POPULAR
Computing WEEKLY

1 July 1982 Vol 1 No 11

30p

Robot Control on ZX81

Atom Galaxian

ZX81 speech pack

Basic re-numbering

More Spectrum Graphics

Win a ZX Spectrum & ZX Printer - details inside

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POPULAR Computing WEEKLY

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How to submit articles
Articles which are submitted for publication should not be more than 1000 words long.

All submissions should be typed and a double space should be left between each line.

Programs should, whenever possible, be computer printed.

At present we cannot guarantee to return every submitted article, so please keep a copy.

Accuracy
Popular Computing Weekly cannot accept any responsibility for any errors in programs we publish, although we will always try our best to make sure programs work.

This Week

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Editorial

The phenomenal growth in the number of home microcomputers over the past two years has given rise to a similar growth in the number of different computer languages.

The ZX81, Vic20, Spectrum, BBC micro and TRS80, all have their own versions of Basic — the most commonly used microcomputer language. Unfortunately, most of these variations of Basic are mutually exclusive. A program written for a Vic20 will not run on a ZX81 or a BBC micro.

It is usually possible to convert programs from one version of Basic to another, but it is time consuming and a waste of effort that could better be put to writing original programs.

However, the chances of a standard version of Basic being voluntarily adopted throughout the industry are so remote as to be hardly worthy of consideration. No manufacturer is going to promote another company's products at his own expense.

The solution to this problem lies in the hands of the users. An organised users lobby could put pressure on the manufacturers to agree to a common form of Basic. They will not do it on their own.

Next Week

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Electronics and Computing July '82

£5

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ZX81. Software, 16K hangman — excellent graphics, £3.95; 1K super-tape — includes mastermind £3.95, echo £3.95, pontoon £3.95, fruit £3.95, sketch £3.95, multiplication race £3.95, roulette £3.95, roll-a-ball £3.95; 16K sketch-draw and save 12 sketches on tape, £3.95; 32K or 16K notepad — save 40 (20 with 16K) pages of data on tape, £3.95; specify memory size when ordering; 16K language dictionary — make your own dictionary, and save it on tape, £3.95; Send sae for further details to T. Meakin, 28 Spinney Rise, Toton, Nottingham NG9 6JN.

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ZX81 16K, boxed large keyboard, eight tapes, £100. Telephone Roth (0709) 525913.

ZX81 16K keyboard/case very good condition, £50 worth of books and tapes, £90. 26 Spring Street, Rishton Hyndburn, Lancs.

VIC 20, plus "avenger" cartridge, bargain £150 ono. Ingrebourne 48276.

SHARP PC1211 pocket computer with cassette interface, £60. Telephone 041-887 3119 (evenings).

ZX81 16K, free software worth £20, offers around £80. Telephone 02727 37693.

ZX81 1K, complete, as new, £50, no offers. 907-4703 (evenings).

VIC-20, cassette unit, over £20 software and £10 books, worth £270, will accept £220. Tel: 021-458 7682.

VIC users. Add to your software by exchange. Write for list to Mick, 23c Woodstock Road, N4.

BBC GAMES. Sae for details to ICGB, 139 The Ryde, Hatfield, Herts. AL9 5DP.

ZX81 16K + SOFTWARE. Value over £30, chess, invaders etc, £120 ono. Tel: Maidstone 0622-61917.

BBC MICRO GAMES. Cassette A (Models A & B): Space Invaders (machine code) Dodgems Breakout — £5 (inc): Cassette B (Model B only) Pacman (machine code) 3D Maze — £5 (inc). Both cassettes for £9 (inc). From B. Cridland, 8 Bowness Avenue, Fleetwood, Lancs. FY7 8PA.

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.....

.....

Telephone .....

Please cut out and send this form to: Classified Department, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2

ICL strike ends hopes of early Micro B delivery

The gremlins which have so far pushed delivery of the BBC Micro B back to six months, have struck again with a strike at ICL, the main supplier.

The production stoppage at ICL's Kidsgrove plant has brought all deliveries of the B machine to a halt.

Acorn's John Coll admits that ICL's production, at 700 units per week, was already 500 per week below target. Now the company is taking strenuous steps to inspire confidence in its ability to supply the B machine.

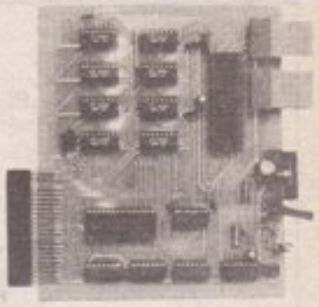
Two other manufacturers, apart from ICL, will shortly begin production of the model B. They are AB Electronic Systems — formerly Cleartone — who begin production immediately, and Race Electronics of Llantrisant, who commence production in the middle of this month.

With three companies producing the B machine, Acorn expects to quickly reduce its six-month backlog. Meanwhile John Coll told *PCW*: "I'm saddened and frustrated by the whole ICL situation. The position is acutely embarrassing. We thought we would be at the four-week order turnround stage ages ago."

Although no cheques are now being cashed and no credit-card orders have been drawn, there are still long-standing orders for which cheques have been cashed.

John Coll explained that Acorn will give a refund to customers who replace their cashed-cheque orders with a credit-card order. This offer will not prejudice the purchaser's position in the queue of orders. The credit-card account will then not be drawn until the micro is dispatched.

Deliveries of the model A have been unaffected by production difficulties.



Ground Control's 16K I/O board.

Latest I/O port for ZX81

A new combined 16K Ram and I/O board for the ZX81 has been launched by Ground Control.

The board plugs into the expansion connector at the rear of the ZX81.

The I/O interface is memory mapped and uses the 8255 PP10 chip. The I/O has two 14-pin DIL sockets.

The module is available, with power supply, either complete for £53 or in kit-form for £10.75.

Information from Ground Control, Alfreda Avenue, Hullbridge, Essex.

Spectrum get to the customer

Delivery of the first production run Spectrums has now taken place.

The batch forms part of the delivery of machines returned to Timex for further work. This followed the discovery of a design flaw, reported in *Popular Computing Weekly*, June 17.

To correct the reported data-bus clash, each of the micros dispatched has been modified by hand.

Pins 36 and 37 of the ULA chip have been cut away from the printed-circuit board and a NAND gate inserted between the ULA and the board. This means that Pins 36 and 37 are inhibited when the input/output request lines from the microprocessor are operating.

This gives priority to the CPU over the ULA when both are trying to use the same data.

The design modification has now been incorporated into the production line at Timex and at the time of going to press the second batch had left the factory.

Neat functional lines . . . the Amber 2400 printer.

Amber unveils low-cost matrix printer

A new dot matrix printer is to be manufactured by Amber Controls Ltd.

To be priced at just under £70, the Amber 2400 printer is intended for use with BBC, Vic20 or Tangerine micros. A version for the ZX81 will also be produced.

The text print width is 24 characters. The machine was designed for use with ordinary paper to reduce running costs.

The Amber 2400 is of the inked ribbon type. It uses four print solenoids which each cover one-quarter of the paper width. The paper is incremented by one dot-height during the return scan of the print heads.

The printer is supplied with its own built-in operating system and power supply.

Available from the end of August, the Amber 2400 will be priced at £69.95 plus VAT. Five 90ft rolls of paper and one inked ribbon will cost about £2.50.

For further details contact: Amber Controls Ltd, Central Way, Walworth Industrial Estate, Andover, Hants.

Software debut for the ZX82

Two companies have produced the first software for the Sinclair Spectrum.

AVC Software has produced *Fortune*, a colour/sound version of their *Madam ZX81*.

Bug-Byte Software has launched *Spectral Invaders* — the first Invaders game for the Spectrum.

Fortune costs £3 from AVC Software, PO Box 415, Birmingham.

Spectral Invaders costs £5 from Bug-Byte Software, Freepost, Liverpool L3/AB.

Spectrum tapes Microfest '82

In a comparison of home computers in *Popular Computing Weekly*, June 24, we mistakenly stated that the Spectrum cassette system did not work.

The ZX Spectrum loads, saves and verifies programs at 1500 baud. We have had no problems with the system.

Japanese link-up for IBM

IBM is currently negotiating with Japanese firm Matsushita Electric Industrial to develop joint business ties.

One possible venture may involve the joint development and distribution of a new personal computer.

Matsushita already supplies IBM components.

Laserbug

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LASERBUG newsletter is distributed to members each month and is full of news, reviews, letters, articles, programs, contacts and classifieds (rates on application). Our regular meetings also go a long way to help you get the best out of your BBC Microcomputer.

You want to join? for £12.00 you get a year's subscription to **LASERBUG**, 12 issues of the newsletter and free entry to all **LASERBUG's** meetings and shows — or send £1 and a large SAE (12" × 9") for a sample copy of the **LASERBUG** newsletter and all the latest information.

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- **No special case needed**
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Other ZX81 products include keyboard two-tone Bleeper £8.95 built, keyboard repeat key kit £2.95 + postage on both items.

ZX81 klik-keyboard kit at £22.50, fully built at £26.00. Please add 70p for postage. Delivery 14 days from receipt of order. SAE in all correspondence please. Proprietor A. Pandaal, B.Sc P.G.C.E.

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Letters

Let's put the record straight

Re your Spectrum Review, May 6, I would like to point out that the maximum number of colours you can put on the screen on the BBC Micro, at any one time, is not four but eight. Here is the program:

```
10 C=0
20 MODE 7
30 FOR A=129 TO 136
40 C=C+1
50 VDU A
60 PRINT "COLOUR", C
70 N.A
```

In the now famous ZX Spectrum catalogue, Sinclair have a table. In the table, they say the BBC Micro has no user-definable graphics. Well it has, VDU 23 allows this. Have a look at Neil and Pat Cryer's book *Basic Programming on the BBC Microcomputer.*

Sinclair also say the BBC Micro has no VERIFY command. It has — *CAT will not only catalogue, it will also show SAVE errors.

Sinclair do not point out that the BBC Micro has 320×256 hi-res graphics. Nor do they mention that the BBC Micro has 42 different plot commands. The only thing the BBC does not have that the Spectrum does have is "BRIGHT". I am sure that it is better to have a highly expandable system, with the most powerful Basic and the highest-res graphics for under £600, than a ZX Spectrum which can only play one note at a time compared with the BBC's four.

Robert Lober
Rivendell
13 Pwll-y-min Crescent
Cardiff CF5 6LR

A Harrowing view of PCW

Popular Computing Weekly has made a promising start and I hope you can maintain the momentum. It is an unfortunate fact that 90 percent of program listings contain submitted and/or typographical errors in *all* magazines (at present I am buying eight monthly magazines and your weekly magazine).

Not having had time to enter and run any of the programs in *Popular Computing Weekly* (issues 1-5), I am not in a position to comment on the percentage of errors contained within them. However, in Issue 4, Barry Cornhill's feature on Chaining ZX81 programs together omits the six mentioned programs altogether. Any chance of printing them in a future issue?

Lastly, please scrap 'Citizen Pain' — it is a total non-event content-wise. It would be better to leave that section of the page blank, for competition doodlings etc. The thought of Messrs Ireland and Macdonald being paid for that drivel makes my eyes water.

G O'Brien
105 Roxborough Road
Harrow HA1 1NT

Playing the RAND game

A tip for people with ZX81s and Toni Baker's m/c code book — enter "RAND 640" before running "Life". You will be in for a surprise, to say the least.

Other interesting RANDs are 440, 480 and 510. Any offers for more, as they definitely exist?

Paul F Tolson
16 Thirlmere Road
Dewsbury
West Yorkshire WF12 7ED

GOTO this VAL function

In the first issue of *Popular Computing Weekly* (it abbreviates to *PCW*) Graham Charlton described a method of converting the ON...GOTO facility for use in ZX81 programs using the AND logical connective.

The method I use may be of interest to readers. It has the advantage that it does not involve re-numbering, as GOTO 100*J may, and it also looks more like the conventional ON...GOTO. Simply use the VAL function along with the string slicing properties of ZX basic. For example, to translate:

```
ON J GOTO 1200,2420,1000,25
```

for the ZX, write:

```
GOTO VAL "1200242010000025"
(4*J-3 TO 4*J)
```

Clearly, if the line numbers were no more than three characters long then the term in brackets could be written (3*J−2 TO 3*J).

Alexander Macphee
26 Glenburn Gardens
Whitburn
West Lothian EH47 8NL

Manpower helps the ZX printer

Roger Bexley may find that the answer to his problem of faint printing on the ZX81 (Peek & Poke, April 23) is to pull the paper gently as it feeds through. The ZX81 printer is like a car with a flat battery — so much current is taken by the motor that there is nothing left for the spark. Easing the load on the motor in this way may give a darker print.

Tim Goldingham
11 Furze Platt Road
Maidenhead SL6 7ND

Please look Sharp about it!

Congratulations on an excellent magazine. I have found only one snag with it — I have recently outgrown my ZX81 and expanded to a Sharp MZ80K. Please, please, please could you cater for the MZ80K as well as the ZX81, Vic and BBC Micro. I am looking forward to the next issue of *Popular Computing Weekly* and hope you feature the MZ80K.

Nigel Nock
Cwmifort House
Bowls Lane
Caerphilly
Glamorgan
South Wales CF8 2TW

Catering for the top brass . . .

In reply to your Sound and Vision article in your May 27 issue, please find enclosed a subroutine for producing a brass envelope on a Vic-20.

This should work on any music producing micro. You would only need to alter the volume address 'V' (36878 on the Vic) and the limits of this (0 to 15) on the Vic). You may also like to amend the quantities in the delay (FOR-NEXT) loops to take into account the different counting speeds of micros.

Once you have set up a series of pitch pokes to make your tune in the normal fashion — you only need to enter GOSUB 1000 after each poke.

The volume starts and drops back to one. This is to eliminate the annoying click which is heard when the volume 'V' is poked on and off. The volume should be poked off at the end of the tune to avoid a constant drone in the rest of the program.

Of course, this is not a true brass synthesis, as there is neither sawtooth wave nor envelope filter, but it gives more realism than the drainpipe on/off sound, with which micros seem to be lumbered.

Although I would not play my Vic during a live performance, I do use it to produce a repeating melody and a display on a monitor, prior to our band's venture on stage at gigs.

```
   1 V=36878
1000 REM BRASS ENVELOPE
1002 REM (A)DSR
1004 FOR A=1 TO 15
1006 POKE V,A
1008 FOR T=1 TO 2
1010 NEXT T,A
1100 REM A(D)SR
1102 FOR D=15 TO 4 STEP-1
1104 POKEV,D
1106 NEXT D
1200 REM AD(S)R
1202 FOR S=1 TO 30
1204 NEXT S
1300 REM ADS(R)
1302 FOR R=4 TO 1 STEP-1
1304 POKEV,R
1306 FOR T=1 TO 4
1308 NEXT T,R
1310 RETURN
```

D Whittaker
204 Poplar Court
Salford 6

If you have an opinion you want to express, or have spotted an error that needs correcting, write to: Letters, Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2.*

COVER STORY

Robot Control

You are living in a world dominated by robots. All the work is done by robots, while humans follow a hedonistic lifestyle devoted to idle pleasure.

In a society similar to ancient Rome, life has lost its meaning and its value. Pleasure has become the ultimate goal and bloodlust the ultimate pleasure.

To satisfy this growing desire for blood, a world-wide lottery has been instituted. Everybody's name is fed into the central computer. You are one of the unlucky few who has been chosen to compete in *The Games*.

A miniature radio transmitter has been surgically implanted in your body and you have been released in an arena. A robot, attuned to the transmitter in your body, is pursuing you relentlessly. The only way you can escape is by forcing the robot to step onto a mine. If you position yourself so the mine lies in the robot's path, it will step onto it and be destroyed.

But, your respite will be brief. If you succeed in evading the first robot, two more will be released in the arena. If you manage to avoid these two robots, three more will take their place, and so on.

Machine code

This program runs on a 16K ZX81 and makes judicious use of machine code. But, the program must be entered exactly as shown in the listing to ensure that the correct addresses are used. Particular attention should be paid to lines 100-137, as they contain the hex code for the machine code. Line 1 should consist of exactly 450 dots.

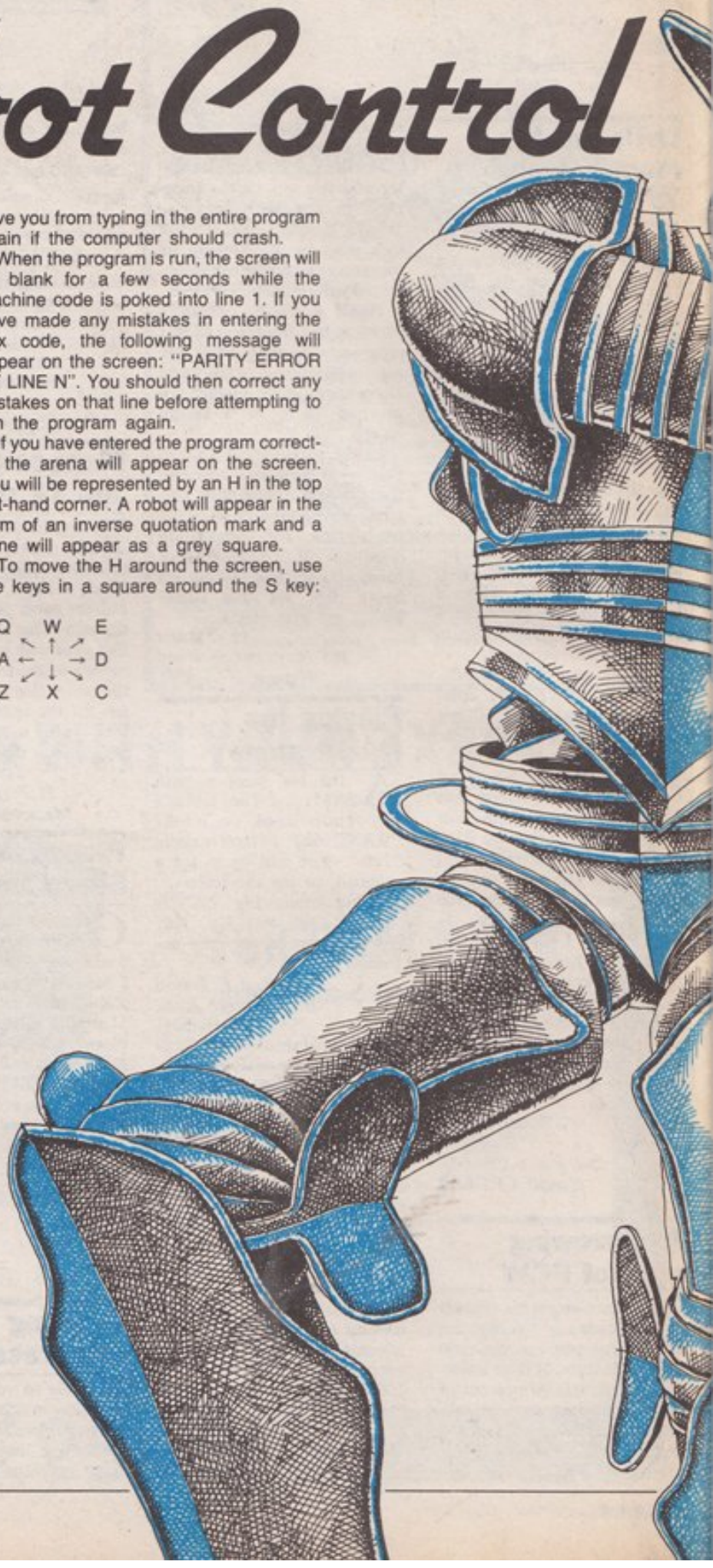
After entering the program, you should save it onto tape immediately. This will save you from typing in the entire program again if the computer should crash.

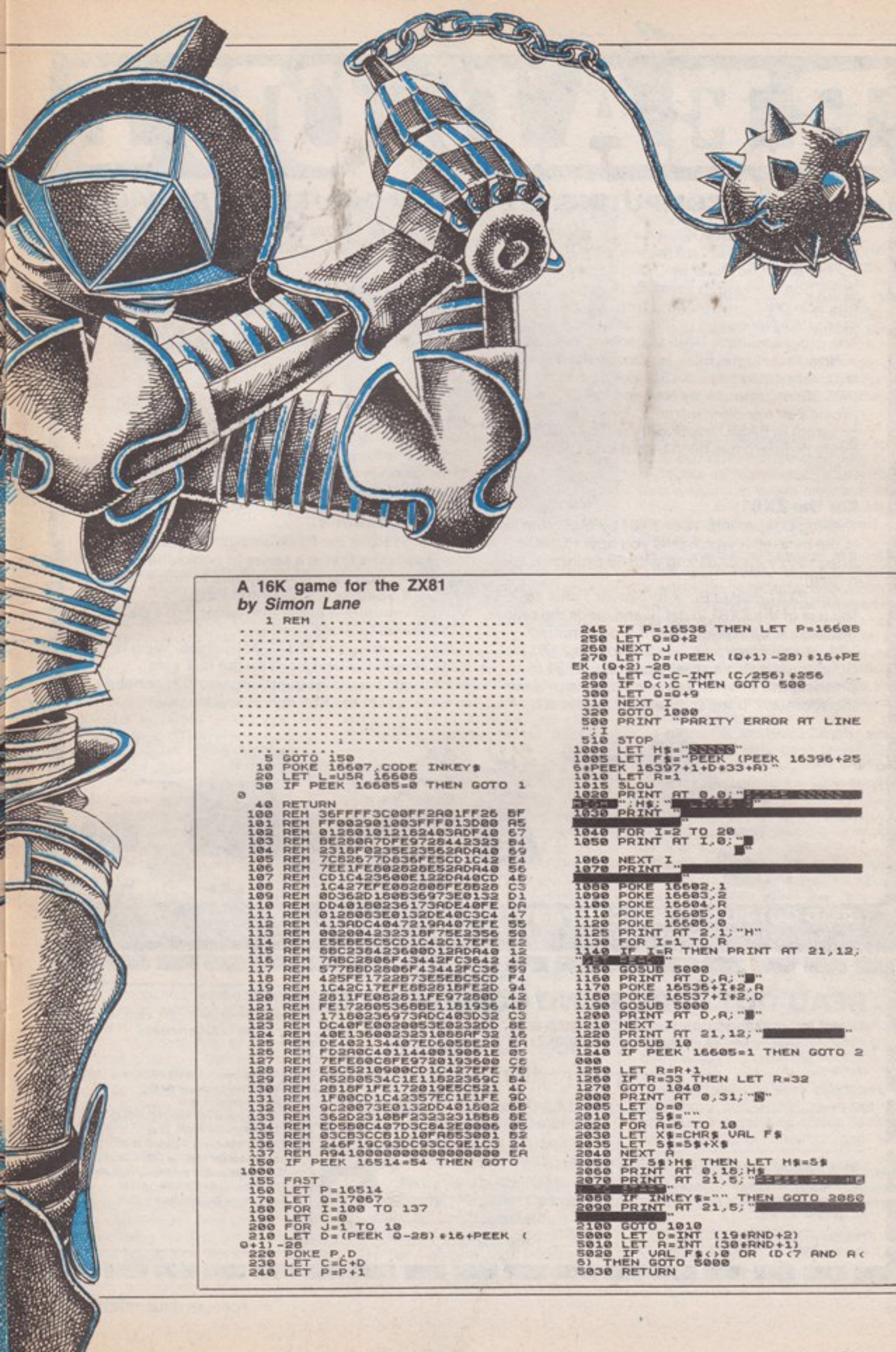
When the program is run, the screen will go blank for a few seconds while the machine code is poked into line 1. If you have made any mistakes in entering the hex code, the following message will appear on the screen: "PARITY ERROR AT LINE N". You should then correct any mistakes on that line before attempting to run the program again.

If you have entered the program correctly, the arena will appear on the screen. You will be represented by an H in the top left-hand corner. A robot will appear in the form of an inverse quotation mark and a mine will appear as a grey square.

To move the H around the screen, use the keys in a square around the S key:

```
Q  W  E
 ↖ ↑ ↗
A ←   → D
 ↙ ↓ ↘
Z  X  C
```





A 16K game for the ZX81

by Simon Lane

```
    1 REM .....
.....
.....
.
```

READ-OUT

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If you own a BBC Micro, the *Practical Programs for the BBC Computer* by David Johnson-Davies, is the book for you! It contains over twenty practical programs ranging from maths and graphics to language manipulation and games. The programs have been tested and they work!

Now that Auntie Beeb is actually delivering its micros to customers, *BASIC Programming on the BBC Microcomputer* by Neil and Pat Cryer will provide an excellent introduction on how to program in BASIC specifically for the BBC Micro. Every program has been tested on a production model.

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The ZX81 Pocket Book by Trevor Toms covers the use of the ZX81 in detail and leads the reader into a clear understanding of programming.

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For the PET:

An excellent introduction for beginners and an invaluable aid for enthusiasts is *The Personal Computer Book* 2nd Edition by Robin Bradbeer which tells you all you need to know about microcomputers.

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PCW—2

Club Reports

Why ham and chips means new wave radio

***David Kelly** talks to Paul Newman, founder of the Sinclair Amateur Radio User Group.*

Paul Newman's house in Leistdn is distinguished from its neighbours by the 24 foot, 16-element, antenna which extends upwards into the sky from his chimney.

During the day he is a computer programmer for a software house, but by night he is to be found at his "old pump handle".

He is an amateur radio ham, call-sign G4INP.

In 1981 he formed SARUG, the Sinclair Amateur Radio User Group, which now has upwards of 175 members.

How did he become involved with amateur radio in the first place? Paul explains: "I was about 10 years old. Wandering round the estate where I lived, I saw this guy with funny bits of wire in his garden. I asked him what they were — he explained — and I've been fascinated ever since."

With the advent of the ZX80 he became seriously interested in the possible applications of microcomputers for amateur radio users.

The most obvious such use of a micro is for the encoding and decoding of radio messages. Nearly all amateur radio enthusiasts use either Morse code or radio teletype for transmission. Very little speech is sent or received, mainly because amateur radio messages are sent all over the world. Where a voice would be unintelligible, a sequence of short and long sound pulses can still be distinguished.

Both Morse and radio teletype lend themselves to automated microcomputer control.

Paul first contacted a like-minded radio user on-air — Steve Gibbs, who broadcasts from Guernsey. They corresponded for some time and then placed an advertisement, asking to hear from other radio/micro users, in the American magazine, *73*. Seventy Three is ham radio slang for 'greetings'.

As a result of the advertisement, Paul heard from Marty Irons, who runs the American Sinclair Amateur Radio User Group (ASARUG). Paul joined ASARUG, becoming the first British member. But he also began to think of forming a similar UK group.

Computer radio ham . . . Paul Newman.

Early in 1981 he wrote to *Radio Communication* asking for interested micro users to contact him. "I thought we could exchange ideas, programs and generally keep each other in touch," he says. "I thought I might get about 20 to 30 replies.

"Had I known what I know now I might have thought twice about doing it."

In the following two weeks Paul received over 200 replies. The response caused him unexpected problems: "It soon became obvious that I could not organise a UK group like ASARUG. Over there it is informal — they keep in touch on-air. That would not be possible with 200 members."

So the first issue of a regular news letter was written. Called *SARUG News* the 10 photocopied sheets were produced and funded by Paul himself. The newsletter contained several programs, news and views from the US and information on the use of the ZX80 in amateur radio.

In the following months the membership settled down to an enthusiastic group of about 80. In November 1981, with the ZX81 widely available, Paul formed the present group — SARUG UK. He charged a £5 subscription fee to cover printing costs.

Issue 5 of the newsletter has now been sent out. SARUG UK currently has about 180 members in 14 countries.

Interface chip

With a one-chip interface, I/O port and a small 350 byte machine-code program, a ZX81 can be connected to a radio. A simple algorithm allows the words to be keyed in and converted into Morse. Similarly, Morse can be decoded into English.

One problem with the use of the ZX81 is that its clock timer has a harmonic that is within the amateur bands. For this reason the ZX81 has to be shielded from the transceiver.

A microcomputer is, however, not only of use in sending or receiving radio signals. It can also be used to assist in circuit or antenna design, satellite tracking, logging of contacts and continuous receiver monitoring.

SARUG UK broadcast ZX programs in the 450 to 28 MHz band range. In the next few weeks a transatlantic ZX program exchange network will be set up with ASARUG.

One of SARUG UK's members is working on a real-time satellite telementry and tracking system.

Paul's own interest is in the link between radio conditions and the weather. Little is known about the way radio waves travel through the air, but freak atmospheric conditions do result in reception anomalies.

Paul described an incident when he picked up a radio station in Norway while trying to contact Holland. Such effects are caused by atmospheric "ducting". Layers of air of different densities can act as a tunnel, called a wave-guide, down which the radio signal is channelled.

He reckons that such conditions are predictable and would like to set up a continuous monitoring station to record radio conditions, weather and windspeed.

Membership of SARUG UK is open to all amateur radio licence holders or anyone with a proven interest in amateur radio.

For further information contact: Paul Newman (G4INP), 3 Red House Lane, Leiston, Suffolk.

We want to hear from you!

Whether you are starting a new club, holding a special meeting, or just changing the venue, we want to hear from you.

Write to David Kelly, Club News, *Popular Computing Weekly*, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF or call him on 01-930 3271.

Reviews
software

Banking system

J. P. Gibbons, 14 Avalon Road, Orpington, Kent.
ZX81, 16K
Price £9.00.

The ZX81 is now supported by a comprehensive catalogue of software. The vast majority of this software comprises games of one kind or another but, as the ZX81 matures, an area that is being increasingly developed is the business/personal finance program.

I first saw J. P. Gibbons' Personal Banking System (PBS) at the 1981 ZX Microfair, and thought it rather over-priced at the time, at £10. A year and several refinements later, together with a drop in price, makes it look a lot more attractive.

And this program *is* attractive. It comes with a detailed handbook, and an amusing demonstration program, on one side of the tape. This demonstration explains how the System works, and also how Sinclair made his fortune!

The System takes a little time to set up, and careful reading of the excellent manual is necessary whilst doing so. Once this is done the program runs well.

The account name, together with the current year, date and balance brought forward, is typed in, and then details of your standing orders. The standing order file will recognise between 10 and 24 monthly, quarterly, annual and semi-annual payments. In the accompanying (highly fictional) illustration, I am paying Sinclair £100.00 every six months. *Popular Computing Weekly* are receiving my £19.95 annual subscription on the 8th August. Standing order No 3 is a very mysterious payment of £250 every month from one F. Fawcett. The rest is self-explanatory, and pure fantasy.

Now the data from your cheque-book can be added to the System. Cheque number, date of cheque, details (payee etc) and amount are all inputted, and the PBS will then check through the standing orders, posting any that are due on that date. The program then prints the information, together with the up-dated balance, for each input. Ten pages of 12 lines each can be held in the PBS. As you can see from the next illustration, the standing orders have been accounted for automatically.

Corrections of past data, or additions to the file, are easily made at any time. The program will, however, make certain that the user is sure of the correction before it proceeds with execution.

One more facility is offered by the Menu – Entry Search. Using this, one can find a certain payment, described by cheque number, payee, or amount and display the item. The program will find all occurrences of that description, so that one can, for example, find out how much has been paid to the local supermarket over the year (if you are sure you wish to know!).

As with any program of this nature, a printer is almost a necessity, and all the pages of the account, with either cheque numbers or payee details displayed, can be printed. The standing order file, and the Entry Searches, can also be printed.

Back-up maintenance is provided for the PBS. This is, unfortunately, a rarity for the ZX81, and other manufacturers should follow Gibbons' example in this. He will supply the purchaser with up-dates as they are implemented. Future developments will include a financial analysis routine, and a 32K version giving a statistical break-down using histograms.

An interesting detail of the present program is a small machine-code routine for high-speed saving and loading of data, the whole process taking only some 45 seconds. The loading procedure overwrites any data presently held by the PBS, so multiple accounts can easily be handled, without the need for lengthy re-loading of the master program.

Summary

The unique fast-load feature, the after-sales support, and the flexibility and user-friendliness of this program make it a joy to use. Of greatest use in conjunction with a printer, J. P. Gibbons' Personal Banking System is a very successful program, and can be recommended. **TB**

```
        ** STANDING ORDERS **
SO DETAILS      DUE DATE      AMOUNT

 1 SINCLAIR     6  JUL (6)   -100.00
 2 PC WEEKLY    8  AUG (0)    -19.95
 3 F. FAUCETT   11 MONTHLY    250.00
 4 MORTGAGE     18 MONTHLY   -325.00
 5 INSURANCE    19 MONTHLY    -25.83
 6 RATES        25 AUG (3)   -156.89
 7 NEW CAR      23 AUG (6)  -8500.00
 8 SALARY       30 MONTHLY   2400.00
 9
10

N/L TO CONTINUE/ "P" TO PRINT
  ** BANK ACCOUNT 1982 PAGE 1 **
DATE  DETAILS          DR/CR BALANCE
25JUL BAL BT/FWD  2000.00 2000.00
26JUL BRIT. RAIL  -670.00 1330.00
30JUL SALARY      2400.00 3730.00
08AUG PC WEEKLY    -19.95 3710.05
11AUG F. FAUCETT   250.00 3960.05
12AUG SPECTRUM    -175.00 3785.05
15AUG MORTGAGE    -220.00 3565.05
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28AUG NEW CAR    -8500.00-5117.67
30AUG SALARY      2400.00-2717.67
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```

Charset-20

Rabbit Software, 380 Station Road, Harrow, Middlesex.
Vic-20, 3K
Price £4.99.

Vic owners must be relieved that some cassette software is, at last, coming on to the market at reasonable prices. We have had many calls complaining about the cost of some of the Commodore cartridges.

Charset-20 allows you to design your own characters for the Vic and is one of the more serious packages put out by Rabbit Software, a division of Cream Computers. At £4.99 the price is competitive, even in comparison with Sinclair software.

The documentation for Charset-20 is non-existent. The enclosed small dot-matrix printer strip of paper simply says *Charset-20*. As seems to be usual with Vic-20 programs the instructions are loaded first, before the main program. At this point you learn that you need the 3K Ram pack to use the program.

There are seven screen-worths of instructions with the program. Reading through and trying to memorise the whole lot first time through is well-nigh impossible.

For the uninitiated and new Vic owners the instructions will mean very little. For example, the opening words in the instructions are "When the program is run it will display several POKE'S which initialise various pointers in the Vic chip. Commands are also given to copy the character set which normally is at 32768 into Ram." Cast your mind back a few months and ask how much those instructions would have meant.

The technique used to design your own characters is quite simple. You select a character you will not need to use. Using the program the Vic will display the character as an 8 by 8 dot matrix. Each dot in the matrix can then be edited using the BLK and WHT keys to set and reset the points. You use the cursor keys to move from point to point.

We gather from Rabbit that there have been some complaints from users about the lack of instructions and the need to keep referring back to the instructions program. The company says that an instruction leaflet is now included with each cassette.

Summary

This is a relatively simple but useful program for the Vic-20. If you are interested in learning more about how your Vic works we would recommend it. The price of £4.99 is at the sort of level we would like to see all Vic programs. **DS**

Reviews
hardware

TE I/o port

Thurnall Electronics, 95 Liverpool Road, Cadishead, Manchester.
Price £17.95 assembled and £14.95 as a kit without case.

This is not a memory-mapped port, like many others, so you cannot use PEEK and POKE to get information out of it. Instead Thurnall have provided a REM statement containing a machine-code routine which does the same job.

The port is based on a Z80A Programmable Input/Output device (PIO) addressed by having the address line A7 low (ie any number below 128 will give access to the port). The configuration of the port needs to be set before use.

It contains 16 lines which can form two 8-bit ports or one 16-bit port for input or output. In fact, each bit of the 16 available lines can be individually assigned as either an input or an output. Once this is done the user can make use of two other connections from the port, the strobe and ready lines. These alert an external device that data is ready for it and waits for a reply before clearing the port for a new input or output. This is often called "handshaking". Being an input/output port the full amount of RAM can be used, but care must be taken with addressing as the Sinclair's poor addressing also occurs on the input/output map.

The instructions have been simplified and should be easy enough to use by a Basic programmer or a machine-code user. The port has dimensions of 4 × 3 × 5½ inches and plugs on to the edge of the ZX81, with an edge connector at the back for RAM, printer etc. There are many other boxes which can connect to this port containing relays, LEDs and joysticks made by the same company. The PIO is easy to use and the ports appear on a pcb edge on the right-hand side so no soldering is necessary. **SA**

S-pack

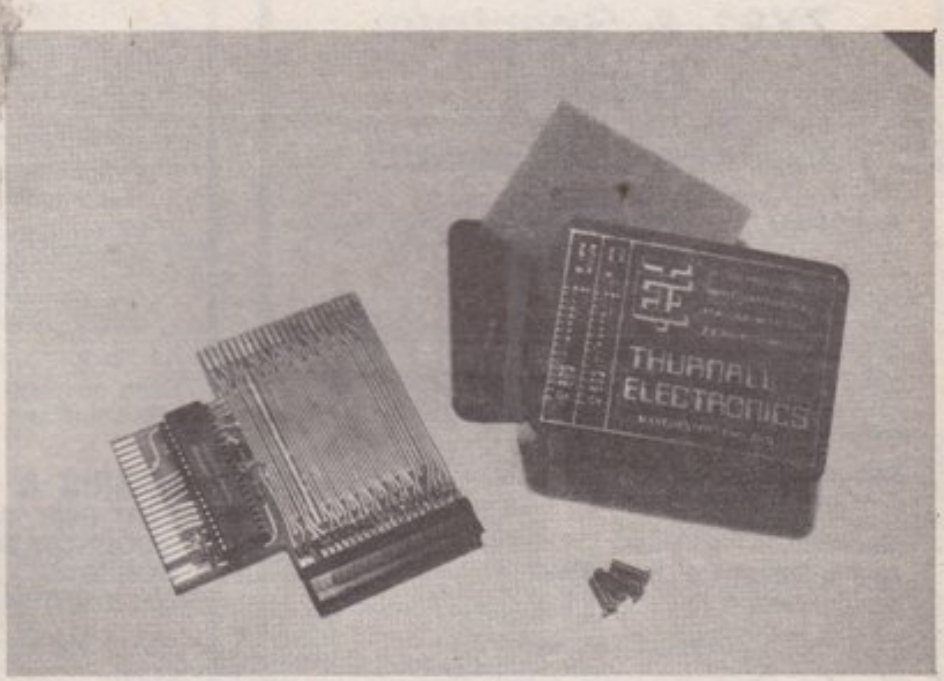
DCP Microdevelopments, 2 Station Close, Lingwood, Norwich.
Price £49.95; extra ROMs £14.95.

This unit connects to the back of a ZX81 to provide it with a computer generated speech facility. The black box contains a special processor and a ROM containing the words to be spoken. It also contains three other sockets so that other word ROMs can be plugged in. The unit does not obstruct any other extension of the ZX81 as there is a printed circuit-board edge on the back of the box so that a RAM pack, printer etc. can still be plugged in. The S-Pack is driven from the ZX81's own power supply and requires no external amplifier since a volume control and loudspeaker are built-in. If, however, you want to connect it up to an external amplifier a 3.5mm jack-plug socket has been provided (it is the same size as the tape leads, so the words can even be recorded on tape).

The S-Pack is memory-mapped into two locations in RAM (49149 and 49148) and is simply POKEd with the number of the word required. A pause of some sort *must* be included before the next word is spoken in order that the processor has time to put out the word. The word may be any one of the 72 included in the first ROM (which is provided with the S-Pack) or if all the available ROMs are fitted the total vocabulary is 249 words. Most of these words are measurements such as a complete set of numbers in the first ROM from zero to a million.

The first ROM also contains the whole alphabet. This includes Zee for Z as this is an American-produced ROM! One can, however, make some words out of the other words, by shortening the words spoken. This can be done as the processor stops talking as soon as another word is POKEd in. Only the beginning of the words can be used in this way though.

Summary
The DCP pack has a clear, but definitely transatlantic voice of sufficient volume for the single user. It is very easy to use and there is much entertainment in trying to find how many other words you can make yourself. The price is well below anything yet available. **SA**



The 16-line input/output port now available from Thurnall Electronics.

The Electronic office

By Dennis Jarrett.
Gower/Philips, 165 pages.
Price £12.50.

To move into the age of the electronic office is costly — those intelligent copiers, teletext transceivers, satellite communications systems and so on do not come cheap. But come they will, and indeed they are here.

This book also is not cheap but it is a readable, well-illustrated account of the field, written by a specialist journalist.

Many users of personal computers are becoming involved with computerised accounting, data-base systems, Prestel, and even word-processing. These applications form the beginnings of a personal electronic office — an exciting concept requiring substantial investment and changes of attitude.

If your family is lukewarm about the time you spend poking around a keyboard, you might consider it worthwhile to arm yourself with this book. It presents a fascinating new world.

Jarrett is right to insist that we must move fairly slowly to the new world of automated office activity. Whether vested interests will allow us to do that is another matter. Certainly, these advances will affect us all.

Summary
This is one of the best "person-in-the-street" accounts of progress, problems and potential in the field of office automation. If that interests you, then read it. **KJ**

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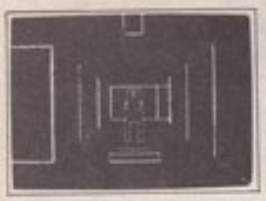

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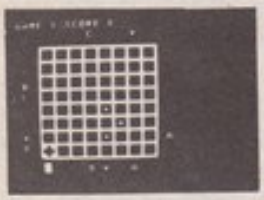

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Open Forum

Open Forum is for you to publish your programs and ideas.
It is important that your programs are bug free before you send them in. We cannot test all of them.
Contributions should be sent to: Popular Computing Weekly, *Hobhouse Court,*
19 Whitcomb Street, London WC2H 7HF.

How to contribute

Each week the editor goes through all the programs that you send to Open Forum in order to find the Program of the Week.

The author of that program will qualify for DOUBLE the usual fee we pay for published programs.
(The usual fee is £10.)

Presentation hints

Programs which are most likely to be considered for the Program of the Week will be computer printed and accompanied by a cassette.

The program will be well documented, the documentation being typed with a double spacing between each line.

The documentation should start with a general description of the program and then give some detail of how the program has been constructed and of its special features.

Listings taken from a ZX Printer should be cut into convenient lengths and carefully stuck down on to white paper, avoiding any creasing.

Please enclose a stamped, self-addressed envelope.

Character plot

on Vic-20

To design your own characters for the Vic-20, it is usually necessary to draw them on an 8 x 8 grid, and then convert each line of the grid into a decimal value as in Figure 1.

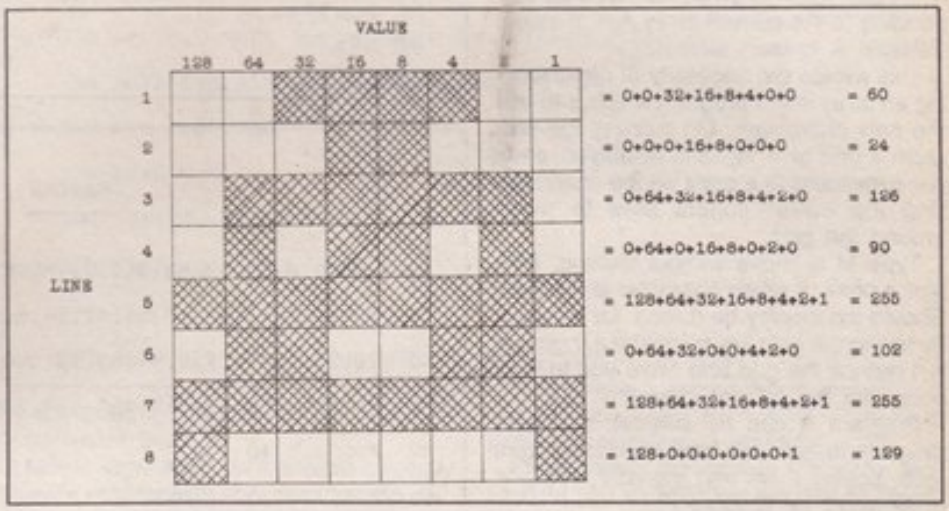
The resulting values are then placed in data lines to be read by the program and poked into Ram memory locations to form the new character generator. This can be a tedious task, especially if there are many characters to be defined.

Program A allows you to design your characters on the screen, and on completion saves them on to tape ready for inclusion into any program.

Program notes

30-40 Checks where Basic program starts. Peek (44)=18 with at least 8K memory expansion.

to next page



Character plot
by John Ireland
Program A

```
10 PRINT"□"
30 IFPEEK(44)>=18THENS=4169:ZS=33792:GOTO90
40 S=7753:ZS=30720
90 PRINT"ENTER NUMBER OF CHARACTERS TO BE DRAWN":INPUTN
95 IFN<1THEN90
100 DIMA(N,7):PRINT"□":POKE36879,93
110 FORK=1TON
120 S1=S
130 FORI=0TO7:FORJ=S1TOS1+7
140 POKEJ,43:POKEJ+ZS,0
150 NEXTJ:S1=S1+22:NEXTI
170 T=S:T1=T:CH=43:C=0
175 PRINT"CHARACTER #"K
180 PRINT:PRINT"#  MOVE = M   PLOT = P":PRINT:PRINT" FINISH = F REDRAW = R":
185 GETA$:IFA$=""THEN280
190 Z=ASC(A$)
200 IFZ=145THENT=T-22
210 IFZ=17THENT=T+22
220 IFZ=157THENT=T-1
230 IFZ=29THENT=T+1
240 IFPEEK(T)=32THENT=T1
250 IFZ=77THENCH=43:C=0
260 IFZ=80THENCH=160:C=2
270 IFZ=70THEN320
275 IFZ=82THENPRINT"□":GOTO120
280 POKET,160:POKET+ZS,1:FORW=1TO70:NEXTW:POKET,CH:POKET+ZS,C:FORW=1TO70:NEXTW
290 T1=T:GOTO185
320 S1=S:L=7
330 FORI=0TO7:FORJ=S1TOS1+7
340 IFPEEK(J)=43THEN400
350 A(K,I)=A(K,I)+2↑L
400 L=L-1:NEXTJ
410 L=7:S1=S1+22:NEXTI
420 NEXTK
450 PRINT:PRINT"#READY TAPE FOR SAVING CHARACTERS":PRINT
460 OPEN1,1,1
465 PRINT#1,N
470 FORK=1TON:FORJ=0TO7
480 A=A(K,J)
485 PRINT#1,A
490 NEXTJ:NEXTK
500 CLOSE1
```

from previous page

Dependent on value found here, S and ZS are assigned values to correspond to top left of grid.
120-150 Draws grid.
185-290 Movement of cursor around grid, plotting or moving as required.
320-410 Computes value of each point on grid and stores same in array A(K,I).
450-500 Saves characters to tape.

In Line 480 A is given the value corresponding to the current array A(K,J) value. Variable A is then saved.

This avoids the necessity of dimensioning an array in the program which is to use the new characters. On running the program a grid of + signs is displayed, each corresponding to a point on the character. Use the cursor control keys to move around the grid.

Type M to move without plotting, P to plot a point, F when character is finished. Should the display be ruined, for instance by hitting the stop key by mistake, typing R will redraw the grid and allow you to start over with the current character.

Program B can be inserted into your program to input the new characters from tape, poking them into memory locations determined by variable P.

Character plot
Program B

```
10 PRINT"■STARTING LOCATION OF  NEW CHARACTERS":INPUTP
20 PRINT"■READY TAPE OF SAVED   CHARACTERS"
30 OPEN1,1,0
40 INPUT#1,N
50 FORK=0TON*8-1
60 INPUT#1,A
70 POKEP+K,A
80 NEXTK
90 CLOSE1
```

Saturn

on BBC Micro

The following program draws a spectacular view of Saturn, viewed approximately 200,000 miles away from its surface and roughly at latitude 30°.

At the start 150 stars of different colours are plotted while the planet begins to be drawn throughout the program. They are constantly changing colour but not position.

Accompanying the program as the drawing is taking place two sound channels are used. One increases in pitch while the other decreases at the same time giving a weird effect.

After the sixth and final ring has been drawn there is a short climax as the pitch steadily rises up to its highest value. Sound channel 0 is then used, while a rapid flashing of the planet and its rings start progressively. With a humorous finale a French alien from Mars drops out of the top of the screen and plants a flag at the North Pole, pronouncing the planet his.

The program lasts for five minutes.

At the start the alien shape is defined together with the shape of the Flag.

Next comes star position determination, where 150 stars are put in the array A(2,150), A(1,?) being x co-ordinate and A(2,?) being Y co-ordinate.

As the program progresses in the middle of the loop at line 110 two of the stars colours are changed — not more than this

PROGRAM OF THE WEEK

Saturn
by Peter Donn

SATURN

```
10  N=600:M=500:DIMA(2,150):MODE 2
20  VDU23,224,1,3,13,21,37,39,8,16
30  VDU23,225,0,128,96,80,72,200,32,16
40  VDU23,226,248,248,248,248,128,128,128,128
50  FOR A=0 TO 150
60  L=RND(1250):P=RND(1020):A(1,A)=L:A(2,A)=P:NEXT A
70  E=0:H=360:MOVEN,M
80  E=E+1
90  IF E=8 THEN 200
100 READ B,C:FOR A=0 TO 360:GCOLO,RND(7)
110 FOR Q=0 TO 2:R=RND(150):PLOT69,A(1,R),A(2,R):NEXT:GCOLO,E
120 PROCsaturn
130 SOUND1,22,A,1:SOUND2,22,H-A,1:NEXT:GOTO 80
140 DEF PROCsaturn
150 D=RAD(A):X=B*COS(D):Y=C*SIN(D):H=X+N:J=Y+M
160 IF POINT(H,J)=1 AND A<180 THEN 180
170 PLOT69,H,J:IF B=220 DRAW600,500
180 MOVEN,M:ENDPROC
190 DATA220,200,600,100,550,90,500,80,460,70,430,60,400,50
200 FOR A=0 TO 255:SOUND1,22,A,1:NEXT A:VDU19,1,9,0,0,0:*FX 9,2
210 *FX 10,2
220 FOR Z=22 TO 37:SOUND0,2,100,10:NEXT:FOR A=10 TO 15:VDU19,A-8,
    A,0,0,0:FOR Z=0 TO 500:NEXT Z:NEXT A
230 VDU5
240 VDU19,7,1,0,0,0,19,0,0,0,0,0
250 FOR A=1024 TO 735 STEP-15
260 GCOLO,7
270 MOVE 560,A
```

otherwise the program will be slowed down too much. Overall this gives a twinkling effect throughout the program.

The point command is used in line 160 to make sure the rings go round the back of Saturn. At the heart of the program is the formula that draws the planet and its rings: X = angle x cos (length), Y = angle x sine (length) – line 150, not forgetting to change from degrees to radians.

There is only one procedure in the program — PROCsaturn, which does all the drawing and sound effects.

In order to achieve the fast flashing at the end of the program two *FX commands are used, *FX 9 and *FX 10. Apart from the features mentioned the program is fairly simple.

That is all except that in the near future I hope many people will be able to sit back on an evening with their lights off in their dining room admiring their computer's spectacular graphics, and a beautiful view of our most interesting planet!

```
280 PRINT CHR$(224)CHR$(225)
290 SOUND1,-15,A/4-1,1
300 FOR Z=0 TO 300:NEXT
310 GCOLO,0
320 MOVE 560,A:PRINT CHR$(224)CHR$(225)
330 NEXT A
340 GCOLO,7:MOVE 560,A:PRINT CHR$(224)CHR$(225)
350 MOVE 675,A:PRINT CHR$(226):VDU 4
360 FOR A=0 TO 8
370 READ B,C
380 SOUND1,-15,B,C*8
390 NEXT
395 END
400 DATA81,1,81,.5,101,1,101,1,109,1,109,1,129,2,117,.5,101,1
```

Atomic regression

on Atom

Regression is a program written in Atom Basic which will calculate and then plot the best fitting straight line through a given set of points. Although mainly of a mathematical nature the listing does include a number of useful routines that the reader with a non-mathematical bent might also find interesting.

It's applications are many fold. Imagine being able to impress your boss with predictions of next month's sales figures. You could tabulate the display average monthly sightings of the light-mantled Sooty Albatros at the local Ornithological Society or even the mean number of moves taken before being defeated by Rubiks' Cube for the umpteenth time.

Regression requires an expanded Atom with the floating point Rom and a full 6K of screen memory. The listed length of slightly under 3K is intended mainly for clarity and can readily be reduced to about 1.5K by abbreviating commands and using multi-statement lines.

Linear regression, as it is more correctly known, expresses the relationship between X and Y values in the form: Y = a x + b. The problem is to determine the constant a, called the regression coefficient, and b, so that the straight line to be plotted can be considered as the best fit to the given set of values of X and Y.

The method is that of the least squares. This technique sets about minimising the errors that are bound to occur when attempting to obtain a best fit. The equations for the least square method can be expressed as:

$$a = \frac{n*\Sigma xy - \Sigma x*\Sigma y}{n*\Sigma x^2 - (\Sigma x)^2}$$

$$b = \frac{\Sigma y - a*\Sigma x}{n}$$

Σ denotes "sum of". Thus Σx reads "the sum of all the x values". n is the number of points. This will produce the equation for the line of Y regressing on X.

Those wishing further information on this operation should be able to obtain it from any reasonable statistics book.

On running, the screen will clear and request you to input the number of points to be plotted. These should then be entered as X and Y values in response to the Atom's prompts. Lines 210 and 250 call subroutine k — lines 1060 to 1090 — if the number of points exceeds four. This routine, which links to FEOA hex in the Basic interpreter Rom, is included to present a more acceptable screen format and can keep up to seven of the top screen lines static whilst scrolling the rest of the screen up a single line.

The number of unscrolled lines is determined by the contents of the Y index register. As the low order bytes of Basic's A, X and Y variables are transferred to their respective 6502 registers when the LINK command is executed, it is a simple matter to seed this value. The formula is simply:

$$Y = (n*32) + 32$$

n is the number of lines — 0 to 7 — to be left unscrolled.

Atomic regression
by Bruce Smith

```
10 REM**LINEAR REGRESSION
20 DIM D(20)
30 $0="    linear regression"
40 D?10=128
50 PRINT $12 $0''
60 ?&E4=0
70 E=0:F=0:G=0:H=0:I=0
80 @=&FS=0:W=255
90 REM*** GET CO-ORDINATES
100 REM*** CALCULATE REGRESSION COEFFICIENT
110 INPUT"NO. OF POINTS"J
120 DIM AA(J),BB(J)
130 PRINT''"INPUT X,Y COORDINATES:"'
140 DO
150  PRINT "-"
160 UNTIL COUNT=32
170 FOR N=1 TO J
180  PRINT "X";N;:INPUT Z
190  AAN=Z:E=E+Z:G=G+Z*Z
200  PRINT $9$9$9$9$9$9$11
210  IF N)4 GOSUB k
220  PRINT "      Y";N;:INPUT Z
230  BBN=Z:F=F+Z
240  I=I+(AAN*BBN)
250  IF N)4 GOSUB k
260  PRINT'
270 NEXT
280 K=(J*I)-(E*F)
290 L=(J*G)-(E*E)
300 REM*** SHELL SORT X COORDS
310 M=J
320 DO
330  M=(M+2)/3
340  FOR A=M+1 TO J
```

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```
350     FOR B=A TO M+1 STEP -M
360      U=B-M
370      IFAAB)=AAU G.a
380      T=AAB:AAB=AAU:AAU=T
390      G=BBB:BBB=BBJ:BBU=G
400     NEXT B
410a  NEXT A
420 UNTIL M=1
430 REM*** CALCULATE GRADIENT
440 REM*** OF GRAPH TO BE PLOTTED
450 XA=K/L
460 XB=(F-(XA*E))/J
470 REM***END X,Y COORDS
480 XC=XA*AA1+XB
490 XD=XA*AAJ+XB
500 REM*** SCROLL SCREEN EXCEPT
510 REM*** TOP TWO LINES
520 Y=64
530 FOR M=1 TO 14
540  LINK &FE0A
550 NEXT
560 PRINT $30''''
570 PRINT "LINE LIES BETWEEN X,Y COORDS :"'
580 PRINT AA1;"XC "  AND  "AAJ;"XD'''
590 PRINT "GRADIENT OF GRAPH IS:"'
600 FPRINT "Y="XA " X "
610 F.F XB(0 GOTO c
620 PRINT "+"
630c FPRINT XB
640g PRINT '''"PRESS shift TO DISPLAY GRAPH"'
650 PRINT "PRESS rept  TO DISPLAY COORDS"'
660n IF ?&B001(128 GOTOe
670 IF ?&B002&40=0 GOTOf
680 GOTO d
690e CLEAR4:COLOUR1
700 A=0:B=0
710 REM*** IF ARRAY ELEMENT IS
720 REM*** NEGATIVE MOVE ORIGIN
730 IF AA1(0 OR BB1(0 B=96:A=64
740 MOVE(0+A),0:DRAW(0+A),192
750 MOVE0,(0+B):DRAW128,(0+B)
760 REM*** PLOT POINTS ON GRAPH
770 FOR N=1 TO J
780  PLOT13,(AAN+A),(BBN+B)
790 NEXT
800 REM*** DRAW REGRESSING LINE
810 FOR N=AA1 TO AAJ
820  XY=XA*N+XB
830  V=XY
840  REM*** IF NEXT POINT GREATER
850  REM*** THAN 0.5 PLOT POINT
860  REM*** IN BETWEEN:
870  IF V-W)1 FOR M=W TO V:PLOT 14,(N+A),(M+B):NEXT
880  F.F XY-V)=0.5 V=V+1
890  PLOT14,(N+A),(V+B)
900  W=V
910 NEXT
920 GOTO d
930 END
940 REM*** DISPLAY X,Y COORDS
950 PRINT $12 $0''
960 PRINT "X,Y COORDINATES ARE:"'
970 B=4
980 FOR N=1 TO J
990  PRINT AAN ","  BBN'
1000  IF N%10=0 GOSUB n
1010 NEXT
1020 GOTO g
1030 REM*** SCROLL SCREEN ONE
1040 REM*** LINE UP EXCEPT TOP
1050 REM*** SEVEN LINES.
1060k Y=244
1070 LINK&FE0A
1080 PRINT $11
1090 RETURN
1100n PRINT "hit key to continue"'
1110 LINK &FFE3
1120 PRINT $12 $0''
1130 RETURN
1140 THIS PROGRAM PLOTS THE BEST
1150 FITTING LINE BETWEEN A SET OF
1160 POINTS. THE EQUATION OF THE
1170 LINE IS GIVEN BY:
1180
1190     Y=mX+c
1200
1210 WITH THE LINE OF Y REGRESING ON X.
1220
1230 PROGRAM REQUIREMENTS:
1240
1250 IN IT'S PRESENT FORM THE
1260 PROGRAM IS 2807 BYTES LONG
1270 HOWEVER BY REMOVING REM STATEMENTS
1280 AND ABBREVIATING COMMANDS THIS
1290 MAY BE REDUCED TO UNDER 1.5K
1300 THE FLOATING POINT ROM IS REQUIRED
1310 WITH A FULL 8K SCREEN MEMORY.
1320 C. BRUCE F. SMITH FEB.82
```

Bridge deal

on Pet

Bridge players can never have too much practice in bidding on diverse hands, but it does get rather tiresome continually dealing out the cards for this purpose. I've never been madly keen on Pet graphics, but one thing they can do well is produce the symbols for the suits of cards.

Four columns of thirteen cards each are printed on the screen, having been dealt at random by the use of the RND function. The ace is quite properly numbered 1. The picture cards are also left as numbers 11 (Jack), 12 (Queen) and 13 (King), since they represent the points value of each of these cards and can thus be a useful reminder when totalling the value of the hand.

The hands of each partner are printed adjacently, so that it is easier to see how well they could support each other in play.

Bridge deal
by Gordon Millington

```
1 REM BRIDGE DEAL BY GORDON MILLINGTON
2 PRINT"□"
4 PRINTTAB(12)"BRIDGE DEAL":PRINT:PRINT
5 PRINT"NORTH"TAB(10)"SOUTH"TAB(20)"EAST"TAB(30)"WEST"
6 PRINT
10 DIM FL(52),D%(52)
20 X=RND(-RND(0))
30 FOR I=1TO52
40 C%=52*RND(1)+1
50 IF FL(C%)<>0 GOTO 40
60 D%(I)=C%:FL(C%)=1
61 IF C%<14 THENPRINT CHR$(193);C%;
62 IF C%>13 ANDC%<27THENPRINTCHR$(211);C%-13;
63 IF C%>26 ANDC% <40THEN PRINTCHR$(218);(C%-26);
64 IF C%>39 THENPRINTCHR$(216);(C%-39);
75 PRINT,
80 NEXT I
81 PRINT:PRINT:PRINT
82 PRINT"13=KING: 12=QUEEN: 11=JACK: 1=ACE"
```

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Instant screen

on ZX81

I had a program which needed to use a mixture of print and scroll statements, giving a table of results, then a series of scrolled newsflashes and then an updated table of results.

This was all very slick except that it took about 30 seconds to clear the screen after the scroll and so spoiled the effect.

My son was writing a space chase game and wanted a black screen. This was also spoilt by the delay while the screen was printed.

Here is a routine which will solve the problem. First type in:

```
1 REM E£RND(graphic 1) CHR$(graphic 2)7?REMURN?C(graphic 7)Y(graphic space)?"?(inverse L)COS/LET
```

Return and Let are both entered by using THEN, moving the cursor back and erasing the THEN.

There are no spaces entered between characters. There are four instructions we cannot enter from the keyboard. These are represented by ? in the listing. We must enter those one at a time using the following instructions.

```
POKE 16521,126
POKE 16523,118
POKE 16528,119
POKE 16530,120
```

To call the routine type RAND USR 16514. You will then get a black screen. To clear the screen type POKE 16527,0.

To check that it works write a short program to print something to the screen. Try, for example:

```
10 FOR I = 1 TO 21
20 PRINT "32 of any character"
30 NEXT I
40 RAND USR 16514
```

You can fill the screen with any letter, number or graphic character you wish simply by using the command, either directly or as part of the program, POKE 16527,X, where X is the number representing the character you want, as given in the back of the Sinclair ZX81 manual.

To use this routine add the line LET XX = USR 16514. You could use RAND USR 16514 but if you are using RND in your listing the same sequence of numbers will always occur.

A catch is that you must reset the print position after each time the routine is used. Do this by making the next PRINT command PRINT AT 0,0;, or any desired position, or else you may get an error 5 — screen full — code, even though the screen is empty.

This routine can also be used to fill or clear any number of lines on the screen. Table 1 gives the numbers you will need to POKE 16518 and POKE 16519, either as a direct command or as part of a program.

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Instant screen

by Roger Elder

TABLE 1

LINES TO PRINT/CLEAR	1	2	3	4	5	6	7	8
POKE 16518	32	65	98	131	164	197	230	8
POKE 16519	0	0	0	0	0	0	0	1
LINES TO PRINT/CLEAR	**9**	**10**	**11**	**12**	**13**	**14**	**15**	
POKE 16518	41	74	107	140	173	206	239	
POKE 16519	1	1	1	1	1	1	1	
LINES TO PRINT/CLEAR	**16**	**17**	**18**	**19**	**20**	**21**		
POKE 16518	16	49	82	115	148	181		
POKE 16519	2	2	2	2	2	2		
LINES TO PRINT/CLEAR	**22**	**23**	**24**					
POKE 16518	214	247	23					
POKE 16519	2	2	3					

TABLE 2

DECIMAL ADDRESS	HEXCODE	OPCODE	M/C BYTES	BASIC EQUIVALENT	BASIC BYTES
16514/5/6	2A 0C 40	LD HL (D FILE)	3	LET X=PEEK 16396+256*PEEK 16397	26
16517/8/9	01 D5 02	LD BC, 02D5	3	LET Y=725	11
16520	23	INC HL	1	LET X=X+	11
16521	7E	LD A, (HL)	1	LET Z=PEEK X	10
16522/3	FE 76	CP,76	2	IF Z=118	
16524/5	28 03	JR Z + 3 (lines)	2	THEN GOTO	15
16526/7	3E 80	LD A, 80	2	LET Z=128	11
16528	77	LD (HL)A	1	POKE X,Z	9
16529	0B	DEC BC	1	LET Y=Y−1	11
16530	78	LD A,B	1	LEY Y=Y−1	
16531	B1	OR C	1	LET Y=Y−Y	
16532	C8	RET Z	1	IF Y=0 THEN RETURN	11
16533/4	18 F1	JR−10 (lines)	2	GOTO	8

TOTAL M/C BYTES=27 (INC LINE No. AND REM)

TOTAL BASIC BYTES=123 (INC LINE Nos)

Solitaire

by Colin McCormick

```
 0 POKE36879,25
 1 PRINT"□"
 2 DIMO(50):DIMN(50):DIMT(50)
 5 FORB=1TO49:O(B)=1:NEXTB:O(25)=2
 10 FORQ=1TO49:READN(Q),T(Q):NEXTQ
 20 POKE36869,242:PRINT"  THIS PROGRAM ALLOWS YOU TO PLAY SOLITAIRE ON THE COMPU
TER AND";
 21 PRINT"   CHECKS THE VALIDITY OFYOUR MOVES.":PRINT"  MOST PEOPLE PLAY   WITH
OUT";
 22 PRINT" DIAGONALS, BUTIF YOU WANT DIAGONAL  MOVES TYPE'Y'."
 23 PRINT:PRINT:PRINT:PRINT
 24 GETK$:IFK$=""THEN24
 25 IFK$="Y"THENU=1
 26 PRINT"  ALLOW INSTRUCTIONS ON THE TOP OF YOUR   SCREEN. TO CORRECT AN ERRO
R TYPE";
 27 PRINT"'0'.TO LEAVETHE PROGRAM TYPE'49'ASYOUR MOVE. PRESS ANY  KEY FOR SOLITA
IRE."
 28 GETK$:IFK$=""THEN28
 29 PRINT"□"
 50 FORQ=1TO49:N=N(Q):T=T(Q):C=1:IFN(Q)<>0THENGOSUB1000
 55 NEXTQ
 60 Q=25:N=4:T=4:C=0:GOSUB1000
 670 GOSUB4035:INPUT"MOVE FROM";R$
 675 R=VAL(R$)
 680 IFR<10ORR>49ORR<>INT(R)THEN670
 685 IFR=49THEN8020
 690 IFN(R)=0THENGOSUB4035:PRINT"NO SUCH POSITION":GOSUB4000:GOTO670
 700 IFQ(R)=1THEN720
 710 GOSUB4035:PRINT"NO PEG AT";R:GOSUB4000:GOTO670
 720 GOSUB4035:INPUT"MOVE TO";S$
 725 S=VAL(S$)
 730 IFS<10RS>49ORS<>INT(S)THEN670
 735 IFS=49THEN8020
 740 IFN(S)=0THENGOSUB4035:PRINT"NO SUCH POSITION":GOSUB4000:GOTO670
 750 IFQ(S)=2THEN770
 760 GOSUB4035:PRINT"THERE AT";S:GOSUB4000:GOTO670
 770 IFS=R+2THENL=R+1:GOTO830
 780 IFS=R-2THENL=R-1:GOTO830
 790 IFS=R+14THENL=R+7:GOTO830
 800 IFS=R-14THENL=R-7:GOTO830
 810 IFU=1THEN7000
 820 GOSUB4035:PRINT"NOT A SOLITAIRE MOVE":GOSUB4000:GOTO670
 830 REMNOPEG
 840 IFQ(L)=2THENGOSUB4035:PRINT"NO PEG TO JUMP OVER":GOSUB4000:GOTO670
 860 O=S:C=1:N=N(S):T=T(S):O(S)=1:GOSUB1000
 870 O=R:C=0:N=N(R):T=T(R):O(R)=2:GOSUB1000
```

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It also gives the number of lines, from the top, which will be cleared or filled.

Table 2 gives the complete routine. The first number is the decimal address, followed by the hex code, the op code, the number of bytes for each instruction and finally the equivalent Basic commands and the bytes that they would use.

Solitaire

on Vic-20

There seem to be so many programs for shooting down little aliens. So, for a change, here is a program that suits an old game, but with colour and sound, and no cheating.

The game is written for the Vic-20, but as the positions are plotted using print statements — lines 1010 to 1030 — it should be converted to other machines.

An array is used for setting up which pegs are and are not present. A '1' is a peg, a '2' is no peg. The data is used to give the co-ordinates of each peg. The zeros indicate that a position does not exist. The pegs are arranged as shown and are displayed this way on the screen

```
      3  4  5
     10 11 12
15 16 17 18 19 20 21
22 23 24 25 26 27 28
29 30 31 32 33 34 35
     38 39 40
     45 46 47
```

Each position has a mathematical relationship with its neighbours. This allows the calculation for checking the validity of moves to be quite simple — lines 770 to 800 and 7000 to 7003.

When the game is run, it will ask you if you want diagonal moves. If you reply Y then it will go to line 7000 to check for diagonal moves when the game is played. R is the position being moved from, S is the position being moved to, and L is the peg being taken.

Subroutine 4035 erases the top line for the next instruction or message. A peg is shown on the screen in red and is shown removed in light yellow. Lines 2040 to 2080 see if only one peg remains, and if so the game stops. If this last peg is the centre one, 25, then a message of congratulations is shown.

```
 880 O=L:C=0:N=N(L):T=T(L):O(L)=2:GOSUB1000
 890 GOTO2000
1000 PRINT"■";
1010 FORK=1TON:PRINT"■■";:NEXTK
1020 IFC=1THENPRINTSPC(T*3-2)"■",0
1030 IFC=0THENPRINTSPC(T*3-2)"■",0
1040 PRINT"■";:RETURN
2000 PRINT"■/EXT MOVE   ":FORK=15TO0STEP-1
2010 POKE36876,200
2020 POKE36878,K
2030 NEXTK
2040 W=0:FORJ=1TO49
2050 IFN(J)=0THENX=0:GOTO2070
2060 IFO(J)=1THENX=1:GOTO2070
2065 X=0
2070 W=W+X
2075 NEXTJ
2080 IFW=1THEN8000
2090 GOTO670
4000 FORK=15TO0STEP-.2
4010 POKE36878,K
4020 POKE36876,K*17
4030 NEXTK
4035 PRINT"■                    ■■■■■■■■■■■■■■■■■■■■"
4040 RETURN
6000 DATA0,0,0,1,1,3,1,4,1,5,0,0,0,0,0,0,0,0,2,3,2,4,2,5,0,0,0,0,3,1,3,2,3,3,3
4,3,5
6001 DATA3,6,3,7,4,1,4,2,4,3,4,4,4,5,4,6,4,7,5,1,5,2,5,3,5,4,5,5,5,6,5,7,0,0,0
0
6002 DATA6,3,6,4,6,5,0,0,3,0,3,0,0,0,0,7,3,7,4,7,5,0,0,0,0
7000 IFS=R+16THENL=R+8:GOTO830
7001 IFS=R+12THENL=R+6:GOTO830
7002 IFS=R-16THENL=R-8:GOTO830
7003 IFS=R-12THENL=R-6:GOTO830
7004 GOTO820
8000 PRINT"■ELL DONE!"
8010 IFO(25)=1THENPRINT"■OU SUCEEDED!"
8020 FORK=1TO100:POKE36878,15:POKE36876,220:NEXT:POKE36878,0
8030 PRINT"■  O YOU WANT ANOTHER GAME? (Y/N)"
8040 GETK$:IFK$=""THEN8040
8050 IFK$="Y"THENRUN
8060 PRINT"■"SPC(8)"BYE!"
8070 POKE36879,27:POKE36869,240
```

Snaky letters

on BBC Micro

This program contains adequate instructions. I advise you, however, to start with the lowest speed.

If you prefer to use different keys to

to next page

Snaky letters
by Alan Wood

```
   5MODE7
   6VDU23;8202;0;0;0
  10HS=0
  20PROCINST
  30S=0
  40C=1
  50CLS
  60FORX=HIMEM TOHIMEM+960STEP40:?X=&FF:NEXT
  70FORX=HIMEM+39TOHIMEM+999STEP40:?X=&FF:NEXT
  80FORX=HIMEM TOHIMEM+39:?X=&FF:?(X+960)=&FF:NEXT
  90A=HIMEM+41
 100?A=95
 110Z=RND(1000)+HIMEM-1:IF?Z=&FF OR(?Z)47 AND?Z(58) GOTO110
 120?Z=64+RND(25)
 130I$=INKEY$(5P)
 140IFRND(50)=3 ?Z=32:GOTO110
 150IFI$="Q"ORI$="q" C=-40
 160IFI$="W"ORI$="w" C=40
 170IFI$="O"ORI$="o" C=-1
 180IFI$="P"ORI$="p" C=1
 190A=A+C
 200FORX=1TO10:Q=HIMEM-1+RND(1000):IF?Q=95 ?Q=32:NEXT ELSE NEXT
 210IF?A=&FF OR?A=95 OR(?A)47 AND ?A(58)PROCDEAD
 220IF?A(>32 S=S+(?A-64):PRINTCHR$7;TAB(20,24);S;:GOTO100
 230?A=95:GOTO130
 240DEFPROCDEAD:SOUND0,-15,20,10:FORX=1TO5000:K$=INKEY$(0):NEXT
 250PRINTCHR$7;:K$=INKEY$(500):PROCHS:GOTO20
 260ENDPROC
 270DEFPROCINST
 280CLS
 290PRINT"SNAKY LETTERS"
 300PRINT"_____ _______"
 310PRINT''"The object of the game is to hit as manyletters as possible with you
r snake."
 320PRINT"If you hit part of your tail or the sideof the arena you die."
 330PRINT"Use the followin9 keys:-"
 340PRINT''"'Q' - uP.""'W' - down."
 350 PRINT''"'O' - left.""'P' - right."
 360PRINT''"Your tail will randomly decay leavin9  holes for you to 9et throu9h
."
 370REPEAT:INPUT"Enter speed (1-fast - 9-slow)"SP:UNTILSP(10 ANDSP>0 AND SP=INT
(SP)
 380PRINT''TAB(10);"ANY KEY TO CONTINUE"
 385*FX15,0
 390K$=GET$:ENDPROC
 400DEFPROCHS
 410CLS:PRINT"You scored ";:S=INT(100*S/(SP+10))
 420PRINTS
 430IFS>HS PRINT''TAB(10);"A NEW RECORD":HS=S ELSE PRINT''"The record is:- ";HS
 440K$=INKEY$(500)
 450ENDPROC
```

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from previous page

control movement just change the letters in lines 150-180.

The scoring in this game is complex, but basically A scores 1 and Z 26. Other letters score according to their position in the alphabet when you hit them. This score is displayed at the bottom of the screen. At the end of the game this score is scaled according to the speed to give an actual score.

Currency

on ZX81

Currency is for any ZX81 Basic 1K unit. It will convert currency A to currency B and vice versa.

When the program is first run it requires a conversion line which needs the amount of currency A per unit currency B. The program assumes that the answer is wanted to two decimal places. The signs used to denote each currency must be only one character, placed before the number.

If the currencies used are pounds and Deutsche Marks we could use £ and D. Supposing we know 4.2DM = £1, then enter the conversion line D4.2£.

Currency
by Nick Causton

```
"CURRENCY"    BY   N.CAUSTON

  10 PRINT "ENTER  (SIGN CURRENC
Y A)(AMOUNT  CURRENCY A PER UNIT
 CURRENCY B)(SIGN CURRENCY B)"
  20 INPUT A$
  30 LET M=VAL A$(2 TO LEN A$-1)
  40 CLS
  50 PRINT AT 1,0;A$( TO LEN A$-
1);" TO THE ";A$(LEN A$)
  60 SCROLL
  70 PRINT AT 7,0;"ENTER SIGN,AM
OUNT FOR CONVERSION"
  80 INPUT W$
  90 PRINT AT 7,0;"
                  ";AT 7,0;W$;"
 = ";
 100 IF W$(1)=A$(LEN A$) THEN PR
INT A$(1);INT (VAL W$(2 TO )*M*1
00)/100
 110 IF W$(1)=A$(1) THEN PRINT A
$(LEN A$);INT (VAL W$(2 TO )/M*
00)/100
 120 SCROLL
 130 SCROLL
 140 GOTO 70
```

Win the great new ZX Spectrum

All you have to do to enter this award scheme is send us a program in one of the following categories: (a) Games; (b) Educational/Scientific; (c) Business/Office; (d) Utility.

Programs for each category should be accompanied by a cassette, a copy of the listing and full documentation. Points will be awarded for use of machine code, innovation, structure and ease of use.

The overall winner will receive a ZX Spectrum and Printer. Individual category winners will be awarded £30 of software, and 24 runners-up will receive programming merit awards.

A competition coupon will be published in each issue of *Popular Computing Weekly* for the next five weeks. To enter the competition, you must send in your program together with any four differently numbered coupons to:

Popular Computing Weekly,
Programming Award Scheme,
Hobhouse Court,
19 Whitcomb Street,
London WC2.

Rules

1. *There is no limit on the number of entries you can send in, but each entry must be accompanied by four differently numbered competition coupons.*
2. *Closing date for entries is August 16, 1982.*
3. *The names of the winners will be announced in the September 16 issue of Popular Computing Weekly.*
4. *The Judges' decision is final.*
5. *No employees of Sunshine Publications Ltd, or their families, will be eligible to enter the competition.*

Popular Computing Weekly
Programming Award Scheme

Fill in this coupon. When you have collected four differently numbered coupons, send them with your program to: *Popular Computing Weekly*, Programming Award Scheme, Hobhouse Court, 19 Whitcomb Street, London WC2.

NAME: .....

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.....

.....

.....

PROGRAM CATEGORY: .....

1

Programming

A numbering program you can count on

David Lawrence presents a basic re-numbering routine for the ZX81.

For those of you who have not lashed out and bought a machine code re-number facility, this basic routine will be of considerable interest. Though by no means as fast as a machine code re-number program — this routine takes around 30 seconds to re-number an average 1K program — this ZX81 basic re-numbering routine does the job. It requires just over 1K and includes the re-numbering of GOTOs and GOSUBs.

The routine is intended to be loaded at the beginning of a program. It should be saved as part of the program during its development, though you may wish to delete it when the program is finalised.

The routine re-numbers all lines before 9959, starting at 1000 with a gap of 10 between the lines. If you wish to have another base, or another gap, alter the variable base in line 9976 or the increment in line 9987. Once familiar with the working of the routine, you may also wish to shorten it by reducing the variable names to single letters. This saves over 100 bytes.

To use the routine, enter GOTO 9959.

```
9959 LET T$=""
9960 LET X1=16509
9961 LET X2=X1+2
9962 LET LINE=256*PEEK X1+PEEK (
X1+1)
9963 IF LINE>=9959 THEN GOTO 997
6
9964 LET LENGTH=PEEK X2+256*PEEK
 (X2+1)
9965 IF PEEK (X2+2)=234 THEN GOT
O 9969
9966 FOR I=X2+2 TO X2+LENGTH
9967 IF PEEK I=236 OR PEEK I=237
 THEN GOSUB 9971
9968 NEXT I
9969 LET X1=X2+LENGTH+2
9970 GOTO 9961
9971 IF PEEK (I+5)=126 THEN GOTO
 9974
9972 PRINT "NON-STANDARD COMMAND
 LINE ";LINE
9973 STOP
9974 LET T$=T$+STR$ I+CHR$ PEEK
(I+1)+CHR$ PEEK (I+2)+CHR$ PEEK
(I+3)+CHR$ PEEK (I+4)
9975 RETURN
9976 LET BASE=1000
9977 LET X1=16509
9978 LET X2=X1+2
9979 LET LINE=256*PEEK X1+PEEK (
X1+1)
9980 IF LINE>=9959 THEN STOP
9981 LET LENGTH=PEEK X2+256*PEEK
 (X2+1)
9982 FOR I=1 TO LEN T$ STEP 9
9983 IF VAL T$(I+5 TO I+8)=LINE
THEN GOSUB 9990
9984 NEXT I
9985 POKE X1,INT (BASE/256)
9986 POKE (X1+1),BASE-256*INT (B
ASE/256)
9987 LET BASE=BASE+10
9988 LET X1=X2+LENGTH+2
9989 GOTO 9978
9990 FOR J=1 TO 4
9991 POKE (VAL T$(I TO I+4)+J),C
ODE (STR$ BASE)(J)
9992 NEXT J
9993 LET BYTE1=128+INT (LN BASE/
LN 2+1)
9994 LET BYTE2=BASE*65536/(2**(B
YTE1-128))
9995 LET MEMORY=VAL T$(I TO I+4)
9996 POKE MEMORY+6,BYTE1
9997 POKE MEMORY+7,INT (BYTE2/25
6)-128
9998 POKE MEMORY+8,BYTE2-256*INT
 (BYTE2/256)
9999 RETURN
```

9959 T$ is the string used to store the location of the various GOTOs and GOSUBs in the program.

9962 Line is simply the line number of the line currently being examined.

9964 Length is the value of the two bytes which store the number of characters in each line.

9972* An error warning will occur when the GOTO or GOSUB destination does not have 4 digits, eg GOTO 20 should be altered to GOTO 0020. If this error message occurs, alter the relevant command and re-run.

9974 The address of the GOTO/GOSUB is recorded in T$ along with the destination.

9982 Having recorded in T$ all the GOTO/GOSUBs, this loop examines T$ on the second pass through the program to see if the line about to be re-numbered has a GOTO/GOSUB referring to it.

9985 The line is re-numbered.

9987 The next line number is created.

9988 The next existing line number is picked up.

9990 GOTO/GOSUB destinations are recorded twice in a program line, once simply as characters, and once in floating point notation. This loop pokes the characters of the new line number into the bytes holding the former.

9993 These lines transform any integer number in the range 1-32767 into the first three bytes of the ZX81's floating point notation.

*9965 This line jumps past REM statements. If you wish to use a non-standard GOTO/GOSUB like GOTO X, simply insert a REM at the beginning of the line and you will not run into the error message at line 9972.

Spectrum

In this new slot various contributors explore different aspects of the ZX Spectrum.

The rainbow route to rotating arcs

***Nick Hampshire** with more programs demonstrating PLOT and DRAW.*

In this series I have already gone into some detail about how the Draw and Plot commands can be used on the Spectrum. They are quite adequate for most applications although the users of more sophisticated computers may well find them somewhat cumbersome.

With a bit of thought, however, we can create some very interesting effects.

Last week I introduced the Circle command as the basis for drawing a piechart. In the first program, the command was used in a program loop and the radius from the centre of the disc was varied on each step. The distance between each of the set of concentric circles could be altered but we discovered that that was about all we could do with the Circle command.

The drawbacks we found with the Circle Command were that: (a) the spacing between the dots in each concentric circle could not be varied, and (b) it was impossible to draw a segment of a disc.

In Figure 1 you will find another program for drawing a circle, developed from the one I presented last week. XO and YO are the co-ordinates for the centre, RA is the radius and DP is the angle between the points. It is only a short step from using the circle program in Figure 1 to drawing arcs.

There is a listing for just such a program in Figure 2. P1 is the start angle and P2 is the end angle.

In Figure 3 I have taken the program one stage further. The program draws a series of arcs, within a loop, forming a number of concentric arcs with the spacing between the arcs changing every fourth run in the loop.

To add to the effect the colour of the points are changed on each step. The result is an image of a rainbow. The colour codes are held in the data statement in line 400, read in line 80 and acted on in line 85.

The next stage is to add some movement to the graphic figures we have created. Figure 4 is a program with which to rotate the picture. All the program does is rotate a point about the centre of the circle, at co-ordinates X, Y in a radius XR. To do this I have used a matrix transform technique.

The matrix is stored in array c and is loaded in lines 1200—1240. The rotation is performed by lines 1000—1020. The plotting is controlled in lines 100—210. R1 is the incremented angle and XR is the radius.

Finally for this week is the program in Figure 5. It is the same as Figure 4 except that it rotates a line instead of a point. XR is the inside radius of the line, starting relative to the centre. XE is the outside radius of the line, relative to the centre and R1 is the incremented angle.

Next week I will develop some more sophisticated rotating graphic programs and, if there is space, start introducing some ideas about three-dimensional graphics.

In the meantime I hope that some of you will soon have your Spectrums delivered. When you do let me know if you can find simpler ways of creating any of the same effects.

```
 10 INPUT xo,yo
 20 INPUT ra
 40 INPUT dp
 50 LET dp=dp*3.14159/180
 60 LET r=ra
 90 FOR p=0 TO 2*3.14159 STEP d
p
100 LET x=r*COS (p)
110 LET y=r*SIN (p)
120 LET x=xo+x
130 LET y=yo+y
140 PLOT x,y
150 NEXT p
```

Fig. 1

```
 10 INPUT xo,yo
 20 INPUT ra
 30 INPUT p1,p2
 40 INPUT dp
 50 LET dp=dp*3.14159/180
 60 LET p1=p1*3.14159/180
 70 LET p2=p2*3.14159/180
 80 LET r=ra
 90 FOR p=p1 TO p2 STEP dp
100 LET x=r*COS (p)
110 LET y=r*SIN (p)
120 LET x=xo+x
130 LET y=yo+y
140 PLOT x,y
150 NEXT p
```

Fig. 2

```
 10 LET xo=100: LET yo=50
 30 LET p1=1: LET p2=180
 40 LET dp=1
 50 LET dp=dp*3.14159/180
 60 LET p1=p1*3.14159/180
 70 LET p2=p2*3.14159/180
 75 FOR r=30 TO 80 STEP 10
 80 READ c
 85 INK c
 87 FOR q=1 TO 3
 88 LET r=r+q
 90 FOR p=p1 TO p2 STEP dp
100 LET x=r*COS (p)
110 LET y=r*SIN (p)
120 LET x=xo+x
130 LET y=yo+y
140 PLOT x,y
150 NEXT p
155 NEXT q
160 NEXT r
400 DATA 2,6,4,1,7
```

Fig. 3

```
  2 LET x=0: LET y=0: LET ra=0:
LET a=0: LET b=0
  5 DIM c(2,2)
 10 LET xr=60: LET yr=0
 20 LET xo=100: LET yo=100
 30 LET ri=10
 40 LET ri=ri+3.14159/180
 50 LET xl=0: LET yl=0
 60 LET ra=0
 70 LET ra=ra+ri
 80 GO SUB 1200
 90 LET a=xr: LET b=yr
100 GO SUB 1000
110 PLOT xl,yl
120 PAUSE 2
130 PLOT INVERSE 1;xl,yl
200 LET xl=x: LET yl=y
210 GO TO 70
1000 LET x=xo+a*c(1,1)+b*c(2,1)
1010 LET y=yo+a*c(1,2)+b*c(2,2)
1020 RETURN
1200 LET c(1,1)=COS (ra)
1210 LET c(1,2)=SIN (ra)
1220 LET c(2,1)=-SIN (ra)
1230 LET c(2,2)=COS (ra)
1240 RETURN
```

Fig. 4

```
  2 LET x=0: LET y=0: LET ra=0:
LET a=0: LET b=0
  5 DIM c(2,2)
 10 LET xr=20: LET yr=0
 15 LET xe=60: LET ye=0
 20 LET xo=100: LET yo=100
 30 LET ri=10
 40 LET ri=ri+3.14159/180
 50 LET xl=xo: LET yl=yo
 52 LET l1=0: LET m1=0: LET l2=
0: LET m2=0
 60 LET ra=0
 70 LET ra=ra+ri
 80 GO SUB 1200
 90 LET a=xr: LET b=yr
 92 GO SUB 1000
 94 LET x1=x: LET y1=y: LET a=x
e: LET b=ye
100 GO SUB 1000
110 LET x2=x: LET y2=y
120 GO SUB 300
200 LET l1=x1: LET m1=y1: LET l
2=x2: LET m2=y2
210 GO TO 70
300 LET dp=3
310 LET f=x2-x1
320 LET g=y2-y1
330 LET p=50R (f*f+g*g)
340 LET ux=f/p
350 LET uy=g/p
360 FOR l=0 TO p STEP dp
370 LET xp=x1+l*ux
380 LET yp=y1+l*uy
390 PLOT xp,yp
400 NEXT l
1000 LET x=xo+a*c(1,1)+b*c(2,1)
1010 LET y=yo+a*c(1,2)+b*c(2,2)
1020 RETURN
1200 LET c(1,1)=COS (ra)
1210 LET c(1,2)=SIN (ra)
1220 LET c(2,1)=-SIN (ra)
1230 LET c(2,2)=COS (ra)
1240 RETURN
```

Fig. 5

Sound & vision

Going traditional with Pet sounds

Greensleeves and The Yellow Rose of Texas are both programs which play songs on the Commodore Vic20. The heart of the Greensleeves program lies in line 20, which pokes all the data into the Vic20. The data statements, which tell the Vic20 which note to play, are contained in lines 30-100.

Similarly, the core of The Yellow Rose of Texas program lies in lines 10-80. These lines poke the data statements from the program into the Vic20.

Both programs were printed on my school's Pet printer. Vic programs on cassette will not normally load onto the Pet, but this problem can be overcome with a machine code routine. The following routine should be useful for anyone who wants to obtain a listing of a Vic program from a Pet printer:

```
1 SYS 1024
2 M0400 0407
3 0400 00 01 10 00 8F 00 00
4 Press RETURN
5 Press X and RETURN
```

If your Pet cannot use machine code, enter the following line:

```
POKE 4096,1:POKE 41,16:CLR.
```

Nagaraj Jayakumar

GREENSLEEVES

```
1  REM ****************
2  REM *              *
3  REM * GREENSLEEVES *
4  REM *              *
5  REM *     BY       *
6  REM *              *
7  REM * N.M.JAYAKUMAR*
8  REM *              *
9  REM *    9/5/82    *
10 REM ****************
20 POKE36878,10:A=36876:FORB=1TO72:READC:POKEA,C:
   READC:FORT=1TOC:NEXTT:POKEA,0:NEXTB:END
30 DATA209,200,217,400,221,200,225,300,228,100,
   225,200,221,400,215,200,203,300,209,100
40 DATA215,200,217,400,209,200,209,300,207,100,
   209,200,215,400,207,200,195,400,209,200
50 DATA217,400,221,200,225,300,228,100,225,200,
   221,400,215,200,203,300,209,100,215,200
60 DATA217,300,215,100,209,200,207,300,201,100,
   207,200,209,600,209,600,229,600,229,300
70 DATA228,100,225,200,221,200,215,200,203,200,
   209,100,215,200,217,400,209,200,209,300
80 DATA207,100,209,200,215,400,207,200,195,600,
   229,600,229,300,228,100,225,200,221,400
90 DATA215,200,203,300,209,100,215,200,217,300,
   215,100,209,200,207,300,201,100,207,200
100 DATA209,600,209,400
```

YELLOW ROSE OF TEXAS

```
1 REM   ***********
2 REM   *         *
3 REM   * BY      *
4 REM   *         *
5 REM   * NAGARAJ *
6 REM   *         *
7 REM   *JAYAKUMAR*
8 REM   *         *
9 REM   ***********
10 POKE36878,10:S=36876
15 FORZ=1TO152
20 READA
30 POKES,A
40 READA
50 FORT=1TOA:NEXTT
60 POKES,0
70 NEXTZ
80 END
100 DATA195,300,187,100,183,200,195,200,195,200,195,200,201,200,195,400,187,200
,183,200
110 DATA195,200,209,300,215,100,219,600,195,200,195,200,219,200,219,200,219,200
,219,200
120 DATA215,400,209,200,207,200,209,200,215,200,219,100,215,600,195,100,187,100
,183,200
130 DATA195,200,195,200,195,200,201,200,195,400,187,200,183,200,195,200,209,200
,215,100
140 DATA219,600,195,200,195,200,221,200,221,200,221,200,221,200,219,200,215,200
,209,100
150 DATA209,200,195,200,219,300,215,100,209,600,219,200,225,600,219,200,225,600
,219,200
160 DATA221,300,221,100,221,200,221,200,219,600,219,200,225,600,219,200,225,600
,219,200
170 DATA221,300,221,100,221,200,225,200,219,1600,223,1600,201,100,195,100,191,2
00,201,200
180 DATA201,200,201,200,207,200,201,400,201,100,195,100,191,200,201,200,215,300
,219,100
190 DATA223,600,201,200,201,200,223,200,223,200,223,200,223,200,219,400,215,200
,212,200
200 DATA215,200,219,300,223,100,219,600,201,100,195,100,191,200,201,200,201,200
,201,200
210 DATA207,200,201,400,195,200,191,200,201,200,215,300,219,100,223,600,201,200
,201,200
220 DATA225,200,225,200,225,200,225,200,223,200,219,300,215,100,215,200,201,200
,223,300
230 DATA219,100,215,600,223,200,228,600,223,200,226,600,223,200,225,300,225,100
,225,200
240 DATA225,200,223,600,223,200,228,600,223,200,226,600,223,200,225,300,225,100
,225,200
250 DATA220,200,223,3200
```

Contribute!

You can share your own favourite Sound or Vision programs with other readers by sending lists with explanations to us at *Popular Computing Weekly*.

WRITE TO: Sound & Vision, Popular Computing Weekly, Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.

Peek & poke

Peek your problems to our address. Ian Beardsmore will poke back an answer.

WATCH THIS SPACE BEFORE CHOOSING

J. R. Barratt of Sheffield Close, Little Sutton, Cheshire, writes:

Q Could you tell me which computer, if any, is best suited for my needs. Besides the usual features, it should be able to file an index for my record collection which includes 1,000 Singles, 500 LPs and 500 78s. Cross-references should include artists, titles, first lines of songs and musical groupings such as Classical, Rock and Country. And, if that is not enough, I would like a strong Chess player as well.

A The most essential thing that you need is storage space, and in effect that means a disc unit. The one essential piece of information that you leave out is price. The cheapest solution would be a ZX81 and a Monolith disc drive, but that would leave you little change out of £300. A BBC Micro, or a Vic-20, with disc drive would both be up in the £600 range.

You also fail to say how soon you need your computer. This year is going to see a great deal of activity in the micro market, with both Acorn and Commodore promising to bring out cheaper computers to compete with the ZX Spectrum.

More importantly, the new ZX Microdrive is on the horizon. It is already causing a great deal of interest as it looks set to cut the price of disc storage by at least half, if not more. But, it will be some months yet before the Microdrive comes onto the market. It is safe to assume that once it does come out, interfaces will quickly be developed to allow it to be used on other computers, in much the same way as the ZX Printer can now be used with a Vic-20, or a BBC Micro.

My advice is to wait until the autumn, by which time you should find your options greatly enhanced. Concentrate on the main computers — the ZX Spectrum, the proposed Acorn Electron and the new Vic-10 and Vic-30 — as they are the best supported. Also keep an eye on the developments of the Sinclair Microdrive disc unit. As for the Chess, there are quite a few programs to choose from, and I am sure finding one to suit will not be much of a problem.

FLASHER STRIKES IN BORDER INCIDENT

P. Masters of Thalia Grove, London, SE10 writes:

Q I have a BBC microcomputer model B. Please could you tell me if the BBC Micro has an equivalent command to the BORDER command on the ZX Spectrum and the Vic20?

I would also like to know how to alter the flash rates of the colours. Is is possible to alter the combinations of colour to get flashing red/black, instead of the red/cyan?

A The answer to your first question is no. The BBC Micro uses the 6845 chip, which has an uncommitted logic array when it comes to defining a BORDER. Unlike, for example the Vic chip, the 6845 simply does not have a BORDER function in its architecture.

Changing the flash rates and the colours is done by changing the numbers before or after the comma. These numbers control the colour on the screen and its duration:

```
*FX 9,25
```

Change the number before the comma to change the colour and change the number after the comma to change the duration.

GAME, SET AND MATCH—AT ONCE!

Stuart Fry of St Mary's Way, Walsall, West Midlands, writes:

Q I am writing a number of games for my BBC Microcomputer in which it is necessary to do a keyboard scan. So far I have been using the INKEY function. This works once, when the key is pressed, but there is a delay before it works again as the key is being held down. How can I get a smooth action without this delay?

A Before reading the keyboard input the following two .

```
*FX 12,1
*FX 11,1
```

This will cause the key to repeat as soon as it is pressed. Follow it with this line, which clears the buffer, after the appropriate INKEY or GET statement.

```
*FX 15,1
```

WHEN A COMPUTER IS NOT A COMPUTER

C. R. James of The Grove, Henley-on-Thames writes:

Q I am the owner of a Phillips G7000 and am greatly frustrated by the limit of the computer's programability. Please could you give me some software. Vic, Atom and Atari have a wide range of software but the G7000 has none.

Is there anyway to expand the G7000? I am tempted to buy a computer from Digital, as the storage is greater than the G7000 which only has about 1K.

A This caused me some problems when I first read it. A Phillips G7000? It was a new name to me.

The problem was sorted out after telephone conversations with Phillips, Computer and Video Games, and Carl Bayer, all of whom were very helpful. It turns out that the Phillips G7000 is *not* a computer, it is a computerised video TV games machine.

While you can use a computer to play games on your television, you cannot use a games machine as a computer. Apart from a very simple 'Teach yourself Basic' cartridge, which has nothing like the range or capacity of a real computer, there is no way you can use the G7000 as a home based micro.

If you want to get a micro than I would suggest that you look at something like the Vic, an Acorn, or a ZX, all of which are well supported. You might find it worthwhile to wait a few months as new releases are due from both Acorn and Vic, which should widen your choice.

If you decide not to sell your Phillips to buy a better machine, then there is a club for Phillips owners. The address is, G7000 Video Game Club, 345a Station Road, Harrow, Middlesex.

There is one more point to make. Did you buy your G7000 because you thought it was a computer, or because you went into a shop, asked for a computer, and was sold a G7000. In the first case I'm afraid that it is just bad luck. In the second case, I suggest that you return the machine and try and get your money back.

APOLOGY

Several people have written and pointed out that the answer I gave to Simon Cray in Issue 5 was wrong. You can EDIT even if your memory is nearly full.

The first method is to LIST the line that has to be EDITed, and then press SHIFT/EDIT. I already knew about this method, but made the mistake of assuming that Simon had already tried it. However, this method does not always work, especially when the memory is very close to being completely full.

One method that will work, even when the previous one fails, is the following:

1 Move the curser to the line you want to EDIT.
2 Enter CLS followed by NEW LINE.
3 Press SHIFT/EDIT simultaneously.

This frees the computer from having to maintain a screen display. The line you want to EDIT will be ready and waiting at the bottom.

Send your questions to Peek & poke, Popular Computing Weekly, *Hobhouse Court, 19 Whitcomb Street, London WC2 7HF.*

Competitions

Puzzle No 11

Puzzle No 11

A bee hive stands at the end of a straight one-mile-long wall on a country estate. Growing along the foot of the wall are some clover plants. The first plant is one foot from the hive entrance. The distance between the first plant and the second is three feet, between the second and third is five feet, and so on. In other words, the distance between each successive plant increases by two feet each time.

A bee starts from the hive, flies to the first plant, collects the pollen and returns to the hive. It then flies to the second plant, collects the pollen, and returns to the hive. It repeats this procedure to all the flowers until it returns, exhausted, from the plant at the end of the wall furthest from the hive. What is the total distance that the bee has flown during its work?

Solution to Puzzle No 7

For the nine discs there are 9*8*7*6 = 3024 possible combinations. Each set of four digits can be arranged into any one of 24 different combinations, so the number of different draws possible is 3024/24 = 126.

We now need to know how many of these combinations cannot be arranged, such that at least one of each of the 24 possible arrangements is a multiple of seven.

By running the program, it can be shown that there are only three possible sets: 1238, 1389 and 2469.

```
10 LET Y=0
20 FOR A=1 TO 6
30 FOR B=(A+1) TO 7
40 FOR C=(B+1) TO 8
50 FOR D=(C+1) TO 9
60 LET N$=STR$ (D*1000+C*100+B*10+A)
70 FOR E=1 TO 4
80 FOR F=1 TO 4
90 IF E=F THEN GOTO 160
100 FOR G=1 TO 4
110 IF G=E OR G=F THEN GOTO 150
120 LET H=10-(E+F+G)
130 LET N=VAL N$ (E)*1000+VAL N$
    (F)*100+VAL N$ (G)*10+VAL N$ (H)
140 IF N/7=INT (N/7) THEN GOTO 190
150 NEXT G
160 NEXT F
170 NEXT E
180 LET Y=Y+1
185 PRINT N
190 NEXT D
200 NEXT C
210 NEXT B
220 NEXT A
230 PRINT AT 10, 0; "NUMBERS OF SUCCESSFUL
    DRAWS "; Y
```

Of the 126 different draws possible, only three will produce winning numbers. So, to win a pound for a 10p stake the odds are rather unfavourable — 41 to 1 against!

Winner of Puzzle No 7

The winner is: David Budd, Camelford Close, Hulme, Manchester, who gets £10.

Solution to Crossword No 7

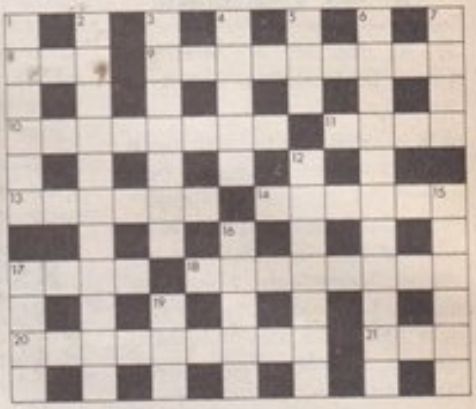
Across: 8 Nodes, 9 Process, 10 Edit, 11 Compiler, 13 Paging, 14 Nitric, 17 Exchange, 19 Call, 21 Execute, 22 Wreck.

Down: 1 Interpreter, 2 Adding, 3 Ash, 4 EPROM, 5 Soup tin, 6 Cell, 7 Ostrich-like, 12 Sneak up, 15 Reader, 16 Agree, 18 Crew, 19 Awl.

Winner of Crossword No 7

The winner is: Clem Pisnoy, Lelant, Cornwall, who receives £10.

Crossword No 11



Across

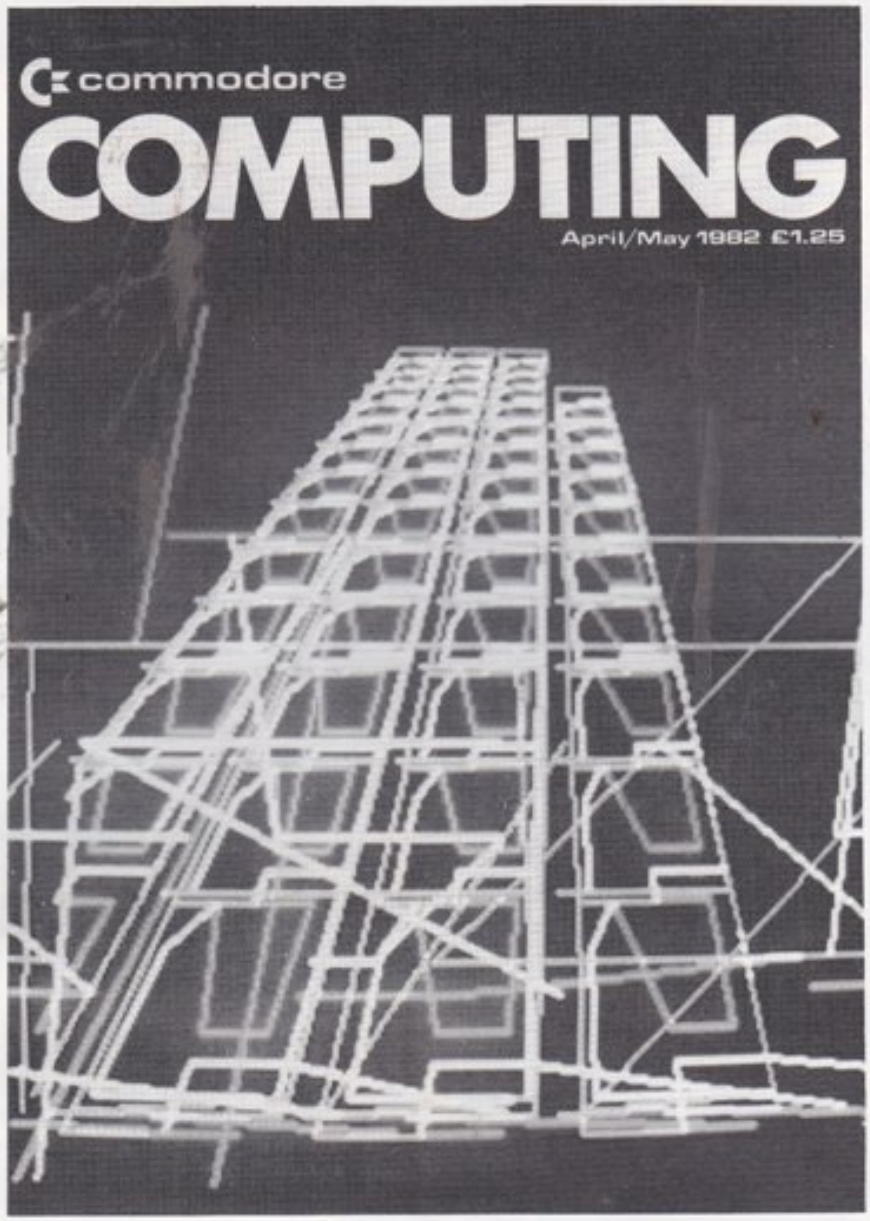
8 One that's over a king (3)
9 Device to find time for rough, untidy girl (9)
10 Parts from earth, fire wind and water (8)
11 Laze in mid-lesson (4)
13 Mask for a television (6)
14 Inform about the sound of gun-fire (6)
17 Leonard's official device (4)
18 Certified class cut up pie with greed (8)
20 Measure of metal store (9)
21 RAP, returning with equal value (3).

Down

1 Light beams show lass embracing queen (6)
2 Output device changes pin letterer (11)
3 Peter gets his majesty to find a soil tester (1, 1, 5)
4 Powdery, in Hindu style (5)
5 Cage, less a hundred years (3)
6 Heart monitor arranging drip cargo — Ah! (11)
7 Is less than any island (4)
12 Quick minute in the communists provides a memory (7)
15 They get about or make speculation (6)
16 Pass on and lie again (5)
17 Lean column (4)
19 Sneakily and grossly terminate (3).

CITIZEN PAIN

BY DAVID IRELAND and JAMES MACDONALD



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