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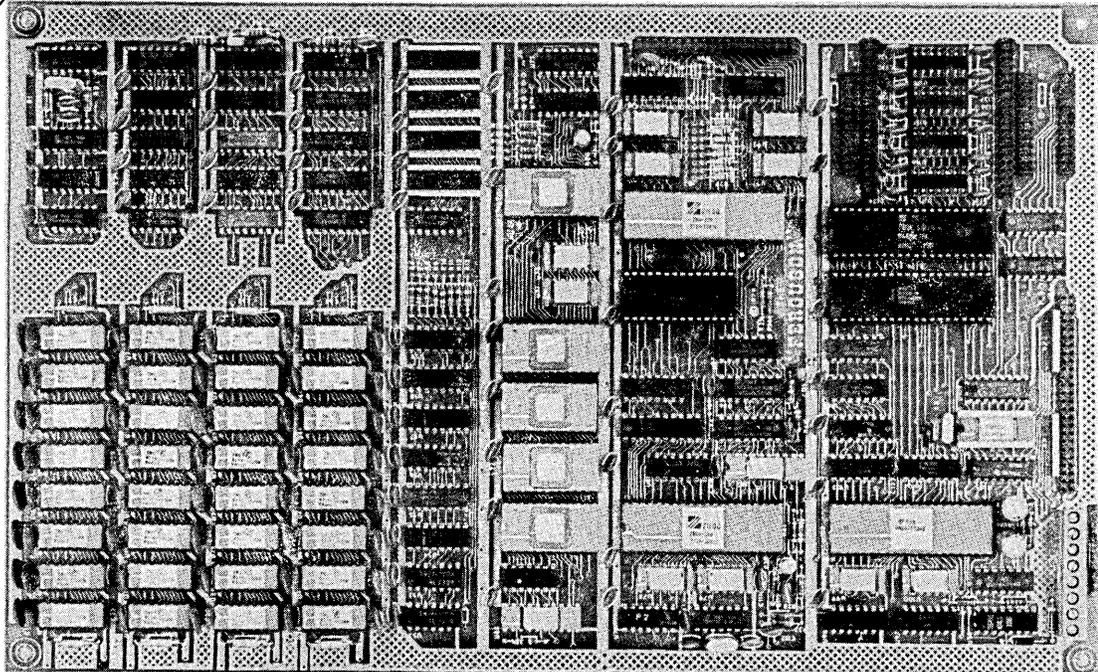
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October 1984 The Single Board Systems Journal No. 20

## SOG Aftermath!



Let me warn you now, you're going to be hearing a lot about SOG III in upcoming issues of Micro C. You see, I was able to tape most of the sessions and there was a wealth of information shared in two intense days. One piece of information that really hit me came from Philippe Kahn, president of Borland International.

### Modula II, Wherefore Art Thou?

Philippe was asked how soon Modula II would be available. "Shortly," he said. However, that "shortly" referred only to the 8088/8086 version. There will probably never be a Turbo Modula for the Z80.

You see, Borland is a market driven company and marketing says that 70 percent of current sales are for MS/DOS machines and they expect that within months they will see that margin go to 85 percent.

I've noticed that a lot of the fancy new software packages are being offered only for the PC bunch (including some really cheap ones like a high-speed WordStar look-alike for \$35) and a really incredible \$49.95 package called Sidekick that Philippe demonstrated at the SOG.

Actually, if I were going to write some new software, I'd take a hard look at the PC market too. After all, you'd not only have a huge and growing hardware base, but you'd also have a very clearly defined memory-mapped video monitor.

### A Real Standard

Terminal definition is one area that CP/M 80 ignored because there was simply no standard terminal. When IBM came along with the PC it not only sold a sys-

tem, it sold a standard. A lot of writers yell about gutless me-tooers jumping on the IBM bandwagon, but it makes a lot of sense, not because IBM created the standard, or that the standard is perfect, but because there finally is a standard.

This standard works because it defines the video, the expansion bus (you know, the plug in cards that handle color graphics, winchesters, more memory, additional ports . . . ), the port addresses, the system calls, the monitor jump table, even the control functions on the keyboard. It is a real standard.

Of course, some systems are better copies of the standard than others. For instance, the Compaq and the latest Heath/Zenith are very compatible, while the Sanyo is only slightly compatible (although, at the price, it is still a very good deal if you want a machine to do straight text editing, spreadsheets, or BASIC).

The Heath machine is available as a kit which ought to make it interesting to a number of Big Board folks. However, the assembly is reported to be 37 hours of cabinet and cable work, circuit boards come already assembled and tested. (That's a long way from the early Heath Kits where you carefully wrapped wire leads around each tube-socket pin and then held a 75-watt soldering iron against the pins until you had smothered the entire area with a glistening chunk of tin and lead.) Ah well, there ought to be something a person could do with an already stuffed board—don't you think?

### The Z80 and Up

Of course I would have preferred to see a Z80 based standard, but one big thing precluded that. You see, there was (and is) no chip that was upwardly compatible with the Z80. The Z8000 was not compatible with its little brother (and it was slow getting into the market place as was the 68000 chip set). The Z800 which is supposed to be somewhat compatible with the Z80 has not yet seen the light of wholesaler's shelves (it may not ever be available).

Meanwhile, Intel has a bevy of new heavies definitely on their way. In fact

(continued on page 61)

# LETTERS

Dear Editor,

I discovered an obscure bug in my Kaypro-II and may even have figured out why it's there. When I have a value between 30H and 3FH in the I (index) register of Z80 and memory bank 1 is selected, my screen display gets weird: it fades way out and has the jitters.

If I'm right, then all Kaypros which follow your schematic must have the same bug. According to Zilog's Z80 technical manual, when the Z80 does a memory refresh, the contents of the I register are placed on the upper 8 bits of the address bus, and a MREQ signal is issued. If the I register is between 30H and 3FH, this fools the CPU video access detector into thinking that video RAM is being accessed, because it doesn't pay any attention to the RFSH signal like it ought to. As a result, the screen is blanked on every refresh cycle! Maybe you can figure an easy way to fix this.

**David Hillman**  
2006 NE Davis  
Portland OR 97232

Dear Editor,

I enjoyed reading Jan Korrubel's review of SWP's dual density package in your April issue. Having purchased this product a few months ago myself I've been equally pleased with it's performance although I too found some damage on arrival.

In my case the daughter board was intact but one of disks in the order had a stray board pin lodged in it's jacket. After carefully coaxing the pin out, I found it left a ghostly dent in the track area of the disk. I was lucky enough to be able to "iron" it out from the convex side so that I could make a successful copy. It would certainly be helpful if all distributors would ship such packages with disks sealed in envelopes to prevent this sort of contamination.

An annoying bug I found with the special-function keys is that if I try to use the screen dump in conjunction with the scroll pause the system locks up forcing me to reset to get out.

I also found that the SETCLK.COM program on users disk #1 can easily be adapted for this BIOS by using DDT. Simply change locations 019EH and

019FH (both 080H) to 0CBH and 027H respectively. This replaces the two ADD A,B instructions with one SLA A instruction so that the program can store the two-digit entries in each location as two BCD nibbles instead of one binary byte. The commands in DDT would appear as follows:

### *Modifying SETCLK*

```
A>ddt
DDT VERS 2.2
-Isetclk.com
-R
NEXT PC
0200 0100
-S019E
019E 80 CB
019F 80 27
01A0 81 .
-C
A>SAVE 8 setclk2.com
```

**Paul R. Pederson**  
8601 E. Old Spanish Trail  
Tucson AZ 85710

Dear Editor,

I recently received your Kaypro Disk K21 and encountered a minor bug in the screen dump. The first time through the dump works fine however when it ends it sends a message to my printer to go into a 5 CPI mode. The next printing whether dump or not is wide letters 5 CPI.

I then fiddled around with the source you sent along trying to insert an initialization string but to no avail. My capabilities in this area are vey limited, so I'm looking for help. I have an Okidata 82A printer and the strings in hex are: 1E = 10 CPI; 1F = 5 CPI.

**Jim Jensen**  
353 Willow St.  
West Barnstable MA 02668

*Editor's note:*

*It seems the non-blinking block cursor of our Pro Monitor ROM is being passed as a printer control character. We've fixed the dump programs on the new disks and will update any customer's disk that is giving them problems.*

Dear Editor,

I installed the Pro-8 ROM package but could not format the odd numbered tracks on drive B or A. That problem turned out to be a trace connecting E40 to E27. This connected PA2 to PBRDY on U72, thus no floppy side select.

However, I still could not format drive A. This turned out to be a bad drive, a new Teac.

I have a fairly early Kaypro, but my board is not exactly like the schematic. For example, U2 was a 74S04 and all but one of the inverters were being used. Also, my board did not have the marking "E40."

Do you know anyone who has a Sorcerer (Exidy)?

**Lawrence Norton**  
2490 Channing Way  
Suite 400  
Berkeley CA 94704

Dear Editor,

Last year you published the letter wherein I mentioned having 300 used disks to share with Micro C readers. Through that letter, I was contacted by, and am still writing to, some of the finest people I know.

Well, once again I came up with a super deal, only this one will be more than 25 cents per disk. The company I work for sells MicroPro and they just changed over from 8" format to 5" and recalled all the 8" "demo" disks from the field. Guess who bought them for scrap?

I have about 35 sets of original, legal, serial numbered, demo disks which include: WordStar, SpellStar, MailMerge, CalcStar, DataStar, and SuperSort. I would like to share these with those Micro C readers who cannot afford to purchase good commercial software at standard prices. I cannot sell them, but I can charge for postage and handling (there is no documentation, but the built-in screens should be sufficient to get someone up and running). I am trying to raise enough cash to purchase a Kaypro or Slicer.

**Neil Joba**  
4774 Carter Rd  
Fiarport, NY 14450  
716-377-3042

# LETTERS

Dear Editor,

When I ordered my PRO-8 ROM on June 18, you asked me to let you know when Micro C #18 arrived. Issue #18, the PRO-8 set, and four Kaypro disks ordered separately all arrived yesterday, June 25. When I renew my subscription I will go the 1st Class Mail Route. It's worth the extra money to avoid having to wait almost one month for the PO to get around to delivering bulk mail.

The PRO-8 set arrived with the box squashed and soaking wet. The instructions dried out OK and the ROMs look OK, at least there was no water inside the ROM package and the pins are straight. The disk cover has a slight crimp but the disk looks OK. Will have to wait about two weeks to find out if it really works since I can't get the II to 4 conversion right now. My postmaster saw the package and she will testify about the condition if I have to make a claim. Have you considered offering to insure shipments at the buyer's request? I know it would cost more but it could save some aggravation.

**Bill Warshaw**  
12 Tamara Drive  
Roosevelt NJ 08555

*Editor's Note:*

*We know that bulk mail is slow (it's supposed to be 10 days maximum), but the price is right (12 cents per copy vrs. over a dollar). Also, only a very small percentage of the packages we send get damaged by the post office so we take a chance by not insuring them. If any part of your shipment was damaged, just return it and we'll send a replacement free.*

Dear Editor,

Thought your readers might like to know that I've just finished interfacing my Kaypro-II to a 1908 steam locomotive. The Kaypro rides up front with the engineer and controls an automatic coal shoveler that's RS232 compatible. In addition, I've dedicated an unused parallel port to control the pitch and duration of the steam whistle.

I had a problem with heat, but I've solved that by keeping the Kaypro in a

rather large cooler partially filled with ice. I've still got a problem with my diskettes, however. They won't fit with the Kaypro in the cooler, and the heat near the furnace causes them to take on funny shapes. Occasionally, I have to shove real hard to get them into the drives. Any ideas on keeping my diskettes cool?

Also, I could use some advice on my next project, interfacing a Kaypro to my new hang glider. I can't find a place on the frame to bolt both the computer and two 12 volt batteries.

**Captain Mick, UFO Ret.**  
1924 N. 6th St.  
Concord CA 94519

*Editor's note:*

*Mick, I folded your letter into an airplane and attached a Kaypro. It didn't fly. (We are going to try from the top of a neighbor's flat-bed truck but we need to replace a cracked CRT first.)*

*The idea of controlling an automatic coal shoveler doesn't auger well. Considering the environmental problems, you probably should buy a shovel and then use your cooler for beer.*

*Perhaps other folks could offer advice on creative new interface ideas. We're planning to install a Kaypro-II in a 1967 Volkswagon Bug (if we can keep the bug running). At first it will be pure research, the driver will always have current information on pavement temperature, wind velocity, and satellite-based relative position. Then, for instance, we can tell if the vehicle is running by watching the relative position over a 24 hour time period (it would also be great for checking the progress of migrating turtles and the post office.)*

Dear Editor,

Having recently purchased a Kaypro-10, and being all-too-human when it comes to accidental file deletions, I purchased a copy of Kaypro user disk K2, mainly for the UNERA and FIX programs. I have, in playing with them, discovered that they have considerable trouble with restoring files on the Kaypro 10 hard disk.

The UNERA program says it is unable to locate the erased file, no matter which logical disk (A: or B:) or user number the

file is associated with. The RECOVER command in FIX seems to hang the system while accessing the hard disk. However, when the system is reset, the file appears to have been restored correctly and the directory structure is intact, but this is hardly confidence-inspiring.

Is this behavior of UNERA and FIX known to others? If so, has anyone developed a version of either program which is more comfortable with the Kaypro 10 hard disk, or (even better) does anyone have a patch for one of the existing programs?

**Christopher Pettus**  
10920 Palms Blvd. Suite 110  
Los Angeles CA 90034

*Editor's Note:*

*Well, help has arrived. We have found an UNERA that works well on the hard disk and have replaced the old copy of UNERA with the new version. However, FIX still occasionally hangs up on the 10. We haven't found an update for it yet. Those hard disk and hard luck purchasers of disk K2 can send their disk in for an updated UNERA.*

Dear Editor,

I have modified a Xerox 820-II so that it will display black characters on a white background. The problem I'm having, however, is that the people who built the display started with a good design and then removed parts until the unit was just barely working. So, I am having some problems with retrace blanking and there is a dark vertical bar in the center, probably due to insufficient quiescent current in the horizontal output.

Can anybody help me find schematics of the analogue part of the Xerox 820-II monitor? I have tried Xerox-Finland etc. but they regard the analogue portion as a nonserviceable module.

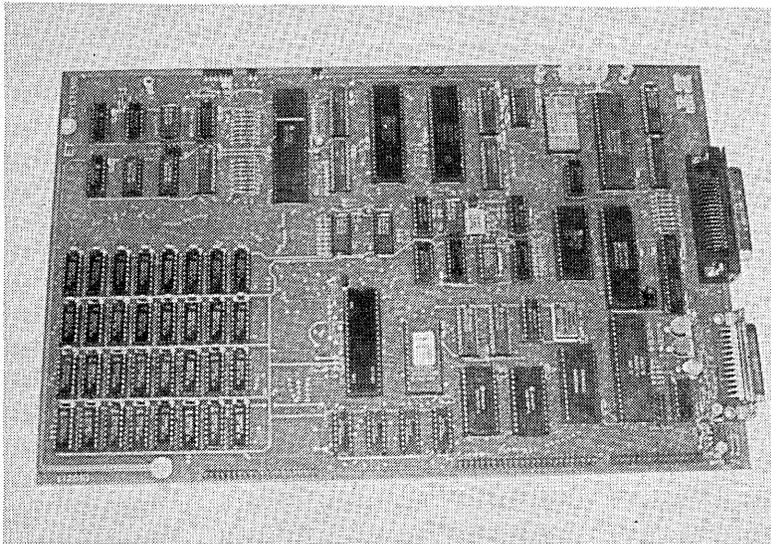
**A W Gustafsson**  
Kaptensgatan 2A5  
SF-22 100 Mariehamn  
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*(Letters continued on page 64)*

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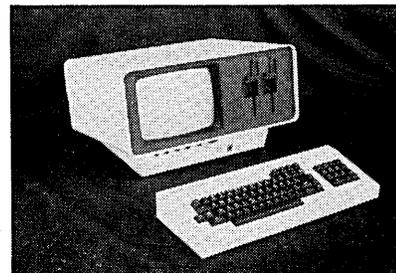
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# ET COMPUTER SYSTEMS

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# HSC 68000 Co-Processor

By Mark Boyd

Box 83 WSU  
Wichita KS 67208

Single board computers are great, but I think double-board computers may be the wave of the future; at least for the serious microcomputer enthusiast. I'm talking about a double-board system consisting of a utility single board computer, e.g., a Kaypro or Big Board, and a co-processor board with a more exotic CPU having its own memory.

## Enter the 68000

Following this concept, I bought a reasonably priced 68000 based system integrated (well, almost integrated, actually it's mounted on one side of the cabinet) with my Kaypro-II. There was no way that I could afford a Sage or other complete 68000 system, but I really wanted a 68000.

Now don't get me wrong, my Kaypro-II is by far the best buy in bundled computer hardware and software around. I have no complaints about the available CP/M 80 software either. The Z80 may even be a good microprocessor, but I was brought up on Motorola microprocessors. Ever since I got my Kaypro I have wished that I could have all that great CP/M stuff and a Motorola microprocessor to play with.

## HSC on the Horizon

After considerable searching, I finally found a useful 68000 system that allows me to "have my cake and eat it too." The heart of this system is a co-processor board known as the CO-1668, sold by HSC INC. They also have a 8086/8186 co-processor, the CO-1686, if you like that sort of thing.

68000 systems have been available for quite a while now, but not at a price I was willing to pay. Sure it would be nice to have UNIX and 50MB of hard disk, but I just wanted a decent development system to play with. The CO-1668 co-processor board makes this possible and it has a big price advantage over a full computer system. All it provides is a CPU, memory, and one relatively simple I/O channel. The host computer acts as an I/O processor controlling an extensive set of I/O devices. If the host is a mass produced utility computer system, the result is quite cost effective because of the low cost of the host hardware.

The combination of the Kaypro-II and

the CO-1668 gives you: 256K 6MHz 68000 system with parity checking memory, two drives, 80 X 24 display, keyboard, printer port, RS-232 modem port, CP/M, and CP/M 68K (includes a C compiler, assembler, linker). And best of all, the whole package is only about \$2200 (assuming you paid \$1295 for the Kaypro). For \$700 more you can expand the 68000 system memory to 768K.

All the 68000 memory is available as a RAM disk for the CP/M 80 system and any increment of 128K to the original memory can also be used as RAM disk under CP/M 68K.

Since both processors use CP/M, the file systems and the console command interpreters are completely compatible. This allows easy switching back and forth between the CPU's, and the use of CP/M 80 utility software with CP/M 68K files. (*Editor's note, CP/M 68K looks like it may become the standard operating system for 68000 systems.*)

## Minor Rain Clouds

Probably this is sounding a bit too much like an ad. However, the only drawbacks I've discovered in this system are pretty minor. A caveat here; I've only been using the system for a limited time, maybe 60 hrs total.

Perhaps the most serious drawback: the !@#%\$CTRL thing is about 1/2 inch too big to fit conveniently inside the Kaypro. I had to mount it on the outside, at least for now. It requires less than 1 amp at 5V, which the Kaypro provides without any problem. I am not sure how the Kaypro supply would do if the board was fully stuffed with memory. (HSC sells a separate case and power supply for the co-processor board.)

This is a general purpose co-processor which will work with any Z80 based system running CP/M 2.2.

The Kaypro-II drives (191 K) are usable, especially in combination with the 128 K RAM disk, for CP/M 68K, but a Kaypro 4 (390 K) would be better. I have had some minor problems with compatibility between CP/M 80 and CP/M 68K; when using CP/M 80 initialized disks with CP/M 68K, the system tracks get written over by data files. This is a minor problem since those tracks are only used when you cold boot the system, warm

boots of CP/M 68k don't use the disk. I just keep a separate boot disk and use it only for booting or setting up the RAM disk under CP/M 80.

Cold booting is always on CP/M 80, then I run a program to load CP/M 68K and set up the I/O interface. It takes less than half a minute to be up and running CP/M 68K.

To the casual user, CP/M 68K is CP/M 80 2.2 with some minor enhancements. For the more serious user, the enhancements are quite significant.

For instance, system calls are provided to take advantage of the much more sophisticated 68000 processor.

The version of C that is provided with the operating system does not support floating point, but it is quite powerful and does follow Kernighan and Ritchie. It provides many of the features of UNIX C, where they make sense in a CP/M 68K environment, or where they can be simulated.

I do not have much experience with C, but, after working with this C for a while, it does appear to be good implementation. In fact, the entire CP/M 68K system seems to be designed around the UNIX C environment, a very good way to go with the 68000.

## Is There a Doc in the House?

The software documentation supplied with the system is good, what there is of it. Several sections assume (explicitly) that you have other reference books and/or manuals. This is frustrating since these references are neither supplied nor readily available.

Hardware documentation is almost nonexistent. Installation is simple and well-documented. The overall quality of the documentation is good, but the coverage is barely adequate for an experienced user. There is no tutorial material nor any examples for any of the software other than the installation package.

This system is not for an inexperienced user. Familiarity with CP/M and C is assumed. It also wouldn't hurt to be very familiar with the 68000 before reading the documentation. The system documentation was designed for hardware neophytes with extensive software back-

(continued next page)

grounds.

The software supplied with my system came on two IBM format DSDD minifloppies. It was a pain to get it down-loaded to Kaypro-II format. I think there was a misunderstanding when I ordered, since I requested standard eight inch CP/M. HSC did offer to download to Kaypro-II format, for a fifty dollar charge.

A source code package for HSC's part of the software is mentioned, but price and availability information are not given. HSC says that the supplied source code is set up for their own assemblers. This means a further expense or hassle to use it.

### Speed

The 6 MHz 68000 with 200 ns. memory should provide more than adequate performance by microcomputer standards (i.e. similar to the Slicer). The one benchmark I have run is the BYTE version of the sieve algorithm in C. It took about ten seconds (six using register variables) for ten iterations. This is two and one half times as fast as the best 6 MHz Z80 result given in the June 84 issue of BYTE.

The C compiler makes three passes (plus the assembly pass and the linker pass) but the entire process can be controlled by supplied submit files and only takes about two minutes (using the RAM disk on a small program). The output of the linker is a relocatable object file.

The archive program is used to build and maintain libraries of functions created as object code files. My overall impression is that CP/M 68K will be a very good program development environment once I get it all figured out. Better documentation would make the figuring out process less time consuming.

### Conclusion

The CO-1668 co-processor system is a nice piece of work. In conjunction with a single board Z80 based CP/M 2.2 system, it provides a powerful system at a very reasonable price. It is expandable, portable in the sense that it could be transferred to other Z80 based systems,

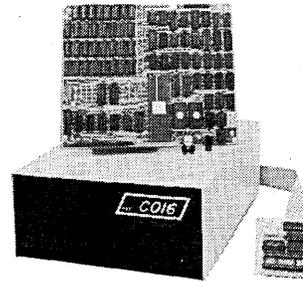
and easy to install. It comes with a good software package but weak software documentation. The hardware looks good and works well, but is almost undocumented. I just wish it were 1/2 inch shorter so that it would fit inside my Kaypro.

CO-1668 (\$899.00)  
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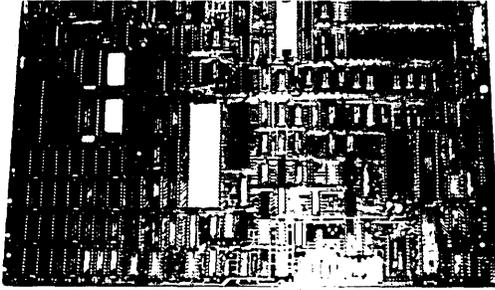
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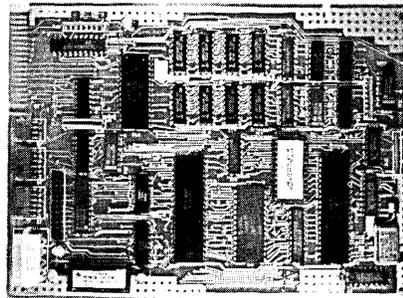
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# DynaDisk For The BBII

By Donald H. Bundy and Curtis Edmonds

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The BBII can be modified to run the DynaDisk from L.A. Software with very few circuit changes, but first we outfitted our BBII's with Andy Bakkers "mixed" version of CBIOS (available through Micro C) which supports both 5 and 8 inch drives.

## Using The Dyna

There are two ways to run Dyna. In the first method, we read an 8" disk into Dyna using BEGIN.COM. Then SWAP.COM reassigns Dyna as drive A and sets up the system to warm-boot from ROM. At the end of the work session, QUIT.COM copies the contents of Dyna back onto an 8" disk.

When we are working from a 5" drive, we format Dyna with FORAM.COM and then use PIP to transfer files into and out of the RAM disk.

## Mixed Modifications

The first modification dates back to the installation of the mixed BIOS.

We used a small piece of perforated board (see Figure 1) to mount a multiplexer chip (74LS157). The board plugs into jumpers JB4, JB8, and JB5 which are located along one side of the floppy controller chip. We cut up a wire-wrap sock-

Figure 1 - Multiplexer

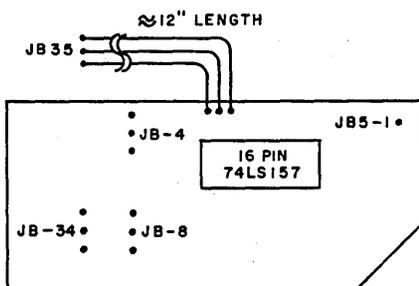
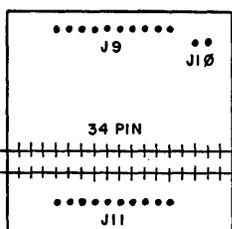


Figure 2 - Interface Board



et and mounted it on the board so that its holes matched the pins on JB4, JB8, and JB5.

Note that the connector groups on the BBII are not on 0.1 inch centers so some holes must be enlarged or redrilled in the small card before the sockets can be epoxied in place.

The connection to JB35 was made with a short piece of 3-conductor ribbon cable. A socket cut from the wire wrap socket plugs into JB35. 5v is available at JB34-3 and ground is available at JB4-1. A 0.1 or 0.01 capacitor should be soldered across the power leads.

You'll need another small piece of perforated board to build a connector to interface between the RAM disk and the BBII (see Figure 2). Cut connectors from an old wire-wrap socket. Again, the spacing between the connector groups on BBII are not on 0.1 inch centers so you'll need to re-drill as before.

You can mount a 34-pin right angle header between the area above J10 and J11. As an alternative you can jumper J10 underneath to BBII board (or wire-wrap on top) or you can use a strip of socket to plug into J10 and add jumpers on the small perforated card.

When all the connections have been made, cut the exposed extra length from the wire-wrap pins. A drop of solder on each pin improves appearance and covers the sharp ends while making the connections permanent.

We also modified our Dynadisk, we added a 74LS74 D type flip-flop to delay CAS for one additional clock cycle.

There is also another way to handle this (if it hasn't been done already). There are some spare gates on the card and if you prefer not to add the flip-flop, see Figure 3 and do the following: B5 and F5 are spares in location 8, 9 and 10. Connect B5 pin 10 to D4 pin 4(-0B), B5 pin 9 to +5V, connect B5 pin 8 to F5 pin 10, connect F5 pin 9 to C4 pin 8(-CADRS), and connect F5 pin 8 to C1 pin 15. The trace to C1 pin 15 must be cut so it only goes to F5 pin 8.

## Changes To The BBII

Modifications to the RAM disk are necessary because the BBII uses simple latches in place of the PIO.

Install a socket in the BBII's prototype

area (we will call this K5), see Figure 4. Cut the trace -RAS from C4 pin 6 near B5 pin 5. Connect K5 pin 6 to B5 pin 5. Connect K5 pin 4 to +5v. Connect K5 pin 5 to -0H at D4 pin 13. Cut the trace from the interface connector J5 pin 22 (BRDY) to D5 pin 13. Connect K5 pin 8 to D5 pin 13.

Connect K5 pin 3 to K5 pin 10 and to K5 pin 9 with a 1K ohm resistor. Connect a 1000 pF capacitor from K5 pin 9 to ground. These two parts create a small delay. Connect +5V to K5 pin 2 and connect K5 pin 1 to interface connector J5 pin 22.

## BBII Parallel Interface

Finally, you must modify the BBII's parallel interface. The DATA-IN on J10, 1 thru 15 (odd only) must be paralleled with DATA-OUT on J11, 1 thru 15 (odd only).

As we noted previously on the description of the connector, you get to decide which of the options you prefer to do. Only three jumpers are required. Cut the trace between U100-11 and U101-3, being sure to leave the trace from U101-3 to U102-7 (see Figure 5). Connect U100-11 to U105-1. Connect U103-1 to U105-8 (-ODAV2). Connect J10-19 to J9-19. Again you decide: you

Figure 3 - Wiring Spare Gates

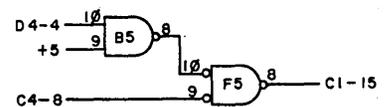
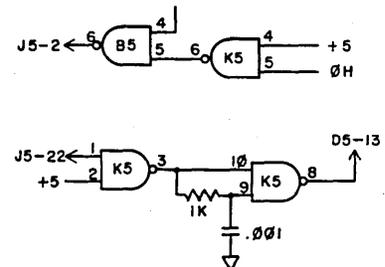


Figure 4 - Prototype Area Circuit



can do it on the BBII card, on the connector, or on the perforated card.

Connect the BBII to the Dynadisk with a 34-conductor flat ribbon. The point-to-point wiring list is shown in Figure 6.

If you want to add some things yourself, you might add an auto refresh to the Dyna. Another change that looks rather simple is upgrading to 256K RAM chips. We don't plan to try this modification

until the cost of 256K chips comes down.

We haven't tried our current CBIOS with a winchester because we don't have one. When we get one, we will incorporate whatever changes are necessary and make them available.

Software will be available on 5 inch diskette for \$15 from:

Curtis Edmonds  
300 E. Kimberly Dr.  
Henderson NV 89015



Figure 5 - Parallel Port Modifications

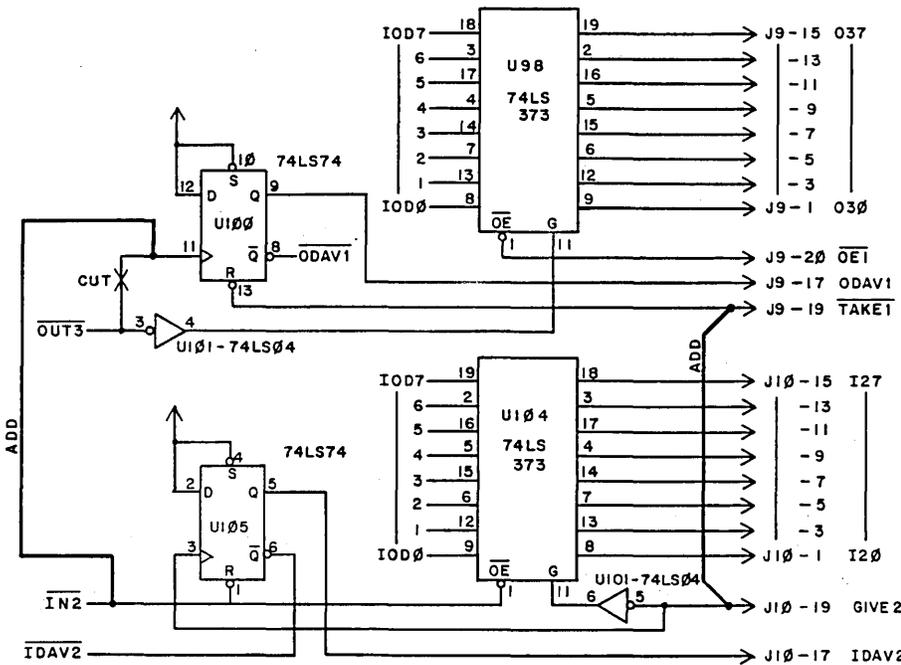


Figure 6 - Interface Cable Connections

BBII	Dyna
J11-1	J5-6
J11-3	J5-8
J11-5	J5-10
J11-7	J5-12
J11-9	J5-14
J11-11	J5-16
J11-13	J5-18
J11-15	J5-20
J11-19	J5-2
J11-17	J5-4
J9-19	J5-24
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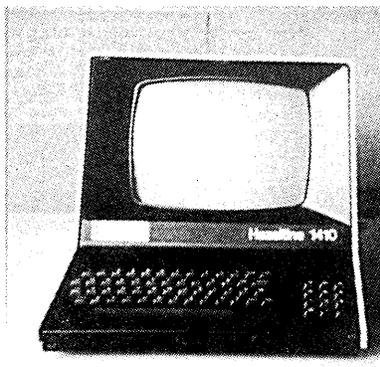
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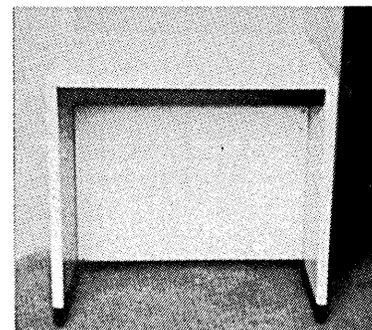
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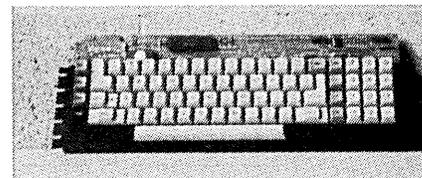
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# BB I: ETX/ACK Serial Print Driver

By Norman B. Doty

3242 Walden Ave.  
Depew, NY 14043

This routine will allow you to use a diablo hytype or other printer that requires the ETX, ACK protocol with your BB I or Xerox 820. I incorporated the following changes into the CBIOS on user's disk B2 (the CBIOS and BOOT on that disk work fine on both the BB I and the Xerox 820).

The changes to the BIOS are simple:

1. Four lines are added to the equates in the start of the cbios.

2. In the warm boot area a small routine called CLRSIO is used to flush all

four of the SIO's input buffers, just in case there is data already pending.

3. Next is the LSTOUT routine which is documented by the remarks in the listing.

4. Last is the initialization of serial port B for the required baud rate. This is placed in the INTAB area for use on boot. If you select a lower baud rate compatible with the printer (like 300) then you won't need any of the protocol since the printer can keep up with the data.

5. Don't forget to change the jump vector at the start of the cbios.

■ ■ ■

## CBIOS Changes for ETX/ACK Protocol

### (CHANGE 1)

```
SIOOUT EQU OF018H ;MONITOR SERIAL OUTPUT ROUTINE
SIOIN EQU OF015H ;MONITOR SERIAL INPUT ROUTINE
SIOST EQU OF012H ;MONITOR SERIAL INPUT STATUS
ETX EQU 3 ;ASCII END OF TEXT CHAR.
```

### (CHANGE 2)

```
LD B,4 ;LOAD COUNT TO FLUSH SIO INPUT REG'S.
CLRSIO: CALL SIOST ;ALL FOUR OF THEM
INC A
CALL Z,SIOIN
DJNZ CLRSIO
```

### (CHANGE 3)

```
LSTOUT: LD A,C ;MOVE DATA
CALL SIOOUT ;WRITE IT TO THE SERIAL DEVICE
LD A,C ;MOVE DATA AGAIN BECAUSE SIOOUT DOES NOT
; RETURN CONTROL CHARS. THAT WERE SENT TO IT
CP OAH ;TEST FOR LF
JR Z,LST1 ;JUMP IF SO
RET

;
LST1: LD A,ETX ;LOAD END OF TEXT
CALL SIOOUT ;WRITE IT
XOR A ;TWO NULLS TO FLUSH THE SIO OUTPUT BUFFERS
CALL SIOOUT
LD HL,0 ;LOAD MAXIMUM DELAY
LD BC,1 ;LOAD DECREMENT COUNT

;
LST2: CALL SIOST ;CHECK SIO STATUS
INC A ;ADJUST THE STATUS
JR Z,LST3 ;GO TO NEXT STEP IF DATA IS AVAIL.
SBC HL,BC ;ELSE DECREMENT MAXIMUM DELAY
JR NZ,LST2 ;RE-DO IF THE DELAY NOT TIMED OUT
RET ;RETURN AFTER MAXIMUM DELAY & NO CHAR PENDING

;
LST3: CALL SIOIN ;READ SIO TO FLUSH THE CHAR PENDING
RET
```

### (CHANGE 4)

```
DEFB 01 ;LENGTH OF TABLE DATA
DEFB 0CH ;SIO PORT B ADDRESS
DEFB 07 ;CODE FOR 1200 BAUD
DEFB OFFH ;END OF TABLE
END
```

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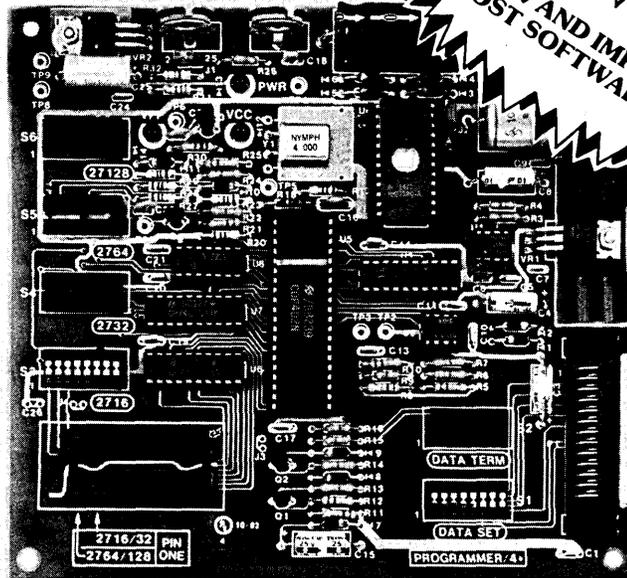
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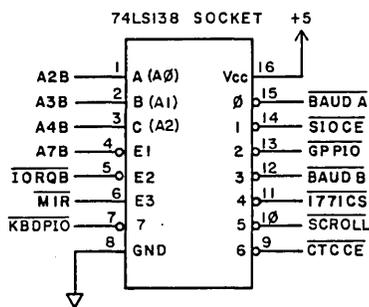
# More I/O On the BBI

By Roger E. Nasiff

103 Highview Dr.  
Syracuse NY 13209

The BBI uses a 74LS138 (U85) to select one of eight I/O components. To add eight more I/O components, a 74LS154 can replace the 74LS138 to select one of 16 components. If more than 16 I/O components are needed, different address lines can be used to activate other 74LS154 decoders. For brevity, this discussion will concentrate only on replacing the '138 with a '154 to provide 16 I/O selections.

Figure 1 - Current I/O Decoding



## Expansion Hardware

Figure 1 shows the current BBI I/O selection hardware. In figure 2, you can see the new I/O selection hardware supports eight more I/O components (labelled PIO1-4 and SIO1-2). To provide the eight additional selections, I tied into pin 3 of U70 (see pin 20 of the 74LS154 in figure 2). To enable the 74LS154, I added a 74LS02 quad NOR.

## Constructing the I/O expansion selector:

1. Take U85 out of its socket.
2. Put the 74LS154 and the 74LS02 on a small wire-wrap board along with an IC socket for the interface cable to U85's socket.
3. Build an IDC cable and plug one end into U85 and one end into the IC socket on the new board (to connect all of U85's lines to the 74LS154/74LS02 circuit).

4. Plug a wire into pin 3 of U70 (to pick up A5B) and connect the other end of the wire into a socket hole on the little board to go to pin 20 of the 74LS154.

Total construction and testing time should take about an hour. I set up the PIOs and SIOs the same way they were originally connected in the BBI, so all of the regular BBI software assignments are the same, with the additional software shown in the figure 3. Note that the BBI decoding design was maintained.

As an application, assume that a PIO was connected the same way as the GP-PIO. The PIO1 line would be used instead of GPPIO line for CE of the new PIO (pin 4 of the PIO), then ports 21 and 23 would be control and ports 20 and 22 would handle data.

Note that no interrupt capability has been described for the additional I/O components, but if Z80 peripherals (e.g. PIOs and SIOs) are used, the usual IEI/IEO/INT daisy chain connection technique can be used.



Figure 2 - Modified I/O Decoding

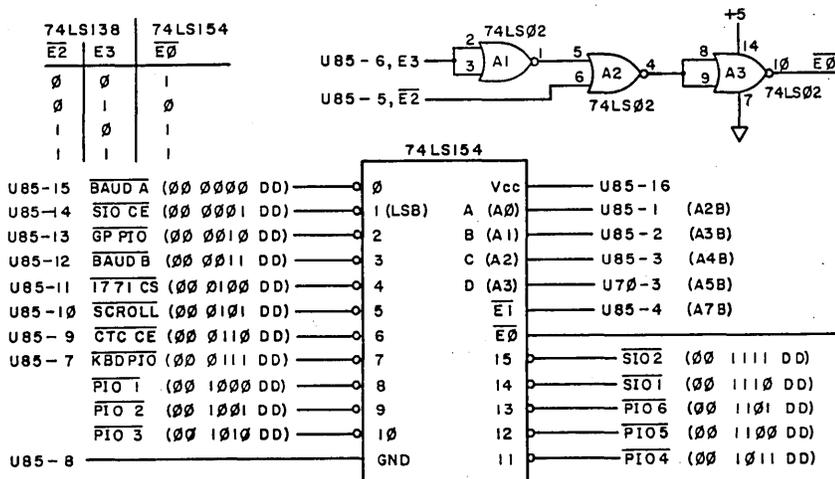
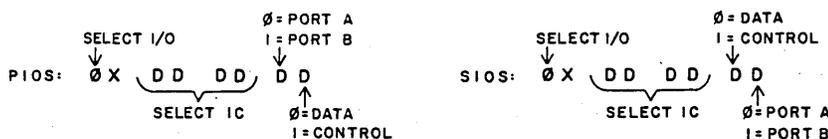


Figure 3 - New Port Addresses

#	Port
0-3	Channel A Baud Rate
4,5	SIO Data Chan A,B
6,7	SIO Cntl Chan A,B
8,9	GP PIO Port A Data,Cntl
A,B	GP PIO Port B Data,Cntl
C-F	Channel B Baud Rate
10,11	1771 Stat/Cmd Reg,Track Reg
12,13	1771 Sector Reg,Data Reg
14-17	CRT Scroll Reg
18-1B	CTC Chan 0,1,2,3
1C,1D	System Data,Cntl
1E,1F	Keyboard Data,Cntl
20,21	PIO1 Port A Data,Cntl
22,23	PIO1 Port B Data,Cntl
24,25	PIO2 Port A Data,Cntl
26,27	PIO2 Port B Data,Cntl
28,29	PIO3 Port A Data,Cntl
2A,2B	PIO3 Port B Data,Cntl
2C,2D	PIO4 Port A Data,Cntl
2E,2F	PIO4 Port B Data,Cntl
30,31	PIO5 Port A Data,Cntl
32,33	PIO5 Port B Data,Cntl
34,35	PIO6 Port A Data,Cntl
36,37	PIO6 Port B Data,Cntl
38,39	SIO1 Port A Data,Cntl
3A,3B	SIO1 Port B Data,Cntl
3C,3D	SIO2 Port A Data,Cntl
3E,3F	SIO2 Port B Data,Cntl

## Decode Design



# Serial Printing On A BBI Sans SIO

By Richard H. Taylor

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Christchurch, New Zealand

Many printers require an RS-232 serial interface, but many do not need the hand-shaking that RS-232 provides. These printers require only the data line and a signal earth (ground for you Americans).

In cases where full RS-232 is not necessary the use of a serial interface chip (such as the Z80 SIO) is not warranted. The printer can be driven by using just one bit off a parallel interface chip (e.g. the Z80 PIO) and some software (of course).

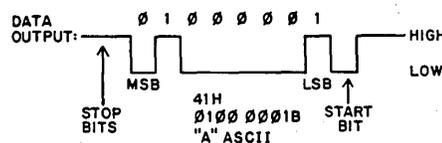
## A Bit of Time

The BBI has one bit of the system PIO (bit 4 of port A) available for user defined purposes. I brought out this bit to the terminal strip TB1 pin 8.

The software required to allow data to be output serially on one bit of a PIO is relatively straight forward.

Figure 1 shows the output waveform for the ASCII character 'A' (41H). In the quiescent condition the output must be held high. When a character is to be sent to the printer the output must first be held low for one bit-time, this is called a start bit. The bit-time is very crucial to the correct operation of serial transmission. If the bit-time is too long or too short then the printer will get out of step and print garbage. The length of the bit-time is derived from the baud-rate of the printer. In fact bit-time = 1/(baud-rate) seconds. So, for a 300 baud printer the bit-time = 1/300 = 0.0033 seconds. 300 baud is very common for printers.

Figure 1 - ASCII Output For 'A'



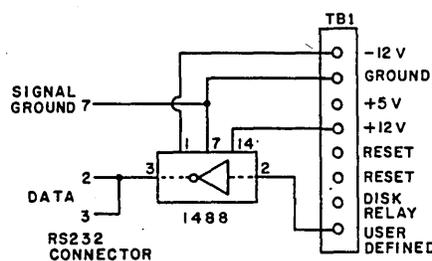
After the start bit, the data byte or character itself is sent to the printer, one bit at a time, beginning with the least significant bit (LSB). After the 8th or most significant bit (MSB) has been output, the printer will store or print the character.

*Editor's note: After the 8th bit has been sent, the line must be held high for at least one bit-time (one stop bit). This gives the printer time to start looking for the next low (the start bit). This type of communication is called asynchronous because there is no set time when the next character must start and because there is no clock transmitted with the data. (The only critical part is that the computer must space the bits pretty close to how the printer expects them to be spaced.)*

## Printer Pickup

There is a small amount of hardware needed to connect up a printer. The RS-232 standard requires voltage levels (+12V to -12V) that are different from the TTL levels (+4V to +0.7V) used by the PIO. However, this interfacing problem is easily overcome. The required circuit is shown in Figure 2.

Figure 2 - RS-232 Interface



The 1488 translates the TTL signals to RS-232 levels. I have shown the data signal connected to both pins 2 and 3. This is because of an idiosyncrasy in the RS232 standard which means that your printer may expect incoming data on either pin 2 or 3.

## PIO.SER.ASM

The following program, called PIO-SERial (PIO.SER), re-initializes the PIO to make BIT 4 an output, copies the driver routine to high memory and patches the driver routine address into the BIOS jump table. The driver routine controls BIT 4 of the PIO and transmits the character in the C register each time it is called.

You may need to make several changes to PIO.SER.ASM to suit your system and printer.

1. PIO.SER.ASM assumes a standard 60K CP/M with the BIOS starting at EA00H. For other configurations alter the assembly variable BIOS accordingly. If you are using Digital Research's Big board CP/M then BIOS = E800H.

2. If you are already using some of the spare memory above PFM you may wish to change the assembly variable DEST so that the driver routine is copied to some other location.

3. PIO.SER.ASM assumes a 300 baud printer and a CPU clock running at 3.5 MHz. For other baud rates or clock frequencies alter the assembly variable ONEBIT according to the formula given.

4. Some printers expect only 7 bits of the character. This can be accommodated by changing the assembly variable LENGTH from 8 to 7.

To use a printer connected to 'BIT 4' run PIO.SER.COM then type Control-P or use PIP to send a file to the printer.

I have been using PIO.SER for more than 6 months now to run an ICL 7077 Termiprinter and have found it perfectly satisfactory. It allowed me to use the printer before I had installed the SIO option and now that I have the SIO it allows me to use both SIO channels for peripherals that require full RS-232.

■ ■ ■

Listing for BBI PIO Serial Interface

```

PIOSER.ASM
;PIOSER.Z80
;SETUPS BIT 4 OF THE SYSTEM PIO AS AN ASYNCHRONOUS OUTPUT
;
;RICHARD HUMPHREY-TAYLOR, CHRISTCHURCH, NEW ZEALAND
;JUNE 1984
;
;
;
PIO EQU 1CH ;SYSTEM PIO PORT
PIOCTL EQU 1DH ;PIO CONTROL PORT
BIT4 EQU 4
LF EQU 0AH
CR EQU 0DH
ONEBIT EQU 0300H ;SOFTWARE DELAY VALUE FOR
;300 BAUD AT 3.5 MHZ CLOCK
;*****
;
; FOR OTHER BAUD RATES OR CPU CLOCK RATES USE THE FOLLOWING
; FORMULA TO CALCULATE THE DELAY VALUE NEEDED:
;
; ONEBIT = CLOCK/(BAUD*15)
;
; WHERE:- CLOCK IS THE CPU CLOCK RATE IN HERTZ
; BAUD IS THE REQUIRED BAUD RATE
;*****
;
DEST EQU 0F800H ;DESTINATION ADDRESS OF PRINTER
;ROUTINE IN HIGH MEMORY
BIOS EQU 0EA00H ;START OF BIOS IN 60K SYSTEM
LNPTH EQU 8 ;NUMBER OF BITS TO BE SENT
;
; ORG 0100H
;
COPY: LD HL,PRNTST ;START OF ROUTINE
LD DE,DEST ;DESTINATION
LD BC,FIN-PRNTST ;LENGTH OF ROUTINE
LDIR ;COPY ROUTINE
;
INIT: LD A,OCFH ;PUT PIO IN BIT MODE
OUT (PIOCTL),A
LD A,00001000B ;ONLY BIT 3 IS AN INPUT
OUT (PIOCTL),A
LD A,40H ;DISABLE INTERRUPTS
OUT (PIOCTL),A
IN A,(PIO) ;GET DATA BYTE
SET BIT4,A ;MAKE BIT 4 HIGH
O OUT (PIO),A
;
LD BC,DEST ;ADJUST BIOS JUMP TABLE
LD (BIOS+2EH),BC
LD BC,DEST+3
LD (BIOS+10H),BC
;
RET ;RETURN TO CP/M
;
HERE EQU $ ;CURRENT ADDRESS
OFFSET EQU DEST-HERE ;CALCULATE OFFSET
;
PRNTST: LD A,1 ;PRINTER READY
RET
;
PRNTER: PUSH HL ;SAVE ALL REGS
PUSH DE
PUSH AF
PUSH BC
DI ;STOP ANY INTERRUPTIONS
LD A,0 ;START BIT
CALL OUTBIT+OFFSET
CALL BITDEL+OFFSET
LD A,C ;GET CHARACTER
;
CONT2: CALL OUTBIT+OFFSET ;OUTPUT BYTE IN A
LD A,1 ;OUTPUT STOP BITS
CALL OUTBIT+OFFSET
CALL BITDEL+OFFSET
CALL BITDEL+OFFSET
EI ;TIMING PART IS OVER
POP BC ;RETRIEVE CHARACTER
LD A,C
CP LF ;IS IT LF ?
CALL Z,LDELAY+OFFSET ;THEN WAIT FOR PRINTER
CP CR ;IS IT CR ?
CALL Z,LDELAY+OFFSET ;THEN WAIT FOR PRINTER
POP AF
POP DE
POP HL
RET
;
OUTBYT: LD D,LNPTH ;BITS TO OUTPUT
RRC A ;MOVE LSB TO BIT 4 POSITION
RRC A
RRC A
NEXT: RRC A ;SELECT NEXT BIT
LD B,A ;SAVE CHAR
AND 00010000B ;MASK ALL BUT BIT 4
LD C,A ;SAVE IT
IN A,(PIO) ;GET PIO BYTE
AND 11101111B ;SET BIT 4 TO ZERO
OR C ;THEN SET IT ACCORDING TO C
OUT (PIO),A ;THEN OUTPUT
CALL BITDEL+OFFSET ;WAIT 1 BIT TIME
DEC D
JR Z,CONT3
LD A,B ;GET SHIFTED BYTE
JR NEXT ;SEND NEXT BIT
CONT3: RET
;
BITDEL: LD HL,ONEBIT ;DELAY 1 BIT TIME
DELAY: DEC L
JR NZ,DELAY
DEC H
JR NZ,DELAY
RET
;
OUTBIT: RRC A ;OUTPUT LSB OF A
RRC A
RRC A
RRC A ;ROTATE TO BIT 4 POSITION
LD B,A ;SAVE IT
IN A,(PIO) ;GET PIO BYTE
AND 11101111B ;SET BIT 4 TO ZERO
OR B ;SET BIT 4 ACCORDING TO B
OUT (PIO),A
RET
;
LDELAY: LD HL,OFFFHH ;LONG DELAY
JR DELAY
;
FIN EQU $ ;END OF ROUTINE
;
END

```

LISTING END

# Parallel Printer Interface For SWP's Dual Density

By Terry Zbinden

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Maple Grove MN 55369

This article describes a customized parallel printer handler for incorporation into a BIOS, such as SWP's double-sided, double-density version. I have done this with my BB-I, and it works very well with my C. ITOH 8510 printer with parallel input. This printer can handle optional character sets, fonts and even bit mapped graphics.

The usefulness of this handler is to let the printer do underlining, tab characters, elite, pica, compressed, and proportional fonts. The font can be changed anytime within a file, simply by storing the correct sequences in the file.

Be sure to read the cautions below, since there are cases which can give some really weird printed matter.

## A Proper Escape

One problem was to get an ESC character to the printer, since the ESC is a control character and can not be stored in a text file. Even worse, Wordstar uses an ESC as an error reset, so ESC never gets outside the file.

To generate an ESC character, 1BH, send a caret. To send a tab character, 09H, send a caret followed by a squiggle.

The characters used to denote the ESC or HT can be changed, of course. To use the tab with the C. ITOH, the tabs must first be set, or the printer will ignore the tab command. See figure 1 for the commands.

## Don't Get Serial

The printer handler (figure 4) is a subroutine to be included in the BIOS of CP/M. As it is written, it can be included with SWP's double density BIOS without modification.

However, the SWP BIOS already has a printer handler for both serial and parallel printers so the serial part must be completely removed, since there is not enough room to hold both the changes to the parallel part and the serial printer handler. The pinout for the printer has been left unchanged.

The operation is perhaps not as self evident as one would like, so I have included a flow chart for the program. See figure 2 for the five basic parts.

Figure 3 contains a list of the connections to the printer from the BB-I.

## An Improper Escape

This handler gives lots of advantages, but it also has a couple of problems. If you are printing a file which has caret in it, the printer will get an escape character and change modes according to the following character(s). This can cause massive underlining, Greek characters, double width, or any combination of the above. The solution is to use a word processor to find and replace all single carets with double carets before printing the file.

In Wordstar, the sequence is "ctrl-QA" and in response to FIND?, type a

caret, REPLACE WITH?, type two carets, and for OPTIONS?, type "GN". This can then be changed back just as easily when the printing is complete. For example, in Wordstar: "ctrl-QA" then two carets, then caret, then for OPTIONS?, type "GN" again.

If you can dump the CRT to the printer, using the SWP screen dump or the routine in Micro C #15, the above method of fixing the file will not give you formatting. You can not modify the CRT before dumping it so you'd need a BIOS that doesn't have the special handler.

■ ■ ■

Figure 1 - Control Code Table

~	tab
^Ln1n2n3...	sets tabs at n1, n2, n3, ...
^	sends a caret to the printer.
^E	sets the printer to elite print.
^N	sets the printer to pica print.
^Q	sets the printer to compressed print.
^P	sets the printer to proportional print.
^X	starts underlining.
^Y	stops underlining.

Figure 2 - Program Flow Chart

CENTR1:	Initializes the BB-I general purpose PIO for printer use.
CENST:	Tests the printer "busy" line and loops until it is free.
CENTR2:	Test for an ESC character.
ESCSEQ:	Test for tab character.
SEND:	Send the character to the printer. This includes the proper pulsing of the READY line to the printer.

Figure 3 - Printer Cable Connections

CENTRONICS PIN	BIG BOARD PIN (J5)
1 (STB NOT)	34 (BPORT 4)
2 (DATA 1)	6 (APORT 0)
3 (DATA 2)	8 (APORT 1)
4 (DATA 3)	10 (APORT 2)
5 (DATA 4)	12 (APORT 3)
6 (DATA 5)	14 (APORT 4)
7 (DATA 6)	16 (APORT 5)
8 (DATA 7)	18 (APORT 6)
9 (DATA 8)	20 (APORT 7)
10 (ACK NOT)	26 (BPORT 0)
11 (BUSY)	28 (BPORT 1)
12 (PAPER EMPTY)	30 (BPORT 2)
32 (FAULT NOT)	32 (BPORT 3)

NOTE: The printer will run with only data, stb not, ack not, and busy connected.

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Figure 4 - New Parallel Printer Code

### PARALLEL.MAC

```

PIOCPA EQU 09H ;control port a on pio
PIOCPB EQU 0BH ;control port b on pio
PIODPA EQU 08H ;data port a on pio
PIODPB EQU 0AH ;data port b on pio
;
CENTRON:
JR CENTR1
CENTR1: LD A,00001111B ;output mode on port a
OUT (PIOCPA),A
LD A,11001111B ;bit mode on port b
OUT (PIOCPB),A
LD A,00001111B ;bits 7..4 outputs, bits 3..0 inputs
OUT (PIOCPB),A
LD A,01010000B ;strobe bit negated
OUT (PIODPB),A
LD A,CENTR2-CENTR1
LD (CENTRON+1),A ;patch entry point after initial call
CENTR2: CALL CENTST
JR Z,CENTR2 ;loop until able to accept print data
LD A,(EFLAG) ;see if last char was caret
CP '^'
LD A,C ;put char back in A
JR Z,ESCSEQ ;if last was caret, gen ESCAPE
CP '^' ;is this char a caret
JR NZ,SEND ;if not, sent it
LD (EFLAG),A ;if it is, store it in flag reg
RET
ESCSEQ: CP '^' ;if last char was caret, and
JR Z,CARROT ;this is too, send caret
CP '^' ;is char a tab
JR NZ,GENESC ;if not skip this
LD C,09H ;if yes, send tab to printer
JR CARROT
    
```

```

GENESC: LD A,01BH ;load A with the escape char
CALL SEND ;send escape, then the next char
CENTR3: CALL CENTST ;wait after sending esc
JR Z,CENTR3
CARROT: XOR A ;clear flag after sending escape
LD (EFLAG),A
LD A,C ;put real character into A
SEND: OUT (PIODPA),A ;send character to pio
PI
IN A,(PIODPB)
RES 4,A ;assert strobe line to centronics
OUT (PIODPB),A
IF SLOW ;generate a pulse for printer
LD B,40 ;count less for 2.5mhz
ELSE
LD B,66 ;count more for 4 mhz
ENDIF
DJNZ $ ;pause approx 200 microseconds
SET 4,A ;de-assert strobe
OUT (PIODPB),A
EI
RET
CENTST: IN A,(PIODPB) ;read pio inputs from centronics
AND 0000010B ;test printer busy bit
JR Z,CENTR2
XOR A
RET
CENTS2: DEC A
RET
EFLAG: DEFB 0 ;return with a=255 if printer ready
    
```

That's all there is to it.

# Pascal Procedures

By John P. Jones

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314-645-1596

A friend who usually programs in BASIC mentioned that one of his dislikes about Pascal is the need "to put semicolons everywhere." Some interesting points came up in the discussion that I'd like to share.

## The Semicolon

All high level programming languages have their programs organized into a sequence of statements which are either interpreted or compiled for execution. Program source files are text files. This gives four alternatives for delimiting statements:

1. Fixed format lines (Ugh!).
2. An explicit continuation character.
3. An explicit separation character.
4. Some combination of 1, 2 and 3.

For whatever reason, the non-structured languages like Fortran and BASIC use method 4 while the structured languages like PL/1, C and Pascal use method 3. Microsoft BASIC uses <CR> as terminator, ':' as separator and <LF> as continuation character. This may be what was confusing my friend, the non-visible terminator and continuation characters.

Pascal, of course, uses the semicolon as a statement separator. Except within identifiers, whitespace (spaces, tab, <CR>, <LF>) are ignored by the compiler. The requirement for an explicit separator character is a consequence of this free form source capability.

C uses the semicolon as a statement terminator while Pascal uses it as a statement separator. In most cases, this distinction between termination and separation is of little consequence but the proper use of the semicolon is critical within an IF-THEN-ELSE statement.

In an IF statement, a semicolon can NEVER occur before the reserved word ELSE since that would be a separator within the statement. Be extremely careful when nesting IF statements as it is easy to get the ELSE clause linked with the wrong IF. As a rule, an ELSE will be compiled as part of the most recent IF that has no ELSE. When in doubt, do not hesitate to use a BEGIN-END block to insure the statement is compiled correctly.

A semicolon is not required following a statement before an END, but if

present will represent a null or empty statement. Empty statements are ignored by the compiler.

## Bug

My thanks go to Jay Sage, a reader from Newton Centre, Mass., who sent information about a bug in Turbo Pascal. The built-in procedure STR is used to convert numeric values into character strings following the normal output formatting conventions used in the WRITE statement. Figure 1 is a slightly modified version of the example program he sent. The program uses STR within a function that returns an 80 character STRING. When this function is called from within a WRITE statement, the WRITE statement terminates. A null WRITE statement within the function fixes the problem. Jay speculates, and I agree, that STR and WRITE share code and the bug occurs because the code is not reentrant.

A voice from the back of the room says, "What did he say? Re-entrant ... what's that?"

## Reentrancy

A routine is reentrant if it can be interrupted by another process which in turn

uses the interrupted routine. (Come on now John, that doesn't help!) To use an example, let's assume a Big Board I with one channel of the CTC set up to generate a real time clock interrupt. Each second, we want to update a clock display in a corner of the screen. If the routine to output a character to a specific screen location is reentrant, it can be used to update the time display even if the clock interrupt occurs during execution of the character output routine.

Reentrancy is of special value in interrupt driven environments (interruptable processes can share code) and multi-user/multi-tasking systems (users/tasks can share code). CP/M's BDOS is NOT reentrant. This means that something like an interrupt driven print spooler is difficult to implement since the spooler would normally use BDOS routines to access the print file and printer.

## Turbo Tips

Pascal compilers that generate native code, like Turbo Pascal, Pascal MT/+ and Pascal/Z can be used for writing interrupt service routines. It is especially easy to write interrupt routines for Turbo because the code it generates is fully in-

Figure 1 - Turbo Pascal Bug Test

```
program bugtest;

type
  string80 = string [80];
  string20 = string [20];

var
  in_value : integer;

function make_string (number, places : integer) : string80;
var
  temp : string20;

begin
  str (number:places, temp);
  makestring := ' is the number ' + temp;
  { write; } { Inclusion of this null write fixes output }
end;

begin { bugtest }
  clrscr;

  repeat
    write ('Enter number : ');
    read (in_value);
    writeln;
    writeln (in_value, makestring (in_value, 4));
    writeln;
  until in_value = 0;

end.
```

Figure 2 - Sample Interrupt Routine

```

{ This program demonstrates interrupt handling by Turbo Pascal }

program test_interrupt;
const
  kbd = $1e;          { BB I keyboard PIO address }

var
  kbd_vector : integer absolute $ffa;  { BB I keyboard vector address }
  vector_save : integer;               { so we can exit gracefully }
  ch : char;
  key_avail : boolean;

procedure do_kbd_int;                  { will vector here on kbd ints }
begin
  { Pascal interrupt procedures MUST preserve all
    registers used so PUSH them all.  If floating point
    were used, would also need to use alternate registers. }
  inline ($f5/ { PUSH AF }
    $c5/ { PUSH BC }
    $d5/ { PUSH DE }
    $e5/ { PUSH HL }
    $dd/ $e5/ { PUSH IX }
    $fd/ $e5); { PUSH IY }

  key_avail := true; { since Turbo I/O routines are not reentrant,
    we will just set a flag to let the main program
    know an interrupt has occurred rather than
    displaying the keystroke here. }

  inline ($fd/ $e1/ { restore registers pushed above }
    $dd/ $e1/
    $e1/
    $d1/
    $c1/
    $f1/
    $fb/ { EI since interrupts disabled on entry }
    $ed/ $4d); { RETI }

end;

begin
  vector_save := kbd_vector; { save current kbd interrupt vector }
  kbd_vector := addr(do_kbd_int); { replace with address of our routine }
  key_avail := false; { initialize flag }
  repeat
    if key_avail then begin { if had interrupt, will be true }
      ch := chr(not(port[kbd])); { read port, inverted input }
      write (ch); { display the keystroke }
      key_avail := false; { clear interrupt flag }
    end;
  until ch = ^[; { exit if ESC pressed }
  kbd_vector := vector_save; { back to normal operation }
end.

```

terruptable. Since the code is not reentrant, you must compile the procedure in absolute (non-recursive) mode and the routine must preserve all CPU registers.

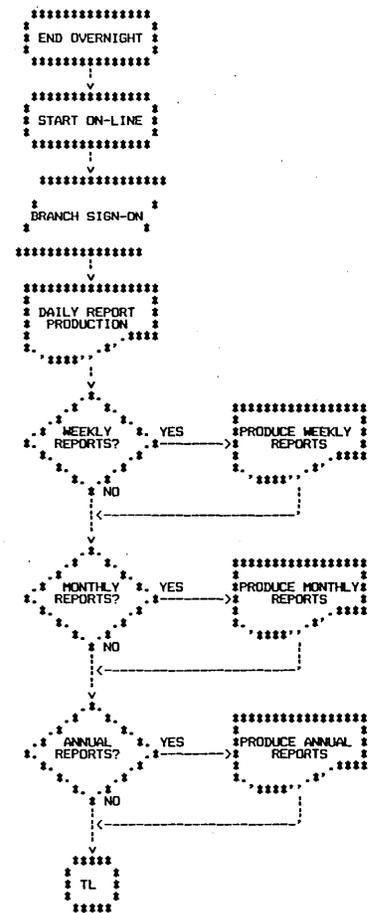
Figure 2 is an example of a program that uses an interrupt routine written in Pascal. Although the example is trivial, it could be used in an application such as a game that requires real time keyboard input. A game running on the Microsphere color graphics card could be set up in an infinite loop which updates the display and moves sprites with the inter-

nal flow controlled by real time keyboard input.

### Error Department

I made an error in transcribing the program fragment in figure 2 of issue 19's column. The last line of that figure should read:

```
loadbinary (fname, routines[0], (size div 128) + 1);
```



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# Extended 8" Single Density

By Larry J. Blunk

2972 Briarcliff  
Ann Arbor MI 48105  
313-663-6171

Extended single density is the name I have given to the 8 inch format I am using. Extended single density formats 8 inch diskettes with nine 512-byte sectors per track (the system tracks, however, are standard 128-byte sectors). This gives me a total of 334K per diskette (vrs 241K). It also improves disk I/O speed quite a bit.

## History

My inspiration for this format was an article by Robert Lurie in the October 1983 issue of Microsystems. Lurie used a little known secret of the 1771 disk controller chip. The 1771 is able to read and write sector sizes which are multiples of 16, as well as the standard 128, 256, 512, and 1024 sizes.

Taking advantage of this, Lurie used two 2432-byte sectors per non-system track. He formatted the system tracks with 29 128-byte sectors so that the standard boot routine would work but there would be extra space for the larger CBIOS needed to block and deblock the 2432-byte sectors. This setup yielded 354K per disk.

I decided against Mr. Lurie's setup because there was really no place to store such a large sector size (without lowering the TPA or using bank-switched RAM). Also, the blocking/deblocking routines supplied by Digital Research with CP/M will only work with sectors which are a power of two (i.e. 256, 512, 1024, etc.). However, I decided to keep Lurie's format of 29 128-byte sectors on the system tracks.

Figure 1 - Modifying SYSGEN

```
A>ddt sysgen.com
DDT VERS 2.2
NEXT PC
0500 0100
-s129
0129 1A 1d
012A 01 .
-s144
0144 00 1b
0145 00 1c
0146 00 1d
0147 00 .
-go
A>save 4 sysgen29.com
```

## Patch Work

In order to make SYSGEN work with 29 sector tracks, you have to make a few patches with DDT. Lurie describes them in his article (figure 1).

Now, when you want to sysgen an extended single density disk, use sysgen29.

## Formatting

To format a disk, use EXTFORMAT. This formatter was derived from FORMAT5, but formats the disk with 29 128-byte sectors on tracks 0 and 1, while tracks 2 through 76 are formatted with nine 512-byte sectors.

## Incorporating the CBIOS

There are two versions of the CBIOS. One is for those who use CP/M as distributed by Digital Research Computers with a CBIOS which ORG's at E800H. The other is for those with a standard 60K CP/M and a CBIOS ORGing at EA00H. Both of these use storage above

the monitor. For the E800H-CBIOS, storage starts at FC80H, while the EA00H-CBIOS uses memory at FB00H and above. Make sure that any programs you run do not use these locations.

Below, is an example of how to incorporate the CBIOS into CP/M. You should have a disk with EXTFORMAT, E8XTBOOT or EAXTBOOT, E8XTBIOS or EAXTBIOS, CPM60, SYSGEN29, and DDT in drive A, and a blank disk in drive B. Figure 2 describes what the session should look like.

Now you are ready to test the new format. Switch the disks and hit the reset button. When you boot, you should get the signon message telling of your new ability to support 334K diskettes. You can use STAT or D to verify this.

EXTFORMAT, E8XTBOOT, E8XTBIOS, EAXTBOOT, and EAXTBIOS are available on Micro C user disk B28.

■ ■ ■

Figure 2 - Incorporating a New CBIOS

```
A>extformt
(respond with B and then after
the disk in drive B has been
formatting type ^C to exit.)

Now use the appropriate column.

E800 CBIOS                EA00 CBIOS
-----                -----
A>ddt cpm60.com           A>ddt cpm60.com
DDT VERS 2.2             DDT VERS 2.2
NEXT PC                 NEXT PC
2300 0100               2300 0100
-ie8xtboot.hex         -ieaxtboot.hex
-r880                   -r880
NEXT PC                 NEXT PC
2300 0000               2300 0000
-ie8xtbios.hex         -ieaxtbios.hex
-r3780                  -r3580
NEXT PC                 NEXT PC
2547 0000               2543 0000
(note: should not be   (note: should not be
greater than 2600)    greater than 2580)
-go                     -go

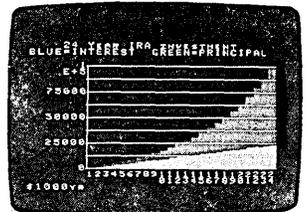
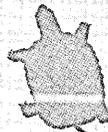
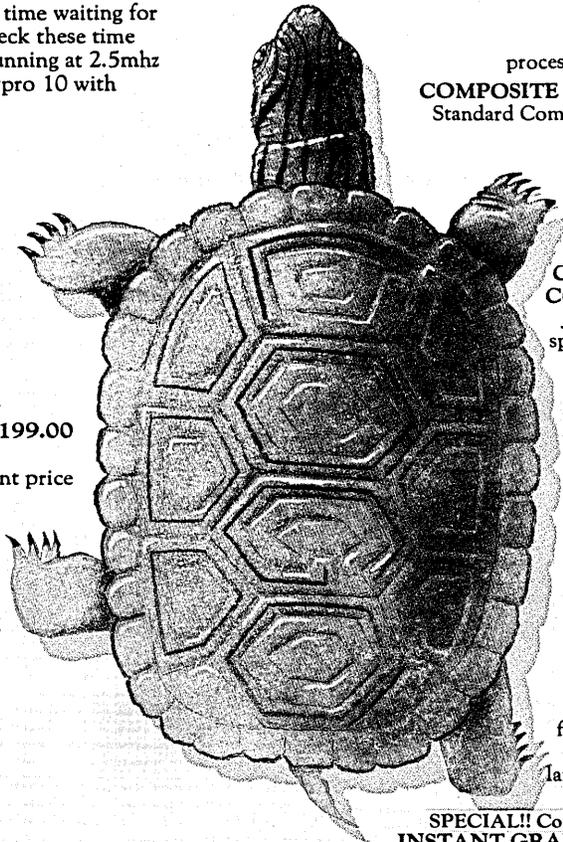
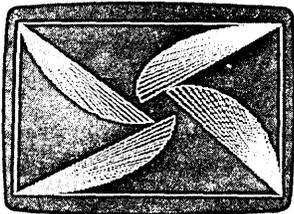
<< Reconverge here >>
A>sysgen29
SYSGEN VER 2.0
SOURCE DRIVE NAME (OR RETURN TO SKIP) <cr>
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) b
FUNCTION COMPLETE
DESTINATION DRIVE NAME (OR RETURN TO REBOOT) <cr>
A>
```

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Load Perfect Calc	10.35	3.16	9.44	1.87	7.19
Load Perfect Calc + 14KFile	12:04.01	3:33.26	10:48.00	1:51.08	6:20.37
Recalc 14K PC File	10:19.00	2:27.36	9:31.25	1:17.78	5:30.53
Page down PC File	25.24	8.01	22.49	4.32	17.55
Load LADDER.COM	10.90	3.31	9.38	2.12	6.60
WARM BOOT	2.82	.64	2.22	.46	2.69
Load M BASIC	5.79	1.64	5.43	1.12	2.55

As you can easily see even a 2.5 mhz Kaypro with RAM disk is faster than a Kaypro 10 using a hard disk. A 4 mhz Kaypro with RAM disk is significantly faster.

# SBASIC Column

By Jack Rodenhi

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Lompoc CA 93436

Okay, so where did we leave off on the last issue? It had something to do with problems I had with disk-file access. This topic is important because many programs require that data be stored away and retrieved at some later time.

## Disk-file Access

My early attempts in SBASIC led me to certain conclusions. I decided that I should impose a structure on disk files. To simplify disk record handling problems, the records should be handled as strings. This means that when a record is written to disk, it should be one string and no longer than 255 bytes. The first byte of the record should be reserved for record status (deleted, last record, etc.).

## Snail Sort

I came up with a novel approach to sorting a disk file. I had been thinking about this problem for some time and the idea came to me as I was working out in the garden. I called my idea the snail sort because of the way the program attaches itself to a disk.

Basically, the program will work like this. Read as many records into memory as will fit (let's say 250). Put them in order in memory somehow. Output the smallest record. Read the next record into memory and again output the smallest record in memory to disk. Continue to do this until you reach the end of the disk.

Notice that at this point, the highest 250 records are in the computer. Write those out to the disk in order and the top (highest value) part of the file is sorted.

Now go back to the beginning of the file and do this again. Only this time you can stop short of the end of the file by 250 records. If the file has 1000 records in it, it will take four such passes to put the file entirely in order.

That sounds okay but think about how the computer will sound for a moment. It will write a record, read a record, merge, write a record, read a record, merge and so on, all the while its little head going ka-chunk, ka-chunk (not the fastest sort of thing to do).

How about if we write out the smallest 125 records in memory and read in 125 new ones. The ka-chunk, ka-chunk goes

away and the head feels better. As an added bonus, the records are now written to the disk in runs of 125 records each and the runs are in order. We can make use of that idea if we can somehow merge these with the records in memory instead of sorting them by brute force.

## Top-Down

Now we take this idea and attempt to transform snail sort into a real program using what is called "Top down" programming. Near as I can tell, this kind of programming doesn't have anything to do with convertibles on sunny days. I think the idea is a little closer to what Philippe Kahn talked about at the SOG. Philippe said the ideal programming language is one that requires you only to sit down at the keyboard and type in "ACCOUNTING PACKAGE" and the language would take it from there.

Well, that's like top down programming only your head is the "ideal programming language." You set your idea up in outline form in phrases like 'Input 125 records' and 'Sort on part number.' Then, you have to be understanding and realize that your computer won't know what you're talking about (after all this time you'd think it would begin to catch on).

So you provide a little more detail like 'Open inventory file,' 'While not end of file' and so on.

These intermediate instructions are written in something called "pseudocode." But your computer still won't understand pseudocode, so you do the small amount of remaining translation to put the program into a language that your computer will understand. However, you've already discovered what you want the computer to do.

## Super Snail Sort

So here's an outline (Figure 2) of what the Super Snail Sort will do. Notice that the words 'up to' are used to allow for an end of file condition.

The program included in this column (Figure 1) is not a sort routine. It is a linear search routine. Notice that the records will be read into an array called 'list' and that they will not change places during the process. The records will be ordered by the array 'next.'

A one-byte value in 'smallest' will point to the smallest value in the array 'list' and the corresponding value of 'next' will point to the next value in the list. From there, each item is found sequentially because it appears in the 'next' array for the previous item. This is known as a linked list. In pseudocode, the program might be written like Figure 3.

In the actual program, the coding becomes more involved, but you can see how the program evolved from the pseudocode.

## SBASIC Tutorial

I had a chance to review the SBASIC Tutorial sold by Sven Erlandsson. In some ways, this book is a better version of the manual that came with SBASIC. At the very least, it is good to have an extra manual on the language. Be aware that it is a manual though and not really a tutorial.

One of the mistakes the author makes in the book is to make frequent comparisons to MBASIC. As an aid to understanding, it was good in the first chapter to contrast MBASIC and SBASIC but it should have stopped there. Other than that, the book seemed okay, not great, but okay.

Unfortunately, the author has apparently written a large involved program dealing with steam tables and chose to include parts of this program as material illustrating some of the more advanced topics of the book. I had to learn what enthalpy meant before I could finish that section.



Figure 1 - SBASIC Search Routine

```

$lines
control.c.trap off
$constant top = 250

dim integer list(top)
dim byte next_ptr(top)
var smallest, current, last_one, last_item= byte

REM*** Here is the actual ordering algorithm***
procedure order(new_item= byte)
  procedure search_and_insert
    while list(new_item) > list(current) do begin
      last_one = current
      current = next_ptr(current)
    end
    next_ptr(new_item) = next_ptr(last_one)
    next_ptr(last_one) = new_item
    last_item = new_item
  end

  Comment
  Compare this part of the program with the pseudocode version.
  Notice that the procedure search_and_insert had to be developed
  for one word of pseudocode.
End
if list(new_item) < list(last_item) then begin
  if list(new_item) <= list(smallest) then begin
    next_ptr(new_item) = smallest
    smallest = new_item
  end else begin
    current = next_ptr(smallest)
    Comment
    When we find an element that is larger than the new
    element, we will:
    1. Change the "next_ptr" array for the last element we just
    looked at to point to our new element.
    2. Change the "next_ptr" array for the new element to point
    to the larger element we just found.
    To do item #1, we need to know what the last element was so
    that we can pass this information on to our search_and_insert
    procedure. So each time we move on to a new item, we set
    "last_one" to be equal to the item we just left.
  End
  last_one = smallest
  search_and_insert
end else begin
  current = next_ptr(last_item)
  last_one = last_item
  search_and_insert
end
end
REM*** The ordering procedure ends here and a demonstration program begins.

var i,current_item,next_item= integer
smallest = 0
list(smallest) = 9999
last_item = smallest
for i = 1 to top
  list(i) = int(1000 * rnd(1))
  print list(i)
  order i
next i
print
print "Now in order"
print "Item no.      Item          Next item"
print
current = smallest
for i = 1 to top
  current_item = current
  next_item = next_ptr(current)
  print current_item,list(current),next_item
  current = next_ptr(current)
next i

```

Figure 2 - Pseudo code Version of SORT

```

Repeat
  Read in up to 250 records
  put them in order
  repeat
    write out up to 125 records
    read in up to 125 records where those came out
    put the new records in order
    until all the unsorted masses have passed through
  write out all the records
  decrease the unsorted masses by 125
until the unsorted masses = 0

```

Figure 3 - More Pseudocode

```

if the new item is smaller than the last item then
  start at the smallest item in the list
else start where the last item was put in
  search for the new item's place and insert it

```

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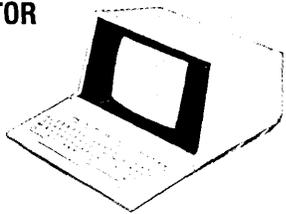
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# The Kaypro Column

By David Thompson

This column is about "new." I mean new drives and disks, the Robie variety and a new system, the Kaypro PC.

## Robie

Speaking of the Robie, this little duckling has the heart of an 84 system, just the drives, drive clock, BIOS and monitor have been changed. Early feedback on the Robie has indicated that there is a problem with the media (disks).

Everyone expected problems with the drives, I mean, 2.6 meg per disk doesn't leave a lot of room for error (or anything else). However, these drives are similar enough to the current 5" drives that it shouldn't be too hard to add them to standard Kaypros (if there are any standard Kaypros still out there what with 5 MHz, 4 drives, and quad density).

Anyway, we're already working on it, and you'll be hearing more about these right here. Don't expect to see these \$500+ drives showing up on the surplus market soon because there is definitely a lot of interest in them. Also, the disks are about \$10 each though they look very similar to standard 5" floppies.

The Robie drive can read standard Kaypro II and 4 disks but it cannot write data on these disks—so software transfers are one way only (whereas a quad-density drive can format and write Kaypro II and 4 disks).

Theoretically the Drivetec drives should provide very good data reliability. You see, the drive has two stepper motors. One positions the head to the approximate track location and the other then adjusts the head position slightly to maximize the signal.

## Your Disks are All Wet

The biggest problem with standard floppy disks is that the base material is hydroscopic so it expands and contracts depending on the humidity. A disk you format and write at the coast might be difficult to read on the high desert (especially if one of your drives is aligned slightly differently from the other and it's off in the wrong direction).

Blow-drying (use a slightly warm setting) a disk for half an hour, or placing it in a steamy bathroom for a few hours, might be all you need to do to read a balky disk. (Note, if your girl friend

catches you using her hair dryer on your disks just tell her you're trying out the latest style in software development. If she doesn't buy that, you probably shouldn't try the same ploy on the guys at the funny farm.) Hold the disk's jacket (not your jacket) open a bit so that the moist or dry air can reach all of the surface.

Anyway, the Drivetec drives compensate for the changes in disk diameter. However, disk size is not the only problem caused by the environment. Most disks are rated for 3 to 3 1/2 million head passes (per track) before the media wears out. Well, some of the disks available for the Robie drives are wearing out after 1 or 2 million passes, but this shortened life appears to correspond with high-temperature (80-100 degrees) and/or high humidity (90+%).

At 70 degrees and 50% humidity, the disks appear to be unscathed after 4 million passes.

There appears to be some disagreement about who makes the best Robie media. Drivetec feels that Brown disks are best, and the Drivetec branded disks are really Brown. Other folks feel that Maxell disks are the best. We'll have to wait and see. I hope that these Maxell disks are not as abrasive as the standard Maxell 5" disks. Anyway, Brown is supposedly coming up with a revised media package so their disks may be getting better.

Squeezing in 192 tracks per inch (sardines have nothing to complain about) might appear to be foolhardy especially when you realize that they have data between the tracks. They call this data "servo bursts" and if the drive doesn't detect these little off-track marks it doesn't send index pulses to the Kaypro. Obviously you have to purchase the disks pre-formatted, and heaven help the little gnome who passes a magnet over papa's new disks.

## Manufacturing

There are four outfits who either are, or soon will be, manufacturing Robie disks: Spin Physics (owned by Kodak), Maxell, Dysan, and Brown.

Kodak (via Spin Physics) is supposedly working on expanding the disk technology. They already have a super den-

sity 5" disk and are working on an even higher density version with vertically polarized media. Anyway, the Robie drive is already one level behind the state of the art and will soon be two levels down.

Three outfits will be manufacturing Robie-style drives: Drivetec, Kaypro, and Kodak. Kaypro and Kodak will be manufacturing them under license from Drivetec.

There are currently only about a dozen 12X systems in existence (the Kaypro 10 with a 2.6 meg floppy drive). The engineers at Kaypro are using these 12Xs for software development (such a deal).

## Ungrounded Problems

The current Robie drives have had a problem with electrical noise, and the folks at Kaypro are testing out the following fix. Unplug the green wires from the grounding tabs on the drives and then tie pins 3 and 7 together on the power supply. This is supposed to tie the chassis ground and the 12V return line together. They feel that the noise results from a ground loop.

## Superterm Won't Be

Kaypro will be doing away with Superterm in the very near future. (Do I hear hooray's?) They will be replacing it with a menu-driven version of Myte. (More hooray's?)

## PC Compatible From Kaypro

The word is that Kaypro will be showing its new PC compatible at Comdex. It will be a very PC XT like system complete with winchester and will run 1-2-3 and Flight Simulator.

Flight Simulator is significant, not so much because everyone wants to run it, (come fly with me) but because it is considered one of the best tests for PC compatibility. If you can run this program, you are really compatible.

It comes with a Western Digital winchester controller, 256K (you can add an additional 192K on board), an 8088 (I believe) on the plug-in processor card (keeping their options open), and one additional card slot for adding additional hardware.

It will come inside a standard Kaypro 10 cabinet (do I hear murmurs in the

crowd?) and will have a built-in 9" green CRT. The choice of cabinet limits them to the single open card slot. There will be a connector on the back for plugging in another monitor. The system weighs about the same as the current Kaypro 10.

I don't have any word on the software package that will come with the system but considering MicroPros selection of PC software, I wouldn't be surprised to see WordStar, CalcStar ... combined with the new system.

**Another Neat Publication**

Push and Pop is the monthly publication (30 pages) of Sacramento's Micro-computer User Group. The June issue covered translating Fortran programs into Pascal, CP/M 68K, purchasing a computer, and winchester drive notes. The magazine is well done and easy to read.

The publication contains a list of other

Sacramento User Groups: Big Board, Morrow, S-100, Televideo, Heath-Zenith, Kaypro, Osborne, and Sanyo. The Big Board group's number is 916-383-7059 (Harold Musser, eves), the Kaypro group's number is 916-961-8810 (Marty Meyer), and the Morrow group is available at 916-421-6268 (Milt Levison).

Subscriptions are \$10 per year and their address is SMUG, PO Box 161513, Sacramento, CA 95816 (Attn Push and Pop).

**84 Board Service Hints**

The 74LS373 (U6) is reportedly the culprit when the centronics port goes to lunch (makes sense).

If you are having autodialer problems, you can check out your dialer chip (U19) by selecting pulse mode in Superterm's dial menu and then listening to the chip (you can actually hear it work). If you

don't hear anything, suspect either the TMS 99531 dialer or the Z80A. As we reported last issue, some people are reporting that their system is locking up during dialing and many of them have been told to replace their Z80A with a Z80H.

On the Kaypro 10s, some people are getting a "status 02" error message. That usually means that the Kaypro can't read the system tracks. (The winchester might not be up to speed or that the system tracks may have been garbaged.) The winchester may be slow coming up, the +12V supply may be weak, or you may need to replace the system track. (Check Kaypro documentation if it looks like you need to rewrite the system tracks.)



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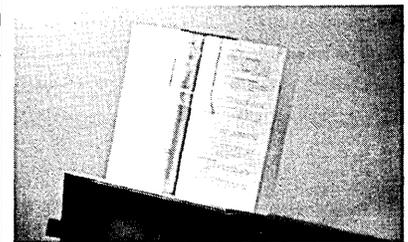
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## Hardwords

The hardware is typical Cheap and Dirty and will make your Kaypro's voice sound a little mechanical and raspy, but very intelligible.

You can make improvements to this circuit so that the speech is telephone quality but that would require more components. And after all, this is a Cheap and Dirty project.

The hardware (figure 1) consists of 2 capacitors and 3 resistors plus almost any amplifier/speaker and microphone. I am using a Radio Shack Mini Amplifier/Speaker (\$8.95 when on sale) and a crystal mike cartridge (\$3.00 at most electronic stores). Your stereo should work well; most small cassette recorders with a built-in mike will also suffice.

## Basic Poking

The listing (figure 2) is MBASIC with a poked-in machine language program which does most of the work. The machine language is customized for a 4 Mhz clock. To re-customize it, change the last data number in line 170 to 23 for 2.5 Mhz or 46 for 5 Mhz. If you have another clock frequency, figure it out yourself.

You must save 16K for the TALKER to operate. With MBASIC in drive A and the TALKER program (named TALKER.BAS) in drive B, type 'MBASIC B:TALKER/M:&H9FFF'. This should produce the Cheap and Dirty Menu.

Option 1 will help you calibrate the output volume of your amplifier and microphone to a level the Kaypro will accept. When calibrating and inputting

voice data into memory (Option 2) beware of background noise. Barking dogs, noisy kids or traffic will garble and distort your Kaypro's voice. Speak distinctly and keep your mouth close to the microphone. (This is your Kaypro you're speaking to, remember?)

Options 4 and 5 save data to and read data from drive B. They are sequential files and take forever to finish. If you don't like to wait, write your own ran-

dom file statements for these options.

The Cheap and Dirty Talker should keep you busy for a while experimenting with voice recognition.

*Editor's note: Now that you can digitize your voice, think of all the things you can do! First, there is voice recognition, and voice control, and finally, of course, mind control (it's no longer going to be mind over Kaypro).*

■ ■ ■

Figure 2 - Listing in MBASIC

```
140 FOR I=40960! TO 41041!:READ X:POKE I,X:NEXT:VOICE=&HA000:VOICE1=&HA031
150 DATA 33,0,164,14,8,219,28,230,8,202,5,160,219,28,230,8,31,31
160 DATA 31,31,126,31,119,13,194,36,160,14,8,35,124,254,228,202
170 DATA 48,160,205,42,160,195,12,160,6, 37
180 DATA 5,194,44,160,201,33,0,164,14,8,126,15,211,8,0,0,0,119,13,194
190 DATA 76,160,14,8,35,124,254,228,202,48,160,205,42,160,195,54,160
200 PRINT CHR$(26):PRINT:PRINT:PRINT:PRINT SPC(8);"CHEAP & DIRTY TALKER MENU"
210 PRINT:PRINT " [1] Calibrate voice data input level."
220 PRINT " [2] Input voice data to memory."
230 PRINT " [3] Output voice data from memory to speaker."
240 PRINT " [4] Store voice data to disk. (Stores on drive B)"
250 PRINT " [5] Read disk and store voice data in memory. (Reads drive B)"
260 PRINT " [6] Print voice data in memory to screen."
270 PRINT:PRINT:INPUT "Your choice ";X:IF X<1 OR X>6 THEN 270
280 ON X GOTO 300,400,500,600,700,800
300 PRINT CHR$(26):PRINT:PRINT:
310 PRINT "Set up your microphone and amplifier as per figure 1 in Micro-C."
320 PRINT "Set the amplifier volume control at a place where #'s do not"
330 PRINT "print on the screen, but if you speak into the mike they print."
340 PRINT "Watch out for background noise! When you say 'SIX' into the mike"
350 PRINT "the #'s should print approximately 1/2 line with a 4 Mhz clock."
360 PRINT "A 2.5 Mhz clock =1/4 line. A 5 Mhz clock = 1/2 line plus a few."
370 PRINT "TOUCH ANY KEY TO RETURN TO MENU. HERE WE GO -----";
380 IF INP(28) AND 8 THEN PRINT "##";
390 X$=INKEY$:IF X$="" THEN 380 ELSE 200
400 PRINT CHR$(26):PRINT:PRINT
410 PRINT "When your ready, touch any key to start. When you see START INPUT"
415 PRINT " Speak distinctly into the mike.":PRINT
416 X$=INKEY$:IF X$="" THEN 416
420 FOR I=1 TO 1500:NEXT:PRINT "START INPUT":CALL VOICE:PRINT:PRINT
430 PRINT "STOP INPUT ---- Press R to repeat or M to return to menu."
440 X$=INKEY$:IF X$="" THEN 440 ELSE IF X$="R" OR X$="r" THEN 400
450 IF X$="M" OR X$="m" THEN 200 ELSE 440
500 PRINT CHR$(26):PRINT:PRINT
510 PRINT "Configure your amp. for voice data output as per Micro-C fig. 1."
520 PRINT "When your ready touch any key."
530 X$=INKEY$:IF X$="" THEN 530 ELSE PRINT "Amazing isn't it ?"
535 CALL VOICE1
540 PRINT "Voice output complete. To stop type M. To repeat type R."
550 X$=INKEY$:IF X$="" THEN 550 ELSE IF X$="M" OR X$="m" THEN 200
560 IF X$="R" OR X$="r" THEN 535 ELSE 550
600 OPEN "O",#1,"B:DATA.BAS":PRINT:PRINT "Recording B:DATA.BAS"
610 FOR I=41984! TO 58367! :A=PEEK(I):IF A=26 THEN A=25
620 IF A=13 THEN A=14 ELSE IF A=10 THEN A=9
630 PRINT #1,CHR$(A):NEXT:CLOSE #1:GOTO 200
700 OPEN "I",#1,"B:DATA.BAS":PRINT:PRINT "Reading B:DATA.BAS"
710 FOR I=41984! TO 58367! :IF EOF(1) THEN CLOSE #1:GOTO 200
720 LINE INPUT #1,X$:IF X$="" THEN POKE I,0 ELSE POKE I,ASC(X$)
730 NEXT:CLOSE #1:GOTO 200
800 PRINT CHR$(26);"PRINTING VOICE DATA ON SCREEN"
810 FOR I=41984! TO 58367! :PRINT USING "####";PEEK(I);
820 IF POS(3)>75 THEN PRINT CHR$(13)
830 NEXT:PRINT:PRINT "To return to MENU touch any key."
840 X$=INKEY$:IF X$="" OR X$=CHR$(19) THEN 840 ELSE 200
```

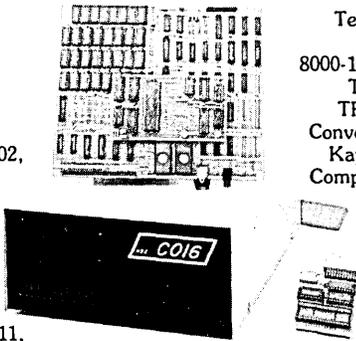
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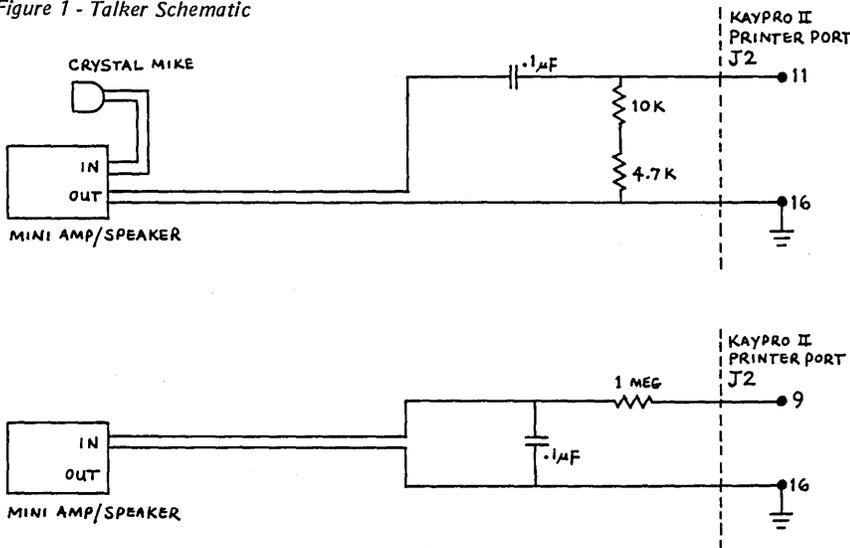
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Figure 1 - Talker Schematic



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# The Slicer Column

By Laine Stump

Micro C Staff

Some great things are happening at Slicer Computers these days. Dean Klein and Earl Hinrichs were in Bend for SOG III to fill us in on what is new (and what will be new, in a few months) in the 16 bit world. Dean has several new designs in the coals and Earl has new software that is more incredible than ever (if that is possible).

## A Short Disclaimer

Please be aware that the following goodies are not yet available (but they are supposed to be soon). We'll let you know when they are ready.

## Software

The hottest software news is that Earl is working on Concurrent CP/M. For the unenlightened, Concurrent (or CCP/M) is a multi-user equivalent of CP/M that allows you not only to have multiple 'physical' consoles hooked up and running at the same time, but also allows one 'physical' console to be in control of several 'virtual' consoles.

One of the 'virtual' consoles is the 'foreground process' or the one the user is currently interacting with and the others are 'background processes' (sure are a lot of buzz words around here). Each process is given a 'window' on the screen to display what is happening with it at any time and even though you can only give input to one process at a time, the others are still back there churning away at whatever you previously told them to do.

CCP/M uses a clock interrupt to allot 'slices' (Hmm, I think I see a 'Daveism' here) of time to each process in round robin fashion. Whenever a timer interrupt occurs, the operating system just saves the state of the current process and switches to another. Even though the processor can really only do one thing at a time, it appears to be doing several things at once.

CCP/M is extremely handy for program development—you can start a program compiling on one console—and begin debugging another program on a second console—while editing the program on a third. Meanwhile, the fourth console is dialing up the DOW network to capture the latest stock quotes on your multi-million dollar software firm.

This sounds like a lot of consoles to buy, but you only have to have one actual terminal (although you could have several if you wanted). The other processes have as much of their output displayed in their window as there is room for and the rest is stored in memory so that when you swap processes (by simply typing a function key) you can enlarge the window and see everything happening with the new foreground process.

Some have said that the 'window' concept couldn't be implemented on a serial terminal but Earl has windows working on the Slicer with any terminal you would like to hook to it.

If you're worrying how your compilation is going, it's easy to check on it. Without having to change processes at all, you can just glance down to the bottom line (or top line, or left half, or wherever you like) and see what's happening. If something looks interesting, just swap in that process and enlarge its window to see more. (The line forms behind me.)

CCP/M also has a PC/DOS mode so you can run PC/DOS programs (if you are an IBM compatible—more on that momentarily) and read disks with the PC/DOS format.

This mode won't be included in the initial version of CCP/M for the Slicer, but they will be working on it. In the meantime they have another programmer writing a BIOS so you can run straight MS/DOS on the Slicer (will be finished 'real soon now').

## Hardware

Meanwhile back on the ranch, Dean has been keeping himself busy designing the next product to be 'ahead of its time'. Dean has a habit of doing designs that use the newest, fastest, most high tech devices available (it's a dirty, disgusting job, but . . .). He talked about several new designs at the SOG (and I'm sure he DIDN'T talk about several more).

The one that everyone will be most anxious to hear about is the 'PC board' which, when hooked on the Slicer, will enable it to run quite a bit of PC/DOS software (although not all). This isn't quite the usual high tech. (it's really more like roller skates on a Corvette) but

it will make the Slicer into the best development system going for new MS/DOS and PC/DOS software.

The board will support IBM's memory mapped video which is the most frequent cause of PC incompatibility.

I might add that it took a lot of judicious work to make a board that could slow the Slicer down enough to look anything like a PC.

The new board will also have a PC bus so you can tack in some those PC boards that fill the back pages of BYTE. It will support most add-ons, such as modems, video boards, etc. but not additional memory. Of course, you can add memory with the Slicer expansion board (which is much faster than any memory ever dreamed of for the PC). Again, no release date, but it is coming.

Another Slicer add-on is an 8087 board for fast numeric processing. Big deal, just hang a socket on the Slicer and plug in an 8087. However, Intel forgot all about the 8087 when they designed the 80186. The 8087 has to be on the same local bus as the main processor, but the timing of the 87 and the 186 are incompatible. The 87 wants a clock with a 30% duty cycle and the 186 wants 50%. Also, the programmable chip select and wait state generation don't work correctly with the 8087 and the protocol for transferring control from one chip to another is totally different.

Intel has come up with a 82188 'glue chip' and they are finally sending out samples (Dean has one). Remember folks, you saw it here before it showed up in the New York Times.

The combination of the 80186 and 8087 will give the Slicer hardware floating point arithmetic that would make Charlie cry (if it slowed down long enough for him to see it). No date for availability yet.

## Rolling Your Own

On during SOG III, 13 attendees had a chance to assemble and bring up a Slicer under the guidance of Dean and Earl. Since I had never before assembled one (I was fortunate enough to have one in the office that had already been assembled by the now legendary Dana Cotant) I decided that I should see just how easy

*(continued next page)*

it was.

I arrived a little late (about 9 AM) but was still able to get my board assembled and running with 256k, two 5 inch drives and a winchester before noon. I ran into one problem with a RAM socket that had been soldered in with a bent pin (sockets were already in place) but Dean and company had that fixed in no time.

The whole experience showed me that assembling a Slicer is a trivial task (much easier than assembling a Big Board). And, when you are finished, the system really screams.

### Drives

Another Slicer bonus is that the system automatically recognizes what kind of drive you have hooked to it; you don't have to make any changes to the BIOS. That means that you can put 8 inch drives as A & B and 5 inch drives as C & D today and tomorrow hook them up the other way and it will still run, with no software changes. The only thing that needs to be set up is the size of the winchester, and that is done with the SETUP program in just a few seconds. All this

means that you will very seldom ever have to reassemble the BIOS.

### 86 User Disks

The Slicer shelf has been getting little dusty lately, so we decided to do something about it. This is official notice of three (that's right THREE!) new 86 user disks. Disk #4 is definitely not to be missed, especially if you have the Slicer expansion board. It contains a new BIOS that supports the on-board real time clock and programs to set the clock and use the time for time stamping listings etc. If you have CCP/M, the system time will automatically be set when you boot. Source code written in PLI is included so you can get an idea of how to access the clock.

For those of you interested in transferring files between CP/M-86 and mainframe environments disk #4 also contains a disk management program for IBM 374X standard interchange disks. It provides full maintenance of disks in IBM 3741 or 3742 directory format. You can copy to or from IBM format as well as initializing new diskettes, listing the di-

rectory, or listing files to the CRT. Mark Johnson, who sent in this program (along with most of the rest of the material on the disk) says that it is faster and better than a popular commercial version sold for \$350.

The final big plus on this disk is an 8086 version of the RESOURCE disassembler. Those of you who have tried to debug someone else's program without the source know what a valuable tool this is.

Disks 5 and 6 are a two disk set of FIG Forth. This is the FIG 83 standard and all of the new words are supported, including a very nice VIEW command which pulls the original source of the definition to the word you want from the disk and displays it to you with comments. The Forth screens are stored in a CP/M file so Forth and CP/M can reside on the same disk without stepping on each other's feet (I currently have it on my winchester). It does not have floating point, but for most applications this isn't needed anyway. This is a very complete Forth, probably suitable for production work. Benchmarks will be FORTHcoming in future issues.

### Bug Note

DU, the disk utility on disk 86-2 will tell you that all disk sectors are empty until you do an "M" command to map the disk. After that, it will work properly.

### Plea for Software

The folks at Slicer are considering putting up a Slicer bulletin board, but they need an RCP/M program first. So, please send us or them any bulletin board programs you have for CP/M-86. It would also be nice to see some good smartmodem programs (and ANYTHING else you have).

A Z80 to 8086 source code translator would be really great, too. I am currently working on a Z80 emulator program that will hopefully be completed shortly. It will support a full-blown 64k Z80 (not just 8080) system and allow BDOS and BIOS calls.

The 8080 emulation is already running (with no BIOS calls). That, along with a screen oriented SWEEP-like file management program called VFILER will be the core of disk #7. I am hoping it will be



Dean Klein (far right) directs Slicer building session on Saturday morning.

finished soon because VFILER alone is worth three times the price of the disk (not to mention the value of being able to run ALL of your CP/M-80 utilities on the Slicer during your conversion). Bear in mind that this is an unofficial synopsis of disk #7; it could all change by tomorrow morning. Also, don't get fooled into thinking that I am going to write ALL the software for ALL the user disks. This is just a carrot to get you going (remember, a free user disk for a neat CP/M 86 program).

### The Great Eight Debate

While I'm on the subject, I was talking to Earl the other day, he mentioned that some people would prefer to see Slicer disks on 5" rather than 8".

We have chosen 8" because single-density 8" is the only real standard and because 8" drives are only \$100 each. However, we would consider also supporting one of the 5" formats if you folks want to pick one (perhaps IBM DSDD?). Send in your cards and letters.

### Hints

Those of you who are familiar with ZCPR under CP/M-80 probably wish you had a new CCP for your 86 that would search user 0 for CMD files not found in the current area. While talking to Earl, I mentioned this and he told me a way to do much the same thing with standard CP/M-86. All you have to do is put all your CMD files in user 0 and use STAT to give them a SYS attribute.

```
A>stat *.cmd sys(CR)
```

Now you won't see the files when you do a DIR (they will display when you do a DIRS) but they will be available from every user area. This is documented in the CP/M-86 manuals, but who has time to read the documentation? Finding this out really made my day. It still won't search drive A (but I hear CCP/M will).

If you are writing a program that needs to move the cursor around, you need to know what the terminal expects. This is simple on the BB and Kaypro because they all emulate an ADM3 (more or less).

On the Slicer, however, there is no way to know what type of terminal the

user will have. Really up a creek (as we say in Montana) aren't you? Well you would be if it weren't for good old Earl.

He saw the problem and added monitor calls to clear the screen and position the cursor. The user can configure these routines in SETUP and presto, your software can clear the screen or position the cursor simply by calling the monitor, no matter what kind of terminal he has.

The following two lines of code will handle clearing the screen.

```
CLRSCN: MOV    BL,24    ;Clr Scrn Funct
          INT    59      ;Intrpt Monitor
```

That's all there is to it. If you want to position the cursor, just load register DL with the vertical row to place the cursor on and register DH with the horizontal column and execute the following code:

```
CURPOS: MOV    BL,25    ;Position Funct
          INT    59      ;Intrpt Monitor
```

This is assuming that the upper left corner is (0,0). These two calls are very nice for programs that you know will only be running on a Slicer, but could be running on ANY Slicer. Don't use them for anything going to another system though! Another catch is that these calls won't work under CCP/M. A way to get around this is to do a BDOS call to check the version number. Do the monitor call if it is not concurrent and send standard IBM-PC sequences if it is.

There are several other monitor routines that can be accessed in the same way. For a list look at the file ENTRY.A86 that came on your Slicer distribution disk. Also take a peek at CODES1.A86 for several handy macro definitions, such as ones to let you use the 186 specific instructions (like hardware multiply and multiple bit shifts) If you 'INCLUDE' CODES1 into your program,

you can clear the screen by merely giving the instruction:

```
MON    CLRSCR
```

### Back in the Saddle

Slicer things were fairly quiet for a while. Interest seemed to lull after everyone found out there was no software to run on it. (What good is a Porsche if the gas station is closed?) That is all changing now; with the new user disks and CCP/M (and the PC board and the 8087 and . . .) it is getting more attractive every day. Let all the uninformed masses rush out and buy their PC's; you can sit comfortably at home running at twice the speed of Charlie and write that elusive mambo program that will make you rich (if not incredibly wealthy).



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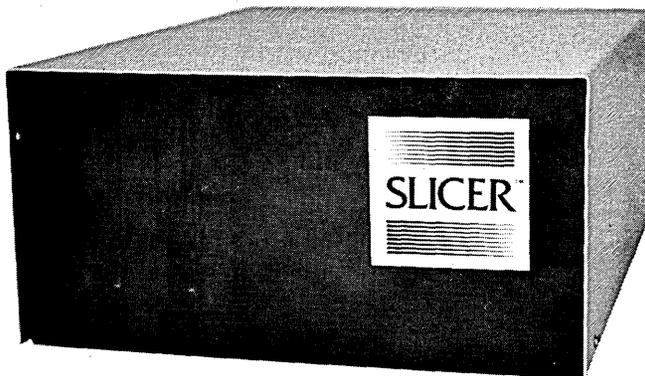
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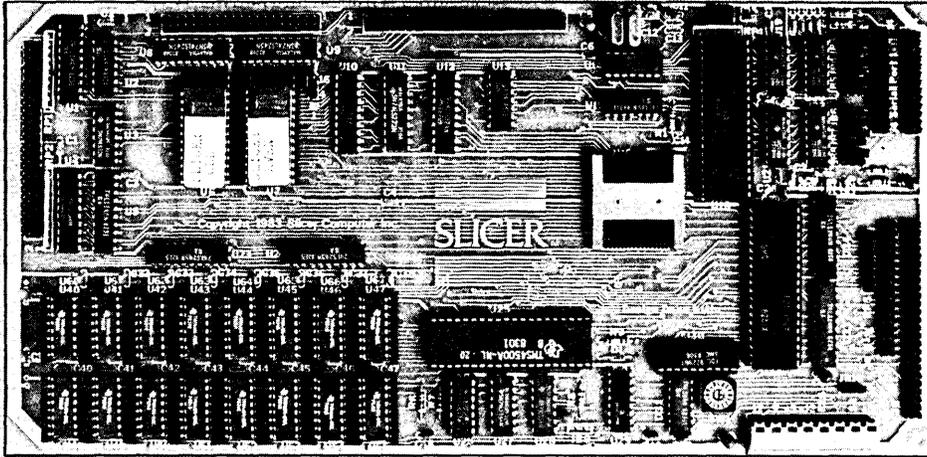
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\*\* New items

I promised a column on forms generation, and finally took the time to write the utility. I hope you like it, it certainly was fun to write!

## Vendor News

I've been compiling a vendor matrix for the FORTH Vendor's Group. This matrix will replace the vendor list that used to appear in FORTH Dimensions. One of the side benefits is that I get everybody's brochures and hints of what they have in the works.

Laboratory Microsystems plans to bring out Pro 325/350 and Macintosh versions within the next few months. They continue to have a nice set of utilities available for their versions, but I'm not impressed by the documentation.

IEV (who markets a very fast 8088 FORTH) is bringing out a version for the Apple in December.

MicroMotion (one of the oldest FORTH vendors) is branching out and supporting the IBM PC and Atari lines in the near future.

Here at Unified Software we are bringing out Apple and Macintosh versions this Fall. We are also converting to FORTH-83 and will have a new manual set.

*(Editor's note: FORTH-83 is also available for the Slicer. Check out the latest CP/M86 disks from Micro C.)*

The Macintosh is an interesting computer. We bought one primarily to generate brochures and flowcharts and love it.

Creative Solutions has done a good job with their MacFORTH, providing window, sound and graphics support. The windows really help in creating an on-line tutorial, as you can display text in one window and have the user try functions in another window. Others may complain about windows and mouse control, but used effectively as they are in the Macintosh environment they can be impressive.

## Forms Generation

Remember the column describing how to create menus? Forms are similar to menus except that they do not provide multiple choices. Instead, the user is expected to "fill in the blanks." Forms are most often used for data base entry pro-

grams, such as in keeping track of customers in a doctor's office or filling orders.

The basic concept of a form is the template. This is the recipe that describes the screen layout for your form. Usually a form consists of two basic elements: labels and fields.

A label is an ASCII string that is placed at a specific location on the screen. They may be informative, such as a title for the form, or they may be interrogative, such as a question to be answered by the user.

A field can be ASCII or numeric. Usually preceded by a label, a field is the blank area to be filled in by the user.

Creating a form requires some method of specifying the location of every field and label to appear on the screen. Filling the form entails not only text entry, but the ability to backspace, terminate entry for one field, move to adjacent fields, and to exit normally or abort data entry. Finally, interpreting the form requires parsing each entered string according to its ASCII or numeric identity and placing the results into the data base.

In this column, I will show you a simple forms generator. Designed to permit data entry on a single screen, this generator can be used as a starting point for your own forms design program.

## Creating The Form

As shown in the accompanying listing, I've defined two words to handle the forms data types. LABEL creates a buffer that contains an ASCII label at a specified row (vertical) and column (horizontal) location. The ASCII string is terminated with a back slash so that you can include blanks in the string. FIELD creates a buffer n characters long that is to be entered at a given row and column location. These buffers are named, and each is linked to its following label or field. You wouldn't have to name buffers, but doing so provides convenient debug facilities and also gives access to each field for data parsing.

START-OF-FORM defines a named form. All LABELs and FIELDs entered after START-OF-FORM is executed are placed in form name>. END-OF-FORM sets the final links in the current form so that the screen paint and data entry

words have starting points. The first field and label have zero links to terminate searches.

CUR-FORM is a pointer to the current form. It is set whenever name> or START-OF-FORM is executed. At the same time, LAST-FIELD and LAST-LABEL are set to zero.

When the first field or label is defined, it sets its appropriate LAST- variable. When a subsequent field or label is entered, the LAST- variable is used to link to prior entries, then is replaced by the current address. This is a crude method to implement linking, necessary if the form is to be painted and filled.

However, the linking is backwards, meaning that the most recently entered field or label will be displayed first. When creating your form, you will need to work from bottom up. All labels or fields should be entered in sequential order to prevent irregular cursor movement.

This procedure of forms creation is simple and flexible. However, you must first sit down with pencil and paper and lay out your form. Then you can determine row, column and length parameters for each element and edit the correct parameters into your disk blocks.

Form lay out would be easier if the user could work free-form on the screen (followed by a parse by the program to locate all fields and labels and to automatically create entries). I leave this forms creation editor as an exercise for the reader! (And when you're done, please send it in!)

## Painting the Form

You've gone through the tribulation of creating your Template. Now you want to display the Template in preparation for operator entry.

First, we need to define two terminal-specific words: you need to be able to clear the screen, and to be able to move the cursor to a specified row and column. The two words shown in the accompanying screen are for the BBI or ADM-3. Similar words are easy to write for other terminals.

Next, we need to define a blanking character. Unless you fill fields when painting the screen, the user won't know

FORTH Screens

```
SCR # 3
0 ( UNIFORTH Forms Generation Package)
1 ( Copyright 1984 Unified Software Systems. Use by)
2 ( individuals hereby granted, as long as not for resale.)
3 VARIABLE LOWLIM ( adr of low answer limit)
4 VARIABLE UPLIM ( adr of high answer limit)
5 VARIABLE CUR-FORM ( pointer to current form)
6 VARIABLE CUR-FIELD ( pointer to current field)
7 VARIABLE CUR-POS ( current cursor position)
8 VARIABLE LAST-FIELD ( last field)
9 VARIABLE LAST-LABEL ( last label)
10 95 CONSTANT BLANKING-CHAR ( field blank char = underline)
11 : GOTOCR ( col row --- ...goto r,c posn..wrt upper left)
12 27 EMIT 61 EMIT 0 MAX 23 MIN 32 + EMIT
13 0 MAX 79 MIN 32 + EMIT ;
14 : PAGE ( clear the screen) 26 EMIT ;
15 -->
```

```
SCR # 4
0 ( LABEL & END-OF-FORM 081284AAH)
1 : LABEL ( row col -- ..Creates label buffers)
2 CREATE ( create the header for the new word)
3 HERE LAST-LABEL @ , LAST-LABEL ! ( link to prev labels)
4 , , ( store row & column)
5 94 WORD ( fetch following string, terminated w/backslash)
6 DUP C@ 1+ DUP >R HERE SWAP CMOVE ( move to definition)
7 R> ALLOT ( allot space in dictionary for string)
8 DOES> 6 + COUNT ; ( leaves stradr & cnt)
9 : END-OF-FORM ( terminate current form)
10 LAST-LABEL @ CUR-FORM @ ! LAST-FIELD @ CUR-FORM @ 2+ ! ;
11 : RESET ( set last- and cur- variables from curform)
12 CUR-FORM @ DUP LAST-LABEL ! 2+ @ DUP LAST-FIELD !
13 CUR-FIELD ! ;
14 -->
15
```

```
SCR # 5
0 ( FIELD & START-OF-FORM 081284AAH)
1 : FIELD ( row col #chars -- .. define a field.)
2 CREATE ( create the header for the new word)
3 HERE LAST-FIELD @ , LAST-FIELD ! ( link to prev fields)
4 DUP >R , , , ( store maxsize, row & column)
5 HERE R> ALLOT ( make room in dict for answer)
6 DOES> 2+ DUP @ SWAP 6 + SWAP ; ( leaves field adr & size)
7 : START-OF-FORM ( create a form)
8 CREATE ( create the header for the new word)
9 0 LAST-FIELD ! 0 LAST-LABEL ! ( init links)
10 0 , 0 , ( the link fields for a given form)
11 DOES> ( run-time execution)
12 CUR-FORM ! RESET ; ( designate this form as current)
13 -->
14
15
```

```
SCR # 6
0 ( PAINT-LABELS & NEW-FIELD 081284AAH)
1 : PAINT-LABELS ( stgadr -- ..paint labels till link=0)
2 DUP IF ( if 1st adr = 0, then leave early)
3 BEGIN DUP >R 2+ @ R@ 4+ @ GOTOCR ( point to label)
4 R@ 6 + COUNT TYPE ( print the label)
5 R> @ DUP 0= UNTIL DROP THEN ;
6 : NEW-FIELD ( adr -- ..move to new field)
7 DUP CUR-FIELD ! ( set current field)
8 DUP 4+ DUP @ OVER 2+ @ GOTOCR ( move cursor)
9 4+ DUP LOWLIM ! DUP CUR-POS ! ( set lowlimit, cursorpos)
10 SWAP 2+ @ + UPLIM ! ; ( and upperlimit)
11 -->
12
13
14
15
```

```
SCR # 7
0 ( PAINT-FIELDS & PAINT 081284AAH)
1 : PAINT-FIELDS ( adr -- ..paint fields till link=0)
2 DUP IF ( if 1st adr = 0, then leave early)
3 BEGIN DUP >R NEW-FIELD ( move to new field)
4 R@ 2+ @ DUP 0 DO BLANKING-CHAR EMIT LOOP ( blankscreen)
5 R@ 8 + SWAP BLANKS ( blankfield)
6 R> @ DUP 0= UNTIL DROP THEN ;
7 : PAINT ( paint the current form)
8 PAGE ( clear the screen)
9 CUR-FORM @ @ PAINT-LABELS ( fill labels on screen)
10 CUR-FORM @ 2+ @ DUP PAINT-FIELDS ( fill fields & blank)
11 CUR-FIELD ! ;
12 -->
13
14
15
```

```
SCR # 8
0 ( ASCII-CHARS 081284AAH)
1 : ASCII-CHARS ( key -- ..handle ascii input)
2 DUP 127 = IF ( is it rubout?)
3 DROP CUR-POS @ LOWLIM @ = IF ( left edge?)
4 BELL
5 ELSE CUR-POS @ DUP 1- CUR-POS !
6 BL SWAP C!
7 BS BLANKING-CHAR EMIT BS ( 'rubout' last char)
8 THEN
9 ELSE
10 CUR-POS @ UPLIM @ = IF ( right edge of field?)
11 BELL DROP
12 ELSE DUP CUR-POS @ DUP 1+ CUR-POS !
13 C! EMIT
14 THEN THEN ;
15 -->
```

```
SCR # 9
0 ( CTRL-CHARS & FILL-FORM 081284AAH)
1 : CTRL-CHARS ( key -- ..check for control functions)
2 CASE
3 01 ( CTRL-A) =: ABORT ;;
4 12 ( CTRL-L) =: ( move to previous field)
5 LAST-FIELD @ NEW-FIELD ! ;
6 13 ( CR ) =: ( move to next field)
7 CUR-FIELD @ DUP LAST-FIELD ! @ ?DUP IF NEW-FIELD THEN ;;
8 18 ( CTRL-R) =: ( move to next field)
9 CUR-FIELD @ DUP LAST-FIELD ! @ ?DUP IF NEW-FIELD THEN ;;
10 CASEEND ;
11 : FILL-FORM ( now get user entry)
12 BEGIN KEY DUP BL < IF CTRL-CHARS
13 ELSE ASCII-CHARS THEN AGAIN ;
14 : DOIT PAINT RESET CUR-FIELD @ NEW-FIELD FILL-FORM ;
15 ;S
```

```
SCR # 10
0 ( An example of a form)
1 START-OF-FORM EPSON
2 6 30 LABEL T3LBL TAB3:
3 6 36 4 FIELD TAB3
4 6 15 LABEL T2LBL TAB2:
5 6 21 4 FIELD TAB2
6 6 0 LABEL T1LBL TAB1:
7 6 6 4 FIELD TAB1
8 5 30 LABEL CHLBL CHAR-SIZE:
9 5 40 5 FIELD CHSZ
10 5 0 LABEL LSLBL LINE-SPACING:
11 5 15 5 FIELD LSPACE
12 END-OF-FORM
13 ;S
14
15
```

(continued next page)

where the entry fields are located or their length.

Many terminals permit reverse video, and for these I recommend using a reverse video blank as the blanking character. Others, like the Big Board I, have no video attributes. The underline character is a good choice as the character stored in BLANKING-CHAR for primitive video terminals.

PAINT is the form-painting word. It uses the current form, and after clearing the screen, displays all labels and fills all fields with the blanking character. Note that PAINT also has to perform one non-screen function: it fills every FIELD buffer with blanks to remove any previous garbage.

**Filling the Form**

Now we come to the hard part, the user text entry. The text entry word, FILL-FORM (shown in the accompanying screen), is really not sufficient for anything more than to demonstrate the technique.

Users are notoriously bad typists and generally know little about computers. If your form is to be used in a commercial product, you must protect against every possible entry error. In addition, many systems require data validation, a subject more complex than I care to discuss in this column.

FILL-FORM is the main entry word. You will note that it is one BEGIN-AGAIN loop, terminated by a CTRL-A (stands for Abort).

Each key press is subjected to a variety of tests. Here I've used the CASE construct from UNIFORTH, but any other CASE statement can be used or even nested IF's if you wish.

The first set of checks is for any control character. The ones I've implemented are in Figure 1.

Figure 1 - Control Characters

- CTRL-R (move to next field)
- CTRL-L (move to previous field)
- CTRL-A (abort)
- <CR> (move to next field)

If a control character isn't detected, then the program assumes that the pressed key was for data entry. Two special variables are set for the current field: LOWLIM is the starting buffer address

for the field, and UPLIM is the ending address. These delimiters prevent data entry outside of the current field.

"Delete" or "Rubout" is used for back-space operations. If a delete is detected, the last entered character is replaced by the blanking character on the screen and by a blank in the buffer. CUR-POS (CURrent POSition) is decremented. However, if CUR-POS is already at LOWLIM, the backspace operation is ignored and a bell sounded.

The other limit occurs when the user attempts to enter more characters than the width of the field. In this case, the character is ignored and a bell sounded. The only ways to move to the next field are with CTRL-R or with CR. You might want to implement "wraparound," where the program automatically moves to the next field when the current one is filled.

**Parsing the Form**

Well, all the data is entered but you've got to move it out of the form buffer into your database. Good luck! I leave this section for you to implement (what's the use of a lesson if you have no problems left?).

Of course, ASCII strings are easy. You may wish to use -TRAILING to truncate entered strings and then store them as packed strings (character count byte preceding the text), or just have a fixed length field and use CMOVE.

Numeric data is a little more trouble. A simple solution is to move the string to HERE or HERE+2 (wherever WORD normally leaves its string), add a trailing blank and then use NUMBER to convert the string into a numeric quantity.

**Extensions**

This has been a brief introduction into Forms Generation, and, of course, the example can be extended!

For example, only one page per form is implemented. By adding an extra parameter to FIELD and LABEL you can specify the page to which they belong.

Other cursor controls such as up and down could be implemented. The keyboard cursor keys could be used instead of CTRL-L or CTRL-R. Redisplay for multiple forms entry should be one of your first improvements. Data validation can also be added. However, I think that you will find the use of forms a valuable addition to your FORTH system.

**Next Issue**

Several readers have inquired about cross-compilation and other turnkey applications, so I plan to enlighten folks on the subject. Don't forget that the FIG National Convention is coming up near the end of October, and the FORML conference shortly thereafter. Until next time, keep the FORTH!



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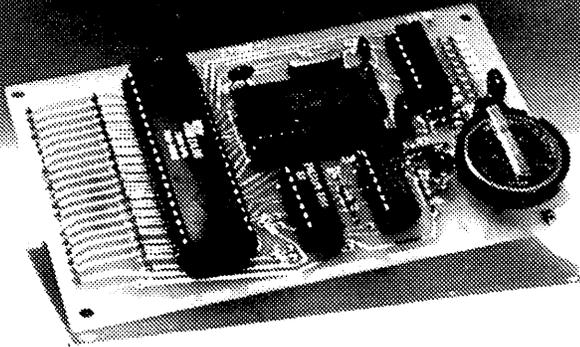
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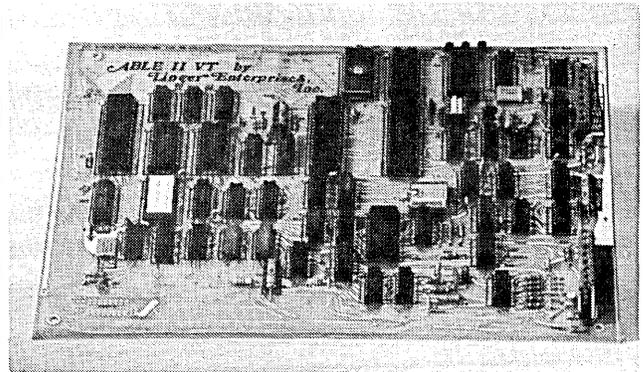
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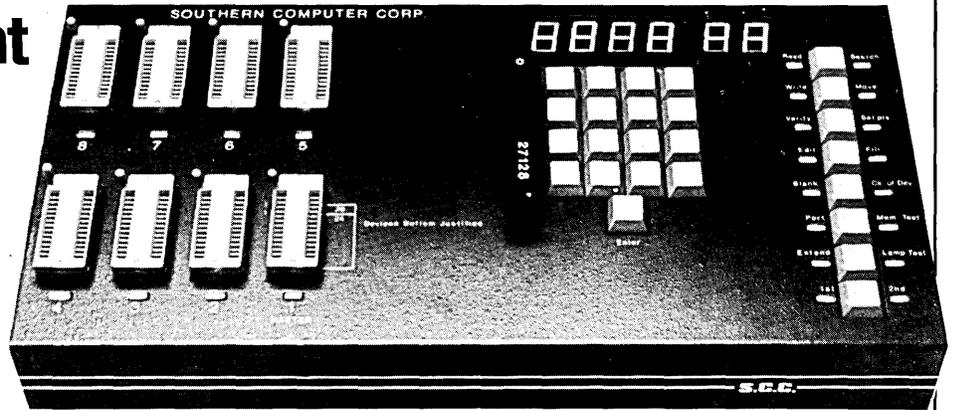
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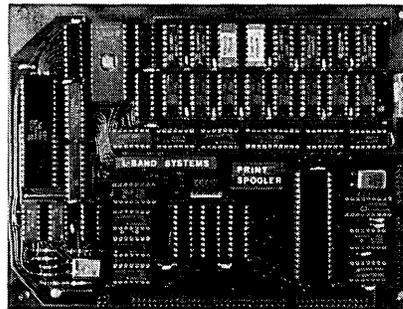
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# C'ing Clearly

By Tony Ozrelic

Micro C Staff

Living almost rent-free can be a bit of a mixed blessing. Sometimes the landlord requires a "little" help in return, and in this case, his travel club needed a simple mailing list. Prompted by the gentle urgings of my wife (she runs the club for him), I decided to help out.

## A Little Simplicity Goes A Long Way

I found an easy way to fulfill my chore by making the list-entry and printing formats compatible with the editor we already use for word processing and other office chores. Then all I had to write was a program for sorting and printing the list.

I called each line a record, with a tab separating each of the individual fields such as name, address, zip, etc. This made list entry simple for anybody familiar with the editor. By changing the printing format with another text file, form letters or special labels could be done just by re-editing the format file.

## Making It Work

So, what I wound up with was a program called `sort.c` which used two files as input: the mailing list proper, and the format file which controls the printing. The only special things about these two files are the first line in each: the mailing list has as its first line (or record) the names of each of the fields in each record, separated by a tab. The format file has as its first line the names of the fields by which the mailing list is to be sorted. For instance, the mailing list might look like Figure 1.

After sort opens the list and format files, it reads the first line of the list and stores the field names separately for later reference. Then it reads the first line of

the format file to determine which fields to sort on and how to print the list. The format file might look like Figure 2.

This file says that we are going to sort the list by zip code first, then state, and finally by the last name. Each record in the file will be printed with a blank line, first name followed by the last, the address, city, state, and zip code. Next comes another blank line and a line prompting the post office to send a change of address. The vertical bar tells sort to replace the field name following it with the contents of the record's field and the backslash tells sort to replace the digit string following it with the equivalent ASCII character; in this case, the "backslash 14" tells my printer to print in enhanced mode, highlighting the zip and address correction info.

Anyway, after the names of all the fields are stored, we then look at the first line of the format file to get the names of the fields to be sorted. The indices of these fields are used to extract the contents of the fields and store them, along with the position of the record in the file, in RAM. Then the file is sorted and printed.

## Make Room

Of course, there's always room for improvement, and this program is no exception.

On the input side, the field definitions might be improved so that the user can define his own separators between fields; this would allow better use of the 80 character rows on a video screen.

On the output side, such things as centering, right or left justification, and more flexible record selection would be helpful.

As it stands, we print the entire file every time we run the program. It would be nice to specify certain records based on some sort of logical expression, such as, "give me all the phone numbers of people living within the zip codes 8000 to 9000." It would be nice too if we had some way of handling very large files without breaking the program.

In its ultimate form, `sort.c` should probably be broken into three software tools: the data entry editor, which accepts as input the data file and a "screen specification" file that makes up a spiffy screen display for the user to enter data into, an indexer, which takes the data and a "sort and select" file to order and cull unwanted records, and a report generator, which takes the index generated by the indexer and a "report generator" file to collect and print the data. Of course, you could roll the whole thing into one huge program too (give it some cute name like "cBASE-II") and sell it for \$39.95! Just remember where you got the idea.

## One Giant Leap For Micro C

When we (Becky, the kids, and I) visited Micro C's 1983 SOG last year, we found ourselves liking Bend very much. When I found out that Eric had to leave this year, I offered to pick up the ball. (Co-editor's note: *Yep, I decided to embark on a full-time teaching career at the local community college so this will probably be my last issue. It's been fun and I'm gonna miss the madhouse here. We're very lucky to get Tony; he and Becky will more than fill my shoes.*)

I have had some fun doing this column, but I have found the requests for source code from these columns are becoming a bit much. In order to alleviate the problem, I am now offering the source as well as the .COM files for ALL the programs that have appeared in this column (or as many as I can find and will fit on the disk) on 8" SSSD or 5" Kaypro formats for twenty bucks.

If there's room, I'll throw a few in that haven't appeared in the column. Just send me a check or money order and specify which size disk you want. Send your order to Tony Ozrelic, PO Box 5246, Bend OR, 97708. If you have any questions or comments, please send them also to the above address.

Figure 1 - Sample Data Fields

```
frstnm  lstnme  address      city          state  zip    phone
Tony    Ozrelic  6708 Melrose  Los Angeles  CA    90038  213/932-0817
Bob     Jones   123 Oak St.   Kansas City  KN    12345
```

Figure 2 - Sample Printout

```
zip    state  last name

|frstnm  |lstnme
|address
|city |state \14|zip

\14 ** DO NOT FORWARD - ADDRESS CORRECTION REQUESTED **
```

## Sort Routine In C

```
/*      sort - sort mailing list and print names      */
/*
Written by Tony Ozrelie and compiled with the Manx Aztec C compiler

use sort like this:

sort (records) (format) >lst:

where (records) is the file to be sorted, one record to a line.
The first record contains the names of each field within a record.
For instance, a mailing list might have the following fields:

firstname      lastname      address city      state      zip

Fields are separated by a tab (see the FIELDSEP character), and may
contain spaces, numbers, etc., anything but a tab character.
the (format) file shows sort.c how to sort the (records) and
print them: The first line of the file shows the fields to be
sorted and the rest of the file shows how the records are to be
printed. For instance, to print labels sorted by zip code and last
name, we might use the following lines:

zip      lastname
|firstname |lastname
|address
|city      |state      \14|zip

\14 ** IF UNDELIVERABLE, PLEASE DO NOT RETURN **

The first line says to sort by zip and last name. The second line
says to pull the firstname and lastname fields out of the record and
print them. Ditto with the address, city, state, and zip fields.
The \14 says to send an ascii char with a decimal value of 14 to the
printer; my printer interprets this as a command to print the rest of
the line in emphasized text. The same holds true for the sixth line,
but no fields are selected.

Printing is accomplished by using the >lst: command to redirect the
output of sort to CP/M's lst: device. If you want to see the records
on the console, omit the >lst:. If you want the records put in
another file, use >(filename) , where (filename) is the name of the
file, e.g., >labels.dat

*/

#include      "libc.h"

#define MAXLINE      132      /* max chars per record (line) */
#define MAXFIELD      10      /* max fields per record */
#define MAXREC      1000      /* max records we can sort */

#define streq      !strcmp      /* def for string equality function */
#define FIELDSEP      '\t'      /* field separator for records */

char fnames[MAXFIELD][MAXLINE];      /* names of fields stored here */
int nlines;      /* number of lines (records) read */
/*
the rec structure keeps a pointer to the sort field and the file
position for each record
*/
struct {
char *field;
long infile;
} rec[MAXREC];

main(argc,argv)
int argc;
char *argv[];
{
char c,*sp;
char s[MAXLINE],s1[MAXLINE];
int sfield[MAXFIELD];
int i,j,done,*lp;
FILE *sfile,*ffile;

/*
open the file to be sorted and the print format file
*/

if((sfile=fopen(argv[1],"r"))==NULL) cantopen(argv[1]);
if((ffile=fopen(argv[2],"r"))==NULL) cantopen(argv[2]);

/*
```

(continued next page)

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## C'ING CLEARLY (continued)

### C Listing Continued

```

read in the names of each field and store them
these names are in the first record of the file
*/
fgets(s,MAXLINE,sfile);
fprintf(stderr,"Fields:\n%s\n",s);
for(i=0;i<MAXFIELD;i++) {
    strcpy(fnames[i],field(i,s));
    if(fnames[i][0]!='\0') break;
}

/*
now get the names of the fields to be sorted from the first line of
the format file. store which fields to select in sfield[]
*/
fgets(s,MAXLINE,ffile);
fprintf(stderr,"Sorted By:\n%s\n",s);
for(i=0;i<MAXFIELD;i++) {
    sfield[i]=whichf(field(i,s),fnames);
    if(sfield[i]==-1) break;
}

/*
select and store the fields for sorting
*/

fputs("Reading File\n",stderr);
nlines=0;
while(1) {
    rec[nlines].infile=ftell(sfile); /* save pointer to record */
    if(fgets(s,MAXLINE,sfile)==NULL) break;
    puts('.',stderr); /* show user we're going */

    /*
store sort string in memory and pointer in rec[].field
*/
    for(i=0,*s1='\0';sfield[i]!=-1;i++)
        strcat(s1,field(sfield[i],s));
    if((sp=alloc(strlen(s1)+1))==NULL) {
        puts("Out of string space");
        exit(1);
    }
    strcpy(sp,s1);
    rec[nlines].field=sp;
    nlines++;
}

fprintf(stderr,"\n%d records in file\n",nlines);

/*
sort the records according to the fields stored
*/
fputs("\nSorting\n",stderr);
shell(nlines);

/*
and print them according to the format file
*/
fputs("\nPrinting\n",stderr);
ptext(nlines,sfile,ffile);

/*
clean up and exit
*/
fclose(sfile);
fclose(ffile);
}

/*
field - return pointer to nth field selected from string s
*/
field(n,s)
int n;
char *s;
{
    static char f[MAXLINE],*fp;
    register int cf;

    cf=0;fp=f;
    while(*s1='\n') {
        if(cf==n) break;
        if(*s++==FIELDSEP) cf++;
    }
    while(*s1==FIELDSEP && *s1!='\n') *fp++=*s++;
    *fp='\0';
    return f;
}

```

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C Listing Continued

```

/*      whichf - return index # of matching field name, else return -1 */
whichf(s,names)
char *s,names[MAXFIELD][MAXLINE];
{
    register int i;

    if(*s=='\0') return -1;
    for(i=0;i<MAXFIELD;i++) {
        if(names[i]!='\0') return -1;
        if(!strcmp(s,names[i],strlen(names[i]))) return i;
    }
    return -1;
}

/*      ptext - output text lines from linbuf using format file */
ptext(nlines,tfile,pfile)
int nlines;
FILE *tfile,*pfile;
{
    char s[MAXLINE],s1[MAXLINE];
    int i;

    for(i=0;i<nlines;i++) {
        putc('.',stderr);
        fseek(tfile,rec[i].infile,0); /* seek record */
        fseek(pfile,(long) 0,0); /* rewind format file */
        fgets(s,MAXLINE,tfile); /* get record */
        fgets(s1,MAXLINE,pfile); /* skip 1st line of fmt file */
        while(fgets(s1,MAXLINE,pfile)!=NULL) /* print record */
            prec(s,s1);
    }
}

/*      prec - print record according to format in print file */
prec(ts,ps)
char *ts,*ps;
{
    int i;

    /*      scan thru print format string, looking for '|'s and '\'s. Print what
    you can from the format string */

    while(*ps) {
        /*      a | means, "replace the name of the following field with the
        contents of the field in the record" */
        if(*ps=='|') {
            if((i=whichf(ps+1,fnames))!=-1) {
                printf("%s",field(i,ts));
                ps+=strlen(fnames[i])+1;
            }
            else putchar(*ps++); /* else just print the char */
        }

        /*      a \ means, "take the following digit and convert into an ascii
        char and send it to the printer" */
        else if(*ps=='\\') {
            if(isdigit(*(ps+1))) {
                putchar(atol(++ps));
                while(isdigit(*ps)) ps++; /* skip digit strg */
            }
            else putchar(*ps++);
        }
        else putchar(*ps++);
    }
}

/*      shell - shell sort for character lines. stolen from K+R */
shell(n)
int n;

```

```

{
    static char *t1;
    static int gap,i,j;
    static long t2;

    for(gap=n/2;gap>0;gap/=2) {
        for(i=gap;i<n;i++) {
            for(j=i-gap;j>=0;j-=gap) {
                if(strcmp(rec[j].field,rec[j+gap].field)<=0)
                    break;
                t1=rec[j].field;
                rec[j].field=rec[j+gap].field;
                rec[j+gap].field=t1;
                t2=rec[j].infile;
                rec[j].infile=rec[j+gap].infile;
                rec[j+gap].infile=t2;
            }
        }
    }
}

/*      cantopen - complain about file opening */
cantopen(s)
char *s;
{
    printf("Can't Open: %s\n",s);
    exit(1);
}

```

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# Xerox 820 Column

By Mitchell Mlinar

1013 W 210th  
Torrance Ca 90502

Nearly everyone who has upgraded their monitor ROM for the Xerox 820-I has also included a real-time clock in the software. However, if you have not done so, read further for more information. By the way, 820-II has the real-time clock software built into ROM.

The clock can be very useful as long as it is set properly. Even though clock setting routines exist for the 820-II and are resident in my 820-I SWP dual density upgrade, how often can you claim you set the time AND date before getting down to business?

## The Hardware

This little package will cost you about \$15 and an hour or so of your time. It uses your spare parallel ports so if you are already using these, tough luck. Next issue, I will describe a Z80 extension bus for the 820 which includes a real-time clock module among other things.

If you feel squeemish about assembly, you could purchase one of the packages sold in Micro C. I counted four ads for clock/calendar boards in the last issue. If I have any preference, it is to those that include source code so that they can be integrated into your monitor or BIOS.

See Figure 1 for the schematic. Special parts you will have to order include the

MSM5832 clock/calendar chip, a 32,768 Hz crystal, and a 40-pin IDS (Insulation Displacement Socket). I recommend purchasing the IDS with at least 6" of ribbon cable already attached; about \$10 should cover all of the above. The remaining hardware (including the 3v lithium battery) can be found at any local place (even Radio Shack).

## Installation

1. Assemble the components on a 1.5 by 2 inch piece of vector board. I strongly recommend purchasing an 18-pin socket so you don't accidentally torch the timer chip with your soldering iron.

Be EXTREMELY careful with the crystal, the leads are very tiny and easily ripped out (and too much heat will ruin it). The crystal should be the last component soldered to the board. Set the trimmer capacitor (C3) to midrange.

2. Add 12" of small-gauge wire (#20-#26) for the +5V, ground, battery plus, battery minus, and direction select leads.

3. Carefully pull apart the ribbon cable (connected to the 40-pin socket), separating the required leads from the unneeded ones. Tie the unused ones off to one side. Solder the wires from the socket to the clock circuit card leaving about

Figure 2 - Board Location

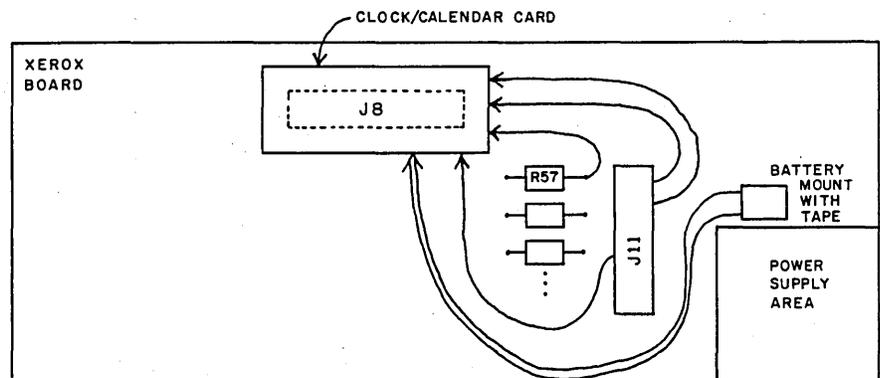
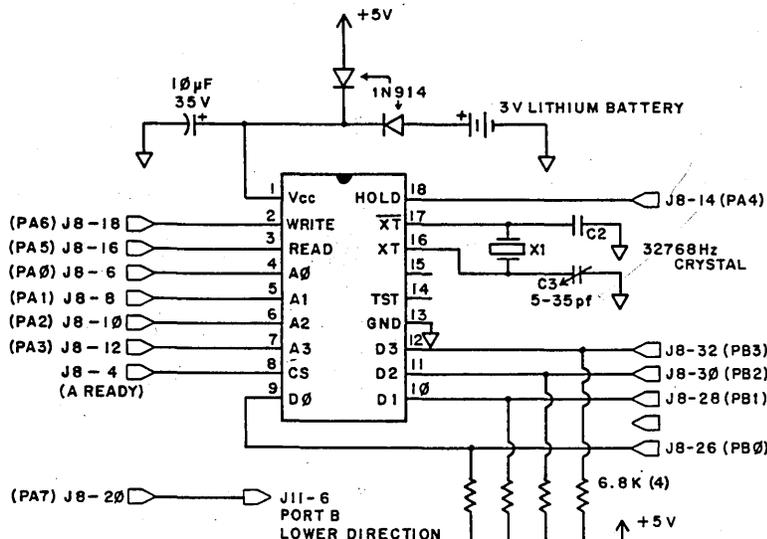


Figure 1 - Real Time Clock Circuit



4" of wire between the IDS and the card. AFTER you have checked your wiring, cut the unused wires as close as possible to the socket. Solder the battery leads to the battery as quickly as possible to minimize battery heating.

4. Plug in the MSM5832 chip. Install the circuit with your IDS oriented properly (Figure 2) and plug into J8. Solder the +5v line to the high side of R57, the side closest to J11. Connect the direction lead to J11-6. Ground can be obtained from J11-13.

5. Tape the battery to the power supply cardboard protector. Roll up the circuit card as much as possible into the IDC cable and tape it; make sure there are no exposed leads which could touch anything on the 820 mother board or case. (This may seem somewhat unprofessional, but it does the job without

need for special mounting hardware. The circuit is so light, there is no problem.)

6. Setup J11 as shown in Figure 3.

Figure 3 - J11 Jumper Table

Jumper	Comments
7-8	Jumper
9-10	Jumper
17-18	Jumper
5-6	Remove

Once you have the circuit installed and the board running, you will probably have to make some minor adjustments to the trimmer capacitor until the board keeps accurate time.

### The Software

Describing the software which integrates the MSM5832 with the Xerox is difficult in this limited space, so I will just include the essentials.

I have written SETCLK which reads and sets the clock/calendar chip. To obtain the SETCLK program (including source) and the MSM5832 data sheets, send me a letter along with your \$10 check (Micro C also has the SET-CLK.COM program available without source).

For those who have SWP Dual Density, I will also include the new monitor and BIOS (with source) for a grand total of \$20. New features include screen dump, IOBYTE, (with a Monitor resident LIST spooler to disk for QP/M only), QP/M compatibility, and 820-II compatible keyboard mode (7/8 bit) and video sequences (line/char insert/delete).

If you have a single-density Xerox 820-I, the disk with SETCLK, BIOS, and new monitor source along with new monitor ROMs (and installation instructions) is available for \$25 for 2.5 MHz machines (unmodified 820-I) or \$30 for 4 MHz machines. Write for more information.

Accessing MSM5832 chip is not trivial since timing is important. The data sheet specifies that the HOLD line should be held high for a minimum of 150 uSec before chip I/O can begin.

The maximum length HOLD can be high before the 5832 loses time is supposed to be 1 second, but my experience

Figure 4 - PIO Bit Assignments

PIO bit	MSM5832 Line	Comments
PA0	A0	Address line 0
PA1	A1	Address line 1
PA2	A2	Address line 2
PA3	A3	Address line 3
PA4	HOLD	Active high
PA5	READ	Active high
PA6	WRITE	Active high
PA7	(PIO-B direction)	Set HIGH for read; set LOW for write (Leave HIGH when not in use)
PB0	D0	Data bit 0
PB1	D1	Data bit 1
PB2	D2	Data bit 2
PB3	D3	Data bit 3

has shown this to be nearer 3/4 second.

Figure 4 illustrates the PIO bit assignment for this circuit.

### Xerox Parallel Port

Initializing the Xerox parallel port is easy. Set GPIO-A control port (09H) to 0FH (output mode) followed by 07H to disable interrupts. Set GPIO-B (port 0BH) to bit mode (2FH) followed by 0FFH so all bits are inputs.

During a chip read, nothing needs to be changed. However, during a chip write, GPIO-B should be set to bit mode (2FH) followed by 0F0H to specify the lower four bits as outputs. After the write, restore GPIO-B to input mode to be safe. Data for GPIO-A is at port 08H and at 0AH for GPIO-B.

### Clock Calendar Chip

There are 13 registers inside the MSM5832 (see Figure 5).

Reading the MSM5832

1. Set the HOLD and PIO-B direction lines high. Wait 150 uSec.

2. Set the proper address lines in PA0-PA3.

3. Set the READ line high and input the data (port 0AH). Set the READ line low.

4. Repeat 2 through 4 as many times as needed. I recommend reading the 13 registers as a stream and processing them after step 5.

5. Set the HOLD line low.

### Writing to the MSM5832

1. Set the HOLD line high and the PIO-B direction bit low. Set GPIO-B lower four bits for output mode. Wait 150 uSec.

2. Set the proper address lines in PA0-PA3. Set the proper data on lines PB0-PB3.

3. Set the WRITE line high. Wait 4 uSec. Set the WRITE line low.

4. Repeat 2 and 3 as many times as needed. Again, I recommend writing the data as a stream.

5. Set the HOLD line low. Reset GPIO-B to read. Set the PIO-B direction bit high.

### Using the Clock

Now that you have a real-time clock, what good is it? Plenty, with the right

Figure 5 - Timer Chip Registers

Addr.	Data Name	Range	Comments
0	Seconds low	0-9	Set to zero
1	Seconds high	0-5	regardless
2	Minutes low	0-9	of input
3	Minutes high	0-5	
4	Hours low	0-9	
5	Hours high	0-1/0-2	See note 1
6	Day of week	0-6	0=Sun. 6=Sat
7	Day low	0-9	
8	Day high	0-3	See note 2
9	Month low	0-9	
10	Month high	0-1	
11	Year low	0-9	
12	Year high	0-9	

Note 1: Set D3 to 1 for 24 hour mode, 0 for 12 hour mode. In 12 hour mode, set D2 to 0 for AM, to 1 for PM.

Note 2: Set D2 to 1 for 29 days in Feb. Internal register stays set until a new write without D2 set or Feb. 29 is reached. It does not otherwise recognize leap years.

(continued next page)

(continued from page 49)

software. By the time you read this, a replacement for CP/M called QP/M will be out of beta test (after 12 months of development).

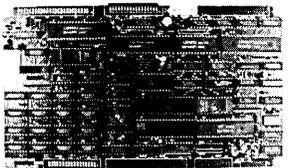
Among its many features are transparent time/date stamping of files, an application that requires an accurate real-time clock. Other features include user 0 file accessibility from all user areas, faster disk I/O, and true backup capability (It doesn't just set an archive bit, it actually records the date of the last backup). All this in the SAME size as the original CP/M package!

Cost has not been set but likely to be around \$40 for Micro C subscribers.

I have run out of room this time. Those of you who have written with questions, be patient. I will try to answer all of them. The most asked questions will be answered here to help everyone understand the Xerox computer a little better.



**Powerful Single Board Computer  
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with all manuals

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## Run Out of Disk Space on Your Xerox 820-1?

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- KAYPRO 4 - 360K ON DSDD, 40 TRACK, 5 1/4"
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- X-8 ROM PACKAGE ..... \$ 49.95
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- X120 BOARD A&T WITH DOCUMENTATION . . . \$140.00
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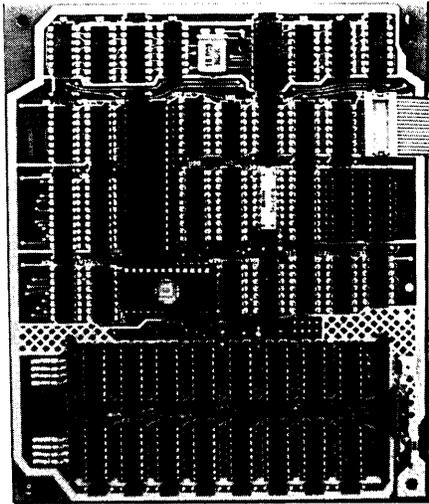
INSTALLATION OF ROM AND BOARD REQUIRE A SMALL NUMBER OF MODIFICATIONS TO YOUR 820 BOARD. CONTROLLER BOARDS REQUIRE ADJUSTMENT AFTER ASSEMBLY.

PRICES FOR CASH, CHECK, OR MONEY ORDER. ADD 3% FOR VISA/MASTERCARD, \$3.00 PER ORDER SHIPPING AND HANDLING, \$6.00 FOR COD.

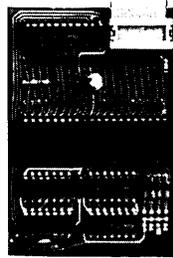


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# SWP's CO-POWER-88 makes Z80, CP/M microcomputers IBM-PC compatible!



CO-POWER-88 is a 16-bit 8088 coprocessor for Z80 CP/M computers. Both versions of CO-POWER-88, 128k and 256k RAM, include both MSDOS, and RAM drive software, complete with MSDOS, IBM-PC compatibility.



Simple commands move system control between the Z80 and 8088 processor. CO-POWER-88's RAM can be used in CP/M as a RAM drive! Currently available for Kaypro, Bigboard, Zorba, Xerox 820-II, Actrix, Osborne, and ATR8000 computers.

128k CO-POWER-88 w/MSDOS & RAM Drive..... \$400.00  
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 CP/M-86.....\$70.00

## ATR8000: SWP's \$499.95 CP/M Computer

SWP's ATR8000 is a 64k RAM, Z80A, 4 MHz computer that includes double density CP/M 2.2. The ATR-8000 runs up to four disk drives that are any mixture of size (5 1/4" and 8"), type (single-sided and double-sided), and density (single, double and quad). The ATR8000 has an RS-232 port for a modem or serial printer and includes software for both. There's also a parallel port with a parallel printer driver. The ATR8000 interfaces to an RS-232 terminal or to an ATARI home computer. Software includes a program that allows the ATR8000 to use CP/M disks from other computers. The ATR8000 can be upgraded to also run CP/M-86 and MSDOS by adding CO-POWER-88.

## Bigboard Dual Density

We've just released a new version!

### Hardware

- A daughter board that plugs into the 1771 socket. With this board the system employs automatic density select.
- Instructions tell how to run 5 1/4" drives. A 50-34 pin disk drive adapter board is included with 5 1/4" disk orders.

### Software V#061983

- One 8" version includes the code to make a 60k double density CP/M for:  
 8" SS 2.5 MHz      8" DS 2.5 MHz  
 8" SS 4 MHz        8" DS 4 MHz  
 5 1/4" SS 2.5 MHz
- Printer drivers are built-in, selectable in the IOBYTE.
- Easy to change port parameters.

- 8" SSDD disk storage is 674k; DS is twice as much! 5 1/4" is 183k.
- Includes DDINIT for SD and DD initializing and DDSYSGEN for DD sysgening.
- Special features have been added including a deluxe pause, screen print and clock.
- Source code is available for \$25 after you sign a disclosure agreement.

For Orders: We accept MasterCard, Visa, Money Orders or checks. Shipping charges and applicable taxes will be added. Call or write for delivery time. Prices and specifications subject to change without notice.

Trademarks: CO-POWER-88, ATR8000, SWP, Inc.; Z80, Zilog; CP/M, CP/M-86, Digital Research, Inc.; IBM-PC, IBM; MSDOS, Microsoft; Kaypro, Kaypro Corp.; Zorba, Mod Comp., Inc.; Xerox, Xerox Corp.; Actrix, Actrix Corp.; Osborne, Osborne Computer.

# SWP

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# SOG III

By David Thompson

Here is part of the report for all of you who didn't make it to the SOG (the rest will show up throughout this and future issues).

We had a super turnout—fell into the river—filled the hatchery building—ate well—met some really super people—got very little sleep—and were very glad when Sunday rolled around so we could explore this beautiful place (in relative peace).

For the record, about 250 people attended, up from just over 100 last year and 50 at SOG I. Let's see now, by the year 2000 the olympics will look like small potatoes compared with the SOG.

## New Blood

As for attracting new people to Bend (my secret motive, remember?) it looks like I may have succeeded beyond my wildest dreams. Several individuals and one good size company have either said they are definitely coming (and are presently pouring over multiple-listing books) or are definitely interested in locating here and are exploring ways to do it.

Interestingly enough, it appears that the wives are often the prime motivation in the moving decision. There is something about Bend with its open fields, horse ranches, forests, wilderness areas, and skiing that makes family raising a reasonable (if not genuinely fun) preoccupation. You could think of it as taking on a long-term application project in a really good systems environment.

## Our Good Offices

Everyone had a chance to visit the Micro C offices (a neat old house that we've turned into a very comfortable feeling headquarters). We had 3 employees last year, there were 10 this year so we've grown.

Philippe Kahn who likes to talk to technical groups, was afraid that this would be another low-level user group meeting. However he had a good time at the SOG. (He was late for one meeting because he got so engrossed in his sight-seeing.) His afternoon talk on designing Turbo Pascal was very detailed and very interesting, especially when he began discussing the problems bringing up

Modula II and Ada. His evening keynote address was about their attempts to get venture capital (and decision to go on without it) and the incredible ruse they set up to get Byte to run their first ad without prepayment (if the ad hadn't been successful they couldn't have paid for it). There was a terrific ovation when he finished the tale. (See what you missed?)

Ezra Shapiro did not make it, he called, confessing ill health on Thursday (the very worst kind). Too bad, Byte will just have to read about this event in Micro C (and you can quote us).

## Financial Hard Times

Some folks tried to get their companies to reimburse their expenses but when they passed around our flyer with Semi-Official Get-together on it, their managers didn't feel the event was serious enough. These poor souls suggested we change the name to Super Official Gathering (not to be confused with Superficial Gathering). Maybe next year we'll have two brochures—an official one (for expense accounts) and an unofficial one (for fun).

## Next Year

Sandy will be putting together some non-computer family events next year, so that everyone will have organized activities throughout the SOG. (Though the word was, that by the last day, the wives were really getting into the swing.)

In case you are thinking about next year, figure on scheduling your vacation for the last weekend in July. We'll be here, hope you will too.

## Special Thanks

I don't usually list names in Micro C just to list names. Names usually mean nothing to anyone but the people with that name. However, these names belong to people who are very special to me because they did yeoman duty at the SOG out of the goodness of their hearts and that means a lot. So there!

The Micro C staff (for service well beyond the call), my mother (hi mom), my dad, Sandy (great food including homemade deserts), Ron Anderson (a powerful guy with all the connections—AC



Hatchery Building - site of SOG III. Note class being held on front porch.



Philippe Kahn, SOG III keynote speaker, leads discussion on compiler design.

wise), and all the SOG speakers and doers and helpers.

**Friday Forums**

9 am, Voice Synthesis and FORTH, Barry Cole.

10 am, On Your Own (the continuing saga) Hampton Miller.

11 am, Slicer News, Earl Hinrichs and Dean Klein.

12 Noon, Bulletin Boards and More, Trevor Marshall.

1 pm, Kamas (Text Organization System), Adam Trent.

2 pm, Micro C Technical Department Forum, Laine Stump and Dana Cotant.

3 pm, New Designs, Jim Ferguson.  
4 pm, Ham Radio, Jim Skinner.

**Saturday Forums**

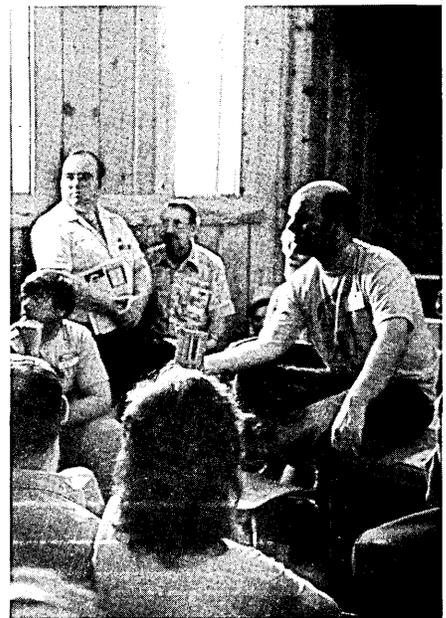
8 am, Slicer Construction (Begins).

8 am, BBII Owners Meeting, Ron Sasso.

*(continued on page 55)*



Dana Cotant and Laine Stump answering questions about upcoming Micro C articles and products.



Hampton Miller leads "On Your Own" discussion.

# This is THE PASCAL COMPILER You've Been Hearing About



VERSION 2.0

"It's almost certainly better than IBM's Pascal for the PC... Recommended."

Jerry Pournelle  
Byte, May 1984

**\$49.95**

"If you don't have CP/M [for your Apple], Turbo Pascal is reason enough to buy it."

Cary Hara  
Softalk Apple, May 1984

"If you have the slightest interest in Pascal... buy it."  
Bruce Webster, Softalk IBM, March, 1984

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Yes. We still include Microcalc... the sample spreadsheet written with Turbo Pascal. You can study the source code to learn how a spreadsheet is written... it's right on the disk.\* And, if you're running Turbo Pascal with the 8087 option, you'll never have seen a spreadsheet calculate this fast before!

\*Except Commodore 64 CP/M.

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10 am, Kaypro Owners Meeting, Thomas Brundage.

12 Noon, BBI Owners Meeting, Dan Long.

1 pm, Computers and the IRS, Jack Rodenhi.

2 pm, Xerox Owners Meeting, Brian Garrison.

3 pm, How Turbo Pascal was Designed (and much more), Philippe Kahn.

5 pm, Color Graphics on the Kaypro, Don Thompson.

7 pm, Making It without Venture Capital, Philippe Kahn.

8 pm, SOG Awards Presentation, David Thompson.

**Finally**

SOG III was definitely a superset of the earlier SOGs. This time we had more people, more speakers, more food, tables of hardware bargains (\$70 for a new 390K drive?), special prices on Slicers and BBIs (Bill Siegmund was demon-

strating some very nice winchester software), and, most importantly, genuine SOG III tee shirts. One kind fellow came up to me during the event and suggested that we charge for admission. He said it would be a bargain at \$50 per person.

Well, fear not, we're not planning to commercialize the SOG. There is so much information being passed around and so many neat projects being dreamed up that it was worth it just for the articles that will show up in Micro C. And besides, everyone in our office really looks forward to it.

We have received a number of letters from happy attendees saying they will be back next year. Only—next year they will be bringing their whole user group. One California group is thinking about leasing a commercial airliner for the trip.

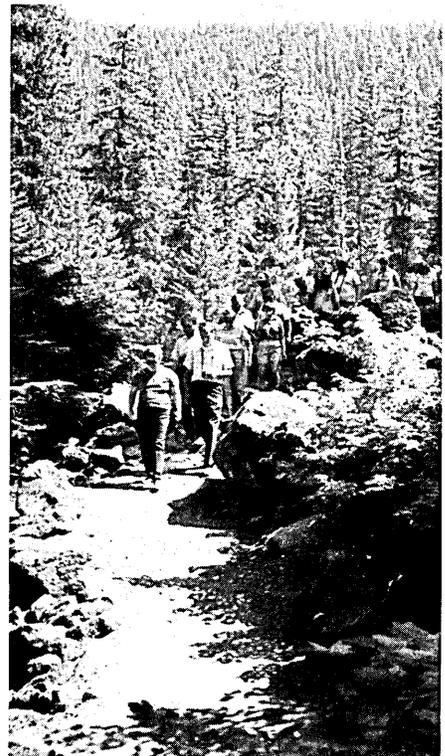
SOG IV could be very very interesting (see you the last week in July).



View of Proxy Falls just above the pool where the water disappears into the ground.



All-day rafters entering Class-4 rapids.



SOG IIIers hiking the Proxy Falls Trail.

# Micro Cornucopia . . .

## KAYPRO USERS DISKS for KayPro II, 4 and 10

\$12<sup>00</sup> each

The following are full disks of software assembled for the KayPro. Each program has a .DOC (documentation) file and many come with source.

### KayPro Disk K1 Modem software

This disk is absolutely priceless if you will be using a modem to communicate with bulletin boards, other micros or mainframes.

**MODEMPAT.COM:** Menu selection of baud rate, bits/character, stop bits, & parity for serial port.

**MODEM7.COM:** Very popular MODEM 7 configured for KayPro.

**MODEM7+.COM:** This is MODEM7 & MODEMPAT combined - you can communicate with anything!

**KMDM795.COM:** Super-version of MODEM7 set up for KayPro.

**TERM.MAC:** Commented disassembly of the TERM program you get with your KayPro so you can configure it for any interface.

**SQ/USQ.COM:** Programs to squeeze and unsqueeze files for faster transfer.

### KayPro Disk K2 Utilities

Really oodles of spiffy little (and big) programs to help you get full use of your KayPro.

**ZESOURCE.COM:** A true Zilog format disassembler for 8080 and Z80 object(.COM) files. Now you can turn .COM files into .MAC files.

**UNERA.COM:** Simply enter "UNERA" followed by the name of the file you just erased and presto, the erased file is back! A lifesaver.

**FINDBD54.COM:** Checks an entire disk, reports bad sectors, and then creates a special file containing those sectors. You save a bundle on disks.

**CAT2:** This a group of programs which create and maintain a single directory of all the programs you have on all your disks. Even keeps track of which programs are backed up and which aren't.

**UNSPPOOL.COM:** Use your KayPro II and print files at the same time. Doesn't slow down system response!

**DUMPX, DU-77, COMPARE, SUPERSUB, FORMFEED, DIR-DUMP, . . .** and all have documentation on disk.

### KayPro Disk K3 Games

**PACMAN.COM:** Despite the KayPro's lack of graphics, this one looks and plays amazingly like the real thing! Keep it hidden.

**ZCHESS.COM:** Chess with a 1-6 level look ahead.

**OTHELLO.COM:** You learn it in minutes, master it in years.

**BIO.COM:** Generates custom graphic biorhythm.

**MM.COM:** Master Mind.

**WUMPUS.COM:** Classic wumpus hunting.

### KayPro Disk K4 Adventure

This disk contains one 191K game, Adventure.

**ADV.COM:** This is the latest, greatest, most cussed adventure ever devised by half-mortals. This is the 550-point version so the cave is greatly expanded and the creatures are much smarter.

### KayPro Disk K5 MX-80 Graphics

A complete Epson MX-80 printer graphics package including example files. (Same as K19.)

### KayPro Disk K6 Word Processing Utilities

A powerful line oriented text editor that looks like Unix's EX, plus a scad of text utilities written in C which handles pretty printing, shortening a file, multiple space output, add tabs, remove trailing whitespace, and more. Also includes ROFF.COM a very neat text formatter.

### KayPro Disk K7 Small C Version 2 Compiler

This is a greatly extended version of Ron Cain's Small C compiler. Version 2 has more expressions and larger library, true subset of Unix C. Disk contains compiler, documentation, and library—everything you need.

### KayPro Disk K8 Small C Version 2 Source

This disk contains the source (written in Small C) of the Small C version 2 compiler. Get K8 if you want to try extending the compiler. (You must have K7.)



### KayPro Disk K9 ZCPR

**ZCPR:** The big news on this disk is the self-installing version ZCPR available only from Micro C. Once you have ZCPR in your CP/M, you'll never go back to straight CP/M! For instance, ZCPR searches drive A for any program not found on drive B, so, even an empty .disk in drive B appears to contain every program on A. It's great for text editors, compilers, etc. Works on KayPro II and 4.

**EX14:** a super replacement for SUBMIT.  
Plus many more: **TREK, FIX, FIND, SNOOPY, ALIENS and DIF2.**

### KayPro Disk K10 Assemblers

We've received a lot of requests for a Z80 assembler. So Dana put in some long hours getting the Crowe Z80 assembler to run on the KayPro (and every other Z80 machine).

**CROWECPM:** This is a first class Z80 assembler. We use this assembler daily (and we included its source). Takes standard Zilog mnemonics.

**LASM:** This is a more powerful version of the ASM assembler you received with the KayPro. This will link multiple programs together at assembly time.

**PRINTPRN:** This program makes it easy to print the listing files generated by the Crowe assembler.

### KayPro Disk K11 Library & Checkbook Programs

**CHECKS:** This has been a very popular group of programs. Categorizes checks so you can keep track which are tax deductible and which get charged to which projects. Includes source and excellent example check files. Very powerful.

**LIBR:** This is a complete set of library routines which let you group files into a single file called a library. Then CP/M sees them as a single program, but with the library routines, you can list them out separately, run them separately, or divide them up again. Almost like a unix environment.

**DISPLAY, VLIST, PGLST:** Additional screen and print utilities.

### KayPro Disk K12 FORTH

Yep, this is FORTH, one of the most unique, most extendable languages known, and for a paltry \$12.00. This disk contains not just one FORTH, but two, along with an editor, decompiler and 8080 assembler! The editor even uses the cursor control keys.

**FORTH:** This is true fig-FORTH.

**KFORTH:** A very nicely extended version of fig-FORTH.

**PLUS,** all the rest of the FORTH goodies. (Forth Heaven!)

### KayPro Disk K13 Source of fig-FORTH

All this disk contains is the 40K ASM source of fig-FORTH with the hooks in place for the KayPro. This disk is for FORTH hackers who just can't leave anything alone. (Look, you probably have faults, too.) The source of FORTH is here because there isn't room on K12. This is the only disk that isn't stuffed.

### KayPro Disk K14 Smartmodem Programs

This is the disk for you if you have a Smartmodem compatible modem.

**SMODEMK:** Smartmodem program set up for the KayPro (and source).

**XMODEM:** Lets you remotely control your KayPro from a distant computer.

**KAYTERM:** This is the information you need to run or write modem software on the KayPro.

### KayPro Disk K15 Hard Disk Utilities

This disk is for the KayPro 10 or any KayPro with a Winchester drive. With these routines you can not only backup files (with printed directories of the backup disks), you can also break up large files. The backed-up files are not encoded (as they are with KayPro's backup routine) so you can access them on any system.

### KayPro Disk K16 Pascal Compiler

This is a real Pascal compiler. It supports only a subset of the language (no records, pointers, booleans, reals or complex) but it generates a real .COM file. Everything is on this disk: the compiler, its source, example programs and documentation.

### KayPro Disk K17 Z80 Tools

This is for those of you who are into Z80 assembly language.

**XLATE.COM:** A very good 8080 to Z80 translation routine.

**DASM.COM:** An easier to use version of ZZ-SOURCE (the Z80 disassembler). This full disk includes source and documentation for both routines.

### KayPro Disk K18 System Diagnostics

Just as we finished editing the routines on this disk, we received a copy of KayPro's diagnostic disk. The memory test and drive exercise, routines on this disk are more powerful than KayPro's versions. (Plus, it's only \$12!) Setup for KayPro II and 4.

### KayPro Disk K19 Prowriter Graphics

This is a complete Prowriter printer graphics package written by the same Micro C subscriber who wrote the MX-80 graphics package. Plot points, lines, circles, boxes, and more. Examples, documentation.

### KayPro Disk K20 Color Graphics Routines

**PACMAN.COM:** This is a deluxe version of pacman for MicroSphere's color graphics board.

**PIE.COM:** Pie Chart generator.

**SKETCH.COM:** An easy way to sketch color graphic designs. You can even use a joystick with this software (see Micro C issue #18 for joystick interface).

### KayPro Disk K21 SBASIC Routines & Screen Dump

**SBASIC:** Finally a disk of SBASIC software. There are some good examples of structured programming on this disk (including one program written both ways so you can see the difference).

**SCREEN DUMP:** This is a screen dump for all Kaypros new and old. You can buy a similar package elsewhere for \$60.

### Kaypro Disk K22 ZCPR (Again)

This disk is filled with ZCPR files. You get ZCPR for the Kaypro II, Kaypro 4, and the Kaypro 10. This version is fixed so that you can pass control characters (such as cntl-P) to the system and you can choose to have it recognize the semi-colon for drive select (as well as the colon). So you can enter "B;" or "B:" to select drive B. Super neat!

**ZCPR,** for those of you who don't know, makes CP/M a lot friendlier. It searches drive A for any .COM file it doesn't find on the current drive, the TYPE command scrolls text 24 lines at a time, and a new LIST command outputs a file to the printer.

### Kaypro Disk K23 Fast Terminal Software & New BYE

This disk contains interrupt-driven terminal programs for all Kaypros. If you are tired of being limited to 1200 baud when you use your KayPro as a terminal then take heart. With these programs, your KayPro can outrun the big boys by receiving and sending up to 19,200 baud without dropping a single character!

Also, a new version of BYE that not only lets you run your KayPro remotely, but also figures out whether you have a 63K or 64K system so it will run with any Kaypro using an external modem.

# Something special for your Kaypro!

## Kaypro Disk K24 MBASIC Games & Keyboard Translator

We sifted through many, many games before coming up with these gems. All will work on any Kaypro and all come in MBASIC source.

**USOPEN** shows you the fairway on the screen. You select the club and direction for each stroke. After you reach the green the display shifts to show details of the green and flag. For one to four players.

**DUCK** is an offshoot of aliens (pardon the pun). Hunter tries to shoot down ducks while ducks try to bomb the hunter. (Much fairer than real life.)

**CASTLE** is an adventure in which you select your attributes (strength, dexterity, and intelligence) and you get to purchase arms and protection. Great documentation and very interesting game.

**KSTROKES** is a keyboard translator similar to Smartkey. Bill Forbes did an excellent job creating this program. You can create and save translation files on disk. The program even includes a table which generates WordStar commands from the Kaypro's keypad! You can define 8 keystrokes at up to 63 characters each.

## Kaypro Disk K25 Z80 Macro Assembler

This is a real Z80 macro assembler! Syntax closely follows RMAC and MAC. Also includes pseudo-ops to support conditional assembly etc. No .phase or relocatable code.

## Kaypro Disk K26 EPROM Programmer & Character Editor

This is the software for the Kaypro EPROM programmer written up in Issue #18. This software and the programmer turn your Kaypro into a very powerful development system. You can read ROMs, write ROMs, save data on disk and restore data from disk. Plus, you get a character editor which will help you design custom character ROMs for the non-graphic Kaypros!

## Kaypro Disk K27 Typing Tutor

A complete typing tutor for beginners and experts. Written in Australia, it comes complete with source. This was customized for Kaypro II, 4 and 10 by Barry Cole of WLAKUG.

The documentation says you can learn to touch type in 8 hours (probably a little longer for mortals).

**NEW!**

## Kaypro Disk K28 Modem 730

One of the most versatile modem programs available. Files and overlays are included to assemble a usable version of MDM730 for a Kaypro II, 4, or 10 using an external modem.

### REMEMBER

#### FREE USERS DISKS

In exchange for submitted software or articles

## New Schematic Packages

Finally, a complete schematic for your portable Kaypro, logically laid out on a single 24" by 36" sheet, plus a very complete illustrated Theory of Operation that's keyed to the schematic. You'll get detail information on your processor board that's available nowhere else.

For instance, those of you with the 10 and new 84 systems get a thorough rundown on your video section complete with sample video control programs in assembly language and Pascal. Of course, all packages contain serial and parallel port details and programming examples as well as complete coverage of the processor, clock, I/O, and disk controller (information that is not even available in Kaypro's own Dealer Service Manual!).

### Kaypro Schematic Packages

Kaypro II & 4 (pre-84) .....	\$20.00
Kaypro 10 (pre-84) .....	\$20.00
Kaypro 84 series (II,4,10) .....	\$20.00

All prices include Postage

For more detailed ROM information see page 48.

## Pro-8 ROM Package

The PRO-8 package from Micro Cornucopia upgrades your KayPro 4 to a KayPro 8 with 784K bytes (96 directory entries) per Tandon 100-4 (or equivalent) quad-density drive. Plus, you can select your own cursor character (and change it at will).

The package includes the new PRO-8 monitor ROM, a disk of formatters and copiers, and printed instructions. (We even tell you how to turn your KayPro II into a KayPro 4.) All you add is one or two double-sided double-density (390K), or double-sided quad-density (784K) drives. You get over 1.5 Megabytes on a two-drive quad-density system!

This new system can read, write, and format KayPro II and KayPro 4 disks as well as KayPro 8 disks. And it recognizes each disk type automatically!

All this for only \$49<sup>95</sup>!

Watch Micro Cornucopia for more KayPro compatibles.

Call or write for information on the other KayPro II and 4 ROMs from Micro Cornucopia.

## Plus-4 Decoder Board

With this nifty little plug-in board, your Pro-8 ROM can access up to four 5¼" drives. You just plug a four-drive 34-pin cable into this board and you can add up to two additional drives.

Now you can run any mix of 191K, 390K, and 784K drives as drives A, B, C, and D. You can run your original drives as A and B then add 380K or 784K drives outboard as C and D. You can even run four half-wides inside your original Kaypro!

The Plus-4 Decoder Board for only \$39<sup>95</sup>

Watch for 4-84 and 10-84 compatible ROMs coming soon.

## Micro Cornucopia



P.O. Box 223  
Bend, OR 97709  
503-382-8048  
9-5 Pacific Time  
Monday-Friday



# More Goodies

## CP/M 86

8" CP/M-86 Disk \$15.00 each

**DISK 86-1 — Disk Utilities**  
**D.CMD/A86, SD.CMD/A86, XDIR.CMD/A86:** Three extended directory programs. Each does it differently, so we included all three.  
**FILE-EXT.CMD/A86:** Disk status program with good display format.  
**PAGE.CMD/A86:** A text paging program. Displays 24 lines at a time.  
**PRINT.CMD/A86:** File printing routine. Puts a header at the top of each page along with page number and file name.  
**MUCHTEXT.CMD/A86:** Counts words and lines in a text file.  
**ERQ.CMD/A86:** Selective file erase program. Displays all selected files and then asks you one at a time for a Y/N.  
**INUSE.CMD/A86:** Prints "In Use" on your terminal and asks for a password. It will not release the console until you enter the password.  
**FINDBAD.CMD/A86:** Finds and collects bad sectors on a disk. If there are no bad sectors, information on the disk is unaltered.

**Disk 86-2 — DU and Modem Programs**  
**DU-V75.CMD/A86/DOC:** This is the popular disk utility from CP/M 80. It lets you read, write, and modify disk sectors.  
**MODEM4.CMD/A86:** This is a modem program set up for the Slicer. This program includes a built-in help file.  
**MODEM7SL.CMD/A86/DOC:** No modem disk would be complete without this standard. This is modem7 set up for the Slicer. It displays a menu when it is called.

**Disk 86-3 — Small C**  
**C86.CMD:** This is the original Small C compiler which appeared in Dr Dobbs Journal in 1980. It runs under CPM-86 and generates 8086 source for the ASM86 assembler.  
**C86.COM:** This is the C86 compiler which runs under CPM-80. This 8080 program produces 8086 assembly language.  
**C86LIB.A86:** This is the C86 I/O library.  
**SMALLC86.DOC:** Documentation on Small C.  
**C?????.C:** Source of the C86 compiler.

**DISK 86-4 — IBM Mainframe Interchange/RESOURCE 8086**  
**XBIOS.A86:** A new BIOS that supports a real time clock.  
**RES86.CMD:** A disk management program for transferring files between CP/M-86 and IBM 374X mainframe environments.  
**SDI86.CMD:** An 8086 version of the RESOURCE disassembler.

**DISK 86-5&6 — FIG Forth**  
 Disks 5 and 6 are a complete two disk set of FIG Forth 83.  
**F83.CMD:** The standard Fig Forth 83.  
**META86.CMD:** The Forth compiler.

### OTHER GOODIES

**Screen Editor in Small C** ..... \$39.00  
 A simple but full-function screen text editor plus a text formatter, all written in Small C by Edward Ream. This package includes the editor and formatter .COM files setup for the Big Board, Small C itself, and source code for all. With the documentation this is over 400K on a floppy disk. Edward is selling this package for \$50, you can buy it from us for \$39 (and Ed gets a royalty). Where else can you get an editor, a formatter, a C compiler, and source for all, for under \$40?

**More ROMs:** Fast monitor ROMs for speed freaks and our famous 'better than Texas' character ROM (V2.3) for screen freaks.  
**Fast Monitor ROM BB1** ..... \$29.95  
**Deluxe Character ROM BB1** ..... \$29.95

### BB II DRIVE INTERFACE

For 5 1/4" and 8" Drives  
 Andy Bakkers is making this special software package available through Micro C. Complete source, HEX, & documentation files on an 8" SS SD disk. Also outlines on disk the hardware changes needed.  
**\$29.95**



## ROMs from Micro Cornucopia

There are two ROMs in each Kaypro, a monitor ROM and a character ROM. The Monitor ROM supplies information for the Z80 processor on such things as how to get information from the disk drives, and which character to use as a cursor. The character ROM works entirely in the video circuit and it determines what the characters look like on the screen (for instance, does the "P" have a high, small cross bar, or a lower, longer one of the Micro C character ROM). When you speed up your Kaypro, you are speeding up the processor clock so you have to use a monitor ROM that will also run at the higher speed. You are not changing the video clock when you speed up the Kaypro so you don't need to change the character ROM (unless you want the nicer looking character set). Since the monitor ROM tells the processor how to do disk accesses you are going to have to change that ROM in order to upgrade to larger drives.

### Pro-Monitor II for Kaypro II

1. This ROM is a fast part so you can run 4 or 5 MHz with your Kaypro II.
2. It gives you a non-blinking block cursor (much less irritating), though you can specify a standard blinking underline if you prefer it.
3. It does faster disk accesses (even if you don't speed up your system).
4. It throws away null characters (those little asterisks that sometimes garbage the screen during data communications).
5. Includes complete printed instructions for simple plug-in installation (takes 5 minutes).

### Pro-Monitor 4 for Kaypro 4

This ROM does everything the Pro-Monitor II does, only it's for a Kaypro 4. Though the ROM that comes in your Kaypro 4 will run 4 or 5 MHz (unlike the ROM that comes in the II), this ROM also gives you:

1. Non-blinking block cursor.
2. Faster disk accesses.
3. Throws away null characters.
4. Complete printed instructions simple plug-in installation (takes 5 min).

### Pro-Monitor 8 package for Kaypro 4

This ROM package does everything the Pro-Monitor II and 4 do (it will run at 5 MHz, ignores nulls, has the fast disk accesses). In fact, even if you will be using your original 191K or 390K drives for now, you can use this ROM package. The Pro-Monitor 8 features include:

1. You get 784K per disk with quad density (96 tpi, double sided) Tandon 100-4 (or equivalent) drives.
2. You can use any combination of Tandon 100-1 (Kaypro II), 100-2 (Kaypro 4), or 100-4 drives as drives A and B.
3. You can boot from any disk with normal system tracks (Kaypro II, Kaypro 4, or Kaypro 8). The disk needs no modification.
4. You can choose any character (including space) as a cursor and you can choose to make the character blink or not blink. Plus, you can change the cursor at will.
5. You get a disk which contains a new copy routine for copying and formatting 784K disks, and a drive diagnostic routine for checking out the quad density drives.
6. You get complete printed instructions for installation of ROM and drives (takes 10 to 15 minutes, including drives).
7. The installation requires no cuts or jumpers, everything simply plugs into a Kaypro 4. (If you have a Kaypro II, see the modification article in Micro C issue 15 to turn your II into a 4.)

### Pro-Character ROM (for Kaypro II and 4)

The character ROM gives you a nicer looking character set. Kaypros have come with two different character ROMs, the early character ROMs had a rotten g, y, q, f, and t as well as commas and semi-colons that were hard to tell from periods and colons. On the newer systems (manufactured since Sept 83) half of the characters (notably the g) have been improved, but they haven't gone all the way.

Also, many of the older character ROMs were poor quality parts so they generated snow as information scrolled up the screen. This white flecky snow disappears when you install a Pro-Character ROM.

### The character ROM comes in two flavors:

1. The standard Greek Pro-Character has the nicer character set plus the standard Kaypro Greek characters.
  2. The Clean Pro-Character has the nicer character set but no Greek characters. This is the ROM for people who get strange Greek characters on the screen when interfacing with Mainframe systems.
  3. Complete printed instructions for simple plug-in installation (takes 5 minutes).
- Note: These ROMs will not work in the Kaypro 10 or the latest Kaypro 4 with graphics (it contains the Kaypro 10 board). We are working on new ROMs for these systems.

### Prices:

Pro-Monitor II	29.95
Pro-Monitor 4	29.95
Pro-Monitor 8 (package)	49.95
Pro-Character (either Greek or Clean)	29.95
Pro-Set II (Pro-Monitor II & Pro-Character)	55.00
Pro-Set 4 (Pro-Monitor 4 & Pro-Character)	55.00
Pro-Set 8 (Pro-Monitor 8 package & Pro-Character)	70.00

## Micro Cornucopia

P.O. Box 223  
 Bend, OR 97709  
 503-382-8048  
 9-5 Pacific Time  
 Monday-Friday



### REMEMBER

FREE Users Disks in exchange for submitted software or articles

# From Micro Cornucopia

BB I, BB II, and XEROX 820 USERS DISKS

The following are full 8" disks of software. Each program has a .DOC (documentation) file and many come with source.

**8" Users Disks \$15.00 each**

## USERS DISK #1

- 1-Two fast disk copiers
- 2-The manual for Small C+
- 3-Crowe Z80 Assembler
- 4-Two disk formatters
- 5-Modem 7
- 6-Othello
- 7-Serial print routine-Port B

## USERS DISK #2

- 1-Two single disk drive copy programs, both with source
- 2-Crowe Z80 Assembler source
- 3-New Crowe.COM file, debugged version
- 4-New CBIOS with parallel print driver & other extensions for CP/M 1.4 & 2.2
- 5-Disk mapper with source

## USERS DISK #3

- 1-EPROM burning software for BB 1
- 2-Reset bit 7 (unWordStar a file)
- 3-Disk file CRC checker
- 4-New fast copy program & source
- 5-DU77, disk inspector/editor
- 6-FINDBAD, isolates bad disk sectors
- 7-Print fancy page headings

## USERS DISK #4

- 1-CBIOS, custom bios for Tandon drives
- 2-ZCPR, dynamite CCP checks drive A for missing .COM files; improved commands
- 3-ZCPRBLOC, identifies CCP location

## USERS DISK #5

- 1-CAT, disk cataloging routines
- 2-Modem 7 for Port A
- 3-Modem 7 for Port B
- 4-PACMAN, the arcade game
- 5-FAST, buffers the disk to speed up assemblies
- 6-NOLOCK, removes BB 1 shift lock
- 7-VERIFY, cleanup & verify a flaky disk
- 8-DUMPX, enhanced for BB 1
- 9-UNLOAD, create .HEX file from .COM file

## USERS DISK #6

- 1-REZ, 8080/Z80 disassembler, TDL mnemonics
- 2-PRINTPRN, prints Crowe listings
- 3-RUNPAC, run-time utility package for 8080 assembly language programs. Has 51 functions. Includes source which assembles under ASM.

## USERS DISK #7

- 1-CHNGPFM, PFM monitor mods
- 2-TERM, terminal routines let you set up BB as simple terminal, as a file receiver, or as a file sender
- 3-Checkbook balancing package
- 4-Disk Utilities - copy to memory, from memory, and dump.

## USERS DISK #8

- 1-BDSCIO, custom BDSC I/O for BB 1 (both .h and .c)
- 2-YAM, Yet Another Modem program in source & .COM form. Turns BB into paging intelligent terminal, complete with printer interface, baud rates to 9600.
- 3-ROFF, text formatter
- 4-SIGNS, prints large block letters

## USERS DISK #9

- 1-ADVENTURE, expanded 550 pt version
- 2-Keyboard translation program
- 3-CBIOS, serial & parallel printer interface
- 4-EPROM programming package for BB II, for 2732s only

## USERS DISK #10 - Lots of Disk Utilities

- 1-REBOOT, sets up the CP/M auto load
- 2-SWEEP, directory/file transfer routine
- 3-A, Lets BB I recognize a double sided drive as one drive with 494K of usable space
- 4-FIX, super disk utility, does everything, much easier to use than DU77
- 5-Compare files routine
- 6-UNERA, retrieve erased files
- 7-FIND, check all drives on system for a file
- 8-MENU, menu program for CP/M
- 9-NEWCAT, enhanced disk catalog program
- 10-Single drive copy program that does track by track copies rather than file by file

## USERS DISK #11 - Printer Utilities

- 1-Microline 92 printer routine
- 2-Graphics display package for MX-80 with Graftrax, very fancy
- 3-Epson MX80 setup for BB 1 with 59.5K CP/M
- 4-Epson MX8 setup for any CP/M, lets you set print modes.
- 5-Micro Tek print driver, Ports A & B

## USERS DISK #12 - Games for BB I

- 1-ALIENS, a fast, exciting arcade game
- 2-ZCHESS, chess with a 1-6 level look ahead
- 3-MASTERMIND, match wits with the computer
- 4-BIO, Biorhythm charts complete with graphics on the BB I
- 5-LIFE, so fast it's real animation!
- 6-CRAPPS, see how much you'd lose in Vegas
- 7-WUMPUS, a caver's delight, kill the Wumpus or be killed
- 8-PRESSUP, similar to Othello
- 9-Games, 7 games in one program, includes blackjack, maze and animal

## USERS DISK #13 - General Utilities, BB 1

- 1-ZSOURCE, disassembles to real Zilog mnemonics
- 2-EX14, superset of submit or supersub
- 3-MOVPATCH, lets you use MOVECPM on other copies of CP/M
- 4-XMON, 3K expanded BB I monitor, use in ROM or as overlay
- 5-CURSOR, prompts you for cursor char you want
- 6-UMPIRE, very fancy RAM test
- 7-ZSIDFIX, display improvement for ZSID
- 8-PIPPAT, modify PIP so you can reset system from within PIP
- 9-@, Lets you use the BB as a calculator, including HEX
- 10-SORT, sort package written in C80.

## USERS DISK #14 - BB II Software

- 1-PRO32, latest 2732 reader & programmer
- 2-SMODEM2, lets BB II talk to Hayes Smartmodem
- 3-GRAFDEMO, demonstrates BB II graphics (in BASIC)
- 4-ATTRTEST, demonstrates BB II graphics (in JRT Pascal)
- 5-INITSIO, initializes port B for 300 or 1200 baud
- 6-MENU, displays menu of .COM files, enter number to run file
- 7-SETCLK, sets realtime clock built into BB II
- 8-PRINT2, modified print which accesses BB II clock
- 9-BOX, draws a thin line box on screen determined by HL and BC
- 10-ALIENS, space invaders arcade game
- 11-LISTSET, printer interface, auto-enables RTS, ignores DCD.

## USERS DISK #15 - Word Processing

- 1-EDIT, very fancy line editor similar to EX (Unix). Includes help menu, programmable key, and full manual on disk.
- 2-TED, simple minded line editor, easy to learn & use. Very fast.
- 3-TTYPE, typing training program written in BASIC
- 4-TINYPLAN, very simple-minded spreadsheet. Whets your appetite for a fancy one.
- 5-C80 Text Utilities
- 6-CHOP, cuts off file after N bytes
- 7-ENTAB, replace spaces with tabs where possible
- 8-MS, double or triple spaces a file to output
- 9-RTW, removes trailing spaces from file
- 10-TRUNC, truncates each line to specified length
- 11-WRAP, wraps at column 80, plus pretty pretty printing, page #s . . .

## USERS DISK #16 - BB I Modem Software

- 1-RCPM27, list of U.S. bulletin boards
- 2-SMODEM, interfaces BB I with Hayes Smartmodem
- 3-PLINK66, easy to use with non-CP/M host, for port A
- 4-BBPAT, menu selection of BAUD rate, bits/char, parity, & stop bits
- 5-MODEM 7+, Modem 7 plus BBPAT, lets you talk to anything from port A

## USERS DISK #17 - Small C version 2

- SMALLC2, this substantially expanded version of Small C now includes for, goto, label, switch (case); external declarations; new preprocessor commands; expanded I/O includes redirection; initializers; plus 12 new expressions. The I/O and runtime libraries have been greatly expanded (including printf). Source & documentation on one full disk.

## USERS DISK #18 - FORTH

- IFORTH, this is Idaho FORTH which can be burned into ROM or loaded from disk. It replaces the PFM monitor & handles all the monitor functions. See issue #11 FORTH column for more info about IFORTH and this disk.

**USERS DISK #19 - BB I Double Density**  
New BB I Monitor, BIOS, character ROM, Winchester Interface, ZCPR, and formatter from Trevor Marshall. See BB I expansion article in Issue #11.

## USERS DISK #20 - Assemblers

**CROWEASM:** This is the Crowe assembler modified so that it runs on any CP/M system (including the BB I, BB II, Xerox . . .). Includes .COM .Z80 and .DOC files.

**LASM:** This assembler is similar to the ASM that comes with CP/M except that it can link files at assembly time.

**PRINTPRN:** Print routine for CROWEASM .PRN files.

**LIBRARY:** Utilities which let you combine many files into one, then you can run, type, or extract any file within the larger system.

## USERS DISK #21 - Winchester Utilities

**BACKUP:** Helps you back-up the winchester onto multiple floppies. Creates a catalog of the files on each disk and includes the date of the latest backup. Will not back-up an unchanged file more than once. Plus many more super features.

**FLOPCOPY:** Lets you make floppy copies (with only one floppy drive) by using the winchester as a buffer.

**BIGBURST:** Backs up a very large winchester file onto multiple floppies. Joins the copies to recreate the original file.

**MULTCOPY:** Use this like PIP but it prompts you to change disks. Accepts ambiguous file names.

**MDIR:** Displays files in all user areas on selected drive. Many features.

**MAKE, MOVE:** PIP-like utilities that make it easy to move files between user areas.

**SWEEP:** The famous disk cleanup and transfer routine that does just about everything you can do with TYPE, ERA, DIR, and PIP.

**UNSQ:** This is the latest, greatest file unsqueezer. Enter UNSQ \*.\* and it will check every file on the disk. All squeezed files will be unsqueezed.

## USERS DISK #22 - Pascal Compiler

This is a real Pascal compiler. It supports only a subset of the language (no records, pointers, booleans, reals or complex) but it generates a real .COM file. Everything is on this disk: the compiler, its source, example programs and documentation.

## USERS DISK #23 - Xerox Utilities

This disk contains Xerox specific utilities including a screen dump from Wayne Sugai (with source); modifications for the SWP package including ZCPR, a new monitor, and a clock/calendar from Mitch Mlinar; and Jim Mayhugh's new monitor (see issue 19). A very special disk for Xeroxers.

## USERS DISK #24 - Prowriter Graphics

This is a complete Prowriter printer graphics package written by the same Micro C subscriber who wrote the MX-80 graphics package. Plot points, lines, circles, boxes, and more. Examples, documentation.

## USERS DISK #25 - Z80 Macro Assembler

This is a real Z80 macro assembler! Syntax closely follows RMAC and MAC. Also includes pseudo-ops to support conditional assembly etc. No phase or relocatable code.

## USERS DISK #26 - BBII CP/M 3.0 Banked BIOS/ Winchester Support

CP/M 3.0 Banked BIOS implementation for the BB I. Roy Epperson's software to support the Adaptec ACB-4000 SCSI and the Rodime R204 5" Winchester on the BBII (see issue #19). Plus more Winchester programs.

## USERS DISK #27 - BYE Remote CP/M System

BYE programs to run your BB I, BBII, or XEROX 820-1 as a remote CP/M system using a Hayes Smartmodem compatible modem. Includes programs to allow restricted access.

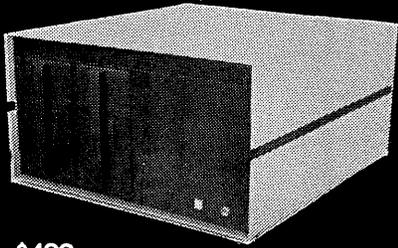
## USERS DISK #28 - VFILER and Screened Single Density

VFILER is a screen-oriented file manipulation utility, similar to SWEEP, CLEAN, and DISK. Also, Larry Blunk's documentation and software for implementing extended single density (334K) on eight inch disks.

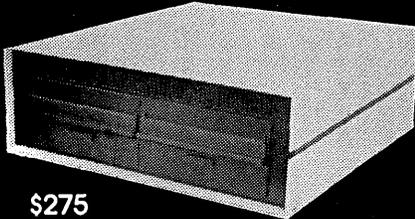
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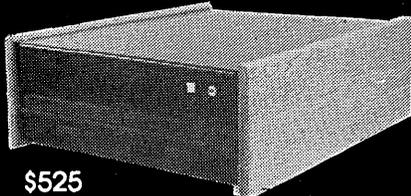
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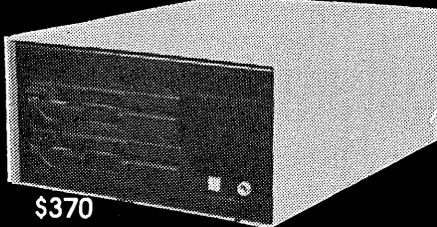
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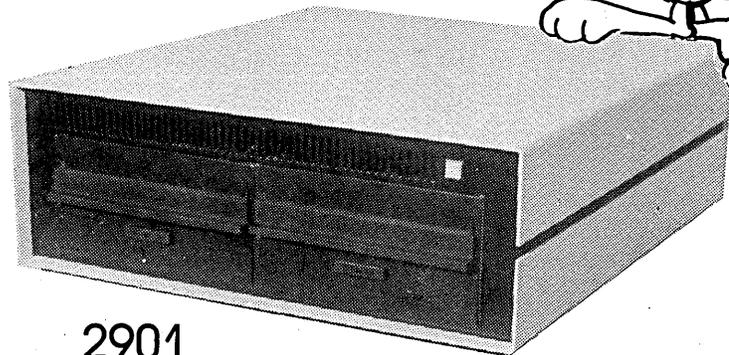
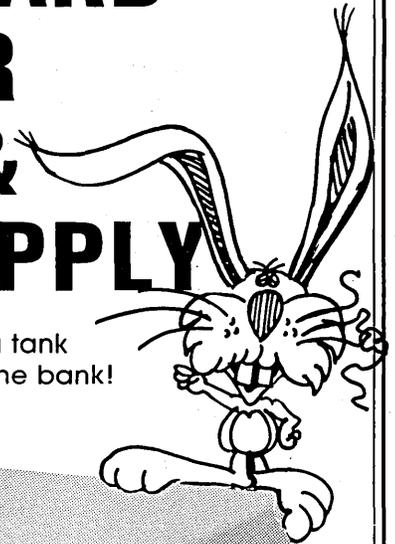
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Cabinet size: 20" w × 22.4" d × 7.5" h. Cabinet painted dove grey; front, back and side accents black. Mounts 2 SHUGART SA851R EIGHT INCH FLOPPY DISK DRIVES or MECHANICAL EQUIVALENT\*. Lighted reset switch on front panel. Lamp supplied, but not connected. 4 DB25, 1 Delta 50, 1 Centronics connector cutouts, two switched ac receptacles, 6' three wire line cord, EMI filter, 70CFM fan with washable dust filter, line fuse, power switch on rear panel. P2901 removable module power supply: +5@3A, +12@.5A -12@.5A for computer; +5@2.5A, +24@2.5A-4A peak, -5@.25A for disk drives. Includes power cable from power supply to computer (unterminated wires at computer end) and power cable to 2 disk drives (specify single or double sided drives when ordering).

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there are four compatible chips, the 8088, 8086, 80186 and 80286. (The 80286 will be the only chip supported by Borland's upcoming Ada compiler.)

#### Don't Throw Away Your Z80—Yet

A little historical (vrs hysterical) perspective is probably in order (you there in the closet, come on out, no one's going to byte your little Z80). Don't forget that the 6502 is still alive and kicking in the Apple IIe and C.

I know that using "Z80" and the "6502" in the same paragraph makes more than a few folks shudder, but when you understand that the processor which beat so slowly as the heart of the KIM and SIM single board computers, now beats just as slowly in Apples everywhere, you'll realize that Z80s will be around for a long, long time.

Also, what are you doing with your system? Is it working for you? Is there any reason that it won't continue to do the same thing for years to come? (I'm writing this on my four-year-old Big Board.)

However, the handwriting is definitely on the wall (it's graffiti to some of us). The play is definitely in the PC's corner and there are starting to be some interesting single-board projects in that corner.

#### The Other Chips

There is the Intel family of chips and there are the others, the 68000, the 16032, and the 32032 to name a few. Unfortunately for these other chips, there hasn't yet emerged a leader with a standard system. So, when you purchase a 68000 based machine you have a choice of operating systems and terminal types. No one is a real force in the 68K world so there isn't going to be the software selection that you otherwise would have.

There is the Sage, the Macintosh, and the new Morrow, for instance. Each has a different operating system, a different monitor, and, no doubt, a different disk format. (Each is gambling that its selection might eventually become the standard so the stakes are very high.)

When you figure that the 68000 has been around almost as long as the 8086,

and that it takes reasonably smart people to design a 68000 based system, you'd think that they could get together and come up with a standard system. Wouldn't you?

On the other hand they'd probably try to do it by committee and I can guess what that would look like. Perhaps their only hope is for some sneaky person to paste "IBM" to a new 68000 based system and circulate half-a-dozen "secret pre-production copies." If no one suspected the ruse, it would be the best thing that happened to the 68K world. (The most sought-after graduates would be those with degrees in high-speed reverse engineering.) Then if someone would do the same thing for the 32032, think of the great systems and software that could be developed.

However, it is to Intel's advantage for the 68000 and 32032 worlds to remain in disarray. After all, as long as you can keep Borland's Sidekick in your camp, you can sell a lot of processors. I see these programs like this as the primary reason that people are purchasing 8086 based systems.

If that seems like an overstatement, remember it wasn't very long ago that a major share of Apple purchases were solely a result of a newfangled program which created electronic spreadsheets. It was called VisiCalc.

#### Two Positions Open

First: I am looking for a person who is familiar with the innards of the Kaypro or Big Board and who would enjoy helping people who call or write for technical information. This is a VERY important position and the successful applicant will have final say on new product documentation and will be responsible for revisions of current materials.

Second: I am looking for an executive administrator. This person must have experience as an administrator or group manager of a high-tech start-up. I am looking for someone to handle business details and establish office procedures. A history of success as an administrator is vital. I would definitely consider a retired ex-CEO.

Please call me between 10am and noon, Pacific time, if you know someone

who might fill either of the above positions.

#### Afternoons are for Writing

It is now 10:13 pm Saturday but most of this evening's work is still ahead of me. I have put in regular 12+ hour days, 6 and 7 days a week for over three years. I am going to have to cut that down to something resembling 40 hours a week before they cart me off to the place where all the jackets are sleeveless and all the doors lock from the outside.

Finding an administrator and technical assistant should help a great deal, but I still need a solid 20 hours per week just for writing and I'm not getting that time at the office. The primary problem is the phone.

So, I'm going to be disappearing in the afternoons to get my writing and editing done. Hopefully, this way, the articles will be more accurate and the copy will read more easily. I can tell by reading a back issue just how bleary-eyed I was when I shipped off the copy.

#### Staff Changes

Tony Ozrelic (LA Software and C'ing Clearly) and his wife, Becky, have moved up from Los Angeles to join the Micro C staff. Tony will be working on new articles, disks, and other products. Becky will be taking Eric Belden's position as assistant editor (she'll be reachable in the mornings also). (Eric Belden has been offered a full-time teaching position at Central Oregon Community College and I'm tickled for him.)

Article submissions and enquiries about article ideas should be directed to Becky.

There is no Dana (to quote Ghost Busters). Actually there is no Dana here. You see, he and Renee have gone home to Wisconsin to have their first child. We're really excited for them but we really miss them too. Dana is working for us remotely during this neat time.



David Thompson  
Editor & Publisher (& Exhausted)



# On Your Own

By David Thompson

What's in a name. Nothing and everything. Your choice of name for your company and product can make the critical difference between floundering and making it. In fact, some companies take naming so seriously that they are willing to spend \$40,000 or more to have an outside company handle the task.

If you don't have \$40,000 to shell out, maybe the following will help.

Generally, you want your bedroom-based start-up to sound like an established, solid, secure, technically competent, easy to remember, company.

A while back, a close friend of mine was designing a house controller system in which the control modules communicated with the computer through the 120V wiring. He was concerned about his ability to market his product because his business was squeezed into half his living room while his competitor had an ugly old cement-block building emblazoned across three folds of a mailing piece. (Actually, his competitor was doing him a favor with that mailer!) All he needed was a good product, a good name, and a well designed mailing piece and there would have been no competition.

Look, you know how small you are—your accountant knows how small you are—but no one else needs to know (and that includes your mother). If you have a good product and you are responsible to your customers then it doesn't matter how small you are.

Sometimes it's an advantage to have the name closely related to the product, other times it is not, especially if the name really limits where the company can go.

## So:

Don't use "enterprises." or "associates."

Don't use initials, just to use initials. If you are going to use initials, make them work for you, like the computer company that selected the name MBI. Say MBI to yourself a few times, it has a certain solid ring to it doesn't it? Now say it backwards and you'll see why it sounds so solid.

Don't use, Son, Brother, Daughter, or Father (sorry pop).

Don't use a name that will limit you.

Notice, for instance, that SoftWare Publishers became SWP. If your name were Motel Computers, you'd have to change it as you began to branch into more general purpose computer systems. But within the motel field, you'd probably do quite well.

The name "Compaq" was brainstormed by one of those expensive name shops (they spent months researching dictionaries and the computer field searching for bits and pieces to paste together.

They had been asked to come up with a name for a portable computer and the name was to promote a feeling the unit was a very solid, state-of-the-art system. It also had to be easy to say and remember.

They settled on the name "Compact" and then changed the ending to q to add the feeling of high technology. It worked incredibly well, and the company sold more product in their first year than any other company in history.

What if they had named it the Dulmont? Where would they be? Don't laugh! There is a portable computer called the Dulmont being imported from Australia. Which would you buy? If you bought a Dulmont, would you admit it in public?

"I really love my Dulmont!" you'd say, "It's the greatest thing since they started putting square tubes on TVs."

The name "Dulmont" sounds "dull" and the "mont" no doubt means it was designed during the 1950s and purchased at Montgomery Ward. Just close your eyes and try to imagine a "Dulmont" and then try to imagine a "Compaq." See the difference? Which one would be easy to carry? Which one would need rabbit ears? Which one would you find at your local landfill?

(However, let me break the name image. The Dulmont weighs in at 8 lbs, has an 8 by 80 liquid crystal display, fits in a briefcase, and uses an 80186 processor. In reality, the Dulmont is higher tech and more compact than the Compaq, but as a dealer or a distributor I wouldn't touch it until they changed the name.)

Micro Cornucopia is too long, too hard to pronounce, hard to spell, and hard to remember. It doesn't sound like a technical journal. However, as you will see,

the name has some redeeming qualities (just as "Dr Dobbs"). (A name should even have a rhythm that makes it easy to understand and easy to say.)

## Good Names

I've chosen a few names that I like: LA Software (Sounds substantial), UniFORTH (easy to say, explains the product), The Code Works (neat pun), RealWorld Software (sounds substantial but also laid back, sort of a programmer's name).

## Bad Names

Overbeek Enterprises: This company used to call itself RealWorld Software but the real owner of the name claimed it, so Overbeek chose his own (unfortunately).

BEE.MOR Enterprises: This is a case where MOR is definitely less (sounds like a mail order self-improvement course). I'd buy a Delphi Winchester System in a minute but I sure wouldn't admit it was also called a STOR.MOR. I think they should "Think.MOR."

Insight Enterprises: I have trouble with this name. It doesn't flow, it breaks the rule about using "Enterprises", it doesn't mean anything related to technology, and it's hard to remember. (I also understand that they have gone out of business.)

ROMAC SCULL-TEK: This name is so full of negative feelings that I doubt it is repeated during daylight hours. ROMAC is definitely the name of a Mission Impossible villain and everyone knows what a scull is. Put them together and this system will get very little word-of-mouth advertising.

## Names with Problems

Digital Research Computers: Too long, too easy to confuse with Digital Research of Cal, but the similarity can be an advantage too.

Slicer: Close to a connection with bit-slice speed but not quite there (though it is definitely growing on me).

Integrand: Does it sound like a small cabinet or a large piano?

Phenix: How does it spell, what does it sell, does it rise from ashes even when it's misspelled? Still, it lends itself to an image of a large ancient bird which is not

bad. Not bad.

CAL-TEX: Many still think it's CALTECH when they hear it on the phone, and there is no computer relationship here. However, the use of the two states gives the impression of a large company.

Big Board: This name just sort of popped up in a conversation between Jim Ferguson and the technician who was bringing up prototypes of this neat system. However, at the time it was introduced, it was really a compact, state of the art system with lots of memory and a fair amount of speed. The name "Big Board" did this system a disservice. The name is easy to say but for me it implies something large and ponderous or something relating to the NY stock exchange.

Of course, now the board has a large following (10,000+ boards I hear) so the name is definitely known. However, what if it had been called the "240" or "SuperTek" or something similar? "240" may surprise you but this number has long been known to give the impression of compactness and speed.

#### Micro Cornucopia

As long as I am going to pick at a few sacred names I may as well take a stab at Micro C.

Sandy and I spent a number of months agonizing over the name of our new magazine. For a while we considered calling ourselves BBUG (the Big Board User's Group).

Micro C probably would definitely not be as big now if we had chosen BBUG. Even during our first year, many of our subscribers had systems other than the Big Board. If you think Micro Cornucopia sounds strange, think about people telling each other about a bug with a stutter.

As I mentioned earlier, Micro Cornucopia has a few problems as a name. It's long, it's hard to spell, and it's hard to pronounce.

The word Cornucopia (means horn-of-plenty) commonly appeared on the marquee of general stores in rural frontier America. This image of an old-fashioned, small-town general store that supplies everything from staples to shoelaces, really fit our image of Micro C.

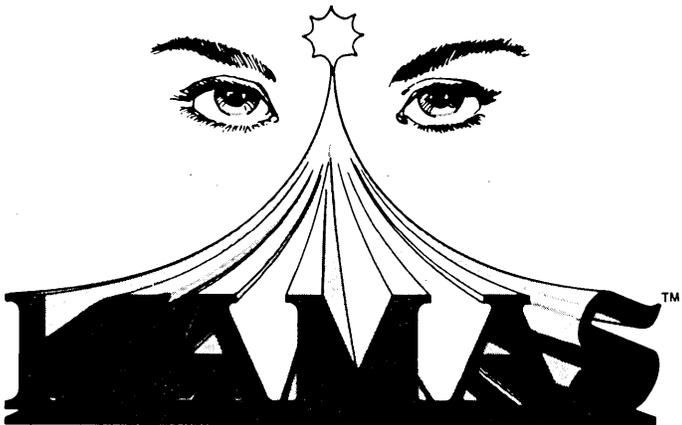
We planned to include information to meet a plethora of very specific needs (as opposed to the general interest magazines which supplied very little information to a very great number of people).

However, because of the name, many people are surprised when they see their first issue. They expect a dozen pages run out on a dot-matrix printer. Unfortunately, our name contributes to that expectation.

We've chosen to keep Micro C laid-back and unslick (our high-quality non-shiny paper costs as much as the slick variety, but it's easier on the eyes). Our graphic style fits the informal style of the

articles and the columns. We provide a place where people can share information. (That's a big part of a general store right?) We have had some growing pains (every small business does) but I think that the name has helped us maintain our original feel. (I can still imagine the original "Dr Dobbs" making house calls.)

Perhaps we could have chosen a better name for our magazine, but like the Big Board, we're not apt to change it any time soon. (And I kind of like the sound of "Micro C.")



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# LETTERS

(continued from page 3)

Dear Editor,

After owning a "blue lunch pail" (Kaypro-II) for just under one year and after 650 hours of use, I received a "BDOS Err on B:" message, the B drive was out. After going through the "User's Guide" Technical Information Troubleshooting sequences, and telephoning my local dealer's tech-rep, we seemed to agree that the drive was probably out of alignment. Into the shop. What the heck!

A telephone call two days later gave me the bad news: He discovered that B:Drive had a bad stepper motor, and was forced to replace the drive assembly.

When I picked up my machine, I inquired if there was something I had done to abuse the drive. "No," was the answer. He reported that their service department got about ten similar problems per month.

Did I do something to abuse the drive? Blue Max lives in a non-smoking, fairly well dusted (air blown) environment. The heads were reportedly, "... not particularly encrusted..." At a \$250 servicing/repair fee, I don't want to experience that feeling too many more times. It's kinda like taking the Bug into the shop for a tune-up and feeling that sinking feeling in the pit of your stomach as the mechanic tells you about the valve job you need. And feeling about as helpless when you don't know the mechanic and don't understand what a valve is. Especially as I read the ad on page 20 of Micro C #18, "... stepper ... \$10-\$25." Ouch!

Now I guess, like Gary Stookey in the letter box, I have to learn how to "... have my head fitted with a 100MB hard disk ..." and struggle to fix my equipment myself. What we need, out here, is a computer version of John Muir's "How to Keep Your Volkswagen Alive," a manual of step by step procedures for the compleat idiot.

**George (Bear) Stevenson**

Dear Editor,

Here's another approach to the Plus-4 Decoder Board.

On my board, the Kaypro people decided to leave out a chip which was right next to the drive connector. However, they did supply power and ground to

the appropriate pads. It is a simple matter to solder a 16 pin socket into these holes. Once the socket is in, make the following connections:

Jumper pads 8, 12, and 13 together.

Jumper pad 1 to J6 pad 6 (not normally connected).

Jumper pad 2 to J6 pad 12 (connected to U71 pad 8).

Jumper pad 3 to J6 pad 10 (connected to U71 pad 6).

Jumper pad 4 to J6 pad 14 (not normally connected).

Bend out pins 6 and 8 on U71 and pins 14 and 15 on the 7445. If you don't bend out pin 14, the system freaks!

Jumper U71 pin 6 to pin 14 on the 7445.

Jumper U71 pin 8 to pin 15 on the 7445.

Insert the 7445 into the socket, and power the system. This is a simple modification and costs about \$2.00.

**Brett D. Johnson**  
975 Yakima Drive  
Fremont CA 94539

*Editor's note:*

*Thanks for the tip!*

Dear Editor,

There are a couple of quirks in SBASIC (or what I, in my innocence, would consider quirks). First, I have only just realized, after reading the evidence over and over, that character variables can be set and checked using integers. I am a little embarrassed to admit it took me this long to find out. This makes the character variable a sort of crossover between strings and integers. Instead of:

```
WHILE Y>CHR(13) DO BEGIN
```

we can write:

```
WHILE Y>ODH DO BEGIN
```

Not one of your earthshakers, perhaps, but a revelation to yours truly. This opens up new possibilities for the CASE ... OF statement that were not available before. The statement would not accept the comparison of a character to, for example, "CHR(13)", without balking, at least as I remember. I would suppose that there would not be a prob-

lem with comparison to an integer.

The other quirk is a bug, pure and simple. When using the TEXT statement, the program ignores CTL..9 (tab) characters. The fix, of course is to use spaces.

Another quirk, while I am on the subject, is the result of SBASIC using its own file access routines. If you program in lower-case, and I'm leaning that way, you may accidentally type in a file name in l/c, whereupon you can't get the damn thing in CP/M.

By the way, I now have all three of the Kaypro manuals on SBASIC, and unless I'm mistaken, they're all the same book, except for book one's notes on B-trees. Book two rearranges the book one chapters, omits B-trees, and uses "publisher's font" instead of typewritten pages. Book three seems simply to be a more fashionable size (it's 7X9 instead of 8X11). So much for progress, except that books two and three are much easier to read.

But I'm happy with them. I haven't had so much fun since the cube, and every day I find another gem. Today's? Well I've been going over the file-handling section again and finally noticed that Ohnysty has made it possible to overlay variables, characters and strings, and file buffers. What elegance! What an economizer! How sweet it is!

**Dan W. Kingery**  
Box 1406  
Renton WA 98057

Dear Editor,

I am looking for a source listing for the BIOS for the Kaypro-II. I was told by Non-Linear Systems that you can provide this information. Is this available on disk. Please respond with cost.

**Robert L. Murphy**  
3500-8 Warwick Dr.  
Lexington KY 40502

*Editor's note:*

*Actually, Kaypro (Non-Linear) sells the BIOS source as part of their copyrighted tinker kit. Try them again and tell them Micro C sent you. (Your dealer might already have a copy and might let you borrow a printout so you can see what is going on.)*

■ ■ ■

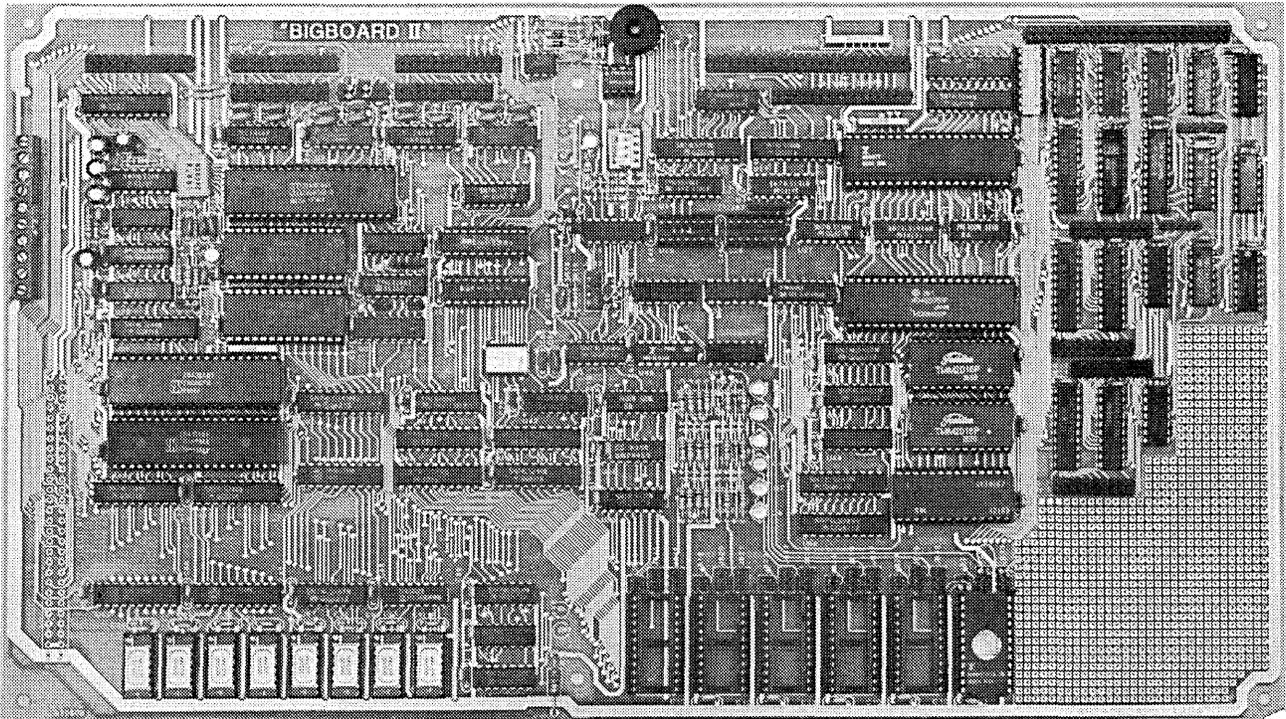
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## **"BIG BOARD II"**

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Jim Ferguson, the designer of the "Big Board" distributed by Digital Research Computers, has produced a stunning new computer that Cal-Tex Computers has been shipping for a year. Called "Big Board II", it has the following features:

■ **4 MHz Z80-A CPU and Peripheral Chips**

The new Ferguson computer runs at 4 MHz. Its Monitor code is lean, uses Mode 2 interrupts, and makes good use of the Z80-A DMA chip.

■ **64K Dynamic RAM + 4K Static CRT RAM + 24K E(E)PROM or Static RAM**

"Big Board II" has three memory banks. The first memory bank has eight 4164 DRAMs that provide 60K of user space and 4K of monitor space. The second memory bank has two 2Kx8 SRAMs for the memory-mapped CRT display and space for six 2732As, 2Kx8 static RAMs, or pin-compatible EEPROMs. The third memory bank is for RAM or ROM added to the board via the STD bus. Whether bought as a bare board or assembled and tested, it comes with a 2732 EPROM containing Russell Smith's superb Monitor.

■ **Multiple-Density Controller for SS/DS Floppy Disks**

The new Cal-Tex single-board computer has a multiple-density disk controller. It can use 1793 or 8877 controller chips since it generates the side signal with TTL parts. The board has two connectors for disk signals, one with 34 pins for 5.25" drives, the other with 50 pins for 8" drives.

■ **Vastly Improved CRT Display**

The new Ferguson SBC uses a 6845 CRT controller and SMC 8002 video attributes controller to produce a display rivaling the display of quality terminals. There are three display modes: Character, block-graphics, and line-graphics. The board emulates an ADM-31 with 24 lines of 80 characters formed by a 7x9 dot matrix.

■ **STD Bus**

The new Ferguson computer has an STD Bus port for easy system expansion.

■ **DMA**

The new Ferguson computer has a Z80-A DMA chip that will allow byte-wise data transfers at 500 KBytes per second and bit-serial transfers via the Z80-A SIO at 880 Kbits per second with minimal processor overhead. When a hard-disc subsystem is added, the DMA chip makes impressive disk performance possible.

**SIZE: 8.75" x 15.5"**

**POWER: +5V @ 3A, +-12V @ 0.1A**

■ **"SASI" Interface for Winchester Disks**

Our "Big Board II" implements the Host portion of the "Shugart Associates Systems Interface." Adding a Winchester disk drive is no harder than attaching a floppy-disk drive. A user simply 1) runs a fifty-conductor ribbon cable from a header on the board to a Xebec controller that costs only \$295 and implements the controller portion of the SASI interface, 2) cables the controller to a Seagate Technology ST-506 hard disk or one compatible with it, and 3) provides power for the controller-card and drive. Since our CBIOS contains code for communicating with hard-disks, that's all a user has to do to add a Winchester to a system!

■ **Two Synchronous/Asynchronous Serial Ports**

With a Z80-A SIO/O and a Z80-A CTC as a baud-rate generator, the new Ferguson computer has two full RS232-C ports. It autobauds on both.

■ **A Parallel Keyboard Port + Four Other Parallel Ports for User I/O**

The new Cal-Tex single-board computer has one parallel port for an ASCII keyboard and four others for user-defined I/O.

■ **Two Z80-A CTCs = Eight Programmable Counters/Timers**

The new Ferguson computer has two Z80-A CTCs. One is used to clock data into and out of the Z80-A SIO/O, while the other is for systems and applications use.

■ **PROM Programming Circuitry**

The new Cal-Tex SBC has circuitry for programming 2716s, 2732(A)s, or pin-compatible EEPROMs.

■ **CP/M 2.2\*\***

CP/M with Russell Smith's CBIOS for the new Cal-Tex computer is available for \$150. The CBIOS is available separately for \$25.

\*\*CP/M is a registered trademark of Digital Research.

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**Full size photo copy** of bare Big Board I (both sides). Invaluable for finding traces under ICs! Send \$1.00 to: Carl Jones, 459 Alexandra Way, Grass Valley CA 95945.

**SOFTWARE Z80 assembly language quiz**, 100 questions. Use it as a fast review, serious study, or game. Self-prompting. Choice questions. Keeps track of score. On 8" SSSD disk for a Z80-64K CP/M 2.2 computer, NEW PRICE \$16.95. (US funds) Send check/m.o. USA & Canada. Z-QUIZ, PO Box 3775, Stn B, Winnipeg, Manitoba Canada R2W 3R6.

**Z80 MICRO-CONTROLLER parallel I/O**, keypad commands. Complete plans and ROM monitor, NEW PRICE \$29.95. Also source & doc on 8" SSSD disk, use with a Z80-64K CP/M 2.2 computer, NEW PRICE \$19.95. Build-N-Learn how controller hdwe/sfwe controls machines/robots. (US funds). Send ch./m.o. to: ZMC, PO Box 3775, Stn B, Winnipeg, Manitoba Canada R2W 3R6.

**BBI ROM Terminal Emulator**. Menu-driven selection of SIO port, baud rate, parity, etc. Interrupt-driven I/O loads at 9600 baud. Uses one EPROM slot. \$29.95 ppd (\$34.95 for 2716-1). Unified Software Systems, PO Box 2644, New Carrollton MD 20784.

**Public Domain UG Software Rental**: CP/M UG Vol 1-92 on 46 8" Flippies \$45.00, SIG/M UG Vol 1-176 on 85 8" Flippies \$90.00, PICONET Vol 1-34 on 17 8" Flippies \$25.00, Pascal-Z UG Vol 1-25 13 8" Flippies \$20.00, UG Games 20 Vols of the best ones \$20.00, UG Modem 20 Vols of the best \$20.00, UG Business 20 Vols of the best \$25.00, UG Utilities 10 Vols of the best \$20.00. Rental is for 7 days after receipt with 3 more days grace for return. Credit cards accepted (preferred). 5" disk formats also available. Downloading-disk format conversions. Call. User Group Software Automatic Update Service - \$7.50 per 2 volume set PP. 619-727-1015 24 hrs. 619-941-0925 info. P.J.'s National Public Domain Software Center, 1533 Avohill Drive, Vista CA 92083.

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**JRT PASCAL 3.0 OWNERS**: All is not lost! A new product, PASCAL POWER, makes developing JRT Pascal programs a breeze. A full screen menu development environment automates the edit, compile, test cycle. PASCAL POWER uses your editor, so you don't have to learn a new editor. The Module Manager insures consistent type, const and external procedure declarations between JRT modules. Become a beta customer for this new product and you will receive PASCAL POWER at a lower price and all future updates free! You will receive a questionnaire for your valuable feedback on our product. PASCAL POWER is for JRT Pascal 3.0 owners, CPM/80, Kaypro and most popular formats. State disk format. Send check or money order for \$14.95 to PASCAL POWER, PO Box 1540, Crestline, CA 92325. Calif. residents add 6% sales tax.

public domain software available by mail. A very informative monthly newsletter with NO ADS, featuring articles on modifying your Kaypro and many offers from distributors for group discount purchases. TAMPA BAY KAYPRO USER'S GROUP, 14 CYPRESS DRIVE, PALM HARBOR FL 33563. One year membership with password ID# for accessing both RCP/M systems (300/1200 baud) \$25.00.

**BIG BOARD, XEROX 820'S, 16/8; REAL TIME CLOCK: MICROCRON** is assembled, adjusted and comes with extensive software collection, timestamp files, printouts, dBASEII-\$69. EPROM PROGRAMMER: EZPROMMER is by far the best value for versatility and con-

**CPAK4** Three programs, main program and two utilities. Fast data encryption, automatic key generation, histogram utility to check security. IBM/PC/DOS and Kaypro-II formats. FREE for cost of disk and postage, \$7.50. Security Technologies, 2752 Kaaha St., Suite 407, Honolulu HI 96826.

**Big Board I System for sale**. Commercial enclosure, 15" green screen, hall-effect keyboard, 2 Shugart drives, lots of software - \$650.00. Also, 2 new Shugart 801's-\$100.00 each. Donald Smith, 39646 Trinity Way, Fremont CA 94538. 415-657-9435.

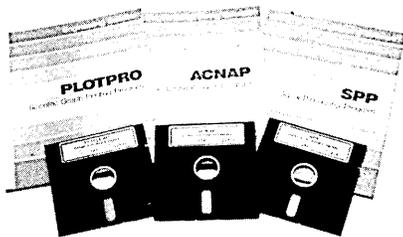
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**TANDON 101-4 Kaypro Quad Density**. Use Micro C's ROM and get 784K per drive. Like new and checked out. \$140 plus 6% tax and shipping. Mike Hagen, 303 Esther St, Costa Mesa CA 92627. 714-645-1929.

**KAYPRO SOFTWARE**, hardware information, technical updates, and two RCP/M systems with 26Mb of on-line storage. The Tampa Bay Kaypro User's Group has the largest public domain library and more current Kaypro-specific programs than KUG. The TBKUG can be of benefit to members without modems, all TBKUG User Disk volumes and other

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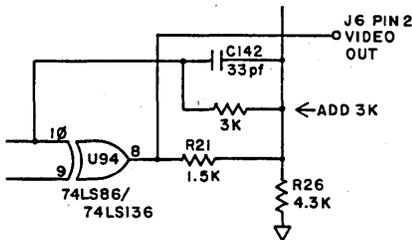
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# TECHNICAL TIPS

## BBI Horizontal Video Fix

I am surprised that nobody has sent in a fix for the lousy video on the Big Board. The video combiner produces a signal which allows all the horizontal portions of the characters to "trail off" like the tail of a comet. Capacitor C142 peaks the video, but it overdoes the job. On the other hand, some kind of compensation is needed. I got good results by paralleling this 33pf capacitor with a 3000 ohm resistor. This allows the horizontal bars on 'E,' 'F,' 'H,' 'L,' etc. to maintain brightness throughout their length. Some work is still needed to get the displayed screen width wider, but this is a good beginning.

### BBI Video Fix



**Doug McGarrett**  
190-15 111th Avenue  
Jamaica NY 11412

## Guest Speaker for Kaypro's Internal Modem

How about a speaker on that Kaypro 484 internal modem? The speaker will fit next to the fan, where the case has been slotted. Silicon caulking can be used to secure it to the case once the wires are connected. The volume control will mount above the speaker and next to the reset switch. This is a handy place since most Kaypro owners are familiar with the location of the reset switch (because of all those whiz bang new programs that crash the system).

### Installation

Very carefully, with the power cord removed, drill a hole for the volume con-

trol. Be sure to remove all the metal shavings from inside the 484 and make sure none got into the fan.

Resistors R10 and R13 are necessary to change the gain of the LM324 to drive the speaker. Shunt R10 (20K) with the 10K resistor from the parts list. Remove R13 and insert the 1M resistor in its place. Connect one end of the 1uf capacitor to E19. Connect a wire from the other end of the capacitor to the high side of the volume control. Connect the volume arm to one side of the speaker and connect the other side of the speaker to 5V common, available at the power connector for the drives.

### Parts required:

- 1 39 ohm speaker, two inch dia.
- 1 1uf 10VDC capacitor, DC isolation
- 1 500 ohm Potentiometer, volume ctrl
- 1 10K ohm, 1/4W resistor
- 1 1M ohm, 1/4W resistor

Figure 1a - Component Locations

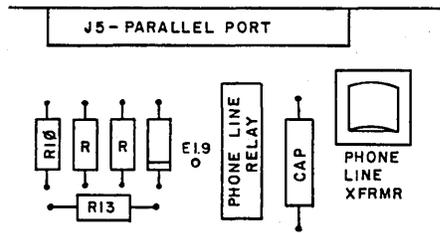
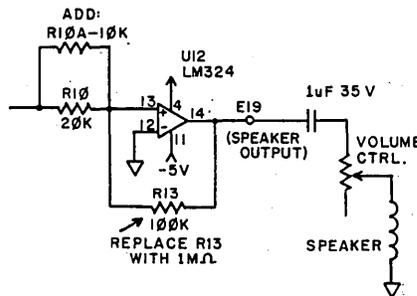


Figure 1b - Speaker Circuit



**Michael G. Veilleux**  
1110 W. Winston Dr.  
Santa Maria CA 93454  
805-922-3318

## UnProtecting MBASIC Files

Ever protect an Mbasic file with the "P" option either by mistake or on purpose and then wished that you hadn't done that. Here is a quick way to UNprotect any Mbasic program running on your Kaypro.

You will need DDT.COM, MBASIC.COM, and the protected file on a disk, and then simply follow the directions listed in figure 2.

Figure 2 - UnProtecting MBASIC File

```

AO>DDT MBASIC.COM
DDT VERS 2.2
NEXT PC
6000 0100
-S80
0080 79 00
0081 20 .
-G
.....

OK
LOAD "filename" (protected file)
LET DDT=&H38
OK
CALL DDT
#4D6A
-SOBEC
OBEC FE 00 (note:
the FE must be here)
OBED 00 .
-G
OK

SAVE "filename",A
SYSTEM
MBASIC filename
LIST
    
```

Your file should list now. Note that underlined characters are entered from the keyboard. The object is to change the Byte FE located at &H0BEC to 00; this unprotects the file and it may be saved in ASCII format again.

**Mike Loth**  
Po Box 847  
Steamboat Springs CO 80477

# TECHNICAL TIPS

## Additions to the PFM-80 Boot Routine

Following a RESET, control of the Z80 on the Big Board is transferred to location 0000 where a short boot routine copies the PFM-80 monitor from EPROM to RAM starting at location F000. This boot routine (actually a Z80 block move command) copies the first 2K bytes but by changing one byte it can be made to copy 4K. That is, it will also copy the contents of a second EPROM (U68) to RAM starting at location F7F0. The byte to alter is EPROM address 0009. Change the contents of this location from 08 to 10.

This modification allows additional routines (such as a printer driver) stored in the second EPROM to be booted up to the correct address, together with PFM-80, following a RESET. However, some thought is needed before a second EPROM can be used in this way.

First, there is not a simple correspondence between EPROM addresses and RAM addresses. This is because the boot routine at the beginning of the EPROM is not copied up to RAM. Therefore EPROM location 0010 is the first one to be copied.

The locations in EPROM that a routine should be stored at (so that it arrives at the correct RAM address) are listed in figure 3.

Figure 3 - RAM/EPROM Offset

	EPROM	RAM
1st	0010	F000
Eprom	0011	F001
	:	:
	07FE	F7EE
	07FF	F7EF
2nd	0800	F7F0
Eprom	0801	F7F1
	:	:
	0FFF	FFEF

Certain areas of RAM are used by PFM-80 for variable storage. These areas obviously cannot be used as they will be overwritten by data. The locations to avoid are FF00 to FFC7. This means that 0800 to 0F0F and 0FD8 to 0FFF in the EPROM address space are available for use.

So, as an example, if an additional routine is to be located beginning at RAM address FA00 then it must be

stored beginning at EPROM address 0A10.

You should find this method of adding software to the Big Board more convenient and professional than patching routines in from disc or squeezing them into the CP/M BIOS.

By Richard H. Taylor  
570 Gloucester St. Flat #3  
Christchurch New Zealand

## Notes on the Morse Code for the Kaypro

In the "Morse Code Interface for the Kaypro" (Issue #17 Micro C), we've dis-

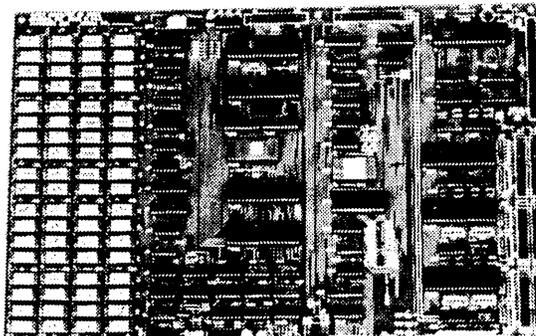
covered a few problems. In the listing, line 140 should read INP (28) less than or equal to 70, not just less than 70. Line 280 should contain 'J=6 TO 3\*SI:', not 'J=6 TOK 3\*SI:'. The DATA statements (310, 320, and 330) should be broken into smaller DATA statements containing the number of constants that will fit on one line.

We've also been questioned about the diagram of the transmit key (by the way, a license is required to transmit). Based on the letters and phone calls, the diagram is correct for some keys and not others, depending on whether your key is negative or positive ground.



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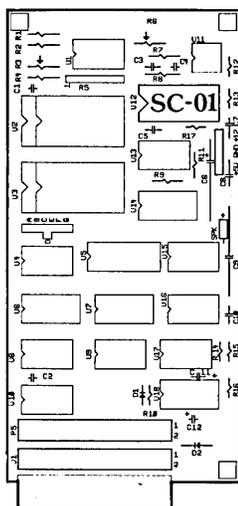
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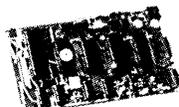
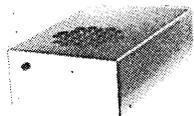
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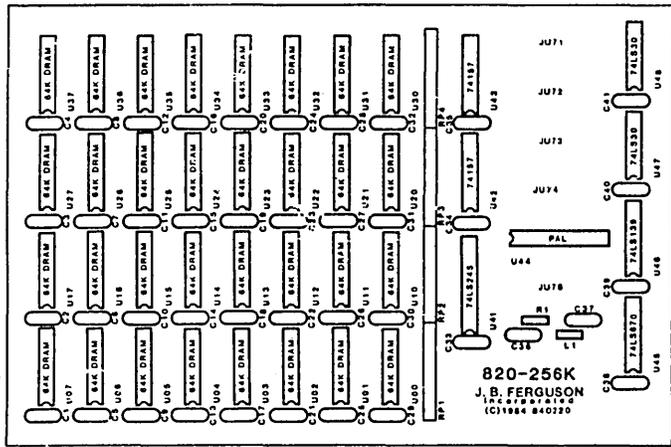
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## BIGBOARD-1 / 820-1 256K RAM EXPANSION MODULE



Now you can add 192K of RAM to your Bigboard-1 or 820-1 in a clean and efficient manner. This module can be used as a RAM disk, a spooler buffer, a disk cache or anything that requires more memory than the basic 64K. This module uses none of your precious I/O. Instead, it plugs in to five device sockets below the existing RAM array as a daughter board. It adds only 1/2 inch to the overall height of the computer board. The interface is accomplished with absolutely NO wires, cables or jumpers. The interconnect hardware, PAL and difficult-to-obtain discrete components are provided with the bare board, kit and tested versions. Only 7 TTL devices are required.

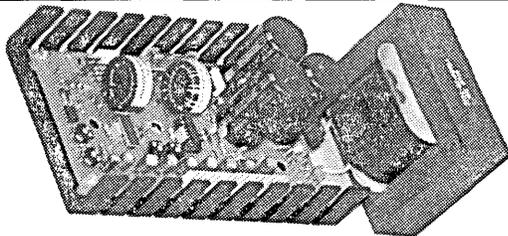
This memory array resides in the address space of the CPU as 16 blocks of 16K. Any 16K physical block can be mapped into any 16K logical block addressable by the CPU. A bipolar RAM mapper controls which 16K blocks the CPU has access to. The mapper is configured by easily-understood single-byte commands written to memory location OFFFHH. This extremely flexible architecture will accommodate a wide variety of applications, such as MPM, CPM+ and a host of high-speed data acquisition tasks. This RAM upgrade will work at 4 Mhz. This product comes with complete schematics and a full theory of operation with many programming examples. Assembly, installation and test procedures are thoroughly documented. PAL code is not available.

We have modified XDRIVE, a public-domain RAM disk software package, to run with the 820-256K. By the end of the 2nd quarter, we will have a CACHE BIOS melded with ZCPR that will give you nearly all the flexibility of CPM+ at a fraction of the cost.

BARE BOARD & DOCUMENTATION .....	\$ 67.50
KIT W/O RAM .....	95.00
2.5 Mhz A&T (250 nS RAM) .....	325.00
4.0 Mhz A&T (150 nS RAM) .....	375.00
NEW MONITOR ROM SOURCE & XDRIVE SOFTWARE .....	45.00
64K 250 nS MK 4564 - 25 .....	4.50

Very legible C size 820 schematics set of six drawings	\$18.00
STD BUS connector for BBII .....	\$12.50
CRYDOM S312 OV switching SSR .....	\$ 7.50
Complete 820 Documentation Package .....	\$15.00
820 CBIOS & Rom monitor source .....	\$35.00
CP/M Primer (Xerox CP/M handbook) .....	\$10.00
8" Dual Drive Cable 17" .....	\$30.00
DB25S to 26 Pin Header, 18" Long .....	\$15.00
Tested Xerox 820-I boards .....	\$100.00 each

## GENERAL PURPOSE INDUSTRIAL CONTROLLER



### UNINTERRUPTABLE POWER SUPPLY

UPS 5-200 \$ 195<sup>00</sup>

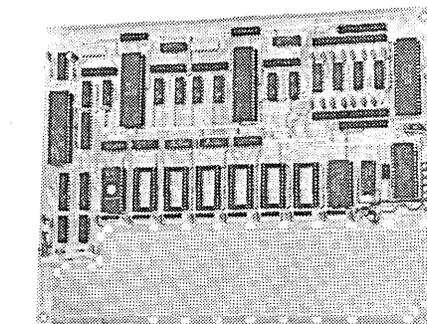
+5 V @ 8.5 AMPS, + 12 V @ 7.2 AMPS  
-12V @ .5 AMP, + 24V @ 2 AMPS (4A Pk)

This supply is designed to power entire computer systems with Winchester and floppy disk subsystems, as well as providing emergency battery backup capability. Designed to meet the needs of single-board Winchester systems.

24V 4.5 AH battery pack, BP-1 .....

#### FEATURES:

- High Reliability
- High Efficiency (75% TYP.)
- High Power - 200 Watts
- 25 KHz Switching Frequency (inaudible)
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- Built-In Quick-Response O.V.P.
- Cycle-By-Cycle Fold-Back Current Limiting
- Drop-Out Immunity for up to 250 Ms (without battery)
- Uninterruptable (with addition of BP-1 battery pack)
- 5 Output Voltages



LB-I  
\$ 75<sup>00</sup>

Bare Board & Doc

#### ACCOMMODATES

- Z80, Z80A, OR Z80B Series Parts
- Dual RS232 Serial I/O W/Current Loop Option on "A" Channel (both strappable as terminal or modem in RS232 Mode)
- 16 Programmable Baud Rates on each serial channel
- 32 Bits Buffered Parallel I/O Assignable on 4 Bit Boundaries, W/Strappable Handshake Polarity (2xZ80-PIO)
- 4 Channels of Counter-Timer, 4 Inputs, 3 Outputs
- Accommodates 16K Mix of Ram or Rom or EEPROM on 2K Boundaries in 2716 or 2016 or XICOR EEPROM
- 2.3" x 10" Sea of Holes Prototyping Area
- All I/O Fully Mode II Interrupt Compatible
- Watchdog Timer for Long-Term Unattended Operation

Rom monitor and source listing .....

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64K	64Kx1	150 ns	4.77
64K	64Kx1	200 ns	4.62
16K	16Kx1	200 ns	1.21

**EPROM**

27256	32Kx8	300 ns	\$49.97
27128	16Kx8	300 ns	18.77
27C64	8Kx8	200 ns	22.50
2764	8Kx8	250 ns	6.50
2732	4Kx8	250 ns	6.37
2716	2Kx8	450 ns	3.50

**STATIC RAM**

6264LP-15	150 ns	\$31.25
6116P-3	150 ns	6.36

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