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CPC

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AMSTRAD

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Gallup Software Chart



THIS MONTH	LAST MONTH	TITLE (Software House)	COMMENTS	PRICE
1	1	STEVE DAVIS SNOOKER Blue Ribbon	Re-released at the time of the snooker championships, this is its second month at number one.	1.99
2	2	SUPER STUNTMAN Code Masters	Another non-releaser from July. This non-simulator title will not be everyone's favourite.	1.99
3	•	ACE Casanova	Released in 1986, this places you in a fighter plane. Fly over land and sea, refuel and survive.	2.99
4	4	FRUIT MACHINE SIMULATOR Code Masters	For the gamblers among you, this is your chance to play without the risk of losing any real money.	1.99
5	•	YOGI BEAR Alternative	If you feel the need to travel to Yellowstone Park, you can in the company of Boo Boo and Yogi.	1.99
6	14	SHANGHAI KARATE Players	Smacks of being a budget title, but still worth looking at. Not outstanding, but a nice game.	1.99
7	•	SOCCER BOSS Alternative	Though the season is over, this is your chance to take charge. Beware! for this Alternative game.	1.99
8	10	WE ARE THE CHAMPIONS Ocean	A compilation of some great games - Penelope, K'n, Rampage, Barbarian and Super Sprint.	9.99
9	2	GHOSTBUSTERS Mastertronic	Though an aside it is still as popular as ever. Not up to the standard of the film though.	1.99
10	9	NINJA SCOOTER SIMULATOR Firebird	Strange title from the budget British Telecom label - watch out for their new one, Popey Stick-Glympics.	1.99
11	8	TRAP DOOR Alternative	On compilation as well as single, this is an above-average spin-off from an excellent TV programme.	1.99
12	7	WAY OF THE EXPLODING FIST Mastertronic	Martial arts games never die, as this one shows. You pass your money and take your choice.	1.99
13	•	SIX PAK 3 Hit Pak	Dragon's Lair and its sequel Escape from Snake's Castle are two of the games to be found here.	9.99
14	13	OUT RUN US Gold	Long-awaited but a disappointment in nearly all aspects now that it's actually arrived.	9.99
15	•	ALIENS Mastertronic	At this time of year it is no surprise that re-released and compilations, dominate the chart.	1.99
16	6	POPEYE Alternative	Another conversion from TV cartoons. Strange to think that Popeye is heading for his pension.	1.99
17	•	SUPER ROBIN HOOD Code Masters	This one keeps popping back - don your Lincoln green, take your arrows and do good deeds.	1.99
18	17	SKATE ROCK Mastertronic	Mastertronic must like it, but not a very exciting game. Good price though.	1.99
19	15	GRAND PRIX SIMULATOR Code Masters	Still heading down, despite its long reign in the charts. Buy it if you haven't already.	1.99
20	•	METAL ARMY Players	Players is releasing nice and nice budget titles. Not an outstanding presence in the charts.	1.99

Amstrad heads for top

AMSTRAD is on the verge of making the big breakthrough into the number two spot in the UK games software market.

The leisure sector has historically been dominated by the "big two" - Spectrum and Commodore.

But Amstrad's share has been steadily growing to where it is now within four percentage points of Commodore's.

Figures supplied by Gallup show that Amstrad games currently account for about 18 per cent of the market, with Commodore games at 22 per cent.

Two years ago Amstrad held 11 per cent of the market compared to Commodore's 28 per cent.

Twelve months ago the figures were 15 per cent and 22 per cent, but since then Amstrad has made further

gains to halve the gap.

Briefly, a month ago, Amstrad was actually less than three percentage points away from Commodore.

But even if Amstrad takes over number two spot from Commodore, there will still

be a lot of ground to make up on Spectrum software.

Spectrum titles account for nearly half of all the games sold in the UK, and its share of the market has steadily risen from 26 to 46 per cent while Commodore's has declined.

Circuit breaker

THE hottest name in British motor racing will appear on the next simulation for the CPC from Code Masters 05020 0141331.

The company's sponsorship of Johnny Dumfries, winner of this year's Le Mans 24 hour race, is about to pay off.

According to Code Masters spokesman Bruce Everiss, a game based on the latest exploits of Dumfries

and his Jaguar teammates will be released this autumn.

"It will be a sports car racing simulation, but more than that I can't say at the moment", said Everiss.

"However, we're confident it will be as successful as our renowned Grand Prix game, endorsed by Johnny Dumfries, which has been in the charts for 52 successive weeks".

Barbarian fights back

THE Barbarian is coming back, but this time publisher Palace Software 181-278 02511 is taking no chances with its controversial packaging.

The original version was banned from the shelves at Boots because its sleeve illustration was considered too bold for young eyes.

As a result, there will be two different covers for Barbarian II which is due for release later this month.

One features the muscled remains of Mike van Wyk and his voluptuous partner Marie Whitaker, while the other - for Boots only - depicts them with the scantily clad Maria.

Palace managing director Pete Stone said: "Only Boots objected to the original Barbarian pack-



aging and we got round that by enlarging the picture so Maria wasn't in it any more.

"This time we are short-circuiting the problem by using two entirely different photos. But it's sad that CPC

users who buy their software at Boots won't have the bonus of the lovely Maria in full colour - she's really just the sort of girl you could take home to meet mother".



Mouse traps

THAT durable rodent Misley Mouse stars in the latest CPC release from Granit Graphics 001-258 2377.

The game is set in Disney Castle where four evil witches under the power of the Ogre King have stolen Merlin's wand in order to perform evil deeds.

Price 15.99 on tape, 174.99 on disc.

New lines

LEADING disc supplier Correc 10480 25200 has announced a number of major new product lines.

It follows a 15000-000 product-leading trip to the Far East by Correc managing director John Taylor during which he signed distribution agreements with manufacturers of computer accessories.

"This exclusive range of high quality products at budget prices enables us to provide a better service to our CPC-using customers", said Taylor.

The new items include larger disc storage boxes, copy holders, disc drive case files, monitor movers, printer stands and the new universal storage box range.

Diary date

THE great northern Amstrad showcase returns to Manchester in October.

Once again the award-winning G-Max exhibition centre is the location for what is the biggest computer specific show held outside London.

Dates to note in your diary are October 21 to 23.

10 LINERS

WIN up to £10!

Send YOUR 10 liners to:
Competing with the Amstrad CPC, Europe Books,
Abbington Park, Abbington, Woodchester SO 10 6NR

WE have an interesting collection of puzzles and arcade
games this month, plus a clever graphics demonstration.
Don't forget to send an SAE if you want your tape or disc
returned, and all submissions must be your own work.

Lucas' Problem By Henry Watten

THIS intriguing puzzle was devised around 100 years ago by the French mathematician Lucas. Originally it was played on a white board divided up into nine squares. The first four squares contain blue counters, the last four red ones. The centre square is left empty.

The aim is to swap the colours so that the blue counters end up on the right, and the red ones on the left.

You are only allowed to move one counter at a time, and it must be into the empty space. There are

only three rules to remember:

- Blue counters can only move right, while the red ones move left.
- If the square to the right of a blue counter, or left of a red counter is empty it can slide across.
- A counter can jump over one other counter, providing it's in the right direction.

To move a counter just press the number corresponding to its square. Should you get into a situation where progress is impossible, or you just wish to start again, press the 0 key.

1 2 3 4 5 6 7 8 9



```
10 000 1100 1,1000 1,10000010 010  
11100 1,1000  
10 110010 11,1100101100110 1000100  
1000 1000 010 10 10 1000 1000 010  
10 1000101 101,100010 10000001010  
10000 1,100010 101,100010 1000000  
1000001000 010 10 10000010100  
1000010  
10 00000 100001000 10000010101  
10001000010001010000101010  
1010 1000 1000 10 100 10000100  
1010 1000 1000 10 100 10 1000 010  
1010 1000 10 100 10 1000 010  
1010 1000 10 100 10 1000 010  
10 10 1000 10 1000 100 10 1000 10  
1000010 1000 010101101010000  
10 10 1000 10 1000 10 100 10 1000  
10 1000010 1000 01010110101010101  
1101010  
10 1000010 010 10 1000 010 10 1000
```

```
100001010010 100 1010  
10 1000 1000 1000 1000 10 100 10  
1000 10001010 10,100010001000  
1000  
10 100 100010 10,1000101000 1000  
100 10 10001010 100001000010  
10  
10 100 010 10 10001010 10000 1000  
100 100010 100 100 1  
100 100010 100,100010 10000100010  
100 1,100010
```

Line Input	Line Output
10 = 1110	10 = 1101
10 = 1010	10 = 1001
10 = 1000	10 = 1010
10 = 1100	10 = 1100
10 = 1010	10 = 1000

The Snake

By John Dawson



A CHANCE for all you game fans to get a little rest, and at the same time learn a clever programming technique called palette switching. This involves changing the colours of adjacent sections, and so giving the impression of smooth, flicker-free animation.

The program listed here shows a multi-coloured snake, winding its way around the screen and avoiding the randomly scattered blocks. The dirty part of the snake block's moves is its head, with the segments that make up the body changing colour, and the last piece being blanked out.



```
10 000,00000 100,0000 0,000 0,0,000  
1,0,00000 0,01100110000000000000  
10 00 10 10 0000011100000000000  
000 1,01010 000000000000000000  
1,0000 001,000000 10  
10 000 1111000000000000000000001111  
1100001000000000000 10000,10000  
100 00 10 1000010000100000000000  
10 00001 100 01000011000010000  
1000 100 01000011000010000100  
10 100 100,010000 100,0100000000  
10 000 100,010000 100,010000000000  
10 100 010 10 10000101 10000 1000  
100 10001 000 100 1  
100 10001 001,100010 10000000001  
100 1,100010
```

Line Input	Line Output
10 = 0010	10 = 1000
10 = 1000	10 = 1000
10 = 0001	10 = 1000
10 = 1000	10 = 1000
10 = 1000	10 = 1000

ES
WINNER

Box Clever

By Karen Johnson

GAMES which are simple in concept but have that certain addictive quality are usually set to become classics, and this one is no exception.

The screen will display a row of boxes numbered 1 to 9, with an extra box displayed under the first. In this will appear a randomly generated number in the range of 0 to 99.

You select one of the nine boxes in which to place it, and the process continues until each box contains a number. Sounds easy enough, but the difficulty is that you've got to place the numbers in ascending order, from left to right.

To help keep track of your progress a histogram will indicate how many you've managed to put in the correct order. If you manage all nine a bonus will be given, making 10 the highest possible score.

As no number is duplicated it is theoretically possible to score 10 every time... but can you do it?



```

10 SCREEN 0:CLS:PRINT "Box Clever":PRINT "Press any key to start":GOTO 100
100 FOR I=1 TO 9:PRINT "Box "I":NEXT I
101 RND=INT(RND*100)+1:PRINT "Number: ";RND
102 FOR I=1 TO 9:PRINT "Box "I":NEXT I
103 FOR I=1 TO 9:PRINT "Box "I":NEXT I
104 FOR I=1 TO 9:PRINT "Box "I":NEXT I
105 FOR I=1 TO 9:PRINT "Box "I":NEXT I
106 FOR I=1 TO 9:PRINT "Box "I":NEXT I
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187 FOR I=1 TO 9:PRINT "Box "I":NEXT I
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200 FOR I=1 TO 9:PRINT "Box "I":NEXT I

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Low Score	Low Date
10 = 4580	08 = 10/08
20 = 6000	08 = 10/08
30 = 1000	08 = 10/08
40 = 1000	08 = 10/08
50 = 1000	08 = 10/08

£10
WINNER

Cecil the Centipede

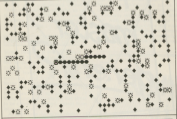
By Simon Matthews

A RECENT accident at Megacore's diamond mine has left the company with only one employee - Cecil. His job is to clear 150 diamonds from each mine, while trying to avoid the poisonous fungi. In fact, Cecil has already brushed against some fungus, and his body is now highly toxic.

Like all good centipedes, Cecil grows each time he collects a diamond until the maximum length of 20 segments is reached. Sadly,

Cecil's arithmetic isn't all that good, and he has no idea of how many diamonds have been picked up. All he knows is that he'll be stopped when 150 is reached, and sent into another mine.

Movement is controlled with the X, K, R and M keys, but be warned, once started Cecil won't stop unless he reaches the edge of the screen. Each mine contains 200 diamonds, which allows the more difficult ones to be left alone.



```

10 SCREEN 0:CLS:PRINT "Cecil the Centipede":PRINT "Press any key to start":GOTO 100
100 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
101 RND=INT(RND*100)+1:PRINT "Number: ";RND
102 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
103 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
104 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
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148 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
149 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
150 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I

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100 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
101 RND=INT(RND*100)+1:PRINT "Number: ";RND
102 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
103 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
104 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
105 FOR I=1 TO 150:PRINT "Diamond "I":NEXT I
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```

Low Score	Low Date
10 = 1000	08 = 10/08
20 = 2000	08 = 10/08
30 = 1000	08 = 10/08
40 = 1000	08 = 10/08
50 = 1000	08 = 10/08

ALMOST as soon as a computer reaches the market art/poster packages are available for it. These are usually either like *Painted's Art Studio* — a straightforward on-screen canvas — or follow the *TeX-Sign* approach to producing text-only output.

With *Screen Master*, KDS Electronics has attempted to combine the two approaches in one program. Unusually, it is disc-only, so owners of unexpanded CPC464s are not catered for. They may not be missing much.

Screen Master is described on the front of the tin and poorly produced manual as a poster and document creator, and inside as not being designed for one particular function. This is true, and I can't think of another program with the potential *Screen Master* has for producing lively and interesting poster-sized printouts.

Utilities are available which will dump pre-prepared screen files to the printer in large sizes — they're not too difficult to write in Basic — and the *Advanced Art Studio* type packages will produce the screens in the first place. Dumps from the latter tend to be on the small side, and so aren't really suitable for big eye-catching displays.

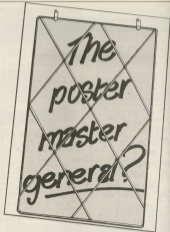
So how does *Screen Master* combine the two jobs? The process of producing your poster or document is simple enough. The screen comprises a work area across the bottom of which is a menu bar. Saying 2 pops up a menu box from which to choose the function you require.

Nutty numerics

You may enter text in a 25 character field, with no processing functions beyond the Delete key, draw feedback, draw a box (they mean a square), draw an oblong, and edit either the graphics fonts or the screen.

Entering text is easy, but very limited in application. For instance, there are two upper case alpha fonts, and one numeric. The latter is associated with alphabetical keys, so to type 1 you press A (usual for upper case) for 2 press B, 3 is C, and so on. This is incredible! There are 20 numeric keys on my CPC464, and not one of them is utilised for the numeric font. How silly can you get?

Likewise, the fonts do not produce lower case characters in the same style, but instead print in the standard *Arrested* typeface we all know and love. However, all is not lost, as there is a facility to re-define the characters, which is why *Edit Graphics* exists at



DAVE DORN draws some conclusions on a new display package

the bottom of the *Work* menu.

I don't understand why more fonts aren't supplied, nor why their organisation isn't simpler and more intuitive. *Screen Master* itself takes around the 14K mark, leaving plenty of room for fancy character sets.

On the plus side, the text can be made virtually any size by a system whereby you define the size of a box on the screen, and *Screen Master* expands or compresses the text to fit the defined size. Unfortunately no attempt is made to smooth slopes and curves, and the bigger the text, the chunkier it becomes. If you want smooth edges, you will have to tidy the screen up yourself!

Freshard drawing is done with graphics characters. You place the cursor where you want it, and scroll through the character set using 0 and 9. Pressing Control and one of the

cursor keys then prints the selected graphic in the desired direction. I can't help thinking that this is a wee bit agricultural, but it is nonetheless quite effective if you have edited the graphics characters into something useful.

Magnified view

Screen editing is a pixel-by-pixel affair, using function keys to move the cursor a character cell at a time. The arrow keys set inside the current cell, and the pixel under the cursor can be set or unset with the Control or Shift keys respectively. Thankfully, there is a magnified display of the current position, but it only shows one character cell, making editing across boundaries a bit awkward.

Other functions accessible from the various menus are fairly standard

block handling (rotate, flip, insert, copy, move, and so on) and screen printing mode (opaque, transparent, inverse) commands which mirror their counterparts in other art packages.

The filing command menu is comprehensive, allowing saving, loading, and merging of saved files, both Screen Master format and others, as well as saving and loading of user-defined graphics characters. There are also Erase File and Erase Backups options, as well as a Save Program for saving your customised version. That's very detailed and useful, so you should never need to use your master disc after first installing the program on a working disc.

Priorities

Screen Designer is straightforward in operation as long as you remember a few simple rules. Always place any pictures first, then text, insert foreground texturing, then background texturing, and finish off with any boxes and borders you wish to incorporate. That way, you won't suffer from text erasing any area of background or borders if it has either to be moved or re-sized. I speak from bitter experience.

At some time during the creation of your work you may wish to rotate a portion of the screen through 90 degrees. Indeed you can do it, but because of the way the screen pixels are organised in Mode 2, any text in the block which is small and narrow will be rendered illegible. The only way to avoid the problem is to make sure the text is fairly wide.

The texturing effects are something unique in my experience. Both background (paper) and foreground (ink) textures are applied in the same manner. After selecting either foreground or background, you are prompted to open a window on the part of the screen to which the texture is to be applied.

After that you choose the texture pattern, and it is done, washing only the ink in foreground mode, and only the paper in background mode. I was quite impressed with this, having had textured fills run amok in various art packages. Screen Master handles this admirably. It is very easy to go overboard, so exercise restraint and remember that there is no undo function — in my opinion a serious omission.

And so to the printout. Having fir-

ished your design and saved the screen to disc, saying it takes you into the printer menu. Now, it seems reasonable to assume that it would be possible to dump to a standard A4-sized sheet, and in portrait mode. In other words like a book with the top and bottom of the document on the short sides of the paper.

The default mode is landscape — down the page — and the unfortunate fact is that, should you wish to print on just one sheet of A4 paper, you will have to print this way, not across. So unless you judge things very finely, particularly with regard to the problem with rotating text, you're not going to be able to produce that super-deuper cover for the club newsletter.

Selecting the set-up printer option, four choices have to be made: Across'

the screen, right diagonals and all.

EDS has got the right idea, and has very neatly managed to implement a good package. There is some potential in the concept, but there's very serious omissions and design faults in Screen Master alone. In my opinion it does not have the look or feel of something for which the asking price is nearly £30 — under half that would be nearer the mark. It is quite good for larger posters, although the screen design section is not what it could be.

Preparing a screen with one of the more powerful art packages certainly overcomes that drawback, but rather defeats the object of the program. Likewise, for posters composed mostly of alphanumeric, you would get more pleasing output with a Teletype/Signwriter type program.



The main editing screen showing the magnify option

down, height 63, x2, w8, w8, strips (how many sheets side by side), and either 6 or 7 bit per.

Juggling with the height and strip options can give rise to some interesting and weird effects. However, once you have hit on the right combination the results are reasonable for the larger sizes — which are read from a distance — but a little coarse for smaller sizes.

The overall look is very much computer-produced, being more or less a straight blow-up of the pixels on

Product: Screen Master
Price: £29.95
Supplier: EDS Electronics, 18 Park Street, Abingdon, Oxford OX10 0BS
Tel: 0493 3078

ADVANTAGE

- Unique, as far as I know.
- Easy to use.

DISADVANTAGE

- Scruffy manual.
- Some glaring omissions and limitations.
- Expensive.

PEP

PERSONAL EXCELLENCE PACKAGE

By Alan Szymanski, Ph.D. (LANSYST)

For Color Book

FOR INFO AND ORDERING INFORMATION
CONTACT THE AUTHOR
ALAN SZYMANSKI, Ph.D.
LANSYST
10000 W. 10th Ave.
Denver, CO 80231

LANSYST

groups: Intelligence IQ), personality, performance, and mental exercises.

The IQ tests come at the top of the menu, presumably because they are the major component of the package, and even though they are not a good place to start, I shall take them as my kick-off point.

To assess your IQ you have to take four tests, each presenting the same mix of logical, verbal, numerical and visual-spatial questions. There are 30 questions in each test, including both easy and tricky ones.

In the verbal category an easy one would be of the type "Dog is to puppy

presented with an IQ score, and after you have taken all four tests in the series you are given an overall IQ rating plus an analysis of your scores in each category. This suggests what sorts of tests you would be good at, but I'm not sure I agree with the analysis in its own case or in general.

For instance if you do well on numerical questions you are supposedly good at numerical tests

100

Type in the odd number in the series:

1 1 3 2 1

Numerical IQ question

such as accountability and computer programming. I don't think that memory is necessary for programming - I'm a user not a programmer but did quite well on this group of questions, while my colleague, who is an expert programmer, did worse than me.

Persons revealed

The second option in PEP is the personality tests. Again these have been modified on traditional tests and so may feel familiar - though in Britain personality testing has never caught on in the same way as it has in, say, the USA.

There are two tests designed to assess your public and private personas. Each consists of 100 statements like "I hate giving something up as a bad job" and "My failures are mainly due to bad luck". You have to consider each statement and decide whether you strongly agree, agree, disagree or strongly disagree with each.

This may sound like a tedious chore but it isn't too bad as each option is highlighted in turn and you just have to press the spacebar to select your reply.

You may wonder what the package can tell on the basis of 100 ratings. In fact, it uses your replies to measure your score on a dozen aspects of personality - such as generosity and tolerance in the private persona test and aggression and ambition in the public persona test.

Finally, PEP supplies you with a chart depicting your scores, and a

Gala performance

ANNETTE HALL measures her personal excellence

ARE you an unrecognized genius? Are you a nice person to work with? What time of day are you at your best? Does a pint at lunch time slow you down? And do you really work better on endless cups of black coffee?

You may feel these are either impertinent questions or that you would need a whole army of professional advisers - educationalists, psychologists and doctors - to come up with the answers. Not so. There is now a do-it-yourself package that lets you do the testing, and reports all the revealing information directly and exclusively to you.

Lansyst's Personal Excellence Package - PEP for short - is written to run under CP/M 2.2, so it can be used by anybody with a disc drive. I must stress that PEP has been designed primarily for personal and recreational use. In reviewing it I was concerned mainly with the aspect of whether it was fun and interesting to use.

The advertising literature suggests you can also use it to measure your colleagues and prospective employees - I feel bound to query whether this would really be an appropriate use of the package.

PEP is a menu-driven program and the tests it comprises are in four

or out is to ..." and you choose the answer from one of five possibilities. Among the numerical questions an easy one would be "Give the next number in the series: 2 4 6 8 10 ...".

There are also questions about alphabetic series, and others in this section take the form "David is shorter than Cyril, Albert is taller than Bertie, Albert is shorter than David. Who is the shortest A B C or D?".

The final category of visual-spatial questions I found both difficult to do and impossible to describe. So that you can appreciate the difficulty, Figure 1 shows you an example from the test.

Even though I was taking the test entirely for fun, I found it still evoked the tension I associate with exams. You are instructed to make sure you will be free from disturbance for the time needed to take the test - 20 minutes - to dim the lights and equip yourself with pencil and paper for rough work.

Perhaps the feature that made the test so realistic was that a fixed time - approximately half a minute - is allowed for each question, and in those cases where I found the questions difficult I really did feel this as a pressure.

At the end of each test you are

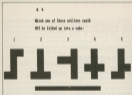


Figure 1: A typical video-spatial IQ question

written analysis. Also a 13th aspect is measured and delivered as a verdict – it sums up how satisfied you are with your personal relationships or how successful you are likely to be in life, according to which test you are completing.

You can also use this test to discover whether other people see you as you see yourself – by asking someone else to rate you on the same set of statements. Instead of seeing "I enjoy competitive games" they have to respond to "Kineste enjoys competitive games".

You have to be feeling confident before you put yourself through this hoop because you are bound to get some surprises from the results.

How to do your best

The set of three performance monitoring tests are fun, but beware taking the results too seriously. The circadian rhythm and adjustment effects tests both measure your reaction time using the CPC's questioner.

This is not nearly as sensitive as instruments designed specifically for reaction time testing, so cannot provide a very accurate result. You may think this would not matter as both tests are designed to indicate changes in performance under different circumstances.

What I found more annoying however was that the graph of the results of the circadian rhythm test – see Figure 2 – stopped at .06 seconds and I managed to get the reaction time down to .02 seconds.

The alcohol effects test is perhaps the most controversial in this section of the package. In it you use either the joystick or the cursor keys to move a

circle around the screen following as closely as possible the movements of a square. This task is very difficult with the arrow keys or your joystick and plug it in before you start.

The test is designed to indicate how your coordination is affected by the amount of alcohol you have consumed, and a link is made between the skills monitored and driving.

The test is, of course, a much simpler situation than driving and it would be misleading to put any faith in its results. I found my performance was still improving even when I had drunk four units of alcohol, yet I would never dream of taking my car out after only half that amount.

A warning about driving after drinking is included at the end of the test, but I still feel uneasy about this test being taken seriously.

The final section has tests for your memory, your typing skills and also contains the X-factor test. This is designed as a repeatable bean-thro-clock exercise which you can use to improve your ability to think quickly.

It contains numerical and logical questions which become more difficult the longer you stay in the game. I enjoyed doing the X-factor test and found it rewarding when my score improved.

Pep is a well-presented package. Some use is made of colour, but it works equally well on a mono monitor. The only sound is the old faithful chibi, and I found the occasional beep in the circadian rhythm test disturbing until I realised that it signalled an increase in the rate at which the screen display changed. The instructions omit this salient fact.

There is minimal documentation but this isn't a problem when you use the package as it contains all the instructions you need. However, I would

have liked more background information about how the tests originated and how they were validated.

The menu system makes the program easy to use, but I would have appreciated an option to allow a change of user without exiting and re-starting Pep.

This package does tell you things about yourself – and self-knowledge is no bad thing – but is limited in certain respects. For instance you can only complete the IQ tests once. At £24.95 it is possibly a little expensive for the CPC market. You can get books from your local library to rate your personality and IQ, though not substitute for the reaction tests.

However, there is perhaps a danger with a product of this type. Being well presented and seemingly authoritative it may be taken too seriously and used inappropriately.

Having explored all parts of the package I would take issue with the suggestion that any of it could be used in business for staff assessment.

In short, I can recommend Pep as being amusing and fun to use in the context of home and relaxation, but not as one to be taken seriously in the context of work and business.



Figure 2: Circadian rhythm chart

Product: Pep
Price: £24.95
Supplier: Amover Ltd, OmniaBox
Building, 47 North Road, London N7
9QP
Tel: 01-267 8222

POINTS FOR

- Good fun
- Will increase your self-knowledge

AND AGAINST

- A bit pricey
- Not to be taken too seriously

ExpertLink update

As part of an intensive effort to inform the Great British public, and the business community in particular, about the coming of the single European market in 1992, the Department of Trade and Industry has been making adverts with such worthies as Alan Sugar telling us what a good thing it all is. You can't really have missed them.

ExpertLink, the service mentioned in the last MicroLink Users Group newsletter, has responded quite admirably by forming the ExpertLink Expert's Club (EEC - oh, very good).

If you missed it, ExpertLink is a service for businesses which brings together interested MicroLink subscribers and a team of the University College of Swansea to discuss and solve business problems.

The EEC is a slightly more specialist subsection, and exists to disseminate information about the rapidly changing regulations and complexities that (until 1992) dog exporters.

There's an occasional

bulletin on the ExpertLink board, and Dr Jim Milnes - a member of the Applied Language Studies unit at the university who's co-ordinating the EEC - is building up a database of MicroLink subscribers who export, what they export and where they export it to.

Already there has been a cross-fertilisation of interests.

An exporter of electronic equipment to Malta and Portugal has registered, and a language expert company has identified Italian contacts for the equipment. Whether anything comes of this remains to be seen, but in business the first contact is often the most difficult to be made.

MUG wishes the EEC the best of luck. It's an imaginative use of electronic mail in the spirit of the ExpertLink bulletin board as a whole, and deserves to succeed.

Mortgage Desk

APOLYNES if this month's newsletter seems like a long list of MicroLink services, but this is an area where there has been a lot of activity recently. Mortgage Desk isn't something you're

likely to need more than once, but that once could be very important. Even by a mortgage broker, it pulls together the information from around 150 different lenders.

People who want a mortgage, or are thinking of remortgaging their house, or who are looking for money towards a company, or who need corresponding data, just have to fill in a form online and the matching of lenders is done automatically.

Of course, there's no guarantee that they can find you the best deal, but it's a very painless way of finding out

MUG power...

It took a while, but eventually we came up with it - the definitive list of computer workbooks on the Telecom Gold/Thalium system. It turns out that there are more than 100 computers in less than 100 countries, and each one of them can be sent messages from the MicroLink computer.

So what now? There's been some discussion on this on the MicroLink bulletin board, and there's a number of people who would like to

make international contact with other users. So, now we have the list, it's just a question of finding out who's on the other end and trying to set up an international list of would-be contacts.

Never a dull moment...

...on the bulletin board. Well, that's not true. In fact, sometimes the dull moments stretch into pretty tedious hours.

But nobody's scared to get on and complain, and the accusations that things have got boring usually result in a heated argument as to who it is that's the most boring and things get flowing again.

A few interesting observations get made. For example, why do so many TV companies join MicroLink? William Gallagher, active MicroLink user, has spotted a good number of TV and production companies.

Among such notables as Yorkshire, Granada and the BBC he has managed to pick out some exotics like TV Ontario.

Also in the media business, and even more exotic, is an Andean shortwave radio station called ECHO. For a service aimed at the British small business and computer user, MicroLink isn't doing too badly...

Finally, an extra service from MUG itself.

There's a small but growing collection of handbooks and software on hand at MUG HQ, some donated by manufacturers such as Galapagos and Database Publications, which are used if any MUGers have a problem they are not able to solve.

Together with the expertise of the MicroLink subscribers themselves, there are few communication problems that resist for long. So - just ask!

All the (computer) news that's fit to print

That used to be the watchword of the British Press. A service that will follow this sentiment, has been going for some time on MicroLink and has recently been greatly expanded, in Newsbytes.

Published as a Sunday afternoon, it brings together the week's events from three regions in the USA and four in the rest of the world, and it - like most other MicroLink services - is free to subscribers.

Newsbytes covers all the goings-on in the micro

world. And as it has details directly from editors in the USA, it often scoops the printed press by several days, as well as providing interesting snippets that news make it to the national computer press.

The UK section is written by MicroLink user and journalist Steve Gold (MAGBEE). He collects the international edition, and posts it up on the MicroLink system, and also acts as the channel to the International editor in America.

That's one of the more

interesting aspects of electronic news - within seconds of reading a story you can be sending a letter to the writer asking for more information or just making a comment.

This week - to what the appetite - there was in-depth coverage of the latest computers from IBM just three days after the launch. And there was a new review from a famous software company about the non-appearance of its product. It's not late, you see; they've just "extended the product appearance window".

The key to computer music

IAN WAUGH plays with an economical composing utility

THERE aren't all that many music utilities for the CPC, especially cheap ones, so it was a nice change to review a new budget priced entry into the market.

Mini-Music Creator from First Byte lets you produce three-part music using the Amstrad's sound chip. It can also be played from within your own Basic and machine code programs by an interrupt driven routine generated by the Creator.

The program can digitally sample and store sounds, and these too can be played from within your own programs.

The first thing you notice when you boot MMC is the awful noise accompanying the main screen. Impressive, yes, but obnoxious!

There are five options on the main menu - Composer (sic), Diskette, Demo, Empty Tummy, and Help. Empty Tummy is a game with Pac Man scenery in which you must guide Hungry Herbert the herpoid frog, it's not in my dictionary, either) around a maze gobbling up herbaceous (not herbaceous?) cookies.

It's a fair little game, seeing that it's free, and the sounds in it were developed, of course, with MMC.

The Demo option is supposed to produce a demo of the system, and Help is supposed to print a series of help pages on the screen or printer, but neither of these were available on the review copy. However, the main screen and Empty Tummy are good demos, and you don't really need a help screen, as the program is easy to use.

Let's start the Composer first. You are presented with a screen showing a double music stave, piano style. A status line running along the top of the display tells you which of the three sound channels you are currently working with, the tempo, the octave setting, the lowest permissible note duration - used to give finer control over the tempo, the current voice out of 16 available, whether repeat is on or off, and the page number.

The CPC's memory is divided into

80 pages, each sub-divided into 12-note slots - 960 slots in all. Each slot can hold one note for each of the three channels, giving a theoretical maximum of 960x3 or 2880 notes, although the manual says that in practice this is limited to 500 notes per channel.

Memory, therefore, is not assigned dynamically, and although this capacity should be enough for game themes, it will restrict your attempts at a magnum opus.

The notes for all three channels are shown simultaneously. This is a great idea but they are all the same colour and once entered you can't tell which notes belong to which channel until you try editing them. There is, however, an option which tells you how long the notes on each channel last for, so you can tell if they fit together correctly. There is a full range

of editing options, although from a musical point of view MMC has several limitations. For instance, you can't tie more than two notes together, and there is no provision for triplets. Although you can insert bar lines, there is no automatic bar checking function which would have been helpful.

Working on the note slot principle as it does, if you want your music to look right, you must space the notes out yourself. You can put a quarter and a eighth in the same note slot and they will play correctly, but it sure looks odd!

There is no provision for repeat bars, but the whole piece can be set to repeat indefinitely. You can only play the complete piece - you can't play only one channel or start playing half

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way through. The tempo values range from 1 to 100; the lower the value the faster the music. This is very logical from a programmer's point of view, but not from a musician's.

They're arbitrary values, not beats per minute, and the default is 24 which is so slow I can't imagine anyone using values of 25 to 100. Also, as slow tempos the notes aggregate quite noticeably.

You can transpose to any key signature but you can't change keys midway through a piece. Two Help screens are available, but the program is so easy to use you probably won't need them after a short familiarisation period.

The envelope designer displays the tone and amplitude envelopes graphically, although parameters must be altered numerically. Still, it lets you see what the sound looks like, which is good. Unfortunately you can't hear the sound until you go back to the music editor and assign it to a channel. This takes the edge off an otherwise very useful utility.

File handling is to be found under Xtra Options. Music and voice data

can be saved and loaded separately, and the whole lot saved to a file which will run from within your own programs. When loading files you must be careful to load the correct type, as MMBC will load an incorrect file and crash as a result.

The digitiser samples sounds from a cassette. No problem for CPC604 owners, but if you have a CPC604/602B, you'll need a tape input. This section can be controlled by a joystick or the cursor keys, and operation is by highlighting a series of menu choices.

It's very easy to use, but unfortunately you can't stop it recording until the buffer is full, and you can't terminate playback until a sample has played right through.

There are block functions such as copy, cut and paste, and you can reverse sections of sound - always good for a laugh. The sound quality is hardly state-of-the-art, but then look at the price!

Speech can be clearly heard, however, as the demo prove, if you have a Datronics speech synthesiser or one of the other synths, the perceived quality will be much better. Although Micro-Music Creator looks

much sophisticated, on a value for money basis I've really got to give it 10 out of 10. Musically, Painbird's Advanced Music System is undoubtedly superior - and more expensive - although it does not let you produce stand-alone music which is one of the main attractions of this program.

It will let you add simple music and sampled sound effects to your programs without too much trouble. And if that sounds like fun, go buy it.

Producer: Micro-Music Creator
Price: £3.95 (tape) / £14.95 (disk) (£24.95 total)
Supplier: First Byte Software, PO Box 26, Hoveil, Somerset BA20 1AS
Tel: 0826 887266

POINTS FOR

- Easy to use
- Stand alone music and speech
- Good fun
- Cheap!

AND AGAIN!

- Lacks sophistication
- Not enough room for longer compositions

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TO ORDER, PLEASE USE THE FORM ON PAGE 53

ACTION REPLAY

IAN SHARPE presents some impressive animated 3D graphics

If you saw *Jane's 16 Lines* page, you'll have seen a clever graphics routine by John Carpenter. It draws an almost-solid rippled surface, and as well as being remarkably short it operates quite quickly.

Great minds obviously think alike because it came into the office at the same time as a similar program submitted to *ST User*, our sister magazine edited by Roland Waddilove for Atari ST owners. The ST version, however, used a bit of machine code to produce an animated display, and just to prove the CPC has lots of life in

it yet I set out to produce an Amstrad version. Program 1 is the result.

It is based on John's routine with a few modifications. Instead of drawing a single picture, my version draws eight - one after another. Each is a slightly different shape and once drawn it is stored in a safe place in memory.

When the eight frames are complete - it takes just over an hour - they are saved to tape or disc so you don't have to sit through the drawing process every time you run the program. The saved frames amount to 32k of data, so I suggest tape users

insert a **SPEED WRITE 1** cartridge as line 5. There's a menu option to reload the frames when you next run the program.

When that's been done, select the **Animate** option. You will now see the eight frames played back in sequence to give a moving display. When the frames have been played, they are run backwards to give the impression of more frames than there actually are.

The effect is quite impressive, especially if you don't know how it's done. I found that playing only one sequence of frames can be too quickly, so first sequences are played simultaneously.

How it's done

The limit of eight frames is due to the amount of memory available. CPROMS and ram pack owners with some knowledge of machine code could write a version with two to three times this number.

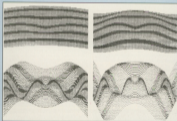
It's interesting to see how this complete picture is created by such a small program. The thing that caught my attention is that the display is drawn from the front towards the back, yet it manages to eliminate areas hidden by the foreground.

Each pixel in the drawing area is accessed by means of a nested loop. As you can see when the program runs, it works in columns and from bottom to top. The ripple effect is based on a sine wave related about an axis to give a surface. Perhaps the best way to explain it is like this: imagine you are looking the surface from the side but from directly above so that it looks like concentric circles.

As I said, each pixel is accessed in turn. For each one, the program uses Pythagoras's Theorem to calculate its distance from the centre of the ripple. If you're a bit rusty on maths, this is the one where you calculate the long side of a right-angled triangle by taking the square root of the sums of the squares of the other two sides.

Having obtained the distance from the centre, it is fed into the equation $y = \sin(\text{distance})$. y is the vertical height of the ripple coming out of the screen directly towards you. Now if you imagine the circles tilting away from you to form the actual screen display they become ovals.

This is achieved by multiplying the y value by a scale factor such as 0.8. To this new y value is added the vertical height just calculated. This final figure is the y ordinate plotted on the screen, a net having changed during the



Four frames of simultaneous animation

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Sine wave beads

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manipulation. But what about the hidden line removal?

Simplified: During the plot of each column of pixels the program keeps a record of the maximum screen height reached so far. If a new point dips below this value it is hidden and therefore not plotted.

As the picture is symmetrical only

the left hand side is calculated and the same values are used to form the right side.

The height (and distance between frames) depends on the number of the frame being plotted. The first one is virtually flat while the eighth is quite pronounced.

This method of hidden line removal has the disadvantage of eliminating low points which would be seen

below higher areas in the foreground.

If you are prepared to sacrifice some speed you could test the screen with the TEST command to see if it is not the background colour before deciding not to plot the point. By using Mode 0 instead of Mode 1 you could regain some of the time lost and make these low points a darker shade than higher areas.

Once I'd seen how impressive the results are I added another type based on Urtejo's figures to produce a smaking line of beads. I'm sure you can come up with ideas of your own to replace the existing routines. Don't try adding extra types without erasing the existing ones, because the program is rather a tight fit in memory.

If when debugging your typing and saving the program you get a Memory full error, type CLEAR, and try again.

```

10 DIM X(30),Y(255)
20 DIM S(8)
30 FOR J=0 TO 255:Y(J)=INT(RND*255):NEXT J
40 FOR I=0 TO 30:Y(I)=INT(RND*255):NEXT I
50 X(0)=0:X(1)=255:X(2)=510:X(3)=765
60 X(4)=1020:X(5)=1275:X(6)=1530:X(7)=1785
70 X(8)=2040:X(9)=2295:X(10)=2550
80 X(11)=2805:X(12)=3060:X(13)=3315
90 X(14)=3570:X(15)=3825:X(16)=4080
100 X(17)=4335:X(18)=4590:X(19)=4845
110 X(20)=5100:X(21)=5355:X(22)=5610
120 X(23)=5865:X(24)=6120:X(25)=6375
130 X(26)=6630:X(27)=6885:X(28)=7140
140 X(29)=7395:X(30)=7650
150 S(0)=0:S(1)=1:S(2)=2:S(3)=3
160 S(4)=4:S(5)=5:S(6)=6:S(7)=7:S(8)=8
170 S(9)=9:S(10)=10:S(11)=11:S(12)=12
180 S(13)=13:S(14)=14:S(15)=15:S(16)=16
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Personal Print	21.50	31.50	26.50	26.50	18.00	26.50
Personal Alarm/Personal Plus	19.95	29.95	24.95	24.95	16.00	24.95
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ARCADE FORCE FOUR

US Gold
£9.99 (tape)
£19.99 (disc)
Joystick or
keys

YET another compilation, this time containing four of US Gold's recent efforts. First off is *Roadrunner*.

There can't be many who don't remember the comic antics of Wile E. Coyote in those wonderfully brutal cartoons. Now you can take the part of our feathered hero trying to avoid the ingenious Wile E.

The obligatory pile of acid are there to be eaten, and leaving too much will result in a life being lost.

The road scrolls from the left as you move, with old time [..] in hot pursuit. Trucks, boulders, mines and chickens have to be bypassed, with bonus points being awarded if the coyote hits them.

The may seem to give you an advantage, but Wile E. has many devices to help catch his supper. Jet packs, rockets, skateboards and popo sticks are all used to maximum effect, as are sticks of dynamite.

Some used contains iron filings, which allow the coyote to slow you down with a magnet. On the other hand, pain will help by making you temporarily invisible. My main problem is that death comes too easily, fighting your way to level three, and losing all your lives in a really unnecessary maze isn't my idea of fun.

When you finally pick the dust you'll want back at level one, where there's a short cut which transports you to the highest level reached in the previous game. The graphics and sound are reasonable, but nothing to write home about, and I found *Roadrunner* to be the least enjoyable of the four.

Another piece of media-inspired software is *Indiana Jones and the Temple of Doom*, with you in the starring role. You start with a search of the Egyptian tombs. Parallel Palace where nine kidnapped children are locked up in cages.

Using the whip to stun the thugger guards and open the cage doors, you make your way around the tunnels and caves. You'll need to watch your step as the place teeters with guards, and slipping on the piles of loose rubble will send you to your death.

Falling off the ladders will

also lose a life, and the high priest - Mola Ram - takes great delight in blasting you with lightning.

Thinking about it, there's not much in the game that isn't fatal.

If you manage to spring the trap, you'll have to make your way to the mine entrance to play level two, the mine cart ride. Watching out for the giant thugger guard, bats, missing rails and traps will take most of your attention, leaving little time to enjoy the trip.

Once through you progress to

are lost too easily.

Next is *Manooshee* where you have to get from one end of a corridor to the other within a time limit. Many obstacles are placed in your path, including mine cars and fuzes. These should be jumped over, as landing into them will take up precious seconds.

Other cars are present, namely blue and green. The blue ones give a bonus between 100 and 1000 points, while the green ones double your speed.

Barbedwire adds new obstacles to be covered in one

last as long as possible. At certain points you will find exits to specified levels which allow you to jump ahead instead of playing the level one in its sequence.

There are four characters from which to choose, each with differing abilities. My favourite is Mole for the Wood, although he's not too good at hand-to-hand combat.

On each level are mines, fuzes, keys, magic potions, doors, transporters, generators and treasures. As their name suggests transporters take you from one place to another - possibly into danger.

Health is important, as it will help restore some of the health lost when fighting. You start with a health rating of 2000, and if it reaches zero you're dead.

I am disappointed by the compensation. It represents excellent value for money.

Phil Lawrence



Indiana Jones and the Temple of Doom



Geometer - the old favourite

the Temple of Doom level, where you try to reach the Barbara mine placed in front of the image of Ark, the goddess of death.

You'll then roll to the mine covers on level one, and continue until three stones have been found before escaping over the rope bridge.

The graphics and sound are rather uninspiring, with the main problem being that lives

are lost too easily. Many obstacles are placed in your path, including mine cars and fuzes. These should be avoided as they will reduce your speed.

This game is good fun with a certain addictive quality. The sound is clear, although a little repetitive, and the graphics and colour are very good.

Last on the menu is the best - *Geometer*, including the deeper dungeons. The idea is to progress through 100 levels and

Presentation 85%

Some instructions vague and incorrect.

Graphics 70%

On average rather blocky, but still colourful.

Sound 70%

Monotonous at times.

Playability 70%

A bit too difficult in places.

Addictiveness 75%

Couldn't keep away from *Geometer*.

Value 80%

Good value on tape.

Overall 72%

Some better than others - two good, one average, one indifferent.

PIRATES

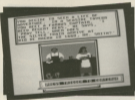
Microprose
£19.95
(CPG6128
disc only)
Joystick or
keys

SINCE the mainframe me-
 chanics, we're off to make
 our fortunes. In this arcade
 adventure you can follow in the
 footsteps of the infamous Henry
 Morgan.

You become a lieutenant,
 plundering ships and towns,
 meeting the governor's
 daughter, trading, getting
 drunk, in fact being a right little
 maniac on the 16th and 17th
 century ocean waves.

You start off as an apprentice,
 and work your way up. As the
 game you are asked several
 questions which decide what
 your role will be. All inputs are
 via menus, and you will find
 pictures popping up to illustrate
 what's going on. You have a
 choice of years to start a career,
 from 1660 to 1680 - the end of
 the pirates era.

Part of the game involves
 navigating the high seas. Here
 you are shown as a tobbly ship



sprite sailing around land,
 shoals and reefs.

If another ship is sighted you
 are offered the choice of
 fighting, running or talking. If
 you select fighting you have to
 intercept the enemy ship and
 fire musketeer and it is dis-
 abled or boarded.

On boarding a ship hand-to-
 hand combat is shown. As you
 fight, a status report shows the
 number of men left and their
 morale. If you capture the ship,

you can loot it and sell it.

When in port it pays to visit
 taverns where you can recruit
 sailors. Occasionally you will be
 offered part of a treasure map.
 Buy it and then set off to find
 the treasure.

If you feel nervous at the
 thought of a life at sea, you can
 put into port and attack towns
 or forts, and ambush silver
 trains.

When I first played Pirates I
 found it hard going. The amount

of information you need to
 absorb seems daunting. It was
 only after a while that I realised
 the best way to play it was by
 ear - jump in at the deep end and
 see to speak, and learn as you go.

All in all Pirates is a nice game
 but I think it could be improved.
 Why Microprose chose to make
 it incompatible with the CPC600
 and expansion isn't beyond
 me.

Dave Manning

Presentation 80%

Good, plenty of
 animations.

Graphics 58%

Unimpressive sprites, light
 sequence view and soft.

Playability 76%

Not difficult, and a bit
 repetitive.

Addictiveness 60%

Capturing the first few
 ships was fun, but it does
 tend to get boring in time.

Value 50%

A big game, but expensive.

Overall 60%

Worthwhile if you're into
 this sort of thing.

BLOOD BROTHERS

Gremlin
£9.99 (tape)
£14.99 (disc)
Joystick
and/or keys

FALL in the future the universe
 is a peaceful place except
 that is, for the Scorpions, a
 band of space convicts who
 loot, pillage and plunder their
 way round the cosmos.

Returning home after a test

flight on their Skywalk jetbikes,
 the Brothers Hawk and Gre find
 their family murdered and their
 home destroyed.

An evil survivor, the brother
 is sworn to avenge the deaths
 of their nearest and dearest. He
 begins a quest which takes
 them to Scorpio to confront the
 pirates on their home ground -
 and beneath it.

There are three separately
 loading modules which can be
 accessed from a menu. Even on

the tape version it is relatively
 quick and easy to flip between
 sections. Each module has the
 same sort of game but with a
 different layout.

At the start of play the brother
 is stand at a mine entrance.
 You have the choice of
 dropping into the mine for a
 spot of plundering, or taking off
 on a jetbike and playing a totally
 different scenario.

The idea is that you have to
 fly through a solid 3D maze to
 escape. As you weave in and out
 of gaps in walls and up towards
 the degree of realism is brilliant.
 It reminded me of blasting
 both a country lane on a bike -
 excellent, but I wonder if it will
 hold your attention for more
 than a week or two because
 once mastered it becomes fairly
 easy.

In this mine you get a side-on
 view of your man - or man in
 two-player mode - in a 3D
 maze. The passages are small,
 and there's plenty going on
 with mines all over the show.

Here you have to collect 12
 gems to complete the module,
 and there are energy, fuel and
 weapon levels to maintain by
 collecting the appropriate
 objects. I liked both scenarios in

Blood Brothers, particularly the
 flight simulator. However, the
 maze sections are more likely to
 hold long term appeal though
 they're not very original. To be
 fair to the flying section devel-
 oped in a later game as it has
 greater potential than was
 realised here.

Gary Sturges

Presentation 85%

The loading system is
 good, but I would have
 liked definable keys.

Graphics 88%

Always clear, colourful and
 smoothly animated.

Sound 75%

Not bad, but pretty
 standard stuff.

Addictiveness 80%

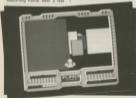
Good in the short term.

Value 80%

I would have been happier
 at a quid or two less.

Overall 82%

An enjoyable game with
 novel flight section, but
 maybe not one you'll be
 playing in three months.



METAPLEX

Prim Leisure £2.99 (tape) Joystick and keys

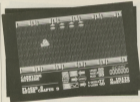
DEEP within the Metaplex fortress sits Gatt, the ruler of the empire. Drawing power from four hyper-generators, he is impervious to all forms of attack - except one. It is just possible for a lone trooper to penetrate the Meta-plex, destroy the generators, and put an end to Gatt's rule.

The fortress is constructed along the lines of a maze. It's not sure how far it extends, but at the moment I've only found two of the four generators.

You explore a labyrinth of levels, which is small, manoeuvrable and armed with laser cannons. Unfortunately it is far too susceptible to damage.

A couple of laser traps, or a collision with one of the walls along, and the on-screen console flashes the message *Get out of here!*

Resizing the display more closely you see a small notice, *See! Space craft - it! You then spend the next few minutes*



scouring rooms and corridors for abandoned jet-bikes.

Destruction of the generators using lasers or bombs would have been far too easy, so Prim dreamed up the idea of using acid.

Sometimes in the Metaplex an eight glass flask, full of acid, lies in the walking acid tank, and fill it up. Flying back to the generator, you can then drop the flask on

it. Repeat this operation four times, and you can take a shot at Gatt.

Various devices can be found around the maze, and if you have the patience to sit through the demo routine you will be shown a picture of each one.

The laser rifle points and shoots rapidly after and self-explanatory, but the sensor unit is tricky.

By sitting on this device and

pressing the fire button you can manipulate a group of nine symbols which can be used to open and close doors, or activate other machinery.

Prim has woven a few strands of originality into what were there and come up with an enjoyable game.

Steve Ross

Presentation 76%

Good screen design and a choice of controls.

Graphics 75%

Hardly breathtaking, but adequate.

Sound 72%

A background tune plus a few effects.

Playability 83%

I wish the controls would withstand a bit more punishment.

Addictiveness 81%

Tweaked of originality helped greatly.

Value 88%

Great value at £2.99.

Overall 82%

A first-rate budget offering.

SABOTAGE

Zeppelin Games £2.99 (tape) Joystick or keys

In Sabotage you are a mercenary hired to destroy innocent waves of alien spacecraft. After eliminating the aliens in a sector, you then face the sector guardian - the heavy squad. Having seen them

all off, your ship lands on the sector runway.

You must now look for a fifth column rebel who will give you part of a blueprint. There are eight levels and eight bits of blueprint to collect.

So that's the scene set. Sabotage is basically a vertically scrolling shoot-'em-up with a few trials thrown in for good measure. The graphics are rather good although your spaceship tends to blur into the background at times. The action

takes place in an area slightly smaller than the full screen, which makes the action seem that more frantic.

When you get spotted, it takes a while to die, and you have time to wipe out a few more badbies before you head for the big space station in the sky.

You can play but you take turns, so there's no room for competition.

Misses stay in fuel and full-on waves - and at times like these you could do with two thumbs on your trigger hand. Some fall vertically but the speedy ones swirl around in formations.

They don't fire at you, they just pipe bombs. You can pick up temporary forcefields as you go, and you'll need them.

The first time you land you won't have a clue where you are or what you're supposed to do. Basically you have to reind your way through a maze avoiding the nasties as you go. When you complete a level you get a password so you don't have to start from screen one each time.

Sabotage is not particularly easy, and you won't see your way through the first sector

before breakfast. I would have liked an easier first level to tempt me into the game, but don't hold that against it.

I suppose the design gets for marks for originality, but if you like a challenge and a goodish battle against those nasty aliens, take a look.

Sam Wright

Presentation 80%

No definable bits, but there's a peace facility and a high score table.

Graphics 82%

Good, but a little too heavy at times.

Sound 30%

No music but good cues.

Playability 80%

It's what your trigger finger's for.

Addictiveness 86%

If you like tap 'em-ups, you'll love this.

Value 76%

A cut above the average budget game.

Overall 85%

No Mission Generator, but a worthy effort.



THE RACE AGAINST TIME

Codemasters Plus

£4.99 (tape)

Joystick or keys

JUST in case you've been hibernating in some Outer Mongolian mountain cave, this is the year of Sport Aid, the aim of which is to raise money for children in need throughout the world.

The Race Against Time is the Darling brothers' contribution to this worthy cause, with the profits being donated to Sport Aid 88.

The game recalls the run by the Dutchess prince Orsis Khatta, who in 1886 lit a torch at an African relief camp and took it all the way to the United Nations in New York.

This year the run is to be

around which can be collected to boost your stamina.

Just to make life a little less easy, you must avoid water because it drowns your torch and extinguishes your one life.

Objects such as a sawmill, umbrella or raincoat can come in quite handy. Unfortunately, you can only carry one at a time which means that until you know the solution to a particular problem you will find yourself doing a little back tracking.

Race Against Time is by no means a classic, but is entertaining enough. However, should you want to participate more actively, there is a global 11km fun run scheduled for June on Sunday, September 11. But what better training than playing the game?

Tony Flanagan

LASER TAG



Go/US Gold

£9.99 (tape)

£14.99 (disc)

Joystick or keys

THE year is 3015 and yet another totally unoriginal game scenario is about to be explained. Forget violence, that's a thing of the past instead, there's laser tag in which your reflexes are tested to the full, but you don't get hurt.

You are a cadet at the laser tag training school where you progress through the ranks by proving your prowess in successive arenas.

The screen events downwards displaying a futuristic complex. The graphics are both colourful and nicely detailed, though unfortunately they are some colour clashes when the background is blue.

As well as abstract geometrical shapes such as squares and spinning spheres, there are more realistic objects. Particularly well executed are the cars which arrive on the scene enclosing lumber jiggers for combat.

Each level has two parts - shoot out and target. In the first you must avoid your fellow jiggers - if which there are many - as contact with them can cause the loss of one of your six lives.

Fortunately, your laser fire is harmless and can be used to greater effect by bouncing it off the various objects. Having a spinning sphere, for example, can increase your fire power fourfold.

Should you complete the shoot-out successfully, it's time to test your target accuracy. Here you meet a similar screen

as before, but this time the more accurate your shooting the greater your bonus points. These are calculated at the end of each level by multiplying the number of hits by your accuracy. More bonus points are awarded for completing within the time limit.

Mostly, this game is excellent with an impressive range of sound effects coupled with really snazzy title music.

The main problem with Laser Tag, however, is that the gameplay lacks variety. Though the program has successive levels and difficulty and progressively more demanding, the game can get a little too repetitive.

It is simply a fast and enjoyable shoot-'em-up you're looking for, this is an entertaining as usual, but don't expect anything more.

Tony Flanagan

Presentation 72%

Two player option, but weak and confusing scenario. Defeatable toys.

Graphics 87%

The fact that you are the same colour as your enemy is a serious flaw.

Sound 96%

Great title music, great range of effects.

Playability 86%

Just about the right level of difficulty.

Addictiveness 81%

A real gem after a while, but a little monotonous in the long run.

Value 89%

Over priced, but aren't most games?

Overall 84%

Addictive, but lacks variety.

CRASH

PAUSE



repeated, and you can join in countries of Code Masters and your CPC.

As Orsis Khatta you carry the torch across six continents. In each you must raise the Sport Aid flag and light the everlasting flame. You start at the (E) Mongolian relief camp in the Sudan and you must first find the flag and light the flame, picking up useful objects on the way.

After that you have to find the airport, whereupon the screen displays a world map. By moving an aeroplane across it you are transported to the continent of your choice where you again light the torch and raise the flag.

The screen flips through 100 locations, with movement left or right. Among these is a host of recognizable landmarks including the Eiffel Tower and Buckingham Palace.

Time is limited, though there are four glasses scattered

Presentation 82%

This pleasant game only. Not long.

Graphics 79%

Fairish landmarks, colourfully presented.

Sound 74%

Good title music. More sound effects would have been better.

Playability 82%

Easy to play and quite enjoyable.

Addictiveness 77%

The puzzles keep the game interesting.

Value 76%

Maybe over priced, but it's far a good cause.

Overall 74%

The graphics look neat, but it isn't necessarily entertaining.

EDDIE EDWARDS SUPER SKI



**Microids/
Loriclets**
£9.95 (tape)
£14.95 (disc)
**Joystick or
Keys**

SPORTS simulations are everywhere, and winter sports seem more so than most. In the Eddie "Eagle" Edwards-emulated Super Ski up to nine

players can compete, and there are four events - slalom, giant slalom, downhill race and ski jump. You can practise any one of these or go in for the competition, which takes you through five rounds of each event in turn.

The slalom and race take place on similar courses - they're all downhill and difficult - although you can choose between these layouts.

The screen shows Eddie's back as you manoeuvre him

down the course, and the game feels and handles rather like a racing simulation.

Four speeds are available - fast, faster, fastest still, and ultimate. Pressing F10 makes the skier kick his heels for a tighter turn.

You can either try to negotiate the gates or go full feather down the slope passing through as many as you can on the way - you'll never do both.

The action doesn't cover the whole of the screen, but it's not remote, so it is in some other games. Cameras at the bottom show your line and how many gates you've missed.

Graphically Super Ski is superb, with smooth scrolling and fast action. I just love the way the skier stuffs the snow as he turns, and when the skier leaves the ground they cast a shadow.

I particularly liked the ski jump, but you have less control over the action here than in the race events. Each player's turn at each event is limited from this, and if the tape version is available, be prepared for long waits and music's missing.

Super Ski is an excellent simulation. My main criticism is

that the final three events are all 2-D only graphics. Perhaps they could have added a ski jump style camera or levels of difficulty or a course designer. And what about the speed skill?

But I still like it!

Ken Waugh

Presentation 76%

No definable keys.

Graphics 95%

3-D in Manual Turbo!

Sound 90%

Buzzing wind and scuffing shoes, but also no music.

Playability 92%

Very playable and great fun.

Addictiveness 72%

You'll want to play and play, but it may lack staying power.

Value 80%

A well-constructed game, but it'd like a few more falls at the price.

Overall 82%

A challenging simulation and fun, too!

ASTROBALL

Power House
£1.99 (tape)
**Joystick or
Keys**

YOU are the Astroball, and your people are in danger from dark forces who dwell beyond the evil forest. You must journey through the forest braving the dangers that lie within, and collect the magical items which have been hidden by the malevolent powers.

Just who you must collect them and exactly how these magical objects are going to keep your people safe is not explained.

What this means is game levels is that you control a bouncing ball and steer it through a series of pre-constructed mazes to collect the goodies. There are four objects per screen to collect, and 10 screens to get through.

You only get one life per game, and you lose energy every time you fall or obstacle - the walls of the maze, monsters - anything, in fact. The ball is in a continual state of bounce, so it hits obstacles all the time and

so you are always losing energy.

You are also working against a time limit of 25 seconds, so whichever way you look at it a screen doesn't last very long.

There's a subtle knack in manoeuvring the little critter, and when you begin you may think you're banging your head against a brick wall.

Only two controls are available - up and down - and you get four choices of control keys including joystick. The Control

key, says the instructions, will freeze the clock - but it doesn't fry Escaped. You can, however, freeze the machinery, which is essential at times in order to squeeze through narrow gaps.

High score table? Forget it. Score? Forget that too. You judge your progress, I guess, by how many levels you've passed through. Every time you begin play you start at screen one, but you can stick to play subse-

quent games from the highest screen you reached last time.

I'm sure the designer/programmer loves it but I'm afraid I could find little of interest here. With so many good budget games around, it beats me how this one escaped.

I suppose if it wasn't for the staff, we'd not recognise the wheel, would we?

Ken Waugh



Presentation 80%

Choose your keys, do high score table, no score!

Graphics 55%

Clay.

Sound 20%

Monotonous in the extreme.

Playability 25%

Frustrating.

Addictiveness 20%

For really pleasant bouncing ball treats only.

Value 20%

Only if you mean the second thoughts, don't!

Overall 30%

I'm feeling generous.

6 PACK VOLUME 3

Elite
£9.99 (tape)
£14.99 (disc)
Joystick and
Keys

THIS must be good money to be made from compilations, because Elite has just released volume three of its 6 Pack series.

BRM is at the ready, it's time to begin your new job as the local **Paperboy**. The game is a diagonally-scrolling extravaganza which employs highly detailed and brightly coloured characters, but no sound whatever.

Repeating like the clappers you always find atop post staircases, road works, pedestrians, and Sinclair OS, I can't remember my paper round being this fun reading!

Bonus points are awarded for throwing papers at doors, smashing windows, and the successful completion of a BRM obstacle course.

Loading the next offering, you make the transition from BRM to dirt like as you cling desperately to the handlebars of your **Enduro Race**.

This Speedy Competition makes a very reasonable attempt at simulating the vibrations of an enduro racing circuit.

It also includes numerous suspension-crunching camps at which my rider falls about like a rag doll in a breeze, while the opposition leaps over with consummate ease.

Completion of the first section within the time limit gives you the opportunity of taking to the desert sands. A God cloud envelops your rear wheel as you scream down the starting straight. The title is far more difficult to control than before (indeed, Bruce provides a refreshing alternative to the usual road racing simulations).

As is the tradition with compilations, there is a buffer to make up the numbers, in this case **Gladius 'n' Goblins**. On his quest to rescue a fair princess, the knight is slaying armour mass combats, triffids, loopy graphics and a horrific sound track.

Despite the fact that the intended knight school, the hero of the piece insists upon throwing his sword at the advancing ghouls.

The backgrounds can most charitably be described as adequate, but the combats suffer from a severe case of the Blot-

ter when walking is pain.

Gladius 'n' Goblins looks very dated compared with the other programs in this otherwise first rate compilation.

In the fourth game we find James Bond in **The Living Daylights**. With a little help from you, Timothy Dalton fights his way through eight action sequences, each inspired by a different scene from the film.

Starting in Gibraltar, Bond comes under heavy fire from a platoon of SAS soldiers.

As he races from left to right across a series of adjoining screens you must spot and shoot the one SAS agent hiding among the troops.

Big hits, and you progress is some two feet, and you'll be doing colander impressions.

The combination of quality graphics and good sound is maintained throughout the remaining seven sections, making for a game which is far



Escape from Singer's Castle

superior to *A View to Kill*, its closest predecessor.

When I first hit the controls, **Dragon's Lair** was practically a spectator sport - you were lucky to see the machine, let alone play on it.

Not surprisingly, when the game was converted for the CPC the video disc graphics weren't implemented, and the characters were somewhat reduced in size.

Also a multitext system is used to provide a reasonable number of sections without compromising on the graphics too much.

Dirk's quest for Singer the dragon and the captive princess begins in a room full of baby dragons, each patrolling the top of a tower.

Creeping and stabbing, Dirk finds his way to the far side, and on to section two. This

involves a large wooden disc suspended in mid air on to which Dirk leaps from the overhanging above, promptly falling off (great game).

Despite my lack of progress I was impressed with the originality of the sections I saw.

Escape from Singer's Castle is the challenging sequel to **Dragon's Lair**. Having defeated Singer and rescued the princess, Dirk returns to the castle with the intention of plundering the wizard king's domain.

The initial section requires a good memory and some nimble footwork. Dirk wants at the entrance to an empty room, and for a few seconds a pattern of tiles is displayed on the floor.

Several of the tiles are coloured white. Remember their position. The pattern now changes, but you must make your way to the location of the

first white tile, which is now no longer white. The objective is to reach the exit by stepping only on white tiles.

The next part - **Ye Oldie Boulder** - features Dirk shooting the rapids on a barrel. The safe route between the boulders is indicated by arrows which flash momentarily over the gap you should be heading for.

With the exception of one game, 6 Pack volume 3 is a first rate collection of cracking arcade games.

Jon Revis

Presentation N/A

The lack of instructions with my pre-production copy hindered progress on a couple of games.

Graphics 80%

A high standard of graphics was maintained throughout the compilation.

Sound 67%

Paperboy dragged this figure down.

Playability 86%

I was most impressed with the Dirk Getting Double-bit.

Addictiveness 85%

Enough excitement to keep you hooked for weeks.

Value 87%

A bargain at any price.

Overall 86%

Well done Elite. What about volume 4?

KARNOV

**Mediagenic/
Data East**
**£9.99 (tape)
£14.99 (disc)**
**Joystick
and/or keys**

In Karnov you are a great big hairy bestriding Russian strongman who after a life in a travelling circus, decided to retire to the quiet village of Ozerina in the Steppes.

Little did you know that hidden among the nearby cluster of ramshackle buildings is the lost treasure of Babylon.

Legend has it that a great evil will befall the world if the treasure gets into the wrong hands, so naturally this is exactly what happens.

After a search lasting thousands of years the bad wizard Ryu has located and made off with the loot. Now his evil minions are terrorising the countryside, and it's down to the local Over-the-Club - of which you are sole member - to save the world.

The story begins just outside town as a lightning bolt strikes a wall. You materialise at the point of impact, and two lethal eagles flap towards you.

Crashing to the ground is a big mistake, as a gang of goatebeard materialisers and closes in for a dice. On to the number two, and shout the eagles along with the guard standing beyond them.

Advancing, you can pick up two looms; you now have the ability to put up a ladder to reach inaccessible places, or blow up an enemy. Take a tip from me and erect the ladder immediately after killing the eagle in the top.

Climb up, and off the top of the screen are more looms. These, along with others you can collect, confer facilities such as boomslangs, extra firepower, extra jump power, wings and so on.

You can get the ladder back by standing at the bottom and pulling down on the joystick, and it's worth climbing it whenever you come to a quiet bit to see what goodies are lying out of sight.

Most of level one takes place in the village. As you battle your way through, Ryu's followers are on the offensive. Disturb-recurring skeletons, devils, and an assortment of demons inhabit the high street. At the end is a guardian thumping with a

riffy line in deadly barrels, and it's a shame to get past until you find the technique.

Level two (out of nine) loads regularly and takes place in some ruins. Many of the hazards here are different to those in the previous stage. Initially you are confronted with columns on top of which are stone heads. Blasting the columns slowly brings the heads down to ground level, and all the time they are firing at you.

Once past them, you are into the ruins themselves, and here's a helpful hint. When you come to a head set in a wall, keep hitting the space bar as a time until they are blown out. Every hit cracks a stone rear, and these turn into 8 blocks



which can be collected. Amass 50 such blocks, and you get an extra life.

It was only after a few days play I noticed that if you put a ladder up at the entrance to the underground section of the ruins you can climb on top and take a different route through - and I thought level two was good before I discovered the extra bits!

The third stage is the mountains, again with many different ways of dying. The random shoot comes when you are walking past seemingly identical rock formations and



and springs into life as some sort of killer effigy.

Again there comes a point where you can deviate from the obvious route and climb down into some caves.

At the end is a red dinosaur which needs a good dose of fire drops to destroy.

Level four starts off with a cave full of volcanoes which are difficult to get past, but once through you're into another underground section. Level five is different again with swimming being the order of the day. And that's as far as I've got.

Verdict is a great point for Karnov - there is plenty of it, and you never know what's coming next. Overall though, I was a bit disappointed with two aspects of the game.

From the playability and

unimpressive angle it is superb, and fully deserving of an Accolade. What lets it down is the sound, which is very subtle, and the graphics.

The vertical and horizontal scrolling is well enough done, but the Spectrum screen shots on the packaging look very similar to the Amstrad version. If I wanted an inferior Speccy display, I'd buy one.

I let the Spectrum graphics eggs run through a computer willy and barked up a bit, which is pretty handy on a full-price title, particularly one which is so good otherwise.

Tiffany Wood



Presentation 45%

No definable keys or high score tables.

Graphics 50%

The scrolling is good, but it's all in all double Mode 1.

Sound 30%

Yes, but only just.

Playability 92%

Few complaints here.

Addictiveness 92%

You will not rest until you've reached it.

Value 75%

I expect decent sound and graphics at this price.

Overall 91%

The playability more than makes up for the pretty graphics and lack of options.

OFTEN you find that games are joystick only, or that they work with the keyboard but the keys are badly placed. So how about building a button box which plugs into the joystick port and is tailor made to feel comfortable?

Other advantages of doing it yourself are that the box can be switched to act as either joystick 1 or 2, and that you can have up to three independent fire buttons - very useful with programs which allow user-definable keys.

This project is quite simple as few parts are involved. The components required and sources of supply are detailed in the parts list panel, and the total cost is about £4. As for tools, you will need a soldering iron of 15 to 18 Watts with a small - about 2.5mm - tip, solder, a screwdriver, a drill, and some pliers. A small vice is handy, but not essential.

A point to consider when selecting switches is whether or not you are heavy handed. If you are, choose a good sturdy switch like a push button. If, on the other hand, you have a light touch, click-action switches might suit you.

You may want to go for proper keyboard type keys, which are more

expensive (about £1 each) but are reliable and have a better feel.

Another point is the size of box you are going to use - the wider it is the better, though you may end up with something a bit too big to be hand held.

Construction

First you must decide where on the box to fit the switches. Take some chalk or flour on the fingers you are going to use for the direction keys and fire buttons. Turn the box upside down so that the screws are facing the floor, and press your fingers on to the case in the position you like best.

Now select a drill bit, the size of which will depend on the type of switch. The ones I used are fixed to the surface of the box, and only the terminals poke through to the inside. Therefore I used a fine bit.

Other types of switch are held in place with a nut, and the main body sits inside the box. Here you would need quite a wide bit, and you will have to adapt the instructions detailed here about feeding wires through the casing.

Make sure everything is correct

before drilling because if you get it wrong, even if you can rectify the damage it will look unsightly. Drill holes for all the switches, including the toggle switch which selects between joystick 1 and 2.

After drilling make sure that the switches fit properly. Finally drill a hole for the ribbon cable in the side of the box facing the computer.

On each of the switches solder two single strand wires - one on each leg - using two colours. Make them about 2 to 3in long, and trim them to size later. Preferably use black for negative and red for positive to avoid confusion.

Put the switches in the holes so that the wires you have soldered are poking through on the inside.

If your switches have nuts, screw them in. If not, roughen and clean the surface of the box and underneath the switches, then use a drop of Super Glue to hold them down.

As for the toggle switch, the two wires should be on the left and right, leaving the middle terminal leg for the moment. Insert the switch in the hole, and fit it in place. Now solder the black wires on the switches that are far up, down, left, right and fire

Box of tricks

JASON BROOKS' easy construction project could be a joy to use





Figure 4. Linking the common connections on the key switches.

From Page 25

together as shown in Figure 4.

Next bare (both ends of) the wires on the ribbon cable. Strip about 3/8" of insulation from each one (except for black, which is not used) and twist each bare end.

Now turn the female D-type connector so that the terminals are facing you, and the row with the most terminals is uppermost.

The next bit is easier if you put the connector in a vice, but if you don't have one a pair of pliers can be used to stop the plug moving during soldering. Most connectors have numbers next to the terminals, but if yours hasn't, see Figure 5.

Solder the ribbon on to the connector in this order:

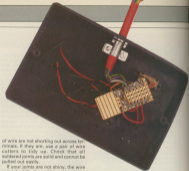
Pin	Colour	Function
1	Brown	Up
6	Red	Fire 2
2	Orange	Down
7	Yellow	Fire 1
3	Green	Left
8	Blue	Joystick 1 Common
4	Violet	Right
9	Grey	Joystick 2 Common
5	White	Space - can be used as Fire 3.



Figure 5. Connections looking from behind the D-connector.

Soldering to this type of connector without bridging to other terminals is quite fiddly. Try the wires - dab a little solder on the end - and put the wire into the terminal. All you have to do then is heat the joint with little or no extra solder required.

After soldering, check that strands



of wire are not shorting out across terminals. If they are, use a pair of wire cutters to tidy up. Check that all soldered joints are solid and cannot be pulled out easily.

If your joints are not shiny, the wire moved while the solder was setting. The cure is to reheat the solder to remake the joint. If the solder is blobby, you used too much, and you should remove the excess.

After you have checked the connections, it would be a good idea to put some masking tape around the ribbon cable where the cover will be so that it clamps better. Alternatively you could use heat-shrinkable sleeving. Now assemble the plug's cover.

Now that we have made the D-plug, we will make the connections to the button box. Before we do, however, two more things are required.

First we have to make sure that the cable will be secure where it leads into the box. Do this by putting some heat-shrinkable tubing round the ribbon.

After pushing the cable through the hole I stamped the section of sleeving inside the box so it can't be pulled out. Another method is to put a grommet in the casing and to tie a knot in the cable on the inside of the box.

When you've done that, it is best to group the wires together. If you have an odd scrap of veroboard, use that. If not, you could use a terminal block which can be bought at an electrical shop for about 25p a strip. Screw or solder the wires in a logical order, and then solder them to the switches as follows.

Brown: Up
Orange: Down
Green: Left
Violet: Right
Red: Fire 1
Yellow: Fire 2
Blue: Left connection of toggle switch
Grey: Right connection of toggle switch

This and the veroboard/terminal

block connection is shown in Figure 6.

Solder the black wire from all the other black wires on the switches to the centre connection of the toggle switch. Now check all connections, and once you are sure they are correct, switch your computer off and plug in your box. Switch the computer back on.

If characters are appearing on the screen as soon as you power up, or if some of the controls don't do what they're supposed to, switch off, unplug the button box, and check all connections and that no wires are crossed.

If when you start typing at the keyboard two characters appear when you've pressed one key, check the common connections on the toggle switch.

To make sure everything is as it should be, type in and run the following program:

```

10 GOTO 1
20 PRINT "123456789"
30 GOTO 20

```

While this program is running two columns of numbers will appear. Press each of the button box keys in turn, and check that the numbers generated are as follows: Left 4; Right 8; Up 1; Down 2; Fire 1, 32; Fire 2, 16; Fire 3, 64.

Only one column will change at a time. If both display the same numbers, check the common connections on the toggle switch. If this is OK, flip the toggle switch and repeat.

If none or only one of the selectors appears to work, check the common connections on the toggle switch.

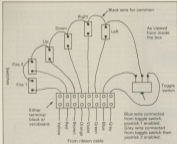


Figure 16: The full ribbon box wiring

PARTS LIST

- One 8-pin female D-type connector CODE 15-6159 **
- One 8-pin D-type cover CODE 15-0230 *
- Four self-adhesive rubber feet 20mm x 20mm CODE 33-0116 **
- One box to put the switches on, I select size to suit you, but I used 115x65x37mm CODE 681 083 ****
- Six push-to-make switches, CODE KHC 10967 ***
- One 1 metre length of 16 strand colour coded ribbon cable, CODE 384 362 ****
- One slider or toggle switch

SUPPLIERS

* Rapid Electronics, 461 Fern Industrial Estate, Buxton.

** Dink Holdings PLC, Park Lane Stockpans, Wals DN13 2ND.

*** T K Electronics, 13 Boston Road, London W7 3SU.

The truth about TELEX

How much does it cost to go on Telex?

You could go the conventional way and buy a dedicated Telex machine. The cheapest will cost you £1,200 (inc VAT), the decent (2402 like Chevron). You will also need a separate telephone line, costing £100 to install, plus £400 a year rental. That's a total outlay over the first year of a minimum of £1,700. (All prices include VAT.)

Or you could do what more and more business users are doing - use your computer to dial in a Telex machine. And just use your ordinary telephone!

How do I turn my Amstrad into a Telex machine?

All you need is a machine and appropriate communications software (see the advertisements in this issue), a telephone, and a subscription to MicroLink.

Telex is just one of a growing number of services available to Amstrad users on MicroLink. With MicroLink you can also read the news as it happens, go shopping, create your own closed user group, send telegrams, and electronic mail right round the world, download free programs directly into your files... and much more.

But why use Telex?

Because it's a standard means of instant communication between business. Today there are 190,000 Telex machines in use in Britain - and more than 2 million there are worldwide. Telex dramatically speeds up business communications - it's just as quick as using the phone (or for more efficient, because you have a hard copy of every "conversation" for your records).

But there's a big bonus you get when you use MicroLink for Telex that the conventional way doesn't offer.

With MicroLink you don't HAVE to be in your office to send or receive Telex messages. You can just sit easily at your computer at home (or even a partner's) - so now you can check whether there are any Telex messages waiting for you - anywhere, anytime, now! That's for your benefits efficiency!

How to join, see Page 52



IAN SHARPE tackles readers' programming difficulties

This is an occasional series where you can send in your programming problems to be solved by our experts. We're restricting the series to Basic and machine code, but beyond that anything goes. If we think answering your problem will provide practical programming help to other readers without getting too bogged down in complexity, you stand a good chance of seeing it in print.

We're aiming to cater for all levels of ability. Some months we'll tackle Basic, others we'll delve into machine code. So no matter how trivial or difficult your problem may seem, you've nothing to lose by sending it in:

Programmers' Snaps, Computing with the Amstrad CPC,
Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP

Problem...

I BOUGHT a CPC604 at Christmas, mainly for the kids to play games on. I know nothing about computers, but having read the manual and Computing with the Amstrad CPC I have realised that my mini can be used for much more than the purpose to which it is being put.

I ran a small club with about 20 members, and at the moment, in a notebook, I keep records of names, addresses, and who has paid weekly subs. This system works well enough, but I thought it might be interesting to put it all on the CPC. I don't want to buy a database to do this, it is purely an opportunity to learn a bit about programming.

As a first step I thought I'd have a go at writing a program to store members' names and a record of who

has paid each week. This would cover all of 1988. If I can manage that, I'll look at storing other details too.

Frankly, I am lost. I have spent weeks reading the manual from one end to the other. A lot of it is gobbledegook, but I can understand how to point something on the screen, or make the speaker beep. I can even use variables and arrays. What I can't see is how to go about stringing it all together into a program. I'm sure if I could get started I could do it. Can you give me some guidelines? — **A. Benson, Milton Keynes**

solved...

IT is quite difficult to make the leap from being able to write three-line routines which print your name at random places all

over the screen, to creating longer programs to do something meaningful. This is perhaps the biggest hurdle to cross in your programming career, a hurdle many fall at.

This is such an important problem that I'm going to spread the answer to your question over two months. This time we'll look at the general principles and make a start on the program. Then I'll give you a month to see how you get on with it, and in the next instalment I'll show you the solution and explain how it works.

In this way you'll see the development of a simple program from conception to finished product without being handed the complete answer before you've had a chance to have a go yourself.

But first some general advice. The best way for a beginner to start with programming is to firstly acquaint himself with the list of Basic keywords in the manual. You don't have to learn them all, but you need to be aware that a certain facility is available even if you have to look up its correct usage.

A few hours spent browsing as you have done, and perhaps typing in the examples and trying to appreciate what's going on, will pay dividends later on.

It's also worth getting a beginner's book on Basic from your library and looking at that. You don't have to understand it all, just get a feel for the sorts of things that are possible.

Next, set yourself an objective. You can learn things by idly playing about at the keyboard, but you won't progress very far. It is better to have something to aim at, something you are motivated to achieve and will hold your interest despite the difficulties that you will encounter along the way.

Keep it simple at first, or you'll get in a tangle and find it a frustrating experience. In your case your objective is to store the details of your club membership.

A computer is a stupid beast, and will only do what you tell it to. So before attempting to write a single line of program you should work out on paper what logical steps the CPC is going to have to make to perform the task in hand. And to do that you need to have defined exactly what the task is.

There is no point in enthusiastically wading in at the keyboard unless you have a clear idea of what the program is going to do, and how you want it

to look on the screen at each stage. Let's suppose that your database is going to have the following facilities:

- Add a name
- Delete a name
- Update payments
- Display non-payers
- Save records to tape
- Load records from tape
- Start a new week

I've specified tape because you have a CPC404, but disc drive owners will find the program works just as well on their machines.

I think the only obscure item in the list is *Start a new week*. The program is going to have room for 52 weeks worth of data, but we don't want to process as-yet-unreached weeks every time we do something with the information, because it is time-consuming and causes other complications. For this reason you have to tell the program when you want it to open up a new week for storing payment records.

It makes sense to have an opening menu asking you to choose which facility you want, and it also makes sense to have a corresponding section of program which prints the choices and waits for you to tell it which one you want. Furthermore, when you've made the choice, it's a good idea to have a clearly defined section of program to perform each choice.

You need to decide how the infor-

mation is to be stored in memory, and we'll look at that in a moment. For now, let's look at how we can handle the data in a similar way to your notebook. Figure 1 shows the idea. The week number is along the top, and the names down the side. There is a tick to show someone has paid, or an A if they were absent and so presumably don't owe anything. A blank square indicates that somebody hasn't paid for that week.

With your notebook you know that if you are up to week four a blank in week five means that you haven't got there yet, and not that the person owes money. In our computer simulation the CPC will be going down the list looking for blank entries so that it can compile a list of last payers. This is why you have to tell it which weeks are open for business so that future ones are not taken into consideration.

In the computer world the equivalent of your notebook is known as a data structure. This is just a fancy name for the way you organise your data in memory, and when planning your program it is a major decision you need to make before you get down to the details.

Figure 1 has two elements. The first is a list of names, the second a table of payments. It's sure everyone can see how this works on paper, but how do

NAME	1	2	3	4	5	...	49	50	51	52
Chalky White	✓	✓	✓							
P. Green	✓	A								
Eric T. Red	✓	✓	✓							
Earl Grey	✓	✓	✓							
Tom Brown	✓	✓								
Lou Blue	A	✓								

Figure 1. How the records appear in the notebook.

mation you type in is to be stored in memory, and this another situation where your background reading helps. As you will have seen in the manual, the CPC can store information

we translate it into something the CPC can handle? Let's look at the names first. A name is a collection of strings of characters, and the way we store these in Basic is in a string variable.

```

1000 Program 1
200 name$="CHALKY WHITE"
300 name$="ERIC T. RED"
400 name$="P. GREEN"
500 name$="EARL GREY"
600 name$="TOM BROWN"
700 name$="LOU BLUE"
800 name$="..."
900 name$="..."
1000 name$="..."
1100 name$="..."
1200 name$="..."
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4900 name$="..."
5000 name$="..."
5100 name$="..."
5200 name$="..."
5300 name$="..."
5400 name$="..."
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7200 name$="..."
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7900 name$="..."
8000 name$="..."
8100 name$="..."
8200 name$="..."
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8800 name$="..."
8900 name$="..."
9000 name$="..."
9100 name$="..."
9200 name$="..."
9300 name$="..."
9400 name$="..."
9500 name$="..."
9600 name$="..."
9700 name$="..."
9800 name$="..."
9900 name$="..."

```

Program 2. The database database.

From your investigations you will know that:

```

10 name$="LOU"
20 PRINT name$

```

Prints the string *LOU* into the string variable named *name\$* and prints it out. You will also know that:

```

10 name$="LOU"
20 PRINT name

```

generates an error because *name* without a \$ symbol is a numeric variable, in other words one that holds a number.

Therefore the way to store the names of your residents is in string variables. It would be a programming nightmare to have 50 differently named variables for the names, because any part of the program which wanted to handle a name would have to come in 50 versions, each dealing with a different variable.

The way round this is to put the names in a one-dimensional string



4 From Page 28

array. This is simply a collection of strings referred to by a single name, and to differentiate between the parts of the array you refer to each element by its number.

This is directly analogous to the strip of names on the left of Figure 1. If these were in a string array called `name()`, `Charlie White` would be in `name(1)`, `P. Green` in `name(2)`, and so on. Now all we need to do when referring to a name within the program is to specify its number in the file.

The payment chart is slightly differ-

ent. Each square in it has either a tick, an A, or it's empty. We could store ticks and As, but just to be different we'll represent them with numbers. An empty square will be zero, a tick will be one, and about two. There is no particular reason for picking these values; it's just a question of deciding an convenient ones and sticking with them.

The other main difference between the lists of names and payments is that the payments have to be accessed by both the person they refer to and the week. This is a case for a two-dimensional numeric array, and you can visualize it as looking like the grid to the right of the names.

The A in the first column next to Lou Blue's name is element 0,1 in the array, and the third tick in `Charlie White's` record is element 1,3. If the array is called `payments()`, these would be `payments(0,1)` and `payments(1,3)` respectively.

Having decided how the data is to be stored, it's time to plan how the program will be put together. I've

already mentioned that it should be split up into modules, and that one will be the menu and the rest correspond to the available options. Knowing that, and without wishing to give too much away, we can come up with Program 1 which is a skeleton to hang the modules on.

There is no particular significance in the line numbers chosen for the headings of the routines. They're just reasonable size gaps, and can almost be adjusted with a bit of judicious **RENUMBERING**.

To get you started I have shown the menu, and dropped some hints in setting up the more important variables. The array called `status()` can be used to print a message depending on the value of any cell in `payments`, `week` holds a number initially one which specifies the number of weeks open for payment records.

And that's where I'm going to leave you while you get to grips with the programming. Next month I'll show you how I planned and completed the program modules.

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AM tips



Rasputin

(Firebird)

It's nice to see the odd poke coming in from fellow females. This one for

Firebird's budget re-release is by Karen Springate of Totem. It gives you infinite health and sword power. As usual, you run the gale and guess play.

- | | |
|-----------------------|----------------------|
| 1) 00000 | 11) 00000 |
| 2) By Karen Springate | 12) 0000000000000000 |
| 3) 00000000 | 13) 0000000000000000 |
| 14) 0000000000000000 | 14) 0000000000000000 |
| 15) 0000000000000000 | 15) 0000000000000000 |
| 16) 0000000000000000 | 16) 0000000000000000 |
| 17) 0000000000000000 | 17) 0000000000000000 |
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| 27) 0000000000000000 | 27) 0000000000000000 |
| 28) 0000000000000000 | 28) 0000000000000000 |
| 29) 0000000000000000 | 29) 0000000000000000 |
| 30) 0000000000000000 | 30) 0000000000000000 |
| 31) 0000000000000000 | 31) 0000000000000000 |
| 32) 0000000000000000 | 32) 0000000000000000 |
| 33) 0000000000000000 | 33) 0000000000000000 |

Monty on the Run

(Gremlin)

Niall Brady of Sligo in Ireland has come up with an alternative poke to the one in the March issue. That only worked with the tape version, but this one works with the disc.

- | | |
|----------------------|----------------------|
| 1) 0000000000000000 | 11) 0000000000000000 |
| 2) By Niall Brady | 12) 0000000000000000 |
| 3) 0000000000 | 13) 0000000000000000 |
| 14) 0000000000000000 | 14) 0000000000000000 |
| 15) 0000000000000000 | 15) 0000000000000000 |
| 16) 0000000000000000 | 16) 0000000000000000 |
| 17) 0000000000000000 | 17) 0000000000000000 |
| 18) 0000000000000000 | 18) 0000000000000000 |
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Race Against Time

(Code Masters)

Within four days of Code Masters releasing its Sport Aid '88 game this poke from John Kerry of Birmingham

arrived on my desk. It's another one of those where you remove the data lines corresponding to features you don't want, and run the poke with the game tape fully rewound in the deck.

The options are to see the screens being displayed; start with nine minutes instead of five, or skip the clock.

First things first. We've been floored over the artist by Dave Rodgers. Who's he? Well he's the guy who wrote the music for Heaton's Cybersold and Nebula among other things. In his review of Cybersold in June, fellow hack Chris Niles credited the sound to Dave Jones. Chris asked me to pass on his most gravelling apologies to Dave, Dave, Heaton, and anybody else who stayed awake that late into the evening.

Talking of Cybersold, I noticed that the official rag carried a map of the game last month. What's the point of a two-page map when there's only one route, no possibility of getting lost, and most of the collectables are dropped by fixed pirates? Answer to ADU please, preferably on the back of a submission...

Now I've had a complaint from Stephen Muir of Rugby. He wants to know why there are no racing pokes and not more hints and tips, especially the ones he sent in for Tai Ai Kung Fu. The few letters I get expressing an opinion one way or the other seem to favour the pokes, so I've been giving preference to them.

To be fair, quite few of the pokes give you the option to make things a bit easier rather than handing the game to you on a plate with infinite lives. However, I run the cover of the mag on your behalf, so we'll take a vote on it.

Write in and tell me your preferences, and I'll go along with the majority verdict. When you write, tell me which games you would most like to see hinted upon or poked, and I'll see what I can do.

Tilbury

- | | |
|----------------------|----------------------|
| 1) Race Against Time | 11) 0000000000000000 |
| 2) By John Kerry | 12) 00000000 |
| 3) 00000000 | 13) 0000000000000000 |
| 14) 0000000000000000 | 14) 0000000000000000 |
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Bobsleigh (Digital Integration)

Here are a few tips from Dominic Adams of Watford to get you on the right track:

Firstly, if the weather report says there has been a severe snowstorm, you must select the banded runners - type four.

If there is a hard frost and the ice temperature is below -5C you may use type one or two runners. Try two first, and if you find that you are slipping and sliding too much, go for the next set of runners up.

If you find that you were going down the slope sluggishly, on the second run use the next set of runners down.

There isn't much need to spend money on a team kit

nor on a fitness session, although you may do so every other run.

It is possible to obtain speeds of 53kmh on your run towards the start. Jump in once you see the sleigh directly on the starting line.

Try to stay as close to the wall as possible when going down the slope. When pulling from a corner continue pulling a little further because although you're out of a turn, the back of the sleigh is still in the corner.

At first keep to single events and stay on one course - preferably the one you're best at - and continue racing until you have £15,000 or more. Then progress to another course.

It's a waste of money buying a National sleigh. Instead keep saving until you have a European or Olympic one.



Metrocross (US Gold)

This double-featured poke by Carl Taylor of Leicester will remove the collision detection and make the clock restart when it reaches zero.

8 Metrocross	19 0476 56,00,00,00,00,00
9 Carl Taylor	20 0476 00,00,00,00,00,00
10 10000000	21 1111 0000
11 10000	22 0476 00,00,00,00
12 0476 00,00,00,00,00	23 0476 00,00,00,00
13 0476 00,00,00,00,00	24 0476 00,00,00,00
14 0476 00,00,00,00,00	25 0476 00,00,00,00
15 0476 00,00,00,00,00	26 0476 00,00,00,00
16 0476 00,00,00,00,00	27 0476 00,00,00,00
17 0476 00,00,00,00,00	28 0476 00,00,00,00
18 0476 00,00,00,00,00	29 0476 00,00,00,00
19 0476 00,00,00,00,00	30 0476 00,00,00,00
20 0476 00,00,00,00,00	31 0476 00,00,00,00
21 0476 00,00,00,00,00	32 0476 00,00,00,00
22 0476 00,00,00,00,00	33 0476 00,00,00,00
23 0476 00,00,00,00,00	34 0476 00,00,00,00
24 0476 00,00,00,00,00	35 0476 00,00,00,00
25 0476 00,00,00,00,00	36 0476 00,00,00,00
26 0476 00,00,00,00,00	37 0476 00,00,00,00
27 0476 00	38 0476 00,00,00,00
28 0476 00	39 0476 00,00,00,00
29 0476 00	40 0476 00,00,00,00
30 0476 00	41 0476 00,00,00,00
31 0476 00	42 0476 00,00,00,00
32 0476 00	43 0476 00,00,00,00
33 0476 00	44 0476 00,00,00,00
34 0476 00	45 0476 00,00,00,00
35 0476 00	46 0476 00,00,00,00
36 0476 00	47 0476 00,00,00,00
37 0476 00	48 0476 00,00,00,00
38 0476 00	49 0476 00,00,00,00
39 0476 00	50 0476 00,00,00,00
40 0476 00	51 0476 00,00,00,00
41 0476 00	52 0476 00,00,00,00
42 0476 00	53 0476 00,00,00,00
43 0476 00	54 0476 00,00,00,00
44 0476 00	55 0476 00,00,00,00
45 0476 00	56 0476 00,00,00,00
46 0476 00	57 0476 00,00,00,00
47 0476 00	58 0476 00,00,00,00
48 0476 00	59 0476 00,00,00,00
49 0476 00	60 0476 00,00,00,00
50 0476 00	61 0476 00,00,00,00
51 0476 00	62 0476 00,00,00,00
52 0476 00	63 0476 00,00,00,00
53 0476 00	64 0476 00,00,00,00
54 0476 00	65 0476 00,00,00,00
55 0476 00	66 0476 00,00,00,00
56 0476 00	67 0476 00,00,00,00
57 0476 00	68 0476 00,00,00,00
58 0476 00	69 0476 00,00,00,00
59 0476 00	70 0476 00,00,00,00
60 0476 00	71 0476 00,00,00,00
61 0476 00	72 0476 00,00,00,00
62 0476 00	73 0476 00,00,00,00
63 0476 00	74 0476 00,00,00,00
64 0476 00	75 0476 00,00,00,00
65 0476 00	76 0476 00,00,00,00
66 0476 00	77 0476 00,00,00,00
67 0476 00	78 0476 00,00,00,00
68 0476 00	79 0476 00,00,00,00
69 0476 00	80 0476 00,00,00,00
70 0476 00	81 0476 00,00,00,00
71 0476 00	82 0476 00,00,00,00
72 0476 00	83 0476 00,00,00,00
73 0476 00	84 0476 00,00,00,00
74 0476 00	85 0476 00,00,00,00
75 0476 00	86 0476 00,00,00,00
76 0476 00	87 0476 00,00,00,00
77 0476 00	88 0476 00,00,00,00
78 0476 00	89 0476 00,00,00,00
79 0476 00	90 0476 00,00,00,00
80 0476 00	91 0476 00,00,00,00
81 0476 00	92 0476 00,00,00,00
82 0476 00	93 0476 00,00,00,00
83 0476 00	94 0476 00,00,00,00
84 0476 00	95 0476 00,00,00,00
85 0476 00	96 0476 00,00,00,00
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87 0476 00	98 0476 00,00,00,00
88 0476 00	99 0476 00,00,00,00
89 0476 00	100 0476 00,00,00,00

11 0476 00,00,00,00,00	21 0476 00,00,00,00,00
12 0476 00,00,00,00,00	22 0476 00,00,00,00,00
13 0476 00,00,00,00,00	23 0476 00,00,00,00,00
14 0476 00,00,00,00,00	24 0476 00,00,00,00,00
15 0476 00,00,00,00,00	25 0476 00,00,00,00,00
16 0476 00,00,00,00,00	26 0476 00,00,00,00,00
17 0476 00,00,00,00,00	27 0476 00,00,00,00,00
18 0476 00,00,00,00,00	28 0476 00,00,00,00,00
19 0476 00,00,00,00,00	29 0476 00,00,00,00,00
20 0476 00,00,00,00,00	30 0476 00,00,00,00,00
31 0476 00,00,00,00,00	41 0476 00,00,00,00,00
32 0476 00,00,00,00,00	51 0476 00,00,00,00,00
33 0476 00,00,00,00,00	61 0476 00,00,00,00,00
34 0476 00,00,00,00,00	71 0476 00,00,00,00,00
35 0476 00,00,00,00,00	81 0476 00,00,00,00,00
36 0476 00,00,00,00,00	91 0476 00,00,00,00,00
37 0476 00,00,00,00,00	100 0476 00,00,00,00,00
38 0476 00,00,00,00,00	
39 0476 00,00,00,00,00	
40 0476 00,00,00,00,00	
41 0476 00,00,00,00,00	
42 0476 00,00,00,00,00	
43 0476 00,00,00,00,00	
44 0476 00,00,00,00,00	
45 0476 00,00,00,00,00	
46 0476 00,00,00,00,00	
47 0476 00,00,00,00,00	
48 0476 00,00,00,00,00	
49 0476 00,00,00,00,00	
50 0476 00,00,00,00,00	

Biospheres (Firebird)

Teeny tinklings of Leeds has tweaked Biospheres to bring you a horrible newswrapped poke armed to the teeth with cheats:

- Removes collision detection - but if you destroy the bio-bomb, without a full shield you will still die.
- Gives 9999 life units. If you intend to collect extra energy pods, you should lose a bit of energy first.
- 127 or infinite cool-downs.
- Rapid fire.

Remove data lines for the features you don't want, remove the game tape, and run the poke. Note! Teeny sent me two pokes, the longer of which redefined the characters to make the screen look tidy as the game loads.

Unfortunately this made the loading rather big, and I've got so much material I've got to print the shorter version. This will give some strange characters during loading.

All contributions for AM TIPS must be original material and accompanied by this form.

I certify that the attached submission is all my own work and has not been submitted to any other publication.

Signed _____

Name _____

Address _____

Post code _____

If you do not want to cut out this page, you can copy out this form on a separate sheet of paper.

The address to write to is:
Teeny, Amiga, Computing with the Amstrad CPC,
Addington Park, Addington, Massachusetts 01810-0001.

Metal Army, Radius

(Players)

Peter Casey of Malvern has sent in some more pokes to be added to his Cracker program published last month. They're for Metal Army and Radius, and all you have to do is add, or in the case of line 25 in Metal Army, substitute, the lines shown to the main program and you have a complete poke.

This applies to the Tanium poke left over from last month which, with a bit of luck, will have found a space this time.

The Radius listing is for infinite lives, and Metal Army does the same plus infinite fire power and you can open all doors with or without passes.



27 0474 21,81,84,22,23,24
27 0474 21,81,84,22,23,24
28 0474 21,81,84,22,23,24
29 0474 21,81,84,22,23,24
30 0474 21,81,84,22,23,24
31 0474 21,81,84,22,23,24
32 0474 21,81,84,22,23,24
33 0474 21,81,84,22,23,24

27 Radius Infinite Lives
28 0474 21,81,84,22,23,24
29 0474 21,81,84,22,23,24
30 0474 21,81,84,22,23,24
31 0474 21,81,84,22,23,24
32 0474 21,81,84,22,23,24

Fruit Machine Simulator

(Code Masters)

Now here's this for a poke! It gives you an infinite supply of money. The only snag is that it only works with Fruit Machine Simulator, and not the Real West service till - believe me, I tried and tried.

Frank Douglas of East Sheeive really will have to put more effort in. You don't get infinite credits because the game would never end if you did.

18 Fruit Machine Sim.
19 --
20 Frank Douglas
21 021 0207070
22 74 04 21,21,21,21,21,21
23 74 04 21,21,21,21,21,21
24 74 04 21,21,21,21,21,21
25 74 04 21,21,21,21,21,21
26 74 04 21,21,21,21,21,21
27 74 04 21,21,21,21,21,21
28 74 04 21,21,21,21,21,21
29 74 04 21,21,21,21,21,21
30 74 04 21,21,21,21,21,21
31 74 04 21,21,21,21,21,21
32 74 04 21,21,21,21,21,21
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36 74 04 21,21,21,21,21,21
37 74 04 21,21,21,21,21,21
38 74 04 21,21,21,21,21,21
39 74 04 21,21,21,21,21,21
40 74 04 21,21,21,21,21,21
41 74 04 21,21,21,21,21,21
42 74 04 21,21,21,21,21,21
43 74 04 21,21,21,21,21,21
44 74 04 21,21,21,21,21,21
45 74 04 21,21,21,21,21,21
46 74 04 21,21,21,21,21,21
47 74 04 21,21,21,21,21,21
48 74 04 21,21,21,21,21,21
49 74 04 21,21,21,21,21,21
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61 74 04 21,21,21,21,21,21
62 74 04 21,21,21,21,21,21
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64 74 04 21,21,21,21,21,21
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66 74 04 21,21,21,21,21,21
67 74 04 21,21,21,21,21,21
68 74 04 21,21,21,21,21,21
69 74 04 21,21,21,21,21,21
70 74 04 21,21,21,21,21,21
71 74 04 21,21,21,21,21,21
72 74 04 21,21,21,21,21,21
73 74 04 21,21,21,21,21,21
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75 74 04 21,21,21,21,21,21
76 74 04 21,21,21,21,21,21
77 74 04 21,21,21,21,21,21
78 74 04 21,21,21,21,21,21
79 74 04 21,21,21,21,21,21
80 74 04 21,21,21,21,21,21
81 74 04 21,21,21,21,21,21
82 74 04 21,21,21,21,21,21
83 74 04 21,21,21,21,21,21
84 74 04 21,21,21,21,21,21
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86 74 04 21,21,21,21,21,21
87 74 04 21,21,21,21,21,21
88 74 04 21,21,21,21,21,21
89 74 04 21,21,21,21,21,21
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94 74 04 21,21,21,21,21,21
95 74 04 21,21,21,21,21,21
96 74 04 21,21,21,21,21,21
97 74 04 21,21,21,21,21,21
98 74 04 21,21,21,21,21,21
99 74 04 21,21,21,21,21,21
100 74 04 21,21,21,21,21,21

Flying Shark

(Firebird)

Steve Crabtree has well and truly nabbed Firebird's arcade conversion. It's rather a boggle, but you can miss out the SYMBOL commands at the end of the poke if you don't mind some strange characters appearing during loading.

There is a whole host of features. Firstly you get infinite lives and smart bullets. Any small craft such as tanks and anti planes don't fire, in fact they aren't visible but you can hear them.

All other craft get shot

18 Flying Shark
19 Steve Crabtree
20 021 0401211 1100
21 0474
22 -----
23 74 04 21,21,21,21,21,21
24 74 04 21,21,21,21,21,21
25 74 04 21,21,21,21,21,21
26 74 04 21,21,21,21,21,21
27 74 04 21,21,21,21,21,21
28 74 04 21,21,21,21,21,21
29 74 04 21,21,21,21,21,21
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71 74 04 21,21,21,21,21,21
72 74 04 21,21,21,21,21,21
73 74 04 21,21,21,21,21,21
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77 74 04 21,21,21,21,21,21
78 74 04 21,21,21,21,21,21
79 74 04 21,21,21,21,21,21
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98 74 04 21,21,21,21,21,21
99 74 04 21,21,21,21,21,21
100 74 04 21,21,21,21,21,21

Tanium

(Players)

Here you get either 256 lives or infinite lives, take your pick. Remove the line you don't want, and add the rest to Peter Casey's Cracker. Peter has sent some hints to go with the poke.

Learn the different formations, and try to get as many five bombs as possible.

If you keep your finger on Fire, you will gradually fire more rapidly. If you get a lot of bullets coming at you, keep firing at the top and eventually a gap will appear for you to fly through.

27 Tanium
28 0474 21,21,21,21,21,21
29 0474 21,21,21,21,21,21
30 0474 21,21,21,21,21,21
31 0474 21,21,21,21,21,21
32 0474 21,21,21,21,21,21
33 0474 21,21,21,21,21,21
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42 0474 21,21,21,21,21,21
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Saturday October 22
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Sunday October 23
10am - 4pm

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ADVENTURE

SUMMER is always a strange time of year for adventurers. Software houses seem to release very few games, and the postman doesn't have quite so much of a wrestling match with my mailbox.

I have been wondering if, unknown to me, all the writers and players pick this time of year to go on holiday together. Perhaps they settle their differences in readiness for a further year of adventuring – visions of writers barricading themselves in their hotel rooms against the onslaught of indie Lord of the Rings owners comes readily to mind.

And the image of writers hunting bugs at the players' only to be on the receiving end of typed solutions in a mad St. Trinians' misle seems almost enticing.

Fearn this it is an easy step to imagine the type of entertainment that might be laid on. Give Us a Clue perhaps!

If this is the reason for this seasonal decline, maybe it is as well that cynicisms such as mine are unaware of it. I have a sneaking suspicion that, were we to attend, the programmers and players would probably concentrate their efforts on us!

Moving on to more serious things, recently a variety of war games has been sent to me for review. I wouldn't normally give them a second glance – I'm an adventurer, not a war gamer – but on the recommendation of Rachel Purkar I've been having a look. My initial deliriousness has disappeared, and

It's the silly season again

Go adventuring with Gandalf

Having spent some time with them I must confess to being pleasantly surprised.

War games, for those of you who haven't encountered them, are simulations of real or imagined battles. While adventures offer puzzles to test the intellect and generally have a fixed scenario, war games offer strategic and tactical challenges with a scenario that changes in response to your moves.

Part of the challenge, I have discovered, is that to get full enjoyment you have to completely understand what you are doing. Since the rules know all the rules, it seems that you have to learn them too in order to stand a chance of winning.

Hopefully, I shall be able to reach a competent enough stage over the next couple of months to be able to bring you a balanced review, and thus introduce you to a new genre.

Have a cup of no tea

Whisker's Guide to the Galaxy – Part IV of a serialised solution by D.P. Frands

I imagine that when you heard the sound of the star drive you thought you were back on the heart of Gold – you're not. In fact you are in the war room of a mighty war fleet that is approaching Earth.

Take the ultra-plasmic owl and

have a good look at the aliens. Do the names sound familiar?

Remember the small galaxy you wiped out earlier with your careless words? Some aliens have come to Earth to take their revenge. Since there is very little you can do to stop them, you might as well enjoy the trip.

The first thing they see when they





land is the dog happily eating the cheese sandwich. This softens their hearts and they leave, transporting you back to the Heart of Gold in the process. Unfortunately, since the aliens are only microscopically-sized, so are you, and you end up materialising inside your own head.

Move along the maze of synapses until you meet the particle. Examining it reveals that it is the eyeglass sense variety, and taking it plunges you back once again into... darkness. By now you have collected the floor fluff, owl, paint stripper, nutrient interface and locket.

Pick up the interface and go to the nutrient - it's tea time. Open the panel on the nutrient, remove the control board and replace it with the interface. Touch the pad, and the nutrient will be into the ship's main computer.

Don't waste time watching the nutrient, head for the bridge and plug the large plug into the large receptacle. At this point you have nearly arrived at Magrathea, a fact that the natives are none too pleased about. In fact they have launched a missile at the ship.

Push the switch on the spare improbability drive, and the missiles are converted into sperm whales.

Accept the congratulations of the crew then head for the nutrient where you will find a cup of real tea awaiting you. Take it (you will drop the no test) and go to the bridge.

Drop the real tea (you will automatically take the no test).

Clue in the colour

Guild of Thieves - Part I of a serialised solution by Graham Wheeler

Jump on to the jolly, SW, M, help the old man, enter the drawbridge. You are shown to the entrance hall and will be told about a rat race that is to be held shortly. West, look into the basket, get the coal and break it to find a fossil, S, examine the paintings, take the oil painting (note the clue on the watercolour - you will need the information later), S, examine the settee, examine and open the cushion, look inside the cushion, get and

FEEDBACK

One of the most frequent contributors to this column - Graham Wheeler - has written in with help for R. Williams's gabbler in *Frankenstein*. To get started in this adventure: Look around, get the money. West, down, examine the stack, get the picture, search the room, sit in the chair, wait (your father opens the front door), stand, examine the chair (your money fell out of your pocket), take the money.

East, search the garden, examine the chest, unscrew the hinge with the knife (you find a rope). East, North, North, East, North, West (you are being chased by a bear), look around (you see a tree), up, wait (until you are told the bear is 48 away), jump on to forest ground - the bear falls into the ravine bringing the tree down in the process, which you can use to cross the gap.

Remove the dangly bit from the tea substitute, and put it in the real tea. Drop everything except the Babel fish and the Aunt's Thing, then push the switch on the dials. You will find yourself in the dark inside the whale's sunnery. Take the flowerpot and put it inside the Aunt's Thing. Wait and you will find yourself in darkness again.

examine the robe. Go to the kitchen, open the swing bag, get and light the lamp, E, S, move the junk.

S, open the safe, put the fossil and painting into the safe, close the safe, N, N, open the door, M, push the pipes (one falls from the wall), open the stopcock, wait until the ceiling has tilted with water which tilts the rats. Close the stopcock, down, examine the sack, get the red bottle and open it. Look inside the red bottle. You find a rat. Put it in the bag, drop the red bottle, get the champagne bottle, go to the courtyard.

You need to stay fairly close to the courtyard so that you can hear when

the greeter calls out about the cat room. It is important not to miss this event as you need to win. If you are too late, all you will find is an empty cage.

Examine the rats, and bait the note on the grey one. The rat wins and the gate keeper gives you a cheque, leaving a cage behind. Get the cage, go to the spare bedroom, examine the bed, open the sewing box and look inside.

Remove the cotton from the sewing box, and get the cotton. It has a needle attached - do not remove it.

Look under the bed, get the china pot, open the wardrobe and look inside. Get the dress, N. N., open the stool and look inside. Get the plastic bag and examine it. It is music - do not open the bag as the music will be destroyed. W., examine the out rack, get the out,

examine the table, get and open the red ball, get the ring, drop the red ball.

Go to the junk room, S., open the safe, put the plastic bag and ring into the safe. Close the safe, open it again, put the china pot and ruby inside. Close the safe then open it again, put the dress inside, close the safe. Drop the cotton and sue, go to the kitchen, open the cupboard and look inside. Get the jar and poison, S., open the cabinet and look inside, get the key. S., look under the bed, get the tub, go to the junk room.

Get the cube, S., get the sue and cotton, tie the cotton to the sue, open the tub and look inside. Get the magnet, put the magnet on the needle, put the needle in the meat. You catch a fish.

Upset an octopus

**Another Delta - A solution by
Glynn White**

Search the pockets of the dead body to find a card. Get and examine it to discover it is the travel permit. Open the briefcase and get the documents. Read them to learn of your mission.

At the station pull the lever, and a travel car will arrive. Enter the car, wear the belt, and insert the card. You are taken to Beta station. Remove the belt and exit the car. Go to the dam and examine the window. You will see a wreck and a missile.

Return to the car and travel to Echo station, using the routine above. Note the torpedos and examine the screen. Get the screwdriver from Foxtrot, get the torch from Alpha, then go to Beta. Your card now runs out and must be renewed.

Go to the living room and get the suit, then travel to lift 2 and open the panel with the screwdriver. Examine the shaft to find it is too dark and deep, and drop the torch as it is useless. Read the sign outside the lift and note the wording and number. Move to the electronics workshop, take the tape player, then go to lift 1 and travel up to level 2.

Drop the tape and screwdriver, and go to the gas bottle store. Get the belts and examine it to find a hose. Attach the hose to the suit and then wear it. Get and wear the floppers from the dining room, then move to the surgery.

Get and examine the thermometer, note the reading, and then drop it.

Get the gun from the deep freeze, and chew it. Return to the lift and go up. The button pops out and must be stuck with the gun. Go up to level 43 with the tape.

Drop the tape in the walkway where the microphone is. Get the spear gun from the armours, the pen from the bureau in the living quarters, and return to Beta station. Open the hatch. Enter, and read the sign. Turn the wheel to fit the airlock.

You are ejected into the sea. Fire the gun at the octopus to upset it, and fill the pen with the ink that is squirted out. Go to the wreck, and down into the field. Get the telescope. Return to the airlock, enter the hatch, and turn the wheel. You are now back at Beta station.

In lift 2, examine the telescope to see a disk at the shaft bottom, then drop it. Go to level 2 via lift 1. Get the card and go to the head office. Insert the card, sign the form (you forge the signature), Non Foli, drop the pen and get the card.

In the lift, get the screwdriver and move on to level 3. Go to the music room and examine the loudspeaker. Unscrew the magnet, drop the screwdriver, and take the magnet. Read the cookbook in the library, turn the tap in the shower room for a refreshing shower! Get the pinners from the dental





surgers, and break the case in the corridor north of the lift. Read the message in the control room for a line for iron. Push the switch in the power room, and get the hammer from the reactor room. Drop it by the camera in the corridor.

Get the line from the laundry on level 2, go to lift 3, fix the magnet, and drop the line. Pull the line up, and you should now have a metal disc. Go to the station, drop the disc and pinners, and enter the car.

Go to Echo station, and examine the screen. Enter the elevator bearing and degrees observed earlier. The torpedo is fixed at the wreck. Get the key from east of the food farm near Charlie station, and return to Beta station. Drop the key and card, take the pinners, and enter the hatch.

Travel to the wreck and pull the rail. Drop the pinners and take the nail and plank. Take the piece of wood and go down. Lever the cannon. Get the ball and drop the wood. Return to Beta station.

Collect the disc, then go to level 2. In the rest room insert the disc and examine the sides. Push/pull the joystick to get three more discs. Drop the plank, nails, and ball by the camera. Get the fork from the dining room on level 2, then go to the conveyor belt and short the switch. The belt now moves left. Climb the belt to go to the refuse compartment, and get the bowl and ball. Enter the chute to reach level 1, then go to level 2.

In the food store, examine the cage to see a hen. Blow a bubble to startle it into laying an egg. Drop the gum and take the egg. In the kitchen, examine the shelves to see a bag of flour. Take it and open the fridge. Take the milk, make a pancake, and fry it on the hotplate. Go to the laundry room, get the iron, and use it to iron the foil. Drop the iron and go to level 3. Throw the pancake to cover the lens.

Take the plans, hammer, nails and ball. Go North to the launch pad. Drop the ball, nails, hammer, plank and foil. Get and open the envelope in the control area. Read the certificate, then drop them. Drop the cassette by the target player, then go to the music room. Take the barrel from the ice to the launch pad.

Using the hammer, nails, plank, and barrel make a see saw. Take the ball and foil, and walk the plank. Drop the

ball to reach the platform. Reflect the beam with the foil. Your mission is now complete and you must make your escape.

Drop the foil, go to the microphone, and shout. You hear some doors sliding. Get the cassette and insert it. The doors open again. Go to the tunnel, and enter the doors to find a knob. Put it (submarine escape please). Return to the ground floor and out to sea via the hatch. Swim down to the mini-sub and pull the lever to end the game.

Trolls prefer tolls

Colossal Adventure - Part II of a serialized solution by Glyn White

Return to the large low room, collecting the golden eggs along the way. Take the keys and drop them at the southwest side of the bridge, get the sandwiches, and attempt to cross the bridge.

Pay the troll his toll, get the keys and cross the bridge. Move on to the barrow room. Read the sign then feed and lead the bear. Unlock his chain, then take him. Return to the bridge and, when challenged by the troll, throw the bear at him.

In turn transfer the keys, chain and spades from the chamber east of the junction to the building. Reclaim the emerald from the alcove west of the plover room, and transfer this to the building. To get the eggs travel to the giant room and type in Poe Pie Pie Pop, pressing Enter/Return after each word.

Have you been robbed yet? If you haven't, go to Y3 and wander round. Sooner or later the pirate will come along and rob you.

If you have been robbed, leave the eggs in the building then go to the west end of the hall of mists. Now move S, E, S, S, S, E, N, E to the orange columns, then E and NW to the pirate's chest. Take all your valuables from the chest and the chest itself, then travel SE, W, S to the columns and down to the splendid EW chamber. Return to the building.

Time and Magic

Mandarin/Level 9 £14.95 (tape or disc)

This trilogy of early Level 9 adventures tells three key episodes in the struggles of the Guardians to protect Time and Magic - Lords of Time, Red Moon, and The Price of Magic.

At the start I should declare an interest in that the package is mastered by our sister company Mandarin Software, but I have approached the review with an open mind and hopefully can give an unbiased report.

In *Lords of Time*, the evil Time Lords are fighting to change history with the aim of gaining control of time, and snapping eternity to their wishes. Your job is to defeat them by bringing together nine crucial objects from different ages. Events begin in your own living room. Since there are only two rooms to explore, it is soon apparent that a mysterious grandfather clock is the key to the nine time zones into which the game is divided.

The areas should be tackled in chronological order, though some of the objects obtained may be necessary for the completion of earlier areas. During the course of the game you will visit a variety of times ranging from the Ice Age to the far future, with plenty of variety in between. To give you a helping hand, the documentation includes a poem listing the objects needed, though not in the order in which they are found.

The first zone is the present, and you first encounter on a drive close to a village. Going inside, a search reveals an object which will enable you to slay mice, and a variety of items that will help you later on.

Wenturing into the garden should find you waiting the stream that runs behind the mill. Using some workman's equipment you will have a means of entering the shed in order to obtain the implement that will quash the willow tree, and to leave you with the first of the nine objects.

The second game in the trilogy - *Red Moon* - is set in a later period. Magic has been fading for many centuries, and has reached a point where the red moon crystal is the only remaining source of power. One night the crystal is stolen, and the Guardians seek you to recover it.

Your task begins on a grassy plain near Castle Cathedral - the location, no more is it of the stolen crystal. Your first move should be to explore all the surrounding locations. Unlike the previous game, magic can and should be employed and it is worth bearing in mind that, while each object has a use, it may not be the obvious one.

To gain access to the castle you must find a way of crossing the lake. Since you discovered this to be impossible, an object found in the bushes is the fully proven useful. Now you can enter the castle and the main body of the game, ready to continue your search for the crystal.

In *The Price of Magic*, the Guardians



Red Moon

have learnt their lesson from the theft of the crystal, and have instituted a system of electing one of their own to act as its guardian. The system works well for some time - until Mygler is chosen. Over the 70 years of his guardianship, he gradually drives mad by the intensity of the crystal's magical radiance, and starts it in a vain attempt to use its powers to make his ancestor.

A lesser magician - you - is chosen to seek out Mygler and regain the crystal. You find yourself on a winding drive by a strange house. Before making an excursion to the woodland, an inspection of the door at a nearby time can prove illuminating. At the shed examine everything before setting light to the wood - remembering to extinguish the candle - before getting everything, and moving on to the herb garden. Again, get anything you can see and you will be rewarded with a few things you can't.

Returning to the vine, the time has come to enter the house where you will discover that it is pitch-dark. An object from the herb garden proves useful here, and you are now in a position to further your search for the crystal and your final confrontation with Mygler.

The packaging has been considerably updated since the games first appeared, and includes full playing instructions, some advice about adventures in general, and these in particular. It also holds more of the Peter Blaxdale stories which set the

scene for the trilogy as a whole and for each episode.

Each game has been enhanced. The parser has been made more flexible. Though at this price you don't get - or expect - something up to the standards of Magenta Levels standard. Also, *Lords of Time* has gained some graphics. One point worth noting that the graphics are only present on the disc version, and this requires a 1086 machine to run. Owners of unexpanded disk machines can only use the non-graphic tape edition.

I didn't play all three adventures to completion, but as far as I went their structure is the same as the originals. In all, *Time and Magic* brings together three acknowledged classics making an excellent package.

Gardell

Presentation 90%

Comprehensive playguide is excellent - other software houses take note.

Atmosphere 88%

All three games are tremendously absorbing.

Frustration factor 85%

One Level 9 adventure is too long - but three!

Value for money 90%

All under £5 per game it's hard to beat.

Overall 88%

Recommended.

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COMPETITION WINNERS

BMX Bike (Elite)



Denise Marshall



THE response to the BMX Bike competition featured in the January issue was phenomenal – both for the sheer quantity and superb quality of entries.

We asked you to design the packaging suitable for a compilation tape. Many of you based your ideas around the Bike Collection games, but many

others created new ideas and those illustrated them. It was very impressive to see the number of different ideas you came up with.

First prize was a BMX bike – a Stingray Aero presented by Elite. It goes to Stuart Tennant from Invercargill. It was a very difficult choice to make and our congratulations to everyone who entered.

There are also 20 runners-up prizes of Elite's biggest compilation which consists of Paperboy, Ghosts and Goblins, Commando, North Jack and II, Frank Bruno's Boxing, Airwolf and the previously unreleased Battleships. One of these compilations will be going to each of the following:

G. Green, Eatham; M. Warner, South Wintal; B. McGovern, Glasgow; S. Beale, London; P. Raja, Haverthorpe; S. Salinas, Haverthorpe; G. Potts, Bradford; N. Bradshaw, Parkdon; D. Hall, Mottisain; N. Milligan; S. Marshall, Birmingham; C. Miller, East London; M. Fawcett, Hull; D. T. Robinson, Newcastle; J. Porteus, Edmonton; I. Ahmed, Brough; G. Jamieson, Uddingston; M. McGee, Kirkcaldy; P. Wallis, Preston and S. Lewis, Abert.



Stuart Tennant

Stuart Tennant

Andy Capp mugs and watches (Mirrorsoft)



TO celebrate the release of Mirrorsoft's Andy Capp on the Amstrad CPC, we asked you to draw or paint Andy as a baby or child.

We received an astonishing number of pictures featuring Andy and his famous cap and football scarf. Congratulations to all who entered on the numerous and imaginative ways you depicted Andy as a child.

The 18 winners of the Andy Capp watch are: B. Davey, Sutton Coldfield; S. Fawcett, Sheffield; S. Neely, Huddersley; N. Westwood, Riggan Hill; D. Marshall, Barnagh; S. Hindmarsh, Slarkey; T. Harvey, Freshwater Bay; C. Bullock, Hudd; M. Wellbourn, Tekebury; R. Parrott, Flitpound.

The next 40 best entries, who will each receive an Andy Capp mug, are:

A. Madson, Denmark; E. Barber, Basingstoke; L. Bennett, New Farming; G. Park, Devonport; D. Skinner, Edinboro; V. Hutton, Hazel Grove; L. Walden, Enfield; S. Wilcock, Mansfield; L. Cotton, Weston; D. Roughman, Ilmry; R. Sharp, Sheffield; A. Macey, Eastney; J. Milson, Linton; M. Gillibrand, Weymouth; P. Williams, Redditch; S. Beckins, Goringbridge; C.

Campbell, London; J. Fowler, London; S. Dave, Woking; P. Wellington, Langney; L. Davies, Pen; L. Tuckwell, Newhaven; A. Collins, Middleton; D. Beaumont, Broadbury; C. Dewar, Luton; G. Walk, Holland; P. King, Hilsea; J. Walls, Dunsfordine; R.

Michell, Edlington; T. Wan, London; L. Baldo, Rushmore; S. Bell, Grimsby; J. Galvin, Uxbridge; M. Hourigan, South; B. Chambers, Norwich; D. Elson, Darlington; P. Thomas, London; C. Pate, Wokingham; A. Bullock, Warrington; C. Wince, Solihull.



Sharon Fawcett



Denise Marshall



Mar Wellbourn

JOIN THE FAST CATS

IAN SHARPE sticks some go-faster stripes on his assembler



OVER the last few years I've written many machine code programs ranging from a few bytes to a full 19K program. It has been noticeable that as my programming improves with practice, the number of bytes I need to achieve a given result gets smaller, and in general the resultant run faster.

Recently I was writing a game - typically to be published in the near future - and in order to keep it down to a reasonable length I used some very simple algorithms. These had the virtue of being expressible in relatively short pieces of code, but ran much slower than more complicated and intelligent possibilities which would have made the program unacceptably long.

The consequence is that even though the game is in machine code, it is only just fast enough to be playable. A particular problem was the routine that updates the screen. It had a lot of work to do, and was causing a rather blurred effect which I wanted to get rid of.

I decided, therefore, to sacrifice compactness in this one routine in exchange for as much speed as I could wring out of it.

My quest led me to crystallise a few ideas I've picked up for speeding up machine code, and the subject turned out to be such an interesting one I thought I'd collect it all together in one article for the benefit of other machine code programmers.

Most of the ideas I'm about to discuss are not my own, but have come from various sources. What follows is

by no means an exhaustive list, and there are techniques used in commercial programs which I won't go into because they are too involved for less experienced programmers.

Before getting down to details, perhaps I should mention the benefits of paying close attention to the length of time your program takes to run.

Apart from the obvious one of speed - not always an important consideration - the main reason is that you'll be looking very closely at what you've written or are about to write, and playing about with alternative courses of action.

This focuses your mind on why you are doing something a particular way, which in turn will improve your programming ability no end.

So how do we measure the speed at which programs execute? One way is to write a short routine which executes the bit of code you want to test thousands of times in a loop. You can then call it from Basic and use TIME to find out how long it takes, or even better call it a few times and take an average. This approach often works well enough, but it does have a couple of drawbacks.

Firstly, every 1000 seconds the operating system interrupts whatever program is running to do some housekeeping. This stops you being sure how accurate your timing loop is, particularly if you are comparing methods which are very close. Secondly, if you disable interrupts from machine code with a DI it stops the system updating the time count.

A more accurate way of timing a

program is to count T states, which are simply a measure of how long an instruction takes to execute in terms of ticks of the internal clock. How long a tick takes in seconds doesn't matter, the point is that by counting them we can get relative timings for machine code routines. The number of T states an instruction takes is listed alongside the opcodes in any decent reference table.

A minor complication is that the video chip needs to have exclusive access to memory in order to generate the display. While it's doing this the Z80 must hold its thumbs. The net result is that the Z80 only works at about 75 per cent of its full speed capacity.

The basic approach is to write your machine code as you would normally, and then to think of alternative ways of achieving the same result. You will find that one runs more quickly than the others, another will be shorter in terms of length, and if you're lucky they'll be the same routine. Often, though, you have to choose one or the other, but at least you are making an intelligent decision rather than accepting your first thoughts. A writer of English improves his technique by polishing and honing his text, and programmers can benefit in the same way.

What follows is a collection of ideas with some examples. Understand them, and your programming horizons will be broadened.

Relocating the stack

Recently I wrote a program which needed to read a list of two-byte values taking one item each time round a loop. You can probably visualise a system whereby a pointer to the current place in the list is kept, and is being incremented twice each time round the loop.

Then I noticed that I wasn't using the stack for anything, so knowing that a single POP 110 T states is much quicker than:

```
LD A,(R1) ; 7
INC R1 ; 6
LD A,(R1) ; 7
INC R1 ; 6
```

I decided to relocate the stack to the end of the list and simply POP the values out of it. The stack pointer is automatically incremented by two whenever you do, so with this simple alternative that bit of code can almost three times faster.

There is an overhead in

Lookup tables

This one may seem obvious, but it is often overlooked. By way of example, let's say that you are writing a program which writes to the screen memory. If you are taking the trouble to do that instead of using the firmware, you're after speed. Unless space is tight you can allocate 480 bytes to store the start addresses of all 380 screen lines, or the left of a window. This can be generated at the start of the program like this:

```

ld hl,0000      org 1.0, screen
ld hl,table    pointer address table
ld b,00        256 screen lines
loop
ld hl,0000,0   pointer hl and line bytes
ld hl,0,0      0th table
inc hl        point to next entry
inc b
call 0a20     firmware table address
jst 0a10      jst next line done
djnz loop    256 't' again

```

In this way all the calculations are done once and for all when time doesn't matter, and it's quick and easy to translate coordinates into a screen address. I have come across literally dozens of instances where a slow and mind-manglingly complex piece of code has, with a lookup table or two, been transformed into a clean-cut speed monster.

relocating the stack and restoring it afterwards, but that's once only so is dwarfed by the cumulative saving inside the loop. Here's how it's done:

```

#1
ld hl,table,op
ld b,r10
loop
-
-
-
and hl
-
-
djnz loop
ld hl,table,ret
ret

```

If you use this technique, remember that you can't call another routine without restoring the stack. Also, when the operating system interrupts your routine, as it does every 1/500 seconds, it may use the stack and corrupt your lookup table. Therefore you must use a 04 before relocating the stack, and remember to restore the old stack position before turning interrupts back on with an E1.

Self-modifying code

Consider this program fragment:

```

ld hl,0000,01
-
-
org 0100
-
-
ld hl,000000

```

The memory location *zero* may be accessed from various points in the program, and will probably be located in an area of workspace. In most cases this is fine, but what if you've discovered for a bit more speed? There may be a loop where *zero* is read from a large number of times, and this is a case where a bit of self-modifying code can even things up:

```

ld hl,0000,01
-
-
org 0100
-
-
ld hl,000000 org 0-2

```

Here the number we're storing in *zero* is pointed into the location in the program that corresponds to the 0 in LD HL,0.

The time to save to memory is just the same, but when it's loaded back there is a saving of six T states, or more if you are using something other than HL. In fact using 04 you would save 10 T states and that instruction would execute twice as fast as a load from memory.

This isn't the only possible

example of self-modifying code. Look out for a section of program which makes a decision and then jumps off to alternate destinations. If the routines at the destinations are the same apart from the odd speeds, there may be a case for only having one routine and putting the appropriate opcodes into memory depending on the result of the decision. This may not always save time, but it will probably save room.

An example which illustrates the *speed* aspect is Chris Neep's TurboTest routine published last February. You may remember that it was a utility to speed up the printing of characters to the screen. One way it achieved this was to provide a customised character printing routine for each of the screen modes. An early version of the program looked at the screen mode every time a character was sent to it, then jumped off to the appropriate subroutine.

With a bit of lateral thinking it was easy to modify the program to avoid having to make the decision, and thus speed it up even further. Near the start of the TurboTest routine we put a JP 0000 instruction.

Then we pasted a piece of code into the firmware routine which changes screen modes. All it did was to poke an address into the 000000 part of the jump instruction, the address being that of the routine for whatever screen mode was being invoked by the firmware. In this early TurboTest was able to jump straight to the appropriate section of code without having to find the screen mode and make a decision.

Page alignment

When you use a lookup table, and if it's less than 256 bytes long, see if it can fit page aligned. Once I'd returned on to this technique I was able to make some massive savings in programs which I previously thought had been tuned to the limit.

The idea is very simple. Imagine that part of your program is being fed with a number *n* with which it has to retrieve the *n*th item from a table. This quite a common requirement, and assuming the initial value is in the A register, a typical bit of code would be as follows. I've put the number of T states against each instruction:

```

ld hl,table    10 bytes start of table
ld b,0         5 bit value in B
ld c,A         7 bytes 00
-
-
-           14 now a 3 bit offset
ld hl,0       11 add to base of table
ld c,0000     7 retrieve value in B
-           30          pointed to by B
-
-
ret

```

The point is that if *table* is less than 256 bytes long, and if the base address is on a page boundary, in other words the low byte of the address is 0 as in 00000, 00100 and so on, whatever value is added to HL the value in H remains constant. For instance 00000+0FF is 000FF.

Turn to Page 44

From Page 43

so H is 840 before and after the sum.

So, if we arrange for table to be on a page boundary and load H with the high byte of the table address, all we have to do to find the correct place in the table is to load the initial value into L. Here's how it looks in assembler:

```

M,table,0x00,0x00
.
.
LD L,table+4*H ; 1
LD L,H ; 1
LD A,(L) ; 1
.
.
.

```

A mere 18 T states – more than twice as fast, and all because we page aligned the table. It's shorter, too, which is an added benefit.

IX and IY registers

Where possible, avoid them! Why? Because using these registers tends to involve opcodes which are longer and slower than their equivalents for other 16-bit regis-

ters – usually by one byte and four T states. Of course, if the price for avoiding the index registers is to make your code longer and more convoluted there isn't much point. Often though, people use them without thinking when they could just as easily have used one of the other register pairs.

Naughty opcodes

Other register pairs? Surely IX and IY are not pairs, but single 16-bit registers? Wrong! There are some undocumented opcodes which act on the high and low bytes of the index registers in much the same way that you can work with H, L, D, E and so on. They were built in by Zilog – the manufacturers of the Z80 – but weren't documented owing to there being a few problems.

In case you missed the excellent article on these codes in the April 1988 issue, Table 1 details them. In general these codes are four T states and one byte longer than the H or L equivalents. Even so, if by using them you can avoid sending bytes to memory or make your

code less complicated they can produce an overall saving.

The disadvantages are that although these codes seem to be OK, they aren't guaranteed to work under all circumstances. Having said that, I'm not aware of any circumstances where they don't function as expected. Also, although they work on the Zilog Z80 there are some Z80 equivalents from other manufacturers in which they are not present. If Avradar decides to start using one of these in its CPCs next week, you're in trouble! Having said that, you'll be in good company because quite a few software houses will be in the same boat.

Finally, many assemblers cannot cope with these instructions so you have to insert the byte values. Disassemblers often get tied in knots, too.

ADC A,XH	00 8C
ADC A,XL	00 8D
ADD A,XH	00 84
ADD A,XL	00 85
AND XH	00 44
AND XL	00 45
CP XH	00 9C
CP XL	00 9D
DAC XH	00 26
DAC XL	00 2D
INC XH	00 24
INC XL	00 2C
LD A,XH	00 7C
LD A,XL	00 7D
LD B,XH	00 64
LD B,XL	00 65
LD C,XH	00 6C
LD C,XL	00 6D
LD D,XH	00 74
LD D,XL	00 75
LD E,XH	00 8C
LD E,XL	00 8D
LD XH,A	00 87
LD XH,B	00 80
LD XH,C	00 81
LD XH,D	00 82
LD XH,E	00 83
LD XH,A	00 6F
LD XL,B	00 69
LD XL,C	00 6A
LD XL,D	00 6B
LD XL,E	00 6E
LD XL,XH	00 6C
LD XL,nn	00 3E nn
LD XH,HL	00 68
LD XH,nn	00 2E nn
OR XH	00 9A
OR XL	00 9B
SBC A,XH	00 9C
SBC A,XL	00 9D
SUB XH	00 94
SUB XL	00 95
XOR XH	00 4C
XOR XL	00 4D

NOTE: XH and XL are the high and low halves of IX, nn is an 8-bit number. For the IY register commands replace XH with YH.

Table 1. Undocumented opcodes for half index registers

Have a good look at your loops

Few programs do not have loop structures. If you look through you will probably find that some, particularly nested loops, execute hundreds if not thousands of times.

Shaving off a few T states in the body of a loop – even if it's only one or two – can mount up to a huge saving for the loop cycle as a whole.

Optimising your code for speed in these bottlenecks is like opening up the throttle on the whole program, and this applies to any language, not just machine code.

Bits and pieces

How many of you would use LD A,B to put B in the A register? It takes seven T states and two bytes, and those in the know use XOR A which has the same effect in half the space and only four T states. Similarly, CP B isn't as efficient as OR A. Here's another useful trick:

```

ORF B ; 11
OR B ; 10
.
.
.

```

is nearly three times slower than:

```

LD A,B ; 11
LD A,B ; 11
.
.
.

```

but it pales against:

```

OR B ; 10 ; 1

```

Most of you – I assume only the machine coders have survived this far – have used the SET r/A type instructions which set bits in A to one. This takes eight T states, whereas OR n takes seven. The only difference is that the shorter version affects the flags. A similar saving results from using AND

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CONGRATULATIONS on the 500 disc drive project, which I aim to build soon. I hope you will continue with other hardware articles in the future.

The clinic section is also a very good idea, as I'm sure many readers have problems with programming. I enjoy reading the House Call features, and I like the Type-Ins and TO-Links - very useful.

Can you tell me whether it is possible to put a CPC6128 rom in a romboard, and use the extra commands that way?

I have a suggestion for a hardware project: A switch to allow the selection between a CPC6128 rom and a CPC664 rom. My intention is due to the fact that some of the games I have don't work with a CPC6128 rom, so I want an easy way to switch between them.

Can you print the address of a distributor of public domain software? - **Andrew Walker, Glasgow.**

Thanks for the prize. It's always good to get feedback - favourable or unfavourable. We intend to publish the occasional hardware project to gauge the amount of interest, and we'd like both comments and suggestions.

It isn't possible to put a CPC6128 rom in a romboard. The rom is a 28k one containing both basic and the firmware. This appears

Wanted: A method of switching CPC roms

as two 16k ones to the programmer. Romboards are designed for 16k roms, so you'd lose part of the CPC6128 rom, and it probably wouldn't work at all.

Technically, it is possible to piggyback a CPC6128 rom on top of the CPC664 rom, soldering the legs together, except for one which is connected to a toggle switch.

Unfortunately, we can't remember which leg to put the switch in. If somebody knows, we'll pass it on, but it's not a job to be undertaken if you aren't a competent solderer, and certainly not on a machine under guarantee.

We don't feel it is suitable for a full hardware project as we don't want to encourage

inexperienced constructors to make internal modifications.

Public domain software is available from a variety of sources. The problem is deciding where changing for legitimate costs stops, and making a profit starts. Try CPM User Group, 72 Mill Rd, Hoveley, Dartford, Kent DA2 7TC.

Caps locked?

AFTER typing in the routine in the February mail page which gave Proton a caps lock indicator, I decided to write a short machine-code program which would give

ETD Prize letter

the same facility at any time, not just within Proton.

The routine listed below does the trick. Make sure Caps Lock is off, and run the program. Then press Caps

Lock, and the cursor should change to the same colour as Caps L. Press it again and the border should revert to the colour of Caps O.

The machine is Jeppenburg driven, an G414 64000 switches it on, and G414 66000 turns it off. - **Alan Scott, Gwent, Gwent.**

```
100 111
110 1010000
120 00111 000000
130 000 000
140 000 00,01111+000
150 00001
160 0000
170 000, 00+00
180 000 01,11,11,11,00,00
```

```
190 0011 11,00,00,00,00,00
200 0011 11,00,00,00,00,00
210 0011 11,11,11,00,00,11
220 0011 00,10,11,00,00,00
230 0011 00,11,11,11,00,00
240 0011 01,11,11,11,10,00
250 0011 01,11,11,11,11,11
260 0011 00
```

Studying by post

AFTER reading the letter from Steven Harris in the May edition, I had to write to tell you about the experience I had with Microwise UK. I bought an introductory Basic course from them last year. The course is good, but the service is not.

The whole point of the course is that you can do it in your own time, but this is wrong because the delays from Microwise are at least five weeks, with various reasons given.

After completing the last installment in December 1987, I sent in my final assignment asking about further courses. I was told that I should have finished them, but there was a delay because the courses were being reorganised. February came and went, and in

Beep away in GAC

In response to the enquiry made by C. Mariner in the May issue of Computing with the Amstrad regarding the use of sound in the Graphic Adventure Creator, perhaps the following will be of some use.

You can obtain a simple beep by pressing Control+G in messages. It can be used for various acknowledgments, and perhaps a string of beeps could be used to emphasise, say, the com-

pletion of a loop being coded in give a bit more reason.

You can use the beep as a message on its own, or even as a room. It's not much, but it can draw up the message's attention. - **S.J. Duggan, Emsworth.**

■ This method could be used by an enterprising programmer to interface more complex sounds with the GAC. Assuming your game

doesn't completely fill the CPC's memory, there should be room for a bit of machine code.

This would either intercept the firmware routine which prints characters, or the jumpblock entry in the control code table for character saves.

The machine code program could then produce a range of sounds depending on further character values following the control code.

Turn to Page 68

4 From Page 47

March I wrote twice without getting a reply.

Microsize still advertises in the magazines, so I rang them up. It was an answering machine, so I left a message. Two weeks went by and nothing happened, so I rang again. This time I got through to Jim Brown, and was told that I would receive something in 10 to 14 days.

Nothing happened, so I rang again and was told that the message would be ringing tomorrow, and if I hadn't heard anything by the Thursday after Easter I should ring again.

I rang to find the answering machine, so this time the message I left was not polite. I told them I wanted my disc back by the following Saturday at the latest. Wonder of wonders, it arrived the next day. There was also a message that I would be sent information when available. Well, they can keep it as far as I'm concerned.

There was supposed to be a unit about printer use, but there was not. The reason given was that there are too many printers on the market. If this is the case, why put this topic on the list of course contents?

My advice is, keep well clear of Microsize UK, and if possible join a course that somebody recommends. — Mrs. A.P. Johnson, Leek.

Toodler pip

I HAVE found a use for the [F] switch in Pip. Having a tune in Basic that I wished to use in a Logo program, I needed to convert the commands to lower case. I first saved the Basic program as an Apple file, then used:

```
[F] run:Caplock [L]
```

All the SOUND com-

Trouble in th' mill

All this recent talk of disc drives prompts me to relate a problem I encountered a while ago with my CPC620. Since removing a disc while the drive was still spinning—not reading or writing I hasten to add.

Normally this causes no problems, but when the disc was half out I remembered that there was something else on it I needed, so I shoved it back in.

Unfortunately, the angle wasn't quite right and the disc caught on something and jammed. A bit of fiddling and a few jabs at the release button freed it, but oh dear what a nuisance!

On reinserting the disc, the drive made ominous noises and refused to read it. I needed that drive

working, and pronto. Where do you get a quick repair in darkest North Wales at 9.30 on a Saturday night?

I duly set about my key-board with a screwdriver. With the casing off, the disc drive came out fairly easily—a couple of screws and connections to remove. I couldn't see anything wrong, but I was desperate. I removed the front plate and unscrewed the bottom circuit board. Pulling out a plug allowed it to swing free, and all was revealed.

There is a rubber bell connecting the motor to the bar which clings on to the disc, and this had detached. It was a five-minute's work to put it back on and reassemble the drive, which then worked per-

fectly. I wonder how much a repair shop would have charged, and how long I would have been without my CPC.

One thing I noticed was that although there was a bit of dust inside the mechanism, despite nearly three years of heavy use the drive head was as clean as a whistle.

This makes a bit of a nonsense of these expensive cleaning discs you see advertised. Actually, 3in discs have an internal pad to keep the surface clean, so it's not surprising really.

If the head did get dirty, it is accessible without removing or dismantling the drive, so a bit of fiddling on a cotton bud would do a far better and cheaper job. — A. Hughes, Colwyn Bay.

Speedier screen saver

WITH reference to a letter from Tim Oliver in your May issue, you replied to his question by saying that the easiest way to store the disk values was to poke them into the last few bytes of screen memory which are otherwise unused.

The problem is, you don't know the disk values in the first place, and POKEing them every time you issue an **INK** command is painful and boring.

You can avoid these problems, as the CPC stores the ink values in memory locations 47081-47076.

There is a second list in locations 47076-47080 for flashing ink. Unfortunately these are stored as hardware colours, and the numbers can't be used in the **INK** command.

I use a similar short machine code to the one you printed which I enclose.

Before copying the screen down to 84000, the two sets of computer screen values are copied to two areas of screen memory which are

not displayed on the screen.

After copying back, these areas are transferred back to locations 47081-47076 and 47076-47080 to create the correct screen colours.

I have been programming in both Z80 and 8502 machine code for many years, but I am fairly new to the CPC620 operating system. Could you refer me to a decent book which contains the firmware routines? — Simon Good, Reading.

■ A good effort, but had you read Amsoft's Firmware Specification (SOFT 968) — available from M.J.C. Supplies an advertiser in this magazine — you would realise that there are problems with your routine, which is why we haven't printed it.

Tim specifically referred to a program he had written, so he must have defined, and therefore known, the ink values to want to save them. The numbers would only need to be poked once just before saving the screen,

and not every time an **INC** command was issued.

If he organised his program with this need in mind, he could store the values in an array, making them easy to get at.

The problems with your method are that it would not work if the screen was loaded and saved from **SC000**, and more importantly the memory locations you are using are specific to the CPC6128 and would not work with a CPC664.

Amrad discourages the use of undocumented addresses for this very reason, and provides a comprehensive list of operating system routines to avoid the need for their use.

In this case there is a call at **80C35** which on any model will return in **BC** the two colours an **INC** number in **A** is displayed in. The values in **B** and **C** are then usable from Basic or machine code.

Programs which really do need to use undocumented addresses should find out which machine they are sitting in by probing the Basic rom for its version number, and selecting the appropriate address from a table.

To save further anguish for people who don't know what their **INC** values are, the following routine improves on the one printed in May.

It still has two calls to copy the screen up and down, but there are two extra ones. The first transfers the current ink value to a specified address and the 32 bytes leading up to it. The second sets all 16 **IN0s** to those specified at an address and the 32 bytes leading up to it.

CALL B100 to copy down to **8000**

CALL B10C to copy up to **8000**

CALL B118, address to save ink.

CALL B132, address to set ink.

If the screen was stored at **80000** and needed to be saved from there, it would be saved and loaded as follows:

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CALL 015, 0111
001701010, 1, 4, 1000, 5000

001701010, 1000
CALL 015, 0111

80FFF is the end of the screen memory when the screen is at **80000**. If the screen is stored at **84000**, the address to use for storing links is **83FFF**. Remember that copying the screen from **80000** to **84000** will erase any links stored at **83FFF** downwards.

1 0011 10,10,10,10,00,00,01
2 0011 00,00,10,00,00,01,00
3 0011 01,11,00,10,01,00,00
4 0011 10,00,10,00,00,00,00
5 0011 00,00,00,01,00,00,00
6 0011 11,11,11,11,00,01
7 0011 10,10,11,00,10,01,01
8 0011 11,11,10,00,00,00,00
9 0011 00,01,00,10,10,00,01
10 0011 01,10,11,00,10,01
11 0011 11,11,11,
12 0011 11,11,11,
13 001000
14 0010 0011 0011 1000
15

16 0011 1,01110,001,1,1,1,1
0010 11
18 001 101 1 00100

Reading list for beginners

A **COUPLE** of years ago my wife and I bought an Amstrad CPC6128 and DMF2000 printer. We knew absolutely nothing about computers, so we bought Mini Office 9 to print our 4.4 size pages of a video film catalogue.

That was the only use we had for our CPC for over a year. Then, out of curiosity,

started writing and you could be one of the winners.

The address is: Postbag, Computing with the Amstrad, Europa House, Adlington Park, Adlington, Macclesfield SK10 4MP.

I've bought a book on programming, and when that we have not looked back. At first we had never heard of the **GO2LR** command. Now we are able to program our own databases, simple games, and some minor Pascal programs for our children.

We would like to pass on the following ideas which have opened up an entirely new world of computing, taking us from complete novices to improving programmers:

□ **Basic Programming on the Amstrad Computers CPC664, 664 & 6128, and Graphics Programming Techniques on the Amstrad CPC664, Winford Jones, Micro Press ISBN 0-7447-0026-1 and ISBN 0-7447-0027-2**

□ **Introducing the Amstrad CPC664, Jennifer and Cameron Proctor, Micro Press ISBN 0-7447-0027-2**

□ **Structured Programming on the Amstrad Computers CPC664, 664 & 6128, Stephen Raven, Micro Press ISBN 0-7447-0024-0**

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□ **Exploring Adventures on the Amstrad CPC664, Peter Derrard, Dordrecht Home Computing ISBN 0-7126-7627-6**

□ **Assembly Language Programming for the Amstrad CPC664, 664 & 6128, A.P. and D.J. Stephenson, Agave Books ISBN 0-85023-801-6**

To get hold of a copy of any of these books, all you need to do is quote the refer-

mation at W.A. Smith who should be able to order it for you. - A & T Pascoe, Walsworth.

Down in the dumps

REGARDING Ian Sharpe's review of *and screen dumps for the DMF2000*. As far as I know it isn't the February issue. I seem to have run into a real problem running the program.

I use the dump to provide printed listings of disc catalogues. It works fine except that it skips off from column 80 onwards in Mode 2. Modes 1 and 2 are also affected.

I use ordinary A4 paper, and my printer is the DMF2000. As far as I know it uses ESC & for 840 dot full image printing. Could you help please? - G.M. Perkins, Ashford

■ The DMF2000 does indeed support ESC &, but 840 dots in this mode are too wide for A4 paper. The point is that the Shinwa type printers ONLY have that way of getting a 840 dot print-out, and on these printers it gives a dump of the correct width.

On the DMF2000 and other true Epson-compatibles, ESC & is not the only way of getting 840 dots, and one of the alternatives is required to get the correct width. This is built into the routine, and all you need to do is alter line 760 to CALL 80000,1 as described in the article.

Whoops!

In the letterhead designer published in July, minor errors crept into lines 760 and 761. In line 760 change the value of *n* from 760 to 800. In line 761 change *n* from 1880 to 1900.

Apologies for the mistake. The effect is to print the wrong line number if you make a typing mistake in the data lines.

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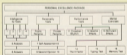
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Shelling out for strings

AFTER reading the excellent series in the June and July issues on sorting data, you may be frustrated by the speed — or lack of it — at which Basic can deal with such tasks. When a large amount of information is involved, it's definitely a case of patience being a virtue. Fortunately, with my ability you can throw said virtue out the window.

Anyone who has, or is developing, a Basic program that stores and manipulates string array data — for instance a mailing list, club membership register, or accounting system — will find Program 1 invaluable. It installs some machine code which is capable of sorting a string array into ascending or descending order. It also gives a quick — literally — demonstration of its power.

After running the program, the syntax for using the facility is:

```
CALL SORT,sort,
        sort1ff,sort1,sort1,sort1
```

That may look complicated, but in practice it is quite straightforward. Say you have a string array called `sort2`. It has 100 elements numbered 0-99, and you want them in descending order.

Your program will have incorporated Program 1, so the variable `sort` will already be set up with the correct value — the address of the sort routine. If you are sure what you are doing, you can alter the value of `sort` in the

header so that the machine code lives wherever you want it to. If you don't understand that, don't fiddle with it!

The variable `sort` tells the routine whether it has to sort in ascending or descending order — 00 or 01 respectively. `sort1` and `sort` are the first and last elements of the array to be included in the sort. In this case they will be 0 and 99, but you can work on any subsection of the array you want:

```
CALL SORT,sort,sort1ff,sort1ff,sort1ff
```

One point to note is that value of `sort` must be greater or equal than two, and `sort1` must be less than or equal to `sort-2`. This program will only work on string arrays, so you must convert numeric data to string format using the `STR$` command.

And that's all you need to use the utility, but for those interested in the nuts and bolts here is some background information. Sorting is one of the most common operations in applications programming, and a

great deal of research has gone into the development of efficient algorithms. Previous articles have explained how most of these work, so I'm not going to go into great detail. However, I would like to explain why I chose the shell sort.

Three non-job specific methods were narrowed down as contenders, namely the quick, selection and shell sorts. Quick sort, as the name implies, is fast. However it was ruled out because it requires dynamic array space in which to store its partition pointers. Or more simply put, it needs two extra arrays for intermediate results, which in turn consumes precious memory.

Selection sort was put aside due to the fact that the same number of compares and swaps is made if the list is random, or if only one element is out of order, therefore making it quite slow.

Shell sort, however, is pretty fast for

Turn to Page 66 ▶

POPping and PUSHing the variables

BEFORE designing the machine code I created a must list:

- It must be relocatable, in other words it should be capable of being used anywhere in memory.
- Variable length strings must be handled along with empty elements (null strings), the latter being considered as less in value than any other string.
- It must be capable of sorting in ascending or descending order.
- It must be able to sort all or part of an array.
- Finally it must be robust, simple to use, and fast.

(Specify the methods by which

these aims were achieved as follows. The way the program gets over the relocation hassle is to PUSH and POP all its variables on the stack, and all conditional and unconditional jumps are made relative to the PC (program counter), and not referenced to any fixed memory address.

The peculiar values of `ord` are due to them being 255 spoolies for JR C and JR NC. The first parameter in the call (the second sort after CALL) is so that an address within the program can be calculated where the value of the `ord` instruction is inserted. This

controls the order of the sort.

After DIMensioning a string array Basic creates a list of three-byte elements called string descriptors, one for each element in the array. They take the form:

- byte 0 — string length
- bytes 1 and 2 — string address

Using this knowledge, swaps are achieved by interchanging the string descriptors and not the contents of the strings themselves, which could scramble memory and corrupt your data. Null strings have a zero in the descriptor's length field, so they are easily identified and managed.

4 From Page 33

random lists and does not require extra arrays. As you will remember, shell sort works by applying half the array size as a gap, and successively comparing and swapping elements as necessary. The gap is halved with each repetition until finally adjacent elements are compared. At this stage the array is sorted.

In general purpose Basic the

algorithm looks like this:

```

10 DIM array(100)
20 FOR i=1 TO 100:READ array(i):NEXT i
30 FOR j=1 TO 100:FOR k=1 TO j-1:IF array(k)>array(k+1) THEN SWAP array(k),array(k+1):NEXT k
40 j=INT(j*.5)
50 NEXT j
60 IF array(1)>array(100) THEN SWAP array(1),array(100)
70 SWAP array(1),array(100)
80 NEXT j
90 IF array(1)>array(100) THEN SWAP array(1),array(100)
100 IF array(1)>array(100) THEN SWAP array(1),array(100)
    
```

Of course there isn't a SWAP

command in Amstrad Basic to exchange the values in the array elements, but I put it like that to make the method clear. Do not type this example in, it is for explanatory purposes only!

To see a working version I suggest you refer back to the Sort it Out series published in the June and July issues and compare the timings to those produced by the machine code. You'll be astounded at the results - it's about 25 times faster.

```

1 DIM array(100)
2 DIM i,j,k
3 DIM swap(1)
4 DIM swap(1)
5 DIM swap(1)
6 DIM swap(1)
7 DIM swap(1)
8 DIM swap(1)
9 DIM swap(1)
10 DIM swap(1)
11 DIM swap(1)
12 DIM swap(1)
13 DIM swap(1)
14 DIM swap(1)
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22 DIM swap(1)
23 DIM swap(1)
24 DIM swap(1)
25 DIM swap(1)
26 DIM swap(1)
27 DIM swap(1)
28 DIM swap(1)
29 DIM swap(1)
30 DIM swap(1)
    
```

```

17 DIM swap(1)
18 DIM swap(1)
19 DIM swap(1)
20 DIM swap(1)
21 DIM swap(1)
22 DIM swap(1)
23 DIM swap(1)
24 DIM swap(1)
25 DIM swap(1)
26 DIM swap(1)
27 DIM swap(1)
28 DIM swap(1)
29 DIM swap(1)
30 DIM swap(1)
    
```

```

31 DIM swap(1)
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92 DIM swap(1)
93 DIM swap(1)
94 DIM swap(1)
95 DIM swap(1)
96 DIM swap(1)
97 DIM swap(1)
98 DIM swap(1)
99 DIM swap(1)
100 DIM swap(1)
    
```

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