YOUR AMIGA • C64 • PLUS 4 • PC • C128

Comic Watch
Neon Zone
Rik of the Journos

MOONWALKER

‘YOUR PROGRAMMER’ Pull-Out
DATA RECORDER
- Quality Commodore compatible data recorder.
- Pause control, counter, etc.
- Suitable for 64/128.
- Send now for quick delivery.
ONLY £24.99

MIDI 64
- Full MIDI INTERFACE for the 64/128 at a realistic price.
- MIDI compatible with most leading software packages.
ONLY £29.99

DIGITAL SOUND SAMPLER
- The new sampler allows you to record any sound digitally into memory & then replay it with astounding effects.
- Playback forwards/backswards with echo/revch/ring modulation.
- Now with full sound editing module to produce outstanding effects.
- Full 8 bit D to A & A/D conversion.
- MIDI compatible with suitable interface (i.e. Datec unit for £29.99, see ad.).
- Live effects menu includes real time display of waveforms.
- Line in/mic in/line out/feedback controls.
- Powerfull sequencer with editing features.
- Load/save sample. Up to 8 samples in memory at one time.
- Complete software/hardware package. Tape or Disk (please state).
ONLY £49.99

COM DRUM
- GITAL DRUM SYSTEM
- Now you can turn your digital sound sampler into a digital drum system.
- 8 digital drum sounds in memory parallel port of your C64/128.
- Complete with 3 drum kits.
- Real drum rhythms not synthesised.
- Create superb drum rhythms with real & step time.
- Full editing. Menu driven. Load/Save facilities.
- Output to hi-fi or through TV monitor.
ONLY £9.99

MODEL & ROBOT CONTROL MADE EASY.
- 4 output channels - each with onboard relay
- 4 input channels - each fully buffered TTL level sensing
- Analogue input with full 8 bit conversion
- Voice input for voice control
- Software features: test mode, analogue measurement/voice activate/digital readout etc.
ONLY £39.99

PARALLEL PRINTER CABLE
- Connects full size printers to the C64/128.
- Many programmes and cartridges (Action Replay/Print cartridge etc.) will drive printers from this port.
ONLY £12.99

FREE MIDI CABLES
- YAMAHA SHS 10 FM SYNTHESIZER KEYBOARD
- Superbly styled guitar-type keyboard with shoulder strap.
- Top quality brandname.
- 2.5 octave keyboard.
- 20 built-in instrument and rhythm choices.
- Uses FM synthesis.
- Full MIDI standard.
- Superbly styled guitar-type keyboard with shoulder strap.
- Requires 6 "C" batteries or AC/DC adapter.

FOR ONLY
£99.99
NO MORE TO BUY!!

RESET CARTRIDGE
- Unstoppable reset button.
- Also fixes your program & clears memory.
- Superbly styled guitar-type keyboard with shoulder strap.
- Requires 6 "C" batteries or AC/DC adapter.
ONLY £5.99

SOFTWARE PLUS...
- DISC DOCTOR 2 - Read & write, any track & sector including extra & renumbered tracks. Repair damaged sectors.
- HEADER/GAP EDITOR - Decodes & displays ALL header information including off bytes & header gap. Rewrite the entire header & header gap. Remember sectors. Also edit any sector full gap.
- DISK LOOK - Sort directory. Recover lost files. Display file list and end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Ram.
- FAST FILE COPY - Selective file copy. Works at up to 6 times normal speed.
- FAST DISK COPY - Copy an entire disk in 2 minutes or less using single 1541.
- FILE COMPACTOR - Compact disk programs by up to 50%. Save disk space.
- FORMATTER - 10 second format an entire disk or format any individual track or half track 0 to 41.
- ERROR EDIT - Quickly find and correct all read errors including extra and renumbered tracks or sectors & half tracks from 0 to 41.

ONLY £9.99

FOR ONLY
£70
SAVE OVER

UNUSUAL VALUE PACK - THE YAMAHA SHS 10 FM MIDI COMPATIBLE SHOULDER SYNTHESIZER, THE ADVANCED MUSCITO SOFTWARE & MIDI INTERFACE PLUS FREE MIDI CABLES TO CONNECT EVERYTHING TO YOUR COMPUTER SYSTEM.
ONLY £70

FOR ONLY
£39.99
NO MORE TO BUY!!

3 SLOT MOTHERBOARD
- SAVE WEAR & TEAR ON YOUR EXPANSION PORT
- Will accept three cartridges on its high grade PCB.
- Switch in/out any slot.
- Fully buffered.
- Reset button and an onboard safety fuse.
ONLY £16.99

DATEL ELECTRONICS
- The Ultimate Disk Toolkit for the 1540/1541.
- A disk toolkit is an absolute must for the serious disk hacker. Toolkit IV has more features than most for less.
- DISC DOCTOR V2 - Read & write, any track & sector including extra & renumbered tracks. Repair damaged sectors.
- HEADER/GAP EDITOR - Decodes & displays ALL header information including off bytes & header gap. Rewrite the entire header & header gap. Remember sectors. Also edit any sector full gap.
- DISK LOOK - Sort directory. Recover lost files. Display file list and end addresses. Disassemble any file program directly from the disk to SCREEN or PRINTER including undocumented opcodes. Edit Ram.
THE ULTIMATE GRAPHICS PACKAGE...

COMMODORE 1351 MOUSE

- 1351 Mouse is a high resolution two button mouse featuring optical counting, teflon guides, microswitches, rubber coated ball and high quality interface.
- When combined with OCP Advanced Art Studio this graphics package is quite simply the best system available. The features are unmatched...

EPROM ERASER

- Pulldown/icon driven menus for ease of use.
- Mouse operation, plus joystick and keyboard control.
- 16 pens, 9 sprays, 10 brushes - so flexible anyone can create superb graphics easily.

256K SUPEROM EXPANDER

- Select instantly from 8 sockets which accept up to 32K EPROM each.
- Program your own EPROMs using our EPROM programer.
- No need to have lots of cartridges - just make a selection from the Superom menu.
- Fully menu driven on power up.
- Select any slot under software controls.
- Unique EPROM generator feature will take your own programs - basic or m/c & turn them into autostart EPROMs. (EPROM burner required).
- Accepts 2764/27128/27256 EPROMs.
- On board unstopable reset.
- On board operating systems - no programs to load.

EPROMMER 64 NEW!

- A top quality, easy-to-use EPROM programer for the 64/128.
- Fully menu driven software/hardware package makes programing/reading/verifying/copying EPROMs simplicity itself.

COMPLET WITH ADVANCED ART STUDIO™

- Full cut and paste facilities plus excellent printer support.
- Fill edit, Font editor, flip, invert, rotate, solid or textured fill and professional manual make Art Studio simply the best graphics package for the Commodore (please state Tap+ or Disk).

INCLUDES FREE MOUSE MAT/HOLDER WORTH £12.99

- Will program 2716, 2764, 27128 & 27256 chips. 12.5, 31 or 35 volts.
- Fits into user port for maximum compatibility with cartridges/Superom Board etc.
- Full feature system - all functions covered like device check/verify.
- We believe Eeprommer 64 is the most comprehensive, most friendly & best value for money programer available for the 64/128.
- Ideal companion for Superom Board, Cartridge Development System, our kernel expanders or indeed any EPROM base project.
- Comes complete with instructions plus the cartridge handbook.

ONLY £29.99 COMPLETE

ALL ORDERS NORMALLY DESPATCHED WITHIN 48 HRS

BY PHONE
0782 744707 24hr Credit Card Line

BY POST
Send cheques/POs made payable to "Datel Electronics"

FAX 0782 744292

UK ORDERS POST FREE EUROPE ADD £3 OVERSEAS ADD £5

PRICES AND SPECIFICATIONS CORRECT AT TIME OF PRESS AND SUBJECT TO CHANGE WITHOUT NOTICE

CALLERS WELCOME - Please reserve goods by telephone prior to visit.

Datel Electronics LTD., Fenton Industrial Estate
Govan Road, Fenton, Stoke-on-Trent, England.

Sales only 0782 744707

Technical only 0782 744324

COM 3
This Month's Programme

REGULARS

6 News
And the main points again...

25 PC Corner
Our monthly police chat-line.

33 Your Programmer
The pull-out section with more listings than the

GAMES

22 Moonwalker
He's bad. He's mad. He's downright licence worthy
Michael is half-plastic, half-computer game.

30 Comics
What do you get if you cross Batman and Superman? Bat soup, of course!

Titanic (think about that one).

56 Big Wobbly Comp
Win a shirt and a ball signed by Richard Henderson, oops... Paul Gascoigne, honest!

60 Software for Sale
Nope, it's not the naughty lingerie pages, but a service where you can purchase past and present listings on disk and tape.

14 Sword of Aragon
The pencil is mightier than the sword. Unless, of course, you're in the middle of a medieval barney.

16 Rick Dangerous
And Adrian Dangerous! We are the dangerous brothers...

17 New Zealand Story
Let's just hope that it's not going to be a new Australasian soap!

18 The Soccer Squad
But what's an octopus playing football for? Oh sorry, I thought you said "Squid!!"

20 Xybots
That's what you get if you sit on a scrabble board.

21 APB
What are you going to do with that truncheon, officer?

YOUR PROGRAMMER

Pull out program section
see page 33.
The contents of this publication including all articles, designs, drawings and programs and all copyright and other intellectual property rights therein belong to Argus Specialist Publications. All rights conferred by the Law of Copyright and other intellectual property rights and by virtue of international copyright conventions are specifically reserved to Argus Specialist Publications and any reproduction requires the prior written consent of the Company. © 1989. Distribution SM Distribution, 6 Leigham Court Road, London SW16 2PG. Printed by Chase Webb, Plymouth. Opinions expressed in reviews are the opinions of the reviewers and not necessarily those of the magazine. While every effort is made to thoroughly check programs published for errors we cannot be held responsible for any errors that do occur.

Your Commodore incorporating Your 64 is a monthly magazine appearing on the first Friday of each month. Argus Specialist Publications Editorial and Advertisement office, Your Commodore, Argus House, Boundary Way, Hemel Hempstead HP2 7ST. Telephone: (0442) 66551, Subscription rates upon application to Your Commodore Subscriptions Department, Infonet Ltd, 5 River Park Estate, Berkhamsted, Herts HP4 1HL U.S.A. Subscription Agent: Wise Owl Worldwide Publications, 4314 West 238th Street, Torrance CA 90505 U.S.A.

ISSN 0269-8277

Game Show Goodies

The jingle of Christmas bells will come early this year as the tills at the Personal Computer Show ring in the new gear. Panic will no doubt be quickening the hearts of the programmers and managers throughout the country as the 27th of September deadline approaches.

Although there are always a few surprises which are kept under wraps until the last minute, a few moriscs are thrown to the press to whet the appetite. So far Psygnosis is flexing its muscles to carry off the award as the most prolific software house of the decade. The company has lined up no less than 43 new releases for launch over the next seven months.

Fully animated aliens have been intercepted by the Pandora team and boxed into a 16 bit treat called Project Xenomorph. Also from the Interceptor Group, the low price label, Premier Budget, debut its latest Joe Blade epic.

There's always an international flavour to the Show and high quality software is the latest Spanish resort. Microdigital Soft is launching Dinamic's PC version of Navy Moves plus three new titles; Grand Prix Master, a

Star Performers

Star has extended its range of LC series printers with the addition of three A3 landscape format machines, one sporting a bottom feeder (Can we say that to our readers?).

The LC-15 is a wide carriage (16.5 inches) version of the fast, new LC-10 II. Both machines are developments of the phenomenally successful LC-10 but now with go-faster stripes added to their performance (67eps in NLQ). The LC-15 is the one which is also available as a bottom feed...
new Freddy Hardest adventure called South of Manhattan, and After the War a post nuclear holocaust entertainment.

Andrew Hewson will be hoping for better Show this year after being deserted by his star programmers on the eve of last year's exhibition. Amongst the games on preview this year is Scavenger, John Philips follow up to Eliminator and Nebulus.

CDS has stooped to appealing to the lowest common denominator with a range of games from US-based Artwork. Ironically dubbed as 'adult software', the first two games are Strip Poker and Centrefold Squares. Wrist aching action for those who get their jollies from digitised dollies.

Mindscape's new games comprise Starrek V, Harley Davidson, Fiendish Freddy and Life or Death. The latter is a blood and guts operation which places the surgeon's electronic knife into the player's hands - should hit the right vein for high livers but it may cost you an arm and a leg.

Winter Draws On

Blue Ribbon hope to take the biscuit with a pools predictor program at the unbelievably low price of £2.99!

System 8 - The Pools Predictor is a dedicated database which the user gradually builds up as each result is announced. The program then takes the data and predicts the likely outcome of future matches in all four English and three Scottish leagues.

Hang on a minute, if hundreds of people buy the software and all enter the same data week after week, surely the prediction will be the same for everyone and won't that reduce the share of any winners? Personally, we'll stick to our lucky pins.

Touchline: The Personal Computer Show, Earl's Court, London; 27 September-1st October (Trade only: 28-29 September).

Video Rentals

You've read the magazine reviews, seen the advertising, now you can hire the video.

In a rather interesting move Action Screenplay is supplying rental versions of its publicity video of the latest games releases to computer stores and video libraries.

Now hardened games addicts will be able to thrill to the latest game demos with the added benefit of a video magazine feature in the comfort of their living (') rooms. The magazine features chart talk and issues of interest to mainline games fan all for a mere £1.50 rental charge.

Touchline: Hot Shot Entertainments, 167 Berholt Road, Colchester, Essex CO4 5AH. Tel: (0206) 751217.
Yo Gazza what's the score

Paul Gascoigne, the crown prince of soccer, has signed up to a new team. But if you are the Spurs fan don't worry, he is not leaving Tottenham, instead Gazza has signed up for Empire Software and will star in Gazza's Super Soccer.

The game is due for release in October on Amiga and C64 and, if you believe the hype, carries more features than there are calories in a Mars bar. Top of the list is the "Boot-o-meter". This gives the player total control of the kick he is about to play, height strength or spin.

The pitch view will be different. With a number of variants depending on the position of the ball, though Empire say "it will work well".

What if the Spurs fan does not own a computer? Fortunately the game can be set for most of the 92 league sides and Scottish Premier Teams. Although I am sure it would be easier to play with Gazza, than against (unless your name is Gary Lineker).

If the game has any of the personality of the Mars Bar Kid it should do well and may even top the league, unlike Gazza's other team.

Star Wars Trio

Domark is to release its three games based on the Star Wars films. The Star Wars Trilogy pack in the coin-op classics Star Wars, The Empire Strikes Back and Return of the Jedi for the Amiga (£24.99), Commodore 64 cassette (£12.99) and C64 disk (£19.99).

New from Domark: the home computer version of Tengen's coin-op race game Hard Drivin', from US company Broderbund comes Shufflepack Cafe and air hockey extravaganza against some hot alien competition and Fantavision, an animation graphic designer which breaks Domark into the utility program field. Hard Drivin' will be available on November 22 for the Amiga at £19.99, PC at £24.99 and for the C64 for £9.99 (cass) and £12.99 (disk). Fantavision is already in the shops but only for the Amiga and PC (£39.99).

Tourline: Domark, Ferry House, 51-57 Lacy Road, London SW15 1PR. Tel: 01-780 2222.

Dungeon's Drag On

A year after the launch of the C64 and PC versions of the Advanced Dungeon and Dragon epic Pools of Radiance, US Gold's SSI division has promised that the game will appear for the Amiga before Christmas - do they mean Christmas 1989, they surely do? So what's the release date? Dunno!

However, when the release date actually arrives, US Gold promises that the third scheduled AD&D game, Hillsfar, will be released one week later.

Ah! But what about the second game? On this the company is almost more specific. Dragons of Flame will be appearing in late October for the PC and Amiga (£24.99) and in late November for the C64 (£14.99 disk, £9.99 cassette).

We look forward to this with anticipation but we're not holding our breath. Until then Heroes of the Lance will suffice.
YOUR MISSION IS TO GET THERE.
SANTA CLAWS IS OUT TO STOP YOU.


Cheat Santa Claws – buy direct from our Dealers!
Come and see...

LATEST GAMES
EVER POPULAR C64
AMAZING AMIGA GRAPHICS
SOFTWARE AND PERIPHERALS
VIDEO AND AUDIO EQUIPMENT
FREE DEMONSTRATIONS

Look out for special deals and Christmas bargains!

THE COMMODORE CHRISTMAS SHOW

TICKET PRICES

<table>
<thead>
<tr>
<th></th>
<th>ON THE DOOR</th>
<th>ORDER NOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>£5.00</td>
<td>£4.50</td>
</tr>
<tr>
<td>Under 16</td>
<td>£3.50</td>
<td>£3.00</td>
</tr>
<tr>
<td>Family (2 adults &amp; up to 3 under 16s)</td>
<td>£15.00</td>
<td>£13.00</td>
</tr>
</tbody>
</table>

Return this coupon to: Commodore, FREEPOST, Ellesmere Port, South Wirral, L65 3EB.
Please send me (specify number) tickets for the Commodore Christmas Show 1989.

I enclose a cheque/PO for £
Cheque No

Please charge my Access/Visa card £

Card No.

Expiry date

Signature

Title: Mr □ Mrs □ Miss □ Ms □ Other (please specify)

First name(s)

Surname

Address

Postcode

Credit card orders on: 051-357 2941

YOUR COMMODORE

WE’LL HELP YOU SEE THINGS DIFFERENTLY

Nine
CURSE OF THE AZURE BONDS

Curse of the Azure Bonds continues the series of games based on the Advanced Dungeons and Dragons role playing system and starts with parties of 5th level and over.

SSI - PC £29.99, C64 Disk £24.99

CURSE of the Azure Bonds continues the AD&D tale that ended with a great victory over the dark forces in the city of Phlan. Now with a party of 5th and 6th level characters you thought you were ready for anything. Unfortunately you were wrong, as you now find you party coming round in the city of Tilverton and all is far from well. All magic and equipment is gone and now you have five blue symbols just under the skin of your sword arm. These you will soon learn are the handy work of the five evil leaders of the New Alliance. Each one bonds you to do their will upon call and your only way out of this curse is to destroy the New Alliance.

Your party of brave adventurers can include up to six 5th level characters and can be loaded in from a Pool of Radiance of Hillsfar save disk, although you may want to roll some new ones as existing characters could have race level restriction. Or you may want to try out a Paladin or Ranger as these can now enter the fray. Luckily your hijackers have left the party with some money to purchase new equipment but upon attacking the king's carriage you find yourself thrown in jail only to escape in the sewers that have become the base for the Fire Knives (a group of thieves). Here you will encounter your first challenge as one of your bonds matches their flaming blade symbol.

The game system will be familiar to those who have played Pool of Radiance (this game's prequel) and has the same 3D views, top down combat screens, slow but tactically accurate combat system and duckshoot menus to control your characters. However there have been some additions to speed up gameplay. The first is the FIX option included in the camp menu that is used to take the pain out of memorising and casting "cure light wound" spells. Select FIX and it's done automatically although it does take up game time. In Pool you could spend ages wandering around the wilderness, but now a full manual to try and find the best way to deal with creatures such as elementals, salamanders and beholders, as these are your new foes. You may find enemy clerics and magic users to be a problem but wait until you come across a mean little beauty known as Dracolith which is an undead dragon that can attack with both a breath weapon - such as fire, cold or acid - and a paralysing touch; it's just as well you can save the game every time you enter camp. Consequently, the game lacks the constant battles with 30 orcs that plagued Pool of Radiance and you face fewer more powerful creatures which makes for a more interesting game. The possible exceptions to this are the patrols of organised creatures, such as Dark Elves or Fire Knife thieves, but these follow set patterns and can be avoided.

As before, the on screen action is backed by references to entries in the accompanying adventurer's journal that also includes tales and rumours that you can discover by drinking in the screen map directs you to destinations via either trail, wilderness or even boat. Both of these speed up the game considerably and leave you to concentrate on the curse.

Your problems are complicated by the various factions of evil that are fighting for this corner of the Forgotten Realm, so it's safe to
assume that almost everywhere is hostile and if you meet one of your “masters” things can get tricky.

Curse of the Azure Bonds also has a very different style of gameplay, as due to your attack on the king you don’t have a fixed base to work on, so there’s no systematic clearing of areas. Instead you must follow the trail of clues and rumour to confront each of your masters and their minions in turn.

It may take time to adjust to combat with 5th, 6th, 7th and 8th level characters as you have so many other options to think about – such as which spells to use and how and when to attack. You’ll also find it useful if you had an AD&D monster local tavern.

There are few differences between the two versions of the game except that PC hard disk owners can do away with all the disk swapping associated with a game with 8 disk sides.

Curse of the Azure Bonds is the fourth game based on Advanced Dungeons and Dragons that began with Pool of Radiance. The good news is that there are more to come.

Tony Hetherington

The AD&D games are the result of the three cornered deal between D&D authors TSR, US software house SSI and US Gold. There are still four years of the first agreement left to run.

Tony Hetherington

Below: Dance of the amazing lego sprites

Above: Serves you right! You should never have visited Honest Ron’s Tatoo Emporium and asked for ‘Millwall are great’.

Above: If you ever want a high ranking army officer, Tilverton’s the place to be!
GAMES UPDATE

GEMINI WING

Virgin - £9.99 Tape, £14.99 Disk

The ultimate in gutter press has started an intergalactic war with its jingoistic outpourings. Now you have to save the day.

This game features perhaps the worst scenario in the history of computer games. It is both unlikely and unrealistic and shows no regard for the laws of physics, logic or common sense. Unfortunately, it's the best part of an otherwise forgettable game.

The scenario centres around an Earth newspaper known as the SoonDay Spirit (I wonder what that could be?) and its silly stories about aliens turning girlfriends into potatoes and so on. According to Virgin these headlines had upset the aliens in question and when the Soonday Spirit went too far with the heading “Die Mutant Alien Scum” the entire forces of every planet in the galaxy arrived to destroy the Earth. But wait! Is it a bird, is it a plane? No, it's you. Armed with only a single laser Gemini fighter you take off to destroy everything else in the galaxy to save the day and rack up a high score. Oh yeah? You have a smush chance of knitting fog or leading England to victory in a Test series.

This takes you to the game itself which would be reasonable as a £1.99 budget release but not as a full priced game. It's yet another shoot the aliens to collect extra weapons style of game. This apparently was caused by a "strange paradox in the fabric of reality" which probably also explains how Virgin can follow up a classic like Silkworm with a game like this.

Tony Hetherington

Below: When you've killed the blob-like aliens...

Right... it's time to kill many more blob-like aliens!

INFO

Gameplay: 22%
Graphics: 25%
Sound: 28%
Lastability: 10%
Overall: 21%

Back in the dawn of computer time Virgin created a game as bad as Gemini Wing called Owzhat. It was based on cricket. Unfortunately to change the name of a player, you had to break into the programme and change the code!
**CITADEL**

*Activision - £9.99 Tape, £14.95 Disc*

All was quiet, all was still. Darkness prevailed and neither good nor evil was present; until the monitor probes moved in to investigate an unknown power source.

For a time, nothing happened in the dark dank recesses of an underground complex on a distant planet. There was no light and no sound, and nothing moved.

Nor had anything thought of moving for quite some time, but they were still charged up and, high above the planets surface, a probe was watching, listening, monitoring and unidentified power source.

But the planet lay dormant. Nothing moved upon it's surface, no birds flew and no fish swam in the seas, and yet, an electrical force was being detected.

Relaying the data back to base, the probe was replaced by a transporter ship which landed five droids upon the surface. They set about finding the power and eventually traced it to a subterranean city.

Going underground, the probe begins transmitting pictures of it's surroundings and switches to manual control for you to maneuver it around the mazes of corridors which have revealed themselves.

Caution is the only approach in an unknown surrounding and if you do not observe this, you will lose probes like ice cubes on a hot day. As you near certain areas of floor, they open and gun turrets appear and open fire. Others open and eject mobile death machines which roam around the maze and latch onto your trail. Following you they will launch projectiles at your probe and can seriously damage it's circuits.

However, the design of these mobile robots has one major flaw in it; they are easily re-programmed using a standard code. Utilising this flaw, your probe can issue instructions to the robots which causes a change of heart and they rebel against their creator and protect you. Once re-programming is complete, they will still follow but they will get in your way and act as a shield. However, squabbles still break out if you decide to have more than one born-again robot following in your footsteps. Newcomers will run into the back of those already established and cause them to explode.

There are various levels to navigate and each one contains a different breed of robots. Some seem to be armour plated and require more hits to destroy, others seem to be able to shrug off the new programming and turn against you once more. And the dangerous bit is that you can't tell when they have lost their friendship.

Your energy level depletes as you come into contact with the enemy of their fire, but there are bunkers which contain energy and fuel littered around the mazes. Also on your travels you will find weapon pods which modify your defences. Lift shafts take you from level to level and transporters zap you from city to city.

Ultra-smooth scrolling, great sound effects and decent graphics make Citadel one of the most playable games in quite some time. It's damned addictive and the best part is that it's not just a shoot-em-up and requires a few ounces of sense and some strategic thinking to get you through.

To Activision all I have to say is "please produce some more decent games like this".

Andrew Banner

---

**INFO**

Gameplay: 82%
Graphics: 76%
Sonicity: 83%
Lastability: 84%
Overall: 84%

---

*Citadel is from Electric Dreams who produced such marvels as Super Sprint and The Incredible Shrinking Sphere. Marketed by Activision who have a recent track record of poor quality games, Citadel comes as a pleasant change.*
GAMES UPDATE

SWORD OF ARAGON

SSI (US Gold) - £29.99
Roleplaying, politics and war are all part of this fantasy epic.

The Duke of Aladda has died leaving you, his son, to your destiny. A destiny that demands for you to lead your people against the orc and goblin hordes and into battle with your enemies to the East. Only when you are liberator and leader of all Aragon will you fulfill your father's will.

Your first decision may be your most difficult as you must choose a character class to be throughout the game. You can be a great Warrior, Knight, Ranger, Priest or Mage – the last three making up their lack of fighting strength with magic.

Your choice of class also effects the type of armies you will raise as, for example, a Warrior can build infantry for half the cost of others.

Money plays an important part of the game as you must manage your city's affairs by setting tax rates and choosing between raising an army or developing trade and industry. Both have their priorities since you need an army to defend your city and expand, but you need resources to develop, train and pay for it. You also have to remember that the townsfolk may not like paying taxes at 80% and may strike, leave or rebel, scuppering your chances of success.

As Duke you must prove yourself as a leader and a statesman by dealing with envoys from other towns and resolving local disputes that can have an effect on your people's health, morale and loyalty. These in turn effect your revenue and the upkeep or expansion of your army.

Each turn represents a month of time in which you must manage your resources, defend your territory and expand to liberate the land. Which will inevitably lead to battles. When a battle erupts you must organise your forces for the fray. Obviously, your tactics will vary depending on the opposition you face and the units you have at your disposal. Personally, I favour bowmen that can weaken an opponent before it reaches you. Where they can be crushed by cavalry charges or by infantry armed with swords, javelins or spears.

Priests, Mages and Rangers should be kept safe behind the line where they can use their magic to greater effect. (Although you represent one class you can hire members of the others to supplement your armies). Unlike other SSI games where magic users cast lightning bolts and hurl fireballs the magic in this game is more subtle. These spells effect the movement and fighting ability of friend and foe by changing the terrain or slowing an advance. Stamina can be restored or drained and armies can be healed, confused, terrified or teleported.

As the battle continues in turns (up to a maximum of 23) victory points are awarded for losses inflicted and territory gained, which finally decide the outcome of the battle. A loss will cause a drop in morale and loyalty but a great win will bring plundered gold, new recruits for your army and experience for your troops. After a few battle these points will amass to form increases in levels which will bring more spells to your magic users and better fighting skills to your units. For example, level 4 mounted bowmen cause more damage with every attack than level 1, 2 or 3.

The result is a fascinating game in which you gradually explore the resources and forces that you have and learn how to use them to expand your empire. The incredibly high Lustibility factor is well earned as it's the style of game that you actually enjoy the more you play. Starting with a lost period when you're not quite sure what you're doing you gain military and character experience which sends you back for more and more. I'm afraid I'm not going to get much sleep until Aragon is free and I've earned the 600 points needed to complete the game.

Tony Hetherington

SSI is the company that took the headlines with the Dungeons and Dragons licences. Games like this show why it got the contract.
Gameplay: 85%
Graphics: 56%
Sonic: N/A
Lastability: 95%
Overall: 91%

Above: A son of a merchant has returned to Sur Nova alone. He says that his father refused to pay tribute to pass through the plains, and was killed! The remainder of the caravan was looted and destroyed by horsemen!

EVENT: Paritan

Above: An effigy of Raag, neck in a noose, was found hanging in the public square.

REPORT: Aladda
Importing 105 GP agric prod.

Above: I've got a great idea guys. Let's all head for that big square!

Below: More text? I like it Mikey!

Above: The sequel's called 'The Flick-Knife of John'.

Below: I bet Danny La Rue would choose the camp option.
Explore the temples and avoid the traps, but will there be a chocolate orange for you at the end?

Firebird - £9.99 Tape, £14.99 Disk

INFO

Gameplay: 65%
Graphics: 60%
Sonics: 50%
Lastability: 45%
Overall: 55%

They say that there is no such thing as a new joke; everything is a derivative of something else. To some extent, the same applies to computer games. Firebird's latest game, Rick Dangerous shows distinct signs of a common ancestry with assorted platform games of many years ago.

Our eponymous hero, part time explorer, part time stamp collector and whole time good guy has been on the trail of a long lost South American tribe for many a long year. By a strange coincidence, when his plane runs out of fuel over the jungle, he just happens to land at the entrance to the very Aztec temple he was searching for.

Getting in proved to be easy. Getting out at the other end was decidedly more problematical. No sooner had the door slammed behind him than a huge stone ball starts to chase him down the passage. With no time to change your name from Rick Dangerous to Rick Moss (because as we all know, a rolling stone gathers no moss!) (Ha ha, very droll. Get on with it - Dangerous Rik!) your only option is to throw yourself off the cliff at the end of the tunnel. Surprise surprise, gravity works in South America too and the ball follows you...

Having eventually dodged out of the way of the overgrown concrete marble, all you have to do now is similarly avoid a series of angry natives, a few snakes and bats, lots of poisonous spiked pits and a whole load of spears shooting out the walls, before you finally reach the other end. Then you can try your hand at three other scenarios including a mighty fortress and an Egyptian tomb.

In order to defend yourself, you can poke things with your stick. Timing is all important here and I found the technique useful only against bats. Natives are best dispatched with a swift bullet but you only carry a few of these and the noise they make is all too likely to set off a trap. You will also need dynamite to blast your way past rock falls and the like.

The trouble with this game is the lack of variety. Problems are usually only solved by trial and error - you frequently have to throw yourself into the unknown. Once you have solved that part of the game though, it is unlikely to cause you further stress and soon becomes repetitive. Fun and simple to play, I would suggest that it is overpriced somewhat. It would make a very good budget game.

Gordon Hamlett
NEW ZEALAND STORY

Your chance to become a fully paid up member of the Antipodean rescue service.

Ocean - £9.99 Tape

On the face of it, kiwis are something of a failure. New Zealand's most famous bird, they are totally incapable of flight, not very good at swimming and pretty ugly to boot. They do have one redeeming quality though, they are extremely loyal. So when 20 of Tiki Kiwi's friends are captured by a psychotic walrus, he doesn't hesitate. Armed only with his bow and arrow, he sets off to rescue his friends before they experience a walrus's digestive system from the inside.

The game is a variation on the old ladder and platform theme, but is none the worse for that, having been skillfully converted from the arcade original.

You must reach all of your friends within a certain time allowance. A rader shows your relative locations and, on the early screens, there are a few helpful arrows to point you in the right direction. Although you only have your bow and arrow to defend yourself with, shooting some of the enemy will force them to drop other, more potent weapons - bombs, bouncing missiles and potions of temporary invulnerability being examples. Collecting fruit scores bonus points and if you manage to pick up all the letters of the word 'extend', you are granted an extra life.

Malicious bunnies, boomerang throwers, evil frogs and vampire bats will all impede your progress and there are also some very large guardian creatures that have to be defeated, not always by orthodox means - the only way to escape from the whale is to allow yourself to be swallowed first. You are then caught up literally in a shoot out!

As well as travelling on land, you will also need to take to the air. As already mentioned though, your wings are not equipped for this purpose so you will need to hijack a balloon to help you. You will also need to watch your oxygen levels when swimming underwater. Drowning is not good for your health!

New Zealand Story is very well presented and is one of those rare games that although simple to play and easy to get into, is highly addictive. Above all, it is good fun which, when it comes down to it, is what a good game is all about.

Gordon Hamlett

INFO

Gameplay: 95%
Graphics: 75%
Sonics: 65%
Lastability: 85%
Overall: 80%

Above: If you need a new beak, buy one from us. Two months later we'll send you the bill!

Below: Hmm! Fried Kiwi, my favourite.
The Soccer Squad

Now that the new football season is well under way, the software charts are dominated by football games. Gremlin has fielded a team of four experienced players as its challenge for the top.

Gremlin Graphics - £9.99 Tape

Four games for the price of one is always worth a look as it often offers great value for money. This one bundles together Gremlins football games starring two of the top names in football, Gary Lineker and Roy of the Rovers. However, before you think that all football games are the same, check out these as each one offers an unique challenge.

Gary Lineker's Superstar Soccer is the traditional style of football game with a scrolling side on view of the pitch and joystick controlled players. In the game you can take control of the centre forward, goalkeeper and manager - as which you can pick your team from a squad of players and decide team tactics by telling forwards to shoot or pass, and defend to either stay back or support the forwards. Perhaps, the best part of the game is that the forwards don't just shoot at goal willy nilly they can also attempt spectacular goal attempts with headers and overhead kicks if the ball's at the right height.

Gary Lineker's Superstars is a selection of training exercises, that includes gym training (such as pushups and squat thrusts), field work (including dribbling, chipping and shooting) and ball control - where you must keep the ball off the ground by bouncing it off various parts of your anatomy.

Roy of the Rovers is a curious mix of football action and arcade adventure, as some unscrupulous gang has kidnapped the Melchester Rovers team just before a big exhibition game that could save the club from the developer's bulldozers. In a race against time you must avoid enemy supporters, hooligans, traps and ambushes and find the other four players, otherwise you will have to face the opposition alone.

The fourth game is the intriguing Footballer of the Year which plays like a board game and casts you as a 17 year old just entering football. Through taking the limited scoring chances that fall your way in action sequences you will earn money and be spotted by scouts from other teams, gradually taking you from fourth division obscurity to first division and international football, and perhaps the ultimate accolade as the Footballer of the Year.

Although together they represent a good footballing package they are, at best, 2nd division games as they lack the quality and depth of the top of the genre.

Tony Hetherington

Gremlin Graphics has now moved out of the US Gold stable and back to Sheffield and independence.

INFO

Gameplay: 50%
Graphics: 38%
Sonics: 35%
Lastability: 42%
Overall: 41%
SDC, 60 Boston Road, London W7 3TR
Other branches at: 309 Goldhawk Road, London W12 8EZ
18 Market Square, Leighton Buzzard, Beds.
* Unit 33-34 Rumford Shopping Hall, Market Place, Romford, Essex
* 675 Holloway Road, Archway, London N19
OPEN TO THE PUBLIC 10 am - 8 pm 6 DAYS

BUY BY PHONE
RING 01-741 1222
01-995 3652
0525 371884

PRICE PROMISE
If you wish to purchase any product from our list and find that you can
buy the same product cheaper from another mail order company
simply enclose the lower amount, stating the name of the other
company and where you saw the adver. it must be a current issue.
Price Promise does not apply to other companies "Special Offers".

CHART TOPPERS

<table>
<thead>
<tr>
<th>OUR PRICE</th>
<th>SAVING</th>
<th>OUR PRICE</th>
<th>SAVING</th>
<th>OUR PRICE</th>
<th>SAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-Man</td>
<td>99.99</td>
<td>A-Man (w/ROMs)</td>
<td>109.99</td>
<td>45.00</td>
<td></td>
</tr>
<tr>
<td>APB</td>
<td>12.99</td>
<td>Action Figure</td>
<td>15.99</td>
<td>7.99</td>
<td></td>
</tr>
<tr>
<td>Aristorch</td>
<td>15.99</td>
<td>Aristorch</td>
<td>15.99</td>
<td>7.99</td>
<td></td>
</tr>
<tr>
<td>Varattered</td>
<td>15.99</td>
<td>Dazzle</td>
<td>15.99</td>
<td>7.99</td>
<td></td>
</tr>
<tr>
<td>Beach Volley</td>
<td>14.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Castle Warrior</td>
<td>15.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Charrrl of Armth</td>
<td>15.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chessmaster 2000</td>
<td>15.99</td>
<td>9.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dominator</td>
<td>14.99</td>
<td>5.02</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dynamrry Duo</td>
<td>17.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F1 6 Combat Pilot</td>
<td>15.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falcon</td>
<td>21.99</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Falcon Missile Disk</td>
<td>12.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Prix Circuit</td>
<td>17.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Honda RV '81</td>
<td>15.99</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiana Jones &amp; The Last Crusade</td>
<td>14.99</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Journey</td>
<td>21.99</td>
<td>8.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kingdom of England</td>
<td>19.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last Ninja II</td>
<td>17.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leisure Suit Larry 2</td>
<td>21.99</td>
<td>6.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>License to Kill</td>
<td>12.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monopoly Deluxe</td>
<td>12.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mr. Hef</td>
<td>15.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Popular Promised</td>
<td>7.99</td>
<td>2.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Powerhouse</td>
<td>17.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Predator</td>
<td>17.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow Island</td>
<td>16.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rainbow Warrior</td>
<td>16.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Real Dangerous</td>
<td>21.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ride On</td>
<td>14.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shoot-em-up Con Kit</td>
<td>21.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skewd</td>
<td>14.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sleeping Gods Inc</td>
<td>14.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soccer</td>
<td>14.99</td>
<td>10.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Space Quest II</td>
<td>17.99</td>
<td>7.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spherical</td>
<td>14.99</td>
<td>5.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Star Wars Trilogy</td>
<td>15.99</td>
<td>9.00</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BEST OF THE BEST

<table>
<thead>
<tr>
<th>OUR PRICE</th>
<th>SAVING</th>
<th>OUR PRICE</th>
<th>SAVING</th>
<th>OUR PRICE</th>
<th>SAVING</th>
</tr>
</thead>
<tbody>
<tr>
<td>Battle Chess</td>
<td>17.99</td>
<td>BattleTech</td>
<td>14.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bloodwyck</td>
<td>15.00</td>
<td>Carrier Command</td>
<td>14.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chomp (The)</td>
<td>13.99</td>
<td>Dark Side</td>
<td>15.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dragon Ninja</td>
<td>14.99</td>
<td>Escape from Drill</td>
<td>12.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Garfield Winters Tale</td>
<td>15.99</td>
<td>Gimmie-Wing</td>
<td>15.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gunship</td>
<td>15.99</td>
<td>Kay Off</td>
<td>11.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kari</td>
<td>15.99</td>
<td>Microprose Soccer</td>
<td>15.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Millennium 2.2</td>
<td>15.99</td>
<td>Millennium 3</td>
<td>15.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Navy Movies</td>
<td>17.99</td>
<td>New Zealand Story</td>
<td>14.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Outrun</td>
<td>6.99</td>
<td>Populous</td>
<td>17.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Populous</td>
<td>14.99</td>
<td>Populous</td>
<td>14.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Xybots</td>
<td>12.99</td>
<td>Xybots</td>
<td>12.99</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

STORY SO FAR 1
ONLY £15.99
Beyond Ice Palace + Black Warriors + Buggy Boy + Battlewings

PRICEOUS METAL
ONLY £13.99
Captain Blood + Arkadium II + X-Men + Crazy Cars

STORY SO FAR 3
ONLY £15.99
Thunderbirds + Bomb Jack + Space Harrier + Live & Let Die

SUNSET SOUR
ONLY £18.99
Baker's Dozen + Blue Thunder + Space Harrier + Live & Let Die

COMPUTE HITS TWO
ONLY £9.99
Tenno + Golden Path 2 + Black Shadow + Joe Blade

PRICEOUS METAL
ONLY £13.99
Captain Blood + Arkadium II + X-Men + Crazy Cars

SUNSET SOUR
ONLY £18.99
Baker's Dozen + Blue Thunder + Space Harrier + Live & Let Die

COMPUTE HITS TWO
ONLY £9.99
Tenno + Golden Path 2 + Black Shadow + Joe Blade

S.D.C. ORDER FORM

Please send me the following titles. BLOCK captitals please!

Type of computer
Title: Amount

YOUR COMMODORE, NOVEMBER

Name
Address
Postcode

Total Enclosed £

Please make cheques or postal orders payable to SDC

TRIAD
ONLY £9.99
Starship + Battlestar (Prychs) + Defender of the Crown

S.D.C. ORDER FORM

Please send me the following titles. BLOCK captitals please!

Type of computer
Title: Amount

YOUR COMMODORE, NOVEMBER

Name
Address
Postcode

Total Enclosed £

Please make cheques or postal orders payable to SDC

TRIAD
ONLY £9.99
Starship + Battlestar (Prychs) + Defender of the Crown
Enter the heroes, two butch commando type characters who waddle forth to victory as though suffering from the after effects of a grade A vindaloo.

Despite the ridiculous waddle our heroes are mean, if a little limited. As they move through the maze complex of the Xybots their progress is shown on a small, colourless section of the screen. This fault typifies two player games of this nature. Although it enhances a game no end to let two players to play simultaneously, the loss of playing area often spoils the gameplay. And when nearly half the screen is taken up with stats and a map, things become a little ridiculous. The only advantage in this game when playing with two players is the ability to shoot each other in the back and the combined firepower.

The Xybots are a mechanical race and not confined to the usual limitation of the humble organic body. This means they can move a lot faster, carry more armour and pack twice as much punch into their shots. Despite this advantage and your rapidly dwindling 'power supply you still manage to slaughter the suckers. This could possibly be due to the artifacts picked up here and there on your travels. Coins can be collected for later purchase of mappers and extra firepower. Energy capsules to keep the body functioning and a host of gadgets to boost your characters abilities.

On level one a little ingenuity is rewarded with the discovery of a teleport pad that takes you directly to level eight. Not only does this allow you to skip the interceding levels but a cache of coins ensures that your character can purchase enough hardware to handle the challenge. If you decide to take the longer route you will be rewarded by a display of hostile mechanics never before seen on your 64. Small robots fire through the maze moving collectible items, large cannon toting robots guard the passage ways and the infuriating droids with the flaps, a killing blow can only be landed on these when their doors are open. The lack of colour makes the returning fire a little awkward to spot so just count the number of blasts currently in circulation and if the number is greater than your feeble firing capacity remember to dodge.

Remember not to panic when a little sign pops up and points to some danger off to one of your sides, as to turn you need to press the fire button and move the stick; the other way around and you blast the wall.

This is not so much a bad conversion but a bad game which, without the advantages heaped upon it by a dedicated arcade machine, fails to produce goods.

Adrian Pumphrey

Xybots is one in a range of Tengen conversions by Domark, who currently holds the licence to convert all Tengen releases to home micro format for the next three years.
The third game from Atari subsidiary Tengen puts you behind the wheel of a police car.

APB, or All Points Bulletin, casts you as rookie officer Bob who must patrol busy streets searching for criminals to apprehend. However, these crooks are far from dangerous, consisting mostly of litter bugs, drunks and hitch-hikers. You must arrest enough of these to meet your daily quota.

Your job is made easier by the fact that these crooks drive around in colour coded cars so it's simple enough to drive up behind them, sound your siren to pull them over and bag yourself a bonus. To help you, you can also pull into a gas station for more petrol, grab a doughnut to give you more time and visit a speed shop to soup up your patrol car by adding armour, extra speed, acceleration, and even a gun to shoot more serious crooks.

By day three of your eight day career you will be called to track down a more serious criminal going under a subtle pseudonym, such as Freddy Freak and Sid Sniper. He isn't as easy to track down as the litterbugs and has to be rammed off the road before coming quietly. Once caught he must be interrogated by waggling the joystick left and right in order to get him to sign a confession before your chief arrives.

APB promises cartoon style humour and graphics, but delivers a Spy hunter style driving screen and tiny briefing and report screens that barely fill a fraction of the screen. This is the third Tengen game where collecting credits, in this case money bags, can be cashed in at a shop for improvements to your tank, robot or police car. Let's hope that future releases aren't just the same game system in a different setting.

All things considered it just doesn't add up.

Tony Hetherington
If we were to believe everything that we read in our national dailies, not only would we have brains the size of amoebas, but we would be led to think that Michael Jackson has committed every strange act known to man, short of living on the moon.

Luckily most people have the sense to shun such comments and try to understand the man as a human being. He was born in 1960 in Gary, Indiana, where he, and four of his brothers, formed a band which was to take the world by storm.

The Jackson 5 were first brought to attention in 1968 when they auditioned for Motown Records. And it was their appearance on the Ed Sullivan Show in 1969 that brought them firmly into the public eye. Michael was the lead Michael Jackson, pop phenomenon or over-publicised eccentric? Rik Henderson explores the man, his music, his movie and previews the forthcoming game from US Gold.
singer, and was but 9 years of age when they experienced their first number one hit.

When Michael was 12 he recorded 'Ben', which was the first solo hit of many, and it was in 1978 that he split from his family group to explore the world of music, and superstardom, on his own. This was after appearing in the pop remake of The Wizard of Oz, entitled The Wiz.

Although he was already at this point a star in the genre, the album Thriller placed him in the record books. He received 58 platinum records in 28 countries.
FEATURE

and in America he was awarded no less than 8 grammys. To date Thriller has sold over 40 million copies worldwide, and is still selling.

How does one follow that? Easy, one makes ones first feature length movie based on ones own records.

Moonwalker is Michael's first feature length film (having previously only done shorts, such as Thriller) and is titled after his best-selling autobiography — which is named after the dance that he has perfected so well. It deals with all the subjects that Michael has shown as being dear to his heart — youth, friendship, drug abuse, bad journalism, and villainy — and in true fairy-tale fashion, he takes many obstacles and shows how to overcome them (yep kids, this is all believable stuff. If you are confronted by a drug baron and his troops, just transform into a large robot and blow the heck out of them).

The plot follows Michael and three friends (one of which is Sean Lennon) through various sub-plots, all of which are interlink by Mr. Big — an evil drug baron with an evil haircut. First prob that Mike faces is the journalists at a Hollywood studio, they are hungry for blood and wish to grab some Jackson negative (any resemblance between these journos and the cut-throats found at Argus is purely intentional).

He manages to elude them by wearing a rabbit mask, and in some smooth puppetry, he speeds away on a motorcycle until he finally escapes their ruthless pencils. This is not the only transformation that he undertakes in Moonwalker.

Like I said earlier, he also transforms himself into a very large Transformer-like robot, and even more unbelievably, a mammoth space ship, as he finishes the battle with a few deft swivels of his thrusters. Moonwalker is definitely intended for kids, and has many charms which makes it ideal for such an audience.

It also makes it ideal for a computer game. Which is just as well as US Gold has secured the licence and will pixelise Michael Jackson's exploits in time for November, and thus Christmas.

The game follows the plot of the film very closely and is split into 4 levels. The action is played in a maze-like game with a top-down view, although in-between each level there is a moderately large action sequence. It follows all the transformations, climaxing in a VERY large action sequence featuring the Spaceship Jackson.

The music throughout the movie is also going to be converted onto the home computer, with relevant song appearing in relevant sections, and the whole game is going to be very movie-esque. US Gold is very excited about this project and, with the help of the Keypunch Corporation of Minneapolis, Moonwalker is likely to be a success Worldwide (much like Michael himself).

If US Gold only sell 1% the amount of copies as the record Bad did, everybody up in Birmingham will be happy likkle bunnies.

Twenty Four

YOUR COMMODORE
Welcome to PC Corner, the part of the magazine for all Commodore DOS users, whether fledglings or old hand. This month it's a mixed bag of mainly software reviews, plus an intro to batch files. First though, I'm going to kick off with a couple of news items.

Lotus Corp (see Magellan review) has been busy lately. Not only has it got both 123 releases 2.2 and 3.0 onto the streets, but has upgraded the help available through its dealer network. The new system uses a CD-ROM disk called unimaginatively, CD/PROMPT. With over 10,000 pages of information on the disk, that time honoured excuse of 'Oh it's not in the manual, we'll have to check with head office' no longer holds any water.

With the Intel 80486 chip now becoming available as upgrades for systems such as the IBM PS2, and AST Premium 386 machines, speculation over processor upgrades for other machines is rife. It seems however that commodore who only has 20Mhz '386 is not yet to be tempted, or was it caught out? Certainly the much rumoured 386SX machine is on the stocks, but what else?

Batch File Fun
It is often thought that MSDos computers do not have a programming language built in. In fact they do, the so-called Batch language, which really is just an extension of MSDos.

Batch programs are just like those you may have written in Basic, but there are differences. The commands available are somewhat limited, and each program is really a text file. However, some useful things can be done. For example with Autoexec.bat. This is the Batch program that controls the computer at start up, so it's very important. Much can be done with
Autoexec.bat, and I may cover the options in future columns, but for now here is a simple mod for you single drive users. The following text should be prepared with whatever editor you use, and saved as a text-only file.

```
echo off
path=a: ;c:
prompt SpSg
copy command.com c:
```

You should also prepare another text file with the following command:

```
Files = 20
Buffers = 20
device = Ramdrive.sys
Set comspec = c; command. com
```

Next, make a working copy of your boot disk and copy both text files to it. Also copy the file Ramdrive.sys to the disk. Rename the first file Autoexec.bat, and the second Config.sys. Reboot, and everything should go as normal, except for a message similar to this:

```
Microsoft Ramdrive Version 2.01 virtual disk c:
Disk size 64k
Sector size 512 bytes
Allocation unit 1 sectors
Directory entries 64
```

What you have done is created a RAM disk which becomes drive c:, and copied Command.com to it. You may well be wondering what this will do for you. The answer is that you should no longer see messages like this: Invalid Command.com Insert Command.com disk in default drive and strike any key when ready.

Command.com will always be available to the system, and irritating disk swaps kept to a minimum. Hard disk owners can still use this trick incidentally, as it does speed things up somewhat. The one drawback of course being that memory is lost to the system. Note, this is only meant as an example and some programs will not work under this configuration of DOS.

**Typografica**

Just about everybody these days has heard of DTP, however fewer people actually put the theory into practice. Reasons for this are complex. An important factor has been the gap between low-priced low-performance systems, and the more exclusive Postscript based kit. Some might regard this state of affairs as a bonus, preventing the perpetration of typographic disasters on the world.

One way of narrowing the gap is to provide the low end user with some of the excellent fonts hitherto only available to Postscript users. This GST have done, with their Typografica range of outline fonts. The normal way of acquiring these is by purchasing one of the two collections. Prime, consists of Sans, Serif, and Courier which is the equivalent of Helvetica, Times and Courier on Postscript printers. Standard, has all the rest, and is much more interesting, with such things as Zapf Dingbats and Sans Narrow. Together they make up the equivalent of the 13 fonts available as standard on Postscript printers. The two collections come complete with a three ring binder, manual, disks and poster showing the fonts available. Individual fonts are also available.

If you want to make use of the fonts, you have to install them first. This is a clumsy process at best, and irritating at worst. Everything has to be specified from menus and sub-menus, you can't just whizz around the screen selecting items at will. Also, as the program generates bit-mapped fonts, the time taken can be excessive. For example, I specified an extensive range of point sizes from 6 to 72 in a single style of one outline font. Typografica suggested 18 minutes 31 seconds to generate the fonts, which then occupied 3Mbyte on my hard drive. Of this, the 72 point style occupied no less than 1.5Mbyte. Simple mathematics then gave me a figure of 72Mbytes for the six fonts supplied as part of the standard collection. The moral has to be, use the minimum
number of fonts necessary to do the job, unless you have a massive hard disk. Unfortunately you are then severely hampered in your choice of fonts, effectively back to square one. And what happens if you wish to use the fonts with two or three different applications?

On the plus side, a large number of applications and output devices are supported including typesetting machines. These however can only be used if you specify the postscript names for the fonts when generating them.

My overall verdict: a cost-effective way of widening the scope of your DTP work, but really needs a large hard disk to get the most out of it.

**Lotus Magellan**

Magellan has been hailed as one of a new breed of DOS shells. What's a DOS shell you ask? Strictly speaking, they are a way of controlling DOS without using the system prompt. That includes everything from simple batch programs to MS Windows. A stricter definition however, would add the fact that some part should remain in memory while your programs are running. This allows the main section to be reloaded when your program terminates. By that definition, Magellan is the Rolls Royce of DOS shells. It has elements of artificial intelligence with its 'fuzzy' search routine and 'Hypertext' facilities that allow you to treat all the files on disk as one enormous database.

Magellan builds an Index of files stored on your hard disk, knows from a list of templates what is in those files displaying the contents accordingly. Dbase and Lotus 123 files are just two types it knows about.

You can search for data in files in several ways using the Explore option. Magellan's file viewers allows it to display the contents of the files in a form near that of the creating applications. Thus Lotus 123 files are displayed in row and column format, Dbase files as tables, and so on. Launch (F7) is another powerful command, because it not only allows you to start up programs from within Magellan, but also gives extensive control over the process. It does this by making use of the powerful Macro facility built into Magellan. Of course it's not perfect, but it could save you a lot of key strokes over the year.

All the other facilities, such as copying, deleting, renaming and printing files are also present, and as you would expect from such a polished product are well implemented.

Documentation is probably the most sumptuous I have ever seen. There is a ring bound manual, plus two small booklets, and all reek of class. However I found the content pedestrian, if thorough. Full marks though for Index and Glossary, essential for this kind of product.

Magellan is a well finished program, but what will be its uses? Clearly Lotus intends the product to fit in with its current base of corporate 123 users, but who else? Certainly anyone who needs to organise their hard disk, or where a number of people need to access data on one machine. But, the kind of disorganised people who do need Magellan are, by definition, the least likely to purchase it.
PC ENGINE SERVICES
Southbank House, Black Prince Road, London SE1 7SJ.
Tel: 01 587 1500 Fax: 01 735 5998

PC Engine PAL (incl. 2 games) 185.00
PC Engine Scart (incl. 2 games) 159.00
CD-ROM Unit (incl. Fighting Str.) 325.00
Sega 16 Bit PAL (incl. 1 game) 225.00
Sega 16 Bit Scart (incl. 1 game) 185.00
Nintendo Gameboy 78.90

PC Engine Software
Drunken Master 15.90
Wonderboy 15.90
Tales of the Monarch's 15.90
Chen & Chan 15.90
Galaga 88 17.90
Dragon Spirit 19.90
Space Harrier 19.90
MotorStorm 19.90
Fantasy Zone 19.90
Vigilante 22.50
R-Type I 22.50
Victory Run 22.50
Pacland 24.50
World Court Tennis 26.90
Legendary Axe 28.90
R-Type II 28.90
Allen Crush 27.90
Son Son II 27.90
Wataru 27.90
Tiger Hei 23.90
Dungeon Explorer 23.90
Final Lap Twin 23.90
Altered Beast 23.90
Digital Champ 23.90
P-47 23.90
Bloody Wolf 29.90

Crydne 29.90
F-1 Dream 29.90
Rock On 29.90
Break In 29.90
Ninja Warriors 29.90
Side Arms 29.90
Gunhead 29.90
Naxat Open 29.90
Yaksa 29.90
Winning Shot 29.90
Cybercroc 29.90
Power Golf 29.90
Fire-Pro Wrestling 29.90
Monster Lair (CD-ROM) 29.90
Varia II 32.90
Altered Beast (CD-ROM) 32.90
Side Arms (CD-ROM) 32.90
Super Darius (CD-ROM) 32.90
Super Albatross (CD-ROM) 32.90

Also coming before Christmas:
Mr. Heli 29.90
Shinobi 29.90
Batman 29.90
Armed F. 29.90
Splatterhouse 29.90
PowerDrift 29.90
Tiger Road 29.90
Atomic Robo Kidd 29.90
Sega 16 Bit software:
Alex Kidd 24.50
Mr. Okumatsu 24.90

I.C.P.U.G.
the Independent
Commodore Products Users Group
is the largest and most friendly
computer club in the country
Back issues of 1988 available to non-members as well as
members, at £2.00 each, postage paid.

- Many local groups with regular meetings
- News magazine included in membership - 100
  plus pages of reviews, news and information
every two months
- We support all Commodore Machines old and
  new; PET, VIC20, 64, 16, +4, PC, 128 and all
  AMIGAS.
- Free Software Library of public domain
  programs for all the above machines available
to members on supply of blank disk or tape and
  payment of P&P. New members, do not send for
  this until membership number is received.
- Help and Advice
- Discount scheme
- Subscription only £13 per year (UK) plus £1
  joining fee (overseas rates on application)

If you are seriously interested in using or programming
any Commodore computer, then joining I.C.P.U.G. is a must!
For full details, send a stamped, addressed envelope to:

Delta Pi Software Ltd
8 Ruswarp Lane, WHITBY, N. Yorks. YO2 1ND.
Tel: 0947 000065 (9am-7pm)

ICPUG Membership Secretary, Jack C. Cohen,
30, Brancaster Road, Newbury Park,
Ifford, Essex, IG2 7EP
THE ULTIMATE UTILITY CARTRIDGE COMES OF AGE!

NOW

ACTION REPLAY Mk VI

FOR CBM64/128

THE ACTION REPLAY MK VI WILL LOAD A 200 BLOCK PROGRAM IN UNDER 6 SECONDS

ONLY £34.99 POST FREE

THE MOST POWERFUL, FRIENDLY AND FEATURE PACKED UTILITY CARTRIDGE EVER CONCEIVED!

TURBO LOADER


INFINITE LIVES GENERATOR

Automatic infinite lives!! Very easy to use, works with many programs. No user knowledge required.

FULL DISK FREEZE MONITOR - examine ALL memory, including stack, 1/O area and registers in their frozen state. Ideal for debugging or just for fun!

SPRITE CONTROL

Freeze the action and view the sprites - watch the animation - customize your games - kill sprite collisions.

FREEZE FACILITY

Now you can make your old slow loading programs load faster. Simply freeze the action and save to tape or disk to reload at superfast speed. No more waiting for programs to load.

DISK COPY

Easy to use disk file copier. Much faster than conventional methods. Ideal for backing up data disks.

TAPE TURBO

This feature will add Turbo Reload to the programs that you save to tape - no user knowledge required.

FAST FORMAT

Format an entire disk in about 10 seconds - no more messing about.

PRINTER DUMP

Print out your frozen screen to printer - MPS 801, 803, Epson, Star, etc. - very versatile.

CENTRONICS INTERFACE

For parallel printers, Star, Epson, etc. - Print out listings with graphic characters etc. (Cable required for parallel port) £12.99.

SCREEN EDITOR

Now you can edit the entire frozen screen with this text editor - change names on high scores, etc. Great fun!

EXTENDED TOOLKIT

Many single stroke commands for Load, Save, Dir, etc. Plus range of extra commands, i.e. Auto Number, Old, Delete, Merge, Append, Linesave, etc.

THE VIEWERS CASE

"I'm stunned, amazed and totally impressed. This is easily the best tool for money. Cartridge: 'The Cartridge King'" - Commodore Disk User

HOW TO ORDER

UK ORDERS POST FREE

OVERSEAS ADD £3

UK ORDERS POST FREE

OVERSEAS ADD £3

DATEL ELECTRONICS LTD

FENTON INDUSTRIAL ESTATE

GOVAN ROAD, FENTON

STOKE-ON-TRENT, ENGLAND

TECHNICAL PHONE LINE

0782 744 524

GRAPHICS, SUPPORT UTILITIES DISK

ONLINE HELP. View your favourite screens in a sliding box type display.

BLUR PRINT, DESK TOP. A unique utility allows you to take any part of a picture & so 'eke it up to full screen.

MESSAGE MAKER. A complete sprite editor helps you to create or edit sprites.

ONLY £8.99
Rik Henderson, the man in the dayglo tights, deals a severe dose of comic capers!

"comic". adj. (also). Of or like comedy (actor, opera); designed to amuse; facetious, burlesque, funny, (song, paper, history of Rome, incident). 2.n.(colloq.). Comedian; paper (horror, pictorial publication full of horrors).

Allen, mirth-provoking, queer, odd; al'ity n.[L f. Gk (Komos revel)]

- The Pocket Oxford Dictionary, Fifth Edition

Although everybody must have a vague idea of what a comic is, I feel the dictionary entry above contains a phrase which sums up its definition perfectly. "Pictorial publication full of horrors" may not say 'Beano' to you, but we're moving into the 1990s. And the comic industry is coming with us.

Long gone are the days when children flocked to the newsagents to see if Spiderman had vanquished Doctor Octopus (again) and if Superman had pulverised Lex Luthor (again). Now dark landscapes are the settings for brutal crimes and many superheroes keep their boxer shorts inside their trousers. Batman has acquired weaponry (and lost a partner). Dan Dare (the great, great, great, etc. grandson of the original that is) has died and been resurrected. And even Judge Dredd has turned from being a fascist psychotic killer into an old fascist psychotic killer.

This can be put down to one thing: Comics are no longer for children only. A fact that became apparent when Viz was launched in December 1979. The publishers now claim to sell around 800,000 copies every two months. The content is crude, barbaric, and at best can be described as toilet humour, which goes half way to explaining why I (and another 799,999 dedicated readers) love it so much.
Another recent comic which has conformed one famous character to a more adult status is 'The Dark Knight Returns'. Written by Frank Miller—who is, at this very moment, writing the script and screenplay for Robocop 2—it looks at the future of Batman, and plots a fitting end to the caped crusader's career. Many scenes from The Dark Knight were converted into cellular format via Tim Burton's Batman masterpiece, thus proving what a strong plot Frank had devised.

But these were just the first of the 'mature' readers comics. There was an enormous flood of them in 1987 and '88, and we can expect many more to come. One other of honourable note is 'Watchmen' by British comic author Alan Moore. It examines superheroes in a realistic society and comes to the conclusion that heroics is something frowned upon by a majority of 'real' people. Of course, like Dark Knight became Batman, Terry Gilliam has already signed on the dotted line to convert this piece of comic literature onto the cinema screens.

Both of these products came from American-based DC Comics. There are of course many British comics that hold their own in the UK market. One such comic is 2000AD. Founded in 1977, it sought to replace The Eagle as a space-age action paper for young and old, fortunately it did far more than that.

It has established itself as the top of its kind (although competition is very scarce) and its characters are now household names (in my household anyway!). As from its 650th issue, they should all become household names in America too, as it will be in the shops there at the same time as here.

Also under the 2000AD name is Crisis, a comic that seeks to educate whilst remaining enjoyable and not too heavy. Dealing with political and social values, it is incredibly well-drawn and it is a rare comic that will get me into a newsagent ready to receive a copy.
Another new magazine to come our way is Deadline, which is edited by two of 2000ADs greatest artists. It can be described as a more down-to-earth, pop-culture version of 2000AD, more than anything else, and it seems to be doing extremely well (having just held its first birthday party at the Limelight club in London's West End). It contains several strips, such as the now infamous 'Tank Girl' by Jamie Hewlett, and a few interviews and features on up-to-the-minute items. Deadline is monthly and it comes highly recommended.

Where DC are seeking to update their characters, Marvel haven't quite got the idea yet. That said, Marvel UK has recently released an amusing little monthly titled 'The Sleeve Brothers'. This is a sort of Blues Brothers in the future. It follows the exploits of two private eyes in a city full of debauchery, crime, sex and violence (although not necessarily in that order). It is very humourous and is well worth seeking out.

The software houses have also decided to capitalise on the rise in popularity of comics. Virgin Mastertronic has announced two games based on famous characters. Silver Surfer is based on the Marvel superhero of the same name (he's silver and he's got a wacking great surf board on which he can fly!), and their second licence is Viz. They say that the latter will not be toned down as this may ruin the feel of the game, but the cover will display a sign to the effect of 'mature gamers only'.

Ocean, of course, has Batman - the movie, but it also has the rights to Watchmen.

The Edge has The Punisher (a vigilante driven by his family's death at the hands of a crime organisation) and The X-Men (a superhero troupe containing many rough and ready characters). It has also announced a few more to come next year - Daredevil (a blind superhero who is anti-drugs, and just about anti everything else as well), and Wolverine (a character who has large, very sharp claws that he can extend from his knuckles).

Empire has Doctor Doom's Revenge, which is based around the Fantastic Four's oldest and most feared enemy.

Rumour also has it that there will be new games based on (wait for it): Captain America, Judge Dredd, The Swamp Thing, X-Factor, The New Mutants, and Rogue Trooper. We can be guaranteed though that this will not be the end, there is a whole universe of licenses just waiting to be grabbed.
YOUR PROGRAMMER

CONTENTS

34 Sprite Priorities
Automatic control for sprite positions, as they wander the screen.

37 VAT Number Checker
Is that invoice valid? Check the VAT number printed with our easy-to-use program.

39 Moving the Screen
Relocate the screen in memory.

41 Special FX
Fade your text in and out, and produce effects for your programs.

43 Strung Along
Making use of the three $ basic functions.

46 Extending Basic 8
The eighth part of our ongoing series, as it nears its impending end.

49 Proglock
Keep your privates private with this security program.

50 The User Port
Use the user port.

How to use the pull-out...
Remove from magazine and cut spine. Punch holes where indicated and insert in a ring binder for easy storage and long-term protection.
If you want to achieve a truly three-dimensional quality to your sprites here is an incredibly useful routine for your to use. It's very short, so there isn't endless lists of data to type in.

Examples of three-dimensional sprites which spring to mind are the various sport simulations, such as 'International Soccer.'

As you probably know, sprites have a definite priority arrangement in that the lower the sprite number the higher is its priority. This means that sprite 0 has the highest, through to sprite 7 which has the lowest.

Sprites with higher priority always display in front of those with a lower priority. This is fixed within the hardware of the VIC II chip, which means if you want to create a three-dimensional illusion, then a routine needs to be constructed which will manage the sprites by keeping 'foreground' sprites higher in priority.

To handle this, I decided that sprites lower down the screen would be considered as 'foreground' to those higher up the screen. I'm sure you know that the pixel map is arranged with the 'Y' coordinate running from 0 at the top of the screen, to 255 at the bottom. The Machine Language routine, SPRITE PRIORITIES, uses the 'Y' coordinate information to decide which sprite should be where; the sprite with the greater 'Y' value becoming sprite 0, and so on.

**Within the routines**

### 1. SPRITE PRIORITIES

This is the ML routine which deals with checking and updating all the sprite positions and their priorities. If a sprite moves up the screen (or backwards into the picture), and in doing so it passes above (or behind) another sprite, then sprite priorities will swap the two sprites around, together with all data relevant to each (ie: Image, Mem, Xpos, Ypos, Colours etc). This neatly holds together the illusion that a sprite's priority is changing - first passing in front of, then behind another sprite. This does, however, pose a tricky problem! Let's say that the joystick is being used to control one particular sprite element. Normally that control would be defined and controlled using one particular sprite - say, sprite 0. All that needs to be done is to peek and poke (or ML equivalent) with 'Y' coordinate information into sprite 0. However, should sprite 0 move up the screen and pass the next sprite, then CONTROL shifts to sprite 1, and if CONTROL carries on up the screen it might become sprite 2, 3, 4, 5, 6 or 7.

The array F() holds the current position of the BLOCK (not the sprite) on the screen, and DS() - which derives from 'Dummy sprite' - holds the current 'Y' location of where each sprite would be, should there be no SPRITE PRIORITIES manipulation.

The variable 'K' is used to shift joystick CONTROL over the block selected from the numerical key input. A loop checks through the F() array to find the current screen position in relationship to the sprite. For example, BLOCK 5 might be at the bottom of the screen, and so it would be sprite 0. Where 'N' is set to equal the actual sprite value - in the foregoing example, 0. When the joystick is moved up or down, program control will call either JOYSTICK UP (commencing at line 21) or JOYSTICK DOWN (line 32). Let's say 'up' is the selection. First DS(K) is decremented (K=Block being moved), and the screen images are simple coloured blocks. Their default values are:

- Block 1 = White
- Block 2 = Red
- Block 3 = Cyan
- Block 4 = Purple
- Block 5 = Green
- Block 6 = Blue
- Block 7 = Yellow
- Block 8 = Orange

You can use the numerical keys (1-8) to select any one of the eight blocks. That block will now be under CONTROL, and can be manipulated around the screen using the joystick plugged into port 2.

If you study the listing, you will see that in the INITIALISE routine (lines 68-78) variables 'N' and 'K' have been declared, and the two arrays F() and DS() dimensioned. At line 76 the arrays are filled - F() with 0 to 7 and DS() with the 'Y' coordinate value of each sprite, from 0 to 7.
parameters are checked (line 22). Then the updated value in DS(K) is
poked into the 'Y' register of the sprite holding the data for that
BLOCK: 'N' holds the sprite number.

Next, the CONTROL sprite's 'Y' coordinate is checked against the
next lesser prioritised sprite 'Y' coordinate. If CONTROL
is greater, then it maintains priority and so the program
skips lines 25-27 and returns to MAINLOOP – no more
need being to do. However, should the coordinate
value now be less, then line 25 calls the ML routine SPRIKE
PRIORITYs, where priority and all relevant sprite data is
toggled from one to the other. On return from the
ML routine, 'N' is now incremented to the next highest
sprite number. This is followed by an error trap, and
UPDATE F(flag) ARRAY (line 64), which will update F(N)
for the current sprite position. Moving down the
screen is the reverse of the above – check out lines 32-39. Left and right
have no effect upon priority, and so these are standard routines to Peek
and Poke 'X' coordinates.

A Stage Further

To take things a stage further and have multiple sprite movement on
the screen, the variable 'N' would need to become an eight element array.
Each image, block, or whatever, would be given a constant value from
0 to 7, and when the program updates 'Y' coordinates for each element,
N(Element Number) would be used. This could be followed by a line such as:

ON (ELEMENT NUMBER) GOSUB (PARAMETERS)

Here subroutines would handle differing images, or elements, and/
or situations.

I have not incorporated a collision
detect routine within the BASIC
demo as the main purpose is to show
how effective SPRIKE PRIORI-
ties is, and to offer a demonstration of
a method of control. Collision
detect should operate quite normal
without any problems. For ML
programmers, the conversion of the
Basic demo routines into source
should prove to be quite elementary.

Sprite Image Data

I have included a listing of data for sprite images which will display,
numbered (1 to 8), three-
dimensional, colourised boxes. The
numbers corresponding with nu-
merical keys and the colours as before.
Should you decide to use these
images, type in the basic loader and
data lines, and save to tape/disk.
You will now have to make some changes to
the BASIC DEMO program.

First, delete line 70 entirely.
Change line 71 to read:
POKE + C, PO + C
Remove the REM from line 72 and
and type:
POKE + 28, 255
Remove the REM from line 73 and
and type:
POKE + 37, 11
Remove the REM from line 74 and
type:
POKE + 38, 12
This enables the multicolour
mode and sets the colours to Grey
1 and Grey 2.

Getting it all in

Sprite Priorities - Type in and save the Basic loader program.

Sprite Image Data - If you are going to use the sprite data which is
included, then type in and save this listing also.

Basic Demo - Type this basic program in. If you are going to use
the additional sprite data, make the
necessary changes outlined above and save it.

Running the Demo

First load and run SPRIKE PRIORI-
ties then type 'NEW'. If you are using sprite image data then load this
is and type 'NEW'.

Now you can load and RUN the BASIC DEMO program. Re-
member, keys 1 to 8 will select the
BLOCK you wish to control with a
joystick plugged into port 2. Well, that's it. I'm off to the pub
for a pint. Hope you like SPRIKE
PRIORITIES, and can utilise it and
expand upon it...
Thirty Six

Your Commodore
Have you ever wondered whether that 15 per cent VAT added to your bill really does go go the Taxman? Are you worried that the plumber’s bill, scrawled in pencil on the back of a cigarette packet, may not be genuine? Well worry no more! With the aid of this simple little Basic program,

**VAT NUMBER CHECKER**

Make sure your VAT invoice is a bonefide invoice with this simple checking program

*By R. Ellis*

```
FD 17 GOTO14
29 10:
63 19 REM *** JOYSTICK UP *
64 **
82 20:
91 21 IFJ<14THENV36
A4 22 DS(K)=DS(K)-4:IFDS(K)<S0T
HENDS(K)=50
71 23 POKEV1+1(N*2),DS(K)
80 24 IFPEEK(V3+(N*2))=PEEK(V1+(N*2)):THEN28
42 25 SYSS82832:REM * PRIORITISE SPRITES
122 26 N=N-1:IFN>7THENV36
6A 57 IFN<0THENENDSUB64
92 20 RETURN
27 29 : C0 30 REM *** JOYSTICK DOWN *
25 31:
19 32 IFJ<13THENV43
CA 33 DS(K)=DS(K)+4:IFDS(K)>208
HENDS(K)=208
9A 34 P0KEV1+1(N*2),DS(K)
73 35 IFPEEK(V1+(N*2))=PEEK(V1+(N*2)):THEN39
87 36 SYSS82832:REM * PRIORITISE SPRITES
66 37 IFN<0THENENDSUB64
61 38 N=N-1:IFN<0THEN END0
69 38 RETURN
12 40:
A4 41 REM *** JOYSTICK LEFT/R
61 ***
10 42:
58 43 Y=PEEK(V+(N*2))
17 44 IFJ<13THENV47
48 45 Y-Y-6:IFCY<13THENV-24
E2 46 GOTO19
D8 47 IFJ<13THENV36
68 48 Y=Y+6:IFCY<13THENV-256
94 49 POKEV+(N*2),Y
8C 50 RETURN
C9 51:
59 52 REM *** SELECT-A-SPRITES
8C 53 REM * KEYS 1 TO 8
0C 54:
09 55 SETK8:X=VAL(K8):IFX<10RX
8TMEN30
19 56 K=X-1
14 57 FORC=0TO7
C6 58 P0KEV+(C*2)+1:THEN208
19 59 NEXT
B2 60 RETURN
07 61:
26 62 REM *** UPDATE F(LAB) AR RAY **
C5 63:
CE 64 Z-F(N):F(N)=F(N-1):F(N-1)
=2:RETURN
7B 65:
94 66 REM *** INITIALISE **
79 67:
88 68 POKE53200,0,POKE53201,0:
PRINT"(CLR,GR EEN)
79 69 U=56H; JS=6320; DP=2040:
PO=158:0INDS(7),F(7)=N;JO- D,K=0
71 70 FORC=0TO63:POKE12800+C,28
S:NEXT:REM * FILL SPRITE IMAG E WITH BLANKS
00 71 FORC=0TO7:POKEP+C,PD,REM
+ DATA POINTERS
C7 72 REM
C6 73 REM
C5 74 REM
FA 75 P0KEV-39+C,C+1:REM * COLOR SPRITES
11 76 NEXT
0F 77 77 FORC=0TO14:STEP2:POKE
V+C,X=X+10:NEXT:REM * POKE
W COORDS
D7 78 Y=200:FORC=1TO15STERP2:POK
E+16,C,Y=Y-10:NEXT:REM * POKE
S COORDS
C4 79 FORC=0TO7:DS(C)=PEEK(V1+C,
(C+2));F(C)=NO:NEXT:REM * SET
UARRAYS
6E 80 POKEV+21,255:REM * ENABLE
SPRITES
OF 81 RETURN
```

**YOUR COMMODORE**

Thirty Seven
you can now know for sure that the firms you deal with are decent, honest and true. Well, actually you can only use it to find out whether the VAT numbers they put on their invoices are genuine or not. But this does go quite a long way towards proving their credentials. You will, once you start using this program as a regular part of your book keeping routine, sleep more easily at night, safe in the knowledge that you haven't forked out fifteen per cent over the odds for your goods, and that the Taxman won't be claiming you've cheated him with phony invoices.

The program is written in Basic, and will run on the C64, C128, Plus 4 and C16. To use it, simply enter the nine digit VAT number and press return. The program will respond with the appropriate message:

**VAT number is valid**

or:

**VAT number is not valid**

Simplicity itself! The program is foolproof, objecting to any input which is not a nine digit number. If such an input is attempted, an appropriate error message will be printed before the program reports that the VAT number is not valid.

The program is in two parts, to make customisation or integration as a subroutine into your own programs easier. The first part, lines 100 to 180, inputs the VAT number, sends it to the subroutine that actually checks the number, and then interprets and prints the result. It then asks whether the user wishes to check another number. If they do, the process is repeated. If not, the program ENDS on line 180. The second part of the program, line 200-260, contains the checking routine itself.

The checking routine returns the result of its check in two variables: V and E. If V=0, the VAT number is not valid. If V=1, the VAT number is valid. However, before the validity of the number is checked, the input itself is checked for errors. If E is not equal to zero upon return from the routine, it means that such an error has been detected. If E=1 the input contains less than nine characters (the length of any VAT number). If E=2 the input contains more than nine characters. If E=3 the input contains non-numeric characters. If any of these errors are detected, V is always set to zero, since the input could not have been a genuine VAT number. It should be noted that spaces are stripped from the input before it is checked. This usefully enables VAT numbers to be input inclusive of spaces, as they so often appear on invoices. Upon return from the subroutine, V$ will contain the original input, stripped of spaces.

The whole program can be turned into a single subroutine by simply replacing END in line 180 with RETURN. However, should you wish to use only the checking subroutine (lines 200-260), then the VAT number to be checked must first be put into A$ before executing a GOSUB to the routine. As we have seen, the result of the check will be returned in variables V and E. Since there are no GOTOs within the checking subroutine, renumbering it for incorporation into one's own programs is simplicity itself.

The calculation used in this program has been extensively tested, and is a form of the calculation used by the Tax Office to create the VAT numbers in the first place. For obvious reasons, it was thought rather counter productive to include that calculation in this program. As an incidental observation, it would appear that using their present system, it is only possible for the Tax Office to issue a maximum of ten million VAT numbers.

---

**PROGRAM: VAT CHECKER**

```basic
26 100 REM * * * VAT NUMBER CHECKER * * *
24 110 E$(1)="100 FEW":E$(2)="T"00 MANY":E$(3)="NON-NUMERIC"
48 120 A$="":INPUT "ENTER VAT NUMBER":A$:"THEN PRINT "NO INPUT":GOTO150
08 130 GOSUB200:IFE<>"THENPRINT "ERROR: INPUT HAS "E$(E)" CHARACTERS"
71 140 PRINT "VAT NUMBER IS "LEF T$("NOT ",ABS(4*(V-0)))"VALID"
```

**ES 150 PRINT "TRY AGAIN (Y/N) ? "**

**EF 160 GETQ$:IFQ$<>"Y"ANDQ$<>"N"THEN160**

**CB 170 PRINTQ$:IFQ$="Y"THEN120**

**34 180 END**

**EB 200 REM * * * CHECK ROUTINE * * **

**44 210 U$="":FORA=1TOL$(A$):U$=U$+MIDS(A$ A,ABS(MIDS(A$ A,1))<>" "):NEXT**

**1F 220 V=0:E=0:B=0:IFLEN$(U$)<9 THENABS$(LEN$(U$))-9)+1:SUB0**

**33 230 FORA=1TOS:IFA<>THENB=B+V A$(MIDS$(U$,A,1)))*9-(9-A)**

**07 240 IFMIDS$(U$,A,1)<"0"DRMIDS$(U$,A,1)+"9"THEN3=A=9**

**7B 250 NEXT:IFE<>"THENRETURN**

**42 260 U=ABS(B-INT(B/77)+1)*77**

```basic
=VAL(RIGHT$(U$,2)):RETURN
```
MOVING THE SCREEN

by Ewan Villiers

There are many great myths in the world such as Atlantis, UFO's and, probably the greatest of them all, the difficulty of moving the text and character memory round. This program has been written to end the last of those myths.

Moving the text screen has many uses, take for example menus in adventures and windows in word processors. These must not harm the text beneath them and one method of doing this is to move the screen under interrupts (if the menu isn't over the text it can't harm it). This program will also allow you to make small alterations to the character set without needing to use a character designer.

I have included two versions of this program in the listings. The first is a machine code version (for speed) and the second a Basic listing (for ease of understanding). All lazy readers should note that the Basic listing can be typed in and compiled to save messing around with data statements.

The programme requires 3 variables:

1. A Complex Interface Adaptor Bank (CIA)
2. A screen pointer within the bank
3. A character pointer

THE C.I.A. BANK:
The chip which looks at the memory can only 'see' 16K at one time so this sets the block to be 'seen'.

SCREEN POINTER:
The C.I.A. bank picks out a block of 16K. The screen pointer cuts this into 1K blocks which mark the start of each screen.

CHARACTER POINTER:
This is like the screen pointer except that, as the primary character set is 2K long, it is cut into 2K blocks (I haven't copied the second set so try changing to it when you run the program).

This is all you need to know to run the program (the addresses of the parameters are in the listing). But if you wish to understand the program, read on.

Changing the C.I.A. BANK (lines 270-290)

The first thing to note about this is that the bank numbers run in the wrong order. The number 0 denotes the fourth block (49152-65535) and the number 3 denotes the first block (0-16384). This is sorted on line 80 by subtracting three from the bank number.

It should also be noted that before the bank can be changed, the C.I.A. must be set for input. This is done by ORing 56578 (and 252) with the bank number (0-3). The only thing left to do is to inform the ROM that you have moved the screen (it is another bank now). The location 648 holds the screen address divided by 255. To inform the ROM, you need to OR 648 (and 63) with 64* the video bank. Once this is done the bank is changed and you can change the screen address.

Changing the Screen Address (lines 340-50)

This is easier than changing the C.I.A. bank. The upper 4 bits of address 53272 hold the screen pointer so you just OR 53272 (and 15) with 16* the screen pointer. Again, the ROM must be informed of the screen's movement. This is accomplished by ORing 648 (and 192) with 4* the screen pointer. The screen has now been moved and you can now move the character set.

Changing the character address (line 400)

This is the easiest part of the program. The lower 4 bits of 53272 hold the character pointer. As the character pointer rises in 2K blocks, twice the pointer is stored there. This is done by ORing 53272 (and 241) with 2* the character pointer.

The C.I.A. screen and characters have now been moved but you still can't use this program because you have not copied the character set yet.
Copying the character data (lines 180-230)

While this is not difficult, it is the most difficult part of this program. The difficulty is in looking at the character ROM and making sure you are not interrupted. These problems are solved by two pokes, one to address 56334, to ensure that you are not interrupted, and the other to address 1 to allow you to look at the character ROM. The rest of this part of the program just copies memory and sets addresses 1 and 56334 back to their original values.

128 Users

Doing this in Basic is much easier for 128 users. The process of copying the character ROM only requires you to use the command Bank14 to gain access to the character ROM but a full guide to this can be found on pages 260-263 of the 128 reference guide.

The Machine code program

This is a short program encoded in data statements which has only 2 major differences from the Basic program.

The first difference is that while in the basic program numbers are entered from 1 to n, in the machine code version they must be in the form 0 to N or the program will not work.

The second difference is in the order of the subroutines. In this program, the screen moving routine is last, so it can be called upon independently by an SYS command (SYS49364).

The position of the parameters (addresses 49152-54) is shown in the listing, as are the SYS addresses, so all I can say now is “happy programming”.

```
MACHINE CODE

10 REM ******************************************************
20 REM * STE 40158 to move CIA *
30 REM * SYS 49364 to shift screen *
40 REM * 49152 = screen pos (0-15) *
50 REM * 59153 = character pos (0-7) *
60 REM * 49154 = CIA bank (0-3) *
70 REM * Program ends at 40420 *
80 REM ******************************************************

90 PUX x = 0 to 242. READ A : POKE 94156+x,a : NEXT

100 DATA 56,169,9,207,2,102,141,3,192,
169,0,174,2,192,240,6
110 DATA 24,105,64,202,206,251,141,5,
192,169,0,174,1,192,240,6
120 DATA 24,105,8,202,206,251,199,5,
192,141,5,192,169,0,141,4
130 DATA 22,199,254,45,14,220,141,14,
220,169,251,37,1,133,1,173
140 DATA 4,120,133,251,173,5,192,133,
252,169,0,133,253,169,208,133
150 DATA 254,162,0,150,177,253,145,251,
200,208,240,230,252,230,254
160 DATA 202,208,240,169,4,5,1,133,1,
169,1,13,220,141,14
170 DATA 220,169,3,12,2,221,141,2,
221,169,252,45,0,221,13,3
180 DATA 192,141,0,221,173,2,192,10,10,
10,10,10,10,133,255,173
190 DATA 132,2,41,63,5,255,141,136,2,
173,0,192,10,10,10,10

10 INPUT "SCREEN POSITION(1-16) ": s%  
20 IF s%>16 OR s%<1 THEN 10  
30 INPUT "CHARACTER POSITION (1-8) ": c%  
40 IF c%>8 OR c%<1 THEN 30  
50 INPUT "BANK(1-4) ": b%  
60 IF b%>4 OR b%<1 THEN 90  
70 s%=s%-1: c%=1-b%: b%=1  
80 vxt=vxt-b%  
90 ca=16384+b%*2048+c%  
100 GOSUB180  
110 GOSUB270  
120 GOSUB340  
130 GOSUB400  
135 END
```

FORTY

YOUR COMMODORE
If you have ever looked at that little bit closer at a piece of software, you will notice many little touches that add a little bit more to the presentation. These touches can be anything from swirling sprites to colour effects. In this article I would like to discuss the use of colours to produce a fade effect, which when used in conjunction with your own program can create great title and instruction screens.

The first thing we must define is: What exactly is a fade? A fade is basically where something, be it a sprite, gradually appears or disappears into the background. When an item appears, it is known as a fade-in and when it disappears, a fade-out.

In order to make the item fade, we must cycle it through a sequence of colours. To help you understand this, we will take a practical example. I want an instruction screen faded in from a black background and the instructions to end up in the colour yellow. We must now create the necessary colour sequence. The first colour should be the background colour – which in this case is black ($00). We now want the text to gradually move from dark to light. The colours best suited for this are the three grey colours. So we add: Dark grey ($0B), Medium grey ($0C) and light grey ($0F).

Next we have an intermediate colour, which in this case is white ($00). This intermediate colour is preferably the opposite of the background. Lastly we put our final colour in which is yellow ($07). If we had chosen the final colour to be light red then we could have put dark red in after white and then light red in order to provide a smoother colour transition. If you look at diagram 1 then you will see this whole example simplified.

Hopefully you should have followed all that. If you look at diagram 2, you will see the complete sequence for our example. So how do you use this sequence in your own programs?

If you type in FADER LOADER, which is in Basic, and run it, it will generate a program on disk called FADER.MC. Now in your Basic or M/C program all you have
to do is load FADER.MC and then poke the values for your sequence into location SCO35 (49205) onwards, terminating the sequence with SFF (255). Now all you have to do is print the text you want to be faded onto the screen in the same color as the background. E.g. if you are fading the text in from a black background, then print the text onto the screen in black. It is then only a matter of typing SYS49152 and hey presto!

If you want to see this in action, then type in FADER DEMO and run it. Note, you must have FADER.MC on the tape or disk first. I have preset the demo to do the fade in as in the example I have just given. Now that you know how to fade-in, you can fade out simply by reversing the sequence.

This fade technique can be applied to sprites and high resolution screens. Hopefully you should be able to develop your own programs to do this. An example of doing a fade with sprites is given in the program SPRITE FADE.

On a final note, you should have no problems typing in the programs as they are all in Basic. Also for those of you interested, I have given a rough flow diagram for FADER.MC which is shown in diagram 3. So there you have everything you need and hopefully you should be able to put this excellent technique to good use in our own programs.

TAPE USERS WILL HAVE TO ALTER ALL THE 8s TO 15s.

PROGRAM: FADER DEMO

```
57  10 D = A + 1
58  20 IF D = THEN LOAD "FADER.MC". B = 1
59  30 PRINT "CLEAR BLACK"; POKES 3280, 0, POKES 3281, 0
60  40 PRINT "CLEAR"; POKES 3280, 0, POKES 3281, 0
61  50 PRINT "CLEAR"; POKES 3280, 0, POKES 3281, 0
62  60 PRINT "CLEAR"; POKES 3280, 0, POKES 3281, 0
63  70 PRINT "READ A: IF A = 255 THEN GOTO 50000"
64  80 POKES 4000, 1, A - I - 1 - GOTO 20
65  90 PRINT "DATA 186, 254, 189, 53, 19, 2, 201, 286, 240"
66  A0 100 PRINT "DATA 8, 32, 22, 196, 230, 216, 201"
67  A1 110 PRINT "DATA 20, 162, 254, 240, 201"
68  A2 120 PRINT "DATA 3, 240, 247, 129"
69  A3 130 PRINT "DATA 5, 247, 129, 125"
70  A4 140 PRINT "DATA 8, 32, 22, 196, 230, 216, 201"
71  A5 150 PRINT "DATA 20, 162, 254, 240, 201"
72  A6 160 PRINT "DATA 3, 240, 247, 129"
73  A7 170 PRINT "DATA 5, 247, 129, 125"
74  A8 180 PRINT "DATA 8, 32, 22, 196, 230, 216, 201"
75  A9 190 PRINT "DATA 3, 240, 247, 129"
```

PROGRAM: FADER LOADER

```
65  10 POKE 3280, 0, POKE 3281, 0
66  20 POKE 3280, 0, POKE 3281, 0
67  30 POKE 3280, 0, POKE 3281, 0
68  40 POKE 3280, 0, POKE 3281, 0
69  50 POKE 3280, 0, POKE 3281, 0
70  60 POKE 3280, 0, POKE 3281, 0
```

DIAGRAM 3.

READ COLOUR

= SFF

YES

END

COLOUR WHOLE SCREEN

SET-UP FOR NEXT COLOUR

FOURTY TWO
It is common knowledge that CBM64 Basic is far from easy to use at the best of times. This problem may have put many people off trying to program for themselves. One of the main inadequacies in the language is the functions designed to handle string variables, that is, LEFTS$, RIGHTS$ and MIDS$. I will describe the use of these functions in detail later. Basically, they allow the programmer to extract 'chunks' from string variables to manipulate within the program. Very well, you say, so what is wrong with that? Well, the problem is that while you can use LEFTS etc. to extract bits from strings, see figure 1, you are not allowed to surgically change parts of a string, see figure 2.

Figure 1

A$="ABC"
PRINT LEFTS (A$,2)
the result would be: AB

Figure 2

A$="ABC"
Now, supposing you wanted to change the 'AB' to 'DE' you might type:
LEFTS(A$,2)="DE"
the result would be: 'syntax error'

As you can see, the computer will let you see what is there, but you are not permitted to change it. Many other forms of Basic do allow this function. Wouldn't it be nice if, just like using DEF FN in arithmetic, we could define functions to allow us to alter strings? But, you have guessed it, C64 Basic will not allow it. I thought that this was inconvenient to say the least, and so I produced a series of subroutines which would allow me to alter my strings. I will start at the beginning and describe to you how each function works, and how the surgical version of it works.

LEFTS$

This function lets you take the leftmost characters from a string. The syntax is: LEFTS$(string$, elements), where elements = the amount of characters you wish to extract. This number can obviously not be greater than the number of characters in the string.
**RIGHTS$**

This function is very similar to **LEFTS**, in that it takes the rightmost characters from the string. The syntax is identical to that of **LEFTS**.

**MIDS$**

This function allows you to take characters from the MIDdle of a string, starting at the character that you specify. It is a very useful function and has many applications. For example, searching through a string to find a key character (perhaps '),. The syntax is: **MIDS$ (string$, start, elements)** where **start** is the start character and **elements** is the amount of characters you wish to extract. **Figure 3** shows a very simple example.

Figure 3

A$=“ABCDE”
PRINT MIDS$(A$,2,3)
the result would be: BCD

Now you know how to use the main functions, we can use these functions to help us define routines to alter strings at our leisure. Let's start with **LEFTS**. If we are altering the **LEFTS** part of a string, we are obviously leaving alone the **RIGHTS** part of the string. With this in mind, we can say that:

altered STRING$=NEW BIT$+RIGHTS$(OLD STRING$,X)

But, we do not know how many characters to change in the **LEFTS**, and consequently, how many **RIGHTS** characters (represented by x) to put on the end of the altered string to make it complete. For this, we need to use another function: **LEN**. This returns the number of characters in a string, referring to **Figure 3** the instruction:

PRINT **LEN (A$)**
would result in 5

If we can call the number of characters we want to leave intact is **LEN (STRING$)** minus N. We can put this into our program using **LEFTS** surgery:

altered STRING$=NEW BIT$+RIGHTS$(OLD STRING$,N)

But, it is a 'pain to have to state both the **NEW BIT$**, so we obviously need to use our friend **LEN**, and define N as **LEN (NEW BIT$)**. So, our revised program looks like this:

ALTERED STRING$=NEW BIT$+RIGHTS$(OLD STRING$, LEN (OLD STRING$)-LEN (NEW BIT$))

Complicated isn't it? No, not really! Here is a breakdown of the ugly looking **RIGHTS$** function I used. What it does is to take the original string, and to chop off the **LEFTS** that is to be replaced by **NEW BIT$$. The length of the bit remaining intact (the **RIGHTS$**) is given by subtracting the length of the changed bit (**NEW BIT$**) from the length of the original string.

Whew!

Now that we have struggled through that, we can actually do something with it, and write a routine to use in our programs.

Here is a simple example of the routine and how to call it:
100 LS=RIGHTS(LS,LEN(LS)-LEN(NS))
110 RETURN
200 LS="CAT SAT ON THE MAT"
210 N$="DAN"
GOSUB100

If you now run with GOTO200, then type PRINT LS, hey presto!, the string LS will have changed to DAN SAT ON THE MAT. Just a few notes about the routine: You will always have to use LS and N$ for the strings to be specified, as there is no way of creating a new function. What we are doing is making a program that uses global variables, and there is no way of making values of variables stay ONLY inside the routine (LOCAL) as there is in other basics. That is the major limitation of the routine. So if, for example, you are using the variable WS, and wished to alter it, you would need to make LS=WS before calling the routine, and WS=LS after calling the routine. For this reason, you may find it more convenient to include line 100 as part of the main program, instead of using it as part of the subroutine. This too has its disadvantages, such as getting a sore finger from repeated typing brackets!

The subroutine for a surgical RIGHTS is obviously going to be much the same, but we must exchange the RIGHTS in the routine for a LEFTS, as it will be the LEFTS that we will now want to leave intact!

Here is the routine for a surgical RIGHTS

100 LS=LEFTS(LS,LEN(LS)-LEN(NS))+N$
110 RETURN

The use of this routine is much the same as the one above. How simple you cry! Doesn't it look easy? Well, yes it does, but then we discover a stumbling block in the form of MIDS. However, with a bit of logical thought we can overcome it.

Just as a string is composed of LEFTS and RIGHTS, it is also composed of LEFTS, MIDS and RIGHTS. Therefore, we now get:

ALTERED STRINGS=LEFTS(OLDS,X)+NEW BITS+RIGHTS(OLDS,X)

As with MIDS, we can't get away with 2 parameters, NS and LS, but we need a third, S, which is the character at which the NEWS will start being inserted.

From that S, we can calculate all the information that we may need:

number of characters in LEFTS=S
number of characters in RIGHTS=LEN(LS)-S-LEN(NS)

so the program for MIDS surgery looks like this:

100 LS=LEFTS(LS,S)+N$+RIGHTS(LS,LEN(LS)-S-LEN(NS))
110 RETURN

Use is as for the routines using LEFTS and RIGHTS, but with the extra inclusion of S, the start character for the insertion of N$.

I hope that you have enjoyed and understood this approach to constructing program routines to the end of making your own functions. Also, I hope that you can appreciate the power that a little thought adds to the humble C64 Basic.

Keep stringing!
EXTENDING BASIC PART 8

Add an auto line numbering facility to your collection of extended Basic routines

By Burghard-Henry Lehmann

When you enter a Basic textfile, the one thing which is fairly regular is the line numbers. Since computers are very good at doing regular, monotonous tasks, it makes sense to let the computer do the line numbering. All you have to do then, is worry about designing your program!

Automatic line numbering is pretty easy. All we have to do is intercept the flow of Basic in the ROM after a line has been entered into the textfile, or before a new line is started off - whichever way you want to look at it. For this let me elaborate on how Commodore Basic deals with a newly entered line.

Basic Warm Start

The whole process starts at $A483$, the so called Basic Warm Start routine. This is the central point to which Basic loops back each time a line has been entered into the textfile or a direct command has been executed.

This point is so important, that it has been vectored by those clever Commodore ROM designers. That is, instead of jumping straight to $A483$, the computer fetches the address it has to jump to from the vector at $0302$. Under normal circumstances this location which lies in RAM can be changed by the programmer, contains $A483$ - the Basic Warm Start routine.

This will be the point where we will intercept Basic to introduce our auto line numbering routine. More about this in a minute.

At the beginning of the Warm Start routine, the computer goes into a loop which waits for the user to enter a character on the keyboard. This character, which can be anything at this point, is stored in a location, called the input buffer ($0200$). Next the computer waits for the user to enter another character, this is stored in the following location in the input buffer, and so on until the user presses the return key (ASCII 13). This finishes this loop and terminates the characters in the input buffer with a zero.

Now, the computer finds out, if the line entered has a line number in front of it or not. If it hasn't got a line number, the “statement”, as it is called, is interpreted and executed immediately as a direct command.

If the line starts with a line number, the keywords in the line are converted into tokens and then the computer looks if a line with the same line number is already present in the textfile.

If a line with that line number exists already, the old line is deleted.

Finally, the new line is inserted into the textfile.

If the line has nothing after the line number, nothing is inserted into the textfile, thus if this line already exists it will be deleted.
Auto Line Numbering

To introduce auto line numbering we first need a new command which starts it off.

I have chosen to use the standard extended command AUTO. Note, when testing for AUTO, the last two letters of the command will be tokenized by the computer into SA4, since TO is a Commodore Basic function.

To produce line numbers automatically we need to know two things:
Which line number does the user want to start automatic line numbering
What step or increment does he want the line numbers to use.

AUTO therefore needs two parameters:
The line number to start with;
The increment up to the next line number.

Both parameters should be separated with a comma. I haven’t bothered to build in any error checks. If you want to be perfect, you should know by now how to foolproof something like this and force the computer to give a syntax error report.

The auto routine itself starts by collecting these two parameters and saving them into the zero page locations 251/252 (first line number) and 253/254 (step) (lines 1640-1780).

Next we change the Warm Start vector so that it points at our routine, instead of the usual routine in the ROM (lines 1820-1850).

Now we print a carriage return, which puts the cursor onto the beginning of the next line (lines 1890-1900).

Now we are all set to do auto line numbering.

The overall mechanics of auto line numbering is as follows: The current line number, contained in 251/252 is printed on the screen (lines 1990-2040). Then it is copied into the beginning of the input buffer (lines 2080-2130).

To print the number on screen we use the normal ROM routine $BDCD, which prints any number whose low byte is in X and whose high byte is in the accumulator. So that the routine can print the number onto the screen, it naturally has to convert it into ASCII digits. It does this and stores the ASCII digits at a location $0100, terminated with a zero.

The reason why I explain all this is, that we make use of this fact when we have to move the line number (in ASCII digits!) into the input buffer (lines 2080-2130).

Now the computer enters the usual loop in ROM, which I have explained above, and which waits for the user to enter a full line (line 2170). In this routine the X-register is used for the index to the input buffer. Normally the loop starts with X=0, but since we have already entered a line number into the input buffer, X contains whatever number of digits the line number consists of. We have the correct amount in X from the loop which we used earlier on to move the ASCII digits from location $0100 into the input buffer.

After this, we test for direct or line numbered statement (lines 2210-2280). This is a little superficial here, since there is no question about a direct statement being given at this point.

Line 2390 calls a routine in ROM which converts the line number at the beginning of the input buffer from ASCII into the more useful low byte/ high byte sequence and stores the result in zero page $14/15. This is used later to search the textfile to see if the line number already exists.

Now all Basic keywords in the line are tokenized (line 2440).

Then the computer searches through the textfile to see if a line with this number already exists (line 2450). If it does, the line is deleted (line 2500).

In lines 2540-2600 we calculate the next line number by adding the step contained in 253/254 to the previous line number contained in 251/252.

Then there are two further ROM routines (lines 2650 and 2660) which re-organize the Basic textfile and reset all the necessary pointers.

In lines 2710-2720 comes an important test which sees if there is something after the line number.

Most of the previous code I have copied straight from the ROM. Why this seemingly unnecessary duplication of code, you may ask?

Well, as I have already pointed out, it would be pretty annoying if we couldn’t switch auto line numbering off since while auto line numbering is on you can’t give a direct command. Furthermore, the vectors at $0300 to $0332
are not changed back to normal, even when you ress the run/stop restore keys! So, we have to take care of this ourselves.

It makes sense to switch auto line numbering off, when the user enters nothing but the line number.

In this case our routine jumps to the aptly called routine *NOTHING*, which resets the Warm Start vector back to normal (lines 2810-2840) and then jumps to the normal warm start in Rom (line 2880).

By now you should understand how you go about patching in new commands to Commodore Basic and should be ready to write some of your own. Watch out for more from me in a future installment of *Extending Basic*.
PROGLOK

Stop prying eyes and itchy fingers with this handy program

By Zak Beck

This program enables you, having just written your latest masterpiece, to 'lock' the computer so that, say, the kids cannot spoil all your hard toils. Before leaving your computer, it simply requires that you press 'f1' and enter any 6-digit password. Before the computer will return back to the language (eg BASIC), the correct code must be entered. This idea has been used before on expensive utility cartridges - well now you have it at little if no cost!

How it all works

The program is written in machine code. Obviously, if it were written in Basic, it would not be compatible with your masterpiece. It resides below Basic, from $1300 to $14C1, in the application or cartridge program area. This means that Basic does not have to be moved about, but the program MAY clash with some cartridges which uses this area as a workspace.

When you first use the program, it sets up function key 'f1' to call itself, and then returns back to Basic. When you wish to 'lock' the computer, press 'f1'. The program first deactivates the restore key, prints up its title, and some prompts. It does this using a kernal call called 'PRIMM' - print message. This works as follows:

```assembly
JSR primm
.byt "Message goes here",0
......
(rest of program follows.)
```

Having called PRIMM, the computer will print out everything that follows until it comes across a '0' byte. Then it jumps back to your subroutine. This useful message-printer resides at $65405, $FF7D.

Proglok, having printed its titles and prompts will then ask for any 6 character code. This is implemented by subroutine 'getcod', which inputs 6 characters, storing them in buffer 'buff'. Then the program stores the contents into the password storage space, 'pass'.

Next, prompts are printed (label 'rest'), to tell the user that the computer has been locked, and that to use it he has to enter a 6 character password. Using 'getcod', an attempt is entered into the buffer 'buff', and the contents of 'buff' are compared with the password 'pass'. If any discrepancies are found, the computer jumps back to 'rest'. Otherwise, the restore key is reactivated, and the computer returns to the language (eg BASIC).

Using the Program

Type in the program (see getting it all in). Next, type the following:

```
SYS4864 and press return
```

This will initialise function key 1 to read 'SYS4891' + chr $(13) as the command 'KEY' will show

Pressing 'f1' in direct mode will call up the program, executing a call to address 4891. You can now enter your keyword, using any of the keys on the keyboard, including Line Feed and those on the keypad at the right of the 128. I feel six characters provide a fairly secure code, who wants their computer to be Fort Knox?

The password having been entered, the computer is immune to the restore key, and can only be accessed by typing in your code. When you come to want to use the machine again, press any key and up will come a screen asking you to enter your code. Entering the right code will take you into BASIC, entering the wrong one will take you back to the press any key screen again.

Should you forget the code, there is a useful little trick to enable you to recover your program. Follow the below instructions carefully:

1. Hold down the RUN/STOP key;
2. Press in the reset button whilst holding RUN/STOP;
3. When the computer powers up, you will be in the monitor. Release RUN/STOP now!
4. Type: X and press return.
5. You will be back in BASIC.

Getting it in

The Basic loader is easy to use. Just type it all in very carefully, and save it to tape or disk. Then run it. If you've made a mistake, !TYPING ERROR will appear. If everything is alright, you can save the code using the following BASIC line:

```
BSAVE "(filename)", B15, P4864 TO P5313
```

When you want to use the program next time, use:

```
BLOAD "(filename)"
```

SYS 4864

And then follow the instructions under 'Using the Program....'.

And that's it...
When Commodore created the user port, they did not intend it to be used purely for RS232 communications, but instead to form a link between the computer and the outside world.

Despite the fact that there are twenty-four lines available from the user port, only ten are actually required to connect the C64 to the outside world: PB0-PB7, 5v, GND.

The 5v and Ground (GND) lines can usually be used to power anything which is connected to the C64, but you must be careful not to draw more than 100m amps because this will damage the computer.

The theory

You should already know that there are eight lines in the user port (called PB0-PB7) which are available for the use of the individual. However, to actually use these lines they must be set to either input or output (they are set to input on power up). Luckily, the Commodore operating system makes this an extremely simple process. At location 56579 there is a bit for each line. To set a line to input make the bit zero, to set a line to output the bit must be one. (ie if you set bit 3 to one then line PB3 will be set to output). The following example should make this easier to understand.

Bit No: 7 6 5 4 3 2 1 0
Value: 0 1 0 0 1 1 0 0

Explore the possibilities of this versatile user port

By R. Smedley
You can see that lines 6, 3 and 2 are going to be set to output, and lines 7, 5, 4, 1 and 0 set to input. To actually achieve this configuration, the binary number, next to the value, must be translated into decimal so that it can be entered into the computer, using the 'poke' statement. The necessary calculation is as follows:

2 to the power of 6 + 2 to the power of 3 + 2 to the power of 2.

In other words 64 + 8 + 4 which equals 76. Therefore, to achieve the configuration in the example we would have to POKE 56579, 76.

Output

Now that the lines have been set, assuming some have been set to output, it becomes necessary to have a way of controlling the state of the lines (either low or high), which again is an extremely simple process. A bit has been allocated to each line at location 56577. To make a line go high you set it to zero (i.e. if you set bit 6 to 1 then line PB6 will be taken to be high). You must remember not to try and output through a line set to input because this will just confuse the C64.

The following example should make this clear:

Bit no: 7 6 5 4 3 2 1 0
Value 0 1 0 0 0 1 0 0

As you can see, lines 6 and 2 are required to go high, leaving the other lines low. Again, this binary figure must be translated into decimal. Using the same process as above we discover that the figure required is 68. Therefore the following statement must be entered:
POKE 56577, 68

To enable you to see for yourselves what effect the contents of location 56577 has on the state of the lines, you might like to construct Circuit 1, (refer to Figure 1 for the pin configuration of the user port). The device consists of a ULN2801A octal darlington driver which amplifies the signal from the user port, to light the LEDs on the lines which have been taken high (before using the device you must enter POKE 56579, 255 to set all the lines to output).

In order to see the speed and accuracy at which the computer can control the lines, you might like to enter Listing 1. (As the program gains speed whilst it is running, you must remember that there is only ever 1 LED lit at a time, the reason for you seeing more than 1 is because the effect of the image lasts on your retina for approximately 1/60th of a second.)

Input

Assuming that some of the lines have been set to input, it becomes necessary to have a method of reading the state of the lines. As you already know, there is a bit allocated to each line at location 56577, so to read the lines all you have to do is PEEK this location, remembering that if some of the lines have been set to output then part of this figure will correspond to output. Because of this, and having to know which lines have been forced low by an external device, you will have to convert the original number from decimal to binary. The easiest way of doing this is shown below:

Bit Number:  7  6  5  4  3  2  1  0
Dec Value:  128  64  32  16  8  4  2  1

To use this table to convert decimal to binary, you take your decimal number and look at the chart. Take the largest number (from the bottom row) which is smaller than your number. You then simply repeat this process until your number is reduced to zero, when you put a 0 by the bit numbers which do not have a 1 by them. You now have your binary figure. Where you see a 1 the line is high, and a 0 shows a line which is low.

For my second example circuit, I thought it might be nice to come up with something which might be useful to other programmers. Circuit 2 gives the necessary details to connect a numeric keypad to the C64. In order to see what effect pressing keys on the keypad has on the state of the lines, you should enter Listing 2. To actually use the keypad, enter and run Listing 3 (An IRQ driven program which reads the keypad and then displays the relevant character on the screen, because of which it will only work when the computer is in direct mode).
TREAT YOURSELF...

TREAT A FRIEND!

Subscribe to YOUR COMMODORE and receive a FREE keyboard dust cover and mouse-mat worth a total of £10.70!

That's right if you take out a years subscription to YOUR COMMODORE for either yourself or for a friend, not only will we make sure its delivered to you each month at no extra charge*, but you or the recipient of your gift subscription will also receive these two stylish Your Commodore computer accessories absolutely free!

Subscription Rates:

<table>
<thead>
<tr>
<th>Region</th>
<th>Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK</td>
<td>£15.60</td>
</tr>
<tr>
<td>Europe</td>
<td>£23.25</td>
</tr>
<tr>
<td>Middle East</td>
<td>£23.50</td>
</tr>
<tr>
<td>Far East</td>
<td>£26.40</td>
</tr>
<tr>
<td>rest of The World</td>
<td>£24.00</td>
</tr>
</tbody>
</table>

Airmail Rates on Request

* Overseas Subscriptions include postage.

Just fill in the coupon below and send it to the address given with a cheque, money order or credit card instructions to cover the cost of the subscription. We'll do the rest.

PLEASE TICK

☐ I would like to subscribe to YOUR COMMODORE and receive a free gift.
☐ I would like to send a YOUR COMMODORE gift subscription and free gift.

MY NAME ...........................................
RECIPIENT'S NAME ...................................
ADDRESS ...........................................
ADDRESS ...........................................
POSTCODE ...........................................
POSTCODE ...........................................

☐ New Subscriber  ☐ Renewal  ☐ New Subscriber  ☐ Renewal

Please commence the subscription(s) with the ............ issue. I enclose my cheque/money order for £ ............ payable to A.S.P. or debit my Access/Visa Account.

Signature ...........................................
Date ...........................................

Valid from .............. to ..............

return this order form and remittance to:

The Subscription Manager (YC/1), Argus Specialist Publications, Argus House, Boundary Way, Hemel Hempstead, Herts, HP2 7ST.

YOUR COMMODORE

Fifty Three
Rik Henderson played for The World-beating Wordsmiths. They were competing in the Grandslam Charity Shield and their fans had turned out in force...

The first semi-final was the Rest of the World vs The Software Publishers...

...The Rest of the World ended as 1-0 winners!

Rik didn't score, but The Journos obliged...

BUT THE BALL'S DOWN THAT END!

C'MON RIK SCORE A GOAL!

I HOPE MY HAIR IS LOOKING OKAY!

Then it was the Journos match!

C'MON YOU JOURNALISTS!

The team that they beat, The Distributors, also lost the 3rd/4th place play-off.

The Rest of the World ended as 1-0 winners!

...Twice!
And so it came to the final. The Journos vs The Rest of the World.

Very soon, The Journos were 2-0 down!

WHAT A BOTTOM!

With 5 minutes to go, he scored straight from the corner spot!

And then from a free kick!

But 'Nobby' Kavanagh refused to lie down.

GO! GO! NOBBY!

...The Journos lost, but were not dissatisfied!

And so the match was decided on penalties...

I WONDER WHAT TIME THE PUB OPENS?

...The Journos lost, but were not dissatisfied!

Photography: Frane Maroevic
Script: Rik Anonymous
You may ask what YC is doing to celebrate the new football season? Well we, coupled with those wobbly chappies (and chappesses) at Empire, are giving away a football and a Tottenham shirt. But hold onto your aluminium studs, these are no ordinary Spurs goodies. They're Spurs goodies signed by the Mars bar kid himself, Paul Gasgoigne.

To get your grubby mitts on the prizes (as modelled here by the delectable Maria Wade) you must answer the following three questions. To make it harder for you we insist that you do it whilst jogging on the spot.

1. From what team did Tottenham sign Paul Gasgoigne?
   a) Newcastle United.
   b) Melchester Rovers.
   c) Washington Redskins.

2. When was the last time that Tottenham won the FA Cup?
   a) When dinosaurs did rometh the Earth.
   b) 1981-82
   c) 1900-01.

3. How tall is our Gazza?
   a) 5' 10"
   b) As tall as Blackpool tower.
   c) 3' 2"

Put the answers on the back of a postcard (or sealed envelope) and send them to:

Gazza Compo, YC, Argus House, Boundary Way, Hemel Hempstead, HP2 7ST.

The first correct card pulled out of the woolly hat on 15th November 1989 will grab the whatsis.

The Ever Important Big Wobbly Rules

Entries will not be accepted from employees of Argus Specialist Publications, or Empire. This restriction also applies to employees families, agents of the companies, and pieces of fruit.

The entry restrictions form part of the rules and the Editor's decision is final (you can be guaranteed that it will be a good one though!). No correspondence will be entered into. In the event of a flood, we reserve the right to use a hairdrier.

PS. No entries will be accepted if scribbled on the back of a cabinet minister.
Wobbling Y.C. Editor wobbles the frame work? At a charity penalty shoot out. After hitting the absolutely mega wobbler in to wobbling orbit he fell into an Epper-wobbling wobbler causing much concern! (they all went to lunch). 

All the advertising team of Y.C. wish Rik an absolutely wobbling football career.
Could Duncan Evans be Confucius? Not likely, but he has certain similarities, neither of them played full-back for Liverpool. He also runs his beadies over the new Swift 24-pin printer.

Confucius he say, "Computer without printer is like Steve Ovett - it's all in the memory." Well I lie, he didn't really, I made that up. He would probably have had a printer though, I mean how else are you going to output your mind-boggling philosophical doctrines unless you can get a hard copy. Oh, it was easy enough in Confucius' day, you just ordered the nearest monk to start scrawling on a slate and before you could say, "The analects of Confucius", you were five generations down the line and your life's work was being published posthumously.

Unfortunately there aren't that many monks willing to spend their lives scrawling out my reviews for Your Commodore, and alas, very few nuns either, so in order to support myself and my football team of Starving Children I needed the hi-tech equivalent. Citizen Europe also realised that monks were in short supply, and that they wrote as quickly as a Commodore Printer, and thus released the 120-D, a relatively cheap 9-pin printer. This combined low cost with decent performance and became the biggest selling 9-pin printer in Europe.

Fair enough, but what has that to do with the price of cheese you may ask, and quite rightly too. Well, good old Citizen, flushed by the success of the 120-D has launched something of a successor, the Swift 24, which it hopes will swamp the 24-pin market in a similar manner to the 120-D and the 9-pin market.

The Swift 24 offers the reasonably low price of £389 ex VAT and the power of a 24-pin printer, plus the convenience of no dip switches. Interested? Then read on.

Amongst the many claims made for the Swift 24 by Citizen, is one of sturdiness. Okay, let's see I thought, and dropped it on the floor from a foot. Apart from the top flapping around like a fish in the sea outside Sellafield, the Swift was unperturbed by its flying lesson. But then again, who has their printed situated only a foot off the floor? I tried two feet, and was rewarded with an unidentifiable piece of plastic whizzing past my ear as the shockwave set alarm bells ringing all over North London. The printer wasn't too happy with this treatment, and had to be calmed down and reassembled before it was up to printing out this article. I still don't know where that piece of plastic came from.
The Swift has a two year warranty from Citizen, as long as they don't catch you dropping it on the floor, and the print head is guaranteed to give you 200 million dots before dying, while the rest of the moving internals will last approximately 4500 hours before ceasing to function. As long as you aren't rough with it, it should last five years with ease.

There's a tractor feed and an excellent single sheet paper feeder, and the printer is equipped with a Centronics parallel interface as standard with a serial RS232C as an optional extra.

Printing speed is another great claim in the advertising blurb, but at only 192 characters per second (at 12cpi) in draft mode its performance is only average against 9-pin printers in this price range. That's the fastest it gets, you should also take into consideration 160 CPS (at 10cpi) in draft, and more importantly 53 CPS at 10cpi and 64 CPS at 12cpi in NLQ mode. The NLQ fonts are presumably why you want this printer, otherwise I assure you, you are wasting your money. An 8K buffer helps the printing process, and a snappy little display tells you how much of the buffer is full of incoming data.

The inbuilt fonts are Times Roman (okay), Courier (very good), Helvetica (sans serif and excellent) and Prestige Elite (horrible). There is a cut away section of the printer where optional font cards can be plugged in to extend the range, and of course your software may be able to create additional fonts anyway. The dot density is 120 DPI in draft mode, and 360 DPI for NLQ and graphics modes.

Instead of dip switches, the Swift has a two line, eight character LCD, and eight button keypad. This can be used to alter all sorts of printer functions including character set (from UK to Japan to Latin American), page layout (size and lines per inch), printer emulation (Epson LQ850, IBM Proprinter X24 and NEC P6+), font, colour or standard ribbon, pitch (proportional and up to 20cpi), and interface options.

The control panel also allows you access to four macros, which contain predefined settings. You can redefine any of these and save them into the Swift's electronically erasable programmable read only memory (EEPROM), so that when the printer is next switched on, your settings are automatically loaded as the default.

The Citizen Swift 24 is an excellent printer, offering the power of 24-pin printing, but with a low cost, considerable ease of use, a resilience to the sort of damage the average customer inflict upon it, and it's backed up by a two year warranty. If Confucius was alive today, the Swift could have saved five generations of monk an awful lot of hard work.

Duncan Evans

Below: The Swift 24, faster than a speeding paycheck!
SOFTWARE
FOR SALE

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

It's three o'clock in the morning. You sit at the computer keyboard having 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 R, 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 guarantee that at least one little but slips through unnoticed.

The Your Commodore Software Service makes available all of the programs from each issue on both cassette and disk at a price of £6.00 for disk and £4.00 for cassette. None of the documentation for the programs is supplied with the software since it is all available in the relevant magazine. Should you not have the magazine then back issues are available from the following address:

INFONET LTD, 5 River Park Estate, Berkhamsted, Herts, HP4 1HL.
Tel: (04427) 76661

Please contact this address for prices and availability.

The Disk

Programs on the disk will also be supplied as totally working versions, i.e. when possible we will not use 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 version of the program, we do not put disk-only programs on tape. There is no sense in placing a program that expects to be reading from disk on to tape.
AUGUST 1989

REASONING ON THE 128 – Programs for the first part of our expert system series (128 Disk only).
THESAURUS – Build up your own C64 thesaurus with this program for disk or tape.
WINDOW ON A MAZE – Generating mazes on your C64
ADDRESS BOOK – A cassette based address book for C64 users
DISK SCRAMBLER – Protect your disk data from prying eyes (C64 disk).

ORDER CODE
DISK YDAUG89 £6.00
TAPE YCAUG89 £4.00

SEPTEMBER 1989

BASES AND SQUARES – Tutorial into mathematical formulae.
REASONING ON THE 128 – Continuation of expert system.
DOS 6.1 – Enhanced DOS commands for disk users.

ORDER CODE
DISK YDSEP89 £6.00

OCTOBER 1989

REASONING ON THE 128 – Turn your 128 into an expert system (part 3).
PLUS/4 UTILITIES – Three utilities for your Plus Four.
FILO STACKS – The proper use of a processor stack.
FLASH LOAD – You too can have colourful loading borders.
DOSMAN – Yet more DOS utilities.

ORDER CODE
DISK YDOCT89 £6.00

Cassettes or disks are available from March 1986. Please ring the editorial office (0442-66551) for details of these.

ORDER FORM – PLEASE COMPLETE IN BLOCK CAPITALS

<table>
<thead>
<tr>
<th>NAME</th>
<th>QTY</th>
<th>TAPE/DISK</th>
<th>ORDER CODE</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOV 1989</td>
<td>TAPE (£4.00)</td>
<td>YCNOV89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>NOV 1989</td>
<td>DISK (£6.00)</td>
<td>YDNOV89</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OVERSEAS POST £1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NAME
ADDRESS
POSTCODE

Enclose a cheque/postal order for £.... made payable to ARGUS SPECIALIST PUBLICATIONS LTD. All orders should be sent to: YOUR COMMODORE READERS SERVICES, ARGUS HOUSE, BOUNDARY WAY, HEMEL HEMPSTEAD, HERTS. HP2 7ST

Please allow 28 days for delivery.
EDITOR’S NOTE

Due to a production error in last month’s Your Commodore, the review of Challenge Software’s Treble Champions carried the wrong INFO Box. Unfortunately the scores presented did not give the game the justice that is deserved. We on the Editorial team apologise to Challenge Software, and the readers who may have been confused and we feel that it is only right to print the correct INFO Box here.

GAMEPLAY: 93%
GRAPHICS: N/A%
SOUND: N/A%
LASTIBILITY: 91%
OVERALL: 93%

“Treble Champions is possibly the most complete football strategy game to date...”

The spectrum screen shots: LIVERPOOL HOME TO CHARLTON

SPECTRUM SCREEN SHOTS
NEON ZONE

If it's Christmas, it must be coin-ops, coin-ops and more coin-ops. Well, that's what all the major publishers decided a few years back anyway and as the punters have responded with wopping the wads of green stuff on counters all around the country, I guess they must have been right.

You can count the home format hits over the years - Gauntlet, Outrun, Operation Wolf - just three of the titles that took the elusive number one spot over the festive season on consecutive years, with a whole trail of others not far behind, all riding on the back of phenomenal arcade success.

Christmas '86, Gauntlet, the first four-player game ever in the arcades, '87 gave us Outrun the best and most glamorous driving game at the time and in '88 came Op Wolf the not particularly ideologically sound electronic shooting gallery that virtually caused a world shortage of 10p pieces.

If you are an afficionado of coin-ops, you'll notice that there's a significant time lag between a machine hitting the arcades themselves and appearing on home formats. The reason for this is pretty obvious. Coin-op manufacturers program and manufacture the games to an almost finished state (bear in mind the scale of the operations here - Sega alone have a workforce of 400 engineers working on the next Afterburner), they then offer the licence to program the game on home formats to the various software houses.

Decisions are made, deals - whereby obscenely large amounts of money change hands - are struck, and then the programming must begin. Yes, some poor son-of-a-bitch has now got to get down to the brass tacks of fitting some 4 Meg extravaganza into 512, 64...or if he's done something particularly nasty in a past life, 48K.

How the hell do you start doing that, you might ask yourself? Well, in some cases it's quite simple. You don't. Many of the present generation of games, particularly the Sega titles, work by throwing tonnes of hardware at the thing, pre-shifting loads of sprites and just (just!) blitting them up on the screen very, very fast. And you can't do that on any affordable home machine available today. So what do you do?

Some conversion houses take the view that if you can't do it properly, you don't do it at all and turn such work down. Others, bear in mind that there is a fair bit of dosh being flung around for these jobs, not to mention possible prestige, set to work on cutting the original game down like a crazed plastic surgeon, so it can work on common home micros, after a fashion.

In the days when all that was in an arcade machine was a 6809 processor, 32K memory and a sound chip, true coin-op conversions were possible. Now, the coin-op hardware has accelerated away into the distance, way out of reach of even the high end home machines, like the Amiga. What you get now are coin-op facimilie and anyone that thinks you get the same as the original deserves to get disappointed!

One of the reasons that coin-ops seem to be slightly less prevalent this year than previously, Activision are at it the same as ever though. Last year it was Afterburner and R-Type - this year it's Altered Beast and a very ambitious conversion of Power Drift.

Power Drift in particular is going to pose very, very significant problems, being a selection of blindingly fast sprite routines. Cut down the colours, take out the scenery, is it really going to be the same kind of experience as the original which was primarily designed to be a sit-in, throw you around, assault you with ear shattering decibels job? I think not, Brian.

How about US Gold, who must be piqued about failing to make the hat-trick with Thunderblade last time around? Only Capcom titles on release this year with a creditable version of Strider hitting the streets about now and Goats 'n Ghosts coming in on the run up to December. There's a near perfect version of this on the Sega Mega-Drive console, so this is certainly a possible in the authenticity stakes, but the gameplay is a bit unspectacular and too similar to the original Ghosts 'n Goblins that did so well for Elite way back. But maybe the punters will be rushing back for more of the same.

Perhaps it's Ocean again who are in with the best strike at the top spot, as Chase HQ made a good enough impression in the arcades and, although challenging to write, is basically a driving game where you can bash into the opposition. Got to be a contender along with Op Wolf follow up, Operation Wolf.
Thunderbolt and Cabal.

But in the Dark Horse department, you have to consider Domark who'll be releasing on all formats the biggie, Hard Drivin', from Atari Games. Now this title was the first coin-op to use filled polygon graphics (like Carrier Command) - not counting the weird I-Robot - and is a great game to boot.

Due to some dodgy programming stateside, the coin-op hasn't got a startlingly fast frame rate and the 16 Bit version should come out about the same, with the 8-Bits suffering but still, probably acceptable...and in trendy 3-D too. That's my tip for the top for this Chrissy, for what it's worth. But what about next year...for now is the time that next year coin-op conversion hits start making their way into the arcades.

Driving games have, again, been making the arcade operators feel warm inside as the pennies drop noisily into the coin slots. The award for most technically advanced has to go to Winning Run from a company called Namco. Like Hard Drivin' this one is a filled poly game but with a difference. It's fast. Very, very fast with some heartbreakingly beautiful touches, such as fading the pallate of background objects up as they proceed towards you. Just like in real life.

It's a race game par excellence as well with smart and quick opposition plus car handling you'd normally dream about. In two modes of difficulty — hard and bloody impossible — there's plenty of life in the thing, so get yourself along to an arcade and try it out now and good luck to the guy that has to put it on home format.

Sega is probably the single most successful arcade company. Its "I've got a hardware expanded sprite routine and I'm going to use it" approach has spawned many hits, along with some sophisticated sit-in units. Its latest is also its best — Super Monaco Grand Prix.

SMGP is also a racing game — but with a different breed compared to something like Winning Run. If the latter were an elegant gymnast, SMGP would be Mike Tyson. The thing impresses by sheer power of volume and speed and is guaranteed to leave you breathless and wanting more! Can't see the software houses turning this one down.

Capcom has come up with a new hardware configuration called its CP System, based on a couple of super custom chips that were developed in-house.

This board can obviously do great things — Strider and the newest Willow and Dynasty Wars being three of them — but the feeling is that the best is yet to come.

In the beat-em-up stakes, the sprites are becoming bigger and bigger — in game such as Violence Fight and Data East's fantasy combat bash, but nothing new beyond that.

After the success of Op Wolf, there have been many similarly inspired games, the white knuckled Mechanised Attack from SNK, Cabal and the latest, Dynamite Duke. The only surprising thing was that the official follow-up from Tafto, the two player Operation Thunderbolt was such flop. Overall, however, `89 has established that the common or garden hardware used in the everyday PCB games has vastly outstripped the capability of the most popular home computers.

A simple game such as SNK's Prehistoric Isle has so much going on, in so many colours, even that would be difficult to undertake. The pace of technological change — the one that spawned home computers and video games almost simultaneously — is so fast that in coin-op terms, the machine you bought last year, let alone five years ago, is now obsolete in arcade terms.

Which begs the question — if that is the case, what will we all be playing in two Christmas's time? And on what machines? Enter stage left a Commodore games console, maybe? Well, whatever, keep that joystick handy, Player One, and give those aliens hell! Until then, if you have been, ta very much...Kirk out.
<table>
<thead>
<tr>
<th>COMMODORE 64 DISK</th>
<th>CASK DISK</th>
<th>COMMODORE 64 DISK</th>
<th>CASK DISK</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>10 COMP-1T</strong></td>
<td>6.00</td>
<td><strong>40</strong></td>
<td>10.00</td>
</tr>
<tr>
<td>VOL. 1</td>
<td>12.05</td>
<td><strong>41</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>10TREX-CAMPS</strong></td>
<td>4.95</td>
<td><strong>42</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>11</strong></td>
<td>6.00</td>
<td><strong>43</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>12POO</strong></td>
<td>6.00</td>
<td><strong>44</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>EDWIN-DOU</strong></td>
<td>6.00</td>
<td><strong>45</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>RACER</strong></td>
<td>12.05</td>
<td><strong>46</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>A.F.P.</strong></td>
<td>12.05</td>
<td><strong>47</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>A.T.T.</strong></td>
<td>12.05</td>
<td><strong>48</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ACC</strong></td>
<td>6.00</td>
<td><strong>49</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ACE</strong></td>
<td>12.05</td>
<td><strong>50</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ACTIVATION</strong></td>
<td>12.05</td>
<td><strong>51</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>AIRBRAND</strong></td>
<td>12.05</td>
<td><strong>52</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ALCOHOL</strong></td>
<td>12.05</td>
<td><strong>53</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>AMERICAN</strong></td>
<td>12.05</td>
<td><strong>54</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ARMOR</strong></td>
<td>12.05</td>
<td><strong>55</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>ASIA</strong></td>
<td>12.05</td>
<td><strong>56</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>AVON</strong></td>
<td>12.05</td>
<td><strong>57</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BARBARIAN</strong></td>
<td>12.05</td>
<td><strong>58</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BARTER</strong></td>
<td>12.05</td>
<td><strong>59</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BAUER</strong></td>
<td>12.05</td>
<td><strong>60</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BAYLOR</strong></td>
<td>12.05</td>
<td><strong>61</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BEACON</strong></td>
<td>12.05</td>
<td><strong>62</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BASKETBALL</strong></td>
<td>12.05</td>
<td><strong>63</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BARBARIAN</strong></td>
<td>12.05</td>
<td><strong>64</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BAUER</strong></td>
<td>12.05</td>
<td><strong>65</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BEACON</strong></td>
<td>12.05</td>
<td><strong>66</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BASKETBALL</strong></td>
<td>12.05</td>
<td><strong>67</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BARBARIAN</strong></td>
<td>12.05</td>
<td><strong>68</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BAUER</strong></td>
<td>12.05</td>
<td><strong>69</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BEACON</strong></td>
<td>12.05</td>
<td><strong>70</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BASKETBALL</strong></td>
<td>12.05</td>
<td><strong>71</strong></td>
<td>10.00</td>
</tr>
<tr>
<td><strong>BARBARIAN</strong></td>
<td>12.05</td>
<td><strong>72</strong></td>
<td>10.00</td>
</tr>
</tbody>
</table>

**UNLISTED ITEMS**

Discounts shown are 10% from RRP of Full Price Software. Discount 50% from RRP of Commodore Add-Ons. Send SAE for FULL LIST!

**SIXTY FIVE**

Alright then! You’ve bought your C64 or C128, Disk Drive and maybe a Printer and Colour Monitor. So what are you going to do now?

Are you content to simply use all this expensive equipment to play the odd game, or, do you want more from your computer system? If the answer is YES then this is for you.

*Commodore Disk User (CDU)* is a magazine packed with programs, features and reviews for the less games-only orientated C64/C128 user. Sit down and ask yourself these simple questions:

**Do I want my programs ready to use without typing in endless listings?**

**Do I want quality software that serves a useful purpose?**

**Do I want the occasional good game to play?**

**Do I want interesting and in depth features on programming techniques?**

**Do I want a FREE disk every month?**

If you can answer YES to any of these questions then *CDU* is for you.

*CDU* is produced with the serious user in mind. On the front of each issue is a disk that has at least 10 programs on it.

You can expect to see: Sprite Editors; Machine-Code Monitors; Assemblers; Graphics Packages; Disk Utilities; Business Packages; Games and much more. Occasional programs on such things as:- Programming Sound and Music, Rasters, Interrupts and Extended Basics.

So ‘Come on Down’ the price is right! Take a step in the right direction and subscribe to COMMODORE DISK USER.
NOVEMBER ISSUE ON SALE OCTOBER 20TH
COMMODORE DISK USER is what you have been waiting for — take out a subscription TODAY!

COMMODORE DISK USER is a lot more than just another computer magazine. Every issue carries a diskette containing more than £50 worth of software ranging from serious programming utilities to arcade games. There are plenty of Commodore magazines on the market, but we believe that this is the first to cater for disk users of all ages and tastes.
Mark Everingham is back with the concluding part of his Introduction to
Plus/4 Machine Language

7501 Machine Language Instruction Set
The instruction set of the 7501 processor is simply the collection of commands which the processor can understand, just like all the BASIC commands PRINT, LIST etc. What follows is a list of commands, each three characters long and requiring one operand. The action of the command is shown in symbolic form, with a brief explanation and example. All the examples can be entered into the TEDMON monitor using the method explained earlier. The valid addressing modes are shown along with the listing of any of the flags of the status register altered by the command. The meaning of each addressing mode is explained in the section entitled "The 7501 Addressing Modes". The conventions below are used in the symbolic representation of the operations. In order to conserve on space, only short examples have been included. Many such examples can be found in back issues of Your Commodore or in the future FourGround articles.

- "h" - Hex digit of number
- "M" - A memory/immediate byte
- "A" - The Accumulator
- "N" - The Negative Flag
- "B" - The BRK Flag
- "V" - The Overflow Flag
- "C" - The Carry Flag
- "X" - The X Register
- "D" - The Decimal Flag
- "Y" - the Y Register
- "T" - Interrupt Enable Flag
- "Z" - The Zero Flag

ADC (Add With Carry)

Addressing Modes: ADC # $hh ADC Shh ADC Shhh,X ADC Shhh,Y ADC ($hh),Y ($Shh,X)

Function: The ADC instruction is used to add two numbers together, using the accumulator. The operand + the setting of the carry flag (1 or 0) is added to the accumulator and the result is left in the accumulator. Any carry necessary is shifted into the carry flag. If the result is > 127 then the N flag is set. If the result is zero, Z is set. If the result is > +127 or -128, the V flag is set. Normally prior to use, you should clear the carry flag. The example below calculates the sum of 16 and 48.

Example: .6000 LDA # $10 ' Load A with value 16
CLC ' Clear Carry flag for addition
ADC # $30 ' Add value 48
BRK ' Return to TEDMON

AND (Perform Logical AND On Accumulator)
Operation: A AND M→A Flags Altered: N,Z

Addressing AND AND Shh AND AND Shhh,X Shhh
Modes # $hh Shh,X Shhh
AND AND AND AND
Shhh,X Shhh,Y (Shh,X) (Shh,Y)
Function: Those bits which are both set to 1 in the accumulator and in the operand are left as 1 in the result. All other bits are set to 0. If the result is > 127, N is set and if the result is zero, Z is set. The example below sets alternate bits in the byte 255 to zero.

Example: .6000 LDA # $FF 'Load .A with value 255
AND # $AA 'And .A with value 170
(alternate bits)
BRK 'Return to TEDMON

ASL (Arithmetic Shift Left)
Operation: C ← [7,...,0] − 0 Flags Altered: N,Z,C
Addressing: ASL Shh ASL Shh,X ASL $ffff
Modes: ASL Shhh,X

Function: All the bits within either the accumulator or a memory location are shifted left. Big 7 is shifted into the carry flag and Bit 0 is replaced with zero. The N and Z flags are set as for the AND instruction. Shifting a byte left has the effect in binary of multiplying it by two. The example below calculates 24*4.

Example: .6000 LDA # $18 'Load .A with value 24
ASL 'Shift .A left (*2)
ASL 'Shift .A left (*2)
BRK 'Return to TEDMON

BCC (Branch If Carry Flag Clear)
Operation: Branch If C=0 Flags Altered: None
Addressing Modes: BCC Shhh

Function: The BCC instruction examines the status of the carry flag and if it is set to zero, jumps to the specified address. Note that the address must be within -128 or +127 of the command address. This is automatically checked by TEDMON. The example below adds two numbers and if a carry does not occur, sets the result on the screen.

Example: .6000 LDA $A5 'Load .A from address $A5
- (Clock)
CLC 'Clear carry flag
ADC $A6 'Add value in address $A6
- (Clock)
BCC $6098 'If carry clear, jump to $6098
BRK 'If set, return to TEDMON
STA $0C00 'Carry clear – store result on screen
BRK 'Return to TEDMON

BCE (Branch If Carry Flag Set)
Operation: Branch If C=1 Flags Altered: None
Addressing Modes: BCE $hhh

The BCS does the opposite of the BCC instruction. It tests the carry flag and if it is set, jumps to the specified address. Again, this address must be within -128 and +127 of the current address. See the example for BCC, substituting BCS for BCC. This stores the result in the screen memory if a carry did occur.

BEQ (Branch If Equal To Zero)
Operation: Branch If Z=1 Flags Altered: None
Addressing Modes: BEQ $ffff

Function: The BEQ instruction jumps to the specified address if the last result set the Z flag because it was equal to zero. The example below adds the value in D0 to the value in D1 and if the result is zero (they are both zero) then it stores an "a" symbol on the screen.

Example: .6000 LDA $D0 'Load .A with value in $D0
CLC 'Clear carry flag for addition
ADC $D1 'Add value in $D1
BEQ $6008 'If result is zero, jump to $6008
BRK 'Result is not zero – return to TEDMON
STA $0C00 'Store value 0 in screen
BRK 'Return to TEDMON

BIT (Test Bits In Memory)
Addressing Modes: BIT Shh BIT Shhh

Function: The BIT instruction tests the bits of a memory location against the value in the accumulator. Bit 7 of the memory value is transferred to N and Bit 6 to Z. If the result of ANDing .A with the memory location is zero, the Z flag is set. Neither the values in the accumulator or in the memory location are changed. The example below looks at the first character on the screen and if it is reversed, replaces it with a space.

Example: .6000 BIT $0C00 'Test bits of value on screen
BMI $6006 'If character is reversed, jump to $6006
BRK 'Not reversed – return to TEDMON
LDA # $20 'Load .A with space character
STA $0C00 'Store space character on screen
BRK 'Return to TEDMON

BMI (Branch On Minus)
Operation: Branch if N=1 Flags Altered: None
Addressing Modes: BMI $ffff

Function: The BMI instruction tests the setting of the N (minus) flag and if it is set, jumps to the specified address. The N flag is set by other instructions where the resultant byte is > 127 (bit 7 set). As for all other branches, the destination address must be within -128 or +127 of the current address. The example below counts from 128 to 254 in steps of two in the accumulator.

Example: .6000 LDA # $00 'Load .A with value 0
CLC 'Clear carry for addition
ADC # $02 'Add 2 to accumulator
BMI $6002 'If result > 127 jump to $6002
BRK 'Result < 128 – return to TEDMON

BNE (Branch If Not Equal To Zero)
Operation: Branch if Z=0 Registers Altered: None
Addressing Modes: BNE $ffff

Function: The BNE instruction does the opposite of the BEQ command, performing a jump if the last result was
not zero. See the example for BEQ, replacing BEQ with BNE.

**BRK (Break Interrupt)**
Operation: PC → Stack, SR → Stack, 1 → B Flags None
Altered:
Function: The BRK instruction, which needs no operand forces a Break interrupt to occur. On the Plus/4, this causes control to be transferred to TEDMON. In fact, the instruction jumps to the address found in $0316 like a JMP ($0316) command. The PC and SR settings before the command may be pulled off the stack using PLA.

**BVC (Branch If Overflow Flag Clear)**
Operation: Branch If V=0 Flags Altered: None
Addressing Modes: BVC Shhhh
Function: The BVC instruction tests the status of the V flag in the status register and if it is clear (no overflow has occurred), does a jump to the specified address. There is no equivalent BVS instruction. The example loops until Bit 6 of the value in $A3 (Clock) is set.
Example: .6000 BIT $D0 'Test bits of value in $D0
BVC $6000 'Overflow (Bit 6) clear – loop
BRK 'Overflow set – Return to TEDMON

**CLC (Clear Carry Flag)**
Operation: 0 → C Flags Altered: C
Function: The CLC instruction which requires no operand resets the carry flag of the status register to zero. It is most useful in preparation for an ADC instruction. See any of the examples using ADC for a demonstration.

**CLD (Clear Decimal Mode)**
Operation: 0 → D Flags Altered: D
Function: The CLD instruction resets the D flag to zero, taking the Plus/4 out of decimal mode back into standard binary arithmetic. For an explanation of the decimal mode, see the SED instruction.

**CLI (Clear Interrupt Disable Flag)**
Operation: 0 → I Flags Altered: I
Function: The CLI instruction clears the I flag and thus enables IRQ interrupts. No other flag is affected. For an explanation of interrupts, see the relevant section.

**CLV (Clear Overflow Flag)**
Operation: 0 → V Flags Altered: V
Function: The CLV instruction simply resets the overflow flag of the SR to zero. Although this is not of any use for arithmetic operations, it can be used to produce a JMP effect using a CLV followed by a BVC. The use of this is that such a command can work when it is placed anywhere in memory whereas a JMP instruction will only work in the address for which it was intended. The example below is equivalent to JMP $6010.
Example: .6000 CLV 'Clear the Overflow flag
BVC $6010 'Branch to $6010

**CMP (Compare Value Against Accumulator)**
Operation: No Effect Flags Altered: N,Z,C
Addressing
- CMP
- CMP $hh
- CMP $hhh
- CMP $hhh,$hh
- CMP $hhh,$hh,$hh
- CMP $hhh,$hh,$hh,$hh

Function: The CMP instruction is used to compare a value with the accumulator in order to find which is larger, smaller, or if they are the same. The bits of the status flag are set thus:-
- \( A < V \) \( \text{THEN} \) \( N=1, Z=0, C=0 \)
- \( A = V \) \( \text{THEN} \) \( N=0, Z=1, C=1 \)
- \( A > V \) \( \text{THEN} \) \( N=0, Z=0, C=1 \)

Combinations of these values are also possible, for instance just testing C shows that \( A \) is greater than or equal to the operand value. Once the CMP instruction has been carried out, you can test the settings of the flags and perform a branch accordingly. The example adds three to the accumulator until the result reaches 160.

Example: .6000 LDA # $00 'Load A with value 0
CLC 'Clear carry flag for addition
DC # $03 'Add value 3 to accumulator
CMP $A0 'Compare A to value 160
BCC $6002 'If A < 160 jump to $6002
BRK 'value > 160 – return to TEDMON

**CPX (Compare Value Against X)**
Operation: No Effect Flags Altered: N,Z,C
Addressing
- CPX # $hh
- CPX $hh
- CPX $hhh

Function: The CPX instruction performs an identical operation to CMP except that the comparison takes place between the \( X \) register and the specified operand value. The settings of the flags are identical to those for CMP.

**CPY (Compare Value Against Y)**
Operation: No Effect Flags Altered: N,Z,C
Addressing
- CPY # $hh
- CPY $hh
- CPY $hhh

Function: The CPY instruction performs an identical operation to CMP except that the comparison takes place between the \( Y \) register and the specified operand value. The settings of the flags are identical to those for CMP.

**DEC (Decrement Memory)**
Operation: M-1 → M Flags Altered: N,Z
Addressing
- DEC DEC $hh,X
- DEC $hhh DEC

Function: The DEC instruction is used to decrease the value stored in a memory location by 1, as if you had subtracted one from it. The result of the decrement is stored back in the source location. If the value is decremented past zero it becomes 255. The N flag is set if the result is > 127, and the Z flag set if the result after the decrement is zero. The instruction does not set the carry flag like ADC and SBC. The example below decreases the border colour until it becomes black (value 0).
Example: 6000 DEC $FF19 'Decrement border colour in $FF19
BNE $6000 'If result < 0 jump to $6000
BRK 'Result = 0 - Return to TEDMON

DEX (Decrement X)
Operation: X-1 → X Flags Altered: N,Z

Function: The value currently in the .X register is decreased by one and returned to the X register. As for DEC, if the result goes below zero, it becomes 255. The N and Z flags are set in the same way as by the DEC command. The example below uses the DEX instructions to provide short pause in the running of a program.

Example: 6000 LDY # 0 'Load .X with initial value 0
DEX 'Decrement value in .X
BNE $6002 'If result <0 jump to $6002
BRK 'Return = 0 - return to TEDMON

DEY (Decrement Y)
Operation: Y-1 → Y Flags Altered: N,X

Function: The DEY instruction performs an identical action to DEX except that it operates on the Y. index register. The example program for DEX will work equally well if LDY and DEX are replaced by LDY and DEY. Settings of flags are as for DEX.

(EOR (Perform Exclusive-Or On Accumulator)
Operation: A EOR M → A Flags Altered: N,Z

Function: Those bits that are set to one in either the accumulator or the specified operand are set to one. Those bits which are both zero in accumulator and operand are set to zero. Those bits which are set to one in both accumulator and operand are set to zero. The resultant byte is left in the accumulator. If the result is >127, N is set, and if the result is zero, Z is set. The EOR instruction has the effect of toggling bits in a byte.

INC (Increment Memory)
Operation: M+1 → M Flags Altered: N,Z

Addressing INC INC $hh,X INC $hhh INC
Modes: $hh $hhh,X

Function: The INC instruction does the opposite of the DEC instruction, adding one to the value stored in a specified memory location. The result after the incrementation is stored back in the source location. If the value is incremented past 255, it returns to zero. The N flag is set if the result is > 127, and the Z flag if the result is zero. The example below increments the border colour until it goes past 255 back to 0 (black).

Example: 6000 INC $FF19 'Increment border colour in $FF19
BNE $6000 'If result <0 jump to $6000
BRK 'Result =0 - return to TEDMON

INX (Increment .X)
Operation: X+1 → X Flags Altered: N,Z

Function: The INX instruction performs the same operation as INC except that it increments the .X register rather than a memory location. The operation and flag settings other than this are identical to INC. The example below increments the value originally in the .X register until it reaches 192.

Example: 6000 INX 'Increment value in .X register
CPX # $C0 'Comapre value in .X to 192
BNE $6000 'if .X <192 jump to $6000
BRK 'X = 192 - return to TEDMON

JMP (Jump To Location)
Operation: M → PC Flags Altered: None

Function: The JMP instruction is used to change program flow to a specified address, like the BASIC GOTO command. None of the flag or register settings are changed. The jump is unconditional and is not limited to the -128, +127 range imposed on branch instructions. The example below just jumps back to itself for ever!

Example: 6000 JMP $6000 'Jump unconditionally to $6000

JSR (Jump To Sub-Routine)
Operation: PC +2→ Stack, M→ PC Flags None Altered:

Addressing Modes: JSR Shhhh

Function: The JSR instruction is equivalent to the GOSUB command in BASIC. First the address to which control must return after the sub-routine is pushed onto the stack, then a jump is carried out to the specified absolute address. When a subsequent RTS is found, the return address is pulled back from the stack and jumped to. The example below calls a short routine to increment the border colour, then ends.

Example: 6000 JSR $6004 'Jump to sub-routine at $6004
BRK 'Return to TEDMON
INC $FF19 'Sub-routine - increment border colour
RTS 'Return from sub-routine

LDA (Load Accumulator)
Operation: M → A Flags Altered: N,Z

and 255 ad infinitum.

Example: 6000 LDA $FF15 'Load .A with background colour in $FF15
EOR #$FF 'Toggle every bit in byte
STA $FF15 'Store back in background colour
JMP $6000 'Loop back to start

Addressing Modes:
LDA #$hh LDA #$hh
LDA $hhh,X LDA $hhh,Y
LDA ($hh,X) LDA ($hh,Y)

Function: The LDA instruction is used to transfer a value to the accumulator. The specified operand value is loaded into the accumulator. The N flag is set if the value is >127, and Z is set if the value is zero. The source value is not affected. For examples, see any of the example programs using the instruction.

LDX (Load .X)
Operation: M → X Flags Altered: N,Z
Addressing Modes:

LDX # $hh  
LDX $hh   
LDX $hh,Y

LDX $hhhh  
LDA $hhhh,Y

LDY (Load .Y)

Operation:  M ← Y  Flags Altered:  N,Z

Addressing Modes:

LDY # $hh  
LDY $hh   
LDY $hh,X

LDY $hhhh  
LDA $hhhh,X

Function: The LDY instruction is identical in use to LDA but the specified value is loaded into the .Y index register.

LSR (Logical Shift Right)

Operation:  0 → [7...0] → C  Flags Altered:  N,Z,C

Addressing Modes:

LSR LSR LSR LSR

Shh,X $hhhh Shhhh,X

Function: The LSR instruction performs the opposite of the ASL instruction. All the bits within the accumulator or memory location are shifted to the right. Bit 0 falls out into the carry flag, and bit 7 is replaced with zero. This has the effect of dividing a number by two with the binary carry bit being left in the carry flag. The example below calculates 192/8.

Example: .6000 LDA $C0  'Load .A with value 192
LSR  'Shift .A right (/2)
LSR  'Shift .A right (/2)
LSR  'Shift .A right (/2)
BRK  'Return to TEDMON

NOP (Null Operation)

Operation:  None  Flags Altered:  None

Function: The NOP instruction simply does nothing – it does not affect any register or flag, and creates a time delay of 2 clock cycles. The instruction is often used either to give a space between sections of a program or to replace other instructions during debugging.

ORA (Perform Logical OR)

Operation:  A OR M ← A  Flags Altered:  N,Z

Addressing Modes:

ORA ORA # $hh  ORA ORA

ORA ORA ORA ORA

Shhhh,X $hhhh,Y  ($hh,X) ($hh,Y)

Function: All the bits which are set to zero in both accumulator and operand byte are set to zero. All bits which are set to one in either both of the accumulator and operand are set to one. The result is left in the accumulator. The N and Z flags are set as for the AND instruction. The example below sets bit 7 of the character at the start of the screen, so reversing it.

Example: .6000 LDA $C00  'Load accumulator from screen byte
ORA # $80  'Set bit 7 (OR with value 128)
STA $C00  'Return byte to screen
BRK  'Return to TEDMON

PHA (Push Accumulator Onto Stack)

Operation:  A ← Stack  Flags Altered:  None

Function: The PHA instruction is used to push the value currently in the accumulator onto the machine stack. Once there, it can be pulled back into the accumulator using PLA. For information on the stack, see the relevant section. The example below uses a push and then pull to set up the status register flags.

Example: .6000 PHA  'Push value in accumulator onto stack
PLA  'Pull value back of stack & set flags
BRL  'Return to TEDMON

PHP (Push Processor Status Registre Onto Stack)

Operation:  SR ← Stack  Flags Altered:  None

Function: The PHP instruction does the same as the PHA instruction except that it is the status register which is pushed onto the stack rather than the accumulator. This is useful for two purposes: retaining the status register when calling a sub-routine and examining the status register by pushing PHP and pulling PLA.

PLA (Pull Accumulator From Stack)

Operation:  Stack ← A  Flags Altered:  N,Z

Function: The PLA instruction pulls a value off the stack into the accumulator previously pushed on using the PHA instruction. The N and Z flags are set in accordance with the manner for the LDA instruction. For an example, see PHA.

ROL (Rotate Left)

Operation:  C ←[7...0] ← C  Flags Altered:  N,Z,C

Addressing Modes:

ROL $hh  ROL $hh  ROL $hh

ROL X  Shhhh

Function: Bit 7 of the accumulator or memory location is shifted into the carry flag. Bits 6 through 1 are shifted left one bit, and the carry flag before the operation is shifted into bit 0. The result is left either in the accumulator or in the memory location specified. If the result is > 127, N is set and if the result is zero, Z is set. The example below uses ROL and ASL to multiply a 16-bit number by two. The low byte (Shh.LL) is stored in SD0 and the high byte (SHH11) in SD1.

Example: .6000 ASL SD0  'Shift low byte in SDi left (*2)
ROL SD1  'Rotate high byte + carry left (*2)
BRK  'Return to TEDMON

ROR (Rotate Right)

Operation:  C ←[7...0] ← C  Flags Altered:  N,Z,C

Function: The ROR command does the opposite of ROL. Bit 0 is shifted into the carry flag. Bits 6 through 1 are shifted right one bit, and bit 7 is replaced by the carry flag prior to the operation. This can be used in conjunction with LSR to perform two-byte division by two. The example below divides the 16-bit value in SD0 (low) and SD1 (high) by two.
Example: .6000 LSR $D1 'Shift high byte in $D1 right (/2)
RDR $D0 'Rotate low byte in $D0 right (/2)

RTI (Return From Interrupt)
Operation: Stack ← SR, Stack → PC Flags Altered: All

Addressing Modes: Implied

Function: The RTI instruction is used like RTS but to return control to the main program after an interrupt has been serviced. It is usually not used on the Plus/4 as the Plus/4's own interrupt handler is normally used. For more information, see the section on interrupts.

SEC (Set Carry Flag)
Operation: 1 → C Flags Altered: C

Function: The SEC instruction simply sets the carry flag in the status register to one. This is mostly used as preparation for the SBC instruction which requires the flag to be set before subtraction. See SBC for an example of its use.

SED (Set Decimal Mode)
Operation: 1 → D Flags Altered: D

Function: The SED instruction puts the 7501 processor in your Plus/4 into its decimal emulation or BCD (Binary Coded Decimal) mode. Normally, numbers are represented in binary, 8 bits holding a number up to 255. In decimal mode, each byte hold a number between 0 and 99. The numbers are represented by two hex digits: $99 is 99 decimal, $23 is 23 decimal and $67 is 67 decimal, digits over $9 not being allowed. The mode is of limited use. The only time I have used it myself is for an on-screen clock in my OOPS! program to be printed in "Your Commodore" in the future. All the arithmetic (ADC and SBC) instructions work while in decimal mode. The example below uses decimal mode to add 23 and 54 together, giving a BCD result.

Example: .6000 SED 'Enable decimal mode
LDA # $23 'Load A with BCD value 23
CLC 'Clear carry flag for addition
ADC # $54 'Add BCD value 54 to A
BRK 'Return to TEDMON

SEI (Set Interrupt Disable Flag)
Operation: 1 → 1 Flags Altered: 1

Function: The SEI instruction disables all IRQ interrupts by setting the interrupt disable flag in the status register. For a full discussion, see the section on interrupts.

TAX (Transfer Accumulator to .X)
Operation: A → X Flags Altered: N,Z

Function: The TAX instruction simply moves the value in the accumulator into the .X index register. The command also sets the N and Z registers accordingly, as if a LDA instruction had been performed. The example below pulls a value off the stack and transfers it to the .X register. This is useful as there are no PLX, PLY instructions.

Example: .6000 PLA 'Pull byte off stack into accumulator
TAX 'Transfer value into .X
BRK 'Return to TEDMON

TAY (Transfer Accumulator to .Y)
Operation: A → Y Flags Altered: N,Z

Function: The TAY instruction works in exactly the same way as the TAX instruction, transferring the value in the accumulator into the .X register and setting the N and Z flags as for LDA. See TAX for an equivalent example.

TSX (Transfer Stack Pointer to .X)
Operation: SP → X Flags Altered: N,Z

Function: As mentioned in the section on the stack, the pushing and pulling values on the stack is handled by an index register, the stack pointer (SP). The value in the stack pointer may be transferred into .X using the TSX instruction. This provides an alternative means of accessing the stack, not needing the accumulator. The example below pushes a value onto the stack and then retrieves it in .Y without using the accumulator.

Example: .6000 PHA 'Push accumulator onto stack
TSX 'Transfer SP to .X register
INX 'Increment .X register
LDY $0100,X 'Pull .Y from stack area
TXS 'Restore new SP setting
BRL 'Return to TEDMON

TXA (Transfer X to Accumulator)
Operation: X → A Flags Altered: N,Z

Function: TXA works just like TAX except here the value stored in .X is transferred to the accumulator instead of vice-versa. This can be especially useful when you want to store the value in .X on the stack temporarily. The example below shows this.

Example: .6000 TXA 'Transfer value in .X to accumulator
PHA 'Push value onto stack
BRK 'Return to TEDMON

TSX (Transfer X to Stack Pointer)
Operation: X → SP Flags Altered: N,Z

Function: As the reverse of TSX, the value in the .X index register is transferred to the stack pointer. This instruction should be used with care as incorrect setting of the stack pointer can cause a program to crash. For an example of correct use, see TSX.

TYA (Transfer .Y to Accumulator)
Operation: Y → A Flags Altered: N,Z

Function: The TYA works just like TAX and TAY except that the value in the .Y register is transferred to the accumulator. For an applicable example, see TAX and TAY.

7501 Addressing Modes

Most of the 7501 instructions just covered require a number as their operand. However, this number can take many forms, all of which lead to a simple byte-long number. The way in which this final number is specified is called an addressing mode. In all operations except stores and jumps,
the actual number is the contents of the address specified
and not the address itself.

Implied Mode. With implied mode, no operand is
specified. In a command like TXA, PHA, the location of
the data byte is implied by the command. Also, commands
like ASL or ROL can be used implied because omitting
the operand chooses the accumulator as the data location.

Immediate Mode [ # Shh]. In immediate mode, you
specify the byte number directly rather than as an address.

Absolute Mode [Shhhh]. In absolute mode, you simply
specify an address of a memory location in the range 0-
65535. The byte operand is then defined as the contents
of the location you have specified.

Zero Page Mode [Sh]. Zero page mode is identical
to absolute mode except that the address you specify can
only be between 0 and 255. The advantage of using this
mode is that it is faster, and because the operand is 8-
bit instead of 16-bit, the command takes up one byte less
than when using absolute mode.

Relative Mode. Relative mode is that used for all branch
instructions. The idea is that instead of specifying an
absolute address, you provide an offset which is added to
the current address to find the destination. The programmer
never has to worry about how this offset is calculated as
TEDMON does the calculation for you.

Indirect Mode [(Shhh)]. Indirect mode can only be used
by one command, the JMP instruction. The 7501 looks
at the absolute address you specify, and gets its jump address
from there. The final address is stored with low byte (ShhLL)
at the location specified, and the high byte (ShhhH) at
the next location on.

Absolute Indexed Mode [Shhhh,X/SHh,Y]. Absolute
indexed mode calculates the address from which to get a
byte by adding the value stored in the index register you
specify to the base address. Thus if .X is set to 34, LDA
$1200,X would get a byte from the address $1234.

Zero Page Indexed Mode [Shh,X/Shh,Y]. Zero Page
indexed addressing is the same as absolute indexed except
that the base address can be between 0 and 255 instead
of 0 and 65535. The advantage is speed and compactness.

Indirect Indexed Mode [(Shh),Y]. Indirect indexed
mode, sometimes called post-index indirect mode is a little
more complex. The address $Shh is a zero page address (0-
255). The base address is found in $Shl (low byte) and $Shh+1
(high byte). From then on, the mode works like absolute
indexed mode. $Shh, Y with $Shhh being the address
found at $Sh in zero page. The ,Y register is added to the
destination to give the final address.

Indexed Indirect Mode [(Shh,X)]. Indexed indirect
mode, sometimes called pre-indexed indirect mode is a little
strange. The address location is calculated thus: The zero
page address $Shh is added to the value in ,X. A base address
is then loaded from the zero page address $Shh+X, and this
forms the final 16-bit address. The mode seems of limited
value, and I have never myself seen a program on any 7501-
type processor using the mode!

Plus/4 ROM/RAM Paging Considerations For Data Transfer
Most computers, such as the BBC Micro have only one
memory map. That is to say that RAM extends from $0000-
$FFFF and ROM from $8000-$FFFF. The Plus/4
however is more flexible than that. It has RAM from $0000-
$FFFF, but the area from $8000 onwards can either be
RAM or ROM, giving the computer a full 64K of RAM.
You can choose to have RAM at $8000- by doing a STA
$FF3E, and ROM by doing a STA $FF3F. All LDA,
JSR etc. operations work on the current type of memory,
ROM or RAM. Note that when using RAM at $8000
onwards, you must disable interrupts first. The two
programs below would appear at first to do the same
thing, but the first loads the accumulator with a byte from ROM
and the second from RAM, by using the STA instructions
to page RAM or ROM in.

Program 1:
  SEI
  STA $FF3E
  LDA $8000
  STA $FF3E
  CLI
  BRK

Program 2:
  SEI
  STA $FF3F
  LDA $8000
  STA $FF3E
  CLI
  BRK

The simple method of choosing between ROM and
RAM configurations makes the Plus/4 far more powerful
than standard single memory map computers.

An Introduction To Plus/4 7501 Interrupts
Interrupts seem to frighten many people, but are really
nothing to fear. Interrupts are just what they sound like
— interrupts! You can program your Plus/4 so that whenever
a specific event occurs, it interrupts the main program which
is running, and says "Hang on a minute, I'm sorry to
interrupt but I've got something important to do now
so you'll have to wait until I've finished." Your program, called
the interrupt handler can then do whatever it wants, then
it returns control back to the main program which continues
running as if nothing had happened.

There are several different events which can be used
to generate interrupts, but here we will consider only the
simplest, what are called raster interrupts. Normally,
interrupts are used on the Plus/4 to keep the system clock
read by TI and TIS running. Every time the screen on your
TV or monitor is redrawn, an interrupt is generated. This
occurs every 50th of a second in the UK. When this interrupt
is generated, a JMP instruction is done: JMP (S0314),
S0314 being a "vector" containing the address at which
an interrupt handler can be found. Then, a routine in the
ROM of your Plus/4 updates the clock, scans the keyboard
and does miscellaneous other work. This means that you
can get your own program to run at the same time as
Bassic, by changing the address stored in S0314. The program below
sets up interrupts so that every 50th of a second, the border
colour is incremented.

... 6000 SEI 'Disable interrupts for setup
   LDA # $0D  'Load .A with low byte of $600D
   STA $0314  'Store low byte in interrupt vector
   LDA # $60  'Load .A with high byte of $600D
   STA $0315  'Store high byte in interrupt vector
   CLI       'Re-enable interrupts
   RTS       'Return to BASIC
   PHP 'Interrupt Handler - Push SR to stack
   INC $FF19 'Increment border colour
   PLP ' Pull SR back of stack
   JMP $C80E 'Return to ROM interrupt handler

The program can be entered into TEDMON and then
called by eXiting to Basic and doing a SYS DEC ("6000") to enable the routine (equivalent to G$6000). From then on, everything works normally, but the border colour changes colour rapidly. This is how the program works.

The first section just changes the address at $0314-$0315 to point to our program at $6000D. When you change this address, you should always stop interrupts first, and re-enable them when you're done. The interrupt handler routine now in action first saves the SR on the stack. Any routine used as an interrupt handler must preserve the contents of all the registers should be pushed into the stack and then restored at the end of the routine, hence the PLP. Control is then returned to the ROM by a JMP SCEL0E into the ROM interrupt handler. This allows the ROM's routine to work, to keep the keyboard active and to update the clock.

And that's really all there is to it! Obviously, there are many ways in which interrupts can be used other than this simple demonstration, and the scope of the subject is really beyond this magazine, but once you grasp the basic principle, you should have no problem going on to more complex uses.

Bibliography And Final Word...

I hope from this short series I have given you an appetising taste of machine code and a foundation knowledge. We have only covered the simpler aspects of machine language programming due to lack of space, and you will probably find this course most useful accompanied by a few reference books. The books I used to write this introduction to machine-code, and which I would recommend are:


Put pen to paper and tell us your news, views and groans

Dear YC,

I feel that I must write and express my views. I purchased a C16 in 1984 and enjoyed the scope of this machine so much that the following year I bought a Plus/4, and I am still impressed by its capabilities.

However, things might have been different if I had known at the time that both of these machines were only a stop-gap until the C128 and Amiga were developed more.

Although I am satisfied with the Plus/4, the software manufacturers appear not to be, support for the machine has been poor. It is picking up slowly now but the demand will never be as great as for the C64, because it lacks the numbers game.

So, why not help all those C16 and Plus/4 owners and compile a C16-Plus/4 edition of *Your Commodore*, you already have the material to hand, so why not re-cycle and up-date a selection of articles from the last five years' magazines. Your range of material must be vast, therefore this edition would appeal to all levels of operators.

Perhaps if you did run such an edition, you might influence some software manufacturers to think again – not such a bad idea!!

K. Williams, Gt. Yarmouth, Norfolk

I agree wholeheartedly with you. The Plus/4 is a very much underrated machine. However, you cannot simply just produce a one off magazine like this every so often. In fact, we have already published the 'Your Commodore C16 and Plus/4 essential guide', back in 1988. On top of this, we have to date got no less than 5 disks of Plus/4 software available through our Readers Services department. The fact of the matter is this, like any other commodity, computers and computer software rely on supply and demand. I think that the following will clearly show what I mean.

At the moment, I have 154 readers submissions awaiting publication. This figure can be broken down as follows:

C64 = 141; C128 = 4; Amiga = 1; Plus/4 = 8. (C'est la vie).
Dear YC
Could you, through your letters pages, please help me solve one of life’s great mysteries.
I have been searching this fair land of ours for some 18 months now, for a copy of the instruction manual for the Currah Speech Cartridge. Unfortunately, my efforts have proved fruitless. I am turning to you as a last resort. Could you please publish my plea for any help in this matter. Thank you.

Ken Cole, 33 Ramsfort House, Roseberry Street, London SE16 3NZ

Thanks for the letter. Here goes...
Come on now you lot out there, someone must be able to help our Ken. Any help would be much appreciated. Please send all replies direct to Ken and not to Your Commodore. Thank you.

Dear YC
The reason for this letter is simple. I am a dedicated C16-Plus/4 user. Therefore, I have started a C16-Plus/4 club. The club intends to produce a monthly magazine which will include Program listings, Tips, Hints, Pokes and Reviews.
If there are any C16-Plus/4 owners that would like to join the club, they can write to me at the address below for details. I would like to add that any C16-Plus/4 users can join, no matter what age, sex, level of competence you are.

R. Robinson, 112 Cliff Road, Hornsea, North Humberside, HU18 1JE.

Thanks for your letter. It is nice to see that someone is actually doing something positive for a change. Good luck with the venture.

Dear YC
I was interested to read your review article about the LC-10C colour printer. I purchased one about a month ago. On arrival, a small part of the membrane key system was dented, which was of course no matter to the control or print output. But after 3-4 colour printouts, two hex dumps in colour, then 8-9 test ones (in Black), in NLQ, the NLQ faded to below draft quality! I therefore phoned Star and spoke to someone that sounded like a young girl assistant. I do not think she understood what I explained to her. I later spoke to someone that appeared to be more technically minded. We both agreed that the ribbon should last far more than those few printouts at NLQ. This was at 11:30 in the morning. At 11:45 the next morning a replacement colour ribbon arrived by post. How’s that for excellent after sales service?! (11 out of 10 to Star).

I wrote back with my thanks, and the following suggestions:
1. The clear part of the plastic cover should be removable in addition to the rest of the plastic cover. This lets one see the print as it is made.
2. As far as I know, only fanfold paper can be scrolled back by the printer, to the top of the page. Single sheets do not obey the command. It should be made possible for single sheets.
3. I found out that if one pulls the release lever to one then ‘backs’ the single sheet with the first sheet of fanfold paper, then the command for the printer to return both the single sheet together with the first sheet of the fanfold paper does work. The fanfold sheet is the first of several sheets of the fanfold stack. The purpose of all this?! One can print in more detailed graphics to pin detail.

J. Bradley, Lanarkshire, Scotland.

Thank you for your comments regarding the review. I have tried your suggestion regarding the scrolling and it does appear to work just fine. Thanks for the tips.
All your C128 problems answered by resident boffin Stuart Cooke.

Cry for help

Dear 128 Corner,

I wonder if you or any of your readers can help me. When using my 128 in CP/M mode I am unable to display the Pound sterling sign on either the Screen or the printer.

On pressing the POUND key I get a Hash sign ( # ) displayed instead. Just as if I had pressed the Hash key.

If you can solve this problem it would make life easier for me as at the moment when in CP/M I have to type Pounds sterling.

I use a Wordprocessor called VDE13 which I obtained from the Public domain, (I am writing this with it) which I think is very good, but would be even better if I could use the POUND sign.

I would also like to know if it is possible to change the Character colour from purple on booting CP/M. Can I change the colour from within a profile sub file, as I have put this file on my CP/M boot disk so as to ask me the Date and time on booting CP/M.

Your Commodore is a brilliant Mag for Commodore users and the 128 Corner is a great idea, its encouraged me to write to you, and I hope you are able to keep it going.

Steve Travis,
Barnsley

After much experimenting in the office I'm afraid that we've come up with a blank regarding your pound sign. You can alter the keymap using the KEYDEF program that is on your system disk to alter the code that any key on the keyboard prints. All we can suggest is that you change the character code that is assigned to the pond key to the same code that your printer expects for this character. You may find that the character does not appear as a pound on the screen, chances are it will be a back slash, but as long as your printer is set up to print a pound you should have no problems. See your printer manual for details on the code to use for a pound sign.

The same program KEYDEF can be used to set the screen colours upon boot up. Don't make changes to the system disk supplied with your C128, make them on a copy of it. KEYDEF has quite a large help file associated with it so you should have no problems using it.

If anyone knows of a better way to allow Mr Travis to have a pound sign please let us know.

Glad to hear that you like the mag and 128 Corner. Remember keep writing in with any tips, hits, views on software and general queries and we'll do our best to keep this page both topical and informative.

Video Memory Expansion

Dear 128 Corner,

In the July issue of Your Commodore you mentioned the video memory expansion from ESSL that brings the video memory of the VDC up to 64 K and you said that you don't know an order company that sells such an expansion.

There is a company in Switzerland that sells such an expansion and also a special Basic that supports the new memory. With this Basic you will be able to reach a resolution of 700x720 pixels.

The program is called Graphic Booster and it is available with the memory expansion for the C128/D in the plastic case and without the expansion for the C 128 D in the metal case. Contact Combo AG, Tugginerweg 3, CH-4500 Solothurn, Switzerland.

J. Beta
Ingerkingen
W. Germany

It's good to see that Your Commodore reaches parts that other computer mags cannot reach!

Thanks for the info on the Swedish company, other readers may wish to contact them directly at the address quoted. I have write to the company myself and will let you know through these pages about prices and any other C128 goodies that they may have available as soon as I get a reply.
Dear 128 Corner,

I have just read your article 128 Corner in the recent edition of Your Commodore, and must congratulate you upon taking the initiative to set up a regular page for C128 users.

I have been a Commodore fan for a number of years, and earlier this year decided to upgrade from the old faithful C64 which had served its purpose well but was stretched to its limits. Although the Amiga and PC clones looked very attractive, the initial outlay for both hardware and software was prohibitive!! so the C128D was bought, and C64 sold, the prospect of wider horizons for myself, and lots of old C64 software to keep the kids happy. Then the bubble burst...where was all the software and support for this machine....oh dear I've bought a dud!!! etc etc.

However I can now say how pleased I am with the C128D, with real wordprocessing courtesy of Superscript, and a machine which can offer the budding programmer 2 processors to play with. I have progressed now to the stage of writing small Z80 routines in 128 mode and transferring them over into CP/M, and feel that the opportunities for learning are once again wide open. OK my pals with the PC clones can still boast massive memories, terrific speeds, and huge cost for software!! but many admit when having seen the C128 in action that its presentation and results are virtually as good, but the C128 is far more versatile and offers the learner far more scope.

Is it beyond the bounds of possibility for an MS DOS emulator to be constructed with the Z80, or is it exclusive to the 16 bit machines?? I have looked at a few MS DOS books for hints on how the system is put together but all that I can find is user instructions... no nitty gritty!! Does anyone have any thoughts on this??

I have tried CP/M software from Digital which has been written for a Rainbow computer but the 1571 is unable to read the discs, should I be looking at modifying the disk parameter table or am I expecting the impossible here?? any hints??

I will certainly do my best to keep the comments flowing in to support C128 corner, and I hope many of my fellow C128 users will do the same. Well done to YOUR COMMODORE and thanks for your support.

Chris Allen
Long Eaton

Glad to hear that you're a C128 fan Mr Allan. Here at this office we still think that much of the software written for the C128 is far superior to that written for the 16-bit machines like the PC or Amiga. If you're into using CP/M why not get writing in with tips and articles as I'm sure that CP/M is an ability of the C128 that most users never use.

I'm afraid that MSDOS is designed for 16-bit computers not 8-bit like the C128 and you'll not be able to run MSDOS on your machine.

As for problems running CP/M software for the Rainbow, there are two versions of CP/M around. One, that on your C128, is written for 8-bit computers the other is for 16-bit machines. You can't run software written for 16-bit machines on your C128, you can of course use just about any piece of software written for 8-bit CP/M.

Get In Touch

C128 Corner is a forum for all 128 users. If you have any comments, suggestions or questions do send them in. Without your contribution then 128 Corner will not be able to continue, so come on, write to:
128 Corner
Your Commodore
Argus House
Boundary Way
Hemel Hempstead
Herts
HP2 7ST

YOUR COMMODORE

Seventy Nine
YOUR SERVICES

AMIGA
C64
G18

REPAIR

TELEPHONE BOOKINGS WELCOME

“COMPUTER KAPUT?”
PET V1C20
PLUS C64
C64 C128
AMIGA...

“BETTER GET”
FAST
EFFICIENT
SERVICE
FOR REPAIRS CALL
01-851 2835
NW LONDON-HARROW

M.C.E. SERVICES
33, Albert Street, Mansfield, Notts
NG18 1EA
Tel: 0623 653512

FIXED PRICE COMMODORE REPAIRS
C64
C16
PLUS4
AMIGA A360
1541
1571
COMPUTER SPARES

NO MORE TO PAY. Please ring for details.

TERMS & CONDITIONS

CLASSIFIED ADVERTISING

Our terms for new advertisers (semi-display and
lineage) are strictly pro-forma payments until
satisfactory reference can be taken up (excluding
recognized advertising agencies). Cheques and
P.O.'s should be crossed and made payable to:
ARGUS SPECIALIST PUBLICATIONS and sent to:

THE CLASSIFIED DEPT
ARGUS HOUSE, ROUNDBOUND WAY,
HEMEL HEMPSTEAD HP2 7ST.

There are no reimbursements for cancellations.
Advertisements arriving too late for a particular issue
will be inserted in the following issue unless
accompanied by instructions to the contrary. It is the
responsibility of the advertiser to ensure that the first
insertion of every series is published correctly, and
connections must be notified in time for the second
insertion, otherwise the advertisers will not accept
liability or offer any reduction in charges.

All advertising is subject to Government
Regulations concerning VAT. Advertisers are
responsible for complying with the various legal
requirements in force eg: The Trade Description Act,
Sex Discrimination Act & the Business
Advertisements (Disclosure) order 1977
Full Terms & Conditions of Advertising available on
request.

YOUR COMMODORE

COMMODORE REPAIR SERVICES

TO ADVERTISE YOUR COMMODORE REPAIR
SERVICES CALL: TONY FLANAGAN ON 0442
66551
RAT: £11.50 (+ VAT) PER SINGLE COLUMN CM
STANDARD SIZE 4cm x 1 col = £46.00 (+ VAT)

HINDLEY ELECTRONICS

EXPERT COMPUTER REPAIRS
COMMODORE - SINCLAIR - ACORN
STANDARD CHARGES
(INC VAT AND FULLLY INSURED RETURN POSTAGE)

| Commodore 64 | £25.00 | Commodore 64C | £32.00 |
| Commodore 4 | £25.00 | Commodore 360 | £30.00 |
| 1541 disc drive | £18.00 | Spectrum 48k | £18.00 |
| Spectrum 1 | £5.00 | Spectrum + 2 | £25.00 |
| AMIGA 500 Disk Drive Replacement | £5.00 |

3 MONTHS "NO QUIBBLE" WARRANTY ON ALL REPAIRS
SPARES — SPARES — SPARES — SPARES

LOW PRICES E.G. Spectrum 48k MEMBRANE £3.99
Spectrum £8.99 LOW PRICES
COMPUTER IC's and GENERAL COMPONENTS WHY PAY MORE (Please ring before posting goods)

HINDLEY ELECTRONICS
DEPT YC, 97 MARKET STREET, HINDLEY WIGAN WN2 3AA Tel (0942) 522743

Computer repairs. Callers receiving same day service please ring before calling and add 10% to standard charge. (Please ring before posting goods)

TO APPEAR IN YOUR COMMODORE OR COMMODORE DISC USER CALL TONY FLANAGAN ON 0442 66551 TO DISCUSS DETAILS

COMMODORE SPARES & REPAIRS

REPAIRS
C64, C+4 .................................. £25 inc.
C128, 1541 ............................. £32 inc.
Three month warranty, 1 week turnaround

SPARES
90614 ................................ £9.95
901227 ................................ £8.95
6510 ................................ £9.95
6401 ................................ £8.95
6526 ................................ £11.50
64 Power Pack £22.00
6581 ................................ £11.25
64 Cassette Unit £22.00
6589 ................................ £12.50
C128 Power Pack £59.95
Inc VAT & PP

OASIS COMPUTER SERVICES
Dept 4C, 14 Ridgeway Road,
Salisbury, Wiltshire, SP1 3BU.
Tel (0722) 335061

COMPUTER SYSTEMS
• REPAIRS • SPARES
• SALES & SUPPLIES

dB
ELECTRONIC SERVICES
CHELMSFORD 260874
THE END IS NIGH

Bribe of the Month

The big wobbly jelly spider
- Virgin Mastertronic

Gazza signs for wrong game

Paul Gascoigne was obviously confused at the recent press launch in aid of his new game. He performed a photo shoot in what one might call a ‘naff’ Batman costume for the shoot photographers that arrived. This was either a very clever ploy by Ocean software’s Gary Bracey, or he was modelling next year’s Tottenham strip. I know which excuse I’d plump for.

Freddy finally killed off

Ha! Ha! US Gold does what no American teenager could, it has eliminated the master of dreams himself, Freddy Krueger. Although we had planned a large feature on Mr. Pizzaface, we have been informed that the computer game has been scrapped and there are no plans to resurrect it in the future. Mr. Eves you can take the mask off now. What do you mean “what mask?”

Christmas is coming

As a special competition for Public Relations peeps, YC has opened a Christmas bribe league. In our January issue (which promises to be big and wobbly) there will be a league table with a list of the top ten freebies received by the press date, and the companies who donated them.

The Computer Industry Karma Sutra

No. 1

A ball in the hand is worth two in the bush

Reader participation

If anybody discovers a small Commodore/computer related news item, or piecey that they think would fit a page of this caliber, send it in and we’ll raise a prize for every one printed. Be careful though, we don’t want anything that may raise us UP to gutter level.

Ad Manager in brain swap shock

Paul Kavanagh, Ad Manager on your big wobbly YC, recently undertook a perilous operation which scientists have been trying to perform for years. He volunteered to have his brain swapped with that of a new born chimp; when asked is it was a success he replied “Ooooh! Ooooh! Ooooh!” Fellow staff members have noticed a dramatic improvement.

Eighty Two

YOUR COMMODORE
RAMSOFT OF ROCHDALE
(FORMERLY 16-BIT SOFTWARE)
AMIGA & ST
BOOK AND HARDWARE
SPECIALISTS

Amiga DOS Quick Reference (Abacus) ........................................... £9.95
Motorola 68000 Programmers Ref Man (Motorola) ......................... £9.95
1001 Things To Do With Your Amiga (Tab) ........................................... £9.95
Amiga for Beginners ................................................................. £12.95
Kickstart Guide to the Amiga (Anardine) ......................................... £12.95
Kids and the Amiga (Computel) ..................................................... £12.95
Elementary Amiga BASIC (Computel) [D] ....................................... £12.95
Amiga Machine Language (Abacus) [D] .......................................... £12.95
Amiga Programmers Guide (Computel) .......................................... £14.95
Amiga DOS Reference Guide (Computel) ......................................... £14.95
Amiga Tricks and Tips (Abacus) [D] ............................................... £14.95
Inside Amiga Graphics (Computel) ................................................. £14.95
Amiga Applications (Computel) [D] .............................................. £14.95
First Book of the Amiga (Computel) ............................................... £14.95
Amiga DOS — Inside & Out (Abacus) [D] ....................................... £16.95
Advanced Amiga BASIC (Computel) .............................................. £16.95
Computer Viruses — A High Tech Disease (Abacus — NEW) ........ £16.95
Amiga Users Guide to Graphics, Sound, Telecom (Bantam) ............. £16.95
Becoming an Amiga Artist (Scott-Foresman — NEW) ..................... £16.95
Amiga 3d Graphics Programming in BASIC (Abacus — NEW) [D] .... £17.95
Using Deluxe Paint II (Computel) ............................................... £17.95
Learning C — Graphics on Amiga & Atari ST (Computel) [D] ........ £17.95
Amiga BASIC — Inside & Out (Abacus) [D] ...................................... £18.95
Amiga Microsoft BASIC Programmers Guide (Scott-Foresman) .... £18.95
Inside the Amiga with C (Sams) ................................................... £19.95
Amiga DOS Manual (Bantam) ..................................................... £22.95
Programming the 68000 (Sybex) ................................................... £22.95
Amiga Disk Drives — Inside & Out (Abacus) [D] ........................... £24.95
Programmers Guide to the Amiga (Sybex) .................................. £24.95
Amiga Programmers Handbook (Sybex) ...................................... £24.95
Amiga Programmers Handbook Vol 2 (Sybex) ............................... £24.95
Amiga ROM Kernel Ref Man: Includes & Autodocs (A.W. — NEW) .. £29.95
Amiga C for Advanced Programmers (Abacus — NEW) .................. £29.95
Amiga System Programmers Guide (Abacus) [D] ........................... £29.95

PLEASE NOTE:
16-BIT SOFTWARE HAS NOW EXPANDED A GREAT DEAL, AND NOW
TRADES UNDER THE NEW NAME OF RAMSOFT.
WE CAN NOW OFFER 48 HR DELIVERY ON ALL STOCK ITEMS.
IF THE ITEM YOU REQUIRE IS NOT ADVERTISED
PLEASE CALL US ON THE OFFICE NUMBER.
WE CAN CALL ALL ITEMS REQUESTED AT OUR SHOWROOM
WITHIN 24 HOURS (SUBJECT TO AVAILABILITY)

AMIGA HARDWARE
OFFERS

* RAMSOFT PACK A
AMIGA A500. 512K MEMORY. 1 MEG INTERNAL DRIVE, T.V. MODULATOR, KICKSTART 1.3, WORKBENCH 1.3,
TUTORIAL AND EXTRA DISKS, MOUSE AND MOUSE MAT, 10 TOP P.D. GAMES OR 10 BLANK DISKS AND LABELS
£359.00

* RAMSOFT PACK B
THIS PACKAGE AS ABOVE PLUS!!! 10 STAR PACKED
VALUE AT OVER £240, PAINT PACKAGE AND FOR A
LIMITED PERIOD, SLAYGON & FINAL MISSION
£379.00

* RAMSOFT PACK C
AMIGA A500. KICKSTART 1.3, WORKBENCH 1.3, MOUSE MAT,
10 TOP QUALITY P.D. GAMES, PHILIPS CM8833 MONITOR
£544.99

ACCESSORIES
CUMANA 3.5 INCH DRIVE £99.99
KONIX NAVIGATOR JOYSTICK £12.95
QUICKSHOT II TURBO JOYSTICK £9.95

PRINTERS
SEIKOSNA SP-150 + LEAD ........................................... £139.99
CITIZEN 120-D + LEAD ........................................... £139.99
STAR LC10 MONO + LEAD ........................................... £169.00
STAR LC10 COLOUR + LEAD ........................................... £199.00

WHY NOT CALL IN OUR SHOWROOM WHERE EXPERIENCED AND HELPFUL STAFF CAN HELP SOLVE YOUR PROBLEMS!
OUR SHOWROOM ADDRESS IS: UNIT 1, 160 DRAKE STREET, ROCHDALE, LANCs
OR CALL US ON (0706) 43519 BETWEEN 9.00 AM & 5.30 PM
BOOK PROGRAMS ON DISK!!! AVAILABLE FOR ALL TITLES MARKED WITH A (D) £9.95
PLEASE NOTE: DISKS CAN BE BOUGHT WITHOUT BOOKS!!! SEND CHEQUE/PO/ACCESS OR VISA DETAILS TO:-
RAMSOFT, DEPT YC, UNIT 1, DRAKE HOUSE, 160 DRAKE STREET, ROCHDALE, LANCs, ENGLAND. OL16 1PX
24 HOUR DESPATCH ON ALL STOCK ITEMS SUBJECT TO CHEQUE CLEARANCE
ALL OFFERS ARE SUBJECT TO AVAILABILITY, AND MAY CHANGE AT ANY TIME. E&OE
Britain's First Music Magazine for the Computer User!

Featuring Reviews on Hardware & Software across all formats — Micro Music is the magazine the Computer Musician has been waiting for.

Available 8th September from all good newsagents.