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NUMBER 10



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r/red serum

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DEMON'S BENT

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SCORE 001530 0:10
1



REAL GARDEN STATE



LAP : COURSES POWER TIME 00:00:00

PARC ASSOCIET COLISE

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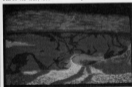
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ABC

THE MYTH GOES ON.

For all members of the
 Official Secret: Magnetic
 Scrolls are about to give you
 a treat. From the writers of
 The Jews, Corruption and
 The Gods Of Thieves comes
 'Myth'. Myth is set in ancient
 Greece, where you play the
 part of Poseidon, God of the
 Sea. Your task is not an easy
 one. Lacking something is
 'Belmont of Inevitably'. Your
 mission Jim should ...
 (Sorry, wrong program.)
 Your mission is to find it. A
 problem? Yes, no, maybe!
 How do you find something
 that is invisible? Enough of
 the plot. Go and get it.
 'Myth' will be made avail-
 able initially for Atari ST,
 Amiga and Macintosh.
 Other formats will follow
 shortly. (C64 and other 8-bit
 disk only machines).

Touchline:
 Magnetic Scrolls, 7 Chapel
 Court, London, SE7 8HT.
 Tel: 01 403 4371/4368



Data Statements

THE WORLD IS SECURETY

Computer Security Ltd, Brit-
 ain's largest systems security
 specialists, will be demon-
 strating its PC products and
 systems at the PC User
 Show (9-11 May at Olympia).
 They will be occupying
 stand number 91A. There
 will be a variety of products
 on view, covering such top-
 ics as Hacking, Viruses, File-
 Security, and Electronic
 Mail protection, etc.-etc. For

anyone that values their
 data, this must be worth a
 visit.

Touchline:
 Computer Security Ltd,
 Olivier House, 18 Marine
 Parade, Brighton, BN1 1PE.
 Telephone: 0173 672799.

JINN OF THE SPHINX

Incentive Software has com-
 missioned exclusively for the
 Home Computer Club, the
 fourth freemage 3D game,
 Total Eclipse II, (The
 Sphinx Jinn). Your mission
 is to rebuild the Sphinx that
 was destroyed in the ancient
 revolution. You can only do
 this before the eclipse, which
 is just 1 hour away. There
 are 12 parts of the sphinx to
 collect from the under-
 ground network of tunnels
 and caverns. As an added
 bonus, the player with the
 highest score will win for
 themselves a trip to Hawaii
 to see a real Total Eclipse.
 Total Eclipse and Total
 Eclipse II are available
 together as a special presen-
 tation. The game is available
 for the Home Computer
 Club only and costs £11.29
 for both disks. The game will
 be released for the Spec-
 trum, Amstrad CPC and
 C64.

Touchline:
 Incentive Software Ltd,
 Zephyr One, Calver Park,
 Aldershot, Beds, RG7
 4QB.
 Tel: 07336 77388.

ON SCREEN READING

Following the major changes in the way that Pressat is organised four new on-line leisure magazines have been launched.

The magazines are a response to recent surveys detailing the users' areas of interest. Until now on-screen magazines have been rather boring to look at since updating a page always seemed to take ages. John Thomas, General Manager for Pressat Leisure has stated that "Rationalisation of the data base and new regional structures mean that reading the magazine will be as easy as flicking to your favourite page in a newspaper."

The magazines cater for those interested in the latest news, sports, leisure and games.

Newsday gives you up to the minute news, from the Observer, available 24 hours a day. The magazine will feature news headlines updated throughout the day, financial news, and features. Travel features, and weather reports, are provided by AA Roadwatch, and the Met office, while rail users will find the instantly accessible British Rail timetables extremely useful.

Sportseye caters for the armchair sports-person, providing cricket information for all major counties and first class matches, updated every five minutes, with daily news and commentary on every match. Football fans will find fixtures, match previews, results and league tables. Horse racing, motor racing, rugby, American football, golf and other special sporting events will be covered.

In a live link, Sportstalk gives subscribers a chance to interview their favourite sporting personalities. Add to all of this options, the ability to order sports-tilts, from the Sportstalk and Sportstays, the Sports Council's database of sports facil-

ities throughout the UK, and you've got what is probably the most comprehensive package available for sports fans everywhere.

Look! is designed to be an entertainment magazine covering travel, health, music, theatre, food and even an agony aunt.

Information for *Look!* is provided by the Consumers Association, British Rail, AA Roadwatch, The National Theatre and Pressat's own *Corkers' Wine Guide*.

Readers of *Look!* will be able to purchase wine, order tickets and take part in regular interviews with personalities.

Play 'n' Games City is as its name suggests, dedicated to those who are looking for a little light relief.

The *Plex* has one-armed

bandits, side-shows and other games - with cash prizes. Prices of hi-fi equipment, videos, and records will all be given away in regular quizzes.

Pressat is an on-line database that can be accessed with a modem and a computer with relevant software. Subscription costs £4.00 plus VAT per quarter. An extra connection charge is also made of 1p per minute off-peak, and 7p per minute peak.

Contact Diavores UK, on 0442 237376, for more information.

KNIT 1 PURL 2

Here's a novel idea for all you knitters out there. You know how difficult it is to read those massive patterns. What with their tiny squares

and black and white font-size. Well, help is now at hand. An enterprising chap from Bradford, Mr Harry Morris, has devised a program for transferring these patterns into a more easily readable form. At the moment, the program is available for the C64, but hopefully other formats will be covered for shortly. To quote Harry, "This programme helps people who want to design their own garments to print out the patterns in a more easily readable form before they start to knit up".

Touchline:
Bradford Interwrite Service,
City Hall, Bridge Street,
Bradford, W. Yorks, BD1
1AF. Tel: 0174 751785.

Computer Graphics for Squaricks

By now you have all probably heard about the launch of yet another satellite TV service in the UK - British Satellite Broadcasting.

Innovative Software, producers of *Franscape 3D* graphics programs, have teamed up with BSB and Broadmead, who produced the award-winning TV series *Knightmare*, to produce a *Megaplane* series entitled *The Satellite Game*.

The game will place three youngsters inside a space shuttle to dock with Enigma, an alien satellite, that is threatening to blow up the solar system.

The contestants have to penetrate and defuse the core of the giant satellite by playing a device controlled Larry.

Franscape, from Iremco, will be used to give a true 3D representation of the world inside the satellite.

BSB is set to begin broadcasting in September 1989. Three channels will be offered at first. News, a sports and news service, *Galaxy*, a general entertainment channel, and *The Movie Channel*, which will offer 6 first-run feature films a week for a subscription of £9.99 per month. For more information contact BSB, 70 Brompton Road, London, SW3 1EF.

The Satellite Game set for launch in January 1990



French Protection

The arguments about radiation, and other nasties from monitor screens affecting the user, is one that seems to go on and on. One minute the manufacturers say there's no problem, then a different company comes up with a new solution to the low-radiation problem we've just been told doesn't exist.

For those who'd rather be safe than sorry, Aquila Permaresh is a new entry into the protection stakes. The French manufacturers claim that the new screen filter offers a fully effective shield against low-level radiation. The filter also protects against static, screen glare, and screen reflections.

The Aquila permaresh screen shield is designed to fit any monitor and is available in the UK from Accodets.

An Alternative Label

Alternative Software is set to lay yet another budget label into the pocket-money software wars.

The first new program on the label, *Winner*, will be scrolling shoot-em up, *Wax*, which was a very popular game when it was sold at full price. Price point No 1 is just £99 for the C64 version.



The Aquila Permaresh protects from screen glare, reflections, static and low-level radiation.

ALL TANGLED UP

A new era of role-playing adventures is about to burst forth. Origin are planning the release of a new style RPA entitled 'Tangled Tales', subtitled 'The Misadventures of a Wizard's Apprentice'. We are informed that this will be a light-hearted and comical approach to the usual fantasy RPA.

You are the cast in the role of a wizard's apprentice with three difficult tasks to perform. Scenes consist of haunted houses, medieval fortresses and country lanes. The game features menu and icon interfaces, state-of-the-art graphics and an unusually good story line. *Tangled Tales* will be released for the C64 and IBM PC's and compatibles. As yet, no definite prices have been announced.

Touchline:

Microprose, 2 Market Place, Tetbury, Glos. GL8 8SQ. Tel: 0600 34720

Another Bond Licence

Demonix is continuing its series of block-buster related games with the computer version of the latest Bond movie *Licence to Kill*.

Licence to Kill, *The Computer Game*, closely follows the plot of the film. In the game you'll take control of 007 in a helicopter chase, an under-water scene and a race to the border as Bond tries to prevent the film badgie Sanchez escaping with a massive haul of drugs.

Licence to Kill will be released in June for the Amiga, PC and C64.

Licence to Kill set for June release. © 1989 Data Design. All Rights Reserved.



Gribbly's SPECIAL DAY OUT



Play: 199999 **Bank:** 00 **0**
Balance: **Score:** 000000
1:00:00am **GameTime:** 0:00:20.6

This is a knock-it-out version of Hewson's Gribbly Gribbly game in which you play a one-legged, armless gribbly from the planet Blagor who must bounce around the hostile landscape rounding up the gribblies and returning them to your cave.

Gribbly's are non-violent people as you probably have already guessed (after all they are armless), and possess no weapons except the ability to lay bubbles on the ground upon their backs on their planet. As the game begins, this creature is locked in a grid, but when this creature is in line to roam. To add to your troubles, there are also tub-like worms that flip the gribblies on their backs, where they are vulnerable to attack. Your task is to bubble these worms, flip the gribblies over and carry them one by one to your cave.

The key to the game is your control of Gribbly, as he can either hop around the ground or fly, but any collisions with the landscape or critters will drain his Psychoenergy - this can also be topped up by jumping on a limited number of the creatures, which sounds great painful, but could mean the difference between success and failure.

Gribbly's Special Day Out makes a change from the usual fan of tapster games, but will appeal to those who appreciate a degree of skill in the game.

Title: Gribbly's Special Day Out. **Supplier:** Kavon (Hewson) 568 Milton Pl., Milton, Abingdon, Oxon OX11 4AA. **Tel:** (0225) 632919. **Price:** £7.97

Incredible Shrinking Sphere

The Sanglathmore Run is a planetary battle training area designed to push new gamers' resolve to their limits. Just the thing that a dust-beard Colonel-in-Chief would like to have a shot at. He did and was trapped in the middle of it in the process, and it's your job to get in after him.



You control a fighter sphere, a craft that's probably unique in the field of gaming as you can use tiles in the Run to change the sphere's volume, mass and speed to help you navigate around the maze. Your fighter is also equipped with a Thonix cannon to blast the assassin spheres that have polluted the Run.

The Run consists of a maze of walls, ramps and passageways which is floored with isotonic tiles that have a variety of effects on your fighter. These could provide the answer to an obstacle in your way or become a death trap. These tiles include some that increase or decrease your mass, which affects your ability to move over damaged tiles or to use the fragile ramps, and others that affect your volume, the size of corridor you can traverse and your velocity, which determines your speed and inertia.

The skill of the game is in controlling the fighter sphere to avoid the many traps and assassin spheres and in planning your journey over the tiles so you're in the right size and weight for the next stage in the puzzle.

Unsolvable Shrinking Sphere is one of those games that is difficult to learn and impossible to master, but if you do you will be hooked for hours and hours.

Title: Incredible Shrinking Sphere. **Supplier:** Activision, Blake House, Manor Farm Road, Reading, Berks, RG2 0LN. **Tel:** (0734) 371661. **Machine:** C64/128. **Price:** £19.99

WEC LE MANS

Are you ready for the "ultimate racing experience"? That's how Ocean (via its Imagine label) describes its latest coin-operation video game, *WEC Le Mans*.

Historic, once again a CDi is supposed to simulate an arcade machine of the sit-in type that spins you around as you race the car wheel. Therefore, unless you spend a fortune and build your own arcade system, it will be impossible for it to compete.

Having said that, the CDi version of *Le Mans 24-hour Racing* is somewhat disappointing, as it offers little more than the old-style games, and leaves you car handling along a road that comes out of the screen towards you. The road in question bends and dips and does all it can to send you careering into one of the trees, lampposts or signs that flank it. Your game isn't helped by the other road users, who fly past you at a phenomenal speed and then slam on their brakes to ram you and send you spinning off the track in a manner that Dick Dastardly would be proud of.

The object of the game is to drive as fast as you can between the track's checkpoints, reaching each one in time to qualify for the next stage. This means keeping your car as close to 220mph as possible. To add to the incentive to drive at breakneck speeds, the game awards bonus points for speeds reached. Since these range from 30 points for



20mph to 80 points for 220mph, it makes sense to keep the accelerator button firmly pressed down.

Controls are the obvious steer left and right, accelerate and brake joystick moves, with the combination acting like a two-position gearstick. This is about the only element of strategy in the game, as you must change gear when the speedometer reads 100mph.

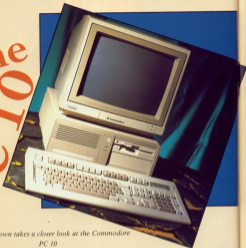
Hurting along a road at 120mph does have its addictive appeal, particularly when you're racing against the clock, as the game ends if you don't reach the next checkpoint in time. If you do, an "extended play" message appears and the race continues. Perhaps the most infuriating part of the game is that if you don't reach the checkpoint in time, you're forced to retire and are then given a fleeting glimpse of the entire circuit, which shows you just how close you were to finishing. It's infuriating enough to drive you back for more and more.

Touchline:

Title: *WEC Le Mans*. Supplier: Imagine (Ocean & Central Street, Manchester, M2 1JY. Tel: 061 832 668). Price: £14.95 (incl. £2.95 tax).



The PC 10



*Andrew Brown takes a closer look at the Commodore
PC 10*

The PC10 is the cheapest machine in Commodore's range of PC/XT compatibles, if you disregard the bargain basement PC1. This is an overcrowded market, so Commodore really needed to get it right for the machine to be successful. Inevitably however, some corners have been cut. One great Commodore merit has been aiming at a C64 owner upgrading to 16 bit technology. These are people who have been loyal to Commodore for a long time, so the following comments are made with them particularly in mind.

The Hardware

The PC10 is very much a standard PC, both in terms of looks and internal architecture. It comes as a

three box system, with the monitor sitting on-top of the system unit, and the keyboard connected by a cable and DIN plug on the right hand side. The dimensions of the system unit are approximately 15"14.5"28cm. This means that the box is slightly deeper than its width, and so is a little awkward to position on an ordinary desk.

The front panel overhangs slightly, though why I cannot fathom, because the keyboard won't slide under it, being too high. The overhang contributes round, and on the right side has the keyboard connector and reset switch, which felt very wobbly on the well-assembled review machine. Inspection of the rear of the machine revealed an array of ports, including parallel,

serial, mouse, composite video and RGB. Unusually, a set of four DIP switches were also visible. Using these, different monitor types can be selected without having to remove the outer case.

The mouse port allows connection of Commodore's own 162 mouse, without having to tie up valuable ports or expansion slots. The power switch is also at the back, just above the power-in socket. There was no power-out socket, so at least two plugs are needed for this system. The power supply itself is rated at 75 watts, so it should be sufficient to power anything plugged into the expansion slots. There are three of these, although the aluminium covers at the back suggest four. Given that almost ever-



Everything is built into the main board, this should be ample. All the slots are full length, so there should be no problems with bulky items such as hard disks on-board.

Externally, everything except the front grille is made of metal, and feels very sturdy. The finish may not be to your taste, being a drab shade of grey, but it will be very durable. Removing the case is just a matter of removing the six fixing screws, and sliding it off. Looking inside reveals the disk drive bays, of which there are three - two floppy, and one hard. The latter mounts to the left of the floppies in a vertical position when present, and also economises on expansion slots by having the controller built onto the main circuit board.

The keyboard is of the new-standard 102 key enhanced type. This differs from the old 84 key type in having the function keys along the top, and a separate cursor area. Amiga 500 and 2000 owners will be familiar with it already, as layout is almost identical. Two nice touches are a cable-tidy, and legs that lock into position positively.

'Feel' is a highly subjective matter, but I think most users will find the action of the keys perfectly adequate. Getting used to the layout will probably prove a problem, and left-handers like myself will not be so enamoured of this layout. Indeed the review machine didn't have the correct system disks. Also the software needed to set the keyboard up was not properly installed, resulting in some strange

things happening when keys were pressed. I suspect that if all machines are set out in the same way, a lot of worried telephone calls will result.

The Monitor supplied was the familiar 1084S monitor, so I won't comment on it here, except to suggest that a stereo monitor is overkill for a simple PC. More interesting is the display adaptor, which can support different kinds of monitor, and hence graphics standards. Colour monitors such as the 8084 will produce CGA graphics, which are more suitable for games. Monochrome monitors can display Hercules graphics, and give 387*15 text with crisp characters. So it's possible to have a dual purpose machine, with monitors for both serious and games applications connected at the same time.



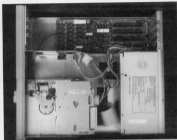
Processor Speed

This is something of an obsession in PC circles, with endless quoting of clock speeds in reviews. However tiresome this can be, it's important to understand that this has a direct bearing on how fast the machine is to use. The PC10 III uses the original 8888 processor, which is the slowest of the Intel 808x family of chips, but clocked at up to 9.54 Mhz. This is double the original speed, and gives very nearly twice the performance. Needless to say, performance is a great improvement on most 8 bit machinery, but not in every way.

In use

Switching the machine on brings a Swoley fan to life, and as the display clears, a number of messages appear at the top of the screen. These seem slightly irrelevant, and I wonder if a better course of action would be to access them from a set up program. You then have to boot MSDos by inserting a system disk. The process is very similar to running Workbench on an Amiga, but when it's done, all you get is just a plain A: prompt. The machine arrives running at the 4.77Mhz (slow) processor speed at switch on. To change speeds, you have to press three keys at once, or use the speed utility supplied. This is just plain, silly, and could lose Commodore sales in the short-term. After all, in the kind of places where this machine is competing, sales people are unlikely to have saved things out sufficiently to change it.

The PC10 will run all the software you'd expect - that is, everything having packages requiring a hard-disk, or EGA standard graphics adaptor. Surprisingly though, changing the processor's clock speed doesn't make much difference to the computer. On reflection however, it's not so odd, as the limiting factor on most computer programs is the speed of the operator, not the machine. Only the benchmarks really show the greater processing power achieved, but even benchmarks should be taken with a pinch of salt. In the end, a computer is a productivity tool, and whether the one you buy meets your needs is the only question that must be answered. As a printer though, a PC-XT compatible, like the PC10, should be sufficient for most home and general use.



Documentation

As before, a plain vanilla computer. The PC10 comes with plain documentation. Three manuals are provided, two of which (for MSDos and QW/Basic) are standard Microsoft issues. As such they are perfectly adequate, but not very friendly to new users. The third, and thickest volume is the User's Manual. This does attempt to make the introduction to MSDos a little less panic inducing. It is however, let down by the standard of production, featuring as it does nasty line drawings and fuzzy photographs. Also the manual veers into discussing low-level programming, something I would rather see put into a technical

reference manual. It is worth bearing in mind though, that after the initial set-up, most people will have no further need for this manual.

Conclusion

Comparing the Commodore PC10 with its nearest competitor, the Amstrad PC1512, reveals few glaring deficiencies in either. The Amstrad is cheaper, but the Commodore has a better display, and so on. It might in the end come down to who offers the better handling deal. At the moment Commodore are handling a printer - the MPS1200 - with every PC1000. That, in my book, just about swings it.



Graphics on the 64

Part two of our introduction to Graphics programming
on the C64

Last month, I began describing the manipulation of graphics on the 64. Due to the lack of space, however, I had to leave two important aspects untouched.

Firstly, there's the small matter of bit-mapped graphics. Last month, I described how you can redefine a character's shape. If you could fill the screen with 1,000 different redefined characters, you could manipulate the whole display in any way you wanted.

Unfortunately, you only have access to 256 characters under normal circumstances. But fear not, the VIC chip offers a solution - bit 5 of register \$10011 allows the activation of a bitmap mode. Type in the following command and see what happens:

```
POKE $1000, POKE($1000) OR 32
```

You should then have a screen full of jumbled rubbish, the top half comprising lines and random dots, the bottom half comprising the full character set. Clear the screen and type some random characters. The character colour should change where each character is placed, and you should see a flashing cursor.

What you have now is a view of the block of ram from memory location 0 to \$1991. The flickering at the top of the screen is the changing of zero page locations by the operating system. The normal screen memory is used to provide the character and background colours, and the memory from 0 to \$1991 defines the dot patterns.

If you want to use bit map mode, you'll need to use a more volatile memory area. The easiest option, if you're using small Basic programs and you don't want to move Basic, is to select the block of memory from \$192 to \$1091. You do this by tweaking the memory register as before. Press RUN/STOP and RESTORE to reset the display, and type in the following:

```
10 POKE $1090, POKE($1090) OR 32
20 POKE $1070, POKE($1070) OR 8
30 FOR I = 0 TO 1000
40 POKE $192+I, 0
50 NEXT I
```

This time you get a more regular display, which is progressively cleared. Lines 30 to 50 clear the bit map by inserting zero bytes. Replace line 40 with the following, and see what happens:

```
40 POKE $192+I, RND(1)*256
```

You can see that by changing the memory block, you can change the bit map. As I said before, the screen memory defines the colours of the bitmap. The bottom four bits of each screen location specify the background colour, and the top four bits define the character colour.

Imagine that you want a white background and a yellow foreground - the value for white is 1 (binary 0001), the value for yellow 7 (binary 0111). Combine them, and we get 0110001 or 113. Add the following lines to the above program, and see the effect:

```
60 FOR I = 0 TO 1000
70 POKE $104+I, 113
80 NEXT I
```

Voilà! The required colour combination is obtained.

As before, two resolutions are available, depending on the value of bit 4 of register \$10016. To set high resolution bitmap with a horizontal resolution of 320 dots, you use:

```
POKE $1070, POKE($1070) AND 228
```

To set multicolour bitmap you use:

```
POKE $1070, POKE($1070) AND 9
```

Both modes have a vertical resolution of 200 dots. But how do we control which dot is set or cleared? Assume you want to set a dot with a horizontal position of X, and a vertical resolution of Y. The following subroutine will set this dot:

```
1000 DEFINT A-Z:DEFSTR S-Z
1010 SUBROUTINE SETDOT(X, Y)
1020 POKE $10000+Y*16+X, POKE($10000+Y*16+X) OR 1
1030 RETURN
```

To erase a dot replace line 10020 with:

```
10020 POKE $10000+Y*16+X, AND ($10000+Y*16+X)
```

Try the above subroutine with the following program:

```
10 POKE $1000, POKE($1000) OR 32
20 POKE $1070, POKE($1070) OR 4
30 FOR I = 0 TO 1000
40 POKE $192+I, 0
50 NEXT I
60 FOR I = 1 TO 1000
70 POKE $104+I, 1
80 NEXT I
90 FOR I=0 TO 100
100 FOR J=00000 $1000
110 NEXT J
120 END
```

This time, line 70 sets the background colour to white, and the foreground colour to black. The program should draw a diagonal line from the top left hand corner.

Multicolour mode uses the same dot pair system as characters to determine which colours are used. The

colours are determined in the following way:

BIT NUMBER	COLOUR SOURCE
04	BLACK
05	Sprite 0 RED OR GREEN
	Priority
10	Sprite 0 BLUE OR GREEN
	Priority
16	Sprite 0 BLUE OR GREEN OR

You will have noticed that bit map routines are very slow. Multicolour mode is even slower, since you need to handle pairs of dots. For successful use of bitmap graphics, it's necessary to access assembler routines for drawing.

The final area needing comment is the use of sprites. A sprite is a block of graphical information, rather like a character, which can be placed anywhere on the screen. A sprite consists of a square block 24 dots wide and 21 characters high. Each row uses 3 bytes, so that each sprite requires 3 x 21 bytes of memory. The VIC chip has a set of registers which determine how sprites are handled. All you need to do is insert the correct values in the relevant registers.

First, we must set up a pattern. You can design a sprite in a manner analogous to that used by characters, but it's a bit more difficult. It's far better to use a sprite designer. The sprite patterns are taught in blocks of 64 bytes, starting at memory location 0. Sprite pattern 0 occupies memory locations 0 to 63, pattern 1 occupies 64 to 127, and so on. You can use the following formula to determine the start address of sprite pattern *n*:

$$\text{ADDRESS} = n * 64 + \text{bank start address}$$

Since the VIC chip is looking at a specific memory bank, this address is really offset from the start address of the bank. Since the default bank for Bank 0, the bank start address is 0. Since the 64 is an eight bit machine, only 4 sprites are supported. The VIC chip finds the sprite pattern from a block of eight sprite pointers. These are located 8016 bytes after the start of the video memory. In the default set up, the pointers therefore start at 1024+8016 or 2040.

The pattern for sprite 0 is held in the first pointer, the pattern for sprite 1 in the second pointer, and so on. If you want to set up sprite 0 to the pattern held at location 12388, you set the sprite pointer as follows:

```
Pattern number = 12388/64 = 193
POKE 2040, 193
```

Rather like the character set, you may not use the area in bank 0 which is occupied by the character ROM image. It is also impractical to use the system area in zero page ram. The usable block is from \$100 to 14396, for example, blocks 128 to 253.

The next step is to position your sprite. The useful screen area occupies a horizontal (X) position from X/24 to X/344, and a vertical position (Y) from Y/50 to Y/380. Each sprite has a register for its vertical position. Since the horizontal position can be larger than 255, two registers are used. Each sprite has a register for the low byte of its X position, and there's a single register for the high bytes of the X positions. The registers are found from:

$$\begin{aligned} X \text{ register} &= 255 * \text{sprite no.} + 1 \\ \text{High byte register} &= 255 * \text{sprite no.} + 1 \\ \text{High byte register} &= 255 * \end{aligned}$$

Before we move on, we must consider how a register holds sprite data. Each sprite has a specific bit which determines how an attribute is set. Sprite 0 uses bit 0, sprite 1 uses bit 1, and so on.

Using the above relationship, the following routine will set up a sprite's position. X and Y are the sprite's position, and SN is the sprite's number:

```
10 POKE 2040+(SN*64), Y
20 POKE 2040+(SN*64)+63, Y+21
30 POKE 2040+(SN*64), X
40 POKE 2040+(SN*64)+63, X+255
50 POKE 2224+(SN*8), 255+(X/255)*255
60 POKE 2224+(SN*8)+1, (X/255)*255
```

Lines 50 and 60 show the way of toggling bits in sprite registers. Line 50 turns the bit on, and line 60 turns it off. This approach is used with the other registers. Table 1 summarizes the sprite registers - for each, you apply the following relationship:

$$\begin{aligned} \text{Value in bit} &= \text{POKE } 2224 + (\text{SN} * 8) + \text{bit} \\ \text{Value in bit} &= \text{POKE } 2224 + (\text{SN} * 8) + \text{bit} - 1 \end{aligned}$$

BIT NO.	REGISTER
0000	
0004	Sprite 0 bit 00
0004	Priority 0000000000000000
	Index
0007	Sprite 0 bit 01-00000000
0007	Sprite 0 bit 1-00000000
0008	Sprite 0 bit 00000000

The priority register determines the position of the sprite relative to the screen contents. If the relevant bit is set, the sprite is behind the screen contents. If the bit is cleared, the sprite is in front of the screen contents. Sprites to sprite pointers are determined by the sprite number. Sprite 7 is maximum and sprite 0 is lowest on the screen.

As with characters, you have the option of using single colour high resolution sprites or four colour high resolution sprites or four colour multicolour sprites. There are eight colour registers which specify the high resolution colours. They are found by using:

$$\text{Colour reg} = 5328 + SN$$

Multicolour mode uses bit pairs and the colours are derived in the following way:

BIT NUMBER	COLOUR SOURCE
00	0000
01	0000
10	Colour register
11	0000

When using sprites, you may want to detect whether they collide with other screen contents. Two sprite collision registers are used.

Register 5376 detects collisions between sprites. The bits relevant to the sprites involved are set if there is a collision. If, for example, sprites 0 and 3 collide, then bits 0 and 3 are set. When you read this register to decide if the collision has occurred, the register is automatically cleared.

Register 5378 detects collisions between sprites and the characters on the screen. It functions in the same way as the sprite-to-sprite collision register.

Well, that's the theory. Next time, I'll give a set of assembly routines which will take some of the bother out of using graphics on the 64.

JiffyDOS

Disk Drive
Replacement System

Jiffy Dos



Can the Jiffy defeat the dolphin?

By S. Garton

The combination of C64 and disk drive has often been described as a lumbering hippo, the reason for this being that disk access is extremely slow. A good indication of just how slow a C64 drive is, is that many games load quicker from cassette than from disk - silly, isn't it?

There are a variety of options available to disk users to help speed up disk access and loading time. These are:

Software fast loader Cartridge Replacement DOS

The first method of disk speeding is OK when it works. But often, clashes between the software used by a fast loader and the program you're trying to load prevent such a speed up system being used. Another problem is that a fast loader for one make of drive will not necessarily work on a different Commodore drive.

A cartridge-based fast loader usually gives a better chance of loading a program than the software method, since many cartridges take up little or no user RAM. However, there are no problems. Firstly, you have to plug them in to your machine when you want to use them, and, despite warnings, many people have damaged their

computers by plugging in or unplugging cartridges while the machine is switched on.

Secondly, some cartridges require you to load fast load software into them, so by the time you've loaded the software in, you may as well have loaded the program in slow mode anyway. Still other cartridges require that you format, or copy, the program. Unfortunately, not all programs can be cloned.

The third method of disk speed-up is, in my mind, the best. A replacement DOS system usually requires you to open up both your disk drive and C64 or C128, remove some chips and add new ones containing the new disk access software. Two such systems are currently available. Firstly, there is Dolphin DOS, which has been around for some time. Now there is a new system on offer called Jiffy DOS.

I've been using Dolphin Dos for some time now, and am particularly happy with it. Dolphin DOS not only replaces chips inside the computer, but a new lead is used for communication between drive and computer. However, this lead plugs into the user port at the rear of the computer, which is a real inconvenience at times, since I use this port for other things, such as my modem.

Since I'm so pleased with Dolphin Dos, I was at first reluctant to try out the new replacement DOS system from Financial Systems Software - Jiffy DOS. However when I did, I was pleasantly surprised by what was on offer.

What You Get

One great problem with Dolphin DOS is that it will only work with my 1541 disk drive. I have a second drive, but this is an Executor, and I've been unable to find a fast DOS system to work with this. Until now that is - Jiffy DOS is available for all of the following computers and disk drives:

C64, 64C, SX-64, C128, C128D, 1240, 1240C, 1240-II, 1271, 1281, PSD-1, PSD-2, Executor+, Exec2 2081, as well as some others.

The fact that you've probably never heard of some of these disk drives will probably indicate to you that Jiffy DOS is of American origin. The originators of Jiffy DOS in the States are Creative Micro Designs Inc. As you can see from the extensive list above, this replacement DOS is available for a much wider range of systems than any other system available.

The first thing that I noticed about Jiffy DOS was the lack of parts to it

-gates are the complicated boards and leads that I associate with my Dolphin DOS. If you have a C64, you simply get two chips with switches attached. If you have a C128, you get three chips, two of them connected to a single switch. One of these chips is the replacement ROM to go inside your disk drive. The other chip (or chips), is a replacement ROM for the KERNAL chip (or chips), inside your computer.

Installation of the new chips is both quick and simple - all that is needed is a screwdriver and a little common sense. Clear, step by step installation instructions are included in the package.

What It Does

Jiffy DOS is designed to speed up all disk operations, including LOAD, SAVE, FORMAT etc. The package claims increases of up to 15 times the speed of a standard drive. A DOS wedge is included in the new chips. This adds 14 new commands to Basic which give you much quicker access to your disks. Single key LOAD, SAVE, and directory commands are also added.

If you have a C128 then the DOS works in both C64 and C128 modes. Rather than spending on about all of the commands that are offered by Jiffy Dos, I've listed all of the new commands in Figure 1.

If you want to see just how well Jiffy DOS performed, then you should check out Figure 2. Please note these figures are for a C128 with an Excelsior disk drive. Other combinations may give different results.

How Was It?

So what did I think of Jiffy DOS? The lack of a parallel cable was the first good point I noticed. I could have my drive where I wanted it, serial cable allowing, rather than wherever a short parallel lead dictated I have it. Secondly, the ability to use a smaller Excelsior drive rather than my bulky 1541 was of great benefit.

On the software side, I found that most programs that I tried worked without any problems, though some heavily protected software would not load without me disabling the new DOS.

Disabling the DOS simply required that the switches mentioned be turned off. Jiffy DOS can be switched in and

out while the computer is still on. This has the advantage that should a program not load while the DOS was turned on, I could simply switch it off. Once the program had loaded, I could turn the DOS back on in order to speed up any further disk activity.

Dolphin DOS prevents C128 owners with a slight problem - if the C128 Kernal is replaced, then you lose the ability to load software from cassette tape. If you should ever need to use tape in C128 mode, you'd have to open up the machine and put your old Kernal back in. Flipping the Jiffy DOS switch turns the DOS completely off, and tape use is then allowed, a great benefit for C128 users who require tape.

Of course Jiffy DOS isn't all a bed of roses, and there are a number of areas where I feel Dolphin DOS has the edge on it. For starters I did miss being able to access the monitor that's built into Dolphin DOS. The machine code monitor that Dolphin DOS

provides may only be a simple one, but it does come in handy at times.

Dolphin DOS is quicker than Jiffy DOS, and having used Dolphin DOS for some time, I did sometimes find myself waiting for something to load. The cheaper price of Jiffy DOS and its ability to work with just about any system configuration does make it an excellent product. Dolphin DOS offers a few more facilities, but does limit you to the type of disk drive you own use.

Being a C128 user who quite often needs to use a cassette recorder in 128 mode, using the rear port for plugging a number of items into the computer and requires quick disk access, Jiffy DOS does everything that I require, and would be my choice over Dolphin DOS, even if it isn't quite so fast.

Footnote:

JiffyDOS Dos Supplier F.S.S.L.
18 High Street, Peckham, Waverley
W9 1JG, Tel: 0181 853115. Price
£54.95.

Command Summary

Standard DOS 3.1 Wedge Commands

D	Load the disk drive case changed
DC: command filename	Copy a file on the same diskette
DD	Initialize the disk drive
DD: command, ID	Format (NEW) a diskette
DD: command	Show NEW
DD	Disable the JiffyDOS commands
DD: command filename	Remove a file
DD: filename, filename	Search a file for files
DD	Reset the disk drive
DD	Wipeout a disk
DD	Display the disk directory
DD: command	Use the diskette test number
DD: command	Load a BASIC program
DD: command	Load and run a BASIC program
DD: command	Load an ML program
- DD: command	Save a BASIC program

Additional JiffyDOS Commands

DD	Disable/enable the 1541 head unit
DD: filename	Load a BASIC program from disk
DD	Disable/enable the function keys
DD: filename	Load/Save a file
DD: filename	Load an ASCII file from disk
DD	Use NEW a BASIC program
DD: command	Load an ML file (two pointers)
DD: command	Load an ML file (two pointers track)
DD: command	Load and run an ML file
DD: command	Verify a file
DD: filename -DD: filename	Load a run file program on disk
DD: command	Screen dump
DD: command	Re-enable the JiffyDOS commands (C=0, D=0, C=128 in 128 mode)
DD: command	Re-enable the JiffyDOS commands (C=128 in 128 mode)
<DD: command>	Default drive setup

Mouse 80

Do you own a C128 and a mouse? Then here's the utility to use them together in 80-column text mode

By D.H. Faber

When I recently purchased a mouse (Commodore 1350), I was not too surprised to find that the accompanying software contained a C128 mouse driver for the 40-column mode only. After all, the 8563 VDC chip (or 8568 in the newer models with 64K video ram) does not support sprites, and its complicated access method doesn't help in creating software sprites either!

However, I intended to use my new acquisition mainly in my own programs for the selection of options for filenames, etc.) from the 80-column screen. If you have similar needs, the utility **MOUSE80** described below is the answer. If you don't own a mouse, please read on anyway, because joystick control is also provided!

How it works

At this point, let's assume you've already spent some time typing in the programs (see "getting it in"), and you have the machine code utility **MOUSE80** and the basic demo program **DEMO-MOUSE80.BAS** at hand. Let's combine an X-ray of the utility's inner life with some action on your part! Connect the mouse to either port (if no mouse signals are detected on port 1 then port 2 is tested), or, if you don't have a mouse plug in a joystick instead (if no mouse signals are detected on either port, then joystick control is assumed, *note* that these tests occur within the **MOUSE80** utility itself, not in the demo program).

Now load and run **DEMO-MOUSE80.BAS** (tape users beware: the first thing it wants to do is load **MOUSE80**). If all is well, you'll see a screen with lines numbered from 0 to 27, using various colours for each line (if you - like me - have to make do with a monochrome hardware you'll see one additional half-line only).

On the upper half of the screen, the two character sets are displayed, the lower half shows a.o. some options that can be selected. The mouse's cursor takes the shape of an arrow,

initially situated somewhere in the lower region of the screen. (**MOUSE80** was written for the Commodore 1351 mouse, since I cannot vouch for the compatibility of other brands, you'll have to try them for yourself).

Feel free to move the arrow around, but don't press any buttons yet! Joystick users will note that the arrow accelerates as the movement continues, its speed is disabled with each of the four available "gears"; with a proportional mouse there's no need for such acceleration.

Notice anything funny on the fourth line? There are six adjacent characters showing fragments of the arrow and the character it is currently moving over. This has to do with the way the soft-sprite is generated: the cursor (arrow) affects up to six character positions, the bit patterns are taken from the character set, the sprite is overlaid and the six "reserved" characters are used to display the "printed" ones.

This process is repeated continuously until one of the mouse buttons (or the five buttons of the joystick) is pressed. The six characters sacrificed for this purpose are rather obscure ones:

REVERSE+CBM+T/U/O/G/R/J/L
(screen display codes 244-249 in the graphic set).

This is no great loss, especially since the same characters are still available in the alternative set. Anyway, if you don't like the choice you can select a different set of six adjacent characters to be sacrificed for this purpose (see below).

Two more things are noticeable about the arrow's movement. Firstly, it doesn't leave the screen area. In the vicinity of the borders it even changes direction to be able to point at the borders "from within". Secondly, although it moves pixel-by-pixel in a vertical direction, in horizontal direction it moves two pixels at a time.

This was done not out of necessity, but for practical reasons only: it

reduces the required mouse-movement, which otherwise would be twice as large horizontally as for the 40-column screen. Also, this utility was not designed for graphical packages, so greater accuracy would be superfluous.

Now, avoiding the "selection areas" for the time being, try "clicking" on various places on the screen. In the right-hand bottom corner of the screen, you may read at what position exactly you clicked. Here the character positions are counted from zero onwards (as in Basic's **CHAR** instruction). Note that the maximum pin value in horizontal direction is 638 instead of 639, since the arrow points to the leftmost point of a pair of pixels (see above).

What happens is that after pressing a button, control is returned to the calling program, which can then examine the latest cursor position and decide what to do next (if not on an **OPTION** area, continue with the arrow in the same position). The calling program can also detect which button (in case a mouse is used) was pressed (see below). This demo program treats both buttons alike.

You may have noticed that the arrow takes on the colour of the characters it is displayed on, unlike the normal cursor which temporarily "paints" the character it is on. There exists another possibility however: try clicking on **MONOCHROME**. This results in a screen in one colour only, but some characters are now looking weird.

What's happened? If the **ATR-bit** in register 25 of the VDC is turned off, then the foreground colour is taken from the left nibble of register 26 and not from the attributes. However, the processor doesn't look at the attributes for the character's bit either! Instead, for all characters the graphic set is assumed. Therefore, if you want to use the monochrome mode, build your option screen with characters from the graphic set only (you may consider swapping the sets in video ram to use characters from the other set instead).

One more remark on this: the colour used for the monochrome

option is the one used in the most recent PRINT statement as stored in location 241 (=SP1). You may also poke the desired colour code directly into this location.

To continue our guided tour, click on COLDR to restore the unblacked-out screen. Up to now we've used a steady arrow. If you find it's difficult at times to locate its position, especially on a crowded part of the screen, try clicking on BLINK FASTER, and BLINK SLOWER. You'll find that you may choose between a steady cursor (speed=0) and one that blinks slowly (speed=12) to quickly (speed=1). This option can also be easily initiated from the calling program when using MOUSE80 (see below).

Before making the demo by clicking QUIT, some more remarks are in order. The VIC must be in 80-column mode, 198 pins per character (as on power-up). You may change the start address of screen attributes and character sets, and you may also change the number of lines displayed. If you're not sure how to do this, it may help to consult the listing of the demo program.

For the sake of completeness: MOUSE80 is not wedged into the IRQ routine as is usually done with mouse drivers. The reason is to be found in the VIC's complicated access method. Changing or reading the contents of a location in video ram (or even a register) requires a multitude of machine code instructions, and another program trying to access the VIC can easily corrupt some of its contents, with unpredictable results. Therefore MOUSE80 returns control only after a mouse button has been pressed; in the meantime it even inhibits interrupts to avoid keyboard interference.

In use

The machine code file MOUSE80 loads from \$E000 to \$E1E8 in RAM 0 (the area from \$E1E8 to \$E4AF is used as a scratch pad). From BASIC the mouse driver is called as:

```
BANK0:$E557:44A,X,Y
```

The meaning of the parameters A, X and Y (which are transferred to the accu, X-register and Y-register respectively) is as follows:

X = horizontal character position at

which the sprite will first appear (0-79).

Y = 16th vertical character position. Normal range 0-24 or higher if you changed the number of lines displayed.

Note that the parameters are not checked! A special case is X=Y=255: the sprite will reappear at the same spot it was in when the previous call to MOUSE80 returned control to the calling program. This is useful to restart the driver if you click on an irrelevant part of the screen.

A = blink speed, 0 for no blink, 1 to 15 for fast to slow blink. If A < 16 the mouse driver operates in colour-mode. To use monochrome mode add 128 to the value of A; the colour used is taken from the most recent PRINT statement or may be poked directly to location 241 (=SP1).

Control is returned to the calling program after pressing one of the

mouse buttons (or the fire button of a joystick). Relevant information is stored in registers A, X and Y. To obtain these values use:

```
RRREG A,X,Y
```

(A) is zero if the left mouse button was pressed, 1 for the right button (its value is irrelevant for a joystick). The values of X and Y are the horizontal and vertical character positions respectively at which the arrow was pointing. You may find the exact pixel values as follows:

```
BANK0
$E557:03:RRREG A,X,XPIX = A +
256*X
$E557:07:RRREG A,X,YPIX = A +
256*X
```

If you want to sacrifice different characters to generate the soft sprite,



you should:

POKE the screen display code of the first character to location **SEDFE** ($\$997E$); the default value is 144.

POKE the character **H** or **I** to location **SESHF** ($\$997F$); default is **H** (for graphics on).

For **ASSEMBLER** programmers: you may call the driver from anywhere in **RAM0** below **SE000**.

```
LDA # $3F
STA $F00
; (set A, X, Y as above)
JSR SE000
```

On return, **A**, **X** and **Y** contain values whose meaning is as described above. To obtain the exact pixel location of the answer use:

```
LDA # $3F
STA $F00
JSR $E00A
```

to obtain the low- and high byte of the x-value in **A** and **X** respectively. Use **JSR SE003** likewise to obtain the y-value.

If you wish to call these routines from underneath the I/O area (**ED000-SE000**), or from a different **RAM** bank or a cartridge or the function **ROM**, you'll have to use the kernels **JSRPAR** routine. If you really intend to do this, I expect you'll know how it works; if not, consult a thoroughly documented **ROM** listing.

MOUSE80 discs of course contain subroutines to access the **VDC's** registers and the video ram. As a bonus

to assembler programmers, here's how to use them for your own purposes.

Assuming the calling program is in **RAM0** and not underneath the I/O area, you must select a bank with **RAM0** and the I/O components:

```
LDA # $3E
STA $F00
; (from $D000-SE000 or from other banks you must use JSRPAR, see above). You can now use five subroutines as follows:
```

```
REGWRITE : JSR SE800 (A,X) -
value X is stored in register A
REGREAD : JSR SE80F (A) -
value of register A is stored in A
VDCWRITE : JSR SE818 (A,X,Y) -
value Y is stored in video ram at A;
X (low/high byte)
VDCREAD : JSR SE825 (A,X) -
the value in video ram (A/X = low/high
byte) is transferred to A
SETUPDATE : JSR SE83D (A,X) -
the contents of A and X are transferred
to registers F9 and 18 ($PDATE low
and high respectively).
```

To **Basic** programmers, these subroutines are not available since there exists no **BANK** command to select the required memory configuration. However, if you consult the listing of the demo program and copy the **DATA** statements and the lines poking them into memory, you'll have the same facilities available in **BANK19** by:

```
REGWRITE: SYS367L,X
REGREAD: SYS368A
```

```
VDCWRITE: SYS369A,X,Y
VDCREAD: SYS368A,X
SETUPDATE: SYS3114A,X
```

Getting it in

In the listings you'll find the two **Basic** loaders **ENTER64** (**DEMOMBAS**) and **ENTER84** (**INTER**). Enter and save these using **VC's** system checker (in 64 the following order):

mode0). Next (still in 64 mode), enter **POKE43**, **81** (**POKE44,41**); **POKE** 10376,8 and **LOAD** "ENTER64/**DEMOMBAS**".S (or 1 for tape users; they should also change 8 to 1 in line 126 of the program). Now run it: the **Basic** program **DEMOMOUSE80BAS** is written to disk (or tape) ready to be used in 128 mode.

Next type "NEW" and login in 64 mode) enter the same points as above and **LOAD**"ENTER64/**INTER**".S (tape users should change the 8 to 1, also in line 116 of the program) and run it: it saves **INTER128** to disk or tape. Now install your computer in 128 mode, load **INTER128** (tape users: change 8 to 1 in line 18) and run it: this produces the machine code file **MOUSE80**.

One final note for tape users: remove the **BLOAD** from line 19 of the demo program and **LOAD** "MOUSE 80",L in direct mode before loading and running the demo program!



PROGRAM: ENTER64-DEMO.BAS

```
10: 18 REM --- ENTER64-DEMO.BAS
20: 34 $PDATE=43-81:SEDFE=44-4070142
30: 39 POKE80,POKE43:POKE44,POKE41
40: 39 POKE10376,8:POKE44,41
50: 42 $M=1:Y=4
60: 42 $P=1:Y=4:POKE44,41:PRINT:GOTO
70: 42 $P=1:Y=4:POKE44,41:PRINT:GOTO
80: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
90: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
100: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
110: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
120: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
130: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
140: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
150: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
160: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
170: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
180: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
190: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
200: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
210: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
220: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
230: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
240: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
250: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
260: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
270: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
280: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
290: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
300: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
310: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
320: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
330: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
340: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
350: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
360: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
370: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
380: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
390: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
400: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
410: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
420: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
430: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
440: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
450: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
460: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
470: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
480: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
490: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
500: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
510: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
520: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
530: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
540: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
550: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
560: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
570: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
580: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
590: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
600: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
610: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
620: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
630: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
640: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
650: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
660: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
670: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
680: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
690: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
700: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
710: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
720: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
730: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
740: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
750: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
760: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
770: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
780: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
790: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
800: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
810: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
820: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
830: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
840: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
850: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
860: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
870: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
880: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
890: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
900: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
910: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
920: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
930: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
940: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
950: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
960: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
970: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
980: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
990: 42 $M=1:Y=4:POKE44,41:PRINT:GOTO
```

```
10: 118 PRINT:GOTO DEMOEND
20: 120 POKE43,1:POKE44,25:POKE
30: 46,76:POKE44,41
40: 124 SAVE:DEMOMOUSE.BAS:GOTO
50: 128
60: 130 POKE44,8:REM:END
70: 140 DATA 64,28,18,8,104,17,2
80: 150 DATA 17,34,57,72,69,60,8
90: 160 DATA 58,48,34,49,49,2
100: 170 DATA 2,49,51,58,101,58,2
110: 180 DATA 32,44,194,49,59,53,
120: 58,52
130: 190 DATA 41,178,59,57,52,58,
140: 32,142
150: 200 DATA 32,65,53,65,45,30,7
160: 5,78
170: 210 DATA 64,44,32,78,39,78,8
180: 32
190: 220 DATA 28,27,8,128,73,178,
200: 49,312
210: 230 DATA 53,52,59,138,68,38,
220: 124,51
230: 240 DATA 49,52,59,178,72,44,
240: 69,58
250: 250 DATA 138,73,8,138,38,38,
```

```
8,131
260: 260 DATA 32,48,52,49,44,49,4
270: 4,54
280: 270 DATA 49,52,44,52,44,4
290: 8,54
300: 280 DATA 59,69,52,44,49,54,4
310: 4,59
320: 290 DATA 52,49,44,49,52,59,4
330: 4,48
340: 300 DATA 44,58,49,52,44,57,5
350: 4,44
360: 310 DATA 49,52,49,44,49,44,5
370: 8,49
380: 320 DATA 52,44,52,52,44,48,4
390: 4,58
400: 330 DATA 49,52,8,128,28,48,8
410: 1,11
420: 340 DATA 32,49,54,44,59,53,4
430: 9,44
440: 350 DATA 49,52,51,44,49,44,5
450: 8,48
460: 360 DATA 52,44,57,54,44,51,5
470: 8,48
480: 370 DATA 52,59,44,49,58,44,4
490: 8,52
500: 380 DATA 58,44,49,52,49,44,4
510: 8,54
520: 390 DATA 57,64,52,49,44,52,5
```

61	4.94				
62	859 DATA 49.44,49.59,49.51,5				
63	4.94				
64	418 DATA 52.59,8.59,39.59,8.				
65	130				
66	928 DATA 32.49,59.49,49.59,5				
67	7.44				
68	458 DATA 51.49,44.59,54.44,4				
69	8.59				
70	468 DATA 44.59,59.44,59.59,4				
71	4.44				
72	459 DATA 54.59,44.49,59.44,3				
73	5.59				
74	469 DATA 44.49,44.49,59.44,4				
75	4.44				
76	479 DATA 52.44,49.59,49.44,4				
77	5.54				
78	489 DATA 37.44,49.57,44.59,3				
79	4.44				
80	499 DATA 49.44,49.59,8.59,39				
81	5.59				
82	449 DATA 8.5493,8.44,39.79,8.				
83	143				
84	514 DATA 32.49,49.43,32.59,3				
85	8.59				
86	529 DATA 79.79,79.89,89.39,8				
87	3.99				
88	539 DATA 89.89,49.79,32.49,4				
89	5.49				
90	474 DATA 8.79,39.89,8.143,8.				
91	139				
92	589 DATA 39.89,8.143,81.49,8				
93	8.59				
94	599 DATA 44.59,59.44,49.59,1				
95	89.51				
96	609 DATA 49.59,52.44,59.53,5				
97	8.53				
98	799 DATA 9.49,59,139,81.49,8				
99	5.59				
100	849 DATA 44.59,59,44,49,179,				
	49,57				
101	859 DATA 49.59,32,32,32,32,3				
	3.32				
102	819 DATA 59,89,32,143,99,59,				
	89,49				
103	829 DATA 89,89,89,79,79,7				
	8.79				
104	839 DATA 4.299,39,199,8,199,				
	51,49				
105	849 DATA 59,59,44,54,44,99,5				
	8.59				
106	859 DATA 199,91,49,99,99,94,				
	59,59				
107	869 DATA 44,49,54,59,191,59,				
	54,49				
108	879 DATA 59,44,49,54,59,139,				
	59,32				
109	889 DATA 32,32,32,32,32,32,3				
	3.32				
110	899 DATA 32,32,143,32,32,79,				
	89,87				
111	799 DATA 32,89,84,84,82,32,8				
	5.84				
112	709 DATA 89,83,84,8.3499,39,3				
	19,8				
113	729 DATA 193,94,12,94,199,49				
	49,49				
114	739 DATA 59,41,94,199,179,94				
	59,59				
115	749 DATA 129,73,379,49,194,5				
	5.54,59				
116	759 DATA 193,94,193,94,89,99,				
	139,79				
117	769 DATA 59,193,94,179,34,59				
	4.59				
118	779 DATA 99,179,8,193,94,194,				
	39,32				
119	789 DATA 94,73,89,89,89,89,8				
	4.73				
120	799 DATA 82,49,89,39,79,79,7				
	8.69				
121	809 DATA 81,39,89,49,79,79,7				
	8.93				
122	819 DATA 84,82,89,84,49,32,8				
	4.73				
123	829 DATA 99,89,89,89,32,84,9				
	9.59				
124	839 DATA 143,32,32,89,82,79,				
	79,84				
125	849 DATA 39,32,32,89,82,79,8				
	8.83				
126	859 DATA 9,199,99,199,8,193,				
	34,89				
127	869 DATA 89,79,89,89,82,89,7				
	7.89				
128	879 DATA 79,32,72,89,79,89,7				
	5.69				
129	889 DATA 99,79,89,49,82,92,8				
	8.32				
130	899 DATA 32,79,79,79,89,82,1				
	99,39				
131	909 DATA 194,34,59,8,143,39,				
	149,8				
132	919 DATA 193,84,179,34,89,89				
	129,79				
133	929 DATA 179,49,194,32,59,59				
	139,39				
134	939 DATA 193,34,99,89,199,79				
	199,193				
135	949 DATA 94,199,34,59,4,29,1				
	99,199				
136	959 DATA 8.199,32,49,59,32,4				
	4.59				
137	969 DATA 82,89,194,9,44,99,1				
	99,93				
138	979 DATA 49,32,59,44,59,32,4				
	4.44				
139	989 DATA 179,49,99,94,99,92,				
	39,32				
140	999 DATA 32,32,32,32,32,32,				
	32,32				
141	1009 DATA 32,32,32,143,32,32,				
	32,79				
142	1019 DATA 89,89,32,49,79,84,				
	32,79				
143	1029 DATA 79,8,24,32,169,8,1				
	99,51				
144	1039 DATA 49,59,99,44,32,99,				
	49,89				
145	1049 DATA 59,199,51,49,99,59				
	44,51				
146	1059 DATA 31,44,49,59,199,32,				
	49,49				
147	1069 DATA 82,44,99,49,94,44,				
	89,89				
148	1079 DATA 199,91,49,59,59,94,				
	52,49				
149	1089 DATA 44,59,32,49,89,32,3				
	32,143				
150	1099 DATA 92,59,87,79,89,89,				
	32,51				
151	1109 DATA 32,79,79,79,49,89,				
	4.59				
152	1119 DATA 31,179,8,159,51,49,				
	52,59				
153	1129 DATA 44,82,89,49,49,94,				
	89,199				
154	1139 DATA 51,49,59,59,44,51,				
	52,49				
155	1149 DATA 49,79,199,32,49,49,				
	52,44				
156	1159 DATA 99,49,99,44,59,51,				
	59,159				
157	1169 DATA 31,49,59,59,44,59,				
	52,44				
158	1179 DATA 89,379,79,32,99,32				
159	1189 DATA 32,32,32,32,32,32,				
	32,32				
160	1199 DATA 59,59,59,59,82,82,				
	82,82				
161	1209 DATA 32,82,82,82,82,82,				
	82,82				
162	1219 DATA 79,79,8,299,81,199,				
	8,199				
163	1229 DATA 51,49,59,59,44,59,				
	52,44				
164	1239 DATA 89,89,32,32,32,32,				
	32,32				
165	1249 DATA 32,82,82,82,82,82,				
	143,32				
166	1259 DATA 79,79,8,299,81,199,				
	8,199				
167	1269 DATA 51,49,59,59,44,59,				
	52,44				
168	1279 DATA 89,89,32,32,32,32,				
	32,32				
169	1289 DATA 32,82,82,82,82,82,				
	143,32				
170	1299 DATA 32,82,82,82,82,82,				
	32,82				
171	1309 DATA 89,89,32,49,8,129,				
	79,179				
172	1319 DATA 49,194,32,59,79,79,				
	79,49				
173	1329 DATA 179,79,79,79,49,17				
	4,49,59				
174	1339 DATA 153,94,153,79,79,7				
	8,89,34				
175	1349 DATA 99,79,79,69,4,1				
	32,32				
176	1359 DATA 259,8,69,82,179,39,				
	89,179				
177	1369 DATA 72,179,49,54,84,79,				
	49,179				
178	1379 DATA 181,49,89,89,82,173,9				
	8,82,54				
179	1389 DATA 41,89,79,49,179,89				
	49,179				
180	1399 DATA 59,53,54,173,71,49				
	8,199				
181	1409 DATA 32,4,1,199,91,49,4				
	9,32				
182	1419 DATA 44,79,49,44,79,49,				
	179,49				
183	1429 DATA 54,59,199,32,49,59				
	59,44				
184	1439 DATA 51,49,44,79,79,79,				
	89,179				
185	1449 DATA 59,59,199,32,49,59				
	59,44				
186	1459 DATA 51,49,44,199,59,59,				
	32,32				
187	1469 DATA 32,32,32,32,32,32,				
	143,32				
188	1479 DATA 32,82,79,79,79,82,				
	32,82				
189	1489 DATA 89,89,32,49,8,129,				
	79,129				

C128 PROGRAM

32.14					
37	1699	DATA	1.88,83,178,88,83, 178,83		
38	1700	DATA	48.48,58,72,58,178, 181,48		
39	1701	DATA	88,83,173,88,83,84, 81,83		
40	1702	DATA	78,58,178,88,83,27, 5.88,83		
41	1703	DATA	84,173,72,88,8.58, 84,24		
42	1704	DATA	1.158,51,48,48,32, 44,78		
43	1705	DATA	88,44,72,88,178,48, 84,88		
44	1706	DATA	188,51,48,93,78,44, 81,48		
45	1707	DATA	44,78,78,88,178, 48,32		
46	1708	DATA	88,58,178,51,48,58, 58,44		
47	1709	DATA	51,48,44,84,51,88, 82,52		
48	1710	DATA	32,82,32,32,148,32, 82,82		
49	1711	DATA	78,78,78,82,32,83, 88,84		
50	1712	DATA	32,88,8,87,83,84,8, 178		
51	1713	DATA	78,178,88,184,84,8, 5.88,88		
52	1800	DATA	83,178,84,48,172,7, 5,178,74		
53	1801	DATA	378,48,54,58,72,48, 178,181		
54	1802	DATA	48,88,83,573,88,33, 184,41		
55	1803	DATA	28,78,84,378,88,83, 171,88		
56	1804	DATA	83,84,173,73,88,8, 181,83		
57	1805	DATA	44,1,128,51,48,87, 84,44		
58	1806	DATA	78,88,44,72,88,44, 54,52		
59	1807	DATA	173,72,378,78,88,1, 88,74,88		
60	1808	DATA	32,32,32,32,32,32, 32,32		
61	1809	DATA	32,32,32,32,32,32, 32,32		
62	1810	DATA	32,32,32,32,32,32, 32,32		
63	1811	DATA	32,32,32,32,32,32, 32,32		
64	1812	DATA	32,32,32,32,32,32, 32,32		
65	1813	DATA	32,32,32,32,32,32, 32,32		
66	1814	DATA	32,32,32,32,32,32, 32,32		
67	1815	DATA	32,32,32,32,32,32, 32,32		
68	1816	DATA	32,32,32,32,32,32, 32,32		
69	1817	DATA	32,32,32,32,32,32, 32,32		
70	1818	DATA	32,32,32,32,32,32, 32,32		
71	1819	DATA	32,32,32,32,32,32, 32,32		
72	1820	DATA	32,32,32,32,32,32, 32,32		
73	1821	DATA	32,32,32,32,32,32, 32,32		
74	1822	DATA	32,32,32,32,32,32, 32,32		
75	1823	DATA	32,32,32,32,32,32, 32,32		
76	1824	DATA	32,32,32,32,32,32, 32,32		
77	1825	DATA	32,32,32,32,32,32, 32,32		
78	1826	DATA	32,32,32,32,32,32, 32,32		
79	1827	DATA	32,32,32,32,32,32, 32,32		
80	1828	DATA	32,32,32,32,32,32, 32,32		
81	1829	DATA	32,32,32,32,32,32, 32,32		
82	1830	DATA	32,32,32,32,32,32, 32,32		
83	1831	DATA	32,32,32,32,32,32, 32,32		
84	1832	DATA	32,32,32,32,32,32, 32,32		
85	1833	DATA	32,32,32,32,32,32, 32,32		
86	1834	DATA	32,32,32,32,32,32, 32,32		
87	1835	DATA	32,32,32,32,32,32, 32,32		
88	1836	DATA	32,32,32,32,32,32, 32,32		
89	1837	DATA	32,32,32,32,32,32, 32,32		
90	1838	DATA	32,32,32,32,32,32, 32,32		
91	1839	DATA	32,32,32,32,32,32, 32,32		
92	1840	DATA	32,32,32,32,32,32, 32,32		
93	1841	DATA	32,32,32,32,32,32, 32,32		
94	1842	DATA	32,32,32,32,32,32, 32,32		
95	1843	DATA	32,32,32,32,32,32, 32,32		
96	1844	DATA	32,32,32,32,32,32, 32,32		
97	1845	DATA	32,32,32,32,32,32, 32,32		
98	1846	DATA	32,32,32,32,32,32, 32,32		
99	1847	DATA	32,32,32,32,32,32, 32,32		
100	1848	DATA	32,32,32,32,32,32, 32,32		

C 128 PROGRAM

61	2019 DATA 81.34,194.34,38.33	62	2019 DATA 81.34,194.34,38.33	63	2019 DATA 81.34,194.34,38.33	64	2019 DATA 81.34,194.34,38.33
65	2019 DATA 81.34,194.34,38.33	66	2019 DATA 81.34,194.34,38.33	67	2019 DATA 81.34,194.34,38.33	68	2019 DATA 81.34,194.34,38.33
69	2019 DATA 81.34,194.34,38.33	70	2019 DATA 81.34,194.34,38.33	71	2019 DATA 81.34,194.34,38.33	72	2019 DATA 81.34,194.34,38.33
73	2019 DATA 81.34,194.34,38.33	74	2019 DATA 81.34,194.34,38.33	75	2019 DATA 81.34,194.34,38.33	76	2019 DATA 81.34,194.34,38.33
77	2019 DATA 81.34,194.34,38.33	78	2019 DATA 81.34,194.34,38.33	79	2019 DATA 81.34,194.34,38.33	80	2019 DATA 81.34,194.34,38.33
81	2019 DATA 81.34,194.34,38.33	82	2019 DATA 81.34,194.34,38.33	83	2019 DATA 81.34,194.34,38.33	84	2019 DATA 81.34,194.34,38.33
85	2019 DATA 81.34,194.34,38.33	86	2019 DATA 81.34,194.34,38.33	87	2019 DATA 81.34,194.34,38.33	88	2019 DATA 81.34,194.34,38.33
89	2019 DATA 81.34,194.34,38.33	90	2019 DATA 81.34,194.34,38.33	91	2019 DATA 81.34,194.34,38.33	92	2019 DATA 81.34,194.34,38.33
93	2019 DATA 81.34,194.34,38.33	94	2019 DATA 81.34,194.34,38.33	95	2019 DATA 81.34,194.34,38.33	96	2019 DATA 81.34,194.34,38.33
97	2019 DATA 81.34,194.34,38.33	98	2019 DATA 81.34,194.34,38.33	99	2019 DATA 81.34,194.34,38.33	100	2019 DATA 81.34,194.34,38.33

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3	Dragon Warrior	£19.95
4	Street Fighter 2 Super Turbo	£19.95
5	Dragon's Lair	£19.95
6	4-in-1 Super Turbo	£19.95
7	Demolition Man	£19.95
8	4-in-1 Super Turbo	£19.95
9	Superman	£19.95
10	Star Trunked Finger Rabbit	£19.95
11	Operation Star	£19.95
12	London's ABC Party	£19.95
13	Operation Star	£19.95
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C128 Corner

If you own a C128 and have a tip, query or simply want to communicate with other C128 owners, this is the page for you



The Commodore 128 computer is a bit of a white elephant. Its memory and capabilities really do put some other computers, including the C64 and C16, to shame. Not only does it offer total compatibility with the extremely popular C64, but it also boasts an impressive Basic, both 40 and 80 column screen formats and a massive 128K memory (not as much as an Amiga, but double that of a C64).

Not only do the facilities of the machine itself far surpass those of the C64, but its disk drives are superior to the lumbering 1541's. Both the 1570 and 1571 are far quicker than the 1541 drive, but the 1571 is also double-sided, giving double the amount of storage per disk - without having to resort to the floppy technique of turning the disk over.

Unfortunately though, the similarities between the C128 and the white elephant do not end with the size and power of the computer - software for the C128 is extremely scarce and the C128 computer itself seems to be about

as common as a white elephant.

It's a great shame that the C128 was never given the acclaim it deserved by the software houses, or even Commodore itself. Your Commodore has been one of the few magazines that has continually supported the C128 range over the years, and this page is simply an extension of that support.

'C128 Corner' is the page for all Commodore 128 users. It's designed to be a forum for all queries and tips relating to your computer. But, and it's a big but, 'C128 Corner' cannot succeed without your help. If you have a query about your 128 or software for the machine, then write to this page. If you have a tip you'd like to share with other C128 users, write to us. If you learn about anything happening in the C128 world that hasn't been covered in the magazine, write to us.

Help us to help you - without your input, 'C128 Corner' will be impossible to produce, so support your machine by writing to us.

Forgotten Memories

The *Your Commodore* office often receives queries about software that works on "a friend's C128D" but not on their C128. This is usually due to the fact that the C128 and C128D computers are not totally identical - the C128D computer has more video memory than most (but not all) standard C128 computers. This difference only becomes apparent if you're running a program that uses the extra 64K of video RAM that is present on some 128s.

The problem is not insurmountable. All that's required is a memory upgrade for your C128 that gives your computer access to 64K extra video RAM. Financial Systems Software is the only company we're aware of that sells such a memory upgrade. It's a small circuit board that's plugged into the board inside your C128.

As long as you can use a screwdriver and are capable of delicate work, you should have no problems fitting the board yourself. Don't forget though, that if you do open up your

C128 you'll invalidate your guarantee. Once the board is fitted, programs that require additional video RAM will work with no problems.

Financial Systems Software, suppliers of the aforementioned RAM board, is probably the biggest supplier of C128 software at the moment. If you do own a C128, then I suggest you take a look at PSS's ads, or even get hold of their catalogue, since they offer an impressive range of products - including an excellent C128 newsletter magazine.

PSS can be contacted at:
31 High Street,
Pembury, Weymouth,
WR10 1BG
Tel: (0208) 553151

Write All About It

Since the C128 has an 80-column screen, it's ideal for use as a wordprocessor - in fact much of *Four Corners* is written using C128s - both the Editor and Technical Editor use them for all their wordprocessing.

We receive a large number of telephone calls and letters asking just what wordprocessors are available for

the C128 range. To our knowledge there are at least four wordprocessing packages available. Firstly there is *Superscript 128*. This offers both 40 and 80-column display options, and is fully compatible with the popular C64 version of the same program. This is available from Precision Software (Tel: 01-300 7166), at £29.95.

Viva Classic from Viva Software offers the user a full 'What You See is What You Get' (WYSIWYG) display, together with easy-to-use pull down menus. Viva Classic only works in 80-column. Viva Classic no longer seems to be available, but, if you occur the computer shows you should find it.

American software publishers Batteries Not Included have produced a number of versions of their *Paperclip* wordprocessor for the C128. This favourite in the office is *Paperclip II*. This version not only has superb wordprocessing facilities, but also has an inbuilt communications package. Batteries Not Included do not market in the UK, but you could try contacting them directly at in the States.

The final wordprocessor we've looked at is *Font Master 128*.

This wordprocessor not only offers the normal editing features you'd expect, but also allows you to print out your text in a variety of fonts - you can even design your own fonts if you're feeling particularly creative.

Should you only have a dot matrix printer, then you may find that this is an excellent choice for you, as the quality of the printout will probably be better than the normal quality that you get from your print mechanism.

Fontmaster 128 is available from PSS.

Please Write In

We cannot stress too much that if you own a C128 then this is your section of the magazine, and that we need to hear from you in order to produce this page for you. Should you have any hints, tips, questions, news or comments, then please write to:

C128 Corner,
Four Corners,
Argon House,
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Quick Search

If you need to change anything in your Basic text, find and list it with this handy routine

By Neil Higgins



How many times have you been programming in Basic, and suddenly found out that you need to change a variable to another value, or re-init a string of text? Put it this way - if you'd a pound for every time you've had to re-edit a Basic program, you'd be richer than the editor of *Your Commodore!*

The main problem encountered is that you always need to search the whole program to make sure all the correct changes have been made, especially if it's a variable that needs changing.

This all adds up to lots of typing of the command LIST, which in a long program can be a bit of a pain. Well fear no more, the routine given here will do all the searching and listing for you, and all you need supply is the text to be searched for. To do this, the syntax is

SYSA9151, Text

For example, if you wanted to list all the lines in your program where the variable AS appears, you would simply enter-

SYSA9151,AS

```

PROGRAM QUICK SEARCH
80 100 1000 *****
10 100 1000 *       QUICK SEARCH
90 100 1000 *****
07 100 1000 *  IN A STRING NAME
100 100 1000 *****
04 100 1000 *          QUICK TEXT FOR
1000 *****
05 100 1000 *****
06 100 1000 *****
08 100 1000 *****
09 100 1000 *****

```

Keywords can also be searched for. If you wanted to list all REM statements, you'd enter-

SYSA9151,REM

As with all keywords, to save a bit of typing you can enter the abbreviated form. For example, to search for all occurrences of the PRINT statement you may use-

SYSA9151,?

If you wanted to search for a full string, that's how you would enter it. For example, to find a string defined as "My word", you'd enter-

SYSA9151,"My word"

Note that the same string would also be listed if you entered-

SYSA9151,My word.

But so would any other lines containing the words, My word, if you get my point?

If you experiment with a large Basic program, you'll find out the easiest ways to use the routine. Sometimes, if the chosen text appears in a lot of lines, they will disappear

off the top of the screen like a normal listing. To prevent this, you can use the space bar to pause the listing, in which case pressing another key will continue the search. The Run/stop key will break out. Please note: this routine can only be called in direct mode, not from within a Basic program.

For the technically minded, the routine resides in the 4K block of Ram from \$C000, and scans the text to be searched for in a table directly after itself. Machine codes will find the source code useful, particularly if they wish to calculate the routine as part of an extended Basic type program. The routine was written using the *Your Commodore Speedy Assembler*, but should be transportable to most assemblers.

Getting It All In

I've supplied two methods of typing in the program. Method one provides the source listing if you have an assembler. This listing is well documented, so you can see how the routine works. Secondly, I have provided a Basic loader. Remember to save your efforts before running it - accidents will happen.

```

81 100 1000 *****
82 100 1000 *****
83 100 1000 *****
84 100 1000 *****
85 100 1000 *****
86 100 1000 *****
87 100 1000 *****
88 100 1000 *****
89 100 1000 *****
90 100 1000 *****
91 100 1000 *****
92 100 1000 *****
93 100 1000 *****
94 100 1000 *****
95 100 1000 *****
96 100 1000 *****
97 100 1000 *****
98 100 1000 *****
99 100 1000 *****
100 100 1000 *****

```


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PC Games

The PC is now a serious rival of the Amiga and C64 in the games machine race, and it's getting more popular all the time

By Tony Hetherington

The IBM PC (and its compatibles, that now include an extensive range of IBM PCs) is rapidly staking its claim as a games machine. As you will see from the selection of titles listed below, the PC is not only a rival of the C64 and the Amiga in selection and quality, but is often the first machine a game is released on. For example, Infocom's *Battletech* arrived for the PC in January, but we're still waiting for the other versions.

The PC obviously has an impressive following in the States, and so many of the games have American origins, but are now beginning to find a niche over here. So at last, PC owners can put aside their spreadsheets and databases and play a game.

The PC tends to attract strategy-based games that are ideally suited to a hard disk system. And remember, a PC hard disk costs only £200, which is only a third of the price of the Amiga counterpart. The PC is an option definitely worth considering.



**Battletech/Infocom
(Activision)**

Without doubt, *Battletech* is one of the best strategy, combat and role-playing games you will ever play on a computer, and marks Infocom's transition from its usual adventures to full role-playing games. The game is

based on the *Battletech* series of board games, in which giant mechs (fighting machines) slug it out with lasers, machine guns and missiles.

You play Jason Youngblood, a young trainee mech pilot who is faced with a desperate mission when the deadly Kanita warriors attack and destroy your city. The only hope for your Lyran Commonwealth is to find the other survivors of the attack, and then track down the wisest stash of mech parts that will enable you to launch a counter-attack.

During the game you will have to infiltrate enemy bases, fight enemy mechs in open combat, learn how to repair and patch up your mechs and gurry, and how to weed out the traitors who try to sabotage your mission.

Also from Infocom: Superb text adventures including *The Hitch-Hiker Guide to the Galaxy* and the *Zork* series.

Pool of Radiance/SSI (US Gold)

Dwarves and Dragons is the cult role-playing game, and so it was inevitable that there would be a computer game. Despite heavy competition, SSI won the rights to do it. *Pool of Radiance* was the first computer role-playing game and, after an initial learning stage, is unbeatable. Here at last is the game system you always wanted to play, with the character classes, monsters and spells that other systems copied, and all the original's characteristics of strength, intelligence and so on.

The combat system can at first seem very slow, especially when you're up against an army of orcs, but this soon grows on you as it gives you time to define and carry out your own



Diplomacy/Leisure Genius

Here's another game that's become a computer game, but this time

strategy and tactics. This becomes vital when your magic users become strong enough to start hurling around fireballs and lightning bolts.

What I particularly like about *Pool of Radiance* are the unexpected surprises that it throws at you - just when you think you've got on top of things and your confidence is growing, a trap, a monster or some other equally unpleasant situation puts you in your place.

The game also shows the value of a hard disk system as, after a lengthy installation process, you can play and save the game without ever changing a disk.

Also from SSI - *Questrom II, Star Command* and *Siege Crusade*.



your aim is to lie, cheat and deceive your opponents. You control one of the major powers in Europe, circa 1630, and must use your limited armies and fleets to take control of the continent's supply centres and complete your domination of the world.

Unfortunately, six other human or computer players have exactly the same aim and ambitions. The only way to succeed is to back up your military might with deals and alliances, and the instinct to know when to stab your allies in the back just before they plan to do it to you.

You only have two moves a year, so you can't afford to make any mistakes in a game with secret orders and simultaneous movement, conflict and compromise. It's the odds that make the game so intriguing - seven players (at least one computer controlled) and only one winner, but you can't win on your own. It's this that forces you into alliances with your enemies and to double cross your friends.

The Games - Summer Edition/Epix (US Gold)



Eight events form the latest in the "Games" series of games that play just as well on the PC as they do on other machines. This time it's the fun of the summer Olympic events that weren't covered in *Summer Games I* and *II*, including diving, 400 metres hurdles (PC64 owners only 300 metres), velodrome cycling (that means it's indoor), hammer throw, pole vault, archery and the two tough gymnastic events - the rings and the unparallel bars.

Up to eight players can compete for the gold, silver and bronze medals in the latest of a series that seems to have no end. This latest version, which was released in the winter, boasts improved 3D graphics to enhance the already remarkable gameplay.

Also from Epix - *California Games*, *World Games*, *Winter games*, etc.



NFL Challenge/Xor Corporation

A must for fans of football American-style. This imported game is perhaps the best simulation of NFL Football to date. The program contains actual statistics for all 28 NFL teams, and a selection of plays that leaves other games on the bench.

NFL Challenge puts you firmly in place as Head Coach and gives you the chance to call all the plays, but leaves the players to carry them out. This gives you the chance to feel the glory when long passes are caught for touchdowns, and the misery when the ball is fumbled over by a fumble.

You can play against either a human or computer opponent, and control all team selection and substitution either for tactical reasons or to fill gaps left by injured players.

Whatever the call, the players line up and carry out the plays decided by their coaches, but only as representations (X's and O's) on the screen.

Also from Xor - Update disks to keep the teams stats up to date.

Battle Chess/Interplay (Electronic Arts)

Take a classic old game like chess (and they don't come much older) add some pretty graphics and animation and you've got a winner. It sounds unlikely, but that's exactly what happened when Interplay produced *Battle Chess*, a software classic.

It's a program well known to Amiga owners, but is also available for the PC. It plays an average game of chess, but when one piece takes another they fight for the space with some surprising results. For example, the rooks turn into giant stone monsters that pummeled their opponents, while the Queen has an impressive array of magical powers, not to mention a wonderfully feline walk!

Times of Lore/Origin (Microprose)

This was one of the better attempts to bring role-playing games to the masses through combining the depth and scope of a role-playing world with the speed and reactions of arcade games.

You begin the game in a tavern knowing nothing of what lies ahead, but soon you become immersed in a quest to save the kingdom from hordes of barbarians attacking from the south and orcs invading from the north. All your actions are controlled by joystick movement, icon selection and choosing between phrases to control conversations - in this game you must talk to people as well as killing monsters.

Your first task takes you on a raid to retrieve a magic item stolen by the orcs in which you must fight your way through their guards and creep up on the camp site before striking. It's the need to organise your actions and the enemies you face that sets this game apart from all the other so-called arcade adventures.

Also from Origin Systems - *Ultima V*.



Jewel of Arc/Chip (US Gold)

Jewel of Arc is a treat for strategy gamers who crave power, as it crowns you king of France. Your only problem is that English forces and their treacherous allies occupy half of France. Your job is to turf them out through skill on the battlefield, swiftness, diplomatic skills and regal justice.

At your disposal you have generals (your best is Joan) to take charge of your armies, spies to infiltrate and assassinate your enemies, politicians to talk to and deal with your adversaries, provinces to tax to raise the money to build armies, and executioners to keep order and punish traitors.

The game uses action sequences to determine the outcome of battles and sieges. In these battles you use mouse, joystick or keyboard control to scale ladders, pour boiling oil on invaders, challenge soldiers to duels and lead a cavalry charge on a battlefield.

Jewel of Arc features some stunning graphics, a novel setting, a grand strategy base and playable arcade sequences that directly affect the course of the game where money, power, subterfuge, military might and diplomacy are of equal importance.

Also from US Gold - *Heroes of the Lance* and *PC Gold Hits* (including *League Board*).



Wizardland/Interplay (Electronic Arts)

This was the surprise of 1988 when it appeared on the C64 in its 8-disk sides format. Set in a post-holocaust environment, you must patrol what's left of civilization as a Ranger and battle with mutants and outlaws in a very unfriendly world.

Part of the fun of this click role-playing game is to build up a party armed with a variety of weapons (anything you can find) and devise

battle tactics to use their strengths and protect their weaknesses. However, that's not all - there are also puzzles to solve, people to kill and mangled (or what's left of it) to save.



Apart from saving the world and taking out anybody or anything that gets in your way, you must organize raids on gang headquarters to rescue kidnapped mayors, find lost children and rid forests of the mutants that plague them. If you do all this you may be rewarded with some loot, weapons or even a new party member.

The game reflects *The Bard's Tale* style of role-playing, but it's nice to fight mutants for a change, instead of the usual selection of orcs and goblins.

Also from Interplay - *Bard's Tale I and II*.

F19/Microprose

Flight simulators have a special significance for PC owners, as using the Microsoft Simulator became the recognized way of testing whether a PC compatible was actually compatible.

Few in terms of PC flight simulators this is something special, as it gives you the chance to fly a fighter the US Airforce won't even talk about. It makes you wonder whether the Kremlin has a PC.

The Stealth Fighter can be launched from either land bases or aircraft carriers, and fly missions around America's favourite warzones - that is, Libya, the Persian Gulf, the North Cape and Central Europe. Apart from the incredible attention to detail and the pile of info and overlays you are given to help you fly the plane, the game gives you a choice of screen views that includes the usual cockpit view, as well as TactView, which displays you and the target on the screen. SlotView lets you see the plane and the flight path, but without the gauges and TankCam that magnifies target for a better view of the action.

There's a choice of promotions and medals for those who survive the missions, so what more could you want?

Also from Microprose - *Gambit*, *Silver Swallow*, *Airborne Ranger* and *Planes*.



Hardware requirements

The Commodore range of PCs is just one of many so called IBM compatibles. They're compatible because IBM set the standard. However, it's a very curious standard as there are two different disk sizes, three different processors, three different standard memory configurations and four types of graphics display! The result of all this is that most games have a label somewhere on them that says something like this:

IBM PC, XT, AT, Compaq, Tandy 1000 series, 386, 486, 387X, Sap-

ports VGA, EGA, VGA, Hercules graphics. Supports hard disk, requires DOS 2.0 or higher. Joystick supported.

When buying a PC, it's important to check that it works with your system, because some won't. Check that you have the required memory, and turn off any memory resident programs such as Windows. Check also that your graphics card is listed - if it isn't it won't be supported - and finally take a careful look at whether a hard disk or twin floppy drives are supported or required.

Sprite Library



This month we're going to run circles around the sprites. The CIRCLES sprites can be used as individual sequences; for example, the growing circle animation, if run backwards, will create the effect of a pebble being dropped in water. Alternatively, you can overlay one sprite over the other; the two dials if overlaid will produce a clock effect. Another useful effect is to expand the x axis of the sprites, which will give the illusion of 3D.

This month, Mike Benn shows how to run rings round sprites

Table (Circle - Hires)

HEX	DICIMAL	DESCRIPTION
A0 - A4	160 - 164	Growing circle
A6 - AA	166 - 170	Rotate through Y axis
AA - B0	170 - 176	Rotate through X axis
B0 - BC	177 - 188	Dial large hand
BD - C8	189 - 200	Dial small hand
C9 - D4	200 - 212	Disappearing Pe
D5 - D7	213 - 215	Turning windmill sail
D8 - D9	216 - 217	Turning spotted wheel
DA	218	Globe
DB	219	Ying Yang
DC - DF	220 - 223	Turning arrow

Getting it all in

Type in the basic loader as published, and SAVE IT - DON'T RUN IT, as it will self-destruct. Before running the loader program, you'll need to reset the computer and type directly the following - POKE 143, 0:POKE 144, 64:POKE 16384, 0:NEW and press return.

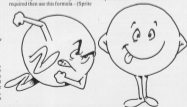
This will trick the computer into believing that the Basic now starts at 16000 instead of 16001. Load in the Basic loader and run it; if error free, the program will automatically save itself as a block of data. If you intend that data in the future, remember to add a 1 after the device number. The data is saved in the following location \$1800-\$1FFF.

The sprites run from 168 to 223 in a compromise to avoid the area \$2000, traditionally set aside for re-defined character graphics, and to avoid the need for typing in line after line of data.

If only one or two sprites are required then use this formula - (Sprite

block No. - 168) * 48 + 198 = the data line number at which that sprite block's data starts. Remember to type in the following three lines of data, and alter the variable BL to the number of data lines you have in your finished program, line 1.

The small Basic program CIRCLES DISPLAY will variously animate the sprites in both non-expanded and expanded forms on the screen simultaneously. To hold on any sprite, enter the same number for Start and End. Any Sprite Editor program will enable you to change and save the individual sprites to your own requirements.



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DEMON'S WINTER



AlthoughSSI were one of the first companies to start producing computerised role-playing games, they never really consolidated their initial advantage. To date, only *Pools of Radiance*, their offshoot licensed *Dungeons and Dragons* title, has been a particularly successful game when compared with the likes of *Wizard's Tale* and the *Ultima* series.

It was interesting then to take a look at their latest release, *Demon's Winter*, in order to see what steps they had taken to improve their image. The game contains several imaginative ideas and features not previously seen in CRNGs, but unfortunately there are still sufficient presentational problems to make any potential buyers wary. Playing the game, you soon come across several spelling mistakes which, apart from being totally unacceptable, I always feel suggest badly for the rest of the game. If you can't be bothered to check your spelling, what chance is there of the programming being 100 per cent perfect?

The hardest part of the game is actually getting started. It's blatantly obvious that you'll need to back up the disks (three sides) before you get anywhere, but it would have been nice to be told that. Instructions for all other versions contain this useful snippet of information, but not the C64 one. Again, you will need to have access to your own disk copier. The Apple version includes its own, so why not here?

As to the game itself, you are told precisely little about your ultimate goal. Your village has been raised to the ground by marauding Kobolds, and you and your party go off

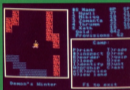
in search of revenge. You can't help suspecting, though, that a Kobold is not going to be the most serious threat you come across, certainly in view of the game's title!

You can choose from one of five different races, including troll and dark elf, and each character can opt to follow one of ten different professions. Depending on how clever your character is, you can learn a variety of skills. At the start of the game, you can only learn two abilities. If you want any more, you have to find a college that is prepared to train you and pay the necessary fee.

Weapons skills are obviously a must, but you can also choose to specialise in hunting, tactics and various types of lore. If you tend towards the arcane arts, then there are a whole series of runes and charms that you can learn. Spirit runes are recommended, as these give access to all the healing spells for when one of your party gets injured in battle. This idea of using different skills brings considerably more variety into the game than the traditional approach, and means that you can readily overcome any blandness that you made when you first picked your party.

There are several different Gods and Shamans within the game, and each character can select which one to pray to. If you need help in the course of a tricky battle or whatever, then you can ask your deity to intervene on your behalf. This is a basic 20 per cent chance which reduces by 5 per cent each time you try, although you can top up your standing by worshipping in the appropriate temple.

One interesting feature of the game is the unusual

GAMES
UPDATE

properties possessed by some of the weapons. As well as the usual combat bonuses, a sword might also have other constant powers such as giving you a new skill or improving an old one. Then there are powers which can be invoked, that is you decide when you want to call on them. For example, you may be able to call on a flame shield twice a day. Finally, the most powerful attributes are the dormant ones, the ones that the weapon itself decides when to use, including life stealing and honouring.

Demons' Power follows the traditional hack and slash storyline. There are mini-quests to be undertaken, but these are let down somewhat by one of traps that kill off all your party instantly, so remember to save your game frequently. Control of the game is fairly straightforward, apart from the magic system which requires all spell names to be typed in full. Whatever happened to menus or abbreviations?

I started off convinced that I was not going to like *Demons' Power*, but it soon grew on me, and I quickly became hooked. But all the time, the doubts nagged away. Why didn't they do this, or wouldn't it have been better to do it this way. In the end I decided that it was a good game, but with a bit more care it could have been a very good game.

Finalizer:

Title: *Demons' Power*. Supplier: GSI via EG Gold. Order: 213 Bedford Way, Weyford, Ox. 74J. Tel: 021-736 1588. Price: £29.99.

LAS VEGAS CASINO

Despite the title, *Las Vegas Casino* offers none of the excitement of the real thing. Here is your chance to lose pretend Monopoly money at four different games - roulette, black jack, baccarat and crap.

Starting with only 250 pounds, can you break the bank? Frankly, who cares? Certainly, there is no legitimate way it can be done in real life and just to make doubly sure, the program cheats, or at least does not use casino rules.

Take Black Jack for example. Now if you are a good gambler, this is the game that you stand to make most money at. For every pound that you invest, you should be able to get 99 pence back. The way to win (or not lose so much), is to know when to make favourable bets and when to stick and twist. This can be done because you know that the dealer must twist on 16 and stick on 17.

In this version, the program sticks as soon as it has got a better hand than yours, so all thoughts of tactical betting go out of the window. OK, so you might get lucky in the short term, but the odds over a period of time are totally stacked against you.

Poor graphics and control, especially on the roulette wheel, only heighten the mind-blowing numbers of this game. When will program authors realize that gambling when there is nothing at stake is utterly pointless? Save your money or, if you must blow three quid, put it on the 3.30 at Ascot. At least there'll be some momentary excitement, even if your horse does come in last.

Finalizer:

Title: *Las Vegas Casino*. Supplier: Zappella Games. 28 Osborne Road, Jeonson, Newcastle upon Tyne, NE2 2AJ. Price: £2.99.



GAMES UPDATE

Para Assault Course

Years ago, I can remember waggling my joystick like mad as I tried to survive a grueling 1500 metres race in a Decathlon game. Surprise, surprise, the same idea has resurfaced again. Oh to be sure, the game looks superficially different. The backdrop here is a Parachute regiment assault course rather than an athletic stadium, but at the end of the day, joystick waggling is what it is all about.

There are four different courses for you to attempt, each containing a variety of obstacles. There are walls to be climbed, and pools of water to be kept. There are ramps and rope swings, tunnels and death slides and all the time, you are competing against the clock.

to clear. At a time when the news has just broken about nuclear fusion, there is a new energy force at work here. Run into the wall from a distance of one yard, and bounce back three!

Each course can be previewed and practised before you attempt the real thing, although killing you for falling off the death slide does seem a trifle harsh. Fair enough when you're trying the course proper, but surely not in practice mode.

I didn't enjoy this game at all. Yes, I know it's a section of certain full price games currently available, and this will obviously tempt people to buy it, but it seems to be lacking one vital ingredient - fun. And that after all, is what games are all about.



Climbing an obstacle is very much a case of precise timing, and my feeling was that the limits set by the program were just a little too tight. Too often I was not pixel perfect enough and went crashing into whatever it was I was trying

To achieve:

Title: Para Assault Course. Supplier: Zappala Games, 38 Colverton Road, Jeonville, Newcastle upon Tyne, NE2 2AJ. Price: £19.95.

Head for Home

We present an update for this popular program

By Kirk McMillan

Head for Home was written using the technique of joining ML Data onto the end of a basic program. A few zero bytes separate each section and prevent the ML from being displayed with Basic's LIST command.

There are two very good reasons for doing this: firstly, it saves considerable room. Head for Home would not have fitted into the C-16's memory otherwise, and it's faster running, with no waiting for FOR NEXT loops to poke data into memory.

However, there is one disadvantage - Basic programs can't be edited or altered. This changes the number of bytes used, and causes the ML routines to be at a different address to that intended. The only exception is where the change doesn't affect the length of a program - as in changing DLOAD to LOAD. Both commands are reloaded and use one byte.

Unfortunately, Head for Home's machine language wasn't spotted by us at the magazine and was published as two basic programs (YC March, 1989).

Now comes the task of adding the ML to both programs...

After typing in the basic sections, you must check that no extra spaces or lines have expanded the programs to where the ML is to go. Load the first program in and, in direct mode, enter:

```
PRINTPEEK (45) +256* PEEK (46)
```

The answer must be less than 4450. Likewise, the result for the second program should be less than 9528. If not, remove anything from the programs that is not in the listing.

The ML Data could be entered

directly into the monitor, but there's a lot of typing required with no means of error checking. DATA ENTRY may help a little here by speeding up input and alerting you to errors.

Type in and run the program - it will first ask you for a starting address. Enter the line number from the listing e.g. to begin with it would be 1164. You will need to keep track of where you're up to if you type in the data over several sittings.

When a line is typed in the program will generate a checksum which you can check against the listing. Press RETURN only if it matches - any other key allows you to re-type the line.

To Exit from DATA ENTRY - press ESC twice and then enter the monitor to save your work.

```
FOR ML1 AND: S "name", 8, 1164, 1404
```

```
and ML2 - S"name", 8, 2538, 3630
```

To continue later on, LOAD "name", RJ then NEW, DLOAD "His Entry"

and RUN. (If using tape substitute "1" for "2" and LOAD for DLOAD.)

If you lose track of where you are, or for any reason want to check what has been entered, then simply use the "M" command from within Teedron. The line addresses and each row of bytes will correspond 1 to 1 with the listing. You could use the "T" command to fill memory with a known value to indicate where data has or hasn't been entered.

Once both ML sections are finished, (ML1 should be 3 disk blocks, and ML2 18 blocks), the method for merging them with the Basic programs is as follows:

- (1) DLOAD "Head for Home" in the normal manner.
- (2) RENAME "Head for Home" TO "HFH.b6"
- (3) LOAD "ml1",RJ
- (4) DSAVE "Head for Home"
- (5) DLOAD "L BASIC"
- (6) RENAME "1.basic" to "1.basic.b6"
- (7) LOAD "ml2",RJ
- (8) DSAVE "1.basic"

FOR DATA ENTRY

```

10 TRAP180
20 PRINT"CLD(0)W/A ENTRY FOR FILE
30 FILE" :PRINT"DOWN(1)R198(1)PPE8
5 3 08 2"
30 GETCHAR, B=INSTR"1234567890
-STR$000
70 IF B=1 THEN B=649:CLER=12800
80 FOR I=0,9:10:150:FOR J=0,15
+LOC$0000
97 FOR I=0, PEEK(200):PEEK(100):PEEK
200:CLB:PRINT(I);:PEEK(60)+PEEK
-50
99 GOTO 1:INPUT"CONCATENATED ADDRESS
3 08(1)",B
99 GOTO 180:PRINT
70 CL=0: B=0:PRINT"OK(1)", : , P
81225.0

```

```

60 GOTO GETCHAR:PRINT" BETWEEN
70 PRINT" ", PEEK(200)+PEEK
849-1
100 CL=0+08(128)+08(128)
110 LOC$00118+8-8
120 PRINT(PEEK(200),PEEK
30,2
130 GETCHAR:IF CLB+PEEK(12)THE
W/0
140 SOUND(,217,5,50+8) :PEEK(200)
70
150 PRINT"PRINTPAGE FILE NOW B
ETER TEXT IN WORKING, CONN(10) I
MAP:END
160 PRINT:IF B=1+AND(08(128)+07(1
8120) :ELSE PRINT"TYPE(128)A(1), 00,1
5:RESTART
170 PRINT"ERR(10)" :ERRC LINE"CL
-807150

```


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Extending Basic

Create your own symbol table, and learn all about tables and search routines

By Burghard-Henry Lehmann

In the last article of this series, we developed a routine which allows us to declare labels for GOTOs and GOSUBs in Basic. We did this with a routine that stores each label and its value in the Basic variable area which follows directly after the Basic textfile.

But with this method we are subject to the limitations Commodore Basic imposes on the use of variables, the main one being that only the first two characters of a variable name are taken into account — the rest are ignored.

What we want to do is overcome this limitation by creating our own symbol table. In the process we will learn about several concepts in machine code programming which will be very useful in whatever programming you want to do.

The Symbol Table

The symbol table we want to create is an area in memory where we store each label, and send to it the line number to which the computer has to jump when the label is used with a GOTO or GOSUB instruction.

In machine code programming, you create many tables. A table is an array of data where each entry is of the same length. Tables are useful for storing data and accessing it quickly and efficiently. For the symbol table we create in our program, I have chosen a memory area starting from location 50000 (you may of course put the symbol table anywhere you like). Thus, 50000 is the base address of our symbol table.

To make each entry the same length, I've chosen a maximum of six recognizable characters for each label. That is, if a label is longer than six characters, the rest will be ignored, and if it's shorter than six characters, the difference will be filled (or "padded") with zeros in the symbol table, so you will see in a minute.

Since we also want to store the line number belonging to each label next to the label, each entry needs an

additional two bytes — one byte to store the low byte of the line number, and one byte to store its high byte. This becomes important if the line number is larger than 255.

In all, we use eight bytes for each label stored in the symbol table. Therefore, to point at the beginning of a label, we increment the base address of the table in multiples of eight. And if you call the base address of the table position 0, then the offsets for the first four entries, for example, on the table are 8, 16 and 24.

Now you should understand why it is important that each entry in a table is the same length. If the computer has to search the table from beginning to end, it can very easily jump from entry to entry simply by adding the length of the entry to pointer address. And if it has to jump to a specific entry straight away, it can do so by adding the offset of that entry to the base address of the table.

Storing a Label

The routine to store each label in the symbol table (lines 2940-3450) is quite simple: before the computer starts searching through the Basic program for all the labels, the base address of the symbol table, which is 50000, is initialized to zero (page 251/252 (line 2400-2431)). This allows us to use indirect indexed addressing later on.

When a label has been found, zero page 57A/7B is pointing at the beginning of the label in the Basic textfile. STORELOOP (line 2930-2990) stores each letter of the label in the symbol table, using indirect indexed addressing.

If the label is shorter than six characters, the following loop (line 3000-3008) fills the rest with spaces. Next the line number belonging to the label is stored. To do this we increment zero page 251/252, which stores the pointer in the symbol table, by six (line 3140-3160).

Now we come up against a little

difficulty: we have to use indirect-Y addressing for the source and the destination, but Y has to contain a different value. To point at the source, it has to contain two and three, while to point at the destination it has to contain zero and one.

To solve this problem, table the low byte of the line number first and push it onto the stack (lines 3230-3250). Then get the high byte, change the index to one and store it in the symbol table (lines 3260-3290).

Lastly, decrement that index by one, pull the low byte of the line number from the stack, and store it in the correct place in the symbol table (lines 3300-3320). Such tricks are necessary to overcome the lack of registers (the 6500 has got! Remember, we can't use the X-register here, because X can only be used to index absolute addresses!).

Finally, increment the symbol table pointer address by another two bytes to make it point at the location where the next label has to be entered.

End Marker

When all labels have been collected and entered into the symbol table, enter a zero in the symbol table, where the beginning of the next label would have been (line 3560-3580).

This is important, because when the computer has to search for a label, it has to know where the end of the symbol table is. Because, if it reaches the end of the symbol table, that means that it hasn't found the label and that the search is finished. If there was no way to determine the end of the symbol table, the computer would go on searching for ever — that is, it would get lost in an endless loop!

To signify the end of a table, it is sometimes useful to use an end marker as we do here. At other times it is more useful to store the end location at the beginning of the last entry in a variable. You have to decide which method is best according to what suits you in the specific routine you are writing.

Searching for a Label

When executing the Basic program itself every time the computer needs a label after a GOTO or GOSUB command, it has to search through the symbol table to find that label and get the line number next to it which it needs to jump to the right destination.

In order to write a search routine you have to ask yourself some very important questions: when is the search successful, and when is it not? This sounds trivial and obvious, but remember, the computer is a very simple-minded animal and knows nothing about what you have in mind! So you have to define things very accurately. This is half the art of programming a computer.

The search for a label is successful when all the six recognized characters of a label in the textfile match with the characters of a label in the symbol table. And the search is unsuccessful when the computer has reached the end of the symbol table and hasn't found the label it was searching for.

Once we've got this clarity in our mind, the construction of the search routine itself is not too difficult. The main search loop (lines 1400-1470) compares each character of the label in the textfile with each character of a particular entry in the symbol table.

It has three exits:

Exit number one is taken if the end of the label in the textfile has been reached. This is signified by a zero (if we make the rule that a label has to be at the end of a Basic line and that nothing else, including remarks, is allowed after it). If this point has been reached it means that the label has been found, even though, if you want to be a perfectionist, you might want to make this routine more accurate and versatile. You can do this by setting up additional tests if the label is not at the end of a line, and if the label in the textfile is shorter than the label in the symbol table.

The second exit of the main loop is taken when any letter in the textfile does not compare with a letter in the symbol table. This does not necessarily mean that the search is unsuccessful at this point. If the label is shorter than six characters, it could mean that it has been found! So lines 1530-1540 test if the next byte in the symbol table contains a zero. If yes, the label has indeed been found. If not, the search has been unsuccessful up to this point.

The third exit is taken after all six recognized characters have been compared and found matching. This means

of course that the label has been found.

Now the line number after the label is gathered in zero page 114/15 (lines 1790-1840), and then the GOTO routine is executed (line 1880).

If the label so far has not been found, lines 1560-1650 increment the pointer in the symbol table contained in zero page 151/152 by eight, so that it points at the beginning of the next label. Then a test is made to see if the

end of the symbol table has been reached (lines 1730-1735).

If it has, the search has been unsuccessful. This means that the computer cannot get a destination line number. Thus line 1750 returns the program flow back to the main routine which results in a system error output, signifying that a label in the Basic program has been used which cannot be found.

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C64 PROGRAMMING

1840	STB #01	2140	SPRCL ST	JOB CRASHIT	2018	STORE LABEL
1850	LEA #+0000	2150		BRK SPRCL ST	2020	
1860	STB #01	2160			2030	LEA #0
1870	:	2170		RTS	2040	SYMBOL LEA (STB),Y
1880	ORASH SEARCH LOOP	2180			2050	SEA (STB),Y
1890		2190			2060	BRK LABELLED
1900		2200	MODIFIED "RSH"-ROUTINE		2070	LEA
1910	LEA #0	2210			2080	CTL #0
1920	COMPLXOP LEA (STB),Y	2220			2090	BRK SYMBOL
1930	BRK POSITIVE	2230	LD "RSH"		2100	
1940	CMF (STB),Y	2240			2110	BRK POINTAGE
1950	BRK NEGATIVE	2250	BRK ST	LEA #0	2120	
1960	LEA	2260		JOB SPRCL	2130	
1970	CTL #0	2270		JOB LABEL	2140	
1980	BRK COMPLEX	2280			2150	
1990		2290			2160	
2000	BRK POSITIVE	2300			2170	
2010		2310			2180	
2020	OR IF LABEL SHORTER	2320			2190	
2030	(TERM 8 CHAR	2330			2200	
2040	NEGATIVE LEA (STB),Y	2340			2210	
2050	BRK POSITIVE	2350			2220	
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3060		3360			3230	
3070		3370			3240	
3080		3380			3250	
3090		3390			3260	
3100		3400			3270	
3110		3410			3280	
3120		3420			3290	
3130		3430			3300	
3140		3440			3310	
3150		3450			3320	
3160		3460			3330	
3170		3470			3340	
3180		3480			3350	
3190		3490			3360	
3200		3500			3370	
3210		3510			3380	
3220		3520			3390	
3230		3530			3400	
3240		3540			3410	
3250		3550			3420	
3260		3560			3430	
3270		3570			3440	
3280		3580			3450	
3290		3590			3460	
3300		3600			3470	
3310		3610			3480	
3320		3620			3490	
3330		3630			3500	
3340		3640			3510	
3350		3650			3520	
3360		3660			3530	
3370		3670			3540	
3380		3680			3550	
3390		3690			3560	
3400		3700			3570	
3410		3710			3580	
3420		3720			3590	
3430		3730			3600	
3440		3740			3610	
3450		3750			3620	
3460		3760			3630	
3470		3770			3640	
3480		3780			3650	
3490		3790			3660	
3500		3800			3670	
3510		3810			3680	
3520		3820			3690	
3530		3830			3700	
3540		3840			3710	
3550		3850			3720	
3560		3860			3730	
3570		3870			3740	
3580		3880			3750	
3590		3890			3760	
3600		3900			3770	
3610		3910			3780	
3620		3920			3790	
3630		3930			3800	
3640		3940			3810	
3650		3950			3820	
3660		3960			3830	
3670		3970			3840	
3680		3980			3850	
3690		3990			3860	
3700		4000			3870	
3710		4010			3880	
3720		4020			3890	
3730		4030			3900	
3740		4040			3910	
3750		4050			3920	
3760		4060			3930	
3770		4070			3940	
3780		4080			3950	
3790		4090			3960	
3800		4100			3970	
3810		4110			3980	
3820		4120			3990	
3830		4130			4000	
3840		4140			4010	
3850		4150			4020	
3860		4160			4030	
3870		4170			4040	
3880		4180			4050	
3890		4190			4060	
3900		4200			4070	
3910		4210			4080	
3920		4220			4090	
3930		4230			4100	
3940		4240			4110	
3950		4250			4120	
3960		4260			4130	
3970		4270			4140	
3980		4280			4150	
3990		4290			4160	
4000		4300			4170	
4010		4310			4180	
4020		4320			4190	
4030		4330			4200	
4040		4340			4210	
4050		4350			4220	
4060		4360			4230	
4070		4370			4240	
4080		4380			4250	
4090		4390			4260	
4100		4400			4270	
4110		4410			4280	
4120		4420			4290	
4130		4430			4300	
4140		4440			4310	
4150		4450			4320	
4160		4460			4330	
4170		4470			4340	
4180		4480			4350	
4190		4490			4360	
4200		4500			4370	
4210		4510			4380	
4220		4520			4390	
4230		4530			4400	
4240		4540			4410	
4250		4550			4420	
4260		4560			4430	
4270		4570			4440	
4280		4580			4450	
4290		4590			4460	
4300		4600			4470	
4310		4610			4480	
4320		4620			4490	
4330		4630			4500	
4340		4640			4510	
4350		4650			4520	
4360						

Windows on the C64

Using windows on your C64 couldn't be easier!

By F.E. Randall

This program provides all the facilities you'll need to create a window environment for your Basic programs. These routines can also be used by means of SYS calls typed in from the keyboard. They allow you to specify the size and shape of the windows you require.

When a window is invoked, all the normal screen editing functions are available, but they only operate on the area of the window you have specified. When that window is 'pushed back', the original screen is restored. Up to four windows may be defined, and each may be 'pulled down' in whatever order you determine.

The definition of a window includes its position on the screen, but when 'pulled down', it may be 'dragged' to another position, and it then becomes the new location for that window in subsequent operations.

The areas used by the system are \$C000 to \$C800 for the machine code, and the screen data is saved under the Basic RAM at \$A000 to \$1FFF. The locations \$F9 to \$FF are used for the parameters of the current window, and

must not be disturbed whilst the window is 'pulled down' otherwise the system may crash. The original values in these locations are saved each time a window is 'pulled down', and restored when the last window is 'pushed back'.

To achieve the usual screen editing functions while only operating on the area of the window, the system includes rewritten parts of the Kernel routines CHIRIN and CHIROUT. When a window is active, the vectors at \$0124 and \$0126 are changed to \$C380 and \$C300 respectively. Pressing *runstop/restore* will reset these vectors if you run into difficulties.

How to Use the System

To use the system, you first have to initialise it by SYS \$0076. That call should also be used if there has been an error message, since the parameters can be in an indeterminate state after such an event. More about the error messages later.

After initialisation the windows have to be defined by SYS \$0078, a,

b, c, d, e where-

a = the window serial number from 1 to 4. This number is used to pull down the window later.

b = the number of the row on the screen where the top left and corner of the window is to appear.

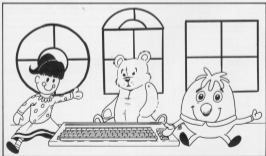
c = the number of the line on which the top left hand corner is to appear.

d = the width of the screen in characters.

e = the number of lines, in the depth of the window.

The window must be a minimum of three characters wide and three lines deep, and the starting row and line plus the width and depth must not exceed 59 and 24 respectively, since these are dictated by the screen's dimensions. In practice, you'll want to leave ample room for any Basic commands you wish to enter from the window.

This brings me to the one exception to the normal screen editing facilities which the system imposes. Normally there is wrap-around on input so that each line may be up to 80 characters



long. In this system the input line is restricted in length to the width of the window you specify. You must make allowances for this when setting the parameters.

The definition of windows will probably come in the initialization procedure of your program. If you're going to use them to display preset messages, you will probably also want to set up the displays in the initialization by 'pulling down' the window, PRINTing the text, then 'pushing back' the window. 'Pulling down' is achieved by SYS 50482, where 'n' is the window number as used in the definition. SYS 50485 will 'push back' the window.

Windows can be redefined without reinitializing the system, but once redefined, the original contents of the window will be lost. Furthermore, if redrawing takes place too frequently, you may run out of space in which to store the contents of the windows. Better to use the same window for different purposes, and clear it by PRINTing "cls" each time.

Dragging Windows

Having 'pulled down' a window, you may drag it round the screen using the following commands:-

```
up      - SYS 50391
down    - SYS - 50388
left    - SYS 50394
right   - SYS 50187
```

To drag the window from your Basic program, you would probably want to test for the pressing of a particular function key and then use the appropriate SYS call. For more flexibility, machine code built could "wedge" code into the interrupt routine to check whether a function key is pressed and if so, call the relevant subroutines listed above.

Error Messages

The system generates error messages as shown below to help in debugging your program. The conditions are merely related to the use of incorrect parameters.

Since the system may be left in an indeterminate state when the error is detected, after displaying the message, the system waits for a key to be pressed before carrying out a warm start. It's always best to initialize the system again after such an occurrence.

The exceptions to this are the absence of parameters following the SYS commands, as this is picked up by the Basic interpreter and results in a SYNTAX ERROR message.

The message displayed will take the form "ERROR . ." followed by a letter. The significance of the letters are as follows:

```
a - an attempt made to 'pull down'
a window before it has been defined.
b - an attempt made to 'pull down'
```

more than four windows or the same window.

c - when defining a window either the start row plus width exceed 59, or the start line plus length exceed 24, or there is no more space to store the window contents.

d - in a window definition, the window number is not in the range one to four.

e - when 'pulling down' a window, the window number is not in the range one to four.

f - in a definition, the window width or length is less than three.

Demonstration Program

Included on the disk is a demonstration program introducing the use of windows. Load and run WINDOWS.DEMO. To use the machine code in your own programs, type LOAD "WINDOWS.MC", R, 1 then NEW. The demonstration gives you the choice of 'pulling down' windows containing instructions on how to use the system; using a window to view the directory of a disk; defining a window of your own; or 'pulling down' one of the windows used in the program. The latter uses window numbers too, so if you try to 'pull down' that window, you will get "ERROR - B".

If you study the listing of the demonstration program, I'm sure you will soon find all it made clear. You may also wish to incorporate the directory listing routine in some of your programs. Happy windowing!

PROGRAM WINDOW DEMO		
00 10 NEW.....	40 -4,5,8,0,23	(WINDOW) (WINDOW) - (PRINT) (L)
00 20 NEW	4C 170 DEFVAL,1	00 100 (PRINT) (WINDOW) (WINDOW)
00 30 NEW	50 180 PRINT "FILE,TYPE,LENGTH,DISK"	00 110 (PRINT) (WINDOW) (WINDOW)
00 40 NEW	54 190 PRINT "INITIALIZE SYSTEM - NEW"	00 120 (PRINT) (WINDOW) (WINDOW)
00 50 NEW	58 200 PRINT "INITIALIZE WINDOW"	00 130 NEW
00 60 NEW	5C 210 PRINT "INITIALIZE WINDOW"	00 140 NEW
00 70 NEW	60 220 PRINT "INITIALIZE WINDOW"	00 150 NEW
00 80 NEW	64 230 PRINT "INITIALIZE WINDOW"	00 160 NEW
00 90 NEW	68 240 PRINT "INITIALIZE WINDOW"	00 170 NEW
00 A0 NEW	6C 250 PRINT "INITIALIZE WINDOW"	00 180 NEW
00 B0 NEW	70 260 PRINT "INITIALIZE WINDOW"	00 190 NEW
00 C0 NEW	74 270 PRINT "INITIALIZE WINDOW"	00 200 NEW
00 D0 NEW	78 280 PRINT "INITIALIZE WINDOW"	00 210 NEW
00 E0 NEW	7C 290 PRINT "INITIALIZE WINDOW"	00 220 NEW
00 F0 NEW	80 300 PRINT "INITIALIZE WINDOW"	00 230 NEW
01 00 NEW	84 310 PRINT "INITIALIZE WINDOW"	00 240 NEW
01 10 NEW	88 320 PRINT "INITIALIZE WINDOW"	00 250 NEW
01 20 NEW	8C 330 PRINT "INITIALIZE WINDOW"	00 260 NEW
01 30 NEW	90 340 PRINT "INITIALIZE WINDOW"	00 270 NEW
01 40 NEW	94 350 PRINT "INITIALIZE WINDOW"	00 280 NEW
01 50 NEW	98 360 PRINT "INITIALIZE WINDOW"	00 290 NEW
01 60 NEW	9C 370 PRINT "INITIALIZE WINDOW"	00 300 NEW
01 70 NEW	A0 380 PRINT "INITIALIZE WINDOW"	00 310 NEW
01 80 NEW	A4 390 PRINT "INITIALIZE WINDOW"	00 320 NEW
01 90 NEW	A8 400 PRINT "INITIALIZE WINDOW"	00 330 NEW
02 00 NEW	AC 410 PRINT "INITIALIZE WINDOW"	00 340 NEW
02 10 NEW	B0 420 PRINT "INITIALIZE WINDOW"	00 350 NEW
02 20 NEW	B4 430 PRINT "INITIALIZE WINDOW"	00 360 NEW
02 30 NEW	B8 440 PRINT "INITIALIZE WINDOW"	00 370 NEW
02 40 NEW	BC 450 PRINT "INITIALIZE WINDOW"	00 380 NEW
02 50 NEW	C0 460 PRINT "INITIALIZE WINDOW"	00 390 NEW
02 60 NEW	C4 470 PRINT "INITIALIZE WINDOW"	00 400 NEW
02 70 NEW	C8 480 PRINT "INITIALIZE WINDOW"	00 410 NEW
02 80 NEW	CC 490 PRINT "INITIALIZE WINDOW"	00 420 NEW
02 90 NEW	D0 500 PRINT "INITIALIZE WINDOW"	00 430 NEW
03 00 NEW	D4 510 PRINT "INITIALIZE WINDOW"	00 440 NEW
03 10 NEW	D8 520 PRINT "INITIALIZE WINDOW"	00 450 NEW
03 20 NEW	DC 530 PRINT "INITIALIZE WINDOW"	00 460 NEW
03 30 NEW	E0 540 PRINT "INITIALIZE WINDOW"	00 470 NEW
03 40 NEW	E4 550 PRINT "INITIALIZE WINDOW"	00 480 NEW
03 50 NEW	E8 560 PRINT "INITIALIZE WINDOW"	00 490 NEW
03 60 NEW	EC 570 PRINT "INITIALIZE WINDOW"	00 500 NEW
03 70 NEW	F0 580 PRINT "INITIALIZE WINDOW"	00 510 NEW
03 80 NEW	F4 590 PRINT "INITIALIZE WINDOW"	00 520 NEW
03 90 NEW	F8 600 PRINT "INITIALIZE WINDOW"	00 530 NEW
04 00 NEW	FC 610 PRINT "INITIALIZE WINDOW"	00 540 NEW
04 10 NEW	00 620 PRINT "INITIALIZE WINDOW"	00 550 NEW
04 20 NEW	04 630 PRINT "INITIALIZE WINDOW"	00 560 NEW
04 30 NEW	08 640 PRINT "INITIALIZE WINDOW"	00 570 NEW
04 40 NEW	0C 650 PRINT "INITIALIZE WINDOW"	00 580 NEW
04 50 NEW	10 660 PRINT "INITIALIZE WINDOW"	00 590 NEW
04 60 NEW	14 670 PRINT "INITIALIZE WINDOW"	00 600 NEW
04 70 NEW	18 680 PRINT "INITIALIZE WINDOW"	00 610 NEW
04 80 NEW	1C 690 PRINT "INITIALIZE WINDOW"	00 620 NEW
04 90 NEW	20 700 PRINT "INITIALIZE WINDOW"	00 630 NEW
05 00 NEW	24 710 PRINT "INITIALIZE WINDOW"	00 640 NEW
05 10 NEW	28 720 PRINT "INITIALIZE WINDOW"	00 650 NEW
05 20 NEW	2C 730 PRINT "INITIALIZE WINDOW"	00 660 NEW
05 30 NEW	30 740 PRINT "INITIALIZE WINDOW"	00 670 NEW
05 40 NEW	34 750 PRINT "INITIALIZE WINDOW"	00 680 NEW
05 50 NEW	38 760 PRINT "INITIALIZE WINDOW"	00 690 NEW
05 60 NEW	3C 770 PRINT "INITIALIZE WINDOW"	00 700 NEW
05 70 NEW	40 780 PRINT "INITIALIZE WINDOW"	00 710 NEW
05 80 NEW	44 790 PRINT "INITIALIZE WINDOW"	00 720 NEW
05 90 NEW	48 800 PRINT "INITIALIZE WINDOW"	00 730 NEW
06 00 NEW	4C 810 PRINT "INITIALIZE WINDOW"	00 740 NEW
06 10 NEW	50 820 PRINT "INITIALIZE WINDOW"	00 750 NEW
06 20 NEW	54 830 PRINT "INITIALIZE WINDOW"	00 760 NEW
06 30 NEW	58 840 PRINT "INITIALIZE WINDOW"	00 770 NEW
06 40 NEW	5C 850 PRINT "INITIALIZE WINDOW"	00 780 NEW
06 50 NEW	60 860 PRINT "INITIALIZE WINDOW"	00 790 NEW
06 60 NEW	64 870 PRINT "INITIALIZE WINDOW"	00 800 NEW
06 70 NEW	68 880 PRINT "INITIALIZE WINDOW"	00 810 NEW
06 80 NEW	6C 890 PRINT "INITIALIZE WINDOW"	00 820 NEW
06 90 NEW	70 900 PRINT "INITIALIZE WINDOW"	00 830 NEW
07 00 NEW	74 910 PRINT "INITIALIZE WINDOW"	00 840 NEW
07 10 NEW	78 920 PRINT "INITIALIZE WINDOW"	00 850 NEW
07 20 NEW	7C 930 PRINT "INITIALIZE WINDOW"	00 860 NEW
07 30 NEW	80 940 PRINT "INITIALIZE WINDOW"	00 870 NEW
07 40 NEW	84 950 PRINT "INITIALIZE WINDOW"	00 880 NEW
07 50 NEW	88 960 PRINT "INITIALIZE WINDOW"	00 890 NEW
07 60 NEW	8C 970 PRINT "INITIALIZE WINDOW"	00 900 NEW
07 70 NEW	90 980 PRINT "INITIALIZE WINDOW"	00 910 NEW
07 80 NEW	94 990 PRINT "INITIALIZE WINDOW"	00 920 NEW
07 90 NEW	98 1000 PRINT "INITIALIZE WINDOW"	00 930 NEW
08 00 NEW	9C 1010 PRINT "INITIALIZE WINDOW"	00 940 NEW
08 10 NEW	A0 1020 PRINT "INITIALIZE WINDOW"	00 950 NEW
08 20 NEW	A4 1030 PRINT "INITIALIZE WINDOW"	00 960 NEW
08 30 NEW	A8 1040 PRINT "INITIALIZE WINDOW"	00 970 NEW
08 40 NEW	AC 1050 PRINT "INITIALIZE WINDOW"	00 980 NEW
08 50 NEW	B0 1060 PRINT "INITIALIZE WINDOW"	00 990 NEW
08 60 NEW	B4 1070 PRINT "INITIALIZE WINDOW"	01 000 NEW
08 70 NEW	B8 1080 PRINT "INITIALIZE WINDOW"	01 010 NEW
08 80 NEW	BC 1090 PRINT "INITIALIZE WINDOW"	01 020 NEW
08 90 NEW	C0 1100 PRINT "INITIALIZE WINDOW"	01 030 NEW
09 00 NEW	C4 1110 PRINT "INITIALIZE WINDOW"	01 040 NEW
09 10 NEW	C8 1120 PRINT "INITIALIZE WINDOW"	01 050 NEW
09 20 NEW	CC 1130 PRINT "INITIALIZE WINDOW"	01 060 NEW
09 30 NEW	D0 1140 PRINT "INITIALIZE WINDOW"	01 070 NEW
09 40 NEW	D4 1150 PRINT "INITIALIZE WINDOW"	01 080 NEW
09 50 NEW	D8 1160 PRINT "INITIALIZE WINDOW"	01 090 NEW
09 60 NEW	DC 1170 PRINT "INITIALIZE WINDOW"	01 100 NEW
09 70 NEW	E0 1180 PRINT "INITIALIZE WINDOW"	01 110 NEW
09 80 NEW	E4 1190 PRINT "INITIALIZE WINDOW"	01 120 NEW
09 90 NEW	E8 1200 PRINT "INITIALIZE WINDOW"	01 130 NEW
10 00 NEW	EC 1210 PRINT "INITIALIZE WINDOW"	01 140 NEW
10 10 NEW	F0 1220 PRINT "INITIALIZE WINDOW"	01 150 NEW
10 20 NEW	F4 1230 PRINT "INITIALIZE WINDOW"	01 160 NEW
10 30 NEW	F8 1240 PRINT "INITIALIZE WINDOW"	01 170 NEW
10 40 NEW	FC 1250 PRINT "INITIALIZE WINDOW"	01 180 NEW
10 50 NEW	00 1260 PRINT "INITIALIZE WINDOW"	01 190 NEW
10 60 NEW	04 1270 PRINT "INITIALIZE WINDOW"	01 200 NEW
10 70 NEW	08 1280 PRINT "INITIALIZE WINDOW"	01 210 NEW
10 80 NEW	0C 1290 PRINT "INITIALIZE WINDOW"	01 220 NEW
10 90 NEW	10 1300 PRINT "INITIALIZE WINDOW"	01 230 NEW
11 00 NEW	14 1310 PRINT "INITIALIZE WINDOW"	01 240 NEW
11 10 NEW	18 1320 PRINT "INITIALIZE WINDOW"	01 250 NEW
11 20 NEW	1C 1330 PRINT "INITIALIZE WINDOW"	01 260 NEW
11 30 NEW	20 1340 PRINT "INITIALIZE WINDOW"	01 270 NEW
11 40 NEW	24 1350 PRINT "INITIALIZE WINDOW"	01 280 NEW
11 50 NEW	28 1360 PRINT "INITIALIZE WINDOW"	01 290 NEW
11 60 NEW	2C 1370 PRINT "INITIALIZE WINDOW"	01 300 NEW
11 70 NEW	30 1380 PRINT "INITIALIZE WINDOW"	01 310 NEW
11 80 NEW	34 1390 PRINT "INITIALIZE WINDOW"	01 320 NEW
11 90 NEW	38 1400 PRINT "INITIALIZE WINDOW"	01 330 NEW
12 00 NEW	3C 1410 PRINT "INITIALIZE WINDOW"	01 340 NEW
12 10 NEW	40 1420 PRINT "INITIALIZE WINDOW"	01 350 NEW
12 20 NEW	44 1430 PRINT "INITIALIZE WINDOW"	01 360 NEW
12 30 NEW	48 1440 PRINT "INITIALIZE WINDOW"	01 370 NEW
12 40 NEW	4C 1450 PRINT "INITIALIZE WINDOW"	01 380 NEW
12 50 NEW	50 1460 PRINT "INITIALIZE WINDOW"	01 390 NEW
12 60 NEW	54 1470 PRINT "INITIALIZE WINDOW"	01 400 NEW
12 70 NEW	58 1480 PRINT "INITIALIZE WINDOW"	01 410 NEW
12 80 NEW	5C 1490 PRINT "INITIALIZE WINDOW"	01 420 NEW
12 90 NEW	60 1500 PRINT "INITIALIZE WINDOW"	01 430 NEW
13 00 NEW	64 1510 PRINT "INITIALIZE WINDOW"	01 440 NEW
13 10 NEW	68 1520 PRINT "INITIALIZE WINDOW"	01 450 NEW
13 20 NEW	6C 1530 PRINT "INITIALIZE WINDOW"	01 460 NEW
13 30 NEW	70 1540 PRINT "INITIALIZE WINDOW"	01 470 NEW
13 40 NEW	74 1550 PRINT "INITIALIZE WINDOW"	01 480 NEW
13 50 NEW	78 1560 PRINT "INITIALIZE WINDOW"	01 490 NEW
13 60 NEW	7C 1570 PRINT "INITIALIZE WINDOW"	01 500 NEW
13 70 NEW	80 1580 PRINT "INITIALIZE WINDOW"	01 510 NEW
13 80 NEW	84 1590 PRINT "INITIALIZE WINDOW"	01 520 NEW
13 90 NEW	88 1600 PRINT "INITIALIZE WINDOW"	01 530 NEW
14 00 NEW	8C 1610 PRINT "INITIALIZE WINDOW"	01 540 NEW
14 10 NEW	90 1620 PRINT "INITIALIZE WINDOW"	01 550 NEW
14 20 NEW	94 1630 PRINT "INITIALIZE WINDOW"	01 560 NEW
14 30 NEW	98 1640 PRINT "INITIALIZE WINDOW"	01 570 NEW
14 40 NEW	9C 1650 PRINT "INITIALIZE WINDOW"	01 580 NEW
14 50 NEW	A0 1660 PRINT "INITIALIZE WINDOW"	01 590 NEW
14 60 NEW	A4 1670 PRINT "INITIALIZE WINDOW"	01 600 NEW
14 70 NEW	A8 1680 PRINT "INITIALIZE WINDOW"	01 610 NEW
14 80 NEW	AC 1690 PRINT "INITIALIZE WINDOW"	01 620 NEW
14 90 NEW	B0 1700 PRINT "INITIALIZE WINDOW"	01 630 NEW
15 00 NEW	B4 1710 PRINT "INITIALIZE WINDOW"	01 640 NEW
15 10 NEW	B8 1720 PRINT "INITIALIZE WINDOW"	01 650 NEW
15 20 NEW	BC 1730 PRINT "INITIALIZE WINDOW"	01 660 NEW
15 30 NEW	C0 1740 PRINT "INITIALIZE WINDOW"	01 670 NEW
15 40 NEW	C4 1750 PRINT "INITIALIZE WINDOW"	01 680 NEW
15 50 NEW	C8 1760 PRINT "INITIALIZE WINDOW"	01 690 NEW
15 60 NEW	CC 1770 PRINT "INITIALIZE WINDOW"	01 700 NEW
15 70 NEW	D0 1780 PRINT "INITIALIZE WINDOW"	01 710 NEW
15 80 NEW	D4 1790 PRINT "INITIALIZE WINDOW"	01 720 NEW
15 90 NEW	D8 1800 PRINT "INITIALIZE WINDOW"	01 730 NEW
16 00 NEW	DC 1810 PRINT "INITIALIZE WINDOW"	01 740 NEW
16 10 NEW	E0 1820 PRINT "INITIALIZE WINDOW"	01 750 NEW
16 20 NEW	E4 1830 PRINT "INITIALIZE WINDOW"	01 760 NEW
16 30 NEW	E8 1840 PRINT "INITIALIZE WINDOW"	01 770 NEW
16 40 NEW	EC 1850 PRINT "INITIALIZE WINDOW"	01 780 NEW
16 50 NEW	F0 1860 PRINT "INITIALIZE WINDOW"	01 790 NEW
16 60 NEW	F4 1870 PRINT "INITIALIZE WINDOW"	01 800 NEW
16 70 NEW	F8 1880 PRINT "INITIALIZE WINDOW"	01 810 NEW
16 80 NEW	FC 1890 PRINT "INITIALIZE WINDOW"	01 820 NEW
16 90 NEW	00 1900 PRINT "INITIALIZE WINDOW"	01 830 NEW
17 00 NEW	04 1910 PRINT "INITIALIZE WINDOW"	01 840 NEW
17 10 NEW	08 1920 PRINT "INITIALIZE WINDOW"	01 850 NEW
17 20 NEW	0C 1930 PRINT "INITIALIZE WINDOW"	01 860 NEW
17 30 NEW	10 1940 PRINT "INITIALIZE WINDOW"	01 870 NEW
17 40 NEW	14 1950 PRINT "INITIALIZE WINDOW"	01 880 NEW
17 50 NEW	18 1960 PRINT "INITIALIZE WINDOW"	01 890 NEW
17 60 NEW	1C 1970 PRINT "INITIALIZE WINDOW"	01 900 NEW
17 70 NEW	20 1980 PRINT "INITIALIZE WINDOW"	01 910 NEW
17 80 NEW	24 1990 PRINT "INITIALIZE WINDOW"	01 920 NEW
17 90 NEW	28 2000 PRINT "INITIALIZE WINDOW"	01 930 NEW
18 00 NEW	2C 2010 PRINT "INITIALIZE WINDOW"	01 940 NEW
18 10 NEW	30 2020 PRINT "INITIALIZE WINDOW"	01 950 NEW
18 20 NEW	34 2030 PRINT "INITIALIZE WINDOW"	01 960 NEW
18 30 NEW	38 2040 PRINT "INITIALIZE WINDOW"	01 970 NEW
18 40 NEW	3C 2050 PRINT "INITIALIZE WINDOW"	01 980 NEW
18 50 NEW	40 2060 PRINT "INITIALIZE WINDOW"	01 990 NEW
18 60 NEW	44 2070 PRINT "INITIALIZE WINDOW"	02 000 NEW
18 70 NEW	48 2080 PRINT "INITIALIZE WINDOW"	02 010 NEW
18 80 NEW	4C 2090 PRINT "INITIALIZE WINDOW"	02 020 NEW
18 90 NEW	50 2100 PRINT "INITIALIZE WINDOW"	02 030 NEW
19 00 NEW	54 2110 PRINT "INITIALIZE WINDOW"	02 040 NEW
19 10 NEW	58 2120 PRINT "INITIALIZE WINDOW"	02 050 NEW
19 20 NEW	5C 2130 PRINT "INITIALIZE WINDOW"	02 060 NEW
19 30 NEW	60 2140 PRINT "INITIALIZE WINDOW"	02 070 NEW
19 40 NEW	64 2150 PRINT "INITIALIZE WINDOW"	02 080 NEW
19 50 NEW	68 2160 PRINT "INITIALIZE WINDOW"	02 090 NEW
19 60 NEW	6C 2170 PRINT "INITIALIZE WINDOW"	02 100 NEW
19 70 NEW	70 2180 PRINT "INITIALIZE WINDOW"	02 110 NEW
19 80 NEW	74 2190 PRINT "INITIALIZE WINDOW"	02 120 NEW
19 90 NEW	78 2200 PRINT "INITIALIZE WINDOW"	02 130 NEW
20 00 NEW	7C 2210 PRINT "INITIALIZE WINDOW"	02 140 NEW
20 10 NEW	80 2220 PRINT "INITIALIZE WINDOW"	02 150 NEW
20 20 NEW	84 2230 PRINT "INITIALIZE WINDOW"	02 160 NEW
20 30 NEW	88 2240 PRINT "INITIALIZE WINDOW"	02 170 NEW
20 40 NEW	8C 2250 PRINT "INITIALIZE WINDOW"	02 180 NEW
20 50 NEW	90 2260 PRINT "INITIALIZE WINDOW"	02 190 NEW
20 60 NEW	94 2270 PRINT "INITIALIZE WINDOW"	02 200 NEW
20 70 NEW	98 2280 PRINT "INITIALIZE WINDOW"	02 210 NEW


```

03 300 GOTO 1700:1700:1700:1700
15 400 PRINT:LINE:GOTO:400,400,400
    400,400
14 410 GOTO
05 420 GOTO FULL INSTRUCTION
    400,400
20 430 GOTO
07 440 GOTO:1,4,0,0,0,0,0,0
06 450 GOTO:1,4,0,0,0,0,0,0
05 460 GOTO:1,4,0,0,0,0,0,0
20 470 GOTO:0,0,0,0,0,0,0,0
44 480 GOTO
45 490 GOTO
05 500 GOTO DISPLAY DIRECTORY
70 510 GOTO
07 520 GOTO:1,1
07 530 PRINT:FILE:SPACE:SPACE:
    00,LINE:SPACE:PRINT:10
    000:END AND PAGE:0 AND
    500 GOTO:1700:1700:1700:1700
09 540 GOTO:0,0,0,0,0,0,0,0
    0,0,0,0,0,0,0,0
07 550 GOTO
07 570 GOTO DEGREE & WINDOW
05 580 GOTO
06 590 GOTO:1,PRINT:FILE:END
    4,0,0,0,0,0,0,0:WINDOW:END
    1,PRINT:WINDOW:FILE:WINDOW
    WILL BE:0,0,0,0,0,0,0,0

```

```

02 600 GOTO:1,0,0,0,0,0,0,0:START:1
    0,0,0,0,0,0,0,0:PRINT:FILE:END
    1,0,0,0,0,0,0,0
40 610 PRINT:WINDOW:OF:LINE:0,0
    0,0,0,0,0,0,0,0:PRINT:WINDOW:OF:END
    1,0,0,0,0,0,0,0
07 620 GOTO:1,4,0,0,0,0,0,0:END
    1,1
14 630 PRINT:FILE:END:OF:FILE:END:END
    WINDOW:END:FILE:END:END:END
    1,0,0,0,0,0,0,0:PRINT:FILE:END:OF:END
    2,WINDOW:END:FILE:END:END:END
07 640 PRINT:FILE:END:OF:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:OF:END
    0,0,0,0,0,0,0,0
10 650 GOTO
95 660 GOTO FULL:END:0:WINDOW
    0,0,0,0,0,0,0,0
20 680 GOTO
95 690 GOTO:1,PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:END:END:END:END
    0,0,0,0,0,0,0,0
14 700 PRINT:WINDOW:FILE:END:END
    0,1,1,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0
47 710 GOTO:1,4,0,0,0,0,0,0
07 720 GOTO:1,4
07 730 GOTO:0,0,0,0,0,0,0,0
06 740 GOTO:0,0,0,0,0,0,0,0:END
45 750 GOTO
17 760 GOTO:0,0,0,0,0,0,0,0:END

```

```

02 780 GOTO AND:END:WINDOW
04 790 GOTO
05 800 GOTO:1700:1700:1700:1700
02 810 GOTO:1,4,0,0,0,0,0,0:END:END
02 820 PRINT:WINDOW:FILE:END:END
    0,1,0,0,0,0,0,0:PRINT:FILE:END:END
06 830 GOTO:1,4,0,0,0,0,0,0:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
47 840 GOTO:1,0,0,0,0,0,0,0:END:END
    0,0,0,0,0,0,0,0
40 850 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
07 860 GOTO:1,0,0,0,0,0,0,0:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    1,0,0,0,0,0,0,0:PRINT:FILE:END:END
05 870 GOTO:1,0,0,0,0,0,0,0:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
02 880 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
70 890 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
02 900 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
70 910 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
06 920 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
06 930 GOTO:END:END:END:END:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
    0,0,0,0,0,0,0,0:PRINT:FILE:END:END
40 940 GOTO:1700:1700:1700:1700
92 950 GOTO:END:END:END:END:END:END

```



PROGRAM WINDOW END

```

03 00 100000
05 00 0000 4 17 0 0000 0000 000
07 00 0000 1 0 0 0 0 0 0 0 0 0
77 00 00 00 00 70 100 200 300 400
    4 000 1 0 000
43 00 00 00 00 4 000 70 200 300
    100 70 200
06 00 00 00 00 70 100 0 200 000
    000 200 000
71 00 70 00 00 200 30 0 70 100 1
    00 000 00
01 00 00 00 00 10 000 00 200 4 4
    1 000 000
47 00 00 00 00 2 40 40 0 0 100 0
    0 70 70
93 00 00 00 00 100 000 100 000 0
    70 70 000
99 00 00 00 00 200 00 000 400 100
    000 0 0 0
52 00 00 00 00 100 000 70 000 10
    1 100 000 00
48 00 00 00 00 0 0 00 000 000 100
    000 000 000
01 00 00 00 00 200 000 100 000 0
    0 100 000 000
05 00 00 00 00 100 000 000 000 1
    00 00 000 000
93 00 00 00 00 100 000 1 000 000
    00 000 000
07 00 00 00 00 70 40 000 000 00
    000 0 70
30 00 00 00 00 00 000 70 100 000
    000 10 000
00 00 00 00 00 00 100 70 100 000
    00 000 000
93 00 00 00 00 100 000 000 0 0
    000 100 000

```

```

02 00 00 00 00 100 00 00 100 00
    0 100 70 00
04 00 00 00 00 100 70 000 000 10
    000 100 70
94 00 00 00 00 00 000 70 00 000
    00 100 000
30 00 00 00 00 100 000 0 100 00
    000 00 100
40 00 00 00 00 0 70 00 000 000 1
    0 000 00
54 00 00 00 00 70 00 000 100 000
    00 000 000 000
05 00 00 00 00 70 00 000 000 000
    00 000 000 000
73 00 00 00 00 00 000 000 100 000
    00 000 000 000
03 00 00 00 00 000 000 00 000 00
    0 000 000
05 00 00 00 00 100 000 00 000 00
    00 000 000
70 00 00 00 00 000 000 00 000 00
    0 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
96 00 00 00 00 000 000 0 000 00
    00 000 000
94 00 00 00 00 000 00 000 00 000
    00 000 000
07 00 00 00 00 000 0 000 00 00
    00 000 000
54 00 00 00 00 100 000 000 00 00
    00 000 000
20 00 00 00 00 100 000 000 00 00
    00 000 000
76 00 00 00 00 000 000 00 000 00
    00 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
80 00 00 00 00 000 000 0 00 000 0
    00 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
08 00 00 00 00 0 70 00 000 0 100
    00 000
02 00 00 00 00 000 000 00 70 000 0
    0 000 000
80 00 00 00 00 000 000 0 00 000 0
    00 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
04 00 00 00 00 70 00 000 000 000
    000 000 000
07 00 00 00 00 0 000 000 00 000
    00 000 000
07 00 00 00 00 0 000 000 000 000
    00 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
07 00 00 00 00 100 000 000 000 0
    00 000 000

```

```

90 00 00 00 00 100 70 100 000 00
    000 100 000
02 00 00 00 00 000 000 000 000 00
    00 000 000
14 00 00 00 00 00 100 000 100 000
    000 000 000
00 00 00 00 00 100 00 000 000 00
    00 000 000
97 00 00 00 00 000 000 000 000 00
    000 000 000
98 00 00 00 00 100 000 000 000 1
    00 000 000 000
04 00 00 00 00 00 000 000 000 1
    00 000 000
08 00 00 00 00 100 000 000 000 1
    00 000 000 000
07 00 00 00 00 00 000 000 000 000
    000 000 000
97 00 00 00 00 000 00 000 000 00
    00 000 000
98 00 00 00 00 000 000 00 000 00
    00 000 000
84 00 00 00 00 000 000 000 000 00
    000 000 000
74 00 00 00 00 000 000 000 000 1
    000 000 000
00 00 00 00 00 100 000 000 000 0
    000 000 000
14 00 00 00 00 00 000 000 000 0
    00 000 000
48 00 00 00 00 000 000 000 000 0
    00 000 000
08 00 00 00 00 0 000 000 000 000
    000 000 000
20 00 00 00 00 000 000 000 000 0
    000 000 000
02 00 00 00 00 100 000 000 000 0
    0 000 000
44 00 00 00 00 00 000 000 000 00
    000 000 000
02 00 00 00 00 0 000 000 000 000
    000 000 000
10 00 00 00 00 000 000 000 000 0
    000 000 000
44 00 00 00 00 00 000 000 000 00
    000 000 000
02 00 00 00 00 0 000 000 000 000
    000 000 000
40 00 00 00 00 0 000 000 000 000
    000 000 000

```


8.128.32.197
 80 50540 C67A 187.30.48.199.174
 151.288.175
 85 50540 C67A 14.388.187.33.288
 238.32.188
 90 50540 C67A 32.189.187.32.232
 177.32.190
 12 50540 C67A 194.338.8.141.32
 3.248.182
 A2 50572 C67A 148.79.3.149.4.14
 1.38.5
 C4 50568 C67A 148.195.148.37.3
 188.18.32
 D0 50568 C67A 218.288.98.188.18
 4.188.172.32
 D7 50590 C67A 162.8.189.18.288
 248.4.32
 F1 50564 C67A 238.288.288.288.2
 48.184.32.288
 F8 50520 C67A 228.148.8.133.288
 183.288.248
 F9 50528 C67A 282.78.182.284.17
 4.32.288.248
 G2 50528 C67A 32.32.232.188.32
 232.187.288
 L4 50528 C67A 32.288.174.32.288
 282.48.18
 C2 50544 C67A 188.33.288.148.34
 288.32.188
 8E 50552 C67A 187.32.188.188.18
 8.18.32.8
 A0 50548 C67A 182.88.182.5.188
 38.288.187

5A 50548 C67A 38.3.282.18.247.1
 82.8.188
 E6 50576 C67A 8.288.248.248.288
 18.288.188
 E8 50548 C67A 78.32.238.288.84
 188.8.177
 C8 50520 C67A 248.48.8.288.182
 4.288.187
 84 50588 C67A 98.172.32.288.248
 13.178.32
 C3 50588 C67A 288.288.288.33.28
 8.141.14.288
 78 50528 C67A 32.187.187.148.85
 78.288.188
 9E 50548 C67A 172.32.288.248.5
 184.281.188
 C7 50512 C67A 288.1.88.32.211.1
 88.32.232
 88 50548 C67A 187.188.281.32.13
 2.187.152.3
 41 50548 C67A 198.3.181.252.145
 288.282.188
 E8 50588 C67A 88.288.32.188.188
 188.18.32
 D2 50584 C67A 8.192.88.172.32.17
 88.248.218
 88 50572 C67A 284.232.188.248.2
 13.32.211.188
 D8 50588 C67A 32.232.187.188.25
 2.78.88.188
 84 50588 C67A 172.32.288.248.18
 7.248.1.24
 D2 50548 C67A 88.1.284.188.252.2

81.38.248.188
 C8 51184 C67A 32.232.188.32.232
 182.232.282
 8E 51112 C67A 78.98.188.173.32
 288.288.178
 E8 51128 C67A 288.1.24.181.231
 181.282.288
 D5 51128 C67A 34.288.188.32.231
 188.32.232
 F7 51138 C67A 187.238.231.78.89
 188.238.288
 E7 51144 C67A 238.282.188.281.1
 88.232.188.284
 F8 51152 C67A 288.284.88.188.25
 1.188.232.288
 88 51168 C67A 282.288.288.238.2
 84.238.284.88
 F8 51188 C67A 8.8.8.8.8.8.8.8
 90 51178 C67A 8.8.8.8.8.8.8.8
 98 51188 C67A 8.8.8.8.8.8.8.8
 18 51188 C67A 8.8.8.8.8.8.8.8
 D7 51288 C67A 8.8.8.8.8.8.8.8
 D7 51288 C67A 8.8.8.8.8.8.8.8
 C8 51218 C67A 8.4.13.88.88.81.7
 8.88
 99 51254 C67A 32.48.32.8.87.241
 182.1.240
 F7 51232 C67A 8.8.8.8.8.8.8.8
 8C 50548 C67A 8.8.8.8.258

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Commodore Cabriolet Cabriolet	2995.00
Commodore Cabriolet Cabriolet	3095.00
Commodore Cabriolet Cabriolet	3195.00
Commodore Cabriolet Cabriolet	3295.00
Commodore Cabriolet Cabriolet	3395.00
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Commodore Cabriolet Cabriolet	3895.00
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Commodore Cabriolet Cabriolet	4195.00
Commodore Cabriolet Cabriolet	4295.00
Commodore Cabriolet Cabriolet	4395.00
Commodore Cabriolet Cabriolet	4495.00
Commodore Cabriolet Cabriolet	4595.00
Commodore Cabriolet Cabriolet	4695.00
Commodore Cabriolet Cabriolet	4795.00
Commodore Cabriolet Cabriolet	4895.00
Commodore Cabriolet Cabriolet	4995.00
Commodore Cabriolet Cabriolet	5095.00
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Commodore Cabriolet Cabriolet	6595.00
Commodore Cabriolet Cabriolet	6695.00
Commodore Cabriolet Cabriolet	6795.00
Commodore Cabriolet Cabriolet	6895.00
Commodore Cabriolet Cabriolet	6995.00
Commodore Cabriolet Cabriolet	7095.00
Commodore Cabriolet Cabriolet	7195.00
Commodore Cabriolet Cabriolet	7295.00
Commodore Cabriolet Cabriolet	7395.00
Commodore Cabriolet Cabriolet	7495.00
Commodore Cabriolet Cabriolet	7595.00
Commodore Cabriolet Cabriolet	7695.00
Commodore Cabriolet Cabriolet	7795.00
Commodore Cabriolet Cabriolet	7895.00
Commodore Cabriolet Cabriolet	7995.00
Commodore Cabriolet Cabriolet	8095.00
Commodore Cabriolet Cabriolet	8195.00
Commodore Cabriolet Cabriolet	8295.00
Commodore Cabriolet Cabriolet	8395.00
Commodore Cabriolet Cabriolet	8495.00
Commodore Cabriolet Cabriolet	8595.00
Commodore Cabriolet Cabriolet	8695.00
Commodore Cabriolet Cabriolet	8795.00
Commodore Cabriolet Cabriolet	8895.00
Commodore Cabriolet Cabriolet	8995.00
Commodore Cabriolet Cabriolet	9095.00
Commodore Cabriolet Cabriolet	9195.00
Commodore Cabriolet Cabriolet	9295.00

Star LC10-C Colour Printer

We put the LC10-C under the microscope

By Paul Eves

Shortly after this, I began reviewing programs for Your Commodore. Yes, you've guessed it, suddenly the need for graphics printing became only too clear. Back went the 801, and I said hello once again to the 801.

Since those early days, I have used many different printers. These machines, like Assemblies, come in all sorts of formats. Some will do one thing, others will do another. It's not until you find a printer that will do EVERYTHING you personally want it to do. That is to say, until 14 months ago, when I discovered the LC10-C. For my money this has got to be one of the best home-use printers I've ever come across. So what makes this printer stand out above the rest? Well, it's a compact, convenient, colour dot-matrix printer. It's fully compatible with the

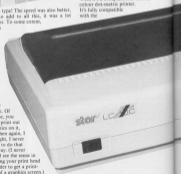
Ever since I purchased my first computer system, some four and a half years ago, I have always understood the importance of having a printer. Even in those early days in a computer novice, I could see the importance of being able to get hard copies of any important work done, be it listings of your latest masterpiece, print-outs of your finances, or simply letters.

The first printer I bought was the MP5001, and at the time it seemed like a good buy. I was able to get print-outs of virtually anything I desired with relative ease. True, the finished result was not spectacular, but it was something - better than my hand-writing. I can assure you. However, when I looked around at my friends' listings, lists and letters, I was somewhat misled to discover that my humble 801 was perhaps not quite as good as I had first thought.

Not to be outdone, I traded in the 801 and upgraded to the 802. Ah, what bliss! This printer had a far superior finish to it. Alright, so it is a lot larger and heavier, but what an improvement

in the type! The speed was also better, and to add to all this, it was a lot quieter. To some extent, it was

also a lot easier to use. Of course, you can't print out graphics on it, but then again, I thought I never want to do that anyway. (I never could see the sense in raising your print head in order to get a print-out of a graphics screen.)



C128 and C164, it supports the Commodore graphics and business character sets, (Standard and IBM versions), and you can also swap to ASCII operating mode.

On top of all this, you have access to no less than ten international character sets. For those of you who like colourful displays and print-outs, you have a six colour print option. Operating the printer is simplicity itself. You are provided with a clear, easy to read front panel, and from this panel a multitude of operations can be performed.

Apart from the obvious function of switching power on or off, these are the other functions available:

The type style can be selected along with the type pitch. Left and right margins can be set up along with setting the top of paper, and paper can be fed automatically with micro-feed if needed (forward or reverse). Pause printing and the printing of test patterns are both possible.

You can also prevent software from altering your pitch and style settings. One other function, which I think is a boon to machine code programmers, is the facility for printing a Hex dump. This is



On top of this, you can have Enhanced Underlined, Superscript, Subscript, Bold, Double sized and Quadruple sized printing. The printer also prints standard eight-bit graphics and Commodore seven-bit graphics.

You can use up to triple-ply multi-copy forms, normal landscape forms or single sheets. An extra feature is the ability to park landscape paper, whilst you are using others. Of course, you don't have to take my word for all this

— at the end of this review you'll see



some sample print-outs.

All these print-outs were executed from within simple Basic programs. I think you'll agree that the finished results are quite impressive (especially for a humble home-user printer).

As well as everything else I've said, the supporting manual is well laid out, informative and easy to understand. (I must be *g'd* to understand it... Ed)

But I don't want you to think that I have no criticisms at all, because I have. All this Hi-Tech equipment is somewhat delicate. I had great trouble for some time getting it to respond to colour commands, both from within software and by direct use. I just could not understand what the problem was (the test patterns proved OK).

Eventually I hit on the problem. My ribbon had by this time become faint on Black and Blue. For some reason this interfered with the operation of the rest of the ribbon. On purchasing a new ribbon, the problem disappeared. It would be better if this could be overcome, but I think that this is a small price to pay considering the advantages the machine has.

In the final analysis, I would highly recommend this printer. I know there must be better ones around, the 24 pin type for example, but for all-round versatility, it is hard to beat.

Final Word

The printer that was reviewed here is the Commodore Serial Interfaced Version. There is a Commodore Version that's compatible with Epson and IBM printers. Therefore this version is suitable with the Amiga and any other computer that supports these printers.

Footnote

See Microcom, Crown House, 40 Oxbridge Rd, Basing W3 2AS; Telephone: (01) 840 1808.

so that you can check that the codes the printer is receiving are correct.

Five type styles are raised too, all of which can be used in italics (one dual and Four NLQ). There are then four different print pitches for each.

Spritz Sprite System

*If you are fed up not having sprites on your Plus/4,
read on*

By Mark Everingham

A spritz, according to the Concise Oxford Dictionary is, "An EH, Fairy or Hobgoblin." Hmm... Maybe, but perhaps the definition should extend to include Cars, Planes, Pacmen, Invaders from Space and (just for Jeff Minter) Sheep, Camels and Llamas.

In fact, in computer terms, a spritz is any piece of computer graphics which plays an active part in a game. Sadly, the Plus/4 does not have any, a fact which has been long lamented by the machine's owners who have to bear the ridicule of C64 owners, whose machines are endowed with hardware—controlled sprites.

Spritz sets out to put the balance right by providing your Plus/4 computer with a comprehensive Spritz System, giving not one, not two, but eight independent, full colour sprites which can be controlled very simply through 19 new commands. These commands are added to the standard Commodore Basic language — so need for those angsty pixels for which the C64 has become infamous!

The Theory of Sprites

Sprites form the heart of the majority of today's computer games, and are found in abundance on every computer, from the humble C16 to the mighty CBM Amiga. A spritz is a graphic element or picture which can be placed on the screen and moved quickly and smoothly about with the minimum of trouble.

On the Plus/4, the text screen is

used for sprites because of the speed and ease of use this screen offers. When a spritz is displayed, the computer automatically remembers what was under the spritz before it was printed. To move the spritz you simply change its coordinate position, the computer acknowledges that the spritz has been moved, replaces what was underneath, moves it to the new position and reprints it. *SPRITZ* will detect a collision between a spritz and something else. Sprites can even be printed below or above foreground graphics.

In addition to these features, *SPRITZ* also has a facility for selective priority printing, a feature not found on either the C64 or C128. *SPRITZ* handles this complicated process in about 20 milliseconds under the control of an interrupt.

If it all sounds a little technical, remember, all you have to do is to tell the computer where to move a spritz, everything else is incompetently automatic and transparent to the user.

Using The Spritz Commands

SPRITZ adds 19 new commands to basic which makes the control of the spritz simplicity itself, without a FUDGE in sight. These commands act in exactly the same way as the normal Commodore Basic commands. Every parameter can be expressed either as direct numbers or variables. Standard error messages are given which can, if required, be intercepted in Basic using the Commodore TRAP command.

The error messages *SPRITZ* gives are explained below:

SYNTAX Error — You have either used a command or keyword that neither *SPRITZ* or CBM Basic understands, or you have entered too few or too many parameters following a command.

Type Mismatch Error — you have replaced a numeric parameter with a string.

Illegal Quantity Error — One number you have used as a command parameter is outside the valid range for that particular command.

As well as these error messages, the Basic HELP command (Key F8), also works with *SPRITZ* commands. If you enter something like:

```
DEFINE 255, 1, 2, 3, 4, 5, 4, 4, 7, 8, 9
```

then there should only be the numbers 1-8 the HELP command will mark all of the line from the final '9' back to indicate where the error lies.

Similarly, if you typed something like:

SCROLLING RULES ON

The phrase 'RULES ON' would be flashing as the valid argument for the SCROLLING command is either ON or OFF. This feature of the HELP command with *SPRITZ* makes the location of errors extremely easy.

SPRITZ Set-Up Commands

RAMPFONT \$AAAA/AAAA

For the most part, you will want your sprites to be made up of user-defined graphic characters, aliens, spacecraft etc. You tell *SPRITZ* that you want to use a character set or Font in RAM instead of ROM with the *RAMPFONT* command. Its sole parameter is the address where the character set is stored. This can be expressed either in decimal, or hexadecimal preceded with a '\$' character. *SPRITZ* also uses and interrupt to retain a character set, so when you generate an error message the computer will not go wild as it usually does!

Examples:
RAMPFONT \$3000
IF RAMPFONT 4012

CRMFONT

However attractive a redefined character set is, it can be difficult to edit a program where all the colours appear as monochrome, as the numbers 0-9 as various sections of a centipede's body! To get your computer back to the normal Commodore font, just enter *CRMFONT*.

Examples:
CRMFONT
RCRMFONT

FONTCOPY 0/1

Most people find that they only want to redefine part of a character set as user defined graphics, and still want the usual alphanumeric characters. The answer is to copy the normal ROM character set down into RAM and then redefine the characters you want. The *FONTCOPY* command copies a character set into RAM. Either into UPPER case font (*FONTCOPY 0*) or the lower case font (*FONTCOPY 1*). The command must be preceded by a *RAMPFONT* command to tell *SPRITZ* where to put the new character set.

Examples:
RAMPFONT \$3000:FONTCOPY 0
IF RAMPFONT 4012:FONTCOPY 1

DEFINE Char. D0, D1, D2, D3, D4, D5, D6, D7

Once you have copied a standard font

into RAM, you will probably want to redefine some of the characters to form graphics with which to build sprites or displays. Usually, this would be done using a series of *DATA* statements and *POKEs*. These are replaced with one command in *SPRITZ*, *DEFINE*.

The *DEFINE* command takes nine parameters in the range 0-255. The first is the character number, and the 8 that follow are the data bytes which make up the character.

Note, the character number is not ASCII, as in *CHR\$(C)*, but a screen code. The relevant code for each character can be found on Page 191 of your computer manual.

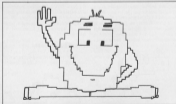
See also the section in the *SPRITZ* *SCRN* function.

Example:
IF RAMPFONT \$300: FONTCOPY 0
20 DEFINE 0, 170, 85, 170, 85, 170,
85, 170, 85
30 PRINT "***"**

HARDRVS and SOFTRVS

A character set can contain either 128 characters and use the *RVS ON/OFF* function, or 256 characters with no hardware reversing. If you need the extra characters, entering *SOFTRVS* does this, with reversing being handled by software if required. *HARDRVS* selects the lowest 128 characters, but with *RVS ON/OFF* being handled by hardware.

Examples:
HARDRVS: PRINT "ABCD"
[RVS ON] "ABCD"
SOFTRVS: PRINT "ABCD"
[RVS ON] "ABCD"



HIREX and MULTI

The Plus/4 computer has several modes, the most important of which are High-resolution and Multi-colour. The *HIREX* and *MULTI* commands switch between the two. *HIREX* mode is usually in operation. *MULTI* mode, which is used in quite a number of arcade games, halves the horizontal resolution but allows each pixel to be one of four different colours.

Examples:
HIREX: PRINT "(ORNG) SPRITZ"
MULTI: PRINT "(ORNG) SPRITZ"

SPRITZ Sprite Commands

SPRITE SF, CH0, CH1, CH2, CH3, CR, LR, CL, LL, CL, LL, CL, LJ

Each sprite under *SPRITZ* control is made up of four characters displayed on the Plus/4 low-resolution screen. These characters are arranged in a square of 2x2 characters, and each character can be an individual colour. Reverse or normal characters can be used to make up a sprite, and each colour can be one of the Plus/4's full 121. The *SPRITE* command is used to tell *SPRITZ* which characters and colours are to be used to make up a sprite. The parameters it requires are:

SF - Sprite number (0-7)
CH0 - Top left char code (0-255)
CH1 - Top right char code (0-255)
CH2 - Bottom left char code (0-255)
CH3 - Bottom right char code (0-255)
CR - Colour for that quarter (1-16)
LR - Luminance for that quarter (0-7)

As you can see, the characters are specified not as ASCII but as screen codes, as for the **DEFINIS** command. The reason for this is that using ASCII, reverse characters are not evaluated. To specify a reverse character using the character code you simply add 128 to the original value. Again, the relevant values can be found on page 193 of your manual, also refer the **SPRITE SCRNS** function.

Colours are represented using the colour and luminance values that you would use in a **COLOR** command to represent all 121 colours. These are entered in the same order as the character codes for each quarter of the sprite. Each sprite is numbered 0-7 for each of the eight available.

Examples:

```
SPRITE 0, 1, 1, 3, 4, 3, 7, 3, 6, 3,
5, 5, 4
```

When **SPRITE** is first used, each sprite is set up as characters 96-127 (the last is a character set), with each character being black. The characters in each sprite are arranged thus:-

	Character	Colours
SPRITE 0	96 97	1,0 1,0
	98 99	1,0 1,0
SPRITE 1	100 101	1,0 1,0
	102 103	1,0 1,0

and so on....

BACKGROUND CH and MODE SP, OVER/UNDER/SELECT

As mentioned before, each sprite can be displayed either above or behind foreground graphics, or with selective priority. If a sprite is **OVER** it appears on top of anything printed on the screen. If a sprite is **UNDER**, then it appears behind everything except a space character on the screen. When using **SELECT** (ive priority), a sprite can made to appear in front of some characters and behind others so that you could, for example, make a helicopter move between tower blocks.



or weave in and out in a pattern. You can make each sprite behave in any one of the three ways, so you could have a helicopter moving between buildings, clouds moving behind, and a spotlight in focus.

The **MODE** command is used to specify how a sprite is displayed on the screen. It takes two parameters: The first **SP** is the sprite number in the range of 0-7, and the second parameter should be one of **OVER**, **UNDER** or **SELECT** as explained above.

The **MODE** of a sprite should be chosen before a sprite is first **ENABLED**.

When you first use **SPRITE**, all sprites are set to **OVER**.

Examples:

```
FOR N=0 TO 7:MODE N, UNDER:
NEXT N
8:MODE 0, SELECT
```

When using **SELECT** mode you have to tell **SPRITE** which characters should be considered as foreground and which as background. The command to do this is **BACKGROUND**. Its single parameter in the range 0-255 is the character to be used as foreground. To clarify this, the examples below show the result of each value:

Examples:

BACKGROUND 128 - All reversed characters are foreground and all others background.

BACKGROUND 65 - Every character with a code of 65-127 is foreground and every other in the range 0-64 is background.

Note that even with a command like **BACKGROUND 96**, setting every character with a code over 95 as foreground, the space character, (code 32), is logically still treated as background.

ENABLE SP/DISABLE SP

Once you have set up the sprites you wish to use, the **ENABLE** com-

mand is used to switch them on. The command takes only one parameter, the sprite number in the range 0-7. Once enabled, the sprite stays on the screen continuously. Even if you clear the screen, the sprite is reprinted in its original position. This means that you could use one routine to scroll a background and another to control the sprite, and the routines don't need to take any notice of each other!

Once you have finished using any sprites you can switch them off using the **DISABLE** command with the sprite number as its argument. Note that when using a large number of sprites in the Basic direct mode, there can be considerable losses in speed of keyboard auto-repeat as the computer is doing a lot more work than usual on its interrupt. Thus, it is a good idea to switch sprites off when leaving a program to improve the auto-repeat speed. The internal clock will inevitably run slightly slower than normal when **SPRITE** is maintaining many sprites.

Examples:

```
ENABLE 0:ENABLE 2:DISABLE 4
10 FOR S=0 TO 7:ENABLE S:NEXT
```

MOVE SP TO TX, TY

Obviously you need to be able to move sprites around the screen. The **MOVE** command is the primary way of doing this. The command takes three parameters: the sprite number **SP** in the range 0-7, and the coordinates to which the sprite should be moved. The destination coordinates should be separated from the sprite number using **TO** as for the Commodore **DRAW** command. Coordinates should be separated using a comma like all other **SPRITE** commands. The X-coordinate should be in the range 0-38 and the Y-coordinate in the range 0-23. When you use a **MOVE** command with that sprite enabled, **SPRITE** automatically removes the sprite from the screen and reprints it in the new position leaving the screen intact. The **MOVE** command can also be used when a sprite is not enabled in order to move it to its initial



position. When you first use *SPRITZ*, the sprites are arranged in a row in the top left of the screen.

Examples

```
X=10:Y=10:MOVE 1 TO X, Y:
ENABLE 1
```

```
SHIFT SP SLEFT/SRIGHT/SUP/
SDOWN and SHIFT SP,DIR
```

Usually you will want to move a sprite one character at a time, and the *SHIFT* command can be used to do just this. It will move any sprite one character Left, Right, Up or Down. If a sprite goes off an edge of the screen, it reappears at the opposite side. Moving off the screen to the right makes the sprite reappear on the left. The *SHIFT* command has two possible syntaxes. Both take their first parameter, the sprite number, in the range 0-7. Following the sprite number is the direction in which the sprite is to be moved. If the direction is expressed as a number, it should be preceded by a comma. The effect of each of the possible arguments are as follows:

NUMERIC	WORD	DIRECTION
0	SLEFT	LEFT
1	SRIGHT	RIGHT
2	SUP	UP
3	SDOWN	DOWN

Note that when you specify the direction in English as a single word, the word should be preceded by 'S'. This is to avoid clashes with the BASIC functions LEFTS and RIGHTS.

Examples:

```
ENABLE 0: D0: SHIFT 0
SPRIGT: SHIFT 0 DOWN: LOOP
ENABLE 0: D0: D0: END D0:0
SHIFT 0: LOOP
```

SPRITZ UTILITY COMMANDS

SCROLLING ON/OFF

One of the problems implementing sprites using software is that whenever a program or entry in direct mode causes the screen to scroll up, the sprites will also scroll, leaving an image above them. Usually this will not be a problem when programming, but if you wish to print on the bottom line of the screen while sprites are enabled, it can be useful to disable the screen



scrolling effect. To do this just type *SCROLLING OFF* or to re-enable it, type *SCROLLING ON*.

When scrolling is disabled, if the cursor, is pushed off the bottom line of the screen, instead of scrolling the screen up, it just reappears at the top of the screen. The *SCROLLING* command is the equivalent of the ESC 'M' and ESC 'L' sequences.

Examples:

```
SCROLLING ON: ENABLE 0:
CHAR0,30,30, ""
```

SCREEN SUP/SDOWN

Sometimes you may want to scroll the screen up or down but leave the sprites you have enabled intact. The *SCREEN* command will do just this.

SCREEN works by first removing all the sprites from the screen, scrolling the screen either up or down, and then replotting all the sprites previously enabled. When using many sprites this inevitably causes some screen flicker so it is not really recommended for rapid use. However, it can be very useful when editing programs or implementing an asterisks type effect. *SCREEN SUP* scrolls the screen up and *SCREEN SDOWN* scrolls it down. Each scrolling is one line in each direction. Note that if you have a window specified, the *SCREEN* command will scroll the window only.

Example:

```
10 MOVE 0 TO 30,12
20 ENABLE 0
30 CHAR1,RND(1)*40, 0, ""
40 SCREEN SDOWN
50 GOTO 30
```

RESET

If you do something like enter an incorrect address in a *RAMFONT* command, or leave all your sprites enabled when entering direct mode to

edit a program, it can be hard to tell what's going on when the character set is corrupted. If you get into such a situation entering *RESET* will reset all *SPRITZ*'s variables to their default values.

The command can also be used at the start of a program to make sure that all the system variables contain the default values. These default settings are shown below:-

```
MODE : HERO8
FONT : CHFONT (U per case)
REVERSE: SOFTRVS
SPRITES : DISABLED
```

Examples:

```
10 RESET:SCNCLR:ENABLE 0
RESET:SCNCLR
```

SPRITZ

As *SPRITZ* adds 30 new keywords to the Basic operating system, it can be a little difficult to remember all of them. If you cannot remember a command or keyword, typing *SPRITZ* will display a list of them on the screen. It will automatically configure the list width to the size of the current window.

Example:

```
SPRITZ
```

10 SCNCLR:SPRITZ

SPRITZ User Function

As well as the 19 commands *SPRITZ* adds to Basic, *SPRITZ* also provides you with four new functions. These make the setup and control of sprites easier. These are used just like Basic functions as an argument of another command. For example:- *PRINT SCRN ("A")* will print the screen or character code value of the ASCII "A" character. Equally *CS=SCRN("A")* will assign this value to the variable CS. As you can see, these functions are used as the argument for another command, not as a command by themselves.

SCRN ("CHR")

SCRN is used to convert an ASCII character into its equivalent screen code used in the *DEFINE* and *SPRITE* commands. As with all functions, the single parameter is

enclosed within brackets and, as the argument is a string, it should also be enclosed within inverted commas. The string should only be one character long, but, if the string you specify is longer, in the same manner as the Basic ASC function, only the leftmost character is considered. You can also use functions from within other functions as long as they yield the correct type of parameter.

Example:

```
DEFINE SCRN ("0", 170, 85, 170,
85, 170, 85, 170, 85)
IF S=SCRN (CHR$64)
PRINT S
```

XPOS (SP) and YPOS (SP)

The XPOS and YPOS functions are used to find the position of any sprite.

The one parameter they take is the sprite number, which should be in the range 0-7. The functions should only really be used when the sprite you are finding the position of is enabled. The values returned are in the ranges of 0-25 and 0-23 for the X and Y-coordinates respectively.

Examples:

```
ENABLEMOVE TO XPOS (0)=1,
YPOS (0)=1
IF PRINT "Position of Sprite 0
"XPOS (0);",YPOS (0)
```

COLLIDE (SP)

COLLIDE is an important part of the SPRITZ system. It tells you whether or not a sprite (SP) has collided with a character which is foreground. It returns a zero for no collision or a one for a collision. Collide can be used with the IF command like any normal function. What constitutes a collision is for any of the characters in the 27 square sprite occupies, to be a non-space character, greater or equal to the FOREGROUND setting. Thus the two setups below are respectively no collision and a collision.

```
Foreground value 1
Sprite 0 at (10,10)
```

Contents:

```
10 = COLLIDE (0)=0
0 11
```

```
1 10 = COLLIDE (0)=1
12 11
```

Example:

```
10 CHAR 1, 0, 0, ">">CHAR 1, 30,
1, " "
20 MOVE 0 TO IS,ENABLE 0:D=0
30 SHIFT A,DAIF COLLIDE (0)
THEN D=D+D
40 GOTO 30
```

SPRITZ Keyword Abbreviation

This brings an end to the discussion of each of the SPRITZ commands and keywords, however, to cut down on typing you can use a simple abbreviation for each keyword. The full and abbreviated forms of each SPRITZ keyword are shown below:

FULL KEYWORD	ABBREVIATION
CHARFONT	C (Spritz-C)
COLLIDE	C (Spritz-D)
DEFINE	D (Spritz-E)
DISABLE	D (Spritz-I)
ENABLE	E (Spritz-N)
FONTCOPY	FO (Spritz-N)
FOREGROUND	F (Spritz-O)
HARDWYS	H (Spritz-A)
HIDES	H (Spritz-I)
MODE	M (Spritz-O)
MOVE	M (Spritz-V)
MULTI	M (Spritz-U)
OVER	O (Spritz-V)
RAMFONT	R (Spritz-A)
RESET	R (Spritz-E)
SCREEN	S (Spritz-C)
SCRN	SCRN
SCROLLING	SCR (Spritz-O)
SDOWN	S (Spritz-D)
SELECT	S (Spritz-F)
SHIFT	S (Spritz-H)
SLEPT	S (Spritz-L)
SOFTWYS	S (Spritz-O)
SPRITE	S (Spritz-P)
SPRITZ	SPRITZ
SRIGHT	S (Spritz-R)
SUP	SUP
UNDER	U (Spritz-N)
XPOS	X (Spritz-P)
YPOS	Y (Spritz-P)

As you can see, using abbreviations can save you up to seven characters of typing per command, which for those less experienced on the keyboard, can be quite considerable.

SPRITZ Sprite - Editor Program

As well as the SPRITZ Basic commands, I have provided a full-featured

Sprite Editor which can be used to create colours, hires Sprites for SPRITZ with the minimum of effort. As the program is fully cursor controlled, it is not necessary to use any numbers at all to define a sprite.

The Screen Display

When you run the Sprite Editor program you will see that the screen is divided into seven squares or windows. These windows are used as follows:

The **Title Window** at the head of the screen simply displays the Sprite-Editor heading.

The **Edit Window** on the left of the screen is where all the action happens. In it is displayed a full colour, enlarged version of the sprite currently being edited. In the Edit Window you can move the cursor and change the status of pixels and colours.

When you first run the Sprite-Editor it will contain a display of sprite 0 and a cross wire cursor in the top left of the window.

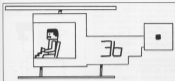
Next to the edit window are two windows which contain a normal size picture of the current sprite. The windows look identical but the top one shows the current sprite in colour and the lower one in monochrome.

On the centre-right of the screen is the **Dialogue Window** which for most of the time displays a reminder of the control keys the Sprite Editor program uses. Whenever you are using a function such as saving a set of sprites or changing colours, all the computer output and human input is displayed in this window.

In the bottom-right corner of the screen is a window which displays the right sprite which are currently in memory, accompanied by their equivalent number. These sprites are displayed in colour as in the top display window.

The final window, the **Status Window** is located beneath the two display windows. On the left is displayed the number of the sprite which is being edited, and on the right is the current editing mode.

When first run, these will be 0 0 and " ".



The Control Keys

The most important keys the Sprite Editor uses are the cursor control keys. If you press these you can see the cross with cursor in the Edit window move around the window.

If you move the cursor over a set pixel then it changes to a white cross on a coloured square, if it is on a reset (white) pixel then it appears coloured on a white background. In this way the cursor is always visible and the status of the pixel it covers is still displayed. The Sprite-Editor will prevent you from trying to move outside the Edit Windows.

Individual pixels of a sprite can be changed by using the 'A' and 'R' keys to Set and Reset the pixel under the cursor. Any changes you make to a sprite are displayed in colour in the top display window and the sprite window, and in the monochrome in the lower display window.

As well as changing the state of pixels individually, you can make the cursor leave a trail of either Set (coloured) pixels or Reset (white) pixels as you move it around the edit window. To make it leave a Set trail press F1, or to make it leave a Reset trail press F2. These are the equivalents of drawing or erasing. If you only want to change pixels individually using 'A' and 'R', then you can press F3 to do so. The current drawing mode is shown in the status window. A '1' indicates the draw or set mode, a '2' indicates the Erase or Reset mode, and a '.' indicates that pixels will be unchanged when you move the cursor over them - the Over Mode.

One of the features the Sprite-Editor program offers which is unique to SPRTZ is the colour function.

As explained before, a sprite can have a different colour for each of its four single character quarters. By

pressing 'C' you can change the colour of the quarter-Sprite in which the cursor is currently located. When you press 'C' the program will clear the

```

PROGRAM SPRITE LOADER
00 END *****
01 END "
02 END = SPRITE BASIC LOADER "
03 END "
04 END *****
05 END *****
70 CLEAR% 1:CLAMP% 0
80 PRINT CONTACT:"SPRITE BASIC LO
ADDER PROGRAM"
90 PRINT "COMMUNICATED JANUARY 198
2 BY M S UNDERMAN"
100 PRINT "COPY"
110 PRINT *****
210 PRINT *****:FOR I=0:99:TO 255:G
OTO I
220 PRINT "COLOR DOWN DOWN DOWN
DOWN"
230 PRINT "COLOR DOWN DOWN DOWN
DOWN"
240 PRINT "COLOR DOWN DOWN DOWN
DOWN"
250 PRINT "COLOR DOWN DOWN DOWN
DOWN"
260 PRINT "COLOR DOWN DOWN DOWN
DOWN"
270 PRINT "COLOR DOWN DOWN DOWN
DOWN"
280 PRINT "COLOR DOWN DOWN DOWN
DOWN"
290 PRINT "COLOR DOWN DOWN DOWN
DOWN"
300 PRINT "COLOR DOWN DOWN DOWN
DOWN"
310 PRINT "COLOR DOWN DOWN DOWN
DOWN"
320 PRINT "COLOR DOWN DOWN DOWN
DOWN"
330 PRINT "COLOR DOWN DOWN DOWN
DOWN"
340 PRINT "COLOR DOWN DOWN DOWN
DOWN"
350 PRINT "COLOR DOWN DOWN DOWN
DOWN"
360 PRINT "COLOR DOWN DOWN DOWN
DOWN"
370 PRINT "COLOR DOWN DOWN DOWN
DOWN"
380 PRINT "COLOR DOWN DOWN DOWN
DOWN"
390 PRINT "COLOR DOWN DOWN DOWN
DOWN"
400 PRINT "COLOR DOWN DOWN DOWN
DOWN"
410 PRINT "COLOR DOWN DOWN DOWN
DOWN"
420 PRINT "COLOR DOWN DOWN DOWN
DOWN"
430 PRINT "COLOR DOWN DOWN DOWN
DOWN"
440 PRINT "COLOR DOWN DOWN DOWN
DOWN"
450 PRINT "COLOR DOWN DOWN DOWN
DOWN"
460 PRINT "COLOR DOWN DOWN DOWN
DOWN"
470 PRINT "COLOR DOWN DOWN DOWN
DOWN"
480 PRINT "COLOR DOWN DOWN DOWN
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490 PRINT "COLOR DOWN DOWN DOWN
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500 PRINT "COLOR DOWN DOWN DOWN
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510 PRINT "COLOR DOWN DOWN DOWN
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520 PRINT "COLOR DOWN DOWN DOWN
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530 PRINT "COLOR DOWN DOWN DOWN
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540 PRINT "COLOR DOWN DOWN DOWN
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550 PRINT "COLOR DOWN DOWN DOWN
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560 PRINT "COLOR DOWN DOWN DOWN
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570 PRINT "COLOR DOWN DOWN DOWN
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580 PRINT "COLOR DOWN DOWN DOWN
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590 PRINT "COLOR DOWN DOWN DOWN
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600 PRINT "COLOR DOWN DOWN DOWN
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610 PRINT "COLOR DOWN DOWN DOWN
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620 PRINT "COLOR DOWN DOWN DOWN
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660 PRINT "COLOR DOWN DOWN DOWN
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670 PRINT "COLOR DOWN DOWN DOWN
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680 PRINT "COLOR DOWN DOWN DOWN
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690 PRINT "COLOR DOWN DOWN DOWN
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700 PRINT "COLOR DOWN DOWN DOWN
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710 PRINT "COLOR DOWN DOWN DOWN
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720 PRINT "COLOR DOWN DOWN DOWN
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730 PRINT "COLOR DOWN DOWN DOWN
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740 PRINT "COLOR DOWN DOWN DOWN
DOWN"
750 PRINT "COLOR DOWN DOWN DOWN
DOWN"
760 PRINT "COLOR DOWN DOWN DOWN
DOWN"
770 PRINT "COLOR DOWN DOWN DOWN
DOWN"
780 PRINT "COLOR DOWN DOWN DOWN
DOWN"
790 PRINT "COLOR DOWN DOWN DOWN
DOWN"
800 PRINT "COLOR DOWN DOWN DOWN
DOWN"
810 PRINT "COLOR DOWN DOWN DOWN
DOWN"
820 PRINT "COLOR DOWN DOWN DOWN
DOWN"
830 PRINT "COLOR DOWN DOWN DOWN
DOWN"
840 PRINT "COLOR DOWN DOWN DOWN
DOWN"
850 PRINT "COLOR DOWN DOWN DOWN
DOWN"
860 PRINT "COLOR DOWN DOWN DOWN
DOWN"
870 PRINT "COLOR DOWN DOWN DOWN
DOWN"
880 PRINT "COLOR DOWN DOWN DOWN
DOWN"
890 PRINT "COLOR DOWN DOWN DOWN
DOWN"
900 PRINT "COLOR DOWN DOWN DOWN
DOWN"
910 PRINT "COLOR DOWN DOWN DOWN
DOWN"
920 PRINT "COLOR DOWN DOWN DOWN
DOWN"
930 PRINT "COLOR DOWN DOWN DOWN
DOWN"
940 PRINT "COLOR DOWN DOWN DOWN
DOWN"
950 PRINT "COLOR DOWN DOWN DOWN
DOWN"
960 PRINT "COLOR DOWN DOWN DOWN
DOWN"
970 PRINT "COLOR DOWN DOWN DOWN
DOWN"
980 PRINT "COLOR DOWN DOWN DOWN
DOWN"
990 PRINT "COLOR DOWN DOWN DOWN
DOWN"

```

dialogue window and prompt for Colour (0-15) and Luminance (0-7). When you enter these, the change in

colour will be displayed in the Edit, Display and Sprite windows. The cursor will then draw in the new colour selected.

If you want to start with a clean canvas so to speak, then pressing the 'CLR/HOME' key will clear the Edit window leaving you with an empty black sprite. Care should be taken using this function as you can not then recover your hardware!

All of SPRTZ's eight sprites can be edited. You can change the key to be edited by pressing the 'E' key. The dialogue window will then clear and you can enter the sprite in the range 0-7. The new number is displayed in the Status window and the new sprite is drawn in the Edit and Display windows. The Sprite can then be edited just like any other.

When you are happy with your sprite you can save them onto disk or tape by pressing 'S'. The dialogue window will prompt you for the save device and you should press 'D' for the Disk or 'T' for Tape. The name under which you wish your collection of eight sprites to be saved should then be entered. The filename should be no longer than ten characters as SPRTZ adds a five character extension of its own.

You can reload sets of sprites previously saved from the Sprite-Editor by hitting the 'L' key. The program will prompt for device and filename in exactly the same way as for saving sprites. The sprites will then be reloaded for further editing.

Finally, when you have finished using the Sprite-Editor program, you can get out of it by pressing 'ESC' which will return you to Basic and reset the SPRTZ system variables to their default settings.

Changing the Sprite-Editor Font Address

When you first use the Sprite-Editor program, it is set up for a character set at \$F800 - the highest possible place on a Plus4 or 64K C16. If you want to change this address, for example, if you only have a MK C16, then all you have to do is change the RAMFONT declaration in line 90 and the ADDRESS declaration in line 100 of the program. Care should be taken not to set the address lower than the end of the Sprite-Editor program if you have not saved a backup copy.

Using Sprites in your own programs

It is not much use designing a set of sprites if you cannot then use them in your own programs under the control of *SPRITZ*. Luckily, this is easy to do. The lines displayed below should be added to the start of your program to load in the sprite character set and data.

```
10 IFL = 0 THEN L = 1: LOAD"NAME,
FONT",chr(L)
20 IFL = 1 THEN L = 2: LOAD"
NAME,SPRT",chr(L)
30 ADDRESS = (ADDRESS)
40 RAMFONT AD
50 POKE$0,POKE$6,AD: TM CLR
```

You should insert the file-name given to your collection of sprites in place of "NAME", (chr) should be replaced by 1 for tape users or 2 for disk users, (ADDRESS) should be replaced with the address at which your sprite character set is stored. This can be expressed in decimal, or in hex using DEC("AAAA") where "AAAA" is the hexadecimal address of the character set.

It must be stressed that this section of program should be used at the beginning of a program and will only work in this position because it is necessary to clear (or CLR) all Basic variables after loading a section of data into RAM.

When the program section shown above has been run, your sprites can be displayed and moved simply by **ENABLING** the sprites and then using the normal *SPRITZ* commands. There is no need to create any further *SPRITZ* commands as *SPRITZ* sprite data as well as character set data is loaded into RAM, thus simulating the effect of a series of **DEFINE** and **SPRITE** commands.

Getting SPRITZ Up and Running

The BASIC Loader Program

The Basic Loader Program is used to install the *SPRITZ* machine-code program. It should be entered and run in the normal way. The program gives its own error messages to help you locate any errors you may have entered in the data section. Once the program has been entered correctly, you should press 'D' or 'T' to choose whether the

program is to be saved to Disk or Tape and then hit RETURN as indicated by the loader program. At this point two files are saved: A backup copy of the basic loader program and a file named *SPRITZ*. At this point you can reset your computer and from this time you can get *SPRITZ* running by simply typing:-

```
LOAD"SPRITZ" (For Disk Users)
LOAD"SPRITZ" (For Tape Users)
RUN (RETURN)
```

A copyright message will be displayed and you can then use any of the *SPRITZ* commands and functions either in a program or in Basic direct mode.

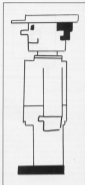
Demonstration Program

I have included a Demonstration program to display *SPRITZ*'s functions working to the limit. The program controls all eight colour sprites independently and simultaneously while playing a section of J.S. Bach's 2-part Invention in D-Minor - quite a feat for a humble Plus/4 program written in Basic!

To use the demo program you should first load the *SPRITZ* system program. You can then save the demonstration program using the procedure as follows:-

PROGRAM SPRITZ LOADER

```
100 POKE 40,PEEK(100): POKE 44,PEEK
(100): POKE 48,PEEK(101): POKE 44,PE
(101)
110 PRINT "PROGRAMMING COMPLETE -
BASIC MACHINE"
120 END
130 END
140 END -----
***
150 END *
160 END *
170 END *
180 END *
190 END *
200 END *
210 END *
220 END *
230 END *
240 END *
250 END *
260 END *
270 END *
280 END *
290 END *
300 END *
310 END *
320 END *
330 END *
340 END *
350 END *
360 END *
370 END *
380 END *
390 END *
400 END *
410 END *
420 END *
430 END *
440 END *
450 END *
460 END *
470 END *
480 END *
490 END *
500 END *
510 END *
520 END *
530 END *
540 END *
550 END *
560 END *
570 END *
580 END *
590 END *
600 END *
610 END *
620 END *
630 END *
640 END *
650 END *
660 END *
670 END *
680 END *
690 END *
700 END *
710 END *
720 END *
730 END *
740 END *
750 END *
760 END *
770 END *
780 END *
790 END *
800 END *
810 END *
820 END *
830 END *
840 END *
850 END *
860 END *
870 END *
880 END *
890 END *
900 END *
910 END *
920 END *
930 END *
940 END *
950 END *
960 END *
970 END *
980 END *
990 END *
1000 DATA 00,00,00,00,00,00,04,31,
0441
1010 DATA 30,31,34,40,40,40,40,40,
4400
1020 DATA 00,00,00,70,00,10,05,02,
0234
1030 DATA 04,20,00,00,00,00,00,
0234
1040 DATA 00,05,04,00,01,02,70,77,
0777
1050 DATA 03,00,70,01,01,02,30,73,
0201
```



SAVE"SPRITE DEMO"

(For Disk users)
SAVE"SPRITE DEMO"
(For Tape users)

Before running the Demo program you should first load the *SPRITZ* system program.

Sprite-Editor Program

I have already discussed the actual use of the *SPRITZ* Sprite Editor, however you can save a copy of the program as shown below:

SAVE"SPRITE EDITOR"

(For Disk users)
SAVE"SPRITE EDITOR"
(For Tape users)

As with the Demo program, you should first load the *SPRITZ* system before running the Sprite-Editor.

Well there we are. Next time your moony Old-manning friends are getting your Plus/4 computer to ridicule, all you have to do is load *SPRITZ*, run the demo and watch the smile fade from their faces!!!

LISTINGS

2890 DATA 20,22,28,29,38,47,55,9
 S, 2,2890
 2890 DATA 21,29,29,30,33,33,33,3
 S, 2,2891
 2890 DATA 21,28,27,25,32,29,32,9
 S, 2,2892
 2890 DATA 20,22,28,30,33,34,34,9
 S, 2,2893
 2890 DATA 24,24,25,27,29,12,28,2
 S, 2,2894
 2890 DATA 18,28,12,28,14,20,27,9
 S, 2,2895
 2890 DATA 20,21,20,23,25,25,23,1
 S, 2,2896
 2890 DATA 12,23,28,28,24,24,24,9
 S, 2,2897
 2890 DATA 21,18,24,23,24,25,26,2
 S, 2,2898
 2890 DATA 25,21,18,28,23,20,27,9
 S, 2,2899
 2890 DATA 28,23,24,14,24,28,22,4
 S, 2,2900
 2890 DATA 17,22,28,18,22,28,18,5
 S, 2,2901
 2890 DATA 20,24,25,26,23,18,25,2
 S, 2,2902
 2890 DATA 24,24,24,24,24,24,24,2
 S, 2,2903
 2890 DATA 18,24,24,28,29,17,25,2
 S, 2,2904
 2890 DATA 20,25,17,25,21,20,21,2
 S, 2,2905
 2890 DATA 18,25,20,20,20,20,21,2
 S, 2,2906
 2890 DATA 21,20,20,20,20,14,28,2
 S, 2,2907
 2890 DATA 28,11,28,18,20,27,28,2
 S, 2,2908
 2890 DATA 26,11,28,24,28,11,20,2
 S, 2,2909
 2890 DATA 20,20,28,20,20,16,20,2
 S, 2,2910
 2890 DATA 23,23,18,22,24,17,25,2
 S, 2,2911
 2890 DATA 22,22,18,22,20,18,20,2
 S, 2,2912
 2890 DATA 22,22,18,22,20,18,20,2
 S, 2,2913
 2890 DATA 28,20,27,21,28,20,20,2
 S, 2,2914
 2890 DATA 24,24,24,22,24,18,24,4
 S, 2,2915
 2890 DATA 28,24,17,20,20,25,25,1
 S, 2,2916
 2890 DATA 20,21,20,23,18,18,20,2
 S, 2,2917
 2890 DATA 25,20,20,20,20,21,20,2
 S, 2,2918
 2890 DATA 20,20,20,20,20,21,20,2
 S, 2,2919
 2890 DATA 20,20,11,28,20,20,11,9
 S, 2,2920
 2890 DATA 18,25,27,28,20,20,11,2
 S, 2,2921
 2890 DATA 16,25,11,22,24,22,20,2
 S, 2,2922
 2890 DATA 20,23,24,22,28,24,24,2
 S, 2,2923
 2890 DATA 25,27,25,28,29,18,24,2
 S, 2,2924
 2890 DATA 22,22,21,24,24,24,24,2
 S, 2,2925
 2890 DATA 28,20,27,24,24,27,25,9
 S, 2,2926
 2890 DATA 28,20,27,24,24,27,25,9
 S, 2,2927
 2890 DATA 27,25,27,24,24,27,25,9
 S, 2,2928
 2890 DATA 28,20,21,24,24,24,24,2
 S, 2,2929
 2890 DATA 28,20,27,24,24,27,25,9
 S, 2,2930
 2890 DATA 22,22,22,22,22,22,22,2
 S, 2,2931
 2890 DATA 24,20,17,24,12,28,24,8
 S, 2,2932

2890 DATA 20,20,21,21,21,21,21,2
 S, 2,2933
 2890 DATA 23,24,20,24,25,24,24,2
 S, 2,2934
 2890 DATA 23,24,24,24,27,28,27,2
 S, 2,2935
 2890 DATA 20,20,27,27,28,27,28,2
 S, 2,2936
 2890 DATA 20,20,20,18,28,18,28,2
 S, 2,2937
 2890 DATA 20,20,20,20,20,18,28,2
 S, 2,2938
 2890 DATA 25,18,20,21,28,28,22,2
 S, 2,2939
 2890 DATA 18,20,24,24,24,24,24,2
 S, 2,2940
 2890 DATA 20,27,20,21,28,20,22,2
 S, 2,2941
 2890 DATA 18,20,20,28,18,12,28,4
 S, 2,2942
 2890 DATA 17,20,26,18,20,28,28,2
 S, 2,2943
 2890 DATA 27,20,23,24,23,27,20,2
 S, 2,2944
 2890 DATA 24,21,24,24,24,24,24,2
 S, 2,2945
 2890 DATA 24,25,14,20,23,24,24,2
 S, 2,2946
 2890 DATA 18,24,18,20,24,28,28,1
 S, 2,2947
 2890 DATA 22,24,22,24,28,28,28,4
 S, 2,2948
 2890 DATA 27,25,25,25,28,28,2,4
 S, 2,2949
 2890 DATA 17,20,20,20,24,24,28,2
 S, 2,2950
 2890 DATA 24,20,20,20,20,20,28,2
 S, 2,2951
 2890 DATA 28,28,20,17,25,28,28,4
 S, 2,2952
 2890 DATA 20,28,20,18,20,21,24,2
 S, 2,2953
 2890 DATA 27,20,18,12,28,28,28,2
 S, 2,2954
 2890 DATA 20,27,20,18,27,24,24,2
 S, 2,2955
 2890 DATA 20,28,28,24,24,24,18,2
 S, 2,2956
 2890 DATA 20,20,28,22,20,24,18,2
 S, 2,2957
 2890 DATA 20,28,18,20,28,20,2,4
 S, 2,2958
 2890 DATA 12,28,24,24,24,24,24,2
 S, 2,2959
 2890 DATA 18,24,24,24,24,24,24,1
 S, 2,2960
 2890 DATA 20,24,24,20,20,12,28,2
 S, 2,2961
 2890 DATA 21,24,24,28,12,28,28,2
 S, 2,2962
 2890 DATA 23,24,12,28,20,18,14
 S, 2,2963
 2890 DATA 24,24,20,20,17,24,24,2
 S, 2,2964
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2965
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2966
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2967
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2968
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2969
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2970
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2971
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2972
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2973
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2974
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2975
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2976
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2977
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2978
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2979
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2980
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2981
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2982
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2983
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2984
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2985
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2986
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2987
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2988
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2989
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2990
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2991
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2992
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2993
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2994
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2995
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2996
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2997
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2998
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,2999
 2890 DATA 20,21,20,20,24,24,24,2
 S, 2,3000

2890 DATA 23,24,24,24,24,24,24,2
 S, 2,3001
 2890 DATA 20,27,25,25,23,28,24,4
 S, 2,3002
 2890 DATA 21,23,23,28,24,24,24,2
 S, 2,3003
 2890 DATA 24,23,24,24,23,24,24,4
 S, 2,3004
 2890 DATA 24,24,24,24,27,24,27,4
 S, 2,3005
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3006
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3007
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3008
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3009
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3010
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3011
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3012
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3013
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3014
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3015
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3016
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3017
 2890 DATA 24,24,24,24,24,24,24,4
 S, 2,3018
 2890 DATA 24,24,24,24,24,24,24,4
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 2890 DATA 24,24,24,24,24,24,24,4
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 2890 DATA 24,24,24,24,24,24,24,4
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1200 DATA "F1" - OWNER " " "FC
 - OWNER " " "FC
 1400 DATA "F3" - OWNER " " "CLER
 - OWNER " " "CLER
 1410 DATA "C" - COLOUR " " "E
 - EDIT " " "E
 1420 DATA "L" - LOAD " " "E
 - SAVE " " "E
 1430 DATA "ESC" - EXIT " " "E

PROGRAMS WITH IDENTIFICATION

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Contributions

So you own a Commodore? So you've written some programs? So why haven't you sent them to us?

Your Commodore is always on the look out for new programs, films and tips, articles and even regular series. In fact if you have something that you think could be of use to other Commodore owners we want to hear about it.

So if you have got something which you think we may be interested in, how do you go about submitting it to us?

Below you will find a list of guidelines that will help us to deal with any item that you send in to us. We don't expect everybody to be the next William Shakespeare but if you do follow these simple rules then it will make our job a lot easier.

1) If possible all material sent to the magazine should be typed or printed out on a computer printer.

2) All text should be double spaced i.e. there should be a blank line between each line of text. You should also leave a margin of about 10 characters around the text.

3) On the very first page you should put the following:

Name of the article
Machine that it is for
Any extras required - disk, printer etc.
Your name
Your address
Your telephone number

4) The top of every page should have the following information on it:
Abbreviation of the article title
Your name
The page number

For example, suppose you had submitted an article on C64 interrupts. You should put something like the following at the head of the page:

Interrupts/J.Smith/1

5) Please make sure that you do not make any additional marks on your text especially underlining.

6) Try and write in clear concise English. It does not have to be a work of literature but it must be comprehensible.

7) On the bottom of each page you should put the word MORE if there are more pages to the article or ENDS if it is the last page.

8) If possible, enclose a listing of all programs.

9) Under - no circumstances use a staple to hold the pages together. Use a paperclip instead.

10) Programs should be included on either disk or tape. Make sure that you SAVE two copies of every program so that we have a better chance of loading them if problems occur.

11) Programs under 10 lines can be included on the list. If your program is longer than this you must enclose a disk or cassette.

12) If your article needs any artwork then supply clear examples of what is needed. We don't expect you to be an artist but we do need to see what is required.

13) Photographs, if necessary, must be either black and white prints or colour slides. We can take them ourselves so don't worry about this too much.

14) Submissions of any length are welcome. If you have a free line routine that you think may be of use to someone else we welcome it just as much as a full blown six part series.

15) Payment varies quite a lot and depends on quite a number of factors, such as complexity of program, presentation of program, number of magazine pages it takes up etc. Payment is generally between £10.00 and £300.00.

16) All payments are made in the month that the magazine containing your article has appeared in print.

17) If we do find your submission suitable for inclusion in the magazine we will write to you giving the terms of publication, the rate of payment and an agreement form. Prompt return of this form will allow us to use your program as soon as possible.

18) If you want the program returning to you, should we find it unsuitable for publication, then you should enclose a stamped self addressed envelope.

19) The last and most important point to make is 'get writing', we are waiting for your articles.

THE REAL GHOST

I first came across the original (and presumably, in view of this fine, usual Ghostbusters) game years ago at a computer show I was helping out with. These wonderful people on the Activision stand played the theme music from the film non-stop for four days. That, coupled with an unbelievable amount of hype and a mediocre product, left my feelings for the original game at best lukewarm.

Now years later, with the television programme currently proving extremely popular, I was interested to see whether the sequel was going to prove to be a major improvement on its predecessor. Sadly, the game is little more than a glorified shoot-em-up. You must wander round trying to clear an area of assorted ghosts, ghouls and things that go bump in the night. At the end of the levels (there are ten in all, you have to dispose of a bigger, badder baddy who, upon going to that great haunted house in the sky, lets slip a key allowing you access to the next stage of the game).

You can destroy the creatures either by shooting them, or zapping them with your proton beams. This latter method

has the advantage that the ghosts can then be stored in your backpack for a points bonus when you complete the level. The disadvantage, though, is that this weapon only has a limited amount of energy, whereas your gun has a limitless supply of bullets.

The energy for your proton beams can be topped up on one of a number of bonuses that can be collected on your travels. You can also increase your fire power, provide yourself with a protective shield or enlist the services of your friendly neighbourhood slimer. This little critter dashes round your head destroying anything he touches, also offering a form of increased protection.



STBUSTERS

Picking up business is simply a matter of finding and then walking over them. Some are hidden under oil drums, some carried by ghosts. The most useful ones though are behind barriers of spiky things (the graphics aren't clear enough to determine what exactly) that rise and fall out of the ground. Contact with these spikes is fatal, so you have to time your run into the protective ring precisely.

The graphics and sprites are very chunky, and even though there is a large variety of ghosts, my overall impression was that the whole thing looked very dated. Scrolling was reasonably smooth, although there was a fair

amount of screen flickering. The Ghostbusters theme tune has been turned up to include a few new sound effects, but I must confess to preferring the original.

Like the original, *The Real Ghostbusters* is lachrymose. There's nothing here to make you sit up and take notice. It might be worth a second look if you are a fan of the series, but overall, I can't imagine myself rushing back to have another go.

Title: *The Real Ghostbusters* **Supplier:** Activision **Price:** £9.99 (tape), £14.99 (disk)

TIME THIEF

Here is something of a rarity - a text-only adventure! At a time when even the mighty Infocom have reluctantly been forced to include graphics in their games, it's nice to find someone who still believes that a picture is not necessarily worth a thousand words, and that the powers of imagination still count for something.

The wizard Kodrigorn has invented a system of time short travel. Rather than wasting away when you're old, you can trade some of that time for a decent holiday now. Unfortunately, the vagaries of the system mean that you can't use up your own years, but somebody else's. But if, while using their time, you let them use up yours, an amicable

settlement can be reached and everybody ends up with what they want.

That, at least, is the theory. But Kodrigorn refused to license his invention, and made himself many enemies who wanted a share of the action. Now he has a problem, as somebody has managed to penetrate the system and steal some time from the customers so that they are returning old, withered, even dead.

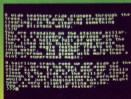
In an attempt to sort out the problem and save himself from financial ruin, the wizard sent his assistant Lucasta to investigate, but she has now disappeared and so it is up to you - her twin - to see if you can sort things out.

The game loads in two sections, and there is plenty for you to get your teeth into. Location descriptions are both long and atmospheric, and you'll have to read everything very carefully in order to glean the appropriate clues. There is a nice touch of whimsical humour running through the story too. The problems and puzzles, together with the storyline, show a considerable amount of imagination and invention is what has all too often been reduced to a hackneyed art form. The game is perfectly adequate, and I found no problems with the vocabulary either.

Time Thief is on disk only and at only five pounds, represents excellent value for money. The game is only available through mail order, address below.

Timeline:

Title: *Time Thief* **Supplier:** Big Sky Software, 15 Old Easton Road, Dingswood, Newcastle (VIC) **Price:** £5.00 (disk)



Amiga Workbench

Since its appearance on the market some four years ago the Amiga has gone from strength to strength. Today it is one of the most powerful and versatile home computers available. And yet, recently it has actually gone down in price. So, the band of Amiga owners is growing all the time.

I always maintain that a computer is as good as what you make of it. This is especially true for computers. Nobody has any queries about what to do with a television set or a video recorder or a hi-fi. Once you've bought it, you just get it out of its box, plug it in, press the ON-button, and Bob's Your Uncle.

Computers are very different from that. When you start a computer it does very little at first. All you've got is a clever box of electronic bits and pieces.

This is true even for a machine as powerful as the Amiga. Its real might is hidden underneath the surface, only unleashed by good software and by your own enthusiasm to get to know the machine and make use of its own capabilities.

Sure, when you switch on the Amiga, the first thing you are greeted by is Workbench. And that's a whole lot more than what you get from most other computers at start-up, especially the 8-bit machines we all grew up with, like the Commodore 64, the Sinclair Spectrum and the Acorn BBC machines. I don't know if some of you still remember the ancient days of computers when all you were greeted with at start-up was a flashing cursor of some kind.

Amazing how far things have come since!

But, Workbench too is merely an environment in which to make things happen on the Amiga. It's not the main event itself.

Workbench is basically an applications program that allows you to run other programs and do some disk operations, like disk copy, disk formatting and so on. All the facilities of Workbench are made possible by an important part of the Amiga operating system, called Intuition.

Whenever you resize a window, pull down a menu, click the gadget on the left hand side of a window which makes the window vanish, it's Intu-

By Burghard-Henry Lehmann

view, not Workbench, that makes it all happen.

Attention is a programmer's delight because it puts all the sophisticated facilities of the Amiga right at his fingertips. The programmer does not have to draw lines to form the borders of a window, nor does he have to construct pull-down menus or complicated gadgets. Attention does it all for him, and informs him whenever something really important has happened.

When you first try to find out more about the Amiga, and especially how to program it, the task seems quite daunting. This isn't helped by the literature which is supposed to help you, like the massive Amiga manuals published by Addison Wesley. You wonder what kind of computer genius it takes to understand the workings of the Amiga, let alone, to be able to program it.

But since you've overcome this initial barrier and get some insight into the Amiga, you'll discover to your surprise that the Amiga is in fact one of the easiest machines to program!

Yes, that's true! Never mind, if you program in Basic or in C or even in machine code, the Amiga puts all its capabilities more readily at the disposal of the programmer than any other machine! Before you know it, your program will have windows and pull-down menus, gadgets and requests and will run comfortably in the multitasking environment of the Amiga together with other programs.

To help you on your way to discovering the workings of the Amiga and how to unleash its power for your own purposes and desires, Four Commodore is starting this new monthly column.

My main aim in this column is to discuss all aspects of Amiga computing with special emphasis on programming the Amiga.

For this I'd like to hear from you! What are your main interests in Amiga computing? What persuaded you to buy an Amiga in the first place? What do you find most difficult and confusing about the Amiga?

In short, send me your opinions, your queries, your suggestions.

But let's start the ball rolling by having a closer look at Workbench 1.3 which most of you will have by now.

If you compare Workbench 1.3 with its predecessor Workbench 1.2 there seems very little difference. The main advantage with Workbench 1.3 is that it runs a bit quicker because of new facilities like fast text and fast filing.

You are also able to rename the Ram disk, something you couldn't do on Workbench 1.2 because there was a bug.

The main advantage with Workbench 1.3 does not lie with Workbench at all, but with CLI. The new shell window makes the real difference to Workbench 1.3.

As far as commands are concerned Shell is very much like CLI, except for two new commands. Its main advantage lies in the vastly improved editing facilities, which has to be a big improvement, because the old CLI didn't have any editing facilities at all - except backspace.

Shell acts more like a screen editor than a line editor. Unlike the CLI it's got a history. That is, you can see the cursor up and down keys to recall commands you have typed in before. This makes it possible to edit a wrong command you've given instead of having to type it all in from scratch again.

You can also use cursor left and right to correct anything you've typed in wrongly or add something you've forgotten.

Then the Shell has got two new commands which are extremely useful: *alias* and *Resident*.

Alias allows you to design your own commands. For example, I have made up for my purposes some aliases to give me the directory of the disk in drive 0 and 1. "d0" gives me the directory of the disk in drive 0, while "d1" gives me the directory of the disk in drive 1. Furthermore, "d2" gives me the directory of the disk in drive 1 with option 1, while "d3" gives me the same for drive 1.

With the *Alias* command you can use square bracket to signify a filename or variable which can then be given together with the *Alias*. For example:

alias d0 dir d0[]

gives you, if used by itself, a printout

of the directory in drive 0 (which is of course the default drive), if you enter "d0 My Directory" you get a printout of "My Directory" on the disk in drive 0.

The other new command the Shell has is *Resident*.

This makes a command behave works as if you had copied a CLI command into the RAM disk so that it executed quicker and without the Workbench disk in the drive.

Resident also works for programs. But there is the restriction that resident only works for CLI commands and programs that are re-entrant and re-executable, meaning programs that can be used by several processes at the same time in the Amiga multitasking environment. This is not as restrictive as it seems since most programs can be made resident quite happily with the "resident pure" option, even if at first it refuses to make that program resident. All you have to do is experiment a bit with the program to make sure that the machine won't play up.

Finally, the Shell has a startup script, called "Shell-startup". You can find it in the s-directory of the Workbench disk.

In the Shell startup script you can enter all your favourite aliases so that they will be automatically initialized every time you start a new shell process.

This seems to me to be the main advantage with Workbench 1.3. Workbench 1.3 has a much larger startup-structure than Workbench 1.2 and even uses a sub-script, called StartupH. All this enables you to set up your own Amiga work environment as it suits you.

To finish off, let me know about any good scripts you've written lately.

Info

Send your queries, hints and general Amiga comments to:

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Software for Sale

If you think that one of our programs looks very interesting, but you can't afford the time to type it in, then our software service will help you out

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Everyone has probably faced this problem. When it does happen it's a matter of spending hours searching through the program for any typing mistakes. No matter how long you look or how many people help you, you can usually guarantee that at least one little bug slips through unnoticed.

The Your Commodore Software Service makes available all of the programs from each issue on both cassette and disk at a price of £5.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts, HP4 1HL.
Tel: (04427) 7666

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use Base Loaders that making use of the programs much easier. Unfortunately at the moment we cannot duplicate C16 and Plus/4 cassettes. However programs for these machines will be available on the disk.

What programs are available?

At the top of each article you will find a strap containing the article type, C64 Program etc. So that you can see which programs are available on which format, you will also find a couple of symbols after this strap. The symbols have the following meaning:



This symbol means that the program is available on cassette.



These programs are available on disk.

Please Note

Since the programs supplied on cassette are total working versions of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.

JANUARY 1989

PREFAB SPRITES - A powerful sprite editor for the C64.

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Readers Problems

Though the Commodore bit is one of the world's most popular microcomputers, it can be very difficult to find specific information about your particular machine.

At the Four Commodore office we receive literally hundreds of letters from you, our readers, on a wide range of subjects ranging from the simple 'Can you give me the telephone number for...?' to the most complex 'I'm trying to write a program that uses a split screen. How do I do it?'

Unfortunately, the volume of mail received has become so great that it is impossible to answer every letter and still manage to publish a magazine each month.

For this reason we have felt it necessary to produce a number of guidelines for getting information from us:

1) We cannot guarantee to answer every letter sent to the magazine. Should it become apparent that a number of readers are suffering from the same problem, then we will reply to the letter via the Letters page.

2) A new helpline has been set up. This will be open for your queries on

Tuesday and Thursday afternoons between 2.00pm and 4.00pm. We will not be able to deal with our telephone queries at any other time. If our technical adviser is not available when you ring, then a message will be taken.

If you are having problems with one of our listings, can you please let us know in writing. This will enable us to see if a number of people are having the same problem. When a common problem becomes apparent with a program, then a correction sheet will be issued. Enclose a self-addressed, stamped envelope and we will send you a copy of the correction sheet as soon as it is available.

We are sorry that it has become necessary to institute these rules. However, we are sure that you will agree with us that the more time that we can spend making Your Commodore the most informative magazine around, the better.

For program queries write to:
Program Corrections
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Boundary Way,
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Bug Finder

We'd like to remind our readers that we run a Bug Finder service.

If you have typed in one of our programs and despite much checking, you still can't get it to run, then send us the following:
Two copies of your program on tape or disk.

A description of your problem.
If possible a listing of your work (you may omit this).

A stamped, self-addressed envelope for return of the program to you.

Should any of the above be missing then we will not be able to deal with your query.

We will try to point out where you have made errors and place a corrected copy of the program back on to your tape or disk before we return it to you.

Do not send a program to us as soon as it stops working, please check it several times first.

We do get a large number of queries and so it may take a while for us to deal with yours personally.

Notes we can only deal with problems relating to programs published in Your Commodore.

The Nibbles



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