INTERFACE

ZX80 ATOM ZX81 BBC

GWCULLEN 82

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ACORN ATOM

Disk Unit available

Acord Computers have launched a 5¼" mini floppy disk unit for the Atom at £345 inc VAT. The unit is based on the Olivetti OPE FD 501 drive giving 92K of storage on a 40-track single-sided disc. The controller card has 4K DOS ROM and 3K of static RAM.

The power supply can power both the disk unit and a fully expanded Atom.

The disc controller is based on the Intel 8271 chip. This highly intelligent device minimises the amount of control software and memory requirement and so allows phenomenol high speed operation. Both soft and hardware has been vigorously tested and is very, very reliable.

Atom owners will need bus buffers and indirect edge connectors to connect the package, a 64-way connector plug and cable is provided.

The disk operating systems (DOS) decodes the following commands used to control the storage of files on disk: —

*CAT	catalogue files on disk
*LOAD	load image of memory contents as file
*SAVE	save image of memory contents as file
*DELETE	delete file from disk
*SPOOL	store all printer characters on disk
*EXEC	read characters from disk as if from keyboard

The D.O.S. also replaces the cassette operating system vectors as used by BASIC to allow the use of the following commands in Atom BASIC: —

LOAD	load BASIC program from disk
SAVE	save BASIC program to disk
FOUT	open file for output
FIN	open file for input
SHUT	close file
EXT	find extent of file
PRT	find value of pointer into file
PUT	put number to file
BPUT	put byte to file
SPUT	put sting to file
GET	get numbers from file
BGET	get byte from file
SGET	get string from file

These commands provide full random access of up to 5 disk files simultaneously. The disk unit is available directly from Acorn Computers and their dealers.

Atom Programs

Hyponsis

Mark Deven of Weybridge was one of a number of members of the Independent Acorn (Atom, BBC) Users' Group who responded to our request for a modified version of our graphics program in a recent Interface. Mark writes:

As requested, here is an alternative listing to the one published in last month's edition of your truly (no fibs) magnifico mag.

It is slightly longer and incorporates an assembler routine to inhance the hypnotic effects of the screen (not for the epileptic!!)

Lines 10-80 draw a moire pattern in graphics mode 4; the assembler routine produces the audio effects as the screen dazzles your eyes.

```
  5 DIMVV4,P-1;L=#B002;GOS.a
 10 CLEAR 4
 20 F.T=0 TO 256 S.3
 30 MOVE128,96;DRAW T,192
 40 MOVE128,96;DRAW T,0
 45 N.
 50 F.T=0 TO 192 S.3
 60 MOVE128,96;DRAW256,T
 70 MOVE128,96;DRAW0,T
 80 N.
 85 DO
 90 N=A.R.%7*2
 92 IF N=0 G.90
 95 ?#B000=(N+1)*16
100 LI.VV0;LI.VV0
120 U.0
```

```
1030a P.$21;C
1040 :VV0 LDA L;LDY #81
1050 :VV1 LDX #80
1060 :VV2 DEX
1080 BNE VV2
1090 EOR @4
1100 STA L
1110 DEC #80;INY;CPY #83
1120 BNE VV1
1130 RTS
1140J;P.$6
1150 ?#80=0;?#83=50
1160 ?#81=255
1170 R.
```

Ice caves

And here's another splendid 'visual' program, this time from Norman Alm, who says:

This draws a series of simulated three-dimensional views of ice caves. Depending on the random parameters that the Atom chooses, you get a view looking out of a cave, looking in, or a look at the surrounding landscape.

Uses 170 bytes of memory.

```
  5REM NORMAN ALM
 10 CLEAR 4
 20X=A.R.%256;Y=A.R.%192
 30F.R=50TO425STEP3
 40MOVER,20
 50DRAWX,R
 60DRAW(X-R),Y
 70DRAW20,(Y-R)
 80DRAWR,20
 90N.R
100F.M=1TO120;WAIT;N.
110G.10
```


Spiral Eater

In this game, you must consume the whole of a spiral, by running over it and wiping it out, to end up on top of the asterisk in the centre of the screen. You lose points everytime you leave the spiral. You'll see that your points are clocked up at the top of the screen. There is a highest score feature. Z moves you left, M moves you right, while L moves your blob up and A moves it down. Don't try to land on top of the asterisk until you've 'eaten' all the spiral (there's nothing to stop you doing it in the program, but — as Mr Nixon said — it wouldn't be right). The keyboard scan routine was adapted from the book GETTING ACQUAINTED WITH YOUR ACORN ATOM.

```
 3REM Spiral Eater (C) Mahogany 1982
 5P.$21
10 DIM P(-1);@=0
20C; JSR #FE71;STY #80;RTS;]
22Y=0;P.$6
25Q=99999;?#E1=0
30C=2;L=15
40 CLEAR0
42K=269
43K?#8000=42
45GOTOb
500aREM READ KEYBOARD
900Z=32%L+C
990 LINK TOP
```

```
1000IF ?#80=58;C=C-1;IF C<0;C=0
1020IF ?#80=33;L=L+1;IF L>15;L=15
1030IF ?#80=44;L=L-1;IF L<0;L=0
1040IF ?#80=45;C=C+1;IF C>31;C=31
1045Z?#8000=64
1050IF L<15 A=32*(L+1)+C
1052 IF L>0 B=32*(L-1)+C
1053 IF C>0 D=32*L+C-1
1054 IF C<31 E=32*L+C+1
1060IF(A?#8000=64)&(B?#8000=64)&(D?#8000=64)&(E?#8000=64)G.z
1068 Z=32*L+C
1069IFZ?#8000=42 GOTOh
1070 Z?#8000=128
2000 GOTOa
4990z REM UPDATE SCORE
5000Q=Q-257
5010P.#30Q
5100GOTO1068
5200hP.''"YOU DID IT!"''
5210P."SCORE IS "Q'
5220IFQ>Y THEN Y=Q
5230PRINT"HIGHEST SCORE IS "Y'
```

```
5240LINK#FFE3
5250GOTO25
5290END
5999END
6000b REM...
6010MOVE 0,0
6020PLOT1,0,47
6030PLOT1,63,0
6040PLOT1,0,-47
6050PLOT1,-55,0
6060PLOT1,0,39
6070PLOT1,47,0
6080PLOT1,0,-31
6090PLOT1,-39,0
6100PLOT1 ,0,24
6110PLOT1,30,0
6120PLOT1,0,-16
6130PLOT1,-22,0
6140PLOT1,0, 8
6150PLOT1,13,0
6160GOTOa
```

```
   5 Q=6;A=10;B=160;E=1000
 15DIMP(-1);P .#21;[;JSR #FE71;STY#80;RTS;];P .#6
 16CLEAR3
 20 MOVE64,76;DRAW64,116
 30 MOVE44,96;DRAW84,96;MOVE59,76;DRAW69,76;MOVE59,116
 40 DRAW69,116;MOVE44,91;DRAW44,101;MOVE84,91;DRAW84,101
 50 MOVE62,86;DRAW66,86;MOVE62,106;DRAW66,106
 60 MOVE54,94;DRAW54,98;MOVE74,94;DRAW74,98
 70 MOVE34,66;DRAW94,66;DRAW180,0
 75 MOVE34,66;DRAW-52,0
 76LI.TOP
 77IF?#80=49 A=A-5
 78IF?#80=55 A=A+5
 79IF?#80=48 B=B+5
 80IF?#80=32 B=B-5
 81 A=A+R.%5;B=B+R.%5
 82 IF A>113 A=A.(A)-8
 83 IF B>180 B=A.(B)-8
 85 IF A<0 A=ABS(A)+8
 86 IF B<0  B=ABS(B)+8
 89 IF ?#80=0 GOS.500M
 90GOS.100;WAIT;GOS.100;G.76
100 MOVEA,B;PLOTQ,A,(B+10);MOVEA,(B+5);PLOTQ,(A+7),(B+10)
110 PLOTQ,(A+14),(B+5);PLOTQ,(A+7),B;PLOTQ,A,
            (B+5);MOVE(A+14),B
120 PLOTQ,(A+14),(B+10)
130R.
500 MOVE34,66;PLOT6,64,96;F.W=1TO3;WAIT;N.W
510 MOVE34,66;PLOT6,64,96
520 IF A.(A-64)<6 AND A.(B-96)<6 THEN GOTO 540
530 E=E-10;R.
540 CLEAR0;F.W=0TO100;?#B000=#80;?#B000=0;?#B002=?#B002;4;N.W
550 P."YOU'VE GOT HIM!!!"''''"YOUR SCORE:"E';E.
```

Starwars

G Hillebrann from Holland, who contributed last month's BREAKOUT program, sent us this game, written in CLEAR 3. The object of the game is to move the X-Wing fighter in your fire position and shoot it down with a laser beam. P moves the fighter up, @ down, Q left and W right. Push the space bar to fire your laser beam.

Data sort

Just follow the instructions, and your magic Atom will sort numbers into order. Ain't computers wonderful?

```
 5REM DATA SORT
 7P.#12
10Y=1;X=5;A=X;@=0
20IN."HOW MANY ITEMS TO BE SORTED"N
40DIMAA(N+X)
45FORM=1TO N+5;AA(M)=0;N.
50FORT=A TO N+X-Y
60PRINT"ENTER ITEM NUMBER "A-4
70INPUTD;AA(A)=D;A=A+Y
```
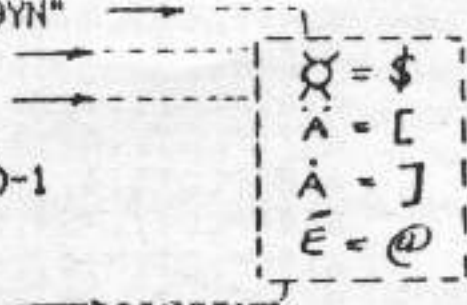
```
100NEXT T
110FOR B=X TO A-Y
120FOR C=B+Y TO A-Y
130IF AA(B)>= AA(C) GOTO 170
140 D=AA(B)
150 AA(B)=AA(C)
160 AA(C)=D
170 NEXT C
180 NEXT B
190 FOR B=X TO A-Y
200 PRINT B-X+Y"    "AA(B)'
210 NEXT B;END
```

Number Rotate!

From the Netherlands, where they have a strange character set on the Atom, comes this program from Markus Jakobsson.

```
1REM NUMBER ROTATE BY MARKUS JAKOBSSON 19811018
5DIMRR(3),WK11),F(0),A(10),P(-1)
10R=#FFE3;WW="€123456789YN"
14P.A21
15A
20:RR1 STX F;RTS
25:RR0 JSR R;LDX £LEN(W)-1
30:RR2 CMP W,X;BEQ RR1
35DEX;BPL RR2;BMI RR0
40A
50P.A6
52P.A12"NUMBER ROTATE"'''
55?#E1=0;P."INSTRUCTIONS(Y/N)?"'
60LINK RR0
70IF?F<9;P."IMPOSSIBLE NOT MORE THAN 9!"';G.60
80IF?F=10;P.A12;GOS.a
120P.A12"OK! LETS GO!"'
130?#E1=0
140€=2
170F.K=1TO9
180A?K=ABSRND%9+1
190N.K
195Q=0
200J0=0
210F.J=1TO8
220F.K=(J+1)TO9
230IFA?J=A?K;A?K=ABSRND%9+1;Q=1
240N.K
250N.J
260IFQ=1;G.J
310T=0
320GOS.P
330?#E1=0
332P."HOW MANY DO YOU WANT TO REVERSE?"
335LINK RR0
340P.'
350IF?F=0;G.320
360IF?F>9;P."WRONG INPUT !";G.1
390T=T+1
410F.K=1TO (?F/2)
420Z=A?K
430A?K=A?(?F-K+1)
440A?(?F-K+1)=Z
450N.K
```

```
460GOS.P
470Q=0;F.K=1TO8
480IFA?K?K<K;Q=1
490N.;IFQ=1;G.330
510€=0;P."YOU DID IT IN "T" MOVES!"'''"ONE MORE GAME?(Y/N)"'
535LINK RR0
540IF?F=10;P.A12;G.170
550IF?F=11;P.A12,"THANKS FOR THE GAME(S)!";E.
560P."WRONG INPUT!";G.535
610P0=0+1;IFO=5;O=0;P.A12
615€=2
620F.K=1TO9;P.A?K;N.K;P.',';R.
700aP.'"NINE NUMBERS WILL APPEAR   IN"'"DISORDER ON THE SCREEN!"
710P.'"YOU SHALL ARRANGE THEM IN"'"NUMERICAL ORDER FROM LEFT "'
720P."TO RIGHT!"'
730P."YOU JUST TELL HOW MANY NUMBERS"'
735P."FROM THE LEFT YOU WANT TO"'
740P."REVERSE! IF THE LIST IS:"'
745P."  4 3 2 1 5 6 7 8 9"'
750P.'"YOU REVERSE THE FOUR NUMBERS "'
755P."4 3 2 1 , WHEN YOU PRESS 4 AND"'
760P."THE NEW LIST WILL BE THIS ONE!"'
765P."  1 2 3 4 5 6 7 8 9"'
770P."PRESSING € GIVE YOU AN ESCAPE!"'
773P.'"PRESS ANY KEY WHEN READY!"'
780LINK#FFE3;R.
```
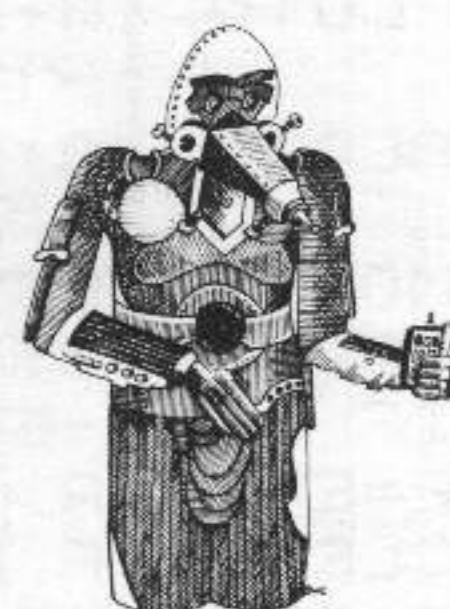
Deathstar draughts

Tim Hartnell wrote this draughts variant, based on his program published a few months ago in INTERFACE. It follows standard draughts rules, except:
• There is a "warp" square (an inverse W) which moves randomly from move to move, swallowing whichever piece is on that square.
• Instead of changing into kings when reaching the opposite side of the board, the pieces change into those of the opponent.
• The winner is the first person to capture (by jumping over diagonally into an empty square, as in draughts) 10 of the opponent's pieces.
• There are no multiple jumps.

You move by entering the letter and number (as in A8) of the piece you want to move, then press RETURN, then enter the letter and number (as E2) of the square you're moving to. The Atom will have first move.

```
1 REM Deathstar Draughts
2 REM (c) Hartnell 1982
3P.$12
10GOS.9000
50GOS.7000
60M=0
70P.$7
1000P.'';P."LAST MOVE "$G'
1012F.I=1TO2
101SIFI=1INPUT"FROM"$E
1030ISI=2INPUT"TO"$E;$G=$E
1040IF$E="A2"FF(I)=72
1110IF$E="A4"FF(I)=71
1120IF$E="A6"FF(I)=70
1130IF$E="A8"FF(I)=69
1140IF$E="B1"FF(I)=66
1150IF$E="B3"FF(I)=65
1155IF$E="B5"FF(I)=64
1160IF$E="B7"FF(I)=63
1170IF$E="C2"FF(I)=59
1180IF$E="C4"FF(I)=58
1190IF$E="C6"FF(I)=57
1200IF$E="C8"FF(I)=56
1210IF$E="D1"FF(I)=53
1220IF$E="D3"FF(I)=52
1230IF$E="D5"FF(I)=51
1240IF$E="D7"FF(I)=50
1250IF$E="E2"FF(I)=46
1260IF$E="E4"FF(I)=45
1270IF$E="E6"FF(I)=44
1280IF$E="E8"FF(I)=43
1290IF$E="F1"FF(I)=40
1300IF$E="F3"FF(I)=39
1310IF$E="F5"FF(I)=38
1320IF$E="F7"FF(I)=37
1330IF$E="G2"FF(I)=33
1340IF$E="G4"FF(I)=32
1350IF$E="G6"FF(I)=31
1360IF$E="G8"FF(I)=30
1370IF$E="H1"FF(I)=27
1380IF$E="H3"FF(I)=26
1390IF$E="H5"FF(I)=25
1400IF$E="H7"FF(I)=24
1410N.I
1420    AA(FF(2))=AA(FF(1));AA(FF(1))=B
1425 IF W<73;AA(W)=B
1430 W =43+A.R.%11;IF ( W>46)AND(W <50) G.1430
1435 IF AA(W)=C;T=T+1
1436 IF AA(W)=H;S=S+1
1440 AA(W)=119
1450IFABS(FF(1)-FF(2))>7;M=1;AA(FF(1)+((FF(2)-FF(1))/2))=B
1466 IF((AA(Z)=C)&(Z>23)&(Z<28))AA(Z)=H
1470GOS.7000
1475 AA(W)=B
1480 F.Z=24 TO 72
1490 IF((AA(Z)=C)&(Z>23)&(Z<28))AA(Z)=H
1500 IF ((AA(Z)=H AND (Z<68) AND (Z<73))) AA(Z)=C
1510 N.
```

```
2002Q=0;Z=24;D=1
2021 REM RESPOND
2022IFAA(Z)=H   G.2110
2023IFAA(Z)=9 G.2110
2024IFAA(Z)=B   G.2110
2025IFAA(Z)=W G.2110
2045U=0
2050IF(AA(Z+XX(D))=H)U=7
2055IF((U=7)&(AA(Z+2*XX(D))=B))Q=XX(D)
2056IFQ<>0G.2130
2090IF(D<2)D=D+1;G.2045
2110IF(Z<72)Z=Z+1;D=1;G.2021
2120IFQ=0G.2240
2130AA(Z+2*Q)=AA(Z);S=S+1;AA(Z+Q)=B;AA(Z)=B
2140G.50
2240Z=72;U=0
2250IF(AA(Z)<>C)G.2290
2260IF(AA(Z-13)=H)G.2290
2262IF(AA(Z-12)=H)G.2290
2265IF(AA(Z-14)=H)G.2290
2270IF(AA(Z-6)=B)&(AA(Z-12)=C)U=-6
2275IFU=-6&AA(Z-18)=H Q=Z-6
2280IF(AA(Z-7)=B)&(AA(Z-14)=C)U=-7
2295IFU=-7&AA(Z-21)=H Q=Z-7
2290IF(Q=0)&(Z>23)Z=Z-1;G.2250
2350Y=0
2360Z=24+A.R.%48;Y=Y+1;IFY>400G.2440
2380IF(AA(Z)<>C)G.2360
2385IFY>200G.2390
2386IF(AA(Z-13)=H)G.2360
2387IF(AA(Z-14)=H)G.2360
2388IF(AA(Z-12)=H)G.2360
2390D=1
2410IFAA(Z+XX(D))=B Q=XX(D);G.2460
2420IFD<2 D=D+1;G.2410
2430G.2360
2440IFY>400 $E="Z";G.7000
2460AA(Z+Q)=AA(Z);AA(Z)=B;G.50
7000P.$30;Q=0;?$E1=0
7030IFM=1;T=T+1
7040M=0
7090P."ATOM "S     HUMAN "T'
7100P."      *12345678x"'
7110P."    AX "$AA72" "$AA71" "$AA70" "$AA69"*A"'
7120 P."    BX"$AA66" "$AA65" "$AA64" "$AA63" *B"'
7130P."    CX "$AA59" "$AA58" "$AA57" "$AA56"*C"'
7140 P."    DX"$AA53" "$AA52" "$AA51" "$AA50" *D"'
7150P."    EX "$AA46" "$AA45" "$AA44" "$AA43"*E"'
7160 P."    FX"$AA40" "$AA39" "$AA38" "$AA37" *F"'
7170P."    GX "$AA33" "$AA32" "$AA31" "$AA30"*G"'
7180 P."    HX"$AA27" "$AA26" "$AA25" "$AA24" *H"'
7190P."      *12345678x"'
7210IF$E="Z"T=10
7220IF(T=10)P."you win";END
7230IF(S=10)P."i win";END
7320RETURN
9000 DIM AA86,XX2,L1,FF2;XX1=-6;XX2=-7
9060H= 67;B= 46;Q=0
9070DIMG2,E2
9110F.Z=1TO96;AA(Z)=9
9130IF((Z<73)&(Z>55))&(Z<>67)&(Z<>68)&(Z<>61)AA(Z)=C
9140IF((Z<54)&(Z>42))&(Z<>47)&(Z<>48)&(Z<>49)AA(Z)=B
9150IF((Z<41)&(Z>23))&(Z<>334)&(Z<>35)&(Z<>36)&(Z<>28)AA(Z)=H
9160N.Z;AA62=9;AA29=9;AA60=9;AA71=C
9170$E="";S=0;T=0;M=0;$G="?";W=R,
9175Z=A.R.%2+57;Q=A.R.%2+6;AA(Z)= B;AA(Z-Q)=C
9190R.
```

ZX Education —
with Eric Deeson

...with a word for Atom owners

Actually, don't turn away, Acorn users — at least some of this is relevant to you.

In the November issue of the Educational ZX80/1 Users' Group Newsletter, I wrote the "editorial" around the true story of an educational adviser with a large authority. This chap — a very senior one, by the way — said in discussion at a big educational computing meeting that if he came across a Sinclair micro in any of "his" schools, he'd stamp on it.

That's really rather a sad story — it illustrates how far behind the times are some persons in high authority in computing.

But even sadder was the subsequent flood of letters from EZUG members reporting similar instances of bureaucratic blindness from other parts of the country.

There are some authorities which explicitly ban micros like the ZX81 and the Atom from their schools. There are many others — maybe even a majority — which recognise their existence but refuse support.

Why is this? Why indeed do so many teacher trainers also ignore the existence of the new wave of cheap powerful machines?

Having been in education myself for nearly eighteen years, I often tend to comment on the conservatism of the profession. Here, however, it is the conservatism of the teachers' servants — the advisers, the inspectors, the Department of Education and Science, the course-providers, the trainers — that is the barrier. The teachers in the schools are generally unable to be conservative.

That is because the only way in to computing in so many cases involves the down-market machines — the ZX micros, the Atom, and now the VIC and the BBC computer.

Another very relevant point is pressure from pupils, parents and PTAs — again, the majority of their experience is with the cheap personal computers.

In my experience, then, teachers generally (in secondary schools as well as the primary sector) welcome the current trend towards cheap computer power for all. That power enables them to learn techniques quickly — because they can do it at home — and also to overcome that big barrier to educational computing, the lack of facilities for large groups.

Statistics are not available — but I suspect that there are now more ZXs in schools than all other micros added together, and it seems that the Atom is rapidly climbing the educational charts too.

What a pity then that Government support is so inflexible and that the majority of local authorities are dragging their heels in this crucial area of education. My voluminous files of correspondence with the explosively growing membership of the Educational ZX80/1 Users' Group is sufficient evidence of the problem. Really, though, there should be no need at all for organisations like EZUG. (EZUGs parent organisation, MUSE, the professional association for educational computing, showed no interest in supporting the formation of a similar group for the Atom, by the way).

EZUGs original aim was the development of teaching software of excellence for the MUSE Library. It is good to report that we have now got fourteen cassettes on our list. Many are relevant to home teaching as well as class work. Send an s.a.e. for the current list, which may have doubled by the time you read this.

You may also like to know of the several suppliers of good teaching programs for the ZX81 that we've come across. Send *them* s.a.e.'s for further details.

AVC Software PO Box, Birmingham 17 (primary, secondary)
Rose Cassettes 148 Widney Lane, Solihull, West Midlands (ditto)
S Spencer The Sycamores, Queens Road, Hodthorpe, Notts (skeletons for teacher use)
Turner Consultants 3 Hillgarth, Underbarrow, Kendal, Cumbria (primary)

There has been a lot of demand, by the way, for a general spin-off from EZUGs activities — a complete (?) directory of suppliers to the ZX market. This categorised and indexed list of some 150 suppliers gives names, addresses and brief details of products. Cost is £1.00 from the address below.

ERIC DEESON
Highgate School,
Birmingham B12 9DS

```
120     SCROLL
130     PRINT"CLASS", "FREQUENCY"
140     FOR T = 1 TO I
150     PRINT A(T),
160     INPUT B(T)
170     PRINT B(T)
180     SCROLL
181     NEXT T
183     FOR T = 1 TO I
185     REM - - SUM OF FREQUENCIES
190     LET F = F + b(T)
195     REM - - SUM OF FREQUENCIES*MID POINT
200     LET X(T) = A(T)*B(T)
210     LET SFX = SFX + X(T)
215     REM - - SUM OF FREQUENCIES*MID POINT SQUARED
220     LET S(T) = B(T)*A(T)*A(T)
230     LET SFX2 = SFX2 + S(T)
240     NEXT T
250     CLS
255     PRINT AT 19,0;"X";AT 19,7;"F";AT 19,12;"FX";AT 19,21;"FX**2"
260     FOR T = 1 TO I
275     SCROLL
280     PRINT AT 20,0;A(T);AT 20,7;B(T);AT 20,12;X(T);AT 20,21;S(T)
290     NEXT T
300     SCROLL
310     SCROLL
320     PRINT AT 21,0;"(inverse)TYPE ANY KEY TO CONTINUE"
330     IF INKEY$ = ""THEN GOTO 330
340     CLS
350     PRINT"FOR THE FREQUENCY DISTRIBUTION - "
360     PRINT AT 4,0;"THE MEAN = (1 space)";SFX/F
365     LET C = (SFX2/F) - (SFX/F)**2
370     PRINT AT 8,0;"THE STANDARD DEVIATION = (1 space)";SQR(C)
380     PRINT AT 12,0;"THE VARIANCE = (1 space)";C
390     PRINT AT 16,0;"IF YOU WANT TO SEE THE RESULTS(2
        spaces)AGAIN, TYPE IN F"
400     IF INKEY$ = ""THEN GOTO 400
410     IF INKEY$ = "F"THEN GOTO 250
420     STOP
```

The variables used are:

F = the sum of the frequencies
SFX = the sum of the (frequencies * the mid point)
SFX2 = the sum of the (frequencies * mid point squared).

BYE FOR NOW.

Communication breakdown
A report from Jeremy Ruston, who compiles our monthly BBC section in INTERFACE

First of all some of our gripes with the BBC and Acorn:

The manual supplied with the initial models of the BBC Micro were only draft, provisional copies, which is fair enough. But when we try to attach a printer to our Issue 2 model B machine, the trouble really began. We rang the BBC and were advised to ring a gentleman in the BBC's engineering dept. He could shed no light on the matter, so we rang Acorn. All the relevant people were not in at the time we rang, so it was back to the BBC, because we were getting quite desperate.

After a none too fruitful conversation, we were referre back to Acorn, where the mystery was at last solved: Acorn had revised the centronics interface circuitry — but not bothered to tell the users, or even the BBC! We are still waiting for a copy of the new circuit diagram . . .

All the people we spoke to were doing their best to be helpful, but if we had to go through all that hassle to get a printer working — and the centronics interface is meant to be standard — what is your average user going to do?

The current models do not still have any of the sophisticated sound commands incorporated in them, making it necessary for the first-time user to jump into assembly language, just for sound effects, which is not going to encourage the sort of beginner the BBC wishes to attract.

The general public should be getting their machines by now, and if so, remember that we are always on the lookout for good programs.

Last month, I mentioned how to turn the sign on message of the computer a different colour. Well, much to my embarrassment, the BBC and Acorn have seen fit to move the "sign on" message one line down the screen, so for production models you will have to use something like '?(HIMEM + 40) = 1'.

Another new development in the production models is that it is now possible to incorporate those colour numbers into user defined keys, without having to use the query operator. The format is '*KEY 0 " ! A'", where A has a value of 1, which is added to the value for the exclamation mark, which is 128. Thus the

above example will assign colour one (red) to key 0. Colour two etc. are accessed by replacing the letter 'A' with 'B' etc. For a fuller explanation of the subject, see last month's piece. Unfortunately, due to lack of space, the explanation of the Teletext graphics set will have to wait until next month.

Most computers scroll the screen by the simple expedient of moving the characters on the screen back by 32, or 40.

This is fine on the standard micros, but when you consider that three of the BBC micro's text modes take up 20K, instead of 1K or 2K, you begin to realise that there is no way that amount of memory can be manipulated in the time that can conveniently be given to scrolling. To help matters then, the BBC Micro uses special hardware to scroll the screen. Even special hardware cannot move 20K of RAM that quickly, so the whole process has been rethought.

What happens is that when the cursor reachers the bottom of the screen, and it becomes necessary to scroll the screen, the ULA takes over and moves a special pointer to the start of screen memory forward by a specified amount, be it 40 bytes for Mode 7 or 640 bytes for mode 0. Then, the bottom line is not mapped onto RAM, but into the BASIC ROM located at &8000. So the computer maps the bottom line onto the unused memory just before the screen starts.

This is a long and boring way of saying that HIMEM (the start of screen memory) may not always be situated on the top of the screen. Whenever a CLS instruction, or a MODE change is effected, however, HIMEM jumps back to pointing to the top left hand corner of the screen. My only defence for telling you all this is that it puzzled me for quite some time.

In the provisional Users Guide (BBC-speak for "manual"), a lot of important information is left out, so I have been devoting much of my time to delving into the innards of the machine, and have come up with these non too useless nuggets:

Executing VDU 23,0,10,0,0,0,0,0,0,0 turns the cursor into another hardware generated figure — a static white square. The really odd thing about this square is that if it is moved (by pressing the control key in conjunction with HIJK) over another character, in mode 7, it turns that character into reverse field — which is just not possible in the same way in normal circumstances.

Executing *FX 4,1 will make the cursor control keys and the copy key give definite values, rather than just move the cursor around, in response to an INKEY$ or GET$ function. This has useful applications in any program which needs keys to move a space ship or whatever, and you have a phobia about using letter keys for the purpose. The cursor keys revert back to their old function if *FX 4,0 is executed.

*FX 9,X and *FX 10,X allow you to alter the flash rates of colours 8 to 15. The duty cycle of each colour is determined by the number after the comma. The number gives the time, in 50ths of a second, that each colour will be on the screen for.

The only application I can see for this is to make the screen flash between black and white at 8Hz, which is the frequency at which epileptic fits are induced, but I really would urge anyone to think twice before doing that.

*FX 11,X alters the amount of time a key needs to be pressed for before it starts to repeat, and *FX 12,X alters the speed at which it repeats. All jolly useful stuff this . . .

It occurs to me that those people who complain so bitterly at the BBC's inability to deliver machines are being rather harsh: At no point have they placed an order form in any of the special interest magazines, nor have they been asking the general public for orders. So anyone who has sent their money off to the BBC has done so on their own initiative, so it's really their hard luck if they are not satisfied.

I close with a few simple programs:

```
  10 REM This program times printing in
each of
  20 REM the BBC Micro's text modes.
  30 REM Copyright (C) Jeremy Ruston 19
82
  40 DIM time_for_each_mode(7)
  50 FOR mode=0 TO 7
  60 MODE mode
  70 TIME=0
  80 FOR counter=1 TO 1000
  90 PRINT counter
 100 NEXT counter
 110 time_for_each_mode(mode)=TIME
 120 NEXT mode
 130 REM This chooses Centronics printe
r output
 140 *FX 5,1
 150 VDU 2:REM Turn printer on.
 160 VDU 1,30:REM This makes my printer
print at 40 characters a line.
 170 WIDTH 40:REM Sets the number of ch
aracters per line for the computer
 180 PRINT "The times to print the numb
ers from one"
 190 PRINT "to one thousand for each of
the "
 200 PRINT "eight graphics modes look l
ike this:"
 210 PRINT
 220 FOR mode=0 TO 7
 230 PRINT "The time for MODE ";mode;"
was ";time_for_each_mode(mode)/100
 240 NEXT mode
 250 PRINT
```

```
260 PRINT "MODE 0 - 80 by 32 text, 20K
"
270 PRINT "MODE 1 - 40 by 32 text, 20K
"
280 PRINT "MODE 2 - 20 by 32 text, 20K
"
290 PRINT "MODE 3 - 80 by 25 text, 16K
"
300 PRINT "MODE 4 - 40 by 32 text, 10K
"
310 PRINT "MODE 5 - 20 by 32 text, 10K
"
320 PRINT "MODE 6 - 40 by 25 text, 8K
"
330 PRINT "MODE 7 - 40 by 25 text, 1K
"
340 VDU 3

  5 REM ERROR GENERATOR - GENERATES AL
L POSSIBLE ERRORS
  6 REM Copyright (C) Jeremy Ruston 19
82
 10 A%=100
 20 ON ERROR GOTO 40
 30 GOTO A%
 40 REPORT: PRINT " at line ";ERL;
 50 IF A%=510 THEN PRINT:END
 60 A%=A%+10
 70 GOTO 30
100 PRINT SIN(100000000000)
110 PROCdummy
111 DEF PROCdummy(A,B,C) : ENDPROC
120 PRINT fakearray(3)
130 PROC!"/+*) (~=(&#
140 DIM fakearray(-3)
150 PRINT &-10
160 PROCmode
161 DEF PROCmode: MODE 7:ENDPROC
170[LDA #2356:]
180 DIM fakearray(10000)
190 PRINT 0/0
200 PRINT $20
210 PRINT EXP(90)
220 FOR A$="A" TO "B"
230 PRINT LOG(-10)
240 PRINT MID$(A$)
250 PRINT "FRED
260 PRINT TAB(10,10)
270 This should force a mistake
280 PRINT SQR(-10)
290 =joke
300 NEXT one
310 ENDPROC
320 UNTIL FALSE
330 PROCjoke
340 GOTO 335
350 PRINT no_such_variable
360 FOR T=1 23
370 LOCAL anesthetic
380 ON 5 GOTO 0
390 ON 5 PRINT
400 READ some_data
410 A$=STRING$(255,"#")
411 A$=A$+A$+A$
420 DIM A(10):PRINT A(16)
430 LIST PRINT
440 PRINT 20000000000000000009999999999
99999999999999999999999
450 FOR T=1 TO 10:GOTO 450
460 GOSUB 460
470 REPEAT:GOTO 470
480 A="A"
490 *FX 0,0
500 *FX 23,0
510 *DISK
```

Why the Beeb put up its prices

Prices for both the basic and enhanced models of the BBC Microcomputer are up. The basic model is now £299, and the enhanced model £399.

The 12,000 customers who had already placed orders or whose orders were received before February 1st pay the original prices, but orders arriving after that date will be charged at the new rates. Any customers who are unaware of the increases will be notified and asked to confirm their order.

Both the BBC and Acorn Computers, who are manufacturing the computer on license, naturally regret the necessity for the price increase.

"The machine was developed very rapidly and only now are we approaching full volume production. The original pricing structure has proved to be too optimistic, given the need for particularly rigorous test procedures and various increases in component costs. Nevertheless, even at the more realistic prices of £299 and £399 we believe that the BBC Microcomputer still represents excellent value for money," Chris Curry, managing director of Acorn told Interface.

Acorn Computers are now confident that the component problems which have been holding up production have now been overcome.

Adding joysticks to the ZX81
A construction article by M Small of Aylesbury

Ever wished you could use joysticks with your ZX81 instead of those awkward curser keys. Well now you can with these cheap home built models.

I have built two, 1 for use with keys 1 to 5 and the other for use with keys 6 to 0.

You will need the following items (for one joystick).

QTY	ITEM
4	Strips tinfoil (off an old tin can) approx 1" long by ¼" wide.
2	Pieces of hard plastic (something like the material the ZX81 case is made of) each approx 1" square. You could if you wish cut two pieces out of the bottom of the case and use them, while at the same time improving the ZX81 ventilation.
1	Length 6BA threaded rod approx 2½" long.
4	6BA mounting bolts, approx 1" long.
28	6BA nuts.
26	6BA washers.
5	Solder tags for 6BA thread.
1	Hand Held Control box. (Maplin type 401, part No. LL14Q. Vero Part No. 202-21026G.)
1	Miniature push button switch. (Maplin FH59P.)
2	Small rubber grommets with internal hole suitable for 6BA thread.
1	Biro pen top.
1	2" square approx cloth material to suit.
1	Approx 1.5m of 6 core cable. (or ribbon cable if desired.)

CONSTRUCTION.

Cut and drill the two pieces of plastic as shown in fig 1.

Drill and bend the four pieces of tin foil as shown in fig 2. Assemble each piece into the upper panel ensuring the holes match up as shown in fig 3.

Next insert the 6BA bolts from the top as shown in fig 4. Only one is shown but proceed with all four.

Before fitting the lower panel insert the centre grommet and threaded rod as shown in fig 5.

Double nuts have been used to ensure that they stay tight while in use. Do not over tighten them into the grommet.

Adjust all the bolts to centralise the control spindle.

Next you must prepare the hand held control box. Drill and prepare holes as shown in fig 6. Mount the switch and grommet in their appropriate holes.

Position the joystick inside the case and mark and drill the 4 mounting bolt holes. Mount the joystick and remove any excess thread from the bolts. Tie and glue the piece of covering cloth around the top of the centre control spindle. Do not replace the lid of the case yet though as the control wires need to be soldered in place next.

Insert the wire through the grommet and solder in place as per the circuit and schematic diagrams figs. 9 and 10.

After removing the ZX81 base solder the other ends of the wires as shown in fig. 11. When the back is replaced they will be routed out of the case via the extension port connecting hole.

Finally replace the control case lid and glue the pen top onto the joystick spindle.

To use the joystick program a routine using inkey$ 1-4 or 6-9 for movement and 5 or 0 to fire.

A simple program to move a star around the screen is listed below. By further programming it should be possible to have both joysticks in use together. To increase the speed of the movement you will have to revert to a machine code program. Any suggestions?

```
 100   LET H = 5
 200   LET V = 10
 300   PRINT AT H,V;"@" (@ is the multiplication sign star on the ZX)
 400   IF INKEY$ = "5" THEN PRINT AT H,V;"inverse star"
 500   LET H = H + (INKEY$ = "2") − (INKEY$ = "3")
 600   LET V = V + (INKEY$ = "4") − (INKEY$ = "1")
 700   LET H = H + (H greater than 0) − (H less than 21)
 800   LET V = V + (V greater than 0) − (V less than 31)
 900   CLS
1000   GOTO 300
```