COMMODORE

MAGAZINE

VOL 5 NO 4

AUSTRALIAN **$4.95**
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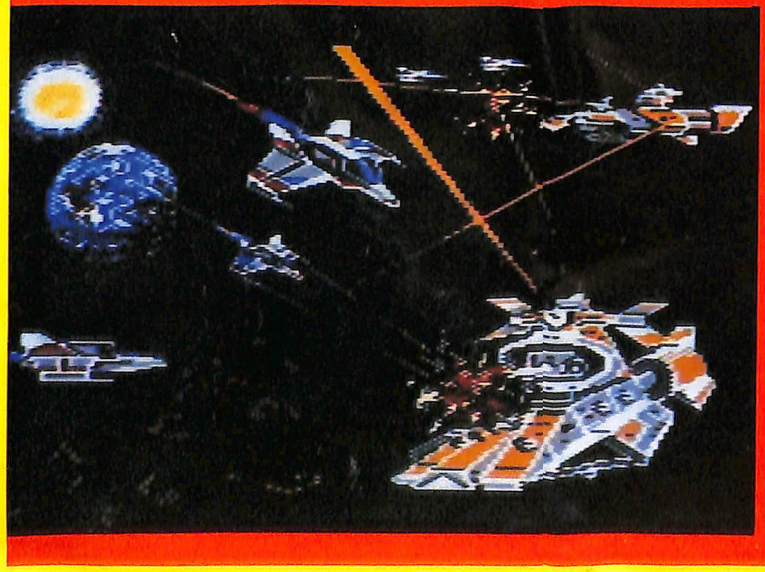
Issue 32

BOOM!

SOUND EFFECTS GENERATORS for your 64

TAITO!!



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BUILD A SPEECH BOARD
For your VIC, 64 & 128

BACK ISSUE - INDEX

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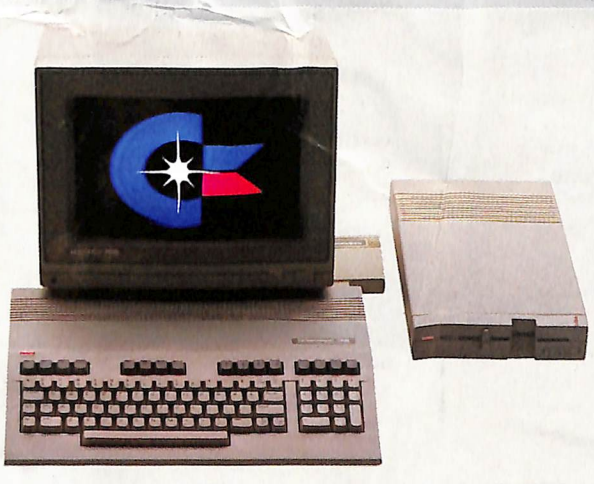
If you own an Apple IIc, you'd have to add all this



to match the versatility, expandability and higher intelligence of the new Commodore 128

(and it costs less too).

The new Commodore 128™ personal computer is breakthrough technology at a breakthrough price. It outshines the Apple® IIc in performance capability, performance quality and price. It is expandable to 512K RAM while the IIc isn't expandable at all.

And the new Commodore 128 has a numeric keypad built right into its keyboard that makes crunching numbers a lot easier. And the Commodore 128 has graphic and sound capabilities that far exceed those of the Apple IIc. But the most important news is that

the new Commodore 128 jumps you into a whole new world of business, productivity, education and word processing programs while still running over 3,000 programs designed for the Commodore 64.™ That's what we call a higher intelligence.

COMMODORE 128 A Higher Intelligence

commodore COMPUTER

Keeping up with you.

BEEMAN MAYRHOFER STOTT/CC422

COMMODORE MAGAZINE

COMMODORE USERS MAGAZINE VOLUME 5 NUMBER 4 ISSUE 32

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CONTENTS **PAGE**

PROUDLY PRINTED IN AUSTRALIA

EDITORIAL

MERVYN BEAMISH

Mervyn Beamish

Last issue I floated the idea of a user convention – a get together of micro computer users. Not a marketing exercise to promote product and service, but an event to develop fellowship and information sharing amongst users. The event would seem to be ideal for a large user group to organise.

Since then I've had some reaction. Generally it is thought that it should be an annual event organised under the name of national organisation of user groups.

Another reader commended the idea but pointed out that the petty politics between the larger groups made it "...unlikely that they could organise their way out of a wet paper bag."

The above view I took with a grain of salt until I discovered that earlier this year Commodore had floated the idea of a user's fair held under big marques in a Sydney location. The idea, I was informed, was proposed to a number of User Groups. The company soon withdrew the proposal when it was met by inter-group rivalry and narrow mindedness from some of the groups.

Commodore comes into quite a lot of flack from its users. Sometimes quite justifiably but more, I feel, because of the Australian's national pastime of knocking. Commodore is a commercial enterprise. If users want a convention and if they require support from Commodore for the venture they have to sell the benefits of such an event to the company, prove by a unified front, that the company is not going to end up with egg on its face while groups run around each other seeking a pecking order.

Keep the concept of a national user convention alive send me your ideas and comments.

Another "Lik Lik" problem. Some readers have complained that their subscription copies arrive after the magazine appears on the newstands. Unfortunately there is little that can be done about the situation. The magazine is delivered, by the printer, to Gordon and Gotch for newstands delivery at the same time as it goes to the mail packaging people. Gordon and Gotch seem to get them out in about a day (sometimes). The Mailing room needs about four to stuff, sort and deliver – then it is in the hands of Australia Post. The problem is further enlarged when there are mail strikes – e.g. last issue. So to our valued readers, please do not believe that we are ignoring you. We get the magazine out to you as soon as possible and in most cases it arrives at the same time or before your local newstands.

Mervyn Beamish
Editor

NEXT ISSUE

Win a
Commodore 128
Computer & Disk Drive

Open to current and
new subscribers
Competition details next issue!

READ THIS PAGE
Before entering listings printed in this magazine.

If you want to enter any of our programs without HELPOUT, omit the checksum at each line.

HELPOUT

HELPOUT is a program checker that makes it easier to correctly enter C64 programs from the Commodore Magazine. Once HELPOUT is loaded enable it with SYS49152, type TEST <CR>.

A typical line would be:

6045 NEXT:GOSUB 6300'CFSI

You type ALL of it, remembering to use a single quote ('), not "talking marks". You may use shorthand typing (GO then SHIFT and S for GOSUB, for example), and put in or omit spaces as you like (except, of course, inside quotes).

If you do it wrong, one of six error messages will appear, and a fog-horn will blow.

NO CHECKSUM: You probably forgot the apostrophe, or some or all of the four character checksum. Cursor to the end of the line, enter the checksum as shown, and press Return.

QUOTE: HELPOUT checks to ensure that quotes come in pairs. Either you left one out, or got a bit carried away and added one of your own.

PARENTHESIS: This is like QUOTE, except that HELPOUT looks for pairs of (and).

KEYWORD: You may have misspelled a Basic keyword (GOSLOB instead of GOSUB) or simply left one out. Recheck the line.

#OF CHARACTERS: Ignoring spaces outside quotes, you have typed too many or too few characters. This could even be a typo in a keyword, so check the line carefully.

UNIDENTIFIED: The *cowards* way out. The line is *not* right, but the error could be any of a number of things- wrong line number, wrong checksum, or you just mussed it up. Read the line carefully to find the error.

If you do get an error, the line WILL NOT be entered into your program. You will have to take some action to correct it before that can happen. To clear the error message, press any key (the line underneath the error message will not be affected if you use, say, the space bar), then get to work to fix the problem.

Then the line is OK, HELPOUT strips off the checksum, then enters the line into your program. There is no program space overhead from using HELPOUT.

We like HELPOUT. It comes from Mark Robin, and is the program that Commodore uses in its homegrown magazines. With a pedigree like that, and with the very considerable help it gives, we know it will make your programming more enjoyable.

If you want to add checksums to a program of your own, say for this magazine or a User Group publication, load HELPOUT and get it all going. But this time, enter ADD <CR> instead of TEST.

If your program is already written, load it and LIST it to the screen. Using the cursor keys, put the cursor on each line in turn and press Return. You will get a chirp of sound at each line, but nothing will appear on the screen until you type LIST again.

ADD will include checksums if you are writing new lines. Nothing could be more simple!!

Lastly, you may turn HELPOUT off to suit yourself. Type KILL <CR>, and HELPOUT is disconnected. If you want it again, type SYS49152 <CR> and away you go.

```
1000 REM: HELPOUT '64
1010 REM:
1020 REM: COMMODORE MAGAZINE
1030 REM:
1040 SA=49152:FA=50052
1050 FORI=SATOFA:READA:S=S+A:POKEI,A:NEXT
1060 IFS<>103233THENPRINT"->ERROR.. CHECK AGAIN!!":END
1070 PRINT"OK":NEW
1080 DATA  76, 35,192,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0,  0, 13
1090 DATA   0, 88,193, 94,193,102,193,118,193,131,193,143,193,234,234,234
1100 DATA  76,131,192,162,  5,189, 29,192,149,115,202, 16,248, 96,160,  2
1110 DATA 185,  0,  2,217, 60,193,208, 11,136, 16,245,169,  1,141, 16,192
1120 DATA  76, 31,193, 96,160,  3,185,  0,  2,217, 56,193,208,224,136, 16
1130 DATA 245,169,  0,141, 16,192, 76, 31,193, 96,160,  3,185,  0,  2,217
1140 DATA  52,193,208,224,136, 16,245,160,  5,185,162,227,153,115,  0,136
1150 DATA  16,247,169,  0,141, 24,212, 76, 31,193,230,122,208,  2,230,123
1160 DATA  76,121,  0,165,157,240,243,165,122,201,255,208,237,165,123,201
1170 DATA   1,208,231, 32, 90,192,173,  0,  2, 32,163,192,144,220,160,  0
1180 DATA  76,234,193,201, 48, 48,  6,201, 58, 16,  2, 56, 96, 24, 96,200
1190 DATA 177,122,201, 32,208,  3,200,208,247,177,122, 96, 24,200,177,122
1200 DA.  240, 53,201, 34,240,245,109,  5,192,141,  5,192,173,  6,192,105
1210 DATA   0,141,  6,192, 76,189,192, 24,109,  7,192,141,  7,192,144,  3
1220 DATA 238,  8,192,238, 11,192, 96, 24,109, 10,192,141, 10,192,144,  3
1230 DATA 238,  9,192,238, 12,192, 96, 10,168,185, 17,192,133,251,185, 18
1240 DATA 192,133,252,160,  0,169, 18, 32,210,255,177,251,240,  6, 32,210
1250 DATA 255,200,208,249, 32, 84,195, 32,126,195, 32,228,255,240,251,160
1260 DATA  27,185, 63,193, 32,210,255,136, 16,247,104,104,169,  0,141,  0
1270 DATA   2, 76,116,164, 75, 76, 76, 76, 84, 69, 83, 84, 65, 68, 68,145
1280 DATA 145, 13, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32, 32
1290 DATA  32, 32, 32, 32, 32, 32,145, 18, 81, 85, 79, 84, 69,  0, 75, 69
1300 DATA  89, 87, 79, 82, 68,  0, 35, 32, 79, 70, 32, 67, 72, 65, 82, 65
1310 DATA  67, 84, 69, 82, 83,  0, 85, 78, 73, 68, 69, 78, 84, 73, 70, 73
1320 DATA  69, 68,  0, 78, 79, 32, 67, 72, 69, 67, 75, 83, 85, 77,  0, 80
1330 DATA  65, 82, 69, 78, 84, 72, 69, 83, 73, 83,  0,200,177,122,208,251
1340 DATA 132,253,192,  9, 16,  3, 76,199,193,136,136,136,136,136,177,122
1350 DATA 201, 39,208, 19,169,  0,145,122,200,162,  0,177,122,157, 60,  3
1360 DATA 200,232,224,  4,208,245, 96, 76,242,194,160,  0,185,  0,  2,153
1370 DATA  64,  3,240,242,200,208,245,160,  0,185, 64,  3,240,232,153,  0
1380 DATA   2,200,208,245, 32,215,193, 76, 86,194,160, 11,169,  0,153,  3
1390 DATA 192,141, 60,  3,136, 16,247,169,128,133,  2, 32, 27,195,160,  0
1400 DATA  32,155,193, 32,202,193, 32, 49,194,230,122,230,123, 32,124,165
1410 DATA 160,  0, 32,175,192,240,205, 36,  2,240,  6, 32,215,192, 76, 18
1420 DATA 194,201, 34,208,  6, 32,188,192, 76, 18,194, 32,231,192, 76, 18
1430 DATA 194,160,  0,185,  0,  2, 32,163,192,200,144, 10, 24,109,  9,192
1440 DATA 141,  9,192, 76, 51,194,136,162,  0,185,  0,  2,157,  0,  2,240
1450 DATA   4,232,200,208,244, 96, 24,173, 11,192,105, 65,141, 11,192, 56
1460 DATA 173, 12,192,233, 25,144,  6,141, 12,192, 76, 96,194,173, 12,192
1470 DATA 105, 65,141, 12,192,173,  5,192,109,  7,192, 72,173,  6,192,109
1480 DATA   8,192,141, 14,192,104,109, 10,192,141, 13,192,173, 14,192,109
1490 DATA   9,192,141, 14,192, 56,233, 25,144,  6,141, 14,192, 76,150,194
1500 DATA 173, 14,192,105, 65,141, 14,192,173, 13,192,233, 25,144,  6,141
1510 DATA  13,192, 76,171,194,173, 13,192,105, 65,141, 13,192,160,  1,173
1520 DATA  11,192,205, 60,  3,208, 32,200,173, 12,192,205, 61,  3,208, 23
1530 DATA 200,173, 13,192,205, 62,  3,208, 14,173, 14,192,205, 63,  3,208
1540 DATA   6, 32,100,195, 76,122,192,173, 16,192,208, 17,152, 72,104, 76
1550 DATA 247,192,173, 16,192,240,  1, 96,169,  4, 76,247,192,164,253,169
1560 DATA  39,145,122,162,  0,200,189, 11,192,145,122,200,232,224,  4,208
1570 DATA 245,169,  0,145,122, 32,100,195, 76,122,192,160,  0,185,  0,  2
1580 DATA 240, 17,201, 40,208,  3,238,  3,192,201, 41,208,  3,238,  4,192
1590 DATA 200,208,234,173,  3,192,205,  4,192,208,  1, 96,169,  5, 76,247
1600 DATA 192,169, 32,141,  0,212,141,  1,212,169,  9,141,  5,212,169, 15
1610 DATA 141, 24,212, 96, 32, 65,195,169,129, 32,119,195,169,128, 32,119
1620 DATA 195, 76,113,195, 32, 65,195,169, 17, 32,119,195,169, 16, 32,119
1630 DATA 195,169,  0,141,  4,212, 96,141,  4,212,162,112,160,  0,136,208
1640 DATA 253,202,208,250, 96
```

NICE LISTER CONVENTIONS

1. All control, colour, function, and shifted and Commodore key graphics are converted to 'words' (or the abbreviations as represented on the keyboard) enclosed in square brackets [ ].
For example, [DOWN], [CLR] and so on.

2. Multiple cursor controls are represented by one word plus a number.
For example, [DOWN 15].

3. Shifted graphics (right-hand symbol on key) are converted to the corresponding alphabet character enclosed in square brackets. A shifted 'S' heart character becomes [S].

4. Any character accessed by the Commodore (C=) key is indicated by further enclosing the alphabet character inside the symbols <>.
A Commodore 'A' becomes [<A>].

5. With multiple characters, the redundant brackets][are replaced by a comma as:-
[CLR,DOWN5,WHT,<A>]

6. With multiple shifted graphics, the alphabet character is simply repeated, numbers are not used as [AAAAAAAAAA].

7. Multiple Commodore graphics are repeated as [<A>, <A>, <A>, <A>].

8. Spaces and shifted spaces within quotes are represented by the words [SPACE] or [SHSPACE] followed by a number if required.
For example, [SPACE15].

9. Extra words are used for the following control characters.

Keyword	CHR$	
DEL (CRTL-T)	20	
INS	148	
TEXT (CTRL-N)	14	converts character set to upper/lowercase mode.
GRAPH	142	converts character set to uppercase/graphics mode.
LOCK (CTRL-H)	8	disables the C = key and locks the keyboard in the current character mode.
UNLOCK (CTRL-I)	9	enables the C = key sequence.

NEWS & VIEWS

Items of interest that have come in since last issue.

SKAI-64 SUPER DRIVE BETTER THAN EVER

When Century Corp. of Japan released the Skai-64 Disk Drive no one could doubt its superior physical features.

Now Century Corp. have released the new model SKAI-64 SUPER DRIVE. With Super EPROM and the new Fastload & Utility Diskette the real compatibility of the Skai is vastly improved PLUS it is much faster in formatting and reading than the 1541.

LOADING TIMES (seconds)			
SIZE OF FILE (Blocks)	SUPER-DRIVE		COMMODORE
	Super	With Turbo	1541
33	17	6.5	33
65	32	10.5	44.4
120	53	15.8	75
220	101	35.2	144
Format	10	10	85

SKAI–64 Super Drive New Features:

- Formats a diskette in 10 seconds (Commodore 1541 - 90 sec.)
- Reads from diskette 30% faster.
- No head knock on read errors.
- Now runs Epyx fast load cartridge and videotex software.
- Runs all Commodore software.

Over 2000 programs have been tested successfully by various impartial reviewers. With the earlier model Skai-64m, a smaller number of programs did not run. Now, with the Super Drive, the following programs not only run but they are much faster:- Fastload (EPYX), Mr Nibble (F.C.S.), Copy Q and Copy QII (Q-R&D), Turbo 64 (F.S.S.), Profimat V2.0, Grog's Revenge, Gemstone Warrior.

The SKAI-64 comes well packaged in moulded polystyrene within a cardboard sleeve to ensure in-transit protection - similar to that of the 1541. However, apart from reading and writing the same disk format, this is where any similarities between the two units end. A comprehensive manual and new Fastload & Utility Diskette are included in the package, along with the connecting cable to hook up directly to your Commodore unit.

The new Skai-64 Super Drive is a superior product to the Skai-64 Model 1. Obviously its physical attributes play an important part in the reliability, ease of maintenance, user friendliness, and overall life of the disk drive, but now it is also faster and much more compatible.

PRICE $299.00 (introductory offer).
Available through Porchester Computers Pty. Ltd. (Inc. in Victoria)
Tel: (03) 417 6999

Below: SKAI-64 Super Drive

ISEPIC

Well it happens to the best of us.

Corrupted programs and damaged disks can be a nightmare, especially when you're the owner of a Commodore 64.

Chances are you've got quite a collection of commercial software - the stuff that has hidden read/write protection schemes.

That means you can't make back-up copies, so if you really liked that disk you had better fork out and get another one. Unless you've got de-protection software.

ISEPIC (pronounced Icepick) is a revolutionary new concept in software deprotection for the Commodore 64.

ISEPIC is an extraordinary hardware/-software combination capable of copying virtually all memory-resident software regardless of the original protection scheme or storage medium.

Rather than duplicating kisks or cassette tapes, ISEPIC copies the program to disk as it runs in the Commodore's memory, thus creating a "snapshot" image of the entire RAM, I/O, and CPU status.

This snapshot is now unprotected and self contained enabling the user complete access for inspection and alteration. You can create a compact, auto-booting file that will load up to 10 times faster and also allow you to store many programs on a single disk as well as transfer them to a hard drive or a device other than a 1541.

The entire procedure is relatively simple, a matter of flicking a switch and turning the drive on and off. All adequately explained step by step in the accompanying documentation. If you're a machine language programmer or you just like experimenting, the "program editor" option on the ISEPIC menu can prove to be a worthwile and educational experience.

The unbroken snapshot image can be edited in hexadecimal and machine language. Once inside you have access to the entire 64K snapshot as well as the I/O memory and CPU status.

Bensons (Australian distributors) have the ISEPIC available at a very reasonable $149.00 inc. Tel: (03) 417 6999.

MARKET MATURITY SHOWS AT COMMUNICATIONS 85

The "gee-whiz" is gone from the computer and communication industry as the hardware takes a similar look and industry sophistication moves to the software.

Gone are the bathing suit clad, leggy women enticing show goers to see the latest electronic piece.

The industry has come of age, and the important questions revolve around equipment and software applications.

This change is evident in the style of the 46 display stands which were at the Communications '85 show in Sydney, where the concept was to provide manufacturers and supplies with a marketing platform while providing visitors with an opportunity to compare the latest communications technology available in Australia.

Among the notible advances were:

The various types of telephone extension systems. Telecom has a very compact double connector, and the James Hardie Industries Group subsidiary Phone World offers the Super Snap connector system which includes a caddy reel as well as adhesive telephone cable.

NEC Australia introduced a teleconferencing device called the Electronic Writing Board which is a pressure sensitive board that translates into digital form all handwriting and diagrams which are written on the board. Thus the information can be handled as normal data transmission information.

The West Australian computer communications company, Dataswitch Technology Ltd displayed a latest generation data switching system which can connect up to 1320 devices at 9600 baud. The system forms a local area network in much the same way voice PBX ties together telephones.

The next show, Communications '86, will occur in Melbourne next June.

Letters

Address letters to: The Editor, Commodore Magazine, Kim Books 82 Alexander St., Crows Nest 2065

Dear Merv,

I enjoy your magazine very much, and have just recently taken a one year subscription, which we can both enjoy.

Would it be possible for you to include in "COMMODORE" a section dealing with machine language routines with the aim of assisting machine code learners to get a toehold in the art. Routines such as ---- get a character, print it to screen, update counter, get next character. ----- open rs232, set file name, set baud rate, listen, output a character. ---- Small routines that can open the way.

My opinion is that machine code is not more difficult than basic and might even be easier if magazines carried as many machine code routines as they do basic routines. It is a fact that a novice cannot read a basic program, he (she) must learn all the new meanings and functions for special words, and realisation of the actual program flow comes gradually after reading basic program routines until the pieces fall into place.
If similar short, one job type, machine code routines were as freely available as basic routines I am sure the enigma of machine language would quickly dispell. Look how many people know morse code, braille and the ASCII and Commodore poke codes. How many people can read and write Chinese? (760 million).

Another point would be the end of the terrible result of one program not running on another machine because of an update in basic roms. Machine language changes are usually minor and are not of the frequency of basic changes. Far too much of the printed word assumes that for one to learn machine code one must clamber up through the jungle of basic to see the light to be told machine language is a thousand times better and a thousand times faster but ------- a secret to difficult to learn.

Thank you for your time, please find enclosed a S.A.E. if you would care to acknowledge.
Yours faithfully,
C.P.MacPherson

Paul- Many thanks for your letter of 31 July, which reached me today. It's very useful to get feedback on what our readers like, or suggestions about topics they would like us to cover.

I agree with your sentiments about short MC routines, and have actually included some in recent magazines. But the value of them to "learners" is a bit lost, because we put them up as DATA type loaders, which is great for the "type and run" folk, easy to typeset, but of little real value for those who want to see how the routines work.

Part of the problem lies with the demands of modern publishing methods. We use a form of automatic typesetting, which speeds production, but at the same time places some restrictions on us. I would like to include assembler output listings (CBM or MAE for example), because then you and others could see how the program is constructed. The difficulty is translating that listing into the magazine pages. The Editor and I have been discussing ways and means, with a view to solving the translation problem. Hang in there, we'll get it all worked out.

But you don't want to hear our problems. I am always on the lookout for useful items to include, and have thoughts about some notes on using editors and assembler programs to write MC programs. For now, they will probably be printed as DATA loaders, but we will experiment with assembler outputs to see if there are more instructive ways of helping MC tyros along.
Best Regards,
Paul

Dear Sir,

It may interest you to know that, despite the commercial end of the very popular Commodore VIC-20 Colour Computer, there is still a great number of enthusiastic users remaining with absolutely no intention of disposing of their machines. So to support this large group of users, we have recently decided to continue publication of the Association's magazine "VIC".

VIC" is now in its third year of publication with 16 bi-monthly issues under its belt. The magazine sells to subscribers and retail customers for $2.00, a price which, compared magazines such as Compute and the Gazette is very low. The magazine is also entirely dedicated to the VIC-20 computer with no advertising and very little space tied up by news, letters etc....

The Association also distributes public domain software for a small copying fee and maintains a library of around 900 programmes. This service is extremely popular with our subscribers although also open to non-members. Despite the end of Association meetings, we still provide services to members such as free advertising, free software consulting and special deals on books, disks/tapes and hardware.

I am writing to you in the hope that through your news pages or club news section, you may write a small segment on the Association as I see the main problem as being the communication between users away from the capital cities and one of the last reliable sources of information for the VIC-20. I hope you can help and anxiously await any publicity you may provide.

Thankyou
Chris Groenhout
The Editor "VIC"

ED- There you are Chris, yet another free plug.

Dear Sir,

I have a Commodore 64 and a Datassette and I would love to own a Joystick, but I don't want to spend ten's of dollars on one. So I have a question for you. "Is it possible to build one yourself at home spending a couple of dollars?"

If it is, would you be able to present something like: Instructions how to build a Joystick, in the next issue please.
I only want to use the Joystick for experiments, not for high speed games...I would really appreciate if you could do that for me, thankyou.

H. Borynski

ED – Vol 2 No 2 had a simple Joystick alternative for the old PET. It did not have a fire button, but with a little initiative it can be added.
We will re-publish it in this issue if space permits or next issue. However remember that the original design was for the PET so you will need to check your input port wiring. It should be noted that a fire button should also be added.

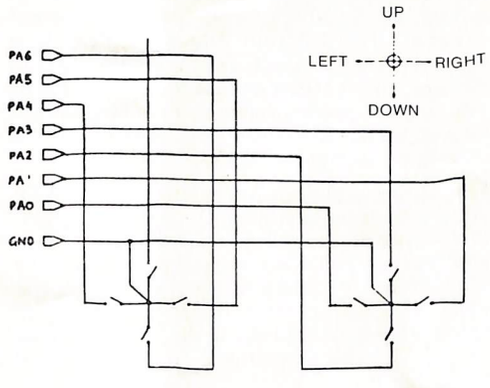


Fig 1. Joysticks for the PET. The switch arrangement for my PET joysticks is shown here. The switches are normally open.

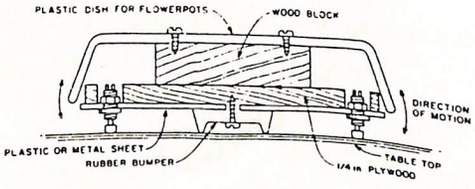
FORMAT OF THE BYTE INPUT VIA THE USER PORT

MSB(PA7) LSB(PA0)

...	DOWN	RIGHT	LEFT	UP	DOWN	RIGHT	LEFT

LEFT JOYSTICK RIGHT JOYSTICK

Fig 2. The byte input from the user port is shown here. This design exploits the fact that the PET lines PA0 to PA7 will float to high when they are disconnected. When a line goes low. the corresponding switch is closed.



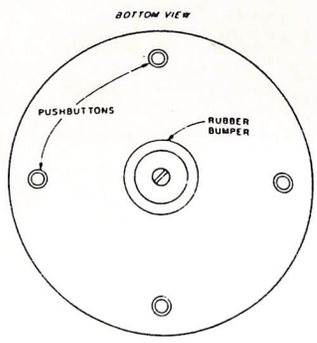


Fig 3. The Wobbilator–a low-cost alternative to joysticks that is easier to use as well. Eight low-cost miniature push buttons are used ot build two of these units. Either normally open or normally closed push buttons may be used. The push buttons should not be "snap action" or "detent" or go "click" when depressed, and should only move about ⅛ inch for closure. Use a bit of ribbon cable to attach the connector for the user port to the Wobbilators. Mark each Wobbilator with a dot for "Up" and "Right" and "Left". Choose a dish that fits your hand comfortably.

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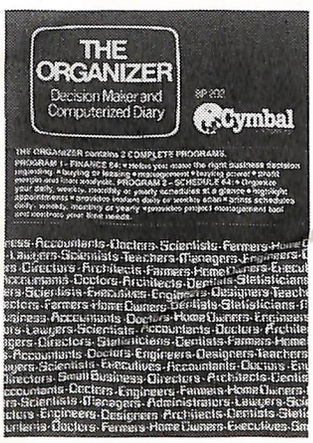

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User Group Column

In this edition we reshuffle the group arrangements in order to travel around a bit and give everybody a change at the top. (Democratic lot aren't we!)

The Christchurch New Zealand Commodore Users' Group (CUG) reports in their newsletter "Connection", that Commodore owners there should be grateful that the city's dealers include some keen folk who are prepared to spend both time and money working on bulletin board systems. Other computer owners are not so fortunate. The owner of one popular but now ageing home machine told Connections", "...our dealers couldn't care less once they've got your money...."

Across two continents to Editor Alan Stuart of the Vic-Ups CUG in Nedlands Western Australia, who has a sure fire way of keeping his readers happy. He publishes members' classified adverts for FREE and says that small adds can be phoned through to him. Now that's service!

With a flash of your eyeballs and to Townsville, where Group Secretary Tony Moore reports that the group has now officially affiliated with the Commodore Computer Users' Group of Queensland. A major advantage of the affiliation is that members now have access to an increasing library of good quality public domain software. Showing that community involvement is important, the group participated with the Cranbrook State School annual fete where they provided computers and software for those attending.

Down the east coast to Victoria, where the newsletter Communicator" of the Shepparton CUG reports that through their efforts the Goulburn Valley Regional Library is going to install a permanent Viatel facility. In addition, the Club, in conjunction with the Library, will be having a free Viatel demonstration during the Shepptember Festival. Also important is that the Club is already planning their end-of-year party. Now that's advance planning! Obviously them want to ensure that the lemon squash is good and cold!

The Peninsula CUG, which meets at Red Hill Victoria, seems truly up and running. Their second Newsletter reports that members have formed three groups: Introduction to the Commodore, Business Applications, and Games. A major goal for the Intro Group will be to provide additional information about keyboard control keys.

The Commodoare 64 Users' Group, headquartered in Abbotsford Victoria, announces that they have enough members required by law to proceed with Incorporation and their Constitution is available as an Easyscript file that can be copied to members' individual disks. This is a fine example of paper reduction.

Moving north across the Murray, to Belconnen and the A.C.T. CUG, their Newsletter reports that Brian Evans and Kevin Biggs from Magmedia, were guest speakers. The topic of the evening was how disks are made and included a slide show. We wonder if Brian or Kevin told how to wring out spilt lemon squash from a disk? In addition, book reviewer John Hambley was impressed with the library addition entitled "Multiplan on the Commodore 64". He forecasts it to, "become very well thumbed."

Nearer to the 'Big Smoke' and the 'Coathanger', the Southern Tablelands CUG Newsletter columnist Mark Bowman reports that Summer Games from Epyx offer some of the best graphics and sound seen on any of the decathalon games.

Mark Hopkins, Editor of the Compu-Tech Computer Club's Victim newsletter (based at Newcastle Technical College) addresses the a popular question often asked by non-computerites, "What can you doe with a computer?" His reply is, "It is principally because of the diversity of applications that the question is so hard to answer. It is also perhaps the main reason why computer clubs have been so successful; everyone is able to contribute something to the conversation because the computer is flexible enough to be able to be used effectively in everyone's field of expertise." That's a good answer and worth remembering.

And in the shadow of the 'Coathanger' the Sydcom 64 and CHUG magazine, Peripheral, reports one of the main advantages to being a user group member is that group members offer unbiased opinions and assistance on new products that a person may be considering purchasing plus store discounts. Sydcom is both Australian wide and has members in neighbouring countries.

Laurence Hulse

INDEX TO ISSUES
23 to 31 Commodore Magazine
Vol 4 No 1 — Vol 5 No 3

ARTICLES

PROGRAMS

BOOK REVIEWS

Continued overleaf

Continued from previous page

GAMES REVIEWS

Abductor ..... Vol 4 No 2
Adventure Master ..... Vol 4 No 5
Beyond Castle Wolfestein ..... Vol 4 No 5
Carriers At War ..... Vol 4 No 5
Garden of Eden ..... Vol 4 No 5
Gemstone Warrior ..... Vol 5 No 3
Ghostbusters ..... Vol 4 No 6
Gridrunner-VIC20 ..... Vol 4 No 2
Horace Skis on Pavloda ..... Vol 4 No 2
Hover Bovver ..... Vol 4 No 2
Labrynth of the Creator ..... Vol 4 No 1
Matrix ..... Vol 4 No 1
Metagalactic Llamas Battle at the Edge of Time ..... Vol 4 No 1
50 Mission Crush ..... Vol 4 No 5
Moon Buggy 64 ..... Vol 4 No 1
Munch Mania ..... Vol 4 No 3
Mystery Master ..... Vol 4 No 5
Petch ..... Vol 4 No 3
Professor Guile's Chemical Erabus ..... Vol 4 No 3, Vol 4 No 5
Quest for Tarek ..... Vol 4 No 1
Questron ..... Vol 4 No 5
Scramble 64 ..... Vol 4 No 1
Sherlock ..... Vol 4 No 5
Speculator ..... Vol 4 No 2
Tarek Mk1 ..... Vol 4 No 5
Telengard ..... Vol 4 No 5
The Way of the Exploding Fist ..... Vol 5 No 3
The Quill ..... Vol 4 No 5
Valhalla ..... Vol 4 No 5

PRODUCTS, HARDWARE AND SOFTWARE REVIEWS

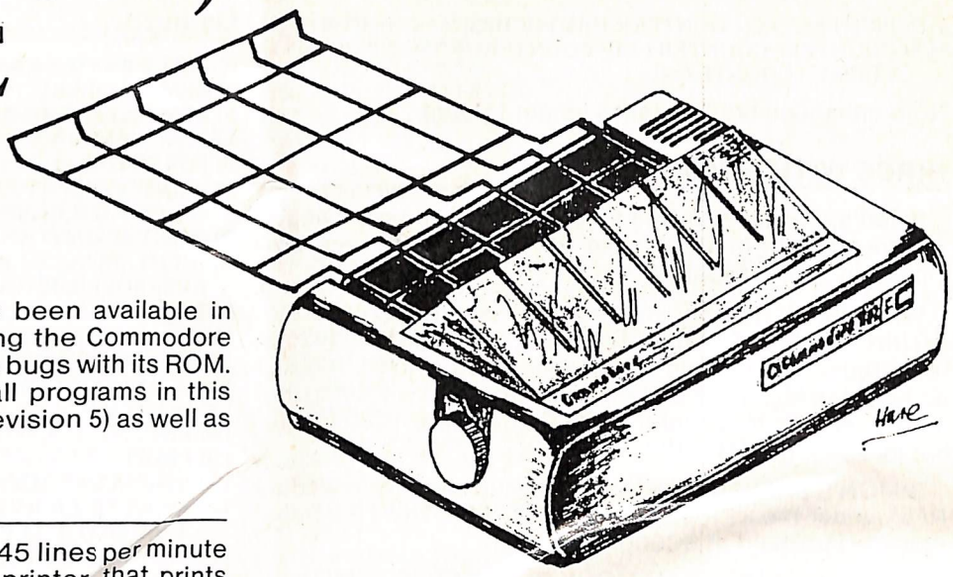
Advanced Cassette Operating System ... Vol 4 No 3
Blitz – a fast basic compiler ..... Vol 5 No 1
Cicada 300C Modem ..... Vol 4 No 2
Cockroach Disk Drive Cooling Fan .... Vol 5 No 2
Commodore MPS 802 Printer ..... Vol 4 No 2
Commodore SX-64 Executive Pack ... Vol 4 No 3
Dataform - program review ..... Vol 4 No 1
Datalign - Program Review ..... Vol 5 No 2
Dreamhouse ..... Vol 4 No 5
Easycript 1520/Printer ..... Vol 5 No 3
Graphics Master ..... Vol 4 No 6
Inside Commodore DOS ..... Vol 4 No 4
Joysticks ..... Vol 5 No 2
Ladders to Learning ..... Vol 5 No 3
Let's Stop & Pick the Daisies ..... Vol 4 No 5
Mega Modem Kit ..... Vol 5 No 2
Microneye System ..... Vol 4 No 6
Paintpic/Koala Pad ..... Vol 4 No 2
Pavloda - fast loading cassette system ... Vol 4 No 1
Plus/4 ..... Vol 4 No 6
Print Shop ..... Vol 5 No 2
Promenade for the VIC 20 & C64 ..... Vol 5 No 2
Sure Shot Joystick ..... Vol 4 No 3
SPR C64/1541 Turbo System ..... Vol 4 No 6
The New Machines
Part 1 ..... Vol 4 No 5
Part 2 ..... Vol 4 No 6
Part 3 ..... Vol 5 No 2
The Skai-64 (CX500) Disk Drive ..... Vol 5 No 2
The World-Link Interface ..... Vol 5 No 2
TOTL Business 3.6 ..... Vol 4 No 3
Turbo 64 ..... Vol 4 No 4
VIP Terminal ..... Vol 4 No 4

REFERENCE SECTIONS

Commodore Reference-Basic 3.5 Memory Map ..... Vol 4 No 5
Commodore 64 Utility Basad Manual .... Vol 4 No 5
Monad Manual ..... Vol 4 No 3
Term 64 Manual ..... Vol 5 No 1

MPS802 (1526) PRINTER AND THE C64

BY DENIS HARE



The Commodore MPS802 Printer has been available in Australia now for about a year, replacing the Commodore 1526 Printer, which reputably had some bugs with its ROM. If you own a 1526 read on, because all programs in this article have been tested on the 1526 (revision 5) as well as the MPS802.

DESCRIPTION

The MPS802 is a friction/tractor feed, 45 lines per minute (80 columns), serial impact dot matrix printer, that prints upper and lower case alphabetic characters, numeric characters, and all the graphic characters available on your C64. The printer having its own internal microprocessor has excellent formatting capabilities. Formatting features includes the ability to specify left or right justification of columns, or alignment of numeric data on its decimal position. Line spacing is programmable and user defined characters can be printed. Enhanced and reverse printing, are also available, as well as bit mapping graphics, but you will have to read on, because the MPS802 handbook makes no reference to the bit mapping graphics capabilities.

FORMAT CONTROL

Through the printer's format control option, you can control the interpretation of data sent to the printer. To implement the format control option, you use the third parameter of the OPEN command which is called the secondary address. Any one of ten secondary addresses can be used with the OPEN command as follows.

0 – Print data exactly as received in Upper/Graphics case. (default value)
1 – Print data according to a previously defined format.
2 – Store the formatting data.
3 – Set the number of lines per page to be printed.
4 – Enable the printer format diagnostic message.
5 – Define a programmable character.
6 – Set spacing between lines.
7 – Print data exactly as received in Upper/Lower case.
8 – Not used.
9 – Suppress diagnostic message printing.
10 – Reset printer.

Don't forget that after each appropriate OPEN command has been transmitted a PRINT# statement is required to transmit the secondary address information to the printer.

Examples of most of the format control secondary addresses can be found in the program listings that are part of this article.

FRICTION FEED

The FRICTION FEED mechanism (fed similar to a standard typewriter) is a very handy facility enabling A4 paper, envelopes etc, to be used with the printer. FRICTION FEED is enabled by placing the paper release lever (on left hand side) in the rear position.

The program ENVELOPE PRINTER MPS802, detailed in LISTING 1, will allow you to print addresses on envelopes using the printer's FRICTION FEED capabilities. If thin envelopes are being used, it maybe necessary to place a sheet of paper behind the envelopes to protect the printer platen.

Note the pokes in lines 260 to 300 which put a leading quotation mark before your response to the input statement, enabling leading blanks to be used. This also allows commas, colons, cursor control and C64 left side Key graphic symbols, to be used, without an EXTRA IGNORED error message.

MULTILAYER PAPER

A small lever is located on the right handle side of the MPS802, which can be set to allow up to three copies including the original copy to be printed.

For single ply paper the lever should be in the forward position.

FORMATTING

Perhaps the most significant feature of your printer is its ability to format data. Formatting is a must, if you are using preformatted forms with the printer.

The program HEXADECIMAL CONVERSION CHART, detailed in LISTING 2, demonstrates the capabilities of formatting with the MPS802. Study the REM statements in the program and refer to the printer handbook and you should have little trouble understanding how the formatting was achieved.

HIGH RESOLUTION (HIRES) GRAPHICS

The MPS802 handbook makes no reference to HIRES (Bit-mapped) printing using the printer but it is possible.

The program HIRES GRAPHIC PRINT MPS802, detailed in LISTING 3, will dump a standard HIRES graphic screen to the MPS802, taking about 10 minutes, with the print out about 9.5cm x 6cm in size.

The program rotates each HIRES byte into a new format and then defines it as a programmable character for printing.

The program in LISTING 4, draws a sine wave. Type in both programs as one and after SAVING, RUN to see your first HIRES print out, on the MPS802.

For doing letter heads or other work, the print out can be enhanced to a 19cm x 6cm by changing lines 4185 and 4190 of LISTING 3, as follows.

Continued overleaf

Continued from previous page

```
4185 PRINT#4,TAB(COUNTER)CHR$(14)CHR$(254)CHR$(141);
4190 COUNTER=COUNTER+2:IF COUNTER=80THENPRINT#4,
     CHR$(13):COUNTER=0
```

Note enhanced printing takes longer to print.

HIRES WITH SIMON'S BASIC

If you are using your C64 for programing and not using a enhanced form of BASIC like SIMON'S BASIC, you are limited in some respects.

With SIMON'S BASIC you can make pictures, graphs, etc in HIRES or MULTICOLOUR modes. You are given quite a few graphic commands for drawing lines, circles, blocks, adding text, etc. It has a COPY command that will dump the graphic screen to a printer in the Commodore 1525 format but locks up the MPS802.

SIMON'S BASIC places the 8K bit map memory in hidden *RAM, under the KERNAL at $E000-$FFFF.* The 1K screen memory is placed *at $C000.*

The program HIRES MEMORY RELOCATOR (SIMON'S), detailed in LISTING 5, switches out the ROM, allowing you *to access the 8K bit map data and transfer it to memory $2000-$3FFF, then,* switches back the ROM.

Memory location $2000-$3FFF is where the program HIRES GRAPHIC PRINT MPS802 (LISTING 3) prints from and to make it work with SIMON'S BASIC all you have to do is remove the REM from line 4020.

The program in *LISTING 6, is* a SIMON'S BASIC demonstration program for testing the HIRES printing. Carry out the following steps for a MPS802 SIMON'S HIRES screen dump to the printer.

STEP 1 – Load SIMON'S BASIC.
STEP 2 – Type in the program in LISTING 5, SAVE and RUN. The routine (program) is wedged into memory to relocated memory when called.
STEP 3 – Type in the Demonstration program in LISTING 6 and then use the MERGE command to add HIRES GRAPHIC PRINT MPS802 program (LISTING 3) to the demonstration program.
STEP 4 – Remove REM from line 4020 so that the program can call the relocate memory wedge.
STEP 5 – SAVE and RUN.

SAVING HIRES SCREENS

If you wish to save a HIRES screen that you have printed, NEW the memory (or use your reset button if fitted) and enter the following line in the direct mode.

```
SYS57812"filename",8:POKE193,0:POKE194,32:
POKE174,64:POKE175,63:SYS62954
```

The file (screen) can be loaded when required as usual, as follows.

```
LOAD"filename",8,1
```

After LOADING the HIRES screen file, LOAD HIRES GRAPIC PRINT MPS802 program (listing 3) and run. Great, specially with SIMON'S BASIC screens that can be printed without SIMON'S BASIC in the computer.

Datassette can be used instead of the disk if you change 8 to 1 when saving and loading.

ACKNOWLEDGEMENTS

1. COMMODORE MICROCOMPUTER Sept/Oct 1984 for the basic idea for LISTING 3.
2. Mr Bob Wicks, Sergeants Mess, Watsonia for testing the programs on his 1526 printer.

Listing 1

```
10 REM ################################
20 REM     D HARE 1985
30 REM ENVELOPE PRINTER FOR THE MPS802
40 REM ################################
50 POKE 53280,13: POKE 53281,13: PRINT "[CLR,<CYN>,TEXT]"
60 PRINT "[RVS,SPACE3,E,N,V,E,L,O,P,E,SPACE,P,R,I,N,T,E,R,
   SPACE,F,O,R,SHSPACE,T,H,E,SPACE,M,P,S]802[SPACE5,OFF]"
70 PRINT : PRINT
80 INPUT "[SPACE4,RVS,E,OFF]NVELOPE OR[SPACE,
   RVS]Q[OFF]UIT";A$
90 IF A$="E" THEN 170
100 IF A$="[E]" THEN 170
110 IF A$="Q" THEN 140
120 IF A$="[Q]" THEN 140
130 GOTO 50
140 END
150 PRINT
160 B$="":C$="":D$="":E$="":F$=""
170 PRINT "[CLR,RVS,SPACE6,E,N,V,E,L,O,P,E,SHSPACE,P,R,I,N,
    T,E,R,SPACE,M,P,S]802[SPACE6,OFF]"
180 PRIN " "[DOWN,SPACE,P]RINTING STARTS FROM A THIRD
    OF THE WAY";
190 PRINT " ACROSS THE[SPACE,P]LATEN AND 2.2CM DOWN
    FROM "
200 PRINT " THE BEND IN THE[SPACE,M,P,S]802 PAPER FEED. "
210 PRINT "[DOWN,RVS,SPACE,P,L,E,A,S,E,SHSPACE,E,N,S,U,R,
    E,SHSPACE,A,SHSPACE,E,N,V,E,L,O,P,E,SHSPACE,I,S,
    SHSPACE,I,N,SHSPACE,M,P,S]802[SPACE,OFF]"
220 PRINT "[DOWN,RVS,SPACE,A,N,D,SHSPACE,T,H,E,SHSPACE,
    P,A,P,E,R,SHSPACE,R,E,L,E,A,S,E,SHSPACE,L,E,V,E,R,
    SHSPACE,I,S,SHSPACE,I,N,SHSPACE,T,H,E,SPACE,OFF]"
230 PRINT "[DOWN,RVS,SPACE,R,E,A,R,SHSPACE,P,O,S,I,T,I,O,N,
    SPACE25,OFF]"
240 PRINT "[SPACE8,<O><O><O><O><O><O><O><O><O>
    <O><O><O><O><O><O><O><O><O><O><O><O><O>
    <O><O><O><O><O><O><O><O><O><O><O>]"
250 PRINT
260 POKE 631,34: POKE 198,1: INPUT "LINE 1";B$
270 POKE 631,34: POKE 198,1: INPUT "LINE 2";C$
280 POKE 631,34: POKE 198,1: INPUT "LINE 3";D$
290 POKE 631,34: POKE 198,1: INPUT "LINE 4";E$
300 POKE 631,34: POKE 198,1: INPUT "LINE 5";F$
310 PRINT
320 PRINT "[SPACE8,<U><U><U><U><U><U><U><U><U>
    <U><U><U><U><U><U><U><U><U><U><U><U><U>
    <U><U><U><U><U><U><U><U><U><U><U>]"
330 OPEN 4,4,7: REM PRINT DATA AS $[LOCK]EIVED,
    LOWER OR UPPER CASE
340 PRINT#4,"[SPACE23]";B$
350 PRINT#4,"[SPACE23]";C$
360 PRINT#4,"[SPACE23]";D$
370 PRINT#4,"[SPACE23]";E$
380 PRINT#4,"[SPACE23]";F$
390 CLOSE 4
400 PRINT "[DOWN,SPACE,A]NOTHER ENVELOPE[SPACE,RVS,
    SPACE]SAME[SPACE,OFF,SPACE]PRINT";
410 INPUT "([Y]/[N])";G$
420 IF G$="[Y]" THEN 490
430 IF G$="Y" THEN 490
440 PRINT "[DOWN,SPACE,A]NOTHER ENVELOPE[SPACE,RVS,
    SPACE]NEW[SPACE,OFF,SPACE]PRINT";
450 INPUT "([Y]/[N])";H$
460 IF H$="[Y]" THEN 530
470 IF H$="Y" THEN 530
480 GOTO 50
490 PRINT "[RVS,SPACE,P,L,A,C,E,SHSPACE,A,SHSPACE,N,E,W,
    SHSPACE,E,N,V,E,L,O,P,E,SHSPACE,I,N,SHSPACE,T,H,E,
    SHSPACE,M,P,S]802[SPACE,OFF]"
500 PRINT " PRESS ANY KEY "
510 GET K$: IF K$="" THEN 510
520 GOTO 330
530 PRINT "[RVS,SPACE,P,L,A,C,E,SHSPACE,N,E,W,SHSPACE,E,
    N,V,E,L,O,P,E,SHSPACE,I,N,SHSPACE,T,H,E,SHSPACE,
    M,P,S]802"
540 PRINT " PRESS ANY KEY "
550 GET K$: IF K$="" THEN 550
560 GOTO 160
```

Listing 2

```
10 REM ################################
20 REM      D HARE 1985
30 REM  HEXADECIMAL CONVERSION CHART
40 REM ################################
50 OPEN 1,4: REM PRINT DATA EXACTLY AS TRANSMITTED
60 OPEN 2,4,1: REM FORMAT DATA BEFORE IT IS PRINTED
70 OPEN 3,4,2: REM TRANSMIT THE FORMAT STRING
80 OPEN 4,4,4: REM ENABLE FORMAT DIAGNOSTIC MESSAGES
   TO BE PRINTED
90 PRINT#4: REM ENABLE ERROR DIAGNOSTICS
100 PRINT#1, CHR$(14)"[SPACE3]HEXADECIMAL CONVERSION
    "; CHR$(15)
110 PRINT#1, CHR$(14)"[SPACE3,<Y><Y><Y><Y><Y><Y>
    <Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y>
    <Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y><Y>]"; CHR$(15)
120 PRINT#1,"HEX[SPACE2]-0[SPACE2]-1[SPACE2]-2[SPACE2]-
    3[SPACE2]-4[SPACE2]-5[SPACE2]-6[SPACE2]-7[SPACE2]-
    8[SPACE2]-9[SPACE2]-A[SPACE2]-B[SPACE2]-C[SPACE2]-
    D[SPACE2]-E[SPACE2]-F"
130 B=0
140 A$=CHR$(65)
150 X$=CHR$(29)
160 F$="Z[RVS]-[SPACE2]999 999 999 999 999 999 999 999 999 999
    999 999 999 999 999"
170 PRINT#3,F$
180 FOR I=0 TO 9
190 PRINT#2,I,B+0,B+1,B+2,B+3,B+4,B+5,B+6,B+7,B+8,B+9,
    B+10,B+11,B+12,B+13,B+14;
200 PRINT#2,B+15
210 B=B+16
220 NEXT I
230 F$="A[RVS]-[SPACE2]999 999 999 999 999 999 999 999 999 999
    999 999 999 999 999"
240 PRINT#3,F$
250 FOR I=1 TO 6
260 PRINT#2,A$,X$,B+0,B+1,B+2,B+3,B+4,B+5,B+6,B+7,B+8,
    B+9,B+10,B+11,B+12,B+13;
270 PRINT#2,B+14,B+15
280 B=B+16
290 A$=CHR$(65+I)
300 NEXT I
310 PRINT#1, CHR$(13) CHR$(13) CHR$(13)
320 CLOSE 1: CLOSE 2: CLOSE 3: CLOSE 4
```

Listing 3

```
4000 REM ################################
4005 REM     D HARE 1985
4010 REM  HIRES GRAPHIC PRINT MPS802
4015 REM ################################
4020 REM SYS21820
4025 PRINT "[CLR,DOWN10]"
4030 PRINT "[RVS,SPACE]PRINTING TO THE MPS802. GRAPHIC
     PRINT[SPACE2,OFF]";
4035 PRINT "[RVS,SPACE8]TAKES ABOUT 10 MINUTES[SPACE10,
     OFF]"
4040 REM ----------
4045 REM ADJUST POINTERS : OPEN CHANNELS TO THE
     MPS802 (CUSTOM)
4050 REM ----------
4055 POKE 52,32: POKE 56,32
4060 OPEN 5,4,5: OPEN 4,4
4065 REM ----------
4070 REM PUT ML IN CASSETTE BUFFER
4075 REM ----------
4080 COUNTER=0:BASE=2*4096: GOSUB 4215
4085 REM ----------
4090 REM MOVE BYTE INFO INTO CASSETTE BUFFER WITH ML
4095 REM ----------
4100 FOR BYTE=0 TO 7
4105 A=PEEK (BASE+BYTE)
4110 POKE 965+BYTE,A
4115 NEXT
4120 BASE=BASE+8: IF BASE>2*4096+8000 THEN CLOSE 4:
     CLOSE 5: GOTO 4365
4125 REM ----------
4130 REM RUN ML ROUTINE TO ROTATE EACH BYTE INTO THE
     NEW FORMAT
4135 REM ----------
4140 A$="": SYS 828
4145 FOR BYTE=0 TO 7
4150 A=PEEK (973+BYTE)
4155 A$=A$+ CHR$(A)
4160 NEXT
4165 REM ----------
4170 REM PRINTING ROUTINE
4175 REM ----------
4180 PRINT#5,A$
4185 PRINT#4, TAB(COUNTER) CHR$(254) CHR$(141);
4190 COUNTER=COUNTER+1: IF COUNTER=40 THEN PRINT#4,
     CHR$(13):COUNTER=0
4195 GOTO 4100
4200 REM ----------
4205 REM SET MPS802 LINE SPACING : ML ROUTINE
4210 REM ----------
4215 OPEN 6,4,6: PRINT#6, CHR$(10): CLOSE 6
4220 B=0: FOR DE=828 TO 980
4225 READ A
4230 POKE DE,A:B=B+A
4235 NEXT
4240 IF B<>17120 THEN PRINT "ERROR IN DATA STATEMENTS":
     END
4245 RETURN
4250 DATA 162,7,169,0,157,205,3,202
4255 DATA 224,255,208,248,169,128,141,196
4260 DATA 3,162,0,160,0,189,197,3
4265 DATA 10,157,197,3,32,183,3,200
4270 DATA 192,8,240,2,208,239,232,160
4275 DATA 0,224,1,240,28,224,2,240
4280 DATA 31,224,3,240,34,224,4,240
4285 DATA 37,224,5,240,40,224,6,240
4290 DATA 43,224,7,240,46,224,8,240
4295 DATA 49,169,64,141,196,3,208,197
4300 DATA 169,32,141,196,3,208,190,169
4305 DATA 16,141,196,3,208,183,169,8
4310 DATA 141,196,3,208,176,169,4,141
4315 DATA 196,3,208,169,169,2,141,196
4320 DATA 3,208,162,169,1,141,196,3
4325 DATA 208,155,96,144,10,24,185,205
4330 DATA 3,109,196,3,153,205,3,96
4335 DATA 0
4340 DATA 0,0,0,0,0,0,0,0
4345 DATA 0,0,0,0,0,0,0,0
4350 REM ----------
4355 REM RESET MPS802 : RETURN TO NORMAL : END
4360 REM ----------
4365 OPEN 10,4,10: PRINT#10: CLOSE 10
4370 POKE 53272,21: POKE 53265,155: PRINT "[CLR,
     SPACE]BYE-BYE": END
```

Listing 4

```
10 REM ################################
20 REM      D HARE 1985
30 REM STANDARD HIRES - SINE WAVE
40 REM ################################
50 TT=2*4096: POKE 53272, PEEK (53272) OR 8
60 REM ----------
70 REM STANDARD HIRES SET UP
80 REM ----------
90 POKE 53265, PEEK (53265) OR 32
100 FOR I=TT TO TT+7999: POKE I,0: NEXT
110 FOR I=1024 TO 2023: POKE I,3: NEXT
120 REM ----------
130 REM SINE WAVE FOR THE DEMO
140 REM ----------
150 FOR X=0 TO 319 STEP .5
160 Y=INT (90+80* SIN (X/10))
170 CH=INT (X/8)
180 PO=INT (Y/8)
190 LH=Y AND 7
200 BY=TT+PO*320+8*CH+LH
210 BI=7-(X AND 7)
220 POKE BY, PEEK (BY) OR (2↑BI)
230 NEXT X
240 POKE 53272,21: POKE 53265,155
```

Continued on page 42

Robots (Artificial Intelligence)

Imagistics

From running shoes which keep track of energy use to robots which knock over furniture while trying to serve a meal, these are some of the signs that we have arrived at the interface with artificial intelligence.

You can put soles on your C-64 with the Puma RS (Running System) Computer Shoe. The shoe has a microprocessor located in the right heel. First a runner calibrates the runner's processor by entering height, weight, and stride measurements.

After the run, the footwear is connected to a C-64 and the information is downloaded and stored on disk. The separate software disk has room for six years of running logs and running efficiency can be formulated easily. The shoes cost about US$200.

As for the recalcitrant robot waiter, the Court of Session in Edinburgh Scotland dealt with a case recently in which a second-hand robot, bought to serve wine to customers, ran amok in a restaurant and stopped only when its head fell off into a customer's lap. The robot had cost $9,500.

The trend is toward re-programmable robots or more correctly-mechanical manipulators. The three common ways of producing controlled mechanical movement for industrial robots are by electric motors, pneumatics or hydraulics.

Electrical systems use direct current motors as fixed increment stepping motors. The major limitation of this type of system is that electric motors produce rotary motion and to convert that to linear motion requires a lead screw, a gearbox or an harmonic drive gear. These have problems with reliability and cost.

In pneumatic drives, compressed air is used in a cylinder to move a piston which provides the linear motion. Replacing the compressed air with a low viscosity oil forms the hydraulic system.

Many robotic systems use low pressure hydraulics, because a single, low-cost electric motor is sufficient to drive the oil pumps which control the arm and gripper movements. Piston return is by springs and/or gravity.

The common features of hydraulic computer controlled robots are their low cost (usually under $10,000), they have up to six controllable axes, are positional sensing, have servo control plus continuous path motion, a learning ability and an RS232 interface.

Domestic application of robots which plug into C-64s and Vic 20s are being developed by Intellect Electronics Pty Ltd. The robots are priced at about $400 and can 'walk', talks and learn their way around a house. They are designed to carry and collect items.

To get started in building computer controlled robots, a fun project is building a robot 'mouse'. A very simple scurry robot consists of a rectangular piece of perspex to the front end of which are attached two small five volt DC motors. These motors directly drive model airplane wheels. At the centre rear of the plastic base is a small furniture castor.

Construction tools are a sharp knife, a small hacksaw, a ruler and plastic cement.

The two controls needed for a DC motor are speed and direction. Speed can be controlled by changing the supply voltage, and rotation direction by switching polarity of the motor's power supply. Additional circuitry is required to protect the computer if high voltages are used.

There are many basic switching circuits for small DC motors, some of which include solid state relays, which can be driven by a computer I/O port. So the direction of motor rotation is easily solved.

The motor's speed can be controlled by pulse-width modulation, which turns on the motor for a period and then off. The ratio of on and off times determines the speed of rotation. If the time periods are very small, then the motor's mechanical inertial will cause the pulses to be smoothed out and gives a varying motor supply voltage and so speed.

For more information on ROBOTS & THE MOUSE we recommend:
Commodore Computing May 1984 Vol 2 No 12 "Building A Robot Mouse". (Try inter-library loans through your local library.)
"DIY ROBOTICS/SENSORS - C64"
a Sunshine Book.
(CW. Electronics, P.O.Box 335, Gladesville 2111 can supply this one if its not available at your local shop - $21.26 p&p included.)

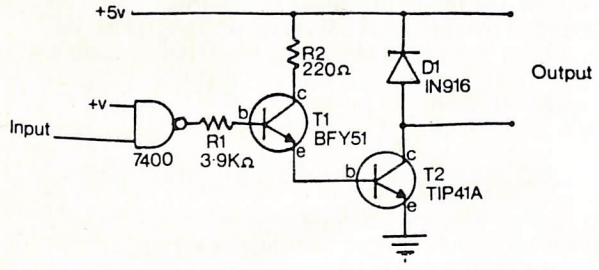
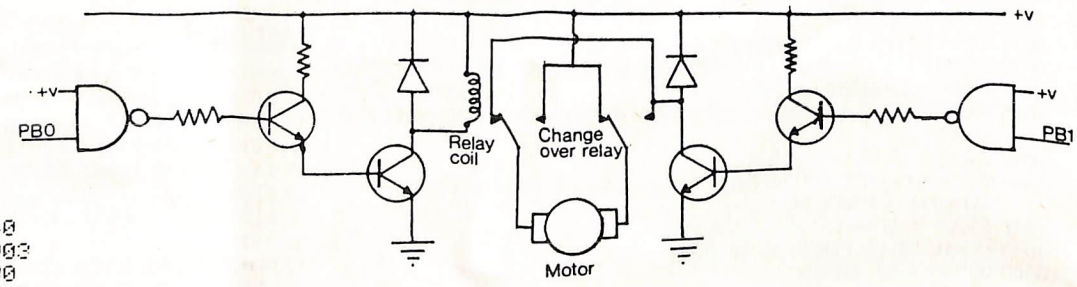


FIG A
A basic circuit configuration for switching small DC loads.

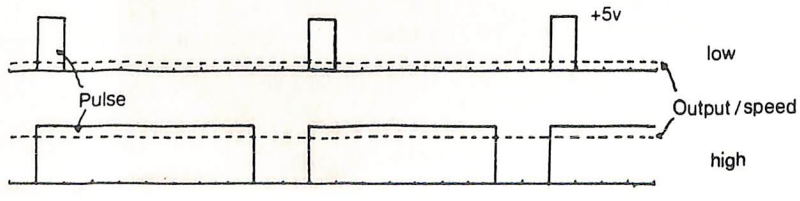
FIG B
Complete Motor Control Circuit




```
 0  C000  A940      LDA  #$40
 1  C002  8D03DD    STA  $DD03
 2  C005  A200      LDX  #$00
 3  C007  8E01DD    STX  $DD01
 4  C00A  E8        INX
 5  C00B  E4FB      CPX  $FB
 6  C00D  D0FB      BNE  $C00A
 7  C00F  A940      LDA  #$40
 8  C011  8D01DD    STA  $DD01
 9  C014  E8        INX
10  C015  D0FD      BNE  $C014
11  C017  A5C5      LDA  $C5
12  C019  C940      CMP  #$40
13  C01B  F0E3      BEQ  $C000
14  C01D  60        RTS
READY.

10 SYS49152
20 POKE251,VAL(A$)*25+1
30 WAIT197,64:POKE198,0:GOTO10
READY.
```

FIG C
A Program to control the speed of a DC motor with the C64.



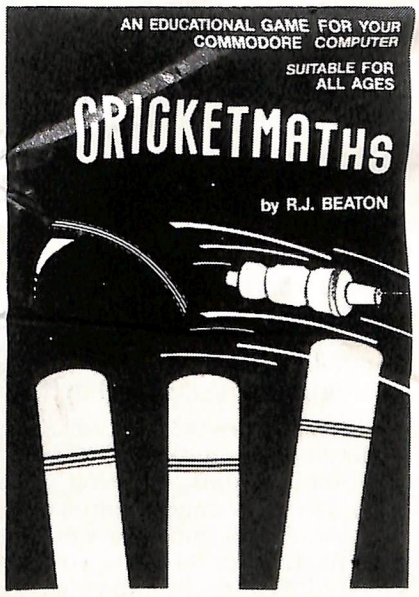
Figures reprinted from Commodore Computing May 1984

PITMAN EDUCATION SOFTWARE

EDU-KIT

Software for Australian Primary Schools

Mathematics



★ **Cricket Maths**
Players practise their Maths facts whilst playing against the computer in a cricket setting.

★ **Number Maze**
To get through the maze you must know your tables!

★ **Number Snake**
A game similar to Snakes an Ladders that fosters the learning of number facts at varying levels of difficulty.

English

★ **Wordmaster**
The computer challenges you to spell the words correctly!
With Wordmaster you can compose and store your own word lists.

★ **Save Our Sal**
Choose the correct homophone and save Sally from the dreaded shark Knaws!

★ **Funky Punky**
The player types the missing punctuation marks into sentences on the screen.
Capital letters, full stops, commas, question marks, apostrophes or any combination of these.
Compose and store your own passages!

★ **Zap the Letter**
A strategy game which challenges the player to unjumble the words in a block puzzle.

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SPEECH BOARD for the VIC & C64

by Paul Markowski

I've always wanted to try one of those speech add ons available for the VIC and 64, however I've always thought they've been a bit pricey for my limited budget. The other day I was browsing through the local Tandy electronics store and I came across a small a package containing a speech chip, a SPO256. There was also a small booklet included explaining how to interface the chip to almost any computer with a parallel port and how to program the chip to produce speech. As all this was priced at a reasonable $24.95, I soon found myself walking away with one SPO256.

The SPO256 is a pretty ingeneous device consisting of a parallel port, a 16K ROM containing speech allophone data, and a microprocessor to process the data feed in through the parallel port and the data from the 16K ROM. Here is the way it works. You provide the SPO256 with one of 64 decimal numbers which specify the address of the desired allophone you wish the SPO256 to utter. The microprocessor takes the data from the parallel port and uses this to fetch the data required to make the desired sound. The microprocessor passes the data through a vocal tract circuit and it comes out on pin 24 as a digital signal that can be fed into an amplifier to create the desired speech.

You might be surprised to learn that the VIC and 64 USER PORTs can be programmed as parallel ports and that there are also all of the other signals required to make the SPO256 work. As the SPO256 only requires a single +5V power supply getting the whole thing working is very easy indeed. There is also a big plus for 64 users, you can feed the ouput of the SPO256 (pin 24) directly into your 64 at pin 5 of the audio/video socket. This is the audio input connection and you can use the output filters of the SID chip to filter the speech of the SPO256. The speech can then be heard through the television speaker. VIC owners will need to build the additional circuit outlined in the diagram to filter and amplify the SPO256 output.

The circuit is fairly easy to build. I used a small matrix board with solder pads on one side (Radio Shack Part No 276-168) from Tandy. It is also a very good idea to use a socket for the SPO256. That way you can test the pins in the socket with a multi-meter with everything connected up but with the SPO256 not in the circuit. You don't want to blow a $25 chip first time you power your speech board up. The small booklet that comes with the SPO256 is very clear about what pins do what and how the pins are configured on the chip. The booklet also contains the information you will need to create words and even provides a small dictionary to get you started. For VIC owners I have provided a list of additional parts you will need to get the project working.

Now a few tips about using this device. The SPO256 is a fairly slow device (after all you've got to hear what its saying) so it is fairly easy to drive it from a BASIC program. I have included some demonstration programs for both the VIC and 64 so you can see how its done. Another peculiarity off the SPO256 is the fact that if you don't supply it with a new allophone code after it has finished with the previous one, it will keep sounding the previous sound it generated. This means that you must give the SPO256 the code for a pause between each word and that you must try to supply each succeeding allophone at the precise time that the SPO256 is ready for it, otherwise some funny clicks and clucks can occur. The booklet supplied has a table of allophone codes and a time taken to utter each sound, so it is fairly easy to generate a delay loop to get the desired effect. Another unusual feature of this chip is the fact that all the speech information stored in the SPO256 was taken from actually spoken words which were analysed to extract the 59 discrete sounds which the SPO256 can make (the other 5 codes give you various length pauses). This has meant that because the chip was designed in the USA, all speech generated has a distinct American drawl to it.

Well I hope you have a go at building this project. It can be a lot of fun, teach you a little bit about microprocessor interfacing and hopefully you will wind up with a talking Commodore....good luck.

Parts List

1 SPO256 chip
1 matrix board (Radio Shack part no 276-168
1 28 pin IC socket
1 39pF ceramic capacitor
1 27pF ceramic capacitor
1 22pF trimmer capacitor
1 100uH choke
1 12 way connector for the USER PORT(must have 0.156" spacing wire and solder

VIC owners will also need

1 LM386 OP AMP
1 3ohm speaker
3 0.1uF ceramic capacitors
2 0.022uF ceramic capacitors
1 100uF electrolytic capacitor
1 10Uf ceramic capacitor
1 1uF ceramic capacitor
2 33k resistors
1 10ohm resistor
1 10k variable resistor

VIC SPEECH PROG

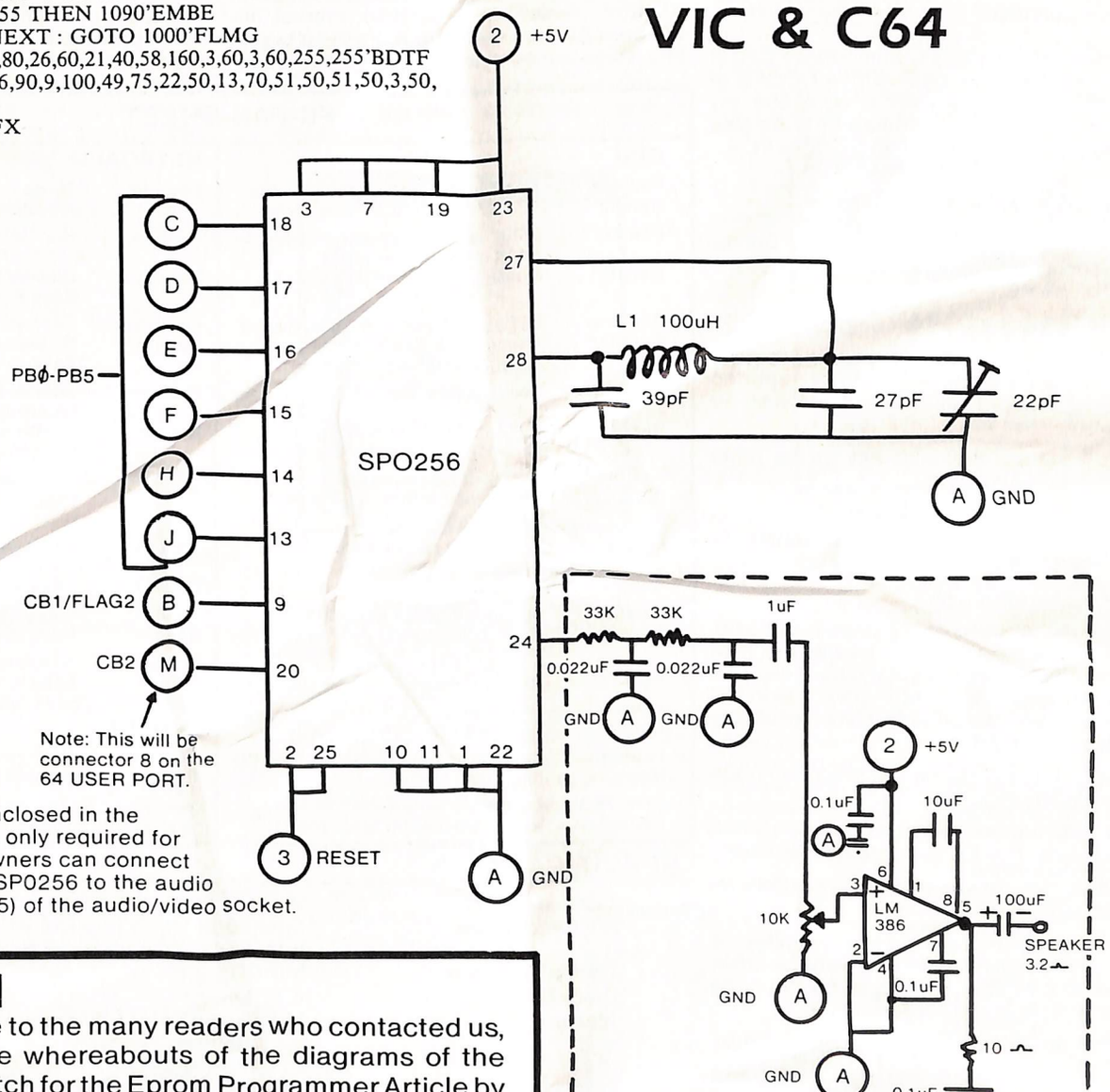
```
1000 RESTORE
1005 REM SET CB1 TO NEGATIVE INTERRUPT MODE & CB2
     TO PULSE OUTPUT MODE
1010 POKE 37148,175
1020 REM DISABLE CB1 AND CB2 INTERRUPTS
1030 POKE 37150,124
1045 REM SET THE DATA DIRECTION REGISTER FOR VIA
     #1 TO OUTPUT
1050 POKE 37138,255
1060 REM NOW START SENDING DATA
1070 READ A,B
1080 IF A=255 THEN 1160
1085 REM CHECK THE INTERUPT REG]TO SEE IF CB1 IS
     SET & IF SO WAIT FOR SPO256 TO FINISH
1090 X=PEEK (37149) AND 16
1100 IF X<>16 THEN 1090
1110 POKE 37136,A: FOR I=1 TO B: NEXT : GOTO 1070
1160 READ A,B: IF A<255 THEN 1090
1170 FOR I=1 TO 500: NEXT : GOTO 1000
1200 DATA 8,60,24,50,16,80,26,60,33,100,58,160,3,60,3,
     60,255,255
1300 DATA 42,80,15,40,16,90,9,100,49,75,22,50,13,70,51,50,51,
     50,3,50,3,50,255,255
1400 DATA 255,255
```

64 SPEECH PROG

```
1000 RESTORE 'BAOS
1005 REM SET THE PASSBAND FILTER & VOLUME'BCHG
1010 POKE 54296,128+16+15'DNLX
1015 REM SET THE FILTER FREQUENCIES'BXQG
1020 POKE 54293,2'BHBV
1030 POKE 54294,130'BJTX
1040 POKE 54295,8+(16*9)'DMYB
1045 REM SET THE DATA DIRECTION REG FOR CIA #2 TO
     OUTPUT & DISABLE INTERRUPTS'BGDS
1050 POKE 56579,255: POKE 56589,16'CSCC
```

```
1060 REM NOW START SENDING DATA'BTAF
1070 READ A,B'BDDB
1080 IF A=255 THEN 1160'DILE
1085 REM CHECK THE ICR TO SEE IF FLAG2 IS SET & IF SO WAIT
     FOR SPO256 TO FINISH'BETV
1090 X=PEEK (56589) AND 16'DKRG
1100 IF X=16 THEN 1090'DHIW
1110 POKE 56577,A: FOR I=1 TO B: NEXT : GOTO 1070'GRMC
1160 READ A,B: IF A<255 THEN 1090'EMBE
1170 FOR I=1 TO 500: NEXT : GOTO 1000'FLMG
1200 DATA 8,60,24,50,16,80,26,60,21,40,58,160,3,60,3,60,255,255'BDTF
1300 DATA 42,80,15,40,16,90,9,100,49,75,22,50,13,70,51,50,51,50,3,50,
     3,50,255,255'BVUK
1400 DATA 255,255'BHFX
```

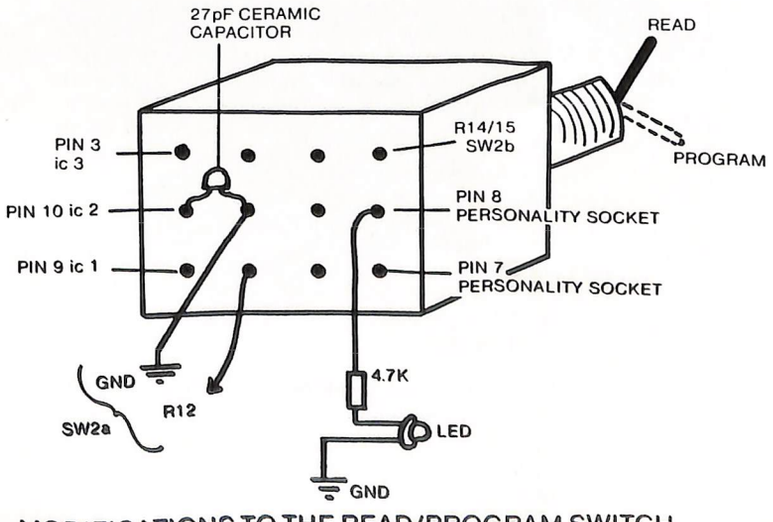
SPEECH BOARD for the VIC & C64



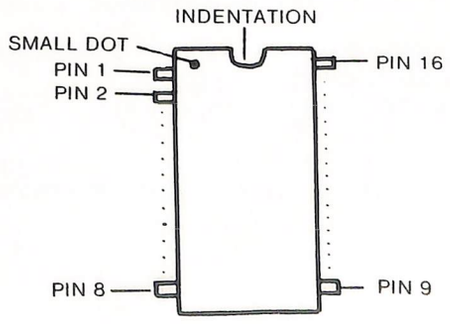
NOTE: The circuit enclosed in the dashed line is only required for the VIC. 64 owners can connect pin 24 of the SP0256 to the audio input pin (pin 5) of the audio/video socket.

ERRATUM

We must apologise to the many readers who contacted us, enquiring as to the whereabouts of the diagrams of the Read Program Switch for the Eprom Programmer Article by Paul Markowski in last Issue. Diagrams are printed below.



MODIFICATIONS TO THE READ/PROGRAM SWITCH TO OVERCOME RANDOM PULSES TO THE ADDRESS GENERATOR



IC PIN NUMBERING SCHEME (16 PIN IC)

PC, SIDEKICK & other matters

Mervyn Beamish

I'm sitting down with a Commodore PC10. It is the first time I've been within COOEE of any PC so all I can do is give you my impressions of it as a computer in its own right and not in comparison to other PC's.

Commodore's Answers

First a few questions to Collin Conlin, *Commodore's National Marketing Representative for the PC.*

Q. *IBM Compatible. How compatible is it?*

A. So far we have not found anything that will not run on it. Dealers have not reported anything either. That includes software or *hardware.*

Q. *Is it* compatable with any of the other Commodore machines.

A. No. It is IBM compatible there is no Commodore compatibility at all. Hardware or software wise.

Q. Is there a hard disk?

A. You can get a *hard* disk version (PC20). The hard disk *sits* inside. Unlike the IBM there is no outward sign of the hard disk. It's a Cannon hard disk a BASF drive. The PC10 does not have a hard disk but one can simply be added by the user.

Q. If you bought this off the shelf (PC10) in IBM what would it cost?

A. The IBM equivalent would cost $5150.00 off the shelf. The PC10 costs $3,600.00.

Q. Is this the cheapest IBM compatible on the market?

A. No. There are other cheaper machines on the market. Generally Taiwanese IBM copies. But we believe this to be the most cost effective in the market place.

Q. What do you get with the computer.?

A. The screen (monitor), disk drives and Keyboard (*if you bought* an IBM in some cases the keyboard is an extra)!

Q. Power supply?

A. Built in. The power supply is rated at 170W so you should be able to run peripherals straight off the PC's own power supply i.e. 2x70Mb hard disks – no upgrade required.

Q. Software – what do you get?

A. MS DOS and CW BASIC on floppy disk. The IBM has BASIC in ROM but you have to buy the MS DOS. We don't charge extra for it.

Q. So there is no software on ROM?

A. That is right. When you switch it on the machine invites you to load a disk the same as any other IBM compatible machine.

Q. Any out of the usual uses for the system arisen yet?

A. The system has not been out in the market long enough yet. One of our dealers in the country has a POINT-OF-SALE system running and it operates the cash register, and has lights hooked up too! He sells off the system. If anyone comes in he says "Look at this, I use one in my own business" and pushes F5 and the *till* draw opens and so on. Another dealer in a vertical market in Western Australia sells restaurant software and some accounting software. Apart from that the system is selling as a good solid business unit.

THE GOOD BITS

Commodore produce a Feature/Benefit sheet for their dealers. I've included it here verbatum and with no comment.

PC FAB SHEET

CPU

Feature	Five(5) Full size expansion slots
Benefit	Will accomodate all size cards
Feature	256K of memory expandable to 640K on motherboard
Benefit	Doesn't use expansion slot
Feature	RS232 interface on motherboard
Benefit	Doesn't use expansion slot No additional expenditure
Feature	Centronics interface on motherboard
Benefit	Doesn't use expansion slot No additional expenditure
Feature	170 watt power supply
Benefit	Will drive 2x70Mb hard disks No upgrade required
Feature	Fan inside power supply
Benefit	Mor efficient cooling
Feature	Space inside for hard disk
Benefit	Hard disk upgrade can be internal
Feature	Activity LED for hard disk
Benefit	No requirement for dealer to install
Feature	BASF floppy drive
Benefit	High performance/reliability
Feature	Keyboard connects at front of CPU
Benefit	Keyboard stability
Feature	Locking floppy disk drive
Benefit	Media corruption protection

KEYBOARD

Feature	Three position stand
Benefit	Adjustable to suit most requirements
Feature	Numbers lock LED indicator
Benefit	Display of current mode Easy to use
Feature	Capitals lock LED indicator
Benefit	Display of current mode Easy to use
Feature	Specific purpose keys seperate from typewriter keyboard
Benefit	Aesthetically pleasing Easy to use
Feature	Home keys on typewriter sculptured
Benefit	Easy to use
Feature	Home key on numeric key pad has "Bump"
Benefit	Easy to use
Feature	Large return key
Benefit	Easy to use
Feature	Two return/enter keys
Benefit	Easy to use

SCREEN

Feature	Fold-up screen stand
Benefit	Easy to use

SPECIFICATIONS

Compatability	IBM PC & XT
Microprocessor	Intel 8088 16-bit processor Intel 8087 Floating Point Processor (optional)
Operating System	MS-DOS 2.1.
Clock Speed	4.77 Mhz
Memory	Main – 256K RAM (Expandable to 640K) Video 32K RAM ROM 8K or 16K
Display	12" monochrome CRT (green phosphor), or 12" RGBI colour (medium resolution) Screen formats: Monochrome graphic 640 X 200 pixels Monochrome graphic 640 X 352 pixels Colour alphanumeric, 16 colours, 40 X 25 Colour graphic, 16 colours, 160 X 200 pixels Colour graphic, 4 colours, 320 X 200 pixels Colour graphic, 16 colours, 320 X 200 pixels Colour graphic, 4 colours, 640 X 200 pixels Alphanumeric attributes: High intensity, reverse video, blinking Underlining (monochrome only)
Keyboard	Detachable 84 keys, including 10 function keys
Interfaces	Parallel port – Centronics Serial port – RS232 Keyboard RGBI Composite monochrome Five expansion slots (for PC compatible PCBs) Power
Storage	Dual double-sided floppy disk drives capacity 360K each, or one floppy & one 10M byte hard disk
Software	Will run all IBM P.C. software

SIDEKICK

I took a copy of SIDEKICK (refer last issue) to try on the PC10 and once into the system I became envious of PC users. SIDEKICK sits in the background and you can call it up as required – over the top of whatever you are currently working on and without losing anything. SIDEKICK contains:

Notepad
A full-screen WordStar/TURBO Pascal compatible text editor with special notepad features like easy data transfer from any other program, automatic time/date stamping of notes, etc.

Calculator
On-screen calculator performing as a normal pocket calculator, and offering special features for programmers.

CaLendar
Perpetual CaLendar with daily appointment schedules.

Dialer
Automatic dialer which takes numbers from its own phone directory or directly from the screen. You may find the number with dBase-II or any other database that you already have, and Sidekick will make the call!

ASCII Table
Displays the full 256-character ASCII alphabet in decimal and hexadecimal values and shows the corresponding IBM PC characters and mnemonics. A must for any programmer.

Help
An on-line help system holds your hand whenever you need it.

Setup
Sidekick's various standard values may be changed to suit your every desire whenever you want – no complicated installation procedures necessary!

At logon SIDEKICK will tell you how much memory you have in total, the memory available after DOS and other system stuff and finally the amount of memory left after loading SIDEKICK. A rather nice feature is that limited versions can be loaded thus saving memory i.e. exclude Notepad and load the rest etc.

EASY TO USE

The system is called up by pressing the Ctrl and Alt keys together, a main menu comes on screen.

Figure 2 – Sidekick Main Selection Window

Selection is made by pressing the relevant function key. But there are a number of ways to access an item i.e. Notepad can be called up with F2, AltN or use the arrows to move the horizontal bar to NotePad and press ENTER. If you want to get back to what you are doing hit the Esc key. Alternatively if the window (or any SIDEKICK window) is covering something you wish to see on the screen it can be easily moved by activating SCROLL LOCK and deactivate NUM LOCK then use the arrow keys to move the window around the screen. It is possible that you have a number of windows on the screen at the same time and that your current one overlaps another. It is possible to rearange the windows and bring one in the background into the foreground.

CALCULATOR

The calculator is typical of the detail that SIDEKICK goes into. On the screen the calculator window gives graphics representing an every day electronic calculator.

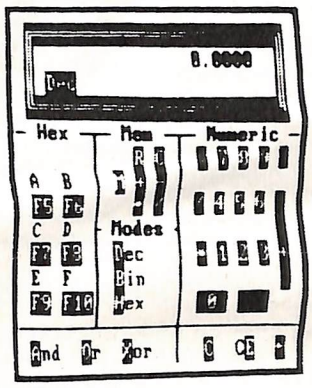


Figure 3 Calclulator

The graphic's display reacts the same as a calculator as you use the numeric pad on the computer. One can do DEC, HEX and BIN conversions and maths and if you wish lift the result and store then for inclusion in work you are doing elsewhere. You can remove SIDEKICK windows from the screen, carry on with the job you are currently working on and call the window back later on without losing any information contained within the window. NotePad can be utilized as a screen dump if you so desire. I'm very excited about the versatility of SIDEKICK it is flexible, powerful and useful (as opposed to gimmicky).

Continued overleaf

Sidekick makes full use of windows: each function uses its own separate window, and many windows may be present on the screen at the same time. When a window opens, it will cover some other information, but everything is still present underneath it.

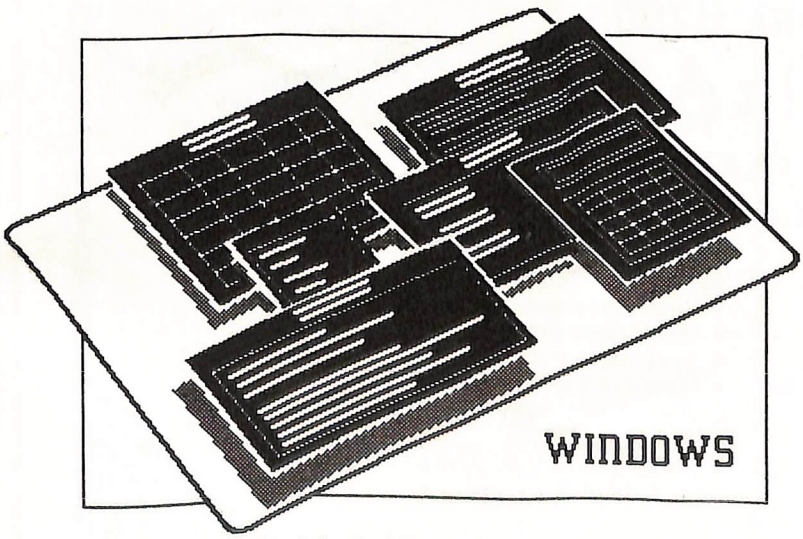


Figure 1 Sidekick makes full use of Windows

Each window may be easily moved around on the screen to uncover information that you need to see on the original screen or in other windows. The size of the notepad window may even be varied, both horizontally and vertically – it can take up the whole screen, or just part of a line.

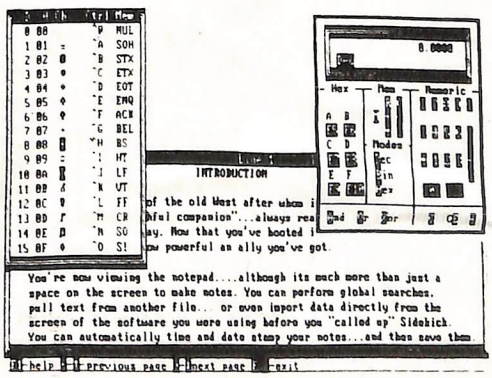


Figure 4 Notepad - Calculator - ASCII Table

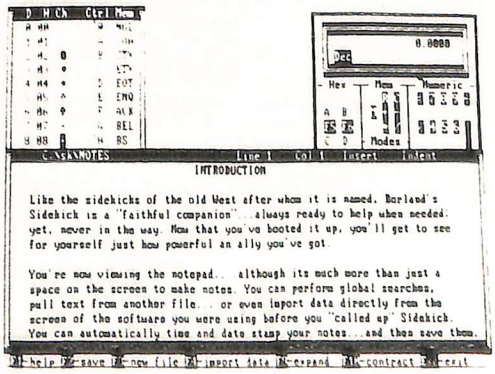


Figure 5 Back to the Notepad

Continued from previous page

USES

But how would you use it? In the back of the manual some typical examples are given:

Example 1

You are working with a word processor, like WordStar, and you need to make a few calculations in connection with the text you are writing. You do not want the calculations included in the text, only the results. On the other hand you want to keep the calculations for future reference.

Without Sidekick: First dig out your calculator. Now do the calculations. Now find a piece of paper and a pencil, or write the number with WordStar, then mark the text as a block and write it to a file. When you later on need the notes and calculations for your own reference you must either read in the file as a block, read it and then delete it, or try to find the piece of paper.

With Sidekick: Activate the calculator. Do the calculations. Activate the Notepad and write your notes.

Press Esc twice to return to your word processor.

When you later on need the notes, simply activate the notepad from within your word processor, read the note and return to your word processor by pressing Esc.

Example 2:

Something very strange just happened to the program you are running, unfortunately the in-house specialist is out to lunch and you know he will not believe you unless you show it to him. On the other hand you can't stop working. What do you do?

Without Sidekick: 1) Continue working and learn to live with the problem; nobody will fix it, because nobody will believe you. Or 2) Stop working and get in trouble with your boss.

With Sidekick: Activate the notepad and press F4 to import data from the screen. Now use the block commands to copy the entire screen to the note file which you may show the in-house specialist later on.

Example 3:

You are writing a large BASIC program with lots of GOTOs and GOSUBs. but you keep forgetting the line number of your input routine, or the meaning of line numbers such as 8760.

Without Sidekick: You very quickly end up with endless lists of notes on paper – which you must keep updated all the time.

With Sidekick: Use the Notepad to maintain lists of your subroutines. Notepad's search command lets you quickly locate any subroutine in the list, and the sort command lets you keep the list sorted – on line numbers, on names, or on anything else.

COMMODORE PC

AVAILABILITY

SIDEKICK comes on disk and is accompanied by a very readable and understandable manual! All in all the package is very professionally presented and as you've no doubt guessed has impressed this user. Distributed by Software Source Pty Ltd, Sydney, the package is available (protected and unprotected) for IBM PC, XT, AT, Jr. and true compatibles – like the Commodore PC. Price $99.95.

Pittwater Distributors Presents:

ELECTRONIC CASH BOOK 64

A DISK BASED PROGRAM FOR THE COMMODORE 64

A Cash Book is essential if a business, no matter how large or small is to properly monitor its incoming and outgoing money. Without accurate knowledge of cash flow, no businessman can operate efficiently in the current financial climate.

Too often, especially in small businesses, writing up a manual Cash Book is put off because it is tedious and time consuming and most feel that they are better served by making more sales or obtaining more work than worrying about the cash management side of things. Many would be better served to try and contain the day to day running cost of their business so that the extra income is not swallowed by extra expenses.

With the above in mind, the ELECTRONIC CASH BOOK has been designed to help businessmen both large and small, to get an accurate picture of incoming money (sales) and their outgoing money (expenses). Coupled to the Commodore 64 it is an economical and foolproof method of keeping on top of your cash flow.

ECB has made provision for the following:

- ★ No accounting experience needed whatsoever
- ★ Comprehensive manual
- ★ Program is menu driven
- ★ Allows for 19 Dissections for incoming money or sales
- ★ Allows for 40 Dissections for outgoing money or expenses
- ★ Keeps a running balance of your bank account
- ★ Enables budget to be set against all Dissections
- ★ Has extensive printout facilities
- ★ Provision for periodical payments from bank account
- ★ Electronic reconciliation of bank statement
- ★ Extensive enquiries possible
- ★ Provides for comparing MTD, YTD and Previous YTD figures

These and many more jprovisions are available through the program to enable all businesses, whatever their size, to keep a firm hold on their cash flow. As well, you will save on accountancy costs because at the end of the year, you will simply present to your Accountant complete printouts of all financial transactions conducted throughout the financial year. From the Cash Book printouts your Accountant will be able to write up your general ledger, thereby, leading to your profit and loss account.

This program does not cost, it SAVES.

THE ELECTRONIC CARD FILE

A DISK BASED PROGRAMME FOR THE COMMODORE 64

The Electronic Card File is an extremely fast program, designed to emulate a handwritten card system. But with many more options!

Flexibility:	You design wht card the way you want it to appear.
Efficient data storage:	Allows up to 3200 records per disk depending upon layout, etc.
Efficient data entry:	Normal entry, plus

- up to 100 coded entries
- the ability to duplicate any field into any other field *of the same type*
- assign values to keys for single keystroke *entry of common entry values*
- create an overlay that can be entered *into any* record at any time
- simple arithmetic operation (add, subtract, multiply, divide) between any pair of numeric fields
- multiple numeric fields can be totalled
- instant update of totals, etc., whenever new numeric data is entered, or existing numeric data is altered

Access records via

- sequence, either backward or forward
- record number
- the values stored in key fields - every field on the card may be declared a key field at any time, either singly or in conjuction with others

Extensive reporting facilities - *set up your own page* of text, indicate where data from the cards is to go.
Labels - design your own. The system will handle up to 5 labels across a page up to 30 lines per label.

PROFESSIONAL FLIGHT MANAGER

A DISK BASED PROGRAMME FOR THE COMMODORE 64

Designed for: General Aviation

Anyone who flies a powered aircraft - from student pilot in a two seater trainer, to the holder of the Senior Commercial Licence piloting an executive Learjet.

And for anyone who operates or manages the operation of General Aviation aircraft - private owners, flying schools, charter operators, commuter airlines.

The Need

Prior to any pilot conducting a flight outside of a training area, a flight plan is required to be lodged. Flight planning involves selecting a route, plotting tracks and distances on charts, applying meteorological data, calculating en-route times, and assessing fuel needs a time consuming process.

In addition, certain elements of this information need to be available at short notice to those who operate aircraft in business, Charter operators, for instance, need the ability to provide immediate comparative quotes on flights to remote locations.

The Concept

PROFESSIONAL FLIGHT MANAGER embodies the very concept of the computer. It introduces a time and labour saving facility combined with the security of absolute accuracy, into a professional environment where these qualities must be integrated without compromise.

The Answer

PROFESSIONAL FLIGHT MANAGER offers two prime functions. These relate to a) Flight Planning and b) Trip Costing.

These prime functions incorporate the ability to access extensive navigation related calculations capable of providing an unprecedented wealth of information to the user.

Utilising the database provided, the user has the ability to store, access and edit information relevant to his own needs and operating procedures.

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Sound Effects for the Commodore 64

by David Bergmeier

Sound effects are an important part of any game. They can be used to increase the quality of practically any program, and can be adapted to suit a particular game. Take for example an enthralling adventure where as well as the text "you hear a loud gunshot", you include a good sound effect. There is no telling how much sound effects can improve a game. What's more, they are very easy to write in BASIC.

One method that I use is to have all the sound effects one after the other at the end of the program, then call them using the GOSUB statement whenever they are required.

The general structure of a sound effect is easy. The first thing to do is to clear the SID chip so any previous settings will not affect the current noise. The next thing is to specify a maximum volume, the attack, decay, sustain and release (ADSR) and a waveform (more about these later). Then comes the sound effect which can range from changing pitch to changing just about anything (such as filter settings which will be discussed later.) Then all that is left is to turn off the dreadful noise once the sound effect has executed.

The first few lines of initialization are what I term "standard settings" simply because all they do is to enable the sound to start as soon as it is turned on and stop once it has been turned off. (ie. No attack, decay or release and a maximum sustain.)

```
10 S=54272
20 FORI=0TO24:POKES+I,0:
   NEXT
30 POKES+24,15
40 POKES+5,0
50 POKES+6,240
60 POKES+4,17
```

Now for the sound effect. An often used but simple method is to continuously change the pitch with a FOR-NEXT loop. There are two pitch locations for each voice, a high byte and a low byte. When creating sound effects it is very much easier to cheat by disregarding the low byte and only using the high byte. There may be a few sound effects where it is neccessary to use the low byte, but for most cases it can be omitted. Here is a simple siren :-

```
70 FORI=1TO255
80 POKES+1,I
90 NEXT
```

Now to remove the high-pitched wail at the end there are three alternatives.

1) turn off the volume (type "POKES+24,0")

2) turn off the pitch (type "POKES+1,0") or

3) turn off the waveform (type "POKES+4,16").

I would usually do 2 and 3. To alter the speed of the siren change the rate at which the *FOR-NEXT* loop increments. ie, change line 70 to :-

```
70 FORI=1to255STEP5
```

Try different numbers (other than 5) for different speeds. To slow the siren down try using decimal values such as (0.5 or 0.8). Don't try numbers that are too large or the siren will sound wrong. Stick to numbers less than ten, fifteen at the most (for a GOOD siren). The siren goes up and can easily come down. Enter the following lines onto the end of the program so far.

```
100 FORI=255TO0STEP-1
110 POKES+1,I
120 NEXT
```

After you have run this sound effect, you may notice that there is no sound left at the end. This is because the pitch is turned off by the last value POKEd into the pitch register during the FOR-NEXT loop. Once again, go ahead and change the speed by altering the number after the STEP in line 100 but DON'T omit the minus sign or the siren will not come down.

In the initialisation (line 60) the waveform was set. This actual waveform is a triangle waveform and sounds very smooth. (This is due to the fact it is very similar to a sine wave.) There are three other waveforms available. They are the sawtooth which sounds like a buzz, the pulse (or square wave) which is a smooth buzz and the random waveform which is similar to a white noise. Each have different purposes. To hear them, change the number POKEd into S+4 in line 60 to one of the following :-

```
17 - triangle
33 - sawtooth
65 - pulse
129 - noise
```

If using the pulse waveform add a pulse width by adding line 55:

```
55 POKES+3,8
```

Once again this is only a high byte. It can be altered to any value between zero and fifteen. But if the high byte is fifteen, the low byte (S+2) can only be zero. (For further information see pages 192 to 196 in the 64 Programmer's Reference Guide.)

The second sound effect is essentially the same as the first except it is repetitive. This makes it far more flexible, easier to create better sounds and far more useful in programs. Use the first six initialisation lines from sound effect one and add the following lines:-

```
70 FORI=1TO20
80 FORJ=1TO255STEP20
90 POKES+1,J
100 NEXT
110 NEXT
```

Then to end the sound effect add:-

```
120 POKES+1,0
```

The following modifications can be made to this sound effect:

1) the speed by changing the number after the STEP in line 80

2) the waveform by changing the number POKEd into S+4 in line 60.

3) the number of repetitions by altering the second number (20) in line 70

4) the range of the pitch by changing one or both numbers in line 80

eg. 80 FORJ=100TO200STEP10

Make sure the first number is greater than the second one.

As you see, the number of all possible sound effects using this method is quite large. Note that the first two numbers in line 80 MUST be integers between (and including) 0 and 255. Don't forget to add line 55 if using a waveform of 65. Also, there is no limit to the range of numbers in the FOR-NEXT loop in line 70. Large numbers simply keep the sound effect running longer.

To save time I have written a simple sound effects generator to help create these kinds of sound effects. It is very easy to use and contains full instructions. Type it in and run it. Sound effects are added to the end of the program once you are satisfied with the current sound effect. All ranges for prompts are given and if you want to use previous settings just hit RETURN without typing anything. At the end you must press RETURN several times or cursor down and enter NEW before hitting RETURN on those lines.

To give you an idea what the uses for this type of sound effect are, I have written several short sound effects each using FOR-NEXT loops. Some are more complicated than others, but you can see how the loops are basically constructed. These are all included in the second program which includes full instructions.

Next time I'll be discussing elementary sound effects with things like randomness and simple useful sounds for games. I'll also include an explanation of ADSR.

SFX GENERATOR

```
10 REM "################################"
   'BAPC
20 REM "#SOUND EFFECTS GENERATOR V-1[SPACE3]#""BAVG
30 REM "#BY DAVID BERGMEIER[SPACE2]APRIL 1985#""BAPH
40 REM "################################"
   'BAPF
100 POKE 53280,5: POKE 53281,0: POKE 650,128'DXRB
110 PRINT "[CLR,GRN,DOWN,SPACE7]SOUND EFFECTS
    GENERATOR V1""BAFF
120 INPUT "[DOWN3,SPACE2]START (0-255)";S$'BDXB
125 S=VAL (S$): IF S<0 OR S>255 THEN 100'HPVK
130 INPUT "[DOWN,SPACE2]END[SPACE3](0-255)";E$'BDFC
135 E=VAL (E$): IF E<0 OR E>255 THEN 100'HPUK
140 INPUT "[DOWN,SPACE2]STEP (BETWEEN -255 & 255:NOT 0)";
    T$'BDQH
145 T=VAL (T$): IF T=0 OR T>255 OR T<-255 THEN 100'KTWP
147 IF (S>E) AND (T>0) THEN 100'FLUL
148 IF (S<E) AND (T<0) THEN 100'FLYM
150 INPUT "[DOWN,SPACE2]REPETITION";R$'BDWE
155 R=VAL (R$): IF R<1 THEN 100'FLTK
160 INPUT "[DOWN,SPACE2]WAVEFORM (17,33,65,129)";W$'BDKH
165 W=VAL (W$): IF W<>17 AND W<>33 AND W<>65 AND
    W<>129 THEN 100'PWAV
200 SD=54272: FOR I=0 TO 24: POKE SD+I,0: NEXT 'HTAE
210 POKE SD+24,15'CHHY
220 POKE SD+5,0'CFEA
230 POKE SD+6,240'CHHB
240 POKE SD+4,W'CFRC
245 IF W=65 THEN POKE SD+3,8'FIVK
250 FOR I=1 TO R'DDMD
260 FOR J=S TO E STEP T'EEGF
270 POKE 54273,J'BHSF
280 NEXT 'BAEE
290 NEXT 'BAEF
300 FOR I=0 TO 24: POKE SD+I,0: NEXT 'GLPD
310 PRINT "[HOME,DOWN18,SPACE2,RVS]C[OFF]HANGE ,
    [SPACE,RVS]A[OFF]GAIN OR[SPACE,RVS]L[OFF]IST""BAXH
330 GET A$: IF A$="" THEN 330'E IF E
340 IF A$="C" THEN 100'DFEE
350 IF A$="A" THEN 200'DFDF
360 IF A$<>"L" THEN 330'EFVG
400 PRINT "[CLR]": POKE 53280,6'CIWB
410 INPUT "[DOWN2]START OF LINE NUMBERS (1000-)";LN$
    'BEWH
415 LN=VAL (LN$): IF LN<1000 OR LN>63999 THEN 400'HYKO
420 INPUT "[DOWN2,SPACE2]STEP OF LINE NUMBERS 5
    [LEFT3]";LI$'BETJ
425 LI=VAL (LI$): IF LI<0 THEN 400'FOQL
430 INPUT "[DOWN,SPACE]CONTINUE (Y/N)";A$: IF A$="N"
    THEN 200'EJOJ
440 PRINT "[CLR,DOWN]""BALD
450 PRINT LN"S=54272""BCFF
455 LN=LN+LI'CGLL
460 PRINT LN"FORI=0TO24:POKES+I,0:NEXT""BCVL
465 LN=LN+LI'CGLM
470 PRINT LN"POKES+24,15""BCBI
475 LN=LN+LI'CGLN
480 PRINT LN"POKES+5,0""BCVJ
485 LN=LN+LI'CGLO
490 PRINT LN"POKES+6,240""BCBK
495 LN=LN+LI'CGLP
500 PRINT LN"POKES+4,"W'BDIC
505 LN=LN+LI'CGLH
510 IF W=65 THEN PRINT LN"POKES+3,8""EFMG
515 IF W=65 THEN LN=LN+LI'FJCK
520 PRINT LN"FORI=1TO"R'BDFE
525 LN=LN+LI'CGLJ
530 PRINT LN"FORJ="S"TO"E"STEP"T'BFSH
535 LN=LN+LI'CGLK
540 PRINT LN"POKES+1,J""BCSG
545 LN=LN+LI'CGLL
550 PRINT LN"NEXT:NEXT""BCSH
555 LN=LN+LI'CGLM
560 PRINT LN"POKES+1,0""BCRI
565 LN=LN+LI'CGLN
570 PRINT "[DOWN7,WHT,SPACE4,RVS,SPACE]PRESS
    RETURN 13 TIMES ""BAVN
580 PRINT "[HOME]";'BBFH
599 END 'BACR
600 FOR I=54272 TO 54296: POKE I,0: NEXT 'FQUG
610 GOTO 100'BDAC
```

SFX GENERATOR 2

```
10 REM "################################"
   'BAPC
20 REM "# SOUND EFFECTS GENERATOR[SPACE2]V-2 #"
   'BAWG
30 REM "# BY DAVID BERGEMIER[SPACE2]MAY 1985 #""BAHH
40 REM "################################"
   'BAPF
100 PRINT "[CLR,WHT]":: POKE 53280,6: POKE 53281,0'DRJA
110 PRINT " < SOUND EFFECTS GENERATOR VERSION 2 "
   'BADG
120 PRINT "[DOWN,RED,RIGHT3]PLEASE MAKE YOUR
    SELECTION[GRN,DOWN]""BASF
130 PRINT "[RVS,SPACE12]1 SIMPLE SIREN #1[SPACE11]""BAAF
140 PRINT "[RVS,SPACE12]2 SIMPLE SIREN #2[SPACE11]""BACG
150 PRINT "[RVS,SPACE12]3 MUSICAL SCALES[SPACE12]""BATH
160 PRINT "[RVS,SPACE12]4 UFO SHOOTING[SPACE14]""BAQI
170 PRINT "[RVS,SPACE12]5 UFO LANDING[SPACE15]""BANJ
180 PRINT "[RVS,SPACE12]6 UFO DECENT[SPACE16]""BAVK
190 PRINT "[RVS,SPACE12]7 ALIEN WARNING[SPACE13]""BAFL
200 PRINT "[RVS,SPACE12]8 ALIEN ALERT[SPACE15]""BAKD
210 PRINT "[RVS,SPACE12]9 BLACK ALERT[SPACE15]""BAYE
220 PRINT "[RVS,SPACE12]0 RED ALERT[SPACE17,HOME]""BAQF
230 GET A$: IF A$="" THEN 230'EIED
240 IF A$="0" THEN A$="10""EESD
250 IF VAL (A$)<0 THEN 230'EILF
260 POKE 53281,1: PRINT "[CLR]";'CJCF
270 ON VAL (A$) GOSUB 300,400,500,600,700,800,900,1000,1100,1200
    'DVHN
280 GOTO 100'BDAF
300 REM ### SIMPLE SIREN #1 ###'BTAC
305 S=54272'BGJE
310 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDD
315 POKE S+24,15'CGOF
320 POKE S+5,0'CELB
325 POKE S+6,240'CGOG
330 POKE S+4,17'CFQC
335 FOR I=1 TO 255'DFLH
340 POKE S+1,I'CEHD
345 NEXT 'BAEG
350 POKE S+1,0'CEHE
355 RETURN 'BAQH
400 REM ### SIMPLE SIREN #2 ###'BTBD
405 S=54272'BGJF
410 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDE
415 POKE S+24,15'CGOG
420 POKE S+5,0'CELC
425 POKE S+6,240'CGOH
430 POKE S+4,17'CFQD
435 FOR I=1 TO 255'DFLI
440 POKE S+1,I'CEHE
445 NEXT 'BAEH
450 FOR I=255 TO 0 STEP -1'FGMH
```

Continued overlea

```
455 POKE S+1,I'CEHK
460 NEXT 'BAEE
465 RETURN 'BAQJ
500 REM ### MUSICAL SCALES ###'BTQE
505 S=54272'BGJG
510 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDF
515 POKE S+24,15'CGOH
520 POKE S+5,0'CELD
525 POKE S+6,240'CGOI
530 POKE S+4,17'CFQE
535 FOR I=200 TO 50 STEP -50'FIHL
540 FOR J=1 TO I STEP 4'EETG
545 POKE S+1,J'CEIK
550 FOR K=1 TO 40: NEXT 'EFOH
555 NEXT 'BAEJ
560 NEXT 'BAEF
565 POKE S+1,0'CEHM
570 RETURN 'BAQG
600 REM ### UFO SHOOTING ###'BRGE
605 S=54272'BGJH
610 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDG
615 POKE S+24,15'CGOI
620 POKE S+5,0'CELE
625 POKE S+6,240'CGOJ
630 POKE S+4,17'CFQF
635 FOR I=1 TO 16'DEIK
640 FOR J=20 TO (40+2*I)'FJJJ
645 POKE S+1,J'CEIL
650 NEXT 'BAEF
655 NEXT 'BAEK
660 POKE S+1,0'CEHI
665 RETURN 'BAQL
700 REM ### UFO LANDING ###'BQVF
705 S=54272'BGJI
710 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDH
715 POKE S+24,15'CGOJ
720 POKE S+5,0'CELF
725 POKE S+6,240'CGOK
730 POKE S+4,17'CFQG
735 FOR I=0 TO 20'DECL
740 FOR J=(50-I) TO (30-I) STEP -5'HMBL
745 POKE S+1,J'CEIM
750 NEXT 'BAEG
755 FOR J=(30-I) TO (50-I) STEP 5'GMFR
760 POKE S+1,J'CEIJ
765 NEXT 'BAEM
770 NEXT 'BAEI
775 POKE S+1,0'CEHP
780 RETURN 'BAQJ
800 REM ### UFO DECENT ###'BPDF
805 S=54272'BGJJ
810 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDI
815 POKE S+24,15'CGOK
820 POKE S+5,0'CELG
825 POKE S+6,240'CGOL
830 POKE S+4,17'CFQH
835 FOR I=250 TO 0 STEP -20'FHGO
840 FOR J=1 TO I STEP 5'EEUJ
845 POKE S+1,J'CEIN
850 NEXT 'BAEH
855 NEXT 'BAEM
860 POKE S+1,0'CEHK
865 RETURN 'BAQN
900 REM ### ALIEN WARNING ###'BSXH
905 S=54272'BGJK
910 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDJ
915 POKE S+24,15'CGOL
920 POKE S+5,0'CELH
925 POKE S+6,240'CGOM
930 POKE S+4,17'CFQI
935 FOR I=1 TO 30'DEEN
940 FOR J=70 TO 60 STEP -1'FGOL
945 POKE S+1,J'CEIO
950 NEXT 'BAEI
955 FOR J=60 TO 70'DFMP
960 POKE S+1,J'CEIL
965 NEXT 'BAEO
970 NEXT 'BAEK
975 POKE S+1,0'CEHR
980 RETURN 'BAQL
```


```
1000 REM ### ALIEN ALERT ###'BQPW
1005 S=54272'BGJA
1010 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDY
1015 POKE S+24,15'CGOB
1020 POKE S+5,0'CELW
1025 POKE S+6,240'CGOC
1030 POKE S+4,17'CFQX
1035 FOR I=1 TO 20'DEDD
1040 FOR J=10 TO 110 STEP 10'EIEB
1045 POKE S+1,J'CEIE
1050 NEXT 'BAEX
1055 NEXT 'BAED
1060 POKE S+1,0'CEHB
1065 RETURN 'BAQE
1100 REM ### BLACK ALERT ###'BQDX
1105 S=54272'BGJB
1110 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDA
1115 POKE S+24,15'CGOC
1120 POKE S+5,0'CELX
1125 POKE S+6,240'CGOD
1128 POKE S+3,1'CEKG
1130 POKE S+4,65'CFTY
1135 FOR I=1 TO 10'DECE
1140 FOR J=20 TO 30'DFEA
1145 POKE S+1,J'CEIF
1150 FOR K=1 TO 50: NEXT 'EFPC
1155 NEXT 'BAEE
1160 NEXT 'BAEA
1165 POKE S+1,0'CEHH
1170 RETURN 'BAQB
1200 REM ### RED ALERT ###'BQEX
1205 S=54272'BGJC
1210 FOR I=0 TO 24: POKE S+I,0: NEXT 'GKDB
1215 POKE S+24,15'CGOD
1220 POKE S+5,0'CELY
1225 POKE S+6,240'CGOE
1230 POKE S+4,33'CFOA
1235 FOR I=1 TO 20'DEDF
1240 FOR J=10 TO 50 STEP 2'EGSC
1245 POKE S+1,J'CEIG
1250 NEXT 'BAEA
1255 POKE S+1,0'CEHH
1260 FOR J=1 TO 10: NEXT 'EFKE
1265 NEXT 'BAEG
1270 RETURN 'BAQC
```

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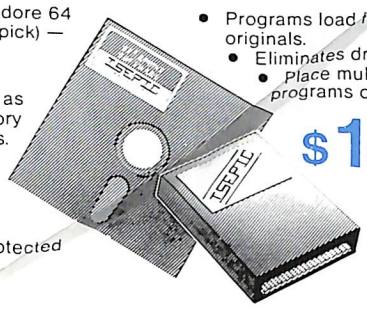

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CM10

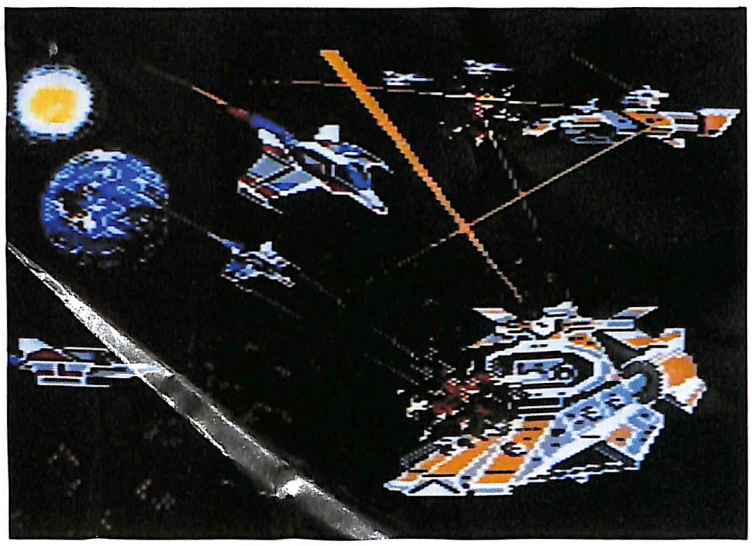
Graphic Library Number 3 : Spacebattle

by Harold T. Salive – Kiwisoft Programs Ptd Ltd

This is the third in our series of GRAPHIC LIBRARY illustrations for the C64.

The illustrations are drawn and compatible with CADPIC © and PAINTPIC © software produced by KIWISOFT of (you guessed it) New Zealand. These programs are available through this magazine.

The two programs below are:



DISPLAY

A high speed picture loading program. You can load any of our Graphic Library pictures with this program by changing the file name in Line 7.

SPACEBATTLEGEN

This program generates SPACEBATTLE, our Library picture for this month. It has a double check facility. First HELPOUT – (if you are not using HELPOUT omit the last 5 characters in each line 'xxxx). Secondly the program has a built-in checksum error facility.

First load and run SPACEBATTLEGEN which will generate the SPACEBATTLE file, then save it to tape or disk.

Secondly NEW, LOAD display and RUN. The picture will then come up on your screen.

May the force be with you.

NOTE: The should be 13
items in each of the datalines
except for the last two.
Double check that you put in all commas
that are shown.

DISPLAY PROGRAM

```
1 REM MULTICOLOR PAINTPIC PICTURE DISPLAY
  PROGRAM'BOIL
2 REM SUPPLIED BY KIWISOFT PROGRAMS LTD'BEDJ
4 BK$=CHR$(144):BL$=CHR$(31):CS$=CHR$(19)+
  CHR$(147):DN$=CHR$(17)'KMNQ
5 JT=37376:BO=53280: FOR I=JT TO 37565: READ X: POKE I,X:
  Y=Y+X: NEXT 'KKMR
6 IF Y<>33014 THEN PRINT "BAD DATA STATEMENT":
  STOP 'GHAO
7 POKE BO+1,5:="SPACEBATTLE":BC=2:DP=10:REM DISPLAY
  FOR 10 SEC WITH RED BORD
8 SYS 37532: REM CLEAR GRAPHIC SCREEN TO BG'CDMO
10 PRINT CS$DN$DN$DN$DN$BL$ TAB(12);"DISPLAY
  PICTURES" 'CWAH
12 PRINT "[SPACE6]"DN$DN$"** PAINTED WITH"BK$
  "PAINTPIC"BL$" **"DN$'BPGK
15 PRINT " " TAB(13)"SPECIAL OFFER"DN$'CGLI
20 PRINT " " TAB(11)BK$"COMMODORE MAGAZINE"
  'CGKF
25 PRINT " " TAB(7)"VOL 5 NO 1 - $35 P&P INCD" 'CCMK
30 PRINT " " TAB(15)DN$"KIM BOOKS" 'CGOE
37 PRINT " " TAB(3)"82 ALEXANDER ST. CROWS NEST.
  2065" 'CCKQ
50 FOR I=1 TO 5000: NEXT 'EHJE
60 GOSUB 1000: GOSUB 9100: PRINT CS$: RUN: REM NEED
  FULL RESTART SINCE CM NOW BAD'FSQQ
1000 GOSUB 2000: OPEN 1,DEV,SA,ID$: GET #1,A$:
  IF A$<>"P"THEN PRINT "NOT PICTURE": END 'JCIH
1010 GOSUB 9000: POKE BO,BC AND 15
1020 GET #1,A$:UB=ASC (A$+ CHR$(0)): POKE BO+1,UB:
  SYS JT: CLOSE 1:U=FRE (0)
1030 FOR I=0 TO DP: FOR J=0 TO 500: GOSUB 1060: NEXT J:
  NEXT I: RETURN
1060 GET A$: IF A$="Q" GOTO 1070: REM QUIT
1065 IF A$="-" GOTO 9500: REM CHANGE BORDER
1067 RETURN
1070 GOSUB 9100: PRINT CS$: END 'DJHD
2000 CLOSE 1: PRINT DN$DN$"ENTER T FOR TAPE OR
  D FOR DISK": INPUT "[SPACE2](T/D)";A$'DMGH
2010 A$=LEFT$(A$,1): IF A$="T" THEN DEV=1:SA=0:
  POKE 37529,96: RETURN : REM STOP ST CHK'KOGL
2020 IF A$<>"D" GOTO 2000'EGCY
2030 DEV=8:SA=2: POKE 37529,208: RETURN :
  REM SET ST CHK'FDWH
9000 POKE 53272,120: POKE 53265, PEEK (53265) OR 32:
  REM TURN ON GRAPHICS SCREEN'FVVP
9010 POKE 53270, PEEK (53270) OR 16'DPNG
9020 POKE 56578, PEEK (56578) OR 3: POKE 56576,
  ( PEEK (56576) AND 252) OR 2'HJXO
9030 RETURN 'BAQE
9100 POKE 53272,21: POKE 53265, PEEK (53265) AND 223:
  REM TURN ON TEXT SCREEN'FRKP
9110 POKE 53270, PEEK (53270) AND 239'DQLI
9120 POKE 56578, PEEK (56578) OR 3: POKE 56576,
  ( PEEK (56576) AND 252) OR 3'HJYP
9130 POKE BO,8: POKE BO+1,5: RETURN 'ELQJ
9500 POKE BO,( PEEK (BO)+1) AND 255: RETURN :
  REM CYCLE BORDER'GBUQ
9900 DATA 162,1,32,198,255,160,0,132,253,169,216,133,254,169,219,32,83,146
  'BODW
9905 DATA 165,252,201,219,144,245,169,231,197,251,176,239,132,253,169,92,
  133,254'BUFE
9910 DATA 169,95,32,83,146,165,252,201,95,144,245,169,231,197,251,176,239,
  132'BRVY
9915 DATA 253,169,96,133,254,169,127,32,83,146,165,252,201,127,144,245,
  169,63'BRQE
9920 DATA 197,251,176,239,72,72,104,104,76,204,255,141,193,146,32,207,255,
  141'BRYA
9925 DATA 190,146,32,207,255,141,191,146,32,207,255,141,192,146,160,0,24,
  173'BQGF
9930 DATA 191,146,101,253,133,251,173,192,146,101,254,133,252,173,190,
  146,145,253'BVAC
9935 DATA 230,253,208,9,230,254,173,193,146,197,254,144,195,165,254,197,
  252,208'BTRG
9940 DATA 232,165,253,197,251,208,226,165,144,208,179,96,160,0,132,253,
  169,96'BRQC
9945 DATA 133,254,169,192,133,251,169,224,133,252,152,145,253,230,253,
  208,2,230'BTHH
9950 DATA 254,230,251,208,244,230,252,208,240,96'BNPW
```

SPACEBATTLEGEN

```
1 REM PROGRAM TO MAKE PICTURE IN CADPIC FORM'BHRI
2 REM SUPPLIED BY KIWISOFT PROGRAMS LTD'BEDJ
10 DIMX(99),VX(11):L=0'CPYB
12 PRINT:PRINT"CHECKING DATA STATEMENTS"'CBGH
15 I=0'BCRD
20 GOSUB400:READX(I):IFX(I)<1000THENI=I+1:GOTO20'IXIH
30 IFI<>12THENGOSUB450:GOSUB500:PRINTI+1;"VALUES INSTEAD OF 13":GOTO15'JRVN
40 FORI=0TO11:X(12)=X(12)-X(I):VX(I)=VX(I)+X(I):NEXT'IKNN
50 IFX(12)<>5000THENGOSUB500:PRINT" BAD VALUE ON LINE":GOTO15'HQCN
60 K=K+1:PRINT"#";:IFK<633GOTO15'GMMI
65 IFLGOTO95'CDFI
68 IFX(0)<>38THENPRINT:PRINT"##TOO MANY DATA LINES":GOTO95'HKJV
70 FORI=0TO11:GOSUB400:READX(I)'FNQI
80 IFX(I)<>VX(I)THENK=0:GOSUB500:PRINT" BAD POSITION";I+1;"SOMEWHERE"'IUFU
90 NEXT:IFKGOTO100'DFVH
95 PRINT:PRINT"###PLEASE FIX ERRS###":STOP'DCFR
100 PRINT:PRINT"DATA STATEMENTS ARE CORRECT"'CBOD
110 PRINT:PRINT"BEGIN STORING PICTURE":PRINT'DCGE
120 PRINT"ENTER T FOR TAPE OR D FOR DISK STORAGE":INPUT" (T/D)";A$'CEWK
130 A$=LEFT$(A$,1):IFA$="T"THENDEV=1:SA=1:B$="":GOTO150'JBGJ
140 DEV=8:SA=2:B$=",S,W":IFA$<>"D"GOTO120'HRSI
150 OPEN1,DEV,SA,"SPACEBATTLE"+B$'CLKH
160 RESTORE:READK:READK:A=2:PRINT#1,"P";CHR$(K);:REMEMBER 2 SEMICOLONS'HHON
170 FORI=1TO633'DFLE
175 FORJ=ATO6'DDBJ
180 D=0:READC:READB:IFC=0THEND=1'HLDJ
185 PRINT#1,CHR$(B);CHR$(C);CHR$(D);:REMEMBER 3 SEMICOLONS'FGAT
190 NEXTJ:READK:REMTHROW OUT CHECKSUM'DUCL
195 A=1:PRINT"%";:NEXTI'DGRM
200 CLOSE1'BBIV
205 PRINT:PRINT"PICTURE SAVED":END'DCYG
400 L0=PEEK(63):L1=PEEK(64):RETURN'FOME
450 IFI=1ANDX(0)=1771THENPRINT:PRINT"##MISSING DATA LINES":GOTO95'IOAQ
455 RETURN'BAQI
500 L=1:PRINT:PRINT"#ERR LINE";L1*256+L0;"-";:RETURN'GPUI
1000 DATA 68,,6,11,4,6,15,8,1,2,2,6,5129'BFKY
1010 DATA 11,8,1,9,2,11,2,7,2,11,4,6,5074'BGWA
1020 DATA 10,8,2,2,1,6,2,7,1,2,2,7,5050'BEUA
1030 DATA 12,8,1,11,3,7,2,11,4,6,1,8,5074'BGWC
1040 DATA 2,10,10,8,5,7,12,8,1,11,3,7,5084'BHWD
1050 DATA 2,11,4,6,1,8,2,10,6,6,4,8,5068'BFFE
1060 DATA 5,7,12,8,6,11,4,6,2,8,3,6,5078'BFQF
1070 DATA 1,14,2,6,1,12,4,8,5,7,12,8,5080'BGAG
1080 DATA 6,11,4,6,2,8,1,6,4,12,2,6,5068'BFFH
1090 DATA 2,2,19,8,9,6,3,,1,6,4,12,5072'BEHI
1100 DATA 4,6,3,8,3,,13,8,9,6,3,,5063'BCQY
1110 DATA 9,6,19,8,9,6,3,,10,6,1,,5077'BDYA
1120 DATA 17,8,9,6,2,,2,14,8,,7,8,5081'BDXB
1130 DATA 2,9,2,8,1,9,1,8,4,9,2,8,5063'BDXC
1140 DATA 9,6,3,,1,6,1,,1,6,1,2,5036'BBAD
1150 DATA 2,,10,8,2,9,2,8,1,9,2,8,5061'BDKE
1160 DATA 1,9,4,8,9,6,3,,1,6,1,12,5060'BDIF
1170 DATA 1,6,1,2,2,6,4,8,2,,4,8,5044'BCFG
1180 DATA 1,,3,9,8,8,10,6,2,,1,6,5054'BCHH
1190 DATA 1,12,2,6,1,,1,6,4,8,3,9,5053'BDDI
1200 DATA 3,8,1,9,11,8,2,2,8,6,2,,5060'BDIA
1210 DATA 4,6,4,2,5,9,14,8,1,,5,12,5070'BEDC
1220 DATA 5,6,6,9,4,2,19,8,1,,5,12,5077'BERD
1230 DATA 5,6,6,9,4,2,2,8,6,7,11,8,5074'BEUE
1240 DATA 1,,10,12,7,9,2,,3,8,6,7,5065'BDJE
1250 DATA 11,8,1,,5,12,5,6,7,9,5,8,5077'BERG
1260 DATA 6,7,11,8,1,,8,8,9,9,5,8,5080'BDFG
1270 DATA 6,7,11,8,1,,7,8,10,9,22,8,5097'BFSI
1280 DATA 1,,2,8,6,9,1,8,1,9,29,8,5082'BDAI
1290 DATA 1,,2,8,4,9,1,8,2,9,1,8,5053'BCOJ
1300 DATA 8,9,21,8,1,,2,8,15,9,22,8,5111'BFKC
1310 DATA 1,,10,9,13,8,17,,10,9,13,8,5098'BGJD
1320 DATA 17,,6,252,4,242,1,173,1,49,1,135,5881'BMJF
1330 DATA 1,101,1,251,1,133,1,251,1,173,1,50,5965'BOJG
1340 DATA 1,135,1,101,1,252,1,13?,1,252,1,108,5987'BPJI
1350 DATA 21,252,4,242,2,10,1,13,1,45,1,135,5727'BNMI
1360 DATA 1,145,1,251,1,104,1,168,1,96,4,252,6025'BOVJ
1370 DATA 1,242,2,252,1,242,13,252,3,241,2,252,6503'BQEL
1380 DATA 4,242,1,136,1,24,1,144,1,212,1,177,5944'BOVL
1390 DATA 1,251,1,41,1,252,1,141,1,45,1,135,5871'BNMM
1400 DATA 1,32,1,133,5,242,13,252,3,241,2,252,6177'BPLF
1410 DATA 4,242,1,254,1,169,10,242,1,29,5,242,6200'BPMG
1420 DATA 22,252,1,208,1,233,7,242,2,252,1,242,6463'BQOH
1430 DATA 1,139,5,242,14,252,7,249,1,252,1,220,6383'BQAI
1440 DATA 1,9,4,242,2,252,1,254,2,252,1,242,6262'BNUI
1450 DATA 1,173,17,252,1,242,1,252,7,249,3,,6198'BNLJ
1460 DATA 5,242,4,252,1,242,5,,13,252,1,242,6259'BNXK
1470 DATA 1,252,7,249,3,,7,242,2,252,1,242,6258'BMHL
1480 DATA 7,,1,230,1,252,1,140,1,193,2,142,5970'BMOM
1490 DATA 1,199,1,142,1,172,1,199,1,142,1,242,6102'BPOO
1500 DATA 1,252,6,249,1,137,2,128,1,,10,242,6029'BNWF
1510 DATA 7,,1,243,1,76,1,14,1,139,1,32,5516'BJCF
1520 DATA 1,242,1,138,1,162,1,254,1,132,1,251,6185'BPJI
1530 DATA 1,242,1,252,6,249,1,137,2,128,1,10,6030'BONI
1540 DATA 2,,1,240,13,,1,12,1,76,1,41,5388'BHSI
1550 DATA 1,240,1,28,3,106,1,108,1,145,1,251,5886'BOWK
1560 DATA 1,200,1,242,1,252,7,249,3,,1,242,6199'BMWL
1570 DATA 3,252,1,242,1,240,10,,1,12,1,172,5935'BMHM
1580 DATA 1,32,1,145,1,251,1,200,1,208,1,251,6093'BOEN
1590 DATA 1,230,1,252,1,145,1,251,1,242,8,252,6385'BPNP
1600 DATA 2,,2,242,2,252,1,242,1,252,1,254,6251'BMJG
1610 DATA 1,252,1,240,9,,1,44,1,140,1,96,5786'BKDH
1620 DATA 1,24,1,96,1,32,1,242,1,138,1,162,5700'BMOI
1630 DATA 1,1,1,32,4,252,6,242,1,,1,2,5543'BHNI
1640 DATA 1,242,2,252,1,242,23,252,1,142,4,252,6414'BQGL
1650 DATA 6,242,1,,3,242,2,252,2,242,21,252,6265'BNRL
1660 DATA 1,,10,242,5,252,1,242,1,252,1,,6007'BKCM
1670 DATA 1,252,1,242,19,252,1,,1,98,9,242,6118'BMGN
1680 DATA 7,252,2,,3,252,6,242,11,252,1,,6028'BKRO
1690 DATA 10,242,7,252,2,,3,252,6,242,11,252,6279'BOAP
1700 DATA 1,,10,242,7,252,1,204,1,142,3,252,6115'BNFH
1710 DATA 6,242,11,252,1,,1,142,1,173,1,204,6034'BNFI
1720 DATA 1,142,1,56,1,237,1,186,1,142,1,140,5909'BOXJ
1730 DATA 8,252,1,186,1,142,3,252,6,242,11,252,6356'BQAL
1740 DATA 1,,1,205,1,185,1,142,1,240,1,21,5799'BLQL
1750 DATA 1,144,1,19,1,236,1,188,8,252,1,142,5994'BOKN
1760 DATA 1,176,20,252,1,,1,141,1,185,2,140,5920'BNLN
1770 DATA 1,188,1,142,1,32,1,124,1,136,1,141,5769'BOWO
1780 DATA 1,48,1,135,1,41,1,7,1,205,1,185,5627'BLXP
1790 DATA 1,142,1,240,1,21,20,252,1,,1,140,5820'BMSQ
1800 DATA 1,183,1,140,1,44,1,124,1,140,1,24,5661'BNGI
1810 DATA 1,108,1,189,1,142,1,141,1,188,1,140,5914'BPQK
1820 DATA 1,156,1,5,1,172,1,252,1,141,1,189,5921'BNWK
1830 DATA 20,252,1,,1,24,1,109,1,183,2,140,5734'BMKL
1840 DATA 1,60,1,140,1,172,2,204,1,48,1,140,5771'BNKM
1850 DATA 1,188,1,12,2,76,1,140,1,173,1,189,5785'BNNN
1860 DATA 20,252,1,,1,44,1,236,1,142,1,172,5871'BMOO
1870 DATA 1,204,1,140,1,44,1,157,1,140,1,172,5863'BOMP
1880 DATA 1,251,1,141,1,194,1,142,1,165,1,252,6151'BPER
1890 DATA 1,24,1,109,1,191,1,142,1,141,1,195,5808'BOTR
1900 DATA 1,142,17,,1,140,1,32,1,204,1,252,5792'BMJJ
1910 DATA 1,140,1,204,1,142,1,160,1,,1,32,5684'BLCK
1920 DATA 1,121,1,136,1,24,1,109,1,181,1,142,5719'BOML
1930 DATA 1,141,1,47,1,135,1,176,1,65,1,169,5739'BNLM
1940 DATA 1,159,17,,7,,1,3,3,,1,15,5207'BEDL
1950 DATA 1,48,2,207,1,63,1,,1,3,1,255,5583'BIDN
1960 DATA 1,3,2,255,1,2,1,170,2,,1,252,5690'BIRO
1970 DATA 1,15,1,252,1,255,1,15,1,171,4,,5717'BKQQ
1980 DATA 1,192,2,48,1,204,10,,1,128,1,32,5620'BLJR
1990 DATA 1,8,1,2,8,,1,128,1,40,64,,5254'BFYR
2000 DATA 3,3,5,,5,255,2,63,1,15,3,,5355'BFDA
2010 DATA 2,192,3,240,44,,1,2,2,,1,2,5489'BGYB
2020 DATA 4,,1,80,1,118,1,253,1,149,5,,5613'BIAC
2030 DATA 1,155,1,95,1,149,6,,1,192,1,104,5706'BLDE
2040 DATA 16,,2,3,8,,1,192,1,48,1,12,5284'BGDE
2050 DATA 2,3,8,,1,192,56,,1,12,2,15,5292'BGBF
2060 DATA 2,63,1,207,1,254,2,250,1,234,1,229,6245'BOUH
2070 DATA 1,166,1,181,1,149,1,213,1,85,1,129,5929'BOGJ
2080 DATA 1,102,1,169,1,149,1,85,1,87,1,127,5725'BNKJ
2090 DATA 1,215,1,10,1,86,1,165,1,89,2,85,5657'BLNK
2100 DATA 1,245,1,117,1,243,2,191,1,175,1,239,6217'BPTD
2110 DATA 1,111,1,123,1,91,3,,2,192,1,,5526'BINC
2120 DATA 2,240,8,,1,10,1,2,7,,1,128,5400'BGID
2130 DATA 1,160,1,40,1,10,1,2,6,,1,128,5351'BIFE
2140 DATA 1,160,1,40,1,10,30,,1,195,7,,5446'BIPF
2150 DATA 1,60,7,,1,63,7,,1,255,1,,5396'BEHG
2160 DATA 1,15,3,3,3,,1,255,2,252,4,255,5794'BJEI
2170 DATA 1,63,1,255,5,,2,192,1,240,1,,5761'BIYI
2180 DATA 1,37,1,7,1,15,1,41,1,11,1,5,5122'BHIJ
2190 DATA 3,,1,105,1,213,1,89,1,176,1,90,5681'BKAL
2200 DATA 3,,1,176,1,252,1,86,7,,1,128,5656'BIOC
2210 DATA 6,,1,48,2,,1,8,1,11,1,187,5266'BFFD
2220 DATA 1,85,4,,1,3,2,,1,160,1,,5258'BDYD
2230 DATA 1,192,10,,1,12,1,56,32,,1,48,5354'BIUF
2240 DATA 1,12,2,3,8,,1,192,1,48,1,12,5281'BHUG
2250 DATA 1,3,6,,1,5,1,1,40,,2,254,5314'BERG
2260 DATA 1,249,1,253,2,249,1,253,1,249,1,87,6347'BOOK
2270 DATA 3,95,4,127,7,255,2,253,7,255,1,91,6100'BNNK
2280 DATA 1,90,1,87,2,86,1,87,2,86,2,240,5685'BKBL
2290 DATA 6,252,24,,1,2,7,,1,128,1,160,5582'BIBL
2300 DATA 1,40,1,10,1,2,7,,1,128,1,160,5352'BIHD
2310 DATA 1,40,1,42,7,,1,128,40,,2,15,5277'BHVE
2320 DATA 3,3,3,,1,255,1,240,2,252,3,255,6018'BKPG
2330 DATA 1,63,1,240,1,15,4,,2,192,1,,5520'BHMG
2340 DATA 1,255,7,,1,192,1,63,7,,1,252,5780'BIKH
2350 DATA 1,3,4,,1,42,1,8,1,130,1,255,5447'BHTI
2360 DATA 1,10,1,8,1,34,1,130,1,3,1,40,5231'BIYJ
2370 DATA 1,232,1,251,1,15,1,42,1,46,1,171,5763'BMOL
2380 DATA 1,2,1,34,1,232,1,186,1,255,1,162,5877'BMBM
2390 DATA 1,168,1,250,1,192,1,48,1,240,1,,5904'BLTN
2400 DATA 1,192,1,63,1,160,1,32,5,,1,255,5712'BKPF
2410 DATA 8,,1,255,7,,1,240,1,13,4,,5530'BFSF
2420 DATA 1,1,1,5,1,1,1,85,4,,1,64,5165'BEAF
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2430 DATA 4,,1,1,1,,1,5,1,8,1,42,5065'BCSG
2440 DATA 1,8,1,,1,213,1,95,1,16,1,85,5423'BHAI
2450 DATA 1,61,1,189,1,61,1,1,1,80,2,85,5484'BJFK
2460 DATA 2,240,1,80,17,,1,9,7,,1,85,5443'BGGK
2470 DATA 7,,1,84,1,249,1,253,1,249,1,238,6085'BLOM
2480 DATA 1,222,1,250,1,254,1,251,2,127,1,119,6230'BPAO
2490 DATA 2,95,1,93,1,87,1,149,1,253,2,247,5932'BMVO
2500 DATA 1,223,1,127,1,255,1,127,1,215,2,255,6209'BPMH
2510 DATA 1,253,2,255,1,247,1,253,1,117,1,87,6219'BOBI
2520 DATA 2,86,3,91,1,90,1,110,3,252,1,188,5828'BMLI
2530 DATA 1,60,3,240,40,,1,10,2,2,5,,5364'BGII
2540 DATA 1,128,1,160,1,174,1,171,1,42,1,10,5691'BNMK
2550 DATA 1,2,4,,1,176,1,236,1,191,1,175,5789'BKJL
2560 DATA 1,187,6,,1,192,1,224,32,,1,63,5708'BJDM
2570 DATA 2,15,2,3,3,,1,192,2,240,3,252,5715'BJUM
2580 DATA 2,255,19,,1,2,2,,1,14,1,8,5305'BFSN
2590 DATA 1,32,1,,1,2,1,128,1,,1,8,5176'BEUN
2600 DATA 1,34,1,42,1,172,1,171,1,14,1,43,5482'BLMH
2610 DATA 1,40,1,130,1,,1,192,1,200,1,35,5603'BKVI
2620 DATA 1,8,1,47,1,130,1,224,1,194,1,200,5809'BMQJ
2630 DATA 2,192,1,51,1,204,1,63,8,,1,241,5765'BKWK
2640 DATA 1,15,1,19,4,,1,85,1,5,2,244,5378'BHJK
2650 DATA 2,,1,1,2,85,1,17,1,84,1,85,5280'BGEL
2660 DATA 1,169,1,20,1,1,1,85,2,255,1,,5537'BIBM
2670 DATA 1,85,1,64,1,42,1,106,1,90,1,218,5611'BLSO
2680 DATA 1,214,1,6,1,66,1,5,1,63,1,143,5503'BJTO
2690 DATA 1,163,1,168,1,138,2,170,1,85,1,128,5859'BOKR
2700 DATA 2,255,1,252,1,60,1,15,1,131,1,64,5784'BMUI
2710 DATA 1,21,1,246,1,253,1,207,2,255,1,213,6202'BOGJ
2720 DATA 1,,1,85,1,170,1,255,2,64,1,85,5666'BJJK
2730 DATA 1,106,1,53,1,69,1,163,1,243,2,3,5644'BLVL
2740 DATA 1,83,1,163,1,85,1,221,2,255,1,191,6005'BNTM
2750 DATA 2,253,1,245,1,84,1,208,1,80,3,64,5943'BMHN
2760 DATA 2,,1,243,1,207,1,62,1,60,2,15,5595'BJXN
2770 DATA 1,12,1,3,1,149,2,229,1,250,1,186,5836'BMAP
2780 DATA 1,47,1,207,1,58,4,85,1,253,1,170,5829'BMNQ
2790 DATA 1,254,1,255,3,85,1,86,1,250,1,171,6109'BNER
2800 DATA 1,255,1,252,1,108,1,191,1,187,1,243,6242'BPPK
2810 DATA 1,236,1,131,1,,1,192,1,240,1,48,5853'BLQK
2820 DATA 2,192,60,,1,174,1,35,4,5,2,1,5477'BIHK
2830 DATA 1,248,1,191,1,47,1,74,1,91,1,94,5751'BLMM
2840 DATA 1,87,1,84,3,,1,192,1,176,1,224,5771'BKJN
2850 DATA 1,188,1,253,1,,3,1,2,5,1,10,5466'BHVN
2860 DATA 1,86,6,85,1,165,1,168,7,,1,208,5729'BKYP
2870 DATA 8,,2,63,2,15,2,3,2,,3,192,5292'BFDP
2880 DATA 2,240,2,252,1,255,8,,1,2,1,8,5772'BIDQ
2890 DATA 1,2,5,,1,46,1,188,1,32,1,128,5406'BIAR
2900 DATA 1,202,3,,1,40,1,160,1,42,1,11,5463'BJCJ
2910 DATA 1,46,1,15,1,14,1,12,1,,1,186,5279'BIXK
2920 DATA 1,184,1,179,1,56,1,12,1,172,1,12,5621'BMSM
2930 DATA 4,,1,192,3,,1,127,1,213,1,117,5660'BJSM
2940 DATA 1,1,4,,1,214,1,80,1,64,5,,5372'BFRN
2950 DATA 1,8,2,42,1,128,1,34,1,10,1,2,5231'BIIO
2960 DATA 2,,1,160,1,128,1,10,1,162,1,,5467'BIMP
2970 DATA 1,170,4,,1,2,1,168,1,8,1,170,5527'BIYQ
2980 DATA 1,3,1,170,1,128,1,85,1,3,1,15,5410'BJNR
2990 DATA 1,60,1,240,1,192,1,143,1,63,1,240,5944'BNOT
3000 DATA 1,201,5,,1,255,1,1,1,85,1,16,5568'BIAB
3010 DATA 1,7,1,3,1,,1,127,1,64,2,,5208'BEVB
3020 DATA 1,84,1,212,1,244,1,84,1,243,1,3,5876'BLBE
3030 DATA 1,63,5,,1,4,1,20,1,80,21,,5197'BFSE
3040 DATA 1,204,1,207,1,48,1,15,4,,1,171,5654'BKQG
3050 DATA 1,2,1,255,1,3,1,255,1,,1,2,5523'BGLG
3060 DATA 1,,1,168,1,3,1,192,2,,1,3,5373'BFTH
3070 DATA 2,13,1,128,1,3,1,63,1,245,1,221,5680'BLMJ
3080 DATA 1,117,1,223,1,125,1,3,1,255,1,95,5824'BMTK
3090 DATA 2,85,1,213,1,85,1,255,1,,2,240,5886'BKFL
3100 DATA 1,95,1,87,1,215,1,127,1,255,4,,5788'BKQD
3110 DATA 1,192,1,240,1,124,1,223,40,,3,2,5828'BLLE
3120 DATA 1,,2,1,2,7,1,149,1,169,1,170,5504'BIXE
3130 DATA 1,106,1,26,1,196,1,241,1,252,1,5,5832'BMRG
3140 DATA 1,16,2,64,1,130,1,146,1,144,1,68,5575'BMAH
3150 DATA 2,85,1,5,1,1,1,128,1,160,1,168,5554'BKXI
3160 DATA 1,170,1,42,1,106,1,90,1,84,1,85,5583'BLAJ
3170 DATA 1,21,1,5,1,1,1,245,1,251,1,255,5784'BKPK
3180 DATA 1,149,1,64,1,90,1,85,1,92,1,,5486'BIQK
3190 DATA 1,64,1,208,1,244,1,1,1,175,1,171,5869'BMDM
3200 DATA 1,101,5,,1,64,1,208,1,80,1,255,5718'BKSE
3210 DATA 2,63,2,15,2,3,3,,2,192,3,240,5527'BIYE
3220 DATA 1,252,24,,1,12,4,3,8,,3,192,5500'BHRF
3230 DATA 23,,1,3,3,,1,3,1,15,1,60,5111'BEHF
3240 DATA 1,240,1,192,1,15,1,60,1,240,1,192,5945'BNQI
3250 DATA 80,,3,3,1,13,1,55,1,61,1,247,5466'BIDI
3260 DATA 1,221,1,119,1,87,1,127,1,255,1,247,6062'BOXK
3270 DATA 1,223,2,255,1,247,1,221,1,255,1,107,6315'BPIM
3280 DATA 1,253,1,247,1,245,1,85,1,117,1,246,6199'BOGN
3290 DATA 1,249,1,119,1,253,1,127,4,223,1,127,6107'BPPO
3300 DATA 1,255,1,223,1,117,1,221,1,253,1,247,6322'BPEG
3310 DATA 1,221,1,87,1,213,1,,1,192,1,240,5959'BLVG
3320 DATA 1,112,2,220,1,92,1,223,28,,1,2,5683'BKLH
3330 DATA 2,10,1,6,2,31,1,127,1,191,1,111,5484'BLHI
3340 DATA 1,155,1,165,1,164,2,255,1,253,1,244,6243'BPRK
3350 DATA 1,208,1,65,1,7,1,31,1,20,1,101,5438'BKHK
3360 DATA 1,5,1,31,1,127,3,255,1,42,1,10,5478'BKPL
3370 DATA 1,2,1,64,1,208,1,244,1,245,1,213,5982'BMUM
3380 DATA 4,132,1,4,1,1,1,,1,160,1,56,5362'BHLM
3390 DATA 1,58,1,14,2,15,1,3,1,67,1,19,5183'BIEN
3400 DATA 1,20,2,16,2,196,1,200,1,248,1,204,5892'BNSG
3410 DATA 1,20,1,4,1,1,13,,1,252,1,255,5550'BIHG
3420 DATA 2,63,2,15,2,3,4,,2,192,2,240,5527'BIYH
3430 DATA 6,,1,85,1,253,6,,1,64,9,,5426'BENI
3440 DATA 1,192,4,48,3,12,7,,1,3,3,,5274'BFDJ
3450 DATA 1,3,1,15,1,60,1,240,1,192,1,15,5531'BKEL
3460 DATA 1,60,1,240,1,192,92,,2,13,1,15,5618'BKQM
3470 DATA 1,13,2,63,1,55,1,61,1,125,1,231,5555'BLON
3480 DATA 1,233,1,235,2,170,1,218,1,122,1,233,6218'BPDP
3490 DATA 2,230,1,237,1,167,1,173,1,253,1,255,6322'BPNQ
3500 DATA 1,95,1,127,1,175,1,191,1,251,1,254,6099'BOEI
3510 DATA 1,215,1,223,1,255,1,215,1,221,1,247,6382'BPHJ
3520 DATA 1,239,1,235,1,190,1,127,1,247,1,246,6290'BPVK
3530 DATA 1,244,1,113,1,212,1,245,1,125,1,159,6104'BPAL
3540 DATA 1,119,1,155,1,231,1,31,1,77,1,17,5636'BMVL
3550 DATA 1,72,1,113,4,,4,192,16,,2,5,5410'BHRL
3560 DATA 1,1,1,3,,1,145,1,70,1,90,5319'BGRM
3570 DATA 1,22,1,69,1,17,1,4,1,127,5327'BJCN
3580 DATA 1,159,1,67,2,169,1,20,2,64,1,253,5840'BNGP
3590 DATA 1,245,1,213,1,84,1,64,3,,1,85,5699'BJMQ
3600 DATA 1,84,1,64,5,,1,106,1,90,1,26,5380'BICH
3610 DATA 1,5,4,,1,4,1,161,1,170,1,86,5435'BHWI
3620 DATA 1,5,1,1,2,,1,252,1,4,1,25,5354'BFRJ
3630 DATA 1,149,1,165,1,105,1,89,1,26,4,,5543'BKDL
3640 DATA 2,64,2,80,9,,1,1,1,4,1,21,5[illegible]'BFXL
3650 DATA 2,26,1,21,1,,1,252,1,254,1,60,5620'BJKM
3660 DATA 1,127,1,191,1,175,1,95,1,3,1,164,5761'BMDO
3670 DATA 1,144,1,64,2,,3,192,7,,1,5,5420'BGVO
3680 DATA 7,,1,87,1,12,3,3,1,15,1,60,5191'BGWP
3690 DATA 1,240,1,192,1,15,1,60,1,240,1,192,5945'BNQR
3700 DATA 1,,3,192,104,,1,55,1,61,1,55,5474'BIBI
3710 DATA 1,63,1,55,1,61,1,55,1,59,1,90,5389'BJNK
3720 DATA 1,155,1,91,1,215,1,219,1,230,1,237,6153'BOQL
3730 DATA 1,238,1,175,1,173,1,167,1,169,1,153,6081'BPBN
3740 DATA 1,101,1,85,1,101,1,127,1,87,1,95,5602'BMQN
3750 DATA 1,255,1,253,2,247,1,119,1,222,1,246,6349'BPWP
3760 DATA 1,247,1,92,1,240,1,77,1,23,1,205,5890'BMAP
3770 DATA 1,112,1,128,1,,1,12,1,241,1,4,5503'BJBP
3780 DATA 1,5,1,208,1,219,1,22,1,49,1,,5509'BIYQ
3790 DATA 1,3,1,19,1,5,1,66,3,192,1,64,5357'BIKR
3800 DATA 1,16,1,196,1,193,1,192,7,,1,64,5673'BKLK
3810 DATA 16,,1,1,7,,1,64,1,80,1,4,5176'BEEJ
3820 DATA 1,1,36,,1,6,1,1,6,,1,164,5218'BEXK
3830 DATA 1,100,1,84,13,,1,21,1,5,1,1,5229'BHGM
3840 DATA 3,,2,16,1,87,1,80,1,81,1,64,5337'BHIN
3850 DATA 1,,1,4,2,,1,240,1,244,1,252,5747'BHQO
3860 DATA 1,60,2,63,1,31,1,15,1,,1,16,5192'BHNP
3870 DATA 1,,1,3,1,31,1,125,1,241,1,213,5619'BJIQ
3880 DATA 1,15,1,60,1,244,1,212,3,84,1,64,5687'BLBS
3890 DATA 8,,1,192,3,48,4,12,104,,1,59,5432'BIHS
3900 DATA 1,12,1,15,1,12,1,14,1,12,1,1,5072'BIVK
3910 DATA 1,3,1,233,1,255,1,60,1,195,1,12,5764'BLSM
3920 DATA 1,51,1,28,1,131,1,181,1,101,1,121,5619'BNDN
3930 DATA 1,29,1,207,1,50,1,204,1,51,1,119,5666'BMSO
3940 DATA 1,125,1,253,1,247,1,157,1,115,1,140,6043'BPEQ
3950 DATA 1,51,1,243,1,124,1,92,1,87,1,251,5854'BMAQ
3960 DATA 1,51,1,136,1,32,1,195,1,28,1,44,5492'BLXR
3970 DATA 1,,1,129,3,,1,192,1,195,1,1,5525'BHWR
3980 DATA 1,3,1,8,1,3,2,12,1,192,7,,5231'BFOS
3990 DATA 1,16,1,4,1,1,1,3,7,,1,192,5228'BFRT
4000 DATA 1,224,1,40,1,11,1,3,6,,1,192,5481'BINC
4010 DATA 1,240,6,,2,1,7,,1,80,1,,5339'BDYC
4020 DATA 1,1,2,5,1,4,1,20,2,,1,84,5122'BELD
4030 DATA 1,80,1,64,1,8,1,34,1,136,4,,5331'BHVF
4040 DATA 1,5,1,6,1,4,1,134,4,,1,85,5243'BFUG
4050 DATA 1,170,1,168,1,170,4,,1,85,2,170,5773'BLCI
4060 DATA 1,168,2,,1,1,1,,2,64,1,16,5257'BFVI
4070 DATA 1,84,1,,1,1,1,,1,86,1,21,5198'BEDI
4080 DATA 1,5,4,1,1,,1,128,1,144,1,80,5367'BHVK
4090 DATA 1,96,2,104,1,96,4,,1,15,1,12,5333'BIXL
4100 DATA 1,242,1,200,1,15,1,63,1,241,1,208,5975'BNNE
4110 DATA 1,32,1,128,1,32,1,128,1,213,1,244,5783'BNQF
4120 DATA 1,240,1,244,1,252,1,124,1,63,1,31,5960'BNKG
4130 DATA 1,,1,4,11,,3,32,4,3,1,14,5074'BEOF
4140 DATA 1,15,6,,4,192,23,,1,59,15,,5316'BGEH
4150 DATA 1,3,5,,2,3,5,,1,252,1,136,5409'BFTI
4160 DATA 1,48,2,,1,240,1,12,1,240,1,48,5595'BJXJ
4170 DATA 1,,1,192,33,,1,3,7,,1,112,5351'BFLK
4180 DATA 1,31,1,204,1,49,1,8,1,2,1,12,5312'BIIL
4190 DATA 1,,1,204,1,19,1,124,1,77,1,192,5622'BKPN
4200 DATA 2,12,1,163,1,204,1,51,1,204,1,53,5694'BMLF
4210 DATA 1,206,2,,1,11,1,227,1,16,1,68,5535'BJUF
4220 DATA 1,130,3,,1,240,1,,1,1,1,32,5411'BGTG
4230 DATA 1,,1,2,1,11,1,7,1,160,1,96,5282'BGPH
4240 DATA 1,,1,48,2,192,27,,1,255,1,27,5555'BIKI
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4250 DATA 1,23,1,20,1,41,1,10,1,16,1,60,5176'BJEJ
4260 DATA 1,1,2,193,1,150,1,69,1,1,1,104,5525'BKKL
4270 DATA 1,10,3,80,1,148,1,159,1,69,1,86,5560'BLIM
4280 DATA 1,20,5,,1,192,1,176,1,144,32,,5573'BJYM
4290 DATA 2,1,3,,1,1,2,,2,1,1,4,5018'BBHM
4300 DATA 1,16,1,67,1,14,1,49,1,224,1,67,5443'BKBG
4310 DATA 1,12,1,52,1,228,1,144,1,64,1,1,5507'BKKH
4320 DATA 1,22,1,162,1,8,1,33,1,21,1,22,5274'BJLH
4330 DATA 1,102,1,166,1,169,1,,1,80,1,104,5627'BLOJ
4340 DATA 3,168,2,160,1,47,2,7,1,132,1,,5524'BJAJ
4350 DATA 1,128,1,32,1,1,1,,3,192,2,240,5602'BJKK
4360 DATA 2,61,2,32,1,16,1,20,1,23,1,15,5175'BJLL
4370 DATA 2,1,5,,1,3,6,48,4,12,16,,5098
4380 DATA 1,15,24,,1,240,70,,1,40,7,,5399'BGYN
4390 DATA 1,34,1,8,1,,1,3,7,,1,48,5105'BDYN
4400 DATA 5,,1,48,32,,2,2,1,1,3,,5095'BCYF
4410 DATA 1,127,1,252,1,113,1,135,1,39,1,105,5777'BOUI
4420 DATA 1,20,1,,1,146,1,112,1,252,1,245,5781'BLHJ
4430 DATA 1,212,1,64,2,,1,14,1,3,1,19,5319'BHPJ
4440 DATA 1,135,1,105,1,22,1,1,1,,1,68,5337'BINK
4450 DATA 1,1,3,,1,80,1,144,1,100,3,,5335'BGEL
4460 DATA 2,192,1,48,1,12,1,3,20,,1,3,5284'BHRM
4470 DATA 1,12,2,,1,1,1,12,2,,1,2,5035'BDBM
4480 DATA 3,,1,128,1,1,1,6,1,90,1,106,5339'BHTO
4490 DATA 3,,1,106,1,104,1,105,1,100,1,145,5568'BMCQ
4500 DATA 3,,1,170,1,106,1,90,1,26,1,90,5490'BJUH
4510 DATA 1,73,1,37,1,5,1,130,1,8,1,98,5357'BIKI
4520 DATA 1,72,1,97,1,85,1,89,1,106,1,33,5488'BKTK
4530 DATA 1,128,1,16,1,65,1,64,2,,1,64,5344'BICK
4540 DATA 1,204,1,95,2,23,1,,1,16,1,5,5350'BHOL
4550 DATA 1,1,3,,2,208,1,240,1,112,1,124,5694'BKGN
4560 DATA 8,,1,3,1,243,1,47,1,207,1,44,5557'BIFN
4570 DATA 1,,1,195,1,15,4,,4,192,168,,5581'BHKO
4580 DATA 1,4,1,1,8,,1,240,1,12,1,3,5273'BFIP
4590 DATA 8,,1,192,1,48,1,12,1,24,15,,5303'BHTQ
4600 DATA 2,192,1,48,1,12,1,3,3,,1,3,5267'BGVI
4610 DATA 1,12,3,,2,192,1,48,27,,2,3,5291'BGYJ
4620 DATA 1,14,1,8,1,12,1,,1,3,1,60,5103'BFBK
4630 DATA 1,240,1,128,1,32,1,192,1,195,1,,5793'BLWM
4640 DATA 3,192,2,,1,192,8,,1,21,7,,5427'BFDM
4650 DATA 1,85,2,12,1,15,2,3,3,,1,192,5317'BHUN
4660 DATA 1,176,1,48,1,,3,192,1,48,6,,5477'BHSO
4670 DATA 1,1,1,85,4,48,1,12,2,92,1,93,5341'BIFP
4680 DATA 184,,1,3,8,,1,192,1,48,1,12,5451'BHCQ
4690 DATA 1,3,8,,1,192,1,48,1,12,8,,5275'BFFR
4700 DATA 1,12,1,3,8,,2,192,1,48,1,12,5281'BHUJ
4710 DATA 1,3,3,,1,3,1,,1,3,1,,5017'BAHJ
4720 DATA 1,3,1,192,1,240,1,12,3,,1,195,5650'BJQL
4730 DATA 1,252,1,,1,3,3,,2,192,2,,5457'BEYL
4740 DATA 1,48,13,,1,15,1,56,1,15,1,1,5153'BHQN
4750 DATA 6,,1,255,2,85,1,26,1,10,1,,5388'BGEO
4760 DATA 1,7,1,5,1,192,1,80,1,164,1,168,5622'BKYQ
4770 DATA 1,128,1,31,1,195,1,85,1,48,2,12,5506'BLYR
4780 DATA 1,3,1,117,1,52,1,245,1,53,1,106,5582'BLOS
4790 DATA 1,21,1,64,1,85,2,84,1,20,1,84,5365'BJBT
4800 DATA 1,167,1,107,1,43,1,81,1,245,1,255,5904'BNYL
4810 DATA 1,204,1,245,3,,1,192,1,84,1,253,5986'BLFM
4820 DATA 1,15,1,85,3,,1,1,1,4,1,85,5198'BFEM
4830 DATA 1,218,1,90,1,5,1,31,1,106,1,170,5626'BLMO
4840 DATA 1,,1,85,1,170,1,169,1,85,1,253,5768'BKMP
4850 DATA 1,164,1,144,1,64,3,,1,64,53,,5496'BIJP
4860 DATA 2,85,6,,1,64,1,80,86,,1,48,5374'BGVQ
4870 DATA 1,63,6,,1,48,9,,1,3,8,,5140'BCIQ
4880 DATA 1,192,1,48,1,15,8,,1,192,1,48,5508'BJIT
4890 DATA 1,12,1,3,8,,1,192,1,48,1,12,5280'BHST
4900 DATA 1,3,8,,2,192,1,48,1,12,11,,5279'BGCL
4910 DATA 1,64,3,,1,64,7,,1,1,3,,5145'BCAL
4920 DATA 1,1,1,15,1,61,1,116,1,,1,5,5204'BGDN
4930 DATA 1,16,1,106,1,170,1,253,1,80,2,,5632'BKIP
4940 DATA 1,64,1,85,1,4,1,164,1,81,1,1,5405'BIXP
4950 DATA 1,5,1,85,1,69,1,81,1,20,1,4,5270'BHAQ
4960 DATA 2,85,1,81,1,85,1,84,1,83,1,79,5504'BJSS
4970 DATA 1,63,2,85,1,21,1,85,1,208,1,69,5538'BKLT
4980 DATA 1,87,1,127,1,83,1,95,1,87,1,105,5590'BLOU
4990 DATA 1,1,1,85,2,244,1,61,1,253,1,243,5894'BLBV
5000 DATA 1,127,1,85,1,,1,21,1,5,1,1,5245'BGND
5010 DATA 1,,2,64,1,85,1,,3,85,1,127,5370'BGEE
5020 DATA 1,31,1,7,1,,1,64,1,80,1,84,5272'BGWF
5030 DATA 3,255,1,253,1,,2,5,1,31,1,63,5616'BIWG
5040 DATA 1,127,1,221,1,85,1,,1,84,3,244,5769'BKFI
5050 DATA 3,84,28,,1,40,1,175,1,149,1,165,5648'BLNJ
5060 DATA 3,85,1,23,2,26,1,208,1,197,1,84,5632'BLIK
5070 DATA 1,85,1,106,3,170,1,,1,85,1,,5454'BHYK
5080 DATA 1,5,1,80,1,147,1,164,1,169,1,,5571'BJEL
5090 DATA 1,85,1,,1,85,1,,2,255,1,63,5495'BGLM
5100 DATA 1,64,1,85,1,,1,85,1,1,1,196,5437'BHKE
5110 DATA 1,192,1,193,1,3,1,64,2,,1,192,5651'BJCF
5120 DATA 1,48,1,12,1,3,1,127,1,85,6,,5286'BHFG
5130 DATA 1,192,1,85,7,,1,240,15,,1,15,5558'BIHH
5140 DATA 10,,2,3,4,,1,35,1,187,1,51,5295'BGXI
5150 DATA 2,192,1,60,4,,2,48,36,,1,192,5538'BIMJ
5160 DATA 1,48,1,12,1,3,8,,1,192,1,48,5316'BHCK
5170 DATA 1,12,2,3,8,,1,192,1,193,1,48,5462'BIEL
5180 DATA 2,,1,64,1,17,1,16,1,64,1,,5168'BFXM
5190 DATA 1,64,1,12,1,3,2,2,6,,1,192,5285'BGVN
5200 DATA 1,176,4,,3,48,1,240,1,5,1,21,5501'BIRF
5210 DATA 1,84,1,80,1,68,1,80,1,68,1,81,5467'BJQH
5220 DATA 1,85,1,80,2,,1,5,1,6,1,4,5187'BEDH
5230 DATA 1,6,1,85,3,,1,85,1,170,1,168,5522'BIHI
5240 DATA 1,170,1,85,3,,1,85,2,170,1,168,5687'BKMK
5250 DATA 1,90,1,85,1,1,1,,2,64,1,16,5263'BGWK
5260 DATA 1,84,1,151,1,169,1,90,1,86,1,21,5607'BLDM
5270 DATA 1,5,2,1,2,208,1,112,2,156,1,84,5575'BKUN
5280 DATA 1,103,1,107,1,1,4,,1,1,1,6,5227'BGEN
5290 DATA 1,24,1,212,1,65,2,5,1,213,1,87,5613'BKPP
5300 DATA 1,33,1,136,1,1,2,85,1,119,1,221,5602'BLJH
5310 DATA 1,119,1,223,1,127,1,84,1,116,1,220,5895'BOWI
5320 DATA 1,119,1,223,3,255,4,,3,128,1,224,5962'BMAJ
5330 DATA 10,,1,16,5,,1,171,1,40,6,,5251'BFJJ
5340 DATA 1,55,1,241,1,253,1,1,4,,3,255,5816'BJYK
5350 DATA 2,170,1,85,1,112,1,127,3,71,2,74,5649'BMEM
5360 DATA 1,85,1,,1,255,2,253,1,245,1,164,6009'BLWN
5370 DATA 1,167,1,84,1,52,1,244,1,85,1,,5638'BJHO
5380 DATA 1,63,1,255,1,253,3,,1,127,1,3,5709'BJBO
5390 DATA 1,255,1,213,1,85,3,,1,85,1,255,5901'BKYQ
5400 DATA 1,253,1,87,1,192,3,,1,80,1,252,5872'BKEI
5410 DATA 1,84,6,,1,2,2,,1,12,1,3,5113'BDNH
5420 DATA 1,12,1,,1,179,1,12,1,3,1,51,5263'BHLJ
5430 DATA 1,204,3,,1,176,1,224,1,252,1,204,6068'BMML
5440 DATA 1,207,1,44,1,191,1,51,7,,1,192,5697'BKFM
5450 DATA 9,,1,14,1,48,1,15,1,48,1,,5139'BFDM
5460 DATA 1,12,1,3,1,,1,192,1,188,1,44,5445'BIWN
5470 DATA 1,143,1,3,1,,1,15,6,,2,192,5365'BGTO
5480 DATA 32,,1,192,1,48,1,12,1,3,4,,5295'BGXP
5490 DATA 1,4,1,1,1,,1,1,1,192,1,48,5252'BFLQ
5500 DATA 2,,1,66,1,10,1,66,1,32,1,8,5189'BGCI
5510 DATA 2,2,1,8,1,224,1,136,1,10,1,186,5573'BKQK
5520 DATA 1,238,1,186,1,170,1,171,1,200,1,226,6197'BPPM
5530 DATA 1,10,1,58,1,238,1,186,1,168,1,170,5836'BNHM
5540 DATA 1,6,1,185,1,172,1,189,1,161,1,37,5756'BMLN
5550 DATA 1,136,1,40,1,38,1,6,3,85,1,42,5355'BJEN
5560 DATA 1,21,1,,1,128,1,22,2,85,1,170,5433'BJOO
5570 DATA 1,85,2,,1,161,1,36,2,164,1,161,5615'BKTQ
5580 DATA 1,85,2,,1,4,1,1,2,81,1,4,5183'BEAP
5590 DATA 1,84,1,16,5,1,1,5,1,21,1,86,5223'BHVR
5600 DATA 1,90,3,105,1,103,2,167,1,144,1,64,5682'BNVK
5610 DATA 1,18,1,136,1,162,1,200,1,225,1,213,5960'BOIL
5620 DATA 1,22,1,102,1,34,1,136,1,2,1,80,5382'BKDM
5630 DATA 1,104,3,168,1,31,1,159,1,47,1,135,5652'BNYN
5640 DATA 1,39,1,135,1,39,1,135,5,255,2,253,5867'BNPO
5650 DATA 1,245,4,224,1,208,1,84,1,87,1,95,5952'BMQP
5660 DATA 11,,2,1,1,7,1,15,1,31,16,,5086'BFMP
5670 DATA 1,85,7,,1,85,7,,1,85,7,,5279'BDHP
5680 DATA 1,85,32,,2,3,2,12,3,48,2,,5190'BFWR
5690 DATA 1,11,1,12,1,48,1,12,2,48,1,143,5281'BKIT
5700 DATA 1,242,1,15,1,60,1,176,1,204,1,60,5763'BMOL
5710 DATA 1,51,1,188,1,59,1,243,1,195,2,3,5746'BLLM
5720 DATA 1,12,1,3,7,,1,3,56,,1,20,5105'BENL
5730 DATA 1,16,5,,1,1,2,,1,16,1,64,5108'BETM
5740 DATA 1,69,1,245,1,244,1,245,1,236,1,59,6104'BNDP
5750 DATA 1,32,1,128,1,162,1,42,1,234,1,168,5772'BNVQ
5760 DATA 1,170,1,43,1,170,1,163,1,138,1,42,5732'BNNR
5770 DATA 1,168,1,163,1,254,1,50,1,200,1,130,5971'BOMS
5780 DATA 1,200,1,32,1,138,1,34,1,136,1,48,5594'BMST
5790 DATA 1,240,1,12,1,35,1,128,1,32,1,128,5581'BMKU
5800 DATA 1,4,1,17,1,4,1,5,1,,2,16,5053'BERK
5810 DATA 1,17,1,85,1,21,1,4,1,21,3,,5156'BGPM
5820 DATA 5,85,3,,3,85,1,21,1,84,2,64,5354'BHPN
5830 DATA 1,74,1,73,1,105,1,164,1,128,1,1,5551'BLPP
5840 DATA 1,6,1,90,1,106,1,170,1,1,1,22,5401'BJEP
5850 DATA 1,106,1,104,1,105,1,100,1,145,1,152,5718'BPTS
5860 DATA 1,166,1,169,1,170,1,106,1,90,1,26,5733'BNYS
5870 DATA 1,90,1,73,1,162,1,160,1,130,1,8,5629'BLST
5880 DATA 1,98,1,72,1,97,1,85,1,39,1,133,5530'BKNU
5890 DATA 1,37,1,132,1,20,1,65,1,64,1,,5324'BIOU
5900 DATA 2,85,1,213,1,85,1,21,1,23,1,71,5505'BKPN
5910 DATA 1,19,1,93,1,125,1,116,2,244,3,208,5814'BNYO
5920 DATA 8,,1,55,1,21,1,,2,21,1,29,5140'BFMO
5930 DATA 1,55,1,29,69,,1,63,1,255,1,200,5676'BKIQ
5940 DATA 1,48,1,12,3,,1,48,1,227,1,128,5471'BJCQ
5950 DATA 1,48,6,,1,192,7,,1,3,1,12,5272'BFYR
5960 DATA 4,48,1,192,1,195,1,3,1,14,1,56,5517'BKFT
5970 DATA 1,192,1,224,1,140,1,227,1,136,1,32,5957'BOUU
5980 DATA 1,192,1,179,1,238,1,48,1,192,1,48,5903'BNPV
5990 DATA 3,,1,240,1,60,1,188,1,60,1,176,5732'BKTW
6000 DATA 1,44,41,,1,3,2,1,5,,1,194,5293'BFVE
6010 DATA 1,16,1,66,1,16,4,,1,42,1,139,5288'BIHF
6020 DATA 1,47,1,139,1,44,1,50,1,,1,64,5350'BIVG
6030 DATA 1,188,1,186,1,40,1,10,1,138,1,171,5739'BNCI
6040 DATA 2,3,1,138,1,,1,42,1,162,1,224,5576'BJVI
6050 DATA 1,130,1,194,1,162,2,168,1,130,1,8,5799'BNFK
6060 DATA 1,224,1,177,1,5,1,1,2,,1,1,5415'BGLK
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6070 DATA 1,,1,79,1,157,1,109,1,21,2,,5373'BHYL
6080 DATA 1,85,2,64,3,255,2,,1,85,1,1,5500'BHBM
6090 DATA 1,2,3,246,1,22,1,90,1,106,1,98,5572'BKXO
6100 DATA 1,154,1,153,1,150,1,166,1,161,1,133,5923'BPHH
6110 DATA 1,144,1,133,1,97,1,168,1,42,1,170,5760'BNYH
6120 DATA 1,154,3,102,1,41,1,165,1,149,1,85,5704'BNUI
6130 DATA 1,37,1,149,2,85,3,86,1,109,1,89,5564'BLAJ
6140 DATA 2,106,1,162,1,154,1,166,1,169,1,170,5934'BPUL
6150 DATA 1,,1,64,1,144,1,148,2,100,1,164,5627'BLOL
6160 DATA 1,148,1,5,1,1,6,,3,64,13,,5243'BFUL
6170 DATA 1,55,1,31,1,7,1,39,1,11,1,33,5182'BISM
6180 DATA 1,9,1,33,59,,1,3,1,14,1,3,5126'BFUN
6190 DATA 2,,1,224,1,48,1,236,1,179,1,,5694'BIJO
6200 DATA 1,131,1,200,1,62,2,,1,192,1,,5592'BIKG
6210 DATA 1,192,1,32,1,136,1,224,2,,1,12,5603'BKEI
6220 DATA 1,3,2,,1,48,1,192,1,240,7,,5496'BGEI
6230 DATA 1,3,8,,1,192,1,48,8,,1,48,5311'BFFJ
6240 DATA 1,192,3,,1,48,1,192,54,,3,1,5496'BHLK
6250 DATA 1,5,1,4,2,,1,1,1,,1,64,5081'BCOK
6260 DATA 1,,1,1,1,4,1,21,1,65,1,16,5113'BFDM
6270 DATA 1,3,1,,1,2,1,87,1,28,1,124,5250'BGON
6280 DATA 1,28,1,23,2,,1,162,1,248,1,55,5523'BJXO
6290 DATA 1,31,1,15,1,79,1,84,1,85,1,64,5364'BJIQ
6300 DATA 1,255,1,61,1,254,1,246,1,217,1,68,6107'BNAI
6310 DATA 1,23,1,31,1,95,1,159,1,127,1,65,5506'BLYJ
6320 DATA 1,5,1,204,3,255,1,207,1,255,1,253,6187'BNXK
6330 DATA 1,125,1,218,2,216,1,104,2,106,1,170,5947'BPKM
6340 DATA 1,168,1,166,1,38,1,41,1,105,1,169,5693'BNJM
6350 DATA 1,170,1,169,1,165,1,166,1,153,1,101,5930'BPMO
6360 DATA 1,149,1,64,5,85,2,86,1,31,1,94,5520'BKLO
6370 DATA 1,79,1,9,1,126,3,254,1,250,1,201,5927'BMCP
6380 DATA 1,249,1,185,1,106,1,154,1,104,2,106,5911'BPKR
6390 DATA 1,161,2,169,1,20,1,144,2,80,3,64,5648'BMCR
6400 DATA 25,,1,9,1,33,1,9,1,33,1,9,5123'BFXI
6410 DATA 1,33,1,5,1,16,18,,2,3,2,12,5094'BGRJ
6420 DATA 2,2,2,,2,224,2,200,2,206,6,,5648'BHQK
6430 DATA 2,192,32,,1,63,98,,1,1,1,4,5395'BGJL
6440 DATA 1,1,1,4,1,1,1,4,1,17,1,68,5101'BFGM
6450 DATA 1,16,1,67,1,7,2,31,1,68,1,28,5224'BIFN
6460 DATA 2,127,1,255,1,253,1,247,1,223,1,5,6117'BNSP
6470 DATA 1,87,1,31,2,127,6,255,1,253,2,246,6012'BNYQ
6480 DATA 2,218,1,233,1,105,1,103,1,167,3,159,5994'BPXS
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6490 DATA 1,127,1,16,1,197,1,193,1,240,4,255,6037'BOCS
6500 DATA 1,125,1,118,1,54,1,246,1,218,1,216,5983'BOCK
6510 DATA 1,218,1,106,1,170,2,106,1,105,1,153,5865'BPIM
6520 DATA 4,149,3,85,1,84,1,80,1,64,1,,5473'BIRL
6530 DATA 1,84,1,80,1,64,5,,1,34,1,72,5344'BHEM
6540 DATA 1,18,1,4,1,1,2,,1,5,1,118,5153'BFLN
6550 DATA 1,150,1,38,1,137,1,34,1,72,1,18,5455'BLVP
6560 DATA 1,88,3,165,1,148,1,84,1,148,1,16,5657'BMUQ
6570 DATA 1,144,32,,1,16,2,,1,16,1,36,5250'BHMQ
6580 DATA 1,37,2,25,16,,2,200,2,,2,192,5479'BICR
6590 DATA 4,51,2,15,2,207,2,51,2,128,2,240,5706'BMRT
6600 DATA 2,48,2,60,23,,1,14,7,,1,192,5350'BHXK
6610 DATA 21,,1,3,1,,1,62,5,,1,192,5287'BEBK
6620 DATA 1,,1,128,22,,1,2,1,40,4,,5200'BEFL
6630 DATA 1,60,2,3,1,43,5,,3,192,22,,5332'BGQN
6640 DATA 1,1,1,6,1,,1,1,2,7,1,31,5053'BDKN
6650 DATA 1,255,2,85,1,127,1,,1,253,1,244,5971'BLCQ
6660 DATA 1,245,1,218,1,90,1,104,1,223,1,127,6013'BOGR
6670 DATA 1,255,1,,1,85,1,138,1,18,1,84,5586'BJLS
6680 DATA 1,255,2,253,1,6,1,86,1,150,2,166,5924'BMFT
6690 DATA 1,106,3,169,1,39,1,167,1,159,1,21,5669'BNPU
6700 DATA 1,127,1,255,1,192,4,255,1,85,2,255,6179'BOLN
6710 DATA 1,1,253,1,254,2,246,1,85,1,106,5952'BMXN
6720 DATA 1,,1,169,1,165,1,149,1,144,1,85,5823'BOBP
6730 DATA 1,80,,1,81,1,84,1,34,1,137,5507'BKDP
6740 DATA 1,80,2,,1,1,1,102,1,136,1,37,5363'BILP
6750 DATA 1,145,2,,1,5,1,88,1,34,1,149,5428'BIIQ
6760 DATA 1,84,1,4,1,84,,1,98,1,136,5428'BJKS
6770 DATA 1,37,1,80,4,,1,34,1,137,1,96,5393'BIKS
6780 DATA 5,,1,16,1,80,38,,1,41,1,37,5221'BGTT
6790 DATA 1,5,1,36,2,20,2,16,16,,2,2,,4,5305'BIMU
6800 DATA 2,48,2,192,4,,2,2,2,,1,8,5263'BECM
6810 DATA 1,,2,176,2,252,2,207,1,192,17,,5852'BKAO
6820 DATA 1,14,2,59,2,224,2,56,1,12,1,192,5566'BLCP
6830 DATA 2,48,2,12,2,50,1,136,7,,1,128,5389'BJEQ
6840 DATA 8,,1,3,2,48,1,15,4,,1,224,5307'BFWQ
6850 DATA 1,192,1,,1,192,6,,1,3,1,14,5412'BGOR
6860 DATA 1,3,3,,1,3,1,60,1,192,1,188,5454'BHYS
6870 DATA 1,232,1,62,1,3,1,,1,192,1,60,5555'BIRT
6880 DATA 2,,1,43,1,188,1,192,1,,1,60,5490'BHYU
6890 DATA 1,40,1,188,1,60,1,192,27,,1,6,5518'BJBW
6900 DATA 1,1,6,,1,170,1,89,1,5,1,1,5277'BFAN
6910 DATA 4,,1,97,1,133,1,21,1,85,4,,5348'BGFO
6920 DATA 4,85,4,,1,41,1,73,1,81,1,85,5377'BHQP
6930 DATA 4,,1,21,1,106,1,138,1,69,4,,5346'BHYQ
6940 DATA 1,85,2,170,1,85,4,,1,81,1,148,5579'BJPS
6950 DATA 1,144,1,84,92,,1,16,14,,1,14,5368'BIFS
6960 DATA 6,,1,252,1,192,15,,1,3,1,195,5667'BIJT
6970 DATA 1,3,1,192,8,,2,3,1,8,1,56,5276'BFHU
6980 DATA 1,63,3,,2,252,2,3,1,,1,12,5340'BFHV
6990 DATA 2,3,2,192,2,48,1,15,1,136,2,238,5642'BLBX
7000 DATA 2,3,2,,1,240,1,128,1,,1,48,5427'BGRF
7010 DATA 2,240,127,,2,1,1,7,1,63,1,,5445'BGRG
7020 DATA 1,71,1,31,1,64,1,255,2,253,1,246,5927'BMCI
7030 DATA 1,,2,247,1,31,1,127,1,,1,85,5497'BHEI
7040 DATA 1,162,1,,4,255,1,1,1,85,1,165,5677'BJEK
7050 DATA 1,,1,246,1,218,2,106,1,170,1,137,5884'BMWL
7060 DATA 1,169,1,,2,159,1,127,1,112,1,127,5701'BMQM
7070 DATA 2,255,1,,3,255,1,,2,255,1,253,6028'BJAM
7080 DATA 1,,3,218,1,106,1,105,1,165,1,164,5766'BMUO
7090 DATA 1,,1,165,1,149,1,85,1,84,1,85,5574'BJOP
7100 DATA 1,72,1,34,1,,1,64,2,,1,89,5266'BFFG
7110 DATA 1,34,1,137,1,100,2,,1,1,1,86,5365'BIPH
7120 DATA 1,136,1,37,1,85,1,65,1,,1,1,5330'BHTI
7130 DATA 1,88,1,34,1,137,1,84,3,,1,86,5437'BIRJ
7140 DATA 1,136,1,34,1,88,4,,1,36,1,132,5435'BJCK
7150 DATA 1,84,12,,1,11,1,44,1,131,1,252,5539'BKLM
7160 DATA 1,200,1,50,1,,1,3,1,252,1,240,5751'BJCM
7170 DATA 1,12,1,48,1,12,1,,1,12,1,51,5141'BHBN
7180 DATA 2,192,2,12,2,,1,192,1,60,6,,5470'BHUO
7190 DATA 1,3,1,59,6,,1,255,1,11,1,63,5402'BHTP
7200 DATA 2,227,2,251,2,51,1,204,1,,2,192,5935'BLSI
7210 DATA 2,,2,207,1,243,1,15,2,,2,192,5667'BIAI
7220 DATA 2,,1,192,1,240,2,15,8,,2,192,5655'BIDJ
7230 DATA 116,,2,1,5,,1,85,1,149,1,170,5531'BIXK
7240 DATA 1,86,1,1,3,,1,86,1,90,1,152,5423'BHAL
7250 DATA 1,97,1,69,1,85,2,,1,132,1,21,5411'BIBM
7260 DATA 4,85,2,,1,169,1,41,1,74,1,82,5461'BILN
7270 DATA 1,84,1,85,2,,1,167,1,133,1,69,5545'BJKP
7280 DATA 1,90,1,98,1,81,2,,1,255,2,85,5617'BIRP
7290 DATA 2,170,1,85,2,,1,253,1,85,1,84,5685'BJLR
7300 DATA 1,165,1,164,1,85,2,,1,149,1,84,5654'BKJJ
7310 DATA 1,64,5,,1,84,15,,1,21,1,4,5197'BFCJ
7320 DATA 38,,,,,,,,,,5038'BSFH
7330 DATA 1771,55917,1738,57800,1654,56436'BHHL
7340 DATA 1641,58774,1734,61560,1530,61549'BHUM
```

Commodore Telecomputing
The Hows and Whys Part 2

by Greg Perry

The Terminal Program.

Once you have finally got your modem, the next requirement is a good terminal program. What type of program you choose will depend on your needs. No one program will cover all situations. A special program will be required for Viatel, and a program which is good for Commodore-Commodore communications may well be useless when it comes to talking to a large mainframe computer.

If you think that there are such things as absolute standards in computing you are about to be rudely awakened. There are two main problems.

1. Most computers encode characters with the American Standard Code for Information Interchange known as ASCII. Unfortunately, Commodore's version of ASCII (known as CBM-ASCII) is not the same as 'standard' ASCII. (Other manufacturers do it as well!) There are no problems when talking Commodore-Commodore, but when talking to some other system, our CBM-ASCII must be converted to the standard form before sending the data and incoming data must be converted back into CBM-ASCII. If not, only garbage will appear on the screen. Most terminal programs invisibly perform these conversions. The simplest programs do no conversions at all while some allow you to select whether conversion is used on not. On Viatel, a different set of characters are used to control graphics and other features.

2. When transferring programs or sequential text files between computers, some method must be adopted to ensure that the data is not corrupted by noise on the line. Most methods involve sending the data in 'packets' containing 64, 128, or 256 characters followed by some form of checksum. The checksum is a unique code generated mathematically from the packet characters. If the receiving computer calculates the same checksum as that sent then it can be assumed (not always true!) that the packet of characters has been received correctly, and the next packet can be sent. If the checksums do not match, the same packet is sent again.

A number of different protocols are used. The main three you will encounter are the XMODEM (YAM or Ward Christensen), the Punter methods, and KERMIT. These are incompatible with each other. Some people aslo have written their own just to make life more complicated.

Before talking about the different methods, it must be established that, usually, the only requirement for Commodore-Commodore file transfers is that both terminal programs use the same method irrespective of what that actually is.

Probably the most common method is the XMODEM (Ward Christensen) protocol (sometimes known as YAM or XYAM – Yet Another Modem program). This is commonly used in systems using the CP/M operating system as with many of our local BBSs. A number of C64 terminal programs which use this protocol are available but some do not work correctly when used with the CP/M systems. (Most also download text files as program files causing problems for many wordprocessors). There is a public domain Commodore CP/M compatible terminal program which has just appeared for those users with a CP/M cartridge.

Another, although less common in Australia, protocol for transfer of Commodore files was developed by Steve Punter in the U.S. in the late '70s. There are at least two different Punter protocols.

KERMIT is a protocol specifically designed for micro-mainframe communication as often required by universities and the like. Developed by Columbia University in the U.S, a public domain version is available for just about every micro except Commodore! I have a written a fledgeling version but it still has a few problems. (Anyone interested in taking up the challenge?)

Types of Terminal Programs.

It is easy to write a simple terminal program (Reference Guide page 356) but most people prefer to use one of the range of public domain or commercial versions. Terminal programs are often described in terms of their 'smartness'. A 'dump' terminal is a simple program which will allow you to just talk to another system. Such programs usually allow you to set the baud rate and other parameters but will not up or download programs, print the incoming data, or allow you to log the on-line session.

'Smart' and 'ultra-smart' programs provide many extra, almost indespensible, features. These include at least one method of transferring programs and text files, adjustable screen widths of 40/64/80 or more columns, graphics capability, efficient disk access, built-in text processing facilities, screen dumps and other hardcopy facilities, an in-built buffer to capture all or part of the on-line session (called a 'log') including complete documents and view, edit, and save the buffer when off-line, and other advanced features including touch tone dialing, auto dial and auto answer. Further, if you wish to access a large mainframe computer such as a VAX or PDP-11 etc., the terminal program may have to emulate one of the standard terminals used on mainframe computers. A number of programs will emulate the DEC VT52 or VT100 terminals and provide the correct set of characters (known as escape sequences) required by the mainframe. Students enrolled in university or technical college courses may need such a program to allow them to full access to the mainframe from home.

The best commercial program is undoubtdly VIP TERM from Softlaw in the US and marketed here by Commodore. (At the time of writing, mid-July, I am informed that Commodore is planing to release a new version which provides XMODEM file transfer from the main menu. With apologies to Steve Sharp who runs the only Punter BBS in Australia, this will be a great boon to the rest of us BBS users.

Probably the best and most widely available public domain programs are TERM 64 and MODEM 64 (by Nick Gammon, written in G-PASCAL). For more information see our documentation for Term64 and other program summaries in the May issue.

RS 232 Terminal Parameters.

When using one of the terminal programs, a number of parameters or protocols must usually be set to define the characteristics of the RS 232 interface to the modem and the processing of incoming and outgoing characters. The protocols are usually defined by the Duplex, Baud Rate, Number of Stop Bits, Parity, Word length, and ASCII or CBM-ASCII characters.

Duplex: Most BBS operate at full-duplex. Every character you type goes down the line and is 'echoed' back to your terminal and then displayed on your screen allowing you to ensure that your characters are being received correctly. In half-duplex mode, characters are not echoed back and your own terminal program must display them on its own screen. Half-duplex is used when talking C64-C64 and full-duplex with BBSs. Essentially, if you cannot see what you are typing switch to half-duplex. If everything you type eennddss uupp llookkiinngg lliikkee tthhiiss, switch to full-duplex. (Do not confuse this with the actual full/half duplex electrical protocol of the modem itself. Commercial full duplex modems may be manually set to 'echo' back received characters or not.)

To understand the other protocols we must first look at how a character is actually transmitted. As most of you probably know, each character in the computer's memory is stored as its CBM-ASCII code in one byte or eight bits. This is transmitted down the RS 232 line in serial form, that is, one bit at a time. For the letter 'A', ASCII value 65 and 01000001 in binary, the signal would look like

Signal

1 **the line is high waiting for the first bit of character**
1 **still waiting**
1 **still waiting**
0 **the START BIT – a zero bit signalling that a character is coming**
1 **DATA bits for character starting with bit 0**
0 **bit 1** — often
0 **bit 2** — only
0 **bit 3** — 7 ASCII bits
0 **bit 4** — are
0 **bit 5** — used
1 **bit 6** — **'WORD LENGTH'** = no of data bits followed by

Continued on page 32

64 TALK : Communications Cartridge for C64.

Greg Perry

ACME Sofware from Melbourne have recently released their 64 TALK communications cartridge for the Commodore 64 to partner their successful Micromodem III 300/300 and 1200/75 modem. This one cartridge contains more than 20k of software and by some smart memory switching provides a comprehensive set of telecommunications software to meet the needs of almost all Commodore 64 users. Unlike some other packages, the 24 page manual supplied with the package provides a full set of instructions, even if somewhat succinct at times. What's more its been completely designed and written in Australia by Bill Dimech from Acme Software.

Plug in the cartridge and turn the computer on, and the opening screen reveals an extensive menu providing access to Viatel (videotex) mode at 1200/75 baud or TERMINAL(ascii) mode at various baud rates from 300 up to 1200/75. This is the first package I have seen which allow me to access BBSs and other communications services at 1200/75 in a normal terminal mode.

Apart from selecting between the two terminal modes, the main menu provides full disk access as well as disk directory, 8 programmed function keys for passwords, IDs or messages, saving or loading of the complete terminal environment of function keys and parameters such as baud rates etc.

One can return to the main menu from either Viatel or Terminal mode at any time by simply pressing shift/run.

Viatel Mode.

The Viatel mode provides an almost(!) complete set of the standard videotex characters, colours, and attributes to access Viatel (and other Videotex systems) with a 1200/75 baud modem. However two features are missing - the flashing and reveal attributes. (See below.)

In summary, this mode provides

- Almost full Viatel compatability (*)
- Full implementation of TELECOM's CET download protocol for downloading of softwre from Microtex 666 (disk/tape).
- Store and recall up to 16 frames into memory.
- Save current or all stored frames to disk or tape.
- Reload saved frames from disk or tape.
- Selectable hires or ASCII hardcopy of current or all frames in memory.
- Single key LOGOFF and Retransmit last screen (*00)

Using the Viatel Mode.

I must mention at this point that I am very impressed with the whole package. However, since I have been playing with it for some two months or more I have had more than the usual amount of time to find fault with the Viatel mode.

But first, some of the features I like about the Viatel mode are:- The ability to switch the storage device between disk or tape while on line (just in case you forget!); the choice of saving just the current frame or all the 16 stored frames to disk or tape; the posibility of dumping all stored frames to the printer or just the current one; and the nice layout and operation of the download.

Saving frames into memory or recovering them, takes a bit of practice. Put simply, it involves a quick tap of the appropriate function key f1, f3, or f5. Unfortunately, if the finger lingers too long, it is very easy to move two or more pages too far. One nice but confusing feature is that if the next store position contains a previously stored frame, this frame is displayed as a warning that it will be overwritten with the next Viatel frame. (In such cases, you can save or printout the lot to disk/tape before continuing.)

The download works very well. During downloads the screen shows the number of frames to download, the current frame being processed, and a running count of the number of bytes received and the number saved to disk/tape. If a number of errors are found in the download, the user is asked whether to retry or abort the download. However as with some other programs, since each frame is saved to disk as it is decoded, if the download aborts, the user is left with rubbish on the disk. (Not a problem for tape users.)

Lack of the reveal attribute (where Viatel transmits a hidden line which requires the pressing of a special key to reaveal it) is irrelevent, all but one of the other C64 Viatel packages also don't bother either.

Unfortunately, I have one major reservation with the Viatel mode, the lack of the flashing attribute. This is a fairly major loss. Flashing on Viatel is used with great effect to draw attention to a special feature and is also an integral part of the frame design. On some frames, the picture will be distorted since it has been designed to swap between two sets of colours or images. One such example is the 'juggler' greeting card on *103325 where the juggling action is simulated by swapping between two flashing inages.

A few other comments.

- Dynamic Viatel pages (for example *222) are not displayed correctly. Combined with the lack of flashing attribute this could be a problem when the graphic designers begin producing more complex frames.

- All keys repeat: a nice feature but not for Viatel where it is too easy to accidentally send the wrong numbers.

- One of the characters is incorrect, the Viatel character known as DBAR ($7c) appears as a horizontal line. Since this is generally not used for graphic displays it poses no problem.

For most users who can never remember their Viatel user identification number I would have liked to see an auto-logon of the user id. The ASCII terminal mode has programmable function keys. 'Tis a pity a few couldn't be provided for Viatel. However, just how much can on fit in a small cartridge!

Terminal Mode

The other option from the main menu is the normal ASCII terminal mode. A large range of terminal parameters may be chosen.

- Baud rates 300,600,1200,2400, and 1200/75. The 1200/75 terminal mode is very useful. A number of local BBSs are will be moving to an optional 1200/75 for faster access and downloads in the near future.
- Full or half duplex, parity, stop bits, word length.
- Optional carriage return after line feed (very useful).
- Display width 40 or 80 columns.
- Ability to use prestel (Viatel) graphics in terminal mode.Good for access to other 1200/75 or 300 baud videotex services such as Minerva via Austpac, Agridata videotex farm data base, Teledata, and others.

The actual terminal mode provides many nice features.

- A 14800 byte workspace for logging of on-line sessions. Workspace can be readily turned on or off to selectively log only important parts of a session. A flashing warning is provided when there are less than 1000 bytes left in the workspace.
- Workspace may be viewed or printed while on-line.
- Workspace may be saved (or loaded) to disk/tape
- Workspace can be transmitted directly. A file may be written with Easyscript, loaded into the workspace, then transmitted to the BBS or other user.
- Upload and Download with the most popular XMODEM protocol for either disk or tape.
- Optional key click.
- A carrier detect indicator (a telephone icon which flashes when no carrier is detected – will not work on a simple three wire connection of course.)
- Selectable screen and character colours.

Using Terminal Mode.

With developing our local BBS and other 300 baud communications, I would have spent over 10 hours on-line in terminal mode and it has performed without a hitch. Occassionally, the first few characters displayed on the screen at the initial log-on have been garbled but this is most likely caused by line noise or errors at the receiving end. When accessing OTC's Minerva or Telecom's new Telememo service this often happens, but after log-on everything works fine.

The XMODEM download and upload is quick and reliable, maybe even slightly faster than that in the new VIP Terminal XL program.

Depending on the colour combinations, the 80 column mode is quite good, even on my Sony TV. It is particularly useful for

Continued on page 42

Beginners Corner:
BASIC Error Messages

Paul Blair

One of the most difficult skills for the new user to acquire is the ability to enter a program correctly at the first attempt without creating any extra errors. Don't worry if this happens to you occasionally, it happens to even the most experienced programmers all the time. However the experienced programmer can generally look at the offending line and rapidly find and correct the problem. For the beginner, just finding the error can be a frustrating experience.

Most beginning programmers quickly fall into the trap of trying to make the program more complicated than it actually needs be. One can always add the smart tricks once the program has done the basic job for which it was written.

A good rule is that if the program is very complicated and difficult to comprehend, then it probably is badly written program and most likely will take longer to debug than it took to write in the first place. At best it will work only for the specific job and not be readily adaptable for future problems.

One of the most difficult things to teach programming students is to plan the program carefully then write it in a series of simple, well documented, logical steps. These can be combined to solve a complicated problem. There is no point in saving program lines or making the program run 10% faster if it simply makes more errors! Plan the program, get it working correctly, the add all the frills.

One energetic person I know wrote a nice program to run the accounts of a service station. Only one problem – the program was 35K long and ran out of memory after entering two days takings! After some thought, and a lot of hard work, the program was rewritten in a more logical manner, eventually reducing to only 9K and would now keep track of all the accounts for a year!

Let's look at some of the typical errors messages encountered with Commodore BASIC programs and attempt to provide an analysis of what to look for and when. A few simple rules are also included. These provide only a rough guide and not an absolute truth! (In any case, most good programmers define their own set of guidelines with experience.)

One further complication arises if too many statements are placed on the one BASIC line. Often it can be difficult to decide which statement contains the error. In such cases, if all else fails, divide the line up into specific statements and put them all on separate lines to find out which is incorrect.

Some of the typical errors in programs are

?SYNTAX ERROR IN xx

The most common error is often caused by a simple typing mistake when entering a line. It means that the BASIC statement is unacceptable to the computer. This may be due to several causes. First of all, one must remember and look for the normal structure of the BASIC statement.

That is

1. Line Number 0-63999
2. Command (Keyword)
3. Expression terminated by the end of a line or a colon ':'
4. A new Command keyword must immediately follow the colon ':'

This is the most common typing error. Some typical examples are

- Incorrect spelling of a BASIC keyword (PRINY instead of PRINT, or leaving spaces between commands, for example GO SUB instead of GOSUB)
- Line does not start with keyword or the equivalent LET command. For example forgetting PRINT as in 100 "HELLO FRED"
- Mathematical expression with incorrect number of brackets (number should always be even).

For example 100 A=(5*(X+9)*(Y+2)

- Incorrect variable name. (Variables should be kept to a maximum of two characters with first character A-Z and second character A-Z or 0-9, followed by variable type of integer '%' or string '$' if required. Variables TI, ST, ON, FN, IF, (and DS in BASIC 4 machines) are 'reserved words' (reserved for BASIC's own use) and cannot be used for user defined variable). Typical example

215 A#=12.6
or 150 FN=9

- Parenthesis (inverted commas) or commas missing, or commas and semicolons interchanged. For example

200 INPUT "NAME",A$ (semicolon required, not comma.)

- Incorrect matching of variable types in READ and DATA statements. If a READ command attempts to read a number and the corresponding DATA statement contains a string variable, the SYNTAX ERROR will be shown as in the DATA statement. In reality it may be in either the READ or DATA statements. For example

100 READ A
110 DATA HELLO

Where is the error? Should Line 100 contain A$ or is there a number value missing from Line 110? On the other hand, if a 'number' is read into a string variable, no syntax error results but the program may not work as advertised. (Difficult to find.)

?TYPE MISMATCH IN xx

A very specific error and easy to spot. Hopefully caused by typing errors and not a misunderstanding of variable types. Typical examples occur when trying to assign a string variable to a number and vice versa. As with

100 A="HELLO" (should be A$)
or 110 X$=25.697 (should be X or "25.679")

? UNDEF'D STATEMENT ERROR IN xx

Caused by a GOTO, GOSUB, or RUN to a line number which does not exist. Easy to find by simply listing the program to check if the offending line is there or not. This can be difficult to correct if entering a program from a book or magazine since one has to simply make the best guess as to which line number was actually intended. In your own program, this should be easily fixed by finding the correct line number.

?REDIM'D *ARRAY IN* xx

An attempt has been made to re-DIMension an array that has already been DIMensioned. One trap is that an array can be DIMensioned automatically, almost without your knowledge. If, for example, the variable Q(5) is used, then the array Q is automatically DIMensioned as if you performed a DIM Q(10). Any attempt to DIMension Q at a latter date will be in error.

All arrays should be only DIMensioned once and preferably at the beginning of the program.

? BAD SUBSCRIPT ERROR IN xx

Occurs when the value of the subscript for an array variable is negative, greater that the DIM statement allows, or uses the wrong number of subscripts. Or, an array variable larger than 10 is used without being DIMensioned at all!

Examples

10 PRINT Z(25) Array Z( ) not DIMensioned first.
20 INPUT S$(2,5) Array DIMensioned as S$(10)

often this error will occur in a statement such as

10 PRINT D(J)

In such cases the value of J must be determined at this point to check if it is within the limits defined by the DIM statement. (Ask the computer with PRINT J and check if within the allowed limits.)

One other trap for beginners is the following

10 PRINT TAB (30)"HELLO"

The 'space' left between the TAB and '(' means that the line is not interpreted as a 'TAB(30)' statement at all but as the floating point array variable 'TA(30)'! Do not leave any spaces within keywords like TAB(or GOSUB etc.

? ILLEGAL QUANTITY ERROR IN xx

This is caused by the expression used in a function or BASIC command being outside the legal range. Typical examples are

- attempting to equate an integer variable to a value less than -32767 or greater than +32767.

Continued overleaf

Continued from previous page

as 100 A%=25413
or 100 X%=A*B*C

which gives a value greater than 32767

- A POKE to memory location NOT between 0 or 65535, or with a value greater than 255 or negative. This ofter happens when using variables.

as POKE 12654, A

where A turns out to be 1256 or similar because of an earlier error.

- A CHR$ value outside 0-255.

as PRINT CHR$(259)
or PRINT CHR$(A)

where a is <0 or '255

- *Attempting* to find the ASCII value of a *null string.*

as A$="": PRINT ASC(A$)

This can often happen when getting information from the disk or tape. When read *from disk or tape, a zero* byte (a CHR$(0)) is *actually returned as a null* string, that is A$="". Therefore always use the expression

PRINT ASC(A$+CHR$(0))

? NEXT WITHOUT FOR ERROR IN XX

Hopefully this shouldn't happen in a well planned program. (Happened in one of mine recently!) In simple terms it may possibly be the result of bad nesting of FOR/NEXT loops or misspelling of the variable name. An example of bad nesting is

```
100 FOR X=1 TO 10
110 FOR J=1 TO 50
120 PRINT J*X
130 NEXT X
140 NEXT J ## error
```

This type of problem can be avoided by not using the variable name in the NEXT statement. But, you should only do this once you are sure that you are writing the program correctly in the first place.

There are other causes of this error which may be quite involved. One example is when the program jumps to within a FOR/NEXT loop. For example

```
100 FOR X=1 TO 20
110 PRINT "COUNT=";X
120 NEXT
130 GOTO 110
```

? OUT OF DATA ERROR IN XX

Results from an insufficient number of items in a DATA statement when a READ statement is used. For example

```
10 READ A,B,C,D,E
20 DATA 5,6,8,9
```

This often occurs in programs from magazines which contain a machine code, sound, or sprite routine where values are read and POKEd into memory. If the program contains a few hundred DATA lines it can be very difficult not to make a typing error. All you can do is check each line carefully. One small check is to compare the end of the previous DATA line with the end of the one currently being typed and how they appear in the original listing. For example, in the following

```
100 DATA 22,55,125,89,236,125,15
110 DATA 2,9,22,66,3,33,66,54,4
```

check if in the magazine listing that the '4' at end of line 110 is under the '1' of line 100.

Another simple cause of this error is pressing the RETURN key on the READY line. This attempts to READ Y.

? DIVISION BY ZERO ERROR IN XX

Not always an easy one to find. As stated in the error message an attempt has been made to divide by zero. This is not allowed in BASIC. A typical case might be

100 X=A/Q where Q=
or 100 PRINT A*(B-C)/(X-Y) where X-Y equals 0.

In such cases, the value of each variable must be determined to find which is causing the problem. However the actual cause of the problem may occur far earlier in the program.

? CAN'T CONTINUE ERROR

Occurs only when the CONT statement has been used to continue a program which was stopped by use of a STOP or END statement or by pressing the RUN/STOP key. There are five simple causes for this error.

- The program has never been RUN in the first place.
- The program has stopped due to a ?SYNTAX ERROR or similar and not as above.
- The variables have been cleared by using a CLR statement after program stopped.

or more likely

- The program lines have been edited after stopping. This clears all variable.
- Or a SYNTAX or other error has occurred in the direct mode after the program stopped. Typically you accidentally pressed RETURN on the READY or similar.

? EXTRA IGNORED

One main cause is attempting to use a comma or colon in an input statement. For example, assume the program contains a line

100 INPUT "ENTER ADDRESS";N$

Any attempt to enter something like- 12 GREY ST, ELMORE -will generate this error and everything after the comma will be ignored. (N$ will contain 12 GREY ST.) Don't use commas or colons with the INPUT statement. Or, uses a leading quote (") if absolutely vital.

That's enough for now. If you have a particularly difficult problem, send it in to us and we will attempt to answer it in the Doctor column.

Continued from page 29

Commodore Telecomputing

0 PARITY bit (sometimes)
1 then a one or two 'STOP' bits
1 ok waiting for next start bit
1 still waiting

From this it can be seen that sending an normal 8-bit character actually involves sending between 10 and 11 bits of data.

Baud Rate: A baud rate of 300 baud will transfer 300 bits per second which, assuming 10 bits per character, means 30 8-bit characters per second. Baud rate must be selected to conform to that of the modem.

Word Length: Defined as the actual number of bits used for the character data. Optionally, 5,6,7 or 8. Select 8 unless otherwise advised. 7-bit words are used for Viatel and 5 and 6-bit words are very rare.

Stop Bits: The number of bits required to signal an end of character transmission. Optionally 1 or 2. Select 1 unless otherwise advised.

Parity: Parity bit is used as a check digit for the data bits. Five types – None, Even, Odd, Mark, Space. Briefly, a parity bit of 1 or 0 is used to make the total number of '1' bits for the character odd or even. Mark parity always send a '1' and space parity always sends a '0' bit. Select None unless otherwise advised. Often word length and parity are related to make an 8-bit total. That is 8-bit word, no parity, or 7-bit word with parity.

ASCII Conversion: Convert CBM-ASCII to 'true' ASCII or not. (Lower case CBM ASCII equaly uppercase true ASCII and vice versa.) When accessing a BBS or a non-Commodore computers, use standard ASCII. For C64-C64, CBM ASCII may probably be ok depending on the terminal program.

Other Parameters.

Two other parameters are often used when accessing BBS. These are

Line Feeds: Depend on whether the sending system sends a line feed character as well as a carriage return at the end of each line. If it does not, then everything will appear on the same line. If in doubt, select for incoming line feeds. Normally not required when sending.

Nulls: 'How many nulls do you require?' is often asked when you log on to a BBS (especially of the RCPM type.) A null means a null character sent after each carriage return to prevent loss of any data bits. Select one if in doubt.

ADVENTURE HELP

Michael Spiteri

Welcome to ADVENTURE HELP, where I will try to help adventurers escape or solve a certain problem in their games. If you are stuck in any adventure game, tell me your problem, and I'll see what I can do. If I can't help you, I'll print your problem on this page and hope that someone can help. If I can help you, you MIGHT receive the tip in the mail, otherwise, it will be printed in a future issue of the magazine...please be patient.

Those who are on VIATEL can send me their problem via electronic mail....my VIATEL number is: 378697780.
That way I can give you an immediate reply.

I received a very rare letter from a PLUS/4 adventurer. Col Ronneberg is stuck in SCOTT ADAMS STRANGE ODYSSEY. He can't seem to find a new cystal.

What he has found however, is a cave with a large boulder in it. Can anybody help??

John Watson was stuck in SHERLOCK. In fact, he couldn't get anywhere! Here are a few tips for SHERLOCK suckers:

A MAJOR FFORBES, will appear on the scene. He will hit one of the policemen and go home. Make sure you are with MAJOR FFORBES, and make him at least answer a few questions. He is a prime suspect... or is he? Try paying him a visit at his home....you'll have to ask HIM where he lives.

WITNESS fans should be aware of Infocoms help facility. Good ol DUFFY will give you help, but you have to ask him for it!

MOUNTAIN VALLEY SOFTWARE have special hint sheets for all their games! Write ot PO BOX 407, Boronia, Vic 3155 for more information.

Those stuck in EUREKA in the KING ARTHUR era, the tune you're after is a popular Elvis tune. Think about the present the old woman gave you, and give it a live sentence...got it yet?

Lot's of adventurers are stuck in CASTLE OF TERROR, some cannot enter the castle! Examine something in the old mill, then try entering the castle. Huh? Try the ladder!

Thats it for this issue, but don't be scared to ask for help. I also want to know what your "favourite" and "not-so-favourite" games are.

Write to me at the address given below or send me a message on VIATEL.

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POSITION VACANT: Michael Spiteri is cutting back his workload with the magazine as next year is his final year at school. He has this twisted view on life that it is somehow important to study. Adventure Help is one of the columns he will dropping. If you have had wide experience, a vast library and suitable contact list to write this column please contact the editor. Pay is minimal, insults are high and pressure excessive.

BEYOND POLAR GRAPHS

Peter Davies

My article on polar graphs (Vol 5 No 1) created some interest. It was written for Year 11 students of mathematics to put a bit more interest into the topic – working with a calculator and using graph paper is quite tedious and limits the topic to very simple curves.

A friend and neighbour was experimenting with the polar graphs on his Amstrad and he saw no reason why the calculation of the x and y co-ordinates should be limited to X=R*COS(A) and Y=R*SIN(A).

He tried the likes of

X=2*R*COS(A)*SIN(A/2)

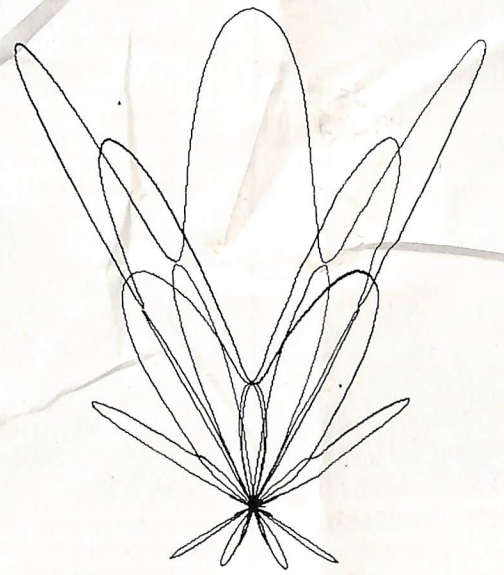

Fig 1.

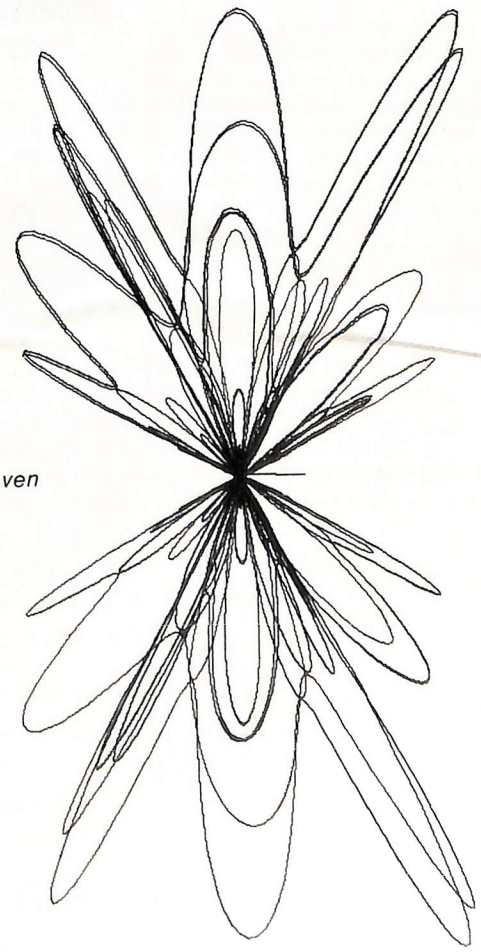

Fig 2
Note that the graph is still incomplete even though 3000 points were used.

Of course the resulting graphs can no longer be described as polar in the strict mathematical sense – a more accurate description would be parametric graphs I would think. Anyway some extremely complex graphs result.

The example shown was produced from

```
R=50*(COS(5*A)↑2) + 50*SIN(A/2)
X=2*R*(COS(A)*SIN(A) + 160
Y=1.8*R*SIN(A/2) +20
```

I have been asked several times 'What use is it?'. Who cares! It is fun, though polar graphs do have uses in describing the characteristics of micrphones. Points to watch – I have found no easy way of determining the upper limit of the loop in the programs using this variation. Also, some of the graphs are so complicated that they show up fairly poorly on the screen. The 1520 plotter can handle them though with its 480 by 960 'resolution'.

The Printer Page

Paul Blair

It seems that there is a lot of interest in this subject, and as long as you keep showing it, we'll keep trying.

Mike Utting wrote to me from Katoomba, up thar in the Blue Mountains. Mike had been trying to make his word-processor do some of the things we listed (fig 1), but without success. He now knows how to handle a lot more features of his printer, but not before he had written a program for his particular printer set-up.

Presets discussed in greater detail in Issue 31 Commodore Magazine on the Printer Page.

Commands where no presets are required.

Function	Effect	Keypresses
Underline ON	Underline until an Underline OFF cmd is sent	F1//+
Underline OFF	Turn off underline	F1//I
Double Strike	Print twice in same place	F1//UA//G
End D. Strike	Revert to standard	F1//UA//H
Emphasized ON	Print, move paper, print again	F1//UA//E
Emphasized OFF	Revert to standard	F1//UA//F
Italics ON	Print italics	F1//UA//4
Italics OFF	Guess What!!	F1//UA//5

Commands requiring presets before using them.

Function	Effect	Presets/Keypresses
Enlarged print	Double width	6=14 F1//6
Normal print	No more big-uns	7=20 F1//7
Compressed ON	Half width	8=15 F1//8
Compressed OFF	Normal again	9=18 F1//9
Superscript ON	Print above line	0=0 F1//UA//S//F1//0
Superscript OFF	Line up again	None F1//UA//T
Subscript ON	Print below line	1=1 F1//UA//S//F1//1
Subscript OFF	Normal again	None F1//UA//T

Our first column was written around a simple cable connection between a C=64 and a Gemini printer. Mike pointed out to me that many people have the C=64 with Cardco interface to their Gemini's, which is doubtless true. Mike had worked out how to control this configuration from BASIC, and kindly agreed to have his program put before you.

In the program, you will find nearly all of the useful combinations you will want. There are lots of REMs, so it is all easy to follow.

64/GEMINI/CARDCO

```
100 REM: SAMPLE PRINTER PROGRAM'BVXB
110 REM: CONFIGURATION:'BPSA
120 REM:  COMMODORE 64'BMPA
130 REM:  GEMINI 10X'BKIB
140 REM:  CARDCO INTERFACE'BQGE
150 REM:'BBAA
160 REM: MIKE UTTING, KATOOMBA NSW'BXJI
170 :'ABHC
180 REM:*** THIS IS "ESC CODE A"'BKDI
190 REM:*** BASED ON P22 OF INTERFACE BOOK'BEVM
200 REM:*** DEFINE ESCAPE CHAR SET'BXWC
210 A$=CHR$(27):REM ** ESCAPE CODE'DTDD
220 B$=CHR$(17):REM ** LOWER CASE ON'DUVE
230 C$=CHR$(145):REM ** UPPER CASE ON'DVTG
240 D$=CHR$(14):REM ** EXPANDED ON'DTDG
250 E$=CHR$(15):REM ** EXP OFF+COND ON AFTER
    EXP/COND ON'DMJM
260 F$=CHR$(20):REM ** CONDENSED ON'DUBI
270 G$=CHR$(18)+CHR$(146):REM ** CONDENSED OFF'FBIM
280 H$=CHR$(14)+CHR$(20):REM ** EXP/COND ON'FXJM
290 I$=A$+CHR$(45)+CHR$(1):
    REM ** UNDERLINE ON (ESC"-"1)'GGPQ
300 J$=A$+CHR$(45)+CHR$(0):
    REM ** UNDERLINE OFF (ESC"-"0)'GHBI
310 K$=A$+CHR$(52):REM ** ITALICS ON'EUNF
320 L$=A$+CHR$(53):REM ** ITALICS OFF'EVCG
330 M$=A$+"B"+CHR$(1):REM ** PICA ON'FQMH
340 N$=A$+"B"+CHR$(2):REM ** ELITE ON'FRAI
350 O$=A$+"B"+CHR$(3):REM ** COMPRESSED ON'FWBL
360 P$=A$+CHR$(64):REM ** WILL CANCEL ANYTHING'EEUN
370 Q$=A$+"E":REM ** EMPHASIZED ON'DTGL
380 R$=A$+"G":REM ** DOUBLE STRIKE ON'DVWM
390 S$=A$+"H":REM ** DOUBLE STRIKE OFF'DWGO
400 T$=A$+"F":REM ** EMPHASIZED OFF'DUWF
410 U$=A$+"S"+CHR$(0):REM ** SUPERSCRIPT ON'FXHI
420 V$=A$+"T":REM ** SUB/SUPERSCRIPT OFF'DAFJ
430 W$=A$+"S"+CHR$(1):REM ** SUBSCRIPT ON'FVBJ
440 :'ABHC
450 OPEN4,4:PRINT#4'CFGF
460 PRINT#4,"THIS IS NORMAL UPPER CASE."'BCBM
470 PRINT#4,"THIS IS NORMAL "B$"LOWER "C$
    "AND UPPER CASE."'BGN
480 PRINT#4,"THESE ARE";'BDVJ
490 PRINT#4,D$" EXPANDED";'BFML
500 PRINT#4,E$" NORMAL";'BFNC
510 PRINT#4,H$" EXPANDED/CONDENSED";'BFTG
520 PRINT#4,E$" AND CONDENSED";'BFCG
530 PRINT#4,G$" CHARACTERS!!"'BEYG
540 PRINT#4,I$"THIS IS UNDERLINED";'BFXJ
550 PRINT#4,J$" AND THIS IS NOT.";'BFSJ
560 PRINT#4,K$" THIS IS ITALIC CHARACTER SET";'BFRO
570 PRINT#4,L$" NOW NORMAL"'BEJK
580 PRINT#4,M$"THIS IS PICA
    ABCDEFGHIJKLMNOPQRSTUVWXYZ"'BENT
590 PRINT#4,N$"THIS IS ELITE
    ABCDEFGHIJKLMNOPQRSTUVWXYZ"'BECV
600 PRINT#4,O$"THIS IS COMPRESSED
    ABCDEFGHIJKLMNOPQRSTUVWXYZ"'BEUO
610 PRINT#4,G$"NOW NORMAL"'BEWF
620 PRINT#4,F$"THIS IS CONDENSED
    ABCDEFGHIJKLMNOPQRSTUVWXYZ"'BETQ
630 PRINT#4,G$"NOW NORMAL";'BFGH
640 PRINT#4,Q$" NOW EMPHASIZED";'BFKJ
650 PRINT#4,R$" NOW EMP/D-STRIKE";'BFNL
660 PRINT#4,D$" EXP/EMP/D-STRIKE"'BEAM
670 PRINT#4,P$"NOW NORMAL";'BFPL
680 PRINT#4,R$" NOW D-STRIKE";'BFRN
690 PRINT#4,S$" BACK TO NORMAL"'BEMO
700 PRINT#4,D$"EXPANDED"E$'BGAF
710 PRINT#4,D$Q$"EXPANDED"E$T$" WITH EMPHASIZED"
    'BKWL
720 PRINT#4,D$R$"EXPANDED"E$S$" WITH DOUBLE STRIKE"
    'BKNN
730 PRINT#4,D$Q$R$"EXPANDED"E$T$S$" WITH EMPHASIZED
    AND DOUBLE STRIKE"'BOET
740 PRINT#4,K$"THIS IS ITALIC"'BEKK
750 PRINT#4,Q$"THIS IS ITALIC WITH EMP"T$'BGGO
760 PRINT#4,R$"THIS IS ITALIC WITH D/STRIKE"S$'BGKQ
770 PRINT#4,Q$R$"THIS IS ITALIC WITH BOTH"L$T$S$
    " NOW BACK TO NORMAL"'BMAW
```

Continued on page 42

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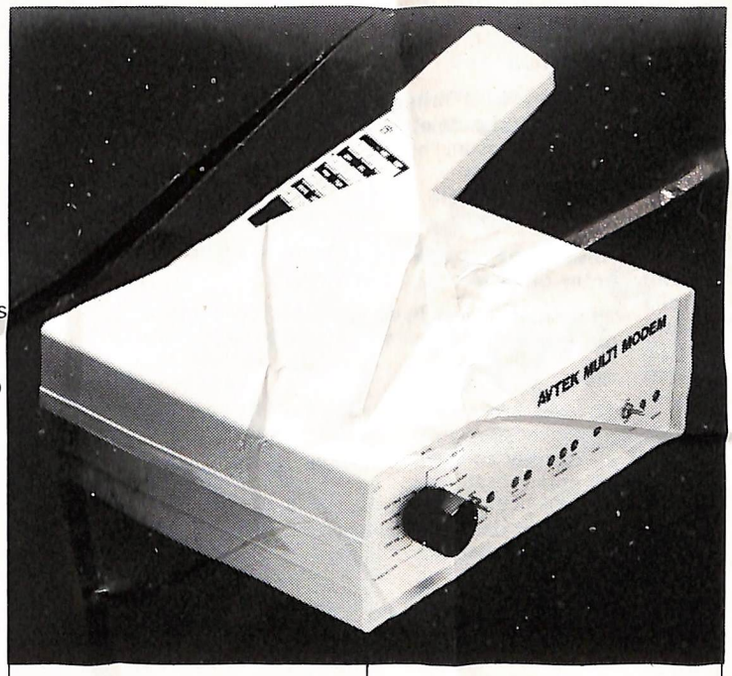

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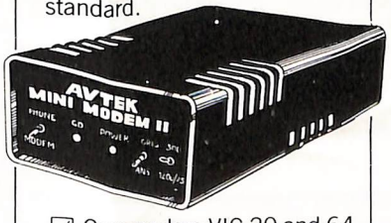

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SUPERBASE

Paul Blair

The small snippet in Vol 4 No 6 about SUPERBASE (I will call it SB from now on) has generated a lot of interest. It seems that there is a lot of interest in using databases on the C64 (of course, versions of SB, sometimes hiding behind different names, are available for other Commodore omputers).

The Editor (the ugly feller on the Editorial page who keeps us chained up and pays us his loose change) has churlishly agreed to make space available between the ads to discuss some of the better things of life, SB among them. And having made the suggestion, guess who gets to write the page?

If that frightens you (it frightens the hell out of me), rest easy. I intend to let you do the work, while I sit back and get to use your elegant, practical and efficient routines for my own work. Clever, huh?

Having defined the ground rules, I genuinely hope we can help each other to get more out of SB. Maybe you can understand the manual? Fine, write and we'll let Australia know about it, and maybe even let the Kiwis have a read too. Know how to set up labels with three fields on one line? Really? That could earn you a few letters of gratitude.

So fire up your C64 (or whatever) and start work. This column depends on you.

From time to time, we do get some material from ICPUG (UK), and despite their dismal grasp of the Queen's language, some (most?) of it is useful. We'll include the juicy bits where appropriate.

DELETE ROUTINE

This issue I will relate a cry from the heart of one Michael Robertson of Bacchus Marsh in Victoria. He wrote:

"Is there any way to delete large numbers of unwanted records from a file without going through the tedious and time consuming task of pressing the "D" and "Y" keys from the SELECT screen?". He continues "I have tried using the BATCH command but to no avail".

Michael points out that building a key list with FIND takes forever if the file is cluttered with extraneous junk. Good point.

I rang a few people in Canberra who are keen SB users and put the problem to them. I got no useful responses to pass on to you, but I did get a heap of "if you DO find out, please let me know". So a solution (if you have one) would win considerable approval. Write in (don't forget to include your name and address – you would be surprised at how many writers are shy) and tell us how you cope. There will probably be less sleepless nights at the Marsh as well.

Ed – I've received a couple of letters regarding this problem and published an answer here without Paul having a chance to run his eye over it.

SUPERBASE MULTIPLE DELETE ROUTINE

```
100 find "hlist" where "<search criteria for
records to be deleted>"
200 select from "hlist"
300 eol menu
400 select delete
500 goto 200
```

Note: See Prog section of Manual for how to enter programs (f5 from Menu 2).

This answer was from Ian MacColl. Similaa answer was also received from Brian Gower

Also

```
10 rem ****** DELETE ALL RECORDS
******
20 display:across
30 select first
40 a$=[KEY FIELD]:display @1a$;
50 select delete:display @28"Deleted"
60 eof menu
70 goto 40
```

This program can be easily modified to add a conditional test after line 40. Depending on the result of the test, program flow could be directed to line 80.

```
80 select next
90 eof menu
100 goto 40
```

From R.J. Macaw, Frankston VIC

EXPORT/IMPORT

The second matter being discussed among some User Groups/SBers relates to the EXPORT and IMPORT functions. EXPORT, if you haven't used it, permits a SB file to be written out as a SEQ (sequential) file. The SEQ file can then be read with a Basic program of your own devising, and you can then twiddle it and fiddle it at will. IMPORT is the reverse, converting a SEQ file into SB format for storage.

I first struck the problem when the local User Group membership records went awry. The Secretary, John Hambley, sought help with file reconstruction after something went wrong. John had followed the manual to the letter, and got a nasty shock when the sky fell in. This let me in for some hours work – first while I figured out how SB stores its records (I might pass that on one day if I can find my notes), then a bit more time purging the disk. I recovered all but 2 records (out of 330 odd), but the program had crashed because the disk sector link bytes on two DOS-adjacent sectors were pointing at each other – a 1541 version of perpetual motion. Then I found that the pointers used by SB to index a particular record were mangled – one record had two pointers, and neither could be erased. Do you ever have those sort of days?

Then news of other EXPORT/IMPORT crashes started filtering in. By this time my interest was aroused, so I set out to cause a crash from a sample program, which I did. Then, more by luck than any deeply reasoned calculation, I made sure every field of every record had an entry, even if it was something chosen to be of no program use (Z or zero was what I chose). This time – no problems.

I may have been lucky, or maybe I did nothing sinister to bring on spasms. For what it is worth, that was my experience. What has yours been?

I still haven't seen SB V2, although I notice some good prices for V1 being advertised (this is early June) probably due to end of financial year stock clearances. Chambers are advertising a "Mar 85" version for (ouch) $199. Presumably it is V2, but there is no confirmation of that. If Precision Software or their Australian agent would like to forward a copy, we can let you know more about it.

For everyone's benefit, would anyone like to comment on use of SB with FLASH, EPYX cartridge, EXPRESS or any other (legal) hang-on for faster disk access?

We await your contributions. Remember that, with near-monthly publication, there will be a time lag between you writing and us responding in print. But if it's good enough, who minds waiting?

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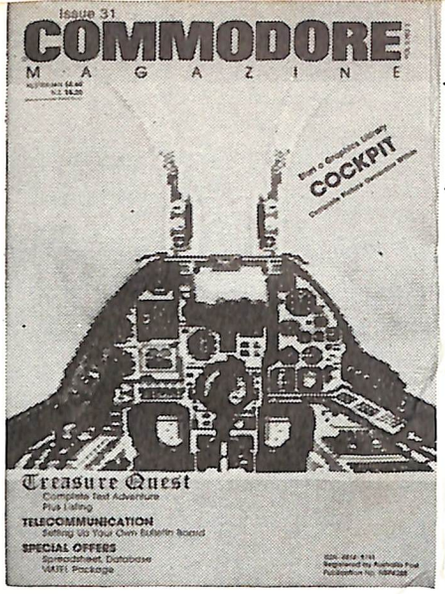

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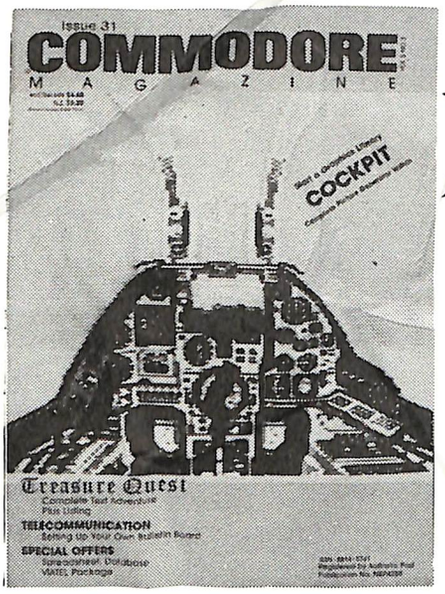

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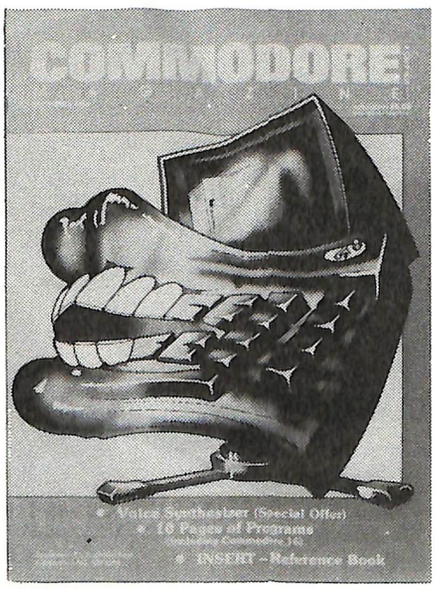

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array does not ...
check is made that each element does not exceed 255. If numbers larger than 255 are ... as useful subroutines in your own COMAL ... Australian publishers' pricing policy for

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- Unlike some interfaces,
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The OTHERS
'DATA' statements in G-Pascal

by David Roth

One of the major drawbacks with G-Pascal is the awkwardness of setting up tables of numbers or characters. It can be done by tediously assigning data to arrays, e.g.

```
a[1] := 40 ;
a[2] := 20 ;
..... and so on
```

or

```
alpha[1] := "abc" ;
alpha[2] := "def" ;
```

But there is a better way. The following technique provides a useful way of setting up BASIC-like DATA statements in a G-Pascal program. It allows tables of strings or numbers to be more easily set up.

1. Numbers

The following program sets up the 'DATA' at the start of the program as 'comments'. Each data element must be 3 digits, i.e. 1 = 001.

```
1: (*
2: 001002003004
3: 095160160186186186186186186186
   186186186160105£££££*)
4:
5: varj : char;
6: z : array [80] of char;
7: (* read the data lines *)
8: procedure read data;
9: const start source = $4000;
10: var i, ptr : integer;
11: begin
12: for i := 0 to 79 do
      z[i] := 0 ; (* clr array *)
12: i := 0;
13: ptr := start source - 1;
14: repeat
15: ptr := ptr + 1
16: until memc[ptr] = "(";
17: ptr :=ptr + 3;
18: repeat
19: z[i] := (memc[ptr] - $30) * 100;
20: z[i] := z[i] + ((memc[ptr + 1] - $30) * 10);
21: z[i] := z[i] + memc[ptr + 2] - $30;
22: i := i+1; ptr := ptr + 3;
23: until (memc[ptr] = "    ; (* delimiter ? *)
24: end;
25: (* mainline - display the data *)
26: begin
27: read data;
28: (* display the data *)
29: forj := 0 to 74 do
30: writeln(z[j]);
31: end.
```

This technique takes advantage of the G-Pascal standard that source code starts at $4000. Therefore, if the program starts with a 'comment area', that area can be used to store data. The first 'data' line must start with the "(*". The first data element can from one to any numbers of blanks after the "(*", since the editor tokenises the blanks so that two blanks take up as much space as four blanks. The end of the data is marked by a row of pound signs (or whatever delimiter you prefer). Extra protection could be added to check that the index for the receiving array does not exceed the array bounds. No check is made that each element does not exceed 255. If numbers larger than 255 are required, then the receiving array must be defined as INTEGER.

2. Strings

The following program handles string data.

```
1: (*
2: Mary had a little lamb, its fleece
3: was white as snow.£££££)
4:
5: var j, k : char;
6: z : array [80] of char;
7: (* read the data lines *)
8: procedure read data;
9: const start source = $4000;
10: var i, ptr : integer;
11: begin
12: for i := 0 to 79 do
      z[i] := " " ; (* clr array *)
13: i := 0;
14: ptr := start source - 1;
15: repeat
16: ptr := ptr + 1
17: until memc[ptr] = "(";
18: ptr :=ptr + 3;
19: repeat
20: z[i] := memc[ptr] ;
21: i := i+1; ptr := ptr + 1;
22: until (memc[ptr] = "    ;
23: end;
24: (* mainline - display the data *)
25: begin
26: read data;
27: (* display the data *)
28: forj := 0 to 79 do
29: write(z[j]);
30: writeln
31: end.
```

Notice that the use of "*)" as a delimiter for the 'DATA' rather than looking for the ending "*)" for the comment allows "*"s to be included in the 'DATA'.

REVIEW

Commodore 64 Graphics with COMAL

Author: Len Lindsay
Publisher: Prentice Hall (Aust)
Price: R.R.P.$33.95

This book follows the excellent example of Len Lindsay's "COMAL Handbook". Each of the graphics control commands (including TURTLE graphics) built into COMAL is explained by a working example. The discussion of each command is an object lesson to the writers of computer manuals – a clear, low-jargon explanation, notes on its correct use and syntax, and a sample program. The sample programs are for the most part easy to follow and are good examples of sound structured programming style. They can also be readily incorporated as useful subroutines in your own COMAL programs. If you don't have the COMAL handbook, appendices are provided explaining COMAL structured programming, COMAL keywords and useful functions and procedures.

The book is, I think, pitched towards the 'practical' programmer or student, rather than the technical theorist. The book is basically a manual of graphics commands and does not attempt to give a full explanation of Commodore 64 graphics concepts. Each category of graphics command (TURTLE, GRAPHICS and SPRITES) is introduced by a clear and simple explanation of the concepts used. If these explanations and the examples are followed through carefully, you will gain a good basic knowledge of graphics and a sound understanding of structured programming.

Some of the examples are a little complex – the sample program for SPRITECOLOR has too many ELIFs (ELSE IFs) when a CASE construct would have been simpler. But perhaps this is an implied invitation to the reader to improve the program as a learning exercise. But most of the sample programs are quite well thought out and present interesting ideas for the reader to build on. They could be improved if they were tied together by a common theme. If each sample program was a 'building block' in a bigger program then you would have a clearer idea of how the commands fit in together. For example, in a 'shoot 'em up' game, SPRITECOLLISION could be used to detect hits, PLOTTEXT to give the score, the TURTLE to draw a landscape, and so on. Having completed the examples in the book, you would then have a completed project to fiddle with, modify and learn from, rather than a disconnected set of examples, however excellent in themselves.

The book could also be improved by the inclusion of pictures or diagrams of the screen when the sample program is run. It is far easier to check a program from a picture than from a verbal description. And it seems strange that a book on graphics should have no pictures.

One drawback for users of the public domain COMAL version 0.14 is the limited memory available for user programs – 6 to 8K. I understand that the new COMAL version 2.0 for the 64 – now available from COMAL User Groups in the UK or USA – has over 100K available to the user, but it is expensive (over $100 for the cartridge). The graphics commands available do get around the memory limitation to some extent, since they condense a good deal of power into one simple statement (imagine the number of BASIC lines required to implement a TURTLE). If you are too lazy to type in the examples, you can send away for a companion disk. I don't recommend this, since you can learn far more by typing in and debugging the programs (and hopefully modifying them to try out your own ideas). The disk is also rather pricy, at $20 (US).

On the subject of price, I am very critical of Australian publishers' pricing policy for

Continued overleaf

SNIPPETS

Paul Blair

A few snippets that have come my way lately.

1. EASY SCRIPT/EASY SPELL 4040 DISKS

Despite there being some minor differences between disks formatted on CBM 4040 dual drives and those NEWed on CBM 1541 drives, many of us forget about these differences and cheerily use the disks interchangeably.

By and large, few problems arise in practice, *despite the heavy* warnings about going blind or whatever. *But I have* found that using EASY SPELL with 4040 format disks in a 1541 drive has caused me one or two heart stoppages.

Before finishing off my scribblings, I usually *run EASY SPELL to check* the worst of my spelling. I have noticed an odd thing when using a 4040 format disk. The problem shows up when I edit an incorrect word by adding a letter or two to a word. The program throbs on to the end quite cheerily, but reloading the file reveals *that the first* character of all paragraphs following the correction have *vanished*. Edit more words to lengthen them, and yet more letters evaporate.

I offer no explanation, because I don't have one. I know that the problem does not arise on 1541 format disks (that I can discover, anyway). Has anyone out there had a similar experience? If so, can they throw any light on the scene?

ED – Paul we've had this trouble with 1541 and the SX quite consistently. Loveto know a way around it.

2. CHIP SHORTAGES

There is a reported shortage of 6525/6526 chips, which is delaying repairs to C64's. Without them, there is no life!

There are abundant supplies available from the USA, but at a price. For example, 6526 chips would cost about $50 each. They are less than US$20 in quantity, but the Australian dollar is kinda sick, and duty has to be paid. The price seems to be very hefty to me, but the supplier works in the international IC market, so would have to be competitive to stay in business. Commodore, my spies report, are pretty awful in the spare part department, so if folk are desperate enough, alternate supplies could be arranged. Let us know.....

3. 8032/8096/8296/SUPERPET USERS CIRCLE

With umpteen million C64's floating around, some users of older (i.e., more than 2 years!!) CBM equipment feel left out. Many 8XXX owners wish to make contact with other owners for information exchange. If you would like to send us your name and address, a list of your computer gear and your interests, together with a self addressed, stamped envelope I will attempt to set up a register and send a compiled list to you all. Some folk are a bit wary about these lists, fearing burglary, in which case a phone number alone could be supplied. It might take a month or two to get it together, so be patient.

While on the subject of 8XXX computers, would anyone have a copy of the instructions for a database program named DMS, a Compsoft product? It is something of an antique now, and a friend of mine cannot find his set of words. Anyone who can help could contact me direct.

4. BUSCARD

Both models, I and II. There have been spasmodic reports of (a) overheating (b) problems with power line "spikes" when the fridge switches on. Any reports would be welcomed.

5. 1525 PRINTERS

A revised character ROM is now available for the *later models*. As with the 801, the new chip offers descenders on appropriate lower case letters (g,j,y,p,q) and overall improvements to ALL other characters. Smarten up your printout. Contact me for further information.

6. PRINTER ROMs (General)

The MPS801 printer ROM with revised characters has 'taken off', following articles in the TPUG (Toronto, Canada) Magazine and RUN. Two dealers in Canada are selling dozens each week. A mini-export drive?? Some hundreds are printing away happily in Australia and NZ, and now many hundreds more in Canada and the USA.

7. EPSON/COMMODORE PRINTER

The EPSON GX-80 is due for release in June. This model connects directly to the serial port, and uses a built-in interface to give the full Commodore character set, funny graphics, control characters and all. NLQ (near letter quality) mode promises better looking correspondence. We have a review model (Serial # 2, would you believe?) and will tell you all about it as soon as we can.

8. END OF (FINANCIAL) YEAR BLUES?

It's bargain time again. Commodore hardware and some software is being drastically reduced in price, either to clear old stock before new models, or to provide some bread for the accountants.

The C64 has been cut to $299 ($399 over the counter, with a $100 rebate directly from Commodore on proof of purchase). Any bets that the $299 price will stick? Having cut the price of the apparently not-popular C16 and Plus/4 (they can be had down to $99 and $280 I'm told), and other items like the 1541 disk drive (reportedly down to around $325) and 803 printer (around $289), it could be a great time to get some bargains. But hurry. The release of the C128 seems likely to be brought forward to give impetus to flagging sales, and prices will then firm up again, I suspect.

9. ROM REVISIONS

The article on Kernel update (Vol 5 No. 1, page 44) had a section at the end of the listing to help load VIC tapes into the C64. Not everyone needs this, as the note at Line 2999 indicates.

With this fix in place, there may be hassles getting standard C64 tapes to load (you can't win 'em all!!), but SAVE routines will not be affected.

The tip is to only use the VIC timimg fixes when it is absolutely necessary.

CONTACT

You can contact me:-
Paul Blair,
C/- Commodore Magazine,
82 Alexander Street,
Crows Nest 2065 N.S.W.

Continued from previous page

microcomputer books. They cost far more than comparable works in other technical fields and it is therefore reasonable to assume that popularity, rather than time and effort, is the principal determinant of price. The excessive price is, in my opinion, a disservice to both readers and authors and a reflection on the the business acumen of publishers. It restricts the market to wealthy readers and school libraries. Since microcomputers become rapidly obsolete (remember the VIC 20 ?), the majority of people who would like to read the book will not have access to it until it is out of date. It is therefore likely that cheaper microcomputer books would mean more sales revenue for the publisher and more royalties for the author. It would also cause demand for these books to rise generally since if people have read and enjoyed one computer book, they are likely to want to read others. This is publishers' policy in the USA and UK – in the UK, I was able to buy books comparable to, or better than, the one under review for about a third of the Australian price. Unlike supermarkets, which take great pains to study customer demand, Australian publishers (and booksellers) appear not to study their market and simply skyrocket the price if the subject is popular. If the book doesn't sell, they remainder it rather than adjust the price downwards to see if more people will buy. Unfortunately, it seems that the Australian book trade generally has only one idea on marketing and that is a wrong one.

David Roth
Canberra ACT

BOOKS & THINGS

A sampler of the publications we've recently received.

THE HOME COMPUTER WARS

Title: The Home Computer Wars – An Insider's Account of Commodore and Jack Tramiel
Author: Michael S Tomczyk
Publisher: COMPUTE! Publications Inc
Published: 1984 ISBN 0-942386-75-2
Reviewed by: Laurence Hulse

This book lifts its reader to a height where it is easy to believe that anything can be achieved by getting "INVOLVED".

Newspapers have been full of stories which say some computers companies are near their end, but here is a book about a *survivalist. Jack Tramiel*, Chairman of the *Commodorians*, says, They (people) just *obeyed the rules. But* that's why we need more Commodores. *We need more* mavericks, just so the rules don't take over." His fundamental philosophy is, "Computers for the masses, *not the classes*".

The real action begins in the second *chapter, and* gives a general background of the company which was primarily a calculator company. "The purchase of MOS was one of Jack's most brilliant moves, and one of the things that helped keep Commodore from going bankrupt after the Calculator Wars in the 1970's." *MOS gave* Commordore its own source for semiconductor chips and provided the 6502 microprocessor.

Here's a bit of inside history, "The full name of the Commodore PET was Personal Electronic Transactor. ... The name PET was inspired by the Pet Rocks fad. ... The VIC's official name is Video Interface Computer, but the 20 was selected because twenty sounds friendlier" than 22 (22 columns) or 5 (5 bytes memory). "Jack shrugged and that was that."

The initial marketing strategy is worth noting. Jack Tramiel decided to commit most of Commodore's resource to Europe, because starting in the U-S meant competing head to head with Apple and Radio Shack (Tandy). He conquered Europe, where there was no real competition, and then stormed the American shores, knocking out old rivals (Texas Instrument and others) by slashing Commodore prices.

On competition, Tramiel said, "The Japanese are coming – so we will become the Japanese. We have to compete with ourselves, always. We have to be like the Japanese. We have to constantly come up with something new, something better. We have to believe that we are the competition. If we do this, no one can get ahead of us."

"Jack called his management philosophy The Religion. A key element was people. He believed people will go out and hire more people. Next to money, overstaffing is the single biggest problem associated with growth. He (Jack) believed managers had to be doers as well as managers. They had to be INVOLVED. Business is like sex, you have to be INVOLVED."

The approach to setting prices is interesting. Working from a cost-up as opposed to price-down, always meant reaching a lower cost and therefore when needed a lower price than the competition.

There is also an interesting story about how Tomczyk handled a corporate political 'assassin' who wanted to stick in the knife. The tale starts on page 200.

Jack Tramiel resigned from Commodore on Friday, Jan 13, 1984 and within six months had purchased his old competitor, Atari from Warner Communications. "On the day Jack and his team started, Atari occupied over 40 separate buildings, most of them leased. By the end of the first week the total was down to seven buildings. The closings left a warehouse full of used office furniture, much of it more plush than Jack and his grup were used to at Commodore."

Tomczyk began his days as a Commodorian as Tramiel's assistant and went onto establish the VIC as a marketing success. His book lights a fire within the reader as it describes the people and the problems behind the plastic which became 'the machines'.

IMPOSSIBLE ROUTINES FOR THE COMMODORE 64

Publisher: Duckworth
Author: Kevin Bergin

These routines will enable you to utilise the more hidden areas of your 64. The book contains most of the answers to the questions that give you sleepless nights, and also provides an insight into how to approach future problems.

The topics covered include protecting a program on tape or disk, moving Basic, scrambling programs, disabling control keys, and how to make a program auto-run as soon as it's loaded. There is a collection of routines to speed up program execution using the internal routines on your 64, and many other hints and tips such as adding commands to Basic, downloading the Commodore character set to an Epson FX80, and producing screen dumps, etc.

Each routine includes a documented listing, along with a general outline of the idea and a detailed look at how the program was constructed.

COMMODORE 64 LOGO PRIMER

Publisher: Prentice-Hall (Aust.)
Authors: Gary G. Bitter/
Nancy Ralph Watson
Price: R.R.P. $27.50

Discover how easy it is to learn Logo! This book teaches anyone – novice or advanced user – how exciting, useful and creative Logo can be.

The authors divide this comprehensive volume into three distinct stand-alone sections:

Part I is a step-by-step development of Logo with no user prerequisites except access to a Commodore computer with Commodore Logo.
Part II, Quick-Start Logo, is for the person who has some familiarity with Logo.
Part III gives you a broad overview of Logo that includes its historical development along with useful Logo applications.

Together, the three sections form a comprehensive picture and cover all the major Logo topics, including procedures, recursion, coordinates, the REPEAT capabilities, screen commands, and the Logo library. In addition, you'll benefit from the pictorial examples, the list of commands and error messages, and the detailed glossary/-index.

Commodore 64 Logo Primer makes you a Logo user with a minimum of anxiety and frustration.

The Printer Page-Continued from page 34

```
780 PRINT#4,U$"THIS IS SUPERSCRIPT"V$;'BHYQ
790 PRINT#4,W$" THIS IS SUBSCRIPT"V$" NOW NORMAL"'BGTT
800 PRINT#4,K$U$"THIS IS ITALIC SUPER"V$;'BJFK
810 PRINT#4,W$" THIS IS ITALIC SUB"V$L$" NOW NORMAL"
    'BIBN
820 PRINT#4:CLOSE4'CDRF
```

I suggest that you type in the program, then LIST it to paper just as is. Then, immediately below the listing, RUN the program and get the exact output on paper. Keep the two sections together for future reference.

Thanks, Mike. Your efforts will be appreciated by many, I'm sure.

Are there others of you out there who are doing useful things like this? Or are there some of you who wish they had such a program for their printer? Well, stop shuffling your feet and let us know, or send in your favourite sequences. Meanwhile, I'm playing around with an OLYMPIA 165 with a Xetec interface, a very powerful combination. I'll keep you posted.....

M.P.S. 802 Printer-Continued from Page 11

Listing 5

```
10 REM ################################
20 REM      D HARE 1985
30 REM HIRES MEMORY RELOCATOR (SIMON'S)
40 REM ################################
50 C=0: FOR AD=21820 TO 21902
60 READ A
70 POKE AD,A:C=C+A: NEXT
80 IF C<>9513 THEN PRINT " ERROR IN DATA STATEMENTS":
   END
90 NEW
100 DATA 76,63,85,32,78,85,32,90
110 DATA 85,32,84,85,169,192,141,9
120 DATA 80,96,120,169,52,133,1,96
130 DATA 169,55,133,1,88,96,169,224
140 DATA 141,112,85,169,32,141,115,85
150 DATA 160,32,162,0,142,111,85,142
160 DATA 114,85,189,0,224,157,0,32
170 DATA 232,208,247,238,112,85,238,115
180 DATA 85,136,208,238,96
190 DATA 169,132,141,112,85,169,4,141
200 DATA 115,85,160,4,208,215
```

Listing 6

```
10 REM ################################
20 REM      D HARE 1985
30 REM SIMON'S HIRES - WHEEL WITH TEXT
40 REM ################################
50 HIRES 0,1
60 CIRCLE 160,100,40*1.4,40,1
70 CIRCLE160,100,45*1.4,45,1
80 FOR X=0 TO 360 STEP 22.5
90 ANGL160,100,X,40*1.4,40,1
100 NEXT
110 TEXT28,20,"A PRINTING SIMON'S ON THE MPS802",1,2,8
115 TEXT100,175,"A BY DENIS HARE ",1,1,8
120 PAUSE5
130 NRM
```

64 TALK:
Continued from page 30

accessing non-commodore boards where the output is designed for 80 column screens.

Overview

64 Talk's most appealing feature is that everything is in the one package and does not have to be loaded. Just plug in the cartridge and go! Another nice feature is the ability to rapidly swap models. For example, if you dial the local BBS and its engaged, just hang up, redial Viatel, and with the press of a few keys you're ready to log on. At the end of the Viatel session, redial the BBS, press shift/run and select Terminal mode and you're away again.

Apart from some problems with the Viatel mode, this is an excellent well designed package for the asking price of $79.00. Since it does provide Viatel access as well as 1200/75 terminal access as well as many of the more useful features of VIP Terminal XL (at $100.00) it would appear to be one of the best overall communications programs for the Commodore 64 user thinking of getting into communications.

COMMODORE DOCTOR

by Dr. Greg Perry

The aim of this column is to help our readers with any problems they have with CBM/PETs, VICs, C64s, Plus 4/C16 and associated Commodore equipment. Send us your queries and we will do our best to provide an intelligent answer.

Alternatively, if you don't have any immediate problems but have discovered some smart tricks in BASIC or machine code, or even better ways to program some of our answers/articles we would be interested to hear from you. You never know the routine may even win you a prize for the best item published each month. Also drop us a line if you would like a specific topic covered in the magazine.

Write to

Commodore Doctor
The Commodore Magazine
82 Alexander Street
Crows Nest, NSW 2065.

OR MAIL them to me on VIATEL 738329500

Please ensure that any program listings are in NICE LISTER format and include a REM statement with your name and address. (By the time it passes through several hands and reaches me sometimes bits of the letter can have been mislayed. If not, I'm also likely to lose it!) Machine code programs should be in assembler format and not directly in hex. I apologise for the fact that, in general, letters can not be answered personally. Also, because of printing schedules and other factors, some questions may not appear until two months after they are received.

Comments

This has been an interesting month. One of our other writers (PB) has finally discovered the adventureland of modems and telecomputing. Who said old dogs can't learn new tricks!

Telecomputing can be great fun, but sometimes it can be just the opposite. Because the magazines's writers live in different cities, many of our articles are transmitted by electronic mail from the various cities to Sydney where they go directly into the typesetting machine. (Which sometimes chews them up anyway!). The system we use is MINERVA from OTC. In late June, however, OTC apparently switched computer systems. This probably seemed like a good idea to them but in the process our mailbox identification number got changed without anyone telling us. Terror reigned for some time afterwards. Think of what would happen if Australia Post changed your address without telling you! We are finally back on line, although nobody seems to know where the 6-7 articles which were in waiting in our editor's mailbox at the time have gone!

Questions/Answers

Q. I have a problem with my VIC 20. After using it for about half an hour, the screen 'cuts out', the keyboard drops dead, and the only way to revive it is to turn it off for a while. This is very infuriating when you've jus typed in a program and you lose it because your computer goes on strike. It never used to do this and I've no idea what caused it.
Can you help.
David Catling
QLD

A. This sort of problem often occurs when the power supply is getting towards the end of its life. Once the power supply warms up it fails to produce the correct voltage. Try using another power supply and see what happens. Alternatively, if the VIC is of some age, a similar problem could be happening to the internal ROM/RAM or I/O chips. As the chips age their output voltage tends to drop as they warm up. If swapping the power supply does not work the only thing to do is to take the lot into an authorised Commodore service centre.

Q. I have a C64 with the Commdore datacassette and have recently purchased several games from 'Melbourne House'. These include 'Sherlock', 'Hobbit' and 'Spatial Billiards'. However none of these programs will load correctly. The 'Rolf Harris' program that came with the C64 also will not load. All these tapes feature the Pavloda high speed loader.
When in Brisbane recently I took these tapes and my equipment back to the supplier. They made an adjustment to the datacassette that increased the strength of the signal and also demonstrated the effect of magnetic interference on the datacassette with the suggestion that I change the position of the furnishings and equipment. The only improvement was that 'Hobbit' will load occassionally. When I tried to save this, however, it was lost. Can this be rectified.

J.Corney
Dalby 4405

A. Your problem is a common one encountered by many users with tapes whether using fast load routines or not. All of the high speed tape loading systems, including Pavloda, achieve their increase in loading speed by eliminating most of the safeguards in the original process and recording the program at a much higher density on the tape. By this I mean that the actual length of tape used to record each bit is dramatically shorter. Therefore if the alignment of the read/write head in the datacassette is out by a small amount, or, if the tape has been recorded at a slightly lower level (as is common), or, if the quality of the tape is poor, the program will not load successfully.

There are two solutions. You could contact your dealer again and obtain another copy of the programs and see if these versions will load. If not, your datacassette will need realignment (yet again). This could be done by the dealer or you could try yourself.

A rough alignment is relatively simple if you have the perserverence. Just behind the label on the front of the datacassete you will find a small hole leading to the screw controlling the alignment of the read/write head. Find a 'good' commercial tape recorded at normal speed (check with a friend for one which is known to load on other decks) and see if it will load. If not, insert a small screwdriver into the hole and give the alignment screw a quarter turn and try to load the program again. Keep repeating this until the program loads successfully. At this point, check PEEK(159). This stores the number of errors found on the load. (normal load ONLY!) It should be zero. If not re-adjust the alignment and try again.

The datacassette should now be in good alignment and should load 'turboload' programs. (If not try the dealer for a new tape!)

I practice, you should find that the screw needs to be out by as much as one full turn for the program not to load.

Two final points. As suggested by your dealer, tapes with high speed loaders are extremely sensitive to interference. Place the datacassette as far away from the TV and power cables as possible to minimise magnetic interference with the signal from the tape. If you do manage to load the program successfully, because of the program protection, it will generally not be possible to save the program back to a new tape. What you do save is not in fact what you loaded.

Competitions

Interesting One Liners. If you have found any interesting one line routines we would like to hear about them. The best routines every month will receive a NSW lottery ticket or equivalent prize.

For example

```
1 FOR I=0 TO 1 STEP 0: POKE 53280,3:
  POKE 53280,6: NEXT
```

Come on folks! Send some in!

COMPETITION 2

Still, none of the entries for this competition have been successful! As we announced last month, our editor has aggreed that the prize for this competition will jackpot each issue until we receive a correct solution and program. See below for hints.

The Problem: Two computer experts, who live on country properties, are having a quiet drink in a country pub. Expert 'A' owns a rectangular property which is totally enclosed within a 23 by 23 kilometre square. Expert 'B' knows the area of the property and that the sides are whole numbers (integers), but does not know the dimensions. He ('B') asks if the breadth of the property is greater than half the length. Expert 'A' answers. (We are not privilege to rural conversation, but we know the answer was either yes or no.) On hearing the answer, expert 'B' can now

Continued overleaf

Continued from previous page

calculate the dimensions of the property. A farmer has been quietly listening to the conversation, and, although he did not previously know the area of the property, on hearing both the question and answer, thinks for a while, and then, to their astonishment, tells the computer people what the area and dimensions of the property are. (What happens to him after that we won't discuss.)

That's the problem. Can you do it? What is the area and dimensions of the property?

Ok, it seems that this problem is too difficult for you all! The following answers have been received; 25x1 (Jeff and Michael Bone); 22x12 (Ken Morehouse); 22x22 (C.A.P Boundy); 24x8 or 16x12 (Barry Smith); *13x19 or 29x3* (Jim Gregory); and several *tries from L.E. & J.E. Johns.*

I will try to give a few *more hints* and I assure you that there is a specific *logical answer* to the problem.

Everyone is totally missing the point. *Somehow you must find* a rectangle which *can be PROVED* to be 'unique' by the L>B*2 relationship with respect to all other possible rectangles which may be enclosed within the 23x23 square. There is no guesswork.

You must, therefore, work out ALL *the* possible rectangles *(including* squares) which can be contained within the area 23x23. Or, more correctly, a list of all the different areas and the possible dimensions. For example, the area of 30 has factors 3x10, 30x1 and 5x6. (Remember that it is possible to have a length greater than 23 by laying the rectangle along the diagonal.)

Then, compare the way in which the dimensions relate to L>2*B. For example, the area 30 has two sets of dimensions where L>2*B and one where L<2*B. In this case, the answer would have to be 30x1 since there is no way to chose between the other two. If we find another area with factors related similarly (two greater than and one less than) then neither can be the 'unique' one.

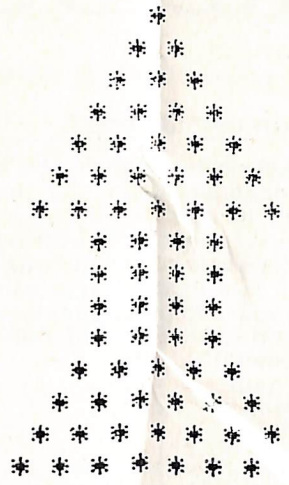
Now comes the easy part! Find out which rectangle is the unique one! You must also write a BASIC program to prove your answer. It is not easy and requires a considerable amount of calculation.

At present, the winners jackpot has not been claimed for 7 issues and currently stands at 7 disks or 7 C10 cassettes (1 will be added each issue until solved). *Greg has also agreed to throw into the pot a copy of his recently published book on Sound and Graphics for the C64.*

Good luck!

COMPETITION 3/2

Using PRINT statements containing only one '*', write a BASIC program to draw the following pattern on the screen.



We have received a number of answers for this problem (even one in machine code!) but the competition will run for one more issue.

The best entry will be judged on skill, brievity, and elegance of the program. It can even be done with a one line program if you are devious.

COMPETITION 4/1. Machine Code.

(If anyone has a nice small little machine code problem suitable for this section pleaase drop us a line.)

Write a program to convert a three digit ASCII number to a single byte hex number. Assume that decimal 159 as its ASCII equivalent is stored in memory starting at location $1000. That is

Loc	Hex	ASCII
$1000 =	$31	= 1
$1001 =	$35	= 5
$1002 =	$39	= 9

The program must convert these values to a single byte hexadecimal value ($9F) which must appear in location $1004. (It must also work for any decimal number 0-255!)

LIMITATIONS: Program MUST NOT contain any C64 BASIC ROM routines!

Through a fault of mine in not specifying the problem sufficiently, I have received a number of answers to the above which a very short and sweet, using the BASIC ROM routine to convert strings to numbers or get integer number from BASIC.

Because of this I must award this month's prize of *IMPOSSIBLE ROUTINES FOR THE COMMODORE 64* by Kevin Bergin to Ken Wakefield from Dingley, VIC. He sent in the following routine which is about as short and to the point as possible.

```
Loc     Opp          Comment
$1005   LDA #$00     ; set up string pointers
 1007   STA $22      ; ($22) to point to
 1009   LDA #$10     ; address $1000
 100B   STA $23
 100D   LDA #$03     ; with string length of 3
 100F   JSR $B7B5    ; convert string in ($22)
                     to floating
                     ;point number in FACI
 1012   JSR $B1AA    ;convert FACI to integer
 1015   STY $1004    ;lo byte of integer end up in
                     ;Y reg thus result store
                     integer
 1018   BRK          ; back to monitor
```

Because of the delay between my receiving answers and publishing details, we will run the competition for another issue at least. Remember, no ROM routines.

As stated earlier, the winning entry will be judged purely and simply by cleverness! Specifically, the winning program will be judged on speed of operation. The program should be placed in memory starting at memory location $1005. All entries MUST be as an assembler listing or handwritten. I do not want to sort through a hex dump!

(If anyone has a nice small little machine code problem suitable for this section pleaase drop us a line.)

Regards Greg Perry

Definitions

FRUSTRATION – the emotion experienced when a program you have just spent 5 hours typing out (and neglected to save) crashes and you haven't got a reset button.
PASCAL – a brand of confectionary
LISP – a speech defect
VIC – abbreviation of Victoria
USER FRIENDLY – a myth
SYNTAX ERROR – computer manufacturer's cure-all work saver

Ken Plowman VIC

WORDPROCESSING –
"Dear Graham",
Enclosed is a letter from .....who is enquiring into the whereabouts of his Big Mouth.

Courtesy Melissa Williams
Commodore Magazine

High Score

GALACTIC CROSSFIRE
27,010 Michael Bakes Tas
MENAGERIE
6,100 J.H.Fry ACT
MONEY WARS
104,240 D.G.Fry ACT
RADAR RAT RACE
137,540 Tom Spencer Qld.
RAID ON FORT KNOX
13,783 D.G.Fry ACT
SPRITEMAN 64
92,290 Brendon Madden VIC
TRASHMAN
407,705 Stephen Norman N.S.W.
VIC FROGGER
225,000 J.H.Fry ACT
FALCON PATROL
5,525 Jeremy Bone SA
BEACH HEAD
95,000 Jeremy Bone SA
SAMMY LIGHTFOOT
54,376 Greg Taylor Qld
ATTACK OF THE MUTANT CAMELS
79,664 R. Kelloway N.S.W.
LOCO
100,400 Brendon Madden VIC
JUPITER LANDER
4,200 Jacki Simpson TAS
WIZARD OF WAR
128,400 Jacki Simpson TAS
LUNAR LEEPER
60,920 Jacki Simpson TAS
THRESHOLD
512,700 Jacki Simpson TAS
FMR COOL
223,654 Jacki Simpson TAS
ED – See!! Girls can do just as well as guys.
OMEGA RACE
250,200 Mathew Campbell VIC

Ergonomics – A better way to work & play

Ergonomics simply means designing furniture for people. Ergonomically designed workstations help reduce work-related injuries. They provide for a range of functions at the workplace and at home.

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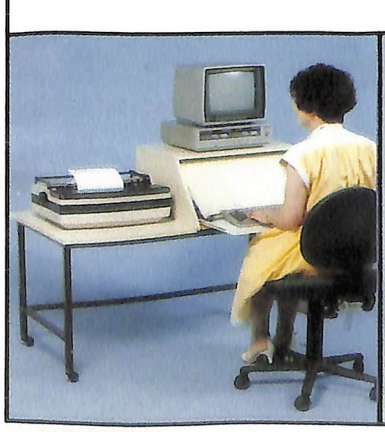
I'd like to work & play ergonomically.
Please send me full details.

Name .....

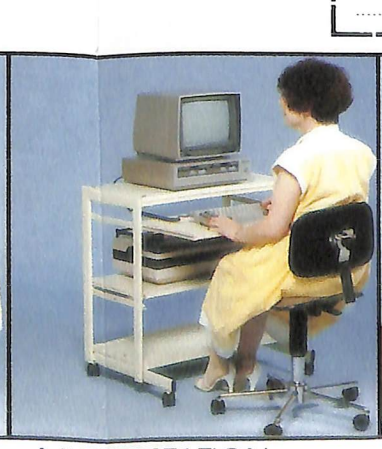
Address .....

.....

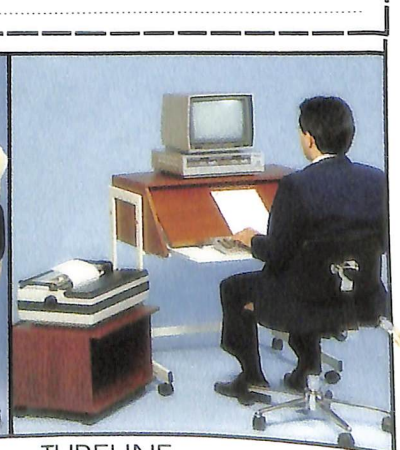


TC DESK

PANELINE



MICROSTATION



TUBELINE

DT:EG/004

The Commodore 64 Music Maker.

The Keyboard For The Keyboard

Well, it's not exactly 'clip on Chopin', but the Commodore 64 Music Maker certainly adds a new dimension to home computers. It's the 'keyboard' for the 'keyboard'. Just clip on and play.
Music Maker comes with instructions and easy-step melody book to enable you to explore the wonderful world of music at your own pace and in your own time. In fact, it's so much fun that music lessons may never be the same again. Music Maker encourages musical adventure and experiment,and that, in our opinion, is a good place to start experiencing the magic of making your own music.
Talk to your nearest Commodore dealer today about the simple, easy way to turn your Commodore 64 computer into a Music Maker.

commodore
COMPUTER

Keeping up with you.

Contact your nearest Commodore Dealer or Commodore Business Machines:
Sydney: (02) 427 4888. Melbourne: (03) 429 9855. Brisbane: (07) 393 0300. Perth: (09) 389 1266. BMS/CC373