

Computing *with the* AMSTRAD

Vol. 2 No. 4
April 1985
£1

The independent magazine for Amstrad computer users



HIDDEN OPCODES REVEALED

EXPLORE

3D arrays
Recursion
Z80 stack and
Program Counter
CP/M PIP

PLAY

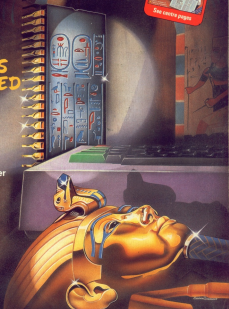
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Yahtzee

UPGRADE

512k RAM
reviewed

STORAGE

How to cram
more into RAM



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Computing with the AMSTRAD

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Keep up to date with the latest happenings and arrivals in the ever-expanding world of the Amstrad.

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All about our next great Amstrad Computer Show. We've moved to Manchester in the New Century Hall, Corporation Street on Saturday and Sunday, March 22 and 23.

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The part of the magazine you write yourselves. Just a small selection from our bulging mailbag.

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In his regular section Jo Stork examines the problems of matching software to your company's needs, and reviews Personal Assistant from PMP and Cashbook Accounts from Amsoft.



Some of the features of the new Mini Office II

With advanced processing you can...

- Generate databases in compressed format
- Transfer records from database to personalised records
- Change file sizes
- Multiple methods of sorting
- 25 columns, 80 columns or 4 characters
- 80 columns, 80 columns or 4 characters
- Customise reports for printing and screen
- Add text, lines, dates and times
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With the database you can...

- Access the database
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Database proudly presents...

When it was launched in October, 1984, Mini Office was acclaimed as the most innovative software of the decade, creating new standards in serious programming — and at a price everyone could afford.

Since then it has become far and away one of the best-selling packages ever created for the home computer, frequently displacing games from their position in the Top Ten. And, unlike most software releases, it is still as much in demand now as it was 15 months ago.

Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

The answer is — by making it even better! And the new Mini Office II is certainly that ... in every respect.

While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

The result is the most comprehensive suite of business programs ever produced for the Amstrad — and still the best value ever.

And it comes with a no-nonsense, easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.

It's a word processor...



It's a database...



It's a spreadsheet...



It's MINI OFFICE II on the Amstrad 464, 664 and 6128

Software

ORDER FORM
ON PAGE 71



It's a graphics pack ...



It's a comms pack ...



It's a label printer ...



All 6 modules for £14.95 (cassette), £19.95 (3" disc)

Back to where it all began...

On June 21, 1948, a group of distinguished scientists witnessed the birth of the world's first stored program computer, pictured here. Built mainly out of war surplus electronic valves, it proved to be far too large for the room in which it was to be housed and so overflowed into the corridor. It was known as the Manchester Mark 1.

NOW - nearly 30 years later - the city which saw the birth of the computing revolution is about to host an event dedicated to a range of machines no bigger than typewriters and costing only a fraction of the price, yet infinitely more powerful than their giant granddaddy. For this is to be the...

FIRST
NORTHERN

AMSTRAD COMPUTER SHOW

Organised by
Desktop Publications

The first two Amstrad Computer Shows played to packed houses in London. Now the event comes to Manchester, and with even more to offer.

Subscribers invited to the include: AME, Amrad, Amrad Clear Club, Amrad in Action, Amrad Computer User Forum, AMSEC, Amey, Barchings, Bicom, Educational Computer Software, Custom Software, Custom Systems, Data, Computer Software, Computer Workshops, Computing with the Amstrad, Custom Systems, Data, Data International, Data Electronics, Desktop Design, Design, DRI Process, DSI Computer Graphics, Duxton Studio, Eastford Micro Centre, Eplus, Elmwood, Galeside, GEM Distribution, Gemini, Graphic Software, Interceptor Software, Interlink Services, John Riley, KDS Electronics, LCC, Lead & Bin, Management, Micro Systems, Minerva, Minicom, Star Company, Starline, Northern Computers, Pace, Phoenix, Phoenix Software, Quest Support, Saxon Computing Services, Stone, Stockport, Stone, Software International, Software Plus, Thomas, Maynard, Leisure, Vision Electronics, Visionline

If you own an Amstrad - or are just thinking about buying one - this is the show you cannot afford to miss!

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Sunday, March 23 - 10am to 5pm

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MODEM USERS 'PUT AT RISK'

A LEADING modem manufacturer says problems with government red tape are forcing Amstrad users to risk fines of up to £1,000.

Barry Kite, managing director of DataStar Systems, the company behind the Magic Modem, said: "Amstrad owners are buying non-approved modems like realising they can face heavy fines for using them.

"For most people are unaware that while it is not illegal to sell them, it is illegal to hook them up to the telephone".

Kite doesn't cast the companies selling non-approved modems for sale as the villains of the piece.

"The trouble is that manufacturers often have to wait several months to get modems passed", he said. "We know this has been marketing non-approved modems".

Delays like this after initial heavy investment costs could put some people out of business. So in desperation some offer their machines without approval.

"It's all down to the bureaucracy".

The situation is further complicated - according to Kite - by conflicting reports questioning just who has the authority to approve modems since new telecommunications legislation was passed.

"At least two different government bodies seem to have got in on the act", said the DataStar boss.

"And if that wasn't enough to cause confusion, even BT itself has been marketing non-approved modems".

Confronted by Computerworld with the Amstrad, a BT spokesman confirmed that Amstrad owners who use non-approved modems can be fined up to £1,000.

Sugar shows City how it's done

AMSTRAD achieved record profits of £28 million in the first six months of its current financial year, thanks mainly to the success of its computer products.

The news rocked City analysts back on their heels, as most had forecast the figure would not exceed £19 million.

"Alan Sugar doesn't seem to be able to put a foot wrong at the moment", one leading stockbroker told Computerworld with the Amstrad. "With him at the helm, Amstrad almost certainly own has restored the confidence in the UK micro market".

The latest results reveal that profits had almost tripled over the same period of the previous year, while turnover doubled to £70 million.

At the same time company founder Alan Sugar saw his 50.4 per cent stake rocket in value from £27.5 million to £188 million on the day of the announcement.

In his interim report the



Alan Sugar... sees further expansion of the Amstrad range.

chairman revealed that demand for Amstrad computers had been far higher than expected in the UK, France and Spain.

"Amstrad's flexible approach was again demonstrated by our ability to respond to this with a rapid organisation of extra production capacity, enabling us to achieve a much higher level of sales during the period", Sugar reported.

Looking ahead to the second half of the year, the chairman forecast further expansion due to moving into the American

market. Having signed an agreement with "a substantial American company", Amstrad now hopes to establish a beachhead in North America without taking capital.

"The USA represents a massive market, with great potential", said Alan Sugar. "However the approach we are taking will limit our financial commitment to the cost of opening a liaison office to coordinate this business".

Commented one observer: "It seems that Amstrad leased a lesson from Acorn, who lost £6 million in their attempt to get into North America".

Although Alan Sugar made no announcements about additions to the Amstrad computer range, there was a veiled reference to the subject in his report.

Referring to the CPC-604, the CPC 612B and the PCW 8250, he said: "Further innovations in these product ranges are planned and will reflect in next year's financial results".

Waiting for the big one

ALTHOUGH no official confirmation is forthcoming from the company, it is an open secret in the trade that Amstrad plans to launch a more powerful version of its PCW8250 shortly.

Industry observers believe the new machine will be called the PCW8512, have 512k of RAM and cost about £1900 more than the 256k PCW which has achieved phenomenal success since its launch.

Amstrad's official position is that "we are no longer prepared to discuss what our future product plans are on the grounds that such disclosure may compromise our commercial edge".

But third party suppliers are so convinced that the new machine is imminent that many of them are already developing products to support it.

Business of a PCW8512 have even stopped the

process at publisher John Wiley and Sons which was planning to launch a book titled Mastering the Amstrad PCW8250 at the Amstrad Computer Show in Manchester on March 22 and 23.

Spokesman Geoff Farrell said: "We are expecting an announcement about the new machine from Amstrad any day now. When it comes the book will be entitled Mastering the Amstrad PCW8512".

New products line up for Amstrad Show

THE countdown to the third national Amstrad Computer Show has begun, and technicians busy across the country are putting the final polish on a host of new programs and peripherals for CPC and PCW users.

The show, which takes place at the New Century Hall, Corporation Street, Manchester, on Saturday and Sunday, March 22 and 23, was fully booked within a week of its announcement.

At least half of the 57 firms who will be exhibiting are expecting to bring with them their latest developments for the Amstrad machines.

As *Computing with the*

Amstrad went to press the tally of new products scheduled to make their debut at the show had reached 55.

Added to which will be special offers from all the leading Amstrad suppliers to delight bargain hunters.

Sure to attract plenty of attention will be Spansia Microsystems' long-awaited add-on board from German developers Veritas, giving the CPC 6128 IBM compatibility.

Production problems prevented this product's appearance at the January Amstrad Computer Show in London, but it is likely to be a star of the Manchester exhibition alongside Spansia's other launches — a limited expansion board for the 6128, a 20-mbyte hard disc drive and a variety of disc stations.

Orlik has five new products lined up for the CPC range — a modem packed with interface and software priced £36, a telecommunications downloading package for £30 and three Honeywell peripheral boards.

They are an 8-bit parallel card which allows interface with peripherals such as printers and robots, costing £19.95, a ROM card which allows instant access to ROM-based software at £18.34, and a dual RS232C serial interface card for £28.95.

The Microfile card index package from Corin which was previewed at the January show will be launched in Manchester. Intended for the CPC series, it costs £19.95 on cassette and £24.95 on disc.

Corin will also be revealing an 8288 version of its Simple Accounts software.

There will be three product launches by dTronics — bank switching software as a separate utility in ROM format for the CPC486, a similar addition for the CPC6128, and a 2866 silicon disc operating system on ROM for the 6128.

Vulcan Electronics will be offering a new mouse and associated software at under £50.

A certain eye-catcher will be the preview by AMS of the Amstrad version of its highly acclaimed PageMaker.

A complete English 0 level course with real speech facility for the CPC range is LCL's contribution to the education sector. The 24 program course, called Micro English, costs £24.

Also for educationists are Amstrad conversions of three programs from Source Educational Software — *WorldWise*, *WordWing*, and *Animal Vegetable Mineral*.

There is an impressive array of new business software, including costbook accounting



New release on the entertainment front... Acorn's Moon Cresta

from MicroSimplex, ProMerge and PodBall from Amos, the PCW version of Connect System's Money Manager, accounts and payroll programs from Computer Contacts and Maple File from SageSoft.

New for home entertainment enthusiasts are a stereo sound amplifier and a music generator from Vanguard Leisure, the third program in Design Design's Dark Star trilogy, *Fortnite Planet*, and an arcade game based on Michibumi's Moon Cresta from Incentive.

The chart topper

AMSTRAD users have voted the original Mini Office package the best serious software on the market — not once, but a remarkable four times out of five in recent polls conducted by a national user magazine.

It topped to second place only once during the past five months in readers' Top Ten charts published in Amstrad Action.

That was when votes for two other programs — *Taxword* and *Answer* — were combined.

Says editor Peter Cornall: "The original version of Mini Office is definitely worth the wait as far as our readers are concerned."

"How there's an interesting prospect in store... what happens if Mini Office II has a similar success?"

Stock facts on tap

SHOPKEEPERS needing access to up-to-date stock information can obtain it with Retail Stock Control, claims Colchester Computer Centre.

The program, for the Amstrad 6266, has a capacity of 1300 records a disc, can maintain up to eight characters of code, 40 characters of description, a six character information line and number of units sold year to date.

The system supports a number of printouts and dis-

plays stock in, stock out information and editing of stock code details.

Printouts and displays include lists between record numbers, search by stock code, goods to be returned, sort through of stock by description, a stock take form, retail and trade price lists, items below re-order level, unused stock codes, price labels and stock value. Retail Stock Control costs £85 and can be customized to include other features.

CP/M PLUS TRAINER

A DISC-based training program to teach new Amstrad PCW 6256 users about the CP/M Plus operating system has been released by MicroCal.

The program uses the simulation techniques pioneered by MicroCal in which a representation of the operating system appears in the upper half of the screen with tutorial guidance being displayed below.

The user is prompted to perform functions such as renaming or erasing files, or listing a directory. If in error, the upper half reverts as would the operating system while the guidance below helps to explain the problem.

Available initially by mail order only from MicroCal, *Handle On CP/M Plus* costs £39.95.



SIX BUDGET RELEASES

THE six new budget priced releases for the Amstrad CPC range from Blasty Computer Games - all priced £1.99 - have the player up against a fine array of enemies.

In *The Balls*, here Hunchle must deal with 15 screens of moving platforms, armed guards, bombs, bats and more before being able to save his blonde beauty friend.

Volcanic eruptions and alien farms are the obstacles in *R.E.M.*, in which a remote exploration module is used to remove radioactive waste from 20 vast underground caverns.

In *Wiggler* the player must save his Kibbi garden from an invasion of insect crawlers - nasty spiders, chiving gremlins and slimy snails.

The local inhabitants of an inhospitable planet cause problems for Captain Roger Wiles, hero of *Wireless Roger*. They distract and hide his spaceship which must be found, rebuilt and reengineered.

Life Expectancy Zero is a title game in which the player dodges a destructive burst of mean riders. This program is used with the Tronics speech interface.

Fella the Platter is the victim of *Jumpman*. He consistently harasses Hubert C. Jumpman as he tries to change the colours of a series of blocks by jumping on them.



Medieval combat in Knight Games

LATEST ON THE GAMES FRONT

MOON MENACE

SLITDOWN from Arktype Software for the CPC range features 3D full colour graphics.

As the only human being saved of *Zor Wars* HD on the Moon, the player has to beat an out-of-control central computer to prevent the unstable nuclear reactor from reaching meltdown.

The game is available for the CPC6128 on disc for £14.95 and on tape for the CPC464 and 664 for £9.95.

Clued up

PERENNIAL family favourite board game *Cluedo* has been converted for the Amstrad CPC series by Winchester Holdings under its Leisure Games label.

The computer version of the famous *Winningtons* product allows up to six people to play, with any or all rules being taken by the computer.

The program includes three skill levels and makes use of the Amstrad's graphics and sound facilities. *Cluedo* costs £9.95 on cassette age £14.95 on 3in disc.

Ghoulish

LATEST young programmers to join the Bubble Bus Software team - Paul Hildred and Simon Jones - have come up with *Deathville*, a game of ghosts and graveyards available for Amstrad machines on disc at £12.95 and tape £8.95.

Combat from the past

HELPING to bring the former glory of the Holy Roman Empire back to life is Domark's latest game for the Amstrad.

Gladiator puts you in the role of a slave who must fight for his freedom at the emperor's gladiator school. This means winning through 15 sections and collecting enough prize money.

The first 20 people who send proof of achieving this goal will receive a numbered Certificate of Freedom and a chance to take part in a grand tournament.

The winner will receive a specially commissioned *Winstator* sword engraved with their name.

Gladiator, which costs £9.95, has three different skill levels, five screens, 24 different moves and 48 weapons to choose from.

Also going back in time for its theme is *Knight Games*, from English Software. Its aim is to bring medieval combat to life on the Amstrad 664, 884 and 6128.

The player's skills are challenged in sword fighting, axe twirling, archery, customer-staff bantering, crossbow shooting, ball and chain juggling and polestaff contests.

Knight Games which has single or two-player combat modes, costs £9.95 on cassette.

Skyfox flies on 464

SKYFOX - a number one in the software charts last summer - has been converted for the Amstrad CPC464.

The 3D scrolling flying simulation game from Arktype has five skill levels taking the player from coiled to ace of the base and 18 scenarios including training missions and massed invasion.

Its other features are air-to-air or air-to-ground missiles, laser cannons, heat seeking missiles, guided missiles, concussion and space computers to help locate

the enemy and autopilot. Price: £9.95.

Arktype has also released a mind-teaser of a game, *Think!*, again for the CPC464.

The game is similar to *Connect 4* and involves the player getting four of a colour in a row to win.

Players can either compete against each other or against the computer. There are seven different skill levels and four different modes - against the clock, replay, hint and tutorial. Price: £9.95.



Meltdown... on the Moon

A Picture is worth a Thousand Words



"... the 15 different screens are absolute masterpieces of graphical design. The colours are mixed well and the animation and use of characters is extremely impressive... Thoroughly recommended".

Beleg Jan/Feb 1986

"... it has been produced on such a scale that it takes on the aura of an adventure program... a bewildering variety of detailed graphics and excellent animation".

Secret Jan/March 1986



STAIRWAY TO HELL

For the AMSTRAD CPC464, 664, 6128

Release date 14th March 1986

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**SOFTWARE
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HIDDEN OPCODES

Revealed

THE Zilog Z80 chip contains some 200 well-documented instructions, which machine code programmers will be used to. There are also some 98 "hidden" instructions that are not mentioned by Zilog and which you may not be familiar with, but which appear to work on all Z80 chips.

These extra instructions have been known about for some years now, and I take no credit for discovering them. Some games software writers are using them, either for convenience or in protection systems to confuse the unwary hacker.

But as the majority of assemblers/disassemblers packages around do not recognise them it can be very difficult to find out how other programmers are using them, or to use them in your own programs.

There is however one assembler for Amstrad machines that does accept these hidden instructions, and that is the Code Machine from Pictanque which was reviewed in the October 1985 issue of Computing with the Amstrad.

So what are these extra commands, and where have they come

MARTIN RIDOUT
describes the 98 hidden instructions to be found on the Z80 chip

from? The majority are concerned with the IX and IY index registers, but there is one Shift command that appears to be missing. Here is a list of the Rotate and Shift commands, all but one of them have a left and right version!

RLC	RRC
RL	RR
SLA	SRA
RLD	RDD
	SRL

The final one, SRL (Shift Right Logical) has no left hand counterpart - which should be SLL (Shift Left Logical) - and there is a gap in the logical sequence of hex codes where these instructions should be from 00 30 to 00 37.

Experimenting with these op

codes shows that the instructions are recognised, and a logical shift to the left does occur. But it does not do exactly as you would expect. Looking at the published explanation of SRL, the register is shifted to the right by one bit; bit 0 is copied into the Carry flag; and 0 is placed in bit 7.

SLL would be expected to do the opposite, and it does, almost. It shifts the register to the left by one bit and copies bit 7 into the Carry flag but instead of putting 0 into bit 0, it puts 1 into it (see Figure 1).

All the flags are set/reset exactly as for SRR. So once that you know that SLL does indeed work, though not as you would expect, why not use it? It's

SLL (HL)	CB 36
SLL (B) (+-nn)	00 CB nn 39
SLL (D) (+-nn)	FD CB nn 3B
SLL A	CB 37
SLL B	CB 38
SLL C	CB 31
SLL D	CB 32
SLL E	CB 33
SLL H	CB 34
SLL L	CB 35

Table 1: The SLL forms and opcodes

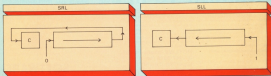


Figure 1: Comparing the contents of bit 7 after SRR and SLL

HL command			IX or IY command		
ADD	A, (HL)	06	ADD	A, (IX+2)	DD 66 06
DEC	(HL)	35	DEC	(IX+5)	DD 35 05
LD	A, (HL)	7E	LD	A, (IX+6)	FD 7E 06
LD	(Incrd, HL)	32 (no r/n)	LD	(Incrd, IY)	FD 32 (no r/n)
RES	1, (HL)	0B 8E	RES	1, (IX+5)	DD CB 0B 9E

Figure 11: Some HL commands and their index register equivalents.

not an earth-shattering command, but could be useful. Table 1 shows all the SLL forms, and their hex opcodes.

But let's go back to the majority of these hidden instructions, which relate to the IX and IY registers. If you study the opcodes for any index register command and compare it with the HL register equivalent, you will see that the index register opcode is simply the HL code preceded by DD (for IX) or FD (for IY), with the inclusion of an offset byte where required (see Figure 11).

However there are some gaps in the logical sequence of codes for the index register instructions. Take, for example, LD A,H (hex code 7C). There is no published IX or IY equivalent, whose hex code would be DD 7C or FD 7C.

But if you experiment with these codes you will almost certainly find that the high 8 bits of IX or IY will be loaded into the accumulator. Similarly, DEC H (opcode 2B) will, if

unless careful precautions are taken to protect the interrupt routines, these extra four registers can be extremely useful.

All these new instructions handle the individual halves of the index registers, and as their opcodes relate to the H and L registers. We'll refer to them as XH and XL for the high and low halves of the IX register respectively, and YH and YL for the individual halves of the IY register.

The complete list of extra instructions and their opcodes are given in Table 11. Any flag changes that result

from the new instructions are the same as for the equivalent H, L or HL instructions.

Although these extra instructions are not acknowledged by Zilog in their Z80 documentation, I have not yet heard of a Z80 on which they do not work. But perhaps you know differently. There is always the possibility that Zilog could produce a version of the Z80 that does not accept them, but as modifications to an already popular and proven chip would be very expensive, I think that it is unlikely to happen.

The majority of these hidden opcodes relate to the IX and IY registers

preceded by DD, decrement the high half of the IX register, and if preceded by FD will decrement the high half of IY. Again DEC L (opcode 2D), turns into DEC XL (opcode DD 2D).

Suddenly we have another four 8 bit registers available to us - the high and low halves of IX and IY. And on the Amstrad, where the alternate register set is all but unavailable

ADC	A,XH	DD 8C	LD	XH,A	DD 67
ADC	A,XL	DD 6D	LD	XH,B	DD 6D
ADD	A,00H	DD 86	LD	XH,C	DD 61
ADD	A,XL	DD 85	LD	XH,D	DD 62
AND	XH	DD 84	LD	XH,E	DD 63
AND	XL	DD 45	LD	XL,A	DD 6F
CP	XH	DD 8C	LD	XL,B	DD 68
CP	XL	DD 8D	LD	XL,C	DD 69
DEC	XH	DD 2E	LD	XL,D	DD 6A
DEC	XL	DD 2D	LD	XL,E	DD 6B
INC	XH	DD 24	LD	XL,XH	DD 8C
INC	XL	DD 2C	LD	XL,nn	DD 2E (n)
LD	A,XH	DD 7C	LD	XH,XL	DD 65
LD	A,XL	DD 7D	LD	XH,nn	DD 2E (n)
LD	B,XH	DD 44	OR	XH	DD 84
LD	B,XL	DD 45	OR	XL	DD 85
LD	C,XH	DD 8C	SBC	A,XH	DD 8C
LD	C,XL	DD 4D	SBC	A,XL	DD 8D
LD	D,XH	DD 54	SUB	XH	DD 94
LD	D,XL	DD 55	SUB	XL	DD 95
LD	E,XH	DD 5C	XOR	XH	DD AC
LD	E,XL	DD 5D	XOR	XL	DD AD

Table 11: The "hidden" index register instructions. XH and XL are the high and low halves of IX respectively. For the IY register commands, register 2D will be FD.

If you can cast your mind back to the April 1985 issue of *Computing with the Amstrad*, you may remember the Palindrome tester. It was a program that used `MID$` to reverse a string and see if it read the same backwards as forwards. This month's program also reverses a string, but now the method used is recursion.

Going back to recursion

by Trevor Roberts

- 30, 40** Prompt you to enter the string which is to be reversed. This held in the string variable `word$`.
- 50** Dimension the array `letter$` making sure that there is one element for each letter of `word$`.
- 60** Takes a copy of `word$`, storing it in `mirror$`. Also the variable `count`, which will be used to keep track of the number of subroutine calls is set to zero.
- 70** Calls the subroutine that does the reversing. As is the way with recursion, once invoked this subroutine then goes on to call itself over and over until an ending condition is satisfied.
- 80** Displays the result of the reversing.
- 90** Stops the program running on into the subroutine code. Try leaving it out and see what happens.
- 100, 100** Form the boundaries of the lines that make up the subroutine.
- 110** Each time the subroutine is called the variable `count` is increased by one. In effect it keeps track of the number of calls.
- 120** Stores the length of the string `word$` in the variable `length`. As we'll see this differs after each subroutine call. **130** takes one letter from the left side of `mirror$` and stores it in `letter$(j)`. Each time the subroutine is called a letter is sliced off `mirror$`, the differing values of `count` ensuring that it is held in a different element of `letter$(j)`. This is akin to making a note of the money in the box.
- 140** If `mirror$` is only one character long, `reverse$` - which will eventually hold the reverse of `mirror$` - is set to the null string. This corresponds to finding no more boxes to open.
- 150** Should `mirror$` be longer than one character then the `RIGHT$` returns

`mirror$` to what is left after `letter$(j)` is removed and then calls the subroutine again. This is like finding another box and going on to open it.

Notice that the program goes on calling the same subroutine (which does the same job each time but with a shorter `mirror$`) until the string is reduced to one character in length. It doesn't get to the next line until this condition is satisfied and all the subroutines start "unwinding" as they meet their respective `RETURN`s.

Suppose you wanted to reverse the word recursion. The first time round, recursion is obviously more than one character, so `r` is taken off it and the subroutine called again to work on recursion. This is still longer than one character, so `e` is split off and the routine called again using cursor. This carries on until the final `t`, when the program stops calling subroutines and at long last gets to the next line.

160 Now comes the bit that corresponds to the setting up of the numbers. As each subroutine comes to an end, the letter that has been separated in that particular subroutine is added to the end of `reverse$`.

170 `count` is now reduced by one so that as the previous subroutine unwinds it can retrieve the letter it peeled off from the appropriate element of `letter$(j)`. Try adding:

```
155 PRINT "The letter retrieved is"  
156 PRINT letter$(count)
```

```
165 PRINT "reverse is now "reverse$  
175 PRINT "count is now "count  
to see how this happens.
```

180 Ends the subroutine, sending the Amstrad back to the program line following the one that called it.

Amstrad Analysis

RECURSION

Suppose someone gave you a box and said that inside it were a number of smaller boxes, one contained within the other like a Russian doll. As well as the smaller box, each box also holds some money. Your job is to find the total amount of money in all of the boxes. How would you go about it?

One way is to open the outside box, make a note of the money found there, open the smaller

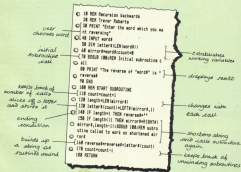
box, make a note of the money in that, open the still smaller box you find with that money, make a note of the cash you find in that and so on.

You carry on until there are no boxes left unopened and then add up all the figures you had noted as the process continued.

Notice that you can't figure out the total until every box has been opened. Only when the condition that there are no more

boxes to be opened is true can you be sure that you've got all the sums of money to be added together.

This method of repeating the same actions over and over until a finishing condition is met and then going backwards using the results from each successive step is a very powerful programming technique called recursion. And it's a lot easier to use than to explain!



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Preparing for the Easter Parade

ALEATOIRE looks to the moon to calculate Easter Day, 2001

EASTER Sunday appears to be random, but is defined as the first Sunday after the first full moon on or after March 21—approximately the vernal equinox when day and night are of equal length.

This was decided in 325 AD by the Council of Nicea and it is remarkable that this inconvenient, moveable date — it can vary between March 22 and April 27 — should still be accepted.

It's even more surprising when you realize that it is also calculated using an imaginary moon. By that I mean that a full moon is defined as occurring 14 days after the first sighting of a new, crescent moon — that is when the moon is already about two or three days old.

If you like mental arithmetic you might enjoy calculating when Easter will occur for any given year in this century; that is the years 1901 to 2000. To do this you need to know when full moons occur, which is simply when the moon is 15 days old.

There is a very simple but surprisingly accurate way of doing this, which essentially depends on the fact that the sun and moon are in almost exactly the same positions every 19 years, plus the fact that the moon takes almost exactly 30 days to completely wax and wane.

Since there was a new moon on February 1, 1600 the above means that there were new moons on February 1, 1919, 1608, 1987 and 1976. This cycle, plus the 30 day period of the moon, allows us to calculate the age, in days, of the moon for any intervening date as follows:

Let Y = the year such as 1986 or 99. First calculate $(Y \text{ MOD } 19)$, that is the integer remainder after dividing Y by 19. Multiply this integer by 11 and then add on the month-20. Finally add on the day of the month, divide by 30 and this final remainder gives the age of the moon in days on that date.

Here's a specific example. Take the date March 21, 1986, the day this year from which Easter is calculated. $1986 \text{ MOD } 19 = \text{remainder } 10$
 $10 * 11 = 110 + 1$ (March) = 111
 $111 \text{ MOD } 30 = \text{remainder } 12$,
 so the moon will be 12 days old, therefore the next full moon 15 days old will occur on Monday, March 24,

therefore Easter Sunday this year is on March 30.

This calculation of the moon's age becomes quite easy with practice, particularly if you just remember the "magic" number 37 (MOD 19P11) MOD 30-20 for each year.

For 1986 this number is 1110 MOD 30-21 = 18. All you now have to do is add the month and day to this constant and take the result MOD 30 so March 21 is simply $(18 + 3 + 21) \text{ MOD } 30 = 12$, the same as before.

Although quick and easy, the formula can be cut by a couple of days, usually because of February having only 28 days, so I have written a more accurate program, using Gauss' formula, to calculate the correct dates of Easter for this century.

An interesting exercise is to compare the two methods. The difficulty is knowing what day of the

week is March 21 for a given year, but my Planet program published in the December 1985 issue of Computing with the Amstrad can perform this calculation.

To test the program is working you should get the following results:

1984 => APRIL 22
 1985 => APRIL 7
 1986 => MARCH 30
 1987 => APRIL 19

An interesting problem, to which I don't know the answer, is to discover when the Gauss formula breaks down. I believe this to be so far in the future that we probably will have decided, by then, to fix Easter to, say, the first Sunday in April. Can any reader enlighten me?

• Next time I will discuss how to define the moon's position more precisely and then use this knowledge to predict eclipses.

Gauss' formula

```
10 PRINT "Easter Sunday Program (Gauss Formula)"
20 INPUT "Year: " Y
30 I=(3*Y+688-371)*4887
40 A=INT A/4
50 B=INT A/4
60 C=INT A/25
70 D=(19*(Y+19A-3B)/25) MOD 30
```

```
8 Then phase
90 IF (D+19*(Y+19A-3B)/25) MOD 30=0 THEN
100 phase
110 IF (D+19*(Y+19A-3B)/25) MOD 30=1
120 IF (D+19*(Y+19A-3B)/25) MOD 30=2
130 IF (D+19*(Y+19A-3B)/25) MOD 30=3
140 IF (D+19*(Y+19A-3B)/25) MOD 30=4
150 IF (D+19*(Y+19A-3B)/25) MOD 30=5
160 IF (D+19*(Y+19A-3B)/25) MOD 30=6
170 IF (D+19*(Y+19A-3B)/25) MOD 30=7
180 IF (D+19*(Y+19A-3B)/25) MOD 30=8
190 IF (D+19*(Y+19A-3B)/25) MOD 30=9
200 IF (D+19*(Y+19A-3B)/25) MOD 30=10
210 IF (D+19*(Y+19A-3B)/25) MOD 30=11
220 IF (D+19*(Y+19A-3B)/25) MOD 30=12
230 IF (D+19*(Y+19A-3B)/25) MOD 30=13
240 IF (D+19*(Y+19A-3B)/25) MOD 30=14
250 IF (D+19*(Y+19A-3B)/25) MOD 30=15
260 IF (D+19*(Y+19A-3B)/25) MOD 30=16
270 IF (D+19*(Y+19A-3B)/25) MOD 30=17
280 IF (D+19*(Y+19A-3B)/25) MOD 30=18
290 IF (D+19*(Y+19A-3B)/25) MOD 30=19
300 IF (D+19*(Y+19A-3B)/25) MOD 30=20
310 IF (D+19*(Y+19A-3B)/25) MOD 30=21
320 IF (D+19*(Y+19A-3B)/25) MOD 30=22
330 IF (D+19*(Y+19A-3B)/25) MOD 30=23
340 IF (D+19*(Y+19A-3B)/25) MOD 30=24
350 IF (D+19*(Y+19A-3B)/25) MOD 30=25
360 IF (D+19*(Y+19A-3B)/25) MOD 30=26
370 IF (D+19*(Y+19A-3B)/25) MOD 30=27
380 IF (D+19*(Y+19A-3B)/25) MOD 30=28
390 IF (D+19*(Y+19A-3B)/25) MOD 30=29
400 IF (D+19*(Y+19A-3B)/25) MOD 30=30
```

LAST month we looked at what an adventure is and how to start exploring one. Now let's look at some common objects found in adventures and the typical uses found for them.

But before we do that there is one use that is common to nearly every object found in an adventure - mapping mazes.

Mazes are locations put in by the programmer to disorientate you. They are usually locations that have the same description, and cannot therefore be recognised by that description.

The most common way of mapping them is to use the objects you have found in the course of your travels. If you come across a maze, drop an object, make a move and then look and see if the object is still there. If it is, you obviously haven't moved.

If it isn't, drop another object and make another move, and so on. You can make a map by basing it, not on the descriptions, but on the objects you have dropped. Very much a matter of trial-and-error I'm afraid, but like everything, the more you do the better you get.

Programmers are, of course, aware that you can use this method of mapping, and sometimes make the maze too difficult to map this way. I

If it's lying there, t chances are it is u

have already covered how to map mazes in detail previously, so if you want more definitive ways to tackle them, see the September and November 1985 issues of *Computing with the Amiga*.

There are two types of objects found in adventures, those you can use and those you can do things to.

Adventuring with Gandalf

The most common object of all is a lamp.

Most adventures have at least some locations underground or in

coves and a source of light is nearly always necessary. Quite often the lamp is an old oil one or a torch but not always. In *Dungeon Adventure* for instance, a piece of oilwood mantle burns to give you some light.

If it is a torch you may find that you need batteries, as in *Colossal Adventure* - though in that game you don't realise your lamp needs batteries until you find the machine that dispenses them.

Coins crop up regularly. In the case of the machine just mentioned, you have to insert the coins to get the batteries out. A more common use for them is to pay one of the characters in the game for an object he has, or pay for crossing a river or even to get a train ticket, as in *Enterated*.

Weapons are fairly common too. In virtually every adventure I have ever played there is a weapon of some kind, whether it is a spell that has to be cast, as in *Red Moon*, or the sword used to kill a Karl warrior in *Forest at World's End*.

In fantasy adventures magical objects usually make an appearance. Rings are common, and usually have to be worn or rubbed. Wands are common too but these can often be dispensed, as in *Colossal Adventure* when you are told it is a rod.

Usually raising a wand will cause something to happen, often the creation of a bridge across a chasm previously impassable.

Keys are another common sight. They are nearly always used to unlock another object such as a door or a chest. A rope is also common. To give an example of it and the key in *Forest at World's End*, you have to use the rope to climb into a volcano. Then you need the key to open the chest that you find there to get the crystals that the blacksmith needs to make the sword for you.

You may find food. Some adventures work on a real time basis, that is, they emulate real life. Well, you get hungry in real life so why shouldn't

SOS Dept.

SEAN Swift wants to know what to give the cannibals in *Jewels of Babylon* and where he can find the staff in *Return to Eden*.

The watch will get you past the cannibals. To get the staff you must have first used the parachute. Then find the tree roots and twist them into a slinging vine. Go to the wood pile and you will see a branch.

Throw the vine over the branch and climb up it. You will find yourself in a tree.

Further movement upwards is by use of a moving platform. Find the south platform and drop most of the objects you have found so far.

Go to the north platform and pull the lever. You will find yourself in the topmost branches of the tree. Go south to the blueberry and then go to the fragile branch and

use the berry to glue it. Cross the branch and you will find the staff.

The branch will only hold your weight and that of one object, so get the staff, return across the branch, drop the staff and then go back for the cherry. A word of warning: Once you have the cherry, don't drop it until you need it.

N. Shayer asks several questions about *Don Durack*.

The parishes is a red heifer. The message on the wall, 34 * * 8, means 34'8. The answer to this will give you the correct route through doors that you will find later.

The message "3KS4Keys, with love" means give the philtres to three people whose names begin with K for (H) the keys. You will receive three scripts which, if you take the first letter of each, will enable you to stop the letters at the right place and open another door.

the useful...

you need to eat in an adventure?

The food isn't always for you though. In *Colossal Adventure* you must feed the bear to stop him killing you and to allow you to catch him so that you can get a treasure and lighten off a trail.

Containers, usually bottles, are regular features. In *Adventureland*, the first home computer adventure, a bottle is used to catch bees and, when filled with water, to catch fish.

In *Colossal Adventure* a bottle of water is needed twice to make a thorny plant grow into a foodstalk for you to climb.

Musical instruments crop up quite often, too. In *Forest at World's End* a horn must be blown to get the dragon to ferry you up and down a cliff, and in *Classic Adventure* an eastern flute must be played to pacify the snake before you can use the bell to kill it.

One particular object I want to cover comes in many guises. It is used to cross obstacles and may be a log, used to cross a chasm as in *Forest at World's End*, or a plank, used to cross a pit, as in *Jewels of Babylon*, or a ladder. In the latter case it may be used as it is, or extended to enable you to cross a river, as in *Emerald Isle*.

One other object I must mention is the real herring. Believe it or not, I still get people writing in and asking me what a real herring is.

Simply put, it is an object that is meant to look as though it is to be used, when in fact it is not used in the adventure at all.

Herring said that however, in *Jewels of Babylon* there is a "strangely coloured fish".

This, when examined, turns out to be a real herring. In fact this one is used to feed a lion. Which goes to prove one thing — in adventures nothing should be taken for granted!

Next time I will be using *Forest at World's End*, from *Interceptor*, to show you how to approach an adventure. This is a superb beginner's game that I strongly recommend.

Newcomer

IN the wake of the Quill and the Illustrator, soon to be reviewed, comes a new contender from Camel Micros, The *Genesis Text/Graphics Adventure Creator*. Not only does it offer text and graphics in one package but also sound.

The 1.1 version is suitable for all Amstrad models but is supplied only on tape. It is the best adventure creator I have yet to see and, incidentally, also the cheapest.

More than 30k of memory is available for your program and there is an option to allow mixed modes on a screen.

The manual has been considerably improved and up-dated and is now a lot easier to understand, though I found the \$ signs, used to indicate commands that need to be entered, a bit off-putting.

I also would have preferred an option to use discs. Overall, a superb package that I have no hesitation in recommending.

Feedback

I WOULD like to thank Brian Standing for another map and partial solution he has sent in for *Mansport*. Brian, you may remember, was one of the winners of the "most maps and solutions" competition. Since then he has sent in tips and maps regularly for various adventures. So I would like to nominate him for the Hall of Fame.

Elizabeth Zence asks if I have any

clues for *Classic Adventure*. The answer is lots, but unless you tell me where you are stuck, I don't know which ones to give you.

I answer every letter providing an SMI is enclosed, so if you are stuck in a game let me know where. A map will help, but an inventory is an absolute must when you write in.

John Olsen has supplied maps of his favourite adventures, *Castle Dracula* and *Mountain Palace* and also answers to some problems raised in December's column:

Heroes of Karn: Graham will require the crowbar from the tool-room beneath the crypt to open the giant stain in order to get the pearl hidden inside.

The black knight can be killed with the bottle of acid. The pirate cannot be killed yet as the help of one of the heroes is required. The serpent can be killed by collecting the wicked cage and telling Beren to GET BIRD and KILL SERPENT WITH BIRD.

Snowball: M. Fae should WEAR VIOLET and EXAMINE SCREEN after sitting at the console. To open the security door he will need to remove the frozen crewman and get the colour stole.

Brown Fee: To get a tomahawk, Dave Carr will need to get the Indian charm from the yellow idol south of the sanctuary behind the shrubbery. The bowie knife will come in handy here. He must then take the charm to the box chamber and wave it to reveal the tomahawk.

Reviews

Master Adventure

It's late and you've spent the night accessing bulletin boards with your Amstrad. You are ready to quit but decide to call up just one more number.

Being tired, you accidentally dial the wrong number and are connected to an unknown computer system. As you try to log-on the system malfunctions and you suddenly find yourself past the first level of security.

What do you do now? This is how *Master* begins. There are no instructions. It's up to you to work out what to do.

Your first task is to correctly

identify various parts of a Subterranean Remote Unit (SRU). It is at this point that you find out that you need a joystick. Having done this, you find yourself in charge of an SRU and able to control it.

It uses a series of subterranean passages to move round the world. After moving around for a bit you discover that your task seems to be to recover the missing pieces of a top secret report. To do this you have to find the spies who have stolen it.

This involves finding out which passages lead where and which will allow you to access the surface. I gave up in defeat here. I did manage to reach the surface and find one of

the spies, but couldn't then find out what to do with him!

I confess to a feeling of disappointment with this game. It bears no relationship to any computer system I have ever accessed - and who ever heard of using a joystick on one?

VERDICT: A superb idea that just hasn't been well implemented.

The Alien-Finding Story Game

This is another adventure based on a film. The land of Fantasia is being attacked by the All Consuming Nothing and only you, Alroyu, can find the saviour who can save the land from extinction. There are various characters to be met in the land and it is up to you to decide whether they can be of help or not.

The adventure has superb graphics and uses a split-screen display, so

nearly all the locations and all the objects are displayed.

There are three parts to the adventure, and I'm still struggling with part 1! The game comes on two cassettes and represents over 100k of data and code - a truly massive adventure.

VERDICT: A superb game that I highly recommend. If you'll excuse me now, I want to get back to playing it.

Alien Attack!

This is another game that isn't inspiring enough to make me want to keep playing it. It is based on the film of the same name and, in case you don't know, involves the crew of a spaceship inadvertently bringing a hostile lifeform into their ship.

A small booklet packaged with the game gives the background and sets the scene well. Where it falls down is

in not giving enough detail about how to play the game.

When it loads you are treated to a picture from the film and suitable music. After about 10 minutes of music I found that I needed to press the spacebar to start the game.

The initial command menu didn't seem to accept most of the options it offered, and I ended up being given a demonstration of the sound effects.

The object is to destroy or drive off the Alien. You control all the members of the crew and their actions and can get them to use the objects found around the ship.

From a strategy point of view the game looks superb. The problem is I couldn't work out how to use the options properly and suspect I missed out on a lot of the game because of this.

VERDICT: Once again, a superb idea, but this time let down through inadequate documentation.

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Programming arrays in three dimensions

BY now you should have a good grasp of arrays. We've seen how an array is made up of an ordered list of elements and is used to structure data in an easily-managed form.

Also we've learnt how to use pointers to pick out a particular element from an array.

Not content with exploring one-dimensional arrays and parallel arrays, last month saw us entering the world of two dimensional arrays. If you think that logically this means that we'll be dealing with three dimensional arrays this month, you're right.

Program 1 shows a 2D array being used to hold the data from Figure 1.

The data to be processed by the program consists of the first three

By PETE BIBBY

marks in a class's English and Computing exams. They're obviously better at English.

Don't think I'm obsessed with school. In fact the figures could be the times of the winners of two races or any other data. The point to grasp is that data in tabular form is just made for putting into a two-dimensional array. We saw last time how it makes it a lot easier to handle.

As it is, I'll stick to the classroom example as I think most people will be able to appreciate it. At the end of this article you'll see another example of using a two-dimensional array.

The actual code of Program 1 should be fairly straightforward by now. Line 20 sets up the two dimensional array mark(). This has six elements (2 lines 3 is 6) and each element is uniquely located by means of the index, the two subscripts in the following brackets.

The nested FOR...NEXT loops of lines 40 to 80 are there to READ the data into the array. In our example programs this data is typed away at the end of the program. In practice it would probably be read in from tape or disc or typed in at the keyboard.

Once we've got our data in the array we can then go on to interrogate it, manipulating it to tease out the elements we want. In this program we just want the top mark in each subject, so we set the final subscript (which deals with the position) to 1

and use a FOR...NEXT loop to ferret out the relevant elements from the array.

Don't just be content with understanding the program, try altering it so that it gives you the second and third marks in the subject of your choice. Or maybe it could tell you the subject and mark of each element under 50. Or, if you make them up, it could even have the names of the top three kids (parallel two dimensional arrays, no less).

You'll learn a lot more about programming by trying it out for yourself than just by reading about it. And if you find the concept of two dimensional arrays a little strange, don't worry. As you come to need them they'll make more sense.

If you like you can look on two dimensional arrays as just a set of one dimensional arrays. Figure 11 shows the data of Program 1 in this form.

Here there are two separate

Position \ Subject	1st	2nd	3rd
English	60	50	45
Computing	45	30	35

Figure 1: The first three positions in two subjects

```
10 REM Program 1
20 DIM mark(2,3)
30 REM Structuring the data
40 FOR subject=1 TO 2
50 FOR position=1 TO 3
60 READ mark(subject,position)
70 NEXT position
80 NEXT subject
90 REM Interrogating the data
100 FOR subject=1 TO 2
110 IF subject=1 THEN PRINT "The top
120 English mark is ";mark(subject,1)
130 IF subject=2 THEN PRINT "The top
140 Computing mark is ";mark(subject,1)
150 NEXT subject
160 DATA 60,50,45
170 DATA 45,30,35
```

Program 1

Position \ SUBJECT	1	2
1st	60	45
2nd	50	30
3rd	45	35

Figure 11: Another way of looking at two dimensional arrays

You'll learn a lot more about programming by trying it out for yourself than by reading about it

arrays, one for the English marks, one for the Computing marks. The first subscript of the two-dimensional array `marks()` can be looked on as deciding which of the two single arrays is to be chosen. The next subscript is just a pointer to the required element of that particular single dimensional array.

So if you had an array dimensioned with:

```
100 array(2,20)
```

you could look on it as either a table of 100 elements (5 times 20) or as a set of five arrays, each consisting of 20 elements. To find the value of the element `array(3,7)` you can either imagine the micro looking at the element that is found at the intersection of the third row and seventh column of table or the seventh element of the third array.

To sum up, the first subscript moves you along one dimension to select an array, the second subscript takes you to the required element of that array.

Notice, however, that although each element is located by two numbers, each element only contains one item of data.

Another point is that there is more than one way to structure a set of data. Program 11 deals with exactly the same set of data as Program 1 but the array is dimensioned differently.

Here the data is still held in a two dimensional array, but now the first subscript refers to the position in class, the second to the subject. The data is the same, it's just structured differently (as you'll see if you look at the data in lines 170 to 190).

The point to grasp is that both

methods work and to the relief it makes no difference. You can have the data structured as you want and so long as you treat it consistently you get the right results.

Having said that, however, I'd advise you to structure the data in a way that you find natural. The computer may handle it with no problem but it does help if you yourself find it easy to understand. I prefer the way the data is structured in Program 1. To me, it's simpler to look on the array as:

```
arr(subject,position)
```

where I can use the value of the subscript `subject` to "switch" between the lists of English and Computing marks. In fact that's how I think of the subscripts, as a series of switches or choices that provide me with routes into arrays.

I find that idea very helpful when we come to things such as three dimensional arrays, which we now have. Suppose that instead of just having the marks for one class you had the marks for two. How would you handle them? You could, of course have two, parallel, two dimensional arrays such as:

```
arr1(classno,subject,position)
arr2(classno,subject,position)
```

and switch between the two as needed. Or you can lump them all into

one big three dimensional array.

This is what I've done with Program 11 which takes the data in Figure 11 and adds it to the data from Figure 1.

We set up the three dimensional array with line 20's:

```
100 arr3(2,2,2)
```

The "three" of the three dimen-

Position	1st	2nd	3rd
Subject			
English	70	65	64
Computing	60	75	70

Figure 11. A second set of results

```
10 REM Program 11
20 DIM arr3(2,2,2)
30 REM Structuring the data
40 FOR classno TO 2
50 FOR subject=1 TO 2
60 FOR position=1 TO 2
70 READ arr3(classno,subject,position)
80 NEXT position
90 NEXT subject
100 NEXT classno
110 REM Interrogating the data
120 PRINT "Which subject? English-1 2
    Computing-0"
130 INPUT subject
140 PRINT "Which position? 1-2"
150 INPUT position
160 FOR classno TO 2
170 PRINT "Class/classno/arr3/arr3(classno,subject,position)
180 NEXT classno
190 REM First class
200 DATA 68,70,65
210 DATA 65,58,55
220 REM Second class
230 DATA 78,65,64
240 DATA 60,70,70
```

Program 11

```
10 REM Program 11
20 DIM arr3(2,2)
30 REM Structuring the data
40 FOR position=1 TO 2
50 FOR subject=1 TO 2
60 READ arr3(position,subject)
70 NEXT subject
80 NEXT position
90 REM Interrogating the data
100 total=0
110 subject=0
```

```
120 FOR position=1 TO 2
130 total=total+arr3(position,subject)
140 NEXT position
150 average=total/position/2
160 PRINT "The sum of the first two
    English series is "average
170 DATA 68,65
180 DATA 78,70
190 DATA 65,64
```

Program 12

There's a lot you can do with data once you've structured it in an array

shows refers to the fact that each element now has three subscripts used to position it in the array. If you like you can imagine Figure II stuck on top of Figure I forming a block of data made up of 12 elements (2 times 2 times 3). Myself I'd rather look at it as a set of switches.

The first subscript can be 1 or 2 and chooses between the classes. The second chooses between the subjects and the third between the positions. Once all the switches are set the index (the bit in brackets) points to one particular element in the array.

The extra dimension our new subscript has given us allows us to choose between the two sets of arrays holding the data for each class.

Despite the fact that we're now handling another dimension, the workings of Program III should produce a feeling of déjà vu. The lines reading the data into the array are practically the same except now there's a third FOR . . . NEXT loop. This deals with the task of handling the data for the two classes.

Now when we interrogate the data the program will give us the marks for the same subject and position in each class. Can you alter the program so that it compares the average of the marks in each subject or gives those subjects where two or more children got over half marks? And can you regroup the inputs and make the messages a little clearer? You could even add class data items to make the example more realistic.

As you can see, there's a lot you can do with data once you've structured it in an array. And, as you might guess, you can have more dimensions if you wish, though that's rare in practice.

The main point to bear in mind is that while data is easy to handle in

arrays, there may be more than one way to handle it.

A little time and trouble thinking things out before you start coding can save you a lot of time and trouble later.

Now let's get away from the classroom and look at another use of arrays. Take a look at Figure IV, which shows one stage in a game of noughts and crosses.



Figure IV: Noughts and crosses

How would you represent this if you were writing a noughts and crosses program? There are nine places to play in, so you could number

each one from 1 to 9 and keep track of things that way.

However isn't it just made for a two dimensional array? Program IV shows one way of reproducing Figure IV on the screen.

There's nothing difficult about the program. Line 20 sets up a two dimensional array grid(3,3) whose nine elements will hold the information for the display.

The following FOR . . . NEXT loops take the data from lines 100 to 210 and place it in the array. The nested loops beginning at line 100 then print out each element in turn until the whole grid appears.

The IFs and PRINTs of lines 130 and 160 are just there to make the grid look better. You can leave them out if you wish.

Once you've grasped how Program IV works you'll see on the way to writing your own noughts and crosses program. After all, the program used the information in grid(I) to display the state of the game for a particular set of information, so why not use the array to keep track of a whole game?

You could start with the array full of spaces and then, as the players give values for row and column, put the relevant symbol in:

```
grid(row,column)
```

after each move. That way the array will record the state of the game. Have a go at writing the program. You'll find that it will increase your understanding of arrays enormously. And, if you find it easy, why not have the computer declare the winner or even take you on board?

It's your decision. And there'll be more on decisions next time.

```
10 DIM Program IV
20 DIM grid(3,3)
30 REM Reading the state of the game
  into the array
40 FOR row = 1 TO 3
50 FOR column = 1 TO 3
60 READ grid(row,column)
70 NEXT column
80 NEXT row
90 REM Displaying the game state
100 FOR row = 1 TO 3
```

```
110 FOR column = 1 TO 3
120 PRINT grid(row,column);
130 IF column=3 THEN PRINT " "
140 NEXT column
150 PRINT
160 IF row=3 THEN PRINT "-----"
170 NEXT row
180 REM Save state data
190 DATA "X", " "
200 DATA " ", " "
210 DATA "O", "X", " "
```

Program IV

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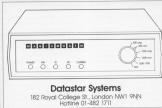
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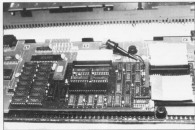
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MODEM



My board' comes aboard... the Vortex expansion board in situ

Once upon a time I had trouble filling the 18k memory of my Video Game. When I expanded it to 32k I couldn't imagine a use for all that space. The 64k of a CPC464 was luxury, so why have I just bought another half a megabyte of RAM in the form of a Vortex expansion board?

For about £150 for the \$12k version you get a leathly box of very substantial packing - damage in transit is unlikely. Nestled in this packing is an assembled printed circuit board, a sheet of plastic, a heat sink, a cassette and a manual.

All I had to do was open up my CPC464, switch a couple of micro-chips and plugs around, box it up again and I had memory beyond my wildest dreams - or maybe, more room to make my dreams wilder.

Although no soldering is involved, you do have to perform a little "brain surgery", so if your computer is still under guarantee don't buy this board...yet.

The well produced printed circuit board had no signs of obvious last minute changes. There were sockets for the main integrated circuits and all but three were occupied.

As part of the installation procedure you have to move the 290 microprocessor and the Amstrad gate array from the computer's board to this new board and plug two 40 pin

Thinking big? Then half a megabyte of RAM may help

DIL headers, linked to the new board, in their place.

The board contains 16 dynamic RAMs and a 18k eprom. In addition to a few miscellaneous chips, there are buffer ICs on all of the 290's lines. If your future expansion plans are modest these won't affect you.

However the more you plug into the expansion port the more likely you are to experience bus loading

problems unless you have these buffers. This is one of several features of this board which the manual omits to publicise.

The manual is the "make or break" of a board like this. If you can't install the board it's useless, and if you can't operate it it's equally useless. The 48 page AS manual is your only key to these two problems and varies from good (installation procedure and expanding CP/M) to adequate (description of new RSRs).

The installation procedure is clear and methodical. It assumes you have a layman's knowledge of electronics, a couple of screwdrivers, a steady hand and half an hour with no distractions. What I found to be a nice

TONY HUNTINGTON
indulges in a little brain surgery and installs a Vortex Expansion Board in his CPC464

SYSTEM COMMANDS

IBOS	Turn on Basic Operating System.
IBASIC	Turn off BOS return to S44 system.
IID	Display memory statistics.
IBANK	Select bank (direct command only).
IDEV	Select output device for ILIST.
ILIST	List a Basic program occupying several banks.
ISAVE	Save a Basic program occupying several banks.
ILOAD	Load a program saved by ISAVE.
IRUN	Load and run a program saved by ISAVE.
IRSW	Clear one or more banks.
ISPOOL ON	Turn on 32k printer buffer.
ISPOOL OFF	Turn off 32k printer buffer.
IMON	Enter machine code monitor.

GENERAL BASIC EXTENSIONS

COMMON	Enable variables to be shared between banks.
ICALL	Call a machine code routine in specified bank.
IGOTO	Go to a line number in another bank.
IGOSUB	Call a subroutine in another bank.
IRTURN	Return from a subroutine in another bank.
ISPEE	Read a memory location in any bank.
IPONE	Change a memory location in any bank.

GRAPHICS EXTENSIONS

IFAST	Speed to Mode 2 display with no windowing.
ISLOW	Normal Mode 2 display.
IFRAME	Synchronous screen update with frame bytest.
IGNAR	Read a character from a given screen location.
IGPAPER	Set graphics paper colour.
IGPEN	Set graphics PEN colour.
IRASK	Define a mask for plotting dotted lines.
IRMARK	Cancel effect of IRASK.

DATA FILE SYSTEM

IRAMOPEN	Open data section of RAM.
IRAMCLOSE	Close data section of RAM.
IRAMFIELD	Define fields in data record.
IRAMREAD	Read a data record.
IRAMWRITE	Write a data record.
IRECORDS	Calculate maximum number of records.

SCREEN IMAGE SYSTEM

VIDEON	Configure RAM as 17 screen images.
VIDEOFF	Turn off screen image system.
ISCREENIN	Copy screen image from RAM to screen.
ISCREENOUT	Copy current screen to RAM.
ISCREENI	Calculate maximum number of screen images.

Table 1. A summary of the new BASIC commands

A	Assemble Z80 instructions.
B	Set up to eight breakpoints.
D	Display a block of memory.
F	Fill a block of memory with a given value.
G	Run machine code program from given address.
I	Load binary file from tape or disc.
L	Disassemble machine code to mnemonic form.
M	Move a block of memory.
O	Save a binary file to tape or disc.
P	Turn printer on or off.
R	Display or alter Z80 register contents.
S	Show or alter a given memory location.
T	Trace or single-step a machine code program.

Table 2. Monitor commands

feature of this section is a paragraph entitled "What to do when it doesn't work?". This is a check list which is worth following before you re-assemble the computer. I am pleased to report that following this procedure my board worked first time.

There is a section in the manual which leads your hand through the job of reconfiguring CP/M 2.2 so that it has a 64k TPA.

The procedure is explained for Amstrad 2in disc drives and Vortex 5 1/4in drives. Having neither, I have not yet tried this bit out. Under CP/M you can use much of the remainder of the expansion RAM as a RAM disc.

The final, and weakest, part of the manual describes 33 new BASICs supplied in ROM. It certainly sells short some excellent new instructions.

I felt that there was a section missing from the manual. There was no description of the electronics to show, for example, how the new memory was mapped on to the 64k

address space of the Z80, or which I/O ports are used for bank switching. I'll have to load my disassembler sometime and investigate the ROM for some answers.

The software is supplied as a cassette with two utilities to assist in reconfiguring CP/M, and a program which contains the new BASICs.

Table 1 briefly summarises the new BASICs, which fall into five categories—system commands, general Basic extensions, graphics extensions, data filing systems and screen image system. Using two of these has to be IMON which turns on one of the best machine code monitors I have used in a long while.

Table 2 lists the monitor commands. Unfortunately I have already found three bugs in the monitor. The disassembler will translate 50800 into IN A,00H—note the missing leading bracket, and will translate 87B into RST rather than HALT.

More worrying, the file assembler will translate IN A,000 into 8607B

which is actually IN A, (C1)

The general basic extensions follow their "barless" counterparts except that they allow a bank number as well as a line number to be specified (the basic program area is split into nine 32k banks).

COMMON enables you to specify whether variables with the same name in different banks mean the same thing.

The graphics extensions are the standards which several people are offering, and imitate some of the additional instructions available on the CPC6128.

Using the data filing RSXs you can create a random access data file (comprising a number of records each split into lines). Every record must have the same length and be split in the same way.

The screen image RSXs seem to be of least value. You can store up to 17 screen images and play them back

at up to three images per second and that's about all, as you are left with only 184 for a Basic program.

If you are running CP/M programs you will probably configure the RAM as a 486k RAM disc with a 32k printer buffer and CP/M 2.2 with a 62k TPA.

If you haven't got discs you will leave it in its default state of 288k for Basic programs and 256k for data for 224k for data and a 32k printer buffer.

In this arrangement the banking system automatically performs a SYMBOL AFTER 32 instruction so if your program includes a SYMBOL AFTER you will get an error message.

It also pulls HIMEM down to a maximum of 32516 on bank 0 and 32787 on the other eight banks. This could be a bit restricting for some proprietary programs, so you have the option of BASIC to return to an ordinary 84k CPC464.

VERDICT: This is not the add-on to buy if you are wary about driving inside your computer, nor is it any good if you are looking for CPC6128 compatibility.

If you like writing very big Basic programs, or would like to have several programs in memory at one time and switch between them, then this is the board for you.

If you need a larger CP/M TPA for one of the bigger commercial programs and need the added speed of a RAM disc, this is a cheap way of getting both.

I like the idea of the board fitting permanently inside the computer case - no problems with dirty or loose connections. Shame about the bugs in the monitor, but I'm well pleased with my purchase and wouldn't be without it now.

START
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FILE Powerful program compressor. In tests it reduced about 2500 bytes from a 15,000 byte program.

FROM PRINT Switch printer on/off

SEARCH REPLACE Selectively or globally replace any string/line keywords/strings

DELETE CHANGE Source changes in 16 lines, for Amstrad DMAPS & E-type printers

PRINT Print various info

PARTSAVE Save any part of program in disc/image

KEY Function key editor

RAMM Function key editor

RENUMBER Fully flexible program renumber

START Allows many programs to be used in memory at the same time (like BBC) allows TRACE Advanced trace facility with single stepping

LOOPY Copy and rename program lines to elsewhere

MOVE Move Basic program in memory

FORMAT Very quick disc formatter

LIST List programs from disc/tape without corrupting the program in memory

ROM Pull into or all from & back constants

LIBRARY Move Basic program from HELP System of all Beebug commands

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Incoming telex: 50p for each correctly obtained telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non delivery and asked to provide a mailbox address.

Each user entitled for telex and using the facility will incur a charge of 14 storage units a month. Further storage charges could be incurred depending on the amount of data storage and the use made of short code and message file facilities.

Telexmessage: £1.25 for up to 250 words.

Telexmessage is a transmission illustrated page and for 40p extra.

Backspacing: No charge.

If you have a BF Backspace you can be advised automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2000 characters - 30p in Germany and Denmark, 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1000 characters - 10p 10p.

Please always refer to the transmission of information by the Database service to other Database centres outside the UK and the Isle of Man. Multiple copies to addresses on the same system has invariably one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Quarterly bills are rendered monthly.

Software over the telephone

MicroLink is a setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world - by satellite

MicroLink joined the international Telecom network in the USA, Australia and a growing number of other countries. There are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain - the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have these things to connect to MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Farnet type using 1200/75 baud, or a more sophisticated one operating at 300, 900 or 1200/1200 baud), and appropriate communications software.

MicroLink

in association with

TELECOM GOLD

Application Form

This form only applies to users MicroLink.

I will enclose my cheque for £3 payable to Database Publications as registration fee to MicroLink.

I will allow access to my Telex. I authorize you to charge an additional £10 to my credit bill for validation.

I confirm that I am over 18 years of age.

I confirm that I accept the terms and conditions for the time being in force, a copy of which are available on request.

Signature _____

Date _____

FOR OFFICE USE ONLY

Mailbox assigned _____

Subscriber _____

Password _____

SEND TO:

MicroLink
Database Publications
Europe House
48 Gower Road
Wood Lane
Stockport SK7 5NS.

(0161) 475 111

Name _____
Residence _____
Company _____
Address _____

Postcode _____ District telephone _____

Commencement of service _____
Please indicate month of commencement _____ in ____
After 10 days for validation of mailbox.

Payment

Micro Database Publications Ltd will transfer the sum of £3 to you. The commission and billing thereof will be handled by Telecom Gold as agents for Database Publications Ltd. One of the payments to be on this of month including commencement.

Please complete following information form A, B or C below.

A. Direct Debitting Mandate (Over all postal address of Bank Branch)

To _____

This authority you will further notice in writing to change to my/our account with you on or immediately after 10th day of each month unexpired amounts which may be debited from the balance of Bank Telecommunications plc - TELECOM GOLD by Direct Debit. This authority is irrevocable (if applicable debt is processed).

Name of Account to be debited _____

Account Number _____

B. Please debit my/our

Account No./American Express account number _____
*Overseas subscribers only.

This authority you will further notice in writing to change to my/our account with you on or immediately after 10th day of each month unexpired amounts which may be debited from the balance of Bank Telecommunications plc - TELECOM GOLD. Bills are issued 10 days before being applied to your account.

Signature _____ Date _____

C. Please invoice the company/institution.

I/We If you intend this system, which is ONLY AVAILABLE to government establishments and Public Limited Companies, you will be sent an acknowledgment form for completion which will require an official order number to accept requested amounts.

If you flick through the pages of *Computing with the Amstrad* you'll see that most of the program listings are quite short. With around 40k of RAM free it means that very little of your Amstrad's memory is being used at any one time.

Wouldn't it be useful if we could store several Basic programs in the memory at once, and be able to switch between them and run any one?

You could then have all Pete Ebbey's example programs from this month's beginners article in memory at the same time. For instance, you would be able to select one, run it, select another, run that, then compare the results. It would save a lot of typing or accessing the disc or tape.

That's just one of many uses once you have this ability. It opens up a whole new range of possibilities.

For instance one program could be used to modify another. It wouldn't be difficult to write a utility to compact a program, taking out the REMs. You could also have a search and replace utility so that you could change variable names, and so on.

These are just a few ideas. I'm sure you can think of many more.

The program accompanying this article will enable you to store (and run) Basic programs at any address in the memory. This means that you could load one program at &1000 say, then another at &2000 and a third at &3000. Any of the programs can be selected and run.

You don't have to use nice round figures like &1000, though it's easier to keep track of where you're put all your programs if you do. It's quite easy to lose track of where your programs are! Also it's up to you to make sure that the program you put at one address doesn't overwrite the program at another. However with so much RAM free it's not difficult to find a bit of space.

Program 1 is a Basic listing of the utility and Program 2 is an assembly listing. When it is run several new commands are added to Basic. They are listed in Table 1.

The first PRINT.PAGE, prints the value of a system variable I've called PAGE. This is at &A054 if you have Basic 1.1 or &A8B1 if you have Basic 1.0. The second command, ISET.PAGE, as you've probably

How to cram more in RAM

By ROLAND WADDILOVE

already guessed, sets the value of PAGE.

When you type a program in or load it from tape or disc Basic stores it at PAGE. Then when you type SAVE Basic saves the program stored at PAGE and when RUN is entered the program at PAGE is run.

If we alter the value of PAGE we can enter or load another program without affecting the first, providing,

```

:PRINT.PAGE
:SET.PAGE,Integer
:SET.PAGE,@variable%
:GET.TOP,@variable%
:SET.LOWER,@variable%
:NEW.PROGRAM
  
```

Table 1 New commands

of course, that we don't overwrite it.

It's not just a matter of altering one system variable though. If we want to go back to our original program and we alter PAGE to its previous value, the program won't be magically restored. We have to do that ourselves.

As well as keeping track of where a program starts, Basic also needs to know where it ends. This address is stored in another system variable which I'll call TOP.

The end of a Basic program is marked by a couple of zero bytes. So to find TOP we search through the program line by line until we come to them. The address is then stored in TOP.

Basic needs to know TOP since

this is where the Basic variables are stored when the program is run.

Several other pointers need to be set to the same value. For ones that tell Basic where the variables end. The variables are placed at the end of the program starting at TOP.

By restoring all these pointers we restore the original program, which can be run again. The variables will be lost though, and it's always best to enter CLEAR when changing PAGE.

All this is carried out automatically by the utility. So if PAGE is changed the routine looks to see if a program is stored at the new address. If there's nothing there, or if it can't follow the program because it's been corrupted, NEW PROGRAM is executed.

This command will delete the program at PAGE without destroying any other programs in the memory. The normal Basic command NEW destroys everything in the memory, so use it with caution.

A program may need to know what PAGE, TOP and LOWER are - LOWER is the lowest point in the memory which is free. The commands ISET.PAGE, IGET.TOP and IGET.LOWER look up the relevant system variable and place its value in one of Basic's integer variables.

```

:PAGE
:SET.PAGE,%0
  
```

will set %0 to the current value of PAGE.

Page is an extremely useful utility and a great help when programming. It enables you to take full advantage of the generous amount of RAM in your Amstrad.

Full listing starts on Page 63

YANTZEE

Laurie Lambert
introduces you to this
deceptively tricky,
intriguing and
sometimes infuriating
game



YANTZEE is a simulation of the traditional dice game and can be played by one to four players. The object of the game is to get the highest score possible by using a set of five dice to tick off each one of a special list of scoring combinations.

Players take turns at throwing the dice, each turn consisting of a maximum of three throws. After the first two throws you may:

- Throw all the dice again.
- Hold selected dice and throw the rest.
- Accept the throw as seen.

On the third throw you must accept the dice shown.

With each throw of the dice the range of scoring combinations you can claim are displayed. Your task – and the crux of the whole game – is to choose one of these for that turn's score. Once you've chosen an option you can't pick it again, so take care.

Having made a valid selection, a summary of your current score and the previous options you have picked are shown. Play then passes to the next person. The game cycles round all the players until everyone has had 12 turns – sufficient to cover all the scoring combinations possible.

If you should wish to hold some of the dice and re-throw the others, all

you need to do is type in the face values of the unwanted die or dice. For instance, from a display of the five dice values 55246, entering 346 would hold the two dice value 5, and re-throw the three dice showing the face values 2, 4 and 6.

Once you decide to accept a throw you simply type in the letter alongside the scoring combination you have chosen.

There are two sections to the score sheet. The first simply totals the number of like dice as shown in Figure 1. The second section consists of special scores based on special combinations such as three of a kind, as shown in Figure 2.

Should the total scores achieved under section one exceed 83 a bonus of 25 points is automatically added.

There will be occasions when the combination displayed after three turns does not match any of the remaining scoring options. You might, for instance, have chosen it earlier. Should this occur you must pick one of the outstanding options – which will be ticked off the list for a score of zero. The point is you must always score something at the end of each turn, even if it is a zero.

You'll find Yantzee intriguing, thought provoking and infuriating. Do yourself a favour – type it in today.



Combination	Scoring	Range
Ones	total all ones	1-6
Twos	total all twos	2-10
Threes	total all threes	3-18
Four's	total all fours	4-20
Fives	total all fives	5-25
Sixes	total all sixes	6-30

Figure 1: Section one of the scoreboard

Combination	Description	Score
3 of a kind	Any three dice the same	Total value of ALL dice
4 of a kind	Any four dice the same	Total value of ALL dice
Full house	Two dice the same and the other three the same	25 points
Straight 4	A consecutive run of four dice (1234, 2345 or 3456)	30 points
Straight 5	A consecutive run of all five	40 points
Yahtzee	All five dice the same	50 for the first Yahtzee 100 for any subsequent
Chance	Any five dice	Total of all the dice

Figure 2: Section two of the scoreboard

VARIABLES

Array for dice values.
 TOTAL() Array for sub-total and total.
 DICES() Array for dice graphics.
 SCORE() Array for category scores.
 NAMES() Array for player's names.
 ROUND Number of turns.
 ROLL Number of each player's throw.
 PLAYER Player number.
 CMDS Player's input.

PROGRAM STRUCTURE

70 Set-up colours, arrays and windows.
 100 Dice face graphics.
 200 Introduction.
 300 Set up screen.
 400 Select dice to hold.
 500 Update score.
 600 Bonus dice or given.
 800 Update grand total.
 1010 Find winner and display.
 1100

SUBROUTINES

1100 Scoring-options.
 1420 Roll dice.
 1480 Print dice faces.
 1520 Get input.
 1570 Dice outlines.
 1670 Print categories.
 1760 MSGOS to command window P 8.
 1800 Wait for key.
 1870 Instructions.

```

10 DIM SCORE(10)
20 DIM NO
30 DIM NO
40 DIM NO
50 DIM SCORE(10)
60 DIM SCORE(10)
70 DIM NO
80 DIM NO
90 DIM NO
100 DIM NO
110 DIM NO
120 DIM NO
130 DIM NO
140 DIM NO
150 DIM NO
160 DIM NO
170 DIM NO
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GRAFIX NEWS

Amstrad musicians take up the baton ...

Having produced the best graphics software with light pen control, which has yet been seen on the Amstrad, the Electric Studio have commissioned the first light pen controlled Music Package, which also looks set to become the market leader.

The MUSIC BOX is available on cassette and disc and boasts an impressive list of features, which include:

- 484, 664 and 6128 compatible.
- 3 channel polyphonic sound.
- Tone and volume Envelope Designer.*
- Internal storage of approximately 8000 notes.

- Print out of musical score.
- Save ideas and envelopes to tape or disc.

- Use envelopes in own programs.
- Any key as time signature.
- Automatic bar line creation.
- Easy to use letters with light pen control option.

- Custom music editor.
- Short memory of channels in any combination.
- Playback: Tempo; Key transposition; Octave.

- Demonstration music included.

* The Envelope Designer uses the light pen to draw the graph of the envelopes — no numbers to enter. Sounds can be played while envelopes are edited.

The package can be controlled by either the ESP or the Envelope light pen; by joystick; or by cursor keys which will help all users get the full benefit from the various functions of the program.

THE PROGRAM WILL WORK WITHOUT A LIGHT PEN AND CAN BE PURCHASED SEPARATELY FOR USE WITH JOYSTICK OR KEYBOARD.

The MUSIC BOX is priced at £19.95 for the cassette program or £29.95 for the disc version and for a limited period the MUSIC BOX plus an ESP Light Pen will be available for the price of £19.95 with cassette software or £29.95 with disc based software.

Don't worry Joyce — you're not forgotten!

Final development work which will allow the ESP Light Pen to interface with the Amstrad 8086 "Joyce" machine, is now nearing completion at ESP's research and development facility. If you thought that people just go to sleep in Beds, then you'll be surprised at the exciting taking place in Luton!

A simple to use graphics program, based on the successful format of the ESP range for Amstrad home computers, will soon be available which will transform your simple word processing into a graphically stimulating experience.

Many 8086 owners will need a graphics capability and should find the new Light Pen program an extremely useful word tool for their business or leisure use.

World First for British Company!

At a Press Conference held earlier this week, The Electric Studio announced the launch of the first ever, pixel accurate light pen for the Amstrad, for under £30.

This major breakthrough has been achieved through extensive development of their product since its introduction in September 1985, and is the culmination of months of work by the technical department.

The Technical Director of the company was quoted as saying, "Up to now pixel accurate pens for freehand drawing were priced around the £40 mark. We can now produce a light pen capable of total accuracy, for a price that no other light pen manufacturer gets near."

The company confirmed that the ESP "PIXEL" Light Pen was available for £19.95 complete with the cassette software package that has proven to be the market leader.

They stressed that the accuracy would be available on both mono and colour monitors and the CPC 6128 machine specific program with freehand draw ability, will now retail at £29.95 with software on disc.

All future products, commencing with the "PIXEL" pen will be released with French, German and Spanish versions of both program and manual, as The Electric Studio recognises the importance of the European involvement with the Amstrad/Schneider range of computers.

Continued support for existing ESP users

Because of the launch of the new freehand drawing "PIXEL" pen, the Electric Studio will offer a special upgrade facility for existing users of the ESP character accurate Light Pen.

The upgrade will provide modified pen and software which will transform the unit to a freehand drawing instrument, while the full graphics capabilities of the program remain the same.

Any owner of an ESP character accurate pen, whether in the UK or elsewhere can benefit from this offer by observing the following conditions: All returns to The Electric Studio, PO Box 96, Luton LU2 2JF.

Cassette Software: Return the Light Pen only.

Disc Software: Return the Light Pen plus a disc and state type of computer. Any user who has upgraded to a CPC 6128 computer since purchasing a Light Pen will be supplied with a £128 program provided a blank disc accompanies the returned Light Pen.

Terms and Conditions of Upgrade:

a) The pen must be in working order.

Electric Studio to support US Giant

8128 owners who have purchased or are considering the purchase of the Digital Research program DR Draw will be delighted by the news of the availability of an ESP Enhancement Pack.

This comprises a pixel accurate light pen with DR Draw on disc, which will allow total control of DR Draw using the light pen instead of cursor key control.

The cursor is controlled by the light pen which gives almost instant access to all parts of the screen, making menu selection a much simpler process and thus giving additional flexibility to the overall package which is an invaluable time saver for the program user.

8086 users can look forward to a similar enhancement kit being available shortly.

- Returned units should be mailed in protective packaging, i.e. Jiffy Bag or similar.
- State clearly name, address and model of computer.
- Enclose a cheque or P.O. for £2.00 for delivery within the U.K. or £7.00 for overseas delivery.

Advertisement

Please send the items indicated:

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"PIXEL" light pen 484 disc £29.95

"PIXEL" light pen CPC 6128 disc £29.95

ESP Enhancement Kit for DR Draw £29.95

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MUSIC BOX Program on disc £29.95

ES Pen + MUSIC BOX (cassette) £19.95

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The automated factory is often found around Earth that churned out robots to do all the menial jobs has started making robots programmed for the destruction of mankind.

You have been given the task of regaining control of the factory in **Strangelove**, by Virgin Games.

The main part of the screen is a side view of you surrounded by objects waiting to cause you damage, depicted using the same quality of graphics that made *Serenity* a hit.

In the lower part of the screen you have oxygen and fuel meters, a small map showing rooms in the area, a status area, a compass pointing to the control room and your pocket.

The latter makes the game into an arcade-adventure by allowing you to pick up objects and use them, such as putting

Plug that gap to survive

a fuse into a machine. By the correct use of an object you will move a step further in completing your mission.

The first object to pick up, however, is a jet cycle, so this allows you to fly. The problem is that it needs to be constantly refuelled.

There are many hazards to be avoided such as boiling oil,



swart, crushers and the robots themselves.

The only danger that can be eliminated is the swart which will fill your spaceship with more perforations than a teabag. It can be shot.

The tasks in your suit can be repaired with patches that are found lying around. The more tasks, the faster your oxygen

goes, but, as with everything else, it is possible to find more.

Movement is by joystick and a keyboard option would have been nice. Games can also be saved to tape.

Strangelove has great graphics, 250 rooms to explore and puzzle over, and offers was worried to load it.

Sean Murphy

Hi jinks

POOR old Builder Bob's got a problem. His men are on strike and he has an important contract to fulfil.

So he must single-handedly work his way around the building site, painting/scaffolding as he goes and trying to avoid his men, who have abandoned their picket line in an attempt to stop him.

Needless to say, you are in control of **Bob's Hi Rise**, from Bubble Bus Software. There are 99 challenging screens to complete, comprising complex arrangements of scaffolding connected by ladders.

This task is not made any easier by three cheating men, who show considerable intelligence as they try and corner you.

The only help you have is from two birds of glue, which will literally stop the men in their tracks for a short period when dropped. But the glue soon dries up, and the chase is on again.

Hi Rise will not win any prizes for its graphics. Even



though the scaffolding is quite well drawn, Bob and the striking men are flat. They contain very little detail and the animation is quite poor.

I also found the controls quite sluggish, a shame for a game in which you need pinpoint accuracy to succeed.

Despite these drawbacks, Hi Rise could prove to addictive.

If the idea behind the game appeals to you Hi Rise is certainly worth buying. It would take you a very long time to complete every complicated screen.

Brian Finerty

SMARTKEY II (CPM) disc - *Castor Software* will redefine any key to print another character or set of characters, the definitions being saved as files for use with other programs. ...

Theoretically some 30,000 characters could be printed by defining and pressing a single key.

More usefully, with one keystroke you can type standard paragraphs, reformats text, find files, or change margins on word processors, display windows, recalculate models, save files or automatically print spreadsheets and manipulate databases.

The left-most left square bracket key becomes Smartkey's set-up key. So, to redefine a key, with the normal drive A: prompt displayed, you press the set-up key.

A bell acknowledges and you press the key to be redefined, say A. The screen now shows "SMARTKEY: redefine <A> to < " and you type in the new character, say B, and press the set-up key once.

The normal drive A: prompt reappears and pressing the A key will now print B. It is just as easy to redefine one key to print "Hello, sailor" or a

Key to saving time

Shakespearean sonnet, or a CPM command.

There is a facility to change set-up to a key of your choice, but double pressing will print the bracket. Other facilities slow down the Smartkey response if desirable, swap key definitions, list your definition files and allow long and complicated definitions to be set up from within your word processor.

On opening the manual, a nice ring binder with the disc inside, the first page states "Opening this package indicates your acceptance of the terms and conditions ...", going on to make no fewer disclaimers as to *Castor's* liability for anything, that I was worried to load it.

Castor's apparent lack of confidence in their own product is disturbing.

At £49.95, one for the business user to think about.

Bernice Cox

Emergency in space

IN Obsidian, an arcade adventure from Artic, you are piloting your own business using your steered wheel when the captain of the spaceship sends for you.

He says the space station has been hit by a freak radiation storm which has de-activated all of its power systems.

The space station has been built inside a large asteroid and was on course for a black hole, the gateway to another universe, when it was hit by the storm.

You are ordered to teleport to the station, re-activate the power systems, initialise the engines and reset the flight

plan. When the engines are activated a gravity field will then protect the station from the forces of the black hole, but not you!

On completion of the mission you only have a little time to teleport to your ship before Obsidian's engines carry you uncontrolled into the void.

Once onboard Obsidian you have to collect objects from the gravity containers hanging from the ceiling. These open various doors, initialise power plants and turn off some of the protection devices.

You don't know which object does what, and you can only carry one at a time.

While exploring Obsidian's

80 or so rooms you have to negotiate a variety of security systems which include different types of robot and laser, and will soon use up your fee lives if you're not very careful. As you fly around your power pack uses its limited supply of nitro, and when empty explodes unless you can discover how to replenish it.

Artic have made full use of the Amstrad's colour and graphics facilities and the smooth movement of objects and characters makes this game a pleasure to watch and play.

There are no catch tunes, but the sound effects fit in nicely and add to the feel of the



game without being overdone.

One of the better Amstrad games. Well worth spending your money on.

Ian Duerden

HE may be featherweight champion of the world, but there's nothing lightweight about **Barry McGuigan World Championship Boxing**, from Activision.

It is a fascinating blend of arcade action and strategy, as you fight for the right to take on the popular contender for his world title.

That's no easy task though, as there are other challengers just as eager to take on the talented boxer.

And if you do finally box Barry, you'll find the computer version almost as good as its flesh and blood counterpart.

A number of things set this program apart from other boxing games. For a start, there is the sheer scope of the program - 18 other challengers to defeat before you can fight Barry himself.

Then there is a true two-player option, where each player can select any of the boxes to control.

But the most important is the unique strategy element. Before every fight you are in control of your boxer's training and must decide how many weeks he spends on five different exercises, including road work, weights, or punching the heavy or light bag. Choosing correctly could

Challenge for all would be champions

give you the edge over your opponent. Get it wrong and you could end up on the canvas.

Before you start boxing in earnest you must create your own boxer. You choose his size, the colour of his hair and shorts, his character, and most important of all, his style.

A profile of your boxer (which includes his agility, endurance, stamina and strength. These are always poor to start with, and it is during the training camp stage that you aim to improve these).

The other 18 boxes are split between rising pros and challengers and you can choose whether to start as a rising pro, ranked 20 in the world, or a challenger, ranked 50. Either way, it's a long climb to the top.

Fights take place over 10 or 12 three minute rounds, and they are shown on screen in



graphic detail. You can punch to the body, jab, hook, or throw cross punches, but each drains your strength.

If you are on target you will drain your opponent's stamina and endurance. The "crowd" will show their appreciation if both fighters open up.

There are three ways to win - on points, which I have never seen, by a knockout, or by a technical knockout, when a fighter is knocked down three times in a round. It is extremely rare for fights to go the distance.

This is an excellent game with large, colourful graphics, good sound effects and a long-lasting challenge provided by 18 boxes with different styles, strengths and weaknesses.

My sole criticism is that you can't save your boxer to tape. After spending five hours guiding Lightning Luke from 50th in the world to featherweight champion, it was a shame when I had to turn the computer off and this promising boxer was lost for ever.

Brian Finney

Just a little let down

THE French Mistress from Remos, and **Hercule** from Ferns, are aimed principally at candidates revising for O level and pre O-level French.

The French Mistress was originally published for the BBC Micro and it turns out to be no more impressive on the CPC464 than first time round, where it did not impress me at all.

It presents words, in English or French (the choice is yours) and after a user-defined delay gives their translation, colour-coded by gender if appropriate.

It can then test you on those words, and will not let you enter a wrong answer. If you wish, it will prompt you with the next letter of the correct answer.

That's it. No graphics, no pretty screen presentation, no fancy matching, despite the fact that two or more translations are often acceptable, even at the level of simple vocabulary.

Its one plus-point over some education packages is that you can change the pre-recorded data files, and create lessons of your own.

I suspect the program could be thought of as a small step up from testing yourself by covering one side of printed word lists, but that's about as far as it would go.

Hercule is based on the same principles as The French Mistress. Words and phrases, 500 in all, are presented for translation in blocks of 50 or less, loosely grouped by topic.

Once you have decided on the number of words to be presented, the program will not let you continue until you have translated them all correctly, but will prompt you after two failures.

There is no facility to amend the database or to add to it - a definite disadvantage.

But Hercule has something which sets it a cut above the



French Mistress - style and graphics. It was hard not to smile, for example, at screen comments such as "I don't feel I can usefully comment on that, Gabriel, I've not having much of a day myself".

And the range of prompts and replies seems wide enough for them not to become too repetitive.

Some thought, too, has gone into the translations. Once again, the program tests only for perfectly matched strings, but at least here more than one correct answer is possible.

There is room for improvement. For example, phrases entered by you could be word-wrapped, and upper or lower case ignored, but the presentation is generally of a higher quality than with many of its rivals.

The author of these programs really makes full use of the computer as a learning aid, and I would imagine that American users new to language-learning software could well be disappointed by them.

Gabriel Jacobs

Fight with the Few in 1940

BATTLE OF BRITAIN, from P&G, is a wargame based on the famous battle in 1940 when the Luftwaffe attempted to destroy British resistance to an invasion.

The computer plays, as usual, the badly who nearly win. Its objectives are to blind your radar, enter your airfields so they are almost unusable and - given the chance - bomb your cities so badly that the civilian population will surrender.

Your primary objective is a fairly good approximation to the tactics used in the real battle, namely to maintain the RAF as an effective fighting force.

To do this you must avoid large scale clashes with the enemy, particularly if they have a large fighter escort. Don't waste time a head-on battle is to allow you enough to be caught and bombed on the ground.

The selection and direction of your fighters is at least done via a joystick-controlled cursor. The program provides two training options plus a campaign game that covers 30 days of the actual battle between August 8 and December 31.

There are optional arcade sequences where you can either shoot down the enemy

from a Spitfire or blast away with an anti-air gun. Both are good fun but tend to pull in the full campaign and can be ignored when you want to concentrate on surviving the full 30 days.

I thoroughly enjoyed learning how to do this, even though, to begin with, Churchill was asking me regularly after only two or three days.

After a while you begin to get a feel for what the invading air fleets will try to do and also begin to use your own forces more effectively.

It took me about 10 real days to finally survive the simulated 30 day campaign and discover that, after September 30, there is no accolade for this achievement. In this respect the program simulates very accurately what happened in real life.

I suspect there is a bug, because the day after September 30 is given as September 31!

Apart from this there are other slight faults. For example failing to land a squadron should be penalised for more severely than losing it for only the rest of the "day".

However given the limitations of a micro, I found the game well designed, informative and very enjoyable.

Keith Park



Rescue a forlorn Brownie



THE central character of *Sweevo's World*, from Gary's Games, is a non-too-bright robot named Sweevo.

Before the robot master decides to put Sweevo out to run he will give him one last chance. Eliminate all mutants from the planetoid known as Knutz Folly and Sweevo will be rewarded.

The opening menu allows you to select one of four possible starting points. This idea means that should you be unable to negotiate your way through one particular room—all is not lost.

Just re-start the game and

take a different route. You'll still get stuck, but at least you'll see some new scenery.

Knutz Folly is constructed from a series of interconnected rooms, all drawn in three dimensions with one or more exits.

Each room contains obstacles to be navigated, beams to be avoided or eliminated and useful objects to be collected.

What are these objects? That's up to you to find out. Another feature of the rooms is a one ton weight supported by a force beam.

If you are quick enough you

can run through the beam and not be hit by the falling weight. However once you have passed through, the weight will block your return journey.

As you wander around the planet you will find abandoned Brownies, sitting in inaccessible places, waiting to be rescued. It is also inadvisable to hang around for too long in some of the rooms. You are likely to find a finger rising up through the floor causing your demise.

I thoroughly enjoyed playing this one, and it's obvious enough to keep the going/look for more. **Steve Brook**

Time to tread lightly

AT first sight *The Devil's Cross*, from Probe Software, appears to be a library score with rather cruder graphics.

There are again about 40 rooms to explore and you enter and exit via similarly creaking doors, but this is a much harder game and your "spots" is a little janky but much easier to control.

There is also a nice element of suspense as the action takes place underwater in an old shipwreck and you are in constant danger of suffocation partly because the resident fish will steal your oxygen or, in my case, you just run out and can't remember where the nearest refill is.

There is a satisfactory shoot-er-up feature to get rid of the fish, but other problems are that some rooms are in darkness and some rooms contain ghosts, sometimes helpful, sometimes lethal.

Until you learn your way around you have to carry a lamp and tread softly.

So the first task is to kill the fish, exercise the ghosts and then, using a lantern, draw a map of the game and find out what is where. Apart from the



fish, ghosts and refills for gun and oxygen tanks, about 90 objects are lying around.

The next task is to find these items which must be returned to a special room.

Having done that you are asked to find a blue sapphire somewhere in the wreck. To retrieve it you need a ship's wheel but, just as it floats into reach a pirate leaps into the room, grabs the jewel and takes it somewhere else.

There are seven sapphires to be recovered, and note that if you cannot find three collectibles you have a faulty copy of the game that Probe will be happy to replace.

A final twist in the game is to work out, by elimination, exactly what you have to do to make three treasure chests appear and therefore be able to recover the last sapphire to win game and crown.

Dave Allen

Joys of cricket

TIM Love's *Cricket*, from Peacock, is without doubt the most exciting and realistic cricket simulation I've seen on any computer.

In it you have total control over batting, bowling and fielding and have a choice of playing a full test or just a one day match.

The computer displays England and World eleven and gives you the option of changing their batting or bowling skills.

A facility is available to save these changes on tape or disc, allowing you to build up a library of teams.

Although you are given the choice of playing against an opponent or the computer, the computer plays such a good game that I'd strongly recommend that you find a human opponent.

If you really must play the computer, you'll find the practice option will increase your skill before the match.

Batting is controlled from the joystick and bowling from the numeric keypad. The computer will normally set the fielding for you, but before each over you can change it using the cursor keys.

Continually selecting the same bowler causes fatigue to set in, which results in the bowler visibly slowing down.

The batting joystick has no

control until the bowler releases the ball. After that you can switch from moving the batsman to controlling the bat by pressing or releasing the fire button.

Once the ball has been hit, the screen changes to a bird's eye view of the field, and the joystick controls running between the wickets.

During bowling and batting, the players are represented by large colourful sprites.

When fielding, the players are shown as small stick men which run erratically across the screen. Although the graphics are not of the same high standard as some of the latest arcade games, this is such a realistic simulation that it hardly seems to matter.

Steve Lewis



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On the ball...

PINBALL fans should love **Marathon Bumper** from PBS, which simulates the classic game.

But they will have to be patient pinball fans. With no fast-load option and a screen picture to load before the main program, it's more than 12 minutes before you see "Insert" a coin and play your first game.

Luckily the long wait is worth it. Not only does this novel program play a noisy, fun game, but you also have the option of designing and saving your own layout.

Play couldn't be easier. Just four controls are used—two to control the flippers and one each for the left and right functions.

The ball functions isn't explained and there are no hints and tips, something that would have been useful when designing your own table.

Well, it doesn't take long to get the hang of both the game and the design function. You can either design a new table from scratch or modify the existing layout.

Sound is excellent, with jolly tunes and great effects. The graphics are not so good. They have a rather chunky appearance, and, coupled with an unfortunate choice of colour, unappealing.

Putting aside these grumbles, **Marathon Bumper** is an excellent game. I liked both the pinball construction kit, and the option of allowing up to four people to play against each other.

Brian Finerty

Get the most from your versatile disc drive

ODDJOB, from Prime Utilities, is a collection of eight programs designed to help you get the most from your **Atari** disc drive.

A help option is the only documentation supplied. The first program, **Discset**, makes light work of editing the disc directory.

All information regarding filenames, read/write status, user number and so on is displayed on an 80 column screen.

By selecting any of eight options from a menu you can manipulate the parameters to your heart's content. This method is far more detailed than ploughing your way through screens of hexadecimal numbers using a standard sector editor, a version of which is also provided in the **Odjob** package.

Fileform is a utility which will format a disc in half the time normally taken by the **CP/M** format program.

The next program is a rather effective disc back-up utility **Discclone**, to make security back-ups of your expensive discs. It also carries a warning against piracy.

The disc sector editor, **Sector**, requires you to enter the track and number of the sector to be edited.

A **Discmap** program can be used to determine these numbers.

Insert a disc, press a key, and each filename is displayed

along with all the sectors in which the file can be found.

Discpage, as its name suggests, will transfer files from disc to tape. This was the only routine that I could grumble about as you are only allowed to transfer single files.

Had the program accepted wild card characters, or lists of filenames, it could have been used to archive a whole disc full of programs onto tape. This is far less costly than keeping back-up discs.

Odjob contains a collection of utilities which no disc user should be without. I only hope that the editor forgets who's got this review copy.

Jon Ruddy

Not only a race, but a tactical battle, too

THE majority of motor racing games are of the race simulation variety. You sit behind the wheel of a racing car and must rely of skill and reflexes to win the race.

This is OK for a while, but boredom begins to set in after an hour or so. **Formula One**, from CRL, takes more of a tactical approach to the sport.

You are in control of a racing team, say Ferrari or Renault, and your first task as team manager is to find some sponsors.

Having collected the initial sponsorship money you can get down to the nitty gritty of spending it.

You are allowed to run two cars simultaneously, though I would strongly suggest that you begin with a single machine.

In this way you can spend all your money on the best driver, engine, chassis and pit crew.

This gives you a good chance of winning your first grand prix. A win results in a substantial income from prize

money and also increased sponsorship. Everyone loves a winner.

Before starting the race you are advised of the prevailing weather conditions and must select your tyres accordingly. The formalities dispensed with, the race begins. Your only view of the track is the starting straight. As the cars complete each lap you see them whizz past.

A leader board at the top of the screen displays the first six places along with the number of seconds between each car while the bottom of the screen is reserved for news flashes.



All mechanical problems experienced by any of the cars are reported.

At some point during every race you will have to come into the pits and this is the game's only arcade feature.

You guide the little machine to each wheel and change the tyres. As in the real thing, races can be won or lost here.

I enjoyed this game far more than any of the driving simulations I have used. The satisfaction of a well timed tyre change, or a 10 second pit stop, gave the game lasting appeal.

James Hibbett



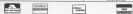
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It sometimes pays to leave the straight and narrow

THOSE of you who've ever tried to follow a Basic program will know only too well how, rather than one line following after another, sure as night follows day the thing tends to jump around from one part to another in gay abandon.

Indeed some programs become almost as tangled as spaghetti and far more indigestible.

There is a reason of course — not for causing a complete tangle, but at least for some judicious leaving of the straight and narrow. Often it helps us save repeating code by calling commonly used program segments as subroutines.

And sometimes we only want to do certain lines of a program if so-and-so is true, otherwise we want to jump past them.

As in Basic, so in machine code. We often want to divert the steady flow of our program, and we've met the mechanics for doing so, JP and CALL.

JP corresponds to Basic's GOTO, and CALL to Basic's GOSUB, with machine code's RET taking the place of RETURN, as we'll see later.

Rest of all though we've got to consider how the Z80 itself knows where it's up to in a particular program. After all, in Basic we have line markers. When we want to alter the program flow we do so by specifying a line number, as in GOTO 1000.

In machine code we don't have line numbers. However we do know where our program is stored in memory. As we progress through it we can keep track of it by remembering where in program memory we've got up to.

This is how the Z80 does it: it has a special 16 bit register called a

Part XIV of MIKE BIBBY'S guide to machine code

Program Counter that keeps track of where you're up to in program memory. In fact it always points to the start of the next instruction after the micro processor has finished doing the one it's on at the moment. It's like when I'm playing the guitar — while I'm playing one note my mind's on what's coming next.

0000 04 0F	LD B,7
0000 70	LD A,B
0000 02 FF 7F	LD B,FFH,A
0000 00	RP
0000 00	END

Program 1

Take a look at Program 1 to see how it works — but don't try to run it, it's not complete. The idea is to load the B register with 7, transfer it to A, then store it in \$2FFH. Not exactly mind-bending, is it? But it'll do to show how the program counter works.

As soon as the Z80 starts on the program at \$8000 — never mind how far the minute — it's expecting an opcode and gets one, 06. From its own internal decoding it then knows that the contents of the next memory location (\$8001) isn't another opcode, but the data byte LD B,A needs.

The next opcode then is to be found after it at \$8002, so we load the Program Counter with \$8002, so that it points to the next task, and get

on with our present one, LD B,7.

Having achieved that, the processor simply looks at its Program Counter to find the address of the next opcode, in this case \$8002, and proceeds to process the opcode contained there.

This time it's \$76 (LD A,B), which the Z80 knows needs no data bytes following it, so the contents of the next memory location (\$8003) must also be the next opcode. Accordingly it sets its Program Counter to \$8003 and deals with the LD A,B.

Again, having completed this it then picks up the next opcode from the address indicated in the Program Counter, \$8005, and on finding \$32 decides it is an instruction of the type LDloopA.

It then knows that this uses the contents of the following two memory locations as data, so the real actual opcode must be at \$8006. It sets its Program Counter to \$8006, and processes the instruction it's found at \$8003.

Figure 1 summarises this. As you can see, the Program Counter always points ahead to where the next instruction is to be found.

However you can get up to mischief with the Program Counter. Suppose that while it was busy with one instruction you changed its value.

For instance, suppose it contained \$8005 as the address of the next instruction to be done after finishing the current one. Instead though, you magically change the Program Counter to \$8000. This means that as soon as you finish the current instruction you get the next opcode from \$8000.

That is, rather than flowing along nicely, picking up each successive instruction, you've done a jump — the equivalent of a Basic GOTO. So

Instruction	First	Second	Third	Fourth
Program memory	8800	8801	8802	8803 8804 8805 8806
Contents	506	507	578	532 576 577
Program Counter	8802	8803	8804	

Figure 2. How the Program Counter works.

how do you change the Program Counter this way? Easily, with the instruction we've already met, JP (opcode &C3).

The point is that when the Z80 encounters a JP instruction it knows the two memory locations following it contain the 16 bits, 16 byte address of a part of the program you want it to jump or branch to.

So the Z80 cunningly puts these bytes into the Program Counter, replacing what's already there, and then signals ingeniously "Instruction

done".

Then, of course, the Z80's next step is to get the address of the next opcode from the Program Counter.

But we've just fiddled things so that the address it gets — and therefore continues running from — isn't the next in sequence, but our own cuckoo's egg, that we got from the JP. So the Z80 innocently starts operating from that address, unaware that its direction has been switched.

Program 8 illustrates the idea in practice. It's a non-beeping program.

```

0000      ;DirOut=MEMA
0001:Z8 07  L0 A,7
0002:C3 00 00  JP here
0003:C3 00 00  CALL CharOut
0004      ;here
0005:CF      SET
0006:      END
  
```

Program 7

You load the A register with 7 but before you can call the ROM routine &B85A to print it out, you JP to here, which conveniently returns you to basic.

Let's look at things from the program counter's point of view. Initially the Program Counter, or PC, is 88000, so it does the first instruction, &3E, loading the PC with &8802 so as to point to the next instruction.

Having loaded A with 7, we then do our next instruction, the one the PC is pointing to. This time it's a &C3 — an unconditional jump, with two

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data bytes following.

Our PC moves automatically on to &8008, the address of the apparent next instruction, but not for long though.

Because it's a jump, we put the address specified in the two data bytes into the PC. So the effect of the JP is to put &8008 in the PC, and having finished this instruction, we then look for our next opcode at the address specified in the PC — &8008. In other words we've skipped or jumped over &8006, &8008, and &8007 entirely. No brag!

This is how all jumps work. Of course conditionals such as JPZ only put their data bytes into the PC — that is, jump — if their conditions are met, otherwise the PC changes as normal.

Relative jumps are similar except here you add the offset given in the following data bytes on to the PC — remembering our convention sees that for numbers &80 and "greater" you're dealing with negative numbers.

But, of course, there's a whole set of branches that we haven't gone into in detail — the CALLs. Basically a CALL is a rather clever jump! Not only does it jump to the address specified in the following data bytes, it also remembers where it was up to, so once it's accomplished the task it branched for, and has met a RET, it returns to the next instruction after the CALL.

Fine, we can see how it jumps to the subroutine slightly, but how does it remember where to go back to? Well the Z80 has a sort of scratchpad area of memory called the stack. If you like it's a handy place for the Z80 to put down things it wants to remember, such as the address of the instruction to return to after a CALL. We'll go into the stack in more detail later.

Now when we mean CALL &805A in Program II our Program Counter automatically moves on to the address of the next instruction in sequence, &8008. However, just as with a JP, we replace the contents with the address given in the CALL, but because it's a CALL we don't just overwrite the contents of the PC (&8008), we move &8008 automatically to the stack to keep it safe.

This means that when it needs a RET the Z80 just looks at the stack to get the address to return to after the address of the next instruction after

the CALL.

The stack works in a very simple way, it just keeps picking up, or stacking, the addresses you give it, one on top of the other.

The point is that the last address you put on the stack is the first one you take off. It's quite sensible really, if you're stacking a pile of boxes, the one on top is the last one on.

Now if you want to unstack them one by one without the whole thing crashing to the ground, you take the top box off first, followed by the next to the top — in the reverse order to which you put them on. Figure II shows the idea.

ADDRESS	OPERATION
	PUSH BC
	PUSH DE
	PUSH HL
	POP BC
	POP DE
	POP HL

Figure I: PUSH and POP

Such ways of handling data, that is, such data structures, are known as LIFO structures — last in, first out. It tends to describe my behaviour at meetings, and is the exact opposite of my behaviour in pubs.

Actually it's not just CALLs that use the stack, you can use it for your own "scratchpad" as well. You can simply push any of the register pairs on to the stack and pop it back when

0000:01 FF FF	LD HL,0FFFF
0000:03 00 00	LD DE,00000
0000:05	PUSH HL
0000:07	PUSH DE
0000:09	POP HL
0000:0B	POP DE
0000:0D 03 FF FF	LD (0FFFF),HL
0000:0F 00 7F	LD (07FFF),HL
0000:11 07	RET
0000:13	END

Program III

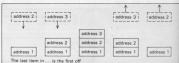


Figure II: How the stack is built up

you want to. The instructions for this are PUSH and POP respectively, and their codes are given in Table I.

Being able to tuck the registers out of the way on the stack can be very useful before calling subroutines that corrupt their values.

All you do is to PUSH the values you want saving on to the stack, call the damaging routine, then POP them back — in the correct order.

Remember, it's last on the stack, first off — so if you PUSH HL, PUSH DE before your CALL, afterwards you'll have to POP DE, POP HL to restore the status quo.

If you reversed the order of these POPs you'd effectively exchange the contents of the DE,HL registers, as Program III demonstrates — check &7FFF on to see that DE and HL have been truly swapped.

Once you understand what's happening, try rewriting it so that it swaps BC and DE. Be careful that you POP off the number you've PUSHed on to the stack, otherwise the RET and the end won't be able to get to proper return address off the stack.

0000:01 FF FF	LD HL,0FFFF
0000:03 00 00	LD DE,00000
0000:05	EX HL,HL
0000:07 03 FF FF	LD (0FFFF),HL
0000:09 00 7F	LD (07FFF),HL
0000:0B	RET
0000:0D	END

Program IV

In fact, for the special case of DE and HL, there's an instruction that let's you EXchange the contents of the registers — EX DE,HL. It has the opcode &69. Program IV is the equivalent of Program III, using this instruction.

■ Well that's enough for this month. We've covered some very powerful topics — exactly how powerful? We'll see next time.

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The user guide shows you how to write your own programs for the RB2 without having to load the entire package. Graphics and CAD/CAM software will be available at a later date.

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Some features and specifications are subject to change. Please refer to the manual for complete details. ©1984 TASMAN SOFTWARE

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PRINTING	PRINTING	PRINTING	PRINTING
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All TASMAN 464 software is fully compatible with the 664 and 6128.

C P/M performs all its input/output between different logical devices.

These are:

- CON:** The console.
- LST:** List device.
- PUN:** Punch device.
- RDR:** Reader device.
- A, B:** Disks.

The PUN and RDR device names are a hangover from the days when computers used high speed punched paper tape for loading and saving data.

Nowadays most computers use these names to refer to the RS232 serial communications ports which are used to talk to other computers via modems, and to some fancy types of printers.

PUN is used for output, RDR for input. LST can only be used for output, but CON deals with both input from the keyboard and output to the screen.

Each of the logical devices, other than the disks, has associated with it four physical devices. Exactly what they are varies from computer to computer, as they depend on what facilities a particular machine can provide.

So on a large computer the list

CONSOLE (CON:)	
TTY:	Special I/O device 0.
CRT:	Keyboard and screen.
BAT:	INPUT from RDR.
	OUTPUT to LST.
UC1:	Special I/O device 1.
READER (RDR:)	
TTY:	Special I/O device 0.
PTP:	Null input.
UP1:	Special I/O device 1.
UR2:	Keyboard.
PUNCH (PUN:)	
TTY:	Special I/O device 0.
PTP:	Null output.
UP1:	Special I/O device 1.
UP2:	Screen.
LIST (LST:)	
TTY:	Special I/O device 0.
CRT:	Screen.
LPT:	Canonics printer port.
UL1:	Special I/O device 1.

Figure 1: Possible logical/physical device assignments

PIP, your friendly in-house software switch

Part IV of COLIN FOSTER's exploration of CP/M 2.2

output LST could be directed to any of four different printers connected to different ports.

Our Amstrads are unfortunately not quite this powerful — we don't even have an RS232 interface built into the computer as most CP/M machines do. However all things are possible so far as add-on peripheral manufacturers are concerned.

The physical devices which the Amstrad BIOS can assign to each of the logical devices are detailed in Figure 1. The two special I/O devices 0 and 1 are normally the two RS232 serial channels provided by Amstrad's own add-on interface.

If you buy anyone else's interface make sure that either it is exactly compatible with Amstrad's or that you are supplied with RSX software and instructions to integrate it into CP/M by installing new device drivers and patching the BIOS jump block appropriately, otherwise you will not be able to use it easily from CP/M.

The null output provides a useful way of "throwing away" program output we don't want by directing it to the punch device and assigning PUN to this "black hole". Similarly, the null input simply returns the end-of-file character and so is useful as a dummy input while testing programs.

The current device assignments can be determined and changed by using — you guessed it — STAT.COM! Type:

stat dev

and STAT will tell you the current assignments. Normally on an Amstrad, the defaults are:

CON:=CRT: (Keyboard and screen)

PUN:=TTY: (RS232 channel 0 output)

RDR:=TTY: (RS232 channel 0 input)

LST:=LPT: (Canonics port)

Typing a command in the form:

stat logical device/physical dev
list

will re-assign the physical device with which I/O is performed when data is sent to/read from the specified logical device. The command:

stat all

will remind you of all legal STAT commands, including the logical and physical device names. For example:

stat aborts

will force output which a program tries to send to the printer on to the screen instead — useful for a final check of the output from a program to avoid wasting paper on mistakes.

stat console

is apparently fatal — the machine appears to die. Can you work out why? Well, this assignment tells CP/M to take all input from the RS232 interface instead of the keyboard, and send all output to the RS232 port instead of the screen. Thus the console is "locked out".

This type of assignment is used when you want to control your Amstrad from another computer via a modem or network — admittedly not an everyday operation for most of us. The only way out of this from the Amstrad and is to hit Ctrl-Shift-Esc and reboot CP/M.

Once we have selected physical devices using STAT we can transfer

data between any logical devices using the transfer utility PIP.COM — CP/M's Peripheral Interchange Program. This might best be thought of as a software switch — a sort of telephone exchange for data. PIP accepts commands in the form:

```
PIP (destination)=[source]
```

If you want to do several things one after the other PIP can also be used interactively by just typing:

```
PIP
```

without any command. PIP then prompts you for commands with a **P**. For example:

```
PIP
RUBBISH
```

turns your Amstrad into a primitive typewriter. Whatever you type on the keyboard is sent to the printer as well as to the screen. This can be quite useful for finishing out quick memos, shopping lists, and so on. Note that the Enter key now only returns the cursor to the start of the line — press Ctrl-J to feed a new line.

To finish we must type Ctrl-Z. CP/M's "end-of-file" character to tell PIP that we have reached the end of our input. Now try:

```
RUBBISH,TRASH
```

This will let you type into the computer exactly as before, but this time whatever you type will be sent to the disc file RUBBISH.TXT on drive A: instead of to the printer.

This can be useful if you don't have an editor readily to hand and you want to create a small text file for some reason. Note, if you haven't already, that absolutely everything which you type in is sent out again — including delete characters.

PIP is not an editor, there is no way to correct mistakes in your input before it is actually read in — just don't make any. Type in a fair bit of rubbish, then hit Ctrl-Z as before to tell PIP that you're finished.

If you now type:

```
RUBBISH,TRASH
```

the process will be reversed — PIP will send the entire contents of A:RUBBISH.TXT to your screen, just like a COPY command.

PIP.COM is an extremely powerful and useful program, coming into its own when you want to move files

around, split them, search them for certain characters or strings, or concatenate files.

You can, for example, add to the end of an existing file by typing on the keyboard, add an input from the RS232 interface, then stick another file on the end, and so on.

Many of these functions are controlled by option parameters which we can give PIP along with our commands, in the form:

```
PIP (destination)=[source], [source],
.....[source]optional
or
M[destination]=[source], [source],
.....[source]optional
```

For example, the command:

```
PIP A:RUBBISH.COM@DUMP@I
```

tells the PIP utility to send the disc file

Option	Function
B	Block mode transfer — input from last device is buffered until XOFF character received, then written to disc.
Ca	Delete characters after column n during transfer, for example truncate lines over 80 columns long sent to printer.
E	Echo all transfers on console.
F	Strip all form feed characters from file during transfer.
Ga	Get file from another user area (user).
L	Convert upper case letters to lower case.
M	Add line numbers to each line transferred. As M, but leading zeros are printed and a tab is inserted after each number.
NO	Object file transfer — normal CP/M end-of-file character is ignored. Should be used when copying any non-text file which does not have a COM extension.
Pa	Insert form feed characters every n lines.
Ca Z	Quit copying from the source as soon as the string a last sequence of printable characters terminated by Z is encountered.
R	Read system files, that is files with SYS status.
Sa Z	Start copying from the source when the string a last sequence of printable characters terminated by Z is encountered.
Ta	Expand Ascii tab characters to every nth column.
U	Convert lower case letters to upper case.
V	Verify that file has been correctly copied.
W	Write over BMD (read-only) files without console interrogation. Normally the message: DESTINATION IS R/O, DELETE NOW! is displayed if an attempt is made to overwrite a BMD file, with the M option this is suppressed.
Z	Zero the parity bit on input for each Ascii character.

Figure 11. PIP parameter options

A:DUMP.ASM to the printer, equating tabs to every eight columns, removing any existing form-feed characters and inserting new ones every 84 lines. Figure 11 lists the options PIP can be given and describes briefly what each does.

It may also now be obvious that PIP could transfer one disc file to another — in other words, copy a file. Thus:

```
PIP A:ANOTHER.SOURCE@I,ANOTHER@I
```

will duplicate the file A:DUMP.COM, creating a copy called ANOTHER.ONE on the same disc. The [V] option tells PIP to verify after copying. I recommend that you always verify after copying anything other than text files, as the standard version of PIP.COM has a bug which occasionally mis-copies binary files.

To combine two files, we use a

CP/M

command of the form:

```
both:source1.bas,md:bas
```

This creates a new file, BOTH.BAS, which has a copy of EX1.BAS added to the end of a copy of EX1.BAS - the original files are not changed.

To copy a file from one disc to another, type a command such as:

```
Copy:brn:map.as
```

PIP can therefore be used as a replacement for the Amstrad COPYFILE utility. Unfortunately it is NOT possible to use PIP to copy files from one disc to another on a single drive system.

The Amstrad utility FILECOPY will do this (sometimes) but has known bugs which appear when you try to copy large files. This problem can be avoided by using one of the better copying programs available in the public domain.

Notice that if you do not want a

discipline 1-24

FILECOPY V2.1

Please insert SOURCE disk drive A then press any key.

Ambiguous file names. Copying individual files (Y/N) ?

```
WRITE .### Copy (Y/N) ? Y
PER .### Copy (Y/N) ? Y
RECURSE .### Copy (Y/N) ? Y
POLYCOPY .### Copy (Y/N) ? Y
PASCAL .### Copy (Y/N) ? N
EVENTS .### Copy (Y/N) ? Y
SPECTRUM .### Copy (Y/N) ? N
RESET .### Copy (Y/N) ? Y
EVENTS .### Copy (Y/N) ? Y
PROBE .### Copy (Y/N) ? N
SCODE .### Copy (Y/N) ? Y
WANGREP .### Copy (Y/N) ? Y
SCHOOLER .### Copy (Y/N) ? Y
RESIST .### Copy (Y/N) ? Y
REBORN .### Copy (Y/N) ? N
```

Copying STARTED - - -

Please insert DESTINATION disk drive B then press any key.

Amstrad's FILECOPY is not

different destination filename from the source the destination filename can be omitted and only the logical device (B:) specified explicitly. Also PIP accepts ambiguous filenames for copying - for example:

```
Copy to:md:con(v)
```

will copy and verify all files with a .COM extension from drive A to drive B:

Next month we'll see how programs can alter device assignments directly, and go on to look more closely at the facilities provided by the standard BIOS.

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```

1000 NEXT I
1010 IF NORMAL=KIVAL=3 THEN SCORE=0,
    00=00
1020 GOTO 1400
1030 IF SCORE18,10=0 OR SCORE18,10=
    THEN SCORE18,11=00:SCORE18,10=20:G0
    TO 1400
1040 IF SCORE18,10=0 OR SCORE18,10=
    THEN SCORE18,10=00
1050 FOR I=1 TO 6:GOSUB 10,1=SCORE18,
    10:GOSUB 1
1060 RETURN
1070 REM** ROLL DICE **
1080 INTFOR I=1 TO 6:FOR J=1 TO 6:G0
    DATE 1+2*99,1+0*9:GOSUB10=0 THEN PR
    INT " "
1090 NEXT J:GOSUB 1
1100 RANDOMIZE TIME
1110 FOR J=1 TO 6:FOR I=1 TO 6:GOSUB 10,
    1=0 THE
    = 0:PRINT(10+0+1+1)=0:GOTO(1+1)+0
    ,0+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1
    ,0+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1
1120 NEXT I
1130 REM** PRINT DICE FACES **
1140 FOR I=1 TO 6
1150 FOR J=1 TO 6
1160 LOCATE 1+2*99,1+0*9:PRINT 10:GOSUB 10,
    1=0 THE
    = 0:PRINT(10+0+1+1)=0:GOTO(1+1)+0
    ,0+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1
1170 NEXT I
1180 REM** GET INPUT **
1190 PRINT#
1200 INPUT:;:DIM I(7):DIM J(7) AND DIM
    I(7) OR LOCATE(1+1) THEN PRINT CHR
    (7+1) GOSUB 10
1210 RETURN
1220 REM** SET INPUT **
1230 PRINT#
1240 INPUT:;:DIM I(7):DIM J(7) AND DIM
    I(7) OR LOCATE(1+1) THEN PRINT CHR
    (7+1) GOSUB 10
1250 GOTO(1+1)+0
1260 RETURN
1270 REM** DICE OUTLINES **
1280 CLS:LOCATE 18,1
1290 FOR I=1 TO 6:PRINT CHR(11+I);:FOR
    J=1 TO 6:PRINT CHR(11+J);:NEXT J
1300 FOR I=1 TO 6
1310 LOCATE 18,I
1320 FOR J=1 TO 6
1330 PRINT CHR(11+I);:CHR(11+J);
    :NEXT J
1340 LOCATE 18,1
1350 FOR I=1 TO 6:PRINT CHR(11+I);:FOR
    J=1 TO 6:PRINT CHR(11+J);:NEXT J
1360 LOCATE 18,1:PRINT"ROLL "
1370 REM** PRINT CATEGORIES **
1380 RESTORE 1700

```

```

1390 FOR I=1 TO 17
1400 LOCATE 1,1+9:READ C:PRINT
    C:GOTO
1410 NEXT:RETURN
1420 DATA "SACES","SIXES","SEVENS",
    "EIGHTS","NINES","TENS"
1430 DATA 00=TOTAL,10=SCORES
    -----
1440 DATA "1/2 OF A KIND","3/4 OF A K
    IND","FULL HOUSE","BIG STRAIGHT 4","
    STRAIGHT 5","LITTLE STR","BIG STRAIGHT"
    -----
1450 DATA -----,00=00 TOTAL
1460 GOTO 000 TO COMMAND MENU **
1470 PRINT#;P000,5
1480 PRINT#;0000;FOR I:RETURN
1490 GOTO 170:FOR I=1 TO 1000000
    :PRINT#;:RETURN
1500 REM**OPEN:PRINT#(IF A** THEN
    1000 GOTO
1510 CLS:FOR I:PRINT SPACES(11)";YARD
    S";PRINT SPACES(11)";*****";FOR I
    1520 PRINT#;PRINT#;Each player has up t
    o 3 rolls of the 6 PRINT#;dice to comp
    ate each of 13 categories.*PRINT#;"In
    no way to completed in any order."
1530 FOR I:PRINT#;PRINT# " Part I";
    SPACES(11);:FOR I:FOR I
1540 PRINT#;RESTORE 1700:FOR I=1 TO 6:
    READ category:PRINT# " " ;category:G0
1550 PRINT#;RESTORE 1800;FOR I=1 TO 7
    :G:LOCATE 22,1+1:READ category:PRINT
    category:NEXT I
1560 PRINT#;PRINT#;"Scores for Part I ar
    e I in the category";
1570 PRINT# " multiplied by the numbe
    r obtained"
1580 PRINT#;PRINT# " example - 3 3
    000 given 8"
1590 PRINT# " or - 4 0000
    given 24"
1600 REM** PRESS ANY KEY FOR ME
    T# P000=0000 1770=0000 1000
1610 CLS:PRINT#;"Scores for Part II ar
    e I in..."
1620 PRINT#;PRINT#;" or 4 of a kind = 7
    out of 11 dice"
1630 PRINT#;"FULL HOUSE = 25"
1640 PRINT#;"BIG STRAIGHT 4 = 30"
1650 PRINT#;"STRAIGHT 5 = 40"
1660 PRINT#;"YARD S = 50"

```

```

1670 PRINT#;"SIX SEVENS = 100"
1680 PRINT#;"SIX EIGHTS = Total o
    f ALL dice"
1690 PRINT#;PRINT#;"Press Enter for the
    1 roll of dice."
1700 PRINT#;"any combination of display
    ed dice can be PRINT#;"held while the
    others are rolled again."
1710 PRINT#;PRINT#;"For example, if the
    displayed dice are 4,5,6 PRINT#;"PRINT
    " 5 5 6 4 5,6,6 5,6,6 5,6,6 5,6,6 5,6,6
    PRINT#;"you can HOLD the 5s by entering
    246."
1720 REM** PRESS ANY KEY FOR ME
    T# P000=0000 1770=0000 1000
1730 CLS:PRINT#;"Enter each roll of the
    dice the options";PRINT#;"and scores
    available are shown in black.*PRINT#;"
    the current totals are shown in white
    ."
1740 PRINT#;"what the categories are
    why you have";PRINT#;"scores indicated
    in red."
1750 PRINT#;PRINT#;"To select a category
    , type its identity";PRINT#;"letter the
    n press Enter."
1760 PRINT#;PRINT#;"(1) thirteen categor
    ies must be filled.*PRINT#;"(2) at the
    end of three dice throws you";PRINT#;"
    have a combination which does not acc
    urately";PRINT#;"you must surrender one of
    it remaining";PRINT#;"categories for a
    zero score."
1770 REM** PRESS ANY KEY FOR
    MET# P000=0000 1770=0000 1000:CLS:FOR I
    0

```



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From Page 63

LD R0,0 length based
-varpointer

```
INC R1
LD RAXD0,R1
let TOP0=4-2
LD RAXD0,R1
let TOP0=4-2       bottom stack
LD RAXE0,R1
let array0=2
LD RAXE0,R1       top stack
let LOW0=4-2
CALL string
DEFB "hi",13,10,7,0
RET
```

```
*** Put page in variable ***
-putpage
DEC R1
ZF R1,parameter
LD R0,(RAXD0)
let PAGE0=4-2     00-PAGE
-IF
LD L,(10*0)
LD R,(11*0)       variable addr
```

```
LD R0,0
INC R1
LD R0,0
RET
```

```
*** Put TOP in variable ***
-puttop
DEC R1
ZF R1,parameter
LD R0,(RAXD0)
let TOP0=4-2
ZF 0
```

```
*** Put lower in variable ***
-putlower
DEC R1
ZF R1,parameter
LD R0,(RAXE0)
let LOW0=4-2
ZF 0
***** Print string *****
-string
POP R1
-err
LD R,(R0)
CALL 0000
```

```
INC R1
ZF 0
ZF R0,0
ZF R0,0
***** Print PAGE *****
-putpage
LD R,"P"
CALL 0000
LD R,(RAXD0)
let PAGE0=4-2
***** Print low word *****
ZF R,lower
-axword
LD R,R
CALL low
LD R,L
```

```
***** Print low byte *****
ZF R,lower
-lob
PUSH R0
R0CA
R0CA
R0CA
CALL low         (left digit)
POP R0           right number
-lead
ADD R0
ADD R,0FF
DAA
R0C R,000
DAA
```

```
ZF 0000
***** Empty *****
-lead
CALL string
DEFB "Can't do that",13,10,7,0
RET
```

```
-error
POP R1           study up
CALL string
DEFB "No row",13,10,7,0
RET
-err
CALL string
DEFB "No error",13,10,7,0
RET
```

```
-check
LD R,(RAXD0)
let axd0=4-2
LD R,R
DEI
RET 1
POP R1           restore ret addr
CALL string
DEFB "Program running",13,10,7,0
RET
```

```
-parameter
CALL string
DEFB "Target PAGE",13,10,7,0
RET
```

```
***** Jump table *****
-jump table
DEFB name,table
ZF 0
ZF 0
ZF 0
ZF 0
ZF 0
ZF 0
```

```
***** Name table *****
-name table
DEFB "PRINT.PAD",0*+000
DEFB "TEXT.PROGRAM",0*+000
DEFB "TEXT.PAD",0*+000
DEFB "TEXT.PAD",0*+000
DEFB "TEXT.T0",0*+000
DEFB "TEXT.LONG",0*+000
DEFB 0
-errpage
DEFB 0
DEFB 0
```

```
-flag DEFB 0
flag
DEFB 0
```



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See Page 67

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From Page 19

```

8,ta,ty,t,y,yt,1,0
210 ta=tytyy
220 IF ta=yy AND ty=yy THEN CONT
  GO TO 2,200,25,1,1,1,yy=yyt
230 RETURN
240 sub=1000:sub dir 1070 100,100,17
  0,100
250 IF y=1 THEN RETURN
260 IF PEEK(addr+100-201)=0 THEN y=y-
  1:RETURN
270 IF y=0 THEN RETURN
280 IF PEEK(addr+100-40)=1 OR ta=yy
  y AND ty=yy=yy THEN RETURN
290 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
300 NEXT
310 PEEK(addr+100-40),1:PEEK(addr+10
  0-20),0:PEEK(addr),0:CALL 10000,ta
  ,ty,2,ta,ty,1,0:CALL 10000,ta,ty,1,ta
  ,ty,1,1
320 PEEK(addr),0:ty=y-1:RETURN
330 IF ta=0 THEN RETURN ELSE IF PEEK
  (addr+100-1)=0 THEN y=y+1:RETURN
340 IF ta=1 THEN RETURN
350 IF PEEK(addr+100-21)=0 OR ta=0:ta
  =y AND ty=yy THEN RETURN
360 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
370 NEXT
380 PEEK(addr+100-21),1:PEEK(addr+100
  -11),0:PEEK(addr),0:CALL 10000,ta,1
  ,ty,ta=2,ty,1,0:CALL 10000,ta,1,ty,1,ta
  =2,ty,1,1
390 PEEK(addr),0:ta=ty-1:RETURN
400 IF ta=1 THEN RETURN ELSE IF PEEK
  (addr+100-11)=0 THEN y=y+1:RETURN
410 IF ta=0 THEN RETURN
420 IF PEEK(addr+100-21)=1 OR ta=0:ta
  =y AND ty=yy THEN RETURN
430 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
440 NEXT
450 PEEK(addr+100-21),1:PEEK(addr+100
  -11),0:PEEK(addr),0:CALL 10000,ta,1
  ,ty,ta=2,ty,1,0:CALL 10000,ta,1,ty,1,ta
  =2,ty,1,1
460 PEEK(addr),0:y=ty-1:RETURN
470 IF y=1 THEN RETURN
480 IF PEEK(addr+100-20)=0 THEN y=y-
  1:RETURN
490 IF y=1 THEN RETURN
500 IF PEEK(addr+100-1)=0 OR ta=yy
  y AND ty=yy=yy THEN RETURN
510 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
520 NEXT
530 PEEK(addr+100-21),1:PEEK(addr+100
  -11),0:PEEK(addr),0:CALL 10000,ta,1
  ,ty,ta=2,ty,1,0:CALL 10000,ta,1,ty,1,ta
  =2,ty,1,1
540 PEEK(addr),0:y=ty-1:RETURN
550 IF y=1 THEN RETURN
560 IF PEEK(addr+100-20)=0 THEN y=y-
  1:RETURN
570 IF y=1 THEN RETURN
580 IF PEEK(addr+100-1)=0 OR ta=yy
  y AND ty=yy=yy THEN RETURN
590 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
600 NEXT
610 LOCATE app,app:open 4:print 0:

```

```

620 NEXT
630 PEEK(addr+100-40),1:PEEK(addr+100
  -20),0:PEEK(addr),0:CALL 10000,ta
  ,ty,2,ta,ty,1,0:CALL 10000,ta,ty,1,ta
  ,ty,1,0:PEEK(addr),0:ty=y-1
640 RETURN
650 LOCATE wt(i),wt(i)-1:PRINT " "
  DATE wt(i),wt(i)-1:PRINT " "
  wt(i)=0:wt(i)=1:wt(i)=0:wt(i)=1:wt(i)
  =0:wt(i)=1:wt(i)=0:wt(i)=1:wt(i)=0
  :wt(i)=1:wt(i)=0:wt(i)=1:wt(i)=0
660 RETURN
670 REM*****Close Stage*****
680 PEEK(addr),0
690 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
700 RETURN
710 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
720 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
730 IF sub=1 THEN CALL 10000,y,t,y,1,0
  0:CALL 10000,y,t,y,1,0:0:CALL 10000
  ,y,t,y,1,0
740 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
750 NEXT 4
760 RETURN
770 IF PEEK(addr+100-20)=1 OR wt(i)=
  1+yy AND wt(i)=yy OR y=1 THEN 0
  1:RETURN
780 jump(i)-1
790 RETURN
800 IF PEEK(addr+100-11)=0 OR wt(i)=
  app AND wt(i)=yy OR y=0 THEN 0
  1:RETURN
810 jump(i)+1
820 RETURN
830 IF PEEK(addr+100-11)=0 OR wt(i)=
  app AND wt(i)=yy OR y=1 THEN 0
  1:RETURN
840 RETURN
850 IF PEEK(addr+100-20)=1 OR wt(i)=
  1+yy AND wt(i)=yy OR y=0 THEN
  RETURN
860 jump(i)-1
870 RETURN
880 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
890 NEXT
900 RETURN
910 REM*****Print Expression*****
920 app=INT(1000-20)+1:app=INT(1000-
  1)+app+app+10
930 app=app+app+wt(i)-1:0:IF
  PEEK(addr+100-1)=0 OR app=0 AND app
  =1 THEN GO TO 950
940 FOR i=1 TO 3:IF wt(i)=0 AND wt i=
  1+y THEN GO TO 450
950 NEXT
960 LOCATE app,app:open 4:print 0:

```

```

970 REM*****Close Stage*****
980 app=app+app+wt(i)+1:app=1:app
  =1:app=1
990 screen=screen+1:cd=cd+1:screen=
  1000
1010 IF screen=1 THEN screen=1
  1000 FOR i=0:11 TO 1:STEP=1:LOCATE
  10,i,0:PEEK(10,PRINT),0:0:0:0:0:0:0
  REM*****LOCATE 1,5:P000,15:P00
  10,screen:GOTO 1,10+10,1,10:G01
  1000 GOTO 90
1020 REM*****Last 1 Expression*****
1030 LOCATE 1,15:screen=PRINT " "
  1:1:screen=1:GOTO 100,10,15,1,1
  1040 RETURN
1050 LOCATE 1,1:PRINT STR$(1000),1:1
  1060 IF INT(10)=1 THEN LOCATE 1,1:0:0
  1:PRINT:0:0:0:0:0:0:0:0:0:0:0:0:0:0
  1070 PRINT:0:0:0:0:0:0:0:0:0:0:0:0:0:0
  1080 FOR i=1 TO 2:PRINT 1:1:0:0 FOR
  1 TO 1:1:0:0 4,y:GOTO 1,y,y,1:GOTO
  4,y,y,1:GOTO 5,1,1,1:GOTO 4,y
  1090 GOTO 200
1100 GOTO 00,100,17,100,17,100,10,
  100,25,100,25,100,25,100,25,100,25,
  100,25,110,100,100
1110 REM*****Close Stage*****
1120 GOTO
1130 GOTO
1140 PEEK (app),screen:CALL (app)
1150 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
1160 FOR i=1 TO 10:STEP=1:FOR y=1
  TO 10:IF PEEK(addr+1)=1 THEN CALL 1000
  0,y,t,y,1,0:CALL 10000,y,t,y,1,0,1
  1:0:loc=loc+1:GOTO 4,y
  1170 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
  1180 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
  1190 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
  1200 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
  1210 sub=1000:sub dir 1070 100,100,17
  0,100,20,2,1,1,1,1
  1220 RETURN
  1230 REM*****Close Stage*****
  1240 screen=INT(1000-20)+1:screen=
  1250 1:screen=0:0:0:0:0:0:0:0:0:0
  1260 app=app+1
  1270 RETURN
  1280 REM*****Close Stage*****
  1290 GOTO 0
  1300 LOCATE 1,10:PRINT STR$(1000)
  1310 GOTO 1:1:0:0:0:0:0:0:0:0:0:0:0
  1320 PRINT STR$(1000),0:0:0:0:0:0:0
  1330 PEEK (LOCATE 1,25:PRINT STR$(
  1000), " "
  1340 LOCATE 0,25:FOR i=0:0 TO 0:0:0:0:0

```


A 664 is a bargain no matter what

I DO wish 664 owners would take a look at what they have got and stop worrying about what they have missed!

When Amstrad started giving away £700 worth of free software with 484s, we early 464 buyers did not demand the computer press with complaints. We know we got an excellent machine at an excellent price.

We also knew that it would be improved or superseded. That always happens in any successful machine.

No matter how innovative a machine is or how fast, to maintain market viability it must be improved and developed.

If you buy this year's car, state in writing whether you do it knowing that next year the same firm will be selling an improved version.

Computers are improved faster, and if they are not, they rapidly become out-dated and irrelevant.

To allow that to happen is commercial suicide, even if the machine has the blessing of the BBC.

So stop whining 664ers - you got the first budget 664 machine with built in drive and monitor at a bargain price.

Join us 464 owners in pride in owning one of a market-leading family of machines, confident of software and peripheral support for years to come.

If you'd have a 664er 100 to select 1, I think they made about 400 before going back to it in a 646 machine with two drives and cost me £2,000.

Worried cost me another £250, and the same again for Malvern. At the time the price was reasonable, and my only problem is maintenance.

I wish they'd replaced it. Pocket Wonders at 270 is an hell an implementation as I will ever need.

Who cares if they launch the 664? It will not make my machine work less well, and I will not need the press.

But I will know that I have a cheap, reliable machine from a company that will be with us for a long time attaching

extensive support from software houses.

Who wants a 128k home machine? The games houses are still exploring the use of 64k, and many have said that the development cost of coding any game to fit 128k would make the price disproportionate.

Would you pay £50 for a 2000 room Jet Set, or an adventure that takes a year to complete?

You would be bored with the general format before you were halfway through (and probably writing letters complaining about the launch of the 3500 room Jet Set just after you bought the smaller one).

Can I ask that someone write a nice, simple idiot's guide to CP/M? And what about random access files, one of the main uses of disks?

Only one book at the Amstrad family machines there - and then only to say that sequential files are easier to handle. Now if you have 5000+ variables, they aren't!

Is it impossible to offer Amstrad's? If so, can you get comprehensive basic under CP/M? What calls are needed?

G. J. Edwards, Leeds.

■ We started a series on CP/M in the January issue of Computing with the Amstrad. You should find that very soon all your questions will be answered.

Saving a byte

THERE is a small bug in Roland Washburn's RAW assembler - the ALCA and RUC codes are mixed up. This is easily cured by reassigning them around in the 7820 and changing their GOSUBs in the 8210.

But it's a brilliant

assembler. I had made one of my own but managed it when I discovered yours. - **D. Inneson Brown, Cardiff.**

■ Thanks for pointing this out. In fact, Roland's program does work, but your modifications will save a byte of machine code.

```

5200 IF 1100 THEN 1140-55
5300 IF 6000 4400,6000,6000
,4400,6000,6100,6400,6400,6
5300,5300,7100,6000,6400,6400
6,4400,6000,6000,6000,6400,
6400,6200,6400,6200,6400,54
70,6400,6200,7100,6000,6400
,4400,6400,6400,6400
7820 DATA OUT,OUT,OUT,OUT
,POW,MOD,RET,RET,RET,RET,AL
,AL,AL,AL,AL,AL,AL,AL,AL,AL
,MOD,MOD,RET,RET,RET,RET,AL
LA,6400,600,600,620,620
  
```

Dumping difficulty

I SHOULD be grateful if you can offer some advice regarding the screen dump program published in the March 1988 issue of Computing with the Amstrad. At that time I was using the descender on the CPC-664 and the program worked well producing dumps on my Massbourne Fatty MY80 printer.

In July I purchased a star drive 100-11 and found that the dump program would not run, producing an error message "Memory full in 120".

I have since tried assembling the program at other addresses (including most recently at 84000) as detailed in the latest issue of your magazine.

The program now apparently runs producing the usual "Ready" message. However subsequent attempts to "Get Back" always result in a crash - everything is lost.

Even attempts to reset the machine using Control-Shift-Esc says fail, and the only way out seems to be to switch the power off and then on again. - **R. Symonds, Hexton.**

■ The screen dump does work with dump 8 you type in the assembly listing and assemble it at 84000. It sounds as if you've made an error entering the listing.

Don't forget to lower HIMEM to 8000 to reserve space for it. Please note however that the last three instructions in the last column should be at the top of the column.

Farm database

I HAVE a PCW8288 and urgently require to purchase the following parts:

Let calves for breed and ear tag numbers each or contain source address, date and price paid, up to 16 week rearing details including feed costs, vet fees, final weight, to whom sold (full details) price, date and shed carcase weight.

Details of children using horse riding facilities, or hourly basis and as resident guests for seven and 14 day periods. Names, addresses, telephone numbers, ages, lessons received and outgoing expenses. Dates.

Details of sales of bagged milk powder to farmers. Individual farm details, names, addresses and telephone numbers, details of contract supply arrangements including delivery frequency, price per tonne, quantities, dates, details of haulier, costs etc.

Please advise if you know of any available and recommended programs available to perform any or all of these tasks. Your assistance will be welcome. - **J. Ellis-Vaughn, Crees.**

■ All you require is a data-

base system. These range from simple electronic card-index programs to powerful relational databases such as dBase III.

But since you don't specify that you need to perform any difficult calculations or complex searches, an electronic filing system should be adequate.

See Demonstrations, if you can, of Cardex, DMS Plus, Delta, EMS, Amfile and Micropan. But the market is brimming with database programs that will do precisely what you want, so ask about any other available.

Don't necessarily go for the first one you see, and try to think of future requirements before you make a choice.

Our intention would be Cardbox, from Cardex Ltd. It's easy to use, fairly fast, and fully interactive.

Spacebase GOTO

I HAVE been typing in Peter Baker's Spacebase from the February issue of Computing with the Amstrad.

When I got to line 770 there appears to be a mistake as it ends with a GOTO and nothing else. Surely this can't be right? — **B. Fisher, Bury St. Edmunds.**

■ If you look carefully at the listing you'll see that line 770 continues on the next line with:

...THE END HOUR END

The real line 780, one line later, reads:

THE 80 END HOUR END

It was a care-take that the listing got to that it appeared to have two line 780s and it did confuse me as two younger readers.

Happy with the 8256

YOUR correspondent Mr Barber, February Postbag may not be computer minded but her letter and questions suggest that she knows quite a bit more than I did when I

Computing with the AMSTRAD Postbag.

WE welcome letters from readers — about your experiences using the Amstrad, about tips you would like to pass on to other users... and about what you would like to see in future issues.

The address to write to is:

Postbag Editor
Computing with the Amstrad
Europa House
88 Chester Road
Hazel Grove
Stockport SK7 5RY

debug my PCW8256?

I live on a remote island in the Hebrides, without access to advice and, until I reached your magazine yesterday, without access to published information. There is one shop on the island, but it does not sell computers.

I walked into Doves in Edinburgh in December, having seen the Amstrad advertisements in the colour magazines.

The young man was helpful, but it was quite clear that I was completely out of my depth, so I left 1984 a cheater and bought the thing.

All right I was about to spend about 18 to 20 hours getting the hang of Jane Smith. It is certainly not complicated, provided one is prepared to read the manual through two or three times.

I will have to spend a little time rethinking my filing system, and in due course refining my use of the word processing features, but after a recent pain delayed the past I found I was able to clear a backlog of over 700 letters in a morning even at my present level of incompetence.

Problems included inadequate introduction to 'Your first 20 minutes', which was really sorted out by a telephone call to Amstrad. Also a lot of verbal interference, which Amstrad's aid simply could not happen.

And in high quality words, behind margins tended to slope to the right while frequently whole lines turned into a thin squiggle.

Finally, at each session

passed, the page when printed seemed to be always a little more to the right-hand side.

This was of a huge mystery to me at first, but I eventually discovered that there were two problems, one lay in a faulty printer, since replaced by Doves, the other lay in the proximity of a video disc player.

All problems now being solved, I am anxious to try in the software called in a small trial for mailing lists, accounts analysis, payroll or indeed anything that will give me more control and a working opportunity to find out a little more about computers.

Meanwhile, take it from me that even for an individual as isolated and amateur as myself, the PCW8256 has proved to be an excellent tool. — **Kevin Byrne, Isle of Colonsay, Argyll.**

■ Amstrad will be pleased you like the 8256. You're just the sort of customer they're trying to sell to, and they can congratulate themselves that they've now reached remote islands in the Hebrides.

For standard term letters, a charge price program is ideal. These often come with word processing packages, but unfortunately there isn't one available for WordStar.

Postnet Wordstar comes bundled with a real merge overlay, and New Ward has the facility built in, as well as many other features such as a spelling checker.

The merge print features in both these programs are a bit tricky to use, but they are just

what you need, and once you get used to the principles involved you'll find they'll save you bags of time.

Alternatively you could go for a database management system with merging and label-generating facilities. One such is Print! Another is Perfect File.

As for accounting and financial modelling, you'd be best starting with some kind of spreadsheet, and many are available for the 8256.

A spreadsheet basically sets out figures in rows and columns and will perform operations on the 'cells' created. So you can ask questions such as 'What if I added two further bedrooms to my hotel?' Quite a complex question, financially.

Spreadsheets you might like to see names of include Supercalc, Perfect Calc, Max, Multiple, Calculator and Calcmaster. They are all relatively easy to use.

You might also like to look at more advanced financial planners, based on spreadsheets but customised for business, such as Finance II (which will handle balance sheets, price lists, profitability reports and stock evaluation), Position II (a powerful planner aimed for serious business use), and Scratchpad II spreadsheet designed to cope with regular payments and deposits, future values, and so on.

Order is a planner which makes full use of the 8256's big screen and is fairly friendly.

Specific accounting systems, which will deal with payroll, stock control, nominal ledgers and so on include those of Sage, Camsoft, Compact, Amsoft ABCO and TAB.

Drive M hint

RE view of Catherine Barber's letter in the February Computing with the Amstrad, I would be more than willing to further mind at rest about the capabilities of the PCW8256.

At about 11:00 I finished writing a book, Mastering the Amstrad PCW8256 — Word Processing and Personal Com-

going, using one of the first production models of the machine.

The subject of the book is, of course, the PCWB255 itself, and I suspect that it probably qualifies for the title first book written using the PCWB255!

As you suggest, *Not Alone* was adequate in both the article text and layout of the book, a total of about 80,000 words.

One thing which your readers may find useful is to create or edit files on Drive M, rather than on Drive A.

This cuts down the amount of time spent accessing the disc and it also seems to do away completely with the occasionally reported problem of spurious characters appearing on the screen during an edit.

In general the machine has behaved itself extremely well, and word processing with *WordPerfect* is much more straightforward than with any other systems (and much easier than it looks at first glance).

I am sure that Catherine Barker, and others in a similar position will find it perfectly suited to their needs. — **John M. Hughes, Tregaron.**

They're ALL there!

I RECENTLY bought your magazine and was very interested in the *Time Tester* program.

As I have only just bought an Amstrad 128, it will take a little time before I am able to program my computer with this program. I was therefore relieved to see the advert on page 54. To give your fingers a rest!

So I turned to page 55. This was the order form, not a return form to page 88 unless for the second time it clearly stated that 44 program listings from each month's issue are available on disc from £8.75.

Imagine my disappointment when I telephoned and was told that it was only one program from each issue.

This is very misleading as the offer at the end of the *Time Tester* suggests you give your

fingers a rest.

If I sent this program I will obviously have to send my fingers very hard. — **J.M.G. Smith, Bournemouth.**

Whoever told you that the disc or cassette contains only one program from each issue was in error.

All listings from the main games and utilities are included on the disc or cassette each month, and they are extremely good value for money.

Missing screens

I HAD a problem with that marvelous game, *Armad* in *Time*.

I have trouble loading the following screens: *Stepping Out*, *Stone* & *Spaceport* and *Master Fingers Dan*. Can anybody give me some help?

Also, why is it that I can never get past the "Test of Time" screen at *Time Zone 107* — **Tim Burdett, Dover.**

We're going to have to leave this one to our expert games players and their...

Printing one page

I BOUGHT my PCWB255 last October and would like to commend *Armad* as an excellent review article (described) which as a writer gives me much food for thought.

I would welcome future articles on PCWB255 applications, as I am a relative newcomer to the home user market. I was attracted to the machine because of its word processor facility.

I have experienced one problem in date, or perhaps you can help? If I have a six page document which I have already printed and saved, then I see an error, say on page 3, I edit how do I print just page 3?

I'm sure the answer is simple, but my machine refuses on printing either the whole document or page 3 in the end. — **Lyndie Turner, Barton-on-Trent.**

You've hit on one of Loco-

Script's weaknesses. There's simply no way to print a document starting at any page, and we agree it can be a real nuisance.

The re-print facility is there only to deal with foul-ups at the printer, not with errors you want to edit out.

There is a way of partly simulating the missing facility, though it's not wholly satisfactory, and it won't deal with the particular example you describe, which involves editing. If you want to re-print page 3, and the printer has reached page 5, use PTR+5 to call up the reprint menu and select Previous Page.

Don't bother re-setting to top of form, but make sure there's enough room on the paper to allow a couple of lines to print. Then repeat the file operation until the previous page inputs the one you actually want to reprint.

The new 1.2 version of LocoScript includes a print-from-any-page feature, and Amstrad will change your faulty one on request.

Handling errors

I'M rather pleased with my Amstrad, much better in all respects than my previous computer, a Colour Gemis, which did, however, have an extremely useful utility called *Error Handler*.

Once loaded, before entering the program being worked on, all the errors in the problem program were highlighted with 0's.

Does such a program exist for the Amstrad? The program is published by Quasar Software, the Colour Gemis User Group label.

Can anyone advise of an easy way of transferring the following six Amstrad Basic: PRINT 0 (1-10)120-131-1; 0

I like to try to get programs from other computer to run on the Amstrad, but have little or no success with the above.

What steps are there loading programs from other CP/M machines? I thought this was a universal disc system? — **M. Cross, Gloucester.**

We haven't seen a utility

like the one for the Gemis. Always start your programs with ON ERROR. Then you can set up your own error handler. Try this program:

```

10 ON ERROR GOTO 60
20 REM first program
30 PRINT "Program 1"
40 PRINT "trailing..."
50 PRINT "gg!"
60 GOTO 70
70 REM
80 REM Error handler
90 HOME :
100 PAUSE 10 PER 1
110 PRINT "Error",ERR,"in 1"
120 GOTO 130
130 END
  
```

now add:

50 GOTO 60

and you'll see when you run the program that the error is trapped and you are placed in the Basic editor at line 10.

The answer to your translation query is as follows:

```

10 10-11-12(10-11)-10
20 LOCATE at MOD 40,10*40
30 PRINT 0
  
```

Although the Amstrad can't run CP/M, it uses a slightly non-standardised system. The software has to be transferred on to 3 inch Amstrad discs.

Monitor manager

I AM thinking of buying a CPC6128 without a monitor for use with a monitor for a colour TV.

I would be grateful if you could tell me if the 6128 would be compatible with my CPC464 monitor and if not, could it be adapted somehow? — **A.S. Pottsford, Dagenham.**

It would be possible, but we're not aware of anyone offering monitors without computer or computer without monitor.

You would be best going for the CPC6128 plus colour monitor. It will work out cheaper anyway as you won't need to buy a monitor.

AMSTRAD CPC 464/664/6128

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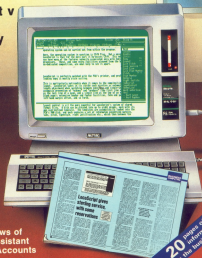
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BETTER SAGE THAN SORRY
17/15/89



WELCOME to the first issue of *Business Computing with the Amstrad*, a magazine dedicated to the company's rapidly-growing involvement in the business market.

The ink had hardly dried on Amstrad's success story in the home computer field when — just as suddenly — it was being extended in the office sector.

By adopting the basic marketing techniques, summed up by chairman Alan Sugar as "profiting what the mass market wants, not a boffin's ego trip", Amstrad has become the darling of the City.

Now it intends to consolidate its position by making many other businesses much more efficient — hence profitable — through its computer range.

If you already have an Amstrad at your firm it will almost certainly have been bought because it is the best value for money around.

We intend to ensure you get the most out of your machine — with expert help and advice, and with stories about how people like yourself are finding out how their Amstrad is saving them both time and money.

So wherever Amstrad means business — and from now on it always will — *Business Computing with the Amstrad* will be there to chronicle the events.

You can't afford to miss an issue.

AMSTRAD served notice that it intended to mount a serious onslaught on the business market when it unveiled the PCW 8256 last August.

It was a typical overhitting move by chairman Alan Sugar.

To launch a personal computer for word processing at a time when that business was causing problems for much larger companies was completely in character for the brash East End millionaire.

After all, he'd already established a reputation as someone prepared to go against the odds by successfully hunting on to the UK home computer scene just as many companies were preparing to re-enact Napoleon's retreat from Moscow.

However the arrival of the PCW 8256 did cause some cynosures to be raised. This was due almost entirely to the price. At £399 complete with printer it made even the most seasoned of computer journalists attending the launch press conference suck in their breath.

Here was a computer and printer costing less than most electronic typewriters, yet capable of doing as much more.

Marital pictures of typewriter manufacturers, hurling themselves out of sixth floor windows were the order of the day.

Figures just out reveal that the PCW 8256 accounted for 21 per cent of group sales in the first half of Amstrad's financial year which ended on December 31 — yet the machine only hit the stores in September.

Nor has its impact been restricted to the UK. It is also making waves in France, Germany, Holland, Denmark, Italy, Switzerland and Australia.

Amstrad even has high hopes for PCW's success in that potential giant market of UK micro manufacturers North America, thanks to reaching agreement with a major distribution company in the States.

Now it is forecast that the word processor will account for 25 per cent of all sales by the end of the current financial year on June 30.

"We've never known a product like it", said a spokesman for a High

The key to success in the business market

Street retail giant.

Why has Amstrad succeeded on the business market where so many others have failed? "The key to it all is their no frills approach", one market analyst told *Business Computing with the Amstrad*.

"In the PCW 8256 they have a product which the businessman can buy for the right price, then take it back to his office, plug it in and it does the job it is required to do.

"No one had apparently thought of that before".

Most companies might well have been happy to know it at that. Not Amstrad. Reliable sources have revealed that an enhanced version of the PCW is about to take its bow any day now.

A LEADING UK business software house has notched up sales of £500,000 in just three months as a direct result of entering the Amstrad market.

Softsoft, based in Newcastle, reports that orders for its new range of software has taken the company by surprise. "The level of demand from smaller businesses has been phenomenal", says Softsoft managing director David Goldman.

"Our stand at the Amstrad User Show in January was besieged by Amstrad owners looking for business software for their machines. This is no niche in the market — it is a market in itself".

THE PCWORLD-*LocoScript* combination has set new standards of price and performance in word processing. It has received rave reviews in the computer press, accolades from such respected institutions as *The Guardian* and *The Times*, and has even been offered by the BBC, of all people, for competition prizes.

But it is only when a new product has been put to everyday use in a wide variety of circumstances that its real value can be judged.

I have now used *LocoScript* continuously for several months, after years of devotion to *WordStar* and frequent encounters with many other word processing packages.

My verdict is that for the majority of users, *LocoScript* will give sterling service. For certain minorities, however, its limitations will prove too great, and the price of the PCW will be a secondary consideration. If you really need a tractor, a brand new Mini — even at a give-away price — is still a luxury.

But before buying *LocoScript* for the unbeatable low, let me praise its qualities.

It has all the major features of modern text processors, from full block operations to intricate page design. And, like many of its competitors, it is also a font and file manager, so that many operations handled by the operating system can be carried out from within the program.

Have the operating system in question is CP/M Plus. But a unique aspect of *LocoScript* is that for the most part it by-passes CP/M. This means that it can have many of the features normally associated only with dedicated word processors. These, and some extra facilities gleaned from the best of the undedicated competition, are what help to set it apart.

LocoScript is perfectly matched with the PCW's printer, and professional looking copy is mostly plain talking.

This is particularly noticeable when it comes to the complexities of page layout. *LocoScript* takes in its stride such niceties as automatic page length adjustment when switching between continuous and single-



Figure 1: Example of a page shown during editing session.

LocoScript gives sterling service, with some reservations

GABRIEL JACOBS compares the Amstrad WP package with *WordStar*

sheet paper, prevention of "widows" and "orphans" (the first line of a paragraph as the last line of a page, and a single line at the top of an otherwise blank page), non-break paragraphs if desired, complex headers and footers, tabs and gap lengths, left-hand margin offset, and so forth.

Layout control is all the more powerful for *LocoScript*'s system of stored format files. A disc can be divided into up to eight groups, each with its own user-defined templates.

The templates are loaded into the PCW's RAM disc at boot-up, and each contains information concerning margins, tabs, pitch, typestyle, right justification and so on, which then becomes the default for the group in

which a document is created.

So you could have a group template which sets up the printer for a letter on A5 notepaper, prints your address and "Dear Sir" in the correct positions, highlights fields on the screen for the address of the recipient, numbers all pages but the first, and so on. This will happen each time you open a new file in that group, unless you override the defaults by editing the header information.

You are not limited to one fixed layout per document. Further layout instructions can be inserted anywhere in a file, and remain in force until cancelled by subsequent ones, or until the default values are re-set.

These layouts can be used in conjunction with *LocoScript*'s very

flexible tab facility to handle tricky indentations, which are reformatted during editing according to their own particular sets of instructions. This is a very powerful feature which is complicated to describe, but surprisingly simple to use.

A wide range of typostyles and emphases can be freely mixed in a LocoScript file. Underlining is shown on screen, and there's a choice between American-style word-only underscores, or full underlines. Bold, double-strike and italic are not displayed as such, nor are pitch changes, line spacing, or half-height and double-width characters. But line and page length are always adjusted on screen to conform with what will be the real result at the printer.

And even with the control-code display turned off, so that the screen is not cluttered with embedded commands, the status line nevertheless indicates their presence as the cursor passes over them. So you can always see, for example, which layout you are currently using, whether you are in Italic or Roman script, and so on. Not quite what-you-see-is-what-you-get, but good enough.

LocoScript is full of little touches too numerous to describe in detail here, which result from its being dedicated to a single printer. Many such touches can be achieved with other word processing packages, but often only with a great deal of hassle, and in some cases, only with a P.D. in communication protocols, or so it would seem.

To take some simple examples, in LocoScript a complete set of European accented characters can be accessed with no difficulty whatsoever and printed in the full range of typostyles, emphases, and so on. Zero can be printed with or without a line through it. The C, R and S signs are all separate, superscripts and subscripts can be printed as they half-height characters and titles can be in enormous double-width 10-pitch.

In fact when it comes to control over the printer, even a powerful, handy, and very expensive word processor like Microsoft's Word for the IBM PC does not measure up to LocoScript in flexibility combined with ease of use.

LocoScript has some superb edit-

ing features, many of which have been associated in the past only with big-deal packages - genuine cut and paste buffers, allowing up to 36 blocks of text to disappear from the screen until required for pasting, a user-constructed glossary of common phrases loaded at boot-up, a page-break marker line which indicates how much room is left on the page, automatic paragraph reform after insertion and deletion, reverse video markers (used with the file) for highlighting parts of a document on screen.

These are the facilities which put LocoScript in the professional range of word processing software.

The amount of free disc space, the name of the disc base-defined, of course, and the number and size of

LocoScript has some superb editing features, many associated in the past only with big deal packages

files in each directory group, are all constantly displayed at the opening menu, to which you can return at any time, even while editing.

Each file also has its own identity tag, which you can fill in with a brief description. The tag can be examined at any time to see what the file contains - a good aide-memoire, and an enormous boon if your file-naming protocol is not all it should be.

Copying, moving and renaming files can be carried out at the opening menu, and also while editing or printing. Nothing absolutely new there. But LocoScript has something else too.

When a file is erased, it is sent into limbo. In other words it is deleted from the directory, then potentially freeing disc space. The file still exists on the disc, however, and can be brought out of limbo at any time until it is overwritten by another file.

Files are stacked in limbo top-down, so the more recently a file has been erased, the more chance there is of recovering it.

Equally, when a file is saved the

previous version is sent to limbo, and can be recovered if you change your mind after saving the new version. This has distinct advantages over a system like that of WordStar, which uses up disc space to create its back-up file and a previous version.

The disc can be by-passed entirely by using a direct typing mode, handy for one-off jobs such as envelope-addressing. Text is entered and can be edited in the usual way, and the full range of typostyles and the rest is available. When Return is pressed the data is sent to the printer with a non-line instruction.

So there's an outline of LocoScript's *plus-points*. Now for where it falls down...

The PCW's dedicated word processing keys do not offer the full possible range of editing functions, and they cannot be supplemented with direct control codes to give those functions. For instance, there are delete character left and right keys (Del+ and Del-) if but there is no way of deleting either a word or a line in one go.

What is more, some of the functions which are provided can be difficult to handle. For example, moving the cursor word by word to the left - a common enough operation - requires three keys to be pressed simultaneously and the use of both hands (Alt + Shift + Word), despite the fact that some keys, like Paste and Copy, are dedicated in all modes (Shift, Shift and Alt) to a single function.

I recognise that the design of the keyboard has allowed only a limited number of keys to be set aside for editing, but surely it would have been better to put Word Left into a single, unshifted keystroke and, if necessary, something like Paste or Copy into a shifted position.

Of course I'm really talking here about a complete re-think of the keyboard, which is out of the question even for any future versions of LocoScript.

All in all, if like me you compose on screen, gaily throwing the cursor around as ideas strike you, and constantly experimenting with phrases which in your heart of hearts you know will soon be discarded, be prepared for a certain amount of frustration over the lack of some

editing features, and the dexterity required to make others work properly.

But these are minor irritations. More serious for some will be that there is no option to toggle out of insert mode. Those who usually overtyping when editing can easily learn to use the Delete + insert method, but there are times when overtyping is the most practical solution to a problem. If much of your work is concerned with making substantial changes to complex tables, the lack of an overtyping mode could be a serious handicap.

By today's standards, and even by those of something like the aging WordStar, LocoScript's Find and Replace facility is primitive.

It will not search backwards through a file — a nuisance when editing a long document — and a global search will only be global from the current cursor position onwards.

It will not recognise control characters, something which can be equally irritating. For example, if you have changed your mind about line length, embedded conditional page breaks may no longer be appropriate, but you cannot alter them all in one operation, nor even locate them without a visual search.

It will not find whole words only, nor will it ignore upper and lower case. So, a search for "and" will locate "anding", but not "And".

Finally, it will not find the nth occurrence of a string of characters. "Who wants to anyway?" I hear. The answer is programmers who use a word processor to create source files and other non-documents. In structured languages, such as C, Pascal or dBase, system words like BEGIN and END, IF and ENDIF, and so on can be nested many levels deep, and it can be very handy to find out quickly if their members correspond precisely



Figure 8: Inspecting a file identity log in the opening menu

when the compiler says there is an error.

This is obviously a minor point as far as most people are concerned, but for some it may be significant.

At the present there are no dedicated LocoScript add-ons, no spelling checkers, no mail-merge facilities, no indexes, no footers,

By today's standards, and even by those of something like the aging WordStar, LocoScript's Find and Replace facility is primitive

no word counts, no compatible databases or spreadsheets.

You can use some auxiliary programs with LocoScript files saved in Ascii format (see later) if you have an early version of LocoScript but that's not quite the same as having the kind of custom-built routines and

overlays typical of WordStar and other established packages.

The major fault with LocoScript itself, however, is that all text is formatted as the cursor passes over it. Finding a word or page marker, or saving a file if the cursor is at the top, is a dreadfully slow business. To make matters worse, the Save and Continue commands always puts you back at the beginning of a file, not back at the previous cursor position.

Three or four minutes may not be long when waiting for a bus, but staring at a computer screen for that length of time seems like an eternity.

The advantage of continuous formatting is that files are always sent to disc ready for the printer. This allows background printing while other operations are being carried out, such as editing another file, with only a small drop in response time.

I would have preferred a greater drop in response time when the machine is working concurrently to the feeling I get in the pit of my stomach when, holding several discs in my hand that I would like to commit to the screen, I also know that it's about time I saved the work I've already done, but simply can't see the long walk.

On a number of occasions, I have actually been obliged to jot ideas down on paper! I had almost forgotten what the experience was like.

The general conclusion from all this must be that if you spend most of your time producing books, or other

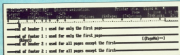


Figure 9: Pagination edit screen

choice between a straight text file, from which all control codes, page layout instructions, and so on have been stripped, or a page image file, into which spaces have been inserted to preserve the layout, and which will contain such things as headers and footers.

That's just about as flexible as you could wish. It's a pleasure to see a manufacturer taking notice of its users, and coming up with the goods in style.

The new Ascii facility is implemented without difficulty from within the program, but of course in export or import data you will need to buy the CPMS/PSM/MS/PC/MS/ASCII port, which is now available.

If you have a version of LocoScript earlier than 1.2, Acornsoft will charge it for you free of charge. Write to them, marking your envelope "Loco-

How many of us have ever found a software package which suits us in every respect?

Script". If you are not sure which version you have, press F at the opening menu. If the pull-down menu offers the choice of printing some pages only, you already have the latest version.

Even with the improved version 1.2 some of LocoScript's limitations may make a difference to your decision whether or not to buy the PCW. On the other hand, you may feel that the hardware is worth buying to run something like WordStar on it.

The curiously named Packet WordStar - virtually identical to the original - and a WordStar look-alike, more powerful than the original, called New Word, are both available for the PCW, together with a number of other systems.

Table 1 compares LocoScript with plain old WordStar, chosen because it represents a standard point of reference. In my scoring, LocoScript loses out heavily to WordStar on speed and edit-ers, but more than makes up for these deficiencies in other ways.

My priorities may well be different

	LocoScript	WordStar	Score	W/P
Screen editing functions				
Automatic paragraph return	Yes	No	5	-
Stored ruler lines	Yes	No	10	-
Reverse video reminders	Yes	No	3	-
Intelligent page break marker	Yes	No	2	-
Numbered place markers	No	Yes	-	3
Place markers saved with file	Yes	No	2	-
Insert Mode on/off	No	Yes	-	5
Delete word line	No	Yes	-	4
Choice of word/full underline	No	No	3	-
Underline shown on screen	Yes	No	5	-
Half space	Yes	No	1	-
Help/help	No	Yes	-	5
32 x 80 screen	Yes	No	5	-
Research and Reference				
Ignore case	No	Yes	-	4
Backwards	No	Yes	-	3
Whole words only	No	Yes	-	2
Find with occurrence	No	Yes	-	3
Find control codes	No	Yes	-	3
Confirm replace after page/para	Yes	No	1	-
Block operations				
Page buffers	Yes	No	10	-
Phrase glossary	Yes	No	5	-
Full named block directly	No	Yes	-	3
Column mode	No	Yes	-	3
Printing				
Mix of typestyles	Full/None	Limited/None	4	-
Print continuous	Yes	Yes/Not clear	4	-
Print previous page	Yes	No	2	-
Conditional page break lines	None/Full	Before only	1	-
Prevent widows/orphans	Yes	No	4	-
Status information				
Size of all files	Yes	No	3	-
Disk identity	Yes	No	2	-
Disk management				
Directory groups	Yes	No	3	-
Disk space for back-up file	No	Yes	5	-
Other points				
Format files implemented	Yes	No	15	-
Speed of Save, Find etc.	Very slow	Average	-	25
Confirm abandon edit/ file	No	Yes	-	3
On line help	No	Yes	-	5
Pull-down context menus	Yes	No	15	-
Non-printing comment lines	No	Yes	-	2
File identity tag	No	No	3	-
Custom built add-ons	No	Yes	-	15
			Total	115
				85

Table 1. LocoScript versus WordStar - major differences and how they score

from yours, so you might like to fill in your own scores.

Whatever the result, one point is clear - LocoScript manages to offer more things to most people. How many of us have ever found a software package which suits us in every respect, including the price and the machine it happens to run on?

Something like WordStar 2000, which has all the advantages of standard WordStar, many of the plus

points of LocoScript, and numerous other powerful features besides, will run only on an IBM PC with at least 256k of RAM and double disc drives. The software alone costs more than the complete PCW system. Nice, if you can afford it.

If you can't, and if most of your requirements are standard, then for all its quirks and deficiencies, you'll find LocoScript a very acceptable alternative.

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Light Pen

A sophisticated Graphics Package which includes a Colour Palette, Image Control for real pixel accuracy, Beads Classic, Text mirroring and User Defined Characters.

It can Magnify, Stretch, create Curves, Be Splines, Lines, Curves and Colour Fill.

There is Picture Storage and a Remask or Pen Calibration utility and Printer Dump.

There is cassette drivers or ROM software for the 486 and ROM software for the 6128.

Cassette £199.95,
ROM £299.95.

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A speech synthesiser and powerful stereo amplifier which greatly improves the quality of the internal speaker.

Extremely easy to use with an almost infinite vocabulary.

Supplied with text to speech converter for ease of output creation.

Includes two high quality four inch speakers designed to complement the Amecad.

There is cassette drivers or ROM software for the 486 and ROM software for the 6128.

Cassette £299.95,
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WHILE I was walking round the last Amstrad show, I saw some business software that was greatly overpriced as well as some more which was so useful that I believe it should be sold with gifts if financial loss-making is not to follow its purchase.

Nevertheless, I was most impressed with the variety of good business programs available, especially so when I consider that the Amstrad is one of the newer home computers.

It therefore astounded me to overhear visitors repeatedly complaining that there was a vast range of software aimed at the amusement market while the commercial sector was very poorly served. I had hitherto been convinced that many potential users were merely finding difficulty in making wise selections from what was available.

These comments are a representative sample.

"I could write better in a morning..."

"That package costs more than my printer!"

"It's a bit elementary, what about...?"

Despite the evidence of my ears, I was not convinced that there was a shortage, but the experience made me reconsider my opinions.

Probably nothing would have come of these musings if it had not been for the fact that a couple of days later the editor wanted my comments on two business programs submitted by readers. I was at first reluctant to do so.

While I am more than happy to respond to general queries, it is extremely time-consuming to perform a thorough test on business software, and the last thing I desired was to act a potentially open-ended precedent. Nevertheless I crossed lines a few times and thus agreed.

I am glad I did, because the exercise proved just how little the average businessman knows about the problems of software producers.

Amateur attitudes

If you understand these problems not only will you accept that it is often unrealistic to expect to find a system which is a perfect match with your

Software selection: Setting the vital parameters

organisation's requirements, but also you'll improve your selections from what is on the market. I'll use several personal, amateur and professional examples to illustrate this point.

The software producer's lot is not a happy one. Both amateur submissions demonstrated different aspects of the same fundamental fact. This is that system creators are faced with a complex series of mutually exclusive choices while requiring considerable amounts of time, money, talent and

concept has some merits, therefore if my suggestions are followed you may yet see the program appear in a listing in *Competing with the Amstrad*.

In summary, I had received two programs, both of which were originally targeted for totally inappropriate slots in the market.

Professional attitudes

Moving into the marketplace generates a variety of problems which frequently have little to do with one's systems and programming abilities, hence the fact I sometimes receive from producers of software I have reviewed in this column.

No matter what I write, they complain. If they do not agree with my comments they cite satisfied clients. If they like my remarks they still object to my not giving them a quote they can use for marketing.

I fully understand their concerns. If you consider that over 90 per cent of all projected business systems never hit the shop shelves, and then remember that the creator's problems are usually multiplied once installing starts, it's obvious that they will become excessively protective. Not only do I sympathise with them, I know their problems first hand. Nevertheless since you are good enough to read this column, my role cannot be to provide advertising copy, but to guide the general reader.

Design problems—phase 1

Let us look at how the examples sent in by two of the readers demonstrated some of the problems

JO STORK
examines the problems
inherent in matching
business software
to your organisation's
requirements

not a little luck before any profit is realised.

The first of these submissions was a suite of four programs intended for listing in this magazine. Unfortunately while a delight in every respect, they were far too long for these pages. I suggested that the package could be a commercial success if marketed properly.

The other offering was very short and intended for sale in the High Street. The creator was seeking my advice on how to go about commercialising his product. You can therefore imagine my surprise on finding that it kept crashing my system.

Even assuming it can be made to run reliably, I doubt the venture would ever be profitable. Nevertheless the

What puts the **Plus** in the **ScratchPad** spreadsheet?

ScratchPad Plus is an electronic spreadsheet available for the Amstrad PCW 8256 and CPC 6128 computers. But it's the **Plus** that makes ScratchPad the only choice for all professional electronic spreadsheet users. It's the **Plus** that gives what others give...



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ScratchPad Plus utilizes "Virtual" memory. Just like any other spreadsheet, it begins by building your model in memory. But unlike any other spreadsheet, ScratchPad Plus does not stop when you have used all the memory space available... It then transfers your data drive to extra memory, and uses the space available to carry on calculating for you.

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Now that ScratchPad Plus is available, a spreadsheet just isn't worth considering unless it uses Virtual Memory!

Plus

FEATURES...

Multiple windows:

Most spreadsheet programs allow you to view two parts of your spreadsheet at the same time. ScratchPad Plus is the **only** spreadsheet which gives you almost unlimited screen-splitting capabilities.

Simultaneously view as many parts of your spreadsheet as will fit on the screen at the same time - Ask "what if" questions and see ALL the answers you need presented before you!

Design the spreadsheet around your application - Not the other way round!

With other spreadsheets, the theoretical number of rows and columns you can have is FIXED. If you need less columns, but more rows - NO CAN DO! With ScratchPad Plus, you decide how many actual rows and columns you require.

Display Pounds (£££££) not Dollars (\$\$\$\$\$)

Let's face it - We are not part of the United States of America. Our currency is English Pounds (££), not US Dollars (\$\$\$\$). ScratchPad Plus allows you to display the good old "£" sign - SOME OTHER SPREADSHEETS DON'T.

Plus

HELP...

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Plus

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the prospective software tycoon faces. While explaining why it is so difficult to buy packages that probably fit your needs, this will also serve as a warning if you should ever feel you can do better.

The first problem is that it is all too easy to believe that just because you are delighted with your brainchild the world will beat a path to your door in order to obtain a copy. The following two factors are frequently overlooked:

■ If you create a system to suit your organization it will almost invariably incorporate elements which are highly specific to your requirements. These factors may well render it awkward or even unusable in different situations. For example an invoicing system developed in a small foundry may be utterly useless for a tailor and a payroll system incorporating piece rates may prove clumsy in firms where everyone is on a fixed weekly rate.

■ The creator is the person most familiar with a system's operation and this invariably disguises the quirks which have been introduced. Even assuming they maintain a perfectly logical approach, this is no guarantee others will find it equally user-friendly.

The next problem to be overcome is that merely making the software more general or simpler to use, whether by ejecting the site specific features or by eliminating the more complex tasks, does not guarantee greater user acceptance.

A depressingly large percentage of purchasers select their software on the basis of which has the most features. This is despite the old maxim: "The greater the number of options the system has the more clumsy will be the software".

Allowing for some suites using more efficient coding than others, this maxim holds true both in terms of the software's performance and its user-friendliness.

Equally true is that the more the software offers the more the costs must rise. Not only will the package be more expensive, but more significantly the costs of your time as you learn the system, set up its files and enter the data will mount dramatically.

This is why I do not hesitate to re-visit in this column that you should

select your systems on the basis that performing 80 per cent of the necessary tasks efficiently and simply, thereby not building up a resistance to keeping up to date, is vastly preferable to using a system offering 20 per cent more facilities than you need in order to meet every requirement.

If you find a system which offers precisely 100 per cent of the features you require, then this is probably owing to no more than good fortune that your needs are so standard or close to the organization the designer had in mind.

My guess is that the show visitors were actually complaining that they could not find software which was a perfect match, rather than there was very little there.

Software authors are constantly trying to second guess what those standard system needs are for any given application. Fifty per cent of the potential offerings fall by the wayside at this stage, merely because they fail to do so.

Design problems — phase 2

Having finally stored a course through these conflicting requirements, the authors meet a totally different set of problems. In many cases they are not equipped to handle them. Some are:

■ The need for market research to determine the sales levels that may be achieved at any given selling price.

■ The need for accurate production costings at each sales level. It is depressing how many times these are grossly under-estimated by persons whose primary expertise is computing. Whether they wish to recoup their systems and programming effort is for them to decide.

Many software writers keep the eventual selling price low by charging these development costs to the original organisation for whom the system was first written. In other words they make no attempt to recover these costs. In government circles this is often called creative accounting.

■ Having done this work they may, if they are lucky, have a series of revenue and cost estimates which show an acceptable level of profit at some level of sales. A decision now has to be taken whether to proceed

with a production and marketing operation. If this point is at 100,000 sales the decision is quite different in one at 750 units.

■ The program may need speedy conversion to run on other micro if a reasonable return on investment becomes possible.

By now a further 20 per cent of potential suppliers have dropped out of the contest for your money.

If you believe that all that is needed now is to believe a fully tested product which does not crash reviewer's systems, please think again. Leaving aside obvious details such as documentation, there are still a whole pack of commercial hazards to be overcome.

More problems

A further 10 per cent will have fallen by the wayside at the coding stage, thus your selection will be limited to those suppliers who can handle commercial chores which have nothing to do with computers.

A brief sample includes keeping production and administration costs under control, ensuring quality is maintained, ensuring sales meet the desired level and responding to user queries.

These tasks have been responsible for more slumps than anything else I can think of, since if any are not completely mastered all the earlier profit estimates will become totally null and void.

You now understand the pitfalls of becoming a software writer and also why at times I rant, on your behalf, disagree with some of the judgments they have made.

With this set of guidelines we can now turn to studying how they apply to software you may be considering. Before reviewing two products currently on the market it will be useful to consider a couple of common and essential programs no matter what the organization's business — a word processor and a spreadsheet.

Personal example

Let me cite a classic case of preaching what I preach. It demonstrates how small can be beautiful.

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With word processors you can now standard paragraphs,

reformat text, find files and change margins.

Instantly With spreadsheets you can define keys to display windows, recalculate results, see files and print automatically. And with databases you can find records, enter data and produce reports with just one keystroke.

With these and other software products, the possibilities are endless! SmartKey will increase your productivity, improve your accuracy and reduce your frustration. Now Amstrad computers will be a lot easier and a lot more fun to use.



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The course develops your skill on the QWERTY keyboard and numeric keypad. With a little concentrated effort you can achieve mastery in just 24 hours.

It is actually so much fun to use that it becomes addiction. So don't start using Touch 'N Go when you have something more important you should be getting on with!

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an IBM PC with more memory than my Amstrats can store on their twin-discs.

Even though the PC has a very powerful word processor these articles plus the bulk of the documents, handbooks and reports which are my main business were until recently produced using a very basic Amstrad word processor on the 864.

It had less than half the functions of my IBM software, did not provide spelling and was significantly slower when cutting and pasting, but I preferred it because it was exceptionally easy to use.

I am also told that the IBM's keyboard is vastly superior to the Amstrad's but I am not a good enough typist to say I can notice much difference.

Only those occasionally-needed facilities were missing. When these were essential I obviously used the PC. I considered switching to a

ROM-based word processor, but decided against it. I would have gained the speed and ease of the facilities but lost the advantages of simplicity — and by now considerable familiarity.

When the 8128 version of my software was produced I did upgrade. I gained two of the missing features and did not lose the user-friendliness. Since this conversion I have not had occasion to use the PC word processor at all.

This fortuitous set of circumstances does not always apply, even with such general software. I frequently need to process spreadsheets. The market leader for the Amstrad is certainly easy to use, and can hold matrices far larger than I will ever need. Nevertheless, I normally use the PC for this work.

The reason is quite simple. Many of the cells require mathematical functions which are far more complex than can be handled by the Amstrad

software. I am forced to use a much more complex and therefore clumsy spreadsheet than I would like in order to gain the mathematical ability. The speed gain from using a PC is marginal with small spreadsheets.

Conclusion

As ever the secret of wise selection is to ensure that the vital criteria are ideally matched. Any other requirements which can be met should be regarded as bonuses, provided that they do not thereby also add to the drawbacks.

While this makes it far easier to achieve for general applications, for example basic word processors and spreadsheets, the principles do not change just because one turns to more specific applications.

Hopefully these criteria are now understood and you will understand the reasoning behind my review of the following products.

Simple system sets standard

Cashbook Accounts Amstrad

THE issues I have raised are admirably demonstrated by this system for the small retailer. It is a classic example of simple systems which perform their fundamental tasks competently being vastly preferable to complex ones which do little more.

I rate it so highly that I suspect it must become the standard by which other retailing systems should be judged.

With any business system, even one this good, the key to success is spending a few thoughtful hours with the manual, a large sheet of paper and several sharp pencils. This post-purchase thought is just as important as that needed before making your choice.

For Cashbook Accounts this time is spent in careful planning of the categories under which payments may be made (lines 23), VAT rates, suppliers (line 75), bank accounts (line 8), and other sundry variables (line 85). The manual explains these

system requirements most clearly.

Only when this work is complete should you turn to the programs themselves. Preparation is further assisted by permitting you to practice every operation using a complete set of pre-created records.

Getting started cannot be easier, merely requiring copying the master disc on to a work disc before running under CP/M 2.2. It performed equally

well as both my green screen 8128 and my colour 864. Only a single disc drive is needed.

“A curious mixture of menus, function keys, cursor control and standard key depressions”

well as both my green screen 8128 and my colour 864. Only a single disc drive is needed.

Once into the package operation is equally straightforward, even though it does use a curious mixture of menus, function keys, cursor control and standard key depressions.

I wonder if the keyboard operation merely seemed more logical to the creator than it does to me, or whether

it has inherited these characteristics from the layperson operators of the CP/M discs on which it was first developed.

You select the function you require, such as defining suppliers or entering payments from a menu. The option within the function — add, edit or delete — is similarly selected from a sub-menu.

Cashbook Accounts operates on weekly accounting periods which may be regarded as if they were monthly bills. I prefer that once a bill is completed the data records can no longer be made available for change or deletion.

Systems are much less open to abuse when modification to what is historical data is impossible. Corrections to finger-fumbled input then require a complete adjustment entry. This would be clearly labelled as such, while leaving the irrelevant entry on file.

Nevertheless at £30 you must expect a few compromises. The designer's approach is quite reasonable and does not negate the system's basic features.

The function keys are primarily

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DIGITAL RESEARCH
The creators of CP/M

used to allow keyboard operators to move forwards and backwards through the records or else return to a menu.

Once you have chosen the facility you require, data is entered or displayed into the appropriate field of a stylised form. Depending upon the size of the shop and how many headings are being used, my guess is that 30 to 45 minutes a week is all the time required to keep the books up to date. This estimate includes displaying/printing of the books as well as producing essential analyses.

I find this most impressive. If the books are not kept long up to date it is not the fault of the system. More likely it is commercial ineptitude.

A few minutes more is needed at year end or to provide up to date VAT liability reports.

The authors have included many nice touches. Examples of these are that they realised that many shopkeepers will use Cashbook Accounts on their domestic Amstrad, and hence allowed the data to be password-protected.

Another is that the last message

on shutting down the package is a reminder to back up the discs. Again I differ slightly since I believe systems should enforce backing up, but at £33...

This system will never serve for the Tesco's of this world, but is admirably suited to the small retailer. It lacks no essential facility for those using Scheme D VAT calculations.

Matching the package to the sample comments from the above, I can only say the first two would be totally wrong. The third would be merely unfair to Amstrad.

Reliable, but could be better

THIS system presents a totally different series of examples of the decisions software designers must face, and is far more difficult to categorise.

Half way through the time I spent with the package a curious thought occurred to me. How does a car tester who has driven the most expensive and desirable models react when he is given the ultimate in utilitarian vehicles to comment upon?

I therefore viewed to quit looking at each element of this extremely comprehensive package in isolation, but rather view it as an attempt to provide the maximum amount of system for the money.

No sooner had I taken this decision when I realised that this review will still certainly fail to do Personal Assistant full justice. How do you cover 250+ of CP/M software in a few hundred words? It is far easier to criticise:

- **APPOINTMATE**, a first class appointment recording and reminder program.
- **BILLMATE**, a simple but sound invoicing program.
- **MAILMATE**, a standard mailing list program.
- **WORDMATE**, a straightforward word processor.
- **BANKMATE**, a moderate bank account reconciliation program.
- **DATAMATE**, a slightly limited database.

When I praise them since they all have shortcomings, and yet the whole is still a highly worthwhile package.

Personal Assistant

FMP

Prospective purchasers must realise that they could pay more for this quantity of software than was paid for their whole SIZB system if they were to select the best known products or ultimate examples of each type of program.

For only £78.95 they must accept that some features they may like will be missing. Nevertheless all the essential facilities needed by any single element are available. Furthermore by the time you read this, version 2 with enhancements based upon customer feedback should be available.

FMP is not wholly responsible for the most failing, since I am sure the limitations of the 3" disc are at least partly to blame. This is that there is far less integration between the different programs of Personal Assistant than I would have liked.

Other than occasional instances such as using the word processor to enter data for the Mailmate program, you should regard this as a series of

separate programs, each of which requires its own unique data entry.

The list of faults continues. It may seem unfair to talk of deficiencies when so much is provided but I do feel that the balance of the offerings may be wrong for many people.

How is it that one has such a complete appointment organising system and yet that most useful of tools in commerce, the spreadsheet, is not provided? Similarly considering the invoicing facilities provided, many potential customers would have found a purchase recording system an asset.

It is unfortunate that it is so easy to criticise this package since it is a splendid attempt to take a raw look at business needs. It took time, but eventually I came to regard it particularly highly.

Most features are exceptionally easy to use. Its application will, however, be restricted to certain types of organisation where the conditions will not prove serious.

The updated little manual explains this might be useful in snippets. I have my doubts that the database is sophisticated enough for the dentist or GP, but small agencies and other areas of the service sector would do well to give it a close look.

Returning to the car test analogy, I finally decided that Personal Assistant is a Jeep and should be judged as such. It may not suit everyone, but it will provide excellent, long and reliable service. FMP have probably covered a small but exclusive niche in the market.

There is far less integration between the different programs than I would have liked

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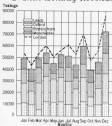
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