

**5/2000**  
**G064!**  
commodore  
**WORLD**

Das Magazin für wahre Computerfreaks

# G064!

## NEWS/ REPORT

Interview mit/with  
Nate Dannenberg

## HEFTDISK/ COVER DISK IT'S MAGIC



## TIPS & TRICKS

Noflicker - 62Hz  
IFLI Viewer



## COVER

# DIGITALISIEREN AM C64

GRUNDLAGEN  
WORKSHOP  
HARDWARE PROJEKT  
AMIGA MODULE SOUNDS

# DIGITIZING WITH THE C64

The Basics  
Workshop  
Hardware Project  
Amiga Module Sounds



DIGIS VON DER CMD HD ABSPIE-  
LEN/PLAY DIGIS FROM YOUR  
CMD HD: DREAMS  
DIGI PLAYER



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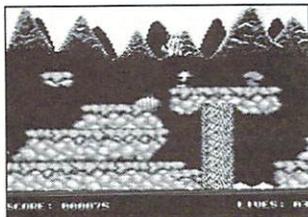
- May 2000 -

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## MODPlay Interview



Playing Amiga MOD tunes on your C64 using a REU... that's only possible with Nate's MOD-Play. You will find the player on the cover disk, the interview inside this issue and a genius hardware interface for second to none music enjoyment on page 13.



## 10 It's Magic Full version

Unbelievable. You will find a special highlight on this issue's cover disk. This is the full version of It's Magic, runnable on both PAL and NTSC computers. Better insert the floppy disk into your drive and connect your joystick! For a quick reference look at page 10.

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## Graphic Tutorial



Painting human beings and faces with expressions is the hardest thing to do, even for professional artists. In this issue's tutorial we will cover this topic and show you how to solve this mystery.



## 28 Unbelievable: 62Hz on a C128

The VIC - the final frontier... "That was long ago" you may want to say. Guenther Walter from Austria proves you wrong. With genius bit manipulation he shows how to achieve 62 Hz on a C128's 40-column VIC chip. The resulting IFLI-Viewer is of course on the cover disk.

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Preview of the next issue...

## Music!

The C64 is state of the art, more that you may think:

A radio station playing SID songs, a German music group being number one in the alternative charts, an American hip-hop group using C64 game sequences in their video are all worth being written about. But when? In the next issue of course!

Dear readers,

Ever since the introduction of computers, their users have felt the desire to enable these digital beings to take part in our brave analog reality. Therefore, this issue of the GO64! mag is dedicated to the very special machines that make this possible for computers by acting as interfaces between digital and analog realities: digitizers. No matter if it's pictures or sounds, there have been countless attempts to offer our C64s higher quality resources from somewhere other than the computer itself.

The fact that the SID does not have a digital output port for this sort of task was of minor significance. Astute observation and intensive trial work eventually revealed a way to make it possible. The VIC still caused problems due to its color placement limitations, but this was not considered a serious obstacle. And so digitizers became a huge success. Still today, a large number of different types exists. The market offers everything ranging from the usual, technically elaborate but very expensive brand products to fantastically creative home-made solutions. For example, a simple photo diode installed on top of the printer head makes it possible to digitize pictures. Simply brilliant! Most digitizers achieve astonishing quality, no matter if they are used for pictures or sounds.

One of the ensuing effects was a veritable race amongst official producers and users to present the best results, thus raising the limits of computing capacity of our beloved breadboxes ever more. Speaking of capacity: This issue contains an absolute hit for you all. There remainea a single bit in one of the VIC chip's control registers that hasn't received any real attantion until late: Once somebody started to take a closer look at it, a new application was found - an application nobody had ever thought of before.

Unfortunately for the C64-only crowd, only C128 users will be able to enjoy the benefits, but none the less: Isn't it astonishing that even after all these years it is still possible to put our machines to new uses? A 64Hertz video signal is not only a new toy for experts, but makes it considerably easier to display high resolution images with less flickering. Maybe there are other applications that can be developed from that point, who knows? But even if there aren't, we feel great seeing our mentality confirmed once more. With a bit of endurance and a strong will it's possible to turn our beloved C64 / C128 into nearly anything you can think of. Even the limits imposed by the hardware are no actual obstacles. Although the rest of the computer community all over the world doesn't take any notice of it: I'm truly very glad to see that one of our fellow fighters was so successful.

In my heart of hearts I'm going to have a little private celebration and will keep on waiting for the next sensation that's sure to come some time or other. That there will be another, I don't doubt at all. But the question remains interesting: What will it be this time?

So: "C64 / C128 forever!"

Yours,



(Wolfram Sang)

# News Flash

## What's new: Game projects

NOMAD Projects, three C64 game designers, are currently working on three games at the same time: 'GOD'z', 'Beast' and 'Star Wars: The Phantom Menace'. The first two of these are action games and you can take a look at the screen shots at the home site, while the Star Wars adaptation is going to be a classic point&click adventure including arcade elements.

<http://www.hex.uksysops.com>

(vr)

## Dr. Zoom's secret coding treasure on the Internet

Programmer Tobias Erbsland a.k.a. Dr. Zoom, particularly famous for the 'Digital Talk' mag system, has put his complete collection of coding disks on the Internet for all interested parties to consult. Amongst the information found on the web site are the source code of the D4 Adventure Editor and of his PD game 'The Jump'. A FD2000 is required to view the code as the disks are stored in this format.

[ftp://ftp.profzone.ch/c64/drzooms\\_diskimages/](ftp://ftp.profzone.ch/c64/drzooms_diskimages/)

(vr)

## Second prize for the GO64! - 'Online Today' praises our home page

The computer magazine 'Online Today' published a special on computers of the 'last generation' in its May 2000 issue. The article also contained links to pages dealing with the topic, and our home page has scored the second prize for C64 pages on the net. We would like to use this opportunity to thank 'Online Today' for the free advertisement and we are hoping for further unexpected media appearances in the future ... There's only one thing the writer of the article in question should maybe know: Datasets are nowadays no longer C64 standard, excepting for April fool tricks ...

(gb/vr)

## New Project for lost sons: Return to the C64!

People who want to return to their roots and are looking for a re-entry into the C64 scene now have a new contact on the Internet: At 'Return to the C64' users can register and will be sent free information packages containing relevant software. Moreover, they will be given an overview of the scene as it is today.

<http://how.to/RT64>

(wg/vr)

## Magic Steel: A new hand-made joystick for C64s

Hardware designer Alexander Ausserstorfer has spent months on end developing a joystick version for C64s (and all other port-compatible machines, of course). The result is called 'Magic Steel' and it is made of robust hardwood. Further information can be obtained from:

**Alexander Ausserstorfer**  
Sparzer Weg 3  
83313 Siegsdorf

(vr)

# April Fools

It is a good tradition of GO64! Magazine to include one or two jokes into our April issues. Although the last issue wasn't exactly released in April, we didn't want to leave those jokes out of our English edition of the magazine.

The next April issue will come for sure. Even if not released in the month of April, it is labeled as April issue, so better be careful and don't trust everything you read. However, we promise to give our best to fool you again!

(The GO64!/Commodore World editors)

## Manfred Trenz: Master of the Ninth Sprite?

Did you notice it? There was another mean little April fool's joke in the interview with Andreas Escher: Whoever would have managed to represent nine sprites in one grid line if not Manfred Trenz? But unfortunately it was only one of the imagination of the editorial staff run wild, and Andreas Escher was only willing to play along. Some of you coders out there probably started having serious doubts about your coding abilities, didn't you, as it's clear that more than eight sprites in one grid line are plain simply impossible.

Are they in fact? That's what we thought. But when some days later Manfred Trenz heard about our little joke and contacted us, our mouths fell open. Here's what he told us, and we have nothing to add to that:

'The famous ninth sprite ... well, it's actually quite simple, although it eats computing time like hell. All you need to do is reset the X position in a grid line with a grid line interrupt and with exact timing. Once the beam passes the position  $X=S20 + 8*3$  pixels, X is reset to a new position. When the beam exceeds this new position by 24 pixels X is reset again to its initial position. There is a demo in which the complete screen and the margins are filled with sprites by means of this principle. I'm not sure if I still have it somewhere. :( By the way, it is impossible to change the Y position of a sprite because a new Y position will only be accepted after the representation has been completed.

Let's hope that Manfred finds the demo and hasn't fooled us as well... we'll keep you abreast of all the news! (vr)

## How the C64 got into the Pentium CPU

And yet another case of a GO64! mare's nest. Many of you might have already suspected that the article on silicon graphics at the heart of the latest GigaHertz CPUs by Intel was a belated

attempt of an April fool's joke. Those of you who actually took the time and visited the web page of the National High Magnetic Field Laboratory at

<http://micro.magnet.fsu.edu/creatures>

(unfortunately there was a little spelling mistake in the URL we printed in the GO64! April issue, but the web page really exists!), found lots of other interesting things exempting the 'C64rulez' picture. None the less, there are lots of other beautiful (and actually existing!) silicon graphics.

It didn't take me very long to produce the actual fraud, and although I hate to admit it, it was done on a PC. First, I searched the 'creatures' homepage for an appropriate picture to work with [longhorn.jpg]. This picture was large enough to be manipulated. I used a word processing program to format the text in an adequate size and TrueType font 'commodore64-v511.ttf' with the attribute 'outline'. This font also contains the Commodore symbol. Then I copied the text and the image to an image processing software, thus

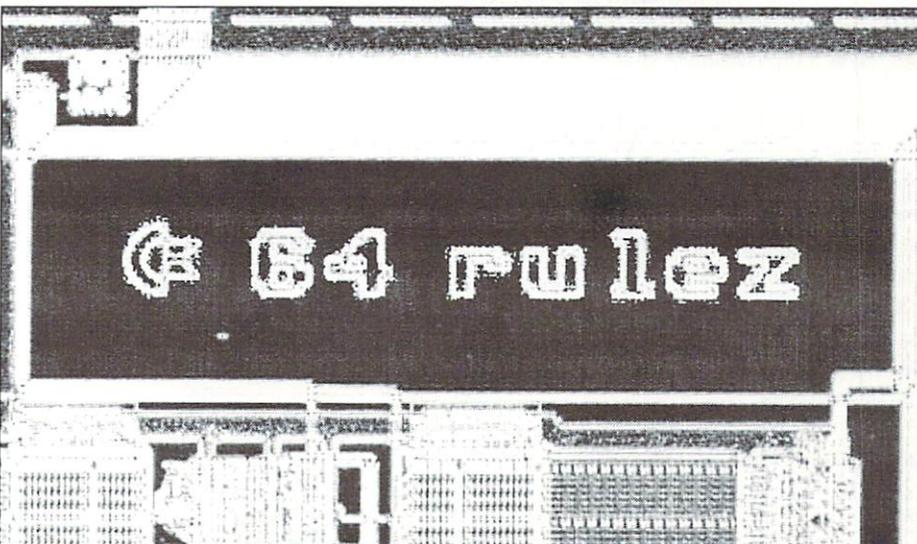
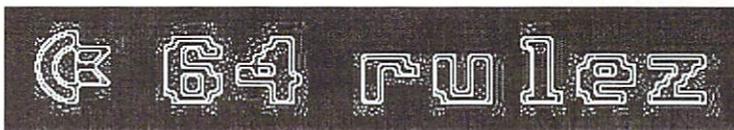
converting the text into a graphic which I first inverted and then blurred [64.jpg]. With a solarisation effect filter (overexposure leads to a partly negative representation) a second inversion of the graphic and some changes in the color settings I achieved the next version of the image [C64-2.jpg]. By carefully blurring the picture and various other minor corrections of the color settings I reached the final version of the picture [C64-3.jpg]. I pasted this into the original. After a few pixel corrections done by hand the picture was literally picture-perfect [C64rulez.jpg]. You will have to admit that the lines of text and conductor circuits are virtually indistinguishable in either color or structure, aren't they?

So far, the C64 as silicon graphic on the Pentium CPU is just a fantasy but maybe a chip designer somewhere out there will eventually turn this fantasy into reality. Possibly this silicon graphic already exists in a Pentium CPU somewhere but hasn't been discovered yet? So folks, screw open all the Intel PCs you can lay your hands on, take out the CPU and crack the cases! If you have the necessary microscope it should be easy to find out if there isn't somewhere ...

Reinhard Kratzberg (gb)

This article and the graphics can also be found under

<http://home.t-online.de/home/mysoft/gigahertz.htm>



# MODPlay - interview with its programmer

We didn't miss the opportunity to interview the author of ModPlay, Nate Dannenberg.

by Malte Mundi

**GO64!:** Please introduce yourself to our readers.

**Nate:** My name is Nate Dannenberg. I was born in Chanute Kansas about 25 years ago (was it really that long ago?). I've lived in the Mulvane KS area since about 1987 or so, and have been messing with Commodore computers since around 1986.

About the time that I got my first C128 (which wasn't long after I got my first C64, of course), I finally got the impression from the PC crowd that the constant "upgrade now, your machine is obsolete" idea was not going to stop, and so I decided that I wasn't going to become a part of that race.

I decided to stick with Commodore, because I knew at least a little about the machines' capabilities back then, and I had the impression that the machine was going to be around for a long time.

Of course I had no idea it would go as far as it has to date, but nevertheless, that's where my decision stood. I guess it's a good thing I dropped out of that race early, before I had invested countless thousands of dollars in PC's and constant upgrades.

**GO64!:** How did you get the idea of writing a MOD player for the Commodore?

**Nate:** Originally it started with a rumor I had heard, that said that Mark Dickenson's DigiPlayer could handle MODs. Come to find out, it couldn't. So, I set out looking for information about MODs. Soon, with some help from a few friends I met on IRC, I came up with enough technical data to write a little "reader". It's only job was to tell me about the file, decode the pattern tables, and so on. That led to an actual player. The first version of the player could only handle samples of about 8KB in length, and sounded very poor, with only a 4 kHz mixing rate, on the C128.

**GO64!:** How long did it take you to write the MOD player? Wasn't it hard to develop it?

**Nate:** It took about a year from the time I found my first text file describing it until I finally had a working, presentable player. It was quite a task to write, and at some points it seemed almost fruitless - would it ever work right? Why does this channel keep resetting to 0? Why does the player keep slowing down suddenly? You get the idea :-)

Looking back on it now, it's actually not that complex of a program - certainly not as complex as, say, a Web Browser or something of that nature. The MOD format is very easy to understand, and now that I know how to mix samples in realtime, the actual code to make it happen isn't that difficult to understand.

**GO64!:** What do you, as the author of the product, think of it? Is it great like this or is there room for improvements?

**Nate:** I think it needs a lot of work, as there are so many things about the program that just seem 'outdated'. The biggest problem I see with it right now is that it doesn't support any of my modern hardware, except that the C64 version can work with a SCPU at 20 MHz.

The secondary problem with it is the poor user interface and lack of any "save" function (referring to the C64 version).

The C128 version's interface is much better (based on Mark Dickenson's StereoPlayer 64 menu screen), but still out of date. What's ironic is that the C128 version with its improved interface actually came first. The C64 version, with its plain menu and missing playback display, followed when I got a Super CPU.

**GO64!:** The last update of MODplay was over a year ago. Why development has been stopped? Will it be continued?

**Nate:** Development was underway until a few months ago, when I had a Hard Drive crash (yep, even a Commodore can suffer a HD crash). Everything that I didn't have backups for was lost completely, including all of my MOD files and the Modplay 64 v1.2 source code, along with all of my other



**Nate Dannenberg, author of ModPlay 64/128. This picture was taken by himself with a QuickCam connected to his C64.**

music files (WAV, SIDplayer) and some GEOS utilities.

The 1.2 version was about 90% complete before the crash. It was basically a minor upgrade and bug fix, and was to be a single, 100% Machine Language program (with all of its tables and such generated by formulas instead of having to be loaded). The current versions of Modplay are part BASIC, part ML, with several individual files to accomplish different tasks or provide different features.

Development isn't COMPLETELY halted though - I've been playing around with a few updates to Modplay 128, to make it Super-CPU compatible, since I still have the source code for that program. As well, I still have the Source code to Modplay 64 v1.1. I have only my internet provider (Southwind Internet Access, Inc) to thank for this, as those source code files were stored in my Web directory on my dial-up shell account!

Eventually I'll continue development - it's just a matter of getting the energy (and incentive) to re-write that lost Modplay 64 v1.2 code. It was a lot of work writing the code that was lost in the HD crash, twice as much as writing the BASIC+ML version that's available now.

I see a "Mod4Win" look-a-like as the future of Modplay 64 and 128. I like the program's user interface, and I especially like the presentation of the Effect Commands panel when a MOD file is playing. It has to be a hundred times more efficient than the display I am using in Modplay 128.

Since Modplay 64 doesn't even have a playback display, this would also add some sorely needed 'glitz' to that program, as it is rather plain. This doesn't mean the program will become all 'glitz' and no content -

certainly not. The code behind that interface will improve to be the best player I can come up with.

**GO64!:** Will there be a version for the SuperCPU RamCard (instead of the REU)?

**Nate:** Yes. This was part of the plan for Modplay 64 v2.0. I've done some "paper programming" to make this doable, but I see some slowdowns in that code that I do not like. It is likely that support for additional RAM devices like Super RAM will come at the cost of speed. Super RAM will still operate faster than an REU, but not as fast as would be possible with a program written solely for SuperRAM.

First, however, I have to get Modplay 64 v1.2 written. The All-ML aspect of it will be a requirement to make the other features I have in mind possible.

**GO64!:** Do you intend to include some kind of optional fastloader to accelerate loading of the rather long MOD files?

**Nate:** No. The way I figure it, if a user has a machine that can play a MOD (that is, a C64 or C128) and a device that's suitable for storing MODs (a 1581 or higher), they most likely have some sort of turbo-disk system (like JiffyDOS) in place anyway.

That said, there are some slow places in the Loader. I figure I can give it a pretty good boost in speed, depending on the type of MOD being loaded. The big problem with this is that the loader is partially in BASIC, which explains why it seems to take so long just to load even the smallest file.

**GO64!:** What other projects are you currently working on?

**Nate:** At this point most of my projects are more or less on the back burner, some due to lack of interest, some due to other factors.

**GO64!:** What do you think of the current development in the area of SuperCPU-supporting operating systems - Wheels, MegaPatch 3 and now even CLiPS?

**Nate:** I think the more programs we have that support the Super CPU, the better. While I don't advocate competing OS's like Wheels vs. GEOS MP3 (I think the two projects should be combined into one), I still think every bit of support is important.

That said, what I want to see in the future is a

full multitasking GUI-based system, something like Windows 95 or 98. As many users are probably aware, I don't like Windows in terms of its implementation (it's slow, bloated, and full of bugs). However, I do like its ease of use and its interface.

At the time of this writing, I haven't seen CLiPS or GEOS MP3 in operation. However, Wheels really hauls tail compared to previous operating systems.

**GO64!:** Thanks for the talk and best wishes for your future projects.

**Nate:** You're quite welcome.

For users who want to contact me, here is my info:

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1437 N Hillside Road  
Mulvane KS 67110  
Tel: 316 777 0988  
natedac@kscable.com  
<http://home.kscable.com/natedac>

(gb)

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# WORLD WATCH

by Rainer Buchty

## This month's focus: Digitizing Data

# HELLO WORLD,

"Commencing digitization!" - in "Captain Power" the TV series, this meant you were sentenced to death. In real life, however, being digitized is a lot less drastic...

### Analog vs. Digital

The world sometimes appears to talk primarily Visa or MasterCard (as we know from advertising), but above all that, it's analog. This means that measured values are located in a continuum, rather than on discrete points. Take a simple line, for example: in real life it appears perfectly smooth, not at all like a staircase. On a C64 monitor, however, it will never appear as realistic as in nature. The reason is simple, the 64's display hardware is unable to fit the single dots of the line together so tightly that our eye would see them as a continuous line. As a matter of fact, a laser printer is doing exactly the same thing, but with pixels the size of a single toner particle.

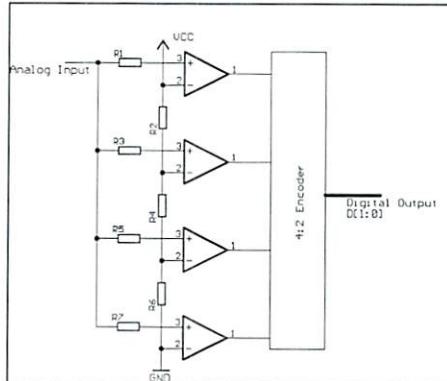
The word "digital" is derived from latin "digitus", i.e. "finger". The idea is, that you (figuratively) put your finger onto each reading point. And that's what it has to do with the example above: each pixel in the computer represents a reading point. This might give you an idea how to avoid the "staircase effect" if you could - by increasing the resolution, that is, by reducing the intervals between readings.

### Going from Analog to Digital...

How can an analogue signal be converted into separate, discrete readings?

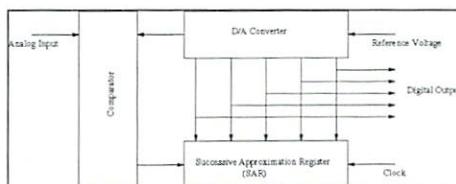
Admittedly, this is a slightly difficult matter. The naive method would be to use direct comparisons to convert the signal to be digitized into the appropriate bit patterns. This method works extremely fast, which is why A/D converters that work this way are

known as "flash converters".



There's a snag, however: you need a comparator for every possible reading point. Since we know that a resolution of, for instance, eight bits allows for 256 different reading points, we know that we'd need 256 comparators to build an 8bit flash converter, plus an encoder that maps all those comparators' states onto an eight bit value.

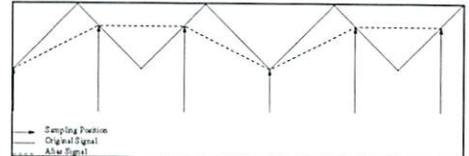
Well, there's a more trivial and much slower way, which is called successive approximation: it uses a digital-to-analog converter to generate a reference value which is compared to the measurand (the signal being measured). The reference value is generated using a counter, which begins to count upwards from zero when the conversion starts, and increments as long as the reference value is smaller than the measurand. The final state of the counter is used as the digital approximation of the analog measurand - which means that in the worst case (if the measurand has the highest possible value), the counter has to pass through all its possible states. This delay can be a problem, since the sampling of analog signals may not take more than a specified amount of time (as determined by the sample rate - see below for a diagram).



### Nyquist and Shannon

Those two gentlemen have invented the so-called sampling theorem, which states that the highest scannable frequency is exactly half the sampling frequency. What does it mean? Take your CD player, for example: it reproduces music data at a rate of 44.1 kHz, and therefore, 22.05 kHz is the highest frequency it can play.

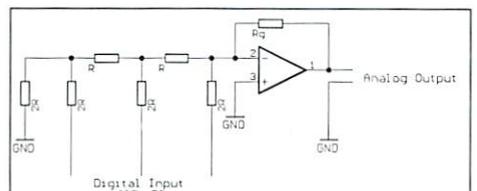
But what happens if this theorem is violated? Figuratively, the signal to be scanned runs away from the sampling, and instead of the desired signal the scanning yields strange or out of place frequencies generated by the "incorrect" scanning. The following figure might clarify this:



These so-called aliasing frequencies are most pronounced if a signal is transposed down, i.e. if they're reproduced at a rate below the sampling frequency. Therefore, the unwanted, high-frequency portions of the signal are usually cut off using something called a low pass filter: ideally, only frequencies below the Nyquist frequency pass this filter, and thus the aliasing effect is avoided.

### Ok, the Sample is in Memory - What Now?

Of course, sampling would be pretty much useless, unless there are ways to re-render the digital data. Reproducing analog signals from digital values is quite easy, it is done using a network of resistors, called an R-2R ladder, due to its particular qualities (see below):



In order to smooth a "staircase" shaped signal, the restored signal is sent through a low-pass filter once more.

### Sample Rates and Resolutions

There are regular religious wars taking place among audiophiles: the purists say that a digital recording can never be as "warm" and "smooth" as an analog one, and the more moderate listeners just argue about the optimal sampling rate and resolution. But what's behind all of this?

Practically, the resolution regulates the difference between levels: the more bits you use for the resolution, the smoother the staircases (sic). The sampling rate, on the other hand, controls the width of the steps. With this example in mind, it should be obvious that both values are linked with each other - what use is it to sample at only 1 kHz at 24 bits resolution? For that matter, what about the other way around: why should one sample at 64 kHz, if the resolution is only one bit, mapping the signal into a bunch of square waves?

On the C64, we know two different resolutions, with the first being the traditional one, when we abuse the volume register to play samples, which yields four bits, and thus 16 levels. However, if you mix two samples, as some digi players do, the resolution of each of the two original samples must be reduced to three bits only, e.g. eight different levels per sample value. By the way, professional studios avoid this effect by using 24 bit recording for mastering: even if eight 16-bit samples are combined, that is, mixed, the resulting resolution will be 19 bits. Alas, we on the C64 can only dream of the memory capacities and computation speeds needed for this.

During the last few years, 12 bit digi players have come into vogue: instead of the volume register, those players abuse pulse width modulation (PWM), which results in a resolution of 4096 different levels. Unfortunately, this method has an unpleasant characteristic: a high whistling noise which is the carrier frequency upon which the sample is impressed by PWM.

### Sample Rates in the Course of Time

Back in the good old times, 3.4kHz were considered good enough by the telephone companies - which lead to the typical "phone sound": this bandwidth easily suffices for speech, but music is really hard to transmit.

In the audio field, 8 bits at 32kHz were "high quality" for a long time - the processor speeds and memory costs simply didn't allow any more. When the CD was introduced in the mid-1980's, the values increased to 44.1kHz/16bits, which in turn gave rise to an improvement of the studio equipment as described above.

And today, in the age of the DVD, people even think about using 96 kHz/24bit - it's up to your personal impression if you can hear any difference...

	<b>Megacom Software</b> <b>Langenfelder Hof 1</b> <b>78652 Deisslingen</b> <b>Germany</b> phone: 0049 7420 1324    fax: 0049 7420 2608 Internet: <a href="http://www.MCSOft.de">www.MCSOft.de</a> email: <a href="mailto:MCSOft@telda.net">MCSOft@telda.net</a>
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<h2 style="margin: 0;"><u>GEOS V2.0 Software</u></h2> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>GeoCom V1.5 (GEOS programming tool)</b></td> <td style="text-align: right; padding: 2px;">39,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">For GEOS64 and GEOS128 (40/80)</td> </tr> <tr> <td style="padding: 2px;"><b>TopDesk128 V3.5 or TopDesk64 V3.5</b></td> <td style="text-align: right; padding: 2px;">25,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">New desktop which supports all CMD drives and has windowing capabilities.</td> </tr> <tr> <td style="padding: 2px;"><b>TopDesk64/128 V3.5 Update from V3.xx</b></td> <td style="text-align: right; padding: 2px;">15,-DM</td> </tr> <tr> <td style="padding: 2px;"><b>HP Deskjet/Epson printer driver V2</b></td> <td style="text-align: right; padding: 2px;">25,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">for GEOS64 and 128, includes interpolation routines. Prints all colors within GeoPaint.!</td> </tr> <tr> <td style="padding: 2px;"><b>MegaTools V2 (for GEOS V2.0)</b></td> <td style="text-align: right; padding: 2px;">10,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">GEOS tools for Geos64 and Geos128 incl. Turbo128 Patch</td> </tr> </table> <p style="margin-top: 10px;"><b><u>64net:</u></b>  <b>64net full version incl. 1,5 meter cable</b>    99,-DM      Now deliverable again! The alternate to CMD's HD. Use the harddisc of your PC (from 286er upward) as a normal drive for your C64 or C128. Up to 4(!) C64/C128 usable in a network! Connection over Userport of C64/C128 to parallel port of PC. Usable in Basic mode and with GEOS/MegaPatch! Full usable with SCPU! Printing over PC when using GEOS. Cable length up to 30 meter possible!</p>	<b>GeoCom V1.5 (GEOS programming tool)</b>	39,-DM	For GEOS64 and GEOS128 (40/80)		<b>TopDesk128 V3.5 or TopDesk64 V3.5</b>	25,-DM	New desktop which supports all CMD drives and has windowing capabilities.		<b>TopDesk64/128 V3.5 Update from V3.xx</b>	15,-DM	<b>HP Deskjet/Epson printer driver V2</b>	25,-DM	for GEOS64 and 128, includes interpolation routines. Prints all colors within GeoPaint.!		<b>MegaTools V2 (for GEOS V2.0)</b>	10,-DM	GEOS tools for Geos64 and Geos128 incl. Turbo128 Patch		<h2 style="margin: 0;"><u>MegaPatch64/128 V3.0<sup>2</sup></u></h2> <p>The new GEOS version made in Germany!      Both versions also for American GEOS kernel!      With printed English manual and new desktop!      Supports SCPU, RAMLink, HD, FD, 1581, 1571, 1541 and all RAM expansions; new Configure, filebox, task switcher, printer spooler, screensaver, screen hardcopy.</p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>MegaPatch64 or 128 V3.0</b></td> <td style="text-align: right; padding: 2px;">69,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">(incl. TopDesk64 or 128 V4.1 full version)</td> </tr> <tr> <td style="padding: 2px;"><b>MegaPatch64 or 128 V3.0</b></td> <td style="text-align: right; padding: 2px;">8,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">(incl. TopDesk64 o. 128 V4.1 update from V3.xx)</td> </tr> <tr> <td style="padding: 2px;"><b>GeoDos V2.95 english</b></td> <td style="text-align: right; padding: 2px;">5,-DM</td> </tr> <tr> <td colspan="2" style="padding: 2px;">(Freeware program... Or download it from our web page.)</td> </tr> </table> <p><b>MegaPatch available in different disk format:</b>      1541 / 1571 / 1581-DD / 1581-HD (CMD-FD)</p> <p style="text-align: center; margin-top: 10px;"><b>Pay with your VISA or MasterCard!</b>  <b>Shipping costs for a parcel:</b></p> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 2px;"><b>Air mail:</b></td> <td style="text-align: right; padding: 2px;">16.-DM</td> </tr> <tr> <td style="padding: 2px;"><b>Normal mail:</b></td> <td style="text-align: right; padding: 2px;">8.-DM</td> </tr> </table>	<b>MegaPatch64 or 128 V3.0</b>	69,-DM	(incl. TopDesk64 or 128 V4.1 full version)		<b>MegaPatch64 or 128 V3.0</b>	8,-DM	(incl. TopDesk64 o. 128 V4.1 update from V3.xx)		<b>GeoDos V2.95 english</b>	5,-DM	(Freeware program... Or download it from our web page.)		<b>Air mail:</b>	16.-DM	<b>Normal mail:</b>	8.-DM
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**USA support:** The World of Merlancia Inc.  
 3516A West Cactus Road Phoenix, Arizona 85029  
 phone: (602)-789-0956/896-1338  
<http://www.merlancia.com/mersoft.html>  
 email: [merlancia@aol.com](mailto:merlancia@aol.com)

# Cover disk

## It's Magic

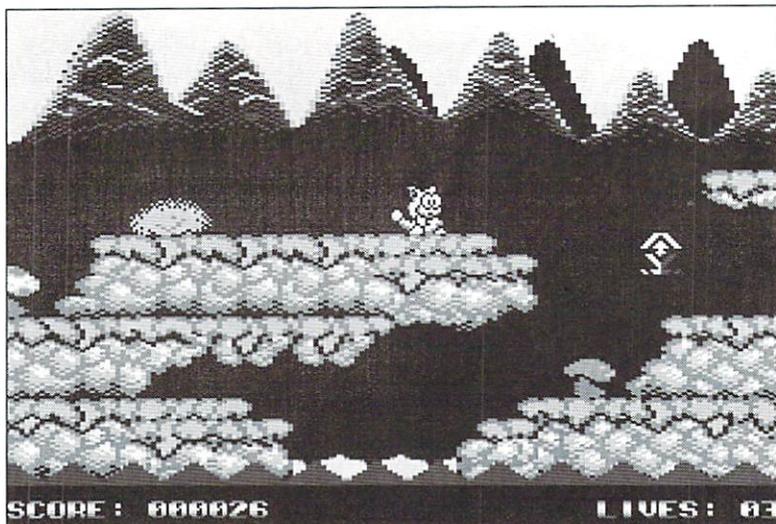
Ages ago, in a time which we only know by legends, there was a wonderful, beautiful group of islands in the middle of an endless ocean. There, all animals lived together in peace. The place was called Dream Islands. One of those peaceful animals was Tom Paw. He was a little tomcat, young and intelligent. He lived on one of the eight islands, but he was longing for faraway worlds. So he decided to leave the islands to explore the world. But no one had ever tried this before, so Tom didn't know how to do it. So he went to a wizard who lived on a more distant island of Dream Islands and hoped to get a magic potion from him. But the wizard wasn't able to help. Tom however didn't want to quit his big dream, he had to do something about it and so he stayed with the wizard to become his apprentice. Tom learned a lot about magic and apart from that, he learned to read in books where he found out how the outside world looked like. One day, when the wizard left the house to look for some rare plants, Tom realized that his chance had arrived to fulfill his dream, and so for the first time he opened the thick book of the wizard. There he found a formula which looked perfect to him and mixed the magic potion. He drank it, took the magic sphere and even before he had finished speaking the magic formula

"Asimbri Asana Degrani", colorful clouds appeared and Tommy's adventure began...

Turn on your C64 and experience his adventure:

Tom wakes up on an island which is totally unknown to him. He remembers things he has read about the outside world. The books said it consists of three island groups with a total of 24 islands. There are the islands of the green mountains, the white islands of the snow forests and the red islands of the hot volcanos. He also had read that on every island there are some little creatures and a big monster, which guard various magic potions.

Help Tom, else he is completely on his own and can not survive. Your C64 will bring you to him and so you can help him on his voyage over the island groups. Find all pieces of the magic crystal and collect magic potions, so Tom can return home before the wizard comes back!



### Game controls:

Joystick in port 2.

Press fire in the title screen to proceed to the game.

### In the game:

Joystick up: Jump, Tommy!

Joystick left/right: Run, Tommy!

Fire button: Show what you have learned, Tommy. Throw a magic flash!

Run/Stop: Take a break, Tom and you, and relax... to go on, press fire.

### Extras:

Round symbol

"L": Extra Life Round symbol

"S": Shield Round symbol

"D": Destruction - a very mighty magic formula. It makes Tommy invulnerable and everything he meets will be destroyed. The power of this formula makes your screen grey.

### Highscore Menu:

Joystick up/down, left/right to enter your name.

Thanks from the GO64! to the programmer team for its excellent work:

**Game Design:** Andre Zschiegner, Dirk Heinrich, Sandra Moths, Norman Zschiegner

**Programming:** André Zschiegner

**Graphics:** Dirk Heinrich

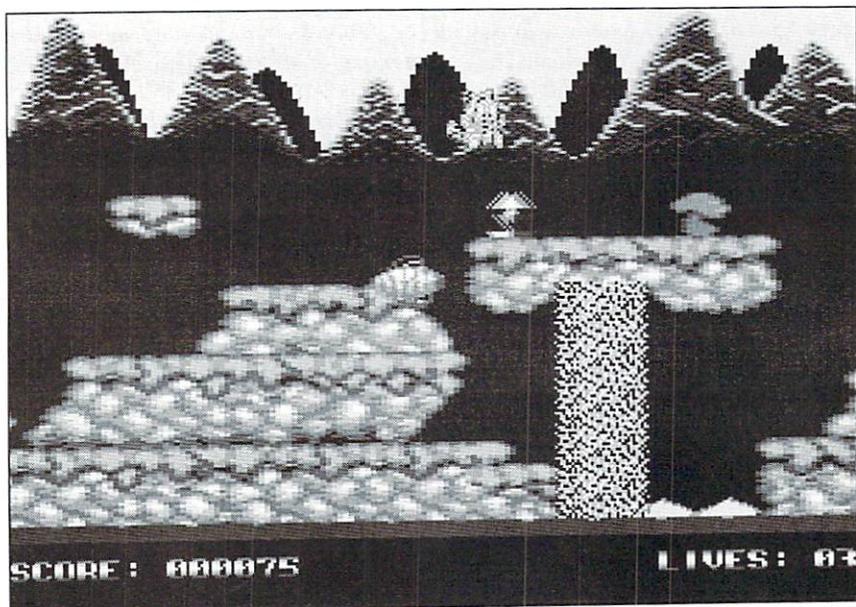
**Music:** Mark Waldaukat

**FX:** Andre Zschiegner

**Script:** Norman Zschiegner

**Test Players:** Sandra Moths, Norman Zschiegner

Thanks to the group "Onslaught" for the NTSC-Fix. (wg)



## Play MODules on your Commodore!

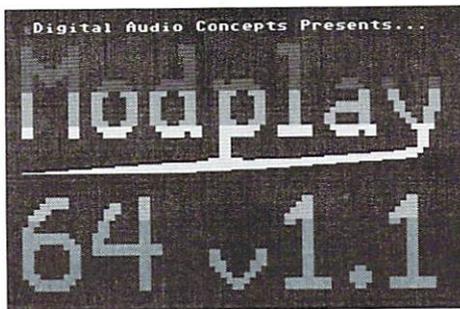
ModPlay64/128 is a program which makes it possible - for the first time - to play the famous "Module" music files, familiar from Amiga, on your Commodore equipped with an REU! An additional SuperCPU wouldn't harm...

by Malte Mundt

There are two versions of Modplay, one for the C64, one for the C128, supporting 80 column display. Both versions require an REU, as module music files are usually quite long. After loading the Modplay64, it generates some tables which are needed for playing the music, mixing the samples and so on.

### Make your selection

ModPlayer supports all kinds of CMD drives, so you are able to load the often long module files from your FD, HD or RAMLink. After having loaded a mod file, it is time to decide about the play parameters. Modplay offers a variety of options. In the case you own a second SID (like SID Symphony or DualSID), this can be used by Modplay. As modules contain digitized instruments in 8 bit resolution, played in 4 channels, but the SID only supports 4 bits in one channel, a 2nd SID will give a better sound quality, because less mixing is required. However, writing to I/O devices like a SID slows down the SuperCPU, which results in a lower playback rate. But as modules support stereo (two voices left, two right), you can have this with two SIDs as well. Most people will only own one SID. Modplay offers to mix everything into one 4 bit SID digit. But you can



The simple loading screen doesn't express the program's power

also choose the special 8bit PWM sampling technique to achieve a better quality (only with a SuperCPU). A very special and outstanding option is the support of an 8 bit DAC (digital-analog-converter) connected to the User Port of your Commodore. A device of this kind is the DigiMax, which provides 4 channels in 8 bit resolution. It is available at a low price via the author of Modplay, and can also be built using schematic diagrams which can be found in the first issue of DisCover, an online "tech" magazine.

### Play the music!

After having selected the output device and have loaded a mod, it can be played. It's a great feeling to hear the mod - it's the first time ever that a C64 or C128 plays this kind of music! However, one of the first things to notice is the relatively low quality on an unaccelerated computer. This is no fault of the Modplay program, but of the many operations which have to be done to convert and play the music in real time. The C64 version supports the SuperCPU (mixing rates up to 42 kHz then). A C128 with its 2MHz can achieve up to 12 kHz. The quality in 4 bits standard SID is already quite good, but usually the 8 bit PWM sampling is better. Unfortunately, the latter play routine produces some noise sometimes which is due to a kind of experimental programming. Quality with two SIDs is not as much better as

one would expect. The absolutely best music quality can of course be achieved with the userport DAC mentioned above. Unfortunately, until now Modplay is the only program which supports that hardware.

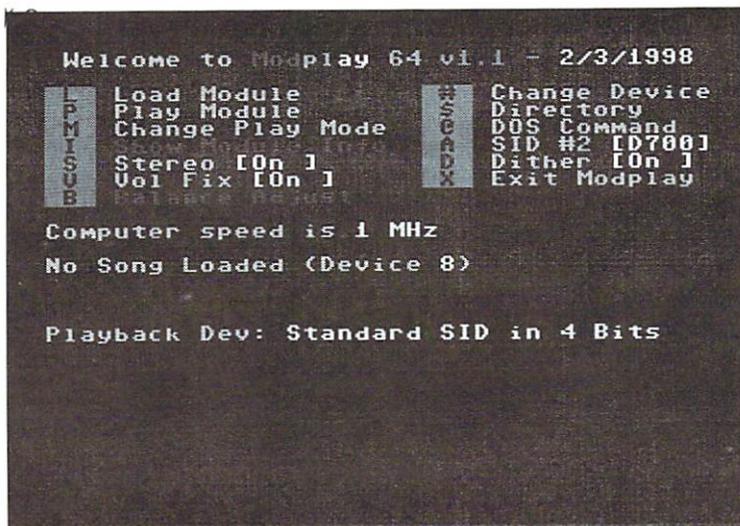
### Fine tuning

To get the best result for an individual module music, there are fine tune options. These are fixed volume for the newer 'low volume' 8580 SID chips, and dithering on/off. Dithering usually generates more background noise but provides more accurate sound. Also try switching between 4 bit standard SID and 8 bit PWM sampling - sometimes 4 bit standard sounds better than 8 bit PWM! After a change of the play mode/output device, a new pitch table has to be calculated. This takes a quite long while on stock machines, but doesn't really disturb on a SuperCPU-equipped system.

### And what else?

The main task of Modplayer is of course playing mod music - and this task is performed greatly. However, some musics and samples sound a bit strange. According to the author, there are still some bugs in the play routine and the current version is not meant to be the final version of ModPlay. See our interview with Nate Dannenberg, programmer of Modplay, for more interesting information! Other options Modplay offers are showing the mod "info", which originally was the sample names but usually is used to put little information messages into the mod. You can also send a DOS command from Modplay as well as change the device number the mod is loaded from.

The current version of Modplay128 doesn't support dual SIDs yet. All versions of Modplay require an REU. The RAM of a SuperRAM card is not yet used, as the program was developed prior to the release of that card.



A lot of options are available to provide the best quality possible

Modplay is a great program, which can be called innovative since it for the first time makes possible to play module music on the C64/128. Well, there is not much sense in writing more - you have to hear the music. So try Modplay64/128 now - it's free!

Download:

<http://www.kscable.com/natedac/modplay.html>

### What are MODs or modules?

Modules are music files commonly created on the Amiga using programs like Protracker. During the years the "MOD" file format became a standard for musics on Amiga and PC. Modules usually are 4 voice-musics, each

voice can have an own volume and plays one of a number of "samples". Samples are digitized instruments or parts of music. By playing the samples at different speeds, higher and lower tones can be created. There are also some effects such as Arpeggio and Portamento. By composing a module using samples, a very good "real-sounding" music can be created without requiring huge amounts of memory. Efficient high-quality Digital audio compression schemes like MPEG-3 didn't exist at the time the module format was created - on the one hand people did not know how to compress audio yet, on the other hand the machines at that time (Amiga 500 at 7 MHz) would have been too slow to decompress in real time. Thus, modules were a great compromise, because 10 seconds of digitized music at medium quality already took at least 100 KB of memory. Decent modules can play for several minutes and range from 50 KB up to 300 KB in average. To get your hands on module music, you could either ask a local Amiga user to copy some for you (Amigas can write to DD MS-DOS disks which you can read with your 3.5" drive) or download some from the internet: Visit for example the Videogames Music Preservation Archive, which offers a lot of decent mods, at:

<http://hangar18.campus.luth.se/~vgpa/>

Or enter Aminet at

<http://www.aminet.org/~aminet/>

and go to the modsubdirectory. For more sites about mods, visit the ModRing at

<http://miso.www.com/~daf/modring.html>

(ad)

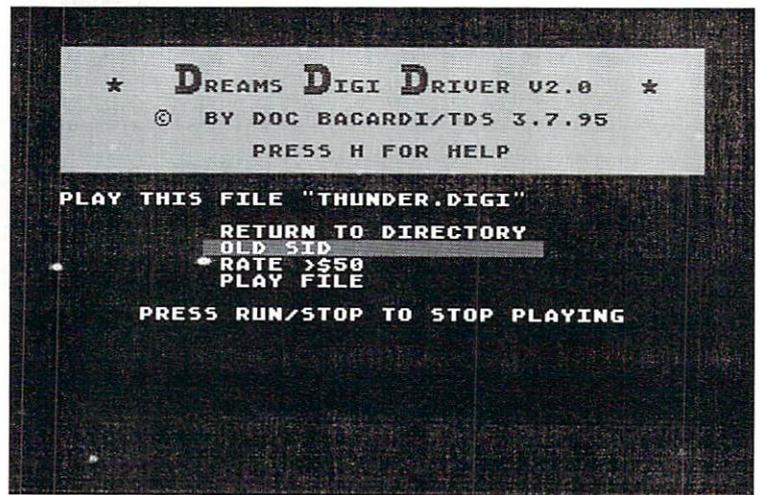
## Dreams Digi-Driver (DDD)

The Dreams Digi-Driver is an utility which makes it possible to play digitized sounds directly from a CMD Hard Drive without loading them into C64 memory first.

by Christoph Thelen

As a result, the samples are not limited to 64KB anymore but can easily be some megabytes in size, depending on the free space of your HD. The data is loaded via a special parallel cable, because the serial bus of the C64 is far too slow for that job. The layout of the cable is given in the box below.

## Dreams Digi Driver



### Usage

After starting the file, "DDD V2.0", with RUN, the program first looks for a CMD HD and then checks if the parallel cable is connected properly. If an error occurs, you will get a specific message. Otherwise, the current directory is loaded and displayed.

Now you can select the file to be played. For that, use "cursor up/down" to move the red bar onto the entry. In case there are more than 15 entries in the directory, just 15 will be displayed, and the rest will be scrolled in with the movement of the bar. When the desired entry is under the bar, press RETURN to select it.

Changing to sub-directories is as simple. Locate the bar onto it and press RETURN. To go to the previous directory, use the "←" key. If you want to go to the root directory, just press "↑". Within a 1581 partition, "/" has the same effect. With "P" you can take advantage of one of the main features of a CMD Hard Drive - partitions. All available partitions will be displayed like a directory. You can use the same keys as above (cursor up/down, RETURN) to select one. By pressing "H", you get an overview of all commands of the DDD.

After you selected a file for playing, you will see a menu, which is also controlled with cursor up/down and RETURN. The first option, "Return to Directory", takes you back to the file selector, where you can choose a new file. "Play File" actually plays the sample. While it's playing, you can press RUN/STOP to cancel anytime. The option "old/new SID" adapts the play routine to your kind of SID. If you don't know which type you have, try and use the selection which sounds better. There is no way your choice can hurt the hardware, so just play around.

The last option in this menu is "Rate". Here the playing frequency is adjusted. A rate of 80 means that every 80 cycles one byte will be

processed. Input can be decimal or hexadecimal values. Furthermore, the cursor keys are active. When you have heard enough samples, you can quit the program by pressing C= and X.

### Where to get samples?

Sadly, the corresponding routine to this player, the digi-recorder, never left the experimental phase. So right now, you can only listen to already existing samples or use the help of a "big" computer. For example, on PCs there is a program called "KONV1", which converts WAV files to C64 digi-format. These can be played with DDD directly. You can get "KONV1" from various FTP servers or BBSes for free. But by using a parallel cable and some extra memory, a C64-based solution of this problem should be possible as well. If somebody finds or even codes such an utility, please let us know.

(ws)

The parallel cable is required to run the DDD. It does not replace the serial cable, so both cables have to be plugged in.

13-pin parallel plug of the CMD Hard Drive	C64 Userport
pin 4	pin d
pin 5	pin h
pin 8	pin c
pin 9	pin l
pin 11	pin j
pin 12	pin f
pin 13	pin k
pin 14	pin e

# A small "Stereo" DAC Card for Nate Dannenberg's Modplay

The layout was created from the details in DisCoverly issue 1 in an article written by Nate. I assume you all know about Modplay? An amazing piece of software that allows us to play "MOD" music files on our Commodores...

by Colin J. Thomson

## Why an external card?

For a much improved sound from our Commodores using Modplay, Nate came up with a design for a small circuit that uses a DAC (Digital to Analogue) Chip, that plugs into the User Port. From that I created this small PCB as seen in the Photo.

Hook this up to either your Stereo monitor and a Stereo amplifier of some kind and be prepared to be amazed! Modplay be setup to use the Sid Chip, but this DAC PCB design gives a much improved sound and is very simple to build..

An REU (Commodore, CMD-REU or clone) is required for Modplay

## Parts list

- 4. 1k, 5 or 10% tolerance 1/4 watt Resistors,
  - 1. single sided PCB (printed circuit board),
  - 1. MAX505ACNG DAC chip. (note the ACNG) this is the 24 pin DIL version,
  - 1. 24 pin DIL IC socket,
  - 1. User Port connector (2\*12 way 0.156")
  - 6. Vero Pins,
  - 2. 0.1uF (micro farad) disc ceramic capacitors (optional see ADDITIONAL NOTES)
- And some miniature screened cable and a suitable connector and some thin insulated cable (wire wrap will do fine).

Construction is very easy.. After etching and cleaning the board (GO64! 9/1999) (The track layout is almost to scale or you can use Etch Resist transfers as I did) you can fit the parts. Fit the User port connector to the board, this is done by soldering the bottom row of pins to the row

of pads on the PCB, the top row of pins then sit above the top/component side of the board. This can be seen in the photo.

Next I would fit the IC socket, taking care which way round the "notch" is, this denotes where pin 1 is. After this fit the 6 vero pins, three for the audio output and the others are for x,y and z. Then the four 1k resistors and the wire link.

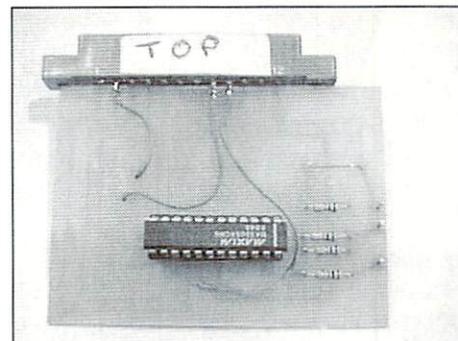
Now we have to fit the three links (x,y, and z) from the board (vero pins) to the appropriate pins on the user port connector (top row) use thin gauge insulated wire. This is clearly seen in the photo.

Next up, is to connect the cable for the audio output to the three vero pins using the miniature screened cable, as seen in the diagram the order is Ground, Right and Left... Yes its stereo! Terminate the leads with a suitable connector(s) to plug into the monitor or amplifier. Now last of all plug the IC into the socket taking note of the "Notch" which denotes pin 1.. And thats it! Make sure your computer is off, plug in the board and enjoy..

## Additional Notes

(1) The three wire links on the top of the board to the User Port connector, could of course be "tracks" if your good enough to make the PCB "Double Sided" which in this design is very easy to do.

(2) I also found that I need to add two small capacitors in "series" to each audio output to add some "DC blocking" due to the strange input circuit of my monitor. You could add the extra pads to the track design if you like..



(3) Where to get the MAX505ACNG DAC chip:

**Maxim Integrated Products, Inc.**  
 120 San Gabriel Drive  
 Sunnyvale, CA 94086 USA  
 408-737-7600  
 or 800-998-8800 (USA/Canada)  
 Fax: 408-737-7194

General inquiries: [info@maxim-ic.com](mailto:info@maxim-ic.com)  
<http://www.maxim-ic.com/>

Some other International phone No's:

- Austria 0800-295-954
- France 01 39 30 1900
- Germany (089) 857 99 0
- Italy (039) 605 8555
- UK (0118) 930 3388
- US/Canada 408-737-7600

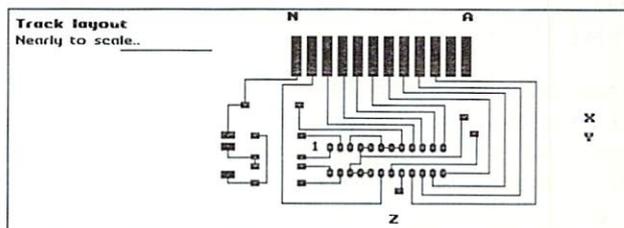
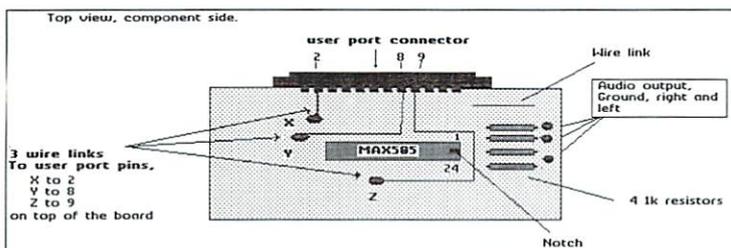
or:

**2001 Electronics Ltd**  
 Pin Green Ind. Estate  
 Stevenage  
 England

<http://www.2001elec.co.uk/>

Telephone: 01438 74 2001  
 Fax: 01438 74 2002

(ma)



# GEOS and the hardware...

...a seemingly neverending topic. Again and again I receive letters from readers asking for advice. All their questions are based on the topic which hardware GEOS requires, which hardware would be useful, and which would be recommendable in particular.

by Niko Malecki

Depending on the requirements of their work and the size of their purse the answer would turn out rather differently. The motto "buy everything, then you can't miss a thing" doesn't meet the point here. For this reason I'll pick up this topic today and I will try to give an answer to as many people interested in it as possible. Because the GEOS-system is quite aged by now I start from the very beginning with Adam and Eve.

## What is GEOS?

What is GEOS actually? GEOS is a software-controlled operating system, that, during execution, makes the stock operating system invisible - GEOS covers it. It is comparable to "Windows" on a PC, Windows too covers the normal DOS like a lid. After booting, GEOS provides an own graphical user environment. This environment in its basic version is called "Desktop", which means as much as "working place". Later on other solutions like "Topdesk", "Dualtop" or "DoubleDesk" appeared. On this environment we mainly act using a mouse, some commands are additionally executable by key-shortcuts. So, to use GEOS, we have to start it first. The process of starting, which means the loading of the operating system, checking the hardware and initializing the system, is called "booting".

When GEOS was released for the first time Berkeley Softworks, the developers of GEOS, wrote in their manuals that merely a floppy 1541 and a mouse or a joystick would be required to boot GEOS.

This statement was, as we know today, quite an embellishment. The publishers of GEOS didn't have the courage to tell the users clearly enough that this configuration would indeed work, but that it would be more

frustrating than satisfying. The C64/C128's memory is simply too small to run a graphical user environment by acceptable speed. This modesty is quite unintelligible, considered that Commodore already offered memory expansions like the REUs (RAM Expansion Unit) 1700, 1764 or 1750 for their popular computers at that time. Only memory expansions like these made it comfortable at all to work at a satisfying speed. This fact was not clearly stated at that time, and quite a few C64/C128 users tried to use their shiny new GEOS with this minimal configuration - and hence angry, many of them banned GEOS to the most far away drawer. But all in all it was - thank god - only a minority of users that acted like this. The triumph of GEOS couldn't be stopped though, since most of the users opted emphatically for new hardware, and also many companies supported GEOS at high rates.

## It started with a disk drive

After the early era of GEOS with just a floppy 1541 and perhaps an additional REU a second phase followed, a fast floppy called 1581. It was a 3.5" floppy, which just used these small disks providing nearly five times the memory-capacity of a common 1541-disk's side. Now the GEOS user could benefit from the advantages of a fast floppy drive. The booting of GEOS was significantly faster now.

Using a memory expansion with GEOS (which is absolutely necessary), makes this memory expansion act like a floppy. This "RAM-floppy" behaves like a standard floppy with all events taking place directly in memory. There is no rotating motor, everything is faster. A memory expansion simulating a common floppy is called "emulating". When the size of the added memory is large enough, as for example larger than 800KB (which is the capacity of a 1581-disk), we have a RAM drive 1581. Only such

a configuration makes fun working, since as an example we have a "real" 1581-floppy to boot GEOS from, we have a fast RAM-1581 that we can use to store everything necessary for work, and maybe also a 1541 for "miscellaneous things".

By the way: Like a PC, GEOS shouldn't principally operate on a (slow) disk drive, but generally in the expansion memory (RAM). So after booting we copy the programs needed for our work into the memory expansion (there are automatically working copy-programs for this task), and from this time on every process takes place in the RAM. Only the finished piece of work (text, graphic, etc.) becomes finally stored on a real disk.

Well, enough about simple memory and disk drives. GEOS could be much more pleasant, if... yes, if we invested a little more money. Everyone who decided to work with GEOS would not want to go without this operating system after a short time. However the comfortable mouse controlled interface and the fast speed of operation makes everyone wish for more. Those people can be helped.

## It is all about memory

Similar to a high-performance athlete also the GEOS user always reaches for better results and thus tries to increase the productivity. Now a simple memory expansion will not be enough any longer, because after turning the computer off the contents of the memory is lost. Okay, there were some special battery back-up devices to keep the data in memory, but these devices were still not that satisfying.

Only with the release of an expandable, power supply and battery back-up supported memory expansion called "RAMLink" arose the perfect solution. The RAMLink is also a memory expansion, but it is the "Rolls Royce" among them. RAMLink comes with its own

power supply, to keep the data in memory. Additionally it is possible to use a back-up battery (in case of a power failure). The size of a RAMLink's memory can be extended by common SIMM-RAMs up to 16MB. Now this device, which plugs into the expansion-port, is capable to be used as a RAM-floppy, and, depending on the size of the memory, can emulate several, even different types of disk drives. So we are able to establish several 1581, 1571 or 1541 disk drives in a single RAMLink and safely store programs in there.

Not only GEOS, but nearly all other programs are able to run from a RAMLink. The booting of GEOS will only take a few seconds and the subsequent work is a real pleasure. But if you think that's all we can do, you are terribly wrong. On we go!

### A hard disk is a must

Just like the PC-user likes his hard disk, of course a C64/C128 user enjoys such a device, too. The first usable hard disk solution for the C64 was introduced by the US company Creative Micro Designs (CMD). By the way the RAMLink is also a product of CMD. Fortunately, CMD decided to use a so called SCSI controller when they designed those hard drives. The major advantage of this system is that there are many more SCSI devices available that may be connected to the SCSI port of the hard disk, for example CD-ROM drives or ZIP-drives, but also scanners and more.

A hard disk is an enormous help when it comes to archive collected data, because an advanced C64/C128-user, may he be working with GEOS or not, often owns a large amount of floppy-disks. The handling of many disks is not an easy task as everybody knows (only to mention the search for a certain program). With the purchase of a hard disk the floppy-disk becomes nearly useless. Every program we have may now be stored on the hard disk. These hard disks are available in different sizes, the biggest one provides 4GB - and that is a real mountain of disks (to be more precise, it is more than 24,000 sides of 1541-

disks). That should be enough even for the most megalomaniac user. Nevertheless, normally we deal with more modest proportions, but it is always good to know that there is so much in reserve. Particularly the GEOS-user, who is advanced among the C64/C128-users, appreciates these immense advantages. We are able to sort our results of work systematically now. We could dedicate an area just for texts together with all the necessary programs to deal with them, we could dedicate another area for our spreadsheets and calculations, one area for our drawings and paintings, one for games and so on.

### Attention, Formula 1 is approaching!

Well, now that we have improved our computer a lot, it is still not a real racer. Only when we add a SuperCPU we can say: "Only flying creates a better sensation". That is not an exaggerated statement, because now the true racer feeling arises. No matter if we have a C64 or a C128, such a booster is available for either of them. This SuperCPU (also manufactured by CMD) is a great purchase for all kinds of programs, and the more GEOS has to calculate, the more pleasant becomes the increase of speed compared to a stock system. Since the graphical environment of GEOS really uses the CPU to it's limits, a performance boost will truly increase your productivity. PC-people know it sufficiently: if your PC lacks RAM and offers too little megahertz there is not much to be done. While it is essential for a PC it is more luxury for us, certainly a very pleasant luxury. Although each of us could use the SuperCPU very well, it is not really essential, just according to the motto: "Life is great but expensive. You may have it cheaper but not so great".

And now back again to the disk drive. The Commodore 1541 is widely spread, but since the user knows about the advantages of a 1581, the 1541 will only play a minor role. The advantages of 3.5" disks are far too clear: larger size of memory, a solid case, less need of space. So it is no miracle that, after the end of Commodore and the 1581, a new generation of disk drives was put to the market. This new drive comes from the company CMD as well and is called "FD 2000". It is a 3.5"-drive, too, and uses standard PC drive with Commodore related electronics. The advantage with this drive is that not only the previous 800KB DD disks can be used, but also the much cheaper HD disks. These offer twice the amount of storage space of a 1581 disk, namely 1,6 MB and all of this space is ready to be used by our

system. That is a real delight for all GEOS users, because as already mentioned, GEOS needs a large amount of storage space.

### What about printing?

Now I have covered a major part of available hardware, but I still haven't mentioned the peripheral devices. Particularly important here is the item "printers". The era of good old dot matrix printers has been over for some years now. Nowadays a C64/C128 user prints the great results of his work with an inkjet printer. But also printing on laser printers is no problem.

Many outstanding printing system programs for GEOS are available, providing truly excellent results. As an example the printing system "Print Text" should be mentioned. "Print Text", in conjunction with an Epson Stylus Color printer, produces colored printouts with high-class quality.

### Summary

When we review all the things we talked about, we realize that a program - respectively in this case the GEOS system - runs more frictionless the more advanced the hardware used is. Nowadays it is indeed not praiseworthy anymore to say "On my computer GEOS only runs with a 1541 and nothing more" - modesty isn't requested any longer.

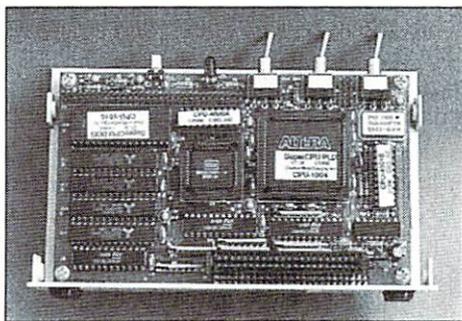
The C64/C128-user wants to participate in the beautiful new colorful world of the 21st century, all necessary technical solutions for our system are available. A fully extended C64/C128-system is not a "poor-people-system", everybody knows that. A C64 is not only a touch of nostalgia and cult, on a powerful and refined system you may also work very well, PC superfluous. Parsimony is not appropriate.

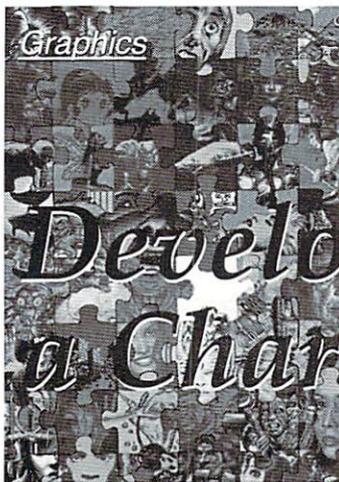
Enough for today, even if I could write a lot more about GEOS. Maybe you encourage me for more by sending me requests, suggestions or wishes related to GEOS - don't hesitate!

My address, as always:

**Nikolaus Malecki**  
**Am Knollenberg 1**  
**D-42553 Neviges**  
**Germany**  
**Europe**

*Yours*  
*Niko*





# Developing a Character

Part 6

... turns out to be no simple task with the computer either. Designing a person only consisting of dots which should still have character is one of the most difficult tasks of a graphician. In today's lesson, we would like to show you how to do it.

by Alexander "Mr. Quark" Teufel and Volker Rust

For starters, it is easiest to have a frontal view. Other perspectives would make considerations of spatial distortion necessary, which can quite easily lead to problems. Let's begin with the anatomical basics (picture 1). Generally, a face has this structure: the eyes are about in the middle of the head. The eyes are about one eye's width apart. If you divide the face into three areas of equal size, the nose would be in the area in the middle, from the temple base to the earlobes, so to speak. Ears and nose have a similar length and location. You can nearly always go with these fundamentals.

You should first start with the face. So you begin drawing the general outline of the face's shape. For the time being, you can ignore the hair. You should consider that



The close-up gives first insights (picture 2)

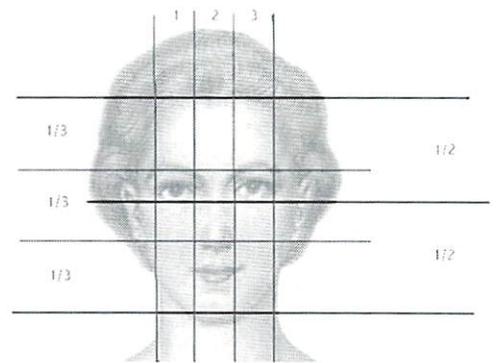
The ceiling could use some fresh paint (picture 3)



there are many different shapes. From "egg head" to "pancake", many variants can be thought of. Let's have a look at some faces drawn in detail.

## Here's Looking At You

Here we have a round shape (picture 2). The color table is limited to the colors black, brown, red, orange, light red, light gray, and white. borders between different parts of the face like nose, cheeks, or temple are made plastic by means of light and shadow (light and dark colors). Sharps lines should be avoided, they are only needed for dark shadows. In this case, the painter had to struggle with the limited choice of colors and resolution, as you can see for instance on the nose's left side.



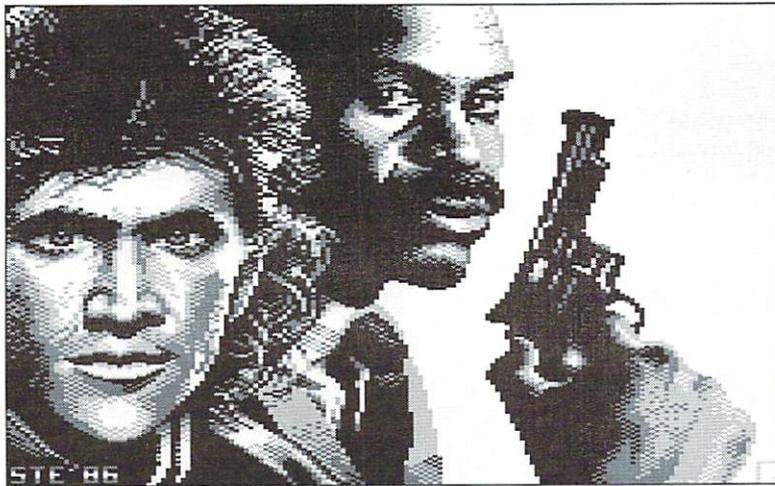
The structure of the average face (picture 1)

## Action Heroes

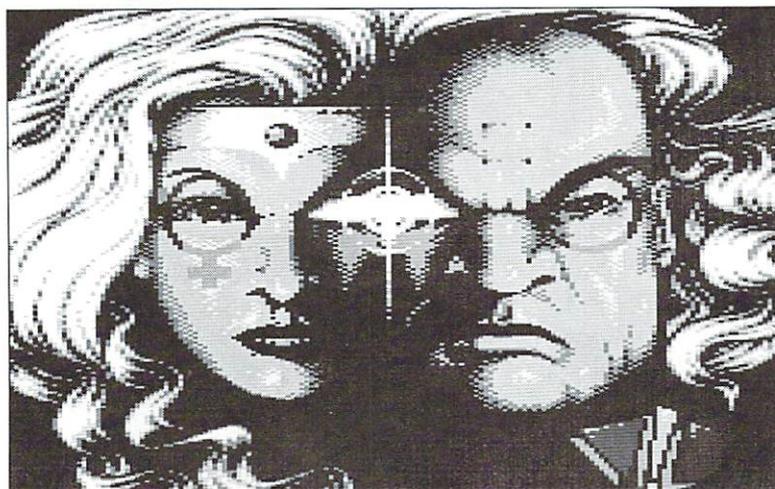
In the next example (picture 3), perspective joins the fray. In this scene from a sequence of the game "Total Recall", Arnold's head is turned slightly to the right and raised. You can see quite clearly, how the half of the face to the left is stretched, while the one to the right is shortened due to the turning. The

color palette contains in this case light gray, light red, orange, and brown which are usually most appropriate for hide color. You should also have a look at the black shadow beneath the chin, which forms a transition with the brown. In reality, this would also be the case, since diffuse rays of light would reach at least the outer border of areas otherwise lying in the shade.

Even if restrained to shades of gray, impressive results can still be achieved (picture 4). The C64 does have three shades of gray to whom black and white can be added. Those few shades of color weren't able to harm the hero from Lethal Weapon - they look just like taken from real life and every dot is on the right position. Light shadows create the plastic impression here as well.



Black and white team in black and white (picture 4)

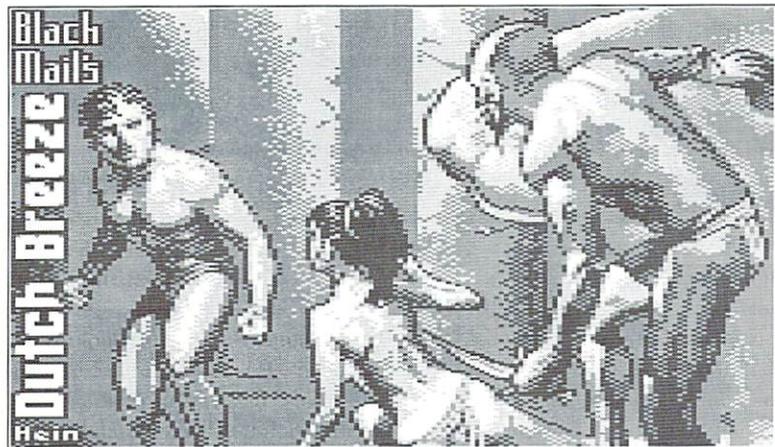


Green shimmering locks (picture 5)

### Now Things Get Hairy

The graphics from the game "Hammerfist" (picture 5) are just what we need in order to illustrate how stringy hair can be shown just as the dots allow. The color light green has been used as base color, and as additional colors, green, brown, and black are used. Basically, you display the outlines of single strands with the base color, which you then divide with color colors. Where no light is reflected in reality, the strands remain dark or even simply black, where light strikes green to light green. If you wish to do black

hair, a similar principle applies. But there is the exception that the hair itself remains invisible, and light reflections can be seen only at places exposed to the light. You show this using shades of blue like blue, light blue, cyan, and in addition white, or using shades of gray: dark gray, medium gray, light gray, white. With brown hair (picture 6) things look the same, here you can use red, orange, light red, yellow, medium gray, light gray, or even purple, just as needed.



Study from the nude at its best: Hein Holt shows his craftsmanship (picture 7)



The wonderful hair of the lady from the demo "Wonderland VIII" by Censor Design (picture 6)

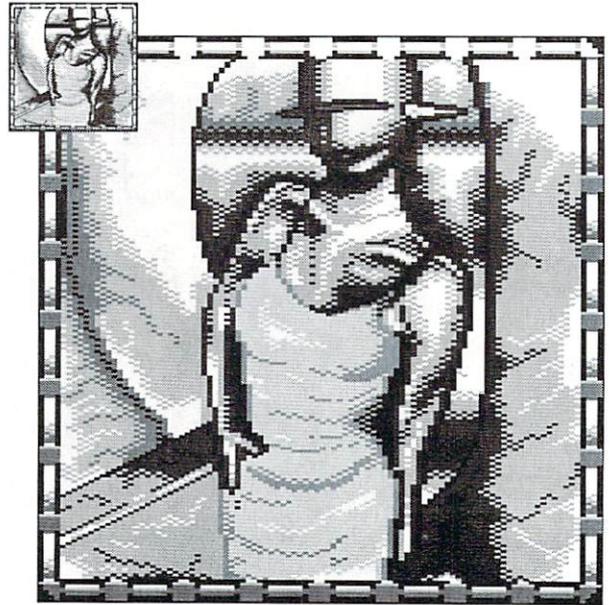
### From Portrait to the Nude

Let's get to an area that's not less difficult to master: drawing an entire body. Precise knowledge about the human anatomy, size and length proportions, different builds, maybe even muscle distribution is needed in order to achieve good results. A model or an exemplary picture can be very helpful. We summarized the most important anatomical basics in an info box nonetheless. Basically, you can say that the relation between legs and torso is about 2:1. The arms with fingers stretched out reach to half of the thigh.

Examples for well-made nudes are many, in the famous scene demo "Dutch Breeze" by Blackmail there are even several. We have picked one picture in FLI from there which can convince in three ways, as far as the persons are concerned, and which can be considered a model for presenting bodies (picture 7). It shows two men seen halfway from behind or front, and a lady from behind. And just about everything is perfect here, in spite of the partially difficult semi-positions: shades, perspective, and outline are masterly designed, as well as the big choice of colors. As a beginner, you should learn from such pictures, but not compare your own works with them (yet), because this would only frustrate you. No man is born a master of his craft, and in this case an absolutely extraordinary talent with year long experience at the dots had been at work.



Male dreams come true (picture 8)



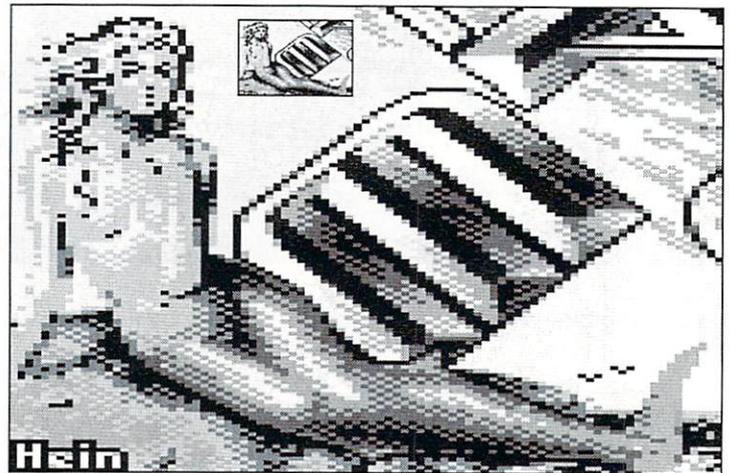
Angle in blue by X- Ample (picture 9)

A simpler, but not less impressive picture can be found in "Graphixmania 2" by the demo group Modern Arts (picture 8). The two ladies have been designed with manageable color dispersions, that even beginners can follow easily.

**Blue Angle in Position**

The world of games also has convincing body presentations. In "Blue Angel 69" by Magic Bytes (picture 9) everything evolves around blue shimmering cyber robots, but they have voluptuous female characteristics. The body proportions are well- made, and the plastic representation has also been realized correctly. Unfortunately, they had to do some trade-offs on the details, probably due to the resolution, as can be seen at the hand or the right arm. As far as colors are concerned, the body itself is done by dark blue, light blue, cyan, and white. The dress is made up of brown, orange, light red, light gray, and white. This example also allows to see easily the following: areas filled with only one color are rare and have consciously been avoided. At places where one color is dominating, it is broken up by lines of similar color in order to hint at a color transition. Consistent usage of this technique loosens up the picture as far as

Hein again: the babe has nice fins (picture 10)



the colors are concerned and creates the illusion of a greater number of colors.

**The Smaller the Graphic ...**

The smaller the space you have for the graphic, the bigger the challenge to deliver a detailed picture. For this there is also a perfect example: the mermaid from the intro

from "Dutch Breeze" (picture 10). Looking at her in zoom mode, you rather get a chaos of colors rather than a good picture. The rule for this is: with only little space, never draw things the way they really look, but in a way so that they look good on the computer. This means: Have a clear idea right from the start on, which colors you want to use, and then draw dots without mercy in zoom mode, while constantly checking the picture's looks in normal mode. Representing body shapes detailed and with motion still remains difficult: try and error is the way!

**The Human Body's Anatomy**

Characteristics of the Male Body

- broad shoulders
- muscular chest
- narrow hips
- narrow pelvis
- normal or rather stubby relation torso/ legs

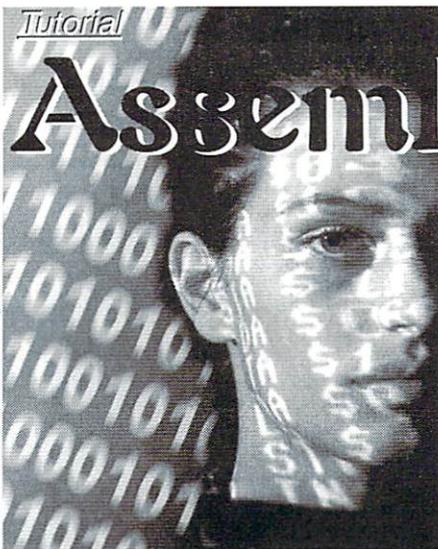
Characteristics of the Female Body

- narrow shoulders
- pronounced breast
- narrow hips
- broad pelvis
- normal or taller relation torso/legs

*All that remains for us now is to wish you good luck with your first dot personalities. See you next time!*

# Assembly Language

Picture: Bernhard Pflüger/Grafiker, raster (www.falchinger.at)



by Gunnar 'Krill' Ruthenberg

**Part 14**

**F**ixed-point routines are fast and precise enough. With them, it's easy to define the precision needed (in effect the number of decimal places) and the computation range. The computation range refers to the range of numbers which can be handled by the routine. A common one would be 0 to 65535 (\$0000 to \$FFFF - without sign) or -32768 to 32767 (\$8000 to \$7FFF - with sign). More about that later.

## The Basics - Binary Number Representation

This tutorial requires basic knowledge about assembly language and the hexadecimal and binary number systems. Thus, it should be first clear what a hexadecimal number looks like. Well, we know the common hexadecimal numbers on the C64; they usually range from 0 to 255, that is from \$00 to \$FF. But what if we also need negative numbers for our computations?

## Negative Numbers in Assembly Language

Quite simple, we split the range. This means that one half of the range is used for positive numbers, while the other half is used for negative ones. We then have a positive half (from 0 to 127 - zero is positive for the computer) and a negative one (from -128 to -1). There are many ways to handle binary representation of negative numbers, but one has proven especially useful: The most significant bit (msb) of our number - this would be bit 7 at the moment - is our sign. If it's clear, the number is positive, otherwise, it's negative.

You could come to believe now, that -3 would be hex \$83 (binary %10000011), but this is not the case. The reason for this is the so called "two's complement" representation of our

Computations in assembly language are one of those things where the C64's instruction set doesn't offer much: addition, subtraction, shifting, and rotating, that's it. This may be enough for starting out, but at least by the time you start demo coding, it just won't do. The exact floating point computations performed by the kernal would be an alternative, but when considering speed, you can forget about this right away ... what we need are our own fast, precise routines.

numbers in the computer. Simply put this means: If we want a negative number, we subtract its absolute value from zero. This sorta makes sense, since -3 is really 0 minus 3, isn't it? In hex this means: -3=\$00-\$03=\$FD. -1 isn't \$81 but \$FF, accordingly. An alternative would be negating the number bit by bit (in effect EOR #\$FF) and then adding 1 - the result would be the same (but it's faster this way).

So why do you use two's complement notation? The system simplifies addition and subtraction enormously. Just imagine adding a negative number to a positive one. First of all, you would need to check the signs of the numbers, invert them accordingly (if they are negative) and then add or subtract based on those signs. Let's better not think about it ...

## Signed Addition and Subtraction

With the two's complement system this is extremely simple: -5+4 equals -1. In assembly language this would then be: \$FB+\$04=\$FF. Under the same token, 8-12=-4 that is \$08-\$0C=\$FC. That would be obvious. But the instruction set of the 6502 family also has shift and rotate commands. Do they have any problems with the sign bit?

## Shifting and Rotating with "Sign"

Shifting left doubles, shifting right halves a number, Wanja's parts of the tutorial should have made this clear. But now we have to be very careful. If we double the number 5, we get ten - this means 5\*2=\$05+\$05=\$0A. Shifting left once has exactly this result. The number to be doubled mustn't be bigger than 127, though, since 2\*128 would already be 256=\$0100, which wouldn't fit into our number range from \$00 to \$FF. That is, unless we worked with the carry bit accordingly, but more about that later.

Shifting to the right has a similar effect, except that it cuts a number in half instead. If you take the value \$24 and shift right once, it becomes \$12. We do have to watch for odd numbers being shifted, since the lowest bit, which will be 1 for an odd number, gets pushed into the

carry as a "remainder".

As you can see, there are no problems with positive numbers. Negative numbers are a different matter. If you shifted a number like SEC (%11101100 or -20) left, it would result in SD8 (%11011000 or -40). Quite correct. If we tried to cut the number in half using LSR, though, we wouldn't get SEC again, but \$6C (%01101100 or 108): wrong!

## The Problem of the Negative Sign when Cutting in Half

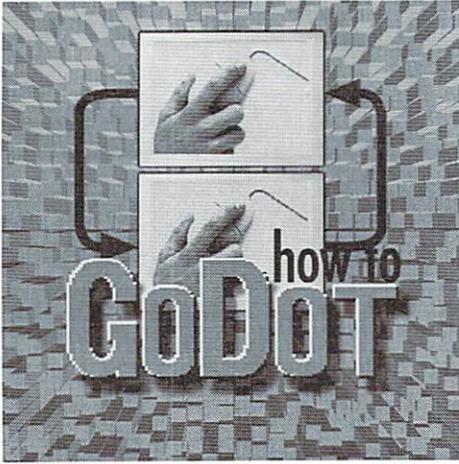
The reason is obvious, our most significant bit was lost during the doubling. This makes it clear why commands for shifting to the left and to the right have different "characteristics" - to the left is "arithmetic" (ASL) and to the right is just "logical" (LSR). This is because shifting left preserves our negative sign, which shifting right doesn't do. What are we to do then? Quite simple. We make sure that our sign is preserved! If we shift a negative number to the right, our result needs to be negative as well. This means we need to buffer the sign somehow. At this point, our Rotate commands join the fray for the first time - a little explanatory piece of code:

```
LDA #$EC ; our -20
PHA ; buffer it
ASL ; sign into carry
PLA ; retrieve value
ROR ; cut in half
```

This leads to the correct result \$F6 (-10. %11110110). During the ASL, the sign goes into carry and is pushed back into our MSB, bit 7, later during the ROR. This routine returns correct results for positive numbers as well, of course.

## And this was only the Beginning

So much for starters. Take your time to fully comprehend all of it. In the tutorial's next part, our small 8 bit range of numbers is extended, both up and down. Are you already curious? (wg)



Picture: Sebastian Bach

by Arndt Detke

**W**ould you ever have believed that the opposing picture from an Asterix movie contains 1816 colors, and it was digitized on a C64? Yes, it's true! Naturally, you can't display all the colors on the C64; the result looks more like our second image (which could use some more editing). But in the times before GoDot, even that seemed impossible unless you'd practically reconstruct the image by hand!

But, one thing at a time. We'll have to learn the basics before we can reach the higher levels of digitizing. First, what do you need to get a video image into the computer? An image source, of course, like a camera. A b/w video camera works best, because a color camera produces a color carrier signal which will interfere with any digitizer, and in the worst case result in a rather noisy digitized image. I'd recommend using b/w surveillance cameras, which are quite cheap (e.g. from Conrad Versand in Germany). The two images showing me and my C64 equipment were recorded with such a camera. As you see, however, the camera tends to wash the image out if there is too much light. The whole process isn't particularly fast, but the result is worth the wait.

You can also use a VCR with a flicker-free still-frame function. Unfortunately in this case, you won't get around the color carrier. You should still get good results on bright images with strong contrasts (note: this also holds for the commonly used color

# Digitizing images

Today's subject is one that requires using additional hardware. Please, don't be sad if you don't have such add-ons. Like always, there are lots of other things to tell about GoDot. Also, this month's cover disk contains some prepared images in GoDot's 4bit image format that let you reproduce the experiments in the article even if you don't own a scanner or digitizer.

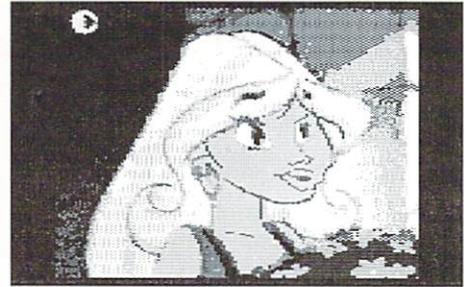


cameras!)

The next thing you need is a digitizer. GoDot supports four types of devices: two devices from the European market that were manufactured by PrintTechnik in Austria, the Scantronik digitizer (which is also available from CMD), and the B&W Connectix QuickCam - if Nate Dannenberg continues to work on it. The GoDot user interface for the latter is ready, and the module itself is working and produces very good images, but it still lacks some of the planned features. We'll see when Nate finishes his work. If you're further interested, look up Nate's article in GO64! issue 1/1999. Today, however, I'll talk about ldr.ScTDigitizer, which I have revised especially for this purpose, because former versions produced slightly distorted images. You can find the new version on our cover disk.

## Digitizing under GoDot

It's an easy business: install and invoke the loader, adjust the camera, and you can freeze the video image with a click. Like this:



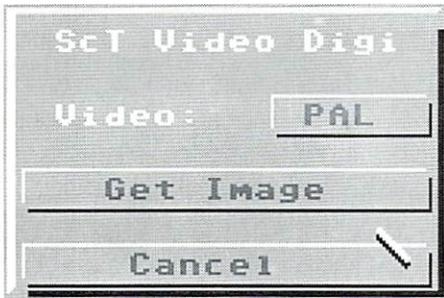
```
Load: ScTDigitizer
Load
Video: NTSC (PAL, if you
live outside North America)
Get Image
```

That's all. The screen will go blank for some seconds. When it reappears, you see GoDot working and a little later the image is in memory. By the way, it's a real grayscale image, as usual in GoDot. If you render it now, it's pretty colorful (and dumb) to look at. But remember the last time, when I showed you how to render such images with optimum quality. Like this, for instance:

```
Inst: ApplyDither
Execute
Dith: Ordered
Mode: Hires
Reduce to: 5 Cols
Accept
(Mode:) Multi
Colors: 5
Palette Default
Display
```

Of course, you can just as well print it in black and white (without passing through the above procedure). By the way, if you export such a digitized image to the PC (e.g. by using svr.PCX with the "Gray Scale" option), you'll find that the image contains odd-looking, vertically interleaved stripes that look like a comb. Unfortunately, this is a (relatively) normal effect. To get rid of the stripes, use mod.AverageGray under GoDot - before applying any dithering effect, of





names with a letter indicating the respective primary color: "r.", "g." and "b." for red, green and blue. This way, the loaders can automatically find the color extracts in the correct order.

Load: 4BitRGB (4BitRGBd usually produces better results!)  
Load "r.ads"  
Display

course. Those of you who don't have a digitizer can still try all the procedures described here, as if you had digitized the image yourself, by using a prepared image file on the cover disk: it's named "GODOTDIGI.4BT".

### Colored

In order to digitize a color image, repeat the whole procedure three times on the same motif, putting a different color filter in front of the lens at the beginning of each turn: first a red filter, then a green one, and at last a blue one. These filters (optical filters made from glass are best) allow only light of their color to pass them. This way, you'll get three 4bit images that show the light intensity of a scene in a very narrow part of the color spectrum. It's exactly the three parts of the spectrum that every TV set (and every monitor) uses to display the original color image. GoDot saves four bits (or 16 intensity levels) for each color, which makes 12 bits in total, or 4096 possible color shades. And remember: all this on a C64!

Now, how can we look at such images without using a PC? Of course, we've taken care of this and developed loaders for this purpose. You can experiment with the "ADS" image that we have digitized as color extracts, which can be found on the cover disk. The loaders require that such color extract files be marked by preceding their

I'm sure you'll be impressed by the color quality. If you didn't mark the file names with the r/g/b prefix, the loader will wait for you to click on the next image file after loading one. This way, you can experiment with your own 4bit images: for instance, loading the same picture three times will result in a conversion into C64 gray levels. Another bonus for this issue of GO64!: ldr.4BitRGBd ("d" stands for "dither") is also available in a new version and can be loaded from the cover disk.

But... what if you want to digitize an image from a VCR in color? That seems like a hard one! Using color filters is not possible - what could you use instead? I've asked this question once before: faithful readers of the German edition might remember the article on digitizing color images, way back in issue 5/97, where I mentioned a so-called digi splitter - a device for the Amiga that was once offered by many different companies. When this device is connected to a video source, and its output to the digitizer, it will separate the signal into its three color components, circumventing the color carrier, and therefore with much higher quality than optical filtering can provide. The image called "ADS" has been digitized with this method. There is, however, a new problem - those digi splitters aren't available any more! And at this point we've got to turn to you, the readers: can someone help us out?

Maybe with a simple circuit? Or could there be a hidden stock of unsold splitters? We'd be glad to support such a digi splitter in GoDot!

Oops, this article about digitizing has turned out longer than it was supposed to! I hope it didn't bore you to death... And I guess we'd better postpone the article on scanning until another issue, all right?

'til next time,

Arndt

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# Graphic Interpretation



by Bruce Thomas

Somewhere, on a disk, I know I have the start of a great article. If I don't find it nothing major will happen - I'll just have to start it over. It's just that I hate the thought of losing a piece of writing that I have put some effort into.

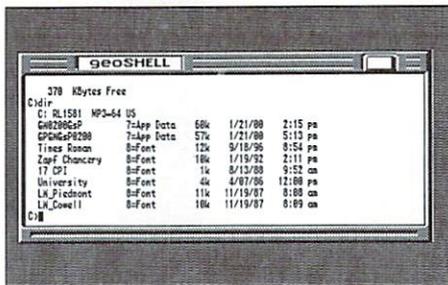
I know the flow I had envisioned for the article as I have some scribbled rough notes on a dog-eared piece of paper that has been sitting on my desk for about 6 years. Amazingly enough, I still feel that the article will be relevant when I do get it finished. Today, I went looking for it.

## Office Clutter

Now, in my own way I'm an organized type of guy (although my wife would tell you different). My office has paper here and there, stacks of disks and shelves full of books. I have magazines and newsletters in piles on the floor and various pieces of hardware lying about as well. As long as nobody else comes in looking for something I am pretty good at knowing just where I put things.

Most of the disks in my collection have labels on them and quite a few even have a rough list of the contents. At the very least they are marked to tell me their format (single or double-sided, floppy, one or two 1581 partitions, Native FD format, etc.).

# Demo Mania



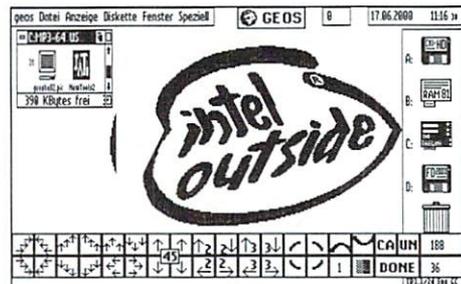
There are disk utilities to help locate files (including FINDER for Wheels - see the Sept. 1999 GO64!) but a person must have some idea of what the file was called for these to be of any use and going through a pile of floppies would be tough. I figured I would just start putting disks into the FD and pressing the JiffyDOS 'F1' key to call up the directory listing. The '@CP2' JiffyDOS command lets me quickly change partitions when needed.

I didn't find the article I was looking for but I did come across a disk I haven't thought about for quite a few years. This disk contains a number of demo files and I thought I would mention a few of them here because they contain some good information and ideas.

Most people are aware that the 64 is a great computer to program on and demos are quite popular. These can be extremely elaborate with terrific graphics, stories and outstanding musical scores coming from teams of developers. The demos I had collected on this particular disk were not in this league.

## A few words from BSW

When Berkeley Softworks released GEOS V2.0 on three 1541 floppies they found they had one side with nothing to put on it. Even with all of the improvements that they had made to the system since V1.3 they were only able to fill 5 disks worth of software. On the



sixth disk they decided to promote some of their other products so they included a number of DEMOS.

If you have the basic GEOS V2.0 System you should check out these demos if you haven't already done so. There is an Introduction demo which explains how the rest of the demo's work and how to control them (they have built-in timers to advance along or keyboard commands let you control them manually).

The other demos provide more in-depth coverage of the capabilities and the many features of geoFile, geoCalc, FontPack Plus, DeskPack Plus and geoPublish. The BSW family of GEOS products offers a lot and the programs all share the same point and click interface. You may just find that one of them does what you want.

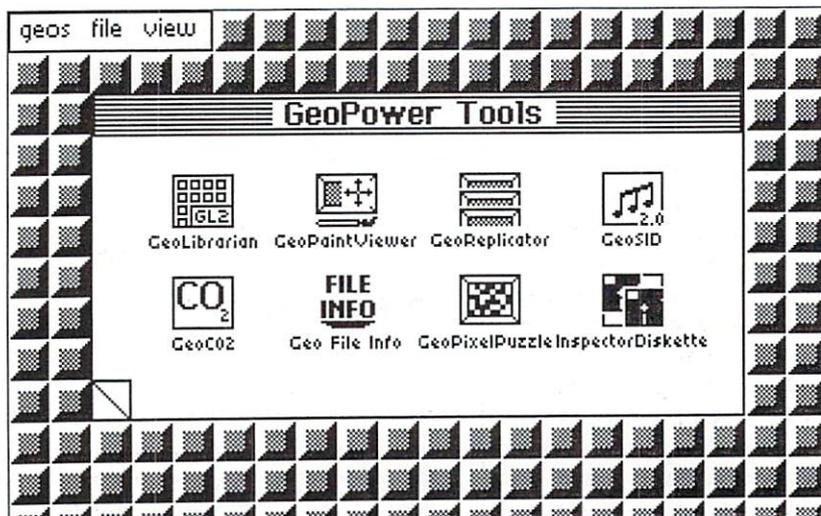
Another BSW demo is the GEOS DEMO which introduces the GEOS V2.0 system and provides a quick look at some of the add-on packages available. This demo was packaged with the two-disk geoPublish version and also with geoChart.

## On with the shows ...

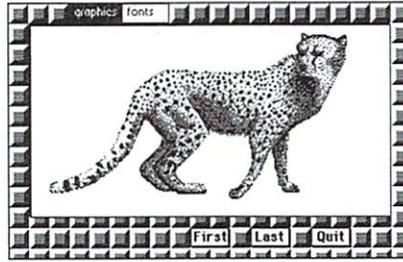
Some of the other demos that I have on the disk are really cool Desktop Simulators. By that I mean that you run the demo and a fake Desktop appears. This group of demos are all advertisements for commercial disk products.

The first of these, AntiGrav Demo, was created by Randy Winchester as an ad for Randy's geoDisk I and II. This ad mimics the look and feel of the original GEOS 1.3 Desktop. All of the GEOS Desktop features are in place but the Icons are for the actual programs on the disk. Clicking on an Icon, or choosing a file name from the View menu, brings up a short description of the program. You can download the geoDisk files from the GEOS page on Randy's web site at <http://web.mit.edu/randy/www/antigrav/antigrav.html>.

The evolution of GEOS is evident in the next of these demos that came out. Jean Major promoted his GEOS Utilities Disk 1 in the



fashion of GEOS V2.0 with DEMO Utilities. This demo features a fully functioning GEOS clock with the proper date/time, support for Desk Accessories and it runs in 40 or 80 column mode (most of the rest of these demos are 40 column only). Jean has moved on from the Commodore world and has released his popular software into the Public Domain.



insight into the workings of the program in the accompanying dox file. While it is possible to select a geoPaint file and watch it scroll out of the FAX machine on the screen the actual FAX portion of this demo does not work.

Next up is a demo of a very rare program from Kent Smotherman. geoCheckBook is one of the many fine programs that Kent wrote for the GEOS environment. The geoChkBkDemo has had the Printing features removed but otherwise does an admirable job of handling cheque tracking chores. I also have the fully working version that I bought from Kent shortly before he sold his software and rights to Parsec, Inc and it all disappeared.

Dave Ferguson wrote some neat software for GEOS and his geoStampDemo is a taste of one of these programs. This Desk Accessory loads into geoPaint and allows you to stamp preformed characters onto the screen.

Maurice Randall has been very busy writing lots of amazing software for GEOS users and he wants people to try it. That must be why he released a demo version of geoShell. If you are not familiar with this program it is a Command Line Interpreter (CLI) for the GEOS environment. This means that you type in commands - very similar to using a C-64 without loading GEOS. The mouse still works for some things in this environment and if you buy the full program it can be set up as your default Desktop. Working in a CLI is much faster than in a graphical environment as you don't have to wait for screens to redraw. Maurice continues to update the commercial product and a number of new commands are packaged with his Wheels product.

The Storm System disk is loaded with great software by Joe Buckley (aka Red Storm) and his demo also supports D.A.'s and the GEOS clock. The Garbage Can may shed some light on Joe's attitude towards the folks at BSW as it returns the following text when clicked on - 'Berkeley Softworks - The lightest minds are working at Berkeley'.

Scott Resch wrote a lot of good GEOS programs for Loadstar. These were released together on the geoPower Tools disk. This product is still available from Loadstar for \$10 plus \$1 postage if you are outside of the United States (prices in US \$). The geoPower AD demo features a really cool color intro.

Desktop 9.9 is a demo written with geoBASIC that calls itself a geoParody. This simulated Desktop features a working clock and two 1571 Disk Icons - one RAM 1571 and one Ewe 1571. Clicking on the geoWrite 8 1/4 Icon brings up a Dialog Box stating that it requires an "HP-geoPlasma Laserwrite Optical Interface. We doubt that you can afford one.". The menus offer choices such as File -> Nail, Disk -> Slipped and View -> LA Skyline. Unfortunately, none of these options do anything so the effect is not as good as it could have been.

### Cripple Ware

The next bunch of demos are what is called Cripple Ware. This means that the program actually runs but it has had certain key features disabled.

First up in this crowd is the geoFAXDemo from Maurice Randall. This demo comes up with the original geoFAX screen and provides a little

### Watch This !

The NEWTOOLS Demo and the geoLABEL Demo programs were created with Spike Dethman's Click Pix. These two demos are stand-alone programs that let you scroll around a geoPaint file without loading geoPaint. The features of both programs are easy to see from these well laid out demos.

The next demo in this bunch is by Nate Fiedler and is called Chaos. This program demonstrates the Chaos Game as it fills the center of your screen with the Sierpinski Triangle.

### The Ultimate Demo

Probably the most widely known GEOS demo is Maurice Randall's 1995 WaveDemo. The demo is cripple-ware but it does contain a working Terminal program that allows users to dial up BBS Systems and Internet Shell Accounts. The WaveDemo created a huge amount of interest in the Commodore community and that interest is finally being rewarded. While the Wave Browser that Maurice is developing at present does not have much in common with this demo program it carries with it an amazing history and will fulfill the hopes of many users around the world.

There you have it. A look at some interesting demo programs created for the GEOS System. While some of these demos will be included on the monthly Cover Disk I hope that you will seek out the full products that are still available as they all add an extra dimension to your GEOS computing experience. As for me, I guess I have to start typing that old article all over again.

Until next time, enGEOy your Commodore!

(me)

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## BJ control mode commands

These commands will affect settings that are used when the printer is switched to BJ mode. Use these commands after sending the "controlmode=bj" command to the printer.

### font

This command will select the font you wish to use as your default font. The choices are "roman", "gothic", "prestige", "script", and "courier".

EXAMPLE: print#4,"font=roman" c\$;

### codepage

This will select the character set that will be used. Some character sets have different characters for different purposes or countries. The choices are "850", "860", "863", "865", "852", "857", and "437". For the USA, you would use 437.

EXAMPLE: print#4,"codepage=437" c\$;

### pagelength

This sets the length of the paper the printer expects to see passing through the machine. You can use "11" or "12". Generally your paper length will be 11. Some label pages might be 12 inches though.

EXAMPLE: print#4,"pagelength=11" c\$;

### character set

There are two different character sets available for the different code pages. One is "set1" and the other is "set2". Choose the one that appears to work for you.

EXAMPLE: print#4,"character set=set1" c\$;

### textscalemode

You can turn this function "on" or "off". I personally haven't tested this feature yet so I can't explain its function. Normally, I would say to just leave it turned off.

EXAMPLE: print#4,"textscalemode=off" c\$;

### autolf

This is an important function to pay attention to. Depending on how you have your printer interface set, you may need to adjust this setting depending on if you're getting no linefeeds at all or getting double linefeeds. Set this to either "on" or "off".

EXAMPLE: print#4,"autolf=on" c\$;

### autocr

Sometimes, the software you're using might keep on sending text to the printer and not keep track of how many characters it has sent on each line. In other words, you might be printing 80 characters on each line, but the software just keeps on sending without performing a carriage

return. In that case, you can have your printer do the carriage return when enough characters have been sent to reach the right side margin, automatically. Most older printers did this by default. The "autocr" command lets you turn this feature on or off. With this turned off, the printer will simply ignore any characters that exceed the right side margin and will wait forever for the carriage return. Generally, you would want this to be "on".

EXAMPLE: print#4,"autocr=on" c\$;

### agm

This is a special graphics mode used on IBM mode printers. When the BJ is in "bj" mode, it can emulate the graphics commands used on these printers. This will allow your BJ to work with the 9-pin graphics commands and to function properly while using some of the older software packages without having everything stretched vertically. When you're using software that supports 24-pin printers, be sure to turn this "off" or you'll also get poor results.

EXAMPLE: print#4,"agm=on" c\$;

## LQ control mode commands

These commands will affect settings that are used when the printer is switched to LQ mode. Use these commands after sending the "controlmode=lq" command to the printer.

### font

This command will select the font you wish to use as your default font. The choices are "roman", "gothic", "prestige", "script", and "courier".

EXAMPLE: print#4,"font=roman" c\$;

### pagelength

This sets the length of the paper the printer expects to see passing through the machine. In LQ mode you can use "11", "12", or "22". Generally your paper length will be 11. Some label pages might be 12 inches though.

EXAMPLE: print#4,"pagelength=11" c\$;

### character set

There are two character sets available, "italic" and "graphics". The names of these character sets refer to the characters used that are defined above the normal 7-bit ASCII set. Generally, for most printing from our Commodores, we would use the italic set.

EXAMPLE: print#4,"character set=italic" c\$;

### textscalemode

You can turn this function "on" or "off". I personally haven't tested this feature yet so I can't explain its function. Normally, I would say to just leave it turned off.

EXAMPLE: print#4,"textscalemode=off" c\$;

### autolf

This is an important function to pay attention to. Depending on how you have your printer interface set, you may need to adjust this setting depending on if you're getting no linefeeds at all or getting double linefeeds. Set this to either "on" or "off".

EXAMPLE: print#4,"autolf=on" c\$;

### international

In addition to the character set command, you can also select how the characters will appear for the country you're in. The following character sets are supported: "japan", "norway", "denmark2", "denmark1", "spain2", "spain1", "sweden", "latinamerica", "legal", "korea", "france", "germany", "italy", "uk", and "usa".

EXAMPLE: print#4,"international=usa" c\$;

## Common control mode commands

These commands will affect settings that are used in both the BJ and LQ modes. Use these commands after sending the "controlmode=common" command to the printer.

### papersel

Since the printer has a mechanism for handling the paper, it needs to know what kind of paper you're using. 4 types are supported, "a4", "#10 envelope", "dl envelope", and "letter". In the US, we would generally want to set this for "letter" while the Europeans would usually use "a4".

EXAMPLE: print#4,"papersel=letter" c\$;

### printmode

You can print fast, or you can print slow. These BJ printers are generally quite fast at printing text even when you choose the high-quality mode, "hq". And likewise, the quality of print is still quite good even with the draft mode, "hs". It's your choice. You can pick from "fine", "hs", and "hq".

EXAMPLE: print#4,"printmode=hq" c\$;

### smoothing

When you print graphics from your Commodore, they might turn out blocky. These printers support quite a high resolution of 360 dpi, but most of our software sends data with a much lower resolution. So, we end up with good looking blocky graphics. The BJ printer can smooth out the edges for you if you turn the smoothing feature "on", but for those programs that use the full capability of the printer's resolution, be sure to turn this "off".

EXAMPLE: print#4,"smoothing=off" c\$;

### reduction

I haven't tried this one out so you'll have to test

it yourself. Three parameters can be used, "wide3", "form2", and "off". I guess you would normally set this to "off".

EXAMPLE: print#4,"reduction=off" c\$;

#### autopoweroff

Use this to automatically turn your printer off for those many times when you forget yourself to press the power switch. If this is set, the printer will wait the desired number of minutes of inactivity and then turn itself off. You can set it to "1", "10", "30", "60", or "disable". I prefer "disable".

EXAMPLE:

print#4,"autopoweroff=disable" c\$;

#### i/d-buffer

This command is used for when you want to send a custom character set into the download buffer area within the printer. This could consume a whole article so I won't go into it here. So, if you don't mess with this setting, it will always remain set to "input", which is the normal setting. For downloading characters you would use "download".

EXAMPLE: print#4,"i/d-buffer=input" c\$;

#### More examples

A resourceful programmer could take all this information and use it to create a complete configuration program. In the examples given in this article, we're making dedicated BASIC programs to configure the printer the way we want it to be. A nice way would be to allow the user to select among the various settings and the program would then send those settings to the printer. A program written in machine language could also communicate with the printer using a geoCable. This would be a handy utility to have in GEOS for those that need to switch the printer between BJ and LQ modes as needed.

Until something like this comes along, we can at least benefit from this article and set these printers up the way we need them to be. It sure beats hauling the thing over to a friend's house to hook it up to a Windows machine anytime a setting needs to be changed! Or worse, having to take your new printer back to where you bought it because you just can't get it to work properly.

Remember that the commands in this article will not work on the Canon printers that have dip switches, only the cheaper ones that require a computer to do the configuring.

Program 4 and Program 5 are two BASIC programs you can use. Feel free to alter any settings you see in these programs to suit your own needs. With the information in this article and a little knowledge of what your own needs are, you shouldn't have too much trouble configuring these printers.

Program 4 - Set printer up for geoFAX and the BJ360 driver.

```
10 c$=chr$(10)
20
d$=chr$(27)+chr$(91)+chr$(75)+c
hr$(2)+chr$(0)+chr$(0)+chr$(31)
30 s$=d$+"bjlstart"+c$
40 e$="bjlend"+c$
50 open4,4,5
100 print#4,s$;
110
print#4,"@setcontrolmode=bj" c$;
120 print#4,e$;
200 print#4,s$;
210 print#4,"controlmode=bj" c$;
220 print#4,"pagelength=11" c$;
230 print#4,"autolf=off" c$;
240 print#4,e$;
300 print#4,s$;
310
print#4,"controlmode=common" c$;
320
print#4,"paperselect=letter" c$;
330 print#4,"smoothing=off" c$;
340 print#4,"reduction=off" c$;
350
print#4,"autopoweroff=disable" c
$;
360 print#4,e$;
999 close4
```

Program 5 - Set printer up for most software packages that support Epson 24-pin printers.

```
10 c$=chr$(10)
20
d$=chr$(27)+chr$(91)+chr$(75)+c
hr$(2)+chr$(0)+chr$(0)+chr$(31)
30 s$=d$+"bjlstart"+c$
40 e$="bjlend"+c$
50 open4,4,5
100 print#4,s$;
110
print#4,"@setcontrolmode=lq" c$;
120 print#4,e$;
200 print#4,s$;
210 print#4,"controlmode=lq" c$;
220 print#4,"font=roman" c$;
230 print#4,"pagelength=11" c$;
240
print#4,"character set=italic" c$
;
250
print#4,"textscalemode=off" c$;
260 print#4,"autolf=on" c$;
270
print#4,"international=usa" c$;
280 print#4,e$;
300 print#4,s$;
310
print#4,"controlmode=common" c$;
320
```

```
print#4,"paperselect=letter" c$;
330 print#4,"printmode=hq" c$;
340 print#4,"smoothing=off" c$;
350 print#4,"reduction=off" c$;
360
print#4,"autopoweroff=disable" c
$;
370 print#4,"i/d-
buffer=input" c$;
380 print#4,e$;
999 close4
```

On top of all this, these printers still support the same old escape codes that we've been accustomed to all through the years. Most software programs are already programmed to send the escape codes that you need and they will still work as long as you have the printer set for the correct operating mode to begin with, BJ or LQ.

This is important, since it's a good chance that no program will do this part for you. Even geoFAX doesn't switch the printer to BJ mode when using the BJ360 driver. The reason is because that geoFAX driver will work just as well with a BJC-4100 printer as it will with a BJ-200. The BJ-200 has dip switches for switching to BJ mode and if a program were to send "@setcontrolmode=bj" to one of these printers, it would likely confuse the printer. It's up to the user to make sure the printer is in the proper mode and that's what this article is all about.

#### Use this info all you want

The info provided in this article is nothing that can't be shared by everyone. It's here for everyone to use. If you're a programmer and want to include any of this in your own programs, feel free to do so. That's what the information is here for. It's just a shame that the info isn't more readily available. I don't understand why Canon feels they have to shield everybody from this stuff. As you can see from this article, it's not that hard to understand. But if you do get a little confused, just go back and read it again. Once you start following the examples, you'll catch on quick.

But be sure not to call Canon's technical hotline about any of this. You won't get anyone that knows anything about this stuff. It's really sad, you know. They make printers that can be used on any computer that can be connected to them, but they don't seem to care about anybody except the huge mass of Windows users. I don't think it should matter what kind of computer a user has. These printers work just fine with our Commodores. Let's set them up properly now. (Maurice Randall/ad)

**CMD****SUPERCPU****CORNER**

**GO64!:** Hello, Steve, nice to have you here; please first introduce yourself a little.

**Steve:** Well, I'm nearing 29, living in New Mexico with two ratty cats and two misbehaved dogs. I direct the youth choir at church. I try to fly often, am a member of the Civil Air Patrol, and am thinking about building a plane. I try to get outside a lot and like looking at stars.

**GO64!:** Wow, a lot of interesting hobbies besides our Commie. So, how did you first get in contact with a C64?

**Steve:** I lived in an Apple II town, but my dad bought a 64 when I was in seventh grade - no disk or tape drive, just a 64. In eighth grade, I took two paper routes and saved up \$400 over four months to buy a 64 + 1541 in 1984, which I still have.

In 1988 I stopped using it when I bought an Amiga. In 1993 I remembered how much fun it was and got a 128D. There is something really neat about that "READY." prompt blinking at you, begging you to do something with the computer. In 1994, almost ten years after I got my first 64, I got interested in 3-D graphics and started doing some serious programming. Until recently, I used the 128D with only JiffyDOS and a FD-2000 for all my development; a few months back I added a 1 gig hard drive and a SuperCPU 128 + 16M SuperRAM.

**GO64!:** Could you describe a little more what made you get a SCPU?

**Steve:** CMD sent me an early SuperCPU, with the idea that I write some programs for it. I think Jammon was the first program. PPPatch was done in return for a SuperRAM card. Jammon was just supposed to be a quick hack to tide us over for a few months until the "real" SuperCPU monitors and assemblers appeared.

**GO64!:** Hmm, those quick hacks still have to do the job. There were some announcements for better programs, but up to now we have

Stephen L. Judd is one of the most outstanding programmers for the SCPU. Jammon, El Cheapo, JPX - for the most part, these are all the results of his work. Together with him, we want to take a critical look at the future of the SCPU.

by Wolfram Sang

had to wait for the releases. Did you expect the software development to be so slow?

**Steve:** When it became clear that no new programs were appearing, I started updating the programs to make them into real tools. My tools are focused on one goal - getting the job done. Although I did expect more SCPU development initially, there have never been large numbers of programmers who get the job done, at least C64 applications programmers. It is, after all, only a hobby.

**GO64!:** You were heavily involved in creating the great JPEG viewer, "JPX". What are your future plans concerning this project?

**Steve:** Adrian [Gonzalez] and I are hard at work on a 24-bit image processing program for the SuperCPU + SuperRAM. Actually, Adrian is hard at work, while I am hardly working.

Incidentally, Adrian really did all the hard work on JPX, too. Although JPEGs have been hyped up for many years as being "impossible", I think people will be very surprised to learn how straightforward they are when they read about it in C=Hacking #19. Without Adrian's renderer, they would have looked very unimpressive.

**GO64!:** I can't wait to read that article! You also developed a 65816 assembler called, "El Cheapo". It has now become "Sirius". What are the main differences?



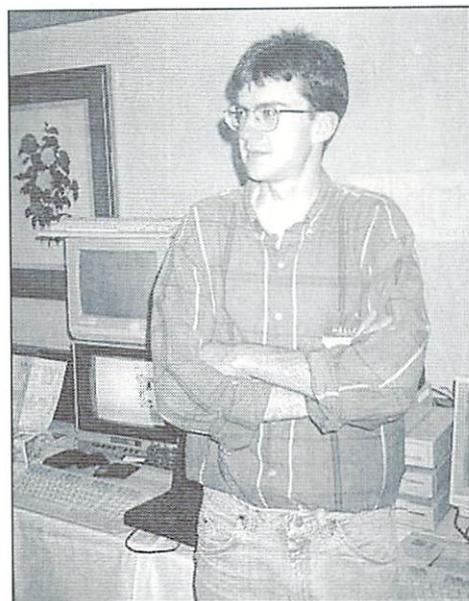
**Steve:** El Cheapo was another quick hack to allow people to write 65816 code. It's actually a pretty decent system, and I wrote both obj3d and the JPEG programs with it.

Sirius has a number of extra features and really takes advantage of a SuperCPU. SuperRAM makes a lot of neat things possible, like editing and assembling multiple large files, and the ability to recover smoothly from crashes. Jammon 3.2 can do a number of nifty things, like single-stepping and 24-bit load/save. Most importantly, Sirius has a linker, which is an essential tool for developing large programs.

Starting with El Cheapo, my long-term goal was to create a 65816 development system that was at least the equal of Merlin 128, my old and very powerful assembler. Many features - for example, local labels - are taken from Merlin 128. I used Merlin's linker extensively, so until I wrote my own linker, I could not assemble the majority of my old programs. My first test of the linker was to assemble Sirius from within Sirius. Except for the lack of macros (and an 80-column editor), I think I have finally written a system which beats my old Merlin 128; as I say in



Picture: Sebastian Bach



the docs, it's pretty close to being what I consider an ideal development system.

**GO64!:** *For most of your projects, you publish the source code as well so that people could theoretically help you with bug fixes or new features. How many responses in that direction do you get?*

**Steve:** Zero. I don't know of more than a few people who have even used my programs, let alone looked at the source code.

Actually, I once got an email from a guy who wanted to know what some of the pseudopcodes were, because he was typing in Tunesmith. Tunesmith is something like 16,000 lines of code. I suggested he download the binary instead, to save a little time.

**GO64!:** *Hehe, that's a nice story. But isn't it frustrating to get so few responses to your work?*

**Steve:** It would of course be nice to have hundreds of people saying how beautiful the code is and how they use the program every day to solve international crises, but not long after I started C64 coding, I realized that as long as I was interested in the program and was going to use it, then it would be worthwhile and satisfying to write, even if nobody else used it. After a while, the only person you're competing with is yourself.

**GO64!:** *There are a lot of operating systems being developed, especially for the SCPU (CLiPS, JOS...). What is your opinion about them?*

**Steve:** I think it's great. On the one hand, historically, alternate operating systems don't

become popular, unless they're named GEOS. For most C64 applications, there's not a very compelling reason to write for or use an alternate OS. The reason these OSes are neat is because they show what the 64/SCPU is capable of and also because they provide a lot of enjoyment for the authors. The more active programmers, the better.

**GO64!:** *Most of these OS projects will include elemental support for an Internet connection. So, programs for mailing, chatting, surfing would be possible then. Would this be the final breakthrough for the SuperCPU?*

**Steve:** No, I don't think so. LUnix and OS/65 both had TCP/IP support but no applications developers. The future of C64 TCP/IP is The Wave. GEOS is what users are used to and what many programmers are familiar with. The Wave can take advantage of numerous existing applications, and it comes with a browser. Most importantly, Maurice [Randall] gets the job done.

Where the alternative OSes will be strong is among the hackers.

**GO64!:** *Luckily, there are still a number of them. We'll have to see... If you were to try to motivate programmers to start working with a SuperCPU, what would you say?*

**Steve:** Get busy!

**GO64!:** *(grin) That was to the point! And what advice would you give them?*

**Steve:** Patience, perseverance, and practice. And always, always finish what you start.

**GO64!:** *Now you have some room to tell our*

*readers anything else you'd want.*

**Steve:** When you get down to it, pretty much all serious developers have shifted to the SuperCPU. I think that's partly due to the breath of fresh air that is the SCPU, and the things it makes possible. But it's also because most users with a SCPU take the machine seriously - that is, as a developer, I can pretty much depend on the fact that if I write a SCPU application, people will actually use it. Outside of the demo community, the plain C64 seems to be dominated by people who would rather talk about the machines (or themselves) than use them.

I am also concerned with the discrepancy between the number of projects that seem to be in development compared with the number of programs which actually get released. If you are a programmer and have some unfinished code laying around, I'd like to encourage you to buckle down, finish it, and release it. We need more finished projects.

Finally, I'd just like to point out that the C64 is still moving forward, almost 20 years after its debut, which is absolutely remarkable, and a testament to just how flexible and neat a machine it is.

**GO64!:** *Okay, thank you very much, Steve! All the best to you, and good luck with your projects.*

**Stephen's homepage:**  
<http://www.ffd2.com>

# Tips & Tricks for the C128

## UNVEILED: THE OMINOUS BIT 1 AT ADDRESS \$D030

62Hz that are easy on the eyes and more with the VIC of PAL systems displayed by software ...Until today, you wouldn't have dreamed of it. A bit in the C128's VIC that hasn't been given much attention until now opens up new possibilities...

by Günther Walter

Even after 15 years, the C128 is still able to surprise us: Little has been said thus far about that undocumented bit 1 of address \$d030, the address which is also responsible for choice of clock frequency and reading the extra keys. Once, it was said, "the computer crashes when the bit was set", another day, they said "the VIC ceases all activity and shows a grey screen when it is set". At first sight, the latter seems to be correct, but motivated by the idea of clearing the bit again after a few cycles, my experiments created the following image:

While the bit is set, the raster line counter in \$d012 no longer increases once per raster line, but rather once per cycle! The screen keeps on being displayed during that time, but the monitor occasionally shows color shifting in that raster line. You should avoid activating it at the start of a raster line, as this would have the monitor display the entire current screen in black and white only.

If you left the bit set for only, let's say 31 cycles, this being approximately for the duration of half a raster line, we would already be "missing" 31 raster lines! This "missing" raster lines comes to notice by the effect, that the VIC now displays as many raster lines less as cycles have passed, since the raster beam obviously returns, when \$d012 (and bit 7 at \$d011) equals a invariable reference value. The last raster line is therefore reached earlier. This reduces the background or the outer border accordingly, depending on where the bit was

temporarily set.

And now for the highlight: Because of there being less raster lines displayed, more screens per second will be shown, as the raster beam speed is constant! There is only the question of how far you can go.

Usually, the VIC of PAL systems displays 284 lines. A Commodore 1084 monitor or a tv set can display a screen that is not v-scrolling at down to 219 lines. This is 69 lines less, or approximately 24%, and the screen refresh rate is increased by that percentage, ending up at about 62 Hertz!

If you do completely without the border and use a monitor that allows setting "V-Hold", like the Commodore 1901, you can reach a maximum value of 64 Hertz!

On the cover disk, there is an illustrative program for each the C128 and the C64 mode of the C128. The C64 mode version is loaded by 'LOAD "NOFLICK.C64.PAL",8,1' and then started by 'SYS 49152', the C128 mode version is

activated by 'BOOT "NOFLICK.128.PAL"'.

The illustrative programs are running in the raster line interrupt and "remove" a total of 68 lines in the upper and lower border. Thus, they are displaying the screen with about 62 Hertz - you really notice the difference! As mentioned before, there are some slight color problems in a raster line in the lower border. (You can shift this distortion down into the last raster line that can be displayed; thereby also winning some raster lines outer border, where the VIC would normally only show black. In order to keep the raster beam from appearing hastily 'cut off', the raster beam return needs to be delayed up until the side border by means of exact timing.)

A sensible use for this could be imagined for IFLI pictures, the flickering would be reduced by about 24%. Since the bit shows no effect on the C64 at all, and the routine needs but two raster lines of time, adding it to any C64/C128 programming not using the border or the time during its display would be conceivable.

Perhaps there are even some completely different things possible with this bit given the right timing...

You can ask me questions about this and other things:

(Günther Walter/ws)

Email: [e95245459@student.tuwien.ac.at](mailto:e95245459@student.tuwien.ac.at)

### 64Hz-IFLI & MCI-Viewer

von Wolfram Sang

The 64Hz trick is one of those typical ingenious C64/128- freak- gadgets. This time, however, we were not only able to uncover a secret of the computer, but there is also a real use for it. When displaying pictures in interlace mode, even good pictures with smooth color transitions still contained some flickering. At 64Hz, this flickering is tremendously reduced! You will find viewers for the two most common interlace formats on our cover disk. One will display pictures in the widely spread Gunpaint- IFLI- format, which need to be loaded to the standard address \$4000. Then the viewer is loaded (with ,8,1) and started by SYS 15872 (hex. \$3E00). Analogous to this is the MCI viewer, that expects a picture in unpacked

TruePaint format (see GO64/ Commodore World magazine 10/99) at \$1C00. Unlike the first one, this program is started by SYS 6656 (hex. \$1A00). The SYS start addresses equal the picture data's addresses minus \$200, and is equal to the programs' loading addresses. Both viewers first show the picture at 50 Hz (PAL) or 60 Hz (NTSC) respectively, after showing the infoscreen, so as to ensure a clean display on all monitors/tv sets. With "F1", you can turn the 64Hz trick on an off, only on a C128 in C64 mode, of course, on a pure breadbox, nothing will happen. If you press RETURN, the computer will reset. By the way, the programs are both PAL and NTSC compatible, although the increase from 60Hz to 64Hz for NTSC isn't that impressive. But see for yourself, there are also some illustrative pictures on the disk.

## Sensation

by Nicolas Welte

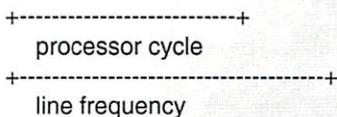
I really have to say: once I read what this sensation was about, I first stood there, mouth aghast! This is a gigantic sensation without doubt! Uncovering the workings of a register bit these days is really a great accomplishment. Many people have already failed at that one, including the authors of the VIC's basic reading, the "VIC article".

Saying it early on: I have adapted both programs for NTSC, they work and the refresh rate equals the one of the PAL versions. The effect isn't as impressive on NTSC, of course, as the NTSC machines start out running at already 60Hz. For details, look below.

Some information on the program's background. The programs remove a total of 68 raster lines from a screen frame, as you know. From a PAL screen with 312 lines, 244 remain. The accompanying frame rate is derived from the crystal's clock rate and the clock divider as follows:

$$f_r = q_f / (d * n_c * n_l)$$

- f<sub>r</sub> frame rate
- q<sub>f</sub> quartz frequency
- d divider
- n<sub>c</sub> number of columns
- n<sub>l</sub> number of lines



(Note the interesting intermediate results!)

The (standard) constants for PAL and NTSC for this are as follows:

	PAL	NTSC
Quarz	17.734472	14.31818 MHz
Divider	18	14
Cycles/line	63	65
Lines	312	263

PAL normal: 312 lines, 50,1Hz  
 PAL noflicker: 244 lines, 64,1Hz  
 NTSC normal: 263 lines, 59,8Hz  
 NTSC noflicker: 245 lines, 64,2Hz  
 (PALnoflicker on NTSC: 195 lines, 81,9Hz, this is purely theoretically, though, since the chip really goes crazy)

It is therefore quite obvious, that we can't simply take away another 68 lines from an NTSC screen, as we would start taking away lines from the 200 lines visible. In addition,

we would have a ludicrous refresh rate which no composite monitor could handle. These are usually able to catch the screen (the screen doesn't scroll through) around their normal refresh rate, which is either 50 or 60 Hz. The 1084-P and 1084S-P (those produced by Philips or Magnavox in the USA, in effect) have a special feature: The vertical-hold automatically registers whether a 50 or 60Hz signal is given, and adjusts the vertical zoom accordingly! Multi-standard tv sets work similarly, and shouldn't have any problems within a range of probably 47 - 63 Hz. Older sets often have a v-hold dial with which you might cover the same range if lucky. But then you have a distorted screen with black borders above and below. (By the way, my old 1702 has a very wide range: I believe, it can even catch 70 Hz!)

What did I have to do now? For the 128 version, I got it quite quickly: Distributing the lines to be removed between the upper and lower border wasn't enough. The NTSC chip (I have the 8564R4) doesn't like the test bit beyond raster line 256. Therefore, I had to put the raster to \$FA, so that you have the change in the first border line. I had chosen to skip nine lines each in both borders, this giving me a total of 263-18=245 lines. This is one more than is shown by PAL, but the refresh rate is still increased by 0.1 Hz. By the way, you better stick to even adjustments, since PAL inverts the color phase (which gives you eleven completely new colors!) and NTSC becomes undecipherable, at least on my tv set.

The C64 version was more trouble, I nearly quit. After applying the aforementioned correction, the last raster line visible flickered. I had to integrate some additional delay, but now it's quite stabile (if you don't mess around). Actually, something like this ought to be timed exact down to the cycle, so that everything would be secure, but as of now, the effect needed to be demonstrated first. I am also not the kind of person who simply knows how to do that exact calibrating, I would need to have a look at it and learn it first.

By the way, the NTSC versions also run on PAL, but they invert the color phase in the lower border, showing the new colors! Don't worry, NTSC doesn't have those color phases and is therefore less problematic for once. The NTSC border display is single-colored and without errors. There is also no flickering in the line the switching occurs, which is why I used (that is had to use) the first border line!

The NTSC chip has a problem, the PAL chip doesn't have, though: If you activate the test bit for too long or too late in the lower border,

it will also move the screen content horizontally. If that hadn't been the case, I would have started an alternative fix: 50 Hz on an NTSC chip. In order to do that, you would have to skip the NTSC sync mark, and reset the bit only during the next frame, so that the sum of the two frames would display 312 lines. Unfortunately, the chip doesn't like that too much, but that doesn't mean, that there can't be someone who finds a solution for it someday. I am also not sure if it's not my old R4 chip's fault. I also have a R6 in the box, but installing it now would really be too much trouble. In addition, the first demo should run on all systems first, there shouldn't be too many mishaps. There will be enough problems with incompatible monitors, that's one for sure.

So much for my humble contribution, I really have to bow in awe, as I was allowed to participate in this millennium event!

I can think of some other uses besides IFLI pictures with reduced flickering. First of all, you could use it to fix some old programs/games. As of this day, people limited PAL/NTSC fixing just to making them executable. But since the dots under NTSC are narrower and taller than under PAL, this offers an improvement of display quality (for instance when having circles) for the first time! Only approximately, of course, as dot width remains the same, and only with appropriate monitors such as the 1084-P and multinorm tv sets, since the screen would stay compressed otherwise.

Music based on the raster frequency could finally be fixed with ease. Who wouldn't want to hear Skate-or-Die with the original 60 Hz speed? That rocks! And this inside the game and not as a ripped version, of course.

What else? This is a bit far off, and probably wouldn't work: You could create a hardware interlace screen with real 625 lines at 25 Hz by manipulating the sync signals and forming a screen with frames of different lengths! But since a line is projected onto a cycle, you would probably already need a SCPU. Actually, you should also move the syncs by half a line, but this is probably absolutely impossible! Fortunate Plus/4 users, the TED has some other possibilities there, it is able to do it.

And there is bound to be some use for those eleven new colors. You can activate them only on PAL and only line by line (if you can even do it with that precision), but still, it should be enough for a look any time!  
 (ad)



# The 1581 ROM-Listing

Part 2

There are commented ROM listings of the operating system of the 1541 disk drive in various books. For the 1581 disk drive, such a thing has never been published. Since a book about a C64 disk drive would probably only be sold

in small numbers today, we bring you exclusively a fully-commented ROM Listing of the 1581 disk drive in GO64!. Because it is very large, we are spreading it over several issues with one page per issue -- this listing cer-

tainly not being interesting for everyone. To help collect these pages, we have specifically provided a margin for hole-punching on the left side.

```

$0509 1289 <- U6
$050c 1292 <- U7
$050f 1295 <- U8
$0600-$06ff 1536- 1791 Buffer 3
$0700-$07ff 1792- 2047 Buffer 4
$0800-$08ff 2048- 2303 Buffer 5
$0900-$09ff 2304- 2559 Buffer 5
$0a00-$0aff 2560- 2815 Buffer 7 (BAM part 1)
$0a00 2560 $00: no BAM loaded
$0b00-$0bff 2816- 3071 Buffer 8 (BAM part 2)
$0c00-$1fff 3072- 8191 Cache buffer
-----
I/O Area
-----
$4000-$400f 16384- 16399 CIA8520A (corresponds to 6526)

$4000 16384 0 PA (Port A)
b0: side selection
b1: 1: no disk in drive
b2: 0: engine on
b3,4: DIP switches
b5: 1: error LED lit
b6: 1: drive LED lit
b7: 0: disk change (will only be reset during a head
movement)
$4001 16385 1 PB (Port B)
b0: DATA IN
b1: DATA OUT
b2: CLOCK IN
b3: CLOCK OUT
b4: automatic ATN answering
b5: data direction for bus driver
0: FSM is input/ 1: output
b6: 0: write protection activated
b7: ATN IN
$4002 16386 2 DDRA (Data Direction Register A)
$4003 16387 3 DDRB (Data Direction Register B)
$4004-$4005 16388 4 Timer A (clock pulse for FSM output)
starting value is usually = $0006
$4006-$4007 16390 6 Timer B (interrupt timer)
starting value is usually = $4e20
$4008-$400b 16392 8 Real time clock
$400c 16396 12 SDR (Serial Data Register)
(FSM I/O register)
$400d 16397 13 ICR (Interrupt Control Register)
b1=1: Timer B IRQ has occurred
b3=1: finished transferring byte (FSM)
b4=1: ATN has occurred
$400e 16398 14 CRA (Control Register A)
b0=1 (otherwise there's no clock pulse for FSM)
b2=00 (always)
b6: SDR set to Input (0) / Output (1)
$400f 16399 15 CRB (Control Register B)
b0: 1: interrupt timer on
b2=00 (always)
-----
$6000-$6003 24576 WDI77X

$6000 24576 0 Command/ status register
$6001 24577 1 Track register
$6002 24578 2 Sector register
$6003 24579 3 Data register

DOS 1

,8000 4d 19 cd 01 checksum
-----

Analyse command string from computer ($c146)

If register SA is addressed with a value of 15, or the it contains an OPEN
command, all data arriving will be written to the command buffer and the
command mode flag ($7b) will be set (see $8e78).

At the end of command transferral the main empty loop is called again. It then
realizes, that there is a command waiting, and calls the respective routine.
-----

,8004 a9 00 lda #500 clear flag: 'write BAM to disk'
,8006 85 35 sta $35
,8008 20 62 a8 jsr $a862 prepare '00,ok,00,00' message
,800b a5 53 lda $53 get secondary address from IEC bus
,800d 10 09 bpl $8018 open SA? No. (consequently command channel) ==>
,800f 29 0f and #50f Yes: open SA 15?
,8011 c9 0f cmp #50f
,8013 f0 03 beq $8018 Yes, (execute command) ==>
,8015 4c 78 96 jmp $9678 Open File Routine ==>

,8018 20 65 81 jsr $8165 Initialize command table
,801b b1 cd lda ($cd),y Get character from input buffer
,801d 8d 8f 02 sta $028f and memorize it
,8020 a2 0b ldx #50b Search command

```

```

,8022 bd 78 db lda $db78,x Fetch legal commands one after the other
,8025 cd 8f 02 cmp $028f and compare with given one
,8028 f0 08 beq $8032 Command found, ==>
,802a ca dex
,802b 10 f5 bpl $8022 Check next command, ==>
,802d a9 31 lda #531 Command searched not found
,802f 4c 7c 80 jmp $807c 31, Syntax Error

,8032 8e 2a 02 stx $022a
,8035 e0 09 cpx #509 Command with file- name?
,8037 90 03 bcc $803c No, ==>
,8039 20 a2 80 jsr $80a2 Check command string
,803c ae 2a 02 ldx $022a
,803f bd 84 db lda $db84,x Call command
,8042 85 40 sta $40
,8044 bd 90 db lda $db90,x
,8047 85 41 sta $41
,8049 6c 40 00 jmp ($0040)

-----
Ending of a Command ($c194)
-----

,804c a9 00 lda #500 Clear flag: 'Write BAM to disk'
,804e 85 35 sta $35
,8050 ad ab 02 lda $02ab Fetch error code
,8053 f0 03 beq $8058 No error, ==>
,8055 4c 7c 80 jmp $807c

,8058 a0 00 ldy #500 00,Ok
,805a 98 tya
,805b 85 4d sta $4d ,00
,805d 84 4e sty $4e ,00
,805f 84 cd sty $cd Clear pointer into input buffer
,8061 20 6d a8 jsr $a86d Send error message
,8064 20 e5 81 jsr $81e5 Turn off LEDs

,8067 a9 00 lda #500 Clear drive status
,8069 85 6e sta $6e
,806b 20 71 80 jsr $8071 Clear input buffer
,806e 4c 34 94 jmp $4394 Release internal channels

Clear Input Buffer ($c1bd)
-----

,8071 a0 28 ldy #528
,8073 a9 00 lda #500 Fill buffer with $00
,8075 99 00 02 sta $0200,y
,8078 88 dey
,8079 10 fa bpl $8075
,807b 60 rts

-----
Send Error with T&S = 00 ($c1c8)
-----

,807c a0 00 ldy #500 T&S = 0
,807e 84 4d sty $4d
,8080 84 4e sty $4e
,8082 4c 3f ff jmp $ff3f To DOS error routine

-----
Searches for drive number in command line ($c1d1)
The position is saved at $0291 (0: no drive number)
I: y: Position, where the search should begin
The routine turns on the drive LED
-----

,8085 a2 00 ldx #500 Flag for 'no drive number'
,8087 8e 91 02 stx $0291
,808a a9 3a lda #' Look for ':' in command line
,808c 20 1c 81 jsr $811c
,808f f0 05 beq $8096 Not found, then ==>
,8091 88 dey
,8092 88 dey Memorize position of drive number
,8093 8c 91 02 sty $0291 (is directly in front of the ':')
,8096 4c 51 82 jmp $8251 Turn on LED

-----
Analyze Input Line up to the ':' ($c1e5)
0: y: position of the ':' +1
(x: number of commas found (ought to be 0 usually))
-----

,8099 a0 00 ldy #500 Start at beginning of line
,809b a2 00 ldx #500 No commas found yet
,809d a9 3a lda #' Character searched for
,809f 4c 1c 81 jmp $811c

-----
Check Input Line during Copy, Rename, New ($c1ee)
-----

Analyze command line up to the ':'

```

## Nostalgia: A portrait of Rainbow Arts



# Somewhere over the Rainbow...

There was one German software producer that dominated the world of the C64 for years, and, while releasing one hit game after the other, prepared the fundamentals for high-quality game production in Germany. In spite of their huge economic success, the productions from the "Rainbow Arts" house mainly stood out by being more than just simple entertainment: these games had a heart and a soul.

by Volker Rust

### Part 2

It's not a coincidence that playing "Hard'n'Heavy" feels exactly like "Giana Sisters", as the same programming team was responsible for both; except for Andreas Escher, who did the graphics. In the game, however, you find no names but senseless pseudonyms, as they tried to avoid any trouble with Nintendo this time.

In 1998, the "Golden Goblins" had been formed, and in 1989, they presented "Circus Attractions" and "Grand Monster Slam", both productions featuring sound and graphics of the highest quality, beginning with the title screens using overlays to simulate very high resolution. With the intro music to "Grand Monster Slam", Chris Hülsbeck made one of his best melodies with unique sounds. While "Circus Attractions" was rather average in gameplay, "Grand Monster Slam" and its mixture of tennis and football had the potential to become a hit arcade game.

For all friends of puzzle games, programmer Jörn Galka presented "Spherical", a new version of the classic "Solomon's Key". This game stood out with its fiddly levels, its very noble design and a perfect soundtrack.

### Cooperations

Rainbow Arts took new ways on the search for project managers and playtesters: they simply poached Boris Schneider and Martin Gaksch, two editors of the market-leading "PowerPlay" magazine. They also made a co-operation agreement with Lucasfilm (now called LucasArts). Also in 1989, Rainbow Arts, together with "64'er" magazine (published by Markt&Technik like "PowerPlay"), looked for Germany's best

players. Four persons won a trip to the finals taking place in Düsseldorf, where they had to show their abilities in playing "Katakis" and "Jinks".

### C64 and CDs: an impossible thing?

Rainbow Arts had a world sensation when they brought out the "First-CD-Edition", which featured 10 classic games (among which were David's Midnight Magic, Leader Board Golf, Impossible Mission, and M.U.L.E.). Of course, with the rise of the CD as a new data medium for computers, this sounded more spectacular than it was: a CD player was connected to the datasette port of the C64 by use of an adapter, which means the CD was produced by Rainbow Arts (and used by the end user) as if it were a cassette.

### Rock, stars and sunshine

In 1990, two years after "Danger Freak", Hans Ippisch published a new game with Rainbow Arts, called "Rock'n'Roll". In the meantime, he had worked on other games, among which was "Aidon Apocalypse" for the CP publishing house. In "Rock'n'Roll", you steer a ball through a maze shown in bird's eye view. The game lives through its exciting soundtrack, perfectly done by Ramiro Vaca. In "Star Trash", the player controls a ball, too, but here it's steered through a colorful three-dimensional landscape. This game is very similar to "Marble Madness", in spite of its outstanding music.

Although Rainbow Arts had already existed for five years, they could celebrate a premiere in 1990: in cooperation with a cigarette trust, Philip Morris GmbH, they published an adventure game called "Sunny Shine - On the

funny side of life", which was bursting with advertisement. The concept of the game was developed by former PowerPlay editor Boris Schneider, and others.

### All This Fuss About a Hurricane

The beginning of 1990 brought the first preview of "Hurrican", which was renamed to "Turrican" some months later according to the wish of programmer Manfred Trenz, and started its way around the whole world. Few games were adapted to as many systems in as many variants, except perhaps for Tetris. The levels and some of the enemies were of a size that was considered impossible to realize on the C64 (for more details, see Go64! issue 8/99).

The same year had another arcade game, namely the conversion of "X-Out" done by Jörg Prenzing. On the other side, "Ra", a game about the sun-god, required more puzzle-solving skills than trigger-fingers. The solid C64 conversion was done by Cyberstyle.

In late 1990, Rainbow Arts announced their jump'n/run game "Apprentice" in full-page adverts, but it never made it into the stores. The guys from Düsseldorf were slowly retiring from the C64 business, but not without pulling another highlight out of their hat: "Turrican II" did not only feature the game action of its predecessor, but also some Katakis-style levels (with real (!) parallax scrolling). Finally, the puzzle game "Logical" followed a short time later, which was their last production for the breadbox.

### Gleanings and farewell gifts

Some of the most influential people at Rainbow Arts have later taken part in some other productions. 1991, Chris Hülsbeck showed up on the breadbox for the last time, bringing the music to Gem'x by Kaiko. Hans Ippisch teamed up with "Danger Freak" graphician Markus Muckenschnabl to deliver "Kangarudy", a real hit game; it was published on the Golden Disk. In 1992, Ippisch wrote his last game on the C64, the conversion of "UGH!" by Play Byte. Manfred Trenz, too, gave away a parting gift to the C64 community, before he turned to other systems: "Enforcer", a Katakis-style game published by CP-Verlag.

"And then the heroes moved out for a last time, never to return."

Many thanks for their research support go to Helmut Bieg, Andreas Escher, Manfred Trenz and Holger Ahrens.

Game	Publisher	Year	Programmer	Music	Graphics	Comments
Halls of Gold	Rainbow Arts	1985?	??	??	??	seldom
Der blaue Kristall	Rainbow Arts	1985?	??	??	??	seldom
Madness	Softgold/ Eurogold/HappySoftware	1986/87	Arthur Wystub	Chris Hlsbeck	Arthur Wystub	Level action with nice animations
Antics	Softgold/Rainbow Arts/Artgames/Time Warp	1987	Peter Thierolf, Chris Hlsbeck	Chris Hlsbeck	Peter Thierolf, Chris Hlsbeck	Game collection made of 4 small games
Baby of Can Guru	Softgold/Rainbow Arts	1987	Markus Pley	Chris Hlsbeck	Markus Pley	according to Hlsbeck the worst game he participated in
Bad Cat	Eurogold/Rainbow Arts	1987	Matthias Sykusch, Hans Ippisch	Chris Hlsbeck	??	A cat is fighting through it
Garrison	Rainbow Arts	1987/88	Jrn Galka	Ramiro Vaca	M. Drechsel	atmospheric "Gauntlet"-clone
Giana Sisters	Time Warp	1987	Armin Gessert	Chris Hlsbeck	Manfred Trenz	a mile stone of software history
In 80 days around the world	Rainbow Arts/ Fantastic Software	1987	Arnd Nolte, Heiko Schroeder, Armin Gessert	Georg Brandt	Holger Flttmann	After the novel of Jules Verne
Jinks	Softgold/Rainbow Arts	1987	Bernd Lintermann, Matthias Giese	Chris Hlsbeck	Bernd Lintermann, Holger Flttmann	A different kind of Break-out
Street Gang	Time Warp	1987	Armin Gessert, Arnd Nolte	Georg Brandt	Boris Kunkel, Michael Growe	Musics are top, the game itself is bad
To be on Top	Rainbow Arts	1987	Chris Hlsbeck, Matthias Sykusch	Chris Hlsbeck	Uwe Meier	Created by Chris Hlsbeck
Warriors	Rainbow Arts	1987/88	Matthias Hillebrand	Timmy Kleinert	Matthias Hillebrand	Game of the Swiss scene group "Modern Arts"
Bozuma/Mystery of the Mummy	Rainbow Arts	1988/89	Stefan Daprich, Ralph Stock	Chris Hlsbeck	Peter Pfeiffer	detailed P.I. game
Danger Freak	Rainbow Arts/ HAIP Software	1988	Hans Ippisch	Chris Hlsbeck	Markus Muckenschnabl	A good Stuntman-Olympiad with very high fun level
Down at/Realm of the Trolls	Rainbow Arts	1988	Peter Thierolf	Chris Hlsbeck	Manfred Trenz, Michael Growe	Heroes arcade
Graffiti Man	Rainbow Arts	1988	Power Bits	Studiomusic	Powerbits	nice spray-sequence, the rest is weak from a gamers point of view
Katakis / Denaris	Rainbow Arts	1988/89	Manfred Trenz	Chris Hlsbeck	Andreas Escher, Manfred Trenz	Number one of all shoot'em up games

Game	Publisher	Year	Programmer	Music	Graphics	comment
R-Type	IREM/Electric Dreams/Rainbow Arts	1988	Manfred Trenz	Ramiro Vaca	Andreas Escher, Manfred Trenz	good conversion of the arcade version
Starball	Rainbow Arts	1988	Matthias Sykusch	Chris Hülsbeck, Ramiro Vaca	Holger Flöttmann	funny mixture of Pong and Break-Out
Volleyball Simulator	Time Warp	1988	??	Michael Winterberg? Ramiro Vaca?	??	graphical weak sport games
Circus Attractions	Rainbow Arts/Golden Goblins	1989	Jörg Prenzing	Chris Hülsbeck	Bettina Wiedner, Andreas Görtz, Olaf von Rauchhaupt	Circus-Olympiad with excellent animations
Dyter-07	Reline	1989	Martin Sander	Ramiro Vaca	Andreas Gehrke, Frank Knust	Helicopter action
Grand Monster Slam	Rainbow Arts/Golden Goblins	1989	Jörg Prenzing	Chris Hülsbeck	Olaf Menges, Andreas Görtz	Tennis-soccer with Beloms, high fun-factor
Hard'n'Heavy	Reline	1989	The Softronics	Man without name	The Soundfactory	The inofficial "Giana Sisters II"
Hollywood Poker Pro	Reline	1989	Holger Gehrmann	Chris Hülsbeck	Frank Knust	good Poker game with nice interlace graphics
Oil Imperium	Reline	1989	P. Fröhlich, H. Heinrich	K. Obarski, Holger Gehrmann	P. Fröhlich, T. Richter	excellent conversion of the Amiga version
Oxxonian	Time Warp	1989	Arnd Nolte	Chris Hülsbeck	Ramiro Vaca	Ramiro Vacas premieres as graphician
Rock'n'Roll	Rainbow Arts	1989/90	Hans Ippisch	Ramiro Vaca	Andreas Escher	Ball action seen from above with rocking synthesizer sounds
Spherical	Rainbow Arts	1989	Jörn Galka	Ramiro Vaca, Chris Hülsbeck	Bernd Budrus, Andreas Escher	Perfect- "Solomon's Key" - adaption
Ra	Rainbow Arts/Cyberstyle	1990	Hakan Akbiyik	Rudolf Stember	Arnold Sakowski	"Turn it"-try with egyptian flair
Star Trash	Rainbow Arts	1990	Olli & Jörg (Prenzing?)	Ramiro Vaca, Chris Hülsbeck	Olli & Jörg	Versy colored "Marble Madness" Clone
Turrican	Rainbow Arts	1990	Manfred Trenz	Stefan Hartwig, Chris Hülsbeck, Ramiro Vaca	Manfred Trenz	The original
X-Out	Rainbow Arts	1990	Jörg Prenzing	FAME	Andreas Escher	very good conversion of the Amiga version
Logical	Rainbow Arts	1991	Christoph Oelckers	Rudolf Stember	Andreas Escher	A game for your brain
Turrican II	Rainbow Arts	1991	Manfred Trenz	Markus Siebold	Andreas Escher, Manfred Trenz	The followup with Katakis action

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