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THIS MONTH'S PROGRAM

Left: Corbin  
Waters - page 26



Right: Corbin  
Waters - page 26



Movie: Moon Zone - page 27



Left: Glass  
Compo - page 54

YOUR COMMODORE

# THIS MONTH'S PROGRAMME

**54 Bits of the Journal**  
The first of our YC Photo-stories. He was an innocent boy until he entered the red-hot Highlights zone.

**58 Printer Review**  
The Gantt 24 - order to plug into your computer that 24 cent!

**65 Arcade**  
They say 62m-ops can make you go blind, John Cooke would disagree! Read his statement.

**68 Background**  
Plug-in owners, we haven't forgotten you.

**75 Mailbag**  
Full of lively letters.

**78 128 Corner**  
What do you call an object with 128 corners.

**82 Back Page**  
Are there 10 seconds to six scandalous scribbles. Evidently not!

**52 Moonwalker**  
Hill-bred. He's mad, he's down-right looney worthy Michael J. Hall's classic, hell-on-wheels game.

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

**Titanic** (think about that one).

**56 Big Wobbly Casino**  
Win a shirt and a ball signed by Robert Henderson. Nope. Paul Gasquigne, 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 sharper than the sword. Liked, 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 Australian story!

**20 Kybote**  
That's what you get if you sit on a scratchboard board.

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

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Take heed all brothers out there. Do not touch the Aztec bonds!

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**13 Citadel**  
Stand a Helder!

## YOUR PROGRAMMER

Full text programme section see page 33.

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Your Committee incorporating Year 66 is a monthly magazine appearing on the first Friday of each month. Argus Specialist Publications Editorial and Advertisement offices, Year Committee, Argus House, Boundary Way, Boreham (Sussex) BN9 7ST. Telephone 0432 86624. Subscription rates upon application to Your Committee/Subscription Department, Inform Ltd, 5 River Park Estate, Birkhamstead, Herts SG4 1EL, U.S.A. Subscription Agent: Wine Girl Worldwide Publications, 433 West 128th Street, Torrance CA 90505 U.S.A.

ISSN 0269-8277



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**Origination:** Ebony  
**Printer:** Chase Webb

**Game Show Goodies**

The jangle of Christmas bells will come early this year as the bills at the Personal Computer Show ring in the new year. Panic will no doubt be quickening the hearts of the programmers and managers throughout the country as the 23th of September deadline approaches.

Although there are always a few surprises which are kept under wraps until the last minute, a few morsels are thrown to the press to whet the appetite. So far Progress 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 Fendish team and bound into a 16 bit treat called *Project Xynonophy*. Also from the Interceptor Group, the low price label, Premier Budget, debut's its latest Joe Blade epic.

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



# SPEAKETH...

**O**n Sunday 17th August 1989 I was invited to participate in the computer industry event of the year. Grandblain Entertainments had hired Luton Town's football ground for the day, and ran a charity soccer tournament in aid of the Hillsborough disaster fund and the baby care unit at Liverpool Maternity Hospital.

Needless to say that although the journalists came rain-soaked on the day, due to a rather exciting penalty shoot-out, both Paul Kavanagh and myself thoroughly enjoyed our day out and we look forward to competing next year. Apparently over £8,000 was raised on the day and congratulations must go to Stephen Wall of Grandblain and everybody else involved in the organisation for making it a successful venture.

This brings me nicely to the subject of football related games. Although we shall be exploring these in much greater detail in a later issue, I just find it quite startling that this year so many licensed soccer games are being released.

There's the Liverpool, Arsenal and Saint and Grimsby games from Grandblain; *Gazza's Super Soccer* from Empire; *Manchester United* from Emerald; and *Super League Box* from Anadigmatic (being programmed with advice from Lou Macari). As soon as *Vinny Jones'* boxing comes out my life will be complete.

Look after yourselves until next issue and don't let your skin-pads slip...

**RI Henderson**

**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 (85ips in NLQ). The LC-15 is the one which is also available as a bottom feed

new Freddy Hardest adventure called *Souk of Misadventure*, and *After the War* a post nuclear holocaust entertainment.

Andrew Huxson will be hoping for a bonus Show this year after being demented by his star programmers on the eve of last year's exhibition. Amongst the games on preview this year is *Scavenger*, John Philips follows up to *Elexandrar* and *Nobuko*.

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

Mindscape's new games comprise *Saintrok V*, *Hardy Bushdew*, *Finnish 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 lives but it may cost you an arm and a leg.

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

version. Similarly the LC24-15 is a wider, laser version of the LC24-10.

Although Star Microvision classifies its LC series printers as low-cost business machines, the range is eminently suitable for home use. The prices start at £199 for the LC-18, £299 for the LC-10 II and LC24-10, £259 for the LC-10 colour version and rise to £399 and £499 for the LC-15 and LC24-15 respectively.

**Touchline:** Star Microvision UK, Queen Moors, 40 Debridge Road, Ealing, London W3 7BS. Tel: 01-840 1800.

## Art of Tea-leaving

It's difficult to understand what someone is saying when their tongue is placed firmly in their cheek, however, we understand that Electronic Art's *Keef the Thief* promises to steal the Show this September.

Designed for Amiga and PC users who find *The Bard's Tale* too serious and esoteric, Keef has his feet planted firmly on the ground as he creeps around Trivinity looking for a few takeways. Thieving comes easily to Keef as he searches for the six pieces of the magic stone which will make him the new God King of Trivinity.

First, Keef must find the



Keef the Thief, needs find the Great, Sun the Fox, and Paul the Fox scrolls which have a spell book. So, when there's magic about you know that Keef's got the scrolls - or maybe he always walks like that.

*Bard's Tale* fans can take Art with the latest EA fantasy roleplaying adventure, *Swords of Twilight* (Amiga only). Written by Frontall Associates, authors of the excellent *Arden*, the idea is to beat the living twilight out of the guardians of the



seven enchanted swords and thereby dispel the evil Shadowlords who have subjugated the neighbouring kingdoms. As is fits, the characters have memories so be nice to the people on the way up - you're bound to meet them again on the way down.

**Touchline:** Electronic Arts, Langley Business Centre, 11-19 Station Road, Langley, Slough, Berkshire SL4 8FR. Tel: 04751 49441.

## Winter Draws On

Blue Ribbon hope to take the Wizard with a patch predictor program at the substantially low price of £299!

*System 8 - The Football 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.

Wag 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.

*System 8* is available for C64, C16, Plus 4, Amstrad CPC, Atari BBC, Electron and MSX (whof?).

## 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 game 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 (TV) rooms. The magazine features chart talk and users of interest to make the game fans all for a mere £1.50 rental charge.



**Touchline:** *Hot Shot Entertainment, 167 Berkhof Road, Colchester Essex CO1 2AA. Tel: (0206) 711177.*



## 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-mat". 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

Denmark is to release its three games based on the Star Wars films. The Star Wars Trilogy packs in the on-top 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 Denmark: the

home computer version of Tron's on-top race game *Ward Drive!*, from US company Broderbund comes *Shufflepack Cops* and air hockey extravaganza against some hot alien competitors and *Fantasticon*, an animation graphic designer which breaks Denmark into the stilly program field.

*Hard Drive!* 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). *Fantasticon* is already in the shops but only for the Amiga and PC (£19.99).

**Franchise: Denmark**  
Ferry House, 51-57 Lucy Road, London SW13 1PX  
Tel: 01-780 2322.

## Dungeon's Drag On

A year after the launch of the C64 and PC versions of the Advanced Dungeons and Dragons epic *Jauld of Redoubt*, US Gold's 881 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? Duno!

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

Ah! But what about the second game? Oh 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 *Reverend of the Laser* will suffice.



# Going for Gold

It's all systems Go for a trip to Taiwan for Switzerland's Anders Kierulff, the winner of the first Acer Computer Olympiad which was held on 12 August at London's Park Lane Hotel. All Kierulff had to do to win was to program the most challenging version of the popular oriental game of Go.

Each year Acer sponsors the world's computer Go championships in Taipei, Taiwan and the Olympiad was devised partly as a qualifier for the event. Conceived and organised by David Levy, an International Chess Master, the Olympiad also invites entries for other events such as Chess, Scrabble and 18x18 draughts and this debut attracted 85 programs from 17 countries.

In the Olympiad, programs compete against each other in a death or glory battle to the death and the medals are awarded to the winners in each category. In the 1989 Go event the competition was expected to be stiff because the prize means a trip to compete in the world final, the winner of which can then try his program against the skills of a human expert. If the game wins, the programmer stands to claim a £1 million prize so Kierulff stands to gain a lot with his *Seven Explorers* program.

Any computer or budding white-kids who think they can beat the world's experts can get further details from David Levy at the address below. The 1990 Acer Computer Olympiad will be held at the same London venue from between 8 August and 14 August 1990.

**Franchise: David Levy**  
17 London Road, London SW18 2LP. Tel: 01-624 1311.



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# 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



**C**URSE 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 binds 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 5th-level save disk, although you may want to roll some new ones as existing characters could have race level restrictions. 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 attack-

ing the king's carriage you find yourself thrown in jail only to escape in the sewers that have become the base for the Five Knights in group of thieves. Here you will encounter your first challenge in one of your hands matches their flaming blade spined.

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 dashboard menus to control your characters. However there have been some additions to speed up gameplay. The first is the F1X option included in the camp menu that is used to take the pain out of mousing and casting "cute light sound" spells. Select F1X 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 is try and find the best way to deal with creatures such as skeletons, 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 beastie known as Dracolich which is an undead dragon that can attack with both a breath weapon - such as fire, cold or acid - and a paralyzing touch. It's just as well you can save the game anytime you enter camp. Consequently, the game takes the combat battles with 30 uses 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 periods of organized creatures, such as Dark Elves or Fire Knight 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 clicking in the screen map direct 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 core.

Your problems are compounded by the various factions of evil that are fighting for the control of the Forgotten Realm, so it's safe to



Above: Don't you think graphics like these just drag out

aware that almost everywhere is hostile and if you meet one of your "mission" 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 rumors to confront each of your enemies 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 master 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 Berberingian

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

Below: Some of the amazing lego sprites.



Above: Saves you right? You should never have visited Howell Fior's Tatos Emporium and asked for "Mithril ore great."



Above: If you ever want a high-ranking army officer, Tiberon's the place to bet!

## INFO

Gameplay: 94%  
 Graphics: 71%  
 Sonics: 30%  
 Lastibility: 95%  
 Overall:  
 78%

## INFO

Gameplay: 95%  
 Graphics: 65%  
 Sonics: 30%  
 Lastibility: 95%  
 Overall:  
 71%

# 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.

**T**his game features perhaps the worst scenario in the history of computer games. It is both sickily 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 *Sunday 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 *Sunday 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 smidge 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 about the aliens to collect extra weapons style of game. This apparently was caused by a "strange passage in the fabric of reality" which probably also explains how Virgin can follow up a classic like *Silverwings* with a game like this.

Tony Hetherington

## INFO

Gameplay: 12%  
 Graphics: 25%  
 Sound: 38%  
 Usability: 10%  
**Overall:**  
 21%

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



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



# 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 planet's 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 sea, and yet, an electrical fever was being detected.

Relaying the data back to base, the probe was replaced by a transporter ship which landed live 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 manual control for you to maneuver it around the mazes of corridors which have revealed themselves.

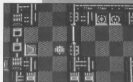
Caution is the only approach in an unknown surrounding and if you do not observe this, you will lose probes like an insect on a hot day. As you near certain areas of floor, they open and gas barrels appear and open fire. Others open

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, explosives still break out if you decide to have more than one bar-a-gain robot following in your footsteps. Newsmen 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 robot. 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



Above: I wandered lonely as a cloud mobile droid.



Above: And now on Destiny Square is the Small Mobile Droid...

their fire, but there are bastions which contain energy and feel lured around the maze. Also on your tracks 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.

Unsavants scolding, 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 Bannor

Citadel is from Electronic 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.

## INFO

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

84%

# SWORD OF ARAGON



SSI (US Gold) - £29.99

Roleplaying, politics and war are all part of this fantasy epic.

**T**he Duke of Aladdin 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 affects 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, snuffing 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 heroes 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 heal fireballs the magic in this game is more subtle. These spells affect the movement and fighting ability of friend and foe by changing the terrain or slowing an advance. Stamina can be recovered or drained and armies can be healed, confused, terrified or teleported.

As the battle continues in turn (up to a maximum of 25) 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 battles these points will assist in force 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 fancies that you have and learn how to use them to expand your empire. The incredibly high Loyalty factor is well named as it's the style of game that you actually enjoy the most your play. Starting with a lost point 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* licenses. Games like this show why it got the contract.

## INFO

Gameplay: 85%

Graphics: 86%

Sound: N/A

Stability: 88%

Overall:

91%



Above: I feel Denny in the wood above the camp option.

LABORATION Apr 11 879 GJ

A son of a merchant has returned to the portland to see if there is any more of the goods that he stole, and was killed. The remainder of the caravan was looted and destroyed by horsemen.

DEATH: Per-Han Apr 11 879 GJ

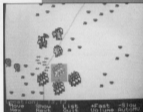
An offing of Hans, took to a rope, was found hanging in the public square.

REPORT: Aladd

Inventing 185 GP ago to prod.

Press any Key to Continue . . .

Above: There's nothing quite as satisfying as a page full of text.



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

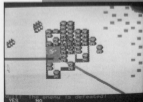
Below: More text? I like it Wiley!

```

===== BATTLE SUMMARY =====
Battle Score: 282 points.
Warrior: gains 1 level.
Cavalry: died.
Cavalry: died.
Cavalry: died.
Cavalry: died.
Cavalry: died.
Cavalry: died.
If the Cavalry: 2 killed gains 1 level.
Total Men Killed: 2
Successful DEFENSE of Aladd!
You capture a treasure of 120 GP!
  
```

Press any Key to Continue . . .

Below: The square's called "The Pink-Kills of John".





Above: How dare's that Terry Orange!

# RICK DANGEROUS

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



Above: Not Rick, that's dangerous

## INFO

Gameplay: 65%  
 Graphics: 60%  
 Sound: 50%  
 Lastability: 45%  
 Overall:  
**55%**

**T**hey 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 anonymous 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 Rick) 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 evergreen concrete marble, all you have to do now is similarly avoid a series of angry snakes, 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 unfortuately to cause you further stress and soon becomes repetitive. Fun and simple to play, I would suggest that it is overrated 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 18 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 more 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 radar

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 immortality being examples. Collecting fruit scores bonus points and if you manage to pick up all the letters of the word 'rescue', you are granted an extra life.

Medicines, 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

Below: Hummel Fried Kiwi, my favourite.



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 Hamden

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

## INFO

Gameplay: 95%  
Graphics: 75%  
Sound: 69%  
Lastability: 35%

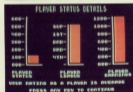
Overall

80%

# 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 Gremlin's football games starting two of the top names in football, Gary Lineker and Roy of the Ravens. 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 - in which you can pick your team from a squad of players and decide team tactics by telling forwards to shoot or pass, and defence 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 SuperSkills is a selection of training exercises, that includes gym training (such as pushups and squat thrusts), field work (including dribbling, clipping and shooting) and ball control - when you must keep the ball off the ground by bouncing it off various parts of your anatomy.

Roy of the Ravens is a curious mix of football action and arcade adventure, as some unscrupulous gang has kidnaped the Manchester Ravens team just before a big exhibition game that could save the club from

the developer's builders. In a race against time you must avoid enemy superstars, hoodlums, 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 Holmbergian

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

## INFO

Gameplay: 80%  
Graphics: 38%  
Sound: 35%  
Lastability: 42%  
Overall: 41%



# Xybots



Above: As agh! There's a robot coming at my XY Botton

Enter the heroes, two hatch-compensated type characters who waddle forth in victory as though suffering from the after effects of a grade A venereal.

Despite the ridiculous waddle war heroes are mean, if a little limited. As they move through the maze complex of the Xybots their progress is shown on a small, colorless section of the screen. This feat 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 redundant. The only advantage is 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 limitations of the humble organic body. This means they can move a lot faster, carry more armour and park twice as much punch into their shots. Despite this advantage and your rapidly dwindling power

Domark - £9.99/£12.99

A mechanical menace in the form of the Xybots is assaulting the Earth. All that stands between them and victory are two waddling heroes.

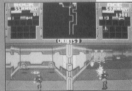
supply you still manage to slaughter the walkers. This could possibly be due to the artifacts picked up here and there on your travels. Coins can be collected for later purchase of weapons and extra firepower. Energy capsules to keep the body functioning and a host of gadgets to boost your characters 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 intervening 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 fit 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 remaining flaps a little awkward to spot so just count the number of blasts currently in circulation and if the number is greater than your health 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 Pomplery



## INFO

Gameplay: 47%  
 Graphics: 60%  
 Sound: 78%  
 Lastibility: 73%  
 Overall:  
**60%**

*Xybots is one in a range of Teenage conversions by Domark, who currently holds the license to convert all Teenage releases to home video format for the next three years.*



# APB

Domark - £9.99 Tape £12.99 Disk

The third game from Atari subsidiary Tengen puts you behind the wheel of a police car.

**A**PB, 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 wiggling 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

## INFO

Gameplay: 32%  
Graphics: 43%  
Sound: 35%  
Lastability: 28%  
Overall:  
**35%**



APB - Another Police Beat



Above: What? I've gotta arrest some sheep?

Below: I think I'd rather detour to the bar stool



# SMOOTH CRIMINAL

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 1958 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 mine, 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 54 platinum records in 29 countries,



# MOONWALKER

## ■ 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 silliness — and in true fairy-tale fashion, he takes many obstacles and shows how to overcome them (rap kids, this is all believable stuff. If you are confronted by a drug dealer 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 interlinked by Mr. Big — an evil drug boss with an evil haircut. First prob that Mike has is the journalists at a Hollywood studio, they are hungry for blood and wish to grab some Jackson niggas (any resemblance between those jamnos and the real-ones found at Argus is purely intentional).

He manages to evade them by wearing a rabbit mask, and in some smooth juppetry, he speeds away on a motorcycle until he finally escapes their ruffian pawns. 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, to which he guides 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 each an audience.

It also makes it ideal for a computer game. Which is just as well as US Gold has scored the license and will produce 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 into the home computer, with relevant songs appearing in relevant sections, and the whole game is going to be very moon-squaq. US Gold is very excited about this project and, with the help of the Kaypunch 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 Red did, everybody up in Birmingham will be happy little berries.







**Andrew Brown, the man  
around town, goes to  
PCs.**

**W**elcome 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 125 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 18,000 pages of information on the disk, that time honored 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 PC2, 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 385X machine is on the stocks, but what else?

#### **Batch File Fun**

It is often thought that MS-Dos 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 MS-Dos.

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 *Autosave.bat*. This is the Basic program that controls the computer at start up, so it's very important. Much can be done with

# LIFE'S A DOS

*Autoreun.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 $p$d
copy command.com c:
```

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

```
Files = 20
Buffers = 20
device = Ramdrive.sys
Set volume = 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 *Autoreun.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.

## • Typography

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 perpetuation 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. 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. *Typographic* suggested 18 minutes 31 seconds to generate the fonts, which then occupied 1Mbyte on my hard drive. Of this, the 72 point style occupied no less than 1.5Mbytes. Simple mathematics then gave me a figure of 73Mbytes 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 GTP 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, known 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 viewer allows it to display the contents of the files in a form near to that of the creating applications. Thus Lotus 123 files are displayed in row and column format, Dbase files as tables, and so on. Launch (P7) 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 scrupulous I have ever seen. There is a ring bound manual, plus two small booklets, and all rock of glass. 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 use? 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 first likely to purchase it.





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Reverses the action and data... (Save... video...)

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REVERSE**

For possible... (Save... video...)

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REVERSE**

Turn... (Save... video...)

**SCREEN  
REVERSE**

How... (Save... video...)

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... (Save... video...)

... (Save... video...)

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... (Save... video...)

EXCLUSIVE  
STEVE BELL  
INTERVIEW

ZEKE MAN  
WORLD MILLS

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

comic, last, fall, of or like comedy ( actor, sport) designed to amuse, fascinate, entertain, humor, ( song, paper, history of Rome, incident), introducing, comedian, paper (horse), potential publication full of horrors, at a(-ly), earth-provoking, queer, odd; ally n.[L. Gk (Amarus revert)]

- The Pocket Oxford Dictionary, Fifth Edition

**A**lthough everybody must have a vague idea of what a comic is, I find the dictionary entry above contains a phrase which sums up its definition perfectly. "Pictorial publication full of horrors" may not say "Stuart" 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 weeks. The content is crude, barbaric, and at best can be described as toilet humor, which goes half way to explaining why I (and another 799,999 dedicated readers) love it so much.



Another recent comic which has reformed 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 *Batman 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 honorable 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 screen.

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 it's tree (although competition is very scarce) and it's characters are now household names (in my household anyway!). As from it's 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 newspaper ready to receive a copy.









# 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 S basic functions.

### 44 Extending Basic 8

The eighth part of our on-going series, as it nears its impending end.

### 48 Peeplock

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 you 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 default priority arrangement in that the lower the sprite number

**Make use of the priority properties of your sprites**

By J. Simpson

# SPRITE PRIORITIES

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 ahead; 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 (i.e. Image, Mvsn, 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

image; are single 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 68-79) variables 'Y' and 'K' have been declared, and the two arrays F() and DS() declared. 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.

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.

**2. BASIC DEMO** - For programmers, and to show the system working, the basic demo program outlines a demonstration of **SPRITE PRIORITIES** in action, as well as useful routines for the controlling of which sprites are where. When you 'RUN' the program (that is after loading **SPRITE PRIORITIES**, and typing 'NEW'), then loading **BASIC DEMO**, eight sprites are displayed diagonally across the screen. The

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 1 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, 8. 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

parameters are checked (line 22). Then the updated value is DS&K) is posted 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 lower prioritized 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 needing to be done. However, should the coordinate value now be less, then line 25 calls the ML routine SPRITE PRIORITIES, whose 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 %tag) 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, as the screen, the variable 'W' 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 SPRITE PRIORITIES 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 routine 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, coloured boxes. The numbers corresponding with numerical keys and the colours as before. Should you decide to use these images, type in the basic loader and data files, and save to tape/disk. You will now have to make some changes to the BASIC DEMO program.

First, delete line 76 entirely. Change line 71 to read: POKEV + C, PO + C  
Remove the REM from line 73 and type: POKEV + 28, 235  
Remove the REM from line 73 and type: POKEV + 10, 11  
Remove the REM from line 74 and type: POKEV + 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 SPRITE PRIORITIES then type 'NEW'. If you are using sprite image data then load this in and type 'NEW'.

Now you can load and RUN the BASIC DEMO program. Remember, keys 1 to 8 will select the BLOCK you wish to control with a joystick plugged into port 2. Well, that's about it. I'm off to the path for a pint. Hope you like SPRITE PRIORITIES, and can utilize it and expand upon it...

## PROGRAM: SPRITE PRIORITIES

```

63 0 PRINT"FILE, SOUND, SPEED"***
   - LOADING...CHECKING DATA - **
64 1 DIM A(8),C(8),D(8),E(8),F(8),G(8)
   - F(8)=F(8)+1
65 2 PRINT"FILE, COLOUR, FREQ+H(8)-
   - F(8)+1"
66 3 PRINT"FILE"
67 4 IF H(8)=L THEN PRINT"FILE, SOUND
   - DATA QUANTITY ERROR IN 1
   - FILE - F(8)+1"
68 5 IF C(8)=F(8)+1 THEN GOTO 1
69 6 PRINT"COLOUR, D, NEXT
   - F(8)+1"
70 7 READ D, F(8)+1, C(8)+1, G(8)+1
   - F(8)+1
71 8 GOTO 1
72 9 IF C(8)=F(8)+1 THEN PRINT"FILE,
   - SOUND, DATA IS ERROR FREQ"
   - GOTO 1
73 10 PRINT"FILE, SOUND, HEIGHT"
   - DATA ERROR LIST END"
74 11 FREQ=H(8)+1:PRINT"FILE"
75 12
76 13 REM *** TO CALL FROM BIT
   - FOR BASIC PROGRAM - USE GOTO
   - GOTO
77 14 REM *** TO CALL FROM BIT
   - FOR THREE LANGUAGE PROGRAMS
   - USE FOR SOUND
78 15
79 16 ON D(8) GOTO 189,208,227,178,207
   - 8,28,208,1289
80 17 ON D(8) GOTO 38,38,207,189,28
   - 180,208,1289
81 18 ON D(8) GOTO 198,208,38,127,28
   - 7,208,207,189
82 19 ON D(8) GOTO 208,38,198,208,3
   - 207,207,189
83 20 ON D(8) GOTO 28,180,208,38,19
   - 208,38,209
84 21 ON D(8) GOTO 27,207,208,18,208,2
   - 208,38,178,1289
85 22 ON D(8) GOTO 189,207,207,28,19
   - 3,208,207,1279
86 23 ON D(8) GOTO 198,207,198,178,178,
   - 207,178,128,1289
87 24 ON D(8) GOTO 198,127,198,207,198,
   - 178,207,28,1287
88 25 ON D(8) GOTO 74,189,2,189,208,
   - 207,189,2089
89 26 ON D(8) GOTO 208,180,178,128,23,
   - 208,2,729
90 27 ON D(8) GOTO 187,178,207,128,
   - 208,2,208,1289
91 28 ON D(8) GOTO 189,207,208,128,
   - 28,208,28,1289
92 29 ON D(8) GOTO 2,189,178,207,19
   - 189,207,1279
93 30 ON D(8) GOTO 189,207,198,208,
   - 207,189,28,1289
94 31 ON D(8) GOTO 194,207,207,189,
   - 208,178,1289
95 32 ON D(8) GOTO 207,189,208,207,
   - 191,208,207,2099
96 33 ON D(8) GOTO 189,208,189,189,207,28
   - 1,189,207,208,208
97 34 ON D(8) GOTO 5,178,2,38,2,207
   - 208,208
98 35 ON D(8) GOTO 198,208,189,208,207,
   - 191,208,208,208
99 36 ON D(8) GOTO 208,207,189,189,208,
   - 207,178,208,208
100 37 ON D(8) GOTO 187,208,207,208,
   - 208,207,191,1289
101 38 ON D(8) GOTO 207,189,208,207,
   - 189,208,207,189,208,207,189,208,
   - 207,208,207,189,208

```



```

48 37 GETIN#
49 38
50 39 REM *** JOURNAL OF *
51
52 40
53 41 IF BVAL(PTERMIN)
54 42 GET IN(PTERMIN)=1:IF BVAL(SET
55 43 PRINT:GOTO
56
57 44 PRINT#4:PRINT, BVAL
58 45 IF BVAL(PTERMIN)=1:PRINT#4
59 46 PRINT#4:PRINT, " PRINTER"
60 47
61 48 GET IN(PTERMIN)=0
62 49 IF BVAL(PTERMIN)=0
63 50 PRINT#4:PRINT, BVAL
64 51
65 52 REM *** JOURNAL BOOK *
66
67 53
68 54
69 55
70 56
71 57
72 58
73 59
74 60
75 61
76 62
77 63
78 64
79 65
80 66
81 67
82 68
83 69
84 70
85 71
86 72
87 73
88 74
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178 164
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180 166
181 167
182 168
183 169
184 170
185 171
186 172
187 173
188 174
189 175
190 176
191 177
192 178
193 179
194 180
195 181
196 182
197 183
198 184
199 185
200 186

```

## PROGRAMMING

# VAT NUMBER CHECKER

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

By R. EMs

Have you ever wondered whether that 13 per cent VAT added to your bill

really does go to 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,

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

Simply listed! 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 180-260, contains the checking routine itself.

The checking routine returns the result of its check in two variables: V and E. If V=8, 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 two million VAT numbers.



### PROGRAM: VAT CHECKER

```

20 100 REM * * * VAT NUMBER CHE
    CKER * * *
24 310 ESC=1:"TOO FEW",ESC2="T
    OO MANY",ESC3="NON-NUMERIC"

40 180 VB="":INPUT"ENTER VAT NU
    MBER":VB:IFVB=""THENPRINT"NO
    INPUT":GOTO150

60 130 GOSUB200:IFE<>0THENPRINT
    "ERROR: INPUT WAS "ESC<>" CH
    ARACTERS"

70 340 PRINT"VAT NUMBER IS "LEF
    T$"NOT ",ABS(V*(V=0))"VALI
    D"

80 150 PRINT"TRY AGAIN (Y/N) ?
    "
82 160 GET$;IFC$<>"Y"ANDC$<>"N
    "THEN150

84 170 PRINT$;IFC$="Y"THEN150

86 180 END

88 200 REM * * * CHECK ROUTINE
    * * *

94 210 VB="":FORN=1TOLEN(C$):VB
    =VB+MID(C$,N,1):MID(C$,N,1)
    ="" :GOTO230

96 220 V=0:E=0:B=0:IFLEN(VB)<>9
    THENE=ABS(LEN(VB)-9)+1:RETR
    N

98 230 FORN=1TO8:IFMID(VB,N,1)
    =MID("80000000",N,1)*C$=A3

100 240 IFMID(C$,N,1)<"0"ORMID
    (VB,N,1)>"9"THENE=B:A=B

102 250 NEXT:IFE<>0THENRETURN

104 260 V=ABS(C-(INT(B/9)+1)*B7
    )=VAL(LEFT$(VB,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 hamper 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 busy 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 Adapter Bank (CIA)
2. A screen pointer within the bank
3. A character pointer

## THE CIA 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 listings). 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 (48192-65535) and the number 3 denotes the first block (0-16384). This is worked on line 280 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 36078 (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 value bank. Once this is done the bank is changed and you can change the screen address.

## Changing the Screen Address (lines 340-350)

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 182) 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 uses 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 character 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 188-230)

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 pointers, one to address 58334, to ensure that you are not interrupted, and the other to address 0 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 58334 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 Bank 14 to gain access to the character ROM but a full guide to this can be found on pages 280-283 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 8, 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 (SYS46064).

The position of the parameters (addresses 49132-54) is shown in the listing, as are the SYS addresses, so all I can say now is "happy programming".

		170,1,198,21,38,18,18		
188	DATA	185,185,175,24,28,41,13,1	188	FOR *****
		185,181,24,28,175,8,185,18	189	FOR = COPY CHARACTER
189	DATA	18,185,285,175,285,8,41,185,5	190	FOR *****
		285,181,28,2,175,8,185	191	FOR*****.FOR=DATA+185-284
190	DATA	18,185,285,175,28,8,41,185,5	192	FOR FOR 5, FOR=FOR+185-284
		285,181,28,2,175,8,185	193	FOR FOR 185 TO 583: FOR=DATA,
191	DATA	18,185,285,175,28,285,8,41,185,5		FOR=DATA+1: NEXT
		8,185,181,24,28,185,175,8	194	FOR FOR 1, FOR=1: ON 4
192	DATA	185,18,18,18,18,18,185,285,175,	195	FOR FOR 18588, FOR=DATA+1: ON 1
		84,285,41,175,175,185,184	196	RETURN
193	DATA	185,175,8,181,18,18,185,185,	197	FOR *****
		175,198,2,43,185,8,185,141,184,1,84	198	FOR = SET C L A BANK
194	FOR = 0 TO 181 : GOTO 4 : FOR		199	FOR FOR 18588, FOR=DATA+1: ON 1
195	FOR = 0 : NEXT		200	FOR FOR 18588, FOR=DATA+185-284: ON 583
196	DATA	84,185,1,187,8,185,185,8,185,	201	FOR *****
		185,1,181,2,184,185,8	202	FOR = SET SCREEN POSITION
197	DATA	24,181,14,284,284,284,181,8,	203	FOR *****
		185,185,8,175,1,185,285,8	204	FOR FOR 18588, FOR=DATA+185-284
198	DATA	24,181,8,185,284,281,285,8,	205	FOR *****
		185,185,8,185,284,281,284,8	206	FOR *****
199	DATA	185,185,284,281,1,281,181,18,	207	FOR *****
		285,185,284,281,1,181,1,185	208	FOR = SET SCREEN POSITION
200	DATA	4,185,120,281,175,8,184,184,	209	FOR *****
		185,185,8,120,281,284,284,184	210	FOR FOR 18588, FOR=DATA+185-284
201	DATA	185,185,8,185,177,281,185,281	211	FOR *****
		185,185,285,285,120,281,285,284	212	FOR *****
202	DATA	285,285,285,185,1,1,1,181,1,	213	FOR *****
		184,1,28,28,285,141,14	214	FOR *****
203	DATA	185,175,8,181,1,181,181,1,	215	FOR *****
		481,481,285,481,181,1,1,8	216	FOR *****
204	DATA	184,141,8,185,175,8,184,18,18,	217	FOR *****
		18,18,18,18,185,285,184	218	FOR *****
205	DATA	184,1,41,481,8,285,141,184,8,	219	FOR *****



# SPECIAL

Produce those colour fades with this simple to use program  
By R. Hoben

If you have ever looked 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 writing 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 (000). 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 (005), Medium grey (00C) and light grey (00F).

Next we have an intermediate colour, which in this case is white (000). This intermediate colour is

preferably the opposite of the background. Lastly we put our final colour in which is yellow (007). 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

FADER THEORY, DIAGRAM 1





# Strung Along

Understand the use of strings with this clear, concise explanation

By E. Dumbill

It is common knowledge that Commodore 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, LEFT\$, RIGHT\$ and MID\$. 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 LEFT\$ 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$="ABC"
PRINT LEFT$(A$,2)

```

the result would be: AB

Figure 2

```

A$="ABC"
LEFT$(A$,2)="DE"

```

Now, supposing you wanted to change the "AB" to "DE" you might type:  
LEFT\$(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.

## LEFT\$

This function lets you take the leftmost characters from a string. The syntax is: LEFT\$(string, *element*), where *element* = 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 **MID**dle 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, characters)** where **start** is the start character and **characters** is the amount of characters you wish to extract. Figure 3 shows a very simple example.

Figure 3

```
AS="ABCDE"
PRINT MID$(A$,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$=NEW BITS+RIGHTS (OLD STRING$,N)
```

But, we do not know how many characters to change in the **LEFTS**, and consequently, how many **RIGHTS** characters (represented by **N**) 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 as **LEN (STRING\$) minus N**. We can put this into our program using **LEFTS** surgery:

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

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

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

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 BITS**. The length of the bit remaining intact (the **RIGHTS**) is given by subtracting the length of the changed bit (**NEW BITS**) from the length of the original string.

When?

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=RIGHT$(L$,LEN(L$)-LEN(N$))
110 RETURN
120 L$="CAT SAT ON THE MAT"
130 N$="DAN": GOSUB100

```

If you now run with GOTO100, then type PRINT L\$, hey presto!, the string L\$ will have changed to DAN SAT ON THE MAT. Just a few notes about the routine: You will always have to use L\$ 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 W1, and wished to alter it, you would need to make L\$=W1 before calling the routine, and W1=L\$ 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 repeatedly 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 have intact!

Here is the routine for a surgical RIGHTS

```

100 LS=LEFT$(L$,LEN(L$)-LEN(N$):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 MEMO. 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, MEMO and RIGHTS. Therefore, we now get:

```
ALTERED STRING$=LEFT$(OLD$,S)+NEW BITS+RIGHT$(OLD$,X)
```

As with MEMO, we can't get away with 2 parameters, N\$ and L\$, but we need a third, S, which is the character at which the MEMO 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(L$)-S-LEN(N$)
so the program for MEMO surgery looks like this:

```

```

100
110 LS=LEFT$(L$,S)-RIGHT$(L$,LEN(L$)-S-LEN(N$))
110 RETURN

```

Use it as for the routine 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  
Lohmann**

**W**hen 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 visited 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 \$0002. Under normal circumstances this location which lies in RAM and 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 (\$0006). 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 typing for **AUTO**, the last two letters of the command will be followed by the computer into **EA4**, 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 1646-1668).

Next we change the Warm Start vector so that it points at our routine, instead of the usual routine in the ROM (lines 1628-1650).

Now we print a carriage return, which puts the cursor onto the beginning of the next line (lines 1696-1698).

Now we are all set to do auto line numbering.

The overall mechanism of auto line numbering is as follows: The current line number, contained in 251/252 is printed on the screen (lines 1960-2040). 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 **PRINT**, 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 location 8030, 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 2176). 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 8030 into the input buffer.

After this, we test for direct or line numbered statement (lines 2210-2260). This is a little superfluous here, since there is no question about a direct statement being given at this point.

Line 2290 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 214/215. This is used later to search the textfile to see if the line number already exists.

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

Then the computer searches through the textfile to see if a line with this number already exists (line 2480). 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 2630 and 2660) which re-organize the Basic textfile and reset all the necessary pointers.

In lines 2710-2730 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 size while auto line numbering is on or you can't give a direct command. Furthermore, the vectors at 8030 to 8033C

```

160
170
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190
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260
270
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290
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320
330
340
350
360
370
380
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400
410
420
430
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590
600
610
620
630
640
650
660
670
680
690
700
710
720
730
740
750
760
770
780
790
800
810
820
830
840
850
860
870
880
890
900
910
920
930
940
950
960
970
980
990

```

are not changed back to normal, even when you see the run/stop restore key! 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 subroutines MDTWNG, which resets the Warm Start counter back to normal (lines 2810-2840) and then jumps to the normal warm start in Room (line 2860).

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*.

```

0000  GET PAPER PARAMETER      0000      LDR R01
0001  GET INK      0001      LDR R02
0002  GET COLOR   0002      LDR R03
0003  GET SMOOTH  0003      LDR R04
0004  GET STY     0004      LDR R05
0005  GET BRUSH   0005      LDR R06
0006  GET WASH    0006      LDR R07
0007  GET DRY     0007      LDR R08
0008  GET GUM     0008      LDR R09
0009  GET WAX     0009      LDR R10
0010  GET WAX     0010      LDR R11
0011  GET WAX     0011      LDR R12
0012  GET WAX     0012      LDR R13
0013  GET WAX     0013      LDR R14
0014  GET WAX     0014      LDR R15
0015  GET WAX     0015      LDR R16
0016  GET WAX     0016      LDR R17
0017  GET WAX     0017      LDR R18
0018  GET WAX     0018      LDR R19
0019  GET WAX     0019      LDR R20
0020  GET WAX     0020      LDR R21
0021  GET WAX     0021      LDR R22
0022  GET WAX     0022      LDR R23
0023  GET WAX     0023      LDR R24
0024  GET WAX     0024      LDR R25
0025  GET WAX     0025      LDR R26
0026  GET WAX     0026      LDR R27
0027  GET WAX     0027      LDR R28
0028  GET WAX     0028      LDR R29
0029  GET WAX     0029      LDR R30
0030  GET WAX     0030      LDR R31
0031  GET WAX     0031      LDR R32
0032  GET WAX     0032      LDR R33
0033  GET WAX     0033      LDR R34
0034  GET WAX     0034      LDR R35
0035  GET WAX     0035      LDR R36
0036  GET WAX     0036      LDR R37
0037  GET WAX     0037      LDR R38
0038  GET WAX     0038      LDR R39
0039  GET WAX     0039      LDR R40
0040  GET WAX     0040      LDR R41
0041  GET WAX     0041      LDR R42
0042  GET WAX     0042      LDR R43
0043  GET WAX     0043      LDR R44
0044  GET WAX     0044      LDR R45
0045  GET WAX     0045      LDR R46
0046  GET WAX     0046      LDR R47
0047  GET WAX     0047      LDR R48
0048  GET WAX     0048      LDR R49
0049  GET WAX     0049      LDR R50
0050  GET WAX     0050      LDR R51
0051  GET WAX     0051      LDR R52
0052  GET WAX     0052      LDR R53
0053  GET WAX     0053      LDR R54
0054  GET WAX     0054      LDR R55
0055  GET WAX     0055      LDR R56
0056  GET WAX     0056      LDR R57
0057  GET WAX     0057      LDR R58
0058  GET WAX     0058      LDR R59
0059  GET WAX     0059      LDR R60
0060  GET WAX     0060      LDR R61
0061  GET WAX     0061      LDR R62
0062  GET WAX     0062      LDR R63
0063  GET WAX     0063      LDR R64
0064  GET WAX     0064      LDR R65
0065  GET WAX     0065      LDR R66
0066  GET WAX     0066      LDR R67
0067  GET WAX     0067      LDR R68
0068  GET WAX     0068      LDR R69
0069  GET WAX     0069      LDR R70
0070  GET WAX     0070      LDR R71
0071  GET WAX     0071      LDR R72
0072  GET WAX     0072      LDR R73
0073  GET WAX     0073      LDR R74
0074  GET WAX     0074      LDR R75
0075  GET WAX     0075      LDR R76
0076  GET WAX     0076      LDR R77
0077  GET WAX     0077      LDR R78
0078  GET WAX     0078      LDR R79
0079  GET WAX     0079      LDR R80
0080  GET WAX     0080      LDR R81
0081  GET WAX     0081      LDR R82
0082  GET WAX     0082      LDR R83
0083  GET WAX     0083      LDR R84
0084  GET WAX     0084      LDR R85
0085  GET WAX     0085      LDR R86
0086  GET WAX     0086      LDR R87
0087  GET WAX     0087      LDR R88
0088  GET WAX     0088      LDR R89
0089  GET WAX     0089      LDR R90
0090  GET WAX     0090      LDR R91
0091  GET WAX     0091      LDR R92
0092  GET WAX     0092      LDR R93
0093  GET WAX     0093      LDR R94
0094  GET WAX     0094      LDR R95
0095  GET WAX     0095      LDR R96
0096  GET WAX     0096      LDR R97
0097  GET WAX     0097      LDR R98
0098  GET WAX     0098      LDR R99
0099  GET WAX     0099      LDR R100

```



# 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 toil. Before leaving your computer, it simply requires that you press 'Y' and enter any 8-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 \$1808 to \$3AC7, 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 use this area as a workspace.

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

```
SR print
  key "Message goes here";0
```

(rest of program follows.)

Having called PRIMM, the com-

puter 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 \$5400, \$F77D.

Proglok, having printed its title and prompts will then ask for any 8 character code. This is implemented by subroutine 'getcod', which inputs 8 characters, storing them in buffer 'buff'. Then the program stores the contents into the password storage area, 'pass'.

Next, prompts are printed (label 'test'), to tell the user that the computer has been locked, and that to use it he has to enter a 8 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 'test'. Otherwise, the reset 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:

```
SY54864 and press return
```

This will initialise function key 'Y' to read '\$Y54881' + chr\$(13) as the command 'KEY' will show.

Pressing 'Y' 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 instructed 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 while 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. Typing LIST and pressing return should give you your program back.

## 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:

```
SAVE "Filename", B15, P4661 TO P5313
```

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

```
LOAD "Filename"
```

```
SY5 4864
```

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

And that's it...



## PROGRAM LIST

```

1 00000000000000000000000000000000
2 00000000000000000000000000000000
3 00000000000000000000000000000000
4 00000000000000000000000000000000
5 00000000000000000000000000000000
6 00000000000000000000000000000000
7 00000000000000000000000000000000
8 00000000000000000000000000000000
9 00000000000000000000000000000000
10 00000000000000000000000000000000
11 00000000000000000000000000000000
12 00000000000000000000000000000000
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14 00000000000000000000000000000000
15 00000000000000000000000000000000
16 00000000000000000000000000000000
17 00000000000000000000000000000000
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```

```

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77 00000000000000000000000000000000

```

## C64 PROGRAMMING

# THE USER PORT

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, 5, 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 100mA since 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 systems 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. (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: 74545210
Value: 01001100

```

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, 3, 4, 1 and 0 set to input. To actually achieve this configuration, the binary number, next to the values, 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 96779,76**.

## 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 96775. To make a line go high you set it to zero (i.e. if you set bit 6 to 1 then line P06 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:

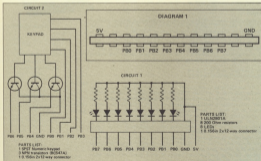
```
Bit no: 7 6 5 4 3 2 1 0
Value: 0 1 0 0 1 0 0
```

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:

```
PROGRAM: LISTING 3
87 10 80000000000000000000
88 20 80001000100010001000
89 30 80000000000000000000
90 40 8000100010001000100000
91 50 8000100010001000100000
92 60 8000100010001000100000
93 70 8000100010001000100000
94 80 8000100010001000100000
95 90 8000100010001000100000
96 100 8000100010001000100000
97 110 8000100010001000100000
98 120 8000100010001000100000
99 130 8000100010001000100000
```

```
PROGRAM: LISTING 4
87 10 80000000000000000000
88 20 80001000100010001000
89 30 80000000000000000000
90 40 80001000100010001000
91 50 80001000100010001000
92 60 80001000100010001000
93 70 80001000100010001000
94 80 80001000100010001000
95 90 80001000100010001000
96 100 80001000100010001000
97 110 80001000100010001000
98 120 80001000100010001000
99 130 80001000100010001000
```

```
PROGRAM: LISTING 5
87 10 80000000000000000000
88 20 80001000100010001000
89 30 80001000100010001000
```



00 3 00*****	76 100 0074001,187,040,3,78,188
03 10 0001+000000000000000000000000	180,188,26,20,000,041,78,20
10 00 00001,180,00,040,20,3,1	000
03 100,173	78 100 0074000,030,040,3,78,173
07 20 007401,0,000,040,0,040,3,0	180,188,03,20,000,041,78,20
01 10 0000000,78,040,180,147,17,	000
03 10 78,188	76 140 0074000,000,040,3,78,188
06 00 001880,00,00,00,20,00,78,	180,187,04,20,000,041,78,20
70,04,07,00,00,00,20,00,00,0	000
0 40,20,00,00,20,00,00	76 140 0074001,001,040,3,78,044
09 00 040077,40,20,00,77,00,00,	180,189,00,20,000,041,78,20
78,00,00,041,17,0	000
08 70 0004101,00,100,001,0,000,	76 180 0074001,180,040,3,78,000
0,20,000,040,000,00,180,78,0	180,188,07,20,000,040,78,20
0 1,00,00,0,173,1,001	000
09 00 0004001,00,180,000,3,78,4	01 000 0004001,000,040,3,78,040
0,040,141,00,180	180,200,00,20,000,041,78,20
03 00 0004001,180,040,3,78,110,	000
180,040,00,20,000,041,78,00,	76 100 0074000,180,040,3,78,7,1
000	20,180,00,20,000,041,78,40,0
20 100 0074001,010,040,3,78,180	78
180,180,00,20,000,041,78,40	00 000 0074000,000,040,3,78,00,
000	071,180,00,20,000,040,78,00,
76 100 0074001,010,040,3,78,040	001
180,180,01,20,000,041,78,40	
000	

### POKE 5677, 00

To enable you to see for yourselves what effect the contents of location 5677 has on the state of the lines, you might like to construct Circuit 1 (refer to Figure 4 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 5677, 180** 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 I. (As the program gains speed whilst it is running, you must remember that there is only one I LED lit at a time, the reason for you using more than 1 is because the effect of the image lasts on your retina for approximately 1/20th 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 5677, 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 J (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).

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All Wanderers played for The World-touring Wanderers. They were competing in the Granston Charity Shield and their fans had typed out to him...



1

Then it was the Journo match!



3

The final semi-final was the best of the World as The Software Publishers...

BUT THE BALL'S DOWN THAT END!



2

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

His didn't score, but The Journo obliged.



...twice!

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



6

OMON FOR SCORE A GOAL!

I LOVE MY TEAM IS LOOKING GREAT!



4

And as it came to the  
end, The Journal on The  
rest of the World.

ad Bed



7

Very soon, The Journal  
were 2-0 down!

WHAT A  
BOTTOM!



8

GO GO GO  
WOBBI!



But 'Mobby' Kavanagh  
refused to lie down.

9

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



And then from a free kick!

10

11

And as the match was decided  
on penalties...



... The Journal lost, but were  
not disappointed!

I WONDER WHAT  
TIME THAT  
PUB CLOSING!



12

THE END

Photography: Frank Marovetz  
Script: Rick Anagnostou



**Y**ou may ask what YC is doing to celebrate the new football season? Well no, coupled with those wobbly chappies (and chappresses) in Empire, we're 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 Man bar kid himself, Paul Gascoigne.

To get your gobby mitts on the prizes (as modified 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 joggng on the spot.

**1. From what team did Tottenham sign Paul Gascoigne?**

- a) Newcastle United.
- b) Middlesbrough.
- c) Washington Redskins.

**2. When was the last time that Tottenham won the FA Cup?**

- a) When dinosaurs did conquer the Earth.
- b) 1981-82.
- c) 1980-81.

**3. How tall is our Gazzer?**

- a) 2' 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:

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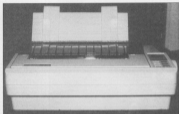


**W**obbling Y.C. Editor wobbles the frame work? At a charity penalty shoot out. After hitting the absolutely mega wobblers in to wobbling orbit he fell into an Epper-wobbling wobblers causing much concern! (they all went to lunch).  
All the advertising team of Y.C. wish Rik an absolutely wobbling football career.

**IT'S A WOBBLER!**

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.

# SWIFT AS A NEWT



Above: A rather decorative little number, don't you think?

Confucius he say, "Computer without printer is like Steve Overt - 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 scribbling on a slate and before you could say, "The anatomy of Confucius", you were five generations down the line and your lie's work was being published posthumously.

Unfortunately these aren't that many monks willing to spend their lives scribbling out my reviews for *Your Commodore*, and alas, very few monks 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, flustered 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.

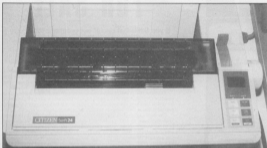
Amongst the many claims made for the Swift 24 by Citizen, is one of sturdiness. Okay, let's see I thought, and dropped it on the floor from a foot. Apart from the top flapping around like a fish in the sea outside Seahfield, the Swift was unpermaned by its flying lesson. But then again, who has their printer 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 shock wave 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 Citrus, 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 4300 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 182 characters per second (at 12dpi) 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 168 CPS (at 18dpi) in draft, and more

Below: The Swift 24, faster than a speeding psychobitch!



importantly 53 CPS at 18dpi and 64 CPS at 12dpi 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.

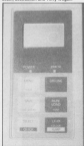
The default fonts are Times Roman (okay), Courier (very good), Helvetica (sans serif and excellent) and Prestige Elite (horrible). There is a cut away section of the printer where optional font cards can be plugged in to extend the range, and of course your software may be able to create additional fonts 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 woldaps to Latin American), page layout (line and line per inch), printer resolution (Epson LQ850, IBM Proprinter X24 and NDC P5+), font, colour or standard ribbon, pitch (proportional and up to 20CPI), and interface options.

The control panel also allows you access to four menus, 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 Citrus 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 can inflict upon it, and it's backed up by a two year warranty. If Commodore was alive today, the Swift could have saved five generations of meek an awful lot of hard work.

Below: Don't press the button that says death, destruction and Terry Wogan.



Duncan Evans

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# 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 so the punters have responded with shopping 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 the pieces.

If you are an aficionado 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 licenses 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 less tasks of fitting some 4 Meg extravaganzas 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 generations of games, particularly the Sega titles, work by throwing tonnes of hardware at the thing, pre-tilting loaded sprites and just (just!) blasting 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 stock being hung 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 circuits, after a fashion.

In the days when all that was in an arcade machine was a 6809 processor, 128K or 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 facsimiles and anyone that thinks you get the same as the original deserves to get disappointed!

Maybe this is one of the reasons that coin-ops seem to be slightly less prevalent this year than previously. Attention are all the same as ever though. Last year it was *Afterburner* and *N-Type* — this year it's *Afterglow* 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 pipped about failing to make the hit-trick with *Thunderblade* last time around? Only Capcom titles on release this year with a credible version of *Strider* hitting the streets about now and *Gods 'n Ghosts* coming in on the map 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 unimpressive 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 *Orion* again who are in with the best title 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 back into the opposition. Got to be a contender along with *Op Wolf* follow up, *Operation*

## ARCADES ■

Christmas is coming — and that means the start of the coin-op avalanche in the shops. John Cook takes a look back at the arcade hits this year and wonders how the hell you fit a 4 Megabyte extravaganza into 512, let alone 64K!





**Thunderbolt and Cabal.**

But in the Dark Horse department, you have to consider **Dunmark** 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 **Command**) — not counting the weird **I-Robot** — and is a great game to boot, boss.

Due to some dodgy programming standards, 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 is trendy 3-D too. That's my tip for the top for this Christy, for what it's worth. But what about next year...for now is the time that next years coin-op conversion kits 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 palette 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 — **Striker** and the newer **Willow** and **Dynasty Wars** being three of them — but the feeling is that the best is yet to come.

In the best coin-op stakes, the sprites are becoming bigger and bigger — in game such as **Violence Fight** and **Data East's** fantasy combat bask, but nothing new beyond that.

After the success of **Op Wolf**, there have been many similarly inspired games, the white knuckled **Mechanized Attack** from SNK, **Cabal** and the latest, **Dynasty Duke**. The only surprising thing was that the official follow-up from **Taito**, 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 overstripped 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, is very much...Kirk out.





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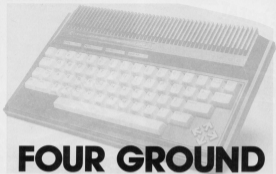
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# FOUR GROUND

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 Four Grounds 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
- "O" - The Overflow Flag
- "C" - The Carry Flag
- "X" - The X Register
- "D" - The Decimal Flag
- "Y" - the Y Register
- "I" - Interrupt Enable Flag
- "Z" - The Zero Flag

- [a] ← [b] - Byte/Bit move from [a] to [b]
- [a] ← [b] - Byte/Bit move from [b] to [a]
- [x] ← [y] ← [z] - Bit ← (y) ← (z) in a byte

### ADC (Add With Carry)

Operation:  $A \leftarrow M + C + A$ , C/Flags Altered: N,Z,C,Y

Addressing Modes: ADC #Shb    ADC Shb    ADC Shb,X  
 ADC Shb,Y    ADC    ADC (Shb),Y  
 (Shb,X)

Function: The ADC instruction is used to add two numbers together, using the accumulator. The operand + the setting of the carry flag (0 or 1) 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 Y flag is set. Normally prior to use, you should clear the carry flag. The example below calculates the sum of 16 and 48.

```
Example: 5000 LDA # 100            'Load A with value 100
          CLC                    'Clear Carry flag for addition
          ADC # 50                'Add value 48
          BRK                    'Return to TEDMON
```

### AND (Perform Logical AND On Accumulator)

Operation:  $A \leftarrow A \text{ AND } M$ , Flags Altered: N,Z

Addressing Modes: AND #Shb    AND Shb    AND Shb,X    AND Shb,Y  
 AND Shb,X    AND Shb,Y    (Shb,X)    (Shb,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 zero. 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 #255      'Load A with value 255  
           AND #8AA         'And A with value 170  
 (alternate bits)  
           BRK             'Return to TEDMON

#### ASL (Arithmetic Shift Left)

Operation:  $C \leftarrow [7] \leftarrow 0$  Flags Altered: N,Z,C

Addressing Modes: ASL, ASL, #bb ASL, #bb,X ASL, #bbhh  
 ASL, #bbh,X

**Function:** All the bits within either the accumulator or a memory location are shifted left. Bit 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  $38^2$ .

Example: 6000 LDA #518      '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, #bbhh

**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 below example adds two numbers and if a carry does not occur, stores the result on the screen.

Example: 6000 LDA #A5      'Load A from address #A5  
                               (Clock)  
           CLC             'Clear carry flag for addition  
           ADC #A6         'Add value in address #A6  
                               (Clock)  
           BCC \$6098        'If carry clear, jump to \$6098  
           BRK             'If set, return to TEDMON  
           STA \$8C00        'Carry clear - store result on  
                               screen  
           BRK             'Return to TEDMON

#### BCS (Branch if Carry Flag Set)

Operation: Branch if C=1 Flags Altered: None

Addressing Modes: BCS, #bbhh

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, #bbhh

**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 " " 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 \$8C00        'Store value 0 in screen  
 memory  
           BRK             'Return to TEDMON

#### BIT (Test Bits in Memory)

Operation: [7] of M ← N, [6] of M ← Y, Flags Altered: N,Z,V A and M ← Z

Addressing Modes: BIT, #bb ASL, #bbhh

**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 loads at the first character on the screen and if it is reversed, replaces it with a space.

Example: 6000 BIT \$8C00    'Test bits of value on screen  
           BMI \$6006        'If character is reversed, jump  
                               to \$6006  
           BRK             'Not reversed - return to TEDMON  
           LDA #320         'Load A with space character  
           STA \$8C00        'Store space character on  
                               screen  
           BRK             'Return to TEDMON

#### BMI (Branch On Minus)

Operation: Branch if N=1 Flags Altered: None

Addressing Modes: BMI, #bbhh

**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 #500      'Load A with value 0  
           CLC             'Clear carry for addition  
           ADC #80         'Add 2 to accumulator  
           BMI \$6002        'If result > 127 jump to \$6002  
                               (Loop)  
           BRK             'Result < 128 - return to TEDMON

#### BNE (Branch if Not Equal To Zero)

Operation: Branch if Z=0 Registers Altered: None

Addressing Modes: BNE, #bbhh

**Function:** The BNE instruction does the opposite of the BEQ command, performing a jump if the last result was

## ■ FOUR GROUND

not zero. See the example for BEQ, replacing BEQ with BNE.

### BRE (Break Interrupt)

Operation: PC ← Stack, SR ← Stack, I ← 0      Flags: None Altered

Function: The BRE instruction, which needs no operand forms 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 \$0016 like a JMP (\$0016) 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 Mode: BVC \$ddd

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 4 of the value in \$A3 (Clock) is set.

```
Example: $000 BIT $D0      Test bits of value in $D0
          BVC $6000      Overflow (Bit 6) clear - loop
                               To $6000
          BRE *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 value in the carry flag of the status register to zero. This 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 offset 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 \$0016.

```
Example: $000 CLV      Clear the Overflow flag
          BVC $0016      Branch to $0016
```

### CMP (Compare Value Against Accumulator)

Operation: No Effect      Flags Altered: N,Z,C

Addressing Mode: CMP + \$bb      CMP \$bb      CMP \$bb,X      CMP \$bbhh  
                   CMP      CMP      CMP      CMP  
                   \$bbhh,X      \$bbhh,Y      (\$bb,X)      (\$bb,Y)

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:-

IF  $A < \text{Value}$  THEN  $N=1$ ,  $Z=0$ ,  $C=0$

IF  $A = \text{Value}$  THEN  $N=0$ ,  $Z=1$ ,  $C=1$

IF  $A > \text{Value}$  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 100.

```
Example: $000 LDA # 300      Load A with value 0
          CLC      Clear carry flag for addition
          INC # $03      Add value 3 to accumulator
          CMP # $A0      Compare A to value 160
          BCC $6002      If A < 160 jump to $6002
          BRE *value >= 160 - return to TEDMON
```

### CPX (Compare Value Against X)

Operation: No Effect      Flags Altered: N,Z,C

Addressing Mode: CPX + \$bb      CPX \$bb      CPX \$bbhh

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 Mode: CPY + \$bb      CPY \$bb      CPY \$bbhh

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 Mode: DEC \$bb,X      DEC \$bbhh      DEC \$bbhh,X

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

**DEC (Decrement X)**

Operation:  $X-1 \rightarrow X$  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 DEB instructions to provide short pause in the running of a program.

Example: 6000 LDX # 0 'Load X with initial value 0  
 DEC 'Decrement value in X  
 BNE \$6000 'If result < > 0 jump to \$6000  
 BRK 'Return = 0 - return to TEDMON

**DEY (Decrement Y)**

Operation:  $Y-1 \rightarrow Y$  Flags Altered: N,X

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

**EOR (Perform Exclusive-Or On Accumulator)**

Operation:  $A \oplus OR M \rightarrow A$  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:  $M+1 \rightarrow M$  Flags Altered: N,Z

Addressing Modes: INC \$hh,X INC \$hhhh INC \$hhhh,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 and if 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:  $X+1 \rightarrow X$  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 # 192 'Compare value in X to 192  
 BNE \$6000 'If X < > 192 jump to \$6000  
 BRK 'X = 192 - return to TEDMON

**JMP (Jump To Location)**

Operation:  $M \rightarrow PC$  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:  $PC+2 \rightarrow Stack, M \rightarrow PC$  Flags None Altered:

Addressing Modes: JSR \$hhhh

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, and then a jump is carried out to the specified absolute address. When a subsequent RTS is found, the return address is pulled back off 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:  $M \rightarrow A$  Flags Altered: N,Z and 150 of influence.

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 \$hh,X LDA \$hh,X  
 LDA \$hhhh LDA \$hhhh,X LDA \$hhhh,X  
 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 altered. For examples, see any of the example programs using the instruction.

**LDX (Load X)**

Operation:  $M \rightarrow X$  Flags Altered: N,Z

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### Addressing Modes:

LDX #Shb            LDX Shb            LDX Shb,T  
 LDX Shhh           LDA Shhh,T

The LDX instruction is identical in use to LDA but the specified value is loaded into the X register.

### LDY (Load Y)

Operation: M → Y            Flags Altered: N,Z

### Addressing Modes:

LDY #Shb            LDY Shb            LDY Shb,X  
 LDY Shhh           LDA Shhh,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 → [\_\_\_\_0] ← C    Flags Altered: N,Z,C

Addressing Modes: LSR            LSR            LSR            LSR  
                          Shb,X            Shhh            Shhh,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 3 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 Shb    ORA            ORA  
                          # Shb            Shb,X        (Shb),Y  
                          ORA            ORA            ORA  
                          Shhh,X    Shhh,Y        (Shb),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 or 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 #0C00        'Load accumulator from screen byte  
                  ORA #80        'Set bit 7 (OR with value 128)  
                  STA #0C00        '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 if set flags  
                  BRK                'Return to TEDMON

### PHP (Push Processor Status Register 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 → [\_\_\_\_0] ← C    Flags Altered: N,Z,C

Addressing Modes: ROL            ROL Shb    ROL            ROL  
                          Shb,X            Shhh            Shhh,X

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 (SHLL) is stored in SD0 and the high byte (SHHH) in SD1.

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

### ROR (Rotate Right)

Operation: C → [\_\_\_\_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.





## ■ FOUR GROUND

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 or 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 [ #Nnn ].** In immediate mode, you specify the byte number directly rather than as an address.

**Absolute Mode [Nnnnn].** 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 [Nnn].** 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 [Nnnnn].** 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 (NnnLL) at the location specified, and the high byte (NnnHH) at the next location on.

**Absolute Indirect Mode [Nnnnn,X]/[Nnnnn,Y].** Absolute indirect 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 10, LDA \$1200,X would get a byte from the address \$1210.

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

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

**Indirect Indirect Mode [Nnn,X].** Indirect indirect mode, sometimes called pre-indexed indirect mode is a little strange. The address location is calculated that the zero page address Nnn is added to the value in X. A base address is then loaded from the zero page address Nnn+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 zero from \$8000 onwards can either be RAM or ROM, giving the computer a full 64K of RAM. You can choose to have ROM at \$8000 by doing a STA

\$FFFE, and ROM by doing a STA \$FFFF. 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 $FFF0
            LDA $8000
            STA $FFF0
            CLI
            BRK
```

```
Program 2:  SEI
            STA $FFF0
            LDA $8000
            STA $FFF0
            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 timer interrupts. Normally, interrupts are used on the Plus/4 to keep the system clock read by TI and TII 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 (\$0114), \$0114 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 Basic, by changing the address stored in \$0114. 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 # 50D       'Load X with low byte of $008D
STA $0114      'Store low byte in interrupt vector
LDA # 568       'Load X with high byte of $008D
STA $0015      'Store high byte in interrupt vector
CLI           'Re-enable interrupts
RTS           'Return to BASIC
PMP          'Interrupt Handler - Push SR to stack
INC $FF19     'Increment border colour
PLP          'Pull SR back of stack
JMP SCIRI    'Return to ROM interrupt handler
```

The program can be entered into TEDMON and then

called by cXiting to Basic and doing a SYS DEC ("6000") to enable the routine (equivalent to Q86000). From then on, everything works normally, but the border colour changes colour rapidly. This is how the program works.

The first action just changes the address at \$0314-\$0315 to point to our program at \$8000. 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 so they should be pushed into the stack and then restored at the end of the routine, hence the PULP. Control is then returned to the ROM by a JMP \$C308 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 onto more complex uses.

**Bibliography And Final Word...**

I hope from this short series I have given you an appetizing 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 the introduction to machine-code, and which I would recommend are: "Programmer's Reference Guide For The Plus/4" ISBN 0-471-12400-3 (Scott Foreman & Company)

"C/C++ Plus 4 Reference Book" (Atco) ISBN 3-717-08104-5

"The Complete Commodore 16 ROM Disassembly" ISBN 0-312-56204-6 (Duckworth)

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## COMPETITION

Complete Commodore systems for the gift below are valued at the time of the most valuable system. All entries to be received by September 26th 1989. The Prize will be paid from the accumulated fund, with interest at Standard C.P.R. 600 Computer Bank (London) Monthly.

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

Dear WC

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 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 C18 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 C16, because it lacks the numbers game.

So, why not help all these 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', hard in 1988. On top of this, we have to state got no less than 5 disks of Plus/4 software available through our Readers Service departments. 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 114 readers' submissions awaiting publication. The figure can be broken down as follows:*

*C16 = 44; C128 = 4; Amiga = 1; Plus/4 = 6. (C16 is by far)*

Dear VC

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 Cerebral 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, 31 Hamlet House, Roseberry Street, London SE26 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 most appreciated. Please send all replies direct to Ken and not to Your Commodore. Thank you.

Dear VC

The reason for this letter is simple. I am a dedicated C76-Plus/4 user. Therefore, I have started a C76-Plus/4 club. The club intends to produce a monthly magazine which will include Program listings, Tips, Hints, Tricks and Reviews.

If there are any C76-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 C76-Plus/4 users can join, no matter what age, sex, level of competence you are.

**R. Robinson, 112 Cliff Road, Harrow, North Humberdale, HU14 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 VC

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 text 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 for 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 use 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, Lancashire, 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.

# 128 CORNER

## 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 WDE11 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,

Barnaby

*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 keypad 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 pound key to the same code that your printer expects for this character. You may find that the character does not appear on a pound on the screen, changes are it will be a blank 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.*

*Good to hear that you like the mag and C128 Corner. Remember keep writing us with any tips, hints, 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 6551 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 768x720 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, Tuggingerweg 3, CH-4580 Solothurn, Switzerland.

J. Brits  
Ingenkingen  
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 given. I have written 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.*

## 18 info I won't go

Dear 128 Corner,

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

It is 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 1371 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 128-corner, and I hope many of my fellow 128-users will do the same. Well done to YOUR COMMODORE! and thanks for your support.

Chris Allen  
Langkates

*Glad to hear that you're a 128 fan. Chris Allen. Here at this office we still think that much of the software written for the 128 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 working in with tips and articles as I'm sure that CP/M is an ability of the 128 that most users never use.*

*I'm afraid that MSDOS is designed for 16-bit computers and it's not like the 128 and you'll not be able to run MSDOS on your machine. :-)*

*As for your problem running CP/M software for the Rainbow. There are two versions of CP/M around. One runs on your 128 or writes for 8-bit computers like others for 16-bit machines. You can't run software written for 16-bit machines on your 128, you can't reverse just get about any piece of software written for 8-bit CP/M.*

## Get in Touch

128 Corner is a forum for all 128 users. If you have any comments, suggestions or questions do send them in. Whether your contribution fills 128 Corner will not be able to continue to come on, write to:

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# THE END IS NIGH

## Bribe of the Month



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## 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 "half" Italian costume for the shoot photographers that arrived. This was either a very clever ploy by Ocean software's Gary Beary, or he was modelling next year's Tottenham strip. I know which excuse I'd plump for.



## Freddy finally killed off

Ha! Ha! U.S. 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 re-assess it in the future. Mr. Even you can take the mask off now. What do you mean "what mask?"



## Christmas is coming

As a special competition for Public Relations goops, 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 bribes received by the press date, and the companies who donated them.



## Ad Manager in brain swap shock

Paul Karanagh, Ad Manager on your big wobbly YC, recently underwent a painful 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 if it was a success he replied "Ooooo! Ooooo! Ooooo!". Fellow staff members have noticed a dramatic improvement.

## Reader participation

If anybody discovers a small Commodore/computer related news item, or piece 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.

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No. 1



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