March 18, 2001

President's page

Howdy Fellow Commodore Users!

When I was on the national service provider GEnie, I managed to make friends with some of the people that I met in the chat forums. Later I became a channel operator, and it turned out that I would be the last remaining active channel host in the Commodore 64/128 forum of GEnie. The mighty Commodore 64 had it's own online service called Quantum Link, which later grew on to become the now famous America On Line. Compuserve and Delphi still maintain a spot on their respective service that Commodore enthusiasts can gather and exchange ideas and have general fun.

Even now when computers are screaming along the information super highway at break neck speeds, our Commodores can still meet other computer users, as well as other Commodore users, online. What do you need to get online?

First of all, your computer needs a modem. A modem connects to the computer, and uses the telephone line to dial out to other computers. The other end may be a friend's computer, a local bulletin board set up by another enthusiast, or to a network of modems connected to an online service provider.

To reach out to people across the world, you will need a second item, an Internet Service Provider. These can be local companies or national companies. For local access, I have been recommending a local company called One Net. They can provide services based on your need and computer type. For most Commodore 64 and 128 users, you should ask for a shell account, which gives us a command line interface to a wealth of information on the internet to explore. If you have an Amiga, or Wheels operating system for your C64 or C128, you can go for the service that most ISP's now offer for graphics based systems, sometimes called TCP/IP or PPP. Another good service provider, which does have a local dial up is IGLOU out of Louisville KY.

Third, you will need a software package that can access your system with your ISP's system. For C64 users, I recommend Novaterm, and for C128 users, I recommend Desterm. Both of these programs have numerous users that access the internet. If you have a high-tech C64 or C128, you might want to check out Maurice Randall's Wave program, which is still under development, but usable for most areas on the web. For the Amiga users, there are several packages that can communicate on the internet.

Fourth, now that you're connected, how do you find people? Internet Relay Chat is probably the most fun I've had over the many years. Just get a listing of channels on the server you are on, if you see a channel name that sounds interesting like C64, that might be a good one to join to talk about issues of Commodore. Some fellow ex-members of the GEnie service started their own channel on irc.stealth.net called #dan-mike. I pop in there whenever I get a chance on Sunday nights from 10pm EST until I get tired chatting. That's not the only place I chat, though. It all depends on your interests and what you like to talk about. I consider myself friends with a lot of my online acquaintances, even though I haven't met them face to face. Some live in the same state, others may live across the other side of the country or even the other side of the globe.

Your Commodore can still spark excitement, with a little bit of help of some friends on the World Wide Web.

PC1.44 Mb floppy drive to C64

64-computer,1.44Mb floppy drive,
16kB EPROM
How to connect PC 1.44Mb floppy-diskette drive to oldie C64
Introduction story
Advanced characteristic of C64 and problems with construction of DDemon
List of hardware and software
Electric scheme (gif picture) from EWB
Download stuff

Introduction story I will describe one of the hardest way for connecting PC and C64. What did I needed that for: well because I didn't have PC at that time (1996) and to pass one of exams I have to make program in C (numerical analysis: solving integrals and differential equations on PC). We have laboratory with computers at faculty but I was unable to concentrate to write my program because this lab was always crowded with students (it was only lab with computers then). Back home I have had C64 and the plan was simple: write program at home on C64 as ASCII text then somehow transport it to PC computer and compile it using Turbo C. Simple isn't it? Simplest way to accomplish that transfer is to use ordinary floppy diskette (3.5 inch: I didn't have 5.25 disk drive for Commodore), connect somehow floppy drive to C64, store my program on diskette and everything else is easy. So I have used standard floppy diskette drive (FDD) which uses a standard 1.44Mb diskettes. C64 computer is too slow for working with FDD which uses data transfer rate of 500Kb/sec. Because of that I have applied a DMA (Direct memory access) type of data transfer which demands additional electrical circuits . Also I have developed a system software for controlling FDD whit ability to emulate PC-DOS system on C64 (shell as Norton

Commander) which makes possible that a files from C64 can be recognized on PC and vice versa. Now I have ability to store "great" amount of data on one diskette in format which is compatible whit DOS operating system on PC (files from C64 are readable on PC). This characteristic makes possible to transfer files from C64 to PC (and vice versa) without any software conversion. It took me about one year to make all this and the best part is when I finally made it I have already bought PC computer. Now this masterpiece of mine is laying down in corner of my room collecting dust..... Advanced characteristic of C64 and problems Two advanced features of C64 (almost unkown to the most users of C64) were very helpful in constructing DDemon: C64 has 512 bytes of address space reserved for I/O devices similar to the PC I/O address space of 1024 bytes in which you can find control register of serial,parallel ports and other I/O devices within PC. This address space in C64 is decoded by two signals (I/O1 and I/O2) which are derived on the expansion port of C64 C64 has DMA input making possible to stop operation of CPU and to take full control over data and address bus. You may say that C64 has already implement logic for DMA type of data transfer. First characteristic of C64 is used to 'plug in' control registers of FDD in adress space of C64 making possible to read/write control/status bits from FDD controller by simplest BASIC instructions such as PEEK or POKE. Second thing is used for implementation of DMA transfer in which DMA input is set to '0'. R/W line is also derived onto expansion port and it's 'pull-up' so it can be driven by any device (not only by CPU or Video Controller =VIC). Now everything is simple: Turn FDD drive motor on, switch on controller on the AT-card with

simplest instructions (from BASIC or ASS prog.). Initiate DMA Read or Write transfer by writing specified bits in control register of FDD controller. When FDD requests DMA operation set DMA input = '0' (stoping and degating CPU from buses). Generate proper 16-bit address on the C64 address bus, set R/W line of C64 and drive data bus from AT-card to the C64 data bus (this is DMA-Read cycle: reading from diskette to C64 memory). DMA transfer is very easy to implement, isn't it? But there are some problems: Catch 1: You cannot lower DMA input of C64 at any time. This must take place only when FI2 system clock is low and at start of mashine cycle (before CPU executes any instruction). Due to this I have to use bistabil to synhronize C64 and FDD controller. Catch 2: CPU isn't only master on the address and data bus. Video controller (VIC) also takes control over buses by stoping CPU in order to refresh VIDEO memory (this VIDEO memory is in fact ordinary C64 memory placed at $0400).Worst thing is that this occurs only sometimes when VIC feels need to read out VIDEO memory so it took me about one month to discover this thing. When I finally discovered that behavior of VIC I didn't have clue how to avoid this and to safely write/ read into C64 memory. It took me few months to find out control bit in VIC which is used to turn off VIC making possible to be only master at address and data bus of C64. The screen is blank when you turn off VIC.This is acomplished by lowering bit 4 (DENy bit) at address &D011. Catch 3: Working frequency of 1Mhz and bad contact's can make your life miserable. List of hardware and software Hardware: 1.44Mb floppy-diskette unit for PC AT- controller card (with FDD controller) Interface for DMA transfer (optionally EPROM). Software: C64 Disk Commander (shell that looks like Norton Commander) this is the emulation of

PC-DOS on C64. C64 Word this is common text editor for C64 which can store text in ASCII-format with ability to view files greater then 64Kb. Also it recognize USA,CRO i C64 character set. It can operate with 3.5inch diskettes and with cassetes. Electric scheme from EWB4 INTRO This el. scheme looks complicated but this is due to real life digital circuits (such as 74139 and other). Logical scheme (created by simple parts such as NOT, JK and other parts) is much more understandable and simpler but I don't have time to make it. I have never implemented EPROM module so signals such as CE,ROMH,ROML and EXROM/GAME were never used. Points (junctions) with same name are connected (e.g. CLOCK).On scheme there are four types of signals: INTERNAL - used only between elements on scheme (e.g. DEX2/$DFDO,CLOCK,LE,..) C64 - connected only to the expansion port of C64 (e.g. IRQ/C64,RESET/C64,R/W,..) AT-CARD - connected only to AT-CARD (e.g. RES/FDD,IRQ 6,DRQ 2,DACK 2,..) SHARED - signals that are shared by C64,AT-card and this DMA interface and usually with three- state ability (e.g. data and address lines D0-D7, A0-A15) IC 4040 has strange pin out (you can view it from EWB4 because it is custom made IC) but basically it has two controls inputs: RESET-resets counter to zero; CLOCK - CLOCK is negativ-edge sensitive input; Two power pins: Vcc and GND 11 counter outputs (used as address lines). For detailed description about signals on scheme you must download that zip file (at bottom of page). DMA TRANSFER 4040 and 2*74244 are 11-bit (2048) counter with tri-state outputs. Purpose: to address C64 memory at DMA transfer (read or write). CLOCK is negativ-edge sensitive input, CLEAR/4040 resets counter when is "1",DMA controls outputs of counter: when

"0" then DMA transfer is active (address outputs of counter are connect to address bus of C64. Function CLEAR/4040 is obtain by IRQ 6, interrupt caused by FDD. * First JK bistabil is used for synchronization of FDD and C64. When DRQ 2 is active ("1") then it is needed at negative edge of FI2 (system clock of c64) to pull down DMA input of C64 at "0" which halts CPU and regain control over address & data bus of C64 (which makes possible for direct read/write in C64 memory by bringing proper address which is provide by our 11-bit counter). PROGRAMING DMA 8-bit latch 74373 is used to memorize other address signals (A12-A15), to fully decode 16-bit address of C64. Also contains values for other signals: R/W (for C64, to notify C64 type of operation: read from C64 memory or write in memory R W (for FDD same purpose) These values are written just one time before DMA cycles. Latch provides change of address at which the data is to be read from or written in memory of C64 at DMA transfer (in 2KB jumps) * All these signals are active when DMA cycle is active (DMA = "0", DMA line is connected to OC input of latch (output enable)) To write data into latch it is needed to select it by demultiplexer 74139 with inverted signal DEX1. (LE). When DEX1 is at "0" (C input of latch at "1" (LE = 1)), then data on data bus is being written in latch. Address of latch in C64: DFE0-DFEF. ADDRESSING FDD REGISTERS To access data stored on diskette it is needed to address FDD control registers:

registers are at $DFF0-$DFF7: -with I/O1 and I/O2 the AEN signal is generated which selects all AT-card, then with address signals A0-A8 (generated by C64) it's possible to precise address FDD registers. That kind of access provides user to easily access FDD-control registers, GAME,COM1,COM2 and LPT port registers (by commands such are PEEK i POKE). * Also you need to generate R and W signals for FDD: R/W from C64 is inverted and connected through 74244 which isn't used in counter. (when R/W "1": R = 0 ; W = 1 and vice versa) This is necessery because these signals are needed to be disconnected (in tri-state) when DMA-cycle is active. (AEN signal controls when these signals are in tri-state: AEN = "0": R i W are active) (lines marked by blue to differ from counter connections) * Note: it seems that R input of FDD has to be pulled up to power by resistor (3.3K) because when it is in tri-state it goes in "0" which causes errors. INITIATION: signals CLEAR/JK,IRQ 6,DRQ 2 It is needed to assure that DMA-device dont turn himself on becuse of some reason, and to start to work from known states (JK-bistabiles). If FDD doesn't work or if FDD registers are not initializied then IRQ 6 output from AT-card float at "1" same as DRQ 2 (signal IRQ 6 is actived at end of DMA cycle, until DRQ 2 is in non-stop use at DMA transfer). That characteristics I have used in my schemes: IRQ 6 signal from FDD is used as CLEAR/JK signal, when it is on "1" then he blocks JK-bistabil and clears counter (CLEAR/4040). Also to obtain real function of IRQ 6 signal (to signalize end of DMA cycle) I have to gate it by DRQ 2 signal on IRQ line of C64 (IRQ 6 active at "1"). When DRQ 2 is at "0" then it is possible for IRQ 6 to set IRQ line of C64 at "0" (at same time reseting counter and JK-bistabil). * That signal have to be gated through log. devicese of OC (open collector) or Thri-state ability, because IRQ line of C64 is pull-up and you cannot connect ordinary log. device to it. EPROM (optional) To address EPROM you need to decode CE signal by ROMH and ROML outputs from C64.

PC floppy to C64

continued

To plug in EPROM in address space of C64 you need to set lines EXROM/GAME at "0". Second JK bistabil (T-type) is responsible for that. It's triggered by neg. edge of DEX2 signal (at dfd0-dfdf) from demultipexer 74139. That means that by addressing these locations you can "turn on or off" your EPROM from C64 address space. The RESET line of C64 is connected to CLR input of bistabil which provides to turn on EPROM just at powering-up time of C64. For all those freaks out there this is export of el. scheme of Disk Demon from EWB4

   Download stuff Detail description (~ 130Kb zipped in html format) of software and mostly of hardware stuff you can find in this zip file (unzip in one temporary folder, and you should be able to see everything off-line). It contains description in html format, pictures, source code for software and else (you can get an el. scheme of my masterpiece in Electronic WorkBench 4 format).

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ED note: I discovered that I have lost track of the scematic for this article. I will include
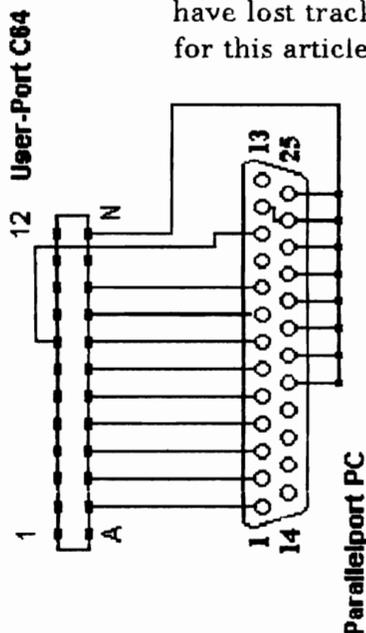
it in a future issue.

The schematic on the left is not related to the article. It just shows one way to con- nect a C64 to a PC.

Ed

Subject: Update on Jeri's board Date: Wednesday, March 07, 2001 11:33 PM

Jeri Ellsworth has given me permission to release a few details on her upcoming release of her 24-bit video board/accelerator for the C64 (o.k., we had a discussion of what it should be called... the Jeri board, the Ellsworth board, the E-board, the JE-board... well, I'll call it the J-Board).

If you read the above statement carefully, yes, that's right... not only will the J-Board be a video board having the capability of displaying thousands or millions of colors, but it will also be an accelerator.

Here are the details:

24-bit video with VGA display (no NTSC/PAL composite video to worry about) 6502 core running at 25 mhz. (25 times the CPU speed of a C64) Currently for the C64 (not C128 mode) Estimated selling price of $100 Production models (v.1?) to be sold at the Louisville Commodore Expo, May 26

The Louisville C = Expo will be the venue where Jeri will debut the board. She calls it a "replacement" for the SuperCPU. She also thanks Bil Herd, former CBM lead engineer in the development of the C128, for his invaluable assistance in solving sprite detection problems in the J-Board. And she thanks Sierra Circuit Designs of Portland, Oregon, for their help, too.

Her work continues on the J-Board, and the board is constantly evolving. Now that her computer stores have been sold, she intends to spend up to 8 hours a day working on the board to get it ready for its debut.

<div align="right">

Sincerely,
Robert Bernardo
Fresno Commodore User Group

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Cincinnati Commodore

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C.C.C.C.

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4 P.M.
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March 18, 2001

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