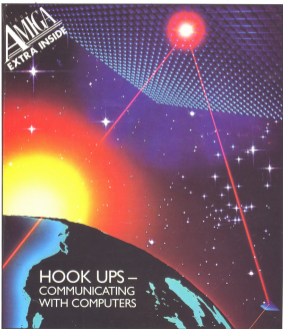


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DATA STATEMENTS

Advertising

Players of the classic adventure game *Ultima IV*, will be thrilled to know that Microprose and Origin Systems has brought the original *Ultima I* from America for the first time and it will be available on the C64.

Ultima I features the evil wizard Mordin who sends demonic minions to ravage the land of Britannia. The champion must overcome all odds to defeat the wizard and deliver the land from its misery.

From the same stable comes *Ultima IV*, the long-awaited sequel to *Ultima III*. The game was previously handled by US Gold. The version being released by Microprose is for the Amiga computer.

Prince is a big new release also from Microprose, and it's a warbucking simulation.



The player explores the bacchanal em and becomes a 17th century privateer plundering ships and ports in the Caribbean.

Action is set in exotic ports, taverns, mansions and, of course, on the open seas.

The player must sail the reef-infested waters in constantly changing weather conditions. You also need to master the skills necessary to control a variety of ships such as barges, sloops, frigates and galleons.

It is available on C64 disk priced at £29.95 and on cassette at £14.95.

Inform has released a new interactive horror story entitled *The*

Larking Horror, in which you explore the world that is peopled by all your worst nightmares.

On a blizzard-filled night you are working in your office at the George Underwood-Edwards Institute of Technology. You have forgotten the notes you had heard about the ancient relics in the dusty basements. You awaken from a dream and find yourself being dragged downwards in a strange sound seems to get closer...

The Larking Horror was written by

Dave Lobbing, the package includes a copy of *G.I.E. At a Glance* and a student ID card.

The game is run on the C64 on disk priced £24.99 and for the Amiga at £29.99.

Finalist:

Microprose/Origin: 2 Market Place, Tetbury, Gloucestershire GL8 8DA, Tel: 0668 34224.

Inform/Revolution: 23 Pond Street, London NW3 2PN, Tel: 01-431 1881.

New Version of 128



Commodore has unveiled a new version of the 128, the Commodore 128D desktop computer.

It is based around the proven technology of the 288A for CP/M software and 8502 for C64 and 128 series software.

The C128D desktop is designed for business applications and comes with an integral 5 $\frac{1}{4}$ " disk drive with a capacity of up to 340K and 128K RAM. 128K and 512K RAM expansion packs are available to bring

the total storage capacity up to 256K or 640K.

The price of the new C128D is £267.95 with the 128K RAM pack at £99 and the 512K RAM pack at £149. The mouse is £34.95 and all prices exclude VAT.

Finalist:

Commodore (UK): Commodore House, The Switchback, Garsdale Road, Middlesbrough, Tees Valley, Te: (0632) 770888.

D A T A S T A T E M E N T S

In the Arcades

Ocean Software has brought *Slap Fight*, Taito's latest coin-op success, to the small screen for the C64, price £9.95 cassette and £12.95 disk.

The player must manoeuvre a *Slap Fight* spaceship over the scrolling landscape of the planet Ocas. Eight different icon selected facilities are available including speed, weapon systems and fire power shields and bonuses.

Fast action is needed and as the game gets harder, stamina is all important.

Logotron's highly successful BBC game *Not* is now available for the C64.

The game features 15 levels of mazes which can all be solved logically. As experience is gained the player realises that strategy and logic are the important qualities for success.

The cassette version is £9.95 and the disk version is £12.95.

Touchline:

Ocean: Ocean House, 4 Central Street, Manchester M2 3NS. Tel: 061-432 6633.
Logotron: Dale's Brewery, Dalegate Street, Cambridge CB2 2LJ. Tel: 0223 329476.

**OOOPS!**

We would like to point out a technical inaccuracy in the *Metacross* review in our August 1987 issue. The game legend of Kage was incorrectly quoted as being published by US Gold. The game is actually published by Imagine Software.

We would also like to take this opportunity to point out that the opinions expressed in our reviews are the opinions of the reviewers themselves and not necessarily those of the magazine.

**Demark: Living Dangerously**

Demark, the company which brought *Caroline* and *Travis' Paradise* to C64 users, has announced the launch of its second James Bond game - *The Living Daylights*. The release of the game coincided with the premier of the new Bond movie of the same name which stars Timothy Dalton as Bond for the first time.

The game closely follows the plot of the film. Bond, has recently returned from Gibraltar and promptly gets sent to Bratislava to mastermind the defection of a KGB general.

Of course, the scenario becomes rather complicated especially with the

entrance of the beautiful Kara who eventually ends up a prisoner of the badies along with Bond himself.

Dominic Wheatley and Mark Strachan, ever willing to enter into the spirit of the occasion, dressed to-kill in Bond dinner jackets when they went to Pinewood Studios.

The Living Daylights is now available from Demark on the C64/128.

Touchline:

Demark: Demark House, 27 Marlfield Road, Wembley, London SW18 3TA. Tel: 01-967 3622.

Epic News

US Gold has announced four major new releases from Epyx. Three are two utilities and two games in the new collection.

Calendar is a versatile personal publishing tool designed to create specialized calendars for schools or businesses.

Calendars can be customized with a wide variety of text, graphics and borders for occasions as diverse as birthdays and dental appointments.

Users can print daily, weekly or annual calendars and include a list of events to be filled in.

Print Magic is a utility package designed to help create cards, certificates, flyers, stationery and banners. It gives the user freedom and speed and a wide choice of spectacular artwork. Graphics can be enlarged or shrunk and flipped and rotated to the user's specifications. There is a choice of fonts and the option to create new ones.

In the games department Epyx has released two fun-moving sports titles: **California Games** and **Street Sports Baseball** (the first in a series of Street Sports titles).

California Games brings the fun and glamour of the West Coast outdoor life to your screen. In Hollywood you can go sky boarding, or roller skate on Venice beach. The waves of Santa Cruz are the setting for the surfing competition and there's Discob throwing in Yosemite Park, plus BMX trials and 'hanky sack' competitions in other famous locations.

Street Baseball allows the player to master America's favourite sport on the streets, where many a star first had a stab at it.

There are 16 neighbourhood kids who all have different skills in pitching, batting and fielding. If you pick the right combination of players you could be in for a worthy rivalry with your team - The 32nd Street Hall of Famers.

Touchline

Epyx US Gold, Units 2 & J Medford/Way, Medford, Devonshire St S&C, Tel 021-756 2488.

Utility File

System Software has released **Rem-Disk**, described as 'the greatest alternative to a floppy disk at a fraction of the cost'.

Rem-Disk provides exactly the same commands as a Commodore disk drive: DIRECTORY, LOAD, SAVE, VERIFY, OPEN, CLOSE, COPY, RENAME and many others.

Rem-Disk is loaded into the C64 and for the user there has access to a 'soft disk drive' without losing memory from Basic. It's available on tape only, price £9.95.

There is a version of **Rem-Disk** on disk for the C64 and this speeds up the disk drive and its commands and still leaves all Basic free. It costs £14.95.

In the States, British-made utility software is doing well against home grown rivals. Precision Software's **Superbase Personal** for the C64 carried off the Software Showcase Productivity Award at the Consumer Electronics Show in Chicago, this summer. This is the second time Precision has won the award - **Superbase 64** was the taker in 1984.

Advanced memory Systems has also announced a major deal for its **AMX Mouse** and **Snap Press** desktop publishing package. AMS director Nick Pearson said: "We have sold this product to Electronic Arts, who are confident of achieving the same high level of sales in America as we have with similar packages in Britain and Europe."

The **AMX Mouse** and **Snap Press** sold at £89.99. **Snap Press** itself costs £39.99.

Touchline

System Software: 168 Worcester Place, Oxford OX1 2JF, Tel: 0852 54181.

AMS: BCC PR, Old Ash House, Old Market Place, Abingdon, Oxshire OX14 4DL, Tel: 0823 435031.

Precision: 4 Park Terrace, Worcester Park, Surrey KT7 5SE, Tel: 81-530 7766.



The AMS Mouse and Snap Press desktop publishing package for the Commodore 64 and 128.

D A T A S T A T E M E N T S

Print Quality

Precision Software has announced the launch of a high speed, low cost, dot matrix printer, the Precision 4000.

The price is £399 plus VAT or it can be bought packaged with either Precision's Superfont Personal, a GEM or a mouse or with Wordperfect Executive. Both packages cost £468.

The printer comes at speed, 352 lines per minute draft and 35.8 lines per minutes NLQ, to its four pin head.

The Precision 4000 is the first

hardware based product from the company and will be handled by Precision Distribution. Richard Binley, divisional director for distribution said: "We intend to launch a series of Precision-budget lines to expand our already comprehensive product list."

Staying in the printer market, York Electronic Research (YER) has launched an RS232 printer/modem interface for the C64. The package comes with a cable, 4000 word manual

and a disk or tape of utility software including a terminal emulator. The manual describes the hardware, the RS232 standard and contains a step by step trouble shooting guide. The whole package costs £29.99.

YER has also released an editor/assembler for the C64 on tape or disk which eliminates the frustrations of the edit/assemble/test cycle. It costs £12.99 and can assemble up to 38K in one operation.

Timeline

Precision: 6 Post Terrace, Wincoburn Park, Jersey AZ4 5AZ. Tel: 01-530 7568.

York Electronic Research: The Aldergate Centre, 4 Aldergate, York. YO1 1AB. Tel: 0904 519722.



In the Future

A new game from Mantic, set in the year 2032, is based on a spy and laser satellite network. The game is called *The Stratagolite Man* and the player must control the spy satellite network from the Satellite Olympus. There are now 16 superpowers and the balance of power must be maintained between all of them. This is the task of the *Stratagolite Man*.

The package comes complete with a colour vinyl map of the world and vinyl re-usable flags of each nation, with which you can plot changes in alliances between the powers.

The cassette version costs £12.95 and the disk version is £14.95 (C64).

The first major new release from the Microprose/Digital joint venture is entitled *Armed*. It is a fantastic, fast pace strategy roleplaying game based on the American board game *Car Wars*. It is now available for the C64 on disk only.

Star Force is a new title from Software Projects for the C64/128 and it stars Captain Ross Parverson. The game comes at only £5.95 on cassette and £10.95 on disk.

Timeline

Mantic: Mantic House, Bay Terrace, Princesway Bay, East Sussex BN24 6EE.

Pocket Prices

Budget software house Code Masters has released three new C64 titles, all at £1.99.

In *Lazer-Are*, there are 30 main levels and two bonus stages. In the first section of the game a scrolling landscape of erupting volcanoes must be negotiated. And in later levels the landscapes eventually mutate.

Also for the C64 are *Super Action Hero* and *Thunderbolt*.

Pocket money firm, The Power House has released a budget compilation for the C64. The tape features eight different games and is priced at £9.99. Included in the compilation are *Gold and Silver*, *Tomatoes*, *Aftersnack*, *Actors of the Space Warrior*, *Pyrrhic*, *Exp. Snow Ranger* and *Gun Hammer*.

There is also a C64 utility tape for £9.99 featuring the two programmes *Helios* and *Shuttle*.

Timeline

Code Masters: 1 Monument Business Centre, Beaumont Chase, Banbury, Oxon.

The Power House: 264 Weyple Road, London SW20 8PA. Tel: 01-879 7366.

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IQ

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COLOSSUS BRIDGE - An Expert Talks

Another bridge program and something of a difference in the review. The game comes packaged with a book — *Begin Bridge* by G.C.H. Fax, one of the country's leading bridge teachers. It seemed appropriate therefore to look at the package from two points of view; that of the experienced player and also from someone who is just learning how to play the game.



The game comes in two parts. There is a mini-tutorial of ten example hands designed to illustrate various aspects of playing bridge. The trouble with these is that they are poorly chosen and are not really suitable for beginners. The on-screen analysis looks messy; layout could have been improved (00%) and the odd spelling mistake and bug that crashes the program doesn't help matters either.

The main program is the one that lets you get down to actually playing some hands. You always play the south hand unless south happens to be dummy, in which case you play north. There are a whole host of features available to you which include rebidding or replaying a hand, having

cards recommended to you and inputting your own hands. On-screen presentation is reasonable although a joystick option would have been nice — moving the cursor over the desired card or bid.

All these options are cosmetic though and my non-beginner is going to want to know how well the game plays. The answer is not very well I'm afraid, either in bidding or card play. This is nothing particular to Colossus Bridge, but to all bridge programmes so far released. Bridge, unlike chess, does not lend itself to computer analysis.

Is the program worth buying then? A guarded yes if you are constantly short of people to play with. Don't expect it to do wonders for your game though. Now let's hear what Your Commodore's resident beginner made of it all. G.H.

COLOSSUS BRIDGE - The Beginner's Tale

I was quite pleased to see that a Bridge program had turned up in Your Commodore's office. I've only just started learning the game in the past month or so, can't play for tiffin, and a computerised tutorial is just what I need.

Unlike chess, bridge is a pre-eminently social affair — you need four for a game and it helps to be on speaking terms with your partner. A computerised opponent avoids all the embarrassment of playing with people vastly better than you, and human players won't let you bow out gracefully before the end.

Sadly, my hopes were mostly to be dashed. I'd much rather spend my time with a book than try to hack through Colossus's Bridge Tutorial. I feel that the analysis screens could be useful, being written by various experienced players, but they're almost unreadable, and the program only provides ten specimen games anyway, so it's hardly worth even starting. As for the game screen, the best said the better.

The actual Bridge playing part of the program looks even

tacker, but this has a lot more going for it. I don't see how it could interest a good player, but for someone like myself, who is struggling to make obvious tricks, it's a challenge at times. It can't be too clear though, because I can beat it most of the time. I also like the range of options the game offers, such as exploring the land, playing it open or playing only hands with a "balanced shape".

There isn't much excuse for the primitive look of this program, as much as I felt I learnt the odd thing or two, if only how to score, so it can't be all bad.

F.P.

Franklin:

Name: Colosseum Bridge. Supplier: CDS Software. Pub: 0002 21104. Machine: C64. Price: £11.99 (incl. VAT). Size: 1.0MB. Originality: 5/10. Playability: 5/10. Graphics: 1/10. Value: 1/10.

THE THREE MUSKETEERS

The Three Musketeers is the first in a planned series of computer novels from the Swedish software company with the somewhat curious name of American Action.

The format of the game is that of a multiple choice graphic adventure, and as such, should appeal mostly to younger players.

You play the part of D'Artagnan, the fourth musketeer and you're entrusted with carrying out a secret mission for the Queen involving the theft of some diamonds. Behind the plot is the evil Cardinal Richelieu who wants to expose the Queen's love affair with the Duke of Buckingham.

The story starts in the streets of Paris where you must find three erstwhile colleagues, Porthos, Athos and Aramis and persuade them that there are more important things in life than wine, women and song. You must also secure passes to let the three of you out of the city gates before heading off towards England.



Movement in the game is controlled via the few direction keys. Onscreen prompts inform you if there is more text to be read or a choice to be made. Most of the time, the correct option is fairly easy to guess but even if you get it wrong, the first section is small enough for you to try all the available options without taking too much time over it. You are allowed one BAmove per section but annoyingly, there is no permanent save facility so that if you make a mistake in the later sections, the whole game has to be started from scratch.

Onscreen presentation is good with some attractive illustrations and a redefined character set. My own feeling though is that there is not enough meat in this game to keep seasoned adventurers happy for very long.

G.R.H.

Name: The Three Musketeers. Supplier: American Action (UK supplier not known). Machine: C64 - disk only. Price: £11. Originality: 5/10. Playability: 5/10. Graphics: 5/10. Value: 5/10.

FRANKENSTEIN

CRI is rapidly becoming the Hammer Horror of the software world. After sinking our teeth into Brian Stoker's Dracula, we are now invited to sample the Mary Shelley monster hit, Frankenstein.

Swig away the gory digitised graphics and what have we got? A trio of short adventures based on the book. In the first two parts you assume the role of Frankenstein in his search for the monster. Starting at your father's house you progress through to the meeting with the old blind man and the showdown with the monster. Part three is the monster's tale.



The parser leaves a little to be desired, giving weird responses to some of the requested actions. For example, I discovered a picture of Frankenstein's parents and suggested that it should be read. The computer claimed to have done this but when I checked the inventory, the picture was still there.

The response time is a little slow too and because the input buffer appears to be one character long, there is no opportunity to type ahead through locations you have visited before.

Dying happens too often for my liking. Like some of the Level 9 adventures, the sands of time are running out from the beginning of the game. You only have a few minutes to vacate the bedrooms in your father's house before the roof comes crashing down as a storm. When you do get out, you find yourself trapped in the living room with no obvious way out. The solution is not obvious and eventually I ran out of things to examine. In despair I sat down and panned for thought. Immediately Frankenstein's father entered, opened the door and disappeared back to his room.

After this you have to negotiate that much loved invention of adventure writers — the maze. With a bear but on your trail it takes several deaths before you find your way through.

As you can see, this is not an easy adventure to get on with. The only way to progress is to save the game regularly and be prepared for anything.

The graphics are bordering on video nasty level. I'm surprised that CRL got away with a 15-and-over age limit and not a maximum 18 certificate. Severed heads, blood and guts litter the screen for disk users.

As a sequel to *Dryack*, this game lacks the atmosphere of evil and is more sick than successful in achieving its aim to entertain.

C.B.

Reviewer:

Name: *Frankenstein* **Supplier:** CRL **Tel:** 01-531 2678

Machine: C64 **Price:** £8.95 **Originality:** 3/10 **Playability:** 3/10 **Graphics:** 5/10 **Value:** 5/10

**TREASURE ISLAND**

Ten years after the original trip to Treasure Island you're on your way back with Long John Silver as a partner! This seemed like a good idea when he told you that he'd found out that the bulk of Flint's treasure was still buried there! Now you're not so sure, after all that's happened, can you trust him?

As the game unfolds you realise that it wasn't a good idea at all as your main objective must be to survive and that isn't going to be easy. Unlike other adventures in Treasure Island, Jim Hawkins (that's you) must eat and drink regularly otherwise you'll run out of energy and die leaving all the booty to Long John Silver. If that wasn't enough you're limited to what you can carry and must type in either RUN, WALK, WADE or SWIM to move anywhere.

The daff thing is that if you happen to walk into water you float around and climb out exactly where you don't want to be but if you make you're OK. Why can't you walk or run and then automatically wade if you hit water and swim if it's too deep? It might actually make the game playable.

All this doesn't help a game that's desperately slow to play, as each location is represented by painfully slow graphics while the game clock ticks away at one hour, every four minutes.

T.H.

Reviewer:

Name: *Treasure Island* **Supplier:** Microscopic **Tel:** 09-377

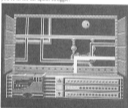
0488 **Machine:** C64 **Price:** £7.99 **Originality:** 3/10

Playability: 3/10 **Graphics:** 3/10 **Value:** 3/10

MASTERSCAN

After being on the wrong side in a deep-space skirmish the *Masterscan* is wrecked and is drifting slowly towards the nearest star. Your job as a small service robot is to repair the ship's systems and save yourself and the ship from a fiery destruction.

M.S.B. (that's you) has also been damaged and since your only remaining program is how to repair masters you're in for an uphill struggle.



The game is in fact an adventure without any text and features logic problems that must be solved using a joystick. For example, the generator is down because a fuel pipe is broken which you must locate and replace with a spare pipe from the stores (once you've found them) but you must hurry as the back-up batteries that are working now are running out. Once you've done that you have to fix the engine. Dip on the right combination of switches to turn on the scanner and finally start the ship to safety.

I found the game was hard enough without the uncontrolled movement of the M.S.B. slowing down the action as it bumbles around the ship which flips screens at an alarming rate that's guaranteed to distract anyone. This is a shame as there's a good game trying to get out.

Reviewer:

Title: *Masterscan* **Supplier:** Microscopic **Tel:** 09-377

0488 **Machine:** C64 **Price:** £7.99 **Originality:** 6/10

Playability: 4/10 **Graphics:** 5/10 **Value:** 6/10

Win an Excelerator

+



An Excelerator + and 10 slimline 64 cases are up for grabs in this month's competition.

For this month's competition we have teamed up with Evoxham online to offer a bundle of superb prizes.

An Excelerator + is up for grabs as the first prize and 10 runners up will each receive one of Evoxham's superb new cases for the C64, Slimline 64.

Just in case you haven't come across the Excelerator + before it offers complete compatibility with Commodore 1541 discs while being much smaller and slightly faster than its Commodore counterpart. For more information see the review in the June '87 issue of *Your Commodore*.

How to Enter

Study the two cartoons, there are a number of differences between them. Once you have decided how many differences there are complete the entry coupon and send it to the editorial address (see below). Please write the number of differences that you have found on the back of the envelope. If you don't then your entry will not be accepted.

Who Rules

Entries will not be accepted from employees of Argus Specialist Publications and Eastern Mirror. This restriction also applies to employees' families and agents of the companies.

The How to Enter section forms part of the rules. The Editor's decision is final and no correspondence will be entered into.



For more information on this competition, see page 50.

No KCPUG gathering

On Saturday evening, after the show closed, KCPUG had a little get-together in the Commodore theatre, for members and invited guests, a good time was had by all, and the free food and drink was appreciated. It was interesting talking to the folks from Commodore, who were very forthcoming, breaking what could be the start of a new era in liaison and co-operation between us.

For KCPUG, at least, it was a successful show... We had lots of new

members, microprocessors and modems, with a scattering of video stuff thrown in. I also run my own publishing company, with products currently for the 128 and Amiga. I have also written two books, one on the 64 and one on the 128.

That's me in a nutshell. Next month will be something interesting.

See you on the bit stream.

For more information on KCPUG contact:

Jack R. Cohen
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10 years after the night that you were on your way back with Long John Silver as a partner! This seemed like a good idea when he told you that he'd found out that the bulk of Flint's treasure was still buried there! Now you're not so sure, after all that's happened, can you trust him?

As the game unfolds you realise that it wasn't a good idea at all as your main objective must be to survive and that isn't going to be easy. Unlike other adventures in Treasure Island, Jim Hawkins (that's your name) can't eat and drink regularly otherwise you'll run out of energy and die leaving all the booty to Long John Silver. If that wasn't enough you're limited to what you can carry and must type in either RUN, WALK, WADE or SWIM to move anywhere.

The catch thing is that if you happen to walk into water you founder around and don't eat exactly where you don't want to be but if you wade you're OK. Why can't you walk or run and then automatically wade if you hit water and swim if it's too deep? It might actually make the game playable.

The ICPUG Column

The second column in a regular series of ICPUG - Britain's biggest independent Commodore user group. This month - Jim Butterfield is in town!

By Tim Arnot

Jim Butterfield is probably the most respected man anywhere in Commodore circles. ICPUG invited him over from Canada for the Commodore show last month, and put him to work, testing some of our 60 odd regional groups. This time around he managed to visit the groups at Basingstoke, Solent, Leicester and the South East.

The main reason for Jim's visit was, of course, the Commodore Show, and he was to be found on our stand among other places, answering questions and talking to visitors. We also held 'questions and answer' seminars in the show theatre, where Jim held a central position among our panel of 'experts'.

ICPUG had a double-sized stand at the show, on the lower level, sandwiched between the noisy bit and the cheap diskette rammer (5.25" were going for 25p each, and 3.5" for 75p each). The exhibitors on the two stands opposite us didn't turn up, so it didn't take long for us to fill the extra space!

My personal opinion of the show was not one of new innovative products. I only found three products that grabbed me, but the show was well-attended, showing the lack of faith of some exhibitors to be completely unshaken. The Amiga in all its guises played a very prominent part, reducing the 64 very much to a supporting role. I believe this is a sign of things to come (after a little price

adjustment), and old-timers who remember this event as being the 'PET show', will soon refer to it as the 'Amiga show'.

OK, my three top products: Edisoft have a new 3.5" external Amiga drive for only 199 + VAT - extremely small and very neat. One or two people had a Mitsubishi colour printer for 65,000 - more colours than you care to imagine on A3 paper, and there's a cheap model at only four grand! Wordperfect was the software product that caught my eye. It does footnotes, tables of contents, indexing, paragraph numbering, macros, has a thesaurus and 115,000 word dictionary, etc. etc. As I am both a writer and publisher, I could really use this product. Review copy anyone!

An ICPUG gathering

On Saturday evening, after the show closed, ICPUG had a hunkie party together in the Commodore theatre, for members and invited guests, a good time was had by all, and the free food and drink was appreciated. It was interesting talking to the folks from Commodore, who were very forthcoming, breaking what could be the start of a new era in liaison and co-operation between us.

For ICPUG, at least, it was a successful show. We had lots of new

members, and lots of good publicity. Anybody who joined the group at the show received a free ICPUG pen (wow!). We are now looking forward to the PCW show in September.

For your information...

Last month I said that I would explain who I am and what I'm doing writing this. OK, I have two jobs within ICPUG. One is as the PCCompatible library organiser (for the Commodore PC and other clones), the other is as editor of the ICPUG area on CompuServe. In real life, I am trained as an electronics engineer, specialising in industrial microprocessors and mechatronics, with a smattering of video stuff thrown in. I also run my own publishing company, with products currently for the 128 and Amiga. I have also written two books, one on the 64 and one on the 128.

That's me in a nutshell. Next month will be something interesting.

See you on the bit stream.

For more information on ICPUG contact:

Jack B. Cohen
Membership Secretary,
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One year's subscription to ICPUG: £18.

Load-It

Tony Hetherington takes you through a new package which will hopefully put an end to frustrating loading problems.

Picture the scene. You've just arrived home with the latest mega game and you rush to your computer to try it, but it doesn't LOAD. You try it on a friend's recorder and it works! Try it on your own again and it still won't work. Feeling disgruntled, you return it to a shop to be supplied with a replacement that seems to have the same 'bug'. What can you do? You've wasted hours and you still can't play the game. Buying a disk drive is one answer but Soltek's latest 'Load-It' have a cheaper solution.

When a computer program is recorded on a tape it is stored in a thin band on a relatively wide tape. Your cassette then tries to read it but if the tape has run slightly out of line during recording, your tape head will miss the data track. The same will also happen if the tape is recorded properly but the cassette's head is out of alignment. If this is happening, then chances are you won't be able to LOAD anything.

The Solution

The answer is simply to adjust the head alignment screw that's just above the REMIND key on the cassette. LOAD-IT appreciate that only a few people will have the confidence to do this and risk messing up the alignment that works for all their other tapes. To get around this problem and make the whole process of head alignment a lot easier, a modification package has been produced that includes a knob that when fitted, can turn the head up to 180 degrees and a piezo electric speaker so that you can hear the tape head and adjust the knob to get the clearest signal.

Package to Suit You

The package comes in two formats and at two different prices. For £685 you get a kit with short but clear instructions explaining how to fit the knob in place of the existing alignment screw. Solder the speaker's two connections and cut a small slot in the cassette one so that the knob can move when the PLAY button is pressed and finally add a small calibrated scale so you can note down the setting that



works for each tape. If you don't think you could manage this you can send off your cassette and LOAD-IT will do it for you for £795.

But Does it Work?

That's the theory, but does it work? To test it I tried to LOAD a selection of tapes that included random submission and game tapes that I 'knew' didn't LOAD. It worked! All but one loaded and the exception was a tape that turned out to be corrupt. Not even this can LOAD damaged tapes.

Using it couldn't be easier, as all you have to do is try to LOAD the tape and adjust the knob until you get the clearest signal. I then wrote the setting on the cassette label for later use and sat back to play the game, happy in the knowledge that my loading problems were over.

Availability

File: LD-40-IT. Supplier: Load-It, 15 Avenue Road, Shirley, Solihull, West Midlands, B89 5BY, Tel: 021-745 4373
Machine: C64, C78 Database. **Price: £685 fixed, £685.**

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Fantasy Games

If your flights of fantasy lead you to imagine heroic quests for lost treasure or battles with monsters and demons, then stop thinking and start playing, as your C64 can quench your thirst for adventure.

By Tony Hetherington

Our history is littered with tales of such heroes and demon-slaying monsters just waiting to be slain. The Welsh flag features a dragon, the Irish talk of the little people and the English garrison Saint is best known for slaying a dragon. And if you ask any Scot what lurks beneath the misty waters of Loch Ness they'll reply 'the monster'!

With such heritage it's understandable that within us all there's a tickle waiting to be scratched and a hearty laugh to be heard... So gather your swords and spears for we travel in search of monsters, magic and treasure!

The search for adventures will inevitably lead to adventure games, but it doesn't stop there as the computer hero can fight for fame and fortune (and his life!) in a series of role playing games, turn-up conversions, arcade games and even some strategy games! Whichever your taste in games you'll be able to taste adventure.

The adventure games were first into the fray with the classic Zork trilogy from the equally impressive Infocom. Does anyone know a bad Infocom adventure? The quality of the text descriptions, the puzzles that are set and the packaging packed full of clues and red herrings is second to none. Much has been said about Zork I, II, and III as well as the sequel trilogy Enchanter, Sorcerer and the recent Spellbreaker, and I'll just add that if you enjoy good adventures that really challenge you and you have never played an Infocom, what have you been? Climb out of your Over Mongolian cave, get a disk drive and get adventuring.

Meanwhile back on this side of the pond, Milwaukee Illinois were making the headlines with an adventure version of Tolkien's Hobbit. Although the game attracted (qualified) rave reviews such as "You can actually talk to the characters" most of the headlines were(n't) about the game itself but about the growing speculation about a follow-up game based on the Lord of the Rings.

In 1983 the first part of the trilogy appeared which was followed recently by part two, The Shadow of Mordor. As in part one the Shadow of Mordor are based on a book in

Tolkien's classic trilogy, this time The Twin Towers. It finds our Hobbit heroes once again alone and in trouble as they attempt to cross the desolate wastelands, survive the evil orcs and finally they reach Sauron's homeland and the third and final part.

The Jewels of Darkness is another classic adventure trilogy and consists of three parts, and for my money the best. Level 9 adventures bundled together, improved and repackaged by Rainbird for £14.95. This treatment of Colonial, Adventure and Dungeon Adventures obviously impressed the wizards of Level 9 as they are now adding the final touches to Knight Dec which promises to be even better.

If you mention Rainbird you must also mention the Pawn. Written by Magnus Sorells this superb adventure has become the new standard by which others will be judged. The Pawn isn't actually a fantasy game although there is a wizard in it, but it is the prequel to The Guild Of Thieves which is already a must for Aesop adventures and due to appear on the C64 in a few weeks.

The game revolves around your attempts to qualify as a member of Becknauht's band by becoming an accomplished thief. To test your morals as well as your skill, determination, puzzle solving and general thieving abilities, you're given a test in which you are dropped on an island and told not to come back until you've given a test to which you are dropped on an island and told not to come back until you've got all the booty. Same is true to find back as a thief; that's writing in plain view. Unfortunately it's also guarded by an equally vicious grizzly bear! Other problems aren't so easy and half your time you're left wondering what's important and what isn't.

Despite the Finnish problems and incredible cost, there's actually space left on the disk for some of the best adventure graphics you are likely to see. Better than the Pawn, if you don't believe me then track down a copy when it's released and see for yourself.

Value for Money?

Adventures such as the *Guide of Thieves* and the *Inkooom* games are superb value for money but won't leave you much change out of £20. Mastertronic's *Spellbound* offers an ingenious plot, window menus and animation for only £200! You start in the game as Magic Knight who has been transported to the mystical castle of Kahn by a misfired spell cast by your friend Gimbel the wizard while he was trying to improve the favour of his rose paddock. Now you have to solve the mysteries of the castle, its objects and its banishes so you can return home, but only when you've discovered



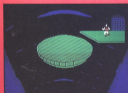
Spellbound

how to get through a darkened room full of inflammable gas and over an unclimbable wall.

Role Play Your Adventures

Fantasy gaming isn't just adventuring in role playing games such as *Dungeons and Dragons* and *Ranquest* have proved. Software has tried to match the depth and excitement of steering a party through these games with a succession of games such as *Ultima IV*, *The Shard of Spring*, *Phantasmic I and II*, *Master of Magic* and *The Bard's Tale*.

The fantasy role playing adventures split into two groups, those that show a party moving around a wilderness and its dungeons and castles, and those that show a 3D view of the corridor or room that you're in. They both have one



Dragons Lair

thing in common, they take a long time to play, sometimes over 100 hours!

"When the going gets tough, the bard goes drinking" is the motto of *Ardland's* (Electronic Arts) superb *Bard's Tale*. The evil wizard Margur has the town of Mura Blue in an iron grip. Under an eternal winter spell nothing moves in comfort except perhaps the messengers that control the streets of the town and the dungeons that lie below them.

As soon as the brave bard has qualified as an and raised a party of fellow adventurers he'll set off and tackle the 128 different monsters that populate the taverns, temples, towers and barrens of the town and seek the 85 magic spells and that they will use in the 16 levels of dungeons. All in 1D!



Bard's Tale

3D Tisles

If you think the *Bard's Tale* sounds challenging then why not try *Adventure Reality*. It also features 3D views of the city, that you have been abducted and brought to as well as the inside of Inns to eat, drink and hear gossip, shops to buy armour, weapons and supplies and even a bank to store your booty.

Nothing too surprising there, but wait, this is *Adventure Reality* – part one. Once you've explored the city in part one you're ready to delve into the Dungeons, await the challenge of the Arima, explore The Palace and survive the Wilderness before reaching the Revolution and finally reach your Destiny in the seventh and final part!



Arima

The king of the wilderness roleplaying adventure is undoubtedly *Ultima IV*. The graphics may be primitive but the atmosphere is piled on thick. For example, instead of rolling dice to decide your characteristics, a fortune teller turns cards and asks you questions. Your answers form your character. Then it's out into a massive world of cities and dungeons and your quest to become the Avatar, the pinnacle of heroism and virtue to lead the land of Britannia into a new era.

Anyone who has played *Exodus Ultima III* will know that this isn't going to be easy but will be amazed by the fact the *Ultima IV* is almost twice bigger than III! Thanks to Microprose who has now set up a UK operation and a deal with Origin (the *Ultima* authors) you will soon be able to play *Ultima I* and *II* as well as the forthcoming *Ultima V*.

The *Ultima* series may be the best but they're just still competitors from games that are getting better and better. 801 *Game Shield of Spring* and *Rings of Zefir* were covered by the recent article. *Warlocks* and *Wargames* and have now been joined by two more, *Wizard's Crown* and *Phantasia II*.

In *Wizard's Crown* you mount an expedition of eight characters to regain the stolen Crown of the Emperor. These brave adventurers include a necromancer, priest, fighter, mage and thief who are defined by an incredible number of factors that include their ability to huggle, sneeze, picklocks and swim.

The game itself features the most complicated and most accurate combat system you will find in a role playing game giving each character and citizen a bewildering number of options every combat turn including a choice of offensive and defensive spells.

Meanwhile the Dark Lord Nekademus has fashioned an evil cult to enslave the people of the beautiful island of Faramous. Undaunted by the task ahead you lead a party of brave monks, priests, wizard rangers, thieves and fighters through the dark wilderness, dark dungeons and then onto the Astral plane and the Netherworld as you tackle the quest set in *Phantasia II*.

This is of course the sequel to *Phantasia* and you can even use your surviving party from the original in this sequel. Newcomers can raise a new band of adventurers but I'd suggest they travelled through *Phantasia* before tackling this quest. Coming soon, *Phantasia III!*

Economy Role Players

For computer role players with a budget, who want maximum value for money, they should look no further than Mastertron's *Master of Magic*. This marvellous program was written by Richard Marling (who has gone on to form Code Masters) and features the music of Rob Hubbard.

Using duck shoes menus to select your commands you may use your magic missile, fireball, energy drain and magical shield spells with ease and collect any scrolls, shields, armour and weapons you can find from your slain victims until you can complete your quest and retrieve the amulet of immortality that is lost in the underground caverns. Return this to the Wizard Thoric and escape from the underworld.

Does the coin-op machines are spellbound by fantasy gaming and in a growing number of coin-op conversions that you can now get for your C64. The best known of these conversions is of course *Guamlet* which brings fast shoot

'em up action to a world full of gnomes, goblins, sorcerers, death and lobbers. 512 levels of monsters, traps, treasure and magical potions await our brave adventurers that can enter on their own or with a friendly warrior, elf, wizard or talker.

Dragon's Lair was thought to be the coin-op machine that wouldn't be converted but the copies were scarce, so Software Projects produced the C64 version of the video disk screen in *Dragon's Lair* and *Escape of Sango's castle*. Incredibly, the screen is all those as the famous Dirk the Daring risks plummeting disks, rapid and whirpools, mad monsters, giant boulders and Sango the dragon himself to rescue the fair Princess Daphne.

Druid, Rastaman and Wizard form a trio of games that show the variety of fantastic arcade games that you can get for your C64. *Druid* was labelled a *Guamlet* clone when it was first released. It wasn't long before players realised it was a completely different game and worthy of a *Four Commodore Games of the Month* accolade. The combination of *Guamlet* style graphics, the need to fight off the continuous onslaught of turtles, ghosts and critters while finding fresh supplies of spells and keys ensured a short topping success for *Druid*.

Wizard (Amuletsoft) added a new dimension to platform games by casting you as a wizard who could gain spells from collecting keys and use them against the screen critters to complete each level.

Horror's *Rastaman* gives you a tricky situation. You're turned yourself into a frog as the warlocks invade, and now he must hop around an eight level dungeon, fight the warlocks and gain their ruins to create better spells to repel the invasion and return himself to his former glory. A nice balance between arcade reactions and strategic planning are required to complete this one.



Finally, not even hard line strategists can escape as one of the best strategy games of all time is a chess variant called *Archon* (Electronic Arts). This is no ordinary chess game as each piece is a mythical creature joined in battle as light fights darkness. An army of unicorns, knights, acolytes and a phoenix stand by the wizard against the dark forces of goblins, mischievous basilisks and dragon's led by the evil Sorcerer. Each piece has it's own unique way of moving, strengths and weaknesses that come into a play when one piece tries to take another, as in *Archon*, if you want to take a square you have to fight for it in a separate combat screen.

Letters

If there's anything you want to know or anything you want to say, just write to this page and we'll try to oblige. Plus, a Your Commodore binder for the star letter.

Write to us!

I think Your Commodore is very good and the layout excellent. However, I do feel that you would increase your circulation a lot more if you enlarged the Letters section, say to two or three pages, to deal with all aspects of Commodore computing and to give solutions to problems encountered by your readers.

I hope that you don't mind the criticism.

**Boris Williams,
Great Torrington**

Of course we don't mind readers commenting upon the magazine — that's the whole idea — but what can we do to see within the pages of Your Commodore? In fact, we would like to have more suggestions from readers as to what they would like to see in the magazine. We can't promise to provide everything, but we can try!

If you agree with your comments about readers' letters — we'd love to be able to print more. The only problem is that most of our mail tends to be extremely specific, such as queries about a particular line in a particular program. So readers — the help is your own! — do encourage you to write more publishable letters, we are now offering a FREE Your Commodore binder for what we think is the star letter. So get to it, get those letters flowing in, we're waiting to print them.

Oh, by the way, Boris, since you want to see more letters and aren't prepared to say so — a complimentary binder is on its way.

Star Letter Plus/4 Probe

Thank you for the support that you are giving to the Plus/4 computer. May I help to clear up some popular misconceptions regarding this Commodore machine?

Many readers may understandably think that the Plus/4 is little more than a deluxe C16, simply because C16 software is advertised for use on both machines.

This association with a more limited machine has been unfortunate for the Plus/4 which is blessed with a full 10241 bytes (one thousand bytes) of RAM (in the C64). It also possesses dual-tasking capability, gives the right software.

Since the Plus/4 was released from its original £309, to around £20, the number of users has increased dramatically — I now have two, and no regrets!

The Plus/4 can use the 1551 drive as well as the venerable 1541, but the 1551 has the advantage that it operates in parallel and is therefore very fast. They are also being sold at giveaway prices — I paid £20 for one! Coupled with two 64-Rescue, green-on-black monitors, a second-hand DPS 100 detached printer, and my trusty MPS 801, modified to give it true descenders. All this, which resembles the command module of the Standing Enterprise, cost less than £700, and provides me with a work station more than adequate for my purpose, the collection and management of several thousands of genealogical (family tree) records.

Until fairly recently, no Plus/4 types have been at a considerable disadvantage in the software field. True, we have our built-in software. This is of doubtful usefulness though it fortunately doesn't interfere with memory, and is easily removable if desired. The situation has now, however, improved enormously, for Precision Software has released Version 2 of Superbase and Script Plus, a word processor program which I rate higher than Easy Script on the C64.

Not to be outdone by Precision, Impact Software has recently produced a fairly comprehensive accounting system for the Plus/4, entitled "Company Pac 1.2.3" (why didn't it include a spreadsheet? Although not involving this program — I purchased it simply to support their claim).

The future then for Plus/4 owners is looking much brighter, user groups clubs are starting up, and I see that we are now rated far on the modern front.

We could do with better support from the hardware manufacturers. I am approaching the point when I could see a hard disk system, but unfortunately I am not aware of one which is compatible. Perhaps someone out there can help!

**Henry Crippard,
Wymondham, Norfolk**

Your Commodore aims to support the whole range of Commodore home computers. It's nice to know that our efforts are appreciated.

It's probably worth pointing out to our readers that once programs for the C16 will also work on the Plus/4 without any problems. Should you have a RAM expansion for your C16 then most of the Plus/4 programs will work on the C16. We would suggest that any C16 readers consider purchasing one of the newer RAM expansions that are available since the extra memory will allow them access to a much larger software base than that for just the C16.

I am afraid that as one in the office is aware of a hard disk for the Plus/4, if anyone else out there is aware of one, then please write to Mr Coppard, c/o Your Commodore, and we will pass it on.

Printing Problems

I own a C64 and an Alphanumeric 42 printer. Unfortunately I do not have the necessary interface to connect them together. My enquiries have revealed that the printer manufacturer's probably no longer trading and I have been unable to locate a trader who can help me.

Any assistance that you could give me towards acquiring the correct interface would be greatly appreciated.

**P.J. Bassall,
Mables, Eacts**

I am afraid that even though we are aware of the Alphanumeric printer in the office, we are not even aware one is in the flesh. We are therefore unable to suggest an interface since we don't know what connection the printer has. Perhaps some of our readers will have come across this trouble and can inform Mr Bassall of a dealer who is happy to get his printer talking to his C64. If you can then write to P.J. Bassall, c/o Your Commodore and we will pass it on.

Educating the Plus/4

As a new reader of your Commodore I am writing to ask if you can recommend any educational software suitable for pre-school to early school age children dealing with spelling and maths. We own a Commodore Plus/4.

Could you also recommend a source of supply for any disks you recommend as I have yet to find a shop that sells this type of program in the local area.

**Bill Bailey,
Huntingdon, Cambs**

As the earlier letter from Denis Dewey Coppard states, the Commodore Plus/4 has always suffered from a lack of software of any kind. Only very recent months has software become readily available.

Here at Your Commodore we have never received any educational software for the Plus/4 or even the C16. If there is anything we have, then I'm sure some other reader will know and will let Mr Bailey know, c/o Your Commodore.

If you've written educational software for these machines you would of course be delighted to talk to a host of it with the view to publishing it in a future issue of Your Commodore.

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The Last Ninja

After Way of the Exploding Fist, which started the Kung-Fu craze, we all wondered where it would end. System 3's Last Ninja is the answer - nothing can possibly beat this Kung-Fu King.

The Last Ninja isn't the first game to try and expand the term "beat 'em up" format into an arcade adventure but this is the only one which keeps the action at fever pitch and features stunning graphics that have only been previously seen in static adventures such as The Prince. In the Last Ninja some of these are embraced and fed into the back cloth for some bone-crunching battles.

You play Arima-kun who was left in the Last Ninja when the rest of the bookkeepers were embarked on their trekking on the island of Liu-Fu. By the dark forces summoned by the evil Shogun Kurohiko. You have orders to seek revenge of the Shogun and his lackeys Ninja's that are now being trained on the desolate island.

To complete your quest you must fight your way through the six areas of the island until you come face to face with the Shogun in his palace. In each stage you will have to fight the Shogun's Ninjas that are armed with a variety of weapons which you can take on, if you can find their hidden in the undergrowth. You will find temples and containers of knowledge and be given divine guidance for what to look for.

Containing the Ninja isn't that fast as your using a complicated selection of joystick moves that have different results depending on which weapon you're using and whether you've pressed the fire button. It's not as complicated as some games such as Rock and Wreath but it takes some practice before you make full use of your third eye.

It's a fair bet that you'll lose a few lives trying to leap across the river or march on the first level since success depends on the correct combination of jumps. This is another aspect that I bet you didn't expect it to be easy, did you?

Your quest begins in the wilderness where you must search for important weapons and useful objects as well as practice your jumping and fighting skills. After a few games you may be good enough to get past the fire breathing dragon at the end of the first and go on to enter the wastelands. Survive the wastelands and cross the Liu-Fu mountains to the Palace Gardens, and then it's through the dangers to the palace. Lower level until a final confrontation in the Inner Sanctum.

The graphics are superb and I can assure you that the standard is maintained throughout the game. However, that is only half the story. The Last Ninja features some frightfully difficult logic problems, such as how do you get past the dragon without getting fried and one of the most realistic combat systems seen in a game where the damage inflicted by a blow not only depends on the weapon used but also where you hit him. So a blow to the head with a sword will do considerably more damage than a kick in the stomach.

The last Ninja is quite simply the last word in beating games.

T.H.



Teacher:

Name: The Last Ninja, Supplier: System 3, Machine: C64 Price: £29.95, Helpsheet: 0/00, Playable: 10/10, Graphics: 10/10, Value: 10/10

Code Masters

We take a look at Codemasters' software which is renowned for its high standards.

By Tony Hetherington

Code Masters launched its range of £1.99 budget games just seven months ago last November, at the time of the great budget bonanza. Software giants like US Gold launched their own American budget games so there surely wasn't room for a newcomer. There was, and now Code Masters boasts 94 top figures that make it the number two budget software house and claim it's hot on the heels of the leader Mastertronic.

The Code Masters story began four years ago with a company called Galactic Software that was formed by David and Richard Darling to sell their own mail order VIC-20 games. This went remarkably well and soon they were writing games for other software houses on other machines such as Master of Magic and BMX Simulator for Mastertronic and the Mirrorsall Games Creator. In November 1986, Richard and David were joined by Jim Darling (their father) and subsequently formed Code Masters.

The current Code Masters collection contains ten games for the C64 that includes eight fast action arcade games, an adventure and the release of the *Games Creator*.

The fun really starts in a two player game as the top down view shows the action as you burn up the tyres and your opponent.

Vampire



A fiendishly difficult arcade adventure set in the 95 coin rooms of Dracula's castle. You play Brok the Brave who has sworn to kill the evil Count who still stalks the world in the year 2087! Now you must guide Brok through the traps and rooms of the castle avoiding the demons and critters that await a mislaid jump.

Red Max



BMX Simulator



This is the full action sequel to *BMX Racers* and is the toughest BMX challenge you'll face. Using joystick power instead of pedal power you must race around seven courses packed with bumps, ramps, hills and different surfaces, either against the clock or against the computer or a friend.

The sequel to the superb *Last V8*, only this time you're riding a superbike as you attempt to save the *Aeromax* from certain destruction. The game begins as you wake to find that the *Reconade* Lords have sabotaged the ship and now you have to save it. This isn't going to be easy as you must drive around the bike crumpling landscape to deactivate 27 fusion mines before descending to the engineering level to power up right back up cooling system, shut down four power plants and finally wake the crew in the information control.

Super Robin Hood

Robin Hood is back in *Super Robin Hood* in my favourite Code Masters game. It's an excellent animated platform game in which Robin must battle his way past crooked archers, guards, foot keys to operate ancient lifts and collect enough heart symbols to save Maid Marian. The action is fast and furious and so smooth. If you like platform games you'll love this one.

Mr Angry

This neatly got Code Masters into a trouble with the supposed similarity between the game and the character on Radio One's Steve Wright show. The game features your attempts to get a picture of a glamorous model staying somewhere in the hotel. First you must collect your camera, flash and press pass before you're ready to get the picture. Unfortunately, the hotel staff will try and stop you as well as one of the game, Mr Angry.

Thunderbolt



It had to happen sooner or later. Both sides in the war between Earth and Proxima had developed the chronocluster bomb that could not only destroy things but things that had been and things that were about to be. It was inevitably used ripping the space time continuum over Europe missing ten centuries of history in battle. You are Thunderbolt the pilot of an Earthborne fighter and you must destroy anything that moves until the effects of the bomb subside and you survive until the end of the game.

The Armadillo

Half machine, half animal, this war machine built by the bearded inhabitants of the planet *Mobert* is a last chance to defeat the attacking *Earthborn*. This time you're out to keep us destroying your world, and ferry as many survivors as you can out of the cities to safety.

Terra Cognita

180 screens of shoot 'em up action in the world of *Terra Cognita* as you play a mining engineer firing from a warrior robot in only a small scout ship. Each screen is full of ships wrecking walls as well as time shifts that send you back to screens and particularly annoying if you're on screen 99's but you will also find extra fuel dumps, bonus scores, and a lives and fever field generation that make you invulnerable to the constant alien onslaught, but only for a few seconds. Seven screens down, 99 to go!

Creations

If you think you can create your own game then why not try *Creations* which is a reincarnation of the original *Games Creator* complete with three sample games. Now you can define the backgrounds, sprites, sound effects, alien movements and player characteristics for your own games for only £1.99. The *Games Creator* was a good buy at its original full price but now it's a budget bargain.

Necris Dams

Finally, *Necris Dams* takes us into the world of adventure outside the disturbing world of a giant banal spaceship that's been taken over by the rogue *Archmandroid* who is now training the manroids for an attack on Earth. You're unjammed onto the ship with the next shipment of coffee to try and stop them. Will you succeed or are you just early for your funeral? These questions are answered as you delve deeper into a fascinating graphic adventure with puzzles that will challenge even the toughest adventures.

The Next Move

Anybody who has played any of the Code Masters games will realize their phenomenal success is due to the standard of their games. At times it's easy to forget that they only cost £1.99 each, so many are as good, if not better, than their full-price counterparts.

That was all achieved in just seven months and already the Code Masters are planning their next move. The next move comes in the guise of *Laserforce* which is to be a sequel to *Thunderbolt*. The game is to feature 30 main levels with bonus stages between each level and graphics showing wringing volleys, rotating landscapes and a giant metallic millipede. You've got just a few weeks to practice with the other games before you can sign up for the *Laserforce*.

Talking through your RS232

There's more to this interface than meets the eye. Do not be deceived by first impressions.

By Eric Doyle

An RS232 interface is hardly the most exciting product as far as appearance is concerned. For your money all you appear to get is two connectors with a length of cable to separate them. Don't be deceived by appearance, this could be one of the most gratifying additions for your Commodore.

An RS232 is the Commodore's link with the real world via the user port, the most ignored socket on the back of any recent Commodore machine. Via this cable you can communicate with Computers, link up with another C64, serve a wider range of printers or perform electronic wizardry with a whole series of domestic equipment.

I was already keen the moment about the user port being RS232 and

you've not wrong but the great drawback is that the Commodore implementation only provides a 0/+5V output and most true RS232 equipment requires a 4/-12V supply. York Electronic Research's interface does the necessary conversion for you.

Value for Money?

For your money you also get a disk or tape which initializes the port for use and will also convert the 64 into a terminal emulator for use with a suitable modem.

It is obvious by reading the manual that the modem link and printer interface are considered to be the most

important uses for the unit and the detail is sufficient to get you up and running. As far as connecting two 64s together, the detail is sketchy and a few wiring diagrams would avoid the possibility of the keen amateur blowing up two 64s in one fell swoop!

RS232 communications have a language all their own. Handshakes, baud rate, parity and duplex form the new vocabulary which not only confuses the newcomers but also has an odd-pasting effect on those considering modem communications. The new syntax is explained quite well in a concise way which proves that the jargon is no more than part of the rites of telecommunication.

Handshaking is a way in which one terminal tells the other that it is about

to send data and the other terminal says it is ready to receive. Band rate is the speed at which information is transmitted. Quite often the speed of transmission can be different to the speed at which information is received. In human terms this means that one machine speaks more slowly than the other.

Parity is a check for data corruption. Anyone who has used a telephone knows how a bad line means that conversation is difficult. This is also true in the binary world. Parity does not solve the problem but it can let you know that something is wrong. Information is sent in binary form, a string of ones and zeros in bursts of eight digits. If you're working on even parity, seven of the bits hold the information for a single character, the computer counts the number of ones in that character and if this is an odd number the eighth bit will be a one if not it will transmit a zero. The receiving terminal knows that if there is an odd number of ones in the transmitted byte something has gone

wrong. Similarly 'some systems use parity based on odd numbers.

Full duplex is when both machines are able to talk simultaneously to one another and half duplex means transmission in one direction must end before the machine can receive.

The Relevant Software

The software for YER's RS232 interface supports any of these systems via a simple menu selection system. The Set Up program is mainly for use with RS232 printers and possibly real concern is the baud rate. If the printer does not tell you which rate to use it will not damage the machine to experiment a little. The worst that can happen is that the printer will fail to respond.

A handy troubleshooting section should solve most of the problems with printers, but if a baud rate over 2400 is required the 66 cannot respond fast enough. Luckily most printers have switches to select various rates so all may not be lost.

Limitations

The one drawback of the Terminal Emulator is that it can't handle Windows/Provid style graphics which limits your entry into the console world slightly. Apart from this, the software menu is flexible enough for any system you'd want to talk to and cuts down the sophistication and cost of the machine required.

York Electronic Research have provided a service which is most Commodore owners never realised they required. RS232 interfacings is the subject of several books and articles which benefit a sector of users who wish to combine an interest in amateur electronics with their computer hobby. For those people YER can supply the missing link.

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The Commodore Show — June '87

This year's Commodore show was a paradise for the game user, but did the serious user find it worthwhile?

By Rory Newman

This year's Commodore show did not have the launch of the Amiga, the 64C nor the Music Expansion system, yet it was one of the most crowded ever. The reason - software - very cheap software.

The crowds were not surrounding the Amiga stands, gawping at the 68000 chips capabilities, and thinking that the Amiga would be the next thing, but crowding around the benches, with boxes and trays of games from 80p upwards, gawping at the bargains and thinking that they'd never had it so good.

More and more people are getting the message that the Commodore show offers amazing software bargains, not only hardware ones, often in excess of £200. Companies such as Shuklana, Twilstar Computers, 3B Software and Trybridge were reporting the highest turnover, not Commodore and the other assorted hardware suppliers.

Many software companies were there, but mainly the smaller independent ones, and although this is a good sign, showing us that they are still around, and that we have a choice, most of the major houses were conspicuous by their absence.

The much neglected and very much underrated C16 had two of the main three software houses there in the shape of Amco and Tynesoft. Amco, very much a major force still, after many years, starting way back with the VIC 20, were

showing off Summer Events, Ido Gertz's long awaited sequel to the quality of Impossible Mission on the 64.

This was selling like hot cakes, as was Terra Nova, a scorching shoot-'em-up of the highest quality, which like Summer Events featured speech.

Tynesoft, the Newcastle based house were showing off Phantoms, a one player gamelit variant which I recently awarded a Gamer Gold and Spy vs Spy, which they've acquired the C16 rights to and produced a faithful copy. The other main C16 Producer, Gromlin was, like so many of hers absent. We are still waiting for Thing on the C16 and it would have been nice to have seen Thing Business Back, Rollunder, and their promised Amiga products.

Where Were They?

Imagine weren't there to show us Army moves or their conversion of Taito's excellent coin-op, Slapfight. Imagine's controlling house, Ocean weren't there either, so we didn't get a glimpse of Tarigan, Head Over Heels or their much praised Witchal. Howson didn't turn up but their Eagles were on sale elsewhere. Jeff Minter wasn't there, so we are still guessing about a release date for Forging 2 and whether there are going to be any more C16 conversions.

The giant US Gold also refused to honour us with their

presence, so we did not have a chance to see *Metrocross*, *Roadrunner*, *World Class Leaderboard* (the fourth in a series of *Killed Until Dead*), *Badger Warriors*, *Mastertronic* were not there, neither were their newly acquired full price label, *McBroom House*. Activision wasn't there, so we couldn't see how their sequel conversions of *Wanderboy* and *Quarter* were coming along. This also meant that there was no news of their oldest, *System 3's* *Last Ninja*, which should have come out in January.

Also missing were *Arctosoft*, *Firebird* and *Coolmasters* but it wasn't their loss, not ours. Their software was selling fast, and if they didn't want to be there to cash in on it, so be it. That was the attitude shared by most at the show, we got the software and those who did turn up made a fortune. The show was a great success without the *Elites*, *Palaces* and *US Golds*.

Bargains Galore

There were some real bargains however, *Trail Blazing*, *Allycat*, *Light Force*, *Tania Costa*, *Rainbow Hill*, *Pyromania*, *New Games*, *Impossible Mission*, *Ghosts and Goblins*. Many, many more were £2 or less, so as you can imagine, to snag up these bargains, a bit of elbow was required! *Comet* of the show award went to *Protronix*, the mail order software and video suppliers who were selling the major new releases such as *Barbarians* and *The Big Four* at

£2 each, £2 above most others, but they were throwing in a free camera with every purchase. Many people, including myself were taken in by this. How well it will work, I don't know, but *Protronix* are laughing all the way to the bank.

There were a few hardware bargains on offer, such as the *Music Expansion System* at £79, but it's been available by mail-order at this price for a good few months now. There was the addition of a disk-drive, printer or mouse as they or those, but there was no kindness from *Commodore* (as was their new). They might at least have given us £100 off the *Amiga 500*, as this was a free monitor, but no such luck. The hardware stands had many people gazing in awe, but not many buying. With the exception of the *AS08*, we'd seen it all before. The hardware stands were of varying quality and any discounts were minimal. With games like *Light Force* and *Tenth Frame* at £2 it was destined to be a software show with or without the support of the major software houses, and it was.

Games had the bargains of a lifetime, and there was a new feature this year, *80Coins* (not the luger) in a signpost all their own. All with games loaded up so players could try out some of the latest releases of the companies who didn't exhibit. This was very popular, and almost as crowded as the software stands. Anyway, as I have said, it was a software show, and a very good one at that, and I would advise anyone who did not go, to go to the next one, and maybe next time there will be more hardware support, and, of course, bargains.

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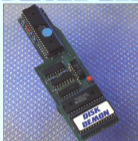
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Hook-Ups

Is your poor little 64 sitting in a corner with no-one to talk to? No more! Follow this series, and your computers could soon be communicating with Beets, Species, and even other 64s!

By Mycroft Appleby

With the lack of a 'real' RS232 port and a decent operating system, the Commodore 64 tends to be a lonely computer, sitting on its own, talking to its own peripherals, but being ignored by all the other computers as they talk to each other.

Why this is so is a bit of a mystery. Compared to the BBC Micro, which leads in the communications stakes, the C64 is more than well enough endowed. The BBC Micro has a printer and disk drive port; the C64 has its intelligent peripherals bus — a considerably more advanced piece of interfacing. The BBC has eight lines of user port with two handshake lines; so does the C64, but provided by a much more advanced chip and with extra handshake lines.

The BBC has a four line RS423 interface; the C64 has a full spec RS232C (almost!). The BBC has four A to D converters; so does the C64, and some joystick ports too. The BBC has the IMHr bus and the tube; the hardware of the C64 cartridge port is more advanced than both these put together.

What it comes down to is software; the (in-built) software in the C64 stinks. You have to write all the assembly yourself and the operating system just doesn't want to know.

The user port can transmit data at very high rates, with no errors and with very little latency. As a lot of other computers have similar capabilities for

a parallel interface like this, usually called a printer interface, though on occasion it is hooked up to some joystick ports. With suitable software, you should be able to send huge amounts of data, at extremely high speed, between any popular computer and the Commodore 64.

Imagine using a BBC Micro to develop a program on, and then sending the code down the line to the C64, or sending graphics information from a C64 to an Amstrad for plotting on its hi-res screen!

The possibilities are endless. Communication between two or more computers is great once you start. The power of the modern microcomputer is astounding. But when you get two processors hooked up together sharing tasks it gets even better. A lot of 'serious' computer enthusiasts have more than one computer because some computers are better suited for some jobs than others. You wouldn't buy a C64 because of its fast disk drive, or masses of development software. But on the other hand you wouldn't get a BBC Micro just for games.

And then...

What this series is setting out to do is provide hardware and software details of hooking up a Commodore 64 to any other popular home computer. I intend covering connecting to BBC, Amstrad CPC, Spectrum, Atari, and

of course other Commodore 64s.

To do this a few concepts need explaining first. Next month will be the first practical example of the connection of a BBC Micro and a Commodore 64. This month we will look at the hardware involved.

Most computers have serial and parallel ports, both of which can be used for communication.

A serial port is designed to use as few wires as possible to connect two computers together — in a minimum-configuration one-way system, just two wires are needed. The eight bits in a byte of information are sent down the line one after another to be picked up at the other end. Complex error checking is needed, as it is easy to miss bits or count them twice, and this makes the software extremely complex. Also, the two computers have to be perfectly synchronised. In general, serial communication is a pain even at the best of times. We will not be using serial communication!

Parallel communication is another kettle of fish. It uses enough wires to send all eight bits in the byte at once. However, the disadvantage of this is that more wires are needed — a minimum of 11 for our purposes (eight for the data, one earth and two for control). Also, this type of communication is more susceptible to interference than serial with its error checking, so parallel links are usually limited to 10 feet in length of cable run.

Parallel communication goes at the speed of the slowest computer, but is typically at least ten times faster than serial communication.

How do you do?

The extra lines in the connection are used by the communicating computers to tell each other that the data is being put on the line. They are called handshaking lines. The sending computer tells the receiving computer that there is data on the line, and once the receiving computer has received the data, it sends a signal to say that it has the data and is ready for the next bit. The process then repeats.

The handshaking lines can be interrupt, operated or checked manually. They can be set manually, or automatically by the chip responsible to the interfacing to the rest of the computer.

A detailed example will make things clearer, so let us consider two C64s talking to each other. The handshaking is in full interrupt receive mode and both computers have framed software that allows the computer to get on with other tasks while the data is being received. A typical interchange would go as follows:

The sending computer sets its user port to full output mode. This means that all the I/O lines in the user port will be used for sending data. The byte to be sent is put onto the output port. This makes the port take up the binary image of the byte being sent. Each one of the eight lines represents a binary 0 or a 1, with 0V for binary 0V for 1. The sending computer then flips its handshake line from 0V to 2V and back again. It then waits, looking at the other handshake line from the receiving computer.

At the other end of the cable, the receiving computer is expecting something to appear on the connection and so has set its I/O user port to full input mode (if it hasn't, there will be now be two triad I/O chips). This means that 2V on any of the lines will be read as a binary 1 by this computer and 0V as a binary 0. It has also set up an interrupt program around the handshake line from the sending computer. But at the moment it is making its own business and getting on with something else.

Suddenly the handshake line from

the sending computer "bounces" and this makes the interface chip interrupt the receiving computer from whenever it is doing and look at the input port. "Ah ha!, a byte," the receiving computer thinks and reads it. Having read the byte it "bounces" the handshake line back to the sending computer and gets back to whatever it was doing.

The sending computer bounces, has noticed the change in the handshake line from the receiving computer and puts another byte onto the output port — and so the cycle continues.

These bytes could be anything: data transfer, memory dumps, screen messages, graphics information, or data to control the other computer.

The Hardware

The connection is to be made from one User Port to the other, all eight I/O lines of one computer to the other; this is the main data highway. FLAG1 is the NMI generating incoming handshake line on the C64 side and PA2 is the main outgoing; FLAG2 gets connected to CB1 on the BBC side which is the outgoing handshake line from the BBC micro. PA1 is connected to CB2 which is the IRQ generating incoming handshake line of the BBC. Ground is common to usual.

The User Port of the C64 is the part on the far left of the machine as you look at it from the front. The User Port occupies all the connections on the bottom of this connector. The connections on the top are of some use, but not in this application, mainly being used to power external devices using this port.

The configuration looking at the port from the rear is as follows:

Gen FLAG1 D0 D1 D2 D3 D4 D5
D6 D7 PA2 Gen

The plug that you need is a standard 0.156 inch pitch edge connector and needs to be ordered I'm afraid.

The BBC side is slightly easier being a 20 way IBC connector. You find the User Port on a BBC by lifting up the machine at the front and looking at the connector with USER PORT written on it — easy!

The configuration on the top is

CB0 CB1 D6 D0 D1 D2 D3 D4 D5 D6 D7

and on the bottom:

2V 2V 0V 0V 0V 0V 0V 0V 0V 0V

Under no circumstances should either of the 2V lines be connected although as many of the 0V pins as possible should be carried across as possible look at the drawing to see how the wires should be crossed.

As an addition you can mount a small button on top of the Commodore 64 connector connector up the first and third connections at the top of the port (looking from the rear). This will reset the machine and can be very useful.

Now the hardware is sorted out let's proceed to the difficult bit . . .

The Software

Taking the User Ports of both machines, there would seem to be no trouble. Both have eight lines of programmable I/O with two handshake lines. In theory, all you have to do is connect up the eight data lines to provide your byte transfer, and cross the two handshake lines to set out the acknowledges and bounces.

The trouble is that the I/O chips on each of the machines are slightly different types. The BBC micro has the older 6521 VIA while the C64 has the newer 6526 CIA. The VIA (variable interface adaptor) is a chip that differs from the out-of-sequence while the CIA (complex interface adaptor) was designed for the C64, and is made more recent.

Most of the differences don't bother us, but the handshaking is handled slightly differently. Both handshake lines on the BBC side are automatic, i.e. when you write a byte to the port a handshake line generated. (Although this can be turned off.) However on the C64 side the 'in' side of the handshake line is connected to an NMI interrupt latch. This is a bit less rigorous that is not when a pulse is received on the incoming handshake line and can set off an NMI interrupt if needed.

The out side of the handshake on the C64 side is completely manual, though the input handshake on the

side either generates an IRQ interrupt or just sets a lock bit.

The important thing is that both the chips need pulses within certain windows to work. Given that the IC's I/O circuitry is clocked down to the usual 2MHz to a standard IBMPC if the C84 runs at 0.90MHz there isn't to be any problem. However, it should be noted that the addresses generated are not just right and during a fast read sequence of up to 1K, they seem to get a possibility of sync and you end up with the illusion that both computers are talking for the other to do something. This can be straightened out with a bit of timing loops, but this reduces the speed of data transfer so much that I abandoned this line of research.

Not Popping Out for a Nybble

In the end I decided to use the low four bits for a nybble transfer, the high two bits for normal handshaking, and the other bits for a purpose that I shall reveal later.

Nybble transfer isn't as slow as you may at first think. In fact you need a sequencer and a large amount of data transfer just to spot the difference. Handshaking will still operate in the same manner, but this time only four bits are transmitted at a time rather than eight. The sequencing machine has to split the byte to be sent into two rows, while the receiving machine has to assemble them. With the normal handshaking, this will now look as any BBC Micro- and C84.

The reason that nybbles had to be used was the lack of suitable manual lines on either side of the buses, so the data lines had to be used.

However you are not left with the use of old handshake lines, these can be used for attracting the attention of the other machine — to indicate when it is ready to start, it is only used once you will handle. As both lines are interrupt driven, it is possible to then have a send ready system. This once becomes the main problem that most communications systems like this have. Returning to one keyboard to put it in receive mode then handing to the other machine to put it into send mode.

With this system all you have to do is tell one computer to send. It then tells the other computer to stop whatever it is doing, accept a long string of data, and then both computers return to their original tasks all quite neat really.

The software listed here is in BBC format. This is because to use the hook-up you need to have a BBC present and as the BBC has a much better assembler and is much faster at loading, it is easier to load a small boot program into the C84, then load the C84 transfer program into the BBC, and squirt it down the line.

So to load the system in you should first load the C84 boot program into the C84, load the C84 transfer program into the BBC and run it, run the C84 boot program, type 'CALL TRANSFER' into the BBC, and wait a few seconds then type in 'SYS 49152'. Then load and run the BBC operating program. You are then ready to start.

the data (this is erased at present, but I thought that it might come in useful).

CALL SEND on the BBC, and SYS 49154 on the C84 starts the transfer. As I said, reception of the data is completely automatic. On the BBC side as most of the memory location pointers are not fixed and have variable locations, this is to make the code relocatable, change the appropriate lines at the beginning of the program to something more suitable if you need to. Also remember that variables disappear if you load another program, so make a note of their values, all pointers to memory chunks are in standard load order.

Initialisation should also be

C84	Function	BBC
R17.A7B	Destination memory address	A72.A73
R17.B7C	Origin memory address	A70.A71
R19.A7A	Length	len
A815A	Control byte	cmd
44354	Send Data	SEND
49032	Initiate	SETUP

How to operate it

The software works by transferring chunks of memory around. You specify (in the sending machine) start locations, lengths, and destination locations, as well as a command byte to tell the other machine what to do with

performed after a Restore or Reset.

The applications of this are numerous, I'm already using my BBC Micro as a data store for my C84 — it's so fast, forget about disk drives.

Next I'll be tackling the Amstrad CPC series, so get those soldering irons hot!

```

PROGRAM: HOOK-UP BBC0
10 0:00000000:00000000:00000000:00000000
20 0:00000000:00000000:00000000:00000000
30 0:00000000:00000000:00000000:00000000
40 0:00000000:00000000:00000000:00000000
50 0:00000000:00000000:00000000:00000000
60 0:00000000:00000000:00000000:00000000
70 0:00000000:00000000:00000000:00000000
80 0:00000000:00000000:00000000:00000000
90 0:00000000:00000000:00000000:00000000

```

```

PROGRAM: C84 CODE
10 0:00000000:00000000:00000000:00000000
20 0:00000000:00000000:00000000:00000000
30 0:00000000:00000000:00000000:00000000
40 0:00000000:00000000:00000000:00000000
50 0:00000000:00000000:00000000:00000000
60 0:00000000:00000000:00000000:00000000
70 0:00000000:00000000:00000000:00000000
80 0:00000000:00000000:00000000:00000000
90 0:00000000:00000000:00000000:00000000

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- EXTENDED FUNCTION (up to 100000 bytes)
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- FAST SAVE (up to 100000 bytes)
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Diskit 7

Transfer your disk programmes to turbo tape with

this handy utility.

By Les Allen

Disk-Turbotape enables a program that consists of just one part to be transferred from disk to cassette tape. The version on the tape will be used at a turbo speed that is approximately 10 times that of the normal Commodore cassette.

A few restrictions do exist regarding the program that is to be transferred to tape.

- 1) The program **MUST** reside at \$B800 in Basic.
- 2) The program **MUST** be less than 98 blocks long.

When used with the computer that was presented earlier in this series (*Four Commodore*, March 1987) you should find that you can transfer most of your programs to tape with ease.

In Use

Simply **LOAD** and **RUN** the utility and insert the disk which holds the program to be transferred into the disk drive. Enter the name of the program to be transferred and press "Y" when prompted for "Tape Header". The turbo loader will now be **SAVED** to your cassette. Once this is done the program will be **LOADED** from disk and **SAVED** to tape at turbo speed.

Should you want to give the program on tape a different name to the one on this disk then follow the above procedure but when asked for the name of the file to transfer enter the new name. The turbo loader will then be **SAVED** out to tape with the new name. When the program searches for the program it will stop with an error since the program that it is looking for isn't on the disk. Now

simply re-**RUN** the program and enter the correct name for the program as stored on disk, but this time enter "N" when prompted for "Tape Header". The program will now be **SAVED** after the loader on your tape.

Getting It All In

The program is presented as a Basic program. Use the **SYSTEM CHECKER** from the **LISTINGS** page to make sure that you are entering each line correctly. Error trap routines are included within the program as a further check of your typing.

When the Basic program presented here is **RUN** it will **SAVE** the Disk-Turbotape program onto the disk in the drive. It is this program that you should use when you need the program. **NOT** the Basic loader presented here. 75

PROGRAM: DISK-TURBO BOOT			
	00	THE BOOT SEQUENCE."	00
	01	PRINT	01
	02	PRINT " CONSOLE FROM HEX	02
	03	TO BINARY AND PAGES"	03
	04	PRINT	04
	05	PRINT " CODE BACK TO THE	05
	06	AREA OF MEMORY FROM"	06
	07	PRINT	07
	08	PRINT " WHICH IT WAS FOR	08
	09	ADDRESS GENERATED."	09
	10	PRINT:PRINT	10
	11	END	11
	12	IF=ASC(CHR\$(PAGE CODE),10)=98	12
	13	IF=ASC(CHR\$(PAGE CODE),11)=98	13
	14	IF=ASC(CHR\$(PAGE CODE),12)=98	14
	15	IF=ASC(CHR\$(PAGE CODE),13)=98	15
	16	IF=ASC(CHR\$(PAGE CODE),14)=98	16
	17	IF=ASC(CHR\$(PAGE CODE),15)=98	17
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	96	IF=ASC(CHR\$(PAGE CODE),94)=98	96
	97	IF=ASC(CHR\$(PAGE CODE),95)=98	97
	98	IF=ASC(CHR\$(PAGE CODE),96)=98	98
	99	IF=ASC(CHR\$(PAGE CODE),97)=98	99
	100	IF=ASC(CHR\$(PAGE CODE),98)=98	100

75	87	99	111	123	135	147	159	171	183	195	207	219	231	243	255	267	279	291	303	315	327	339	351	363	375	387	399	411	423	435	447	459	471	483	495	507	519	531	543	555	567	579	591	603	615	627	639	651	663	675	687	699	711	723	735	747	759	771	783	795	807	819	831	843	855	867	879	891	903	915	927	939	951	963	975	987	999																						
00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99

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Amiga News

Future Sounds

We must apologise for not giving a prior or contact for FutureSound in our list soon. Thanks to those who called and reminded us! The FutureSound sound sampler for the Amiga is available from Tin-Computer Software. It costs £170 + VAT which comes in £185 including delivery to your door. See brochure for the full address details.

Database by Design

A very interesting demonstration of a brand new database for the Amiga has come our way. Available from Lunar Images, the Acquisition database appears to excel in both presentation and user friendly behaviour, including 'cut and paste' of data between fields. Graphic images can be stored as well as more conventional text, date and numeric data. A single field can contain a picture or document.

A 'mapped filing system' allows both relational and hierarchical filing structures, in combination if required. Up to 16 files can be handled in one application.

The Acquisition editors follow full design of both data format and data presentation. Data is manipulated in one file and placed in reports in another. A 190 function database language called ACDB allows direct setup and automatic control of the database. Apparently Acquisition can read and write information to and from other software.

Acquisition is being aimed both at non-programmers and professionals who need to build turnkey database systems.

Professional Page

Gold Disk, whose PageSetter and LaserScript software make up the only true Amiga desk top system, are launching a professional DTP system

called Professional Page. Running on any Amiga with 1Mbyte of memory, Gold Disk intend it to compete with other major players in the microcomputer field.

The software will include powerful tools found in high-end DTP systems such as WYSIWYG word processor, algorithmic and discretionary hyphenation, text surroundings, typesetting (kerning, tracking leading and baseline shifts) and a page layout system.

These new features however will mark the Amiga software apart. Colour picture information up to 768 colour or 4096 in HAM (hold and modify) mode, is maintained within the system. Pictures are displayed as grey level halftones. An add-on module will allow for colour correction, and mechanical as well as four-colour separations for offset printing. Images, regardless of size, will be displayed in the full resolution of the output device. Pages can be manipulated and combined with other pages before printing and can be rotated to any angle, size, moved and reflected at will.

Gold Disk launched Professional Page at the June '87 Comdex show in the USA. They intend to provide a strong technical support program and to publish a newsletter, the New Laser Times, for Gold Disk product owners.

Chatting over the Keyboard

Jensky Software have updated their 'Conversation with a Computer' which we looked at in the first Your Amiga. It remains a unique product with four logic games for maintenance, speech throughout and fully annotated listings in BASIC. The AI techniques involved in the games are explained. The new disk contains well commented source code in C and the whole package can serve as a beginner's level introduction to C for BASIC users. The software also

explains a method of cutting compiled C routines from BASIC.

If you enjoy programming then Conversation with a Computer is an excellent introduction to many aspects of working with the Amiga.

Display Debate

The Amiga is obviously stirring both manufacturers and owners to action concerning how to actually observe the famous graphics quality. This is because the AM0 is being sold with and without monitor. G. Slade from Cowlesme has written to Your Amiga saying that he bought an Amiga 500 from Basbytz (Holtbytz) at their stall at the Commodore Show in London, but only after he had been promised a TV modulator the following week. It transpired that Basbytz could not deliver. A phone call to Commodore revealed that they had 'more modulators than computers'. Mr Slade rang Basbytz again with the good news. They phoned Commodore who by this time changed their minds. They were ordering modulators. The moral of this story is don't leave the shop without monitor or modulator because the stylish grey hardware can get boring on its own!

Good news for owners of CB04 1901 monitors. Tilogic can convert the 1901 for use with the Amiga so that it can display any of the 4096 colours. The 1901 was intended for use with the C128 and has video and RGB inputs. By adding a SCART (game) socket, plus other modifications and a special lead (including audio), Tilogic can realise the full colour, medium resolution capability of the monitor.

The price of the upgrade is £24.95. Mail order upgrades will cost a further £15.00 for data post delivery (remember to send your monitor by insured post of some kind). Those in the Bradford area can of course call us at the following address: Tilogic, 129 Tong Street, Bradford, BD4 9QY. Tel: 0274 664298.



Karate Game

Eidosoft have launched two items of Amiga hardware and a new game, Amiga Karate. The martial arts game features music effects, two player options and many levels of increasing difficulty. Realism is added by carefully chosen sound samples from the real karate world as well as subtle background effects. Instructions will be in English, French and German, but not Japanese!

On the hardware front, Eidosoft's sister label Tintable have an add-on 3.5" disk drive which comes complete with drive disk and public domain software. There is also Pro-draw, a 300 inch graphics tablet costing \$59.95. Pro-draw works with Deluxe and Acpi packages as well as its own software (\$14.95).

Microprose Latest

Following the release of Silent Service, Microprose have announced future availability of Ultima IV, Antioch and, the impending release of Super Harry, Antioch is a fantastic strategy, role-playing game based on the American award winning 'Clu Wars' board game by Steve Jackson.

Superbase Award

The Software Showcase Productivity Award given by the Summer Consumer Electronics Show in Chicago has gone to Superbase Personal from Precision Software. The

award is for the Amiga, Atari and PC versions. Superbase gained special praise for its external file management system which allows applications created with other programmes to be reviewed and displayed next to their database record.

Kickstart Guide

Admiral Software, who published the technical magazine for Amiga software developers, have released edited highlights for us 'general public' in the form of The Kickstart Guide to the Amiga. 260 pages of introduction mainly to the system software and to C and assembler programming but with a hardware overview. Although aimed at those who do not know the Amiga, the book remains pretty technical, a must for everyone who is going to write software for the Amiga, for profit or fun.

Priced in a large A4 format, the book costs £12.95 (US\$ postage). Details from Admiral on 01-980 6203.

Toolkit Extras

Metacore have released a new version 11.2 of their Metacore Toolkit. The toolkit of 11 AmigaDOS commands, including powerful Unix based Make and Touch utilities. Others are Pipes, Librarian, Disassembler, Auxiliary CUI, Mount, House, Enlarge, Patch and Unpack. Price is £26.95.

Barbarian Twins

Following the release of Progression's Barbarian - reviewed this issue - Palace Software have announced an Amiga version of their Barbarian. The programmer and music specialist of hit program Castles are behind the project. Barbarian contains two games. Having perfected your swordsmanship against computer or other player in part one, you go on to fight to save the Princess from the clutches of the dark sorcerer, Drax.

The Barbarian is capable of sixteen different moves including headbutt, kick and web of death. Should we mention the decapitation? Price undecided. Details from Palace on 01-278 0251.

Ray Tracer

Have you seen the much vaunted Jaggler demo which all Commodore dealers seem to have running in their window? Well, it's the work of Eric Graham and involved countless calculations, at least an hour's processing and a program called Ray Tracer. The software is now available through the Amiga Centre Scotland. Ray Tracer lets you create your own spectacular pictures and a competition is to be announced for the best results. There is also a ray tracing newsletter which will be available from the Amiga Centre Scotland. Also available soon will be Eric Graham's Sculpt 3D.

WordPerfect

WordPerfect, which is claimed to be the biggest selling wordprocessor for IBM PCs and compatibles with over 600,000 users worldwide, is now available for the Amiga. The new version takes advantage of the Amiga environment with pull-down windows, multiple documents in memory, windows and menu control.

WordPerfect is available in the UK from Sentinel Software and over 2,000 dealers, priced at £295. Features of the Amiga version include a 115,000 word dictionary, the biggest on Amiga so far, full feature thesaurus, text collating, file drawing, sorting, footnotes and endnotes. More sophisticated capabilities included are mailmerge, automatic backup,

'indexer', contents/index generation and insertion of macros to replace repetitive series of keystrokes. Details on 0952 211064.

Also launched is Prowrite, New Horizon's wordprocessor capable of flowing text around graphics and working in high resolution. We intended to review this issue but the software crashed on our 1080s, working only on an A390. Explorations, we hope, next issue. With the other newcomer Viewwrite, the wordprocessor competition is really heating up.

Amiga at Work

More news from Commodore of the Amiga out in the field. How about those few in a varied set of computer users. Guy's Hospital are using the Amiga as an aid in the assessment of artery performance. Ultra-sound is shown on the moving blood and the reflected signal recorded. The Amiga is used to speed the analysis of the recorded data, comparing recorded wave shapes with known normal shapes to work out what is wrong. Amiga then presents the assessment as a graphic picture of a man with arteries colour-coded, depending on the degree of obstruction.

Supergas, who sell liquefied petroleum gas in cylinders are setting up a real-time telephone order taking and sales ledger system using Amiga connected to their mini computer.

The British Aircraft Corporation Space and Communications department use their Amiga to perform stress and structural analysis. The Amiga has become the intelligent 'front end' to the system, providing bit-maps diagrams where once slow plotters had to be used and allowing further interrogation and analysis of data.

Pharmaceutical company, Upjohns of Crawley, Surrey, use the Amiga to analyse laboratory data from a digital oscilloscope on the RS232 port. Their next project is to use the Amiga for image analysis by digitising pictures.

Dr Alan MacFarlane, a Reader in the Department of Sexual Anthropology at Cambridge University, is working on a database for the storage of large archives, extending it to work with anthropological material and preparing the first Cambridge experimental video disk. The hi-arch LV ROM-disk player will

contain information on the headhunters of India's N.E. Frontier, from the beginning of time to 1947.

Using a PAL Graphics, Dr MacFarlane will combine a collection of photographs, letters, diaries and similar material onto video disk. Diagrams generated by the Amiga can be superimposed upon video or photographic footage. This information will be available for talks and lectures and will become a permanent, though mutable, archive.

SAM Multitasking Basic

Parkway Computer Consultants have developed an alternative to Microsoft BASIC, with program options and a multi-tasking executive. For various programming SAM also provides commands for windows, menus and event handling.

Dancing Disk

Having spent an enjoyable couple of evenings investigating the US monthly Amiga disk magazine Jumpdisk, I was pleasantly surprised to find out that a UK distributor has taken up the cause. The May issue I checked out was a good 50/50 of articles and general interest programmes.

The Jump Disk menus make up articles or programmes, which are mainly in BASIC, easy to activate. All the programmes have full articles associated with them which adds to the

enjoyment and you can try the programmes and pick up ideas. Some of the games are pretty professional and the graphics damn excellent. Jumpdisk can be obtained from George Thompson Services Ltd., 1041 Regale Road, Betchworth, Surrey, RH5 7DR. Tel: 073-384 4675.

Also now available is EarType, the first in a series of 'Jumpdisk presents' software. EarType is a word processing program recommended for the blind and sight impaired. It uses the Amiga voice in an aid to writing. It is also useful for learning to type and could assist children learn the alphabet and spoken English. The price of EarType is a very reasonable £500 inclusive, reduced to £3.00 for orders placed by registered blind users. All profits made from the sale of EarType will be donated to a current appeal for the blind or sight impaired.

Another disk based magazine not yet marketed here is Akadain, a very classy 20 dollar, two-disk pack with top name correspondents interviewing stars, film reviews - complete with digitised pictures! - cartoons, reviews, software, recipes, self-improvement advice, business, fiction and some genuinely original computer art. The angles and graphics are top class and there is plenty of humour, including a "question the president" session with a digitised Ron and Nancy. It's a flash production and the price is concerning but it's not the right material for the medium and nice view.



Commodore at Comet

By the time you read this article your local Comet store should have its special "demonstration module" installed and a stack of A500s in the showroom. Commodore announced this first "high street" deal in mid-June and their national sales manager said "This is the first in a series of multiple retail announcements that can be expected from Commodore in the coming months."

Television Output

The Amiga A500 is very reasonably priced considering its performance but the price of a colour monitor can push the true system cost much higher. Many users will happily plug their A500 into their televisions. This is cheaper but a terrible waste of the graphics quality. Triangle Television, specialists in the combination of Amiga and video, have come up with a solution to the problem with their RGB to Video and RGB to RF converter boxes. These are currently five units, BR3 through BR7, which combine to provide either or both video out and RF out.

The converter boxes take the Amiga RGB output and convert it for a television or for a home video recorder. A valuable offshoot of this is the ability to record the Amiga screen on video tape, a portable way of distributing Amiga artwork and animation. Amiga graphics can of course be used as an opening title screen or for a list of credits on a conventionally shot video.

Triangle's John Clark (Research and Development) says "This unit has an innovative design feature which produces what we call "Super RF" and means that the colours and definition are of a very good quality on the home television."

For A1000 owners who wish to record on video, the units give a cleaner signal than the standard composite out. Prices range from \$67.00 to \$79.93.

How do I get it?

It's alright us giving you an exact address and ZIP code for some Lis-

bonique neighbourhood, but how do you get the software?

1. Check the ads - English Commodore dealers are importing more and more software all the time.
2. Try our contact addresses/telephone numbers.
3. Get in touch with Commodore UK who can supply you with a brochure full of goodies for your Amiga.

Timeline:

Commodore (UK), Commodore House, The Swanwick, Garsdon Road, Maidenhead, Berks, SL6 7XA, Tel: 028 770088.

Adrian Worsley, Finchampstead Road, Wokingham, Berkshire, RG40 2NE.

Almond Innovations and Research Ltd, 143 Maiden Way, New Maiden, Surrey, KT11 5QN, Tel: 01-949 4422.
Amiga Centre Scotland, 4 Ham Street Lane, Edinburgh, EH1 1RN, Tel: 031-557 4242.

Applied Videos, 15 Oak Ridge Road, Medford, MA 02135, Tel: 617-480 3602.

Artisan Software, 273 Kennel Road, London, W10 2DB, Tel: 01-980 0220.
Atlantis, Tressle Cottage, High Cottages, Walkcote, Polesworth, Leicestershire, LE14 6AE, Tel: 053-487 503.

Creswell Commodore Centre/UK Amiga Users Group, 66 London Road, Leicester, LE2 0JQ, Tel: 0533 50999.

Diamond Software, 26 Knightwell, London, SW27 0JD, Tel: 08-761 7902.

Edmond, Hill Farm, Nr. Ockendon, Essex, RM14 3QH, Tel: 0308 850468.

Felina Software, 2175 South Hoover Street, Los Angeles, CA 9007.

George Thompson Services Ltd, Whitegate House, 688 Reigate Road, Betchworth, Surrey, RH13 7JH, Tel: 0753-74-4035.

Gimp Software, 1287 Inglethorpe Lane, Collegeville, PA 19426, Tel: 2155842551.

Gold Disk, PO Box 388, Stratfordville, Mississauga, Ontario, L3M 2C2, Tel: 416-438 0913.

HB Marketing Ltd, Pier Road, North Fulham Trading Estate, Fulham, Middlesex, TW20 0TT, Tel: 01-444 1302.

IDB Images, 224 East 86 Street, Suite H, Bloomington, Minnesota 55403, Tel: 612 854 7793.

Jensky Software, PO Box 4313, Garden Grove, CA 92642.

Kenn Computers Ltd, Pangbourne,

Berkshire, England, Tel: 07257 4315.
Meridian Software, PO Box 896408, Houston, TX 77289-0408, Tel: 4713 488 2144 (1/5A).

Metacom, 26 Portland Square, Bristol, BS2 8RZ.

Microfil, PO Box 444085, Eden Prairie, Minnesota 55344, Tel: 612 944 8758.

Micropro Software, 2 Marlet Place, Tebury, Gloucestershire, GL8 8DA, Tel: 0688 54126.

New Horizons Software, PO Box 43167, Austin, TX 78743, Tel: 512 328 6215.

Parway Computer Consultants, 3 Mandell Court, Mandell, Wichita Garden City, Herts, AL7 1EN, Tel: 0202 775636.

Precision Software, 6 Park Terrace, Worcester Park, Surrey, KT4 1JZ, Tel: 01-330 7140.

Realised Software, 34 New Oxford Street, London, WC1A 1PS, Tel: 01-240 8038.

Sealed Software, Wellington House, New Zealand Avenue, Walton-on-Thames, Surrey, KT12 1PY, Tel: 0932 251166.

Taurus, Taurus House, 3 Bridge Street, Guildford, Surrey, GU1 4RY, Tel: 043 329099.

Triangle Television, 130 Brentwood Road, London SW16 5SD, Tel: 01-874 2418.

Tri Computer Software Ltd, 31 Oak Green, Tamworth Wood, Ashbly Langley, Warwick, Herts, Tel: 0927 69861.

Triangle, 329 Tong Street, Bradford, BD4 9QY, Tel: 0574 684288.

Vite Software, Chalkers House, 14 New Road, Charlton, Kent, ME4 4QR, Tel: 0634 45802.

VI Computing Ltd, Tarnay House, 146-150 St Albans Road, Warford, Herts, WD1 4AL, Tel: 0923 50365.

Club Amiga, 85 Upper Dranscombe Road, Dublin 9, Ireland.

Independent Commodore Products Users Group, 57 Gainsborough Avenue, Feltham, London, W8 4LP, Tel: 01-893 2634.

Local Commodore Business Centre on 0934 20355.

High Voltage, 25-58 High Street, Croydon, Surrey, CR0 1QD, Tel: 01-601 3032.

All Computers, 173 Thornbury Road, Otford, Midwiltshire, Middlesex, TW7 4QG, Tel: 01-568 7149.

CompuLink Ltd, 77/79 Chatterton Way, Odessa, GL9 9DDH, Tel: 080-652 808.

Analyze — a Spreadsheet for the Amiga

Commodore designed the Amiga to be a business machine, as well as a CAD/CAM workstation and a gaming machine. One of the main applications for micros in business is the spreadsheet, so just how successfully have these been implemented on the Amiga to date?

By Alan Solom

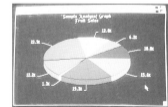
The three main Amiga spreadsheets are *Lotus123*, *VFP Professional* and *Analyze*. *Lotus123* is poor — it requires a double in one of the ports to operate, and then it is slow to move around, slow to recalculate and doesn't seem to recognize the existence of a mouse. Grafik, the company responsible, admits to rushing it out and will be releasing a much improved version later on.

VFP Professional looks rather better, but we haven't had a chance yet to look at it in detail, as there seems to be availability problems.

The Third Option

We looked at *Analyze* in detail. The first thing we did was to copy the demo file, so that we could put the original safely away, as recommended by the *Analyze* manual. As *Analyze* isn't copy protected, this is very straightforward.

When you click on the *Analyze* icon, a requester pops up asking how much memory to use for the



spreadsheet, and suggesting 128K. Theoretically if you ask for too much, the requester stays up, but in practice the requester goes away, and you have to click on *Analyze* again.

Sometimes, the whole screen goes

black, and you have to refresh it before you can try again. It would have been better if the requester told you the maximum space available for the spreadsheet, as they tend to be very memory-hungry applications. Our



256K Amiga wouldn't allow 256K of memory, but when we requested 200K, it happily let us into the spreadsheet.

Lotus 123 Similarities

At this point, we had a very pleasant surprise. Analyze is very reminiscent of the old version 1.0 of Lotus 123. This has been a major best seller on the IBM PC, and quite rightly, as it has all the functionality that a business user requires.

MSS have not copied the full "look and feel" of 123, which has turned out to be a wise move, as Lotus are suing two US software houses for doing this on the IBM. They have adapted the 123 user interface so that it is more suited to the Amiga, but in our opinion, they have not gone as far as they could have.

To load an existing spreadsheet, you bring up the menu with the right mouse button, as usual. You choose Project, then Archive, and the requester that pops up lets you get an old spreadsheet. Each spreadsheet has a comment next to it, which is fine describing its contents; much more helpful than just a filename.

The Archive requester also lets you Store a spreadsheet you have just started up, or Replace an existing spreadsheet with a new version. You can also use this requester to move between directories, and delete unwanted files.

MSS provide a few simple spreadsheets on the disk, to show you

what is possible. It would be a good idea to start off by loading one of these, and changing it around, to get the idea of a spreadsheet, and to get the feel of Analyze.

The end product of most spreadsheets is a report on paper. So Analyze gives you various ways to format your output, and you can then print it either directly to your printer, or else to disk, so that it can be incorporated into some larger document.

Cells can be formatted in several ways. The defaults is General, numbers are displayed in the most natural way. But you can change the format either for the whole spreadsheet, or for a range of cells.

Fixed gives a fixed number of decimal places.

Scientific uses the E (exponential) format, and is suitable for very large or very small numbers.

Currency puts a dollar sign in front of figures, and puts negative numbers in brackets. It also uses a comma to separate thousands. There's no way to get the pound sign.

Comma is like currency, but without the dollar sign. **Percent** displays the value times 100, followed by a %.

Bar can be used to create a simple bar chart.

Text displays the formula, rather than the result of the formula, and is useful for documenting the spreadsheet.

Date is used for formatting the date.

Having formatted the output, you can then print it. Analyze lets you choose the range you want to print, allows you to define headers and footers for each page, define the page width and length, and send the printer a set-up string so you can put your printer into NLQ mode before starting the print (or whatever else you want), as it is possible to set up attractive reports, and incorporate these into a major document.

For a report with more impact you might choose to display the figures in one of three graph types, pie, bar and line. The graph data is entered in sequence by choosing data from the spreadsheet. This can involve as little as clicking the mouse on an individual cell. Explanatory text is entered in a parallel sequence. The graphs are rapidly drawn in a new window.

Manoeuvrability

One of the most important factors affecting how nice a spreadsheet is to use, is how easy it is to move around in it. Lotus 123 is very easy to move around, even without a mouse, because of all the different ways there are for navigating the cursor around the spreadsheet. Analyze gives you a few ways, and they are badly insufficient.

The most obvious way is to use the cursor control keys and this will move the cursor around the displayed screen changes to reflect the new position, but it doesn't try to adjust the screen immediately (as per 123). It just refreshes the row numbers, until you take your finger off the cursor, and then the whole screen is updated. This speeds things up quite a lot, compared with the way Lotus did it. But it still feels rather slow.

You can also move around using the mouse, but this has not been done very well. You can only move around within the screen currently displayed; you can't move off the bottom and expect the screen to scroll in the same way as you can with the cursor controls. This is a major limitation, as it means that the mouse is almost useless for moving around, as spreadsheeting usually involves moving large distances. It's hard to see why MSS didn't let you move off the bottom with the mouse, or provide scroll bars, or let you drag the screen, or something.



DIGI VIEW

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Bring the world into your Amiga with Digi-View, the 4096 color video digitizer. In seconds you can capture any photograph or object your video camera can see in full color and with clarity never before available on a home computer. Digi-View's advanced features include:

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- Print, animate, transmit, store, or manipulate images with available IFF compatible programs
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ONLY \$199.95



NewTek
INCORPORATED

Even using the cursor keys, there are big limitations in your freedom of movement. You can move up and down a page at a time, using Shift-arrow keys, but there is no fast way to move right or left, a page at a time. It is a big pain that spreadsheets tend to be wide rather than deep. One of the most useful navigation keys in 123 is the find key, which signifies any arrow key so that the cursor moves to the end of the row or column. There is no equivalent in Analyze. There is only one method provided for making large jumps around the spreadsheet, and that is to use the Goto key (F3) to move directly to the cell required. But this is not the intuitive way to move around, and very few Lotus users move this way, even though this method is available in 123. We think that MS5 should put a LOT more work into the different ways of moving around the spreadsheet.

Entering data into Analyze is easy — you simply type the number, formula or label into the cell. It is also easy to replicate cells, using Copy. Copy can be invoked by using the mouse to bring up the menu, and choosing Range Copy, or by hitting C while holding down the right Amiga key. Since the mouse isn't very useful for moving around the spreadsheet, you'll probably use Amiga-C, as it feels better to stay on the keyboard than to keep switching between that and the mouse.

You can then type in the range you want to copy from (such as D10..E10) and then the range to copy to. But it's more natural to point to the 'from' and 'to' ranges. To do this, you move the cursor to the start of the from-range, press the \leftarrow key (this anchors one end of the cursor), then you move the cursor to the far end of the from-range. As you move it, the cursor expands, showing you the cells you've chosen to copy. When you get to the far end, you press RETURN and Analyze asks you where to copy those cells. You move the cursor to the top-left hand corner of the area you want to copy to, and press Enter, and the range is copied.

This is all very simple and intuitive in action, but could be made easier by a wider variety of movement methods.

People who have never seen spreadsheets in action before are always pleasantly surprised by the way that formulas adjust themselves when copied, so that they are well correct. So that if a formula that refers to C2 is

Year	Sales	Expenses	Profit
1987	100	50	50
1988	110	55	55
1989	120	60	60
1990	130	65	65
1991	140	70	70
1992	150	75	75
1993	160	80	80

copied one cell to the right, the copy refers to C3 and all is right with the world. Most of the time, this is how you want it to work, but sometimes, you don't.

So you can put an absolute (as opposed to a relative) reference into a cell. This is done by using \$ in the formula. So \$C2 in a formula means that even when it is copied, the copy will still refer to cell C2. You can also have mixed references, such as \$C2 — when this is copied, it will always refer to column C, but the row number will be adjusted. Similarly, you can have C\$2.

Another feature that serious spreadsheet users think is vital is what is called 'natural' recalculation order. Some spreadsheets allow the recalculation to proceed row by row or column by column. This means that if you refer to a cell below and to the right, the spreadsheet will get the answer wrong, unless you recalculate according to their dependencies, in the way that you would expect. Analyze uses natural recalculation order, although you can tell it to work row wise or column wise. Recalculation is normally automatic; every time a cell is changed, the spreadsheet recalculates. But when a spreadsheet grows large, recalculation can take a long time, so Analyze provides a Manual recalc — you can enter a lot of data, and then hit the Recalc (F9) key.

Analyze provides all the formulas that you are likely to need, as well as a number you're not likely to need (such as ArcTan). The usual functions section are SUM, @AVG (average), @SQRT and all there, as well as financial functions like Present Value, Net Present Value, and Present Value.

You can also create your own functions with HLOOKUP, which lets you set up a look-up table, and you can return values from the table that depend on the index you supply. This is very useful for tax tables, or payroll calculations, where the answers are not simple formulae, but can best be represented as a look-up table. VLOOKUP is the same thing, but the table is a column of cells instead of a row.

Another powerful feature is @IF, as this lets you return one value if the condition is true, and another if it's false. You can create conditions to test using the usual equality and inequality tests, and you can then combine them using @NOT, @AND, and @OR.

Conclusion

If we wanted a spreadsheet, and a computer to run it on, we would not choose Analyze on the Amiga. But if we had an Amiga and needed a spreadsheet, Analyze is a quite noticeable product. Most importantly, at no time during its use were we invited to meditate on some strange number, with consequent loss of all our work — that would be the most unforgivable sin, and it did not happen. But the means of moving around the spreadsheet should be improved, so that should not be too big a programming job.

Finalize:

Name: Analyze, Price: £1.99, Supplier: Precision Software (Amiga Systems Software), Tel: 01-428 7196.

The Best in Amiga Peripherals from Precision Software

SUPRA HARD DRIVE



At least a fast, reliable range of Amiga hard drives. Available with 20 or 60MB capacities, the **Supra Drive 4xii** features a real-time clock with battery back-up for time and date retention, a SCSI expansion port to connect another hard disk, and the capability to expand your system's RAM memory. The drive plugs onto the Amiga's bus expansion connector and incorporates a proprietary interface for burst data transfers of over 250 KB/sec. Other bus devices can also be connected.

Supra 20 MB Hard Drive

£699!

Supra 60 MB Hard Drive

£1399!

MEGABOARD 2



MegaBoard 2 is a reliable new low-cost 2 MB RAM expansion unit which plugs onto the Amiga's bus expansion connector. **MegaBoard 2** comes fully populated and can be auto-configured with AmigaDisk Version 1.2. One of the fast RAM units available, **MegaBoard 2** allows better use of memory oriented software — **Amiga Animator**, **DrawPlus**, **Deluxe** slides, etc. — and RAM disk for fast copying and handling.

MegaBoard 2 2 MB RAM Expansion

£499!

CHERRY A3 GRAPHIC TABLET



The ideal graphic tablet for designers of every discipline, the **Cherry A3 Graphic Tablet 540mm x 400mm** offers 2.1mm resolution and accuracy of placement. It is immediately suitable for time-consuming applications, for design yet robust UK design institutes both lightweight pen and 'puck' with 4 colourways and improved lens. The proprietary Mouse Cursor software enables the Amiga cursor to be driven straight through pen in puck, with the puck buttons emulating Amiga mouse buttons and screen function keys.

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FOR AMIGA
COMPUTERS

Printing in Laser Light

The LaserScript extension to Pagesetter offers a professional option to the Amiga Desk Top Publisher

Gold Disk have released an important extension to their Pagesetter software, the LaserScript package which acts as an interpreter for any laser printer which understands the Postscript page description language.

Pagesetter, like other graphics based programs, usually prints the screen page on a dot matrix printer, translating the dots seen on screen into the appropriate pattern and intensity of printed dots on the paper. Postscript is one of a new generation of languages (sets of codes) which both laser printers and typesetting machines can understand.

LaserScript describes a Pagesetter page in the correct code for each printer. Not all laser printers have the Postscript interpreter built-in, including the latest cheap lasers, such as the Epson and Citizen. Pagesetter can certainly "dump" its pages to these printers but even LaserScript will not be able to "describe" them.

Postscript Power

What is the difference then? LaserScript will allow Pagesetter pages to use high quality typesetting fonts like Helvetica, Times, Courier and Symbol. These are supplied in 8, 12, 14 and 24 point sizes and there is a utility to convert to other point sizes as required. Some laser printers are

powerful computers themselves and contain a number of fonts in ROM. The full resolution of the laser printer or typesetter will be used, not the resolution of an Epson dot matrix resolution.

LaserScript also allows you to stack Pagesetter pages onto just one custom designed page. You can create "frames" which are templates for the Pagesetter pages. The Postscript language can be used to create all sorts of typesetting effects such as grey tints, white text on black background and text printed in a curved fashion.

Postscript is a full language with its own commands and structure. However LaserScript does not supply the language in a form which is programmable but provides a front end "studio" in which you choose typefaces and page design. LaserScript then translates the appropriate Pagesetter pages and sends the correct Postscript codes to the printer.

This text is a Pagesetter page printed on a dot matrix printer. We have used the Times typeface in different sizes, the Courier font in 12 point and there is an example of the PS-symbol (special character) font at the end of the page.

These fonts can be copied to the Pagesetter disc or, with a two drive system, become the default fonts by inserting the LaserScript disc at the Workbench prompt. The same file, once proofed, can

be imported into LaserScript. The resulting Postscript file is then ready to be printed out on a laser printer or to be sent to a typesetter. The Postscript file can be in a form suitable for dispatch via electronic mail, for instance to a typesetting company with a mailbox on Telecom Gold.

Package Deal

Commodore distributors High Systems have put together a Desk Top Publishing package based on the Amiga 500 for the all-in price of just under one thousand pounds. The setup comprises Amiga 500, monochrome monitor, Citizen 1200D printer and leads, Pagesetter software from Gold Disk and support. This a cheap DTP setup should be widely available through Commodore dealers. Uniquely, for the price, the software allows the user to upgrade to laser printer and even laser typesetter quality with the LaserScript software. Gold Disk are further integrating their Pagesetter software to produce a "professional" DTP package. Effectively that's what you've already got with Pagesetter and LaserScript combined.

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Tools of the Trade

You will need a new assembler when learning to program in 68000 assembly language. We look at three assemblers with subtle differences, but which all produce either executable or linkable code.

By Anne Owen

The ideal assembler and associated software tools are designed to make the writing of code as easy as possible. Requirements include ease of documentation and debugging, the ability to use meaningful labels and different number bases (e.g. binary, octal). When you buy a professional assembler it is also fair to expect lucid documentation and for the beginner to 68000, a basic introduction to the chip.

In actual fact the assemblers looked at here provide different combinations of editor - in which the program instructions (source code) are written; assembler - which takes the assembler instructions and turns them into machine instructions (object code); assembler/debugger - for checking the actions of the instructions; and linker - which takes combinations of object code (created by assembler or high level compiler) and links them together into one file.

Selva

When using Selva, the programmer flicks between a full screen editor and a command window in which single keypress commands invoke both assembly and file management. Various assembly options, such as listing output to the printer, are available.

The next text editor lacks the sophistication of ED but is functional. Some two dozen pseudo operators can be inserted in the assembler listing providing things like conditional assembly (IF, IFR, ELSE, ENDF), macros and enter output.

The debugger can examine memory locations and registers, edit constants, disassemble code and single step through a program. Interesting Selva acts both as assembler

and linker, accepting linkable code while assembling source at the same time.

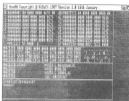
The Selva manual packs also into its 35 pages including 'how' appendices on AmigaDOS libraries and 68000 instructions but there is only one short example program.

Derpac

Hi-Soft's Derpac is the latest assembler release and the first to use Amiga windows and pull-down menus in the editor. Derpac comes recommended from the Atari ST and Hi-Soft proudly tell us that Argonaut used Derpac to write Star Gladiator for ST and Amiga. Derpac provides the editor, assembler and debugger. Pull-down options have key press equivalents and the editor is a window which can be resized and moved around like other Amiga windows. Proper registers prompt for user input and the actions of the assembler can be setup from an 'installation' program as well as from within.

The assembler, GenAmiga, includes features such as conditional assembly, macros, position dependent code for ROM or other micros, general constants, file strings and the ability to include standard libraries of code from specified directories. There are conditional assembly directives such as 'if greater than', 'if string equivalent to other string'. Conditional assembly is useful for debugging code in test versions and writing for different machines.

The Derpac disk contains a range of include files, such as an on the Metacomco disk, but with directives in place of macros and with comments removed. The originals are in the ROM manual. The assembler can be directed by an OPT command to, among others, include debugging information for GenAmiga, to list to a narrow printer and to



M68000's Depmac

line-position independent code. Each option has both an on and off setting.

Green, the debugger, lets you set breakpoints, single step through the code, issuing out operating subroutines if required - examine and edit memory and registers.

M68000 have also provided BLINK, a public domain linker which improves on the ALINK standard. Instructions are found in text files on disk. The version of Depmac I looked at (end of June) was provided with a modified Workbench 1.1 and had a slight problem with Kickstart 1.2. The user has to issue a 'setup user' command before issuing the GENAM command. I had to write an alternative startup sequence file with Ed.

The Depmac manual is desktop published and comes in a ring binder. It provides a generous number of examples on disk (e.g. using library functions to open a window or startup in Workbench) as well as instructions on setup and syntax. Appendixes on AmigaDOS and on the role of libraries in the operating system should prove especially useful for the newcomer. The Motorola 68000 reference guide is usefully included.

Macro Assembler

To use the Metacomco assembler the programmer writes the instructions in the Ed text editor, which is supplied as part of AmigaDOS. The assembler is then called with the name of the instructions file. The assembler command can take various parameters such as source and object filenames, verification file, header file and equate file. There is a further options parameter and finally the programmer can add a directory list for the INCLUDE command.

Metacomco's assembler has a large number of assembly directives for symbol and data definitions, assembly control (e.g. relocate origin, conditional assembly) and listing control (e.g. NOPAGE to turn off paging). There are eight versions of the conditional (e.g. IFD - assemble if a label is defined, IFCT - assemble if expression is > 0). There are directives to change the program counter, to equate labels with symbols, to list selected parts of the code, to set page and line length and to print a program title at the top of each sheet. References to linkable code can be made with KDEE and XREF. INCLUDE combines selected files from disk into the assembly sequence.

The Metacomco manual is stylishly produced in their new standard A3 format. There are sections on the Ed text editor, using the assembler, controlling the assembly and a brief introduction to the 68000. The assembler directives are individually explained.

Macros

A macro is a labelled set of instructions which generate object code when called. Metacomco's assembler is not alone in supporting macros, both Soka and Depmac have MACRO commands.

However Metacomco are justified in emphasising this aspect of their assembler. The inclusion in MCC's assembler of special text manipulating directives VALOP, STRLEN, LEFT, RIGHT and MID (which work like their BASIC equivalents) means that the macro can be instructed to modify arguments appropriately by testing the contents of strings passed to it.

In both Greenigma and Metacomco's assembler macros are defined within MACRO..ENDM directives with MENDIT allowing a quick exit after a conditional run. By default, macro generated code is not included in a listing but can be switched on by the appropriate directive.

Calls to the macros can pass variable arguments and a special argument can produce unique labels within the macro-generated object code. In Metacomco's assembler up to ten previously defined macros can be called from within a macro but nesting is not permitted. In Greenigma up to eight levels of macros can be nested allowing recursion.

Conclusions

These three assemblers reflect the strength of Amiga software in general and offer an excellent choice for the assembly programmer. However some of the manuals attempt to teach assembly programming to beginners will require a suitable book.

Soka is an efficient set of programmer, editor, assembler and debugger, but you will have to become familiar with its way of working. I didn't find this a great obstacle with the programmer, but fail that Soka's poor interaction with the user clouds the abilities of the software.

The Metacomco assembler (68000) is a very powerful program with a set of sophisticated assembler controls designed to ease the difficulties of development and documentation. A further plus is the use of Ed, the Amiga text editor, with which you may already be familiar. Experienced 68000 programmers will want to take advantage of this assembler's sophistication.

Depmac (INTEL) provides an 'Amiga style' advice which is easy to use, a comprehensive set of assembler controls and formatting options and a debugger. With its excellently presented manual, Depmac is the best of the bunch for newcomers to the Amiga and 68000.

Troubleshooter

Product: K Soka Assembler. **Supplier:** Komet Computers, Pangbourne, Berkshire. **Tel:** 0715 741121.

Product: Depmac Amiga. **Supplier:** M68000, The Old School, Greenfield, Andover, HANTS. **SOE.** **Tel:** 0125 718181.

Product: Macro Assembler. **Supplier:** Metacomco, 28 Portland Square, Bristol, BS2 8BE. **Tel:** 0372 438418.

Amiga Games

The graphics potential of the Amiga gives game designers an irresistible challenge.

We've reviewed some of the latest.

CONTENTS

By Anne O'Leary



FLIGHT SIMULATION II

After the first Synthetic Graphics (SG) demo was played to the world's airport, I got showed "Synthetic" Moments from the engine program to have your life and the ground of the sky from the French side, including it changed and there are flighters standing in the scene below.

Another dating machine behind some lines had better. They were waiting for the "Bacon" and the "Light" machine. The only control buttons are two buttons if they fail to drop in the first machine over the scene. Game's assistant and game's engine.

The most interesting feature is that the machine had better to the machine. The only machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

It like me, you can't go back to the flight to the flight to the flight. The only machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

The machine had better to the machine. The only machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

There's a keyboard reference card. It would be better to the machine. They were waiting for the "Bacon" and the "Light" machine.

Great God, there's a lot of things to do. The machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

But let's not get ahead, continue. The machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

The machine had better to the machine. They were waiting for the "Bacon" and the "Light" machine.

Also, you can look at the machine. They were waiting for the "Bacon" and the "Light" machine.

When you're looking at the machine. They were waiting for the "Bacon" and the "Light" machine.

They were waiting for the "Bacon" and the "Light" machine.

At all times you can look at the machine. They were waiting for the "Bacon" and the "Light" machine.

realism of almost unlimited number of units. Control is somewhat more challenging. Unless a player's forces already cover the entire continental United States and extend well into Canada, Mexico and the Caribbean.

Maps and other features are designed directly from aerial photographs or satellite photos. Fortunately, Simbiotic don't expect you to spend the rest of your life around the world so they're just under 24x24 at high speed to save frustration as well as. **PLATFORM:** PC and naturally all your counterparts. The map works with some, maybe all, other areas.

Well, that's all there is to it. The graphics appear to be done via rotating the same window help. The sound is superb, the best controlling, the best construction, the best information all encompassing. It's hard not to be proud here. You're on the ground as opposed to being in a 270 degree heading, facing west in Oakland International Airport in Oakland, California. You're got your maps, manual and all that. You are building the nation, construction, you're. It's hard not to be proud and all that. You're on the ground as opposed to being in a 270 degree heading, facing west in Oakland International Airport in Oakland, California. You're got your maps, manual and all that. You are building the nation, construction, you're. It's hard not to be proud and all that.

Developer:

Name: *Simon & Schuster, 11 Park Ave, New York, NY 10017*

Supplier: *Simon & Schuster, 11 Park Ave, New York, NY 10017*

Availability: *PC, PS, Xbox, Wii, etc.*



HOLE-IN-ONE GAMES

In *Deliverance of the Crown*, you play the part of a Saxon warrior in Medieval Britain with various units, troops, and a leveling system to make your work. You can build a kingdom, with a variety of upgrades. *Deliverance of the Crown* is a strategy game that focuses on the construction of your kingdom. The second level involves building a kingdom and then your home based resources, the third level personal survival play. *Deliverance of the Crown* is a strategy game that focuses on the construction of your kingdom.

A map can be created by a player, created into various areas, some neighbors. *Deliverance of the Crown* is a strategy game that focuses on the construction of your kingdom.

game play, strategy, tactics, and building, with a focus on the construction of your kingdom. *Deliverance of the Crown* is a strategy game that focuses on the construction of your kingdom.

The details of the *Deliverance of the Crown* are a lot of things, but with a focus on the construction of your kingdom.

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project, instead of a linear flow, and depend on your judgement) of the spring mechanism takes you through the shoot-out stages. The "Shogun" fire back and forth at individualy, heading for the bottom of the screen to reload on the second pass.

You can make an optional bonus journey through alternate mazes at various speeds. You have to achieve like a happy player, increasing and decreasing your own speed as well as changing the tracks. The faster you get through, the larger the bonus score. You can also fish coins and pick up various things, which even take about ten "hits" to load (hahaha) for extra points.

Another single player between games but in both levels are seconds and then replay starts immediately, except that the sounds that are missing in "Shogun" are the explosion, load and starting digitized blats.

You can judge "Shogun" as being conventional or a little depending on your taste. It is certainly a fast, well-paced and exciting game to play, the controls I played would not work with "Kickstart" I did use LT or check with Robbin before buying it (you didn't have LT).

Features:

Name: Shogun, Publisher: TETRA, Machine: Atari, Japanese Version: RM 010477 (1987), Originator: TETRA, Programming: TETRA, Graphics: TETRA, Value: 49.95.



GUIDE TO FLEEVES

The strategy being characterized and computer requires advice are all some of the old fashioned instructions that are our responsibility. Now, another game is added to the list. Despite the huge number of computers, there was the last time you had someone dressed in a top cap. Walk back, water too short and carrying a large bag marked "pig." No, the traditional baggie is an endangered species and this is, inherently, the last of our Judge Major Q. Q. Thundershot.

The water had a more paper than the one given that could follow him. As you can see through an oval cut right at the side, it never allows itself to be pulled for whatever you allow legal trouble. If you were really at all, there were was a law about the reference would be a double. The fact that he was also pulled to the ground but the double was like a few lawyers with the second a order in case they were with right on the judge had a bad temper than day.



The Judge's Story was something like this. There will always be trouble to solve but some dramatic events profession and Fortia Castle. It took some time and not a few hours to bring the (not shown) but RUMBLE started at, setting to work upon the head of the highly formal and the one way thing to the well founded method of the man, who was. He was the one that and then to read for himself.

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organ, garden and beehive and a larger whole or subunit (don't like the post-war look).

The location descriptions are creative with some whimsical touches of fantasy. I particularly enjoyed the description of the painting—a colony of Ravens painted during its most period. The paintings are original and the general storyline is excellent, but is the Point.

The music is quite simple but has charm, so playing it on the complex Melodica. It has a few moments where it could make use of the graphics that you had just optioned. The way things about this is that you start journeying normally with the game rather than using the conventional there is a computer to do so as well, should you make a typing mistake.

I have gone on to write the game for showing that graphics have to play a role in games. They should be not only as pictures can enter the picture to atmospheric location descriptions. It is not by far the best. The picture that accompany the game is superb. There is nothing to worry about.

The game comes complete with the hard copy of What Kingship means and you can have a lot of the same as well as writing an original design, creating a new scene, and you can have the game well be played to know that the game is now gone public and is receiving a lot of attention. There is also a lot to find out about you get stuck. Simply type in continuously keep playing of the computer characters and let the computer do it for you. You will then get a simple clue that will help you to solve the puzzle.

Is there nothing to write with this game? Well, the optional audio feature is not bad but that's just a computer to assist all why you shouldn't start calling the Random office immediately.

Features:

Name: *World of Kings—Supreme Assault*, P.O. Box 21,000 Hill View, Dallas, TX 75201. Playability: 70/10. Graphics: 8/10. Value: 8/10.

THE STARGLIDER EXPERIENCE

The Amiga release of *Starglider* really puts it ahead in the forefront of Amiga software publications. The familiar packaging for each of disk, manuals, manual, keyboard and poster effectively work together to create a software experience, something a lot more than just a game. The manuals is especially tied in with the game and you will only know what you are doing when you start and how to play about it by reading the manuals.

In James Fisher's extraordinary tale we get taken from the beauty of Kaitia and Elyon in their ice to the desert of Elyon that which has all but desolate of their planet Nevada. The Elyon Fleet penetrated the Sacred Defense Force by meeting their craft on the Starglider, you take down the Nevada's and whose ships the Nevada's have been programmed to recognize and leave alone.

On the Nevada's moon base Kaitia, events of action depicted an airborne Ground Attack Vehicle (a mission) was destroyed by a highly skilled and a highly skilled and intelligent individual, AGIRA. The main mission was a highly skilled but Kaitia provides a very interesting and



more on combining the mission to keep off "hazardous" missions.

Starglider the game played just as beautifully with colorized screen, with the 3D vector graphics supporting the Elyon ship and Nevada's war ships, an original but effectively powerful graphics which make it very interesting game and a great game. It includes a beautiful manual from the on-board computer. I have to do a beautiful, original story line which opens the game.

Finally, the programming was the Nevada's ability will not provide an original exciting game. You have a continuous and diverse a variety of Elyon vehicles and instead with your flight AGIRAN's mission you will only with involving your ability to make and use your own skills to avoid the ongoing plot.

Once you have mastered the basic challenges of early but you also give information about the Elyon fleet, which is a great, original to understand and like the flight to their strength, which is a great game and a great game. When you become a Starglider One you can just imagine the original film commander Winston Keane getting his mind expanded hard time.

To be said, *Starglider* your Matrix. It would be an essential part of an Amiga game collection. I would have given a higher "value" score but for the high price of the software. There's no denying the quality of the package for Amiga owners and will bring about to get over the odds. What do you think?

Features:

Name: *Starglider*, Price £24.95. Publisher: Amiga Software, Kooled, P.O. Box 21,000 Hill View, Dallas, TX 75201. Playability: 8/10. Graphics: 8/10. Value: 8/10.



SILENT SUBMARINER

Are you a patient tactician with an eye for detail but also an opportunist with a ruthless killer streak? Well, there's a job opportunity for a submariner on an American sub-patroling the Pacific Ocean, circa 1943.

Silent Service took a number of plays before it grabbed me. One particular cat and mouse session with the first torpedos of an enemy convoy kept me playing into the night.

The game is based on accurate mapping of the war patrol region, the Pacific between Japan and Australia, a full war patrol is a good evening's entertainment. The manual provides maps with convoy routes, naval bases and facts and figures from history. You can also choose training patrols and convoy action scenarios based on historical situations.

The scale of the simulation is geographically and chronologically accurate. But you don't have to spend 90 days at sea! The passing of time can be increased by up to 12 days 'real time'.

The time of day is important. You can happily sail on the surface during night at a maximum of 20 knots. When attacked during the day you have to operate below the surface where you won't get above ten knots, and you have limited staying power as the batteries drain.

The game reports actions such as sensor picking up explosions, enemy ships, and depth charges seeking out your flame trail. When you are in trouble you can blow the emergency tanks to halt an uncontrolled dive or release debris and oil to deceive the ships above.

On board your submarine you move between the map room, the bridge, the periscope, a display of vital gauges, damage report and quartermaster's log. This process is intrinsically slow because of the disk access involved. There's no lack of excitement however when it comes to tracking a target with the periscope, firing the deck gun or launching a torpedo on its way. The Torpedo Data Computer (an early analogue device) gives you information on the target and you make your calculations based on bearing, heading and angle on bow. If they are accurate the torpedos will strike home causing flames and oily black smoke to burst forth.

The graphics of the bridge, the conning tower, the submarine damage report and the maps are nicely produced in different styles. There's a nice full screen graphics display of the gauges which show the current status of fuel, battery

charge, torpedos, shells, time, depth, distance to bottom and so on. The enemy ships are well detailed but this serves to add realistic difficulty to the game.

Sound effects include the low purring, acceleration and deceleration of the engines, the gun fire and torpedos launch. You will jump out of your skin the first time you choose to dive and the chosen goes off.

As well as reasonable use of the Amiga's sound and graphics the parallel keyboard and mouse/joystick controls are very responsive, the manual is replete with maps, drawings, historical background, tactical advice, playing tips and military/naval terminology. *Silent Service* provides accurate detail but it is also capable of instilling some of the anxiety felt by a hunted man, and of the satisfaction of hitting a difficult target after careful preparation and planning.

Touchline:

Name: *Silent Service*, Supplier: Microspace, Tel: 0666 34126, Machine: Amiga, Price: £15.95, Originality: 8/10, Playability: 7/10, Graphics: 8/10, Value: 8/10.



BRAIN AND BRAWN REQUIRED

If you prefer swordplay to strategy and wrangling to real time Barbarian should suit your gaming style. It will also introduce you to some of the best character animation yet seen on the Amiga. On using the game, the usual reaction is 'I must get an Amiga'. Barbarian lacks nothing in panache, from slickly painted fantasy screens to animated scenes with accompanying digital cracks of lightning and the rumble of thunder.

The game is an exploration and a mission. You have to destroy the lair of Necron and claim the Kingdom's crown. The trials involve fleeing an exploding volcano against the clock, Hegan moves around his world via a network of ladders, each full screen scrolling into view as he reaches the edge horizontally or vertically, this involves the bric-a-brac of games. The disk must stay in the drive because as you progress further data is read in.

Control is by a means new to me, combining mouse

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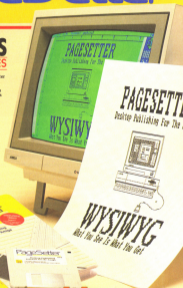
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Setting Amiga System Time

Unorganised - read on, discover the advantages of getting the date and time from the workbench using the Intuition gadget interface capabilities.

By Peter Lawrence

I'm the sort of person who continually rewrites and updates his files giving them odd and cryptic names which, although seemed reasonable at the time, a week later always leave me scratching my head wondering which of 'Program newer' and 'Program latest' is really the most recent version.

Fortunately for me, AmigaDOS has a feature which can save much of this frustration. Whenever a file is saved or rewritten to disk, AmigaDOS automatically stores the system time along with the file, and this can be easily accessed using the LIST command from a CLI. In this way I always know which is the most recent version.

Of course, life is never really that easy. I, like most Amiga users do not have a hardware clock in my system and so every time the computer is powered up, the date and time need to be reset manually. This is not too difficult to do from a CLI using the DATE command, but if you are working with the workbench then you have to use the preferences program which is quite large (>50K) and so eats up masses of memory for storage

and time for loading. Not good enough I say.

'Well', I hear you say, 'Why not modify your start-up-sequence file to include the date command and prompt for user input. In this way the date can be set every time the system is started.' (See listing 1.)

Accidents can Happen

OK, this is true. I'm glad to hear that you are all tirelessly delving into the magical workings of the CLI despite the considerable effort Commodore seem to have put in to prevent we mere mortals from even knowing it's there. But, what happens if you make a typing error (and believe me I often do!) and enter an invalid date or use the wrong format. Yes, date returns some obnoxious error code, the system gets confused and the command sequence is terminated immediately.

This leaves you to set the date, load the workbench and close down the CLI manually - which quite frankly is too much work to expect. This may sound lazy to you, but what do you expect from someone who won't even

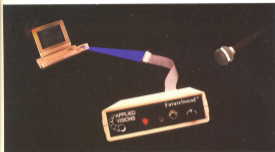
take the trouble to give his files logical names.

'So what is the answer?', I hear you cry while desperately waiting for me to get to the point of this article. What all this has been leading up to is a program which allows you to get the date and time from the workbench using the Intuition gadget interface capabilities.

Such a program would be most efficient than loading in preferences with the thousands of bytes it requires to reconfigure the rest of the machine. In fact, why not write the program so that it will also run from a CLI. In that way you could call it from the start-up sequence and have a more error tolerant way to set the date upon power-up.

The program is presented in listing two and is written in assembly language for the Seta assembler. Assembly language was chosen over C simply because it is faster, more compact and cheaper (which makes it a little more accessible to most Amiga users), and because I don't have a C compiler. In addition, the Seta assembler can be easily used on a system without an external disk drive

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Mnemonic				Address				Data			
LD	R0	#0000	00000000	LD	R0	#0000	00000000	LD	R0	#0000	00000000
LD	R1	#0000	00000000	LD	R1	#0000	00000000	LD	R1	#0000	00000000
LD	R2	#0000	00000000	LD	R2	#0000	00000000	LD	R2	#0000	00000000
LD	R3	#0000	00000000	LD	R3	#0000	00000000	LD	R3	#0000	00000000
LD	R4	#0000	00000000	LD	R4	#0000	00000000	LD	R4	#0000	00000000
LD	R5	#0000	00000000	LD	R5	#0000	00000000	LD	R5	#0000	00000000
LD	R6	#0000	00000000	LD	R6	#0000	00000000	LD	R6	#0000	00000000
LD	R7	#0000	00000000	LD	R7	#0000	00000000	LD	R7	#0000	00000000
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LD	R10	#0000	00000000	LD	R10	#0000	00000000	LD	R10	#0000	00000000
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LD	R13	#0000	00000000	LD	R13	#0000	00000000	LD	R13	#0000	00000000
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LD	R30	#0000	00000000	LD	R30	#0000	00000000	LD	R30	#0000	00000000
LD	R31	#0000	00000000	LD	R31	#0000	00000000	LD	R31	#0000	00000000

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	Variables	Expressions	References
0	<pre> serve:1 seconds:=dl : divide system time by dl : dl =1 : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>	<pre> serve:1 1400000001DL,dl : ADDRESS OF ADDRESS OF two- </pre>	<pre> : serve:1 1400000001DL,dl : ADDRESS OF ADDRESS OF two- </pre>
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8	<pre> : add : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>	<pre> : dl =1 : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>	<pre> : dl =1 : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>
9	<pre> : add : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>	<pre> : dl =1 : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>	<pre> : dl =1 : dl000 to get no. of dive #S70,d0 : elapsed days : serve = dl,elapsedday </pre>

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Graphics Butcher

We look at the latest package in special effects for the Amiga.

By Anne Owen

The Amiga is the graphics microcomputer par excellence with a number of powerful and highly rated painters, technical drawing and animation programmes. The latest 'effects' program from Eagle Software is now available in the UK from Aristimus Software. Rather inappropriately, but deceptively titled 'Butcher', the program comes complete with an onscreen icon which changes drawn when double-clicked!

Butcher provides a number of special effects for an RLEH (HPP Interleaved Bitmap) format file. Thus pictures from Deluxe or Amiga packages can be imported for editing. The simplest feature to use and one of the most useful is that of printing a selected part of the screen, including Hold and Modify screens. In this way any rectangular shaped window can be cloned to a printer supported by Preferences, black and white, colour or laser, either in a standard or enlarged format.

Butcher will load different screen modes and convert between HAM and low resolution with and without inverts. This will be particularly handy for Deluxe Paint users. Display Drivers can change screen format. Butcher will not load the 328 by 240 full page or 352 by 240 full video formats. Butcher provides basic line, rectangle and freehand drawing for retouching purposes. The picture can be reversed or flipped a very fast operation.

Any picture on screen has a default palette. Butcher can adjust the palette and you can maintain three different versions in memory. You can also save them. You can work on individual colours picked from the screen pixels or modify factors such as RGB mix and hue saturation value over the whole range. Colours can be sorted by intensity, speed and 'spread' between two specified colours. Butcher will also 'map' one palette onto another for a closer match.

The most stunning effects available are edging, pixelating (called mosaic) and filtering. During the edging process Butcher decides whether any particular pixel is part of an edge by examining its neighbouring pixels. You can control the threshold at which Butcher will judge the pixel as sufficient variance with its neighbours to be plotted as the edge. The resulting effect sharpens the picture.

Pixelation is the conversion of the picture into rectangular 'tiles', a favoured effect in the printing industry. A variety of tile sizes are available, but I felt the smallest possible was not quite small enough. Filtering again looks at



the individual pixels, removing any isolated groups from the picture. The size of group and the area of picture processed are both under user control.

Butcher offers an insight into the way an Amiga screen is built up, offering the ability to change the number of bit planes displayed. Each screen pixel has its own corresponding bit of data. A 328 by 240 display has 64,000 individual pixels per plane (8,000 bytes of memory). A histogram of the different coloured pixels can be displayed and colours from any clipped (selected) part of the screen merged, exchanged or sorted. These sometimes drastic changes to a picture can usually be restored because Butcher retains a backup bitmap.

Despite the lackluster packaging, Butcher proved exciting software for anyone manipulating graphics on their Amiga. The processes are basically those used in much more powerful systems in the printing and video industries and are therefore educational as well. Anyone contemplating desk top publishing or presentation graphics will find Butcher can live up to their screens.

Features

Name: Butcher. **Supplier:** Aristimus, Tvl Amiga Centre, Scotland G77 5JZ/G72. **Machine:** Amiga. **Price:** £25.

Animated Graphics

No hardware Sprites on your Plus/4? Never mind, movement in hi-res mode is still possible, as this program shows.

By Barry Durnall

The Plus/4 has high quality graphics with drawing and painting commands available in Basic. Unfortunately it does not have hardware sprites and so it is difficult to produce convincing animation.

The following program, written mainly in Basic, uses the technique of overwriting to produce movement in hi-res graphics. Six different pictures are repeatedly displayed on the screen giving the effect of repeated motion.

Operating in text mode the Plus/4 (or C16 with a 64K RAM pack) has 60671 bytes free to Basic. This is situated in the 64K of RAM from 4K to 64767. The RAM below 4K is used by the rest of the system, the operating system and Basic itself. Above 60667 are the graphics/sound chip registers and other I/O devices.

When a graphics mode is selected, the RAM from 6K to 36K is reserved for the 2K colour map and 8K bit-map. The start of Basic is moved up to 16K. This leaves 2K of RAM unused from 4K to 6K.

If the top of Basic is set to 6K before selecting the graphics mode, the start of Basic remains at 4K and extends to 6K. So the 2K of RAM is required for the Basic program.

This leaves enough RAM free above 6K for five additional 8K graphic bit-map screens which the graphics chip can be directed to look at in addition to the normal bit-map. Each bit-map screen shares the original colour map from 6K to 8K.

Program Description

The program starts (line 105) by setting the pointers to the top of Basic to 6143; this will ensure that Basic is located between 4K and 6K, when the

hi-res bit map mode is selected with a GRAPHIC 1 command later in the program.

In line 115 the variable OC is set to 65206; this is the address of the graphics chip register. The contents of this register must be changed when it is required to look at a bit map located somewhere other than the normal 8K to 16K.

Lines 130 to 140 are a routine which POKES a machine code subroutine (two memory at locations 818 to 850) to the start of the tape buffer. This routine, when called with a SYS 818 command, will copy an 8K block of a RAM from 6K to 16K, the normal bit-map location, to a start address POKED into location 827. The data for the code is in hex 145 to 170.

Lines 185 to 210 are where the bit map pictures are drawn and copied into the appropriate locations. The variable SC is set initially to 5 in the FOR-NEXT loop; this means that screen 5 will be drawn and copied first followed by screens 4 down to screen 0. Screen 0 does not in fact need to be copied but is copied to itself as a convenience.

Line 295 calls the subroutine which draws the picture for the appropriate screen number (SC); this routine starts at line 785. You will notice that all drawing commands are addressed to the screen number; this is a convenience way of controlling what is being drawn and also means that you will be able to produce a complicated picture within the 2K of Basic RAM available by calling the same subroutine six times with only SC being changed.

After each picture is drawn the copy subroutine is called (line 305); this is situated at line 545. First the destination address is poked into 827, the required value being computed

from the screen number; the machine code subroutines is then called via SYS 818 in line 325.

When all the bit maps have been drawn and copied, a subroutine to set the colour map is called in line 325; this routine is situated at line 585.

You will recall from earlier that all the bit maps share the same colour map located between 6K and 8K. This is necessary because there is not enough continuous RAM left in the machine to provide a separate 2K colour map for each screen.

The implication of a shared colour map is that colour map cells corresponding to each bit cell of all the bit maps must be appropriately set for all the screens. The colour map is similar to the text screen as it has a resolution of 40x23, and different foreground and background colour on brightness can theoretically be set for each of the 1000 locations. The process of setting the colour map is more difficult to describe than to perform, and if you watch the colour map being set after the bit maps have been drawn you will understand the principle.

Referring to the subroutine for setting the colours in line 505, the FOR-NEXT loop (LP) should be set to the number of different colour blocks that you wish to set, in this case five. Each time the loop is executed, data from line 548 onwards is read into the eight variables SC,FX,SY,PT,CL,BO,CI,BI. These correspond to the following: SC Start of colour block across screen, FX Finish of colour block across screen, SY Start of colour block down screen, PT Finish of colour block down screen.

(These must be in the range 0 to 255 with FX > SY.)
SC Start of colour block down screen.
PT Finish of colour block down screen.

(These must be in the range 0 to 255 with CY > BY.)

CO: Background colour for the block. (Range 0 to 16.)

BO: Brightness to CO for the block. (Range 0 to 7.)

CI: Foreground colour for the block. (Range 0 to 16.)

BI: Brightness of CI for the block. (Range 0 to 7.)

Finally once all the screens have been drawn and coloured, the rotate screen routine is entered in line 240. This is a continuous loop which runs until the stop key is pressed. Each of the six lines between the DO and LOOP statements switches in a different but map screen by POKing

the appropriate value into the graphic chip register address contained in variable GC.

The GOSUB at the end of each line is to a delay subroutine located at line 308. This routine uses the internal timer T1 to create a delay and so vary the rate at which the screens are switched. This subroutine itself calls another subroutine located at line 325. This routine looks to see if a key has been pressed, and if it detects a numeric key between 0 and 9 then it alters the value of the variable T used in the delay routine thus increasing or decreasing the length of the delay. Try pressing the keys 0 to 9 when the program is running to see the effect.

Changing the Program

The subroutines DRAW PICTURE and POK SCREEN COLOURS at lines 705 and 805 can be changed in order to create your own moving pictures. The rest of the program should not be altered unless you find an improvement. If you want more memory for drawing and colouring your pictures then all of the lines containing REM statements throughout the program can be deleted.

As a final comment you are advised to save a modified program to tape or disk before running. This is because if an 'OUT OF MEMORY' error occurs then you may lose the Basic program.

PROGRAM: MAGNITOR 4+

```

100 REM SET TOP OF BASIC TO 8149
105 POK% 55,255:POKE% 56,255:CLR
110 CLR% 1,7,2:COLOR,3,6:COLOR1,6,3
115 GO-82898,7-6
120 :
125 REM POK% FC SCREEN COPY ROUTINE
130 FOR I=81070880
135 READ POK%I,W
140 NEXT I
145 DATA120,141,63,255,168,2,123,893
150 DATA163,51,133,252,168,2,123,893
155 DATA163,32,133,252,168,2,160,30
160 DATA177,253,145,251,200,200,250,230
165 DATAC28,238,251,252,200,250,242,50
170 DATA295,26,56
175 :
180 REM DRAW & COPY 6 PICTURES
185 POK%-82898STEP-1
190 REM DRAW PICTURE
195 GOSUB705
200 REM COPY PICTURE
205 GOSUB805
210 NEXT I
215 :
220 REM SET SCREEN COLOURS
225 GOSUB825
230 :
235 REM ROTATE SCREENS
240 DO
245 POKGC,~POK%GC+96STEP96:GOSUB805
250 POKGC,~POK%GC+192STEP192:GOSUB805
255 POKGC,~POK%GC+288STEP288:GOSUB805
260 POKGC,~POK%GC+384STEP384:GOSUB805
265 POKGC,~POK%GC+480STEP480:GOSUB805
270 POKGC,~POK%GC+576STEP576:GOSUB805
275 LOOP
280 :
285 REM SUBROUTINES
290 :
295 REM DELAY
300 T=T+T
305 GOINT1,T:TT:GOSUB305:LOOP
310 RETURN
315 :
320 REM SET DELAY
325 GETKB:IFKB<"":T=T+96*KB:GOSUB305
330 RETURN
335 :

```

```

340 REM ADDRESS FOR COPY
345 POK%GC,~POK%GC+192
350 REM CALL FC COPY Sub
355 GOSUB10
360 RETURN
365 :
370 REM POK SCREEN COLOURS
375 POK%I,W
380 READ% I,X,Y,FX,FX,CI,BI
385 POKGC+510FX:FOR%I=510FX
390 POK%I+W-192+W+CI,CI,CI+1+1*BI
395 POK%I+W-192+W+CI,CI+1+1*BI
400 NEXT% I,W:CI,LI
405 NEXT I,W
410 :
415 DATA 7,6,24,16,6,6,3
420 DATA32,33,6,21,12,6,6,7
425 DATA 10,8,11,4,6,16,4
430 DATA 18,12,21,3,4,6,7
435 DATA 31,16,21,5,6,7,2
440 :
445 REM DRAW PICTURE
450 DO%I=GC
455 GRAPHIC,3
460 CIRCLE,168,55,16
465 CIRCLE,168,35,16
470 CIRCLE,168,55,32
475 FOR%I=81070880STEP96
480 DRAW,168,510FX,192GC+51
485 DRAW,168,510FX,192GC+51+30
490 LOCATE168,55:LOCATE168,192GC+51+5
495 PRINT
500 LOCATE168,55:LOCATE168,192GC+51
505 DRAW%I,55,192GC+51
510 LOCATE168,35:LOCATE168,192GC+51+30
515 DRAW%I,35,192GC+51+30
520 LOCATE168,55:LOCATE168,192GC+51+5
525 PRINT
530 LOCATE168,35:LOCATE168,192GC+51+30
535 DRAW%I,35,192GC+51+30
540 LOCATE168,55:LOCATE168,192GC+51+50
545 DRAW%I,55,192GC+51+50
550 LOCATE168,55:LOCATE168,192GC+51+35
555 PRINT
560 NEXT%I
565 CIRCLE,168,35,16
570 CIRCLE,168,55,16
575 CIRCLE,168,35,32
580 CIRCLE,168,55,32
585 CIRCLE,168,50*30+30,20*GC+2
590 PRINT,585,50*30+30
595 CIRCLE,31,50*30+30,50*GC+2
600 PRINT,31,50*30+30
605 RETURN
610 :

```


Games Reviews

Here's a selection of the most recent software available.

BRIDE OF FRANKENSTEIN

It was dark and wiles could be heard howling in the distance and the moon projected her great white shadow across the waves. Thunder boomed and lightning crashed. In the cemetery there was one lonely figure, the Bride of Frankenstein who stood frantically digging a grave searching for bits of decaying corpse to put in her husband.

Arctolan's new game puts you in control of Frankenstein's bride, the only trouble is that she can't marry him until he is alive, but he needs emergency surgery as he has not got a heart, brain, kidneys and other vital organs.



How would you like to marry someone lacking these?

So off she goes to rebuild her hubby. First she will need to get the right keys to open doors to different parts of the castle - there are seven altogether but she can only carry one at a time, which makes things difficult.

She will also need a shovel to dig the graves and get the wonderful bits and bobs from the corpses.

Another important item is the lamp which you will need in order to enter the crypts which are otherwise totally black.

If you manage to find the pickaxe you can have a smashing time in here, and you may even be able to defend yourself from the ghosts and skeletons which seem you slowly to death when they touch you.

You are given only one life to complete the game, and this is represented by a beating heart, that beats faster and faster until it explodes, depending on how many times the ghosts touch you.

The castle is made up of 68 rooms which are full of puzzles and traps, it will be a long while before you manage to explore them all.

The sound is not too bad, with a few spot effects and the sound of your heart beating which adds to the atmosphere of the game. On the title screen a rendition of macabre plays with Frankenstein chained to the wall in the top of the castle with lightning flashing now and then.

Frankenstein is not a bad game, although it does give a little of the knee-deep mood and can be quite frustrating at times. A few times I had all the objects, only to enter a room and get trapped in the door by a ghost (most annoying) and killed almost straight away. I promptly turned it off in frustration, only to load it up half an hour later.

All that aside, I enjoyed Frank's Bride, the game is very addictive and not for the weak-kneed. **K.B.**

Timeline:

Name: *Bride of Frankenstein*, Supplies: 10 steps/Arctolan's, Tel: 016 3411, Machine: C64, Price: £9.99 (inc. £12.99 (td), Originality: 7/10, Playability: 5/10, Graphics: 7/10, Value: 7/10.

ROBOTS

Last summer, during the summer holidays, that well-known children's program, *Wac-A-Day* ran a cartoon series called the *Gobots*. Well almost a year on they are still showing it.

The cartoon tells the story of two kinds of robots, the good guys are the *Gobots* and the bad guys who are controlled by the evil *Gag*. They have been sworn enemies for many, many years and now the evil *Gag* has decided that he wants to take over the Earth.

He has built huge bases on the *Mobius* planet, which will



produce clones of your good buddy (I rate American style old Scooter). We will then use these to cause havoc on the Earth and give the Gobots a bad name.

Well, the Gobots could not let this happen so the most important Gobot, Leader Ota, sets out to put an end to these evil plans and to rescue Scooter. Being a Mobius planet it has a ceiling and a floor and both have gravity - very weird.

Your objective is to destroy all the green bases in each wave of the game. To finish these to hit you will need to pick up the Scooter-clones and they will become missiles which you can use to wipe out the bases. While you are doing this you are being constantly attacked by helicopters and enemies which try to stun you. There are also robots that beam from one surface to another and they cannot be shot, so avoid them.

Throughout the game you will be harassed by a large number of aliens and robots, which makes the game harder as you go along.

I was impressed by the game as it was original in the way it is played, with the Mobius planet.

I can recommend Gobots to you, especially if you are a fan of the cartoons. Another addictive and playable game from Aristonsoft.

K.R.

Touchline:

Name: Gobots. **Supplier:** Aristonsoft. **Ref:** 02-02 3411. **Hardware:** C64. **Price:** £8.99. **Originality:** 5/10. **Playability:** 8/10. **Graphics:** 7/10. **Value:** 8/10.

HEAD OVER HEELS

The latest offering from Ocean owns quite a bit to Ultimate's *Knight Lore*; remember the game that caused a stir on the Spectrum with its wonderful graphics and superb gameplay? Not to worry though, it's better than *Knight Lore*, so read on.

You play the part of two characters - one called Head and one called Heels. Again, they are pretty useless, but together they make a great team, and that is your first task; to get them back together.

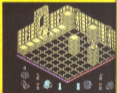
You are sent to the rebel slave planets by the people of the planet Freedom, with Head and Heels being highly trained spy sent to the Blacktooth empire to cause a revolution

amongst the slaves that have been caught by the Blacktooth.

The planets come in many different forms and are created for Blacktooth's bad taste. Egypt is the Ice One, a long time ago a Blacktooth spaceship got lost doing a hyperspace jump and landed on an ice world. Here the crew found a primitive animal forming a civilisation that appeared to revolve around no corpses in lots of bandages and putting them into bag pyramids. When they returned to Blacktooth their chief liked the sound of it so much that he rebuilt the entire city of one of the slave planets to resemble the store.

The next and most weird planet is Pentastar empire's prison planet. Millions are imprisoned in harsh planet, which is very maintenance and where climbing skill is required. The worst place is The Pit, to fall into it, or else!

Another weird place to visit is the totally freaky World. The empire is very keen on movies and books, and has devoted an entire world to them, hence World. Only the empire's movies are permitted in them as information is very suppressed in the rest of Blacktooth. Satan World is another nasty place, in kind of place to picnic.



It is a very green planet with plants galore and is used for hunting. It is also inhabited by natives who worship lakes. You must also be careful of the traps are scattered around as these prove to be a great hind.

And last but not least, the fearsome Blacktooth planet has a large nation with three space stations on biggest one is moon station HQ and this is where you teleport to the different planets. You can of course go forward and choose to escape, leaving all those poor doomed to die, or you can liberate each planet by retrieving the crown. Stealing the crowns from each planet is no easy task, as they are guarded by huge monsters that to be defeated (how they hate disapproval) before you claim the crown.

To help you on your mission there are various items such as the White Bunny who will give you magical powers. The Reinarnation Fish can be used if a nation will soon invade you. If you die you can continue from where you died, the fish and this fish likes to be eaten? (Confused, is he?)

For ammunition you will need a loader and also remember the hint! When you have both you can do

status, as they will freeze while trying to lick the dough off their face.

Well, that about wraps it up and as you can see there is plenty to do in this game and it is sure to keep you hooked for a long time.

Yet another super-cool game from Ocean, hot on the heels of *Wizball* and *Slap Fight*. If Ocean keep this up they're bound to become the top software house. **K.R.**

Touchdown

Name: *Touchdown Football*. Tel: 065-832 8633, Machine: C64. Price: £8.95. Originator: 8/70. Playability: 70/10. Graphics: 8/10. Fabric: 8/10.



SLAPFIGHT

At last one of my favourite arcade games has been released, if you haven't seen *Slapfight* in the arcades where have you been for the last year, huh?

Slapfight does not involve any slapping at each like, in fact it does not refer to the game at all, which is a fast and furious shoot-'em-up.

The idea is to pilot a slow-moving spacecraft across an alien planet, with the goal being to reach a giant complex in the centre of this strange world and blow it to bits.

As you can imagine this is not an easy task as there is a lot of ground to cover.

You can build up your spaceship by collecting stars that are dropped when enemy ships are shot, but not all of them drop these. The weapons available are: speed, which will give you up to five times the normal speed (depending on how many stars you pick up); shot will give you normal firepower if you have lasers or H- missiles, side will give you power beams on the side of your ship which will melt any alien that gets too near. The Wing will extend the size of your ship and enhance your fire by one, bombs is neat but this is a weak weapon and slow to use. The next is the laser which fires an invisible beam, a good buy. The Blasting Missiles are the ultimate weapon, press the button and eight missiles will zoom into the targets - brilliant. Last but not least comes the Shield, get this and you won't have to worry about getting blown up by aliens (for a while anyway).

I enjoyed playing *Slapfight* as it's addictive, colourful, and most importantly close to the arcade version. The music however is dreadful and bland, no doubt you'll be using for

the volume button but don't let this put you off, you can still have sound effects.

Stop putting your money into the arcade version, do yourself and your Commodore a favour and buy *Slapfight*. **K.R.**

Touchdown

Name: *Slapfight*. Supplier: Ocean. Tel: 065-832 8633. Machine: C64. Price: £8.95 (inc. £2.95 p.p.). Originator: 8/70. Playability: 8/10. Graphics: 7/10. Fabric: 8/10.

HADES NEBULA

Oh no, not another shoot-'em-up, ahhhhh! Hang on, look at the graphics - wow, Quick, pass me that joystick, your brain, brain, yeah this is great, can I have another go?

I've just played *Hades Nebula* and I can't stop. This is the new game from Nexus, and a very good one at that. The story behind this awesome game goes like this. It's 2124 and not a good year. Just about everything that makes life pleasant is running out or running down. The various people at WEC (that means World Energy Commission) have formulated The Plan to get round the problem.

The plan is WEC Colony plan, it involves ten really big, like mega-batter, colony ships. They're going to use a Mission Accelerator to go faster gadget to throw them to the far corners of the universe. A long way, 'cos that's where the energy is.

Well, that was the idea, but thanks to the totally evil overlord Hades, all your fleets were killed off, leaving only you to brave the long journey that lies ahead. You must penetrate his Kingdom that although once peaceful is now crawling with aliens intent on blowing you to bits.

While you try to avoid the aliens and their lasers you must also shoot parasites on the floor which come in gadgets for your ship, released by the robot miners enslaved by Hades. There are quite a few extras that can be used for your ship such as Speed, which will double your speed. Also rotators, which can be fitted to the side or front of your ship, which will kill any foolhardy aliens foolish enough to get too near. Lasers come in two forms - H- lasers, which fire in three directions, and normal lasers, which will fire upwards killing any aliens that cross its path, igawf!

You can also have Warp, which will wrap you out of any



links spots that you may get yourself into. Powerwings are new on the menu and, these will increase your fire power vastly, but they also make you more vulnerable as the ship will also grow in size.

I Hood Blades Nebula very much so it has that "just one more go" appeal. Also some stunning graphics mixed in with a touch of good presentation, which left a nice taste in my mouth.

I would not recommend this if you already have Tempest or games of that kind, but if you haven't then get this, it will keep you hooked, that is until you get frustrated by the difficulty of the game, but you will soon load it back up again.

K.R.

Touchline

Name: *Wides Nebula* Supplier: *Nexas* Tel: 01-838 5721
Machine: *C&G* Price: *£12.95* Originality: *5/10*
Playability: *5/10* Graphics: *10/10* Value: *5/10*

QUARTET

When terrorists capture a space colony there's only one thing you can do, send in the Quartet (the galactic equivalent of the A-Team). Edgar, Lou, Mary and Joe form the meanest, toughest and deadliest team in the Universe (it's just as well they're on our side!) that are the stars of the four player coin-op game Quartet. In this C&G conversion either one or two players can play one or two of these heroes and go and trash some space pirates.



Although tapping the pirates forms an essential part of your mission the real task is to get through the game's 22 levels. To complete a level you must battle your way through past the hordes of pirates to the exit that's guarded by a giant mechanical monster. Destroy this with several repeated hits and you'll get the key and a bonus score.

Each level consists of a series of sideways scrolling screens reminiscent of Green's *Prince Knight* full of platforms and ladders for you to climb around and down for the pirates to retreat through. Help is at hand either from a second player who should work together with you and not die in to steal the objects that might keep you alive long enough to complete the level. These objects include springs to give you extra jump, shields to protect you for 15 seconds, jet packs to reach the parts other players can't reach and

smart bomb potions to clear the screen.

Each member of the Quartet has slightly different characteristics that may help or hinder your choice. Edgar can jump higher than the others, Lou is the best shot, Mary's mean with her baroque and Joe is the fastest on two legs.

Although Quartet is great fun to play it lacks the depth and variety of other great four player coin-op game Gamelit which remains my favourite.

T.H.

Touchline

Name: *Quartet* Supplier: *Arcturian* Tel: 09-491 2181
Machine: *C&G* Price: *£9.95* Originality: *5/10* Playability: *8/10* Graphics: *8/10* Value: *7/10*



KILLER RING

Reviews Killer Ring were more to classic arcade game such as *Space Invaders*, *Galaxians* and *Cosmic Pole* than are giant step forward in computer gaming.

The Killer Ring is in fact your spawning rapping ship that must blast anything that moves as well as anything that doesn't move! The moving and non-moving blatable objects look remarkably like *Galaxians* except when they're down. Add on their wings and do some walking space arcade impressions. If you have your way they'll soon be perfecting corpse impressions.

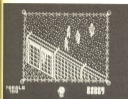
In screen three the *galaxians/invaders* are replaced by a candle supported by some revolving arms that have anti-laser shields so you have to aim for the gaps to destroy them. Screen five and six feature giant blue bulls that seem to be *galaxian/invaders* and finally screen seven features a mirror spaceman that you must blast away at until you destroy his heart while avoiding the onslaught of *galaxian/invaders*.

The game is quite easy, even on the hard level where you must blast your way through an anti-matter beam before you can zap the aliens, but makes a welcome change if you want a quick zap before tackling something more serious.

Touchline

Title: *Killer Ring* Supplier: *Realtime* Machine: *C&G* Price: *£4.99* Originality: *3/10* Playability: *5/10* Graphics: *3/10* Value: *6/10*

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THE GREAT ESCAPE

For you, *in* *War* is over! It's 1942 and you're a prisoner of war but as an officer you set about your duty to plan and execute the great escape!

The POW camp you're in is an old castle that's surrounded on three sides by sheer cliffs and the sea and is packed with patrolling guards led by the camp Kommandant. There are, of course, other prisoners but most of them have been here too long and just follow the roll call, exercise and eating routine of prison life. If you don't do something quick you'll slump to that level as well and the game will end.

As the game begins the camp security is fairly slack and you should follow the routine to plan when you're least likely to be missed. During these times you can slip off unnoticed to do some exploring. During these excursions you'll find objects that may be useful as well as some of the tunnels that form a labyrinth under the castle and your best chance to get to key-off limits areas and finally to escape.

If you miss roll call or are found in the wrong place then the alarm will go and if caught you'll spend the night in solitary and lose some morale. This starts at 100 and drops when you're caught, but can be topped up by finding objects and exploring. However, if it gets too low you'll find it difficult to regain control of your prisoner as he falls into depression.

Actually mounting an escape attempt will take planning, the right objects and the knowledge and timings of guard patrols. Get it right and you could be home soon but get it wrong and the war for you will be over.

A great game from Games.

Facsimile:

Name: The Great Escape. *Supplier:* Ocean. *Tel:* 081-8516621. *Machine:* C64. *Price:* £8.95 (incl. £12.95/£6). *Originality:* 6/10. *Playability:* 6/10. *Graphics:* 7/10. *Value:* 6/10.

T.H.

BAT TRAP

Two centuries have passed since man left a doomed Earth that was stricken by solar explosions. They returned hoping

to find an inhabitable planet, instead they found one that was inhabited. The Cat Men had invaded.

The job of ousting the invaders naturally falls to you a M.T.-ED robot and your companion Hercules I. Unfortunately, the Catmen ambushed you as you landed and Hercules I has been captured. You're now alone in your mission to destroy the Catmen's battle computers.

The action takes place on the desolated cities and landscape of the ruined planet that are not only guarded by the Catmen themselves but also the mutants such as the Five Demons, looters, Shadowmen and Seven beams that they've pressed into service.

You're not completely alone as the Earth forces drop supplies and new weapons for you to collect. These are essential as you need the right weapon at the right time to survive long enough to kill the catmen. This is tricky since the weapons are usually accompanied by a horde of Catmen.

Of all the mutants and catmen that amble across the screens, the Seven Beams are my favourite as their hands suddenly leap up through marshes to grab you. The least popular critters are giant boulders that literally bowl you over and impossible to get past. Kat Trap's good but don't expect too much from it.

T.H.

Facsimile:

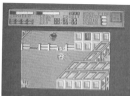
Name: Kat Trap. *Supplier:* Sirevortex. *Machine:* C64. *Price:* £8.95 (incl. £12.95/£6). *Originality:* 6/10. *Playability:* 6/10. *Graphics:* 6/10. *Value:* 6/10.



COLONY

When the world got overpopulated man took to the stars and colonised other planets. You are a work droid on the coldest, bleakest and most hostile planet to be occupied. It is your job to sow seeds and harvest the ripening mushrooms while fighting off the onslaught from the planet's chomping insect inhabitants.

The colony consists of a fenced enclosure containing stone rooms, seed beds to grow the mushrooms and solar panels to produce the energy you need to activate the beacon that will attract the supply ship. Unfortunately, your normal routine of planting seeds and harvesting mushrooms is soon interrupted as the alien insects so rapidly gnawing their way through the fences that you must replace.



You have a laser and a shield to combat this onslaught but these need recharging from your power source which is reduced if the critters damage the solar panels. However, if you spend too much time fighting aliens and repairing fences you won't be able to grow any mushrooms which means you won't raise enough cash to buy more seeds and fences and panels and the colony will die.

Your demise is by no means the end to the game which is greeted by a poor Python like "You're an ex-droid" message and the knowledge that you lasted for so many minutes. No score, just the time you survived and the money you raised. Surely there must be more to colonization of alien worlds than growing mushrooms and killing beetles?

THE
Finalist:
Name: Colony. **Supplier:** Addigy. **Machine:** C64. **Price:** £1.99. **Compatibility:** 4/10. **Playability:** 3/10. **Graphics:** 4/10. **Value:** 3/10.

KINETIK

Throughout the Universe the laws of physics remain constant except on the planet Kinetik. Here the laws of gravity vary from area to area and it's your job to halt the chaos and restore balance.

The planet is represented as a series of screens fitted with alien plants, some of which are as deadly as the energy draining critters that attempt to snag you.

You travel through the screens in a rotating footcannon that is protected by withstand the dramatic changes in gravity and most of the collisions with the planets surface. It can also recharge its energy coils by immersing itself in the planet's pools of water.

You can also improve your chances of survival and of completing the game by collecting equipment pods. These include a deflector shield that protects you from the alien life, a chemical spray to blind the critters, anti-gravity thrusters to counteract the changing gravity and a teleporter to jump from one screen to another. Unfortunately, your ship can only carry three of these devices at once and only one can be active at any one time.

Undoubtedly, Kinetik is an extremely difficult game to play and will take many sessions to complete it especially if the thief strikes at just the wrong time and steals a crucial piece of equipment just when you need it. If you like your

games to be tough then you'll enjoy (if that's the word) Kinetik.

THE
Finalist:
Name: Kinetik. **Supplier:** Firebird. **Price:** £1.50. **Machine:** C64. **Price:** £9.95 (inc. £12.95 p.p.). **Compatibility:** 6/10. **Playability:** 7/10. **Graphics:** 6/10. **Value:** 7/10.



ESCAPE FROM PARADISE

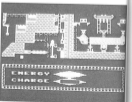
When this game first loaded up I thought, what a load of old rubbish it was, but I persevered and it began to appeal to me. The first thing I noticed was the tiny graphics and macho-like man, then a short time started to play and when I moved the tiny figure the animation was great (impossible mission style). So I started to play, got killed and had another go, and it went on like that for quite a while.

It was really a good too bad for me as I kept getting stuck in the same place, which was quite annoying.

But don't get me wrong, I will like it, as it's one of those games that you keep coming back to.

You play the part of Joe, a man who has it made. He has his very own multi-million pound complex hidden deep underground. One day, however Joe wakes up to find himself with a hangover from the bubble and discovers hundreds of aliens have invaded his home. So what can he do? Escape from his paradise.

Apart from the Spectrum 'Tiny Char' graphics, the game doesn't look too bad.



It is well animated and flicker-free and scrolling is nice and smooth.

A frustrating game with tiny graphics, clear animation and good sound, but at just under ten pounds I would say that of it. But check it out yourself - you might like it!

Verdict:

K.R.

Name: *Escape from Paradise*. **Supplier:** *Atari*. **Tel:** 0632 82513. **Machine:** *Com. Price* £7.99 (*ret.* £9.99). **Originality:** 3/10. **Playability:** 4/10. **Graphics:** 6/10. **Value:** 4/10.



REVS +

Have you ever played a game and then thought 'why did they do that?' or 'why didn't they leave out the fourth level?' People who played *Revs* did; they sent in their suggestions and here had them included in *Revs +*.

The original *Revs* was undoubtedly the most realistic 3D racing game when it was released last year. Since then players have realised that you had to be a world class racing driver to play it! It featured an incredibly detailed version of the classic Silverstone course with every bend in tyre squeaking detail mainly due to a certain David Hunt (former three racing driver and James Hunt's brother) helping out with the game.

Revs + has all those features plus a few new ones to help the beginner and four extra tracks to tackle the experts. Now you can play *Revs +* with any joystick or the keyboard and beginners can enjoy the luxury of assisted steering to get you around the tricky corners. Plus, once you've mastered both Silverstone and Brand's Hatch you can try out Donnington Park, Silverton and Oulton Park as well as the Nurburgring which is widely acknowledged as the toughest drive in Europe.

Revs + is fast and realistic (even a car overtake it happens) and doesn't teleport to start you around the next corner and it's nice to be able to use an ordinary joystick, but why didn't they get it right the first time? Do you still have to pay again to get a finished version??

T.H.

Verdict:

Name: *Revs +*. **Supplier:** *Orbitel*. **Tel:** 01-611 3286. **Machine:** *386. Price* £9.99 (*ret.* £12.99). **Originality:** 4/10. **Playability:** 5/10. **Graphics:** 6/10. **Value:** 4/10.

WIZ

There are two worlds of lightness and dark that touch on the Magical Isle. Evil is posing faith and even you, a mere first level wizard, can see that some monumental evil that you is likely to be forthcoming.

The only people who don't seem able to see are your masters, the council of Wizards. They seem content to play at our riches and stick their heads in the sands. Nor are they too pleased when you decide to take matters into your own hands. They cannot prevent you from advancing as a wizard, but they have removed your protective shielding so that you become vulnerable to attack.

Any wizard worth his salt must have a fine collection of spells at his disposal. You start off with a few written into your spellbook and can learn others from kindheart wizards that you meet on your journey providing that you have enough power to assimilate the magic mana. You need to be careful which spells you learn though for your spellbook will only hold 20 different types. These include rap spells, teleport, tree pruning, bridge repairing and turning yourself into an evil proof being!

Mana are the stuff of which spells are made and you must learn how to assemble the ones that you want. Each spell has a formula - a sequence consisting of four different rune types. There is a limit to how many runes you can keep stored and others have to be acquired by use of, surprise, surprise, a rune spell. This kills buddies and converts them to runes, but only two types can be found on each plane of existence.

It is essential to prepare your spells wisely for if you stay in one place too long, a Tracey appears. This mischievous beast is indestructible and will follow you on your journey. The best that you can do is to temporarily blast back to the Planet of Darkness.

The game itself is a Gemset classic with a top-down view of your surroundings. The graphics are large and clear and the puzzles to be solved, combined with the usual magic, add a pleasant twist to a well worked theme.

G.R.H.

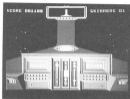
Verdict:

Name: *Wiz*. **Supplier:** *Melbourne House*. **Tel:** 01-577 6411. **Machine:** *Com. Price* £9.99. **Originality:** 4/10. **Playability:** 5/10. **Graphics:** 3/10. **Value:** 3/10.

DEAD RINGER

You can always tell when it's Summer, not just because the rain gets warmer but the software houses are keen to press bargains into your hot little hands. For example, *Dead Ringer* is one of the Breakin' games that are at a "never to be repeated bargain price" of £4.99. It would be a bargain if the game was better than a poor average. It isn't.

Do you have what it takes to become a *Dead Ringer*? Can you survive the race on the Ring, a giant doughnut shaped racing stadium in your heavily armed and armored skimmer?



Probably not.

The racing track consists of four lanes that are graded from the easy inside track to the almost suicidal outside track. Unfortunately, the track appears on the screen as a featureless blue band that then turns green behind you as you can see through your rear mirror. Most of the game involves swerving tracks to avoid or blasting the hazards that appear before you.

The most deadly objects are walls that destroy you on contact that are joined by one other stimulus that you must kill or be killed and mines that must be blasted before it blows you up into tiny pieces. Luckily, there are also some drops to rebok your weapons and warp gates to get you to top speed.

The whole game is as flat as a pancake (rather than a doughnut) and would barely survive as a budget game. At \$4.99 it's no bargain and about as exciting as a wet August bank holiday.

Teacupline:

T.H.

Name: *Grand Knight*, **Supplier:** *Avante*, **Machine:** *CGI*, **Price:** \$4.99, **Originality:** 3/10, **Playability:** 4/10, **Graphics:** 4/10, **Value:** 4/10



GREYFELL

The Orb of Life has been stolen by the evil sorcerer Maxton who has hidden it deep within his stronghold. As

long as it remains in his possession, he can control the feelings of the people in Greyfell and, being evil, he naturally decides to banish all laughter and merriment from the kingdom.

You are Norman, a mungy moggie, quietly getting drunk in a corner of your local tavern. Drinking the ale and listening to tales of various legends, you come over all peculiar and decide to announce to the assembled customers that you, Norman, will go forth and save the people.

And so your quest begins in typical arcade adventure fashion. Wanderrrring round the area, picking up hopefully useful items, solving puzzles and duffing up the local barmaids — the usual assortment of killer monsters, cat-eating plants and rats falling out of trees. Bannan has it that there are also a few dabbleds in the forest who are actually on your side. These include a drunken rabbit called Blotto and Hiccorrs, an owl wizard.

The game is controlled using a series of icons. Normally you can move round thumping opponents, but if there is no one standing next to you, a press of the fire button allows you to select and fire spells and manipulate the various objects that you have acquired. Graphically, the game looks exactly like one of the hundreds of 3-D Spectrum arcade adventures that have been released since Ultimate first released Knight Lane.

Gameplay is very slow and I found the system of icons poorly defined and a swindle to use. Similar problems were encountered with id's wilying objects on the main screen. Not a great game, but not bad either and it may appeal if you enjoy this sort of thing.

G.R.H.

Teacupline:

Name: *Greyfell*, **Supplier:** *Sunlight Software*, **Machine:** *CGI*, **Price:** \$9.99, **Originality:** 5/10, **Playability:** 4/10, **Graphics:** 4/10, **Value:** 4/10



WORLD CLASS LEADERBOARD

Just when you thought that you had mastered every last bunker and water hazard on US Gold's excellent Leaderboard series, they come up with yet another variation on a theme. World Class Leader Board is the most challenging variation yet and several new features have been introduced into the gameplay.

For any of you who missed the original game, WCLB is a golf simulation. You must select your club and then judge the power and timing of your swing in order to hit the ball to the best effect. There are the usual hazards of water, sand and trees to be avoided as you bank your way round the course, trying to achieve as low a score as possible.

WCLB offers you four courses, three taken from real life (St Andrews, Royal Country Club and Cypress Creek), together with one especially constructed for the occasion - The Gauntlet. There is also a partial course designer with which you can access any of these 72 holes and put together your own courses. You can make minor changes to these holes such as changing the type of tree but, somewhat disappointingly, you don't have complete control of what you want. No doubt that will come out in the next version!

There are three skill levels to choose from - kids, amateur and professional. With the courses being as tough as they are, you have to be pretty good to play at professional level. Whereas on previous versions, I could blast my way round in just about level par, my first two rounds here were plus twelve and I'd rather not say.

One reason for this is that you don't now get any assistance when you are putting, as to how hard you have to hit the ball. The clicking scale stops after the first marker leaving you to judge the rest. Not having read the instructions and thinking that it was a bug, my first put took me straight off the green and back into a bunker!

Other features include a top down view of each hole available at the press of a key, driving, practice putting tapes and print-out facilities.

The big question with WCLB is should you buy it if you already have one of the earlier versions. If you enjoyed the game, then my answer is yes. This is sufficiently different to give value for money. If you don't already own a golf game, then I have no hesitation in recommending this as the best and most challenging game you can buy. (Mind the new version comes out (how about a Martian course with variable gravity?)

G.R.H.

Teacher:

Name: *World Class Leader Board*, Supplier: US Gold, Tel: 01-256 2288, Machine: C34 - disk only, Price: £14.99
 Originality: 5/10, Playability: 8/10, Graphics: 8/10, Value: 8/10.

BALLOON CHALLENGE

There have been simulations covering all forms of air transport, helicopters, jets and even gliders. With Richard Branson attempting to cross the Atlantic in a balloon, you might be forgiven for assuming that Transatlantic Balloon Challenge was in the same sort of mould. How wrong could you be.

Instead, Virgin Games have come up with a truly dreadful arcade game. The idea is to cross the pond before



your rival does. So far, so good, but the plot soon takes a nosedive, as credibility is stretched to limits previously unsurpassed in the annals of computer games.

To start with, you don't actually get to play Richard as his rival. You take on the part of an eagle. Your task is to defend your own balloons while also trying to create maximum trouble for your opponent (either human or computer). You are not just an ordinary eagle though. You do have a sonic beam capability and must use this to the best of your ability to defend yourself against incoming missiles and planes.

I will give the odds of 1000 to 1 that you cannot guess how the planes will try to destroy your balloons. Give up! They drop poison on you. I suppose an reflection, this is not a bad idea. Defences against the best sucking missiles are straightforward but you name one one airforce that can defend itself against a pirate attack.

While all this is going on, you must also try to catch any passing bees who happen to be holding on to a bunch of balloons. You may have assumed that the main balloon is incidental to all this, but you must still try to navigate it as best you can by altering its direction and height. These are controlled by a series of icons situated at the right of the screen.

This method does not work particularly well with the wrap-around system of movement used. Your angle is too sluggish to give you proper control (the penalties of sonic beam perhaps?) A fourth icon allows you to pass into your opponent's half of the split screen display but in practice, you don't have the time to bother. Gameplay is reduced to the level of lara.

There is an old joke that says that there will be no money left in the world by the year 2000 because Richard Branson will have it all. Don't add to his cause by buying this rubbish.

G.R.H.

Teacher:

Name: *Transatlantic Balloon Challenge: The Game*, Supplier: Virgin Games, Tel: 01-727 8070, Machine: C34, Price: £7.99
 Originality: 3/10, Playability: 2/10, Graphics: 4/10, Value: 2/10.

Byting Into The 6510

Ever heard of 'indirect indexed addressing'? In this article on machine code programming we will discover all about it, and fill the whole screen.

By Bernhard-Henry Lehmann

Programming in machine code (or assembler, which is what we really use) can be rough going, not because there are many difficult concepts involved but because it lacks the 'user-friendliness' we take for granted when writing programs with a higher level language like BASIC. A microprocessor like the 6510 does not itself contain any 'safety-net' for the incautious programmer because 'safety-nets' take up valuable chip space and time to implement.

Furthermore the microprocessor is, for compare in its naked, elementary, no nonsense form. Microprocessors have been developed with all sorts of things in mind, not just home computers like the Commodore 64, but also washing machines, stereo amplifiers, pocket calculators, and so on. In order to be so versatile they are essentially extremely simple devices.

A chip like the 6510 has roughly the intellectual capabilities of a seven year old child who has just learned how to add and subtract simple numbers on his fingers. This simple-mindedness is offset by its ability to do the few things it can do with breathtaking speed — at around half a million instructions per second — and, when programmed correctly, do everything with amazing accuracy.

So the task of the machine code programmer is a bit similar to that of a first-term primary teacher whose job it is to give a class of youngsters their first timid steps into elementary arithmetic. The simpler the steps, the better!

Programming in machine code means doing an awful lot with precious little to start with. And this is where the real challenge lies.

Task 3

With this in mind, let us return to the practical programming theme with which we started off in the last two articles. All the time we have been up against one of the major limitations of the 6510: the fact that all the programmable registers of the 6510 can only hold numbers in the range of 0 to 255.

In the first article, this was no problem because all we did was output a number to the first location of the screen memory — 1024. This is called *absolute addressing* and is very straightforward indeed.

In the last article we output a byte to a series of successive locations. For that we introduced *indirect addressing* which allowed us to fill 256 locations of the screen.

And then we had to stop, not just because the editor 'wouldn't' allow me to fill one whole issue of *Your Commodore*, but because we came right up against the most obvious limitation of the 6510, the fact that neither the X-register nor the Y-register can hold more than 255.

In this article we want to go the whole hog and fill the Commodore screen. But the whole Commodore screen holds 1000 bytes — way beyond the limit of any of the 6510 registers. So what can we do?

There is, of course, a way of doing it and this is called *indirect addressing*.

Indirect Addressing

This sounds like an underused operation or something a mathematician does in his salad, doesn't it? But it is based on a very simple idea: use one location to point at another location.

Look at it like this: you are in a strange city and have to ask somebody where the railway station is. Maybe you ask a policeman. If you are a long way away from the station the friendly bobby might give you a whole series of directions, "Turn left and then right and then left again . . ."

Maybe our policeman is not only

helpful but also a bit of a psychologist. He realizes that there is a limit to the number of left turns and right turns which anybody can memorize. So he says: "Go to such and such a street and then ask another policeman." In other words, the policeman is pointing you to a location where another policeman will direct you to your final location.

This is precisely what happens in indirect addressing: we want to output a byte, let's say, to the beginning of screen memory, which is 1024. But instead of giving this location directly to the microprocessor, we give it indirectly, that is, we load 8051 into a location and then we point the 6510 at that location, which we might call the pointer-location. In other words, we tell the microprocessor the location, where it can find the location, where it can get the data from (or output the data to).

At this point, dear reader, you are permitted a gasp of sheer incomprehension even though you will doubtless understand the above concept, you will ask, "Why the heck would anybody want to do a complicated thing like that?"

But the basic point of indirect addressing is that it overcomes the major limitation of an 8-bit microprocessor. Since we are using one location to point at another location, this pointer location can be made to point at any location in the computer.

The reason why the novice in machine code programming seems to build up a kind of mental barrier against the concept of indirect addressing lies in the fact that it seems to be unnecessarily complicated. Why not use absolute addressing and add any number to that? But this is precisely what the 6510 can't do. By putting the address of a location into another location we making it into a number like any other number. And that the 6510 can deal with, or, more correctly, you can write a program which will do the job. As we will find out later, there are instructions which allow you to add and subtract numbers of practically any size. But the 6510 does not allow you to do that directly to the address of a location. You first have to make it into a number like any other number. And this is what indirect addressing is really all about.

Suppose I put 8024 — the beginning of screen memory — into the pointer location, so it is now pointing at 1024. I want to move 200 bytes up, which is of course way over

the limit of any 8-bit register, so I add 200 to 1024, giving 1224. Now the pointer location will point at 1224, which is exactly what I want. And if I add one to that, it will point at the next location, namely 1225 and so on.

This system gives me access to the whole memory range of the computer, from location 0 to location 65535, something I just couldn't have obtained with other absolute or indirect addressing.

The basic obstacle when programming in machine code is that there are more things you can't do than things you can. So you have to get used to inventing ways of doing what you basically can't do, with the few things you can do. It's a bit like building Westminster Cathedral out of matchsticks or constructing a vacuum cleaner with a Mopane stick!

Index — Y

There are odd moments in 6510 machine code programming when there are actually some attempts made to make life easier for the programmer! Indirect addressing is, as you might imagine, one of the most often used instructions of the 6510 and the conservative engineers who designed the thing have added an indexing facility to it.

Above I explained that we can make the pointer location point to any location in the computer by adding or subtracting any number to it. But since we have to do this in the form of a program with extra instructions, it can also be pretty cumbersome. Imagine what would happen every time we wanted to fill successive locations? We would have to add one to our pointer location with every pass through our loop, which would waste an enormous amount of time and memory.

So indirect addressing is indexed with the help of the Y-register. This means that we have to add or subtract only over 256 bytes. Within 256 bytes — or a page, as it is also called — we can index in exactly the same way as we did in the last article.

But there are a couple of rules to indirect indexed addressing (aren't there always!) The pointer location has to be a location in zero page, that is, it has to be between location 0 and 255 in the computer. As a trade-off for this limitation we get the advantage that the whole instruction uses only two bytes.

And, secondly, unlike indexed addressing the uses of the X-register and the Y-register are not identical. If you use Y, then the contents of the Y-register are added to the contents of the pointer location. But if you use X, the contents of the X-register are added to the pointer location itself and not to the contents of it.

Since, as I can tell you from experience, indirect-X addressing is used very little, you might as well forget all about it for the time being. (As a matter of fact, indirect-X isn't used once in the whole of the Commodore ROM, and I am still looking for a machine code routine which uses it...)

On the other hand, indirect-Y is used constantly in 6510 machine code programming, so you had better fix the principles of it firmly in your mind: a location in zero page is loaded with the address of the location where the data is to be found and the Y-register is used to index 256 bytes of the contents of the pointer location.

And to close the "theory" section of this article in assembly language indirect indexed addressing is conventionally expressed by putting the address of the zero page location into round brackets and then a comma and then the Y afterwards, e.g. "(251),Y" or, if you use a label "LABELLY". And, if you should ever use it, indirect-X is expressed like this: "(251),X" or "LABELLY".

Back to Work

After all this dry theory, let us now return to our programming task and see how we can use all this in practice.

Listing 1 gives you the assembly listing of a program which will fill the whole of the Commodore Screen.

Zero Page

In lines 90-170 I initialize the pointer-locations in zero page which will be needed for indirect indexed addressing.

In 6510 machine code programming zero page has special relevance. Since the 6510 has only three programmable registers (A,X and Y), there is no room to store data even temporarily inside the microprocessor. The 6510 makes up for this lack of registers by using the locations in zero page as what one might call pseudo-registers. That is, you may see zero page as a kind of

extension of the 6502. For this purpose all instructions concerning zero page can be given without the high byte of the location; if it is zero page, it's included in the instruction and the 6502 will know that it is zero page. This saves you one byte.

Secondly, all zero page instructions take less time to execute. So, if you want maximum speed of execution use zero page whenever you can!

Thirdly, as we have already found out, when you want to use indirect indirect addressing you have to use locations in zero page as pointer locations!

But you have to be aware that both the BASIC interpreter and the Kernal use zero page locations for their main system variables. Some of these variables are vital for the proper functioning of the Commodore 64. For example, if you wrote unwittingly into location 1, you might switch the whole of the BASIC interpreter and the Kernal off so that, when you want to return to BASIC, there will be no BASIC to return to! This, of course, will result in a massive crash, because you will be unable to communicate with the computer any more!

Other zero page locations you can use quite happily: locations decimal 251-255 are completely safe because they aren't used at all by the operating system. If you use a disc-drive you'll get a whole number of zero page locations which are only used for tape-operations (146, 150, 155, 156, 158, 159, 166-176). I also use locations 71-125 quite a lot. They are all right, as long as you don't use the floating point calculator of the C64 and don't interfere BASIC with machine code.

Low Byte/High Byte

In line 90 I do something which, on the face of it, I shouldn't be able to do at all using immediate addressing (prefixed with " # "). I load 1024, which is of course a 16-bit number, into the X-register! How can I do such a thing when I know that zero and zero again, that none of the registers of the 6502 can hold numbers greater than 255?

Well, notice the " $+$" sign before "1024". This has special relevance here! With a "+" the assembler won't load the whole of 1024 into the accumulator, which would surely give me an overflow, but only the low byte

of 1024, which is 0034(10024/256 = 256) = 0.

Then I load this low byte into the first of the zero page locations I have chosen: 251. In machine code 16-bit numbers are always written into memory with the low byte first and the high byte following after that.

The low byte of a 16-bit number is of course the remainder you get when you divide the number by 256. The number of times you can divide the number by 256 is the high byte.

In line 118, I instruct the assembler to calculate the high byte of 1024 by putting "$/$" in front of 1024 — and, again, load it into the accumulator. The high byte of 1024 is 0034/256=4. Therefore, 4 goes into the accumulator, and from there it is transferred into the second zero page location (in our case decimal 252).

Now zero page locations 251 and 252 are pointing at the beginning of the Commodore screen memory. In other words, zero page location 251 holds the low byte of 1024 (=0) and zero page location 252 holds the high byte of 1024 (=4).

In lines 140-170 I do the same thing with the beginning of the colour memory. This finishes the initializing part of our program. Now we can begin the action, starting from line 218.

Since we have to fill 1000 bytes and our index goes to 255 bytes every line, the obvious way to do the job is in four goes. This will of course result in an additional 24 bytes being written into zero 256*4=1024. But in this case we can be quite casual about this. Nothing vital will be overwritten by these 24 bytes.

At other times you have to be more cautious and do the job exactly right. On the whole, stick to the rule always be aware that strange things can happen if you write unwittingly into certain locations!

In line 218 I set up the variable which I use as the counter of the four blocks. I use the X-register for that, because in this routine I won't need it for anything else. Furthermore I count downwards as they do at Cape Kennedy. This saves me an extra instruction, because when the count reaches 0 in line 260, the zero-flag will be set and the 6502 will know the loop and exit.

Next I set the Y-register (line 220), which does the main character count. With every pass through PRINTLOOP (lines 230-260) the Y-

register is incremented by one and the 1 is added to the location contained in the zero page locations 251 and 252 and 253 and 254 respectively.

If, like me, you aren't a mathematical genius and are not in advanced thinking, I advise you to get the workings of this firmly fixed in your mind by playing it several times through in exactly the same way as the microprocessor does it.

We start off with 1024 and the Y-register contained in 1. So when it comes to line 240 the microprocessor gets its value 1024 from zero page location 251/252 and adds the contents of its Y-register to it. Therefore the output location is 1024+0=1024. This is when the contents of the X-register in our case 11 is written to.

In line 270 the Y-register — a index — is incremented by one. As since this will clear the zero-flag, it will branch back to line 230, the beginning of "PRINTLOOP".

Now the contents of the Y-register is 1, and this is added again to 1024 giving 1025, which of course is below the position of the Commodore screen.

And so it goes on, filling the first 256 positions of the screen. Since the Y-register can't hold more than 255, it will eventually reach back to zero. This will result in the zero-flag being set and the 6502 exiting from "PRINTLOOP".

Lines 320 and 330, which I will describe next, are crucial to the whole working of indirect indirect addressing, because this is where we overcome the limit with which we are presented in the last article! An index, how simple it really is: all we have to do in our routine is increment the high byte of our output address by one! Unfortunately it is not always that simple. Very often it is necessary to update the indirect address in a clever way. In this case you have to use addition (or subtraction), which a 6502 machine code programmer is not as straightforward as one would like it to be. But more about this in a later issue!

"INC" is a very simple 8-bit instruction which tells the microprocessor to increment the contents of a location by one. It is similar to "INX" and "INY", which we already know about. But what you must be quite clear about here is that the contents of a location is incremented, and not the location itself! This kind of confusion gives

engineer in machine code programming an endless amount of trouble.

Since we are dealing here with the high byte of 1624 the location we are incrementing contains 4. So it is incremented to 5, and this gives us 2436=1248, which is the base of the next block of screen memory we want to fill.

Line 258, of course, does the same thing for the color memory.

Since the Y-register has automatically been reset to zero, we can, after having decremented the main counter, jump straight back to "PRINTLOOP"

and fill the next 256 bytes of the screen.

Waiting for a Break

In order to make our program more user-friendly, I have added a little routine at the end which makes it wait for the RUN/STOP-key to be pressed. Without this you would get the Commodore "Ready" message and cursor printed straight away before you had any time to admire the full page you had printed in machine code.

This is a loop which loads the contents of the system variable 145 into the A-register and tests it against

decimal 127. "CMP" stands for compare with accumulator.

If location 145 contains any number but 127, this means that the RUN/STOP key hasn't been pressed. In this case the zero-flag will be cleared and it will jump back to the beginning of the loop in line 420.

If, on the other hand, location 145 contains 127, then that means that the RUN/STOP-key has been pressed.

Now it will compare with the number given after the "CMP" instruction, the zero-flag will be set and the microprocessor will jump to the exit in line 480.

10	LDY #0	258	STY \$C0000000	276	INCR \$C0000000
20	LDY #0	259	LDY #0	277	LDY #0
30	LDY #0	260	LDY #0	278	LDY #0
40	LDY #0	261	LDY #0	279	LDY #0
50	LDY #0	262	LDY #0	280	LDY #0
60	LDY #0	263	LDY #0	281	LDY #0
70	LDY #0	264	LDY #0	282	LDY #0
80	LDY #0	265	LDY #0	283	LDY #0
90	LDY #0	266	LDY #0	284	LDY #0
100	LDY #0	267	LDY #0	285	LDY #0
110	LDY #0	268	LDY #0	286	LDY #0
120	LDY #0	269	LDY #0	287	LDY #0
130	LDY #0	270	LDY #0	288	LDY #0
140	LDY #0	271	LDY #0	289	LDY #0
150	LDY #0	272	LDY #0	290	LDY #0
160	LDY #0	273	LDY #0	291	LDY #0
170	LDY #0	274	LDY #0	292	LDY #0
180	LDY #0	275	LDY #0	293	LDY #0
190	LDY #0	276	LDY #0	294	LDY #0
200	LDY #0	277	LDY #0	295	LDY #0
210	LDY #0	278	LDY #0	296	LDY #0
220	LDY #0	279	LDY #0	297	LDY #0
230	LDY #0	280	LDY #0	298	LDY #0
240	LDY #0	281	LDY #0	299	LDY #0
250	LDY #0	282	LDY #0	300	LDY #0
260	LDY #0	283	LDY #0	301	LDY #0
270	LDY #0	284	LDY #0	302	LDY #0
280	LDY #0	285	LDY #0	303	LDY #0
290	LDY #0	286	LDY #0	304	LDY #0
300	LDY #0	287	LDY #0	305	LDY #0
310	LDY #0	288	LDY #0	306	LDY #0
320	LDY #0	289	LDY #0	307	LDY #0
330	LDY #0	290	LDY #0	308	LDY #0
340	LDY #0	291	LDY #0	309	LDY #0
350	LDY #0	292	LDY #0	310	LDY #0
360	LDY #0	293	LDY #0	311	LDY #0
370	LDY #0	294	LDY #0	312	LDY #0
380	LDY #0	295	LDY #0	313	LDY #0
390	LDY #0	296	LDY #0	314	LDY #0
400	LDY #0	297	LDY #0	315	LDY #0
410	LDY #0	298	LDY #0	316	LDY #0
420	LDY #0	299	LDY #0	317	LDY #0
430	LDY #0	300	LDY #0	318	LDY #0
440	LDY #0	301	LDY #0	319	LDY #0
450	LDY #0	302	LDY #0	320	LDY #0
460	LDY #0	303	LDY #0	321	LDY #0
470	LDY #0	304	LDY #0	322	LDY #0
480	LDY #0	305	LDY #0	323	LDY #0
490	LDY #0	306	LDY #0	324	LDY #0
500	LDY #0	307	LDY #0	325	LDY #0
510	LDY #0	308	LDY #0	326	LDY #0
520	LDY #0	309	LDY #0	327	LDY #0
530	LDY #0	310	LDY #0	328	LDY #0
540	LDY #0	311	LDY #0	329	LDY #0
550	LDY #0	312	LDY #0	330	LDY #0
560	LDY #0	313	LDY #0	331	LDY #0
570	LDY #0	314	LDY #0	332	LDY #0
580	LDY #0	315	LDY #0	333	LDY #0
590	LDY #0	316	LDY #0	334	LDY #0
600	LDY #0	317	LDY #0	335	LDY #0
610	LDY #0	318	LDY #0	336	LDY #0
620	LDY #0	319	LDY #0	337	LDY #0
630	LDY #0	320	LDY #0	338	LDY #0
640	LDY #0	321	LDY #0	339	LDY #0
650	LDY #0	322	LDY #0	340	LDY #0
660	LDY #0	323	LDY #0	341	LDY #0
670	LDY #0	324	LDY #0	342	LDY #0
680	LDY #0	325	LDY #0	343	LDY #0
690	LDY #0	326	LDY #0	344	LDY #0
700	LDY #0	327	LDY #0	345	LDY #0
710	LDY #0	328	LDY #0	346	LDY #0
720	LDY #0	329	LDY #0	347	LDY #0
730	LDY #0	330	LDY #0	348	LDY #0
740	LDY #0	331	LDY #0	349	LDY #0
750	LDY #0	332	LDY #0	350	LDY #0
760	LDY #0	333	LDY #0	351	LDY #0
770	LDY #0	334	LDY #0	352	LDY #0
780	LDY #0	335	LDY #0	353	LDY #0
790	LDY #0	336	LDY #0	354	LDY #0
800	LDY #0	337	LDY #0	355	LDY #0
810	LDY #0	338	LDY #0	356	LDY #0
820	LDY #0	339	LDY #0	357	LDY #0
830	LDY #0	340	LDY #0	358	LDY #0
840	LDY #0	341	LDY #0	359	LDY #0
850	LDY #0	342	LDY #0	360	LDY #0
860	LDY #0	343	LDY #0	361	LDY #0
870	LDY #0	344	LDY #0	362	LDY #0
880	LDY #0	345	LDY #0	363	LDY #0
890	LDY #0	346	LDY #0	364	LDY #0
900	LDY #0	347	LDY #0	365	LDY #0
910	LDY #0	348	LDY #0	366	LDY #0
920	LDY #0	349	LDY #0	367	LDY #0
930	LDY #0	350	LDY #0	368	LDY #0
940	LDY #0	351	LDY #0	369	LDY #0
950	LDY #0	352	LDY #0	370	LDY #0
960	LDY #0	353	LDY #0	371	LDY #0
970	LDY #0	354	LDY #0	372	LDY #0
980	LDY #0	355	LDY #0	373	LDY #0
990	LDY #0	356	LDY #0	374	LDY #0
1000	LDY #0	357	LDY #0	375	LDY #0
1010	LDY #0	358	LDY #0	376	LDY #0
1020	LDY #0	359	LDY #0	377	LDY #0
1030	LDY #0	360	LDY #0	378	LDY #0
1040	LDY #0	361	LDY #0	379	LDY #0
1050	LDY #0	362	LDY #0	380	LDY #0
1060	LDY #0	363	LDY #0	381	LDY #0
1070	LDY #0	364	LDY #0	382	LDY #0
1080	LDY #0	365	LDY #0	383	LDY #0
1090	LDY #0	366	LDY #0	384	LDY #0
1100	LDY #0	367	LDY #0	385	LDY #0
1110	LDY #0	368	LDY #0	386	LDY #0
1120	LDY #0	369	LDY #0	387	LDY #0
1130	LDY #0	370	LDY #0	388	LDY #0
1140	LDY #0	371	LDY #0	389	LDY #0
1150	LDY #0	372	LDY #0	390	LDY #0
1160	LDY #0	373	LDY #0	391	LDY #0
1170	LDY #0	374	LDY #0	392	LDY #0
1180	LDY #0	375	LDY #0	393	LDY #0
1190	LDY #0	376	LDY #0	394	LDY #0
1200	LDY #0	377	LDY #0	395	LDY #0
1210	LDY #0	378	LDY #0	396	LDY #0
1220	LDY #0	379	LDY #0	397	LDY #0
1230	LDY #0	380	LDY #0	398	LDY #0
1240	LDY #0	381	LDY #0	399	LDY #0
1250	LDY #0	382	LDY #0	400	LDY #0
1260	LDY #0	383	LDY #0	401	LDY #0
1270	LDY #0	384	LDY #0	402	LDY #0
1280	LDY #0	385	LDY #0	403	LDY #0
1290	LDY #0	386	LDY #0	404	LDY #0
1300	LDY #0	387	LDY #0	405	LDY #0
1310	LDY #0	388	LDY #0	406	LDY #0
1320	LDY #0	389	LDY #0	407	LDY #0
1330	LDY #0	390	LDY #0	408	LDY #0
1340	LDY #0	391	LDY #0	409	LDY #0
1350	LDY #0	392	LDY #0	410	LDY #0
1360	LDY #0	393	LDY #0	411	LDY #0
1370	LDY #0	394	LDY #0	412	LDY #0
1380	LDY #0	395	LDY #0	413	LDY #0
1390	LDY #0	396	LDY #0	414	LDY #0
1400	LDY #0	397	LDY #0	415	LDY #0
1410	LDY #0	398	LDY #0	416	LDY #0
1420	LDY #0	399	LDY #0	417	LDY #0
1430	LDY #0	400	LDY #0	418	LDY #0
1440	LDY #0	401	LDY #0	419	LDY #0
1450	LDY #0	402	LDY #0	420	LDY #0
1460	LDY #0	403	LDY #0	421	LDY #0
1470	LDY #0	404	LDY #0	422	LDY #0
1480	LDY #0	405	LDY #0	423	LDY #0
1490	LDY #0	406	LDY #0	424	LDY #0
1500	LDY #0	407	LDY #0	425	LDY #0
1510	LDY #0	408	LDY #0	426	LDY #0
1520	LDY #0	409	LDY #0	427	LDY #0
1530	LDY #0	410	LDY #0	428	LDY #0
1540	LDY #0	411	LDY #0	429	LDY #0
1550	LDY #0	412	LDY #0	430	LDY #0
1560	LDY #0	413	LDY #0	431	LDY #0
1570	LDY #0	414	LDY #0	432	LDY #0
1580	LDY #0	415	LDY #0	433	LDY #0
1590	LDY #0	416	LDY #0	434	LDY #0
1600	LDY #0	417	LDY #0	435	LDY #0
1610	LDY #0	418	LDY #0	436	LDY #0
1620	LDY #0	419	LDY #0	437	LDY #0
1630	LDY #0	420	LDY #0	438	LDY #0
1640	LDY #0	421	LDY #0	439	LDY #0
1650	LDY #0	422	LDY #0	440	LDY #0
1660	LDY #0	423	LDY #0	441	LDY #0
1670	LDY #0	424	LDY #0	442	LDY #0
1680	LDY #0	425	LDY #0	443	LDY #0
1690	LDY #0	426	LDY #0	444	LDY #0
1700	LDY #0	427	LDY #0	445	LDY #0
1710	LDY #0	428	LDY #0	446	LDY #0
1720	LDY #0	429	LDY #0	447	LDY #0
1730	LDY #0	430	LDY #0	448	LDY #0
1740	LDY #0	431	LDY #0	449	LDY #0
1750	LDY #0	432	LDY #0	450	LDY #0
1760	LDY #0	433	LDY #0	451	LDY #0
1770	LDY #0	434	LDY #0	452	LDY #0
1780	LDY #0	435	LDY #0	453	LDY #0
1790	LDY #0	436			

The Toy Shop

Here's a chance to make a selection of toy models with your computer, thanks to Broderbund's new package.

By S. Gordon

The idea of the whole program is to select the model you want to make, cut it up, and then print it onto normal printer paper. That is then the computer's job over. It is now up to you and your creative abilities to produce an accurate model. Not only are these models nice to look at but they are also working models. Some of them are just made from the paper, but for the more sturdy models you stick the paper to the card before cutting it out.

A very extensive manual is included in the package, along with three disks, adhesive-backed card, wooden dowels, pieces of wire, rubber stripping, cotton cord and balloons. The manual has easy instructions for using the program and from a detailed construction guide for each model. All you need to supply is the computer, a printer and some glue and paper clips. (The package gives a list of the printers that can be used.)

Design your own

The selection of drawings and modifications is carried out with easy-to-use menus. If you have quite a creative mind you may not be happy just doing the set models, so for you there is a chance to customize and adapt the models. So though there are only plans for 20 models there are hundreds of possible variations. You can add personalized text, change fonts and type style and alter print positions.

There is an option in the program to browse through the whole selection of toys and models. You will be shown a detailed picture and description of each one, and using this you can decide which model you would like to make, find out how easy or difficult it will be and what materials you will need. If you know beforehand what you would like to make, you can go straight to an alphabetical list and select it from there.



Having made your selection you can then either print, customise or load your choice. The load option allows you to re-use your own customised model which you previously saved on disk. There are nearly 40 print patterns for you or if you are another Picasso you may even want to create your own print patterns from scratch. (Rather you than me.) These you can then save on a separate disk to be used again. After all, why waste your creativity?

Once you are happy with the look of the model you can select 'print' from the menu. You can print up to nine copies at any one time, and you can also select certain pages from each model to print out rather than the whole thing. This is especially useful if you spot or loose one sheet. To find out which specific sheet you need, there is an index at the back of the manual showing a full layout of each sheet.

The printout times are probably longer than you are used to. They range from about eight minutes for the simpler models, to about 30 minutes for the more detailed ones.

Putting them together

The second part of the manual, the construction guide, gives detailed instructions on how to put each model together and provides a photograph of each one, so you can compare your end result with what it should look like! The models range from easy, medium and challenging so if you are a bit daft, like me you might be as well to start at the beginning. As already mentioned some of the models need to be made from the card. It will say on each sheet whether this is necessary or not. Should you run out of card, more is available in a retail pack.

Alternatively you can use ordinary card and spray adhesive. When you have printed out the pieces you can colour them before assembling them, with either coloured pencils, water colours, oil paints or felt pens. An alternative is to print the models on coloured printer paper.

Fun can be had by all

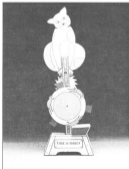
You may think all this sound like Blue Peter, with their sticky-back plastic, but believe me it's great fun. I'm not very artistic but I had a great time producing these models. You have to be patient as some of them are complicated and if rushed will not look very good. It is great fun for adults and children alike and will provide hours of entertainment! The package is quite expensive at around £40 but having looked at it I think this is reasonable, especially if it keeps the kids or husbands quiet!

Available:

Name: *The Toy Shop*. Supplier: *Precision Software*. Tel: 01-208 7388. Marking: C64. Price: £39.99 (+£2.40 p/p).



More Carousel.
Below: Mechanical Bank.



CP/M and the Commodore 128

Batch processing and assembly language are both possible in CP/M — but you have to know how.

By Microsoft AppleII

The submit command is at least as powerful as the PIP command. What it allows you to do is to make up several CP/M commands into a sequence of instructions. The most common use is to start off a complex program when a number of terminal options need to be set, or other system changes made.

The command takes the form `SUBMIT name.SUB`, this will read the file "name" and execute the commands in it as if they were entered in at the keyboard. The difference between this and the GET command is that SUBMIT is much more powerful, particularly in its parameter passing and actual operation of programs.

The object file containing the commands is usually referred using ED, as discussed last month. It's usual to end its name with .SUB, the file extension which tells the SUBMIT command that this is a SUB file. An example of a SUB file (which we'll call WS.SUB) might take the form:

```
ERA file.BAK
REN file.BAK file.TXT
R
WS
```

Typing `SUBMIT WS.SUB` would rename a commonly used text file, set the default drive to R and start up a word processor — nothing complex in that. GET could have done the same, and probably faster.

Suppose, in the same example, we didn't know the name of the file that we wanted to back-up; we would

need to use the parameter-passing option. Parameters are typed in after the SUBMIT command SUB file name. Up to nine parameters may be passed and they are referred to by the names \$1, \$2, etc. to \$9, \$1 being the first parameter in the list and \$9 being the ninth.

If the example file above is changed to the following:

```
ERA $1.BAK
REN $1.BAK $1.TXT
R
WS
```

it will deal with any text files. Now typing `SUBMIT WS.SUB file` will perform the same function as above, but `SUBMIT WS.SUB file` will perform the same function but with the name `file` instead of `file`.

The astute reader will have spotted that this method makes it rather difficult to use dollar signs normally when you don't want to use variables. This is overcome in CP/M by typing two dollar signs, \$\$, which will get replaced by a single dollar, \$, when the time comes.

If you wish to direct control of an actual program, a slightly different method must be used. Take the following example:

```
PIP
<A>=file.*
C
DIR
```

This, as a SUB file will enter PIP and copy the contents of one drive over to another. The less than sign, <, must

precede all in-program commands. As on its own it takes a considerable return.

The SUBMIT command is a form of RUN as discussed in an earlier installment. SUBMIT commands, as well as the usual GET commands can be nested so that they call each other, but eventually you run out of memory.

There is a special SUBMIT file which must be called PROFILE.SUB. This .SUB file is called when CP/M first starts up, this can be used to personalize your system.

Programming In CP/M

CP/M was originally designed to make the programming of the Intel 8080 microprocessor slightly easier than typing in hex codes.

CP/M provides all the routines necessary for all the basic computing functions or primitives as well as some fairly complex disk handling and some crude editing facilities.

To program in CP/M you need to know two things — how CP/M operates, and how to program in 8080 or Z80 code.

CP/M is similar to many other operating systems in the way that it performs tasks: first the user sets up various parameters, calls the appropriate routine, and then the OS carries out the task; the OS returns to the user either with the results of the task or some helpful (and hoped) information about why the task wasn't completed successfully.

The OS operating system routes along these lines: you set up registers, and then call an address where the routine is stored or where there is a jump to where the routine is stored. You have to keep track of all the locations of the routines and addresses.

The BBC micro (which is very similar to the OS in hardware terms) uses a different system: the OS keeps its own table of where the routines are stored, and can keep track of changes in the memory map. As a result, you make the same call whatever changes may have been made to the memory map, and the OS does not have to be altered to take account.

Because CP/M was designed from the start to be used on different systems with different configurations, it uses the same method as the BBC (or rather, the other way round).

The actual operating part of CP/M is held at the high end of memory, but the first 4096H bytes of memory are reserved by the system. One of these is the place to call for your OS function — 40902H actually.

The C register is located with the number referred to the function that you want to perform. A, D, and E, are loaded with data, then 'CALL 40802H' is all you need to perform it. The A register then remains with the success status of the instruction.

When CP/M first came out with V1.4, it had 27 instructions. V2.2 had just under 40, while CP/M+ (V3.0) that we are using has about a hundred. This isn't the biggest CP/M version though MP/M II - the multi-user version of CP/M - has around 150 commands available!

As an example, consider the most simple OS command in any operating system - outputting a character to the screen. A quick glance at our CP/M programming manual reveals that the code for this is 402H, and the character to be output must be held in the E register. The code for this could look like this:

```
LD E,A21H
LD C,402H
CALL 40802H
```

This would print an 'F' on the screen taking into account scrolling and jumps from the keyboard.

A slightly more complicated function would be to print a string on the screen. This has 405H as its code:

```
code LD DE,00
LD C,405H
CALL 40802H
```

In this case the D and E registers are treated as one 16-bit register and contain the 16-bit address for the start of the string. The 3 sign indicates the end of the first string. C, as usual, holds the CP/M function code. However to print a dollar sign on screen you need to use function 02 as above (nothing is ever easy in CP/M).

C for Control

As with any system, there are assemblies and monitors to help you program in mnemonics and to test your results. However with the standard CP/M utilities MAC, ASM, MIB, DIB and the like there is a small problem. They all work with 8086s (rather than with Z80). There is no great problem with this. You will just have to leave 8080 mnemonics rather than Z80 ones. It all produces the same code in the end whether you use 'MOV A,C' or 'LD C,A'.

MAC, BMAC, and ASM all work in much the same way. A file associated with ED and the program is invoked, assembling the program into a .HEX file which can then be converted into a program that CP/M can run. But it all has to be in 8086 code. You will do much better if you buy, or obtain on public domain, a 'real' Z80 assembler.

SID is the 'symbolic instruction debugger' and replaces the earlier DIB or 'dynamic debugging tool'

There are a few more complex commands, but they require a full explanation of MAC (the 8080 macro assembler and its symbol handling, and it's not worth it for 8080 code. The commands in ZSID are basically the same but use Z80 mnemonics.

I hope you've enjoyed this short series on the 'hidden' side of the C128 and CP/M in general. With the advent of the Amstrad range of CP/M based machines, CP/M has received a new lease of life and many programs are now being re-released, as well as lots of books being re-published.

If you have any problems or queries with CP/M, then don't hesitate to write in. Unfortunately we cannot answer problems personally, but in a few months we will run a couple of pages with the most common queries and answers.

CP/M is a fine operating system if put to the use it was intended for - Z80 and 8080 development systems. Use it wisely and it will be your friend. Put it under too much stress and it will bite back!

Bibliography

CP/M 80 Programmer's Guide (Macmillan) One of the more detailed programming guides for CP/M. Deals with writing your own programs rather than using the system.

As	Enter single line assembler, n is the start address
Cn b,c,d	Call address n, b,c,d optionally load these registers
D W n1,n2	Display hex between n1 and n2. W optionally displays as words
F n1,n2,d	Fill n1 to n2 with d
G n,b1,b2	Go to n with optional breakpoints at b1 and b2
ICOMM	Enter CP/M command COMMM
I n1,n2	List (disassemble) 8080 instructions between n1 and n2
M n1,n2,n3	Move n1 to n2 to start at n3
MIB	Load file into memory
T W n2,n1	Trace program at n1 through n2 instructions and optionally (W) without tracing CALLs
U W n2,n1	Untrace as above
MIB,n1,n2	Write file between memory addresses n1 and n2
KEY	Examines the flags or register state

which was used on earlier versions of CP/M and will not be discussed here. There is also a ZSID that uses Z80 code rather than 8080 code and is much more useful.

Like TIM, the Commodore monitor (and almost every other monitor in existence), commands are entered in with one letter and some data. The table shows a list of commands - most of them will be familiar to Commodore users.

Digital Research CP/M Plus Handbook (Prentice-Hall) 417 pages of everything you want to know about CP/M+. Not so heavy on the programming, but lists all the commands and functions in great detail. Now available from Amstrad in a new edition.

Z80 Reference Guide (Melbourne House) The ultimate Z80 book. All you need to know to get the best out of your C128 (284 pages).

Speedy Assembler

Get into machine code programming the easy way with our special offer.

The Commodore 64 computer is a programmer's machine, but most of its outstanding facilities, like high-resolution graphics and three voice sound production, are not easily accessible from Basic. Sooner or later you may have to think seriously about getting into machine code programming, even if you only want to write some subroutines in machine code to spruce up your Basic programs.

In order to introduce its readers to the systems of machine code programming Your Commodore has recently started a major series on machine code programming, called 'Diving Into the 6502'. The author of the series, Hughand-Henry Lehmann, has spent many months writing a comprehensive machine code development package, called 'Speedy Assembler'. Now 'Your Commodore' is offering this program to its readers at a special price.

A Brand New Operating System

Speedy Assembler is a 100% memory-resident program. Load it is either from disk or tape, and you've got a whole new operating system at your fingertips, consisting of a comprehensive screen-editor, list-two-pass assembler and monitor.

With all this help you will find that writing assembly listings can be surprisingly easy and, in some respects, even more convenient than writing Basic programs. This is especially true if you compare what Speedy Assembler has to offer with the rather poor operating system of the

10	:	ORG 40150
20	:	
30	SCREEN	ORG 1000
40	COLOUR	ORG 2000
50	:	
60	:	
70	:	
80	:	
90	:	
99	:	
100	PRINTLOOP	LDX #0
110	:	LDX #1
120	:	STX SCREEN,X
130	:	LDX #0
140	:	STX COLOUR,X
150	:	INX
160	:	BEQ PRINTLOOP
170	:	
180	:	RTS

Sample .asm file

Commodore 64, which has not to be too-bit routine.

Here are some of the facilities the screen-editor of the program offers you:

- auto line numbering,
- block-copying of lines,
- block-deletion of lines,
- line renumbering facility,
- search facility,
- temporary listing interrupts,
- automatic listing interrupts,
- scrolling the screen down from the top,
- converting numbers from hex or binary into decimal and vice versa,
- doing calculations with numbers in different bases.

All these facilities allow you to

enter and manipulate assembly listings in the most convenient way possible.

Printing It Out

Afterwards you can get a print-out of all the listings produced by Speedy Assembler. This is simplicity itself: just enter 'P', and every listing - but the listing of a source file, an assembler listing or a symbol table listing - that is produced by the next command you give will be sent to the printer instead of the screen.

Speedy Assembler even includes a screen-dump facility which is useful if you want to design your own loadings and subroutines for any of the things.

Part of the user-friendliness of the


```

*****
*****
10
20
30 C000 A0 01
40 C002 80 00 C0
50
60 C005 60
*****
*****

```

Simple assembly

program is the comprehensive error-checking system it employs. This warns you of minor traps before they become major calamities.

Speedy Assembler gives "intelligent" error reports, that is, these are 20-error messages which tell you clearly and concisely which error has arisen. Most error reports are given immediately after a faulty line has been entered, and this will result in the line not being placed in the source file. This immediate error-checking system speeds up assembly and prevents those seemingly endless lists of error reports which you might otherwise get after the first pass.

Furthermore, if you give a wrong command to the screen editor of Speedy Assembler, there will be an arrow pointing to the incorrect letter or parameter.

All this permits you to use the program right from Day One without

having constantly to worry that something might go fatally wrong!

The Assembler

Once you've used the screen editor to create an assembly listing, or source file, as it is also called, you can assemble it into machine code straight away. Since the whole program is memory-based you do not have to waste time loading a separate assembler module into the computer.

The assembler produces the machine code you want in a matter of seconds, ready to be executed and tested.

There are five options the assembler gives you: You can have an assembly listing on, if you prefer maximum speed, not. Furthermore you can have the listing in hex or decimal.

An important option gives you an

assembler listing folder in hex or decimal but does not produce any object code. There are times when this option comes in very handy. This is when you want to see how a particular source file assembles but don't want the object code to be written into memory because it might overwrite something else.

The whole idea of the program is that you can develop your machine code with a minimum of fuss and without having constantly to save and load. And since "Speedy Assembler" is so fast, you don't have to dread every time you want to re-assemble a routine after you have modified it!

But there is even more to the package we are offering you:

Speedy Assembler includes two powerful capabilities - a master symbol table and a file catalogue facility - which no assembler we know of has got. These two options have been designed to assist the experienced machine code programmer who wants to write larger programs, like arcade games, word processors, major utilities and so on.

The Master Symbol Table

The master symbol table is a second symbol table which allows a linkage between different source files. Unlike the ordinary symbol table it is not built up automatically. Instead you can decide with the help of a simple transfer facility which labels you want to keep in the master symbol table. Once a label is in the master symbol table the assembler takes it into account just like any other.

This allows you to declare the main variables used in your program once only, and all subsequent source files will be assembled without any problems.

The master symbol table is also very useful for jump vector tables and subroutines calls.

The Filecatalogue

The second advanced facility of "Speedy Assembler" is the file catalog. This is a list of all the source files you have designed so far, each entry giving you the filename and beginning and end addresses of the object code of that particular source file. In this way you get a complete record of the program

Information Provided

```

***** SPEEDY ASSEMBLER *****
(C) 1987 B-H LEHNNH          VERSION C/4/8C
PROGRAM NAME:  HD NAME
CURRENT FILE:  HD NAME
BEGINNING OF SOURCE FILE:  3500
END OF SOURCE FILE:        7000
BEGINNING OF SYMBOL TABLE: 10000
END OF SYMBOL TABLE:     10000
BEGINNING OF MASTER SYMBOL: 10000
END OF MASTER SYMBOL TEL:  10000
BEGINNING OF FILE CATALOG:  10000
END OF FILE CATALOG:       10000
SWT0P:         3450
I: 0          K: 0          DEVICE=HD: 0
ENTER CHD!

```

you are writing which is constantly updated by the computer. At a glance you can tell how much code you can add to a certain source file before the subject object code is in danger of being overwritten.

And because of the file catalog the assembler is even able to give you a warning error report if this should happen!

Maximum Flexibility

Another aim of 'Speedy Assembler' is to give as much flexibility in memory management as possible.

Memory management is of vital importance when it comes to machine code programming, because unlike Basic you have to plan how to make the best use of available memory, especially if you are writing a large, self-contained machine code program. And as things go, however well you plan your memory layout, is the end things *never* quite work out as planned.

This is where the flexibility of Speedy Assembler comes in: the beginnings and endings of the source file, the symbol table, the master symbol table and the file catalog are made visible to you and you can block-move any of these files at any time to a more suitable position. So if you have to switch things around you can do it with a minimum of fuss.

In addition to this all the above files are constantly checked to see if any of them is in danger of overwriting another file or the program itself. And before this can happen a warning is given.

User-friendliness saves you a lot of work in the long run!

Finally

There is much more we could tell you about this excellent machine code development package. But in the end there is no substitute for trying it out yourself. And at £9.95 per copy we'll be very surprised if you don't!

Buying the Software

This program is only available through Your Commodore Reader Services department. It cannot be ordered from Your Commodore office.

Orders should be sent to the address on the order form with a cheque or postal order for £9.95 made payable to A.S.P.

The package includes all necessary documentation as well as some examples of how to use the assembler in the form of assembly programmes from past issues of Your Commodore.

Tape or Disk

The Your Commodore Speedy Assembler is available on both cassette and disk.

Through a simple POKE instruction the cassette version can be made to work with disk. You will of course not have all the facilities of the disk version available to you.

The Disk version of Speedy Assembler will NOT work with cassette.

ORDER FORM - PLEASE COMPLETE IN BLOCK CAPITALS

NAME	CODE	PRICE	NUMBER	TOTAL
SPEEDY ASSEMBLER (DISK)	YSPASDD	9.95		
SPEEDY ASSEMBLER (TAPE)	YSPASDC	9.95		
OVERSEAS POSTAGE		1.00		
			TOTAL	

I would like to order a copy of Speedy Assembler for the Commodore 64.

Name

Address

Postcode

I enclose a cheque/postal order for £..... made payable to ARBUS SPECIALIST PUBLICATIONS LTD.

All orders should be sent to: YOUR COMMODORE, READERS SERVICES, ARBUS SPECIALIST PUBLICATIONS, 9 HALL ROAD, HEMEL HEMPSTEAD, HERTS HP2 1BB. Please allow 28 days for delivery.

Smooth Vertical Scroller

Is your vertical scrolling just a little jerky? Type in this listing and you can stop buying the aspirin.

By Susan Ray

There must be many users who have video recorders, and would like to use their 64 or 128 to create video titles for home productions, etc. One way is to use the standard size Commodore text, but this tends to look insignificant on a video title screen.

With this program, you can create titles that appear in double size characters (twice the height and width of standard text) with the addition of smooth vertical scrolling. Even if you don't have a video recorder, the program is great fun at parties (what sort of parties do you them? — Ed.), and can be very useful at meetings.

The system is in two parts, the code boot and the editor/scroller.

Three Boats

The code boot will read in the machine code and character data from the DATA statements, and enter them into memory. Type in the program as listed, and then **SAVE** it immediately. The code uses memory which overlaps with that used by the program, so it is initially relocated. However, when all the code is entered correctly, a prompt will be given to save the generated code. If you have not **SAVED** the code boot program yet, hit **RUN STOP** and **RESTORE** together and save it.

Press **RETURN** on seeing the prompt, and the code will be saved as a single file named "MC CODE" on disk. If you have a tape unit, or wish to change the filename, then after line 108 hit:

```
108550762="FILENAME",
DEVICEL
```

where **DEVICE** = 1 or 9 for disk units, and 1 for tape.

Now type in part 2, the editor/scroller and **SAVE** it before running it. You are now all set about composing your first title screen.

In Use

To use the system:

1. Load in the code generated by code boot e.g. **LOAD "MC CODE",1**
2. Type **NEW**
3. Load the editor (Part 2), and run it. The screen will go white, and a black square should appear in the upper left corner of the screen. This is your cursor. Messages may not be typed in, but only up to 16 characters may be entered per line. The cursor will not allow you to advance past column 16 of the screen.

After typing in each line, press **RETURN**. This is very important as each line is processed only after the **RETURN** key is pressed. This editor is a pseudo-screen editor, that is, it

behaves rather like the screen editor you use to type in programs on the 64. However, only alphanumeric may be entered, and only in upper case. In addition, the ":", and "<" keys may be used, not to mention spaces.

The cursor up/down keys do what you might expect, allowing you to type in messages down all 25 rows of the screen. Cursor right also functions as normal, but use the 'left' key to perform a cursor left. With a little practice, you will be able to enter messages quickly and efficiently.

This system can be used to produce hundreds of lines of titles in progress, and so if have allowed the screen to scroll both up and down to enter messages in the correct places.

One point to note is that the routine will automatically center the text on screen when it comes to output the finished product, so do not proceed messages by leading spaces.

If you use the cursor keys to edit a message, remember to press return afterwards to reprocess the modified line. Before pressing return, though, move the cursor to the end of the line, as otherwise the character that the cursor is on and all characters afterwards on the same line will be deleted.

When you have entered your messages, you can view the title by pressing the extend key.

The screen will clear and you will receive a prompt for the speed of the scroll. By pressing the cursor down key, you can alter the speed setting, which is indicated on screen. There are two speeds, 1 and 2. It is the faster, 2 is full speed. Having made your choice, press return.

A prompt will appear for the foreground colour. As before, use the cursor down and return keys to make your choice.

Finally, there is the background colour to choose. Again use the cursor down and return keys.

Now the screen will clear, and after a few seconds the title will appear. This takes about three seconds at speed 1, and six at speed 2. The title will scroll smoothly up the screen, and when it is finished, press the space bar. This feature can be used at any time while viewing the title. If the title does not appear after six seconds, press the space bar and re-roll the title occasionally, the title will not appear, but this should be OK.

Pressing the space bar will take you to another menu where you can either re-roll the title, i.e. view them again, or re-enter titles, i.e. return to the edit screen.

From the edit screen, passing the left arrow key will take you to the input/output menu. Here you have several options:

save title data just typed in using the editor;
re-load each title data;
create a demo.

The first two options are self-explanatory. Create-demos will allow you to save your title on a form which can be reloaded in a single file, and run.

Whether you wish to load or save data, or to create a demo, you will be asked to identify the type of storage device you will be using, disk or tape. The options will appear, and again, cursor down and return keys are used to make the choice.

The system will allow for tape units as well as disk drives of device 8 or 9.

The filename is required next. To avoid errors for disk users, the program must have a filename before proceeding. Only alphanumeric characters are valid, and only up to 11 characters.

Finally, instructions will appear for your option to set the storage device and press return.

Note, however, that if you create a demo, you should load it back with a secondary address of zero; so for example, you should type in:

```
LOAD"FILENAME",3 (for disk)
```

```
or
```

```
LOAD"FILENAME" (for tape)
```

```
You should not type in:  
LOAD"FILENAME",3,1
```

```
or
```

```
LOAD"FILENAME",1,1
```

as the demo will not run like this. Nothing else is required for the demo to run, so the scrolling system does not have to be loaded first.

With both the save title and create demo routines not quite the whole area of text memory available is stored. Text will be stored only up to the last line before the line with the cursor on it. By this I am referring to the lines for text entry on the edit screen. So, if the cursor is on line 3 of the text edit screen, then on calling up the save or demo routines, only lines 1 and 2 are saved. This is to avoid saving unnecessary memory, and to thus reduce loading and saving times.

The demo will, upon running, scroll the title at the same speed and colour as was saved with, and to stop scrolling it, use the space bar. It can then be re-run to play again etc.

As before, if the title does not appear after six seconds, press the space bar and re-roll the demo.

PROGRAM CODE LIST

Please use the SYSTEM CHECKER program when loading or this listing.

```
00 10 0-0100-0-0-1-000-00000000
01 20 0-0000-0-0-1-000-000000
02 30 0-0000-0-0-1-000-000000
03 40 0-0000-0-0-1-000-000000
04 50 0-0000-0-0-1-000-000000
05 60 0-0000-0-0-1-000-000000
06 70 0-0000-0-0-1-000-000000
07 80 0-0000-0-0-1-000-000000
08 90 0-0000-0-0-1-000-000000
09 00 0-0000-0-0-1-000-000000
10 10 0-0000-0-0-1-000-000000
11 20 0-0000-0-0-1-000-000000
12 30 0-0000-0-0-1-000-000000
13 40 0-0000-0-0-1-000-000000
14 50 0-0000-0-0-1-000-000000
15 60 0-0000-0-0-1-000-000000
16 70 0-0000-0-0-1-000-000000
17 80 0-0000-0-0-1-000-000000
18 90 0-0000-0-0-1-000-000000
19 00 0-0000-0-0-1-000-000000
20 10 0-0000-0-0-1-000-000000
21 20 0-0000-0-0-1-000-000000
22 30 0-0000-0-0-1-000-000000
23 40 0-0000-0-0-1-000-000000
24 50 0-0000-0-0-1-000-000000
25 60 0-0000-0-0-1-000-000000
26 70 0-0000-0-0-1-000-000000
27 80 0-0000-0-0-1-000-000000
28 90 0-0000-0-0-1-000-000000
29 00 0-0000-0-0-1-000-000000
30 10 0-0000-0-0-1-000-000000
31 20 0-0000-0-0-1-000-000000
32 30 0-0000-0-0-1-000-000000
33 40 0-0000-0-0-1-000-000000
34 50 0-0000-0-0-1-000-000000
35 60 0-0000-0-0-1-000-000000
36 70 0-0000-0-0-1-000-000000
37 80 0-0000-0-0-1-000-000000
38 90 0-0000-0-0-1-000-000000
39 00 0-0000-0-0-1-000-000000
40 10 0-0000-0-0-1-000-000000
41 20 0-0000-0-0-1-000-000000
42 30 0-0000-0-0-1-000-000000
43 40 0-0000-0-0-1-000-000000
44 50 0-0000-0-0-1-000-000000
45 60 0-0000-0-0-1-000-000000
46 70 0-0000-0-0-1-000-000000
47 80 0-0000-0-0-1-000-000000
48 90 0-0000-0-0-1-000-000000
49 00 0-0000-0-0-1-000-000000
50 10 0-0000-0-0-1-000-000000
51 20 0-0000-0-0-1-000-000000
52 30 0-0000-0-0-1-000-000000
53 40 0-0000-0-0-1-000-000000
54 50 0-0000-0-0-1-000-000000
55 60 0-0000-0-0-1-000-000000
56 70 0-0000-0-0-1-000-000000
57 80 0-0000-0-0-1-000-000000
58 90 0-0000-0-0-1-000-000000
59 00 0-0000-0-0-1-000-000000
60 10 0-0000-0-0-1-000-000000
61 20 0-0000-0-0-1-000-000000
62 30 0-0000-0-0-1-000-000000
63 40 0-0000-0-0-1-000-000000
64 50 0-0000-0-0-1-000-000000
65 60 0-0000-0-0-1-000-000000
66 70 0-0000-0-0-1-000-000000
67 80 0-0000-0-0-1-000-000000
68 90 0-0000-0-0-1-000-000000
69 00 0-0000-0-0-1-000-000000
70 10 0-0000-0-0-1-000-000000
71 20 0-0000-0-0-1-000-000000
72 30 0-0000-0-0-1-000-000000
73 40 0-0000-0-0-1-000-000000
74 50 0-0000-0-0-1-000-000000
75 60 0-0000-0-0-1-000-000000
76 70 0-0000-0-0-1-000-000000
77 80 0-0000-0-0-1-000-000000
78 90 0-0000-0-0-1-000-000000
79 00 0-0000-0-0-1-000-000000
80 10 0-0000-0-0-1-000-000000
81 20 0-0000-0-0-1-000-000000
82 30 0-0000-0-0-1-000-000000
83 40 0-0000-0-0-1-000-000000
84 50 0-0000-0-0-1-000-000000
85 60 0-0000-0-0-1-000-000000
86 70 0-0000-0-0-1-000-000000
87 80 0-0000-0-0-1-000-000000
88 90 0-0000-0-0-1-000-000000
89 00 0-0000-0-0-1-000-000000
90 10 0-0000-0-0-1-000-000000
91 20 0-0000-0-0-1-000-000000
92 30 0-0000-0-0-1-000-000000
93 40 0-0000-0-0-1-000-000000
94 50 0-0000-0-0-1-000-000000
95 60 0-0000-0-0-1-000-000000
96 70 0-0000-0-0-1-000-000000
97 80 0-0000-0-0-1-000-000000
98 90 0-0000-0-0-1-000-000000
99 00 0-0000-0-0-1-000-000000
```

```
07 100 000 00 00 0000 00 0000 00
08 100 000
09 000 0000 000000
10 100 000
11 000 0000 000000
12 000 0000 000000
13 000 0000 000000
14 000 0000 000000
15 000 0000 000000
16 000 0000 000000
17 000 0000 000000
18 000 0000 000000
19 000 0000 000000
20 000 0000 000000
21 000 0000 000000
22 000 0000 000000
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25 000 0000 000000
26 000 0000 000000
27 000 0000 000000
28 000 0000 000000
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30 000 0000 000000
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36 000 0000 000000
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38 000 0000 000000
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41 000 0000 000000
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67 000 0000 000000
68 000 0000 000000
69 000 0000 000000
70 000 0000 000000
71 000 0000 000000
72 000 0000 000000
73 000 0000 000000
74 000 0000 000000
75 000 0000 000000
76 000 0000 000000
77 000 0000 000000
78 000 0000 000000
79 000 0000 000000
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00	107,100,001	01	051,171,070,1000	02	0000 0010 020,000,100,000,00	03	0,00,00,000
04	000 0010 0,100,000,0,107,000	05	0000 0010 020,000,100,000,00	06	1070 0010 10,00,00,00,00,00	07	0000 0000
08	070 0010 00,00,0,107,000,0,1000,	09	1070 0010 00,100,0,100,000,0	10	1070 0010 107,107,00,00,00,0	11	0,00,00,010
12	00,0,0,000	13	1000 0010 0,100,0,100,000,0	14	1000 0010 107,107,00,00,00,0	15	0,00,00,010
16	000 0010 107,00,0,0,000,100,0,	17	1000 0010 0,100,0,100,000,0	18	1000 0010 107,107,00,00,00,0	19	0,00,00,000
20	107,00,0,000	21	1000 0010 0,100,0,100,000,0	22	1000 0010 107,107,00,00,00,0	23	0,00,00,000
24	000 0010 0,100,0,0,107,000	25	1000 0010 0,100,0,100,000,0	26	1000 0010 107,107,00,00,00,0	27	0,00,00,000
28	000 0010 0,100,0,0,107,000	29	1000 0010 0,100,0,100,000,0	30	1000 0010 107,107,00,00,00,0	31	0,00,00,000
32	000 0010 0,100,0,0,107,000	33	1000 0010 0,100,0,100,000,0	34	1000 0010 107,107,00,00,00,0	35	0,00,00,000
36	000 0010 0,100,0,0,107,000	37	1000 0010 0,100,0,100,000,0	38	1000 0010 107,107,00,00,00,0	39	0,00,00,000
40	000 0010 0,100,0,0,107,000	41	1000 0010 0,100,0,100,000,0	42	1000 0010 107,107,00,00,00,0	43	0,00,00,000
44	000 0010 0,100,0,0,107,000	45	1000 0010 0,100,0,100,000,0	46	1000 0010 107,107,00,00,00,0	47	0,00,00,000
48	000 0010 0,100,0,0,107,000	49	1000 0010 0,100,0,100,000,0	50	1000 0010 107,107,00,00,00,0	51	0,00,00,000
52	000 0010 0,100,0,0,107,000	53	1000 0010 0,100,0,100,000,0	54	1000 0010 107,107,00,00,00,0	55	0,00,00,000
56	000 0010 0,100,0,0,107,000	57	1000 0010 0,100,0,100,000,0	58	1000 0010 107,107,00,00,00,0	59	0,00,00,000
60	000 0010 0,100,0,0,107,000	61	1000 0010 0,100,0,100,000,0	62	1000 0010 107,107,00,00,00,0	63	0,00,00,000
64	000 0010 0,100,0,0,107,000	65	1000 0010 0,100,0,100,000,0	66	1000 0010 107,107,00,00,00,0	67	0,00,00,000
68	000 0010 0,100,0,0,107,000	69	1000 0010 0,100,0,100,000,0	70	1000 0010 107,107,00,00,00,0	71	0,00,00,000
72	000 0010 0,100,0,0,107,000	73	1000 0010 0,100,0,100,000,0	74	1000 0010 107,107,00,00,00,0	75	0,00,00,000
76	000 0010 0,100,0,0,107,000	77	1000 0010 0,100,0,100,000,0	78	1000 0010 107,107,00,00,00,0	79	0,00,00,000
80	000 0010 0,100,0,0,107,000	81	1000 0010 0,100,0,100,000,0	82	1000 0010 107,107,00,00,00,0	83	0,00,00,000
84	000 0010 0,100,0,0,107,000	85	1000 0010 0,100,0,100,000,0	86	1000 0010 107,107,00,00,00,0	87	0,00,00,000
88	000 0010 0,100,0,0,107,000	89	1000 0010 0,100,0,100,000,0	90	1000 0010 107,107,00,00,00,0	91	0,00,00,000
92	000 0010 0,100,0,0,107,000	93	1000 0010 0,100,0,100,000,0	94	1000 0010 107,107,00,00,00,0	95	0,00,00,000
96	000 0010 0,100,0,0,107,000	97	1000 0010 0,100,0,100,000,0	98	1000 0010 107,107,00,00,00,0	99	0,00,00,000

38	3898 DATA 0,0,0,0,0,0,0,0,0	64	3948 DATA 60,60,60,60,30,30,
39	3899 DATA 0,0,0,0,0,0,0,0,0	65	3949 DATA 60,60,60,60,127,127
40	3900 DATA 15,31,62,60,60,60,	66	3950 DATA 60,60,60,60,127,127
41	3901 DATA 0,0,0,0,0,0,0,0,0	67	3951 DATA 60,60,60,60,127,127
42	3902 DATA 15,31,62,60,60,60,	68	3952 DATA 60,60,60,60,127,127
43	3903 DATA 0,0,0,0,0,0,0,0,0	69	3953 DATA 60,60,60,60,127,127
44	3904 DATA 15,31,62,60,60,60,	70	3954 DATA 60,60,60,60,127,127
45	3905 DATA 0,0,0,0,0,0,0,0,0	71	3955 DATA 60,60,60,60,127,127
46	3906 DATA 15,31,62,60,60,60,	72	3956 DATA 60,60,60,60,127,127
47	3907 DATA 0,0,0,0,0,0,0,0,0	73	3957 DATA 60,60,60,60,127,127
48	3908 DATA 15,31,62,60,60,60,	74	3958 DATA 60,60,60,60,127,127
49	3909 DATA 0,0,0,0,0,0,0,0,0	75	3959 DATA 60,60,60,60,127,127
50	3910 DATA 15,31,62,60,60,60,	76	3960 DATA 60,60,60,60,127,127
51	3911 DATA 0,0,0,0,0,0,0,0,0	77	3961 DATA 60,60,60,60,127,127
52	3912 DATA 15,31,62,60,60,60,	78	3962 DATA 60,60,60,60,127,127
53	3913 DATA 0,0,0,0,0,0,0,0,0	79	3963 DATA 60,60,60,60,127,127
54	3914 DATA 15,31,62,60,60,60,	80	3964 DATA 60,60,60,60,127,127
55	3915 DATA 0,0,0,0,0,0,0,0,0	81	3965 DATA 60,60,60,60,127,127
56	3916 DATA 15,31,62,60,60,60,	82	3966 DATA 60,60,60,60,127,127
57	3917 DATA 0,0,0,0,0,0,0,0,0	83	3967 DATA 60,60,60,60,127,127
58	3918 DATA 15,31,62,60,60,60,	84	3968 DATA 60,60,60,60,127,127
59	3919 DATA 0,0,0,0,0,0,0,0,0	85	3969 DATA 60,60,60,60,127,127
60	3920 DATA 15,31,62,60,60,60,	86	3970 DATA 60,60,60,60,127,127
61	3921 DATA 0,0,0,0,0,0,0,0,0	87	3971 DATA 60,60,60,60,127,127
62	3922 DATA 15,31,62,60,60,60,	88	3972 DATA 60,60,60,60,127,127
63	3923 DATA 0,0,0,0,0,0,0,0,0	89	3973 DATA 60,60,60,60,127,127
64	3924 DATA 15,31,62,60,60,60,	90	3974 DATA 60,60,60,60,127,127
65	3925 DATA 0,0,0,0,0,0,0,0,0	91	3975 DATA 60,60,60,60,127,127
66	3926 DATA 15,31,62,60,60,60,	92	3976 DATA 60,60,60,60,127,127
67	3927 DATA 0,0,0,0,0,0,0,0,0	93	3977 DATA 60,60,60,60,127,127
68	3928 DATA 15,31,62,60,60,60,	94	3978 DATA 60,60,60,60,127,127
69	3929 DATA 0,0,0,0,0,0,0,0,0	95	3979 DATA 60,60,60,60,127,127
70	3930 DATA 15,31,62,60,60,60,	96	3980 DATA 60,60,60,60,127,127
71	3931 DATA 0,0,0,0,0,0,0,0,0	97	3981 DATA 60,60,60,60,127,127
72	3932 DATA 15,31,62,60,60,60,	98	3982 DATA 60,60,60,60,127,127
73	3933 DATA 0,0,0,0,0,0,0,0,0	99	3983 DATA 60,60,60,60,127,127
74	3934 DATA 15,31,62,60,60,60,		
75	3935 DATA 0,0,0,0,0,0,0,0,0		
76	3936 DATA 15,31,62,60,60,60,		
77	3937 DATA 0,0,0,0,0,0,0,0,0		
78	3938 DATA 15,31,62,60,60,60,		
79	3939 DATA 0,0,0,0,0,0,0,0,0		
80	3940 DATA 15,31,62,60,60,60,		
81	3941 DATA 0,0,0,0,0,0,0,0,0		
82	3942 DATA 15,31,62,60,60,60,		
83	3943 DATA 0,0,0,0,0,0,0,0,0		
84	3944 DATA 15,31,62,60,60,60,		
85	3945 DATA 0,0,0,0,0,0,0,0,0		
86	3946 DATA 15,31,62,60,60,60,		
87	3947 DATA 0,0,0,0,0,0,0,0,0		
88	3948 DATA 15,31,62,60,60,60,		
89	3949 DATA 0,0,0,0,0,0,0,0,0		
90	3950 DATA 15,31,62,60,60,60,		
91	3951 DATA 0,0,0,0,0,0,0,0,0		
92	3952 DATA 15,31,62,60,60,60,		
93	3953 DATA 0,0,0,0,0,0,0,0,0		
94	3954 DATA 15,31,62,60,60,60,		
95	3955 DATA 0,0,0,0,0,0,0,0,0		
96	3956 DATA 15,31,62,60,60,60,		
97	3957 DATA 0,0,0,0,0,0,0,0,0		
98	3958 DATA 15,31,62,60,60,60,		
99	3959 DATA 0,0,0,0,0,0,0,0,0		

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66 1070 0010 0100,010,010,010,010,010
67 1080 0010 0100,010,010,010,010,010
68 1090 0010 0100,010,010,010,010,010
69 1100 0010 0100,010,010,010,010,010
70 1110 0010 0100,010,010,010,010,010
71 1120 0010 0100,010,010,010,010,010
72 1130 0010 0100,010,010,010,010,010
73 1140 0010 0100,010,010,010,010,010
74 1150 0010 0100,010,010,010,010,010
75 1160 0010 0100,010,010,010,010,010
76 1170 0010 0100,010,010,010,010,010
77 1180 0010 0100,010,010,010,010,010
78 1190 0010 0100,010,010,010,010,010
79 1200 0010 0100,010,010,010,010,010
80 1210 0010 0100,010,010,010,010,010
81 1220 0010 0100,010,010,010,010,010
82 1230 0010 0100,010,010,010,010,010
83 1240 0010 0100,010,010,010,010,010
84 1250 0010 0100,010,010,010,010,010
85 1260 0010 0100,010,010,010,010,010
86 1270 0010 0100,010,010,010,010,010
87 1280 0010 0100,010,010,010,010,010
88 1290 0010 0100,010,010,010,010,010
89 1300 0010 0100,010,010,010,010,010
90 1310 0010 0100,010,010,010,010,010
91 1320 0010 0100,010,010,010,010,010
92 1330 0010 0100,010,010,010,010,010
93 1340 0010 0100,010,010,010,010,010
94 1350 0010 0100,010,010,010,010,010
95 1360 0010 0100,010,010,010,010,010
96 1370 0010 0100,010,010,010,010,010
97 1380 0010 0100,010,010,010,010,010
98 1390 0010 0100,010,010,010,010,010
99 1400 0010 0100,010,010,010,010,010

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PROGRAM: EDITOR-SUBROUTINE

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01 100 1F0A*00000001
02 101 0000,01,0000,01,CLR
03 102 0000,01,0000,01,PRINT"CLER"
04 103 0000,01,0000,01,PRINT"CLER"
05 104 0000,01,0000,01,PRINT"CLER"
06 105 0000,01,0000,01,PRINT"CLER"
07 106 0000,01,0000,01,PRINT"CLER"
08 107 0000,01,0000,01,PRINT"CLER"
09 108 0000,01,0000,01,PRINT"CLER"
10 109 0000,01,0000,01,PRINT"CLER"
11 110 0000,01,0000,01,PRINT"CLER"
12 111 0000,01,0000,01,PRINT"CLER"
13 112 0000,01,0000,01,PRINT"CLER"
14 113 0000,01,0000,01,PRINT"CLER"
15 114 0000,01,0000,01,PRINT"CLER"
16 115 0000,01,0000,01,PRINT"CLER"
17 116 0000,01,0000,01,PRINT"CLER"
18 117 0000,01,0000,01,PRINT"CLER"
19 118 0000,01,0000,01,PRINT"CLER"
20 119 0000,01,0000,01,PRINT"CLER"
21 120 0000,01,0000,01,PRINT"CLER"
22 121 0000,01,0000,01,PRINT"CLER"
23 122 0000,01,0000,01,PRINT"CLER"
24 123 0000,01,0000,01,PRINT"CLER"
25 124 0000,01,0000,01,PRINT"CLER"
26 125 0000,01,0000,01,PRINT"CLER"
27 126 0000,01,0000,01,PRINT"CLER"
28 127 0000,01,0000,01,PRINT"CLER"
29 128 0000,01,0000,01,PRINT"CLER"
30 129 0000,01,0000,01,PRINT"CLER"
31 130 0000,01,0000,01,PRINT"CLER"
32 131 0000,01,0000,01,PRINT"CLER"
33 132 0000,01,0000,01,PRINT"CLER"
34 133 0000,01,0000,01,PRINT"CLER"
35 134 0000,01,0000,01,PRINT"CLER"
36 135 0000,01,0000,01,PRINT"CLER"
37 136 0000,01,0000,01,PRINT"CLER"
38 137 0000,01,0000,01,PRINT"CLER"
39 138 0000,01,0000,01,PRINT"CLER"
40 139 0000,01,0000,01,PRINT"CLER"
41 140 0000,01,0000,01,PRINT"CLER"
42 141 0000,01,0000,01,PRINT"CLER"
43 142 0000,01,0000,01,PRINT"CLER"
44 143 0000,01,0000,01,PRINT"CLER"
45 144 0000,01,0000,01,PRINT"CLER"
46 145 0000,01,0000,01,PRINT"CLER"
47 146 0000,01,0000,01,PRINT"CLER"
48 147 0000,01,0000,01,PRINT"CLER"
49 148 0000,01,0000,01,PRINT"CLER"
50 149 0000,01,0000,01,PRINT"CLER"
51 150 0000,01,0000,01,PRINT"CLER"
52 151 0000,01,0000,01,PRINT"CLER"
53 152 0000,01,0000,01,PRINT"CLER"
54 153 0000,01,0000,01,PRINT"CLER"
55 154 0000,01,0000,01,PRINT"CLER"
56 155 0000,01,0000,01,PRINT"CLER"
57 156 0000,01,0000,01,PRINT"CLER"
58 157 0000,01,0000,01,PRINT"CLER"
59 158 0000,01,0000,01,PRINT"CLER"
60 159 0000,01,0000,01,PRINT"CLER"
61 160 0000,01,0000,01,PRINT"CLER"
62 161 0000,01,0000,01,PRINT"CLER"
63 162 0000,01,0000,01,PRINT"CLER"
64 163 0000,01,0000,01,PRINT"CLER"
65 164 0000,01,0000,01,PRINT"CLER"
66 165 0000,01,0000,01,PRINT"CLER"
67 166 0000,01,0000,01,PRINT"CLER"
68 167 0000,01,0000,01,PRINT"CLER"
69 168 0000,01,0000,01,PRINT"CLER"
70 169 0000,01,0000,01,PRINT"CLER"
71 170 0000,01,0000,01,PRINT"CLER"
72 171 0000,01,0000,01,PRINT"CLER"
73 172 0000,01,0000,01,PRINT"CLER"
74 173 0000,01,0000,01,PRINT"CLER"
75 174 0000,01,0000,01,PRINT"CLER"
76 175 0000,01,0000,01,PRINT"CLER"
77 176 0000,01,0000,01,PRINT"CLER"
78 177 0000,01,0000,01,PRINT"CLER"
79 178 0000,01,0000,01,PRINT"CLER"
80 179 0000,01,0000,01,PRINT"CLER"
81 180 0000,01,0000,01,PRINT"CLER"
82 181 0000,01,0000,01,PRINT"CLER"
83 182 0000,01,0000,01,PRINT"CLER"
84 183 0000,01,0000,01,PRINT"CLER"
85 184 0000,01,0000,01,PRINT"CLER"
86 185 0000,01,0000,01,PRINT"CLER"
87 186 0000,01,0000,01,PRINT"CLER"
88 187 0000,01,0000,01,PRINT"CLER"
89 188 0000,01,0000,01,PRINT"CLER"
90 189 0000,01,0000,01,PRINT"CLER"
91 190 0000,01,0000,01,PRINT"CLER"
92 191 0000,01,0000,01,PRINT"CLER"
93 192 0000,01,0000,01,PRINT"CLER"
94 193 0000,01,0000,01,PRINT"CLER"
95 194 0000,01,0000,01,PRINT"CLER"
96 195 0000,01,0000,01,PRINT"CLER"
97 196 0000,01,0000,01,PRINT"CLER"
98 197 0000,01,0000,01,PRINT"CLER"
99 198 0000,01,0000,01,PRINT"CLER"
100 199 0000,01,0000,01,PRINT"CLER"

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00 11000+11000PRINT"BLACKI
01 010 DRIVE"
02 000 PRINT PRINT"COLONAS PREI
03 000 RETURN"
04 000 PRINT PRINT"FORWARD P
05 000 RETURN"
06 000 PRINT PRINT"TO LOAD YOU
07 000 GOTO"
08 000 PRINT PRINT"WITH THE MA
09 000 I = (BLACKI) * FLI
10 000 FORCOLON, 0, FORCOLON, 60
11 000 DETAIL: I*PA*+CORR: I+I*PA
12 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
13 000 I = (BLACKI) * FLI
14 000 FORCOLON, 0, FORCOLON, 60
15 000 DETAIL: I*PA*+CORR: I+I*PA
16 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
17 000 I = (BLACKI) * FLI
18 000 FORCOLON, 0, FORCOLON, 60
19 000 DETAIL: I*PA*+CORR: I+I*PA
20 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
21 000 I = (BLACKI) * FLI
22 000 FORCOLON, 0, FORCOLON, 60
23 000 DETAIL: I*PA*+CORR: I+I*PA
24 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
25 000 I = (BLACKI) * FLI
26 000 FORCOLON, 0, FORCOLON, 60
27 000 DETAIL: I*PA*+CORR: I+I*PA
28 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
29 000 I = (BLACKI) * FLI
30 000 FORCOLON, 0, FORCOLON, 60
31 000 DETAIL: I*PA*+CORR: I+I*PA
32 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
33 000 I = (BLACKI) * FLI
34 000 FORCOLON, 0, FORCOLON, 60
35 000 DETAIL: I*PA*+CORR: I+I*PA
36 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
37 000 I = (BLACKI) * FLI
38 000 FORCOLON, 0, FORCOLON, 60
39 000 DETAIL: I*PA*+CORR: I+I*PA
40 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
41 000 I = (BLACKI) * FLI
42 000 FORCOLON, 0, FORCOLON, 60
43 000 DETAIL: I*PA*+CORR: I+I*PA
44 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
45 000 I = (BLACKI) * FLI
46 000 FORCOLON, 0, FORCOLON, 60
47 000 DETAIL: I*PA*+CORR: I+I*PA
48 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
49 000 I = (BLACKI) * FLI
50 000 FORCOLON, 0, FORCOLON, 60
51 000 DETAIL: I*PA*+CORR: I+I*PA
52 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
53 000 I = (BLACKI) * FLI
54 000 FORCOLON, 0, FORCOLON, 60
55 000 DETAIL: I*PA*+CORR: I+I*PA
56 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
57 000 I = (BLACKI) * FLI
58 000 FORCOLON, 0, FORCOLON, 60
59 000 DETAIL: I*PA*+CORR: I+I*PA
60 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
61 000 I = (BLACKI) * FLI
62 000 FORCOLON, 0, FORCOLON, 60
63 000 DETAIL: I*PA*+CORR: I+I*PA
64 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
65 000 I = (BLACKI) * FLI
66 000 FORCOLON, 0, FORCOLON, 60
67 000 DETAIL: I*PA*+CORR: I+I*PA
68 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
69 000 I = (BLACKI) * FLI
70 000 FORCOLON, 0, FORCOLON, 60
71 000 DETAIL: I*PA*+CORR: I+I*PA
72 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
73 000 I = (BLACKI) * FLI
74 000 FORCOLON, 0, FORCOLON, 60
75 000 DETAIL: I*PA*+CORR: I+I*PA
76 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
77 000 I = (BLACKI) * FLI
78 000 FORCOLON, 0, FORCOLON, 60
79 000 DETAIL: I*PA*+CORR: I+I*PA
80 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
81 000 I = (BLACKI) * FLI
82 000 FORCOLON, 0, FORCOLON, 60
83 000 DETAIL: I*PA*+CORR: I+I*PA
84 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
85 000 I = (BLACKI) * FLI
86 000 FORCOLON, 0, FORCOLON, 60
87 000 DETAIL: I*PA*+CORR: I+I*PA
88 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
89 000 I = (BLACKI) * FLI
90 000 FORCOLON, 0, FORCOLON, 60
91 000 DETAIL: I*PA*+CORR: I+I*PA
92 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
93 000 I = (BLACKI) * FLI
94 000 FORCOLON, 0, FORCOLON, 60
95 000 DETAIL: I*PA*+CORR: I+I*PA
96 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA
97 000 I = (BLACKI) * FLI
98 000 FORCOLON, 0, FORCOLON, 60
99 000 DETAIL: I*PA*+CORR: I+I*PA
100 000 PRINT COLON, 0, 0*PA*+CORR: I+I*PA

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It's easy to complain about an advertisement. Once you know how.

One of the ways we keep a check on the advertising that appears in the press, on posters and in the cinema is by responding to consumers' complaints.

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Advertisements in this publication are required to conform to the British Code of Advertising Practice. In respect of mail order advertisements and money by direct debits, other Specialist Publications Ltd will consider your complaints free of charge but all other complaints are subject to a charge of £10.00 per advertisement. Please retain proof of postage receipt, as this may be needed.

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The guarantee covers only advance payment and does not apply to an advertisement in this magazine not, for example, printed made a response to catalogue etc. received as a result of answering such advertisements. Classified advertisements are excluded.

Life-Savers

Looking for a Basic or machine code routine? Want to know a specific POKE? We provide all this and more.

Whenever you go out for a drive in a car you must have to reinvent the wheel before you can get anywhere, the wheel is here to stay. Why isn't it like this with computers? Every time a programmer writes a program he/she will no doubt retype routines that have been used many times before.

In the February 1987 issue of Four Commodore we launched a series titled **Machine Code Library** when we were going to publish machine code routines that people find handy. Letters flooded in from Basic programmers asking for something similar for them, so here it is—a totally revamped series—**Life-Savers**.

Within this series we will be bringing you a whole range of life-saving information. We may produce a machine code listing to read the code channel on a disk drive or multiply two

numbers together, a Basic routine to print a scrolling message could be printed—you may even find a series of handy POKEs for the Plus/4. Just what we print is up to you, since it is you the readers that we are relying on for all of those invaluable routines and interesting POKEs.

Cut it out

Life-Savers will be published in such a way that they may be cut-out or photocopied and stuck onto a card suitable for a card index box. This means that you will always have useful information at your fingertips. An index of the cards published will also be printed on a regular basis.

Send it in

As mentioned above we are relying on you the reader to make this series an

invaluable reference. We are relying on you to send in all of those machine code subroutines, short Basic programmes and other hints and tips for all the Commodore computers. Ten pounds per card printed will be paid to the author, of course longer tips, etc. will be spread over more than one card.

So get to it, get those hints, tips and programmes sent off. A cassette or disk should be sent with any programmes, which will of course be returned to you.

Send your Life-Savers to:

Life-Savers
 Your Commodore
 1 Golden Square
 London
 W1R 3AB

LIFESAVERS 1	CG4	N/C SAVE CALCULATOR	1/1
<p>Unlike some Commodore computers the CG4 does not have a command to SAVE blocks of machine code to disk or tape.</p> <p>Most programmers know that you can SAVE an area of memory by POKEing memory locations 43,44 and 45,46 with the start and end address of the code to be placed on disk/tape and a SAVE command being executed. The only problem with this is trying to figure out what values to POKE into each location.</p> <p>This short program when given the start and end address, in decimal, will display on the screen the necessary POKE instructions saving you from having to work out the values yourself.</p>		<pre> 1 REM ***** 2 REM * N/C SAVE CALCULATOR * 3 REM ***** 10 PRINT "CLEAR, DOWN, RIGHTSON/C SAVE CALCULATOR" 15 PRINT "RIGHTS,CY150" 20 PRINT "DOWN21 INPUT START AD DRESS IN DECIMAL" 30 INPUT "DOWN,SPC30":S 40 PRINT "DOWN3 INPUT END ADDR E IN DECIMAL" 50 INPUT "DOWN,SPC30":E 60 NS =INT(S/256) : LS=S-(NS*256) 70 HE =INT(E/256) : LE=E-(HE*256) 80 PRINT "DOWN) THE NUMBERS TO POKE ARE ." 100 PRINT "DOWN) POKE 43, ",LS 110 PRINT" POKE 44, ",NS 120 PRINT" POKE 45, ",LE 130 PRINT" POKE 46, ",HE </pre>	
	S.Garton		

TIPS AND TRICKS

LIFESAVERS 2	04	MC SAVE SUBROUTINE	1/1
<p>Presented here you will find a Basic subroutine that can be appended to any Basic program that requires a machine code SAVE to take place.</p> <p>Before you call the routine you need to set up the variables as documented in the program's REM statements. The routine should be called with a GOSUB since it ends with a RETURN instruction.</p> <p style="text-align: right;">A. Webb</p>		<pre> 1000 REM * MACHINE CODE SAVE ROUTINE * 1001 REM SA = START ADDRESS 1002 REM EA = END ADDRESS 1003 REM DE = DEVICE FOR SAVE 1004 REM FIS = FILE NAME 1005 POKE104,SA/256:POKE103,SA-P EEK(104)*256 1006 POKE175,EA/256:POKE174,EA-P EEK(175)*256 1007 L=LEN(FIS) 1008 FORI=1:TO L:POKE183-I,ASC(PI DE&FIS,I,1):NEXT 1009 POKE 107,0:POKE109,4:POKE10 3,L:POKE106,DE:SYS 62954 1000 RETURN </pre>	

LIFESAVERS 3	154	1/2 TRACK READER	1/1
<p>How often have you used a disk on one drive only to find that it will not work on another?</p> <p>This problem is usually caused by one of the disk drives being out of alignment, and a service is probably called for.</p> <p>Presented here is a short Basic program that will increase the chances of being able to read a file from a disk that is slightly out of alignment. As an extra feature it will also get rid of the awful head banging that some forms of disk protection cause on your drive.</p>		<pre> 1 REM ***** *** 2 REM * 1/2 TRACK READER FOR 154 3 REM ***** *** 10 INPUT"BUFFS (Y/N) ";SS 20 IF SS<>"Y"THEN#E+100 30 INPUT "HALF TRACK SEKS (Y/N) ";SS 40 IFSS<>"Y"THEN#E+64 50 INPUT "NUMBER OF LOADS ATTE MPTS ";A 60 IF A<=THEN100 70 IF A>31THENA=31 80 E=E+A 90 REM** TELL THE DRIVE ** 100 OPEN#15,0,16 110 PRINT#15,"0-W"CHR\$(106)CHR\$(8)CHR\$(1)CHR\$(2) 120 CLOSE#15:END </pre>	

TIPS AND TRICKS

LIFESAVERS 4	664	B/C/RANDOM NUMBERS	1/1
<p>You can't have too many ways of generating random numbers. You need them all the time - in games anyway.</p> <p>Of course the routine presented here is not totally random, but pseudo-random, but short of tying your coin into a radiolotope source what else can you expect? The main thing is that it's pretty unpredictable.</p> <p>It's best to seed the four bytes from 888 upwards with indeterminate numbers (eg from the clock). The routine delivers a number between 0-255 in the accumulator. If you want to use this from Basic, make sure you store this number before you RTS.</p> <p style="text-align: right;">F. Fahay</p>		<pre> 10 100000000000000000000000 20 tone byte rand 888 30 100000000000000000000000 50 lrandom constants 70 const 415,463,465,474 80 rseed eqs 888 100 org 89000 120 rdat 1dy 48 130 rdll 1lc 140 lda rseed+3 150 bpl rdatb 160 ldx 48 170 rd12 lda rseed,x 180 eor const,x 190 sta rseed,x 200 dex 210 bpl rd12 220 sec 230 rdatb rol rseed 240 rol rseed+1 250 rol rseed+2 260 rol rseed+3 270 dey 280 bne rdll 290 lda rseed+3 300 rts </pre>	

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Listings

Get it right first time with our deluxe program system for the C64.

You may have noticed that our listings are free of those horrible little black blubs which surround you searching around the keyboard for a suitable graphic symbol. You may also have noticed the funny numbers by the side of each line of the listing. For no reason, it's all part of our easy entry aid.

Instead of these nasty graphics and rows of countless spaces in PRINT statements and strings, we use a special coding system. The code, or mnemonic, is always contained in square brackets and you'll soon learn to decipher their meanings.

For example, [SA] would mean type in a Shifted A, or an asc of spacer in layman's terms, and [S&R] would mean a row of ten of these symbols.

[S*2] means hold down the shift key and press the plus key twice. It doesn't take a great leap of logic to realize that [C+2] means exactly the same thing except that the Commodore key (bottom left of the keyboard) is held down instead of the shift key.

If more than two spaces appear in a statement then this will be printed as [SPC4] or, exceptionally, [SSPC4]. Translated into English this means press the spacer four times or in the latter case hold the shift key down while you do it.

A string of special characters could appear as [CTRL N, DOWN,LEFTS,BLUE,FLICK]

This would be achieved by holding

down the CTRL key as you press N, press the cursor key down twice, the cursor left key five times, press the key marked BLUE while holding down the CTRL key, press the P3 key and, finally hold the Commodore key down while pressing the number two key (C2 would of course make the computer print in brown).

Always remember that you should only have a row of graphics characters on your screen with no square brackets and no commas, unless something like this appears:

[SS][C*]

In this case the two characters should have a comma between them.

On rare occasions [REV T] will appear in a listing. This is a delete symbol and is created by entering the line up to this mnemonic. Then type a closing quotation mark (SHIFT & 3) and delete it. This gets the computer out of quote mode. Hold down CTRL and press the number nine key (RYS&N), type the relevant number of reversed Ts and then hold down CTRL and press zero (RYS&OFF). Next type another quotation mark and delete it again. Now finish the line and press RETURN.

A list of these special cases is given in the table but remember that only one of these mnemonics will appear outside of a PRINT string the symbol for pi. This may appear when its value is needed in a calculation so this may look something like:

CC=2*PI*P:

Ignore the square brackets and just type in a shifted upward pointing arrow (ie, the pi symbol).

PROGRAM SYSTEM CHECKER	
00	PRINT "SYSTEM CHECKER - ERIC DOYLE"
10	BL=0: L=0: S=0: M=0: P=0
20	FOR I=0 TO 99: BL=0: S=0: M=0: P=0: G=0
30	PRINT "BL=0: S=0: M=0: P=0: G=0"
40	FOR J=0 TO 99: BL=0: S=0: M=0: P=0: G=0
50	PRINT "BL=0: S=0: M=0: P=0: G=0"
60	FOR K=0 TO 99: BL=0: S=0: M=0: P=0: G=0
70	PRINT "BL=0: S=0: M=0: P=0: G=0"
80	FOR L=0 TO 99: BL=0: S=0: M=0: P=0: G=0
90	PRINT "BL=0: S=0: M=0: P=0: G=0"
100	FOR M=0 TO 99: BL=0: S=0: M=0: P=0: G=0
110	PRINT "BL=0: S=0: M=0: P=0: G=0"
120	FOR N=0 TO 99: BL=0: S=0: M=0: P=0: G=0
130	PRINT "BL=0: S=0: M=0: P=0: G=0"
140	FOR O=0 TO 99: BL=0: S=0: M=0: P=0: G=0
150	PRINT "BL=0: S=0: M=0: P=0: G=0"
160	FOR P=0 TO 99: BL=0: S=0: M=0: P=0: G=0
170	PRINT "BL=0: S=0: M=0: P=0: G=0"
180	FOR Q=0 TO 99: BL=0: S=0: M=0: P=0: G=0
190	PRINT "BL=0: S=0: M=0: P=0: G=0"
200	FOR R=0 TO 99: BL=0: S=0: M=0: P=0: G=0
210	PRINT "BL=0: S=0: M=0: P=0: G=0"
220	FOR S=0 TO 99: BL=0: S=0: M=0: P=0: G=0
230	PRINT "BL=0: S=0: M=0: P=0: G=0"
240	FOR T=0 TO 99: BL=0: S=0: M=0: P=0: G=0
250	PRINT "BL=0: S=0: M=0: P=0: G=0"
260	FOR U=0 TO 99: BL=0: S=0: M=0: P=0: G=0
270	PRINT "BL=0: S=0: M=0: P=0: G=0"
280	FOR V=0 TO 99: BL=0: S=0: M=0: P=0: G=0
290	PRINT "BL=0: S=0: M=0: P=0: G=0"
300	FOR W=0 TO 99: BL=0: S=0: M=0: P=0: G=0
310	PRINT "BL=0: S=0: M=0: P=0: G=0"
320	FOR X=0 TO 99: BL=0: S=0: M=0: P=0: G=0
330	PRINT "BL=0: S=0: M=0: P=0: G=0"
340	FOR Y=0 TO 99: BL=0: S=0: M=0: P=0: G=0
350	PRINT "BL=0: S=0: M=0: P=0: G=0"
360	FOR Z=0 TO 99: BL=0: S=0: M=0: P=0: G=0
370	PRINT "BL=0: S=0: M=0: P=0: G=0"
380	FOR AA=0 TO 99: BL=0: S=0: M=0: P=0: G=0
390	PRINT "BL=0: S=0: M=0: P=0: G=0"
400	FOR AB=0 TO 99: BL=0: S=0: M=0: P=0: G=0
410	PRINT "BL=0: S=0: M=0: P=0: G=0"
420	FOR AC=0 TO 99: BL=0: S=0: M=0: P=0: G=0
430	PRINT "BL=0: S=0: M=0: P=0: G=0"
440	FOR AD=0 TO 99: BL=0: S=0: M=0: P=0: G=0
450	PRINT "BL=0: S=0: M=0: P=0: G=0"
460	FOR AE=0 TO 99: BL=0: S=0: M=0: P=0: G=0
470	PRINT "BL=0: S=0: M=0: P=0: G=0"
480	FOR AF=0 TO 99: BL=0: S=0: M=0: P=0: G=0
490	PRINT "BL=0: S=0: M=0: P=0: G=0"
500	FOR AG=0 TO 99: BL=0: S=0: M=0: P=0: G=0
510	PRINT "BL=0: S=0: M=0: P=0: G=0"
520	FOR AH=0 TO 99: BL=0: S=0: M=0: P=0: G=0
530	PRINT "BL=0: S=0: M=0: P=0: G=0"
540	FOR AI=0 TO 99: BL=0: S=0: M=0: P=0: G=0
550	PRINT "BL=0: S=0: M=0: P=0: G=0"
560	FOR AJ=0 TO 99: BL=0: S=0: M=0: P=0: G=0
570	PRINT "BL=0: S=0: M=0: P=0: G=0"
580	FOR AK=0 TO 99: BL=0: S=0: M=0: P=0: G=0
590	PRINT "BL=0: S=0: M=0: P=0: G=0"
600	FOR AL=0 TO 99: BL=0: S=0: M=0: P=0: G=0
610	PRINT "BL=0: S=0: M=0: P=0: G=0"
620	FOR AM=0 TO 99: BL=0: S=0: M=0: P=0: G=0
630	PRINT "BL=0: S=0: M=0: P=0: G=0"
640	FOR AN=0 TO 99: BL=0: S=0: M=0: P=0: G=0
650	PRINT "BL=0: S=0: M=0: P=0: G=0"
660	FOR AO=0 TO 99: BL=0: S=0: M=0: P=0: G=0
670	PRINT "BL=0: S=0: M=0: P=0: G=0"
680	FOR AP=0 TO 99: BL=0: S=0: M=0: P=0: G=0
690	PRINT "BL=0: S=0: M=0: P=0: G=0"
700	FOR AQ=0 TO 99: BL=0: S=0: M=0: P=0: G=0
710	PRINT "BL=0: S=0: M=0: P=0: G=0"
720	FOR AR=0 TO 99: BL=0: S=0: M=0: P=0: G=0
730	PRINT "BL=0: S=0: M=0: P=0: G=0"
740	FOR AS=0 TO 99: BL=0: S=0: M=0: P=0: G=0
750	PRINT "BL=0: S=0: M=0: P=0: G=0"
760	FOR AT=0 TO 99: BL=0: S=0: M=0: P=0: G=0
770	PRINT "BL=0: S=0: M=0: P=0: G=0"
780	FOR AU=0 TO 99: BL=0: S=0: M=0: P=0: G=0
790	PRINT "BL=0: S=0: M=0: P=0: G=0"
800	FOR AV=0 TO 99: BL=0: S=0: M=0: P=0: G=0
810	PRINT "BL=0: S=0: M=0: P=0: G=0"
820	FOR AW=0 TO 99: BL=0: S=0: M=0: P=0: G=0
830	PRINT "BL=0: S=0: M=0: P=0: G=0"
840	FOR AX=0 TO 99: BL=0: S=0: M=0: P=0: G=0
850	PRINT "BL=0: S=0: M=0: P=0: G=0"
860	FOR AY=0 TO 99: BL=0: S=0: M=0: P=0: G=0
870	PRINT "BL=0: S=0: M=0: P=0: G=0"
880	FOR AZ=0 TO 99: BL=0: S=0: M=0: P=0: G=0
890	PRINT "BL=0: S=0: M=0: P=0: G=0"
900	FOR BA=0 TO 99: BL=0: S=0: M=0: P=0: G=0
910	PRINT "BL=0: S=0: M=0: P=0: G=0"
920	FOR BB=0 TO 99: BL=0: S=0: M=0: P=0: G=0
930	PRINT "BL=0: S=0: M=0: P=0: G=0"
940	FOR BC=0 TO 99: BL=0: S=0: M=0: P=0: G=0
950	PRINT "BL=0: S=0: M=0: P=0: G=0"
960	FOR BD=0 TO 99: BL=0: S=0: M=0: P=0: G=0
970	PRINT "BL=0: S=0: M=0: P=0: G=0"
980	FOR BE=0 TO 99: BL=0: S=0: M=0: P=0: G=0
990	PRINT "BL=0: S=0: M=0: P=0: G=0"

by Eric Doyle

Checksum Program

The hexadecimal numbers appearing in a column to the left of the listing should not be typed in with the program. These are merely checksum values and are there to help you get each line right. Don't worry if you don't understand the hexadecimal system, as long as you can compare two characters on the screen with the corresponding two characters in the magazine you can use our line checking program.

Type in the Checksum Program, make sure that you've not made any mistakes and save it to tape or disk

immediately because it will be used with most of the present and future listings appearing in *Your Commodore*.

At the start of each programming session, load Checksum and run it. The screen will turn brown with yellow characters and each time you type in a line and press the RETURN key a number will appear on the screen in white. This should be the same as the corresponding value in the magazine.

If the two values don't relate to one another, you have not copied the line exactly as printed so go back and check each character carefully. When you find the error simply correct it and

press RETURN again.

If you want to turn off the checker simply type SY569152 and the screen will return to the familiar blue colour. You can then do whatever it was you wanted to do and if this doesn't use the area where Checksum lies you can go back to it with the same SY5 command.

No system is foolproof but the chances of two errors cancelling one another out are so remote that we believe our listings are more reliable than any other magazine in the world. So get typing!

75

Mnemonic Symbol Keypress

[RIGHT]		CRSR left/right
[LEFT]		SHIFT & CRSR left/right
[DOWN]		CRSR up/down
[UP]		SHIFT & CRSR up/down
[F1]		F1 key
[F2]		SHIFT & F1 key
[F3]		F3 key
[F4]		SHIFT & F3 key
[F5]		F5 key
[F6]		SHIFT & F5 key
[F7]		F7 key
[F8]		SHIFT & F7 key
[HOME]		CLR/HOME
[CLR]		SHIFT & CLR/HOME
[KISON]		CTRL & F
[KSOFF]		CTRL & B

Mnemonic Symbol Keypress

[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8
[POUND]		£
[LARBOW]		←
[RPARROW]		→
[P8]		SHIFT & ↑
[INST]		SHIFT & INST/DEL
[REV T]		no text
[KEnter]		CRM + letter
[KShift]		SHIFT + letter

Software for sale

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

It's three o'clock in the morning. You sit at the computer keyboard just finished a marathon typing session entering one of the superb programs from Your Commodore. Your fingers reach for the keyboard and press the letters E, U and N. You press RETURN, sit back and nothing happens.

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 assure that at least one little bug slips through unnoticed.

The Your Commodore Software Service makes available ... of the programs from each issue on both cassette and disk at a price of \$8.00 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, Times House, 179 The Markways, Hemel Hempstead, Herts, HP1 1BB.
TEL: (0442) 48425

please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as ready working versions, i.e. when possible we will not use Basic Loaders thus 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 loaded from disk on to tape. ☐

APRIL 1987

CRIBBAGE - A computerised version of this popular card game. Plus/4 disk only.

DEBIT 4 - A protection program to look after your C64 programs. (Disk only).

DEBIT 8 - A machine code to DATA statement converter for C64. (Disk only).

C16 KEYPAD MONITOR - Make your numeric keypad more useful when entering data.

LETTER WRITER - A novel way to send musical letters to your friends. (C64).

DOUBLE PRINT - The bigger the better. Give your C64 double height characters.

ORDER CODE

DISK YDAPR87 26.00

TAPE YCAPR87 14.00

MAY 1987

LOWER CASE GRAPHICS - Using lower case text on your C16 and Plus/4 graphics screen. (On disk only).

C16 CHARACTER EDITOR - A powerful character editor for the C16 and Plus/4. (On disk only).

EVERYMAN'S GUIDE TO GRAPHICS - All of the programs from this fascinating article.

C64 SPRITE EDITOR - A comprehensive sprite editor for the C64. Available for both disk and tape.

EDIT 84 - A character editor with no fewer than 44 different commands. (Available for tape and disk).

ORDER CODE

DISK YDMAY87 26.00 TAPE YCMAY87 14.00

JUNE 1987

DUAL PROGRAMMING - Have two programs in your Plus/4's memory at once. (On disk only).

EMULATED 84 - Machine code single steppers for the C64.

SMART LISTER - Make your listings smarter and easier

with this program. (C64)

PROCEDURES - Easier programming for the C64 with this program.

C64 SOURCE GENERATOR - A powerful disassembler for the C64.

LIST ENHANCER - Improve the LIST command of your C64.

ANALYSER - A machine code debugger for the C128.

ORDER CODE

DISK YDUN87 £6.00

TAPE YCUN87 £4.00

JULY 1987

UTILITY COMMANDS - This provides many vital commands missing from Basic 7.0 on the 128.

PLUS/4 AND C64 CRUNCHER - Speed up your programs with these handy utilities.

PROGRAMMABLE FUNCTION KEYS - A utility to make more use of the function keys on the C64.

DISKIT 3 - A handy routine to convert memory to data statements on the C64. (Disk only)

ARCADE ACTION - Get those sprites with these handy arcade routines on the C64.

CROSS REFERENCE - This program helps you sort out your variables on the C64.

SUICIDE RUN - A fast and stimulating game for the C64.

ORDER CODE

DISK YDUN87 £6.00

TAPE YCUN87 £4.00

AUGUST 1987

DISKIT 4 - Copy your disk programmes to tape with ease. (C64, C60, Disk only)

SCREEN MARKER - Design text and low-res graphic screens with ease. (C64)

SCREEN DUMP - A Hi-Res screen dump for the C64 plus MPM01 printer.

NUMBER BASE TUTOR - A C64 educational program helping with notions of number bases other than 10.

C16 SPIRIT - Does your C16 lack something? Then add spirit to this useful utility. For C16 and Plus/4, available on disk only.

WINDOWS - A text window system for the C64.

Order Codes

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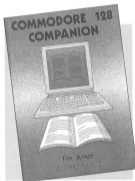
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Books

To keep up-to-date with what's on the bookshelves, read on.



Commodore 128 Companion

By far the greatest challenge to a book reviewer is the assessment of a dictionary. In computer terms the equivalent is a book like the Commodore 128 Companion. It is by no means a "good read" in the conventional sense but to those who need its vast tables of memory locations, Basic breakdowns and chip characteristics it will more than justify the \$18 price tag.

Despite the technical nature of the book, it reveals an honest but critical approach to the C128 and you soon realize that this book has its roots in that noble fellowship of Commodore users: HYPUG (the Independent Commodore Products Users Group). For example, the first section is the

overall appraisal of the 128 in the context of the wider world of computers but does point out the failings of the machine's CP/M mode. The 1541 drive will read from and write to standard 5 1/4" floppy systems CP/M disk but cannot format the wretched things!

Immediately you get the impression that this is not a scyphaptic stroll through the 128 but a serious attempt at coming to terms with the machine's failings as well as its undoubted assets.

The first section of detailed information lays bare the Basic implementation. Each keyword is dealt with in great depth and the header to each page lays out all the parameters relating to the word. The token value representing the word, accepted abbreviations and syntax are supplemented by further details of the location of the keyword in both 128 and 64 mode ROMs in addition to the dispatch vector and actual start of the ROM routine.

This gives way to a further exposition of Basic program storage in memory and variable formats. Greater depth in the description of floating point storage would have been helpful in this section to further clarify a rather thorny subject but this is glossed over as usual.

It is outside the brief of such a book to give detail on machine code programming, but to those who have generated the exotic implementation of 6500 series coding the location of kernel jump routines are detailed to enable the serious user to crib ROM routines for their own use. Again deeper penetration is inhibited by a lack of detail on passing the essential parameters to these routines, but a bit of ROM disassembly would soon reveal the relevant memory locations.

The final section of the book looks at the hardware which handles the software. A chip by chip architecture course of the innards of the 128 reveals which does what, where and why.

The appendices take the form of detailed maps of raw page, Basic ROM and Kernel locations in both 64 and 128 modes.

As you can see, all of the essential elements of the C128 are dealt with to give more than a mere sketch map. The book is a browsing reference book, absolutely essential to anyone who needs a deeper understanding of this bank of bits and strands.

Tim Arnet

Author: Tim Arnet, Publisher: Etcetera Publishing, Palo Alto, CA.

Science & Engineering for the Commodore

Are you a mathematician, a scientist, an applied scientist or a programmer interested in all? If so, this is the book for you. It is not a book of elementary mathematical programming as handled by the C64, but is intended for those interested in the techniques of programming which handle more advanced equations.

The author has structured the book in a very detailed manner and gives a complete analysis of the object of each program prior to the listings. Your knowledge of mathematics will determine how easy you will find the book. As most mathematicians know, the Chi squared formula in statistics is relatively simple; getting the computer to interpret this, however, is a matter of some intricacy and it is here that the author excels. The programmes themselves are not lengthy, and the fundamental steps in advanced equation techniques are well interspersed with REM statements so that you know exactly what you are doing at each step. The programmes which I have checked are without fault.

Well, what does the book cover? The initial four chapters are a good general introduction to structured programming in Basic and other languages. Inclusion of flow diagrams, the speed and accuracy of the C64 in mathematical computation are discussed, while a comparison program of bubble, linear and "quick-sort" times is given. These chapters should not be skipped, by any means, as you will find some good ideas and suggestions in them.

The main part of the book is sub-divided into mathematics, chemistry, physics, biology and technical programmes. In all sections the programmes are well set out and there is an appendix at the back for listing symbols.

MATHEMATICS: fourteen programmes are included ranging from differentiation and numerical integrators to statistics, probability, binomial distribution, vector analysis and matrix calculations. By far my favourite is the statistics and probability section where randomness, Chi squared calculations and Fourier analysis are defined in full, along with simple questions as sample studies. Vector analysis is equally well discussed and routines for the more familiar matrix calculations are not omitted.

At this point, I think it should be made clear that, while most of these problems can be solved using relevant calculations, the programmes themselves are designed as alternatives to be incorporated into other teaching programmes. In other words, use them in conjunction with a suitable time graphics programme which interfaces with Basic-J Videobasic, Simons' Basic (or example) to create your own educational project. This applies to all sections in the book.

CHEMISTRY: here the author uses relative files to maximum advantage in a small database. Naturally, you will require to store all the relevant data you wish in the database itself (in this instance the elements and attributes of the Periodic System); depending on the extent of your knowledge of chemistry, the database may be altered to your own requirements. This database is then followed by a 'reading file' which will call up all the information you have stored.

Other programmes in this section are a pH chart, a Titration calculator and a rather hefty program on quantum mechanics in relation to complex molecular orbits of chemical elements! This is a real classic, providing data such

as charge densities, line velocities, bond ordering and electron energy. Printer output is provided here in view of the large amount of data computed.

PHYSICS: the first program here is a nice little laser to bring you back into orbit. It uses the TI built-in dock to give you a measurement of THREE overlapping lines - try it. Two other useful programmes here detail Optical Geometry and Planetary Orbit Calculations.

BIOLOGY: represented with a single program involving Dynamic Population Models. However, with what has been detailed before in the other sections, it should not be difficult to create programmes involving rates of enzyme reactions, etc. Indeed the scope is unlimited, if use is made of the statistical data in the mathematics section.

TECHNICAL PROGRAMS: here we have Heat Transmission and total coverage of combination circuits in relation to resistances, inductance, capacitance, serial circuits, parallel circuits, branch currents and node potentials.

What more can I say? Not a lot! The author is to be commended in presenting such a wealth of detail in such a compact program form. While the book is highly specialised, the specialist should welcome it highly recommended for the serious programmer. **R.M.**

Freddie:
Author: *Kevin David Durrant*; *Precision Software Ltd* (Abacus Software); *Price: £12.95.*

ADVENTURE GAMEWriters HANDBOOK FOR COMMODORE



Adventure Gamewriter's Handbook

Great scribbles who seek to write off tales of adventure but don't know how to start can seek refuge in the Adventure Gamewriter's handbook.

The book contains all you need to know to go adventuring on your C64 and contains listings for the adventure editor to create your game, the interpreter to play

it and two sample adventures called *Gold Fever* and the *Enchanted Castle*. The author explains the sometimes complex theory of adventuring clearly and concisely and takes you through a step by step guide on how to create an adventure with examples all along the way.

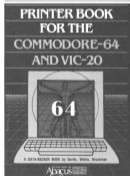
The process naturally starts with the idea—for example a haunted house or a quest, fleshing out your idea to form the plot, creating a map and programming these along with text descriptions, special events, player actions and commands, manipulating objects and limitations and counters.

The above theory is backed up with numerous examples as well as the gradual buildup of the adventure *Gold Fever*.

Unfortunately, the book and its game system offers little more than what already exists in programmes such as the *Quill* and since they're ready to LOAD in and go, why bother buying a book to start from scratch? Starting from scratch is not the only question, but also the answer as some adventure authors think the *Quill* is too limited and will use the book's system as a base to write their own systems with the book as a tutor until they can go it alone.

Trackline:

Authors: J. Walkowiak. Title: Adventure Gamewriter's Manual. Supplier: Precision Software (Abrams Software). Price: £10.95.



Printer Book for the C64 and Vic-20

Most people think of a printer as a device that simply plugs into their computer and prints out listings and graphics dumps. So how can anybody write a book about a printer that's over 300 pages long?

Apart from an introduction explaining how the authors could write a 300+ page book about a printer the book also includes notes about interfaces, printer ROM listings and a few useful listings.

Most of this is well written and at times a chatty book. It would only be used as a reference guide to check the connections on an interface or to delve into the ROM of the MPS 801 or VIC 1520 printer plotters. These heavy sections are nestled between programmes to create 3D-objects, screen dumps, a simple text editor and poster size printers.

However, the heavy technical sections and the light reading (and typing) for a steady read to each other and I feel that the authors would have done better to write two slimmer volumes, a beginners' guide packed full of useful programmes and routines and a separate technical guide. Since the two are mixed and the balance is towards the technical I would suggest beginners follow their own printer instructions and leave the rest to software packages such as *Print Shop* and *Rainbird's Art Studio*.

Trackline:

Authors: R. Bruckmann, K. Gervis and T. Wynn. Supplier: Precision Software Ltd/Abrams Software. Price: £12.95.

GEOS INSIDE AND OUT

An Introduction to GEOS,
its applications and internals



GEOS - Inside and Out

If you are still wondering how to get the best from your GEOS disk then this book will certainly solve your problems. It is well documented and illustrated, and takes you from the simplest aspects of GEOS manipulation to more advanced techniques. The book has been written specifically for GEOS V1.2 and most of the documentation will not work with the original V1 program.

The first two chapters are essentially for beginners; these chapters discuss copying GEOS for back-up purposes

continued on Page 117.

Text Compression

When you're trying to program a large masterpiece, the CII's memory capacity can sometimes seem very limiting. Data compression could be the solution.

By Allen Webb

Even though the lid is graced with a full 64K of RAM, the current trend in software makes even this amount of memory seem insufficient. Consequently, it is frequently necessary to use some form of data compression. In this new *Reliable Routines* article, I will give some simple routines for the handling of data compression.

There are three main areas to be considered:

1. Text compression.
2. Compression of low resolution graphics screens.
3. Compression of high resolution screens.

In this article, I will concentrate on text compression.

In relation to its usefulness, text occupies a lot of memory and a more efficient storage method is frequently necessary. One method is to replace common words with a single byte, as in Table 1.

Table 1

1	the
2	and
3	so
4	for

These frequently used words could be replaced with a single byte with bit 7 set to distinguish it from ASCII codes. So "the" could be replaced with 129 and so on. This is the basis of tokenization used by Basic. With long words, this is a very effective method but since you can only have 128 tokens, the overall compression is only about 25%.

There are some drawbacks in writing such a compression system:

1. You must sort out your list of 128 frequently used words.
2. You must tell the system how to code upper case letters. You will want to be able to use "the" and "The", for example.
3. The code will be quite long with the need for a clever interpreter.

This system is quite complex, however, and there is an easier way.

The Simple Method

The simple approach limits you to 31 characters but will suffice for many applications.

Imagine that you number the alphabet from one to 26. In addition, you number five punctuation marks from 27 to 31. Each letter is represented by five bits even though it occupies a whole byte. Three

characters would occupy 15 bits which could be crunched into two bytes. Thus we achieve an instant 33% compression from three to two bytes.

So how do we do it? Consider Table 2 in which the first three characters of our list are shown.

First we lay off the top three bits of each code value, as in Table 1.

The next steps are:

1. Move the top three bits of the code for B into the bottom three bits of the code for A.
2. Move the five bits of the code for C into bits one to five of the code for B and set bit zero of B to zero.

If we do this we get:

0000100 0000110

These bytes are then stored and decoded on demand. Since all you have is a string of bytes, zero bytes are inserted in the decoded text as a sentinel. This is why you can only have codes one to 31. If you were to encode two consecutive code zero's, you would create an erroneous sentinel in the final data. This may sound very complicated but don't worry since the routines given later handle everything.

The Listings

The doskey work of the encoding

Table 2

Letter	Code	Code in Binary
A	1	000001
B	2	000010
C	3	000011

Table 3

A	B	C
0001	0010	0011

and decoding is handled by the machine code in Listing 1.

This has two entry points, firstly:

1. SYS 40192 (SR000).

This converts three bytes in locations 852, 853, 854 to two bytes which are put in locations 856 and 857. The second entry point is at:

2. SYS 40193, ADDRESS

This decodes a block of data starting at the specified address, ending when a zero byte is found. The text is printed starting at the cursor/underscore position in the current cursor colour. To give you access to RAM not normally accessible to Basic, you can use the RAM under the Basic ROM.

Since the system will only accept the normal alphabet plus space,

comma, full stop, quote and apostrophe marks, any other characters are detected and rejected. The latter allows you to type in text and navigate by use of the DEL key only. Pressing RETURN terminates text entry and continues processing. It is important to understand that text must be entered in the form that you want to see it after compression. So if you want tidy text with no word wrap around, enter it in that form. You may enter up to 254 characters at a time. Any attempt to press RETURN with no text input is ignored.

When RETURN has been pressed, you will be asked where you want to put the text. When you first run the editor, a default value of 40960 will be offered. If text has been compressed, the first free address after the last compressed code will be offered. You may accept the default by pressing

RETURN or enter your own address. The text compression will, if the text is long, take a few seconds. Once the compression is complete you will be given some statistics. You are advised to note carefully the start address of each block of code.

The text option allows you to confirm that your text is correctly compressed.

The SAVE option will save the block of text specified. It will handle only stored in addresses up to 8CFFF (33347). Any saved code can be loaded into your own programs by:

```
LOAD "The name", 1, 1
or
LOAD "The name", 8, 1
```

The LOAD option allows you to re-use coding at a later date. This option does not tell you the end address of the last piece of code, so remember to write it down!

So how do you use encoded data in your own programs? Easy. Imagine that you hold the start address of each piece of text in an array SA(). Listing 2 gives a code fragment which will do the job.

Listing 3

```
10 INPUT "MESSAGE NUMBER" M
10
20 SYS 40193, SA(M)
```

This should start you off. Look out in the near future for an article on compressing graphics.

LISTING 1

```
PROGRAMS TEXT EDITOR
00 0 IF ((P<=40958)
01 1 IF (C<17) THEN GOTO 10 LOAD P10, B, 1
02 0 IF ((P<=40959) THEN GOTO 20 GOTO 30
03 5 FOR M=0 TO 255: NEXT M: GOTO X: IF
04 1 GOTO 30 THEN PRINT "DATA
05 ERROR" GOTO
06 10 CLR: FOR M=0 TO 255: FOR N=0 TO
07 255: FOR O=0 TO 255: GOTO 40 GOTO 50
08 15 PRINT CHR$(I*4): GOTO 60
09 30 PRINT "CONTROL: CLR, SPACE, F4,
10 ST",
11 40 FOR M=0 TO 255: PRINT CHR
12 (M);
13 100 IF ((M<=255) THEN GOTO 70
14 200 GOTO 80 GOTO 90
15 100 IF ((M<=255) THEN GOTO 70
16 200 GOTO 80 GOTO 90
17 30 FOR P=0 TO 255: NEXT
18 50 FOR Q=0 TO 255: NEXT
19 50 FOR R=0 TO 255: NEXT
20 100 PRINT "INPUT P>";
21 200 PRINT "ENTER P2>";
22 300 IF ((P<=255) THEN GOTO 100
23 400 PRINT "ENTER C>";
24 500 IF ((C<=255) THEN GOTO 100
25 600 PRINT "ENTER M>";
26 700 IF ((M<=255) THEN GOTO 100
27 800 IF ((M<=255) THEN GOTO 100
28 900 IF ((M<=255) THEN GOTO 100
29 1000 IF ((M<=255) THEN GOTO 100
30 1100 IF ((M<=255) THEN GOTO 100
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264 24500 IF ((M<=255) THEN GOTO 100
265 24600 IF ((M<=255) THEN GOTO 100
266 24700 IF ((M<=255) THEN GOTO 100
267 24800 IF ((M<=255) THEN GOTO 100
268 24900 IF ((M<=255) THEN GOTO 100
269 25000 IF ((M<=255) THEN GOTO 100
270 25100 IF ((M<=255) THEN GOTO 100
271 25200 IF ((M<=255) THEN GOTO 100
272 25300 IF ((M<=255) THEN GOTO 100
273 25400 IF ((M<=255) THEN GOTO 100
274 25500 IF ((M<=255) THEN GOTO 100
275 25600 IF ((M<=255) THEN GOTO 100
276 25700 IF ((M<=255) THEN GOTO 100
277 25800 IF ((M<=255) THEN GOTO 100
278 25900 IF ((M<=255) THEN GOTO 100
279 26000 IF ((M<=255) THEN GOTO 100
280 26100 IF ((M<=255) THEN GOTO 100
281 26200 IF ((M<=255) THEN GOTO 100
282 26300 IF ((M<=255) THEN GOTO 100
283 26400 IF ((M<=255) THEN GOTO 100
284 26500 IF ((M<=255) THEN GOTO 100
285 26600 IF ((M<=255) THEN GOTO 100
286 26700 IF ((M<=255) THEN GOTO 100
287 26800 IF ((M<=255) THEN GOTO 100
288 26900 IF ((M<=255) THEN GOTO 100
289 27000 IF ((M<=255) THEN GOTO 100
290 27100 IF ((M<=255) THEN GOTO 100
291 27200 IF ((M<=255) THEN GOTO 100
292 27300 IF ((M<=255) THEN GOTO 100
293 27400 IF ((M<=255) THEN GOTO 100
294 27500 IF ((M<=255) THEN GOTO 100
295 27600 IF ((M<=255) THEN GOTO 100
296 27700 IF ((M<=255) THEN GOTO 100
297 27800 IF ((M<=255) THEN GOTO 100
298 27900 IF ((M<=255) THEN GOTO 100
299 28000 IF ((M<=255) THEN GOTO 100
300 28100 IF ((M<=255) THEN GOTO 100
301 28200 IF ((M<=255) THEN GOTO 100
302 28300 IF ((M<=255) THEN GOTO 100
303 28400 IF ((M<=255) THEN GOTO 100
304 28500 IF ((M<=255) THEN GOTO 100
305 28600 IF ((M<=255) THEN GOTO 100
306 28700 IF ((M<=255) THEN GOTO 100
307 28800 IF ((M<=255) THEN GOTO 100
308 28900 IF ((M<=255) THEN GOTO 100
309 29000 IF ((M<=255) THEN GOTO 100
310 29100 IF ((M<=255) THEN GOTO 100
311 29200 IF ((M<=255) THEN GOTO 100
312 29300 IF ((M<=255) THEN GOTO 100
313 29400 IF ((M<=255) THEN GOTO 100
314 29500 IF ((M<=255) THEN GOTO 100
315 29600 IF ((M<=255) THEN GOTO 100
316 29700 IF ((M<=255) THEN GOTO 100
317 29800 IF ((M<=255) THEN GOTO 100
318 29900 IF ((M<=255) THEN GOTO 100
319 30000 IF ((M<=255) THEN GOTO 100
320 30100 IF ((M<=255) THEN GOTO 100
321 30200 IF ((M<=255) THEN GOTO 100
322 30300 IF ((M<=255) THEN GOTO 100
323 30400 IF ((M<=255) THEN GOTO 100
324 30500 IF ((M<=255) THEN GOTO 100
325 30600 IF ((M<=255) THEN GOTO 100
326 30700 IF ((M<=255) THEN GOTO 100
327 30800 IF ((M<=255) THEN GOTO 100
328 30900 IF ((M<=255) THEN GOTO 100
329 31000 IF ((M<=255) THEN GOTO 100
330 31100 IF ((M<=255) THEN GOTO 100
331 31200 IF ((M<=255) THEN GOTO 100
332 31300 IF ((M<=255) THEN GOTO 100
333 31400 IF ((M<=255) THEN GOTO 100
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335 31600 IF ((M<=255) THEN GOTO 100
336 31700 IF ((M<=255) THEN GOTO 100
337 31800 IF ((M<=255) THEN GOTO 100
338 31900 IF ((M<=255) THEN GOTO 100
339 32000 IF ((M<=255) THEN GOTO 100
340 32100 IF ((M<=255) THEN GOTO 100
341 32200 IF ((M<=255) THEN GOTO 100
342 32300 IF ((M<=255) THEN GOTO 100
343 32400 IF ((M<=255) THEN GOTO 100
344 32500 IF ((M<=255) THEN GOTO 100
345 32600 IF ((M<=255) THEN GOTO 100
346 32700 IF ((M<=255) THEN GOTO 100
347 32800 IF ((M<=255) THEN GOTO 100
348 32900 IF ((M<=255) THEN GOTO 100
349 33000 IF ((M<=255) THEN GOTO 100
350 33100 IF ((M<=255) THEN GOTO 100
351 33200 IF ((M<=255) THEN GOTO 100
352 33300 IF ((M<=255) THEN GOTO 100
353 33400 IF ((M<=255) THEN GOTO 100
354 33500 IF ((M<=255) THEN GOTO 100
355 33600 IF ((M<=255) THEN GOTO 100
356 33700 IF ((M<=255) THEN GOTO 100
357 33800 IF ((M<=255) THEN GOTO 100
358 33900 IF ((M<=255) THEN GOTO 100
359 34000 IF ((M<=255) THEN GOTO 100
360 34100 IF ((M<=255) THEN GOTO 100
361 34200 IF ((M<=255) THEN GOTO 100
362 34300 IF ((M<=255) THEN GOTO 100
363 34400 IF ((M<=255) THEN GOTO 100
364 34500 IF ((M<=255) THEN GOTO 100
365 34600 IF ((M<=255) THEN GOTO 100
366 34700 IF ((M<=255) THEN GOTO 100
367 34800 IF ((M<=255) THEN GOTO 100
368 34900 IF ((M<=255) THEN GOTO 100
369 35000 IF ((M<=255) THEN GOTO 100
370 35100 IF ((M<=255) THEN GOTO 100
371 35200 IF ((M<=255) THEN GOTO 100
372 35300 IF ((M<=255) THEN GOTO 100
373 35400 IF ((M<=255) THEN GOTO 100
374 35500 IF ((M<=255) THEN GOTO 100
375 35600 IF ((M<=255) THEN GOTO 100
376 35700 IF ((M<=255) THEN GOTO 100
377 35800 IF ((M<=255) THEN GOTO 100
378 35900 IF ((M<=255) THEN GOTO 100
379 36000 IF ((M<=255) THEN GOTO 100
380 36100 IF ((M<=255) THEN GOTO 100
381 36200 IF ((M<=255) THEN GOTO 100
382 36300 IF ((M<=255) THEN GOTO 100
383 36400 IF ((M<=255) THEN GOTO 100
384 36500 IF ((M<=255) THEN GOTO 100
385 36600 IF ((M<=255) THEN GOTO 100
386 36700 IF ((M<=255) THEN GOTO 100
387 36800 IF ((M<=255) THEN GOTO 100
388 36900 IF ((M<=255) THEN GOTO 100
389 37000 IF ((M<=255) THEN GOTO 100
390 37100 IF ((M<=255) THEN GOTO 100
391 37200 IF ((M<=255) THEN GOTO 100
392 37300 IF ((M<=255) THEN GOTO 100
393 37400 IF ((M<=255) THEN GOTO 100
394 37500 IF ((M<=255) THEN GOTO 100
395 37600 IF ((M<=255) THEN GOTO 100
396 37700 IF ((M<=255) THEN GOTO 100
397 37800 IF ((M<=255) THEN GOTO 100
398 37900 IF ((M<=255) THEN GOTO 100
399 38000 IF ((M<=255) THEN GOTO 100
400 38100 IF ((M<=255) THEN GOTO 100
401 38200 IF ((M<=255) THEN GOTO 100
402 38300 IF ((M<=255) THEN GOTO 100
403 38400 IF ((M<=255) THEN GOTO 100
404 38500 IF ((M<=255) THEN GOTO 100
405 38600 IF ((M<=255) THEN GOTO 100
406 38700 IF ((M<=255) THEN GOTO 100
407 3
```



```

01 000 INPUT "CLEARTEXT ADDRESS"
  " 00 PRINT "CLEARTEXT ADDRESS"
  TAB(100) "0" "000000"
02 010 PRINT "CODE ADDRESS"
  " 010 PRINT "CODE ADDRESS"
03 020 PRINT "COMPRESSION ADDRESS"
  " 020 PRINT "COMPRESSION ADDRESS"
04 030 INPUT "CLEARTEXT ADDRESS"
  " 04"
05 040 INPUT "FINISH ADDRESS"
  " 05"
06 040 INPUT "DEVICE"
  " 06"
07 010 INPUT "FILE NAME"
  " 07"
08 000 SYS 810
  " 08"
09 030 PRINT "0100"
  " 09"
10 010 01000,010,020,30,030,17
  " 10"
11 010 01000,010,020,30,030,17
  " 11"
12 010 01000,010,020,30,030,17
  " 12"
13 010 01000,010,020,30,030,17
  " 13"
14 010 01000,010,020,30,030,17
  " 14"
15 010 01000,010,020,30,030,17
  " 15"
16 010 01000,010,020,30,030,17
  " 16"
17 010 01000,010,020,30,030,17
  " 17"
18 010 01000,010,020,30,030,17
  " 18"
19 010 01000,010,020,30,030,17
  " 19"
20 010 01000,010,020,30,030,17
  " 20"
21 010 01000,010,020,30,030,17
  " 21"
22 010 01000,010,020,30,030,17
  " 22"
23 010 01000,010,020,30,030,17
  " 23"
24 010 01000,010,020,30,030,17
  " 24"
25 010 01000,010,020,30,030,17
  " 25"
26 010 01000,010,020,30,030,17
  " 26"
27 010 01000,010,020,30,030,17
  " 27"
28 010 01000,010,020,30,030,17
  " 28"
29 010 01000,010,020,30,030,17
  " 29"
30 010 01000,010,020,30,030,17
  " 30"
31 010 01000,010,020,30,030,17
  " 31"
32 010 01000,010,020,30,030,17
  " 32"
33 010 01000,010,020,30,030,17
  " 33"
34 010 01000,010,020,30,030,17
  " 34"
35 010 01000,010,020,30,030,17
  " 35"
36 010 01000,010,020,30,030,17
  " 36"
37 010 01000,010,020,30,030,17
  " 37"
38 010 01000,010,020,30,030,17
  " 38"
39 010 01000,010,020,30,030,17
  " 39"
40 010 01000,010,020,30,030,17
  " 40"
41 010 01000,010,020,30,030,17
  " 41"
42 010 01000,010,020,30,030,17
  " 42"
43 010 01000,010,020,30,030,17
  " 43"
44 010 01000,010,020,30,030,17
  " 44"
45 010 01000,010,020,30,030,17
  " 45"
46 010 01000,010,020,30,030,17
  " 46"
47 010 01000,010,020,30,030,17
  " 47"
48 010 01000,010,020,30,030,17
  " 48"
49 010 01000,010,020,30,030,17
  " 49"
50 010 01000,010,020,30,030,17
  " 50"
51 010 01000,010,020,30,030,17
  " 51"
52 010 01000,010,020,30,030,17
  " 52"
53 010 01000,010,020,30,030,17
  " 53"
54 010 01000,010,020,30,030,17
  " 54"
55 010 01000,010,020,30,030,17
  " 55"
56 010 01000,010,020,30,030,17
  " 56"
57 010 01000,010,020,30,030,17
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58 010 01000,010,020,30,030,17
  " 58"
59 010 01000,010,020,30,030,17
  " 59"
60 010 01000,010,020,30,030,17
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61 010 01000,010,020,30,030,17
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62 010 01000,010,020,30,030,17
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63 010 01000,010,020,30,030,17
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64 010 01000,010,020,30,030,17
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65 010 01000,010,020,30,030,17
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66 010 01000,010,020,30,030,17
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67 010 01000,010,020,30,030,17
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68 010 01000,010,020,30,030,17
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69 010 01000,010,020,30,030,17
  " 69"
70 010 01000,010,020,30,030,17
  " 70"
71 010 01000,010,020,30,030,17
  " 71"
72 010 01000,010,020,30,030,17
  " 72"
73 010 01000,010,020,30,030,17
  " 73"
74 010 01000,010,020,30,030,17
  " 74"
75 010 01000,010,020,30,030,17
  " 75"
76 010 01000,010,020,30,030,17
  " 76"
77 010 01000,010,020,30,030,17
  " 77"
78 010 01000,010,020,30,030,17
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79 010 01000,010,020,30,030,17
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80 010 01000,010,020,30,030,17
  " 80"
81 010 01000,010,020,30,030,17
  " 81"
82 010 01000,010,020,30,030,17
  " 82"
83 010 01000,010,020,30,030,17
  " 83"
84 010 01000,010,020,30,030,17
  " 84"
85 010 01000,010,020,30,030,17
  " 85"
86 010 01000,010,020,30,030,17
  " 86"
87 010 01000,010,020,30,030,17
  " 87"
88 010 01000,010,020,30,030,17
  " 88"
89 010 01000,010,020,30,030,17
  " 89"
90 010 01000,010,020,30,030,17
  " 90"
91 010 01000,010,020,30,030,17
  " 91"
92 010 01000,010,020,30,030,17
  " 92"
93 010 01000,010,020,30,030,17
  " 93"
94 010 01000,010,020,30,030,17
  " 94"
95 010 01000,010,020,30,030,17
  " 95"
96 010 01000,010,020,30,030,17
  " 96"
97 010 01000,010,020,30,030,17
  " 97"
98 010 01000,010,020,30,030,17
  " 98"
99 010 01000,010,020,30,030,17
  " 99"
100 010 01000,010,020,30,030,17
  " 100"

```

LISTING 2

PROGRAM: TEXT EDITOR

```

01 10 INPUT "TEXT ADDRESS"
  " 10"
02 010 PRINT "TEXT ADDRESS"
  " 010"
03 020 PRINT "TEXT ADDRESS"
  " 020"
04 030 PRINT "TEXT ADDRESS"
  " 030"
05 040 PRINT "TEXT ADDRESS"
  " 040"
06 050 PRINT "TEXT ADDRESS"
  " 050"
07 060 PRINT "TEXT ADDRESS"
  " 060"
08 070 PRINT "TEXT ADDRESS"
  " 070"
09 080 PRINT "TEXT ADDRESS"
  " 080"
10 090 PRINT "TEXT ADDRESS"
  " 090"
11 100 PRINT "TEXT ADDRESS"
  " 100"
12 110 PRINT "TEXT ADDRESS"
  " 110"
13 120 PRINT "TEXT ADDRESS"
  " 120"
14 130 PRINT "TEXT ADDRESS"
  " 130"
15 140 PRINT "TEXT ADDRESS"
  " 140"
16 150 PRINT "TEXT ADDRESS"
  " 150"
17 160 PRINT "TEXT ADDRESS"
  " 160"
18 170 PRINT "TEXT ADDRESS"
  " 170"
19 180 PRINT "TEXT ADDRESS"
  " 180"
20 190 PRINT "TEXT ADDRESS"
  " 190"
21 200 PRINT "TEXT ADDRESS"
  " 200"
22 210 PRINT "TEXT ADDRESS"
  " 210"
23 220 PRINT "TEXT ADDRESS"
  " 220"
24 230 PRINT "TEXT ADDRESS"
  " 230"
25 240 PRINT "TEXT ADDRESS"
  " 240"
26 250 PRINT "TEXT ADDRESS"
  " 250"
27 260 PRINT "TEXT ADDRESS"
  " 260"
28 270 PRINT "TEXT ADDRESS"
  " 270"
29 280 PRINT "TEXT ADDRESS"
  " 280"
30 290 PRINT "TEXT ADDRESS"
  " 290"
31 300 PRINT "TEXT ADDRESS"
  " 300"
32 310 PRINT "TEXT ADDRESS"
  " 310"
33 320 PRINT "TEXT ADDRESS"
  " 320"
34 330 PRINT "TEXT ADDRESS"
  " 330"
35 340 PRINT "TEXT ADDRESS"
  " 340"
36 350 PRINT "TEXT ADDRESS"
  " 350"
37 360 PRINT "TEXT ADDRESS"
  " 360"
38 370 PRINT "TEXT ADDRESS"
  " 370"
39 380 PRINT "TEXT ADDRESS"
  " 380"
40 390 PRINT "TEXT ADDRESS"
  " 390"
41 400 PRINT "TEXT ADDRESS"
  " 400"
42 410 PRINT "TEXT ADDRESS"
  " 410"
43 420 PRINT "TEXT ADDRESS"
  " 420"
44 430 PRINT "TEXT ADDRESS"
  " 430"
45 440 PRINT "TEXT ADDRESS"
  " 440"
46 450 PRINT "TEXT ADDRESS"
  " 450"
47 460 PRINT "TEXT ADDRESS"
  " 460"
48 470 PRINT "TEXT ADDRESS"
  " 470"
49 480 PRINT "TEXT ADDRESS"
  " 480"
50 490 PRINT "TEXT ADDRESS"
  " 490"
51 500 PRINT "TEXT ADDRESS"
  " 500"
52 510 PRINT "TEXT ADDRESS"
  " 510"
53 520 PRINT "TEXT ADDRESS"
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54 530 PRINT "TEXT ADDRESS"
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55 540 PRINT "TEXT ADDRESS"
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56 550 PRINT "TEXT ADDRESS"
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57 560 PRINT "TEXT ADDRESS"
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58 570 PRINT "TEXT ADDRESS"
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59 580 PRINT "TEXT ADDRESS"
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60 590 PRINT "TEXT ADDRESS"
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61 600 PRINT "TEXT ADDRESS"
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62 610 PRINT "TEXT ADDRESS"
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63 620 PRINT "TEXT ADDRESS"
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64 630 PRINT "TEXT ADDRESS"
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65 640 PRINT "TEXT ADDRESS"
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66 650 PRINT "TEXT ADDRESS"
  " 650"
67 660 PRINT "TEXT ADDRESS"
  " 660"
68 670 PRINT "TEXT ADDRESS"
  " 670"
69 680 PRINT "TEXT ADDRESS"
  " 680"
70 690 PRINT "TEXT ADDRESS"
  " 690"
71 700 PRINT "TEXT ADDRESS"
  " 700"
72 710 PRINT "TEXT ADDRESS"
  " 710"
73 720 PRINT "TEXT ADDRESS"
  " 720"
74 730 PRINT "TEXT ADDRESS"
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75 740 PRINT "TEXT ADDRESS"
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76 750 PRINT "TEXT ADDRESS"
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77 760 PRINT "TEXT ADDRESS"
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78 770 PRINT "TEXT ADDRESS"
  " 770"
79 780 PRINT "TEXT ADDRESS"
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80 790 PRINT "TEXT ADDRESS"
  " 790"
81 800 PRINT "TEXT ADDRESS"
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82 810 PRINT "TEXT ADDRESS"
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83 820 PRINT "TEXT ADDRESS"
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84 830 PRINT "TEXT ADDRESS"
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85 840 PRINT "TEXT ADDRESS"
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86 850 PRINT "TEXT ADDRESS"
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87 860 PRINT "TEXT ADDRESS"
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88 870 PRINT "TEXT ADDRESS"
  " 870"
89 880 PRINT "TEXT ADDRESS"
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90 890 PRINT "TEXT ADDRESS"
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91 900 PRINT "TEXT ADDRESS"
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92 910 PRINT "TEXT ADDRESS"
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93 920 PRINT "TEXT ADDRESS"
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94 930 PRINT "TEXT ADDRESS"
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95 940 PRINT "TEXT ADDRESS"
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96 950 PRINT "TEXT ADDRESS"
  " 950"
97 960 PRINT "TEXT ADDRESS"
  " 960"
98 970 PRINT "TEXT ADDRESS"
  " 970"
99 980 PRINT "TEXT ADDRESS"
  " 980"
100 990 PRINT "TEXT ADDRESS"
  " 990"

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01 10 INPUT "TEXT ADDRESS"
  " 10"
02 010 PRINT "TEXT ADDRESS"
  " 010"
03 020 PRINT "TEXT ADDRESS"
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04 030 PRINT "TEXT ADDRESS"
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05 040 PRINT "TEXT ADDRESS"
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06 050 PRINT "TEXT ADDRESS"
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07 060 PRINT "TEXT ADDRESS"
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08 070 PRINT "TEXT ADDRESS"
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09 080 PRINT "TEXT ADDRESS"
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10 090 PRINT "TEXT ADDRESS"
  " 090"
11 100 PRINT "TEXT ADDRESS"
  " 100"
12 110 PRINT "TEXT ADDRESS"
  " 110"
13 120 PRINT "TEXT ADDRESS"
  " 120"
14 130 PRINT "TEXT ADDRESS"
  " 130"
15 140 PRINT "TEXT ADDRESS"
  " 140"
16 150 PRINT "TEXT ADDRESS"
  " 150"
17 160 PRINT "TEXT ADDRESS"
  " 160"
18 170 PRINT "TEXT ADDRESS"
  " 170"
19 180 PRINT "TEXT ADDRESS"
  " 180"
20 190 PRINT "TEXT ADDRESS"
  " 190"
21 200 PRINT "TEXT ADDRESS"
  " 200"
22 210 PRINT "TEXT ADDRESS"
  " 210"
23 220 PRINT "TEXT ADDRESS"
  " 220"
24 230 PRINT "TEXT ADDRESS"
  " 230"
25 240 PRINT "TEXT ADDRESS"
  " 240"
26 250 PRINT "TEXT ADDRESS"
  " 250"
27 260 PRINT "TEXT ADDRESS"
  " 260"
28 270 PRINT "TEXT ADDRESS"
  " 270"
29 280 PRINT "TEXT ADDRESS"
  " 280"
30 290 PRINT "TEXT ADDRESS"
  " 290"
31 300 PRINT "TEXT ADDRESS"
  " 300"
32 310 PRINT "TEXT ADDRESS"
  " 310"
33 320 PRINT "TEXT ADDRESS"
  " 320"
34 330 PRINT "TEXT ADDRESS"
  " 330"
35 340 PRINT "TEXT ADDRESS"
  " 340"
36 350 PRINT "TEXT ADDRESS"
  " 350"
37 360 PRINT "TEXT ADDRESS"
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38 370 PRINT "TEXT ADDRESS"
  " 370"
39 380 PRINT "TEXT ADDRESS"
  " 380"
40 390 PRINT "TEXT ADDRESS"
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41 400 PRINT "TEXT ADDRESS"
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42 410 PRINT "TEXT ADDRESS"
  " 410"
43 420 PRINT "TEXT ADDRESS"
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44 430 PRINT "TEXT ADDRESS"
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45 440 PRINT "TEXT ADDRESS"
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46 450 PRINT "TEXT ADDRESS"
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47 460 PRINT "TEXT ADDRESS"
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48 470 PRINT "TEXT ADDRESS"
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49 480 PRINT "TEXT ADDRESS"
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50 490 PRINT "TEXT ADDRESS"
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51 500 PRINT "TEXT ADDRESS"
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52 510 PRINT "TEXT ADDRESS"
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53 520 PRINT "TEXT ADDRESS"
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54 530 PRINT "TEXT ADDRESS"
  " 530"
55 540 PRINT "TEXT ADDRESS"
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56 550 PRINT "TEXT ADDRESS"
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57 560 PRINT "TEXT ADDRESS"
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58 570 PRINT "TEXT ADDRESS"
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59 580 PRINT "TEXT ADDRESS"
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60 590 PRINT "TEXT ADDRESS"
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61 600 PRINT "TEXT ADDRESS"
  " 600"
62 610 PRINT "TEXT ADDRESS"
  " 610"
63 620 PRINT "TEXT ADDRESS"
  " 620"
64 630 PRINT "TEXT ADDRESS"
  " 630"
65 640 PRINT "TEXT ADDRESS"
  " 640"
66 650 PRINT "TEXT ADDRESS"
  " 650"
67 660 PRINT "TEXT ADDRESS"
  " 660"
68 670 PRINT "TEXT ADDRESS"
  " 670"
69 680 PRINT "TEXT ADDRESS"
  " 680"
70 690 PRINT "TEXT ADDRESS"
  " 690"
71 700 PRINT "TEXT ADDRESS"
  " 700"
72 710 PRINT "TEXT ADDRESS"
  " 710"
73 720 PRINT "TEXT ADDRESS"
  " 720"
74 730 PRINT "TEXT ADDRESS"
  " 730"
75 740 PRINT "TEXT ADDRESS"
  " 740"
76 750 PRINT "TEXT ADDRESS"
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77 760 PRINT "TEXT ADDRESS"
  " 760"
78 770 PRINT "TEXT ADDRESS"
  " 770"
79 780 PRINT "TEXT ADDRESS"
  " 780"
80 790 PRINT "TEXT ADDRESS"
  " 790"
81 800 PRINT "TEXT ADDRESS"
  " 800"
82 810 PRINT "TEXT ADDRESS"
  " 810"
83 820 PRINT "TEXT ADDRESS"
  " 820"
84 830 PRINT "TEXT ADDRESS"
  " 830"
85 840 PRINT "TEXT ADDRESS"
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86 850 PRINT "TEXT ADDRESS"
  " 850"
87 860 PRINT "TEXT ADDRESS"
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88 870 PRINT "TEXT ADDRESS"
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89 880 PRINT "TEXT ADDRESS"
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90 890 PRINT "TEXT ADDRESS"
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91 900 PRINT "TEXT ADDRESS"
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92 910 PRINT "TEXT ADDRESS"
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93 920 PRINT "TEXT ADDRESS"
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94 930 PRINT "TEXT ADDRESS"
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95 940 PRINT "TEXT ADDRESS"
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96 950 PRINT "TEXT ADDRESS"
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97 960 PRINT "TEXT ADDRESS"
  " 960"
98 970 PRINT "TEXT ADDRESS"
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Books continued from page 124.

(advisable), the formatting and handling of work disks and the creation of a "hotter file" disk. Read these two sections rather carefully as there is a lot of information here on opening and closing of files, flipping, page reading, file deletion, etc.

The "real" handling of GEOS starts at chapter three through to five. It includes a detailed description of the different operations available to you in the system, with an excellent selection of screen dump illustrations to supplement the instructions. Indeed there are a total of 94 of the latter, which will give you some idea of the work file that goes into writing this book.

Initially your screen has a display of seven icons (GIcon, GeoView, GeoView, GeoView, GeoView, GeoView, GeoView) and Backup; this is called the Desk Top. The authors have discussed these in considerable detail - so much so that you should be joy-stick clicking in top gear by the time you have read it all over, twice or three times. Certainly you will want to explore more and more. Everything is here to give you a complete grasp of all operative systems.

It has been said more than once that GEOS is most suited as a word processor and not as an artist's tool (perhaps such contentions were made with GEOS V11). In any event, read up the Graphics Section where you will find that there is ample opportunity for artistry; all aspects of painting, cycling, pattern filling, outlining, pasting, mirroring, use of the 25 brushes available, etc., have been well described. V1.2 is most certainly an artist's tool as the authors show.

Taking this a step further, there is a very good section on

'organizing and planning with Geopaint'. Here the authors have extended the basic concepts in planning rooms, gardens, schematic electronic circuits, etc.

Should you care to type in a program called Filemaker (see paper) you have here a program which will transform your standard G64 files to the GEOS format; also incorporated is a 'sprite designer' to create new icons. Again this is fully described. AmosSoft surely have a disk available with all the programmes in the book (Contact AmosSoft concerning this if you wish to purchase the disk.)

Chapter six (inside GEOS) is fairly lengthy and is intended essentially for the machine code programmer. A single exp simulator is listed for direct entry to memory with a monitor. This should then be saved to disk, from which it can be reloaded as a GEOS accessory in conjunction with Filemaker. A Basic loader is listed for the simulator. The concept of the simulator is to investigate the GEOS operating tool and many facets of creating self-made windows are detailed. All this is fully explained and documented and provides the programmer with opportunities to extend GEOS.

The book has a good glossary and is well indexed; it only remains to be said that it is obviously of immense value to the GEOS user, particularly in view of the now prohibitive price. A highly commendable book.

R.M.

Touchline:

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B R E A K

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A bumper bundle of prizes is waiting its way to winners of *Your Commodore* competitions this month.

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Read on and find out.

Super Sunday

Our March 1987 competition gave 30 lucky people the chance of a copy of *Super Sunday* from Nexus, which will be touching down in the homes of the following people:

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Important Notice

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Apologies are also due to people who experienced delays with software ordered in late June/early July. Unfortunately, problems were caused by problems with the postal service within London.

Escape From Paradise

The May 1987 competition gave away 25 copies of Anco's *Escape From Paradise* in prizes. The following people will all receive a copy of the game:

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OOPS!

We have had a number of queries regarding errors in the *Commodore* programmes printed in the July 1987 issue of *Your Commodore*.

There are no errors in the program printed. However the variable L that is set up to report the line number of any lines with a typing error in them starts off at the wrong value in both programmes. This doesn't stop the program from working, however, if you have made a mistake while typing the program in, the program will give you an incorrect line number for correction. The lines to be replaced are as follows:

The C64 Version:
30 D=48152:L=178

The Plus/4 Version:
40 D=4096:L=180

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