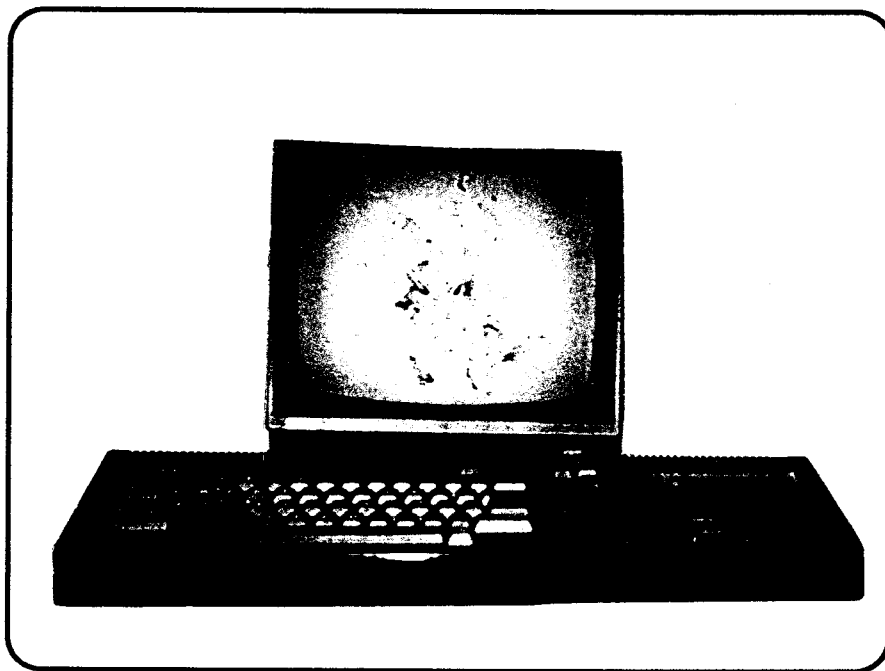


Price £1.10

PRINT-OUT

ISSUE ELEVEN



Written by Thomas Defoe and Mark Gearing

Contributors: Bob Taylor, Chris Williams, Tony Kingsmill,
John Hudson and Stefan Kuhs

Including: THE GERMAN CLONE
PLUS PRINTER PORT
CPM FEATURE
PD SURVEY

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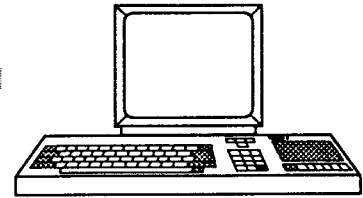
CONSULTANT SURVEYORS

Once again we would like to express our thanks to Mr Gearing and Black Horse Agencies Januarys Consultant Surveyors for their continued support of Print-Out and for the use of their photocopier in the production of this issue.



EDITORIAL

Issue Eleven



First of all, let me thank everyone who has contributed to this issue; Chris Williams, John Hudson, Tony Kingsmill, Stefan Kuhs and of course Bob Taylor - the writers' list seems to get longer every time.

Although we have managed to produce this issue of Print-Out in the two months since Issue Ten, we don't feel able to guarantee the production of the magazine on a 'regular' basis any longer. Sadly, therefore, the next issue of Print-Out will be the last one that the present team are going to produce. We sincerely hope that one of our readers will step forward and take on the job of continuing the magazine - if anyone is interested, please let us know as soon as possible.

Because of this, we are not accepting any new subscriptions - you can still order Issue Twelve in advance if you wish - and we'll refund the unused portion of any existing subscriptions with Issue 12. After the final issue has been despatched, we will run our back issue & program tape/disc service for a further two months.

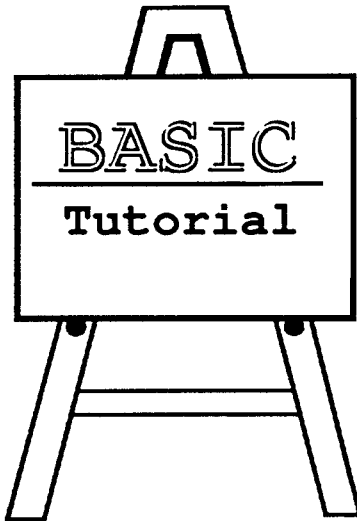
We have managed to arrange a number of special offers on both computer hardware/software and books - see the enclosed sheet for more details; it's our intention to set up several more offers in time for Issue 12, especially in the way of second-hand bargains.

Following our advice on mail-order companies in Issue Ten, we have had an even larger number of complaints about service and delivery - once again, we recommend you contact your local Office of Fair Trading (see your Yellow Pages) and the Advertising Standards Authority who have an advert in this issue.

Remember, if you have a question about any computer-related topic, you can write to us at the address shown below - we'll endeavour to answer all problems that we receive as fully as possible.

PRINT-OUT, 8 Maze Green Road
Bishop's Stortford
Herts CM23 2PJ

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Beginner's BASIC

Recent issues of the magazine have been exploring various aspects of BASIC and I have been asked to take a look at an interesting, powerful & very useful BASIC command, the WINDOW command. To put it simply, the job of the WINDOW instruction is to separate different parts of the screen for your programs. For instance, if you were brave enough to be designing a word processor, you would probably find it very useful to have a section at the top or bottom of

the screen in which to print information like the coordinates of the cursor and the name of the file being edited.

I've written many BASIC arcade games (Ocean weren't interested in any of them, strangely enough!) and one common use I have found for WINDOWS is to make a box on the screen for displaying the score, lives left, time left and so on, while leaving the rest of the screen free for the actual game.

So how do you make a WINDOW, I hear you ask. Well this could be a typical WINDOW statement you might come across in many BASIC programs: `WINDOW #1,20,35,15,20` Don't panic! It's not half as complex as it first appears. As you can see, there are five figures each separated by a comma and the first number is the 'stream' number. You can have up to eight WINDOW commands operating on any one screen and to save confusion, each is given a stream expression which can range between #0 and #7. In this example, #1 will do nicely.

The size of your WINDOW is determined using the text co-ordinates. If you are familiar with the LOCATE command, then you shouldn't have too much trouble here. If you're not, don't worry - basically, when you turn your Amstrad on you will have 40 columns of text, each column numbered between 1 and 40 - with one on the left. You then have 25 rows going from one at the top of the screen to 25 at the bottom. The number of columns is different in other MODEs (in MODE 0 you have 20 columns; in MODE 1, 40 columns; and in MODE 2 there are 80 columns).

As I have been going on about the size of a WINDOW, you may have guessed that the next four numbers represent the four corners of the window. The first number being the left side, then the right side, then the top side and then the bottom side. This definition should clear things up....

WINDOW #stream(0-7), left side, right side, top edge, bottom edge

Don't worry if you didn't pick up most of that as it is really the most tricky concept to grasp. Moving on a bit now, we will look at some of the commands you can use in WINDOWS. Really they are just the same as those you've probably come across already - the only thing is, you have to specify the stream number so the computer knows which WINDOW you're working in.

The PRINT command has to be the easiest to master. Reset your Amstrad and type in the example WINDOW mentioned earlier. Now type in PRINT #1,"Hello World!" You should now see that the text has appeared in our WINDOW, somewhere further down the screen.

Now add a bit of colour by typing PEN #1,3. Re-type PRINT #1,"Hello World!" and you should see different colour text. You can show the whole of your WINDOW by changing it's background colour by entering PAPER #1,2 followed by CLS #1 to clear the WINDOW and its dimensions become visible. As you can see the commands are fairly simple but when using WINDOWS you must remember to specify the stream numbers followed by a comma.

The small program below should summarize what's been covered so far...

```
10 WINDOW #1,20,35,15,20      : REM Sets up a window, this one being stream #1
20 PEN #1,3                   : REM Changes the pen colour in window #1
30 PAPER #1,2                 : REM Sets the paper colour in window #1
40 CLS #1                     : REM Clears the screen in window #1
50 PRINT #1,"This is a Window" : REM Prints a message in it
```

The LOCATE command is another text handling command that can be adapted to use in WINDOWS. If you have not used LOCATE before, all it does is place the cursor in the given position on the screen, using the text coordinates that I mentioned earlier - the first number is the column number & the second number the row.

For example, LOCATE 20,11 would put the cursor somewhere in the middle of the screen. So if you were to type in LOCATE 20,11:PRINT "HELLO!" you would find the message has been printed at the specified cursor position. Anyway, without going off the point too much, as with other commands used in WINDOWS, the stream needs to be stated, for example LOCATE #1,5,5

An important point to note is that the coordinates relate to inside the window rather than the whole screen. So LOCATE #1,1,2 would put the cursor one row down in WINDOW #1; not one row down the screen as a normal LOCATE command would do.

As I stated above, you can have many WINDOWS on the screen at once, in fact up to eight. So let's try putting a few windows on the screen at once. Type NEW to clear any old programs and enter the following program:

```
10 CLS                        : REM Clears the whole screen to tidy things up
20 WINDOW #1,2,18,2,4         : REM Makes a window #1
30 WINDOW #2,22,37,3,7       : REM Makes a window #2
40 WINDOW #3,4,35,9,24        : REM Makes a window #3
50 PAPER #1,1:CLS #1         : REM Sets the paper colour in window #1 to pen 1
60 PAPER #2,2:CLS #2         : REM Sets the paper colour in window #2 to pen 2
70 PAPER #3,3:CLS #3         : REM Sets the paper colour in window #3 to pen 3
```

When run, there should be three different colour WINDOWS on the screen and you can add some lines so it prints a message in each window. You'll need to change the text colour in one of the WINDOWS so it doesn't clash with the paper colour.

The final instruction I want to introduce here is WINDOW SWAP, a handy little command that lets you swap between WINDOWS. To understand this, you need to know that when you turn your CPC on, you're automatically in WINDOW #0 which takes up the whole screen. By using WINDOW SWAP you can switch to another WINDOW you have made. Assuming you have run the program above, enter: WINDOW SWAP 0,2

You should now find you are operating in one of your windows (window #2). What has happened is WINDOW #2 has become the default window and anything you type in appears here now. You can change it back by typing: WINDOW SWAP 2,0

Note that you must omit the hash sign (#) when using this command.

That's all the WINDOW commands I shall be explaining. In case it crossed your mind, you can make windows that overlap one another but you cannot, of course, display something in both at the same time. Below is a list of the keywords that are associated with WINDOWS and that we've looked at in this article...

CLS #stream
LOCATE #stream,column,row
PEN #stream,colour
PRINT #stream,"text"
PAPER #stream,colour
WINDOW #stream,left edge,right edge,top edge,bottom edge
WINDOW SWAP first stream,second stream

PLAY MATES

PUN BY CARL SURRY

Play Mates is a fanzine for people who like to play games on their CPC. It has reviews of games which are written by the readers of Play Mates. Also there are the odd page or two of games tips and pokes.

One of the main sections of Play Mates is called the "Bonzo Litter Tray". This section is for the users of the Bonzo Super Meddler and Bonzo Blitz discs. These discs will transfer over 1000 tape games to disc (Please note that multi-load games will only transfer the main file, levels will still have to be loaded from tape) for faster loading and ease of use. In the Bonzo Litter Tray section I pass on any news of new transfers or sometimes a new type-in to get a game to disc. Plus we sometimes get new games loaders that have pokes in them so you can load and poke the game at the same time.

Now if you fancy a copy of Play Mates and want to know how to get yourself a copy read on. Play Mates comes out every 3 months, on the 1st of March, June, Sept and Dec. It costs £1.30 an issue, this price includes postage. Send your orders to:

Carl Surry

37 Fairfield Way, Barnet, Herts, EN5 2BQ

Now Play Mates has been called one of the best CPC fanzines around. That may or may not be true, I leave that for you to judge. But I will say this, it is only as good as it is because of the contributions from its readers. They write most if not all the reviews, pass on pokes and games tips, plus of course any Bonzo news. So I would just like to thank them and you, if you fancy being a reader of Play Mates and fancy your hand at reviewing a game and wish to see it printed in Play Mates.



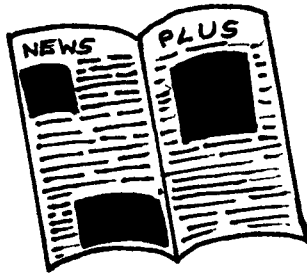
PLAY MATES

For CPC games reviews

PLUS BONZO NEWS

This advert was put together using "Adgenaker" Deluxe available from Alan Scaully

BONZO NEWS
Do you want to transfer your tape games to disc? If you do try the Bonzo discs from Microstyle. Here are just a couple of well known games that will transfer:-
Helltris via Option 1
Silkworm via Blitz 5X



NEWS & VIEWS



FANZINES

Print-Out is not the only fanzine that the CPC world has lost recently; it was only a few months ago that WACCI, the largest CPC user group and fanzine, had to close down - I have heard of several attempts to rescue it but whether any have been successful I don't know.

If you're one of those people who aren't happy with life unless they're doing something with their CPC, then these addresses of other fanzines should come in useful (we'll be doing a fuller review of fanzines in Issue Twelve):

PLAYMATES (edited by Carl Surry) is really a games fanzine with Bonzo news and the occasional serious article thrown in. It's well produced and worth a look at - one issue costs you £1.30 including postage and packing.

37 Fairfield Way, Barnet, Herts EN5 2BQ

A-OK is a mixture of PD, games, hardware and serious programming. I have never seen a copy but from what I have heard it isn't very well presented. It comes out bi-monthly and each issue costs £1.00

31 Colebrook Road, Shirley, Solihull, West Midlands B90 2LB

CPC USER is the fanzine of the United Amstrad User Group (UAUG) and again is a mixture of PD, programming and using commercial software. Those copies which I've seen have been well produced and interesting. It costs £1.50 and comes out bi-monthly, although there are discounts for UAUG members.

41 Kings Road, Gosport, Hants PO12 1PX

ARTIFICIAL INTELLIGENCE (edited by Tim Blackbord) is dedicated to PD software and contains reviews of PD programs and software available at PD prices. It comes out monthly and costs just 70p an issue.

19 Lee Street, Littleton, Liversedge, West Yorks WF15 6DZ

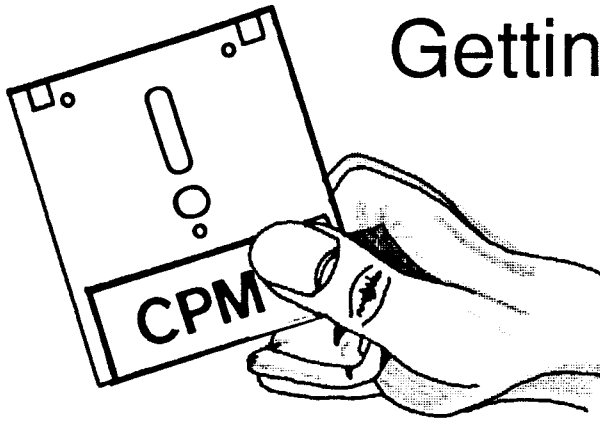
CPC DOMAIN (edited by Alan Scully) is a disc fanzine which is devoted to PD. I have mentioned CPC Domain in our feature on Public Domain libraries, so I'm not going to say anything more here.

Competition

As our next issue is our last we're running a little competition for which the closing date is the 3rd April. Just answer the following question about Print-Out and send your answers to the normal address. The prize is copies of Exolon, Netherworld and International 3D Tennis on tape.

The question is, how old is Bob Taylor? (The person who gets closest to the answer will win our prize - excuse me Bob but...er...how old are you...?)

We'll announce the winner in Issue 12 so send your answers in before 3rd April.



Getting to Grips with CPM

Introducing the system: Part 5

Hello again! By now you probably have a work disc with two files on - SETUP.COM and RUN.COM. If you have set up the display colours correctly & are satisfied with them you can now erase this file so that your work disc is almost empty (we will look at SETUP.COM again later). We can now decide what we are going to do with our disc.

by CHRIS WILLIAMS

Well, the programmers amongst us will be wanting to know how to produce a COM (command) file and how to use the EDOS, BIOS and TPA, whilst the users will want to know what software is available and how to use it. Before continuing here are some points to remember while using CPM 2.2.

1. Always log in new discs with CONTROL+C and remember to use only CPM formatted discs (169K).
2. Use the 'RUN.COM' file you saved to good effect, by having all your TRANSIENT and utility programs on one disc (possibly in drive B if you've two drives).
3. CPM programs can be loaded but not executed, by typing everything between the quotes at the CCP.

'PIP [space] CONTROL+A' or 'B:PIP [space] CONTROL+A', press [ENTER]. This should load in the desired program, then change discs and type 'RUN' to execute. Command tails can be used as normal. For example, 'RUN *.*'

Running programs

First we'll look at the files on the master disc and decide which ones we need as opposed to the files we can do without (for now). If you've just bought your disc drive, one file you will need is FORMAT.COM. This is the file that formats discs. Older users will have found better (and faster) disc formatters that run under the AMSTRAD DISC OPERATING SYSTEM (AMSDOS).

How to use FORMAT.COM

Copy the file FORMAT.COM to your work disc using PIP or FILECOPY. This will show how files are run & used under CPM 2.2. A COM (command) file can be executed by simply typing in the filename without the COM extension. Other files will return you to the A> prompt with a FILE? - not very user friendly is it? Always ensure that you have typed in the filename correctly & insert your master disc and type 'FILECOPY FORMAT.COM' and follow the on-screen prompts to copy FORMAT.COM onto your work disc. Filecopy is bugged so don't copy large files, use PIP instead.

Then type at the A> prompt 'FORMAT' and press return, the program will then run and ask you to insert the disc to be formatted. Always remember that FORMATTING a disc will destroy any programs or data on that disc - unlike erased programs which can be recovered with a disc editor or an unerase program. This will then format your disc to SYSTEM FORMAT. To format a disc to DATA format add a "D" to the format command, such as...

((F)1

FORMAT - formats disc to system (169k)
FORMAT D - formats disc to data (178k)
FORMAT V - formats disc to vendor (169k)* * These are for specialist use only
FORMAT I - formats disc to IBM (154k)* which means you'll never need them!

Most CPM 2.2 programs are used in this fashion and require parameters or a file name to be added after the program name. Other files are...

AMSDOS.COM - A totally useless file just press CONTROL+SHIFT+ESC
CLOAD.COM - Loads files and software from tape
CSAVE.COM - Saves files to tape
ASM.COM - A Z80 assembler creates HEX files for LOAD.COM
ED.COM - A text editor so hard to use it's unbelievable!!!
SUBMIT.COM - Used with a PROFILE.SUB to auto run files on BOOT UP
LOAD.COM - Creates a COM file from a HEX file
PIP.COM - Peripheral Interchange Program (more on this later)
COPYDISC.COM - For copying discs on a two drive system
DISCCOPY.COM - For copying discs on a one drive system
FILECOPY.COM - For copying individual files.

What is ED.COM?

This is a file on your master disc & is used for creating ASCII files for the assembler ASM.COM. This program is very difficult to get to grips with and so if you have an AMSDOS word processor that creates pure ASCII files, it will be far easier to use that. Then boot-up CPM and assemble with ASM.COM (or another more friendly CPM assembler) - because CPM 2.2 is fast to load, this is not as long-winded as it seems. What we need is - I may be asking too much - a TEXT EDITOR that will run under CPM 2.2 and which is much more user friendly. I use MAXAM II running under CPM+ and then copy the files across onto a CPM 2.2 disc.

Briefly, here are some of the file types you may come across on CPM discs...

COM - A COMmand file, an executable file
\$\$\$ - A temporary file created by programs or by CPM if you have spare lines in a PROFILE.SUB file
SUB - A SUBmit file
DOC - A DOCument file probably instructions for a program
?Q? - A Q indicates the file has been compressed by NEWSWEEP to save disc space

The memory layout

This is the SPA (SYSTEM PARAMETER AREA) for the CP/M 2.2 operating system...

ADDRESS	CONTENTS
&0000-&0002	JW warm boot (RST 0)
&0003	Input output byte
&0004	Drive user
&0005-&0007	Jump BDOS (BASIC DISC OPERATING SYSTEM)
&0008-&000F	RST 1
&0010-&0017	RST 2
&0018-&001F	RST 3 Reserved for firmware functions
&0020-&0027	RST 4
&0028-&002F	RST 5
&0030-&0037	RST 6 Unassigned; user RST
&0038-&003F	RST 7 Reserved for interrupts
&0040-&004F	Reserved by DR LOGO; available for use by other programs
&0050-&005B	Reserved
&005C-&007F	Default file control block
&0080-&00FF	Default DMA sector buffer

The rest of the CPC's memory is arranged as shown below...

&FFFF] BIOS ROM
&C000	
&BEC0	BIOS STACK
&BE80	BIOS EXTENDED JUMPBLOCK
&AD33	FIRMWARE AND BIOS VARIABLES
&AD00	BIOS JUMPBLOCK
&9F00	BDOS
&9700	CONSOLE COMMAND PROCESSOR
&0100	TRANSIENT PROGRAM AREA
&0000	SYSTEM PARAMETER AREA

We will look at how to produce a 'COM' file next time, okay? Remember that if you need the use of my 'HELPLINE' then write enclosing a SAE to:

Chris Williams, 6 Frank Street,
Great Horton, Bradford BD7 3BT.

& I'll endeavour to answer any queries about anything I may get.

THAT'S ALL FOLKS!!!!

CPM 3.1 - a great leap forward?

by JOHN HUDSON

There are only three important versions of CP/M - 1.4, 2.2 and 3.1 - compared with five for MSDOS, along with numerous intermediate revisions. Up to version 1.3, Gary Kildall had written separate versions for each new machine. Thereafter CP/M was supplied in two parts - the major part which interfaces with software and allows programs to run on any CP/M machine and also a smaller part which the manufacturer tailors to their hardware.

In version 2.2 the proliferation of disc sizes was catered for by allowing the disc parameters to be altered to suit the disc in use. At heart it believes that all data is being stored on IBM 8" discs; part of the BDOS (Basic Disc Operating System) holds the parameters of the actual disc(s) being used and converts files to and from the format of the disc.

Version 2.2 could also recognise the 'user areas' which had been incorporated into MP/M - the multi-user version of CP/M - and, though it could not use them, it could show which user areas were in use, display their contents and retrieve files from them.

Version 3.1 (or Plus) was to have been the great leap forward with a parallel version for 16-bit machines. It brought bank-switching, password protection and a range of newer and updated utilities. CP/M always grabs the bottom 256 bytes of the workspace and locates the remaining essential routines at the top of the workspace. The less important ones are held in the program area and overwritten while a program is running.

Since the Z80 chip on which all the better CP/M programs was based is limited to 64K workspace (or memory, or TPA), the most CP/M 2.2 could allow for programs was around 48K. A few manufacturers squeezed 56K out of it - by using text-based video arrays, for example - but the Amstrad DDI-1 only allows 39K because of the extra space needed for a graphical video RAM. This is entirely comparable with the 640K out of 1024K which a basic PC offers. The space between 640K and 1024K on a PC is taken up with exactly the same things as the space between 39K & 64K on the DDI-1.

Digital Research's solution in CP/M 3 was to introduce bank-switching. Nearly all of the things which used to be stored in the upper portion of the workspace, together with a copy of the routines which normally run in the program area, are placed in separate 16K banks (the space between 64K and 128K on your 6128) and exchanged with one of the four 16K banks which make up the Z80's workspace. Only 3K is needed to handle the essential routines which allow this to happen; hence, the 61K that appears when you load CP/M 3.1.

Because CP/M 3.1 stores the routines which occupy the program area in one of the banks, these can be 'instantly' recalled whenever a program terminates. This means you never have to re-boot from a floppy or hard disc on exiting a program as in CP/M 2.2 and, as a bonus, there's normally no opportunity for boot viruses to infect a CP/M 3.1 boot (or system) disc as they can on other machines.

Password protection, along with date & time stamping, could not be implemented on CP/M 2.2 discs. So Digital Research supplied a separate program (INITDIR.COM) for creating CP/M 3.1 format discs from CP/M 2.2 format discs. In these, every fourth directory entry holds the passwords, so reducing the number of directory entries by a quarter and making it impossible for CP/M 2.2 or AMSDOS to read the directory properly.

There is no need to use 3.1 format discs if you don't need passwords or date/time stamps; you can use CP/M 2.2 or AMSDOS format discs (as created by DISCKIT) but, if you mix formats, CP/M 3.1 does not warn you that copying from a CP/M 3.1 to a CP/M 2.2 format disc loses your passwords etc.

The resident commands ERA, DIR, REN, TYPE and USER remain the same in CP/M 2.2 and CP/M 3.1. However SAVE (2.2) is relegated to SAVE.COM in CP/M 3.1 while DIRS (Directory of System files) comes in. CP/M 2.2 users needed to use STAT.COM to locate System files - that is, files marked for common use under MP/M. CP/M 3.1 users can mark files for common use in all user areas and operate from any user area, not just user 0 as in CP/M 2.2.

However, most of these resident commands acquired transient (or .COM) versions in CP/M 3.1. For example ERASE.COM allows conditional erasing; RENAME.COM allows multiple renaming; TYPE.COM allows a 'nopage' mode - so you don't have to press RETURN at the end of each screenful so TYPE EXAMPLE.TXT [nopage]CONTROL-P will send EXAMPLE.TXT to the printer without page breaks.

DIR.COM, SET.COM, SHOW.COM and DEVICE.COM take over and expand the facilities available from STAT.COM in CP/M 2.2. DIR.COM now has sixteen parameters to allow complex searching for files; for example DIR LOST.TXT[user=all,drive=all] will find LOST.TXT wherever it is as long as it is on one of the discs in a drive - perfect for hard disc users!

SET.COM and SHOW.COM allow read only files, passwords, date & time stamps, and disc labels to be set and displayed; DEVICE.COM handles the peripherals - out go PUN: and RDR: - in comes AUX: for the CPC (CEN: and PAR: for the PCW) - CON: and LST: remain.

PIP gains one important function apart from the ability to protect and to copy password protected files - the archive switch - important because it can be used on CP/M 2.2/AMSDOS discs as well as CP/M 3.1 discs. With the archive switch set, you can backup a disc and when you next back it up only the files that have been changed will be copied thus speeding up the whole process of backing up files.

SUBMIT.COM incorporates XSUB.COM (which is a separate program in CP/M 2.2) and instead of using SETUP.COM to modify your system disc as you have to do in CP/M 2.2, CP/M 3.1 allows you to modify your setup using '.SUB' files. PROFILE.SUB is the first file CP/M 3.1 looks for after being loaded and so should contain the necessary configuration information.

Virtually everything can be configured in CP/M 3.1; the screen, keyboard, disc drives, joystick, printer, serial interface, and the date & time can all be set. CP/M 3.1 incorporates a system clock which must be set either from a Dk'tronics Real Time Clock or by using DATE.COM if date/time stamps are to be used.

SETDEF.COM allows a degree of configuration, but Amstrad made this easier by supplying their own utilities - including LANGUAGE, PALETTE, SETKEYS, SETLST and SETSIO - which allow you to configure your 6128 extensively. They also built an extended disc parameter block into their implementation of CP/M 3.1, thus making it so much easier for people to develop programs to read PCW or 3.5" discs. More on that next issue!



8 bit Printer Port+ CPC AND PLUS COMPATIBILITY



A Guide to the hardware and software
available for the new machines

In order to use all eight bits of the printer port on the Plus computers, the machine code routine described must be patched in; that is, it must be installed in a convenient part of memory and a Firmware Jump Instruction modified in order to use this new routine instead of the ROM based 7-bit printer driver.

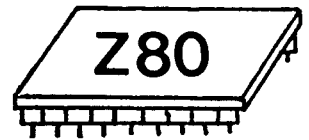
Type in the BASIC loader program listed below, and SAVE it before RUNNING it. Press "S" at the prompt, and a .BIN copy of the routine will be saved for future use. To use the 8-bit facility at any time, just insert the disc containing this .BIN file and enter:

```
MEMORY HIMEM-&40:a=HIMEM+1:LOAD"PLUS8BIT.BIN",a:  
POKE &BDF2,a-256*INT(a/256):POKE &BDF3,INT(a/256)
```

The routine will be installed and the necessary alteration made to the Firmware. This should work (thanks to our readers who tested the program for us), for any program which doesn't reset the Firmware (which would undo that alteration).

PROGRAM

```
[F1] 10 'PLUS 8 bit PATCH Loader by Bob Taylor (copyright 1991)  
[62] 20 MEMORY HIMEM-&40:a=HIMEM+1:RESTORE:PRINT:PRINT"Please wait a few  
seconds"  
[7E] 30 FOR lin=0 TO &40/8-1:total=0:FOR n=0 TO 7:READ a$  
[C4] 40 byte=VAL("&"a$):POKE a+lin*8+n,byte  
[4B] 50 total=total+byte:NEXT n  
[0D] 60 READ a$:IF VAL("&"a$)<>total THEN PRINT:PRINT"Error in line"lin*10+110  
:PRINT:END  
[C4] 70 NEXT lin  
[5B] 80 PRINT:PRINT"All M/C loaded":PRINT:PRINT"Press S to save M/C as  
PLUS8BIT.BIN":PRINT"or any other key to continue":WHILE INKEY$="":WEND:  
IF INKEY(60)<>-1 THEN SAVE "PLUS8BIT.BIN",B,a,&40  
[AF] 90 PRINT:PRINT"To Load and Initialise the Plus 8 bit Patch with a program  
present, just use:":PRINT"MEMORY HIMEM-&40:a=HIMEM+1:LOAD"CHR$(34)  
"PLUS8BIT.BIN"CHR$(34)",a:":"POKE &BDF2,a-256*INT(a/256):POKE  
&BDF3,INT(a/256)":PRINT"with the Disc inserted"  
[EA] 100 END  
[8F] 110 DATA 01,45,00,C5,4F,06,F5,ED,342 [E2] 150 DATA CB,79,CB,DF,20,02,CB,9F,47A  
[74] 120 DATA 78,17,17,79,C1,30,07,10,227 [03] 160 DATA 06,BD,ED,79,79,06,EF,E6,47D  
[BE] 130 DATA F2,0D,20,EF,B7,C9,01,0C,39B [A9] 170 DATA 7F,F3,ED,79,F6,80,ED,79,58A  
[55] 140 DATA BC,ED,49,4F,06,BF,ED,78,46B [34] 180 DATA E6,7F,ED,79,FB,37,C9,00,4C6
```



ROTATING

Shift instructions let you move the bits of a register, or a memory byte, one bit place to the left or right. Shift instructions can be split into two groups, logical and arithmetic - the differences will become apparent later.

Rotate instructions are similar to the shift instructions except that any bit which is 'shifted' off one end of the register appears at the other end. Again, there are left and right rotates, but they are all logical rotates.

When considering shifts and rotates, it is important to remember that instead of looking at the relatively large bytes, we are now working on the 8 individual bits which make up any byte or register. In order to avoid confusion these bits are numbered from 0 to 7, with 7 being the highest value bit.

We'll start by looking at the rotate instructions, of which there are ten!! To begin with, here is an example routine which illustrates the use of the RRCA (or Rotate Right Circular Accumulator) very simply:

```

LD B,8          ; there are 8 bits to check
.loop  RRCA     ; move the next bit of the A register into Carry
      JR NC,nobit ; if the bit wasn't set, then don't do next part

```

the routine to be performed if bit was set goes in here

```

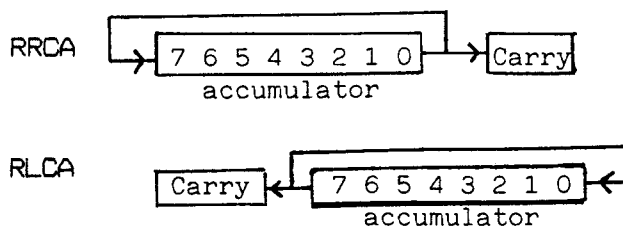
.nobit DJNZ loop ; go back if there are no more bits to check

```

The above rotates the A register to the right eight times, and checks each bit in turn and performs the routine in the middle, if the bit was set; otherwise it moves onto the next bit to check.

Since all eight bits are being checked, it is possible to use the RLCA command instead of RRCA, unless it is essential to check the lower bits first. Note that the A register must be unaltered when the middle routine has finished, otherwise the checking of any further bits will be invalid.

The above descriptions explain what happens when the RRCA (or RLCA) command is used but it can sometimes be helpful to see it in a graphical form. All the bits are moved one place to the right (or left) and the bit which is 'pushed' off the end is put into the Carry flag - note that the value which was pushed off the end is also put in the bit at the other end of the byte. These diagrams should help clarify what is going on:



If you have experimented with RRCA, you may have noticed that each rotation to the right resulted in a halving of the value every time - this is a useful spin-off from the rotation instruction and can be incorporated into any routine which requires a division by a power of two - eg 2,4,8

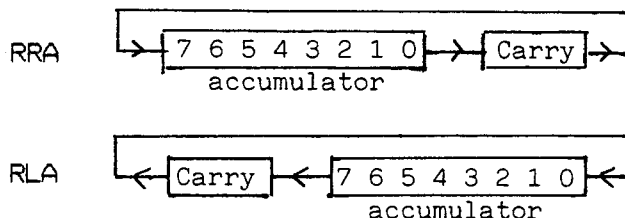
Similarly when rotating to the left using RLCA, the value is doubled each time and this can also be utilised for multiplication. There is the added bonus that you can multiply by any value by adding in the original value at certain points. For example, to multiply a number by 11, you could use the following steps:

- a) multiply the number by 2
- b) multiply the result from (a) by 2 again - to give 'times by 4'
- c) add the original value to the answer from (b) - giving 'times by 5'
- d) now times the result from (c) by 2 - this gives 'times by 10'
- e) and finally add the original value again - so giving 'times by 11'

SHIFT

This brings us across a problem with RLCA (and also with RRCA) and this is the looping of one 'end bit' onto the other end, and this can create some really odd results during multiplication, or division.

You'll remember that RRCA and RLCA both move the eight bits along and the end bit (known as the 'output' bit) is copied into both the Carry flag and the other end bit. However two other rotation instructions are available, RRA and RLA, and they also send the output bit to the Carry - the difference is that the previous contents of the Carry flag are simultaneously put into the other end of the register. Note that the contents of the Carry change, from a bit which is input to the register, into a bit which is output from the register - see the diagrams:

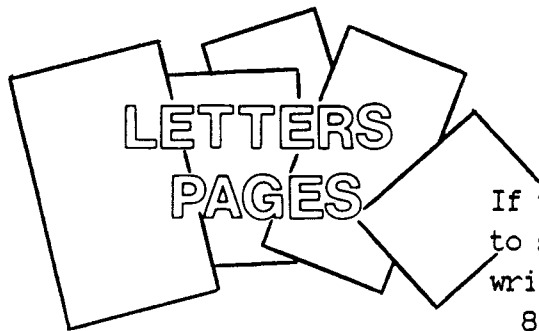


One important result of this is that the bit sent to the Carry is held there until the Carry flag is altered again. This means that it is possible to use the value in the Carry with a different register - ie rotate the Carry value into a different register to the one where the Carry value was originally rotated from.

This ability to cascade from one register to another allows values larger than eight bits to be handled and is very useful for 'floating point' numbers.

In the 8080 microprocessor, the grandfather of the CPCs Z80, the only rotation instructions worked on the A register. Zilog, the makers of the Z80, added a lot of extra instructions, which include the ability to rotate other registers, and memory bytes. These instructions correspond exactly to those already mentioned, but work on all 8-bit registers, and on memory bytes pointed to by HL, IX or IY. These additional commands are summarised at the end of the article.

Moving onto the shift instructions, these move all the bits along the register



If you've a question, information or something to say, we would be delighted to hear from you write to us at the following address:

8 Maze Green Road, Bishop's Stortford, Herts

Multiface Trouble

Having sent my Multiface back and forwards many times to Romantic Robot, I was beginning to think that my computer was at fault. In the end I got quite cheeky & asked some local retailers to help me out. One store said to go over & I could try it on their monitor. People were telling me that it wouldn't work because my monitor was not providing sufficient power.

I was quite overwhelmed at the extent to which they were willing to help me - they went and got a brand new monitor & set it all up for me, and when the fault appeared they spent almost two hours working out where it was; it was indeed the Multiface that was at fault.

The shop then phoned the Multiface people and told them it was their Multiface that was at fault, and finally I got a new Multiface sent to me. The shop would not take any money for their help even though while they were helping me, people were in & out and the shop had to say they were at present too busy to help. The shop was JKL at Uxbridge, not local to you but if you know anyone in trouble you know where to send them.

CHRIS RUSSELL
HARROW

PRINT-OUT: It's good to know that there are some shops about which stock CPCs & are willing to help users. But on the other hand, it's annoying to hear, from you and from others, that a number of major firms keep returning faulty goods and claim that they are working properly without even testing them.

An IBM 6128 ?

Can you inform me whether there are programs available to enable the Amstrad 6128 to run IBM PC programs. My second drive (B) is current a 5 1/4" PACE.

S J PEAKE
MIDDLETON-ON-SEA

PRINT-OUT: I'm afraid it's impossible to run IBM PC software on any of the CPCs as they use completely incompatible operating systems and have very different graphics, memory etc: there have been a number of bits of software around that will let a CPC read PC discs and so get data from them, such as CPC-PC-CPC by Moonstone. It should be stressed that even with one of these programs, there's absolutely no way that you can actually run a PC program.

Using the CRTC...

Please could you give me details of the methods used to make use of the entire screen (border included) for displaying graphics on the CPC screen. I know this involves direct programming of the CRTC, but I am not exactly sure what figures are allowed or desirable, nor am I clear as to the exact effect of each register on the display.

PAUL PEMBROKE
MANNINGTREE

PRINT-OUT: Here's a graphics demonstration that seems to cover the whole screen. Type in the following program, which will produce a ball which bounces right to the very edges of the CRT (SAVE the program before running it):

```
10 DEFINT a-z:ENV 1,10,-1,2:ENT 1,10,-60,2:r=160:s=r^2:DEG:PLOT 1000,1000,1
20 MODE 1:BORDER 13:INK 0,13:INK 1,0:INK 2,6:INK 3,15:ORIGIN 200,200
30 z=4:GOSUB 90:PLOT 1000,1000,2:ORIGIN 160,238:z=2:GOSUB 90:PLOT 1000,1000,3
40 FOR i=16 TO 160 STEP 24:GOSUB 100:NEXT:xd=1:yd=1:x=35:y=28
50 WHILE 1:OUT &BC00,2:FRAME:OUT &BD00,x:OUT &BC00,7:OUT &BD00,y
60 y=y+yd:IF y=21 OR y=35 THEN yd=-yd:z=RND*800+600:SOUND 129,z,0,15,1,1:
   SOUND 132,z+10,0,15,1,1:GOTO 60
70 x=x+xd:IF x=22 OR x=50 THEN xd=-xd:SOUND 129,z,0,15,1,1:
   SOUND 132,z+10,0,15,1,1:GOTO 70
80 WEND
90 FOR y=0 TO r STEP z:x=SQR(s-y*y):MOVE x,y:DRAWR -2*x,0:MOVE x,-y:
   DRAWR -2*x,0:NEXT:RETURN
100 MOVE i,0:FOR a=0 TO 360 STEP 10:DRAW i*COS(a),r*SIN(a):NEXT:RETURN
```

The apparent use of the whole screen area is misleading, as can be seen if the BORDER is given a different colour to the background in line 20. Data PD (see elsewhere in the issue) stock a program that lets you change the CRTC register values; however the instructions are in German but you can still get some idea of the effects that can be achieved by adjusting the values.

Dragon PD

Could you tell your public that we've dropped our prices to 40p per disc plus 20p p+p on all orders. DRAGON PD, The Flat, 415 Whitehall Road, Bristol BS5 7BP.

PRINT-OUT: Short but sweet - no sooner said than done. If there are any other PD libraries out there who haven't been included in our round-up this issue, then get in touch with us (please send us a demo disc and some information on your library, including prices, discs available, etc) and we'll do our best to fit you into our next issue. Also if any readers know of clubs, fanzines or anyone providing a service for CPC users, then let us know before the next issue and we'll print the relevant details in Issue Twelve.

Format debate hots up

I read Alastair Henderson's letter & I have to agree that the CPC is outdated, but so is the 386PC. Even the 486 was outdated before it was launched. Next year the 586 will be launched and that's the problem with the PC; you have to upgrade almost every year, or you'll be stuck with an outdated PC.

Just take a look at the 'games' magazines such as C&VG. They are dominated by consoles - that is the future of gaming. I'd be very surprised if the new Jaguar console from Atari won't beat any PC as far as graphics are concerned. Anyway, the games computers are dead, even the Amiga will soon be outdated.

The reason I bought the CPC was that I wanted a general purpose computer. The Amiga is a games only machine - just look at the so-called serious programs for it. I haven't seen one that is worth bothering about.

The only other general purpose home computer is the Atari ST. It does not have the Amiga's awful Workbench system nor the old-fashioned & totally useless MSDOS but even then the ST is probably too old to be the CPC's successor - but neither will the PC, even an improved one.

No-one can say which computer we will be using ten years from now, but in the meantime I use the CPC for wordprocessing and databases, and the ST for graphics and DTP and I'll continue to do so as long as the machines work & I can get them repaired if they should fail.

No machine is truly outdated as long as it does what you want it to do.

KJELL ROBERTSEN
NORWAY

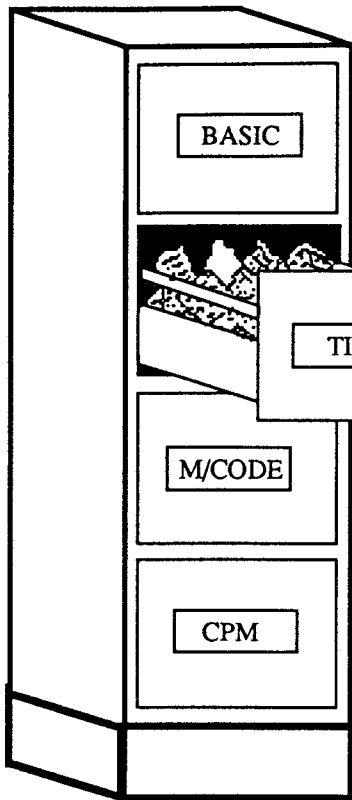
PRINT-OUT: Whilst there are some fairly subjective comments on other computers, and no doubt the users of the machines in question would strongly defend their choice of computer, I have to say that I entirely agree with your last comment - any computer is only 'outdated' when its users think it is...

Pin diagram

Do you happen to know the pin-out that comes out of the disc interface as I'm thinking of putting a 5 1/4 80 track disc drive on my 464 (already have a DDI-1; hence the interface) ?

JACQUI OWEN
BUSHBURY

PRINT-OUT: We have written to Amstrad and have got hold of the necessary circuit diagrams and copies of them are available to anyone who wants them (just send us an SAE). If anyone has a problem with their CPC or peripherals and needs to get hold of sound advice (especially on the insides of their computer, and on interfacing hardware) you can contact 'our man at Amstrad', Mr P Cave, at this address: Amstrad Information Centre, 1 St James' Road, Brentwood, Essex CM14 4LF or you can 'phone their switchboard on (0277) 228888.



Technical Tips

MORE READERS QUERIES ANSWERED.....

by **Bob Taylor**

In this issue, an RSX (!COPYFILS) is printed for copying some files on a disc, with the minimum of disc swapping. As RAM Banks are needed to store the files before transferring to another disc, the minimum requirement is for a 464 or 664 fitted with a 6128 ROM plus at least 64K of memory expansion; it will work properly on the 6128 as it is, but a 256K RAM pack for any CPC will reduce disc swaps to one. NB: the RSX uses a large area of normal RAM as well, so BASIC programs already in memory could be corrupted when it is used. This routine works by CATaloguing the contents of the disc and then allowing selection of the required files. The sequence in which the files are SAVEd to the second disc can be set by the user, by typing a character against each file required; since there can be upto 64 entries in a disc directory the following sequence of characters has been chosen to specify order:

'0' to '9', colon (':'), semi-colon (';'), 'A' to 'Z', 'a' to 'z'

Usually, only a few files need to be copied, in which case any characters from the list could be used, observing their order; in practice, it's sensible to use either digits or letters of one case, and reserving a mix for copying many files at a time. It's also possible to repeat any character from the sequence, or even to use only one; in such cases, files with the same 'order' character are copied in alphabetical order.

Arranging the sequence of files on a disc can speed up disc operation when the files are next used - often used programs or files should be placed at the start of the disc; while long, seldom used ones should go to the end, allowing faster access to a number of shorter ones at the beginning. If a complete disc needs to be copied, then !COPYDISC* should be used if the existing file order is adequate; copying is much faster with !COPYDISC than with !COPYFILS. For multiple copies, !COPYFILS could be used for the first copy to arrange a suitable sequence, then !COPYDISC used for subsequent copying.

Unlike !COPYDISC which Formats each track as it goes along, !COPYFILS can only SAVE to parts of a disc that are free. To re-create a new sequence onto another disc, it will need to be Formatted first, or erased using !ERA,"*.*"

!COPYFILS does not rearrange files on a disc, so that consecutive sectors are used (sometimes called Compacting), so it shouldn't be used to SAVE back to the SOURCE DISC as this will make the original files into .BAK files & will probably fill up the disc.

*printed in Issue Ten

NB Copying a .BAK file using any file copier will alter the filename laid down (to .BAK) in the first 80 bytes of a BASIC or machine code file. This will not matter much to the user as these names are ignored by AMSDOS, and just the entry in the Directory used (where .BAK will be an accurate copy of the original).

However, with Brunword & possibly some other programs, these 'inner' names are used for the name of the file that has been loaded in, and pressing ENTER at the SAVE prompt (to save as the current filename) within these programs will result in the file being SAVED as .BAK!

In order to prevent the accidental alteration of a character used for a file's position, other characters cannot be typed over one already allocated; note that any character can be erased using SPACE, and the new one then inserted. Also, if it is discovered that a selected file isn't required, it too can be removed from the list using SPACE; there's no need to rearrange the sequence of the remaining letters to accommodate such a change.

Use of SPACE or any character key moves the cursor on to the next file in the list - cursor keys can also be used to move around the list. When the selection is completed, use ENTER to start the LOADING procedure.

During the LOADING (or SAVEing) process or during selection, or at any prompt for another disc insertion, the [ESC] key can be used to stop and exit to BASIC - it may need to be held down during disc operations. Also, during Selection or at any prompt, the [DEL] key can be used to abort the present position and start again from the beginning, also allowing another disc to be copied from.

As each file is LOADED its sequence letter will be altered. When as many files as memory will allow have been LOADED, the disc to be copied to (the destination disc) will be asked for; any key other than [ESC] or [DEL] will do when ready.

As each file is now SAVED, its sequence letter will again be altered, and then replaced with an asterisk. If only part of the selection has been copied so far, the Source disc will be again requested; the LOADING process will restart on the remaining files, to be followed by the complementary SAVE one.

This will occur only when a large volume of files is to be copied and just 64K of Bank RAM is fitted - this may be repeated a third time if the sequence & the length of files requires it; only whole files are loaded/saved each time - if a file is too long to be loaded into the amount of RAM spare, it will be abandoned until the start of the next loading process.

When all the selected files have been copied, the program then returns to the Selection stage - this allows further files to be chosen if required, or copying from a new disc to be started.

If the former, only those files not previously copied (ie without an asterisk) can be selected - asterisks cannot be erased using SPACE. If a file is found to be faulty on loading, the 'order' character will be replaced with a crossed out tick, and its name may be printed at the bottom of the screen; such a file will not be loaded or saved, but the NAK character may be overwritten when selecting files for further tries at loading it.

The CAT print-out is crucial for the operation of the RSX; if it is displaced by an error message due to the absence of a disc, or corrupted, operation of the RSX may be impaired. If this occurs, use DEL to repeat the CAT print-out.

Type in the loader program from Listing 2 below and SAVE it before RUNNING it. Save the machine code routine at the prompt, using 'S'. For subsequent use, you should RUN Listing 1 (which should be SAVED onto the same disc as COPYFILS.BIN).

LISTING 1:

```
[91] 10 MEMORY &7FFF:LOAD"COPYFILS.BIN":MEMORY &97FF:CALL &8000
```

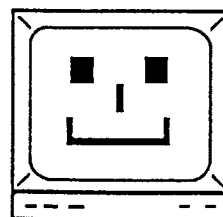
LISTING 2:

```
[F1] 10 'COPYFILS RSX Loader by Bob Taylor (copyright 1991)
[05] 20 MEMORY &97FF:RESTORE:PRINT:PRINT"Please wait a few seconds"
[3F] 30 FOR lin=0 TO &400/8-1:total=0:FOR n=0 TO 7:READ a$
[A2] 40 byte=VAL("&"+a$):POKE &8000+lin*8+n,byte
[4B] 50 total=total+byte:NEXT n
[0D] 60 READ a$:IF VAL("&"+a$)<>total THEN PRINT:PRINT"Error in line"lin*10+110
      :PRINT:END
[04] 70 NEXT lin
[31] 80 PRINT:PRINT"All M/C loaded":PRINT:PRINT"Press S to save M/C as
      COPYFILS.BIN":PRINT"or any other key to continue":WHILE INKEY$="":WEND:
      IF INKEY(60)<>-1 THEN SAVE "COPYFILS.BIN",B,&8000,&400
[EB] 90 PRINT:PRINT"To Load and Initialise !COPYFILS RSX just use:":PRINT
      "MEMORY &7FFF:LOAD"CHR$(34)"COPYFILS.BIN"CHR$(34)":MEMORY &97FF:CALL
      &8000":PRINT"with the Disc inserted"
[EA] 100 END
[28] 110 DATA EB,36,C9,23,01,0B,80,C3,35C
[A5] 120 DATA D1,BC,00,3D,83,3E,02,CD,35A
[AD] 130 DATA 0E,BC,0E,01,11,55,83,CD,28F
[9E] 140 DATA F4,82,28,F1,0D,20,1A,3E,314
[31] 150 DATA 0A,CD,5A,BB,11,00,88,CD,352
[19] 160 DATA 9B,BC,21,FE,07,CD,05,BC,40B
[3B] 170 DATA CD,78,BB,7D,D6,04,32,DC,465
[DC] 180 DATA 83,21,DD,83,22,DA,83,36,389
[89] 190 DATA FF,11,06,01,CD,30,83,CD,364
[8C] 200 DATA 8A,BB,CD,06,BB,FE,FC,CA,597
[F4] 210 DATA 0F,83,4F,CD,8D,BB,79,FE,46D
[44] 220 DATA 7F,28,B2,FE,0D,CA,0E,81,38D
[03] 230 DATA FE,F0,CA,ED,80,FE,F1,28,63C
[77] 240 DATA 6E,FE,F2,CA,01,81,FE,F3,59B
[D4] 250 DATA CA,07,81,FE,20,28,28,FE,3BE
[D7] 260 DATA 30,38,C9,FE,3C,38,0A,E6,393
[50] 270 DATA 5F,FE,41,38,BF,FE,5B,30,41E
[A7] 280 DATA BB,3E,09,CD,5A,BB,CD,5A,40B
[CD] 290 DATA BB,CD,60,BB,FE,20,28,3F,428
```

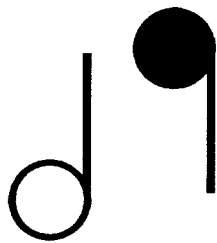
Linechecker

A PROGRAM TYPING AID

All programs in Print-Out have Linecheck codes which are enclosed in brackets at the start of a line. Don't enter them in as they're designed to be used with Linechecker to eliminate errors when typing in programs which appear in this magazine. Please note, all programs will run whether Linechecker is being used or not. For information on how to use Linechecker, please see Issue Three.



[2E]	300	DATA	FE,5B,30,3B,CD,30,83,CD,411	[4E]	850	DATA	11,12,00,19,EB,2A,D6,83,2AA
[CF]	310	DATA	60,8B,FE,20,28,1B,FE,15,38F	[78]	860	DATA	ED,A0,13,13,01,02,00,ED,2A3
[BC]	320	DATA	28,17,FE,2A,28,29,47,79,27B	[DE]	870	DATA	B0,13,E5,0E,04,ED,B0,22,379
[D5]	330	DATA	FE,20,20,23,78,BE,2B,38,2FA	[72]	880	DATA	D6,83,E1,4E,23,46,2A,D4,3EF
[FC]	340	DATA	FC,23,23,7E,2B,77,3C,20,2BE	[21]	890	DATA	83,55,2E,00,7E,CD,95,BC,3A2
[9F]	350	DATA	F8,79,FE,20,28,0D,E5,7E,427	[99]	900	DATA	23,0B,7B,B1,2B,0D,CB,7C,2D3
[F3]	360	DATA	23,77,2B,71,2B,79,BE,38,2D0	[8E]	910	DATA	28,F2,C5,CD,C6,82,C1,30,4E5
[84]	370	DATA	F6,E1,23,79,CD,5A,8B,3A,48F	[83]	920	DATA	EB,18,27,B7,24,CB,7C,C4,410
[8A]	380	DATA	DC,83,8B,28,04,1C,C3,44,369	[57]	930	DATA	C6,82,6A,22,D4,83,F5,CD,4ED
[80]	390	DATA	80,7A,FE,3D,28,F8,1E,06,379	[ED]	940	DATA	8F,BC,3E,2A,CD,5A,8B,F1,486
[18]	400	DATA	C6,14,57,18,F1,7B,FE,06,3B9	[68]	950	DATA	D2,0A,82,11,55,83,CD,12,326
[67]	410	DATA	28,03,1D,18,E9,7A,3D,28,228	[0C]	960	DATA	83,CD,F4,82,CA,0D,80,C3,4E0
[E9]	420	DATA	E5,ED,5B,DC,83,D6,13,18,48D	[70]	970	DATA	0E,81,CD,92,BC,2A,DA,83,431
[31]	430	DATA	E9,7A,3D,28,D9,18,F6,7A,429	[A2]	980	DATA	2B,22,DA,83,CD,60,8B,3C,3CE
[49]	440	DATA	FE,3D,28,D2,18,DA,11,87,3BF	[AD]	990	DATA	3C,CD,5A,8B,18,DD,14,CB,3F2
[13]	450	DATA	83,CD,12,83,21,1E,84,22,2CA	[5E]	1000	DATA	D2,26,40,7A,CD,5B,8D,3E,3D5
[3D]	460	DATA	D6,83,2A,DA,83,22,D8,83,45D	[38]	1010	DATA	C7,BA,D0,A2,46,36,01,CD,43D
[4B]	470	DATA	21,C3,08,22,D4,83,CD,08,33A	[CB]	1020	DATA	5B,8D,4E,35,20,0F,35,CD,2CC
[87]	480	DATA	83,2A,DA,83,7E,4F,3C,CA,3DD	[A1]	1030	DATA	5B,8D,34,20,05,CD,EA,82,3AA
[DD]	490	DATA	EF,81,23,22,DA,83,11,06,329	[C5]	1040	DATA	37,C9,CD,5B,8D,71,CD,5B,47E
[FB]	500	DATA	01,CD,30,83,CD,60,8B,B9,422	[FF]	1050	DATA	BD,70,87,C9,CD,12,83,CD,4DC
[2E]	510	DATA	28,15,3A,DC,83,8B,28,03,2BC	[8C]	1060	DATA	5B,8D,CD,06,8B,FE,FC,28,4C8
[B9]	520	DATA	1C,18,EE,7A,FE,3D,28,D6,3D5	[07]	1070	DATA	0D,FE,7F,3E,12,C3,5A,8B,3B2
[3D]	530	DATA	1E,06,C6,14,57,18,E2,D5,324	[D0]	1080	DATA	CD,09,8B,FE,FC,C0,F1,11,54D
[19]	540	DATA	79,3D,CD,5A,8B,CD,1B,83,403	[23]	1090	DATA	46,83,1A,13,B7,C8,CD,5A,39C
[9B]	550	DATA	11,17,01,CD,30,83,41,11,1FB	[D5]	1100	DATA	BB,18,F7,01,00,0D,21,C7,2C0
[7B]	560	DATA	00,88,73,21,C7,83,CD,77,3AA	[8E]	1110	DATA	83,CD,60,8B,CD,5A,8B,FE,54B
[FD]	570	DATA	BC,30,47,E5,2A,D6,83,77,412	[FA]	1120	DATA	20,28,03,77,23,0C,10,F1,1F2
[1A]	580	DATA	23,73,23,72,23,71,23,70,252	[29]	1130	DATA	3E,1F,CD,5A,8B,7A,CD,5A,3E0
[EE]	590	DATA	23,E3,11,1A,00,19,5E,23,1CB	[47]	1140	DATA	BB,7B,C3,5A,8B,43,4F,50,3F0
[6B]	600	DATA	56,E1,73,23,72,23,22,D6,35A	[B8]	1150	DATA	59,46,49,4C,D3,00,1F,0C,232
[32]	610	DATA	83,2A,D4,83,55,2E,00,5F,2E6	[2B]	1160	DATA	02,12,41,42,4F,52,54,45,1D1
[D0]	620	DATA	CD,80,BC,77,38,08,FE,0F,3CD	[9F]	1170	DATA	44,00,01,15,00,1F,02,01,07C
[3B]	630	DATA	28,28,FE,1A,20,14,23,03,1C2	[0A]	1180	DATA	53,45,4C,45,43,54,3A,20,21A
[57]	640	DATA	B7,CB,7C,28,EB,C5,CD,C6,569	[31]	1190	DATA	07,1F,0C,02,49,6E,73,65,1C3
[44]	650	DATA	82,C1,30,E4,D1,CD,7D,BC,52E	[DE]	1200	DATA	72,74,20,53,4F,55,52,43,292
[6F]	660	DATA	18,35,D1,CD,30,83,11,52,301	[3E]	1210	DATA	45,20,64,69,73,63,20,2D,255
[E8]	670	DATA	83,CD,12,83,CD,7D,BC,C3,4AE	[BC]	1220	DATA	20,74,68,65,6E,20,61,6E,2BE
[FB]	680	DATA	26,81,7B,FE,16,20,0C,2B,28D	[C0]	1230	DATA	79,20,6B,65,79,0D,00,1F,20E
[0B]	690	DATA	0B,DD,2A,D6,83,DD,71,FC,4B5	[47]	1240	DATA	02,01,4C,4F,41,44,49,4E,1BA
[A2]	700	DATA	DD,70,FD,AF,24,CB,7C,C4,528	[0B]	1250	DATA	47,3A,20,20,00,1F,02,01,0E3
[19]	710	DATA	C6,82,6A,22,D4,83,D1,F5,4F1	[45]	1260	DATA	53,41,56,49,4E,47,3A,20,222
[F6]	720	DATA	CD,7A,BC,F1,D2,26,81,11,47E	[2D]	1270	DATA	07,1F,0C,02,49,6E,73,65,1C3
[E9]	730	DATA	95,83,CD,F4,82,CA,0D,80,4B2	[0A]	1280	DATA	72,74,20,53,65,63,6F,6E,2FE
[28]	740	DATA	2A,D8,83,22,DA,83,21,1E,343	[83]	1290	DATA	64,20,64,69,73,63,20,2D,274
[53]	750	DATA	84,22,D6,83,21,C3,08,22,30D	[B8]	1300	DATA	20,74,68,65,6E,20,61,6E,2BE
[0A]	760	DATA	D4,83,CD,08,83,2A,DA,83,436	[1C]	1310	DATA	79,20,6B,65,79,0D,00,00,1EF
[FF]	770	DATA	7E,4F,0D,3C,B7,CA,14,80,32B	[25]	1320	DATA	00,00,00,00,00,00,00,00,000
[30]	780	DATA	23,22,DA,83,11,06,01,CD,287	[28]	1330	DATA	00,00,00,00,00,00,00,00,000
[87]	790	DATA	30,83,CD,60,8B,B9,28,15,391	[2B]	1340	DATA	00,00,00,00,00,00,00,00,000
[28]	800	DATA	3A,DC,83,8B,28,03,1C,18,2B3	[2E]	1350	DATA	00,00,00,00,00,00,00,00,000
[10]	810	DATA	EE,7A,FE,3D,28,D4,1E,06,3C3	[31]	1360	DATA	00,00,00,00,00,00,00,00,000
[40]	820	DATA	C6,14,57,18,E2,79,3D,CD,3AE	[34]	1370	DATA	00,00,00,00,00,00,00,00,000
[02]	830	DATA	5A,8B,CD,1B,83,41,11,00,2D2	[37]	1380	DATA	00,00,00,00,00,00,00,00,000
[03]	840	DATA	88,73,21,C7,83,CD,8C,BC,47B				



SOUND



An introduction to the CPC's sound chip PART 4

We've now looked at how the sound command is affected by both volume and tone envelopes, but there is still one more parameter that can be bolted onto the end of the standard sound instruction.

Remembering back to Issue Seven, you may recall that the full syntax for SOUND on the CPC went something like this:

```
SOUND <channel status>,<tone period>[,<duration>[,<volume>[,<volume envelope>
                                     [,<tone envelope>[,<noise period>]]]]]
```

This issue we're going to use the final parameter, noise period, to produce some rather different sounds - principally, the noise parameter is used in designing sound effects and so that is what I'm going to concentrate on in this article.

The noise period can take a value between 1 and 31 and each number corresponds to a slightly different sounding piece of white noise (each of which is produced randomly by the CPC). Often sound effects can be made using only white noise and the program below will let you hear all 31 types that are available on the CPC. When one has finished, press any key to start the next one off:

```
10 FOR i=1 TO 31
20 SOUND 1,200,200,15,0,0,i
30 a$=INKEY$:IF a$="" THEN 30
40 NEXT i
```

Notice that you must still put in envelope numbers to let the CPC know what is going on. Tone and volume envelopes 0 are not definable by the user and are just the default envelopes which have no effect on the sound produced.

Whilst it's possible to design sound effects based entirely around white noise most incorporate some actual note as well, and they often include volume or tone envelopes (sometimes both).

The noise section is unaffected by the tone envelope and has no effect on the pitch of the note being played. The noise section is completely separate from the rest of the sound instruction; indeed on other home computers, the noises play on a different channel from the 'notes').



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Printed below is a program that has five sound effects that are produced using mixtures of noise, volume envelopes and tone envelopes. I don't claim to be any expert when it comes to sound on the CPC but the real beauty of special effects is that the best ones are often stumbled upon accidentally and are the result of some unexpected mistake (that's certainly how I came up with most of them in the following program).

Type in the program and run it. When one sound has finished, just press a key to start the next one going.

```

10 ENV 1,10,127,10:SOUND 1,400,100,0,1,0,31 : REM Crash!!!
20 a$=INKEY$:IF a$="" THEN 20
30 ENV 1,3,-3,5:SOUND 1,400,15,15,1,0,13 : REM Whack!!
40 a$=INKEY$:IF a$="" THEN 40
50 ENT 1,10,-10,10:SOUND 1,200,100,7,0,1,23 : REM Teleport
60 a$=INKEY$:IF a$="" THEN 60
70 ENT 1,10,-5,5,10,5,5:SOUND 1,200,100,7,0,1,0 : REM Alert
80 a$=INKEY$:IF a$="" THEN 80
90 ENT -1,1,-50,5,1,50,5:ENV 1,10,-1,10:SOUND 1,200,100,15,1,1,9 : REM Phaser

```

Feel free to alter the program and fiddle around with the values until you get sounds that you like. Designing sound effects is probably one of the most interesting things in BASIC programming - most CPC books include a section on helpful suggestions and ideas for special effects (or you could sift through type-ins in the national magazines looking for sound effects).

One useful tip to remember is that if your tone envelope number has a negative value (as in line 90 above) then the tone envelope will continue to repeat until the sound duration has expired. The other thing which can be very useful is what happens when either a volume or a tone envelope takes the volume or pitch value out of range; the resulting wrap around can produce some very interesting sound effects. Also remember that it is possible to build-up still more complex noises by using all three channels at once and also linking sounds and their respective envelopes one after another.

That's all we've got time for this issue, and we'll conclude our look at sound commands in our final issue.



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THE PRINT-OUT FIRMWARE GUIDE

Do want to know what's inside your computer's memory ?
Do you want to be able to push your CPC or Plus to its limit ?
Are you interested in programming software, rather than using it ?
If so, then you need this essential guide to your CPC.....

Written by the authors of Print-Out, this professionally produced guide contains over 80 pages of information about the 'insides' of your computer. It includes:

- a memory map containing detailed descriptions of every memory location's purpose
- a complete list and description of all of the firmware calls and indirections
- the 'undocumented' maths firmware routines
- a list of the entire Z80 instruction set, including the illegal commands
- a chart for easy conversion of decimal-binary-hexadecimal numbers
- the disc and tape systems explained, and their firmware calls
- a selection of routines to make your programming quick and simple
- 6128 to 464 memory address conversion chart

To get the most from this guide, we can also provide a tape or disc with several routines for simple programming in Machine Code. This includes a memory editor, full-featured assembler, ROM enabler and disabler, and software to allow you to use the firmware from BASIC.

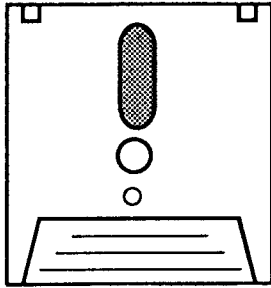
These products are available only from Print-Out at the following prices:

The Firmware Guide	£4.50
The Firmware Guide + tape	£6.75
The Firmware Guide + disc	£8.75

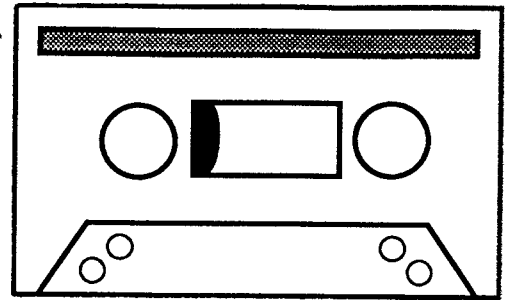
It has been several years since Amstrad discontinued production of the 'official' firmware manual. Not until now has there been a publication with similar information; the Print-Out Firmware Guide has been built up over years of computer programming and the authors' knowledge and expertise has been brought together in *the* guide for all serious users.

If you would like to order a copy, please send your cheque or postal order made payable to Print-Out to the address shown below. The Firmware Guide will be released on the 14th April, but if you wish you may reserve your copy in advance — please send full payment with your order.

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PD LIBRARY ROUND-UP part one...



In this special feature, we'll be investigating the numerous PD libraries that have sprung up for the CPC in the past few years. There are now so many services available with so much software that it is almost impossible to know where to go for PD - hopefully this guide will show you who to trust, and who not to.

DATA PD - 202 Park Street Lane, Park Street, St Albans, Hertfordshire AL2 2AQ
(run by Tony Kingsmill; established May 1990)

Long-time readers of Print-Out will have first heard of Tony in Issue Two when a couple of his programs were printed in a 'Ten-liner' section of the magazine. After this, there was absolute silence from St Albans until, early in 1990, Tony agreed to write an article on his homebrew company which had recently launched a few of his own adventures, including 'Lords of Magic' & 'Island of Chaos'. After reviewing several of his homebrew offerings, we revealed that Tony was planning a PD library in Issue Five's news pages. But enough of this history lesson, what is the library actually like....?

The library has now become disc-only and has over 50 discs - one of which is a 'stock disc' that contains information about Data PD, helplines, adverts, lists of all the software available, and also a selection of programs to show off some of the library's best software.

It has to be said that most PD libraries' selections contain much of the same programs (such is the nature of PD) and thus who to order from really depends on the service offered and the other things that a supplier offers. In the case of Data PD, it appears that most software is despatched promptly, and the files on the regularly updated 'stock disc' hold a reasonable amount of information about the library and other companies.

Remembering back to the birth of Data PD, a newsletter was also produced and a fixed price per kilobyte of program was charged. I always found that this was a rather chaotic system - thankfully this method has been replaced by a fixed rate of £1.00 plus a blank disc for each 'selection' and a SAE (each selection needs a side of a 3" disc). There are also discounts if you order more than ten discs; as a first order we would advise you to get hold of the STOCK DISC (00) which is absolutely free if you send a disc and SAE. Just make all cheques/postal orders out to T Kingsmill and not to Data PD.

If you have any problems or enquiries, you can phone Tony on 0727 872409 (but only between 4.30pm - 9.00pm weekdays, 10.00am - 9.00pm weekends)

SOUNDS LIKE PD - 6 Keyberry Park, Newton Abbot, South Devon TQ12 1BZ

(run by Thomas Faull; recently established)

This newly set up PD library specialises in music and sound effects (hence the name!) and is aimed at people who write their own computer programs and want to include some sound in their programs - all the sounds are totally public domain and Thomas says that programmers are free to use them.

At present the library contains twenty selections and is tape-based - you have to order the selections in pairs, and two choices will cost you 50p and a blank tape, or £1.50 and 'Sounds Like PD' will supply the tape for you (the tape needs to be at least 30 minutes long).

As well as a large collection of sound effects, there is also a tape of tunes, a drumkit, an organ, a digitiser, a synthesiser & several other programs. We've had a go with the digitiser and were pretty impressed (like most digitisers for the Amstrad it prefers some kinds of sounds to others) - another tape we had a listen to was called 'Advanced FX II'; how useful you'll find these sound tapes depends on how good, or bad, you are at making your own sound effects.

Sounds Like PD is well worth investigating - although its only early days, the library appears to be well run and very organised. Thomas produces a short list of the programs in the library, or you can call him on (0626) 335991.

ADVENTURE PD - 10 Overton Road, Abbey Wood, London SE2 9SD

(run by Debby Howard; established for 2 years)

First of all, I have to confess to not being a great adventure fan. Secondly, having been sent a stock/demo disc from Adventure PD, I think I'm hooked - this is how I've always imagined a PD library should be.

The stock disc is the first contact that most people have with a library and, unlike many other stock discs, Adventure PD's catches the eye and is so nicely presented that you can't help but be impressed by the library even before you've actually seen any of the PD. Not only that, but a printed stock-list containing all of the information about the discs & tapes, and how to order, is sent to you as well (much better than having to try and pick up all the info from reading a helpfile).

The library doesn't have a huge selection of discs (around twenty) but each is packed with adventures or solutions - the library also supplies a reduced number of adventures on tape. It's imperative that a PD library dedicated to adventures should have a 'tips' section & solutions are included on several special discs; the library also sells printed maps and solutions to hundreds of adventures. As a final service, you can phone Debby on (081) 310 9877.

The cost of each tape or disc is £1.00 if you send a blank C60/C90 tape or CF2 disc - the library will supply a disc for an extra £3.00 if you wish - you must also send a stamped self addressed Jiffy bag.

The stock disc is available free of charge, if you send a Jiffy bag and stamp to Adventure PD. All I can say, is send off for the stock disc immediately!!!

SCULL PD - 119 Laurel Drive, East Kilbride, Glasgow G75 9JG

(run by Alan Scully; established early 1990)

Scull PD seems to be part of CPC history!!! The PD library has been around in one form or another for ages and Alan has to be one of the most prolific writers of software for the CPCs. With the demise of WACCI, it is fair to say that Scull PD is now the largest PD library in the UK; it is also one of the best organised and run (this is obvious if you have ever seen one of the 'CPC Domain' magazines which is run in conjunction with the library - CPC Domain has now become a disc-fanzine).

The library has over 100 discs, but there have been some important changes to the way that PD is distributed. Firstly, PD is only available to subscribers of CPC Domain, and secondly, when you order a selection you will be sent a disc to copy and then return to Scull PD. I'm not convinced as to whether this is a good system - especially forcing people to buy CPC Domain (good as it is) - but Alan obviously feels that there are advantages.

Alan first came to Print-Out's attention in Issue Four with his cassette based library and since then Scull PD has grown and grown. One of the reasons for this is the huge number of programs that Alan has written himself; culminating in the 'Pagemaker series' of DTP programs (although the later versions are not PD). I can also remember being impressed by his first homebrew games - Rebound & Bandit - and comparing them with other authors' programs it's easy to see why.

Assuming that you are a CPC Domain subscriber, send £1 plus a sticky address label OR send 75p plus a sticky address label and a 24p stamp - please note that this charge applies to each disc that you wish to order. You will then be loaned a disc with the necessary software on (including copying programs) and you have to make a copy of the disc and return it to Scull PD within seven days - or else you will be banned from ordering until the disc is returned and you have paid a 'fine' of £2.

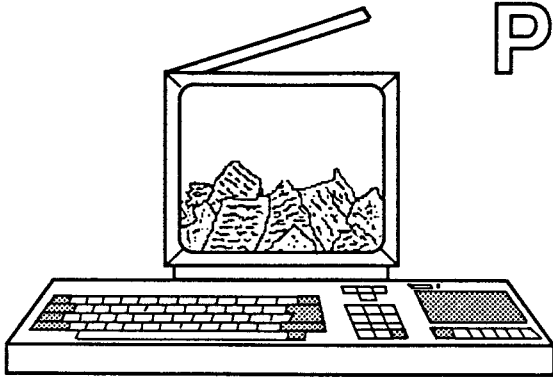
To see what the disc-based 'CPC Domain' is like, send Alan £1.25 plus a disc & a stamped address envelope - you'll also be sent details of how to subscribe in the future.

YORKIE PD - 11 Beechwood Avenue, St Albans, Herts AL1 4XP

(run by Daniel Tuck; newly established)

It seems that St Albans must be the PD centre of the UK, with both Data PD and now Yorkie PD based there! Having only just been founded, the library has only a few discs (eight in fact) but Daniel has plans to expand and is looking for anyone who has written a program to send it off to his library.

The cost of each disc selection (no tapes) is 50p and you can get a catalogue of what's available by sending an SAE to the above address. At the moment, the library contains games, utilities & desk top publishing discs as well as a slide show from the Manchester Amstrad User Group. Daniel hopes to add a CP/M disc to his collection and also an adventure disc in the future.



POKING AROUND

Lift the lid on your CPC - by Bob Taylor

Do you miss your favourite TV shows because you are so engrossed with entering programs? All that can be a thing of the past with this CLOCK RSX which couples an alarm with a digital display.

The display will appear at the top right corner of the screen irrespective of which MODE you are in. The clock display is actually printed in WINDOW 7, which should be reserved for this use only; the window does not need to be set up, as this is taken care of by the routine.

There are several modes of operation which are controlled by the value entered for the STATUS. This is bit-operated with values as follows:

Status 1: turns the display on but not the alarm

Status 2: turns the alarm on

Status 3: turns on both display and alarm.

Note that the clock will still be running and the alarm will still operate if it is enabled, even if the display is switched off.

The following syntax forms of the command are possible:

!CLOCK, Status - this just sets the display and alarm states (on and/or off) without altering the clock or alarm times

!CLOCK, Status, Clock Hours, Clock Minutes, Alarm Hours, Alarm Minutes - this sets both clock and alarm times, as well as allowing a change in display or alarm states.

!CLOCK, Status, Hours, Minutes - this allows either clock or alarm to be set without altering the other. Which is altered depends on Status bit 1: if this is set (ie a status value of 2 or 3) then the alarm will be the one changed, otherwise it will be the clock.

!CLOCK - this is a special form of the command which stops the clock running and turns off both the alarm and the display.

Incorrectly entered hours default to 12, while incorrect minutes default to 0. Whenever the clock is set or altered, the seconds are always reset to 0 (but not when altering the display state). If incorrect numbers of parameters are entered then no alteration of any sort will be made.

The alarm is a repetitive 'beep' which occurs every second for a whole minute unless the COPY key is pressed - the BASIC loader routine allows another key to be chosen (by its key number) for turning the alarm off. Whichever key is chosen will be saved with routine and will be the only one which operates in this way. To change this key at some time in the future, the BASIC loader will have to be re-run. Using the key while the alarm is operating will reset the alarm, and it must then be re-armed via the Status Value for further operation.

The clock uses interrupts to maintain its timing. If interrupts are turned off at all (eg while loading/saving from tape/disc), the clock will stop running for that period and the time displayed will become 'slow'. Within the microprocessor interrupts take precedence over any other routine which may be running when the interrupt occurs - this might result in some apparently spurious effects if the routine being run is sending control codes to the screen handler.

Note that some proprietary programs may turn off interrupts or reset them, so that the clock will no longer work.

Type in the listing below and SAVE it before RUNning it. It will produce a block of code which can be installed elsewhere in RAM when the clock is desired in the future; for this reason, the routine should not be CALLED before it is saved.

THE CLOCK:

```
[F1] 10 'CLOCK Loader by Bob Taylor (copyright 1991)
[20] 20 MEMORY &7FFF:RESTORE:PRINT:PRINT"Please wait a few seconds"
[7B] 30 FOR lin=0 TO &160/8-1:total=0:FOR n=0 TO 7:READ a$
[A2] 40 byte=VAL("&" +a$):POKE &8000+lin*8+n,byte
[4B] 50 total=total+byte:NEXT n
[0D] 60 READ a$:IF VAL("&" +a$)<>total THEN PRINT:PRINT"Error in line"lin*10+110
      :PRINT:END
[53] 70 NEXT lin:INPUT"Enter Key number (not ASCII) for key to use to stop
      alarm (or just ENTER for COPY) ";a$:IF a$<>""AND VAL(a$)<80 THEN POKE
      &810E,VAL(a$)
[99] 80 PRINT:PRINT"All M/C loaded":PRINT:PRINT"Press S to save M/C as
      CLOCK.BIN":PRINT"or any other key to continue":WHILE INKEY$="":WEND:IF
      INKEY(60)<>-1 THEN SAVE "CLOCK.BIN",B,&8000,&160
[0D] 90 PRINT:PRINT"To Load and Initialise !CLOCK with a program present, just
      use:":PRINT"MEMORY HIMEM-&160:a=HIMEM+1:LOAD"CHR$(34)"CLOCK.BIN"
      CHR$(34)",a:CALL a+&3F:MEMORY HIMEM+&3F":PRINT"with the Disc or Tape
      inserted"
[EA] 100 END
[2C] 110 DATA F7,FF,05,00,0E,00,15,00,21E
[56] 120 DATA 25,00,29,00,2F,00,32,00,0AF
[D6] 130 DATA 35,00,3E,00,71,00,B1,00,195
[A1] 140 DATA B4,00,B7,00,BA,00,DB,00,300
[97] 150 DATA DF,00,06,11,2B,7E,2B,E5,2AF
[04] 160 DATA 6E,67,19,7E,B3,77,23,7E,307
[AB] 170 DATA 8A,77,E1,10,EF,01,05,00,2E7
[00] 180 DATA EB,36,C9,23,C3,D1,BC,21,47E
[E8] 190 DATA E3,FF,19,E9,06,01,FE,01,3EA
[01] 200 DATA 28,20,38,30,21,1E,01,FE,1EE
[6F] 210 DATA 05,20,05,CD,4B,00,18,0A,164
[9E] 220 DATA FE,03,CO,DD,CB,04,4E,20,3DB
```

Linechecker

A PROGRAM TYPING AID

All programs in Print-Out have Linecheck codes which are enclosed in brackets at the start of a line. Don't enter them in as they're designed to be used with Linechecker to eliminate errors when typing in programs which appear in this magazine. Please note, all programs will run whether Linechecker is being used or not. For information on how to use Linechecker, please see Issue Three.

```

[F9] 230 DATA 06,2B,AF,32,1A,01,2B,CD,225 [E2] 390 DATA BC,21,01,0D,3B,06,26,21,170
[AF] 240 DATA 4B,00,DD,7E,00,32,19,01,1F2 [55] 400 DATA 2B,02,26,49,CD,75,BB,21,2B7
[49] 250 DATA 21,12,01,11,6B,00,06,81,137 [F7] 410 DATA 1C,01,CD,F2,00,CD,ED,00,396
[07] 260 DATA CD,EF,BC,B7,21,0C,01,DA,437 [6A] 420 DATA CD,ED,00,F1,CD,B4,BB,3E,525
[AD] 270 DATA EC,BC,11,32,00,42,4B,C3,33B [14] 430 DATA C3,32,CD,BD,32,DO,BD,E1,51F
[8B] 280 DATA E9,BC,DD,7E,00,FE,3C,3B,472 [BC] 440 DATA CB,4E,2B,1C,E5,3E,09,CD,356
[96] 290 DATA 01,AF,4F,DD,23,DD,23,DD,3DC [B6] 450 DATA 1E,BB,E1,2B,04,CB,8E,1B,357
[07] 300 DATA 7E,00,3D,FE,0C,3C,3B,02,23B [BD] 460 DATA OF,2A,1B,01,ED,4B,1D,01,1AB
[B2] 310 DATA 3E,0C,77,2B,71,DD,23,DD,33A [EE] 470 DATA B7,ED,42,3E,07,CC,5A,BB,40C
[2D] 320 DATA 23,C9,F5,C5,E5,3E,3B,21,425 [A1] 480 DATA E1,C1,F1,C9,3E,3A,CD,5A,4FB
[1C] 330 DATA 1A,01,34,BE,30,14,23,34,1AB [D3] 490 DATA BB,7E,2B,0E,2F,0C,D6,0A,2BD
[5D] 340 DATA BE,30,0C,3E,0C,23,34,BE,259 [66] 500 DATA 30,FB,C6,3A,47,79,CD,5A,412
[B4] 350 DATA 30,02,36,01,2B,36,00,2B,OF5 [CB] 510 DATA BB,7B,C3,5A,BB,43,4C,4F,3E9
[B2] 360 DATA 36,00,2B,CB,46,2B,39,E5,2BB [A9] 520 DATA 43,CB,00,00,00,00,00,00,10E
[BC] 370 DATA 3E,C9,32,DO,BD,32,CD,BD,4B2 [79] 530 DATA 00,00,00,00,00,00,00,00,000
[02] 380 DATA 3E,07,CD,B4,BB,F5,CD,11,454 [0A] 540 DATA 00,00,0C,00,00,00,00,00,00C

```

CODING TIP

Recently I came across a useful algorithm for obtaining the whole number square root of a number. If the number has a rising sequence of odd numbers subtracted from it, then the integer square root will be the number of subtractions before the remainder becomes less than zero. So to find the square root of 19:

```

1      19 - 1 = 18
2      18 - 3 = 15
3      15 - 5 = 10
4      10 - 7 = 3
       3 - 9 = -6

```

As can be seen from the above, the whole number square root of 19 is four. The principle is based on the fact that the difference between whole number squares 0,1,4,9,16,25,36,49,64 etc is 1,3,5,7,9,11,13,15 etc. A machine code routine to implement the algorithm is here given:

```

LD BC,1 ; set the odd number to 1
LD HL,square
XOR A ; set the square root count to 0 and clear Carry for SBC
; following
.loop SBC HL,BC ; subtract the odd number from the square/remainder
JR C,done ; if the remainder has now gone negative
INC A ; increment the square root count
INC BC
INC BC ; increment BC to the next odd number in the series
JR loop ; to perform the next subtraction
.done
; THE VALUE IN A IS THE INTEGER SQUARE ROOT.

```


THE SOFTWARE REVIEWS

Newword 2 from NewStar, The Widford Old Rectory, London Road, Chelmsford
Essex CM2 8TE (Price: £70.50 on disc only)

I bought my CPC 6128 to use WordStar - it was the first home computer capable of running heavyweight programs. Fortunately, I was persuaded by reviews of Newword 2 to buy that instead and, in spite of the absence of adverts, NewStar are still supplying the CPC version for £70.50 (£60+VAT).

Newword 2 was written by the original authors of WordStar after they fell out with the company; when they were bought back in (and I mean bought, not simply brought), they incorporated many features of Newword 3, for PCs etc, into WordStar 4. With three exceptions, Newword 2 files are fully compatible with WordStar 4, and documents prepared on a PC with WordStar 4, or saved in WordStar 4 format from within WordStar 5 and 6, can be edited and printed on the 6128, or vice versa.

Newword 2 lacks any mathematical functions, and it cannot use some of the more sophisticated formatting commands of Wordstar 4, 5 and 6; it also lacks 'hanging paragraphs' (where the paragraph number is to the left of an otherwise indented paragraph). The last feature can be simulated in Newword 2 (which will correctly print WordStar 4 files that use hanging paragraphs) but the other two cannot.

Fortunately the entire Wordstar (Newword) family uses the convention that any command which is unrecognised is ignored but is left unchanged. So, Newword will happily save a file with WordStar 4, 5 or 6 commands in it even though they are meaningless in Newword.

As the review in Issue Nine said, Protext is probably the best all-round word-processor for the CPC; so what might persuade someone to choose Newword at twice the price?

Well, firstly, there's the compatibility with WordStar 4, 5 and 6 - WordStar 3 is actually less compatible with them than Newword 2; secondly, the package also includes a 45,000 word spell-checker, plus utilities including an external word count facility; thirdly, it allows multiple layouts within a document; fourthly, it allows merging & chaining of files at the printing out stage, even files from different discs; fifthly, it offers the most sophisticated merge-printing and formatting facilities of any CPM wordprocessor. (Any owners of Protext might be interested to know that most of these features are available in the Promerge or Promerge Plus packages - editor)

Apart from changing the left and right margins, Newword allows you to copy the 'ruler line' (which appears at the top of most word-processor screens) into the text & edit it directly. You can copy as many as you like into the text - though if you copy too many, Newword cannot keep up with them when scrolling backwards - and, as Newword passes each one, it will alter the layout of the text to suit the most recent ruler line. This is a superb feature for anyone whose documents are interspersed with tables, each of which needs a separate layout.

Newword is relatively slow unless it is loaded and run from a Silicon Disc and it makes sense to keep file sizes down to cut the time taken on saving and block moves. Because it can easily chain files, however, one can break a report or a long essay into sections and work on the sections separately, chaining them only when printing out. If a report is too long to fit on a disc, you can even change discs at the end of a file without losing any layout information or the correct page number.

In addition, Newword's conditional merge-printing facilities allow you to produce different documents from a set of files or the same text in many different layouts. There is no need to re-format the text - Newword will re-format it for the printer, leaving the source file untouched.

Newword, like Wordstar, uses ASCII Comma Separated Values files to hold the data for merge-printing and the improved programming language developed for Newword 2 was incorporated in WordStar 4 - this is sufficiently complex, for example, to print labels two or three across & to conditionally insert data or files or keyboard responses when printing.

As both dBASE and SuperCalc (via the SDI program on the back of SuperCalc disc) can produce ASCII CSV files, I usually create merge-print data files from data already held in a dBASE or SuperCalc file - this avoids all the problems of making sure the data file is properly formatted.

Newword has an ASCII ('non-document') mode which is excellent for programming. This has an auto-indent feature; the cursor always returns to the 'tab stop' used at the start of the previous line.

Finally, though Newword 2 hasn't been upgraded for six years, it is recent enough to include drivers for 24-pin and Laserjet printers and two pseudo-drivers, one of which creates a disc file showing how the layout will look when printed; the other allows you to create a new data file from existing merge-print data files.

MiP Software

SHAREWATCHER II - a superb stockmarket simulation which allows you to test your skills on the stockmarket without losing a fortune!! "...interesting and enjoyable..." said Printout "...well worth considering." said WAGCI Dec'89. Sharewatcher II costs £3.95 on tape and £6.50 on 3" disc.

MATHS MASTER PLUS - is a comprehensive computer utility packed with well over 100 useful formulae and conversions. It is simple to operate and is based around two main menus. Included in the program are sections on volumes, areas, statistics, physics formulae, trig and much more. Just type in the figures you know, and the answer will be provided in seconds - its invaluable for all students. "...excellent buy.....highly recommended" said Printout. "...well written.....useful..." said A.E.M. Maths Master Plus costs £3.50 on tape and £5.95 on 3" disc.

EDUCATIONAL PACK 1 - this pack contains ten superb educational programs to suit ages 8-13. All the programs have a mathematical theme to them, and are simple to use, although an A4 manual is included in the price. The programs included are fractions, ratios, series, addition and subtraction, and many many more. Also, a free copy of Maths Master is included - this was the predecessor to Maths Master Plus, shown above. "...well presented; good value for money" said Printout. This is a superb buy at £5.95 on 3" disc only.

To order please send a cheque or postal order (payable to M.Pinder) to MiP Software, 4 Wham Hey, New Longton, Preston, PR4 4XU.

REVIEW by John Hudson

BASIC Tokens - part 5

Following our look at the storing of Strings in the last issue of PRINT-OUT, in this, the last part of our series on BASIC's use of memory, I am providing an RSX called !LISTVAR which provides a comprehensive list of Variables, DEF FNs & Arrays at any time as stored by BASIC.

The RSX provides four groups of information:

1. The complete list of all 26 Variable Name start letters as set by any DEFINT or DEFSTR commands. If not defined in this way the default state is identical to DEFREAL and, for reasons of clarity, these are not shown with '!'. The information for these definitions is stored in the 26 bytes beginning at &ADF3 (&AEOC for the 464). The status for each is stored as a byte of &02,&03 or &05 for DEFINT, DEFSTR or DEFREAL/undefined respectively. Comparing these values with those used in the Program and Variables areas as detailed in the previous articles on Tokens shows that there are three different sets used in three different areas - all a bit sloppy I think!!!
2. Each Variable together with its contents. The 3 types are printed separately for clarity. The sequence for each type is as they occur & not in alphabetical order; in the Variables area, all the types are mixed as they are used:
 - % and DEFINT - the value is presented both as decimal and Hex; since these Variables cannot hold more than 32767, decimal values equivalent to &8000 and above are shown as negative.
 - \$ and DEFSTR - up to ten characters of the contents are shown; a final quote character indicates that all of the string is shown.
 - !, DEFREAL & undefined - in order to display the floating point contents of these Variables, BASIC's own formation routine (STR\$) at &F9BC (&F91E for the 464) has been utilised. This needs a value preceded by its type byte to be installed in the six bytes of the Virtual Accumulator at &B09F (or &BOC1 for the 464). On exiting from the BASIC ROM routine the result will have been laid down in another area of memory from where it is copied to the screen.
3. Each DEF FN, together with its parameters and the BASIC line number in which the DEF FN occurs. Again the three types are printed separately, although in the Variables area they are mixed together. The address (the data stored with each DEF FN) may no longer point to the correct token in the Program if certain changes have been made to the Program after running. This will invoke a 'moved' message in lieu of the parameters and the line number. Incidentally, the Variables used as parameters (local variables) do not acquire the DEFINT or DEFSTR status you would expect; whether this is by design or is a bug in BASIC, I don't know.
4. Each Array together with its dimensions. Again, the three types are printed separately. The contents of Array elements are not printed.

The BASIC loader will alter the routine for whichever version of the CPC it is installed in. Once SAVED as a binary file - simply follow the instructions - the routine can be installed elsewhere in memory & will 'relocate' itself automatically when first CALLED.

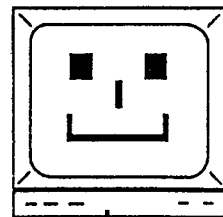
For the 6128, the space used by the relocation routine & table of relocatable addresses can be reclaimed by moving MEMORY a second time after the RSX has been initialised; this is included in the instructions (the 464 does not allow MEMORY to be moved up again, so although the statement should be typed in to verify the LINECHECK checksums, it can then be deleted and not implemented).

After looking at the DEFINT/DEFSTR/DEFREAL area, the main part of the machine code routine scans the Variables or Arrays area once for each type of Variable, DEF FN or Array, and picks out the relevant entries of each for printing during the pass & jumps over those which don't match. In addition to the use of BASIC's STR\$ mentioned earlier, subroutines provide for printing of Hex and Decimal Integer numbers, and strings. !LISTVAR does not require any parameters.

Type in the following program which should be saved before RUNNING:

PROGRAM

```
[F1] 10 'LISTVAR Loader by Bob Taylor (copyright 1991)
[20] 20 MEMORY &7FFF:RESTORE:PRINT:PRINT"Please wait a few seconds"
[06] 30 FOR lin=0 TO &338/8-1:total=0:FOR n=0 TO 7:READ a$
[A2] 40 byte=VAL("&"+a$):POKE &B000+lin*8+n,byte
[4B] 50 total=total+byte:NEXT n
[0D] 60 READ a$:IF VAL("&"+a$)<>total THEN PRINT:PRINT"Error in line"lin*10+110
      :PRINT:END
[1A] 70 NEXT lin:IF PEEK(6)=&80 THEN POKE &B068,&C:POKE &B069,&AE:POKE &B094,
      &87:POKE &B097,&85:POKE &B0CB,&89:POKE &B0CE,&87:POKE &B14D,&87:POKE
      &B156,&86:POKE &B157,&B2:POKE &B1AA,&C1:POKE &B1AF,&8D:POKE &B1B7,&8D:
      POKE &B217,&81:POKE &B274,&89:POKE &B2D2,&1E
[BB] 80 PRINT:PRINT"All M/C loaded":PRINT:PRINT"Press S to save M/C as
      LISTVAR.BIN":PRINT"or any other key to continue":WHILE INKEY$="":WEND:
      IF INKEY(60)<>-1 THEN SAVE "LISTVAR.BIN",B,&B000,&338
[4A] 90 PRINT:PRINT"To Load and Initialise !LISTVAR RSX with a program present
      just Enter:":PRINT"MEMORY HIMEM-&338:a=HIMEM+1:LOAD"CHR$(34)
      "LISTVAR.BIN"CHR$(34)",a:CALL a+&57:MEMORY a+&56":PRINT"in Direct
      Command Mode with the Disc or Tape inserted"
[EA] 100 END
[5E] 110 DATA 7E,23,E5,66,6F,19,7E,83,375
[D7] 120 DATA 77,23,7E,8A,77,E1,23,10,32D
[B3] 130 DATA EF,01,0B,00,EB,36,C9,23,305
[F2] 140 DATA C3,D1,BC,BB,FF,0B,00,0B,41D
[47] 150 DATA 00,0E,00,36,00,43,00,46,0CD
[ED] 160 DATA 00,5D,00,6E,00,B3,00,BB,236
```



[88] 860 DATA CD,5A,BB,56,2B,5E,2B,EB,3D7	[FA] 1000 DATA OF,C6,90,27,CE,40,27,C3,384
[15] 870 DATA 2B,CD,2B,02,EB,10,EF,3E,34D	[99] 1010 DATA 5A,BB,BC,F9,00,01,4C,49,360
[4D] 880 DATA 29,CD,5A,BB,E1,23,4E,23,380	[01] 1020 DATA 53,54,56,41,D2,00,0A,0D,227
[B6] 890 DATA 46,23,ED,5B,6C,AE,C3,F9,487	[78] 1030 DATA 14,18,44,65,66,20,56,61,212
[6D] 900 DATA 00,1A,13,B7,C8,CD,5A,BB,38E	[B6] 1040 DATA 72,69,61,62,6C,65,73,3A,31C
[B0] 910 DATA 18,F7,C5,D5,1E,00,01,F6,3BE	[3D] 1050 DATA 18,0A,0D,00,0A,0D,18,56,0B4
[1A] 920 DATA FF,C5,01,9C,FF,C5,01,18,43E	[34] 1060 DATA 61,72,69,61,62,6C,65,73,343
[BF] 930 DATA FC,C5,01,F0,DB,C5,C1,3E,54E	[AE] 1070 DATA 3A,18,0A,0D,00,0A,0D,18,098
[41] 940 DATA FF,3C,09,38,FC,ED,42,B7,45E	[5B] 1080 DATA 44,45,46,20,46,4E,73,3A,230
[26] 950 DATA 28,02,1E,30,B3,CD,5A,BB,2DD	[FA] 1090 DATA 18,0A,0D,00,0A,0D,18,41,09F
[9F] 960 DATA CB,49,28,EA,7D,C6,30,D1,46A	[6B] 1100 DATA 72,72,61,79,73,3A,18,0A,28D
[E2] 970 DATA C1,C3,5A,BB,3E,26,CD,5A,424	[56] 1110 DATA 0D,00,20,3D,20,00,20,6D,117
[60] 980 DATA BB,4C,C4,67,02,4D,79,1F,319	[9B] 1120 DATA 6F,76,65,64,00,20,69,6E,2A5
[D5] 990 DATA 1F,1F,1F,CD,70,02,79,E6,2FB	[B2] 1130 DATA 20,00,00,00,00,00,00,00,020

"7297NS"

by STEFAN KUHS

No, this is not an article about the Arnold Schwarzenegger movie, but about a computer which is very similar to the CPC.

This computer is the KC Compact (KCC). First. I want to say it's a shame that only 75% of all CPC software runs on the Plus, because about 90% of all software runs on the KCC! In the former GDR (socialistic Germany) they produced the KCC. I'm sure Alan Sugar was very happy when he first heard that some bad guys in the GDR had copied the CPCs.

But why did they copy the CPC? Well, in all the former socialist states there were no copyright laws - therefore, the KCC was only sold in the GDR and not in the FRG. But now let me tell you something about the KCC itself.

The KCC has no disc drive or tape deck built-in and was sold without monitor. You can link your TV to the computer via the Scart port of the KCC. The computer is smaller than the CPC, looks a bit like a Plus and has only 69 keys (whereas a CPC has 74 keys) because there are no function keys from f5 to f9. The CPC has a 7-bit printer port, but in fact the KCC has an 8-bit printer port instead.

The cassette port is defined as having 8 (data) bit. Also there is no speaker, and the sound comes out of the TV. The KCC is like a CPC 6128 but without a disc drive and only with 64K (but with Locomotive BASIC 1.1). If you bought a special disc drive for the KCC, you also got an extra 64K of memory, so the computer is nearly 100% 6128 compatible.

The CRTC is not the same as in the CPC; it is called an MP4845P chip. Although the KCC is 90% compatible with the CPC some programs don't work on this computer (for example Head over Heals, Overflow Tome 2 Demo).

In Issue Twelve, Stefan has written a report on the CPC in Germany, including the clubs, PD libraries, fanzines & programs that exist - having already read the article, one thing is for certain, the CPC is alive and well in Germany!!

HELPLINE

RICHARD WILDEY - Help given on BASIC Programming, Tape-to-Disc transfers and the DMP2000 printer. Contact Richard at: 41 Enmore Gardens, East Sheen, London SW14 8RF.

TONY WALKER - Help given on Protext, Promerge Plus, Prospell, Utopia, Comms, CPM on ROM, ROMDOS (3.5" operating system), Star LC24-10 printers, and CPM+ Protext. Contact Tony at: 24 Ullswater Road, Fulwood, Preston, Lancashire PR2 4AT, or give him a call on (0772) 651698 (but please phone only between 10am and 10pm).

DICK HORNSBY - Help given on BASIC Programming (at ordinary level) and possibly on using Arnor's external ROMs. Help sought on more advanced BASIC programming and machine code programming. Also exchange of serious program, etc, and joint working on programs of mutual interest. You can write to me at 22 Holmwood Grove, Mill Hill, London NW7 3DT, or phone me on 081-959-4779.

CHRIS - Help given on anything: No problem too small; also PD documents printed out, just send disc with DOC files on & I'll send DOCs back printed out (3p per page both sides) with your disc and a bill for postage. Okay! Write to: 6 Frank Street, Great Horton, Bradford BD7 3BT.

SEAN McMANUS - Help given on all aspects of BASIC & assembly language programming but don't forget the SAE!!! Get in touch at: 226 Chertsey Rise, Stevenage, Herts SG2 93Q.

ALAN SCULLY - Help offered on BASIC programming (fairly advanced), printers, all aspects of Public Domain, disc to disc copying and virtually everything else from hardware advice to finding a piece of software; I'm useless at CPM though! You can get in touch with me at: 119 Laurel Drive, East Kilbride, Glasgow G75 9JG.

SAM WRIGHT - I want to get in touch with anyone with ROM blowing or file copying experience. Write to: 24 Chester Avenue, Whitehead, Carrickfergus, Co Antrim BT38 9QQ.

ROGER MEDLEY - I would like to know if anyone has a spare manual for the Canon PW1156A printer, or can photocopy some info from it; I need to know if it is OK to use it with a CPC6128. Rev P R Medley, The Vicarage, Linkinhorne, Callington, Cornwall PL17 7LY.

As Issue Twelve is the last issue of Print-Out, we would very much like it if as many readers as possible put themselves onto the helpline (whether they want, or can offer, any specific help or not) so a 'network' of CPC users can be rapidly built up. So please fill in the form on the previous page and send it off to us.