Instant S/W	16K	C	IA	£11.95
Space Intruder	Gm	Adventure Int.	16K	C	AB	£14.35
Space Intruders	Gm	MA	16K	C	IS	£15.00
Space Intruders	Gm	MA	32K	C	IS	£18.50
Space Shuttle	Gm	Instant S/W	16K	C	AB	£12.50
Special Sampler	Gm	MA	16K	C	IS	£6.50
Star Fighter	Gm	Adventure Int.	16K	C	AB	£20.95
Star Scout	Gm	Adventure Int.	16K	C	AB	£14.35
Star Trek 3.5	Gm	Adventure Int.	32K	D	AB	£18.99
Space Trek	Gm	Instant S/W	16K	C	IA	£6.50
Speechparts	Ed	Bryants S/W	16K	C	HW	£3.75
Spelling Builder	Ed	MA	32K	C	IS	£15.00
Spellsort	Ed	Bryants S/W	16K	C	HW	£3.75
Spelltest	Ed	Bryants S/W	16K	C	HW	£3.75
Spider Mountain	Gm	MA	16K	C	IS	£9.50
Starfighter	Gm	MA	16K	C	IS	£18.50
Starfleet Orion	Gm	MA	16K	C	IS	£18.50
Starflite	Gm	MA	16K	C	IS	£10.50
Starlord	Gm	Bryants S/W	16K	C	IC	£10.00
Statistics	Ed	MA	16K	C	IS	£6.50
S.T.A.D	Ut	MA	16K	C	IS	£15.00
Storybuilder	Ed	Bryants S/W	16K	C	IS	£12.50
					HW	£3.75
Stock	Bs	Tridata	48K	D	ID	£170.00
Stock or Bonds	Gm	Avalon Hill	16K	C	IA	£12.95
Stone of Sisythus	Gm	Adventure Int.	32K	D	AB	£33.70
ST-80	Ut	MA	16K	C	IS	£34.00
ST-80D	Ut	MA	16K	D	IS	£45.00
Strange Odyssey	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Sunday Golf	Gm	Adventure Int.	16K	D	AB	£18.99
Surveyor's Apprentice	Ed	Instant S/W	16K	C	AB	£8.50
Super Breakthrough	Gm	Kansas	16K	C	IH	£8.50
Super Copy	Ut	Kansas	16K	C	IH	£9.50
Super Nova	Gm	Big 5	16K	C	IS	£11.50
Super Pims Data Base	Do	MA	16K	C	IS	£10.50
Super T-Legs	Ut	MA	16K	C	IS	£7.50
Superscript	Ut	MA	32K	D	IS	£21.00
Superkeys	Ut	MA	32K	D	IS	£35.00
Super Simon	Ut	MA	16K	C	IS	£7.50
Swamp War	Gm	Instant S/W	16K	C	AB	£12.50
Swords and Socery	Gm	Kansas	16K	C	IH	£9.50
Sword Of Zedek	Gm	MA	16K	C	IS	£11.50
System Copy Mod I	Ut	MA	16K	C	IS	£9.50
System Master Monitor	Ut	Kansas	16K	C	IH	£17.00
System to Basic	Ut	Kansas	16K	C	IH	£8.50
Tcopy III Mod III	Ut	MA	16K	C	IS	£10.50
T-Step	Ut	MA	16K	C	IS	£7.50
TL DIS	Ut	Instant S/W	16K	C	AB	£12.50
TRS Test	Ut	Instant S/W	16K	C	AB	£8.50
TRS-80 Opera	Do	MA	16K	C	IS	£7.50
Tables Test	Ed	Bryants S/W	16K	C	HW	£3.75
Tanktics	Gm	Avalon Hill	16K	C	IA	£15.95
Targetsounds	Ed	Bryants S/W	16K	C	HW	£3.75
Teachers Assistant 1	Ed	MA	16K	C	IS	£9.50
Teachers Assistant 2	Ed	MA	16K	C	IS	£9.50
Teachers Assistant 3	Ed	MA	16K	C	IS	£9.50
Teacher's Aid	Ed	Instant S/W	16K		AB	£34.50
Temple Of Apshai	Gm	MA	16K	C	IS	£18.50
Temple of the Sun	Gm	Instant S/W	16K		AB	£16.50
The Count	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
The Mean Checkers Machine	Gm	Adventure Int.	16K	C	AB	£14.35
The Congo Mission	Gm	Bryants S/W	16K	C	IC	£10.00
The Quest	Gm	Bryants S/W	16K	C	IC	£12.00
The Secret Wilderness	Gm	Ogre	16K	C	IC	£6.50
Toolkit	Ut	Kansas	16K	C	IC	£12.00
Time Traveller	Gm	MA	16K	C	IS	£10.50
Time Trek	Gm	MA	16K	C	IS	£10.50
Tiny Pascal	Ut	MA	16K	C	IS	£17.00
Timser	Ed	MA	16K	C	IS	£10.50
Tiny Compiler	Ut	MA	16K	C	IS	£12.50
Towers	Ed	Bryants S/W	16K	C	HW	£3.75
Treasure Quest	Gm	Adventure Int.	16K	C	AB	£14.35
Tunnels of Fahad	Gm	Adventure Int.	16K	C	AB	£12.50
Turret & Track	Gm	MA	16K	C	IS	£7.50
Two Heads of the Coin	Gm	Adventure Int.	32K	D	AB	£18.99
Typing Teacher	Ed	Instant S/W	16K	C	AB	£8.50
Typing Tutor	Do	MA	16K	C	IS	£12.00



Typewriter	Ut	Kansas	16K	C	IH	£6.25
Ultra Man	Ut	Instant S/W	16K		AB	£21.50
Ultra Mon	Ut	MA	16K	C	IS	£17.00
Up Periscope	Gm	MA	16K	C	IS	£10.50
Utility II	Ut	Instant S/W	16K	C	IA	£8.50
Valley	Gm	CT Software	16K	C	PF	£9.95
Valley of the Kings	Gm	Instant S/W	16K	C	IC	£10.00
Venture	Gm	Horizon S/W	16K	C	IA	£11.95
Vocabulary Builder 1	Ed	MA	16K	C	IS	£12.50
Vocabulary Builder 2	Ed	MA	16K	C	IS	£12.50
Voodoo Castle	Gm	Adventure Int.	16K	C	IS	£12.50
					AB	£18.99
Voyager	Gm	Avalon Hill	16K	C	IA	£12.95
What Next?	Gm	Baust Computing	4K	D	HA	£6.95
What Next?	Gm	Baust Computing	4K	C	HA	£3.95
Word Processor	Bs	Kansas	16K	C	IH	£19.50
Word Watch	Ed	Instant S/W	16K	C	IA	£6.50
X-Wing Fighter II	Gm	MA	16K	C	IS	£7.50
X-Ref	Ut	MA	16K	C	IS	£7.50
Y-Y Bar	Bs	MA	16K	C	IS	£10.50
Yahtzee	Gm	Kansas	16K	C	IH	£8.50
Your Life Score	Do	Bryants S/W	16K	C	HW	£3.75
Zossed in Space	Gm	Adventure Int.	16K	D	AB	£14.35
Zossed in Space	Gm	Adventure Int.	16K	C	CH	£10.00
9 Kid's Games	Ed	MA	16K	C	IS	£12.50
76 Basic Programs	Do	MA	16K	C	IS	£23.00

VIC20

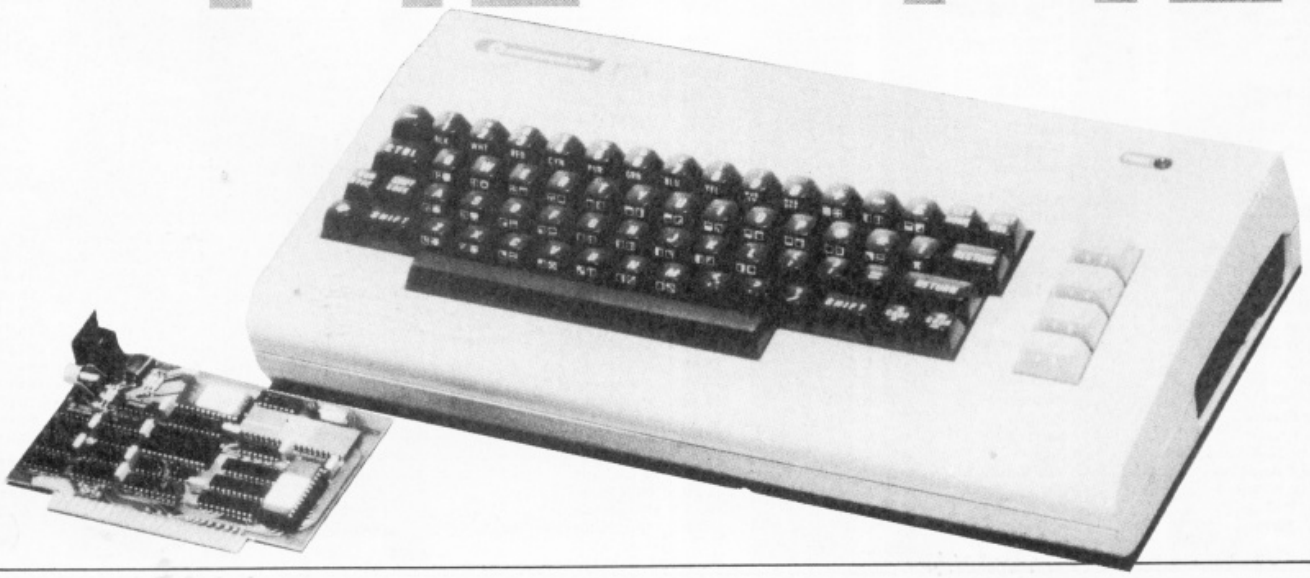
3-D Maze	Gm	Adcom	8K	C	AB	£7.50
3-D Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
A-Maz-Ing	Gm	Audiogenic	8K	C	AA,CH,HM	£6.99
Alien	Gm	Commodore	3K	R	FZ,AB,GF	
					CF,DM,CH	
					FD,FP,AA	£19.95
Alien Attack	Gm	Adcom	5K	C	AB	£7.00
Alien Attack	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Alien Blaster	Gm	Paysoft	5K	C	FP	£5.25
Alien Blaster	Gm	MAC	3K	C	JM	£5.50
Alien Blitz	Gm	Audiogenic	3K	C	AA,HM	£7.99
Alien Blitz	Gm	Audiogenic	5K	C	CH	£7.99
Alien Maze	Gm	Adcom	8K	C	AB	£7.50
Alien Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
Alien Invasion	Gm	Computermat	3K	C	IP	£8.95
Alien Wars	Gm	Hi-Tech	3K	C	FZ	£8.30
					AY	£7.80
					CF,AO	£8.62
Amok	Gm	Audiogenic	5K	C	AA,HM	£6.99
Ant Raiders	Gm	PR Software	3K	C	HN	£7.95
					GV	£7.50
Asteroid Belt	Gm	Adcom	8K	C	AB	£7.50
Asteroid Belt	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Asteroid Blitz	Gm	Mossoft	3K	C	JO	£6.00
Asteroids	Gm	Bug Byte	5K	C	HN	£8.99
Asteroids	Gm	Arcadia	3K	C	KQ	£1.99
Astro Sled	Gm	Arcadia	3K	C	KQ	£1.99
Avenger	Gm	Commodore	3K	R	FZ,AB,GF	
					CF,DM,CH	
					FD,FP,AA	£19.95
A.V.I.T.W.	Gm	Bug Byte	5K	C	HN	£8.99
Balloon	Gm	MAC	3K	C	JM	£5.50
Balloon Bomber	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Bill Sowerbutts Gardening Hints	Do	Micro Computer S/W	16K	C	HK	£4.99
Bill Sowerbutts Gardening Hints	Do	Micro Computer S/W	16K	C	HK	£4.99
Blitz	Gm	Commodore	3K	C	FD	£4.99
Blitzkrieg	Gm	Llamasoft	3K	C	KG	£4.95
Boxing	Gm	MAC	5K	C	JM	£4.95
Booby Trap	Gm	MAC	3K	C	JM	£5.50
Bomber	Gm	Mossoft	3K	C	JO	£4.00
BOSS	Gm	Audiogenic	8K	C	HN	£14.99
Car Drive	Gm	Adcom	5K	C	AB	£7.00
Car Drive	Gm	Hi-Tech	3K	C	FZ	£8.30
					AY	£7.80
					CF	£8.62
Car Race	Gm	Adcom	5K	C	AB	£7.00
Car Race	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Cattle Roundup	Gm	Computermat	3K	C	IP	£8.95
Charset 20	Gm	Adcom	8K	C	AB	£8.00
Charset 20	Gm	Rabbit S/W	3K	C	AH	£4.99
Chase	Gm	Computermat	3K	C	IP	£8.95
Chess	Gm	Commodore	3K	R	HN	£24.95
Cloudburst	Gm	Audiogenic	3K	R	HN	£19.99
Code Breaker	Gm	Adcom	5K	C	AB	£5.00
Code Breaker	Gm	Rabbit S/W	3K	C	AH	£2.99
Cosmic Battle	Gm	Adcom	5K	C	AB	£8.00
Cosmic Battle	Gm	Rabbit S/W	3K	C	AH	£4.99
Cosmic Blaster	Gm	MAC	3K	C	JM	£5.50
Crazy Balloon	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Death Maze	Gm	Mossoft	3K	C	JO	£5.00
Defenda	Gm	Llamasoft	5K	C	HN	£9.95
Deflection	Gm	Adcom	5K	C	AB	£7.00
Deflection	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Dice	Gm	MAC	3K	C	JM	£5.50
Diggles Kitchen Vol 1	Do	Micro Computer S/W	16K	C	HK	£4.99
Diggles Kitchen Vol 2	Do	Micro Computer S/W	16K	C	HK	£4.99
Diggles Kitchen Vol 3	Do	Micro Computer S/W	16K	C	HK	£4.99
Dive Bomber	Gm	MAC	3K	C	JM	£5.50
Dragon Maze	Gm	Adcom	8K	C	AB	£7.50
Dragon Maze	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
Dune Buggy	Gm	Rabbit S/W	3K	C	AH	£4.99
Duplicate	Gm	Paysoft	5K	C	FP	£5.25
Explosion	Gm	Big Softie	3K	C	IQ	£4.50
Fire Trek	Gm	Hi-Tech	3K	C	AY	£7.80
					FZ	£8.30
					CF,AO	£8.62
Fly Snatcher	Gm	PR Software	3K	C	HN	£7.95
					GV	£7.50
Frogger	Gm	Rabbit S/W	8K	C	AH	£7.99
Editor/Softkey 24	Ut	Llamasoft	3K	C	KG	£6.00
Game Graphics & Graphics Editor	Ut	Soft Toys	3K	C	IG	£8.00
Games Tape 1	Gm	Titan	3K	C	HJ	£5.00
Grand Prix	Gm	Hi-Tech	3K	C	FZ, 8.30	
					AY	£7.80
Graphvics	Ut	Adamsoft	3K	C	IR	£19.00
Graphvics	Ut	Adamsoft	8K	C	IR	£19.00
Gun Men	Gm	Hi-Tech	3K	C	AY	£7.80
					FZ	£8.30
					CF,AO	£8.62
Hangman	Gm	Paysoft	5K	C	FP	£5.25
Hangman Maths	Gm	Audiogenic		C	AA,HM	£7.99
Head On	Gm	Computermat	3K	C	IP	£8.95
Hesdon	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Highways Plot	Gm	Adcom	8K	C	AB	£5.00
Hires/Multicolor Utilities	Ut	Adamsoft	3K	C	IR	£13.00
ICBM	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Invader Fall	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF,AO	£8.62
Indi 500	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Intro. to Basic 1	Ed	Commodore	3K	C	AA,AB	£14.95
Invader Fall	Gm	Adcom	8K	C	AB	£7.50
Invader Fall	Gm	Audiogenic	3K	C	AA	£6.99
Invaders	Gm	Arcadia	3K	C	KQ	£1.99
Jelly Monsters	Gm	Commodore	3K	R	AB,CF,DM	£19.95
					GC,GF,AA	
					CH	
Jungle	Gm	Adcom	5K	C	AB	£6.00
Jungle	Gm	Rabbit S/W	3K	C	AH	£4.99
Kiddy Checkers	Gm	Audiogenic	3K	C	AA,HM	£6.99
King	Gm	Big Softie	3K	C	IR	£13.00
Life	Gm	Big Softie	3K	C	IO	£4.50
Line Up 4/Panic Driver	Gm	Terminal S/W	3K	C	JN	£7.95
Lunar Lander	Gm	Adcom	5K	C	AB	£7.00
Lunar Lander	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Lunar Maths	Ed	Titan	3K	C	HJ	£6.00
M/C Monitor + Graphics Aid	Ut	Arcadia	3K	C	KQ	£2.99
Machine Code Monitor	Ut	Commodore	3K	R	AA,AB	£34.95
Machine Code Monitor	Ut	Commodore	3K	R	GF	POA
Martian Raider	Gm	Romik	3K	C	JP	£9.99
Mastermind	Gm	Big Softie	3K	C	IQ	£4.50
Master Wits	Gm	Audiogenic	3K	C	AA,HM	£6.99
Maths Hurdler/Monster Merge	Gm	Audiogenic		C	AA,HM	£7.99
Maze Men	Gm	Titan	3K	C	HJ	£6.00
Maze Muncher/Reversi	Gm	Terminal S/W	3K	C	JN	£7.95
Memory Pack	Ut	Commodore	16K	R	FZ	£74.95
Memory Pack	Ut	Commodore	3K	R	FZ	£24.95
Memory Pack	Ut	Commodore	8K	R	FZ	£44.95
Meteor Run	Gm	Anglo American	3K	R	HN	£24.99
Meteroid	Gm	Adcom	5K	C	AB	£10.00
Mind Twisters	Gm	Romik	3K	C	JP	£9.99
Missile Command	Gm	Adcom	3K	C	HN	£7.95
Missile Commander	Gm	Hi-Tech	3K	C	CF	£8.62
Moak	Gm	Audiogenic	5K	C	CH	£6.99
Mole Attack	Gm	Hi-Tech	5K	C	CF,AOAB	£8.62
Moonlander	Gm	MAC	3K	C	JM	£5.50
Multi Sound Synthesiser	Do	Romik	3K	C	JP	£9.99

REFERENCE

SOFTWARE LISTING

VIC20

Title	Program Type	Program Produced By	Memory Req'd	How Sold	Supplier Codes	Prices
Music Maker	Gm	Adcom	5K	C	AB	£10.00
Music Tutor	Ed	Micro Computers S/W	3K	C	HK	£7.95
Music Tutor de Luxe	Ed	Micro Computer S/W	8K	C	HK	£8.95
Naval Attack	Gm	Titan	3K	C	HJ	£7.00
Naval Battle	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
New York	Gm	Paysoft	5K	C	FP	£5.25
Night Flight	Gm	Rabbit S/W	3K	C	AH	£4.99
Noughts and Crosses	Gm	Mossoft	3K	C	JO	£4.00
Othello	Gm	Hi-Tech	3K	C	FZ	£8.30
					CF	£8.62
					AO,AY	£7.80
Pack Man	Gm	Hi-Tech	3K	C	GZ	£8.30
					AO	£8.62
					AY	£7.80
Pick Up	Gm	Mossoft	3K	C	JO	£4.00
Piper	Gm	Adamsoft	3K	C	IR	£19.00
Pontoon	Gm	Mossoft	3K	C	JO	£6.00
Pontoon	Gm	Big Softie	3K	C	IR	£4.50
Programmer's Aid	Ut	Commodore	3K	R	AA,AB	£34.95
Puckman	Gm	MAC	3K	C	JM	£6.50
Rabbit Functions	Ut	Rabbit S/W	3K	C	AH	£4.99
Rabbit Writer	Ut	Rabbit S/W	16K	C	AH	£9.99
Ratman	Gm	Llamasoft	8K	C	KG	£5.00
Rat Race	Gm	Commodore	3K	R	HN	£19.95
Renaissance	Gm	Audiogenic	3K	R	HN	£19.99
Reversi	Gm	Big Softie	3K	C	IQ	£4.50
Road Race	Gm	Commodore	3K	R	FZ,AB,GF CF,DM,CH, GC,FD,FP	
					AA	£19.95
Robot Zap	Gm	Paysoft	5K	C	FP	£5.25
Rogue Elephant	Gm	Micro Computer S/W	3K	C	HK	£4.95
Rugby Game	Gm	Adcom	5K	C	AB	£7.00
Rugby Game	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Seawolf/Bounceout	Gm	Audiogenic		C	AA,HM	£8.99
Sea Invasion	Gm	Romik	3K	C	JP	£9.99
Shark Attack	Gm	Romik	3K	C	JP	£9.99
Simple Simon	Gm	Audiogenic	5K	C	AA,HM	£6.99
Six Program Pack;	Gm	PR Software	3K	C	GV	£7.50
War Game						
Smash Out						
Black Jack						
Logic						
Pick Up Game						
Alarm Clock						
Ski Run	Gm	Rabbit S/W	3K	C	AH	£4.99
Skier	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Skimetts	Gm	Audiogenic	3K	C	AA	£6.99
Skramble!	Gm	Terminal S/W	3K	C	JN	£9.95
Slot Machine	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Snakeout	Gm	Computermat	3K	C	IP	£8.95
Soft Toys 1	Gm	Soft Toys	3K	C	IG	£6.50
Soft Toys 2	Gm	Soft Toys	3K	C	IG	£6.50
Soft Toys 2	Gm	Soft Toys	5K	C	IG	£8.00
Space Defence	Gm	Adcom	5K	C	AB	£10.00
Space Defender	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
Space Division	Gm	Audiogenic	3K	C	AA	£6.99
Space Fighter	Gm	Arcadia	3K	C	KQ	£1.99
Space Invaders	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
Space Storm	Gm	Rabbit S/W	3K	C	HA	£6.99
Space Travel	Gm	MAC	3K	C	JM	£5.99
Space Wars/Battle Zone	Gm	Titan	3K	C	HJ	£6.00
Spiders from Mars	Gm	Audiogenic	5K	R	CH,AA	£24.99
Spiders of Mars	Gm	Anglo American	3K	R	AA,CH,AB CF,DM,GC	£19.95
Star Trek	Gm	Big Softie	8K	C	IQ	£4.50
Star Wars	Gm	Audiogenic	3K	C	AA	£6.99
Star Wars II	Gm	Titan	3K	C	HJ	£7.00
Stella Shootout	Gm	Adcom	5K	C	AB	£15.00
Stunt Cycle	Gm	Coloursoft	5K	C	FP	£7.75
Sub Attack/Missile Command	Gm	PR Software	3K	C	HN	£7.95
Submarine	Gm	Hi-Tech	3K	C	CF,AO,FZ	£8.62
Super Breakout	Gm	Adcom	5K	C	AB	£7.00
Super Breakout	Gm	Coloursoft	5K	C	FP	£7.75
Super Breakout	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Expander High Resolution Pack	Ut	Commodore	3K	R	AA,AB,FZ	£34.95
Super Lander	Gm	Commodore	3K	R	AA,AB,FZ CF,CH,DM FD,FP,GF	£19.95
Super Moonlander	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Slot	Gm	Commodore	3K	R	CH,GC,AA, DM,AB,FZ FD,CF	£19.95
Super Snake	Gm	Adcom	5K	C	AB	£7.00
Super Snake	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Super Worm	Gm	Rabbit S/W	3K	C	AH	£4.99
Surround	Gm	MAC	3K	C	JM	£5.50
Tailer	Gm	Mossoft	3K	C	JO	£5.00
Target Command	Gm	Computermat	3K	C	IP	£8.95
Terminal Invaders	Gm	Terminal	3K	C	JN	£7.95
The Alien	Gm	Audiogenic	88K	C	AB	£5.00
They're Off	Gm	MAC	3K	C	JM	£5.50
Traxx	Gm	Llamasoft	8K	C	KG	£10.00
Treasure Carrying	Gm	Hi-Tech	3K	C	CF,AO	£8.62
UFO Shooting	Gm	Adcom	5K	C	AB	£7.00
UFO Shooting	Gm	Hi-Tech	3K	C	CF,AO	£8.62
VIC Code Monitor	Ut	Commodore	3K	R	FZ	£34.95
VIC Forth	Ut	Datatronic	3K	R	HN	£38.95
VIC Graf	Ut	Datatronic	3K	R	HN	£28.95
VIC Men	Gm	Coloursoft	5K	C	FP	£7.00
VIC Invaders	Gm	Bridge S/W	3K	C	KJ	£6.90
VIC Stat	Ut	Datatronic	3K	R	Hn	£29.95
VICalc	Ut	Audiogenic	3L	C	AA,HM	£6.99
Vicgammon	Gm	Bug Byte	8K	C	CH	£7.00
Vicmen	Gm	Anglo American	3K	C	GB	£7.00
Vic Cube	Gm	Hi-Tech	3K	C	CF,AO	£8.62
Vigil	Ut	Adamsoft	8K	C	IR	£25.00
Wall Street	Gm	Audiogenic	3K	C	AA,HM	£6.99
Wheel of Fortune	Gm	MAC	3K	C	JM	£4.95
3D Xeosy	Gm	Big Softie	3K	C	IQ	£4.50



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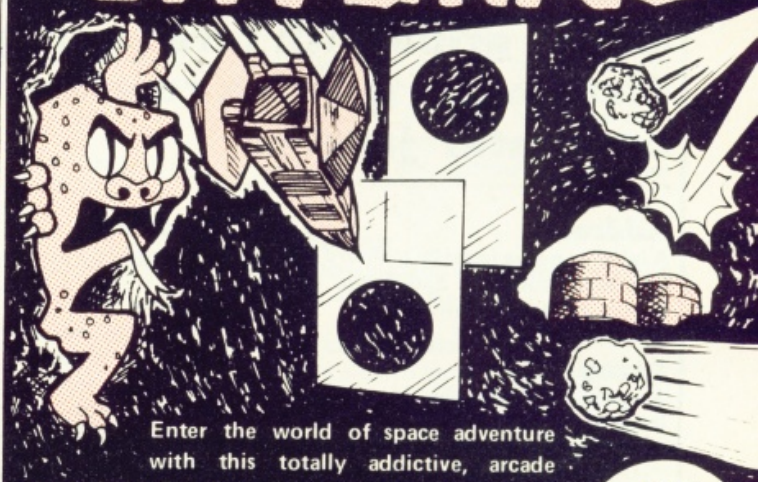

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MICROTERMS

Get to grips with terminology in this month's issue dictionary. A quick reference guide to common computer jargon.

Address
A label or name (usually a *binary* or *hexadecimal* number) specifying a particular *memory* location.

Array
A special variable that is used to hold large amounts of string or numeric information in a row and column format.

Assembly Language
Means of representing *program* statements in mnemonics and conveniently handling *memory* addressing by use of symbolic terms.

BASIC
Beginner's All Purpose Symbolic Instruction Code. An easy to learn, widely used computer language.

Bit
A single *binary* digit, representing either a 'one' or a 'zero'.

Bug
An error in *software*.

Byte
A *binary* number, usually of eight *bits*. It can represent a number from 0 to 255 (8-bit byte) as there are 256 possible combinations of "ones" and 'zeros" eight bits long.

Cartridge
A self-contained unit storing either ROM or RAM which plugs into a computer to expand the memory or provide a program.

Character Set
The list of letters, numbers and symbols that you can use to write programs and display information.

CP/M
A standard disc operating system that in theory allows software packages to be run on different machines. It stands for Control Program for Microcomputers.

Cursor
Character or graphic symbol used by the computer to denote where it's printing. Also used as a prompt to input information or a command.

Data
Simply, information. The raw material that the computer processes.

Debug
To correct the errors in a *program*.

Disc
Magnetic storage device allowing fast random access to a large volume of *data*. A full-size hard disc will hold, say, 5 *megabytes* or more; a smaller *floppy disc* typically holds from 80 to 250 *kilo* bytes but in either case the capacity is being increased all the time.

Display Mode
Means of indicating the form in which the computer's output will appear on the *VDU* screen. It is either text only, text and graphics or graphics only. The display mode is usually represented by a number and the difference between these numbers indicates the change in the display capabilities of the screen, for instance on the BBC computer Mode O gives a higher resolution than Mode 1.

DOS
Disc Operating System. This refers to the piece of computer code that controls the action of the disc drive. On some machines this code has to be loaded into the machines memory and on others it is present in the *ROM* onboard the disc drive. The DOS tells the disc drive how to load and save programs on the disc as well as carrying out any disc management functions such as updating the directory.

Dummy Variable
This is a variable that is defined at the beginning of a program that has no use until later on in the program.

EPROM
Erasable Programmable Read Only Memory. When programming, writing typically takes one minute and erasing, by ultra-violet light, 10 minutes or longer.

Get
A BASIC command. It tells the computer to search the keyboard and bring back the value of the first key pressed.

Gosub
A BASIC command telling the computer to go to a subroutine within a program.

Gcol
A colour command used in BBC Basic.

Hard Copy
A computer printout or listing on paper.

Hardware
All the electronic and mechanical components making up a computer system.

Hex
Shortened version of hexadecimal, meaning '6 plus 10', which is a funny way of saying 16. It refers to the number system with a base of 16. This uses 0 to 9 and then A to F of the alphabet to represent its 16 digits. Two hex digits can be conveniently used to represent a byte (eight bits).

High Resolution
This means that you can pinpoint one dot on a screen rather than one square, giving you graphical pictures of much greater detail and accuracy.

Instruction
A set of *bits* which causes the *CPU* to carry out a particular task in a program.

Interface
Circuit which connects different parts of a system together and performs any processing of signals in order to make transfer possible (ie serial-parallel conversion).

I/O
Input/Output. A computer generally has one or more *ports* through which it communicates with 'the outside world' — *peripheral* devices such as a *keyboard*, video display *(VDU)*, *printer* etc. An I/O port may be just an input or just an output or it can be bidirectional.

Kilo (K)
Normally means 1000, but stands for1024 (2^{10}) when referring to memory.

Language
A repertory of commands — symbols, expressions etc, used to 'call up' the instructions or procedures a *processor* can execute.

Location
Physical position; *memory* location is the same as *address*.

Loop
Program technique where one section of program (the loop) is performed many times over.

Machine Language (or Code)
The lowest (and most tediously detailed)

level of *program instructions*. All higher level coding must be converted to *machine language* (by *compiler* or *interpreter)* before a *processor* can obey it.

Memory Map
Chart showing how *memory* is used by a computer. The arrangement of *data* and *program* within the memory.

Menu
A set of options displayed on-screen by a computer program from which the computer user can make a selection to implement.

Modulator
A device, included in every good hobby computer, which takes the computer's output and converts it to an RF signal on a suitable TV channel, giving you a cheap, convenient visual display.

Monitor
(1) The first level of computer *operating systems:* the *program* which turns *machine code* commands into action, managing input, output etc.
(2) A TV-type device which is specially constructed to handle video signals from a computer that does not have a *modulator*.

Parallel/Serial
Denotes the manner in which the computer's output is sent to its peripheral devices. Serial means that the information is passed out one byte after another and it uses a system of special characters to signify control codes of the device. Parallel communications are sent out along a series of wires using the high or low state of the wire to indicate which bits are set and therefore making up a byte.

Pascal
A very powerful, structured computer language, available on a variety of microcomputers.

Peek
This BASIC command reads a value from a location in the computer memory. It can be used to access either RAM or ROM.

Peripheral
Device attached to a computer, eg *printer, plotter, disc* unit, but not necessarily essential to its use.

Pixel
The single dot that is used to create characters displayed on the VDU. Also the smallest display unit when using high resolution graphics.

Poke
This command places a value in a location of the computer's memory. It can only be used to access RAM or control registers.

Port
Terminal which the *CPU* uses to communicate with the outside world.

Print At
A BASIC command telling the computer where to begin printing.

Print Out
Same as *hardcopy*.

Program
A set of *instructions*, which tells the computer to perform a sequence of tasks also called software.

PROM
Programmable Read Only Memory. Proms are a special form of *ROM*, which can be individually programmed by the user.

Qwerty
The traditional typewriter keyboard layout adopted by computer designers.

RAM
Random Access Memory. *Data* may be written to or read from any location in this type of memory.

Register
A general-purpose *memory*, or set of memory *locations*, built into the *microprocessor* itself. Sometimes, particular registers may be designated for a specific purpose.

RND
In BASIC this stands for RANDOM and instructs the computer to select random numbers, it is often used in games programs. Because the numbers thrown up are mathematically related to the number preceding they are called pseudo-random numbers, not true random-numbers.

ROM
Read Only Memory. *Memory* device which has its *data* content established as part of manufacture and cannot be changed.

Routine
A whole *program* or part of a program designed to perform a single function or action.

RS232
A communications *interface* used for *modems* and for serial *printers*.

Sequential File
This is a data file that can be created on either a disc or a cassette system. As its name suggests, the information is stored one piece after another. If this information is to be changed or modified in any way then the whole file has to be read back into memory and then written back again once the changes have been made.

Software
The different kinds of *program* required to work a computer.

Source Code
Program written in one of the *high-level languages* and requiring *compilation* into *machine language* before use.

String
A sequence of characters used in a program.

Subroutine
A part of a *program* which performs a specific task and which is available for use elsewhere in a program, as often as you like.

Syntax
The grammar of a programming *language*.

Tab
Really stands for tabulate and allows you to automatically put figures and/or words into columns, forming a table.

Toolkit
Name given to a piece of code that runs in a computer independantly of any other programs and adds commands to the machines language to make the process of programming or debugging easier. Commands such as Renumber, Auto and Trace are common in toolkits. Toolkits take the form of a program that is loaded into the machine on power-up or a chip that is inserted on the circuit board which is then initialised by a SYS or USR call from the operator.

Variable
A symbol used in programming which is assigned a numeric memory address. You can change the value of variable at will to suit the program you are writing.

VDU
Visual Display Unit. Usually a TV set in hobby computers, but may be a video monitor which accepts the output directly from the computer.

Z80
Widely used microprocessor. It is used in the ZX81, Spectrum and TRS-80.

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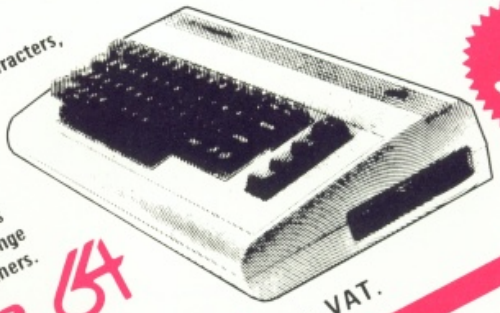

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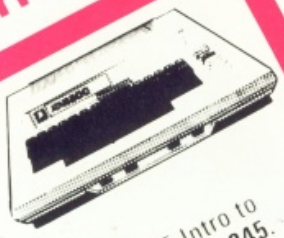

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