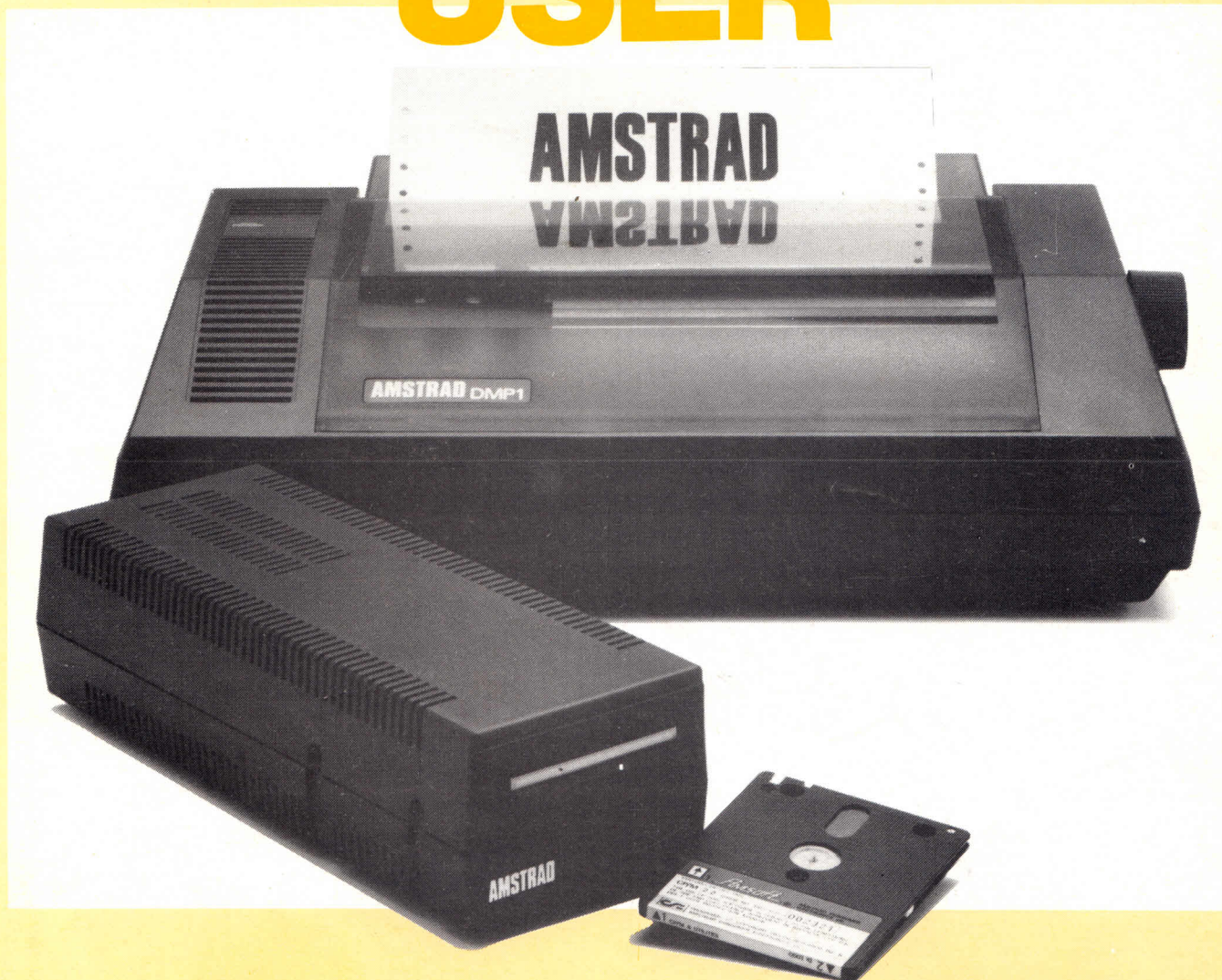


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Issue no. 2 \$3.00

March 1985



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Issue No. 2 March 1985

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Contributions are welcomed from readers or other interested parties. If you want them returned, then please send a large SAE with all submissions.

THE AMSTRAD USER

G'day,

Phew! What a month we've had since the first edition of The Amstrad User went to press - and I am not talking about the weather, although the phone has been running hot and so has the postie's feet bringing us mail from all over Australia. But for the moment, let's take stock of the situation.

First, an impassioned plea not to ring us on matters unrelated to the publication of The Amstrad User. By all means write, but don't ring. We fully appreciate that there are many users who are new to computing and that frustration can occur in, for example, identifying and correcting syntax errors. We also hope that users appreciate that we are heavily involved in producing a magazine for you and, much as we would like to help, we just have not got the time. The establishment of User Groups will go a long way to solve this problem as will a HELP DESK, information on which you can find within this issue. Remember, you can still advise us of your problems by letter and we will do our best to get them resolved.

So, having got that of my chest, what else has been happening during the last few weeks? We have had a very encouraging response from new CPC464 owners which has culminated in plans for the formation of a number of additional Groups. We have also received some entries for the Competition which I suspect must have been near completion before the first issue was published! Here is a hint to all entrants - read 'How to Review' (Page 8, Issue 1) very carefully before you start working on your entry.

I have been keeping an eye open for books relating to the CPC464, and some users may be aware that there are already paperbacks available from various outlets. In this issue you will find a review of two of them and over the course of the next few months we will review the others. Any newcomers to the list will of course receive our critical eye.

All in all, we are very please with the way things have progressed so far, but as I have said before, it is your contributions that will ultimately make The Amstrad User the reference point for all Australian CPC464 users.

See you next month,

Ed.

Letters

Another look into *The Amstrad User* postbag. We've tried to be modest by editing out references to the magazine, but make no apology if any slip through! And remember, if you want a specific response, please include a stamped addressed envelope with your letter.

In the QA section of your first issue, you answered a question about a printer that insisted on producing double space lines. 'Simply' you said, 'cut the connection to pin 14 on the Centronics plug!' Simply? I looked at the plug on my machine and could see no way in which I could cut the right wire, without running the risk of also cutting the wrong one. Yet I have the same double space problem with my Kaga Taxan KP 810 printer as your other reader had with his Shinwa CP80.

Then I had a brainwave. Why take the drastic and irreversible step of cutting anything? I took a narrow sliver of Cellotape and carefully manoeuvred it over the edge connector at the back of the computer until, with the aid of a small stick, I could press it down over the fourth connecting strip from the left - pin 14. Reconnect the printer plug, and presto! - my double space problem was cured.

PL, W.A.

Yes, we have heard of this method. It appears to solve the problem successfully with some printers provided you don't continually remove and replace the plug and break the seal of tape.

Congratulations on an excellent magazine. May I suggest you keep us informed of any books that are available for the CPC464?
CS, Vic.

Your wish is our command! We have already reviewed 'The Working Amstrad: A library of practical sub-routines and programs' by David Lawrence and Simon Lane and 'Amstrad Computing with the CPC464' by Ian Sinclair, and you will find the results in this issue. We certainly intend to continue the policy of look-

ing at relevant material and also intend to make them available for purchase through Strategy Publications (The Amstrad User).

Living in the country, we find it a bit difficult to lay our hands on Amstrad info, so full marks for giving us a chance to subscribe to an Australian mag. Although we have gone for the mag. only, can we purchase the tape separately?

J & BT, Qld.

A subscription to *The Amstrad User* runs for 12 months, for the magazine alone it costs \$30 and for the magazine plus a cassette of the listings appearing in that magazine the cost is \$70. Postage is included. You may increase your subscription at any time to receive the tapes as well as the magazines. The increase will depend upon the number of issues outstanding on your subscription and will be based upon a single cassette price of \$3.50 per issue. You may also purchase back copies of the tapes at a cost of \$5.00 each (including postage).

Will it be possible to copy tape software to the AMSTRAD disc system?

CPN, W.A.

Yes, all your own programs and data will be interchangeable. Programs which contain machine code may use the top 1200 bytes of memory and will require reassembling to leave headroom for AMSDOS. Protected programs present more of a problem, and we believe that an exchange system should be available from software producers for a nominal charge. We will keep you posted on this last point.

Amstrad says it with flowers

A series of flower like patterns is generated by the following graphics display. Studying the code reveals that it is based upon a regular polygon which is decreased in size whilst rotating through 360 degrees and using different pens. You will also discover that the number of steps in a revolution, sides of the polygon and colours are randomly set. The mode changes between 0 and 1.

```
10 *
20 * FLOWERS
30 *
40 * by D.Muir
50 DEFINT b-z
60 PRINT CHR$(23)+CHR$(3);
70 RAD
80 w=0
90 FOR h=1 TO 10
100 n=7+RND*12
110 b=RND*27
120 z=4+RND*4
130 r=560/z
140 MODE 1-w
150 BORDER b
160 p=RND*27:IF p=b THEN 160
    ELSE INK 0,p
170 FOR v=1 TO 9
180 m=RND*27:IF m=p THEN 180
    ELSE INK v,m
190 FOR a=0 TO 2*PI STEP 2*PI/n
200 MOVE 320,200
210 FOR y=0 TO z-1
220 DRAW r*SIN(a+y*2*PI/z),
    r*COS(a+y*2*PI/z),v
230 NEXT
240 NEXT
250 r=r-12
260 NEXT
270 FOR q=1 TO 20
280 FOR s=1 TO 9
290 INK s,1+RND*26
300 NEXT
310 FOR t=1 TO 1000:NEXT
320 NEXT
330 NEXT
340 GOTO 90
```

Amthello

Here is an old favourite, but in CPC464 format. Pit your wits against the computer in this game to try and take over the board with as many pieces of your own colour as possible.

This program appears to work well, despite the frequent use of GOTO. However, beware the un-renumbered lines when keying in – the AUTO function won't be much help.

Here is how the game is played:

1. By skilful play you must out-manoeuver the computer to end the game with more of your colour 'counters' on the board than those of the computer.
2. First choose a colour, remembering that black always plays first.
3. The computer asks for the line and column numbers of the square you wish to select.
4. The validity of the move is checked.
5. On every move, a selection must be placed next to an opponent's square: either sideways, lengthways or diagonally. This selection must trap at least one of an opponent's 'counters' between the one just positioned, and one already on the board.
6. The number of squares that can be captured in a single turn is unlimited, and you can build up quite a strategy by delaying the turn that grabs the majority of squares of your colour.
7. An opponent's square can only be captured as a direct result of a move.
8. If it is impossible to capture a square, then the computer will advise that your (or it!) must pass and allow the opponent another turn.
9. When all the squares have been covered, the computer will announce the winner.
10. In the event of deadlock, the player with most squares wins.

```
5 KEY 138,"MODE 2:INK 0,0:INK 1,11:PAPER 1:PEN 0:CLS:LIST"+CHRS(13)
10 REM *****AMTHELLO BY M.J.GRIBBINS*****
11 BORDER 14
15 CLEAR
16 MODE 1:PEN 0:PAPER 1:CLS
17 INK 0,0:INK 1,14:INK 2,18:INK 3,26
18 LOCATE 2,3:PEN 3:PRINT"A":LOCATE 3,4:PRINT"M":LOCATE 4,5:PRINT"T":LOCATE
5,6:PRINT"H"
19 LOCATE 6,7:PRINT"E":LOCATE 7,8:PRINT"L":LOCATE 8,9:PRINT"L":LOCATE
9,10:PRINT"O"
20 WINDOW #1,2,39,22,25:PAPER #1,1:PEN #1,0:CLS #1
21 PEN 0
30 LOCATE #1,8,1:PRINT #1,"BLACK ALWAYS PLAYS FIRST"
33 LOCATE #1,1,3:PRINT #1,"PRESS B OR W TO CHOOSE BLACK OR WHITE"
34 BS=INKEY$:IF BS="" THEN 34
40 IF BS="W" OR BS="w" THEN Q%=3:N%=0:GOTO 75
50 IF BS="B" OR BS="b" THEN Q%=0:N%=3:GOTO 75
52 CLS #1:LOCATE #1,4,3
60 PRINT #1,"          BLACK OR WHITE ONLY"
65 FOR T=0 TO 1000:NEXT T
70 GOTO 34
75 DIM C%(10,10),P%(9,9),C1%(8),C2%(8),CX%(9),CY%(9)
80 I1%=2:J1%=2:I2%=7:J2%=7
82 FOR I%=0 TO 9
83 C%(I%,0%)=6:C%(0,I%)=6
84 C%(9,I%)=6:C%(I%,9)=6
85 NEXT I%
90 FOR I%=1 TO 8
95 READ C1%(I%),C2%(I%)
100 FOR J%= 1 TO 8
110 READ P%(I%,J%)
120 C%(I%,J%)=6
130 NEXT J%:NEXT I%
140 C%(4,4)=3:C%(4,5)=0:C%(5,4)=0:C%(5,5)=3
143 FOR K%=1 TO 58
144 READ AR%,BR%,CR%,DR%
145 PLOT AR%,BR%:DRAW CR%,DR%,0
146 NEXT K%
150 GOSUB 1000
160 IF Q%=3 GOTO 370
170 CLS #1:INPUT #1," WHICH LINE DO YOU WANT ";E%
180 IF E% <1 OR E% >8 GOTO 170
190 LOCATE #1,1,3:INPUT #1,"WHICH COLUMN DO YOU WANT ";D%
```

```

200 IF D% <1 OR D% >8 GOTO 190
210 IF C%(D%,E%)=6 GOTO 230
215 CLS #1:LOCATE #1,5,2:PRINT #1,"THAT SQUARE IS ALREADY OCCUPIED !"
218 FOR T=1 TO 1000:NEXT T
220 GOTO 170
230 PLOT 270+(30*D%),70+(30*E%):DRAW 290+(30*D%),89+(30*E%),Q%
231 PLOT 290+(30*D%),70+(30*E%):DRAW 270+(30*D%),89+(30*E%),Q%
235 GOTO 239
236 FOR M%= 0 TO 19 STEP 2:PLOT 270+(30*D%),70+M%+(30*E%)
237 DRAW 290+(30*D%),70+M%+(30*E%),6:NEXT M%
238 GOTO 170
239 VRX%=0
240 FOR K%=1 TO 8
250 VR%=0:C3%=D%:C4%=E%
260 C3%=C3%+C1%(K%):C4%=C4%+C2%(K%)
270 IF C%(C3%,C4%)=N% GOTO 275 ELSE 280
275 VR%=VR%+1:GOTO 260
280 IF C%(C3%,C4%)=6 GOTO 285 ELSE 290
285 NEXT K%:GOTO 340
290 IF VR%=0 GOTO 285 ELSE 300
300 VRX%=VRX%+VR%
310 C3%=C3%-C1%(K%):C4%=C4%-C2%(K%)
320 IF C%(C3%,C4%)=6 GOTO 285 ELSE 330
330 C%(C3%,C4%)=Q%:GOTO 310
340 IF VRX%=0 GOTO 343 ELSE 350
343 CLS #1:PRINT #1," THIS IS NOT A POSSIBLE CHOICE"
344 FOR T=1 TO 1000:NEXT T
345 GOTO 236
350 E%=E%-D%:D%=VRX%=VRX%
351 CLS #1:PRINT #1,"YOU HAVE PLAYED LINE NUMBER ";E%
352 PRINT #1,"          AND COLUMN NUMBER ";D%
353 LOCATE #1,2,4:PRINT #1,"THAT GIVES YOU ";VRX%;" SQUARE(S)"
355 C%(D%,E%)=Q%:GOSUB 2000
360 GOSUB 1000
370 CLS #1:LOCATE #1,10,2:PRINT #1,"NOW IT'S MY TURN ...!"
380 P%=0:VRX%=0:VRY%=0
381 IF I1%*J1%=1 AND I2%*J2%=64 GOTO 390
382 FOR K%=2 TO 7
383 IF C%(2,K%) <> 6 THEN I1%=1
384 IF C%(7,K%) <> 6 THEN I2%=8
385 IF C%(K%,2) <> 6 THEN J1%=1
386 IF C%(K%,7) <> 6 THEN J2%=8
387 NEXT K%
390 FOR I%=I1% TO I2%
400 FOR J%=J1% TO J2%
410 IF C%(I%,J%)=6 GOTO 450
420 NEXT J%:NEXT I%
425 IF P% > 0 GOTO 438
426 IF PAS%=1 GOTO 428 ELSE 430
428 CLS #1:PRINT #1," DEADLOCK ! I MUST PASS ALSO.GAME OVER"
429 FOR T=1 TO 1000:NEXT T:GOTO 1070
430 CLS #1:LOCATE #1,18,2:PRINT #1,"I MUST PASS"
431 GOSUB 3500
432 IF PAS%=1 GOTO 434 ELSE 437
434 CLS #1:PRINT #1,"DEADLOCK! YOU MUST PASS ALSO.GAME OVER"
435 FOR T=1 TO 1000:NEXT T:GOTO 1070
437 GOTO 170
438 IF LC%=0 THEN LC%=1:RANDOMIZE LC%:RL%=RND(LC%)
439 CX1%=CX%(RL%):CX2%=CY%(RL%)
440 GOTO 600
450 VRX%=0
460 FOR K%=1 TO 8
470 VR%=0:C3%=I%:C4%=J%
480 C3%=C3%+C1%(K%):C4%=C4%+C2%(K%)
490 IF C%(C3%,C4%)=Q% GOTO 495 ELSE 500
495 VR%=VR%+1:GOTO 480
500 IF C%(C3%,C4%)=6 GOTO 505 ELSE 510
505 NEXT K%:GOTO 525

```

```

510 IF VR%=0% GOTO 505 ELSE 520
520 VRX%=VRX%+VRX%:GOTO 505
525 IF VRX%=0 GOTO 420
530 IF P%(I%,J%) < P% GOTO 420
540 IF P%(I%,J%) > P% GOTO 545 ELSE 550
545 P%=P%(I%,J%):VRY%=VRX%:LC%=0:CX%(0)=I%:CY%(0)=J%:GOTO 420
550 IF VRY% > VRX% GOTO 420
560 IF VRY% < VRX% GOTO 562 ELSE 565
562 LC%=0:VRY%=VRX%:CX%(0)=I%:CY%(0)=J%:GOTO 420
565 LC%=LC%+1:CX%(LC%)=I%:CY%(LC%)=J%
570 GOTO 420
600 CX2%=CX2%:CX1%=CX1%:VRY%=VRY%
605 CLS #1:PRINT #1," I CHOOSE LINE NUMBER ";CX2%
606 PRINT #1," AND COLUMN NUMBER ";CX1%
610 LOCATE #1,1,4:PRINT #1,"THAT GIVES ME ";VRY%;" SQUARE(S)"
620 PLOT 270+(30*CX1%),70+(30*CX2%):DRAW 290+(30*CX1%),89+(30*CX2%),N%
630 PLOT 290+(30*CX1%),70+(30*CX2%):DRAW 270+(30*CX1%),89+(30*CX2%),N%
640 FOR T=1 TO 1000:NEXT T
700 FOR K%=1 TO 8
710 VR%=0:C3%=CX1%:C4%=CX2%
720 C3%=C3%+C1%(K%):C4%=C4%+C2%(K%)
730 IF C%(C3%,C4%)=Q% GOTO 735 ELSE 740
735 VR%=VR%+1:GOTO 720
740 IF C%(C3%,C4%)=6 GOTO 745 ELSE 750
745 NEXT K%:GOTO 785
750 IF VR%=0 GOTO 745
760 C3%=C3%-C1%(K%):C4%=C4%-C2%(K%)
770 IF C%(C3%,C4%)=6 GOTO 745
780 C%(C3%,C4%)=N%:GOTO 760
785 C%(CX1%,CX2%)=N%
800 GOSUB 3500
810 GOSUB 1000
820 IF PAS%=1 GOTO 825 ELSE 830
825 CLS #1:PRINT #1," YOU MUST PASS":FOR T=1 TO 1000:NEXT T:GOTO 370
830 GOTO 170
1000 FOR I%=1 TO 8
1005 FOR J%=1 TO 8
1010 FOR M%=0 TO 19 STEP 2
1015 Z%=270+(30*I%):H%=70+(30*J%):W%=H%+M%
1020 PLOT Z%,W%:DRAW Z%+20,W%,C%(I%,J%)
1030 NEXT M%:NEXT J%:NEXT I%
1040 X%=X%+1
1050 IF X%=61 GOTO 1070
1060 RETURN
1070 CQ%=0:CN%=0
1080 FOR I%=1 TO 8
1090 FOR J%=1 TO 8
1100 IF C%(I%,J%)=Q% THEN CQ%=CQ%+1
1110 IF C%(I%,J%)=N% THEN CN%=CN%+1
1120 NEXT J%:NEXT I%
1130 IF CQ% > CN% GOTO 1175
1140 IF CQ%=CN% GOTO 1145 ELSE 1150
1145 CLS #1:LOCATE #1,25,2:PRINT #1,"DEADLOCK"
1146 END
1150 CLS #1:LOCATE #1,5,1:PRINT #1,"YOU HAVE ";CQ%;" SQUARES;I HAVE ";CN%
1160 LOCATE #1,11,3:PRINT #1,"I HAVE WON....!!!"
1170 END
1175 CLS #1:LOCATE #1,5,1:PRINT #1,"YOU HAVE ";CQ%;" SQUARES;I HAVE ";CN%
1180 LOCATE #1,5,3:PRINT #1,"WELL DONE. YOU HAVE WON !!"
1190 END
2000 IF C%(2,2)=Q% AND (C%(3,1)=N% OR C%(1,3)=N%) GOTO 2002 ELSE 2003
2002 P%(3,1)=1:P%(1,3)=1
2003 IF C%(7,7)=Q% AND (C%(8,6)=N% OR C%(6,8)=N%) GOTO 2005 ELSE 2006
2005 P%(8,6)=1:P%(6,8)=1
2006 IF C%(2,7)=Q% AND (C%(1,6)=N% OR C%(3,8)=N%) GOTO 2008 ELSE 2009
2008 P%(1,6)=1:P%(3,8)=1
2009 IF C%(7,2)=Q% AND (C%(6,1)=N% OR C%(8,3)=N%) GOTO 2011 ELSE 2018
2011 P%(6,1)=1:P%(8,3)=1

```



```

2018 IF D%=1 OR D%=8 OR E%=1 OR E%=8 GOTO 2030
2019 IF CX1%=1 OR CX1%=8 OR CX2%=1 OR CX2%=8 GOTO 2030
2020 RETURN
2030 FOR J%=1 TO 8 STEP 7
2035 FOR I%=2 TO 7
2040 IF C%(I%,J%)=N% GOTO 2042 ELSE 2043
2042 P%(I%+1,J%)=21:P%(I%-1,J%)=21
2043 IF C%(J%,I%)=N% GOTO 2045 ELSE 2046
2045 P%(J%,I%+1)=21:P%(J%,I%-1)=21
2046 NEXT I%
2048 FOR I%=2 TO 7
2050 IF C%(I%,J%)=Q% GOTO 2052 ELSE 2055
2052 P%(I%+1,J%)=2:P%(I%-1,J%)=2
2055 IF C%(J%,I%)=Q% GOTO 2057 ELSE 2060
2057 P%(J%,I%+1)=2:P%(J%,I%-1)=2
2060 NEXT I%:NEXT J%
2065 P%(1,2)=1:P%(1,7)=1:P%(2,1)=1:P%(7,1)=1
2070 P%(2,8)=1:P%(7,8)=1:P%(8,2)=1:P%(8,7)=1
2120 FOR I%=2 TO 7
2121 IF C%(1,I%-1)=Q% AND C%(1,I%+1)=Q% THEN P%(1,I%)=25
2122 IF C%(8,I%-1)=Q% AND C%(8,I%+1)=Q% THEN P%(8,I%)=25
2123 IF C%(I%-1,1)=Q% AND C%(I%+1,1)=Q% THEN P%(I%,1)=25
2124 IF C%(I%-1,8)=Q% AND C%(I%+1,8)=Q% THEN P%(I%,8)=25
2125 NEXT I%
2200 FOR J%=1 TO 8 STEP 7
2205 FOR I%=4 TO 8
2210 IF C%(J%,I%) <> N% GOTO 2230
2215 IC%=I%-1:IF C%(J%,IC%)=6 GOTO 2230
2220 IF C%(J%,IC%)=Q% GOTO 2222 ELSE 2225
2222 IC%=IC%-1:GOTO 2220
2225 IF C%(J%,IC%)=6 GOTO 2227
2226 GOTO 2230
2227 IF IC%=0 GOTO 2230
2228 IF C%(J%,I%+1)=Q% AND C%(J%,IC%-1)=6 GOTO 2230
2229 P%(J%,IC%)=26
2230 IF C%(I%,J%) <> N% GOTO 2250
2235 IC%=I%-1:IF C%(IC%,J%)=6 GOTO 2250
2240 IF C%(IC%,J%)=Q% GOTO 2242 ELSE 2245
2242 IC%=IC%-1:GOTO 2240
2245 IF C%(IC%,J%)=6 GOTO 2247
2246 GOTO 2250
2247 IF IC%=0 GOTO 2250
2248 IF C%(I%+1,J%)=Q% AND C%(IC%-1,J%)=6 GOTO 2250
2249 P%(IC%,J%)=26
2250 NEXT I%
2255 FOR I%=1 TO 5
2260 IF C%(J%,I%) <> N% GOTO 2280
2265 IC%=I%+1:IF C%(J%,IC%)=6 GOTO 2280
2270 IF C%(J%,IC%)=Q% GOTO 2272 ELSE 2275
2272 IC%=IC%+1:GOTO 2270
2275 IF C%(J%,IC%)=6 GOTO 2277
2276 GOTO 2280
2277 IF IC%=9 GOTO 2280
2278 IF C%(J%,I%-1)=Q% AND C%(J%,IC%+1)=6 GOTO 2280
2279 P%(J%,IC%)=26
2280 IF C%(I%,J%) <> N% GOTO 2305
2285 IC%=I%+1:IF C%(IC%,J%)=6 GOTO 2305
2290 IF C%(IC%,J%)=Q% GOTO 2295 ELSE 2300
2295 IC%=IC%+1:GOTO 2290
2300 IF C%(IC%,J%)=6 GOTO 2302
2301 GOTO 2305
2302 IF IC%=9 GOTO 2305
2303 IF C%(I%-1,J%)=Q% AND C%(IC%+1,J%)=6 GOTO 2305
2304 P%(IC%,J%)=26
2305 NEXT I%:NEXT J%
2320 IF C%(1,1)=N% GOTO 2322 ELSE 2325
2322 FOR I%=2 TO 6:P%(1,I%)=20:P%(I%,1)=20:NEXT I%
2325 IF C%(1,8)=N% GOTO 2327 ELSE 2330

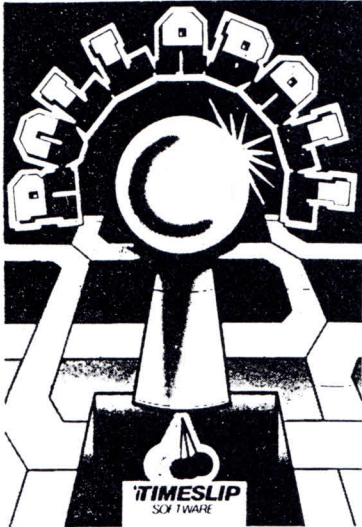
```

```

2327 FOR I%=2 TO 6:P%(I%,8)=20:P%(1,9-I%)=20:NEXT I%
2330 IF C%(8,1)=N% GOTO 2332 ELSE 2335
2332 FOR I%=2 TO 6:P%(9-I%,1)=20:P%(8,I%)=20:NEXT I%
2335 IF C%(8,8)=N% GOTO 2337 ELSE 2340
2337 FOR I%=3 TO 7:P%(I%,8)=20:P%(8,I%)=20:NEXT I%
2340 IF C%(1,1) <> 6 THEN P%(2,2)=5
2341 IF C%(1,8) <> 6 THEN P%(2,7)=5
2342 IF C%(8,1) <> 6 THEN P%(7,2)=5
2343 IF C%(8,8) <> 6 THEN P%(7,7)=5
2350 P%(1,1)=30:P%(1,8)=30:P%(8,1)=30:P%(8,8)=30
2360 FOR I%=3 TO 6
2365 IF C%(1,I%)=N% THEN P%(2,I%)=4
2370 IF C%(8,I%)=N% THEN P%(7,I%)=4
2375 IF C%(I%,1)=N% THEN P%(I%,2)=4
2380 IF C%(I%,8)=N% THEN P%(I%,7)=4
2385 NEXT I%
2390 IF C%(7,1)=Q% AND C%(4,1)=N% AND C%(6,1)=6 AND C%(5,1)=6 THEN P%(6,1)=26
2391 IF C%(1,7)=Q% AND C%(1,4)=N% AND C%(1,6)=6 AND C%(1,5)=6 THEN P%(1,6)=26
2392 IF C%(2,1)=Q% AND C%(5,1)=N% AND C%(3,1)=6 AND C%(4,1)=6 THEN P%(3,1)=26
2393 IF C%(1,2)=Q% AND C%(1,5)=N% AND C%(1,3)=6 AND C%(1,4)=6 THEN P%(1,3)=26
2394 IF C%(8,2)=Q% AND C%(8,5)=N% AND C%(8,3)=6 AND C%(8,4)=6 THEN P%(8,3)=26
2395 IF C%(2,8)=Q% AND C%(5,8)=N% AND C%(3,8)=6 AND C%(4,8)=6 THEN P%(3,8)=26
2396 IF C%(8,7)=Q% AND C%(8,4)=N% AND C%(8,5)=6 AND C%(8,6)=6 THEN P%(8,6)=26
2397 IF C%(7,8)=Q% AND C%(4,8)=N% AND C%(5,8)=6 AND C%(6,8)=6 THEN P%(6,8)=26
2400 RETURN
3500 PAS%=0
3510 FOR I%=1 TO 8
3520 FOR J%=1 TO 8
3530 IF C%(I%,J%)=Q% GOTO 3560
3540 NEXT J%:NEXT I%
3550 PAS%=1:RETURN
3560 FOR K%=1 TO 8
3570 VR%=0:C3%=I%:C4%=J%
3580 C3%=C3%+C1%(K%):C4%=C4%+C2%(K%)
3590 IF C3% < 1 OR C3% > 8 GOTO 3595 ELSE 3600
3595 NEXT K%:GOTO 3540
3600 IF C4% < 1 OR C4% > 8 GOTO 3595 ELSE 3610
3610 IF C%(C3%,C4%)=N% GOTO 3615 ELSE 3620
3615 VR%=VR%+1:GOTO 3580
3620 IF C%(C3%,C4%)=Q% GOTO 3595 ELSE 3630
3630 IF VR% > 0 THEN RETURN
3640 GOTO 3595
4000 DATA 1,0,30,1,20,10,10,20,1,30,1,1,1,1,3
4010 DATA 3,3,3,1,1,0,1,20,3,5,5,5,5,3,20,-1,1,10,3,5
4020 DATA 0,0,5,3,10,-1,0,10,3,5,0,0,5,3,10,-1
4030 DATA -1,20,3,5,5,5,5,3,20,0,-1,1,1,3,3,3,1,1,1,-1,30,1,20,10,10,20,1,30
4040 DATA 263,100,263,120,270,130,255,130,255,130,255,140,255,140,270,140
4050 DATA 270,140,270,150,270,150,255,150,255,160,270,160,270,160,270,180
4060 DATA 270,180,255,180,270,170,255,170,270,190,270,210,270,200,255,200
4070 DATA 255,200,255,210,255,220,270,220,270,220,270,230,270,230,255,230
4080 DATA 255,230,255,240,255,240,270,240,255,250,270,250,270,250,270,260
4090 DATA 270,260,255,260,255,250,255,270,270,280,270,300,270,300,255,300
4100 DATA 255,310,255,330,255,330,270,330,270,330,270,310,270,310,255,310
4110 DATA 255,320,270,320
4120 DATA 310,355,310,375,350,355,335,355,335,355,335,365,335,365,350,365
4130 DATA 350,365,350,375,350,375,335,375,365,355,380,355,380,355,380,375
4140 DATA 380,375,365,375,380,365,365,365,410,355,410,375,410,365,395,365
4150 DATA 395,365,395,375,425,355,440,355,440,355,440,365,440,365,425,365
4160 DATA 425,365,425,375,425,375,440,375,455,375,455,355,455,355,470,355
4170 DATA 470,355,470,365,470,365,455,365,485,375,500,375,500,375,500,355
4180 DATA 515,375,515,355,515,355,530,355,530,355,530,375,530,375,515,375
4190 DATA 515,365,530,365

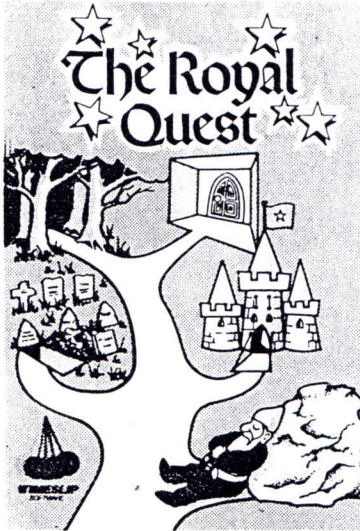
```

AMSTRAD CPC464 SOFTWARE



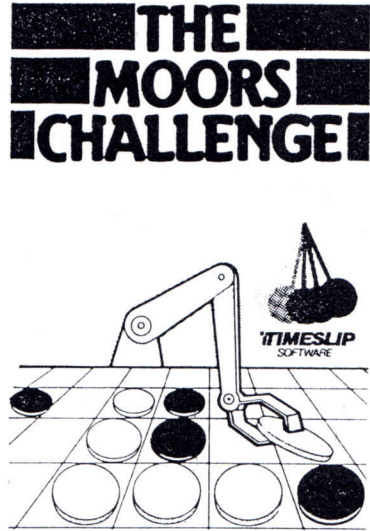
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unlike. 5. something strikingly unlike. 6. variation in tones and forms in a work of art, photograph, etc.

contra·vene, *v.*, -vened, -vening. to violate or infringe. – contravention, *n.*

con·tri·bute, *v.*, -uted, -uting. to give to a common stock. – contribution, *n.* – contributor, *n.* – contributory, *adj.*

con·tri·tion, *n.* sincere penitence. – contrite, *adj.*

con·trive, *v.*, -trived, -triving. 1. to plan with ingenuity. 2. to bring about or effect by a device, stratagem, etc.; manage (to do something). – contrivance, *n.*

Whether your definition results in . . .

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. . . they will be gratefully received.

The Learning Centre

As you would have discovered in the first issue, this article will provide explanations and techniques each month to develop the skills of new programmers. This month we look at re-defining the numeric key pad, and converting your games to use a Joystick.

We also introduce you to Tony Blakemore whose induction to the CPC464, affectionately known as 'Arnold', hasn't always been as simple as he first thought!

Re-defining the Numeric Key Pad

Although each key on the CPC464 has a pre-determined function, it is possible to temporarily change that function to suit a particular circumstance. Naturally you should exercise a certain amount of care when considering which key or keys you wish to re-define. There is little point in changing the function of a key only to discover you need the original later on in your program! This is one of the reasons for choosing the numeric key pad on the right of the main keyboard as the subject of any re-definition. As they duplicate the function of the number keys on the main keyboard you still maintain access to the full character set.

Here is a good example of re-defining the key pad, and at the same time providing a useful tool for keying in a program:

```
10 KEY 128,"RUN"+CHR$(13)
20 KEY 129,"LIST "
30 KEY 130,"AUTO "
40 KEY 131,"RENUM "
50 KEY 132,"CHR$("
60 KEY 133,"EDIT "
70 KEY 134,"INPUT "
80 KEY 135,"GOSUB "
90 KEY 136,"GOTO "
100 KEY 137,"RETURN"
```

This has the following effect:

KEY	FUNCTION
0	RUN and ENTER
1	LIST
2	AUTO
3	RENUM
4	CHR\$(

5	EDIT
6	INPUT
7	GOSUB
8	GOTO
9	RETURN

4	= LEFT
8	= RIGHT
16	= FIRE

Notice that the zero key has been redefined to RUN as well as ENTER, thus saving a key depression.

Joystick Conversion

Many games that are available for the Amstrad CPC464 are played by pressing certain keys to move an object on the screen left, right, up, down or to fire something. This may be fine for some people, but others who are left handed, or have two left hands, or big fingers or, like myself, beat the stuffing out of keys in my excitement/desperation/frustration etc., may prefer the convenience, or in my case the more cost effective method, of a Joystick.

The method of converting a program to use a Joystick is relatively simple. Naturally, the program will contain the following statement.

```
A$=INKEY$
```

In effect this is setting up the keyboard as the input for the left, right etc. commands. It is therefore necessary to replace this command with one which will identify the Joystick as the input, and is achieved with:

```
JO=JOY(0)
```

JO has five standard values:

1	= UP
2	= DOWN

The next step is to study the program and identify the checks for "action". Most programs fall into one of three categories of "action".

CATEGORY 1 – where a game uses UP, DOWN and FIRE the following changes apply:

```
IF A$="Q" to IF JO=1
IF A$="A" to IF JO=2
IF A$="(SPACE)" to IF JO=16
```

CATEGORY 2 – where a game uses LEFT, RIGHT and FIRE the following changes apply:

```
IF A$="Z" to IF JO=4
IF A$="C" to IF JO=8
IF A$="M" to IF JO=16
```

CATEGORY 3 – where a game uses UP, DOWN, LEFT and RIGHT, the following changes apply:

```
IF A$="Q" to IF JO=1
IF A$="A" to IF JO=2
IF A$="O" to IF JO=4
IF A$="P" to IF JO=8
```

You may find some small variations on the above examples, and if you need further help take a look at Chapter 7 (Page 2) of the Amstrad User Manual.

Note – more experienced users are very welcome to impart some of their knowledge to newcomers by submitting simple but useful routines, hints or explanations to this article.

The Trials of Tony Blakemore

A column dedicated to the absolute beginner

Why call it the trials of Tony Blakemore? Relating my early trials and tribulations in learning how to become a programmer to the Trials of Arnold Blackwood seemed to be a good analogy. At the time I really did not know where I was going, but was determined to get a Program into the computer and running as quickly as possible. After all, the salesman had told me how easy it was, and I had been using a calculator for years. This was going to be easy. Two o'clock in the morning and everybody was in bed except me. Five more lines to enter and I would be ready to try my first game. I had very carefully entered all the instructions and checked them to make sure that they were right. Ah! the last line and I am finished. Enter RUN and away we go. The salesman was right this was easy. But wait what is this 'SYNTAX ERROR'? What the heck is a syntax error?

Judging by the amount of letters received on the subject this would seem to be the most common problem encountered by novice programmers.

To explain why syntax errors occur we have to know a little about how the CPC 464 BASIC INTERPRETER works.

The interpreter is the program that takes our instructions and converts them into MACHINE CODE, the language that the computer understands. It resides in the ROM, the permanent part of the computer memory, and operates automatically on all Basic instructions. The interpreter only understands exactly what it is told and these instructions, known as BASIC KEYWORDS, are listed in the manual (appendix VIII page 4.) Misspelling of these words is the most common error. Punctuation can also produce syntax errors. Incorrect use of the COLON, SEMI COLON and brackets being the most common. Another area that is confusing is arithmetical operators, namely the add, subtract, multiply and divide signs. In Basic the "x" is used as a letter and would confuse the interpreter if used to multiply. It is replaced with '*' known as an asterisk. The divide sign being similar to the minus is replaced with '/' known as a slant or slash.

Only by studying the manual and reading books can you really become familiar with Amstrad Locomotive Basic. I would suggest AMSTRAD

COMPUTING By Ian Sinclair as the best book to read for beginners.

O.K., you say, this is all very well, but I have run a games program and it keeps stopping with the syntax error message. How am I going to fix it? The first thing you should do is check for spelling and punctuation errors. If you have a printer list the program and check it line by line, otherwise list the program on the screen one line at a time. This makes checking much easier. One of the areas that gave me a lot of problems when I first started was mistaking letters for numbers and vice versa. Common examples of this area O for 0 and l for 1. If the programs in the book you are using are taken from an old printer listing, the '0' will not have a slash through it. This only adds to the confusion.

You could try SENSATIONAL GAMES FOR THE AMSTRAD by Jim Gregory. The listings are clearly printed in 40 column width and are very easy to read and enter. Whatever errors are made are easily found and corrected. I heartily recommend the book for all aspiring programmers.

Next month I will expand further on tracking down errors, known as BASIC BUG HUNTING. Happy programming and let's hear from you if you come across any unusual bugs.

Announcing the HELP-DESK

A special service for the novice programmer

Each weekend, between 4 p.m. and 9 p.m. on Saturday and 10 a.m. and 4 p.m. on Sunday (EST), Tony Blakemore has kindly offered to make himself available to answer problems that you may have concerning your CPC464 and related software. For Tony's sake, please keep the calls short and within the prescribed hours as the phone is otherwise used for business purposes.

THE HELP-DESK LINE IS (03) 878 6212

The relieve the pressure, we would welcome volunteers from other States to operate a similar service as soon as possible. Please advise us on (03) 233 9227.

Book Reviews

Shane Kelly takes a look at two paperbacks currently available for the CPC464.

The Working Amstrad: a library of practical subroutines and programs.

This book should have been titled: - "A modular approach to structured programming without using GOTO (unless absolutely necessary)". It is probably the most structured book I have come across in my microcomputer reading career which would span several years. The question in my mind is that if this book is aimed at the non-novice user won't he already have his own way of doing things, and therefore reject the highly structured approach of this book?

Enough of the philosophical let's go down to the meat and drink - is this book worth buying? The answer is a cautious yes - cautious because there are some gems in the collection of quartz and yes, because it provides some useful routines that could become an important part of your programming arsenal.

The book is part of a series of "The Working XYZ Computer" books and because this book is the last (to date) in the line, all the bugs have been worked out and the programs do actually work (I typed in the sound routines myself!). The programs provided are good solid implementations of their type that take advantage of some of the Amstrad's special features (e.g. EVERY, ON, SQ, etc.) and are probably worth having for those points alone.

Summing up, I dislike the style. It is very dry and unrelieved by humour (except at the end). I dislike the highly structured format (because I am, by nature, a slob), but I thought the contents useful, if you are into semi-serious programming.

Buy it for reference, not for the narrative.

Amstrad Computing with the CPC464

This publication is an excellent addition to your library on the "ARNOLD". Mr Sinclair had stated his aim as to offer progressive help to novice buyers. I believe he has achieved that aim admirably.

The book's style is straight forward, it avoids jargon where possible, and its explanations and analogies are simple, but at the same time, perfectly clear. The novice is shown how to set up the computer, use the print statement and loop structures. Each command or function

is introduced as it is needed and this way the reader is introduced painlessly to some very advanced programming concepts (i.e. using interrupts).

There are whole chapters on sound, graphics, windows and also the cassette. There is good advice on how to go about planning to use graphics, sound and windows. Paper, pen and ink commands (not explained very well in the manual) are given clear simple explanations and examples of their use.

All in all, the book goes a long way towards making the novice user familiar with the powerful Locomotive Basic.

With appendices on editing, error trapping, redefining keys and the advanced "print using" command, this book would not go astray on even the most advanced programmer.

RECOMMENDED

N.B. Ian Sinclair is well qualified to write on electronics and computing - I remember reading articles by him back in 1978 - the early days of home computer!



Users Hot-Line

Arthur Harris provides answers to some of the questions raised in last month's Hot-Line. If you have any tricky problems you feel could be solved by other users, or have the answers, we would like to hear from you.

Dave Anderson of Merredin, W.A. had two problems published in the first issue of The Amstrad User – how to separate the integer from the whole of the number in order to use what's left, and trouble in saving and retrieving data to cassette.

Firstly, the problem of $X = 0.119999886$. This is caused by the way a computer stores a number. Usually the number is stored in binary, i.e. a series of 1's and 0's. The value shown for X is probably the closest approximation the Amstrad can achieve to 0.12. Try storing $Y = 0.12$ and the print Y to the screen. To store this in 2 bytes, the binary version is $(00011110) (10111000)$. Converting this back to decimal gives 0.119951172 which is *not* 0.12. If anyone is interested enough to write in and request it, I will provide a fuller explanation of how to achieve conversions between decimal and numbers to any base most efficiently.

Now to answer Dave's second problem. Whether the data is being stored on disk or cassette, the solution is the same. The data *must* be separated by commas, whether it is numeric or string. If the string data *could* contain a comma, then that item *must* be enclosed within quotes. The following example lines, from a working program, illustrate how to do this.

```
10 OPENOUT "DATA": PRINT #9,
N, ", ", X, ", ", O$, CHR$(34); S$,
CHR$(34); ", ";
20 FOR I = 0 TO N:FOR J = 1 TO
M:PRINT #9, PT(I,J); ", ";
NEXT J: NEXT I: CLOSEOUT
30 OPENIN "DATA": INPUT #9, N,
X, O$, S$
```

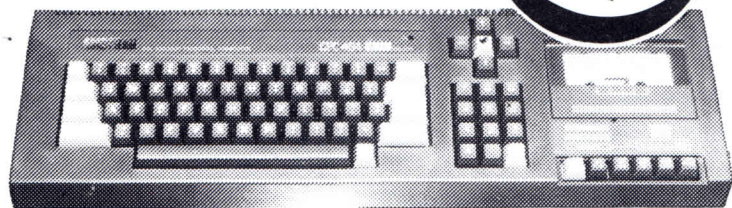
```
40 FOR I = 0 TO N:FOR J = 1 TO
M:INPUT #9, PT(I,J):
NEXT J: NEXT I: CLOSEIN
```

This illustrates the saving and recovery of numeric variable contents, string variable contents (including one which will contain a comma, S\$) and the contents of 2-D array. I hope this solves the problem for Dave and anyone else with similar problems.

John Harris of Diannela, W.A.

wanted information on the availability of a suitable modem and interface that would be compatible with the CPC464. Dick Smith's DATAPHONE II will do an excellent job for a modem. I assume that the disk port will provide a suitable serial outlet for connection of the modem. The biggest problem is to obtain a program suitable for the CPC464 to transmit and receive information.

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Scheduler

We are very mindful of the number of commercial users of the CPC464 system. A good number have chosen the CPC464 as it can span home and business applications more readily than most of the alternatives. Many such users have the machine at home to develop their programming skills and write their own applications so here's a very interesting application that puts work efficiency theory into practice.

The specific application may not be exactly tuned to your requirements, but you may well be able to tailor the format to suit a wide variety of planning applications in commercial (and private) situations.

This program is for use in workstudy/production control. Being implemented on a micro, it should be applicable to the practically minded manager who would normally be intimidated by trying to get to grips with a large company computer terminal.

The program will provide an efficient method for determining a sequence for processing a set of jobs, or maybe a customer, either of which will place demands on organisational resources. Under certain conditions that problem will be solved, or a least an optimum solution will be found.

Sequencing

Sequencing is the order in which jobs are placed for processing. Sequencing jobs involves the ordering of jobs through one or more processes, so that specific performances, (optimum performances), such as minimal idle time, total machine time, and time delivery dates are reached, variations of which can produce significant results in costs and productivity.

The sequential ordering of the start and finish of jobs is called a schedule. This schedule is only formed when the processing sequence has been established, noting that a job does not start until the previous job has finished. The machines provide the process by which the jobs are completed, and machines need not be mechanical, they could be human, (visual quality check, and so on). It is important to note that all jobs must go through the same process.

The process time is the amount of time that a machine will need to complete that process, the times for these processes are then collected. These times are then manipulated to obtain the configuration requiring the least amount of processing time: maximum efficiency. Assuming that the least amount of processing time is the result required!

Total facility processing time is the total machine time plus the machine idle time. Therefore reducing the total facility processing time also reduces the machine idle time.

The method used to solve this problem was developed by S.A. Johnson and later extended by W.A. Stark,

(number of jobs - 1 method). These two algorithms are used in the program to obtain the results.

The Johnson algorithm finds the shortest processing time for two machines, the Stark algorithm is then used to get the shortest processing time from the total number of jobs. By using the Johnson algorithm on the first two times and the last two times, another sequence is obtained. Stark's algorithm is repeatedly applied to the Johnson algorithm, (1 to number jobs-1).

This procedure will develop several sequences, allowing some discretion as to the best sequence for one's purposes, considering that holidays and maintenance must be accounted for.

The program itself

The program will ask for the number of jobs you have to process, say 4 cars for a service at a garage - or four items for assembly into a final product.

Then the program asks for the number of operations: the example garage operations are: service, oil change, wash/clean, polish (Really? You must let me have the name of your garage: ed)

The assembly operations are:

Assemble and cable into roverpoint, seal roverpoint, attach plug and test. Next enter a brief description of the operations, service, oil change, wash/clean and polish. Now enter the job name: for the garage it might be a CORTINA.

Then enter the times the Cortina has to spend in each operation.

The computer then asks for the units of time you are using.

The computer now presents a summary of the data input, together with the finish times. Another prompt invites you to proceed to check times for the initial sequence.

Next comes the schedule itself, and you can list all the options, or select only the best ones.

Having decided how you want to view the results, the program goes through its paces to list the best results for you to examine, and then finally to determine the recommended schedule, sequence and the time involved. *Please note the following listing has been compressed to 40 columns. DO NOT terminate line ends with (ENTER) unless the next line on this listing starts with a valid line number! (Follow the sequence incrementing in 10's)*


```

100 MODE 2:INK 1,0:INK 0,13:BORDER 13
110 DIM m(20,20),j$(20),m$(20),a(20)
120 DIM b(20),c(20),seq(20,20),PASS(20)
130 DIM mt(20),t1(20,20),t2(20,20)
140 DIM it(20),kl(20)
150 GOTO 410
160 FOR I=1 TO 500:NEXT I
170 PRINT,,,"PRESS ANY KEY FOR MORE"
180 IF INKEY$="" THEN 180
190 RETURN
200 REM *** CALCULATE IN/OUT SCHEDULE
210 t1(1,1)=0
220 FOR I=1 TO nm
230 t2(1,I)=t1(1,I)+m(c(1),I)
240 IF I= nm THEN 260
250 t1(1,I+1)=T2(1,I)
260 NEXT I
270 TI=T2(1,1)
280 FOR J=2 TO NJ
290 T1(J,1)=T2(J-1,1)
300 T2(J,1)=T1(J,1)+M(C(J),1)
310 NEXT J
320 REM
330 FOR J=2 TO NJ
340 FOR I=2 TO NM
350 T1(J,I)=T2(J,I-1)
360 IF T2(J-1,I)>T2(J,I-1) THEN
T1(J,I)=T2(J-1,I)
370 T2(J,I)=T1(J,I)+M(C(J),I)
380 NEXT I
390 NEXT J
400 RETURN
410 CLS:PRINT:PRINT
420 SPEED INK 20,20
430 INK 2,0,13
440 MODE 1:INK 1,0:INK 0,13:BORDER
13:PAPER 0:PEN 1
450 PRINT "M-MACHINE SCHEDULING"
460 PRINT:PEN 2
470 PRINT TAB(6)"by J.P.MARSHALLSEA":PEN
1:PRINT
480 PRINT:PRINT"THE PROGRAM CAN BE USED
FOR UP TO 20"
490 PRINT "JOBS AND 20 MACHINE
OPERATIONS.":PRINT
500 PEN 3:PRINT,"NOTE"
510 PRINT STRING$(40,45)
520 PRINT ,"COMPLETE ALL DATA ENTRIES
BY"
530 PRINT ,"HITTING THE RETURN KEY"
540 PRINT STRING$(40,45)
550 PEN 1
560 GOSUB 160
570 MODE 2:INK 1,0:INK 0,13:BORDER 13
:CLS
580 DISPLAY=0
590 INPUT "Type in the number of jobs
";NJ
600 PRINT
610 INPUT "Type in the number of machine
operations";NM
620 CLS
630 PRINT "Begin by describing the
machine operations."
640 PRINT "These operations are assumed
to be sequential."
650 PRINT
660 FOR I=1 TO nm
670 PRINT:PRINT
680 PRINT "Type a description of machine

```

```

operation";I
690 PRINT "(use up to 7 characters)."
700 INPUT m$(I)
710 IF LEN(m$(I))<=7 THEN 750
720 PRINT
730 PRINT"Use only 7 characters please"
740 PRINT:GOTO 680
750 NEXT I
760 CLS
770 PRINT "Now briefly,(6 characters or
less) describe each job,and the"
780 PRINT "time in each machine
operation for that job."
790 PRINT
800 FOR J=1 TO NJ
810 PRINT "Type a description of job ";j
820 INPUT j$(j)
830 PRINT
840 PRINT "For this job,enter the time
(to the nearest tenth unit) required"
850 PRINT "for each of the machine
operations listed below."
860 PRINT
870 PRINT "(Use the same time units for
all operations.)"
880 PRINT
890 FOR I=1 TO nm
900 PRINT "Time in operation ";m$(I);" =
";
910 INPUT M(J,I)
920 PRINT
930 NEXT I
940 CLS
950 NEXT j
960 REM
970 PRINT "Input complete"
980 PRINT
990 PRINT "Type in the units of time,
(E.G.,Minutes,Hours,ETC.)"
1000 INPUT UNITS
1010 ns=1
1020 nf=ns+3
1030 IF nf>nm THEN nf=nm
1040 CLS
1050 IF ns=1 GOTO 1080
1060 PRINT,,"MACHINE OPERATIONS (CONT."
1070 GOTO 1090
1080 PRINT,,"MACHINE OPERATIONS"
1090 PRINT,,"STRING$(18,45);
1100 PRINT,,"(TIMES IN ";UNITS;)"
1110 PRINT,,"JOB";,,;
1120 FOR I=ns TO nf
1130 PRINT m$(I);,,;
1140 NEXT I
1150 PRINT STRING$(80,45)
1160 FOR j=1 TO nj
1170 PRINT J;".";,,;j$(j);,,;
1180 FOR I=ns TO nf
1190 PRINT M(J,I);,,;
1200 NEXT I
1210 PRINT
1220 NEXT j
1230 PRINT:PRINT"Do you wish to change
any of the data"
1240 a$=INKEY$:IF a$="" THEN 1240
1250 IF a$="Y" THEN GOSUB 2730 :GOTO
1040
1260 IF a$<>"N" THEN 1240
1270 PRINT "Do you wish to re-arrange
your schedule."

```

```

1280 AS=INKEY$:IF AS="" THEN 1280
1290 IF AS="Y" THEN GOSUB 3820 :GOTO
1010
1300 IF AS<>"N" THEN 1280
1310 IF NF=NM THEN 1330
1320 NS=NF+1:GOTO 1020
1330 FOR j=1 TO nj:c(j)=j:NEXT j
1340 GOSUB 2990
1350 GOSUB 200
1360 CLS
1370 PRINT:PRINT"INITIAL SEQUENCE"
1380 PRINT:PRINT"ORDER          JOB NAME
      F/TIME"
1390 PRINT
1400 FOR j=1 TO nj
1410 PRINT j;;;j$(j);;;t2(j,nm)
1420 NEXT j
1430 GOSUB 160
1440 kk=0
1450 GOSUB 3090
1460 LET bt=nm*t2(nj,nm)
1470 display=0
1480 flag=1
1490 GOSUB 3390
1500 GOSUB 160
1510 IF nm=2 THEN GOTO 1600
1520 PRINT "To veiw all loading
sequences as they are determined,"
1530 PRINT "type an <A>,to view only the
best schedule(s),"
1540 PRINT "type a <B>."
1550 PRINT "You may return later to
review all schedules."
1560 PRINT:PRINT"A or B"
1570 AS=INKEY$:IF AS="" THEN 1570
1580 IF AS="B" THEN display=1:GOTO 1600
1590 IF AS<>"A" THEN GOTO 1570
1600 FOR KK=1 TO nm-1
1610 rpt=0
1620 GOSUB 1950
1630 GOSUB 2070
1640 IF rpt<> 1 THEN GOSUB 2560
1650 GOSUB 200
1660 IF flag=0 THEN 1700
1670 IF NM <>2 THEN 1680
1680 GOSUB 2420
1690 GOSUB 3090
1700 GOSUB 3390
1710 IF flag=0 THEN 1740
1720 GOSUB 160
1730 IF rpt=1 THEN GOTO 1870
1740 NEXT kk
1750 IF nm=2 THEN 1870
1760 GOSUB 3640
1770 FOR LL=0 TO lm
1780 kk=kl(LL)
1790 display=0
1800 CLS
1810 PRINT "A good job sequence is:"
1820 PRINT
1830 PRINT "ORDER          JOB NAME
      F/TIME"
1840 IF nm=2 THEN RETURN
1850 LET rpt=1:GOTO 1620
1860 NEXT ll
1870 GOSUB 2840
1880 ON FLAG GOTO 1910,1930
1890 PRINT:PRINT "THEN GOODBYE!":PRINT
1900 GOTO 1940
1910 flag=0:CLS
1920 GOTO 1010
1930 GOTO 580
1940 END

1950 REM **** COMBINE DATA FOR J&J ****
1960 FOR j=1 TO nj
1970 a(j)=0:b(j)=0
1980 NEXT j
1990 FOR I=1 TO kk
2000 FOR j=1 TO nj
2010 a(J)=a(J)+M(J,I)
2020 b(j)=b(J)+m(j,nm-I+1)
2030 NEXT j
2040 NEXT I
2050 RETURN
2060 REM **** J&J ALGORITHM ****
2070 nf=0:nl=NJ:l=0
2080 GOSUB 2360
2090 FOR j=1 TO nj
2100 c(j)=nj+1
2110 NEXT j
2120 sm=tt
2130 FOR j=1 TO nj
2140 fl=0
2150 REM **** ELIMINATE DONE JOBS ****
2160 FOR jJ=1 TO nj
2170 IF j=c(jJ) THEN fl=1
2180 NEXT jJ
2190 IF fl=1 THEN GOTO 2220
2200 IF b(j)<= sm THEN sm=b(j):il=j:l=2
2210 IF a(j)<= sm THEN sm=a(j):il=j:l=0
2220 NEXT j
2230 IF l=2 THEN GOTO 2260
2240 c(nf)=il
2250 nf=nf+1:GOTO 2280
2260 c(nl)=il
2270 nl=nl-1
2280 IF NL >= NF THEN 2120
2290 REM ***** GENERATE AN ARRAY FOR
2300 REM ***** FILTER.
2310 FOR J=1 TO NJ
2320 SEQ(KK,J)=C(J)
2330 NEXT J
2340 RETURN
2350 REM *** FIND MAXIMUM ELEMENT ***
2360 tt=A(1)
2370 FOR J=1 TO NJ
2380 tt=MAX(a(j),tt)
2390 tt=MAX(b(j),tt)
2400 NEXT J
2410 RETURN
2420 REM *** PRINT JOB SEQUENCE
2430 IF RPT=1 THEN GOTO 2500
2440 CLS
2450 IF NM<>2 THEN GOTO 2470
2460 PRINT "AN OPTIMAL SEQUENCE
IS:":GOTO 2480
2470 PRINT "A POSSIBLE SEQUENCE IS:"
2480 PRINT
2490 PRINT"ORDER          NAME
      F/TIME"
2500 FOR j=1 TO nj
2510 PRINT j;;;j$(c(J));;;t2(j,nm)
2520 NEXT j
2530 GOSUB 160
2540 RETURN
2550 REM **** FILTER SUBROUTINE ****
2560 flag=1
2570 IF nm=2 THEN RETURN
2580 IF kk<2 THEN RETURN
2590 FOR k=1 TO kk-1
2600 IF nflag=0 THEN GOTO 2670
2610 nf=0
2620 FOR j=1 TO nj
2630 IF nf=1 THEN GOTO 2650
2640 IF c(J)<> seq(k,j) THEN nf=1
2650 NEXT j

```

```

2660 IF nf=0 THEN LET flag=0
2670 NEXT k
2680 REM *** FLAG=1 IF SEQUENCE DIFFERS
2690 REM *** FROM PREVIOUS SEQUENCE
2700 REM
2710 RETURN
2720 REM **** CORRECTIONS ****
2730 PRINT:INPUT "Enter the job number
";j
2740 IF j<1 OR j>nj THEN PRINT
"ERROR-RE-ENTER PLEASE":GOTO 2730
2750 PRINT:PRINT"Now enter the new job
description"
2760 INPUT w$
2770 IF LEN(w$) >7 THEN w$=LEFT$(w$,7)
2780 j$(j)=w$
2790 FOR I=1 TO nm
2800 PRINT "Enter the new times for
operation ";m$(i);
2810 INPUT m(j,i)
2820 NEXT i
2830 RETURN
2840 LET FLAG=0
2850 PRINT
2860 PRINT"Do you wish to schedule more
?"
2870 PRINT:PRINT" Y or N"
2880 INPUT AN$
2890 IF AN$="N" THEN RETURN
2900 IF AN$<>"Y" THEN GOTO 2880
2910 PRINT:PRINT"Do you wish to modify
existing data ?"
2920 PRINT" Y or N"
2930 INPUT AN$
2940 IF AN$="Y" THEN LET flag=1:RETURN
2950 IF AN$<>"N" THEN GOTO 2930
2960 PRINT"Then a new problem is
assumed"
2970 flag=2
2980 RETURN
2990 REM *** CALCULATE MACHINE TIME
3000 FOR I=1 TO nm+1 :mt(I)=0:NEXT I
3010 FOR I=1 TO nm
3020 FOR j=1 TO nj
3030 mt(I)=mt(I)+m(j,I)
3040 NEXT j
3050 MT(NM+1)=MT(NM+1)+MT(I)
3060 NEXT I
3070 RETURN
3080 REM *** PRINT SCHEDULE ***
3090 IF display=1 THEN RETURN
3100 ns=1
3110 PRINT "JOB";,;
3120 IF ns=1 THEN GOTO 3150
3130 PRINT" SCHEDULING (CONT.)"
3140 GOTO 3160
3150 PRINT "SCHEDULE"
3160 PRINT STRING$(79,45)
3170 nf=ns+3
3180 IF nf>nm THEN nf=nm
3190 FOR I=ns TO nf
3200 PRINT ,;" ";m$(I);" ";
3210 NEXT I
3220 PRINT
3230 FOR I=ns TO nf
3240 PRINT ,;"IN      OUT ";
3250 NEXT I
3260 PRINT
3270 FOR J=1 TO NJ
3280 PRINT C(J);".":" ";
3290 FOR I=NS TO NF
3300 PRINT ,INT(T1(J,I));"
";INT(T2(J,I));
3310 NEXT I
3320 PRINT
3330 NEXT J
3340 IF NF=NM THEN GOTO 3360
3350 NS=NF+1:GOTO 3110
3360 GOSUB 160
3370 RETURN
3380 REM ***** IDLE TIME *****
3390 OT=NM*T2(NJ,NM)
3400 IF ot>bt THEN bt=ot
3410 IT(KK)=INT(OT)-INT(MT(NM+1))
3420 IF flag=0 THEN RETURN
3430 PRINT
3440 PRINT" PERFORMANCE CHARACTERISTICS
FOR";
3450 IF kk<>0 THEN GOTO 3480
3460 PRINT " INITIAL SEQUENCE"
3470 GOTO 3520
3480 IF nm<>2 THEN GOTO 3510
3490 PRINT" OPTIMAL SEQUENCE"
3500 GOTO 3520
3510 PRINT " THIS SEQUENCE"
3520 PRINT STRING$(79,45)
3530 PRINT"TOTAL FACILITY PROCESSING
TIME ";
3540 PRINT "= ";ROUND(OT,2);",in units
of ";UNITS
3550 PRINT
3560 PRINT "TOTAL MACHINE PROCESSING
TIME ";
3570 PRINT "= ";ROUND(MT(NM+1),2);",in
units of ";UNITS
3580 PRINT
3590 PRINT "IDLE MACHINE TIME ";
3600 PRINT "= ";ROUND(IT(KK),2);",in
units of ";UNITS
3610 PRINT
3620 RETURN
3630 REM *** SHORTEST SEQUENCE ***
3640 FOR I=0 TO nm-1
3650 BT=MIN(IT(I),BT)
3660 NEXT I
3670 is=-1
3680 kk=0
3690 IF it(kk)=bt THEN is=kk
3700 IF kk>=(nm-1) THEN GOTO 3720
3710 kk=kk+1:GOTO 3690
3720 kl(0)=is
3730 l=1
3740 FOR I= 0 TO is-1
3750 IF it(I)<>bt THEN GOTO 3780
3760 kl(l)=n
3770 l=l+1
3780 NEXT I
3790 lm=l-1
3800 RETURN
3810 REM ***** ALTER SCHEDULES
*****
3820 PRINT:PRINT "Enter the machine
number you wish to move."
3830 PRINT "Then enter the new location
in your schedule (X,Y)"
3840 INPUT fs,ms
3850 PASS=MS(FS):MS(FS)=MS(MS)
:MS(MS)=PASS
3860 FOR I=1 TO nJ
3870 PASS(i)=m(I,fs)
3880 m(I,fs)=m(I,ms)
3890 m(I,ms)=PASS(i)
3900 NEXT i
3910 RETURN

```

Review of DDI-1

Following on from Kevin Poynton's overview last month, Shane Kelly was asked to give his impressions of this Disc Drive after two weeks constant use.

First of all I must comment on the implementation by Amstrad. The Disc Drive, when added to the system is a natural extension of the CPC464's operating system. By this I mean that its' use is straight forward with very few of the esoteric and almost mythical mumbo jumbo type commands that are usually necessary to get a disc drive to interface to Basic.

For instance, to save ASCII data from within a program you use PRINT#9,(ITEMS LIST) right? – Well, you use the same thing to save to disc – and it is automatic if you have a disc installed, i.e. the disc is the default device. You must specify a filename and it must be in CP/M format, i.e. not more than eight characters plus a 3 character extension, usually BAS for Basic programs.

The "AMSDOS" operating system is really the cassette operating systems redirected to disc, so it is known and familiar and seems to work with the minimum of fuss. One thing I have noticed is that merging program files does not seem to work, although Kevin Poynton tells me it is possible as he has done it. In any event, merging ASCII files works a treat, so just save the file you want to merge as "Filename-Ext",A and it will be mergeable into your program. I have noticed no other (suspected?) bugs in the system and I am quite pleased with the speed of the disc drive and the fact that I have had no errors in loading or saving to the disc (even while the automatic washing machine was going!)

We now come to the obligatory grumble section (no review is complete without it!)

The disc capacity is a

mere 169K (formatted). This is one of the arguments against the 3" disc system. It cannot easily be made to hold more than 170-180k of data. (The 3½" drive can hold almost double this.)

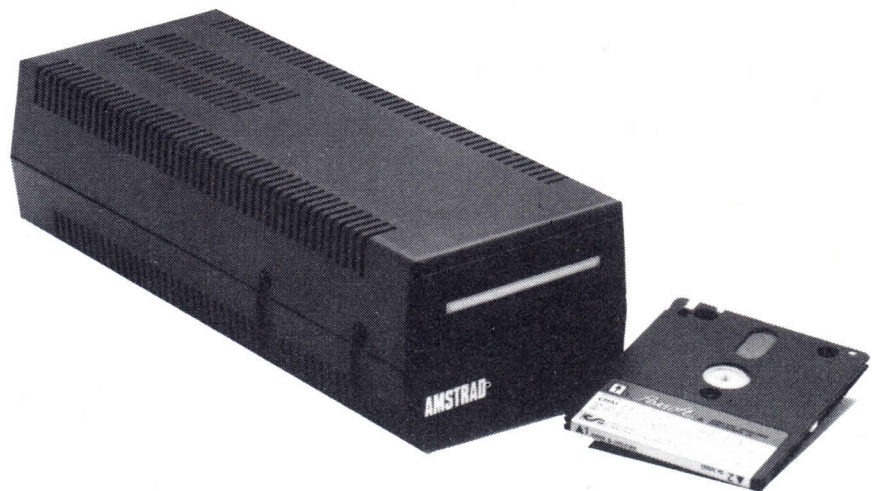
This disc size is not backed by any major computer manufacturer. Apple are putting 3½" drives in the Macintosh, Apricot have 3½" drives and a number of other manufacturers have announced their intention to support 3½" drives.

Those are all the grumbles I have. In actual fact, they don't amount to a hill of beans because I think that the Amstrad will sell enough computers and disc units to ensure that disc supplies remain plentiful, and I am also sure that Hitachi will not stop manufacturing the discs as they use them in their own computers.

This next bit is about CP/M so if your not interested, skip it.

The CP/M is a standard CP/M2.2 version, licensed by Digital Research, modified by AMSOFT (I presume) to integrate into the CPC464 with hardly a shudder. (The default colours give good contrast on the screen, but that pastel Cyan background is a bit much!). By typing the command █CPM, you will load CP/M (if you are using a disc formatted in the system mode) and the familiar A> prompt is there. From this prompt all the usual CPM commands are available plus the usual array of utilities such as ED, DDT, ASM, SYSGEN, BOOTGEN, PIP and an extensive range of disc copiers and file copiers for either one or two drive systems. Also provided is MOVCPM and SETUP, two utilities that alter the configuration of CPM in your machine. Become familiar with the system before playing around with these!!

With CPM you get access to all the software that is currently avail-



able in the public domain for CPM. To get it into the machine you will require assembler listings (in 8080 mnemonics if you have only ASM) or a modem (supposedly coming soon!) or someone who has done all the hard work for you in getting the software on to a 3" disc – but don't rest there, you still have to get it in a format the computer can read! The easiest way to get this public domain software is to join a CPM Users Group, get a terminal program, a modem and a good supply of discs. You can then access the bulletin boards and "download" the software – it ain't easy, but without CPM it's impossible! Enough about CPM – what about LOGO?

LOGO on the CPC464 appears to be a very good implementation allowing you to use all the features of the Amstrad, but restricting you to Mode 1 graphics. The LOGO language is specifically designed for children and there are many good, reasonably priced books available on the language.

The manual provided with the drive is adequate – it doesn't go deep enough for me, but it will serve most users (as opposed to hackers). There is some very sensible advice about copying your master disc and then

storing it in a safe place – I made two copies of mine and I keep the master locked away from all electrical equipment! In fact the manual is full of good advice – most users will need nothing more than this manual as it is quite well laid out and contains all the information the average user will want.

My impressions after two weeks of constant use is that the unit complements the computer and works with the user to actually make the transition to a disc system painless. I think it's a winner.

Now, for the technically minded, the disc drive contains disc controller, CPM ROM and the drive itself. It is connected by a 34 pin (the standard?) cable to the interface plug there is provision for a second disc drive to be added (5¼" if you want) and the operating system can handle two drives (I don't know about anymore).

The system offers 3 different formats:

- System format (CP/M)
- Vendor format – the same as above, but with no system on the discs.
- IBM format – logically the same as CP/M on the IBM PC.

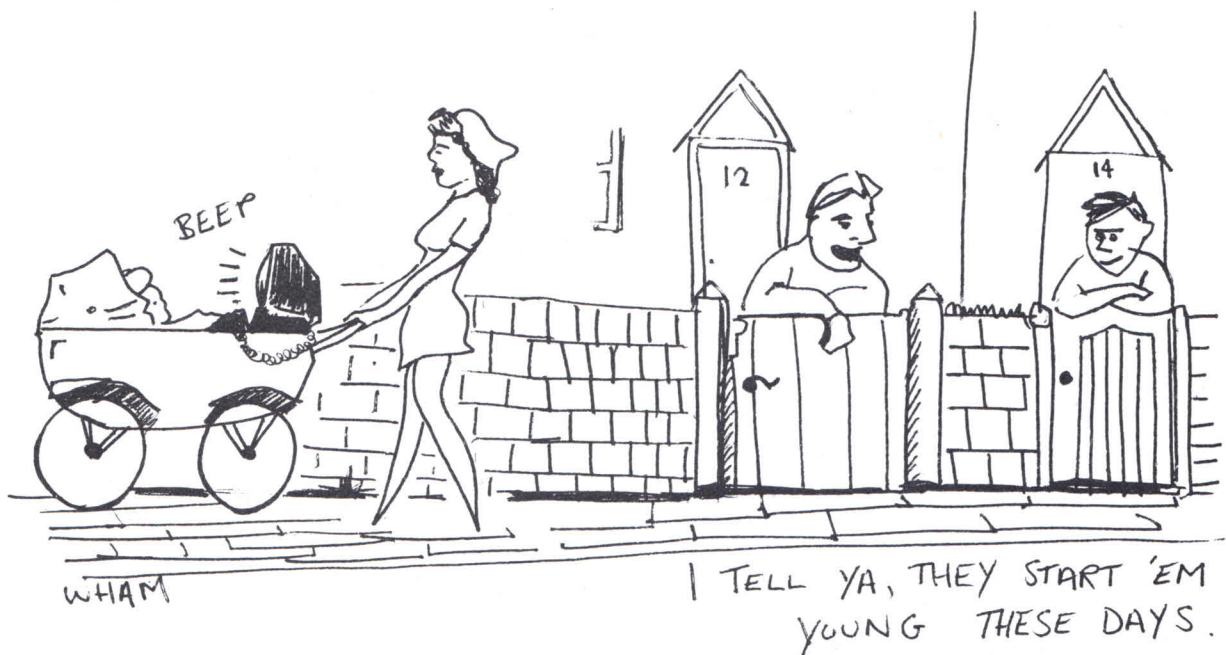
There is another way to use the discs and that is as data only discs that are to be used solely by programs to store data – you cannot boot CP/M from these discs.

Error messages are two types, AMSDOS and CP/M. If you get an error, the AMSDOS error messages are fairly self explanatory and give you the option to retry, Ignore or Cancel. The CP/M error messages are the usual terse BDOS messages that all CPM'ers know and love!

The three inch disc is double sided and the disc surface is not accessible when the disc is out of the drive. I like these discs as they appear to be very hardy animals.

Now for the best piece of advice I can give you – read the manual from cover to cover, especially the end user licence agreement. It doesn't matter if you don't understand it first time around, you will eventually.

Let me conclude this review by saying that the \$449 you spend on the DDI – 1 will probably double your enjoyment of your hobby, and as you progress further you will appreciate just how beneficial the installation of this disc drive can be.



Bytes and Pieces

Further snippets of information to make a programmer's life more tolerable. Any further hints and tips which may save re-inventing the wheel will no doubt be greatly appreciated.

- Hands up all those people who spend a lot of time coding to cover the possibility of getting a user response in lower case instead of upper case (or vice-versa)! A method to ensure that all entries through the keyboard will be accepted regardless of whether they are in upper case or lower case is:

```
POKE 46312,255
```

Quite simply, this puts the CAPS LOCK on. To put it back to normal merely:

```
POKE 46312,0
```

- If the number of characters output to a printer on a single line is the same as the number specified in the WIDTH command, a carriage return/line feed sequence is automatically inserted. If a line is too long, WIDTH stops the printer overprinting the last column. WIDTH255 will disable this feature thereby inhibiting an automatic move to the next line.
- A carriage return or line feed character which forms part of a string (using CHR\$(13) or CHR\$(10)) is sent to the printer by PRINT without further embellishment. Remember that unless a PRINT statement is terminated by a comma or a semicolon, the carriage return/line feed sequence is automatically issued.
- In the event that your printer does not require both carriage return and line feed, and you don't want to change the existing PRINT or WIDTH statements, you will need to intercept the output to the printer at the MC PRINT CHAR jumpblock entry and suppress the line feeds at this point. The following program causes line feeds (&OA) to be ignored by the printer.

```
100 MEMORY HIMEM-7          'SPACE FOR PATCH
110 POKE HIMEM+1,&FE        'CP &OA :CHECK IF LINEFEED
120 POKE HIMEM+2,&OA
130 POKE HIMEM+3,&37        'SCF
140 POKE HIMEM+4,&CB        'RET Z :IGNORE IF SO
150 POKE HIMEM+5,PEEK(&BD2B+0) 'OTHERWISE PRINT CHARACTER
160 POKE HIMEM+6,PEEK(&BD2B+1)
170 POKE HIMEM+7,PEEK(&BD2B+2)
180 POKE &BD2B,&C3          'POINT JUMPBLOCK AT PATCH
190 POKE &BD2B+1,&FF AND UNT(HIMEM+1)
200 POKE &BD2B+2,INT((HIMEM+1)/256)
```

- Characters held in the keyboard buffer are causing problems for a number of people writing their own software. Possibly the simplest way to ensure that these extraneous characters don't cause problems is to use the following when testing for a key depression:-

```
100 IF INKEY$<>="" THEN 100
110 IF INKEY$="" THEN 110
```

Whilst the above may seem illogical it really does work. Line 100 (or whatever line number you use) ensures that the keyboard buffer is clear before doing the normal key depression test at line 110.

APC SHOW

13 – 16th March 1985
at Centre Point,
Sydney

*The Amstrad User
will be there – will you?*

User Group Information

We are pleased to report that 'the word' is getting around. This month sees the potential establishment of a further seven User groups, adding some more links to the Australian Amstrad User 'information network'.

Of course, it is early days yet. Just four weeks have elapsed since the last article was completed for the first edition. So it is very encouraging that in such a short space of time we can witness the formation of ten groups in various locations within Australia. Incidentally, you may be interested to learn that we have received one subscription request from Papua New Guinea, so it would appear that the CPC464 knows no boundaries.

We are currently involved in a number of discussions concerning the formation of additional groups in Queensland, N.S.W and South Australia and hope to provide more information in the third issue of The Amstrad User. We owe an apology to Bob Harwood for putting part of his telephone area code in the actual phone number (and also an apology to the person who has been getting his calls). The correct number, which appears in the User Group List, is (095) 27 1777. So watch

out Bob, you'll be getting some more calls!

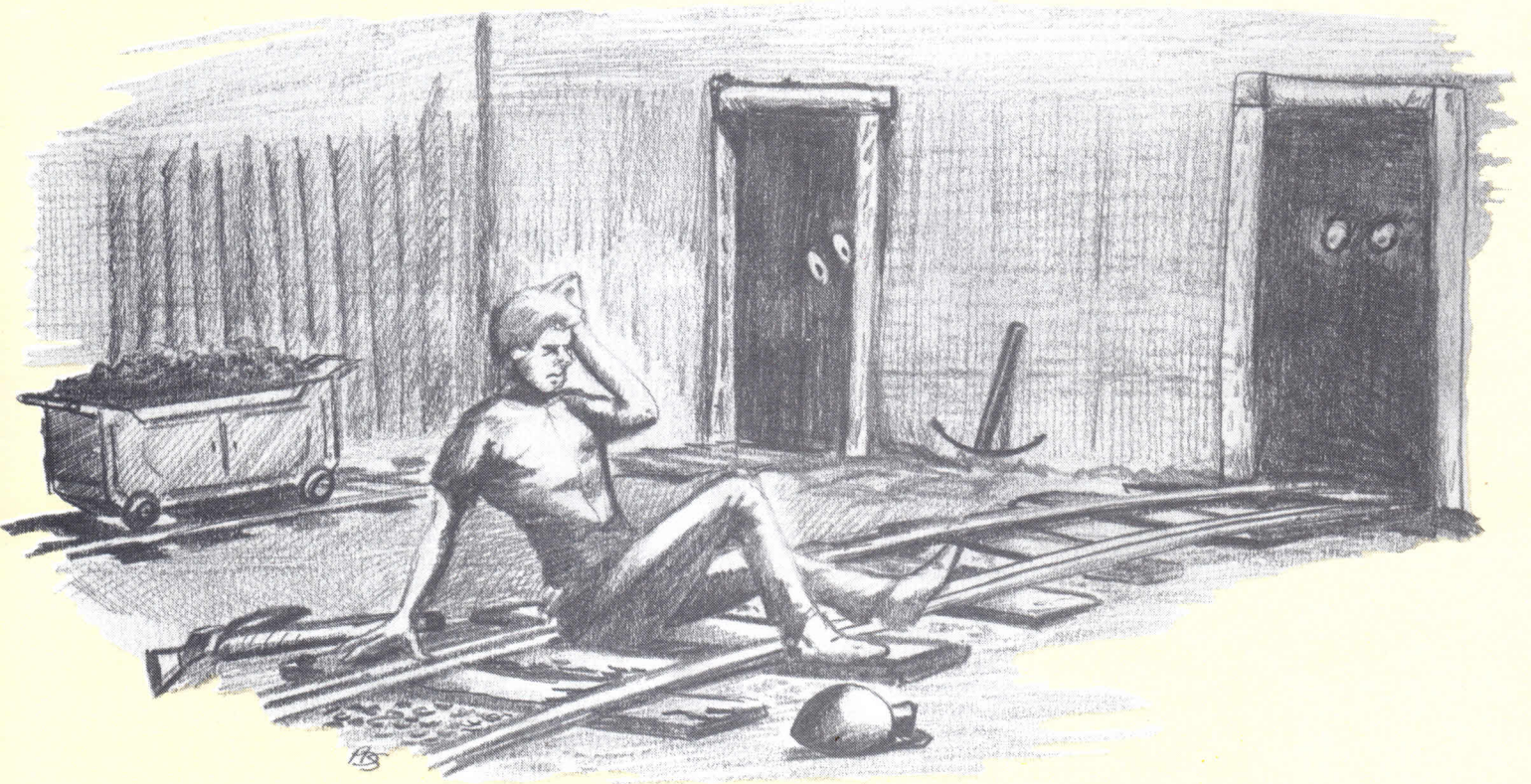
Among our many aims in establishing User Groups throughout Australia is a target of 100 groups by the end of this year. Can you imagine the volume of information that would be flowing? But as we pointed out in the first issue "nothing will be achieved without a positive response from you, the CPC464 user. As a member of a User Group you will learn much more and get greater enjoyment from your computer than you would isolated at home." So if there isn't a group listed which is near enough for you - then perhaps we can help you form your own through the pages of this magazine.

Finally, another reminder that we require all information concerning the formation of User Groups, activities, contributions, messages and so on, by the last day of each month. The deadline will ensure that you get included in the next issue.

User Group Contact List

NSW	John Patterson	11 Sherwood Road, Lismore 2480	(066) 21 3345
ACT	John Payne	Electricland Pty Ltd, 28 Townshend St, Phillip, 2606	(062) 82 2277
VIC	R.A. Russo Tony Blakemore	7/2 Lyndhurst Street, Richmond, 3121 1 Lynette Street, Nunawading, 3131 <i>Tony has established the Eastern Amstrad Users Group which meets each Sunday from 10.00 a.m. to 1.00 p.m.</i>	(03) 428 4281 (03) 878 6212
	Martin Scragg	53 Pearceedale Road, Pearceedale, 3912 <i>Martin wishes to form a Frankston and Peninsula area User Group, and can be contacted after 4.00 p.m.</i>	(059) 78 6949
	Don Leith Michael Prezents	534 Albion Street, Brunswick, 3055 5 Francis St., Frankston, 3199 <i>Will establish a group for Frankston</i>	(03) 383 1498 (03) 781 2158
	Mrs. G. Chapman	<i>Has offered the use of her home for an inaugural meeting to form a South Clayton group. Ring (03) 551 4897</i>	
WA	Bob Harwood	29 Millgrove Avenue, Coo loongup, 6168 <i>Bob is setting up a group to cover the Rockingham/Kwinana areas. You may ring Bob at the above number during office hours.</i>	(095) 27 1777
	Dave Andersen	6 Kitchener Road, Merredin, 6415 <i>Is forming the 'Central Wheatbelt Amstrad User Group of W.A.' You may write to Dave, but no personal callers please.</i>	
	Graeme Worth	25 Clifton Street, Scarborough, 6019	(09) 341 5211

Down the Mine



Down the mine is Philip Riley's first adventure game, and perhaps provides an insight into his devious mind. The complete program consumes about 27k and would have taken too much space in this issue if presented in one go. We were also mindful of 'Keying-iner's cramp'! So here is the first half, with the concluding part being published in the April edition.

(Tape subscribers will be provided the complete version with the April edition)


```

10 CLS
20 s$="DOWN THE MINE"
30 sl$="WRITTEN BY PHILIP RILEY"
40 LOCATE 15,5
50 FOR u=1 TO LEN(s$)
60 SOUND 1,200
70 PRINT MID$(s$,u,1);
80 FOR i=1 TO 500:NEXT
90 NEXT
100 LOCATE 10,10
110 FOR u=1 TO LEN(sl$)
120 SOUND 1,200
130 PRINT MID$(sl$,u,1);
140 FOR i=1 TO 500:NEXT
150 NEXT
160 LOCATE 15,20
170 PRINT"PRESS ANY KEY"
180 a$=INKEY$:IF a$=""THEN 180
190 CLS:PRINT:PRINT"One day you were walking through a
forest not far from your house when suddenly the ground
gave way under your feet. You don't remember much after that
a few small memories, you remember falling, but not for
how long. You
200 PRINT"remember hitting the ground, but after that you o
nly know that you have just awakened in what looks like an
d old and deserted mine shaft. You manage to get to your fe
et and look around and not the sort of person to give up too
easily you";
210 PRINT"decide to set off and find a way out."
220 PRINT"press any key to continue."
230 a$=INKEY$:IF a$=""THEN 230
240 CLS:PRINT:PRINT"The computer understands the standard
two word commands. e.g. get wood, leave wood and a few other
s besides these two.All of these commands can be shortend to
the first three letters. e.g get woo andlea woo. I also unde
rstand some";
250 PRINT"one word commands. These are:--"
260 PRINT"view -- gives a description of room."
270 PRINT"help -- Not really of much use at all."
280 PRINT"quit -- If you think you are stuck."
290 PRINT"inventory -- For the list of items that you are ca
rrying."
300 PRINT:PRINT"All of these words can also be shortened to t
he first three letters."
310 PRINT"press any key"
320 a$=INKEY$:IF a$=""THEN 320
330 CLS:PRINT:PRINT"If one command won't work try something
else along similar lines. Use the cursorkeys to move north s
outh east or west. Don't worry if you don't get through
first time and GOOD LUCK."
340 PRINT"Press any key"
350 a$=INKEY$:IF a$=""THEN 350
360 INK 0,0:INK 1,14:INK 2,6:INK 3,18
370 wl=1:w2=1:w3=1:w4=1:n=99:ql=1:yp=1
380 WINDOW #1,1,20,1,5:PAPER #1,1:PEN #1,2:CLS #1

```

```

390 WINDOW #2,21,40,1,5:PAPER #2,1:PEN #2,2:CLS #2
400 WINDOW #0,1,40,6,25:PAPER #0,0:PEN #0,3:CLS #0
410 LOCATE #1,10,3:PRINT #1,"directions"
420 CLS
430 DIM i$(12),it(12),yh(12)
440 FOR t=0 TO 12:yh(t)=0:NEXT
450 it(0)=1:it(1)=17:it(2)=71:it(3)=24:it(4)=38:it(5)=22:it(
6)=31:it(7)=33:it(8)=13:it(9)=55:it(10)=5:it(11)=69:it(12)=5
3
460 FOR j=0 TO 12
470 READ i$(j)
480 NEXT
490 DATA miners hat,spade,ladder,hacksaw,pole,hammer,slug pe
llets,crowbar,padlock,rope,stones,bucket,wood
500 IF b13=1 THEN 2120
510 a1$="gettakleadrothrbredigcliplacutvaujumsmafluusekilexa
locpadshuoepulfiltursawwea"
520 a2$="hatspaladhacpolhampelcropadropstobucwoomircavbarpit
waltoisludoomonhanwattantapfir"
530 a3$="helviequiinv"
540 GOTO 720
550 PRINT:PRINT"what next"
560 v$="":x$="":z$="":b$="":a$=""
570 a$=INKEY$:IF a$=""THEN 570
580 IF a$=CHR$(127) THEN b$=LEFT$(b$,LEN(b$)-1):PRINT:PRINT
b$;:GOTO 570
590 b$=b$+a$
600 PRINT a$;
610 IF a$=CHR$(240) THEN 670
620 IF a$=CHR$(241) THEN 680
630 IF a$=CHR$(242) THEN 690
640 IF a$=CHR$(243) THEN 700
650 IF a$=CHR$(13) THEN 770
660 GOTO 570
670 IF w1=0 THEN 710 ELSE n=n+13:GOTO 720
680 IF w2=0 THEN 710 ELSE n=n-13:GOTO 720
690 IF w3=0 THEN 710 ELSE n=n-1:GOTO 720
700 IF w4=0 THEN 710 ELSE n=n+1:GOTO 720
710 PRINT:PRINT"you can't go that way":GOTO 550
720 IF yh(0)=0 AND ds=1 THEN PRINT:PRINT"You stumble in the
darkness as you did not have a light.":GOTO 4770
730 CLS:ON n GOTO 1,1,1,1,1,1,1,1,1,1940,1,1,1,1,1,1,1,1,1,1,1,
1,1900,1,1,1,1,1,1,1,1,1,1480,1440,1400,1,1820,1860,1,1,1,1,1,
1,1,1,1,1320,1360,1780
740 ON n-50 GOTO 1,1,1,1,1,1,1,1,1,1280,1240,1730,1980,2020,22
90,2330,1,3910,3860,1,1,1150,1110,1190,1690,1640,2060,2130,1
,1,1,3660,3610,3570,1,1070,1030,1,1600,1,2170,1,3780,3740,37
00,1,3370,3330,3300,990,1520
750 ON n-100 GOTO 1560,1,2210,2250,1,3820,1,3450,3410,1,1,23
70,1,1,1,1,1,1,1,1,3530,3490,1,2990,2940,2410,2450,2500,2540,1
,1,1,1,1,1,3240,3030,2890,2690,2580,2620,2660,1,1,1,1,1,1,31
90,3070,2850
760 ON n-150 GOTO 2730,2770,1,1,1,1,1,1,1,1,1,1,3110,3150,1,28
10
770 FOR aa=1 TO LEN (b$)

```

```

780 q$=MID$(b$,aa,1):IF q$=" "THEN 850
790 NEXT
800 v$=LEFT$(b$,3)
810 FOR v=1 TO LEN(a3$) STEP 3
820 IF v$=MID$(a3$,v,3) THEN ON v GOTO 4690,1,1,720,1,1,4700
,1,1,4710
830 NEXT
840 PRINT:PRINT"I do not understand that word.":GOTO 550
850 x$=LEFT$(b$,3)
860 z$=MID$(b$,aa+1,3)
870 FOR x=1 TO LEN (a1$) STEP 3
880 IF x$=MID$(a1$,x,3) THEN 910
890 NEXT
900 PRINT:PRINT"I don't know how to ";x$:GOTO 550
910 oo=0
920 FOR z=1 TO LEN(a2$) STEP 3
930 IF z$=MID$(a2$,z,3) THEN 970
940 oo=oo+1
950 NEXT
960 PRINT:PRINT"I don't know what a ";z$;" is.":GOTO 550
970 ON x GOTO 4100,1,1,4100,1,1,4130,1,1,4130,1,1,4300,1,1,4
600,1,1,4490,1,1,4190,1,1,4150,1,1,4520,1,1,4550,1,1,4580,1,
1,4600,1,1,4470,1,1,4650,1,1,4660,1,1,4220,1,1,4450
980 ON x-52 GOTO 1,1,4450,1,1,4430,1,1,4670,1,1,4410,1,1,427
0,1,1,4250,1,1,4520,1,1,4680
990 w1=1:w2=1:w3=1:w4=1:yp=1:ds=1
1000 GOSUB 3950
1010 PRINT"You are at the bottom of a deep mine      shaft. Lo
oking up you can see light      shining in through the mouth
of the      shaft."
1020 GOSUB 4020:GOTO 550
1030 w1=1:w2=1:w3=1:w4=0:yp=2
1040 GOSUB 3950
1050 PRINT"You move into a small dark evil smellingroom that
has been hewn out of solid      rock. The cobwebs that hang f
rom the      roof give the impression that nobody hasbeen here
for a long time."
1060 GOSUB 4020:GOTO 550
1070 w1=0:w2=1:w3=0:w4=1:yp=3
1080 GOSUB 3950
1090 PRINT"You are in a narrow twisting tunnel. Youcannot se
e much in the gloom ahead."
1100 GOSUB 4020:GOTO 550
1110 w1=1:w2=0:w3=1:w4=0:yp=4
1120 GOSUB 3950
1130 PRINT"You walk along a dark evil smelling      passage.
Looking around you see that thepassage extends north and wes
t."
1140 GOSUB 4020:GOTO 550
1150 w1=0:w2=0:w3=0:w4=1:yp=5
1160 GOSUB 3950
1170 PRINT"The passage ends suddenly here. All      around yo
u see solid rock walls except to the east where you can see
a narrow passage that disappears into the gloom."
1180 GOSUB 4020:GOTO 550

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1190 w1=1:w3=0:w4=0:yp=6:IF b12=1 THEN w2=1 ELSE w2=0
1200 GOSUB 3950
1210 IF b12=1 THEN PRINT"You are in a narrow passage. Scatte
red on the floor are some iron bars.":GOTO 1230
1220 PRINT"You walk into a narrow passage. The floor and
walls have been cut from solidrock and blocking your way ar
e some vertical iron bars."
1230 GOSUB 4020:GOTO 550
1240 w1=1:w2=0:w3=1:w4=0:yp=7
1250 GOSUB 3950
1260 PRINT"The walls in this part of the mine seem to glow,
giving the whole arrear a strange green glow."
1270 GOSUB 4020:GOTO 550
1280 w1=0:w2=1:w3=0:w4=1:yp=8
1290 GOSUB 3950
1300 PRINT"The mine becomes very narrow here, but you are j
ust able to slip through."
1310 GOSUB 4020:GOTO 550
1320 w1=1:w2=1:w3=0:w4=1:yp=9
1330 GOSUB 3950
1340 PRINT"You have found a junction in the tunnel.Tunnels l
ead North, South and East. The passage to the east looks rat
her unsafe."
1350 GOSUB 4020:GOTO 550
1360 w1=0:w2=0:w3=1:w4=0:yp=10
1370 GOSUB 3950
1380 PRINT"The tunnel ends abruptly at a cave-in. You notic
e that the tunnel roof looks alittle dangerous. Suddenly y
ou here a distant rumble and a little of the roof breaks aw
ay and falls to the floor."
1390 GOSUB 4020:GOTO 550
1400 w1=1:w2=0:w3=1:w4=0:yp=11
1410 GOSUB 3950
1420 PRINT"The tunnel seems to get darker as you move alon
g it. The floor turns to a slimy mud and you nearly slip
over a fewtimes."
1430 GOSUB 4020:GOTO 550
1440 w1=0:w2=0:w3=1:w4=1:yp=12
1450 GOSUB 3950
1460 PRINT"You are in a passage that seems to widento the we
st. But to the east it changes into a dark evil smelling tun
nel."
1470 GOSUB 4020:GOTO 550
1480 w1=0:w2=0:w3=0:w4=1:yp=13
1490 GOSUB 3950
1500 PRINT"You have walked into what was once the storeroom
for the mine. It is almost empty now. Most of what is le
ft is rustyfrom neglect."
1510 GOSUB 4020:GOTO 550
1520 w1=0:w2=0:w3=1:w4=1:yp=14
1530 GOSUB 3950
1540 PRINT"You are in a large tunnel that would have been
one of the main tunnels when the mine was open."
1550 GOSUB 4020:GOTO 550
1560 w1=0:w2=1:w3=1:w4=0:yp=15

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1570 GOSUB 3950
1580 PRINT"Looking up you cannot see the roof of the tunnel
as it is so high. You feel really small as you walk through
this massive tunnel."
1590 GOSUB 4020:GOTO 550
1600 w1=1:w2=1:w3=0:w4=0:yp=16
1610 GOSUB 3950
1620 PRINT"you are in the tunnel of elusions."
1630 GOSUB 4020:GOTO 550
1640 w1=1:w2=0:w3=1:w4=0:yp=17
1650 IF b16=0 THEN n=n+13:GOTO 1600
1660 GOSUB 3950
1670 PRINT"You walk into a small twisting tunnel the floor
is made of loose soil."
1680 GOSUB 4020:GOTO 550
1690 w1=0:w2=1:w3=0:w4=1:yp=18
1700 GOSUB 3950
1710 PRINT"The tunnel becomes a dark evil smelling place. Large
cobwebs hang from the roof and you have to keep wiping your
face as you walk through them."
1720 GOSUB 4020:GOTO 550
1730 w1=1:w2=1:w3=0:w4=1:yp=19
1740 GOSUB 3950
1750 IF b15=1 THEN PRINT:PRINT"As you reach the far side of
the bridge it collapses and disappears forever.":b15=2:PRINT
1760 PRINT"You walk into a large dome shaped room. Tunnels lead
North, South and east. A light breeze blows from the South."
1770 GOSUB 4020:GOTO 550
1780 w1=1:w3=0:w4=0:yp=20:IF b15=2 THEN w2=0 ELSE w2=1
1790 GOSUB 3950
1800 PRINT"You are stood at the edge of a bottomless
crevasse. A strong, warm wind blows up from its dark depths.
The only way across the crevasse seems to be a very old
and dilapidated rope bridge that sways in the wind."
1810 GOSUB 4020:GOTO 550
1820 w1=1:w2=1:w3=0:w4=1:yp=21:b15=1
1830 GOSUB 3950
1840 PRINT"This was a very little used part of the mine. A thick
layer of dust covers everything and the air smells
musty and stale."
1850 GOSUB 4020:GOTO 550
1860 w1=0:w2=0:w3=1:w4=0:yp=22
1870 GOSUB 3950
1880 PRINT"This tunnel comes to an abrupt end. It seems that
they started mining here and then gave up as it looks like
nobody has been here for many, many years."
1890 GOSUB 4020:GOTO 550
1900 w1=1:w2=1:w3=0:w4=0:yp=23
1910 GOSUB 3950
1920 PRINT"The tunnel here starts to get very low and at one
stage you have to crawl along on your stomach. But you eventually
manage to crawl through."
1930 GOSUB 4020:GOTO 550
1940 w1=1:w2=0:w3=0:w4=0:yp=24

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1950 GOSUB 3950
1960 PRINT"You have walked into what was once a temporary
workshop. But it has long since been abandoned. Most of
what is left is rusty and useless"
1970 GOSUB 4020:GOTO 550
1980 w1=0:w2=0:w3=1:w4=1:yp=25
1990 GOSUB 3950
2000 PRINT"You are in a large cavern, the floor is rather un
even and you have to watch yourstep as you cross to the othe
r side."
2010 GOSUB 4020:GOTO 550
2020 w1=1:w2=0:w3=1:w4=0:yp=26:bl3=0
2030 GOSUB 3950
2040 PRINT"You walk along a narrow tunnel that twists an
d turns. The walls are rather damp and the air also feels d
amp."
2050 GOSUB 4020:GOTO 550
2060 w1=0:w3=0:yp=27
2070 IF ql=1 THEN w4=0 ELSE w4=1
2080 IF ql=2 THEN w2=0 ELSE w2=1
2090 GOSUB 3950
2100 IF bl3=1 THEN 2120
2110 PRINT"You walk into a room and just manage to stop befo
re you walk over the edge of a bottomless pit. Looking acros
s, the other side looks empty."
2120 GOSUB 4020:GOTO 550
2130 w1=1:w2=1:w3=1:w4=0:yp=28:bl3=0
2140 GOSUB 3950
2150 PRINT"You are at the junction of several tunnels.
The tunnel to the South looks rather narrow, but the tunnel
to the North looks o.k."
2160 GOSUB 4020:GOTO 550
2170 w1=1:w2=1:w3=0:w4=0:yp=29
2180 GOSUB 3950
2190 PRINT"You are in a large wide tunnel. The walls see
m to be of a soft and flaky limestone and crumble when yo
u touch them."
2200 GOSUB 4020:GOTO 550
2210 w1=0:w2=1:w3=0:w4=1:yp=30
2220 GOSUB 3950
2230 PRINT"This part of the tunnel has suffered a few cave-
in's, but it looks safe enough to continue."
2240 GOSUB 4020:GOTO 550
2250 w1=0:w2=0:w3=1:w4=0:yp=31
2260 GOSUB 3950
2270 PRINT"The walls of this cave are lined with wooden sh
elves. Most of the wood is dry,rotten and riddled with woodw
orm."
2280 GOSUB 4020:GOTO 550
2290 w1=1:w2=0:w3=0:w4=1:yp=32
2300 GOSUB 3950
2310 PRINT"You walk along a tunnel that starts to get very
narrow. Small outcrops of rock keep catching on your clothes
, making progress slow. Suddenly the tunnel widens an
d you are able to move more easily."

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How to choose a Printer

If you are thinking about purchasing a Printer for your CPC464, this article by Arthur Harris will provide much of the information you will need to arrive at the right choice.

The range and type of printer available on the market is nearly as great as with computers. Just as a small aside there are at least 140 brands of home computer on the market in Australia. By the time you consider the different models within each brand, there are over 300 home computers available in this country.

No one has, to my knowledge, done a similar count on printers but take a glance through the advertisements in some of the computer magazines and you will come up with a bewildering range of printers to choose from. Even within one of the five types of printer you can compile a sizeable list of make/model combinations. This provides quite a headache when you have to choose which one to purchase for your chosen purpose.

As with computers, the way to choose your printer is to look at the purpose for which you wish to use it. This will determine the type of printer to buy. Next look at the amount of use you will give a printer for this purpose. The use will give a guide to the speed you will require the printer to operate at. Waiting for a printer to produce a 62,000 character newsletter or to print 1,300 address labels or even a program listing of a couple of hundred lines at 10 characters per second, can be most frustrating. Despite these considerations, price will probably be an over-riding factor which will force you to set your sights a little lower than the ideal you would like to achieve. Another consideration is whether you need tractor feed or whether friction feed will suffice for your purposes.

The next paragraphs will be devoted

to a description of the five basic types of printer, how they operate and their relative advantages and disadvantages.

The Dot Matrix Printer

This would have to be the most common and the best general purpose printer on the market. The characters are printed by a series of pins striking the dots in the shape of the required character. The pins are "fired" by means of a solenoid (one for each pin) and the order of "firing" is controlled by a microprocessor and character generation program.

The quality of the output is controlled by the number of dots (and hence pins) in the vertical portion of each character. The horizontal spacing of the dots contributes strongly to the quality but is usually linked to the number of pins to form a rectangular or square matrix with similar density in both directions. A common format for this matrix is 9 x 7 but can be as high as 32 x 32. Some very high quality printers may even exceed this.

Almost every advertisement shouts at you "NEAR LETTER QUALITY!" This refers to the closeness of the letters to typewriter quality printing. Of course, the more pins, the better is the approximation to typewriter quality. But more pins means a more complicated mechanism to control the pins, a more complicated character generation program and hence more dollars.

These printers often boast of the number of character fonts available. The font refers to the style of printing and common ones include, Pica, Elite, Proportional Gothic, Titan, etc. The print modes include bold face (enhanced), double width (or stretched) and

compressed (or condensed). Other features include underlining, superscripts and subscripts, and the availability of different character sets. These include U.S., UK, German, Swedish, Norwegian, Greek and Japanese. Each one caters for special characters used in these languages. The only difference between the UK and US sets is the pound sign and the dollar sign and usually both are not available at the same time.

The strongest point of dot matrix printers is their ability to produce graphics. This is often called bit-image mode. Some printers have been tailored to produce the graphics character set from a particular computer. For example, some of the Tandy printers will produce the Tandy graphics simply by sending the appropriate ASCII number to the printer and some printers perform similarly with the IBM computers. Most dot matrix printers have some basic graphics characters built-in. Usually it is a complicated and very tedious procedure of working out which pins need to print in each vertical line of the required pattern, converting this to a number and transmitting this number to the printer. Each vertical line of the pattern must be handled in this way for the depth of the pattern covered by a normal line of printing. Then the paper is advanced to the next line and the procedure repeated all over again. The pattern is thus gradually built up. With care and patience some beautiful patterns can be produced.

To produce the various features available from the printer, usually requires the transmission of a code or codes. These often include ESC and a number and can be sent by PRINT #

9, CHR\$(27); CHR\$(n), where n is the code for the required feature. Often the number of lines of printing per inch can be controlled and sometimes the line feed can be controlled to a fine tolerance such as 1/144 inch or 1/217 inch with multiples of this spacing possible.

The print speed is usually either fixed or may proceed at one of two rates. If two rates are available, one is for draft documents and one is for letter quality printing. Typical print rates for fixed or draft quality range from about 80 to 160 characters per second and letter quality rates range from about 12 to 40 characters per second.

The cost of these printers range from about \$300 upwards and you get what you pay for. When looking at any printer, check carefully which features are included in the price and don't be afraid to ask for a demonstration, preferably on your own computer. If you know someone using the printer, even on another computer, discuss the good (and bad) points with them. But be careful; no one likes to admit that they bought a "lemon".

The paper feed mechanism and its location is another important consideration. Many printers supply both friction and tractor (or pin) feed mechanisms as standard. Some supply only one and the other is an optional extra – for a price. Most tractor feed mechanisms are ahead of where the printing is taking place and pull the paper past the print head. This usually means that you cannot print on the first form of pre-printed stationery. Some printers, like the C-Itoh (or one of the other brand names under which it is sold) have the tractor feed behind the platten. This allows printing right at the top of the first form on pre-printed stationery.

What about consumables? The main requirements for a dot matrix printer are paper and ribbons. The print head does eventually suffer fatigue and need replacing. Guaranteed life ranges from about 2 million characters upwards. I have recently heard of one head guaranteed for 420

million characters. Replacement costs for a print head can be comparatively high because of its complicated nature.

Formed Letter Printers

Having spent a lot of time and effort explaining dot matrix printers, it will now be easier to explain the operation of the other printers.

A formed-letter printer has either a daisy wheel or a band which has completely formed letters and other characters moulded onto it. With the increasing availability of suitable interfaces, some typewriters can be configured for dual use as either a typewriter or as a printer. This brings into consideration machines using golf balls.

Each of these types rotates the device carrying the characters to the correct position and then uses some method to strike the formed letter onto the paper, with a ribbon in between so that the character shape is transferred onto the paper. Since the daisy wheel type is the most common type I shall confine my comments to these.

The most expensive types of daisy wheel machine have provision to use two daisy wheels. This allows two character fonts to be used on the one document, without requiring two passes over the document.

A daisy wheel is a circular disk, the edge of which is cast as a series of radiating strips called petals. Each petal carries the complete representation for a single character. In operation the wheel is rotated so that the correct petal is in place and this petal is then struck by a hammer, to transfer an impression onto the paper. Daisy wheels are manufactured basically from plastic but are known as plastic or metal, depending on whether the tip which contains the moulded character is made from plastic or metal. The wheels are easily damaged and should be handled very carefully as they cost between \$20 and \$50 each depending on whether they are plastic or metal. Each wheel has 82, 88, 92 or 96 petals. Each wheel has only one character set in one font on it. Printing is spaced at 10, 12, 15 or 20 characters per inch

horizontally and lines are usually spaced at 6 lines per inch.

Speed of printing ranges from about 10 characters per second up to about 40 characters per second. The higher speeds are usually only available on the more expensive machines.

The consumables for these machines are the paper, ribbons and daisy wheels. Ribbons may be fabric, carbon or film. The fabric ribbons are multi-pass while carbon and film ribbons are single pass. Carbon ribbons can be rewound to give up to about 8 passes, if you are inclined to go to the trouble of prising the cartridge apart and talking the trouble to carefully rewind them.

These printers may use friction or tractor feed mechanisms. A further refinement may be the ability to fit a sheet feed bin. This allows the use of cut sheet paper in an automatic feed situation. On more expensive models this can be extended to a dual bin sheet feed mechanism which allows headed stationery for the first sheet of a document and plain sheets for the following ones. These devices are expensive. For one printer that I know of a single bin sheet feeder is \$1,600 and a dual bin feeder is \$2,200.

The printers themselves range in cost from about \$500 upwards. Because of their method of operation, they are generally not able to be used to print graphics.

Printer/Plotters

This device is, in reality, a miniature drum plotter, complete with a multi-pen turret which allows printing and/or plotting in up to four colours.

The paper is fed from a roll by friction feed and is generally narrower than the standard A4 sheets. I know of two sizes in the paper width, 57mm and 114mm. I have recently heard of one of these printer/plotters in A4 width format. Pens are usually small biro's about 30mm long which fit into a rotating turret, allowing up to four pens which may be in up to four colours, black, blue, green and red.

The 114mm width machine can print in either of two formats. The first allows for 40 or 80 characters per line and the second allows selection of one of 9 sizes of character with the size chosen determining number of characters per line.

These printers usually require a special dialect of BASIC with commands for character size, pen colour and graphics commands available. I have heard that the CGP-115 printer/plotter has been operated from nearly all of the computers in the Tandy range and I know that the special commands are not available on most of these computers. So there may be hope for their use with the CPC464 yet.

Apart from the different character sizes and the ability to draw graphics, I know of only one character font available. It may be possible to write programs to generate your own character styles.

The major running expense for these machines are the consumables consisting of the paper and pens. They are not generally suitable for correspondence use but are ideal for graphics output. Resolution is generally about +/- 0.2mm.

Ink Jet Printers

These have recently been given publicity by virtue of the release by Hewlett Packard of an ink jet printer suitable for interfacing with microcomputers.

Their operation is to produce characters by squirting droplets of ink onto the paper and forming the characters in a manner similar to a dot matrix printer. As the HP 2225C is the only known one on the market, my comments will refer to it.

Print speed is 150 characters per second. Printing can be at 40, 80 or 142 characters per line and line spacing can be either 6 or 8 lines per inch. The matrix for characters is 11 x 12 and in graphics mode can be either 96 x 96 or 192 x 96 dots per inch. 128 printable characters are supported but the review that I read states that neither different fonts nor correspon-

dence quality printing are available.

The print head was reported to last for about 500 pages and is of the disposable type rather than refillable. It is also recommended that you use the special "Think Jet" paper for best results. Both of these consumables are likely to be expensive and not easily obtainable.

The example of graphics given in the review article was of a butterfly. Blocked in areas showed a regular series of white lines across them indicating that it is not possible to make the print lines close up completely. This could interfere with the pattern that you require.

The HP2225C is the version produced for non-HP computers and comes with a Centronics parallel interface, making it suitable for connection to the Amstrad. It provides emulation of the Epson MX-80, Epson MX-100 and IBM graphics printers. Cost of this machine is \$684 plus tax as at July, 1984.

Laser Printers

These are the creme de la creme of printers and although not widely advertised for home computers, could be connected to one and nicely round out any discussion of printers.

Their operation is to use a laser beam to "burn" the character representations onto **normal** paper. In this regard they could be considered as thermal printers. I have not discussed these because, while there are some around, they have not proved popular, primarily I feel, because of the need for special paper.

The main virtue of the laser printer is its speed of up to 1500 lines per minute. At this speed they can support up to 32 different fonts plus graphics on one page of a document. They give nearly silent operation and the only consumable is paper. They come with a pretty hefty price tag of between \$11,000 and \$12,000 although I did hear some time ago that Canon released one with slightly lower specifications for about \$3,000. I have not heard anything further about it.

Special Considerations for the Amstrad

Most printers are available with either Centronics parallel or a serial interface. You will need the Centronics parallel interface for the Amstrad.

Whenever the Amstrad encounters a carriage return in the material it is sending to the printer, it sends a carriage return and a line feed. If your printer does the same, i.e. inserts a line feed when it encounters a carriage return, the result is that all your print-outs will be double spaced. There are two solutions, both of which are messy and may not cure the problem completely.

The first one is possible only if you can instruct your printer to provide 12 lines per inch. With the double line feed you should get 6 lines per inch as usual. I have seen this fail with program listings where long lines wrap around onto a second or even a third line.

The second solution, mentioned on p. 22 in the QA section of Issue 1 of the Amstrad user, is to disconnect Pin 14 of the Centronics plug. This solution also cannot be guaranteed to work. It did not work on the printer mentioned in the previous paragraph.

The only sure way that I know of is the method available on my C-Itoh printer. One of the DIP switch settings allows a choice of CR + LF or CR alone. By setting this switch to perform only the carriage return, the CR + LF sent by the CPC464 produced a perfect print-out under all the conditions I was able to test. Obviously, you need a similar facility on any printer that you purchase.

Once you have decided which printer you prefer, after considering above, you would be wise to arrange for a test run of the printer when it is attached to your CPC464. This may necessitate that you transport it to the shop. Fortunately the portability of the CPC464 doesn't make this too difficult and, who knows, you may impress the salesman enough to make him want to buy one for himself.

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Think about your program and map it out in a series of events or features. Write the program onto cassette based around these events and check that the program runs as intended. Once you are satisfied, send a copy of the cassette in a suitable envelope along with the following:

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- 2 A clear program listing if available.
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- 4 Your name and address.

You may make as many submissions as you want, but no entrant may win more than one prize.

Conditions of Entry

- 1 All entries must run on a CPC464, and must include a cassette copy of the program (plus loading instructions where necessary), a brief summary of the program and its purpose and, if possible, a full listing.
- 2 All entries must arrive by 15th May 1985, and winners will be printed in the July edition of The Amstrad User.
- 3 The decision of the judges is final.
- 4 It is a condition of entry that all entrants have exclusive ownership of the copyright of the material submitted, and the winners agree to assign all copyright in the winning submissions to The Amstrad User. Where the entrant is more than one individual, then one person must be nominated and empowered to act on behalf
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