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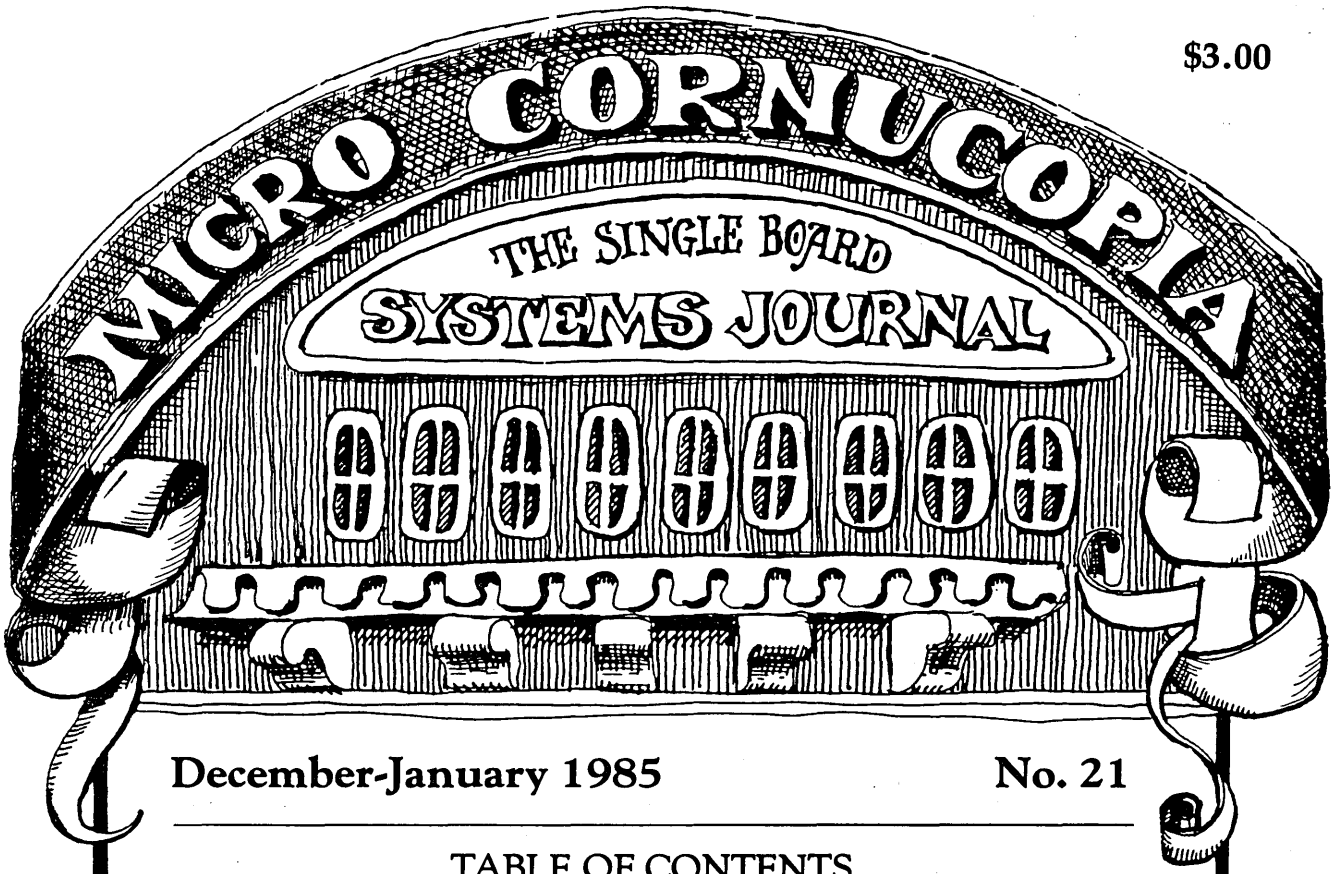

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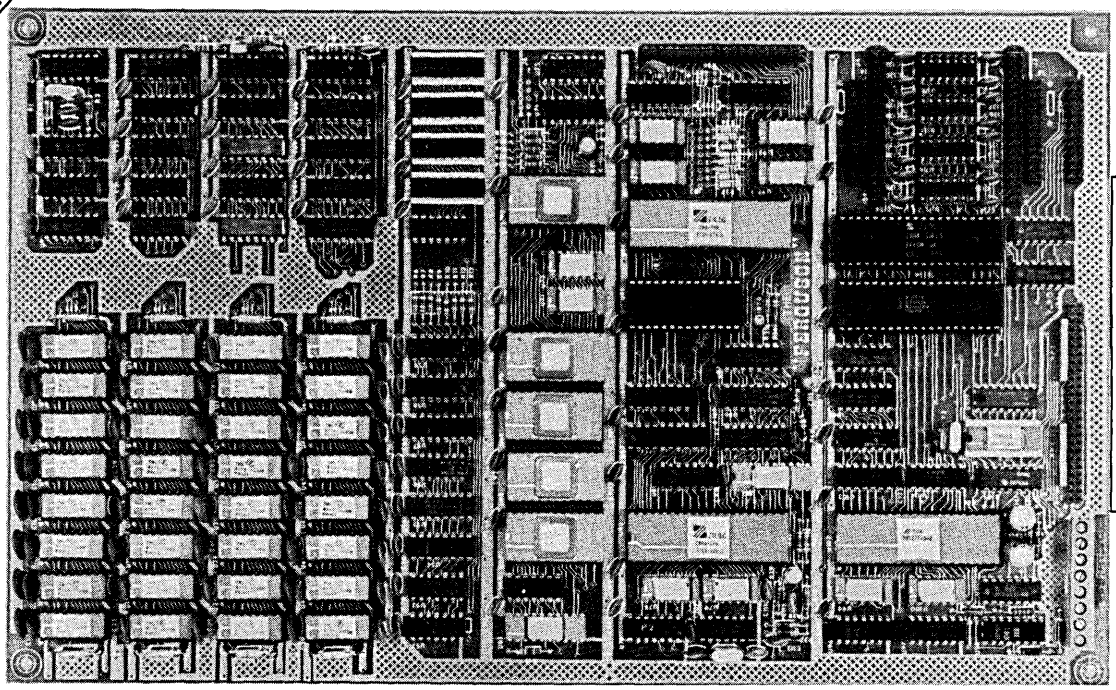

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MICRO CORNUCOPIA

December-January 1985 **No. 21**

I See Spots

Putting Ink On Paper

Those of you who have been with Micro C over the years and those of you who have waded through most of the back issues have followed the growth of Micro C from a 16-page light-weight to this 70+ page catalog. (At least they feel like catalogs when we're hauling more than 3,000 pounds of them to the post office.)

Well, we're still going and growing thanks to a strong core of contributors and a very responsive group of Kaypro owners who are just as excited about the technical details of their system as us "old" timers. Well, as you will see, there will soon be another new group of Micro C subscribers. Many of these, however, are already "old" hands.

Microsystems

Microsystems magazine, begun in 1979 by Sol Libes, has had the same kind of supportive readership that we have had. Originally the magazine was called *S-100 Microsystems* and it helped guide the S-100 system through its infancy and toward its current maturity. In the process, S-100 Microsystems attracted a loyal following of very technical people.

As the computer market moved away from the S-100 bus, Sol dropped the S-100 prefix and began shifting the emphasis from hardware to operating systems (CP/M 80, CP/M 86, MSDOS, and UNIX) and systems software. He was hoping to expand the audience (there are only a limited number of really technical folks) and remain viable in this rapidly changing marketplace.

During this period along came Ziff-Davis, a giant publisher looking for ways to make inroads into the burgeoning computer market. Microsystems seemed just the ticket, and Sol, well, he was much more interested in writing and teaching than in publishing, anyway, so he sold the magazine. (We magazine types don't need offspring; we have our publications which are just as ornery and spiteful and fun as kids ever dreamed of being.)

Ziff-Davis installed some new (expensive) talent and made Microsystems a real high-class operation complete with salesmen, bingo cards, and special subscription deals. Its goal was a total circulation of 100,000 (newsstands and subscribers).

It turns out that per-copy printing costs drop dramatically when you run 100,000 copies. At that number, a four-color, 120-page magazine costs about 60 cents per copy. That's less than it costs us per copy to print a 72-page black and white Micro C.

Anyway, Microsystems' circulation peaked at about 50,000 (which may be two copies for every S-100 system in the country), so the December issue will be the last. (Sol was devastated when they told him.)

The Wall Street Journal just reported that Ziff-Davis has put 25 of its business and consumer magazines up for sale—including: Car and Driver, Popular Photography, Travel Weekly and Stereo Review. The article indicated that Ziff was not selling any of its computer magazines (what's left of them).

So Ziff-Davis appears to be putting its corporate house in order and in the process the computer community is losing an institution. I'm very sorry to see it go. But:

New Columns In Micro C

Just when you thought that Micro C was already chock-full of columns (nuts), we announce two new ones. Sol Libes has agreed to do a column for us. He will be writing about public domain software, and he should certainly know

(continued on page 70)

LETTERS

Dear Editor,

We want to thank you for the mention in Issue 20, "On Your Own." We're sorry you don't approve of the name of our company (BEE.MOR Enterprises). Our name is our names: Linda Bee and Gary Morris, and fortunately we didn't shell out $40,000 to name our company BEE.MOR. We have been marketing peripheral products and systems for Kaypros, and operate a disk drive service center. Fortunately, our business is MOR, not less, than last year because we ship a good product.

We are avid readers of Micro C and appreciate the wealth of knowledge you provide.

Linda Bee
Gary Morris
BEE.MOR Enterprises
22 182nd Ave. E.
Sumner WA 98390

Editor's note:

Thanks for the letter, Linda and Gary. The response to that "On Your Own" column was immediate and very interesting. Some people loved it, some had mixed feelings, and others thought I was off base (I won't repeat how far off).

Picking on someone's business name is about as bad as picking on his personal name (perhaps worse since he didn't have any choice over his own name).

Before I wrote the column, I told the outfit that distributes Dulmonts what I thought about the name (to their face). The distributor indicated that it too had tried to get the name changed but that the Dulmont company insisted: "That's always been our name, we're successful, and we're not going to change it!!!!!!!!!!" The Dulmont company was definitely not interested in a new name.

The Integrand folks responded immediately with a beautifully written reply. Their name was derived from the mathematical term "integration," and at the time, they thought it was appropriate for a small cabinet company (and from what I've heard they are not all that small any longer). And, to answer Integrand's question, "If you make pianos like you make your cabinets, yes, I'd definitely be interested in a piano."

Jim Tanner also called to say that according to his recollection, the name "Big Board" was his idea. One afternoon while going over prices for producing the Big Board circuit board someone commented that the run would be expensive because it was such a "big board." No too long afterwards he was tuned to the stock market report while driving home. They announced the number of shares traded on the "Big Board" and bingo.

Dear Editor,

I have enjoyed your magazine very much and I have found the articles to be very informative. I own a KayPro 10 and I would love to see more on what makes it tick and how to improve upon it.

I work for a KayPro dealer and I have had fun speeding up the II's and the 4's to run at 5mhz.

By the way, I have found that with a standard II or 4, I could only go up to 2400 baud when using MODEM7 between a slow Kaypro and a different brand 4 MHz machine. After speeding up the Kaypro, 9600 baud was no problem.

And now I have the same problem with my 10. I can only go up to 2400 baud before I start getting errors. I wrote a letter to KayPro about this and they called me back to get further information, but as of yet there has been no solution.

There is so much out there in the way of add-on's for the II and 4 but nothing for the 10. I would like to ask everybody out there if they have heard of any way to do the following.

1. Add a clock (with software) onto a 10.
2. How about a 6mhz upgrade? (I have the Z80-B's)
3. Adding an 8088 board and MSDOS and CP/M86.
4. RAM disk (might use 8088 board memory).
5. ZCPR type modifications to CCP.
6. Add an 8" drive. This I would like a lot. I already have UNIFORM for my 5"; with an 8" I wouldn't have to use MODEM7 to transfer my programs.
7. A 300/1200 modem card.
8. Screen dump routine, one that could dump the graphics as well would be nice. (I have Prowriter 8510).
9. I have just read the article on how to turn your KayPro II or 4 into an 8. How about this mod for the 10?

I want the world, but why not?

David R. Meyers
6390 Rancho Mission Rd. #208
San Diego, CA 92108

Dear Editor,

Back in August I sent a check for $20 for your new Kaypro 4-84 schematics. My check hasn't been cashed yet, so I'm not angry, but I sure would like to have those schematics. Did the check get washed down the river when you were shooting the rapids? Just write a note on some toilet paper and let me know.

Chuck Weingart
2152 W. Iowa
Chicago IL 60622

Staff reply:

You're right. It did get washed down the river but we finally fished it out. We decided to wait until it dried out before we sent it, though, so that's why it took so long. As for toilet paper, we ran out last week.

Actually, we finally got the darn things finished and shipped, so if you haven't received yours by now, please let us know.

Editor's note (to the staff):

A shortage of toilet paper could be disastrous (not even the software press releases work very well for this purpose).

Dear Editor,

I could not let J. Wytsma's comments in Micro C issue 19 about the dearth of BBII articles go without rebuttal. One of things I enjoy most about Micro C is its informal approach coupled with varied information. I also enjoy the occasional minor errors. The whole format of Micro C makes it more personal and, for me, more readable than many of the "biggies" I no longer subscribe to. While Wytsma's point is well taken, I don't know how Micro C will continue to offer so much information on so many subjects for so little without changing a lot. It's a rotten shame that progress is a reality rather than just a theory.

Dick Schaffer
5138 W. Olive Ave.
Glendale AZ 85302

Editor's note:

Thanks, Dick. I have really been struggling with idea of Micro C and change and it's been one of the most difficult parts of being editor. Other publications are facing the same changes and it doesn't look like very many have found any real direction. Some are just floundering better than others.

LETTERS

Dear Editor,

I see all of the interesting things that some people are doing with the Big Boards and start getting the urge to try some of them.

Would it be possible to get one of the Big Boards, and by using your improved PROM, generate a system that would use the Kaypro software and read the same disks in the same format?

The Big Boards might have the advantage that I would be able to have more I/O and the possibility of having an 8" disk to access some of the CP/M software.

Some time ago I put together a SWTP 6800 system and have had some limited experience in assembly language programming. I do not have much spare time and am somewhat afraid that I might be getting into a lot more than I can cope with.

Can the disk controller on the Digital Research Computers be changed to one that will control 5" floppies?

Would the BB II be a better choice as an answer to this problem?

Albert P. Van der Klott
Wahl-Henius Institute, Inc.
4206 N. Broadway
Chicago Il 60613

Editor's note:

We're working on that Kaypro/BB modification but it could be as much as six months down the road. Even then, you will need to perform some non-trivial details to use the software.

To date we haven't completed the modification that would allow the DRC controller to run 5" but SWP has a package. However this package will only allow you to run 8" or 5", not both.

The BB II will run both 5" and 8" with Andy Bakker's software but lack of support and documentation (as well as installed base) for that system make it a difficult project for all but heavy-weight engineering types.

Dear Editor,

I received my blank PCB for the BB I about a year ago along with a sample page from Micro C. So I sent for a subscription and have enjoyed every issue.

After admiring my blank board for a couple of weeks, I finally started soldering sockets.

I could only go for about 2 hours at a sitting before those neat rows of pins turned into a sea of waving spears. But I finally got them all in.

The caps and resistors were added; the connectors, crystals, etc., were soldered in; and then the long careful job of inserting the IC's was done. I went over the board with a magnifying glass a million times it seems and everything looked good.

I built a box, a 24-volt power supply, bought a Shugart from Cascade and a solid state switch from Phenix, wired it all together, flipped the switch on, hit return on the keyboard, opened my eyes, and beheld a glorious spectacle of every character in the English and Greek character alphabets flashing on and off.

Going over the board I found 4 IC's with bent out pins and the display changed to alternate zero's and colons. So I got out my stack of Micro C's and found a good article which discussed a similar problem.

Trying everything the article suggested made things no better or worse, so I began to substitute IC's and found a flaky 74LS123.

The monitor went blank when I turned it on and PFM signed on, my wife thought I had been electrocuted from all the jumping and hollering that went on.

To make a long letter longer, I'd like to say it's all been fun and to thank you for a good magazine and thanks to the many suppliers that advertise in it. They have all been prompt and their products excellent.

I have three Kaypro II's at work and have ordered disks and ROM's for them from Micro C. Being at a government agency, I have been amazed at the speed in which you have delivered the items. I hope you have received payment at least in a reasonable time. Many companies will not accept a government purchase order at all.

Now stop laughing and get my subscription renewed.

Stuart Eason
3 Cotswold Rd.
Benton AR 72015

Editor's note:

The tears weren't from laughing, they really weren't!

Dear Editor,

Your magazine is full of ecstatic reports from people who apply power to their BB II and two seconds later hear the bleep which means all is okay.

Let the record show it is not always so fast. I first applied power to my BB II on 19 Dec., 1983, but the "two seconds" ended 24 Feb.,1984.

Only a fraction of those "two seconds" were used fixing solid errors; solder is quicker that the eye.

One short took a bit longer. It measured 0 ohms pin to pin on the IC's, but disappeared as soon as I turned the board over to check it. It came back again only under power. Eventually, this problem just went away.

But the real hassle was a poor IC socket contact. Evidently the pressure of ohm meter probe was enough to make it look good on the static test, but it wasn't making contact otherwise. I found that one only after borrowing a logic analyzer.

Before I could make any sense of that, however, I had to find someone to list out the EPROM and disassemble some of it by hand. Thus I got by with a lot of help from my friends, but the ecstatic items in Micro C were no help at all.

Couldn't you have a department "What to do while waiting for the bleep"? Among other things you could print listings of EPROM's.

Now I start scraping up money for a keyboard and disk drives. But looking ahead, I see things I don't understand.

CAL TEX sent me a disk which I hope I can still find, but I didn't (yet) buy CP/M.

Are the User Disks which you sell "stand alone," or do they assume CP/M? If the latter, is there no way to proceed without spending $150? I mean legally, of course.

R.W. Hartung
408 Orchard
East Lansing MI 48823

Editor's note:

All of our disks assume CP/M. I mean, either we have to spend the $150 or you have the spend the $150. At $12 to $15 per disk, it wouldn't make much sense for us to spend $150 each to put CP/M on them.

(continued on page 72)

Analog To Digital Interface

By Don Fletcher

Rt 1 Box 216
Pleasant Hill MO 64080
816-869-3472

I developed an incubator data acquisition system this summer using my Big Board as a bed for testing different analog to digital convertors (ADCs). I'm the designer, technician, assembler, janitor, and everything else for a hatchery equipment company (called Egg-tronics, of course). (Editor's note: probably owned by a very gentle holding company.)

I hate to waste any effort, so I've taken the results of my design research and written this article. I've tried to include enough information on analog to digital conversion so you can come up with something which will work with your own system.

The circuit and driver provided should work on either the Big Board or the Xerox 820-I, since development work in our shop was done on both computers. (A slight change would, no doubt, make this work on a Kaypro or any other system with similar port hardware.)

Background

Analog to digital conversion, as the name suggests, is a process of converting analog signals (from detectors or other instruments) into the digital 1s and 0s that computers can understand.

Some examples of things you could monitor include: voltage, current, heat, humidity, light, sound, velocity, force, etc. Since ADCs can only convert an electrical signal into its digital equivalent, all inputs must first be converted into voltages.

Conversion Speed: The time required to convert an analog input to a digital number. Faster is better but more expensive.

Resolution: The number of binary states an analog voltage range can be reduced to. For example, if an 8 bit ADC is used, there are 256 different binary numbers that it can output (00 to FF Hex). If the desired input range is 0 to 2.55 volts the voltage per step would be 2.55V/255 steps (zero doesn't count here), or 0.01 volt per step. The more bits you have, the smaller the steps will be.

Accuracy: A measure of how closely the calculated binary output of the ADC matches the voltage input. Usually measured as +/− some fraction of the least significant bit (LSB).

SACs And DSICs

There are two major families of ADCs—the successive approximation convertor (SAC) and the dual slope integration convertor (DSIC), each suited to different applications. When speed is important, the choice is the SAC, which can complete a conversion in 100 micro-seconds. In contrast, the DSIC requires 100 milli-seconds, which is 1000 times longer. The SAC is sensitive to noise, requiring good bypassing and board layout. In contrast, the DSIC is virtually immune to noise. If you need a lot of steps (increased resolution) the DSIC is best because it can give you up to 4 1/2 digits (19999 steps) resolution. The SAC is limited to 12 bits (4096 steps). Both types of convertors are in the same price range.

I used the ADC0804 SAC from National Semiconductor. It has a conversion time of 100 micro-seconds and 8-bit (256 step) resolution.

ADCs differ in the available accuracy and cost; the higher the accuracy, the higher the cost. The ADC0804 has an accuracy of +/− 1 LSB. There are 10 and 12 bit convertors available that are pin for pin compatible with the ADC0804 (the extra bits are handled in software), but they are expensive and hard to get at this time.

If you would rather use an integrator ADC, Intersil has several types available (best buy is the 12 bit ICL7109). Intersil data books and parts are available from JAMECO and several other suppliers. A good second choice is the Motorola MC14433 3 1/2 digit ADC.

Theory Of Operation

IC1-CA4051: Eight channel analog MUX used for input scaling. (See Figure 2.) An analog voltage is supplied to the negative input (Vin-) of the ADC. PIO A bits 3-5 determine which input (0-7) on IC1 is passed through to Vin-. The 1K scaling resistors should be as close to the same value as possible. Use either a resistor pack, or 1% parts.

This circuit increases the resolution of the ADC, providing 256 steps for each of the 8 voltage ranges. This yields the equivalent of an 11-bit ADC. If you don't need this much resolution, leave this circuit off and connect the negative input of the ADC (pin 7) to ground or whatever minimum voltage you require.

Since under worst case conditions, 8 conversions must be made to develop the 11-bit binary output, the conversion time required will increase to 800 micro-seconds. If this is too slow, use an ADC with increased resolution.

IC2-CA4051: Eight channel analog MUX used to provide 8 analog input channels to the ADC. Each channel is selected the same way that reference volt-

Figure 1 - Display Routine In BASIC

```
05 REM          INIT-SETS UP THE PORTS  INPT-INPUTS DATA
10 INIT=&HFA80
20 INPT=&HFAAB
25 REM          FIRST SET UP PORTS, RESET CHANNEL COUNTER
30 CALL INIT
40 CHAN%=0
50 A%=CHAN%
55 REM          GET DATA FOR CHANNEL NUMBER A%
60 CALL INPT(A%)
65 REM          PRINT IT WITH SEPERATION SPACES
70 PRINT A%;"  ";
75 REM          DO IT AGAIN WITH THE NEXT CHANNEL
80 CHAN%=CHAN%+1
85 REM          UNTIL THE 8TH, THEN GO TO NEXT LINE
90 IF CHAN%=8 THEN GOTO 200
100 GOTO 50
200 PRINT
205 Z=0
206 REM         DELAY, WAIT FOR A WHILE
210 FOR I=1 TO 300
220 Z=Z+1
230 NEXT I
240 GOTO 30
250 END
```

ages are passed through IC1. If you only need a single channel, leave out IC2.

Each input channel is tied high through a pull up resistor for noise reduction. Be sure to include these since CMOS ICs get strange when their inputs float.

IC3-LM336-(2.5V): This is a precision voltage reference, so don't use a Zener diode, a resistive voltage divider, two chipmunks in series or any other substitute. The accuracy of this reference determines the accuracy of the whole circuit.

IC4-ADC0804: An 8 bit ADC. The analog inputs are provided by IC1 and IC2 as described above. The binary outputs are connected to PIO Port B. The start conversion (WR-, pin 3) input is connected to Port A bit 6. The conversion starts on the rising edge of this input.

Since the ADC is isolated from the micro processor by the PIO, the read and chip select inputs (pins 2 and 1) are grounded. This means that data is immediately available at the end of the conversion cycle.

The end of conversion is signaled by a negative transition of INTR-. This line is connected to the B Strobe input, which triggers a processor interrupt. The INTR output is reset after a read. (A read occurs automatically at the end of each conversion cycle since the read input is grounded.)

R1 and C1 determine the clock frequency. Analog and digital grounds (pins 8 and 10) are connected to a common point.

Vref/2, developed from IC3, determines the voltage range of the ADC. This voltage should be adjusted to one half of the required voltage span.

Keep the analog inputs as far away from the digital outputs as possible. Connect the ADC bypass capacitor as close to the chip as possible. The ADC0804 is accurate only to the LSB so this bit may twitch randomly.

The resistor and capacitor on the input line are there to reduce noise. Additional noise reduction is possible by increasing the value of either part. If the parts get too large, it will take too long to charge or discharge the capacitor and you will lose information.

If you are sampling each input as rapidly as possible, leave the values as they are. If you are sampling each channel at a slower rate, try increasing either R or C if you have a noise problem.

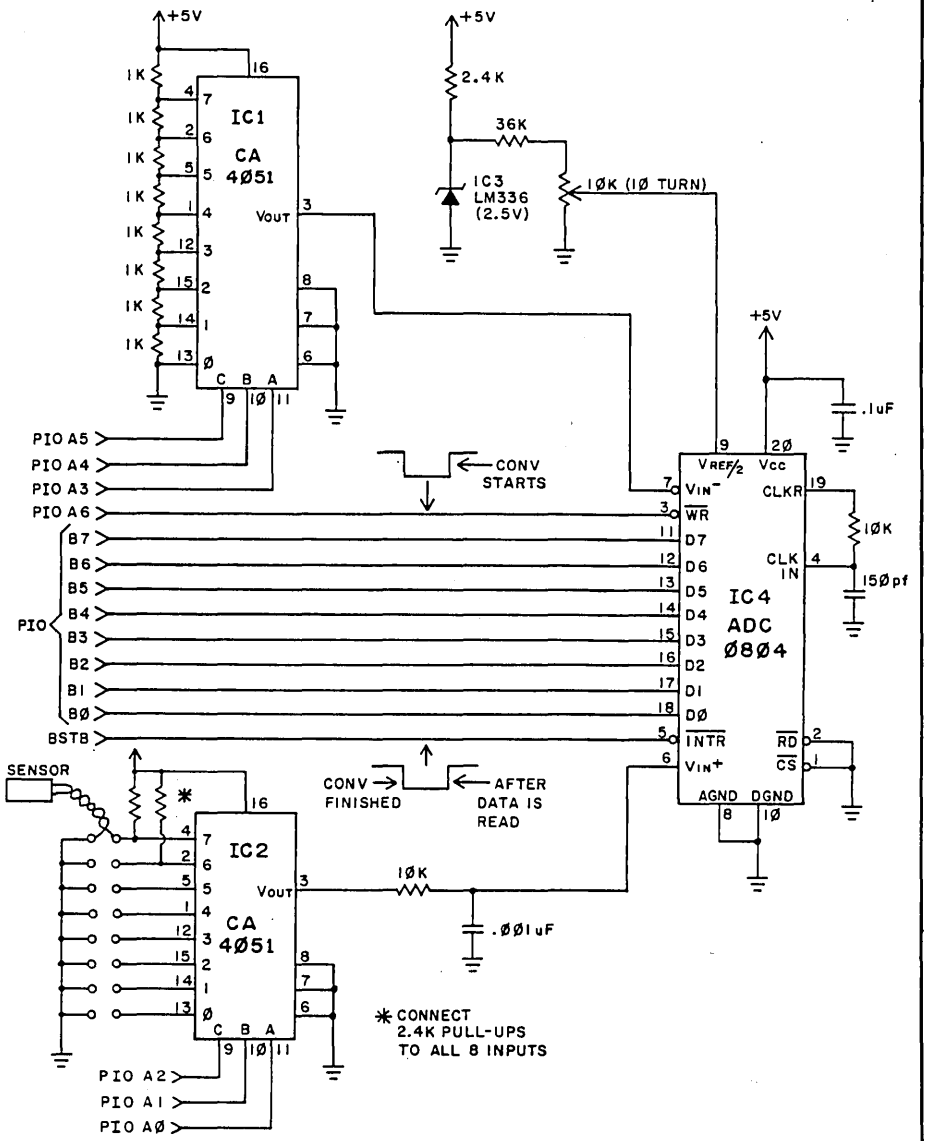
Connect input sensors with either shielded or twisted pair wire. If the sensor is high impedance, additional input filtering may be required. Sometimes this problem can be reduced by the choice of sensors. For example, if measuring temperature, two sensor choices are:

1) A thermistor (high impedance)
2) An LM335 (low impedance)

The proper choice is the LM335.

(continued next page)

Figure 2 - A To D Controller Schematic



Software

I've provided an example driver for my ADC card, and a simple program in BASIC to print out the value of the 8 inputs on the console at periodic intervals. The driver must be loaded first since it resides in high memory. After loading the driver, load BASIC (or the language of your choice) and program away.

If you develop a good application for my ADC circuit, take a few moments and send it to Micro Cornucopia. It's fun—try it.

■ ■ ■

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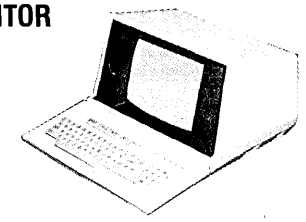

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Figure 3 - ADC Driver Routine

```
; Big Board - Xerox 820-I ADC0804 driver
;
; Board is connected to the General Purpose PIO, port A as output
; controlling the scaling MUX, the channel select MUX, and the
; start of conversion input into the ADC0804.  Port B is set to
; read the binary data output from the ADC.  Port B's strobe is
; also used as the end of conversion interrupt out of the ADC.
;
; Connect the following jumpers on JB3 on the Big Board (J11 on
; the Xerox) -  (3-4), (9-10), and (17-18).
;
; This routine requires M80 to assemble.

.Z80

ADATA   EQU     8
AOCNTRL EQU     9
BODATA  EQU     10
BOCNTRL EQU     11
MODO0   EQU     0FH
MODO1   EQU     4FH
MODO3   EQU     0CFH
AOINTR  EQU     1CH
BOINTR  EQU     1EH
ITOCTL  EQU     87H
LOAD    EQU     0FA80H

BDOS    EQU     5

        ASEG
        ORG     100H

        LD      DE,LOAD         ;Load the program above the monitor
        LD      HL,ADC
        LD      BC,ADCEND-ADC-1
        LDIR
        RET                     ;Return to CPM

ADC:    .PHASE  LOAD

;FIRST SET UP INTERRUPT HANDLER

SETUP:  LD      HL,INTR
        LD      (0FF1CH),HL
        LD      (0FF1EH),HL
        LD      A,0
        LD      (LSTRDY),A      ;SET LIST READY FLAG


;THEN SET UP PORTS

        LD      A,MODO0
        OUT     (AOCNTRL),A
        LD      A,0
        OUT     (AOCNTRL),A
        LD      A,07
        OUT     (AOCNTRL),A     ;SET A TO OUTPUT MODE 3

        LD      A,MODO1
        OUT     (BOCNTRL),A
        LD      A,BOINTR
        OUT     (BOCNTRL),A
        LD      A,ITOCTL
        OUT     (BOCNTRL),A     ;SET B TO INPUT MODE 1
```

```
        LD      A,40H
        OUT     (ADATA),A       ;SET STROBE HIGH

        RET

;SUBROUTINE TO INPUT DATA FROM ADC, CHANNEL NUMBER IS POINTED TO
;BY HL. NUMBER IS RETURNED TO MEMORY POINTED TO BY HL AND HL+1
;(MSB IN HL+1)

ADCIN:  LD      A,(HL)          ;GET CHANNEL NUMBER
        PUSH    HL              ;SAVE POINTER FOR LATER STORAGE

        AND     07H
        LD      B,A
ADCIN3: OUT     (ADATA),A       ;OUTPUT CHANNEL NUMBER, STROBE LOW

        OR      40H
        OUT     (ADATA),A       ;STROBE HIGH

        CALL    ADCIN1
        CP      0FFH
        JP      NZ,ADCIN2

        LD      A,B
        ADD     A,08H           ;TRY NEXT SCALE
        LD      B,A
        AND     38H
        JP      Z,ADCIN2        ;CHECK FOR OUT OF RANGE
        LD      A,B
        JP      ADCIN3

ADCIN2: POP     HL              ;RECOVER POINTER
        LD      (HL),A          ;STORE LSB
        LD      A,B
        RRA
        RRA
        RRA
        AND     07H             ;RECOVER MSB
        INC     HL
        LD      (HL),A          ;STORE MSB

        RET


ADCIN1: LD      A,(LSTRDY)
        OR      A
        JP      Z,ADCIN1        ;WAIT FOR INTERRUPT

        LD      A,0
        LD      (LSTRDY),A      ;RESET READY FLAG

        IN      A,(BODATA)      ;GET DATA
        RET

;INTERRUPT HANDLER-SETS READY FLAG

INTR:   LD      A,0FFH
        LD      (LSTRDY),A
        EI
        RETI

;DATA STORAGE

LSTRDY: DB      0

        .DEPHASE
ADCEND: END
```

End of Listing

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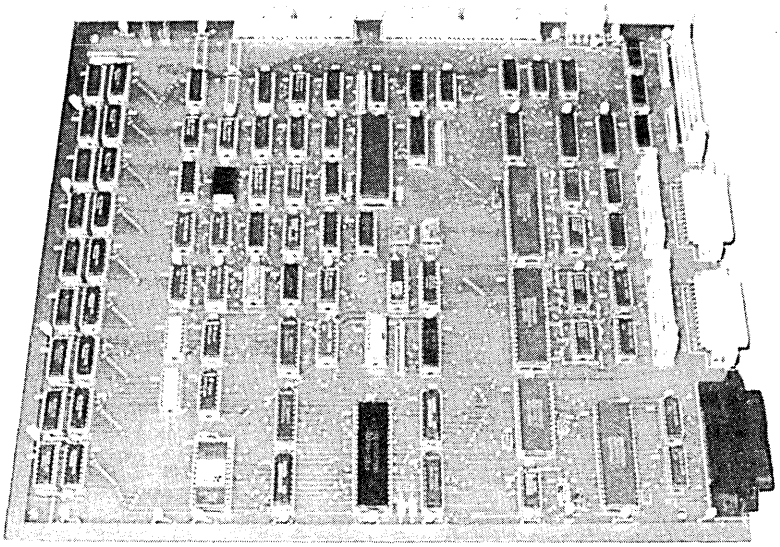

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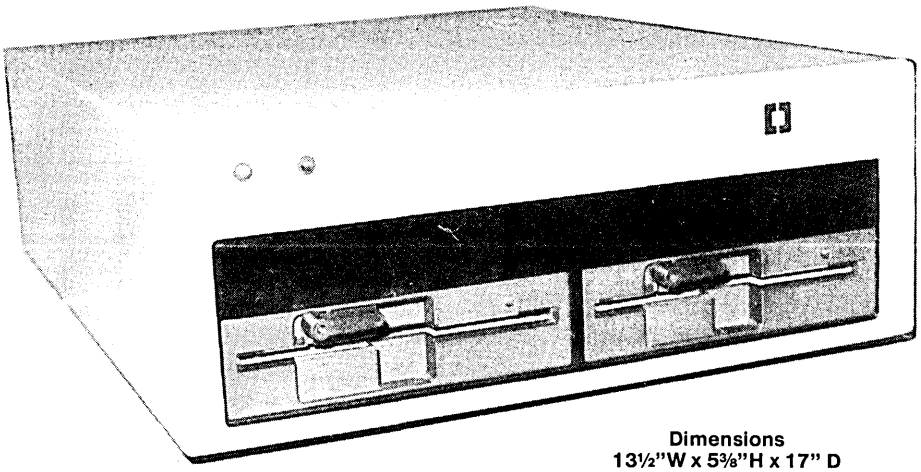

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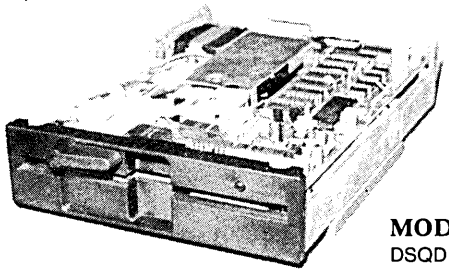

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Communication Between High-Level And Assembly Language

By Christian Phaneuf

P.O. Box 1107
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How many times have you wished you could write complex assembly language programs as easily as you write programs in C, Pascal, or PL/I. After all, you need the control or speed of assembly language, but writing floating point (or even fixed point) routines in assembly language is a royal pain.

Perhaps, instead, you should be writing in a high level language and then, where necessary, calling assembly language subroutines.

This article includes two simple PL/I-80 programs, each with an assembly language subroutine. Both programs pass an ASCII character (*) to a subroutine which outputs the character to the console using CP/M's CONOUT function. The subroutine then reads a character from the console (using CP/M's CONIN) and passes it back to the main program.

High Level Languages Differ

Though there are differences at the detail level, the principles discussed here apply to most high level languages that let you include low-level routines.

However, no matter which compiler you use, the variables will always be passed through either the stack, the registers, the memory, or a combination of these. Therefore, the concepts illustrated in the PL/I-80 programs that follow can be adapted to any high level language compiler capable of generating relocatable code.

Passing Data Back And Forth

In the first program (Figure 1), DEMO1 illustrates one way that parameters can be passed from the main program to the called routine. It also shows the implicit "returning" of values from the subroutine to the calling program.

Note that the assembly subroutine (CONSOLE1) is declared with entry and character(1). This tells the compiler that whenever the subroutine is called, a single ASCII parameter of length '1' will be passed to the called program. If several different parameters were to be passed, the type of each would be listed separately in the declaration of the procedure. For example:

```
dcl entry (char(3),fixed (15), . . .),
           1st par    2nd par    etc...
```

The instruction "call CONSOLE1 (PARAM1);" tells the compiler that the variable PARAM1 is the actual parameter that will be passed. PARAM1 must be of the same data type (character(1)) as that declared in the entry procedure. Thus, an ASCII string of length 1 (the '*' remember) will be passed to CONSOLE1.

PL/I Details

PL/I-80 passes parameters to a subroutine by leaving the address of a pointer in register pair HL. The pointer contains the real address of the first parameter. If several parameters are passed, they must occupy successive memory locations.

The number of parameters and length of each parameter must be determined implicitly by agreement between the calling program and the called subroutine. Sound complicated? Well, if you can understand the man who saw the man who saw the bear, you should have no problem with this.

Returning Data To PL/I

Since the locations of the passed variables are known, CONSOLE1 can alter the contents of these locations, thereby returning data to the calling program. Figure 1 demonstrates this.

CONSOLE1 first prints the '*', then CONIN is used to read a character from the console. Finally, the subroutine places the new character into the memory location called PARAM1 (by PL/I) and returns control to the calling program. Figure 3 shows the results of running DEMO1.

An alternate method, used to return data to the calling program, is very useful for simple routines when there is no entry variable or when you don't want the subroutine tampering with the main program's data.

As shown in Figure 2, assembly language subroutine CONSOLE2 is declared with both entry() and return() attributes. This double declaration tells the compiler that instead of the general parameter passing protocol used in DEMO1, the alternate method will be used. Here, PL/I-80 stipulates that the subroutine must place data on top of the stack and the length of the data must be left in the accumulator before control is returned to the calling program. Note in the execution of DEMO2 that the variable PARAM1 has not been altered by CONSOLE2.

The type of data to be returned will determine which method you use. For instance, fixed binary numbers with precision 1-7 are returned in the accumulator, while precision 8-15 are returned in HL. Bit string data is returned the same way but fixed decimal data is returned on the stack as a 16-decimal digit value in nine's complement form (8 bytes are used).

No matter which method you use, parameter passing can be an easy way to have the advantages of high-level language productivity and low-level language control and speed in the same program.

■ ■ ■

Figure 1 - Returning Data Via Globals

```
DEMO1:
  procedure options (main);

  declare
    CONSOLE1  entry ( character (1) ),
    PARAM1    character (1);

    PARAM1 = '*';
    put skip list ('Before calling: ');
    put      list ('PARAM1 =', PARAM1);
    put skip;
    call CONSOLE1 (PARAM1);
    put skip list ('After calling: ');
    put      list ('PARAM1 =', PARAM1);
end DEMO1;

CONSOLE1:
.Z80              ;Z80 mnemonics used
PUBLIC CONSOLE1 ;Program will be reco-
                  ;gnised by LINK
BDOS   EQU 05h
CONIN  EQU 01h
CONOUT EQU 02h
PUSH   HL         ;Original HL saved
LD     E,(HL)     ;
INC    HL         ;Adress of Parameter in
LD     D,(HL)     ;register pair DE
EX     DE,HL      ;Save parameter adress
PUSH   HL         ;on stack
LD     E,(HL)     ;Parameter must be in E
LD     C,CONOUT ;before calling CP/M
CALL   BDOS       ;console output funct.
                  ;
LD     C,CONIN  ;Read a character using
CALL   BDOS       ;CP/M console input fn.
                  ;
;The character read from the console
;will now replace the parameter from
;the calling procedure in memory
                  ;
POP    HL         ;Parameter adress in HL
LD     (HL),A     ;New parameter now in
                  ;memory
POP    HL         ;Original HL restored
RET               ;Return to calling
END               ;procedure
```

Figure 2 - Returning Data VIA Stack

```
DEMO2:
  procedure options (main);

  declare
    CONSOLE2 entry   ( character(1) )
             returns ( character(1) ),
  ( PARAM1, PARAM2 )   character(1);

    PARAM1 = '*';
    put skip list ('Before calling: ');
    put      list ('PARAM1 =', PARAM1);
    put skip;
/* here, subroutine is  called  by  */
/* invocation, "CALL"  keyword not  */
/* required. */
    PARAM2 = CONSOLE2 (PARAM1);

    put skip list ('After calling: ');
    put      list ('PARAM1 =',PARAM1);
    put      list ('PARAM2 =',PARAM2);

end DEMO2;
```

```
CONSOLE2:
.Z80              ;Z80 mnemonics used
PUBLIC CONSOLE2   ;Program will be reco-
                  ;gnised by LINK
BDOS   EQU 05h
CONIN  EQU 01h
CONOUT EQU 02h
PUSH   HL         ;Original HL saved
LD     E,(HL)     ;
INC    HL         ;Adress of Parameter in
LD     D,(HL)     ;register pair DE
EX     DE,HL      ;exchange registers
LD     E,(HL)     ;Parameter must be in E
LD     C,CONOUT   ;before calling CP/M
CALL   BDOS       ;console output funct.
                  ;
LD     C,CONIN    ;Read a character using
CALL   BDOS       ;CP/M console input fn.
                  ;
POP    HL         ;Original HL restored
POP    BC         ;Return adress in BC
                  ;As per PL/I parameter
LD     E,A        ;passing convention
PUSH   DE         ;place char on stack
LD     A,01h      ;and string lenght in
                  ;accumulator
PUSH   BC         ;Return adress back on
                  ;top of stack
RET               ;Return to calling
END               ;procedure
```

Figure 3 - Results Of Running DEMO1

```
A>demo1

Before calling: PARAM1 = *
*o
After calling: PARAM1 = o
End of Execution



A>demo2

Before calling: PARAM1 = *
*9
After calling: PARAM1 = * PARAM2 = 9
End of Execution
```


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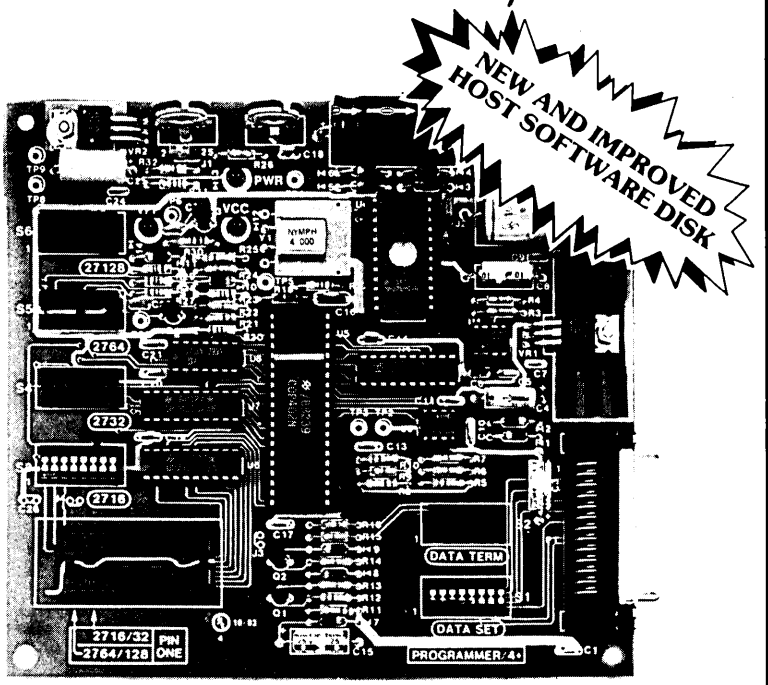

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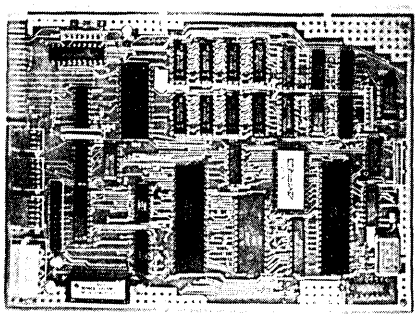

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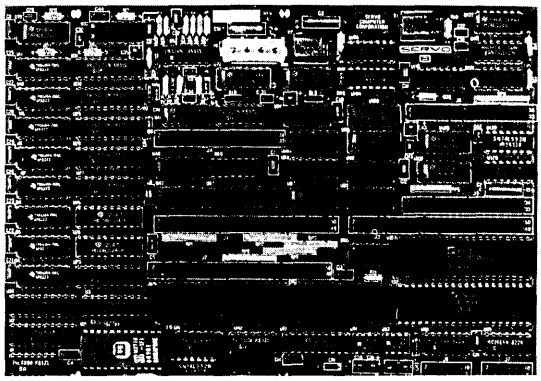

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Pascal Procedures

By John P. Jones

6245 Columbia Ave.
St. Louis MO 63130
314-645-1596

By the time you read this, advertisements for Borland's Turbo Toolbox should be in the magazines. The package consists of three utilities—an indexed file system, a sort utility, and a general installation program.

GINST.COM generates an installation program and the associated files necessary to customize a Turbo Pascal generated COM file to the end user's terminal. Without this utility, applications written in Turbo would either have to be written for each specific terminal or be distributed as source so the user could customize it. The Toolbox licensing agreement permits distribution of the generated installation files and even lets you include relevant sections of the Turbo Pascal manual with your programs without copyright problems.

The other portions of the package are of more general interest. Both the sort and indexed file routines are distributed as source for $Inclusion in application programs.

Turbosort

The sort utility, which uses the quicksort algorithm, can be used for most sorting applications. Because the routine is written to be general purpose, and sorts are extremely dependent on the structure of the data, the user must write three routines to interface to Turbosort. These are forward declared in the sort module and must match these declarations.

INP is called once by Turbosort and it must acquire successive data items. INP then calls SORTRELEASE (in the sort module) for each item. OUTP, which is also called only once, must call SORTRETURN to retrieve the sorted data items for output. The function SORTEOS is provided to let OUTP know when all records have been accessed. Since the user writes these routines, the data can be from any source.

Though it's most likely that you'd input from a file and output to another file, you might also, for instance, input from the keyboard and output to a file.

The third user-provided routine, which is called repeatedly by turbosort, is the boolean function LESS. It is in this routine that you determine sort order (ascending or descending), and whether your program will check single or multiple fields. LESS receives two parameters, X and Y, which are the addresses of the variables to be compared. The routine must declare two variables of the type being sorted on top of the actual variables in memory by declaring them absolute at locations X and Y.

```
var  variable1 : data_type absolute x;
     variable2 : data_type absolute y;
```

Turbosort can be used to sort data files that are too large to fit into memory, since it can automatically set up temporary disk files as virtual memory. I tested the sort routines by generating a file of 1000 records, each 82 bytes long, with a 20 character random sort field. I sorted various parts of the file and output the results to the screen. Timing was from the Run command to the time the first sorted record was output to the screen. I used a 4 MHz Big Board with SWP dual density 8" disk controller using 1024 byte sectors.

# Records sorted	Time min:sec
100	00:05.6
200	00:10.9
250	00:38.8
300	02:30.8
400	03:59.2
1000	20:13.4

The times are quite respectable until you start using disk space. I did not have any other sorting utility for comparison but the results seem to be reasonable.

The sort is easy to use and flexible enough for any application.

Turbo Access

Turbo Access is the B-tree indexed file handler. It is NOT a database manager like dBase II, but it provides the file interface to allow you to write your own database handler. Using Turbo Access is not a trivial task since you need to understand B-tree structured indexes. The manual contains enough information about B-trees for the intermediate or advanced programmer.

Turbo Access uses separate index and data files. The data file is a standard sequential file, with the first record reserved for Turbo Access use. The index file(s) contains the B-tree structure along with pointers to records in the data file. Index and data files are updated by independent routines within the Turbo Access system. This makes the system flexible but you have to make sure that all the relevant files get updated as the data files are changed. Basically, however, the Turbo Access routines can maintain a data file and the index file or files associated with it.

First, a record is added to the data file. Then the index file is updated based on the contents of the key. Although the key does not need to be part of the data record, it is a lot easier to reconstruct a trashed index if it is.

Updates and deletions are performed in the opposite sequence. You access the index in order to locate the record. Then you can retrieve the data. It is never necessary to access the data file more than once to get a record. And depending on the memory available and the application, you might not have to access at all when you are searching the index.

I did not construct a large test database for performance testing but did set up a program for maintaining a club's membership records. I had been maintaining those records using the key-index facilities of JRT Pascal V 3.0. The Turbo Access system is slightly slower than the JRT system but significantly more flexible. Turbo Access allows for duplicate keys and multiple-index files.

This way, you can construct a very complex database. For instance, a magazine article database could be cross referenced using indexes for subject, author, source language, processor, and the like.

The example program BTREE is, by itself, worth the price of the package. If you are at all familiar with programming, I highly recommend that you take a close look at the source for this program.

The program is well written and you can learn a lot about Pascal programming by spending some time analyzing the techniques the Turbo folks used. I was able to set up the club database by making minor modifications to this program. (And it only took one evening.)

In a future column I'll spend some time on pointers, linked lists, and trees. After that we can take a closer look at

how Turbo Access works.

The Toolbox manual is of the same high quality as the Turbo Pascal manual. You get all the information you need to effectively use the utilities.

Turbo Toolbox is available from Borland International, 4113 Scotts Valley Dr., Scotts Valley, CA 95066. It is $49.94.

Turbo Tips

Input filters are used to insure that input data falls within a specific range. The example program, included with Turbo Toolbox, uses a particularly good method to filter character input from the console. (See Figure 1.)

By defining a set type that includes the ASCII character set, it is then possible to pass a subset as a procedure or function parameter. So you can define exactly the range of values that can be returned by the procedure or function.

It is this type of capability which gives Pascal much of its power.

Soap Box

If you are familiar with Jerry Pournelle's column in Byte, you know his opinions about software prices and piracy. I agree with most of what he says, and would like to add a few thoughts.

In order to be successful, a software house has to have at least four factors working in its favor. First, there must be a large market. This means that the product must have general appeal and run on a lot of machines. Next, the product has to be good. Poorly written, "buggy" software has little chance for success.

Third, the program has to be marketed at a reasonable price. The best word processor ever written for microcomputers would sell poorly at $1000 a shot. What is a reasonable price? That, of course, depends on the product. Any software of direct utility in a business application will command a higher price than something like a game since the business can expect to profit from using the product.

Finally, the software publisher has to be able to fill orders There are many cases in this young industry of companies with good products that have failed because they have been unable to keep up with demand.

As the number of small computers expands, the price of software should continue to fall. However, the software publisher can still expect to make a reasonable profit.

Borland International may be the first company to fit all of the above criteria. Their products are all well written, reasonably priced, promptly shipped and run on a broad base of computers. I expect Borland to be around for some time with a growing line of products.

Regarding piracy, quality software offered at a reasonable price should be purchased, not stolen. Only through sales of its products can a company be successful, and every company that fails is a loss to us all. I won't strain my own credibility by telling you that I've never gotten an unauthorized copy of a program. On the other hand, anything I've looked at and have felt was necessary or useful, I've purchased. The copy of dBase II someone gave me has not been used since I tried it out. For what I'm doing, I can't justify the price.

For those of you on a tight budget, there are megabytes of public domain software available for minimal copying fees. Much of it is poor, but there are a lot of excellent programs available, some better than the equivalent commercial product.

■ ■ ■

Figure 1 - Pascal Input Data Test Function

```
type
  charset = set of char;
.
.
function get_char (allowed : charset) : char;
var
  ch : char;
begin
  repeat
    read (kbd, ch);      { input from kbd needs no <CR> }
  until ch in allowed;
  get_char := ch;
end;
.
.
select := get_char ( ['A', 'a', 'z', '0'..'9'] );
.
select := get_char ( ['N', 'Y', 'n', 'y'] );
.
```


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Installing Turbo Pascal

By Laine Stump Micro C Staff

Turbo Pascal is one of the most innovative packages to hit the market in a long time. With its built-in, full-screen editor and the ability to automatically find runtime errors in the source, you can have debugging sessions that rival the speed of an interpretive language like MBASIC (yuck!).

And, because it compiles to machine code, you can have execution speed that is as fast as C or any other 'systems' language and nearly as fast as the same program written in assembly language. However, the full potential of TURBO can only be realized if you use the internal editor for your debugging.

Terminal Condition

Before using the TURBO editor, it is necessary to configure it for your terminal. This is trivial if your terminal is in the list given in TINST's (S) option; as a matter of fact, almost anybody reading this can choose 'ADM3A' and the editor will work.

However, if you want it to work as efficiently as possible, you should create your own definition. This is done by selecting the CREATE NEW DEFINITION option and answering approximately 20 questions about your terminal. This is covered in appendix K; I will briefly go over what is given there adding more detail on the subtle (but important!) points that aren't explained well enough in the manual.

The Inquisition

There are three types of questions asked by TINST. The simplest asks for a Y/N response; just type a 'Y' for yes or 'N' for no and DO NOT follow it with a CR> carriage return. The second type of question asks for a single number. You can enter this number either as decimal by just typing the number, or as hexadecimal by preceding the number with '$.'

When entering a number, you can edit your entry with the (BS) or (DEL) key. To end entry of the number, type (CR).

The third type of question asks for a command string to perform some function such as clearing the screen. TINST is more convenient than many other installation programs because you can enter the command string directly rather than having to enter a list of decimal or hexadecimal numbers.

If a command sequence is '(ESC)=,' you can type the escape key followed by the '=' key and a (CR) carriage return (0Dh) to indicate the end of the sequence. Any control characters typed this way are echoed as 'ctrl-cc' with the exception of (BS)—(ctrl-H), (DEL)—(7Fh), (CR)—(ctrl-M), and (ESC)—(ctrl-[), which are echoed as shown here. All other characters are echoed normally.

One of the most difficult things about entering command strings is that there is no such thing as backspace—once a key has been hit there is no return. If you forget and type a (BS) or (DEL) it will be taken as part of the command you are entering.

So, it is a very good idea to get out the reference guide for your terminal and go through the list of questions given on pp. 231-233 of the manual (for terminal installation) and pp. 11-13 (for editing command installation). Write down the answer to each question on a sheet of paper so that you will be ready and make no mistakes; if you slip up just once, you have to do the entire installation over again.

It is also helpful to STOP after each prompt and read the question. Some questions aren't asked if others are left blank, so you can't count on being able to type in your prepared answers exactly as you have written them down.

Some characters must be entered as strings of numbers (see p. 230 of the Turbo manual). The most obvious example of this is (CR). TINST interprets (CR) as its 'end of line' command, just like CP/M. To get around this, you must type '$0D' (0D hex) or '13' (decimal) instead.

Note: if you enter part of a command in decimal, you must enter all of it the same way! For instance, the Kaypro 10 and the new II-84 and 4-84 have a bug in the terminal driver that causes the 'insert line' command to behave strangely. When the command is given, the current line is broken into two lines at the cursor position. TURBO expects the entire line to be moved down by one position and a new line to be inserted above it.

This difference of opinion means that the file and the screen won't necessarily agree. To cure this problem, you must tell TINST that the command to insert a line is '(CR)(ESC)E' instead of a simple '(ESC)E.' Since you can't directly type a (CR), the way to do it is to reply to TINST's query for an insert line command with the following:

INSERT LINE command: $0D $1B $45(CR)

or 13 27 69(CR)

(Notice the spaces between the numbers.)

When entering numbers for commands, you are allowed a backspace of sorts. If you type a wrong digit you can start the current number over again by typing another '$.' It doesn't work, however, if you have already typed the terminating space. Also, you can't enter a '-' (for 'none') after doing this.

One last thing about entering commands before we start talking about specific questions: you can change an existing definition by selecting its number and answering 'Y' when asked "Do you want to change this definition?" You are then asked the same questions used when creating a new definition, except the old answer to every question is displayed. If you just type (CR), the answer is left unchanged. If you want to change it, type in the new command as described before. If a command isn't supported by your terminal, type a '-' (minus sign) and the answer will be changed to 'Nothing.' This will only work if it is the first character on the line, so be careful what you type.

Terminal Commands

The only command that must be defined for the editor to work properly is the CURSOR POSITIONING command. The screen lines and columns must also be defined, but the other commands simply make it run faster and more efficiently. The questions asked follow a general order of most to least important, with the exception of START/END HIGHLIGHTING. Without these commands, you cannot see what block of text the block commands are going to affect, most inconvenient but still passable.

If your terminal cannot highlight characters, then you can substitute the command for entering and leaving any other 'alternate video' mode, just be aware

that normal text is printed in 'highlighted' mode and special things (like marked blocks of text) are shown as 'normal.' This means that if you have a terminal with reverse video, you should give the command to return to 'normal' video for START HIGHLIGHTING and the command to enter reverse video as the END HIGHLIGHTING command. This seems a bit backwards, but if you do it the other way, the entire program you are working on will be displayed in reverse video, except for the marked block of text and any special characters that happen to be in the file. See Figure 1 for more help.

Figure 1 - What It Really Means

They Say	means
END HIGHLIGHTING	Set Alternate Video Mode
START HIGHLIGHTING	Return to Normal Video

The DELETE and INSERT LINE commands speed things up by making it possible to add and delete lines and scroll through the file without repainting the entire screen every time. The effect of adding these commands is especially obvious when scrolling toward the beginning of the file one line at a time. ERASE TO END OF LINE also cuts down the time needed to update the screen by eliminating the need to type spaces all the way out to the end of a line that doesn't fill the entire width of the screen.

Example

The following is a worksheet that has been filled in for a Kaypro II-84. If you have a Kaypro then you should use this definition rather than the one given in the terminal menu of TINST. If you have an older Kaypro, you should enter nothing (-) for the START HIGHLIGHTING command (the END HIGHLIGHTING command will then automatically be assumed to not exist). The definition supplied for Kaypros will not work totally correctly for any of the Kaypros, because it has highlighting commands not supported by the older models and it doesn't handle INSERT LINE correctly in the newer models, as mentioned before.

Figure 2 - Kaypro II-84 Video Command Worksheet

```
Terminal Type: Kaypro II-84  (4-84, 10)

Send Initialization String? N
Send a Reset String? N

CURSOR LEAD-IN command: <ESC> =
CURSOR POSITIONING COMMAND
  between row and column:  Nothing
CURSOR POSITIONING COMMAND
  after line and column:  Nothing
Column first? N
OFFSET to add to LINE:   $20    (32)
OFFSET to add to COLUMN: $20    (32)
Binary address? Y

CLEAR SCREEN command: ctrl-Z
Does CLEAR SCREEN also HOME cursor? Y

DELETE LINE command: <ESC> R
INSERT LINE command: $0D $1B $45
  (<CR> <ESC> E)

ERASE TO END OF LINE command: ctrl-X

START HIGHLIGHTING command: <ESC> C 1
  < Nothing for older Kaypros
END HIGHLIGHTING command:   <ESC> B 1

number of line on your screen: 24
number of columns on your screen: 80

Delay after CURSOR ADDRESS: 0
Delay after CLEAR, DELETE, and INSERT: 0
Delay after ERASE TO END OF LINE
  and HIGHLIGHT On/Off: 0

Is this definition correct? Y
  (I certainly hope so..)

Operating frequency of your
  microprocessor in MHZ: 4
```

Editing Command Installation

If you happen to use WordStar, you can ignore this section. If you are used to some other set up of editing commands then you can save yourself a lot of grief by changing Turbo's editing commands to match the ones of your normal editor. To do this, select the C> option on the main menu of TINST and answer the 40 or so questions that follow. All these questions are of the same type as the 'command string' questions in the screen installation section and the same rules should be followed for entering them.

You should make up a work sheet for answers to these commands, too. If you want to, you can use the one on pp. 11-13 of the Turbo manual (along with the update for vrs. 2.0 if you have it). The questions asked are sometimes confusing and inconsistent; for instance, did you know that Paging down takes you the same direction in the file as Scrolling up? To help overcome the confusion, see Figure 3.

Figure 3 - WordStar Worksheet

They Say	means
Scroll up ---->	to end
Scroll down -->	to beginning
Page up ------>	to beginning
Page down ---->	to end

Other than this, the only confusing part of installing editing commands is that you cannot have two commands that are the same (if you do, you have to do the ENTIRE installation procedure over again), and you cannot have ambiguous commands. For instance, if you have said that the Page up command will be '(ESC)F', you can't define the End Edit command as '(ESC)'.

The Bottom Line

Turbo Pascal is the greatest thing I have found since root beer floats. (Editor's note: Actually, root beer doesn't float, ice cream floats.) Its capabilities for addressing absolute memory and I/O ports directly make it indispensible for trying out new ideas. With a little work, its built-in editor can be customized to run efficiently and appear almost identical to your usual editor.

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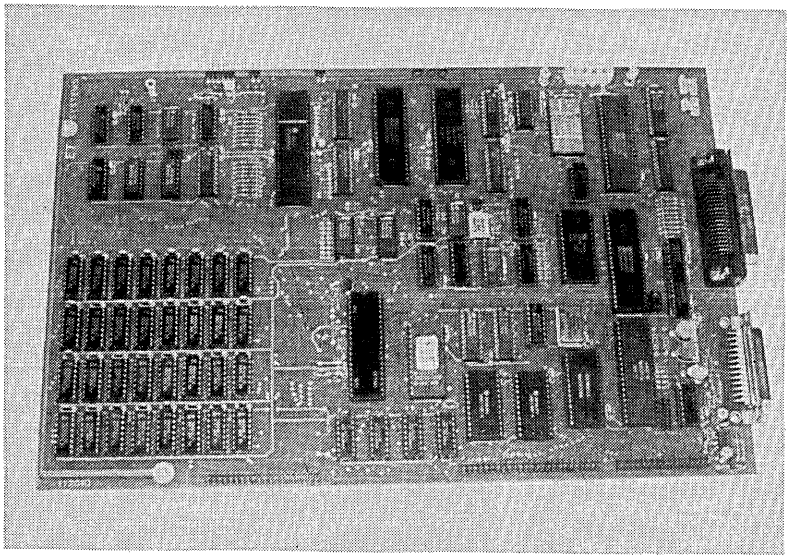

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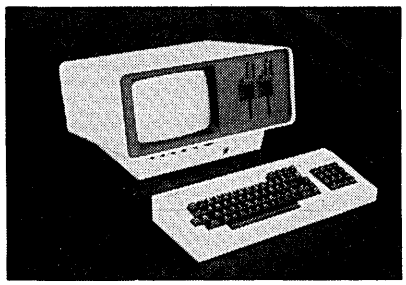

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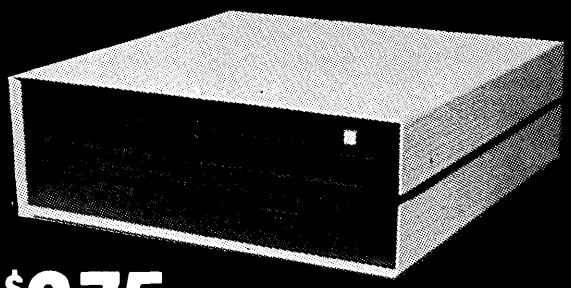

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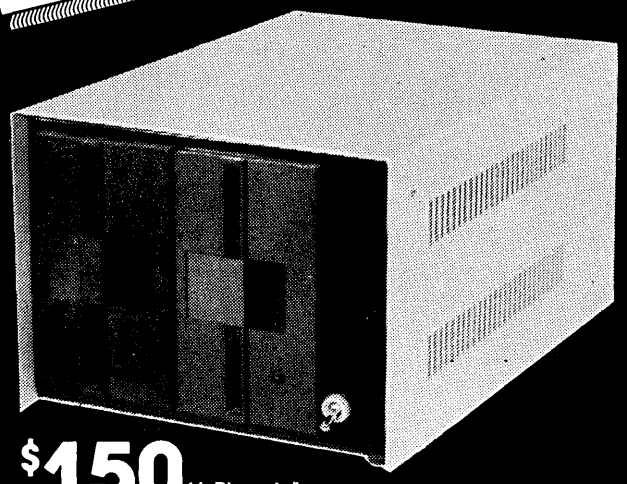

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Xerox 820 Column

By Mitchell Mlinar

1013 W. 210th St.
Torrance CA 90502

Although most of my mail (2 out of the 3 letters) poses questions regarding the Xerox 820-I, there was some interest by the Xerox 820-II user. The last time an 820-II was even mentioned in Micro C was WAY back in December of 1982 (you do save your back issues, don't you?). At that time, John Marlin presented a cursory tour of the 820-II system (sort of a quick test drive). But being an engineer, instead of "driving" it, I tore it apart to see what makes it tick. (At the end of this column there is information on a very deluxe, but inexpensive operating system so that you don't need to purchase CP/M.)

A Little History

The 820-II was born BEFORE the first 820-I was ever commercially sold (1980 timeframe) since Xerox knew that time, tide, and computer technology wait for no man (or company). When the 820-II was finally introduced to the public early in 1982, few eyebrows were raised; after all, it wasn't that different from the -I. Couple the ho-hum greeting with Xerox's public information policy (read: none) and the 820-II quickly entered obscurity.

Most of you -II owners know Xerox does not sell a technical manual for the 820-II, so I recommend purchasing the manual for the 820-I, as there are many characteristics which the -I and -II share.

Contact:
Xerox Corporation
1341 West Mockingbird Lane
Dallas TX 75247

Order:
820 Information Processor
Software Development Guide
Reorder # 9R80368
Cost was $35 in 1982

The only other source of information is the reference section in the CP/M 2.2 documentation that Xerox provides to buyers. However, since the 820-II is no longer made except for limited internal production, and bare boards do not have this documentation, I will assume many of you do not have that either. (Editor's note: I received a call from Xerox marketing about a month ago and they say that the 820-II and the 16/8 are still being manufactured and actively marketed.)

Hardware

I hate to use a cliche, but "where's the beef?" Oh sure, you now have a hot 4 MHz machine with 6k of ROM (up to 8k available) and a new fangled disk controller capable of double density. There is also a cute piezoelectric crystal which can produce a wide frequency range at one volume - annoying. But since one evening and $100 will get you all of the above on a 820-I, there must be more. There is.

For a start, extra video hardware permits four screen attributes: flashing, inverse video, low-intensity and graphics. Although the graphics are nice, no commercial programs make use of them. The inverse video "sea of light" requires welding goggles, and flashing characters send my dog into convulsions.

I like the low intensity mode so I am currently modifying my 820-I to switch between flashing and low-intensity. (More on that in a later issue.) Besides the usual four ports on the back, there is a connector for the disk controller daughter board and a separate bus for future expansion (the 16/8 upgrade board plugs here).

A choice of disk controllers was available for the -II: floppy or hard. The floppy controller is a FD1793 capable of double density operation; the hard disk interface is merely another PIO which operates as a SASI interface. Although this seemed like a nice approach, it was limited. A floppy controller could run either 5.25 or 8 inch drives, but no hard disk. The hard disk interface worked with a SA1403 which only operates hard disks or 8 inch floppies. (Compare that to the BBII which offers all three capabilities.) Since I don't have a hard disk (yet), my discussion will focus on the floppy configured -II.

Software

Compared to the -II, the -I software looks like the stuff I hand-coded for a PDP-8 ten years ago! All of the 820-II specific software (Monitor, BIOS, CONFIGUR.COM, SWAP.COM, INIT.COM, and SYSGEN.COM) was written by Balcones Computer during 1981 and 1982. The monitor code started with version 4.00 and is now up to 4.04. For only 6k of code, it is packed with features.

Upon startup, a RAM test and ROM CRC test are performed followed by the high memory monitor portion move from ROM to F000-FEFF. The upper monitor entry (at FC55H in v4.01) checks for the type of disk controller and, if floppy, the type of disk drives; this information is used to configure the disk I/O drivers.

The monitor in the -II offers 18 commands as shown in table 1 out of which three or four are truly useful. Unlike the -I monitor which loads itself into high memory never to return, the -II makes extensive use of the ROMs during normal execution. All of the 18 commands are located in ROM and overlayed into memory (at FC55H again) before execution. (In contrast, all of the user CALLable monitor routines are present in high memory with the exception of the video driver. It remains in ROM and is called directly.)

This approach saves space since only the command being executed needs to be moved into memory. Although most of the command routines were location independent (only JRs and CALLs to "fixed" routines from F000-FC54), some of them are self-modifying so they have to run in RAM. Of course, the overlay area can be used for disk I/O after system boot. See Figure 1 for monitor commands.

BOOT SYSTEM: This can be accomplished by A or L or LA for loading the system from drive A. To boot drive B, type LB etc.

COPY MEMORY: Copies memory block at (start address to end address) to destination address.

DISPLAY COMMANDS: Gives a quickie help menu.

DISPLAY MEMORY: Dumps memory in standard DDT format from start address to end address. Just like DDT, the start and end values are optional and successive segments can be dumped by just typing D.

FILL MEMORY: Same as DDT: start address, end address, and value all required.

GOTO: Calls subroutine at address; up to three values can follow the address

which are loaded into HL, DE, and BC in order. Any registers not set contain nonsense values.

HOST TERMINAL: Dumb terminal that stores screen lines into memory. These can be accessed by scrolling with the CTRL + up/down arrow keys. Other commands include:

Toggle local echo CTRL + DEL
Toggle local line feed CTRL + LINE FEED
Toggle remote echo CTRL + 1 (keypad)
Transmit break CTRL + . (keypad)
(Break will end when any char is pressed)
Abort CTRL + ESC

INPUT: Display value of input port. After display, press SPACE BAR to display same port again, RETURN to display the next port, or '-' to display the previous port. Any other key exits.

MEMORY TEST: Extended memory test with 256 possible patterns.

MODIFY MEMORY: Modify memory. After display, touching the RETURN will leave the contents alone and advance the address, '-' does the same except backs up the address, any hex value entered replaces the current value, and typing a quote '" accepts the next char ASCII value as the location's new value. Any other key exits.

OUTPUT PORT: Same is input port except writing to it. Note that the Reference documentation errs here - the scroll register reads its data from the normal data lines, NOT the high address lines.

PRINTER PROTOCOL: Xon/Xoff is a flag: 1 = enabled, 0 = disabled. Status mask is mask to read register 0 of the printer (SIO-B). Status value is value after masking to see if printer is available for output (not busy). Next to useless unless you change printers as often as you change disks.

SET BAUD RATE: Sets the baud rate on channel B (unless channel is A) codes include: 05 = 300 baud, 07 = 1200 baud, and 0E = 9600 baud. Codes are sent to port 0 for channel A or port 0C for channel B. All values are in Hex.

TYPEWRITER: Worthless.

READ SECTOR: Disk drive is 0 through F (corresponding to drives A through P). Reads one physical sector regardless of size.

VERIFY MEMORY: Gives a display of all locations that do not match.

WRITE SECTOR: The first time you execute this after turn-on or cold boot, just type W This will give you a nifty copyright message from Balcones. The next time (and thereafter), the write command will work normally. Use caution with this command!

Next time, I will discuss all the monitor entry points—especially those that Xerox told us to avoid.

QP/M

QP/M, a replacement for CP/M 2.x, is now available. QP/M is fully compatible with CP/M but is much more powerful. Like ZCPR you can setup a common user area (where the system searches for unfound programs).

Overlay files (such as those used by Wordstar, SuperCalc, etc.) can be accessed from ANY user area, provided they exist in the common user area. QP/M uses Z-80 code and optimized disk routines for increased speed. Several utilities are supplied, including INSTQPM, PIPQ and STATQ. Also supplied is a compatible copy of ZCPR (a public domain program), complete with source code.

The primary benefit of QP/M is automatic time/date stamping of files. By using the built-in real-time clock in your 820, BB, or Kaypro, QP/M will stamp each file with the current date and time whenever written. The BACKUP utility backs up ONLY those files which have been modified or created since the last BACKUP. Also supplied is a 2k DIR program which can be toggled to display time/date information and .LBR directories.

The complete package, including documentation which describes all aspects of each QDOS call, is available for only $40.00! Send a current address label from Micro C, and get a $5.00 discount. Specify disk format when you contact:

MicroCode Consulting
1013 W. 210th
Torrance CA 90502

■ ■ ■

Figure 1 - 820-II Monitor Commands

```
Command          Format

Boot drive A       A
Boot system       L<disk drive>
Copy memory       C<start addr> <end addr> <dest addr>
Display commands     @
Display memory     D[start addr] [end addr]
Fill memory       F<start addr> <end addr> <value>
Goto location      G<addr> [HL DE BC registers]
Host terminal      H[channel]
Input port        I<port addr>
Memory test       X<start addr> <end addr>
Modify memory      M<addr>
Output port       O<port addr> <value>
Printer protocol     P<Xon/Xoff> [status mask] [status value]
Set baud rate      B<baud rate code> [channel]
Typewriter        T[baud rate code]
Read sector       R<disk drive> <track> <sector> <addr>
Verify memory      V<start addr> <end addr> <dest addr>
Write sector       W<disk drive> <track> <sector> <addr>

NOTE: Parameters within <> are necessary;
parameters within [] are optional.
All parameters and values are assumed to be hexadecimal.
```

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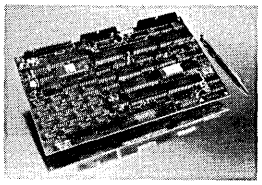

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- **5-1/4" QHD, 1.2Mb**

Up to four drives of any density or size can be connected to MSC-ICO. Both 5 1/4 and 8 inch connectors are on-board to make disk drive connections easy.

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MSC-ICO communicates with printers, modems, plotters, and other standard RS232C devices through its two serial ports. These ports are independently programmable for baud rates, stop bits, data format and parity. Synchronous communication on Port A is jumper selectable.

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A standard Centronics parallel port allows MSC-ICO to communicate with printers and other parallel devices.

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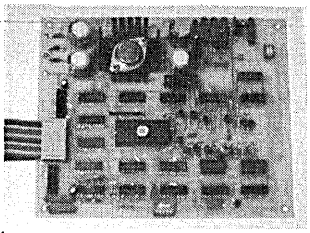

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The Culture Corner

Once upon a midnight dreary, while I pondered, weak and weary,
O'er a quaint and curious program I had written long before;
While I nodded, nearly sleeping, suddenly I heard a beeping
From my Big Board; bugs a-creeping, creeping where I would deplore!
T'was some misstroke I had entered, errant thumbstroke not well centered,
Just a typo, nothing more.

Ah, distinctly I remember, it was in the bleak December
When my hard disk files were listed; that was really quite a chore.
Eagerly I wished the 'morrow. With the dawn I'd seek to borrow
Program guides to ease my sorrow, from the dumps piled on the floor.
My small glitch had thus created endless loops of cosines, fated
To be rooted evermore.

Deep into my green screen peering, long I sat there wond'ring, fearing,
Doubting, dreaming dreams of programs I had dreamt so oft before;
That some subroutine, much needed, had my RAM space just exceeded,
And was therefore rudely weeded, banished from the system's store;
Exiled t'where none can forage, software limbo: federal storage.
There to languish evermore.

Had I brought a curse upon me? More key pounding soon would tell me.
Missing code, programmer's bain; I knew I must explore.
CHESS and CHECKERS, BLKJACK, CARDDECK, even secret Fortran STARTREK,
All these files I quickly queried. To the last they came up poor.
One last hope, a final member: biorhythms for November,
Only this and nothing more.

But I knew there was insurance for my toil and hard endurance.
Nervously I sought assurance, hopefully I did implore.
Daily, hourly, every second, when my Big Board II had reckoned,
I had backed up all my labors safe on floppies, quite a chore.
For eons it did cogitate, then printed out that fateful date:
Quoth the green screen, "Nevermore."

Tony Dowden

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C'ing Clearly

By Tony Ozrelic

Micro C Staff

Philippe Kahn, father of Turbo Pascal, is quoted in the October 1984 issue of Dr. Dobbs' Journal as saying, "C is a disease." He goes on to say that "in Europe, C is seen as an American disease, and here people are trying to spread it."

That's a pretty strong statement, and I wonder how C'ing Clearly readers react to it. To me, such words as "disease" are nonsensical; this is a programming language, not herpes. But then I don't have a Computer Science background (oh, you didn't notice?). I came into software by necessity (so I could make the hardware work), and so I see programming languages as tools rather than religions. Get a hold of the DDJ article and send me a letter.

L Is For Letters

Speaking of letters, I am finally beginning to get some feedback from you folks, most of which has to do with getting small-c to do something useful; my heart bleeds for you! Eric Sosman has figured out a way to compile small-c programs faster: you take out the comments in the .ASM files #included with your C code. Also, he found that CALL.ASM indents each line with eight spaces instead of a tab, making the file quite large. After stripping comments and replacing eight spaces with tabs, the compiles got two minutes faster and the ASM file was 20K smaller to boot.

Eric's comment-stripping program is shown in Fig. 1; he wrote it in MBASIC. Ok, now who's gonna send me a C version? The first one to send one in gets a Micro C T-shirt!

```
100 INPUT "Input file: ", F$
110 OPEN "I", #1, F$
120 INPUT "Output file: ", F$
130 OPEN "O", #2, F$
140 IF EOF(1) THEN 240
150 LINE INPUT #1, L$
160 I% = INSTR(L$,";")
170 IF I% <=0 THEN I% = LEN(L$) + 1
180 I% = I% - 1
190 IF I% <= 0 THEN 140
200 IF MID$(L$,I%,1) = " " THEN 180
210 IF MID$(L$,I%,1) = CHR$(9) THEN 180
220 PRINT #2, LEFT$(L$,I%)
230 GOTO 140
240 END
```

H Is For Help

Scott Rich of 1640 E. 1140 N., Logan, Utah 84321, is confused. He is working with the Manx Aztec C compiler, and, if my notes are correct, he is deaf. That makes it difficult for him to call someone up and ask enlightening (or any other) questions. The following are some of his more interesting questions.

Q Is For Questions

1. What is a library?
2. How do I take a function and build a library out of it?
3. How do I call this library function?
4. When is the extern command used/required?
5. What defines a standard keyword? Is it in the compiler?
6. Can I redefine the standard keywords?
7. When and what do I #include in a *.h file?
8. What do I stick into a library?

A Is For Answers

1. A library is a set of pre-compiled routines that do something useful. An example of this is the runtime library, which is linked with your program after it is compiled.

2. To build a function library, you compile it without the main() program, but with whatever .h(eader) files you need. This gives you a .REL (sometimes called .OBJ) file, which you then link with your main program.

3. Functions are called when you use them. If you forget to include the library which has the function you called during linking, the linker usually complains that it can't find an address, or that it can't find some "name." (The "name" will be that of the missing function.)

4. Extern declarations tell the compiler that the variable you have declared is not in your program, but is in some library you will link to your program later. Functions are, by default, externs. That is, if the function you are calling isn't in your main program, the compiler does not complain—it just assumes it will appear when you link your program with the libraries.

5. Keywords are words like if, for, do, while, switch . . . and they are definitely built into the compiler! These words tell the compiler that you want to do a "for" loop, or a "switch" or an "if".

6. Obviously, if you could alter this list, you would not have a C compiler anymore! No, you can't alter it (at least that I know of. You could use DDT I guess, but why would you want to do that?).

7. *.h files are called header files, and they provide commonly used #defines, variables, and data structures for your program. For example, the stdio.h file contains C's standard input/output routines, and defines commonly used numbers like zero (NULL) or −1 (usually used as an ERROR indicator, as in if(x==ERROR) exit();). By defining constants, we alleviate much grief when it comes time to transport our code to another machine or compiler. It also makes life easier since we can attach a name to the number (pi = 3.14159, for instance).

8. Generally speaking, you put routines you'll be using in many programs into libraries. You can also split a large program into separately compiled segments to make the debug/compile process go faster.

E Is For Example

For example, I was working on a C program to do PC layout on a hi-res video graphics interface. It has a mouse and (soon) a plotter for I/O. To make debugging faster, I split the program into three parts—the graphics I/O (GIO), which handles drawing lines, fetching coordinates from the mouse, and driving the plotter—the graphics package (GP), which did windowing, transformations, and scaling—and the actual drafting package, which did the menus and handled the database management necessary to add, delete, redraw lines, and move from component side to solder side.

Once I had the GIO running, I made it into a library. Then I got the GP working, which went quickly because I didn't have to re-compile the GIO every time I made a change—I just linked the GP with the GIO library. After the GP was done, I could concentrate on the actual drafting package. I had a bunch of functions to open and close windows, scale objects, send text to windows, etc. Real neat stuff. Needless to say, during the development process, I decided that some of the library functions could be ex-

(continued next page)

panded (gee, wouldn't it be nice if I could just . . .). A quick trip to the source of the library and a quick recompile and I was back on the air again.

T Is For Ta-ta

That's it for now. Next issue Bert Berlin will show us how to make our printers do spiffy things with a few simple characters and the printf() function.

P.S. Don't forget to write!

■ ■ ■

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Low Intensity BBI Video

By John P. Jones

6245 Columbia Ave.
St. Louis MO 63139

I have been using the SWP dual-density disk system for some time and both the hardware and software work extremely well. One of the functions added in the software is the ability to set/reset the attribute bit in the video memory. When I began using Borland's Turbo Pascal, which has built-in support for reduced intensity video, I decided to alter the BBI hardware to provide high/low intensity in the video display.

Changes

1. Remove U37, bend out pin 11 and reinstall. This disconnects the blink clock from the video circuit.
2. Connect U25 pin 2 to U25 pin 7 (ground) to re-enable the normal scan line blanking.
3. Jumper U37 pin 12 to U74 pin 11. This latches the attribute bit and makes it available during the dot output portion of the video cycle.
4. Jumper U74 pin 10 to U94 pin 13. The latched attribute bit is now available on U94 pin 11.
5. If you want the attribute bit to cause reduced intensity, connect U94 pin 12 to U94 pin 14 (+5V), for high intensity connect to pin 7 (gnd).

At this point, the hardware changes are different for composite video and separate video.

Separate video

6. Remove R21 to eliminate any effect of the composite video circuitry on the TTL level video.
7. Cut trace from U94 pin 8 to J6 pin 2.
8. Connect 47 ohm resistor between U94 pin 8 and J6 pin 2.
9. Connect 220 ohm resistor between U94 pin 11 and J6 pin 2.
10. CHECK YOUR WORK.

Characters with bit 7 set will now be displayed with altered intensity. Depending on your CRT, you may need to adjust contrast and brightness and/or try different resistor values in steps 8 & 9 above.

Composite video

6. Connect a 3K to 5K resistor between U94 pin 11 and the base of Q1.
7. CHECK YOUR WORK.

NOTE: I did not have a composite video monitor of high enough bandwidth to test the composite video mod. Results not guaranteed!

Cursory Search

One additional problem remains. How do you find an altered intensity cursor character in an altered intensity video field?

Since there is no easy hardware fix, the solution is in software. Figure 1 is a routine to use interrupts from CTC channel 0 to toggle the high order bit of the cursor

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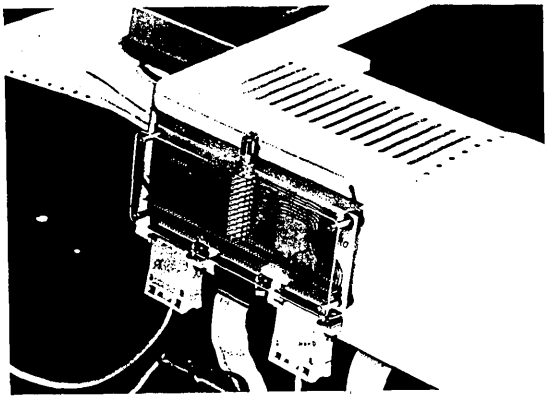

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character at about 4 Hz. The major disadvantage of doing blink this way is that the cursor blink rate drops significantly during periods of high disk activity. This is because interrupts are disabled during disk read/writes. It is set up to be run as a program which copies the interrupt routine to an empty area in PFM and initialize CTC channel 0 for blink timing.

On my system, I modified the PFM overlay that is loaded from disk to include the routine. It could also be included in the BIOS. For BIOS use, put the CTC 0 initialization in the cold boot routine and the interrupt routine anywhere.

If you are still using PFM, a simple patch allows you to send characters with the intensity bit set to the display. At location 0F523H is a RES 7,A instruction (2 bytes). Replace these bytes with NOPs and any char with bit 7 set will be displayed with altered intensity. If you have a PROM burner, patch locations 533H and 544H in the PROM. Alternatively, the patch can be made manually or in the CTC 0 init routine.

This works more than 99% of the time. The remaining problem is that if the final CTC 0 interrupt occurs after the character under the cursor has been replaced but before the cursor pointer (CURSOR) has been updated, the old cursor location can be left with incorrect intensity. This happens very rarely and PFM would be difficult to patch for the problem. If you are using the SWP monitor overlay the easiest fix is to reset the blink counter near the beginning of the CRTOUT routine, just after the input char has been saved in register C. This gives CRTOUT about 250 mS. to do its thing.

```
Blink Counter Reset

ld  c, a        ;existing
ld  a, blnkval  ;added
ld (blnklk), a  ;instructions
```

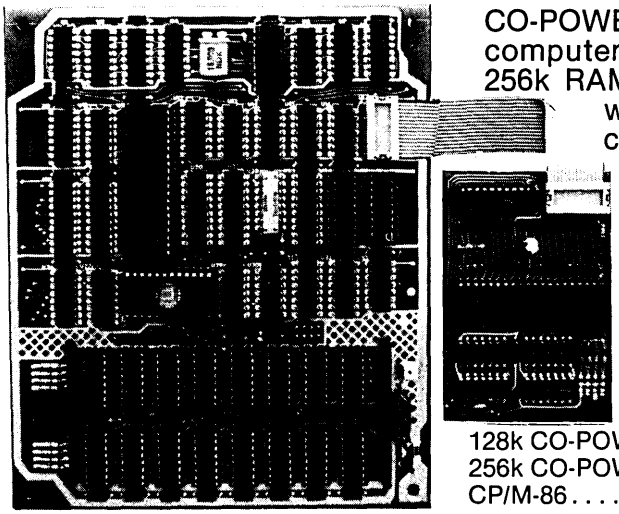
It's surprising how effective screen displays appear when areas can be emphasized or de-emphasized with high or low video.

■ ■ ■

Figure 1 - Blinking Cursor Routine

```
;
;
;       software cursor blink routine (uses ctc0)
;
blnktim equ     15              ;for 4 MHz processor, about 250mS
ctcvec  equ     0ff10h          ;address for interrupt vector table
ctc0    equ     18h             ;ctc0 address
cursor  equ     0ff73h          ;current absolute cursor address storage
bitdat  equ     1ch             ;bank bit port address
;
        org     100h
;
;       first move interrupt routine to final location
;       and initialize vector
;
        ld      hl, blink       ;vector address and destination of routine
        ld      (ctcvec),hl
        ld      de, source      ;source of data to move
        ex      de,hl           ;hl is source, de destination
        ld      bc, length      ; number of bytes to move
        ldir
;
        ld      b, 3            ;three bytes to output
        ld      c, ctc0         ; to ctc0
        ld      hl, initbl      ; from initialization table
        otir
;
        jmp     0               ; back to CP/M
;
source  equ     $
;
        org     0f800h          ; if using M80, .phase 0f800h
;
blink:  ld      (blnksp),sp     ;switch to local stack
        ld      sp,blnksp
        push    af              ;modify no registers
        push    hl
        ld      hl,blnklk       ;update blink clock
        dec     (hl)
        jr      nz, noblnk      ;not time to swap yet
        ld      (hl), blnktim   ;reset timer
        ld      hl, (cursor)    ;point to cursor absolute location
        in      a,(bitdat)      ; get and save bank bit
        push    af
        set     7,a             ;enable crt bank
        out     (bitdat),a
        ld      a,(hl)          ;toggle bit 7 @ cursor location
        xor     80h
        ld      (hl),a
        pop     af              ;restore bank bit
        out     (bitdat),a
noblnk: pop     hl              ;tidy up before exit
        pop     af
        ld      sp,(blnksp)
        ei
        reti
;
length  equ     $-blink
;
        defs    10
blnksp: defs    2
blnklk: defb    blnktim
;
;
initbl: defb    0a7h            ;timer mode, divide by 256 prescaler
        defb    0               ; 256 counts before interrupt
        defb    ctcvec          ; vector low order
;
        end
;
```

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



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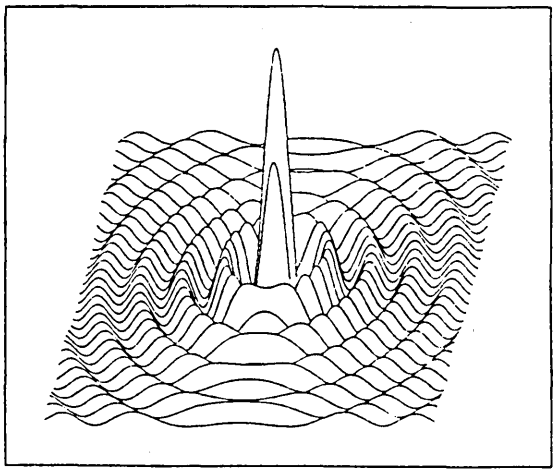

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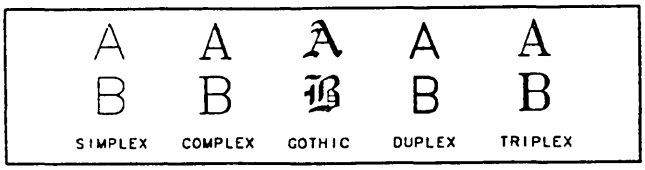

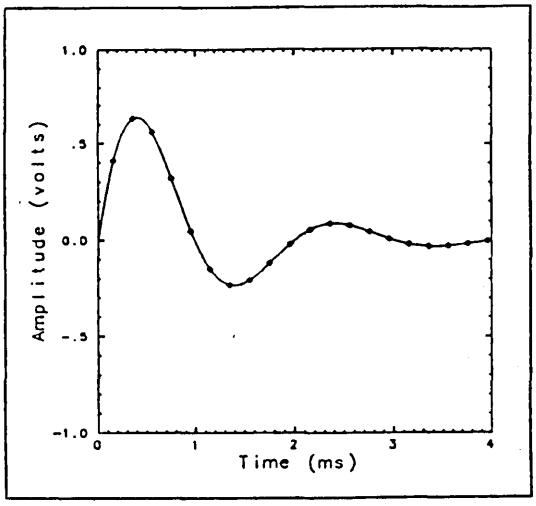

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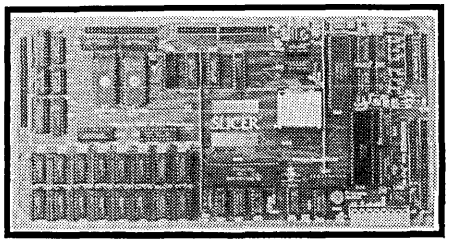

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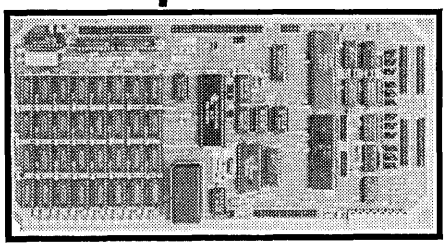

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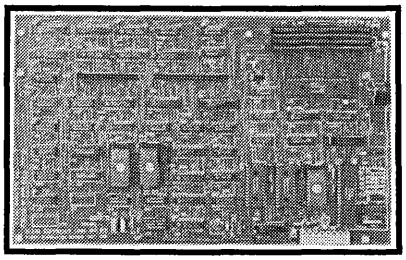

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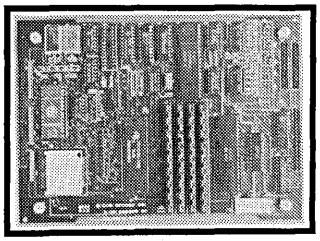

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Slicer Column

By Laine Stump

Micro C Staff

I have undergone massive priority changes in the last two months. Hence, some of the products and projects I spoke of in the last column have been sidetracked momentarily.

But other interesting things have emerged, so this month I will give you a report on some of the Slicer related software and hardware. Then I will cover a few more useful software hints, and end with a description of a fast, cheap way of making one of your RS232 serial ports into a TTL serial port.

CCP/M

Concurrent CP/M has yet to see the light of day. Although it is running, Earl and the others at Slicer want to make certain it is running correctly before they ship it (now that's an interesting policy. Maybe some other firms should try it . . .). CCP/M was almost finished, but Earl had to spend some time working with Slicer's new model (description coming up), so CCP/M got to wait for a while.

CCP/M will sell for approximately $200-$250 and be available only from Slicer. I took a quick look through the "other" magazine and the lowest price I could find for CCP/M on the IBM was $225. Slicer's version can also be reconfigured for a different number of physical and virtual consoles, while the IBM version is locked into a configuration of one physical and four virtual consoles. The Slicer implementation will not (yet) have CCP/M's PCDOS emulation mode, though.

MSDOS

They've finally done it. Slicer Computers is now offering MSDOS for the Slicer; it should be in this issue's Slicer ad. This really opens up a lot of new possibilities for the Slicer since there are quite a few software publishers (notably Microsoft) that do not offer a CP/M-86 version of their 16 bit packages. Even Digital Research has some products that they only offer in MSDOS format. Now, for example, you can get a Fortran compiler that will run on the Slicer.

I have not yet received my copy of MSDOS, so I cannot even tell you which version it is (I'm hoping for 2.0 or better), but I will report on it in the next issue.

PC Board

Of course, even if you have MSDOS you still can't run most of the popular PC software packages that directly access the PC's video memory. So Slicer is designing the "PC Board" (an add-on board that gives you IBM compatible video as well as some card slots for plugging in all those neat PC accessories). It is in the prototype stage right now, and the last time I talked to the folks at Slicer, they told me it was up and running (with Concurrent CP/M no less), so it should be on the market soon.

Son of Slicer

Slicer has an interesting new model based on the 80188 (186 with 8 bit data bus). It has all the same features of the original Slicer, but through the use of AVLSI (Awesomely Very Large Scale Integration) the board has shrunk to the size of a 5" drive. This is also the size of a winchester controller card, so you can now stack the two boards on top of a winchester drive, add a terminal board and a flat panel display, and have a complete system that fits into a briefcase (my spare time project for 1985).

This system wasn't actually developed for the hobbyist market; it was designed for an overseas OEM who is going to base a portable computer on the board. Due to different design goals, the board will be somewhat more expensive than Papa. The problem is that all those new chips (that made it possible to fit all the features into such a small space) are very costly. This means that most people will probably still choose to go with the original, but at least we'll have a choice.

I haven't heard anything yet on pricing or availability. No word yet on the 8087 co-processor board that I talked about last issue, either, but you'll know as soon I find out anything.

Software Workshop

One of the things I need for my Z-80 emulator program (which, by the way, has been stalled by my mandatory schoolwork) is the ability to make direct BIOS calls. In CP/M-80, this is simple; just look at memory location 6 to find the address of the bottom of BDOS and use that to compute the location of the BIOS jump table, then CALL that address.

Things get a lot more complicated when working with CP/M-86. Since your program may be executing anywhere in the 1 Mbyte address space, you must do a CALLF (CALL Far) to get to the BIOS, saving both the IP (Instruction Pointer) and CS (Code Segment) registers on the stack in the process. This would be just fine if BIOS routines ended with RETF (RETurn Far) instructions, but they all end with plain RETs (short returns, not even many happy returns) and RET assumes that only IP was pushed onto the stack when the routine was called.

Apparently the folks at DR knew that someone would want to bypass the operating system (a poor practice that should be avoided whenever possible) so they added a BDOS call to remedy the situation. This is done with Function #50 'Direct BIOS Call'.

When using this function, rather than loading the CPU registers with the arguments that will be passed to the BIOS routine, you must store the arguments (along with the number of the BIOS routine you wish to execute) in a 5 byte descriptor block in memory. Then you must place the offset address of the descriptor into register DX.

Figure 1 contains a subroutine which makes the currently selected drive seek track TRACKNO:

As I previously mentioned, using the BIOS directly is NOT recommended. DR wrote the specifications of the BIOS routines with very specific purposes in mind; if your purposes don't resemble theirs, you can get confused. For instance, the CP/M manual states that the BIOS SETTRK routine may be setup to delay the actual seek until a disk READ or WRITE operation occurs. That means that if you were using the preceding example in a drive test program and you wanted to just perform random seeks, you would have to SETTRK and then do a READ before the head would actually seek.

Monitor Disk Copy

The following little routine showed up at Micro C during the SOG. It shows how to duplicate a SSSD 8 inch disk us-

(continued next page)

ing the Slicer's debug monitor. It is a really neat way of showing the power that was built into the monitor (thanks, Earl). To copy a disk with the monitor, you must first put the source and destination disks into their drives (say drive A and B) and type the following command:

```
+DN0 D? DN1 D? DT0<cr>
```

This tells the monitor to reset both drives, establish the format of the disks, and set the track pointer to 0. Now that the system knows what it is working with, we can execute the copying loop:

```
+DN0 DS1 DM80:0 DR1A DN1 DS1 DM80:
    :0 DW1B,1A &
```

This command first reads a track (1Ah sectors) from drive 0 (A), then writes the same sectors to drive 1 (B). The DW command given here tells the monitor to write 27 (1Bh) sectors on a 26 (1Ah) sector track. This bumps the track pointer up to the next track. The '&' symbol is the monitor's REPEAT command, and tells the monitor to repeat the preceding command until a CTRLC is typed.

After all the tracks are copied, error messages will start appearing on the screen; just type CTRLC and you will be back to the monitor prompt. If you want to use this routine for copying other format disks, just substitute the number of sectors per track for the occurrences of '1A'. Then add one to that number and substitute it for the '1B'. Remember, though, that you cannot do a track-for-track copy between disks with different formats.

Fast MODEM7

The MODEM7SL program on Slicer disk S2 is set up to run at 300 baud. This is done by a routine way down in the middle of the source code near the statement IF SLICER. If you like, you can edit that file and reassemble it to make a version of MODEM7 that runs at a different baud rate, but if you don't want to spend that much time on it, you can get the same results by making the patch in Figure 2 with DDT86.

See the baud rate table on page Monitor 16 of the Slicer manual for values needed for different baud rates. If the number at location 1755 isn't 44h then you don't have the same version of MODEM7SL so you can't make this patch.

TTL Serial Port

My system is a real hodge-podge of odds and ends picked up here and there. Since I don't have a serial terminal, I must, unfortunately, use my Bigboard as a terminal when I am running my Slicer. One of my roommates has a Zenith ZT1 terminal so I hooked it up to the Slicer.

The only problem was that the ZT1 is set up to connect directly to the phone lines through an internal modem and the

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only other connection is a TTL level serial port. After discovering there was hardware modification involved in hooking it up, I dropped the idea for awhile. Then last week when deadlines were looming and everyone wanted to use the computer, I finally decided to take action.

The modification I used involves making two little jumper boards that replace the terminal port RS232 drivers (U19, U20). There are no other modifications needed.

First, make two jumper boards using two 14 pin DIP headers or sockets. Simply connect pin 4 to pin 6 on both boards. This jumpers the data signal across the socket. Call one of the boards H19 and the other H20. Now jumper pin 3 of H19 to pin 2 of H20 and pin 11 of H19 to pin 9 of H20. These last two jumpers connect RTS (Request to Send) output to CTS (Clear to Send) input and DTR (Data Terminal Ready) output to DCD (Data Carrier Detect) input. You need these jumpers if the software you're running uses these signals.

When you have put the four jumpers on the two headers, just unplug U19 and U20, carefully store them somewhere on anti-static foam, and plug in the headers. Your serial port now operates at TTL voltages.

When you make the cable go to the device at the other end, remember that pin 1 is ground, pin 2 is transmit data, and pin 3 is receive data (on the DB25 connector, not the one on the Slicer board). If things don't seem to be working correctly, try switching the two jumpers on JB3 to switch the pinouts of transmit and receive. See page Connectors 4 of the Slicer manual for a diagram of these.

Other Serial Discussions

I recently discovered the use for one of the jumpers on JB2. If your terminal runs at 9600 baud, you can put a jumper between pin 1 and pin 2 on JB2 and the system will bypass the auto-baud code and simply assume 9600 baud. This eliminates the need to type a cr> before the system boots.

Later On

Wishing I had more I/O ports, but not quite having the money for an expansion board, I have been thinking of some possibilities for other ways to chunk on another parallel or serial port—ways that involve small cash outlay. Next issue I will discuss some of these ideas (once I have had the chance to develop them). If anyone has any ideas on such things, please get in touch with me SOON (I have to have the next column finished no later than two weeks after you read this one). Until then, happy trails.

■ ■ ■

Figure 1 - CSEG Seek Routine

```
        CSEG
SEEK:   LD      DX, offset SEEKDESC     ;BIOS call descriptor
        INT     224                     ;call BDOS
        RET

        DSEG
SEEKDESC:DB     10      ;BIOS ftn 10 = SETTRK
        DW      TRACKNO ;reg CX = track to seek
        DW      0       ;reg DX = not used
```

Figure 2 - Modem 7 Baud Rate Patch

```
A>ddt86

-rmodem7s1.cmd
-s1755

xxxx:1755 44 66         ;for 1200 baud, BB for 9600, etc.
xxxx:1756 E6 .

-wmodem12.cmd           ;save 1200 baud version
```


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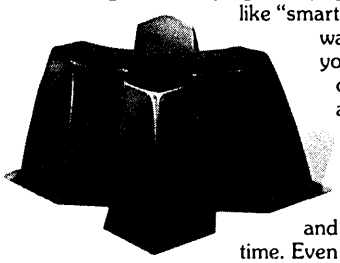

Just like those other "keys", XtraKey lets you redefine your regular keyboard keys to be anything you want. A word, a paragraph, a series of commands . . . whatever you hate to type over and over again! Change or make up new definitions anytime. Even while running a favorite program like WordStar or dBASE II! Unlike other "keys", there's no limit on definition length.* Plus our advanced XShift feature lets individual keys have up to 16 meanings.

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Saving Money on Quad Density Disks

By David Thompson

If you are planning to upgrade to a Kaypro 8 (or are just interested in getting the best possible disk for your dollar) then you're no doubt interested in locating double density (DD) 5" disks that will work dependably in a quad density (QD) drive.

Good Disks vs Bad Disks

The difference between disks is primarily in the way their surfaces are coated, in the way they are polished (burnished) and in the way they are tested. Many different manufacturers use the same raw materials.

Manufacturers can make up for problems in manufacturing by rigorous testing (resulting in high rejection rates). However, when their disks are barely passing double density tests, they are not good candidates for quad density service (or for long term double density service for that matter).

Manufacturing Problems

It is difficult to manufacture a good quality, high density disk. The thinner the magnetic coating, the better the disk records and keeps data. (The thinner the coating, the less the magnetic flux from one bit is able to spread out and effect an adjoining bit—called flux migration.) However, the thinner the coating, the greater the chance of having a dropout (a spot whether the media is missing or is defective).

Iron oxide is the material that stores the information, but iron oxide is very hard and abrasive. Manufacturers add a lubricant to the binder (the oxide particles are suspended in a binder), coat the base material with the oxide and binder and then they polish the surface of the disk. Some disk surfaces are so smooth that you can see your reflection in them, others like Maxell, are rough and abrasive.

Testing

Disk manufacturers grade their disks by testing them. The highest grade is double sided quad density, the lowest grade is single sided, single density.

Just because a disk is only tested on one side (single sided) doesn't mean you can't use both sides. They just haven't checked the back side and they don't guarantee that the back side will work. Otherwise they are the same (single sided are polished on both sides just like the double sided).

Just because a disk has passed a double density test, doesn't mean that it wouldn't have passed a quad density test (again it depends a lot on the basic quality of the untested product).

We have had success formatting and using some standard double density disks in 96 tpi applications. When disks work perfectly in quad density it means they should work more than perfectly in double density (at least that seems reasonable to me).

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DD Disks That Should Work in QD

The MAG MEDIA disks have been amazingly good. We've tested over 500 of them, both double sided double density and single sided double density, and they have all been absolutely solid despite continuous use.

I haven't tested any of the Dysan 5" disks (I can't afford them) but they have such an excellent reputation for reliability that I am comfortable recommending them in any application. Dysan is really the standard in the industry, both for polishing and testing.

Maxell disks have a very good reputation for data reliability but they are abrasive. Tektronix stopped using them because drive heads were being chewed up in less than a year. I cringe when someone sends me an article on a Maxell.

DD Disks That Won't Work in QD

Elephants don't work, period. Their double density disks don't even work well in the standard double density Kaypros. I understand from the rumor mill that they are trying to upgrade their product, but the word, so far, is that "Elephants always forget." (Try to remember that.)

DD BASFs don't work very well QD. They usually format but the latest batch we've gotten don't hold data very long in quad density. BASF, of course, only guarantees them to work double density and they work pretty well in that mode.

Scotch disks might work all right. They had some real problems with quality a year or so ago and I quit using them then. I understand that they are better now but I haven't tried any of the new ones to verify this.

Finally

As far as the rest of the disks, try them for yourself. We test double density 5" disks by formatting them in quad density and then copying back and forth numerous times. Then we go back to double density and try to wear them out by using them as masters for many, many copies.

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Three Keyboard Translators

Review By Philip Bond

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In an effort to make my Kaypro easier to use, I have tried several translation programs which can redefine my keyboard characters. CONFIG, the freebie distributed with the Kaypro, was useful enough to convince me that keyboard translators could be very handy.

(For more on using CONFIG, see ProFiles Magazine, Vol. 1 No. 2 or Vol. 1 No. 4.) I might add that KSTROKES on Micro C disk K24 was not available when I was trying out the three commercial programs described below. I still do not have a copy of KSTROKES, so I cannot make a relative judgement. However, it sounds like a good compromise between CONFIG and one of the more expensive commercial programs.

The three programs I will describe are The Backgrounder, WORDPAD, and XtraKey. Each cost between $40 and $50. All three of these translation programs do one job fairly well, and in about the same way.

All the programs contain a translation table and a small amount of code which accesses the table. The code and table are moved up to the top of the available memory (TPA) where they remain unmolested by programs or warm boots.

When the operator hits a key that is supposed to be translated, the program gets the replacement character or characters from the table and substitutes them for the keystroke.

The Backgrounder

The Backgrounder is a product of PluPerfect Systems (PPS), which also sells the PluPerfect Writer enhancement for Perfect Writer. The Backgrounder must run under a special version of CP/M written by PPS called CP/M 2.2E. Therein lies The Backgrounder's greatest strength and weakness.

CP/M 2.2E is really a series of patches to standard Kaypro CP/M 2.2, in the CCP, BIOS, and BDOS. A complex (but completely documented and prompted) session copies your master CP/M disk onto a blank disk, then patches CP/M and certain utilities. Since some standard Kaypro utilities do not work correctly with 2.2E, new utilities are provided to replace FORMAT, COPY, BAUD and CONFIG. The replacement for CCP is based on ZCPR, but with some functions removed to make room for an enhanced TYPE function.

Because the BIOS is altered, any program which makes direct BIOS calls may not work. Perhaps for this reason, a number of "old reliable" programs get flaky under CP/M 2.2E. Among these are such programs as MODEM7, WordStar, UNIFORM and PIP. The PPS manual also indicates that 2.2E will not work with hardware modifications such as ROMs, speedups, or graphics enhancements. This incompatibility is the main reason I am no longer using The Backgrounder.

Anyway, The Backgrounder does much more than key translation. In the background mode, it lets you run DIR, ERA or TYPE while in the middle of a program like PIP. You can also add other modules such as a screen dump, notepad (simple online editor for notes while in another program). I did not install these modules often, because of the erratic way WordStar worked when they were in memory.

The Backgrounder is easy to use but the setup is not for the casual operator.

WORDPAD

My next attempt to find the best low priced translator program led me to WORDPAD by Wordtech Systems. For the capabilities, WORDPAD might seem a little overpriced, but the concept is beautifully simple and it is virtually immune to hardware and software conflicts. The only problems I had were with programs like UNIFORM and DDT, which also relocate themselves into high memory. Loading such programs can lead to strange halts or runaways.

There are several potential limitations, which may not be a problem for many people. Only the keypad and cursor keys may be programmed, but the keypad hyphen key is used as a shift so you can define up to 35 strings. Each string is limited to 15 characters and defined strings can contain only those characters which can be input from the keyboard. If your application needs special characters (for instance, with bit 7 set) this program will not handle it.

Each keyboard layout is a small independent .COM file, occupying 2K on a Kaypro 4. Calling up a layout displaces the one which was previously in effect, if any. To remove the layouts entirely, you have to RESET the computer.

The master diskette contains versions for the model 10 as well as for 2 and 4. You get a master layout called WORDKEY.COM, sample layouts for WordStar and Perfect Writer (with a set of keytop labels), and SETKEY.COM. You use SETKEY to create your own layouts.

XtraKey

XtraKey is the best translation program I've seen, and is the one I now use. XtraKey by Xpert Software, is apparently compatible with all the CP/M programs I have, and according to the manufacturer it should work properly with most hardware modifications (specifically 5MHz speedup kits, video attribute and graphics kits, and the Micro C ProMonitor ROM). They thought a RAM disk might have problems, depending on how it was implemented. (However, other key translation programs are likely to have problems with a RAM disk, too, so there is no real disadvantage here.)

XtraKey is also the only low cost program I've tried which is compatible with machines other than Kaypro. (Hear that, Big Board users?) In addition to versions for existing models of Kaypro, the master diskette contains a version for other CP/M machines. If you order the universal version only, the price is $39.95. The Kaypro version for $49.95 includes a screen dump routine and a special keypad and cursor key translation routine. (Editor's note: there is also supposed to be a Big Board version that adds the screen dump to the universal version for $49.95.)

Strings of one or more bytes (any HEX value) can be assigned to ANY key, though it is easiest to use the keypad keys. There is no theoretical limit to the total number of bytes assigned to keys, but the practical limit is dictated by the amount of disk space and TPA you want to reserve for definitions.

XEDIT, the XtraKey editing program, has certain limits for individual strings, depending on how much memory you have, but longer strings may be created without XEDIT. The layout can be created directly using an editor, or an existing ASCII text file may become a long string.

Keys may also be temporarily redefined on the fly within any program.

Since the output from Kaypro keypad keys is distinctive, those keys do not require any special prefix key to have an assigned string sent to CP/M. If you are going to redefine the keys on the main keyboard, you must also define a special "shift" key if you also want to be able to use those keys to output their regular characters. You must enter your special shift key before a key will be translated. For this reason, I suspect Kaypro users will probably want to program keypad keys almost exclusively.

Both the Kaypro and general versions of XtraKey have some unique features. You can turn your printer on and off from within any program, you can clear the screen, you can prevent certain characters from going to the screen (nulls, for instance), and you can directly translate all keys on the keyboard to a different single character, with no shift key needed. This makes possible a complete keyboard rearrangement, such as the famed DVORAK layout, for which a definition file is included. Of course, you might want to use this feature only to change a few keys on the keyboard, which is possible by redefining only the keys you want to move.

Summary

Figure 1 compares the three translation programs I have discussed. All three are good values, with only a few flaws here and there. Most differences are probably a matter of personal opinion. The price for The Backgrounder includes the CP/M 2.2E enhancement package.

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■ ■ ■

Figure 1 - Translation Table

	Backgrounder	WORDPAD	XtraKey
Price (list)	$50.00	$40.00	$39.95/$49.95
Manual (pages)	96	12	78
Define Keypad?	yes	yes	yes
Other Keys?	yes	no	yes
Shift keys	1	1	7
String length	255	15	unlimited
Extras? (*)	yes	no	yes

(*) "Extras" refers to features not directly connected with basic keyboard translation.

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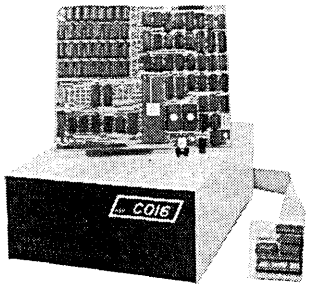

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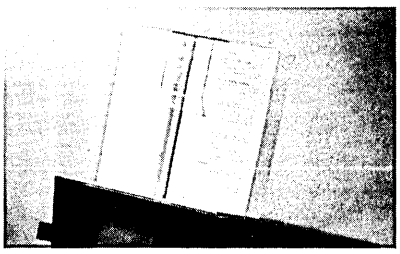

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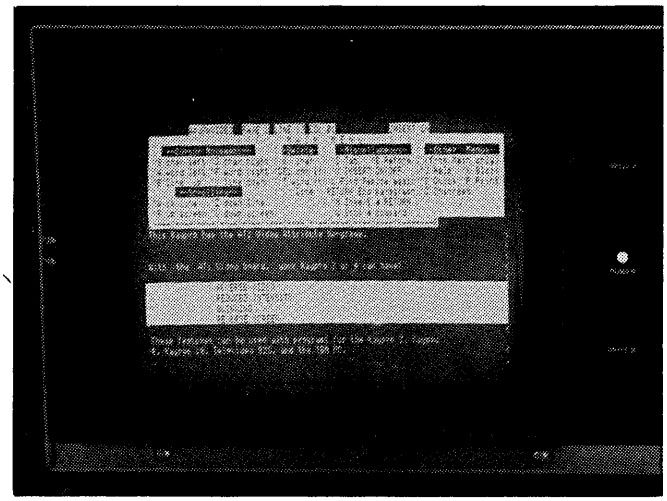

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The Kaypro Column

By Alan Barlow

6921 55th Ave. S
Seattle WA 98118

So you've read the articles in Micro C about adding extra drives and souping up your CPU, and now you want to be the first kid on your block with a 5 MHz mill and double-sided quads growling under the hood. Here is a summary of the steps involved, including corrections, reader suggestions, and a few ideas of my own.

While you're at it, you can also make the drive select lamps do what they are supposed to do—light up only when a drive is (a) selected and (b) running.

The mods are independent. You can speed up your CPU or add disk drives or do both. To speed up an older Kaypro II from 2.5 MHz to 5 MHz will cut processing time in half—a remarkable improvement if you are recalculating spreadsheets, reformatting text files, or creating a program. (See "Benchmarks" in Micro C issue 19, p. 44.)

Disk Drives

The older Kaypro IIs came with two full-height, single-sided, double-density, 40-track, 191K drives. Track spacing was 48 TPI (tracks per inch), so 40 tracks would occupy 5/6". There are three ways to increase total disk capacity.

You could use double-sided drives, which read and write both sides of each disk, giving you a total of 80 tracks per disk (40 on each side). This is the Kaypro 4 format.

Or, you could use 96 TPI drives (commonly called quad density). They pack 80 tracks per side into the same 5/6" of media, so a double-sided drive reads and writes 160 tracks. (Kaypro 8)

Third, you can use half-height drives, like the newer Kaypros. This allows you to stuff up to four drives into your machine. If the drives are also half-power models (most are), four will load your existing power supply no more than the two original drives.

Or you can do all three. If you plug in four half-height, double-sided, 96 TPI drives you get more than 3 Megabytes total usable capacity (for about $540 if you purchase TEACs from California Digital, see the back of BYTE). I replaced just one of my Tandon drives with two half-wides so I have three units in my system.

You can do the speed-up and add the extra drives yourself. All you need is information, tools, parts, and a little skill.

Useful Back Issues

For background information, read the following issues of Micro Cornucopia. For the actual wiring, I suggest following the steps below.

Issue 12, page 24: "The Kaypro Column" (the original speed-up article);

Issue 15, page 14: "Great Eight Kaypro" (converting your Kaypro II to a 4, and the 4 to an 8);

Issue 18, page 3: Letter from Greg DeHoogh (2732 chip select), page 24: "The Kaypro Column" (cutting traces and soldering on the speed-up), and page 26: The "PRO-8 Plus-4" (MC's monitor ROM and 4-drive decoder).

You should also get a copy of the Kaypro schematic from Micro C ($20.00).

In addition, a useful instruction booklet comes with Micro C's Pro-8 Monitor ROM. More about the ROM later.

Not For Beginners

If a lot of monkeys on a lot of typewriters will eventually produce a "Hamlet," then it seems to follow that if you keep hooking up wires and parts, you could eventually wind up with a Cray 2. Sadly, this could require a great deal of time.

Although no technical wizardry is involved, you should not make this your first electronics project. Static electricity that you can't even feel will ruin MOS chips (the big ones). Excess heat from soldering will lift traces (foil strips) and make a hell of a mess to repair. Other things can also go wrong go wrong. (SIC)

You will need the right tools. A soldering gun and acid core solder won't do it. You should have the following:

Recommended Tools

Soldering pencil: 15 to 25 watt, 3-wire grounded (to kill static)
Solder: 22-guage rosin core (I insist on Ersin Multicore)
Desoldering tool: spring-loaded Soldavac
Needle-nose pliers, 4½" to 5", smooth-jawed (to avoid nicking wire)
Diagonal cutters, semi-flush cutting, 4½" to 5"
Wire stripper: for 30-guage wirewrap wire
Stripper/crimping tool: for stripping larger wire and crimping terminals
Allen wrentch: 7/64" for disk drive mtg screws
Socket: 3/16" for serial connector mtg screws
Exacto knife for cutting traces
Screwdrivers, miscellaneous hand tools
Electric drill for mtg holes for new drives
Gooseneck lamp with magnifier

Speed-up

This is the easiest mod you can make. You route the 2.5MHz and 5MHz taps from U86, pins 4 and 5 respectively, to a toggle switch on the back panel. A third line from the switch delivers the selected clock signal back to the CPU board. The switch is useful because a few programs run best (or run only) at 2.5MHz.

You'll need a faster CPU chip, a Z80B, in U63. The B means it will operate up to 6MHz.

You'll also need a faster Monitor ROM, U47. The selection you make depends on your intentions regarding disk drives. If you're sure you'll never be adding extra drives, or replacing the present ones with higher-capacity models, then you could scrimp by buying a blank 2716 rated at 350 nanoseconds or less, and having someone copy the code from the original ROM into the faster part. Or you could buy the Pro-Monitor II from Micro C (it is a 250 ns 2732 which is burned to look like a 2716).

However, if you plan to increase drive capacity, either now or later, I recommend replacing U47 with Micro C's Pro-8 ROM. It should satisfy all your present and future requirements. It will run at 5MHz, and it will allow your CPU to access up to four 5 1/4" drives, single- or double-sided, 48 or 96 TPI, in any combination. In addition, it contains some fancy features. The Pro-8 plugs right into the U47 socket; you'll merely have to cut two traces and add two wires (see below).

Also pick up a small connector to wire in-line between the switch and the CPU board (so you won't have to unsolder wires every time you decide to remove the CPU board in the future).

Parts

1. Z80B CPU chip. Get a Zilog or Mostek part. Leave the chip in its anti-static foam until ready to use!
2. A faster Monitor ROM for U47
3. SPDT (3-terminal) toggle switch
4. Three-terminal connector (male and female pair)
5. 30-gauge wirewrap wire, to make the changes under the CPU board
6. 20-gauge stranded, tinned hookup wire, to connect between the CPU board and toggle switch (get red, white, black, and green if you plan to add extra drives later. These are the colors used in the drive power cable).

Procedure

Unplug your computer from 120 VAC. Then decide where you want to mount the toggle switch. The back panel is recommended, because you won't be using it very often. (Also, if you try to shift gears during operation, the logic will hang up and you'll have to reset, losing everything in memory.) A convenient place is in a ventilation slot, near the reset switch. (I moved my reset switch up front and mounted my toggle switch in the hole it left.)

Remove 10 screws from the sides and top and remove the cover.

Unplug the four connectors on the board: J1 (video), J5 (power), J6 (drives), and J7 (reset switch and LED). Be careful not to bend the pins when removing the disk drive ribbon cable. Use a large flat-tip screwdriver to gently pry up each end of the connector, a little at a time.

On the back panel, use a 3/16" socket to remove the mounting bolts from the serial connector, J4. With a small phillips head screwdriver remove the mounting screws from the parallel connector, J2. Two more screws on the back panel secure the CPU board. Two remaining screws secure the board to the long spacers. After removing these two, put them back into the spacers to keep them apart from the others.

Remove the copper shield from the bottom of the CPU board. After removing the two screws, put them back into the brackets to keep them separated.

Glance at Figure 1 for a review of IC pin-numbering. Counting always starts at the notch. (On some ICs a dimple marks pin 1.) When you're looking at the component side of the board, the pins are numbered counter-clockwise from the notch.

Orientation

In the following directions let's assume you are holding the CPU board in your hands like a book, looking at the component side, with the keyboard connector upward. Locate the 20MHz crystal (in a silver-colored can) at the bottom of the board, near the center. Directly above the crystal is U67. Left of U67 is U66. Right of U67 is U86. Between U67 and U86, and slightly upward, are blank outlines for C6 and Q1 (Kaypro decided these two components were not necessary).

The C6 outline contains two plated-through holes. The bottom hole (nearest the edge of the board) makes a convenient tie-point for the switched clock signal returning to the board. Using your soldering pencil and solder sucker (on opposite sides of the board), open the hole.

Run a 4" 20-gauge stranded wire from this hole to the center pin of the female in-line connector. From the center pin of the male section, run a 12" wire of the same color to the common terminal of the toggle switch (usually the center terminal).

Temporarily remove U86 from its socket (use a small, flat-head screwdriver at one end and carefully pry it out). With your needle nose pliers bend pins 4 and 5 outward just enough so they won't go into the socket when you replace the chip. (We're talking about the bottom row of pins, 4th and 5th from the left end, viewed from the component side—right?) These are the 2.5MHz and 5MHz clock signals.

Solder 4" wires to these two pins and run them to the two outside terminals of the female connector. Now run two 12" wires from the male connector to the two remaining terminals of the toggle switch.

NOTE: These are the only two IC pins which you will have to bend out or solder to! All other wiring can be done quite neatly (and out of sight) on the foil side.

Turn the board over and look at the foil side. The keyboard connector is still upward, as before. The disk drive ribbon cable connector, J6, is now on your left.

Hints

When you cut a trace, use your exacto knife and make two cuts a fraction of an inch apart. Scrape away the foil in between. If you accidentally cut the wrong trace, don't try to drop a blob of solder between the broken ends. Instead, lay a short piece of 30-gauge wire across the break and tack-solder it to the foil.

Use the 30-gauge wirewrap wire to add jumpers on the foil side of the board. When adding a wire, strip little more than 1/16" insulation from each end, to avoid shorting to nearby terminals or traces. To connect to an IC pin, make a J-shaped hook with your needle nosed pliers. To connect to a foil solder pad, lay the wire flat and tack-solder to the pad.

Don't ever keep the iron on any trace, solder pad, or IC pin more than 5 seconds MAXIMUM. With good solder and clean, shiny surfaces you shouldn't need more than 2-3 seconds to do the job. Too much heat for too long will lift traces.

Remember—on the foil side, IC notches are on your right, and pins are numbered clockwise. U66-4 means pin 4 of U66.

Cut trace from U66-4 to solder pad near bottom end of C65.

Add wire from U66-3 to the previous solder pad.

Cut trace from U66-5 to solder pad below U49-2.

Add wire from U66-4 to the previous solder pad.

If you are replacing your 2716 Monitor ROM (U47) with a 2732 (like the Pro-8), then perform the following steps:

Cut trace from U59-2 to U60-1 (address line A11B).

Cut trace from U47-21 to U47-24.

Add wire from U59-2 to U47-21 (address line A11B).

Add wire from U60-1 to U60-8 (ground).

That's all the wiring for the speed-up. Now replace the Z80 CPU (U63) with the Z80B, and the 2716 Monitor ROM (U47) with the faster part—either the faster 2716 which you had burned with the old code, or the Pro-8 2732.

(continued next page)

Caution

Before handling the CPU or ROM chips, always discharge yourself by touching some bare metal on your machine. This puts you and your Kaypro at the same potential and helps prevent zapping gates on the MOS wafer (you need good eyes and tiny tools to repair a gate). All the larger chips (and memory) are MOS. Be especially careful in low humidity. Assembly line workers keep themselves grounded with a wrist strap to the chassis of whatever they are working on.

More Disk Drives

I bought two Mitsubishi M4853s for only $175 each. They are half-height, half-power, double-sided, quad density (784K each), with DC brushless, direct-drive motors. They claim track-to-track access time of only 3ms. When these little hummers go out looking for data, they really rip-snort! The only complaint I have so far is that the disk does not always eject when I pop the door open. I just pull the upper latch down part way and let it snap up a second time.

Adding Extra Drives Requires The Following:

1. Drilling holes in the bracket and physically mounting the new drives
2. Installing address jumpers on all drives and terminators on the last drive
3. Adding connectors onto the ribbon cable for data and control lines
4. Extending the drive power cable and adding connectors
5. Installing a new Monitor ROM, such as the Pro-8 (the original 2716 can address only two single-sided, 48 TPI drives)
6. Adding a four drive decoder on or near the CPU board (the existing hardware can address only two drives)
7. Modifying your CP/M to a 63K system

Parts

1. The drives themselves
2. One 34-pin edge connector for each drive. (Examples: Ansley #609-3415M; Alpha #FCC-170-34; 3M #3463-0001.) If you add both connectors now, you can easily add up to four drives later. (For TEAC drives, see note in Micro C issue 17, p. 19.)
3. One 4-pin power connector for each new drive, AMP 1-480424-0. You also need pins, AMP 60619-1, four per connector. (The Mitsi's come with a connector and pins.) Get four extra pins, for daisy-chaining the wires (explained later).
4. One 3/16" (.188") female push-on connector for each new drive, for the ground wire (AMP 60972-1). Get one extra for daisy-chaining.
5. A new Monitor ROM to replace the 2716 in U47. See discussion under Speed-Up Parts, above. Recommended: Micro C's Pro-8.
6. One 74S04 to replace the 74LS04 in U73
7. 20-gauge and 30-gauge wire (see Speed-Up Parts)
8. Socket-head screws, 6-32 X 3/8", and flat washers. Four each to mount new drives.
9. Four-drive decoder. You can buy Micro C's Plus-4 Decoder Board or you can buy a 7445 chip and a 16-pin socket and make your own.

Procedure

Unplug your computer from 120 VAC. Decide how you want to configure your drives. I made my Mitsi's A: and B:, and my remaining original Tandon C:. This gives me room for all of my most-used programs on A:, lots of data storage on B:, and C: for backup. With A: and B: the same type, I can use fast COPY programs. However, I can no longer use my original version of UNIFORM, which was written for a single-sided, 48 TPI drive in B:. (A number of folks used Kaypro 4 drives in A and B and quad density drives in C and D so they can continue to run everything.)

Remove the CPU board. (Pretty soon you'll be able to do this in your sleep.)

Remove the ribbon cable from the drives.

Unplug the power cable from the drives. On the Tandons, it'll be as tight as a barnacle on a rock. Grab the connector by its little ears and rock it downward.

Remove the socket-head screws. Pull the drives out the front.

On the bottom of the computer remove the four screws that secure the drive mounting bracket. Note that the bracket goes in only one way; keep this in mind when you measure and drill the new mounting holes. If there is a possibility of running four drives in the future, you may as well drill all the holes now. I had to notch my front diagonal brace to get one of the screws to fit.

See Figure 2 for mounting hole pattern. The Mitsi drives seem to be a hair wider than the Tandons. They wouldn't quite squeeze into the top of my mounting bracket, so I simply put the Tandon on top and the two Mitsi's on the bottom.

Be sure to remove all burrs and filings after drilling. (Disk drives are noisy enough as it is.)

Jumpers

Install the address jumpers in your drives according to the instructions that came with them. In your Tandon 100-1s, you have to cut out the jumpers you don't want. Locate the DIP (Dual In-line Package) with the jumpers, near the edge connector. Leave the first jumper (nearest the edge of the board) intact. The second jumper intact = A:; the third jumper intact = B:; etc. If you want your Tandon to be named C:, then you should have the first and fourth jumpers intact; no others. (You may have to bridge a previously cut jumper to set the address you want.)

Some manufacturers specify drive selection as DS0, DS1, DS2, DS3; this is equivalent to the Kaypro's A:, B:, C:, D:.

You have other jumper choices to make. The Mitsubishi drives, for example, have a head-loading solenoid. The heads load (contact the disk) only when the solenoid is energized. If you install a jumper in position HM (not HS), the heads will load whenever the motor runs, and unload when the motor stops. This is normal operation.

Terminators

The drive you decide to install at the bottom (farthest down the ribbon cable from the CPU board) must have terminators installed. No other drive should have them. Most new drives come with terminators installed—remove them from all but the last drive.

My Tandon terminators are contained in a single blue-colored DIP. The Mitsi's use a soldered-in DIP terminator, with 7 individual plug-in jumpers right next to it. To disconnect the terminators, simply remove the jumpers.

Data/Control

To install your newly purchased 34-pin connector onto the ribbon cable, pull off the back and then press the back and front together with the cable in between. You can take your ribbon cable into the shop and have them do it with their special crimping tool, or you can do it yourself with a small vise. Be sure to align the connector carefully with the wires in the cable. The hardest part is getting the connector separated. It takes two people—one to probe with a small, pointy tool in the latch holes, and another to cuss (or discuss).

Power

Note the double wires in the power connector for your uppermost existing drive. To daisy-chain power to your new drives, remove the last connector (with single wires), discard the pins, and install new pins with two wires crimped in each.

Be sure to get the right wires to the right pins. When you copy the existing wiring, note that the connector is keyed to mate only one way.

Daisy-chain the green ground wire in the same way. Cut off the last push-on connector and install a new one with two wires crimped in it.

Circuit Board Wiring

Side Select: Locate the pad labeled E40 (on the component side, it's at right of U73). Now flip the board over to the foil side.

Cut trace from U73-5 to ground bus. Add wire from U73-5 to solder pad E40 (Side Select). Add wire from U73-6 to J6-32.

NOTE: J6 pins are even-numbered from bottom to top on the inside column. (Labeling is on component side.) J6-32, therefore, is the second pin from the top, inside column.

See directions under Speed-Up for installing a 2732 Monitor ROM. If you haven't done it, do it now.

Now you need to add a four-drive decoder. If you've bought one from Micro C, follow the instructions and install it.

If you're rolling your own decoder, this is your big chance to make the drive select lamps behave the way they always should have.

Locate the blank DIP outline labeled U75, near J6. It's made to order for this application.

Use your solder sucker to clean out the 16 holes. Install a 16-pin socket, orienting the notch like all the other ICs. Solder pins 5, 6, 7, 9, 10, 11 and 16 to hold it in place. Wire it according to Figure 3 and the following table:

Wiring Table

Cut trace from U71-6 to J6-12 (Old Drive B Select)

Cut trace from U71-8 to J6-10 (Old Drive A Select)

Add wire from U71-6 to U75-14 (Drive Decode 0)

Add wire from U71-8 to U75-15 (Drive Decode 1)

Add wire from U81-2 to U75-13 (Motor On)

Add wire from U75-12 to U75-8 (Ground)

Add wire from U75-1 to J6-6 (Select D)

Add wire from U75-2 to J6-12 (Select B)

Add wire from U75-3 to J6-10 (Select A)

Add wire from U75-4 to J6-14 (Select C)

If you have already installed the Micro C decoder board, you can still make the drive select lamp modification. Simply remove the ground from pin 13 of the 7445 on the decoder board, and wire it instead to pin 16 of the ribbon cable connector. This will duplicate the circuit in Figure 3.

Plug the 7445 into U75. Replace U73 with the 74S04. Install your new Monitor ROM in U47, if you didn't do so already in the speed-up mod.

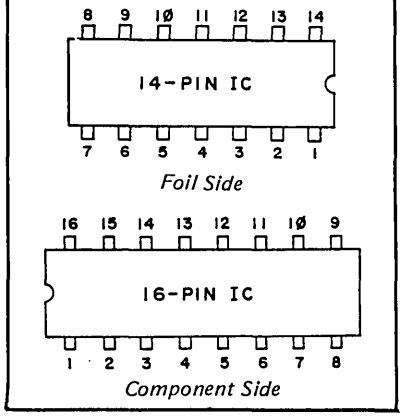
Put it all back together, and connect the power, ground and data cables to the drives. Don't forget the copper shield under the CPU board (copper side away from the board).

Read the instructions with your Pro-8 Monitor ROM for creating a 63K CP/M.

Plug it in, turn it on and stand back!

■ ■ ■

Figure 1 - Pin Numbering On IC



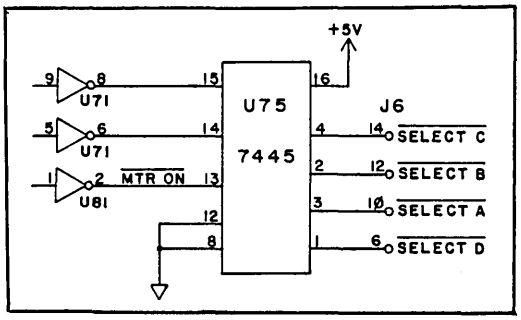


Figure 3 - Four-Drive Decoder With MOTOR ON Monitor

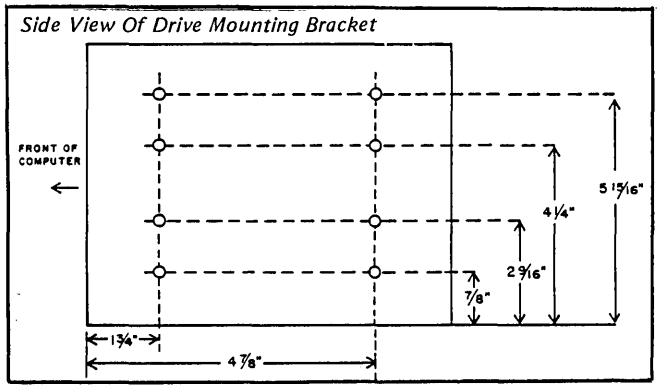


Figure 2 - Dimentions For Half-Height Drives

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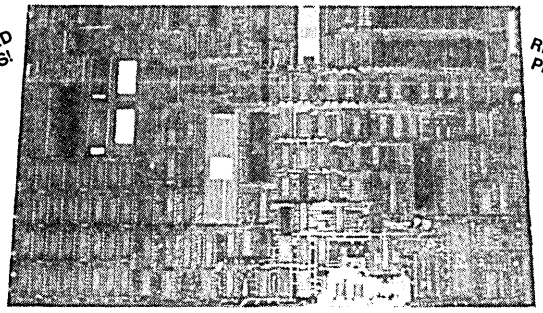

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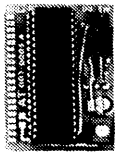

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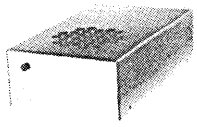

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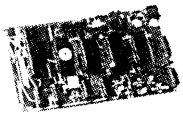

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*Benchmark test data (see below)

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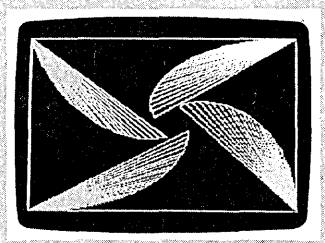

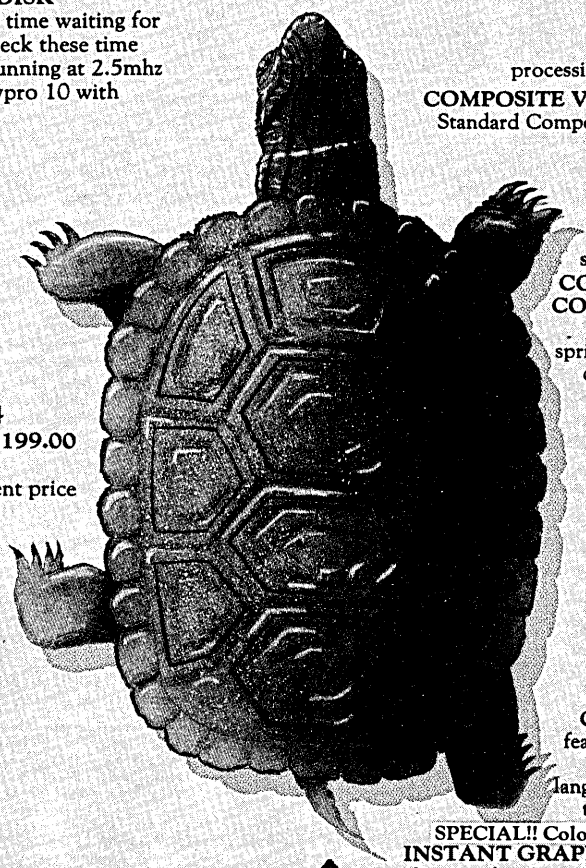

Time in Seconds

	2.5 MHz Kaypro		4 MHz Kaypro		4 MHz Kaypro 10
	Floppy Disk	Ram Disk	Floppy Disk	Ram Disk	Winchester Hard Disk
Load Perfect Writer	8.37	2.46	7.64	1.76	6.57
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.

TLC® LOGO is also available for all Kaypros with internal graphics (2-84, 4-84, 10). No modifications required. This Standard Version uses the internal screen, has 16,000 pixel resolution, multiple turtles, multiprocessing, vectors and many LISP commands . . . **$99.95**

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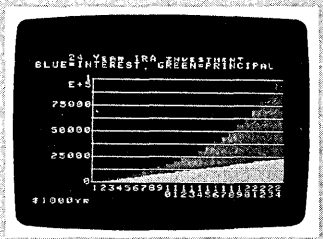

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KAMAS, An Outline Processor

Review By Jack Rodenhi

1317 W. College Ave.
Lompoc CA 93436

I have long been intrigued with the slightly mystical appearance of mind amplification ads, so at SOG III, I attended the KAMAS lecture. After hearing a straightforward talk by Adam Trent and his associate, Anne Hickman, I offered to do a review on KAMAS for Micro C.

KAMAS Programming Language

One cannot review the KAMAS program without first discussing the KAMAS programming language.

A fully developed application development environment, the KAMAS language has some interesting variable types, several good control structures, and runs interpreted code quickly. But it is complex.

A detailed review of this language would require a whole series of articles. Compusophic Systems, developers of KAMAS, publish a newsletter that goes into considerable depth on this FORTH-like language. The language is also thoroughly covered in the two manuals that come with the program.

Also included in the package is a small book which serves as an introduction to outline processing, the major function of KAMAS.

Outline Processing

Outline processors, which have recently become quite popular, basically help you create or work from an outline.

So what should the computer user expect from the KAMAS outline processor? It has a pretty decent text editor with commands similar to those of Perfect Writer. You can enter and edit text from the one or two line descriptions KAMAS uses for keys (for leaves, branches, and stems of the outline).

KAMAS helps you create an outline in two ways. First, it allows the outline to be compressed or expanded so you can zoom in for detail on a leaf or particular branch or back off to view the entire tree.

Second, KAMAS lets you reorganize the outline any way you wish. I believe this is the most important thing an outline processor can do. Word processors allow reorganization, but outline processors go even farther by letting units of text be linked together logically.

The Bottom Line

So how did I like KAMAS? On the negative side, the flexibility and full blown language capabilities that KAMAS includes have been achieved at the cost of simplicity. You could spend a lot of time exploring parts of the package you won't really use.

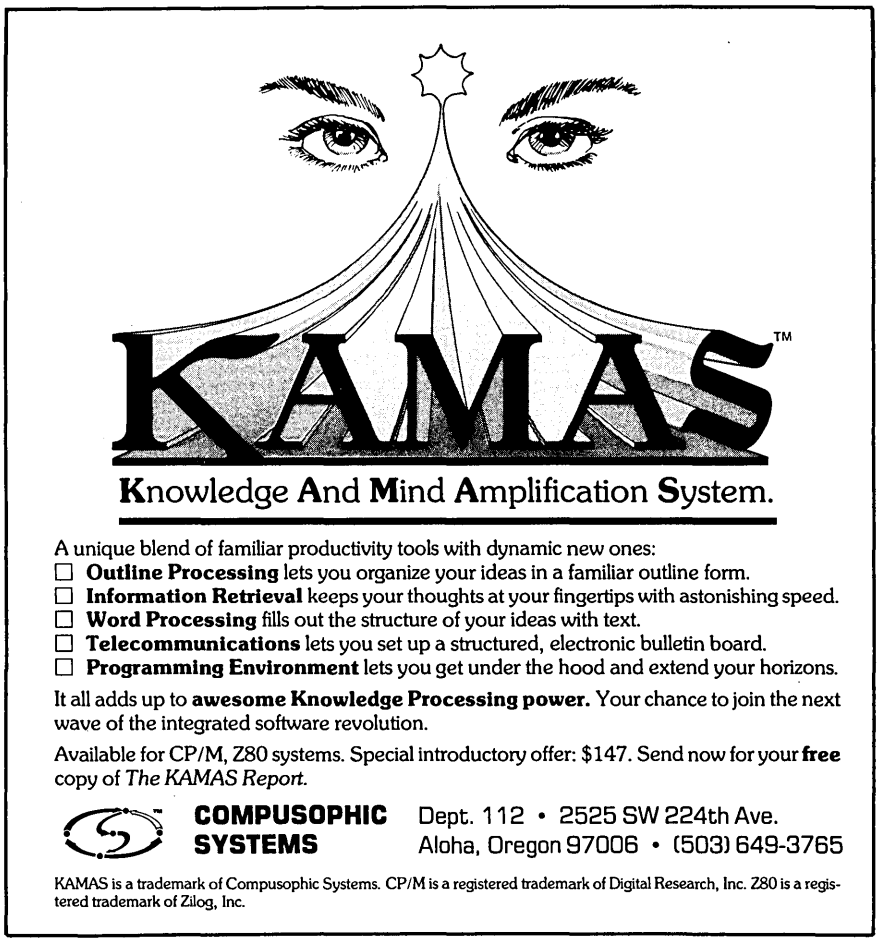
On the other hand, if I spent as much time working with KAMAS as I do with Wordstar, I would feel very comfortable with its complexity, I'm sure. KAMAS has an excellent on-line help facility, and the best way to learn any program is to use it.

Another thing I didn't particularly like about the program was that the delete key is not handled consistently within the program. Within the outline editor, the delete key will back up and delete one character from the entered text. At the ROVE prompt, however, the delete key echoes the deleted key and the backspace key has the desired backup and delete effect.

Owners of Kaypro 10s may not be jubilant with KAMAS. On my Kaypro 4, I get excellent scrolling speed, but my 10 reads a little data and prints it and reads a little more and prints it and so on. It only prints about four lines per second, whereas my 4 probably prints a screenful a second. When I asked Adam about this, he was at a loss to explain it. I suspect that the KAMAS files are spread around on my hard disk and the head is spending a lot of time seeking records. This inconvenience could be solved by unloading some of the clutter before loading KAMAS.

Other than these problems, I found the program dependable, and if you feel that an outline processor would help you in your work, you might want to give KAMAS a hard look.

■ ■ ■



FORTHwords

By Arne A. Henden

7415 Leahy Road
New Carrollton MD 20784
(301) 552-1295

EDN magazine is one of those engineer's freebies that I recommend getting. About once a month, EDN publishes a feature article on some aspect of microcomputers, such as floppy disk drives, laser printers, etc. The July 26, 1984, issue covered pointing devices (joysticks, mouses, etc.). I thought it was a very succinct review and I learned a lot about what pointer I want in my next computer.

Back At The Ranch

I bet you are wondering what all this has to do with FORTH! The above article mentioned that Microtouch Systems, Inc. produces a continuously conductive touch panel that uses the Rockwell 65F11 FORTH chip for its control. Many of these pointing devices are becoming "smart," and the use of FORTH as a controller sounds like a good marriage.

Big Board II Graphics

I've always felt that BBII owners have gotten shortchanged. Since one of my friends finally bought a BBII, I've had a chance to customize UNIFORTH to support the special features of the BBII.

This column will discuss implementing a rudimentary graphics package for the BBII, interfacing with hardware using FORTH.

I approach hardware/software projects with a basic goal in mind, first familiarizing myself with the hardware, then designing the software package to support it. The steps taken in bringing such a project to fruition are listed below.

Have A Goal In Mind

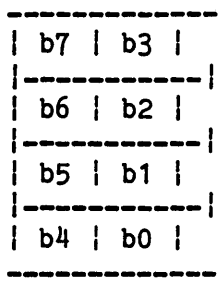
I know this is obvious, but when you sit down at your computer, you should have a goal. It directs your investigation and makes your time much more productive. For our example, the goal is to create a basic graphics package that makes optimum use of the BBII's built-in video.

Look At The Hardware Architecture

Each chip manufacturer publishes a product data book detailing the chip specifications and programming considerations. If you own a Big Board, I highly recommend obtaining a copy of the Zilog and Standard Microsystems Corporation data books.

The BBII uses a CRT8002 Video Display/Attributes Controller (VDAC) to provide the actual dot data to the 6845 CRT controller. The CRT8002 has 4 modes of operation: an internal 7x11 dot character generator for the 128 ASCII characters; wide or block graphics; thin line graphics; and external input for an off-chip character generator.

I'm going to be using block graphics for this application. This mode divides each character cell into a 2x4 matrix, assigning each "pixel" to an input bit. A diagram of this assignment is shown below.



Note that block graphics gives you a 160x96 dot resolution, quite adequate for most situations. For all you non-BBII owners, block-mode graphics are not unique to the 8002. The TRS-80 and other computers and printers also use block graphics. And this particular graphics package should be usable for other systems, besides the BBII.

Study The Hardware Interface

We now know not only how the CRT8002 works, but also how it is incorporated into the computer. This means looking at the schematics and reading the BBII documentation to find port addresses, supported functions, etc.

The CRT8002 uses two normal sources of data input: a RAM array of ASCII codes to display, and a RAM array of attributes for each displayed character. The BBII has bankswitched memory, switching the lower 32K between RAM—ROM and CRT—and the STD bus. In the ROM/CRT bank, addresses 6000-6800H are used for the display codes, and addresses 7000-7800H are for the attributes. You may access these directly by manually switching banks from a routine residing in the upper 32K, or you may use the monitor calls.

Study The Software Interface

Software interface deals with how the monitor interfaces with the 8002, and what kind of function calls it makes available to the programmer. If you look at your scant documentation, you will find some single control-character and escape sequences that control the 8002. First, send a 26 code (CRTL-Z) to clear the screen. Control characters are sent by prefixing the code with a 31. Escape sequences provide cursor addressing, graphics mode selection, and character attribute control. You will find on screen 1 the FORTH words to provide these functions.

Design The Graphics Package

By now we've read the documentation, played with programming and initializing the chip, and feel confident with this new knowledge. The next step is to decide what functions we want to implement, and to name routines to implement those functions. For most projects, the design phase ranges from 5 to 50 percent of the total development time. Because of the simplicity of this project, the lower percentage figure is more reasonable.

Write down the functions you want the package to perform. In this case, simplicity reigns: I just want to be able to enter an x,y pair and have a dot plotted on the screen. Then break up each of these functions into building blocks.

In our example, you must initialize the graphics generator (such as clearing the screen)—you must get the user to input the X,Y coordinates—you then break the X,Y pair into a character cell (and the position within that cell)—and you must actually display the points on the screen.

Your breakdown should continue until each block is one short FORTH word. Then carefully assign the name for each block so you can read the final program and understand it.

I tend to program "quick and dirty." While there may be an easy way to use the row/column offset to pick an 8-bit code that will plot that pixel, I decided to use the offsets as indices into a lookup

```
SCR # 1
  0 ( BBII Graphics Package -- 1            100784AAH)
  1 : BLOCK-MODE  ( set graphics mode)
  2    27 EMIT  77 EMIT  48 EMIT ;
  3 : ASCII-MODE  ( set ascii mode)
  4    27 EMIT  77 EMIT  52 EMIT ;
  5 : NORMAL-GRAPHICS  ( set graphics attribute)
  6    27 EMIT  71 EMIT  56 EMIT ;
  7 : NORMAL-TEXT  ( set normal ascii attribute)
  8    27 EMIT  71 EMIT  48 EMIT ;
  9 : NO-SCROLL  ( turn off scroll function)
 10    27 EMIT  46 EMIT  50 EMIT ;
 11 : SCROLL  ( turn on scroll function)
 12    27 EMIT  46 EMIT  48 EMIT ;
 13 : GOTOCR  ( col row -- ..move cursor)
 14    27 EMIT 61 EMIT  32 + EMIT  32 + EMIT ;
 15 -->
```

```
SCR # 2
  0 ( BBII Graphics Package -- 2            100784AAH)
  1 : GRAPHICS  ( enter graphics mode)
  2    NO-SCROLL  BLOCK-MODE NORMAL-GRAPHICS ;
  3 : TEXT  ( enter text mode)
  4    SCROLL  ASCII-MODE  NORMAL-TEXT ;
  5
  6 : CMATRIX  ( ncols nrows -- ..create byte matrix)
  7    CREATE  OVER , * ALLOT  DOES>
  8    DUP 2+ SWAP @ ROT * + + ;
  9
 10 80 24 CMATRIX SHADOW  ( crt shadow array)
 11  2  4 CMATRIX BITMAP  ( character/dot bitmap)
 12
 13 HEX  0880  0 0 BITMAP !    0440  0 1 BITMAP !
 14      0220  0 2 BITMAP !    0110  0 3 BITMAP !
 15 DECIMAL -->
```

table to select the correct bit pattern. I added a byte matrix defining word because this new data type was needed, and might be useful later.

Code And Test The Package

You can see what names I chose and how I broke the package down by looking at screens 1-3. The monitor commands are straightforward. The word PAGE provides the clear-screen function, and XYTRANS performs the x,y to character cell/offset form. But why is that SHADOW array there? And why do I precede each graphics character output with a 31 code?

When I first coded the routines, I started with the words in screens 1 and 2 and then played with outputting characters on the CRT. You can switch to graphics mode and then just send characters with EMIT. Patterns such as 1, 4, 20H, etc. each turn on one bit of a character cell.

This kind of rough experimentation is useful (not to mention crucial) before you do much planning. Such interactive testing is where FORTH excels. In our case, the testing demonstrated that the monitor masked off bit 7 of each character, preventing codes such as 80H from plotting correctly. In addition, all control codes (such as 1, 4, 9, etc.) are not plotted. However, preceding codes with a "31" will bypass the monitor's stripping function.

Problems And Solutions

The SHADOW array also arose from this preliminary testing. The problem is this: what if you want to plot two dots, but both dots fall within the same character cell? The BBII monitor does not permit fetching a character from the CRT memory so that you can OR in a second dot and re-output the character.

```
SCR # 3
  0 ( BBII Graphics Package -- 3            100784AAH)
  1 : PAGE  ( clear screen and clear shadow array)
  2    0 0 SHADOW 24 80 * ERASE  26 EMIT ;
  3 : XYTRANS  ( x y -- coloff rowoff col row)
  4    4 /MOD >R SWAP 2 /MOD >R SWAP 2R> ;
  5 : ADD-DOT ( coff roff col row -- ..dot to crt & shadow)
  6    2DUP SWAP GOTOCR SHADOW ROT ROT BITMAP C@ OVER
  7    C@ OR DUP 31 EMIT EMIT SWAP C! ;
  8 : !DOT  ( x y -- ..store dot on screen & shadow)
  9    XYTRANS ADD-DOT ;
 10 ;S
```

There are several solutions to the problem. You could bankswitch and directly access the video RAM, requiring a routine resident in the upper 32K of RAM so it is not also switched out. Second, you could keep a 1-line buffer in memory, set all bits in that line, and then output the entire line at once. This method requires some fancy footwork and prohibits real-time plotting of acquired A/D data, etc.

The solution I chose was a generalization of the second method. A 24x80 byte array is kept in RAM, exactly duplicating (shadowing) the CRT display. Each time you EMIT a character, you also store it in SHADOW. When you need to OR a bit, you fetch the shadow byte, OR the bit, EMIT and store it back. Did I invent shadow screening? Heavens, no. It is a common trick in track buffering schemes for disk controllers and is even found in RAM/EEROM chips. Shadow screening works quite well in this graphics application, but at the cost of 2K bytes.

If I were building this package for sale, I would probably directly access video memory as it is faster and does not require the 2K RAM array. However, using a shadow screen gives the package more portability, does not require any assembly language programming, and does not limit the physical location of the graphics package in memory.

Follow-up

There you have it. The !DOT word is the only primitive you need to start building a full-blown graphics package. Line drawing algorithms can be found in many articles; the graphics primers now appearing in many bookstores give BASIC routines that can be adapted to implement lines, circles, filled boxes, pie and bar charts. The rest is up to you.

One More Thing

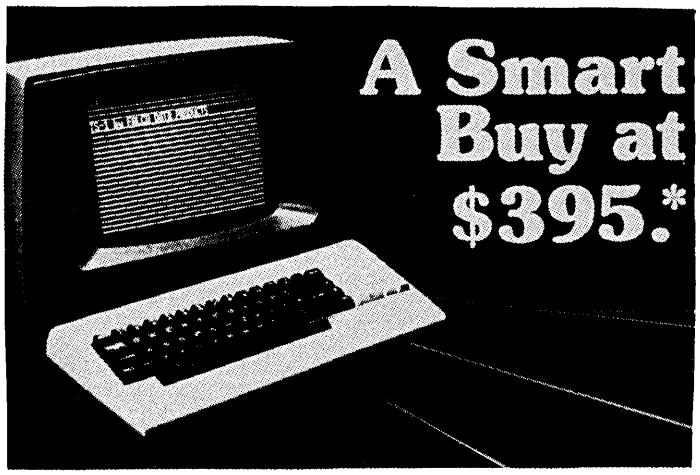
Unfortunately, I wasn't able to attend the FORTH Interest Group annual meeting in November or the FORTH Modification Laboratory (FORML) meeting. I'm certain some of you attended, and hope that someone will send me a summary so I can pass it along to other Micro C readers.

■ ■ ■

IN SEARCH OF THE PERFECT TERMINAL . . . . . .

Refer to Micro Cornucopia Review; October 1983, Page 7.

It took some probing, but we located the Falco TS-1 terminal as described by David Thompson last year in his article, "In Search Of The Perfect Terminal", and we have them in STOCK !



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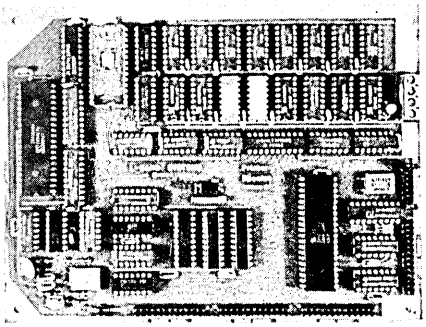

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SBASIC Column

By Jack Rodenhi

1317 W. College Ave.
Lompoc CA 93436

This will be the last regular SBASIC column I will be writing. I have just opened my own CPA office and it seems things that were easily done a month ago take lots of extra attention this month. I have also become a fairly rabid (and rapid) Turbo Pascal user.

Background

I bought my Kaypro in August of 1983. I had had a little experience programming in Microsoft BASIC, dBase II and Apple Pascal, and was convinced that compilers in general and Apple Pascal compilers in particular were a real drag. However, when I got my Kaypro, I discovered it came with a compiler that would let me write real CP/M .COM files. That compiler used words and concepts that were similar to MBASIC and dBase II.

Working with SBASIC, I discovered what a heady experience it was to create a subroutine and call it anything I wished. No GOSUB 25110 in my SBASIC programs. If I thought it was appropriate to repeat a process "Until Miller Time," then that's what I did. SBASIC introduced me to the joys of local variables and modular code. I also learned to appreciate "information hiding" (one of the main strengths of Modula-2).

SBASIC has given me much, but I think it is time to leave it behind. SBASIC is a good transitional language between BASIC and Pascal, but it's not portable. Also, you will have to learn many things about SBASIC that you won't be able to apply to other languages.

Compared to Turbo Pascal, which comes with its own application development environment, writing and debugging in SBASIC is tedious. In fact, I have written most of my recent SBASIC programs (for this column) in Turbo and then translated them into SBASIC after they were fully debugged.

Creepy Crawly Thing

While putting together the program for this column, I ran across what I believe is a significant bug in the language.

The procedure ReadRecords ends by assigning the value 10 to the variable ListSize. ListSize is a variable global in the procedure sssort.

In the main routine of the procedure sssort, there is a call to procedure ReadRecords, the last line inside the procedure prints the value of ListSize (10). On returning to sssort, the value of ListSize is again printed. This time it is 0 even though ListSize is declared as a global variable. Apparently ReadRecords has set up its own undeclared local version of the variable ListSize. The compiler has mutinied!

This particular bug, quirk, aspect, or (depending on your point of view) feature of SBASIC seems to be undocumented. In the section on Scope of Recursion in the SBASIC manual, there is some talk of variables changing values randomly or not changing values when expected to.

But the manual seems to suggest that recursion would not occur in our program. In their example program on recursion, X2 seems equivalent to our variable ListSize. In the discussion on their program, they claim that X2 would not be duplicated when P3 is called from P4. Of course, although their program is executable, it does not contain enough code to reveal anything about recursion in SBASIC. I think our program illustrates the point.

This suggests that you should be VERY careful when using nested procedures in SBASIC.

This program is not fully debugged but a major clarification for it is to unnest the procedures Order, LesserOf, ReadRecords, and WriteRecords. This means you will have to move them as a block to a point before the beginning of the procedure sssort. You will then have to pass variables to ReadRecords and WriteRecords.

I've tried this and found that the program works better but it still has a few problems. To use the module in one of your own programs, you would read the User Supplied Procedures into your program and follow the comments found there. I borrowed some of the ideas in this section from the Sort.Box approach used in Turbo Toolbox.

Finally

I hate to leave you with an unfinished program but I believe this discovery belongs in the growing library of SBASIC unofficial documentation.

Figure 1 - Test Program

```
var i = integer
var a = char

files R(10)
create "UNSORTED.DAT"
open #0;"UNSORTED.DAT"
i = 100
write #0,0;i
for i = 1 to 100
   a = chr$(fix(rnd(i)*26)+65)
   print a
   write #0,i;a
next
```

Speaking of this library, David tells me that Micro C receives more material on SBASIC than any other language. They have amassed a good deal of code and commentary on the language, and it seems that many people who have spent time on SBASIC see the need for a good tutorial. I would imagine that soon David will be putting much of it on users' disks.

So long for now. See you at SOG IV!

Editor's note: It's been great Jack, we'll miss having you in Micro C but we'll still look forward to seeing you and Wickie here in Bend next July.

■ ■ ■

Figure 2 - User Supplied Procedure For Sort Routine

```
REM-------------User Supplied Procedures For Sort Routine------------------

$constant MaxSize = 10
 REM **the higher the better but not more than 255**

dim string: 9; List(MaxSize + 1)
Comment
   Dimension an array for each record element such as:
      dim string:25; Name(MaxSize + 1)
      dim string:25; Address(MaxSize + 1)
      dim string:25; City(MaxSize + 2)
   and so on...
End

dim integer NextPtr(MaxSize + 1)
dim byte Vacancy(MaxSize + 1)
var InfilePtr,OutfilePtr = integer
REM Just include these three statements as is.

var ImpossiblyBig = string:9
ImpossiblyBig = 'z'
Comment
   ImpossiblyBig should be a variable of the same type as your comparison
   string and impossibly big.
end

procedure ReadFile(Infile, i = integer)
   read #Infile,InfilePtr; List(i)
   Comment Be sure to have this read each of your record elements such as this:
      read #Infile,InfilePtr; List(i), Name(i), Address(i), City(i)
   end
end

procedure WriteFile(Outfile,i = integer)
   write #Outfile,OutfilePtr;List(i)
   Rem Set this up like ReadFile
end

function Less(item1, item2 = integer) = byte
  var Less = byte
   if List(item1) < List(item2) then Less = "T" else Less = "F"
   Comment This is where you get to tell the program which element is bigger.
      If you don't your sort based on List, then use your own variable such
      as Name, City or whatever.
   end
end = Less

REM-----------End of User Supplied Procedures-------------------------------

procedure sssort(Infile, Outfile, UnsortedMasses = integer)
   var Smallest, Current, LastOne, LastItem, RunSize;
       ListSize, RecordsIn, RecordsOut, RecordsToRead, i, j = integer

   procedure Order(NewItem = byte)
      procedure SearchAndInsert
         while Less(Current, NewItem) do begin
            LastOne = Current
            Current = NextPtr(Current)

     end
     NextPtr(NewItem) = NextPtr(LastOne)
     NextPtr(LastOne) = NewItem
     LastItem = NewItem
  end
  if Less(NewItem,LastItem) then begin
     if Less(NewItem,Smallest) then begin
        NextPtr(NewItem) = Smallest
        Smallest = NewItem
     end else begin
        Current = NextPtr(Smallest).
        LastOne = Smallest
        SearchAndInsert
     end
  end else begin
     Current = NextPtr(LastItem)
     LastOne = LastItem
     SearchAndInsert
  end
end

function LesserOf(var1, var2 = integer) = integer
   var Lesser = integer
   if var1 < var2 then Lesser = var1 else Lesser = var2
end= Lesser
```

```
procedure ReadRecords
   for i = 1 to RecordsIn
      ReadFile Infile, Vacancy(i)
      InfilePtr = InfilePtr + 1
      Order Vacancy(i)
      print
      print "         *****Run number: ";i;"******"
      for j = 1 to i
         if j = Smallest then print "Smallest ------>";\
                  else print "                  ";
         print j,List(j),NextPtr(j)
      next j
   next i
   $TRACE
   ListSize = ListSize + RecordsIn
   print "ListSize per the procedure ReadRecords is ";ListSize
                          rem ** ListSize contains 10 here **
end


procedure WriteRecords
   for i = 1 to RecordsOut
       WriteFile Outfile,Smallest
       OutfilePtr = OutfilePtr + 1
       Vacancy(i) = Smallest
       Smallest = NextPtr(Smallest)
    next i
    ListSize = ListSize - RecordsOut
end


Write #Outfile,0;ImpossiblyBig
RunSize = fix(MaxSize/2)
repeat begin
      for i = 1 to MaxSize
         Vacancy(i) = i
      next i
      Smallest = 0
      List(Smallest) = ImpossiblyBig
      LastItem = 0
      ListSize = 0
      InfilePtr = 15
      OutfilePtr = 1
      RecordsToRead = UnsortedMasses
      RecordsIn = LesserOf(MaxSize,RecordsToRead)
      ReadRecords
               rem ReadRecords sets ListSize to 10
      print "ListSize per the main procedure is ";ListSize
               rem **** ListSize contains 0 here! ****
      RecordsToRead = RecordsToRead - RecordsIn
      repeat begin
         print "ListSize = ";Listsize;" RunSize = ";RunSize
         RecordsOut = LesserOf(ListSize,ListSize - RunSize)
         print "RecordsOut = ";RecordsOut
         WriteRecords
         RecordsIn = LesserOf(RunSize,RecordsToRead)
         ReadRecords
         RecordsToRead = RecordsToRead - RecordsIn
      end until (RecordsToRead = 0)
      WriteRecords
      Infile = Outfile
      UnsortedMasses = UnsortedMasses - RunSize
   end until UnsortedMasses = 0
end


var i = integer
var a = string: 9

files r(10), r(10)
open #0;"UNSORTED.DAT"
open #1;"SORTED.DAT"
print "                              Sorting the Data File"
sssort 0,1,100
print "                                 The Sorted File"
for i = 1 to 100
   read #1,i;a
   print a
next i
```

END OF LISTING

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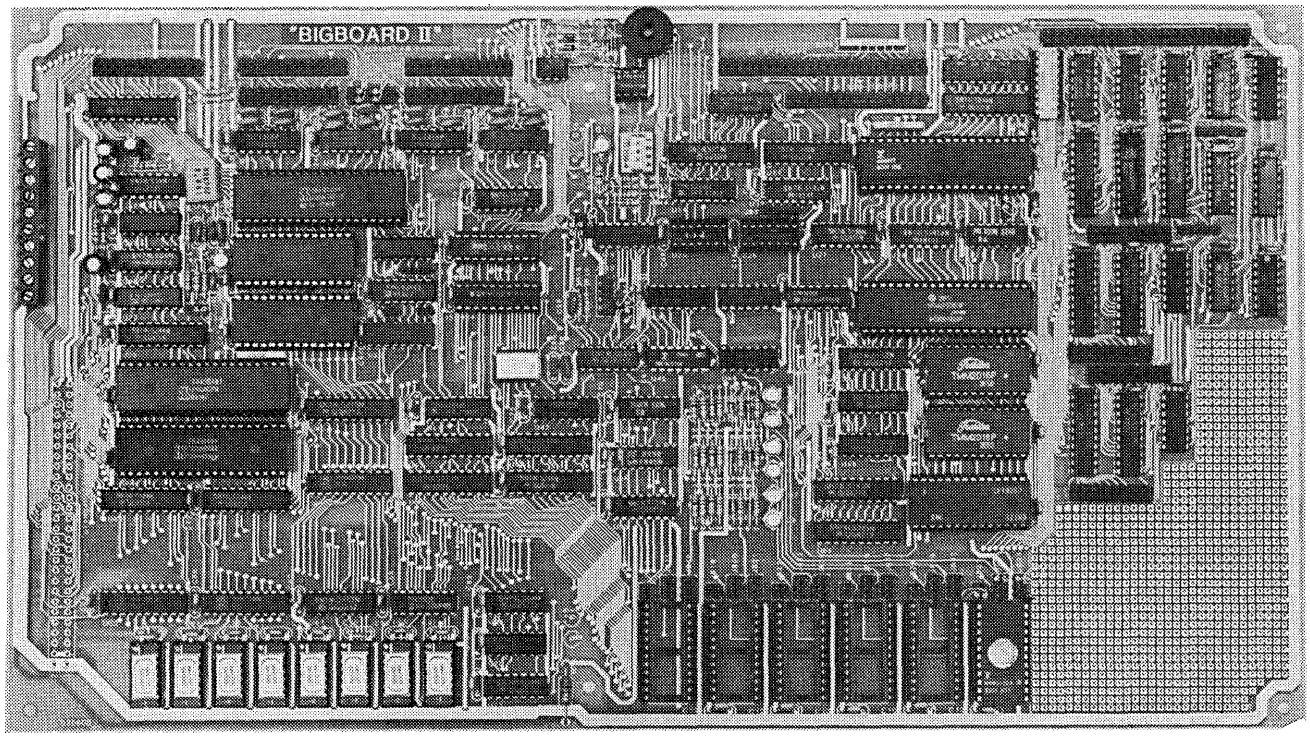

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Jim Ferguson, the designer of the "Big Board" distributed by Digital Research Computers, has produced a stunning new computer that Cal-Tex Computers has been shipping for a year. Called "Big Board II", it has the following features:

■ 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 processer overhead. When a hard-disc subsystem is added, the DMA chip makes impressive disk performance possible.

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■ "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.

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Cooling A Hot Computer

By Kenneth J. Grymala

P.O. Box 2540
Manassas VA 22110

In Issue 19 of Micro C, David Thompson discusses problems with the Morrow MD11. In that article he says, "MD11s are becoming famous for going to lunch before noon, reportedly due to the very critical timing between the TTL parts and the Z80 during data transfers." He also discusses power supply problems in the MD11, and I suspect these same problems are showing up in the Morrow MD16 and MD34.

Heat—The Real Culprit?

I believe the problems are due to overheating. Excessive heat causes equipment to start acting strangely, go into a tighter and tighter tailspin, and finally crash. My MD11 began showing these classic symptoms when its internal temperature exceeded 140 F degrees.

Because of the heat, the clocks and timing circuits changed frequency—capacitors, regulators, rectifiers, and ICs began dying of heat exhaustion.

The power supply might fail repeatedly but the real culprit is probably heat. Obviously, this problem is not exclusive to the MD11. The following discussion is applicable to any system which is having heat problems.

As a designer of equipment for the government, military, and industry, I am all too familiar with the problems caused by heat. In government terms, the MTBF (Mean Time Between Failures) takes a real nose dive as temperature rises. Power supplies, oscillators (timing clocks), and PC board traces are usually affected first.

History

About two days after I got the MD11, an old-time hacker friend paid me a visit. While tinkering with the computer, he noticed that the floppies were coming out of the drive very warm. The next day I put a thermometer inside the MD11 and monitored the temperature between the hard disk and the power supply. After about four hours the internal temperature reached 140 degrees Fahrenheit in an office that was 68 degrees, and I'm sure the power supply components were much hotter.

Six months before I read Micro Cornucopia's description of the problem, I began to look for ways to cool my system. The most vulnerable component appeared to be the Shugart SA-455 disk drive with a maximum operating temperature of 115 degrees. With this plus a safety factor in mind, I set my target for a maximum internal operating temperature of 100 F, or 20 F above an 80-degree office temperature.

I dug out some test equipment and measured the power consumption with a calibrated meter (traceable to NBS). It turned out that my MD11 was drawing (dissipating) approximately 85 watts (Morrow specification is 50 watts). This may not seem like much, but think about sticking even a 60 or 75 watt light bulb in a box the size of an MD11. It'll get darned hot!

Then I took an ALNOR air velocity meter and found that the small MD11 fan pulled only a little more than 3 Cubic Feet per Minute (CFM). An early brochure I have on the MD11 says it is supposed to have a 12 CFM fan. But I discovered that even a 12 CFM fan is really not big enough to adequately cool 85 watts.

Thermal Analysis Formula

When doing thermal analysis, I use a common rule of thumb formula (converted to degrees Fahrenheit) that I learned many years ago in an engineering seminar:

$$(CFM) = \frac{1.76 \times \text{Watts}}{\text{Rise in Temp (deg C)}} + 25\%$$

At 85 watts, this results in a minimum airflow of approximately 17 CFM for 20 F above room temperature. At 12 CFM you could expect an approximate rise of 29 F. (Of course, that's assuming your 12 CFM fan is delivering 12 CFM once it's installed.)

(continued next page)

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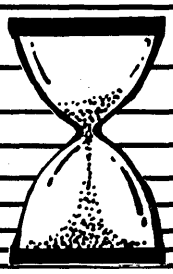

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I pulled out the original fan and discovered it moved only a little more than 3 CFM. So I reversed the wiring and the impeller, and put the fan back in. That increased the air flow to almost 4 CFM, but after about an hour the temperature was up to 130 degrees, still much too high for dependable operation.

Testing Your Own Machine For Airflow

Before you cool your computer, make sure it needs it. To check, turn on your system and hold a facial tissue about 3 inches behind the air intake. If the tissue doesn't get pulled hard against the fan intake, you've got a problem!

When the tissue is directly against the front of the hard disk or the door opening to the floppy disk drive you should see about a 30-degree (off vertical) deflection of the tissue. This air flow is a little more subtle than the air intake because of all of the other holes in the case, but you definitely want air coming out through the disk drives (and the power supply).

Cooling The Morrow

There are ventilation holes on the back of MD11s (Morrow used standard MD series cabinets). As a consequence, even when enough air does go into the rear fan opening, it goes right back out the ventilation holes on the rear panel, taking very little heat with it.

To solve this problem cover the rear panel holes from the inside with a 1-1/2" X 9" thin sheet of plastic.

Now, if you don't have adequate air flow into the rear, I suggest you temporarily operate your MD11 (or other system) without its case until you can replace the fan.

Choosing a Fan

I first decided to replace the present fan with a higher velocity unit of the same size and voltage. It's a plastic 12 volt DC fan, 2 1/4 inches in diameter, and it looks like it belongs in a child's toy.

I scoured all my catalogs, fliers, and magazines for a suitable replacement that did not cost a fortune. It didn't exist. So I chose a standard 3.125", 25 CFM axial style 115 VAC fan in a 4" X 4" X 2" aluminum box chassis, mounted outside of the MD11 on the rear panel over the fan opening. The fan and the chassis are both available in most good electronic supply houses and in ads in the back of electronic hobbyist magazines.

MD11 Installation Instructions

To get power to the fan I used the original MD11 power cord and ran it through the fan housing (you could also purchase a new power cord if you don't want to destroy the original—they're about $5.00). I cut the cord about 8" from the end that normally would connect to the computer, and ran both pieces of the cord into the side of the chassis box through clamping grommets.

I also mounted a new toggle switch below the air intake of the fan housing so I could control power to the fan and the computer. Now the power cord comes into the box to power the fan and it leaves the chassis box to power the MD11. The computer's power switch is always left on, and main power is controlled by the new toggle switch.

The Chassis Box

Make sure that one dimension on your new chassis box is no greater than 4", otherwise it will not fit between the top of the MD11 and the auxiliary RS-232 connector. Conversely, the box also

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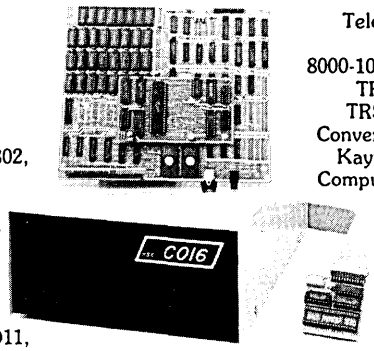

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must be at least 4" in two dimensions to allow room inside for the switch, power cord, and fan.

On a 4" X 4" X 2" box, such as an LMB #143, the air intake and outlet are not centered, but are offset to allow for proper mounting of internal parts and for mounting on the MD11. The air intake is cut for the fan mounting, and the air outlet from the chassis box is cut to exactly match the fan and fan mounting holes on the MD11.

After the holes are cut, and before you mount the fan inside the box, make a filter and impeller protector. I used some 1/4" hardware cloth and two layers of window screen mounted inside the fan housing on the air intake hole.

Opening Up The MD11

First, remove the power and power cord. Then slide the case off the front of the MD11 after removing the four phillips head screws that hold it in place.

Remove the four screws that hold the old fan, and, once the fan is loose, clip the power wires. Insulate the wires with tape, and mark them with a label or masking tape so a couple of years from now when you have the MD11 disassembled for some other reason, you'll remember what they were for.

Next, install a 1-1/2" X 9" piece of cardboard or plastic over the MD11 rear panel ventilation holes. Place some foam rubber weather stripping on the exhaust side of the new fan housing to make a good seal.

With four #4 screws mount the new fan housing over the old fan hole.

Do not plug the short end of the power cord into the back of the MD11 yet, but plug the other end into an AC outlet. Turn on the switch on the fan housing to see if the fan works.

Using another tissue, make certain that the air is entering from the rear and blowing into the MD11. This slightly filtered air must blow out of the front of the disk drives rather than pull dust in.

Assuming this worked, turn the switch off and plug the short end of the cord into the back of the MD11. Turn on the switch. If everything was wired properly, you should be back in business. Replace the cover and operate a cool computer!

Results

With this arrangement the temperature between the hard disk and the power supply reaches a maximum of 28 F degrees above room temperature—a far cry from the 70-degree rise before. And the rest of the computer stays at about 10 degrees above room temperature. The 25 CFM fan pulls about 22 CFM.

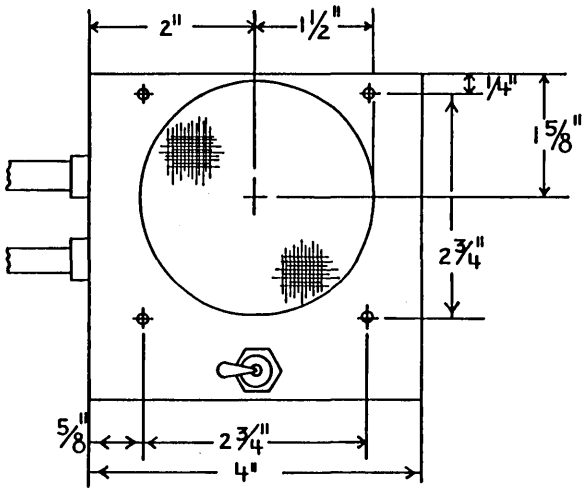
Since I added the fan six months ago, my MD11 has been used an average of 10 hours a day, and so far, I wouldn't trade it for twice the price.

If anyone out there knows of a direct replacement 20-30 CFM 12 VDC fan for the MD11 at a reasonable cost, please do the other MD11 owners a service and send the part number and supplier information to either me or Micro Cornucopia.

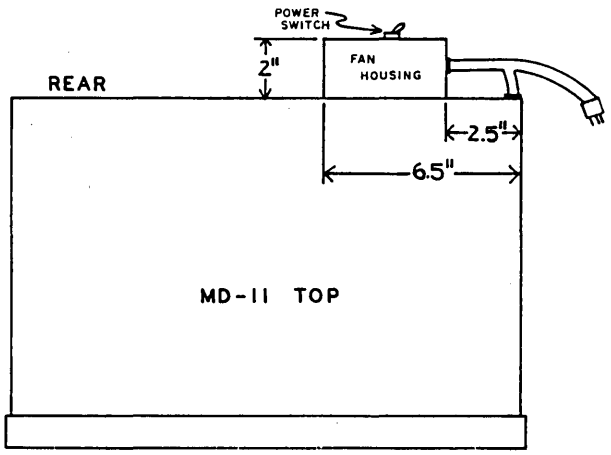
Below is a list of parts you will need to cool your system. And if you'd rather not search for everything yourself, I'll sell you the complete kit for $52.95. Write to the address at the top of the article to order or for more information.

■ ■ ■

Air Intake Panel



MD11 Top View With Fan Installed



Parts List

Quantity	Item
1	3.125" axial style fan. 25 CFM, 115 VAC (Such as ETRI model 126LF or Rotron Sprite series)
1	4" X 4" X 2" box chassis. LMB #143 or equiv.
1	power cord. Belden 17742 or equiv.
1	SPST 3A 125 VAC toggle switch. (Radio Shack 275-602)
1	3.5" X 3.5" hardware cloth (1/4" heavy duty screen)
2	3.5" X 3.5" pieces of window screen
2	power cord grommets
16"	1/4" or 3/8" foam weather stripping
1	1-1/2" X 9" piece of stiff cardboard or thin plastic
4	6-32 X 3/4" fan mounting screws, washers, nuts
4	4-40 X 3/8" fan housing mounting screws, washers, nuts

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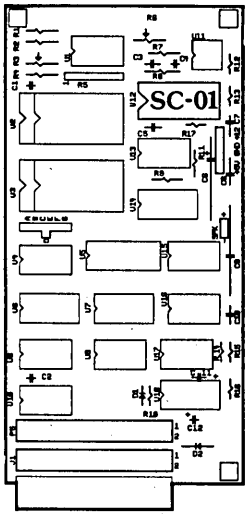

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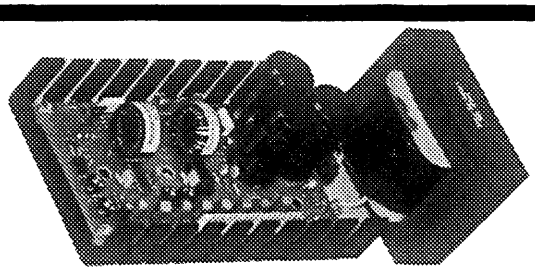

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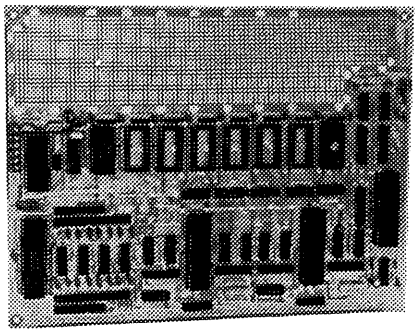

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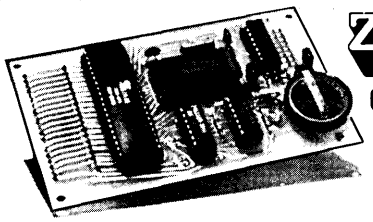

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No Fault Power

By Al Paarmann

368 El Gaucho Rd.
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Editor's note:

This project involves the use of potentially lethal voltages. We do not recommend that you attempt to assemble this project if you do not have prior electrical/electronic experience.

After two power losses while using Perfect Writer, I designed a non-portable battery backup for use with my Kaypro II. After all, a little time spent up front can save a lot of time trying to reconstruct files later.

Controller Circuit

The DPDT-center-off switch stays in the off-position when nothing is running. When it is set in the up position, the 120 V relay is activated.

The relay has a long lock-up path through the upper normally-open contact: normally closed pushbutton; the lower normally-open contact; and the 4.7K resistor.

With the switch moved to the bottom position:

1) The relay is holding on this lock-up circuit.
2) The DC-to-AC inverter is turned on.

Any loss of powerline voltage will drop the relay (permanently) and switch over to inverter power.

When it's time to shut down, I put the switch in center position and break the lock-up with the normally-closed pushbutton. The circuit breakers shown are regular house wiring types. The lamps show where the power is coming from (amber for backup; green for wall power).

Battery Charger

Next, I built a small battery charger (fig 2) for the 12V battery (a discount store special). I set the battery inside a plastic washtub for safety.

I used a small 0.1 A regulator to provide the reference voltage for the 1.5 A regulator.

After charging the batter overnight (so I knew it was fully charged), I adjusted the current down almost to zero. This current, of course, increases steeply as the battery voltage drops.

The two diodes and 330-ohm resistor are intended to clamp the 1K resistor (between the diodes) for −left, +right voltage drop only. The 3-amp diode keeps the battery from discharging through the charger when the charger is off. The maximum charging rate is 1.2 amps.

Fast-Demand Circuit

The inverter draws 2 amps when it is just sitting around buzzing (no load). That seemed like a losing situation since my supply was only 1.2 amps so I cooked up the fast-demand circuit in Figure 3.

The diodes isolate the small 4.7 uFd capacitor from the rest of circuit. When a power loss occurs, the voltage on this capacitor drops quickly, turning the transistor on.

Since the transistor is in series with inverter connect relay, the relay only applies 12V when needed. I've forced a switch-over with the pushbutton many times without loss of data, but have not yet had a real line-voltage drop.

The pushbutton is near the keyboard, and if the lights flicker, I'm sure my reflex will be to manually force a switch-over before something more exciting happens.

Editor's Note:

Kaypro does not recommend that you power a system from any inverter that outputs square waves. You see, those little supplies inside the Kaypros are simply transistor switches driving a transformer.

Most switching supplies like the ones Kaypro has been shipping turn the AC into over 200V DC. They use a simple doubler for 110V and go straight if you have 220V in your wall. Then the 200V DC is used to drive a high-frequency switching transistor which in turn drives small high-frequency transformers. The outputs of these transformers become the +5V, −12V, and +12V supplies for your Kaypro.

Spikes on the incoming 110V, or square waves can be really fun for these little diode doublers and transistor switchers. So, to be on the safe side, I'd either get an inverter that is filtered (so it will output a sine-wave), or get a special filter for my inverter. That way, I'd feel a lot safer about my precious system.

■ ■ ■

Figure 1 - Battery Backup Circuit

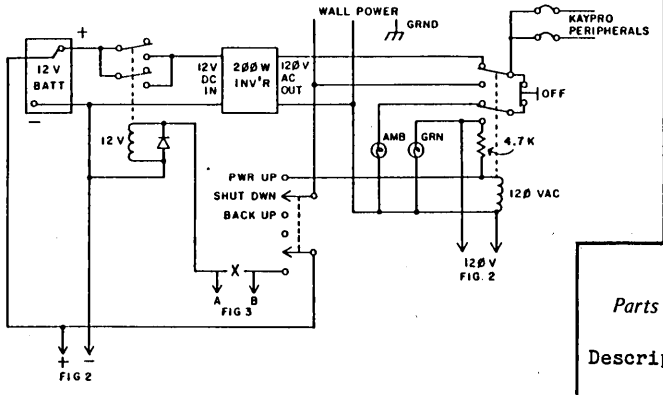


Figure 3 - 12V Relay Hold-off

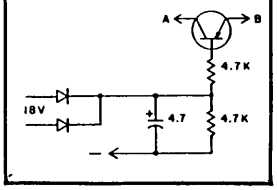
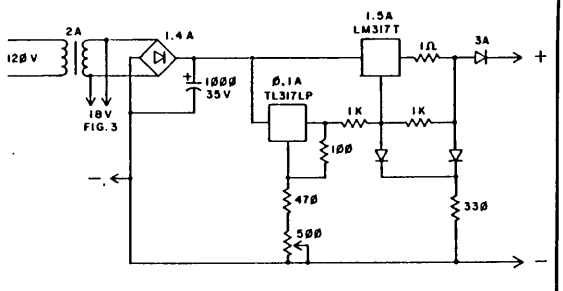


Figure 2 - Battery Charger



Parts List For Battery Backup

Description	Radio Shack #
PNP Transistor	276-2032
12VDC Relay	275-218
120VAC Relay	275-217
LM317T	276-1778
TL317LP	276-1762
Bridge Rect.	276-1151
3A Diode	276-1141
Other Diodes	276-1120
DPDT Ctr-off Sw	275-664
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200W 12VDC to 120 VAC Inverter from Sears. Montgomery Wards also has an equivalent invertor.

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On Your Own: Turbo Pascal, The Early Days

By Philippe Kahn

President of Borland International
4807 Scotts Valley Dr
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Editor's note: This is the story of the early days at Borland International, a once-small software startup headed by Philippe Kahn. He came to the United States with a Pascal compiler and the desire to start his own company, but, as you will see, the people with money to invest didn't believe a company could survive selling a compiler for $49.95. The money people were obviously wrong, but then I'll let Philippe tell you in his own words. The following, excerpted from Philippe's keynote speech at SOG III, is this issue's "On Your Own." I think you'll enjoy it.

In Silicon Valley there are people called finders who, for a fee (5% of the money they raise) will take your business plan to, say, Fred Adler, and he'll read it. So you say, "Great, but I don't have a business plan."

He says, "If you'll give me $1000, I'll write you a business plan."

When I first got here, I didn't know enough English to write a business plan and, unfortunately, spelling checkers are not semantic checkers. However, we wrote a beautiful business plan, which basically said, "If you invest in my company, we will multiply your investment by 20 in two years." That's what any business plan should say (and we did it for a lot less than $1000).

A business plan also has to list the members of the staff. That was a problem. I lined up a couple guys: one had a Japanese restaurant in Cupertino, and the other was a former telephone salesman for Campbell's Soup in Mexico. (It's absolutely true!) I was the "engineer."

We put together this 20-page business plan, but it still looked a little thin, so we told the printer to double space so it would weigh more. In spite of our skimpy business plan, some venture guys interviewed us. I remember one.

A Venture

I met one of the investors of VisiCorp, Arthur Rot, in a restaurant in Palo Alto. I was completely broke so I was hoping he would pick up the tab. My trick was to say, "Oh, I forgot my wallet with my credit cards." I had to do that because those venture guys expected you to pay the bill. Don't hope to get anything out of the venture guys, especially not a meal. You're there because you need the money, so they expect you to pay.

Anyway, he asked me, "How do you intend to do what VisiCorp is doing?"

I said, "I hope I won't do what they are doing, because they are in trouble." But, of course, he didn't understand.

What Venture People Want

A venture guy has a problem: he doesn't know about software, hardware, or anything. He is a business person. He doesn't even own the money he invests. He manages a venture capital pool of 100 million dollars and he needs to find ways to invest it.

The people who put their money into the pool want high returns but they don't want to lose their cash. So venture capital is not risk capital. At least venture people think they don't take risks. What they want is the bottom line and the management team.

They want an MBA from Stanford or Harvard who has worked 5 years at Intel, 4 years at IBM, 6 years at Apple, 7 years at VisiCorp, and is 22 years old. Unfortunately, I was 30 and didn't have an MBA. They told me, "You're a dumb engineer; you don't know anything about management." "Software at $50? You're crazy! You have to sell software at $300 to make a profit."

After a while I found out that I was wasting my time. I got absolutely nowhere, and I was finally so broke that I had to do some consulting for the computer store next door. I rented a little office and I wrote little things for customers—an accounting package and other crazy stuff.

Looking For The Wrong Thing

The problem with venture capitalists is that they think everything is in the marketing team and the management team: who is going to carry your product? how you are going to do your distribution? etc. Well, my idea was that it was very easy to find people who could do that. Just put an ad in any paper and you can find people who know about marketing, who know about distribution, and who know how to put an ad together.

Now put an ad in the paper and try to find a debugged software program that will be a best seller.

So the venture guys have got it all wrong. It's much more difficult to find products and people who can write products than to find marketing teams. The venture guys give no value to the guys who can make something work.

Look at Osborne, for instance. They got themselves into real trouble and dumped $25 million. Look at Eagle, Victor, VisiCorp, and all those guys. They were just marketing someone else's product. They didn't know how to do their own product.

Changing Attitudes

Anyway, now the venture capital people are our friends, strangely enough. We get letters from underwriters, and fellows come and visit us and show us business plans, asking if we think they can make it. We charge them for that (including lunch). It's really strange how things have reversed.

Sorcim was recently sold for $17 million just six months after an English group had purchased it for $24 million. The English group lost a lot of money. You see, they had no product after SuperCalc.

Chances still are that you will go to the venture capital people with your product and you will waste your time—now more than ever. They are frightened by all the flubs in hardware and software.

Making It Without Venture Capital

You have to be very creative to make it without venture capital. My case was even worse than for most people: I had no house for collateral, I was an illegal alien, I didn't have anything. In this situation you have to be very creative. And lucky.

We were lucky to have a debugged working product and we had good timing. JRT had made Pascal somewhat popular but had just gone bankrupt. We had used Europe for a beta test site for a year, and our challenge was to find a way to let the world know about our Pascal. Our big decision was whether to sell it for $50 or $600. (We're selling it right now for $600 in Europe.) We now know we made the right choice, but we could have been totally wrong.

(continued next page)

Pricing

One of our assumptions was that prices would go down as volume increased. The manuals cost us 80 cents, the disks cost $1.00, and the whole package costs $3.50 or $4.00. If you multiply that by more than 10 you have a comfortable margin. Perhaps $49.95 is too high, but sooner or later it probably won't be that price.

When you have 2 million PCs out there it's a big market. Turbo Pascal is a small market but we're shipping serial number 85,000 (end of July 1984). Plus we have Japanese translations, German translations—we have distributors world-wide now. In fact, most countries with more than 10 million people have a local translation of Turbo.

We shipped 10,000 copies of Sidekick in the first three weeks. We expect to ship between 300,000 and 400,000 copies in the first year. At $49.95, it's a cheap product that fits the whole IBM market.

The most important question is: "Do I have the right product to make it?" Don't let people tell you that venture capital is the crucial factor.

Quality

It's not enough to be adequate. I had a long controversy with Adam Osborne, who is currently starting a company called Paperback Software International. He wants to do what we are doing: sell low-cost software. But he contends (in Hypergrowth) that software only needs to be adequate and the rest is a marketing game.

I think software better be damned good if you want to sell it. If you are using software, you'll be using it every day, year after year. I've been using WordStar since 1979 so it's a reliable program. It was a good product then and it's still a good product, which explains why there are a million copies out there. Lotus is an excellent product. It's the fastest spreadsheet around, but it's successful primarily because the product is really good.

In fact, the more you advertise a bad product the sooner people find out that it is bad and stop buying it. That is what happened to JRT. It was a good price, the product was OK, but they just weren't shipping. People stopped buying because the word spread that they didn't ship.

Marketing

We are marketing Turbo in an unusual way, mostly mail order and directly to dealers. We haven't had much luck with distributors.

You see, our discount stops at 45 percent and that's on 1000 quantity, COD. We tried Software Distributors on 30 days net, and they still owe us two-month-old bills. So when SoftSell called, we told them we'd only ship COD. They said, "We're SoftSell." We told them we didn't care. They told us they wanted a 70 percent discount and we told them no.

These guys are used to having people come begging to them. Why should SoftSell get 70 percent discount? That means that you could sell a product for $200 and only get $60 for it. Their contract is a joke: they want the big discount and 90 days to pay. You're financing SoftSell. And everybody is kneeling in front of them. When we sell mail order we get $49.95 and we get the money immediately.

Of course the hackers will read Micro C or Byte and will buy mail order but there are a lot of people who won't buy mail order.

So how do you reach these guys? You start a dealer network, and our guy who used to sell Campbell's Soup now sells Turbo Pascal to dealers (on the phone). Believe it or not, he doesn't know what a computer is, but he knows how to talk to dealers. He tells them that it's a hot product. He's got six people on the phone all the time, and if you take his canned pitch and changed "Turbo Pascal" to "Campbell's Soup" he would be getting orders for soup.

Getting Started

First, we got two rooms above an auto repair shop. Next we needed to advertise and we knew that Byte Magazine was the place we had to be. Unfortunately, we knew that Byte would insist on having its money up front for the first ad and we didn't have $9,000. We weren't even close.

So we set a trap. We took a flip chart and we started writing "Personal Computing—full page, Business Week—double spread, Byte—crossed out." We lined up the whole thing with several layers like it had been done over many days. We got some friends in (I was answering the phones at the time) and scrounged up some banquet tables (my desk was a banquet table). We bought some pictures and framed them, made up letters from big companies that we laid around—we really set the trap.

So Bill McCaffey (the Byte rep.) arrived. My flip chart was open to the right page and I "tried" to keep him from seeing it. I even acted embarrassed that it was open. We had also planned that the girl who was playing the secretary would tell me I had a call from Japan.

So I had to leave the room to take the phone. We had a little hole drilled in the wall, so I got to watch him really look over that flip chart. He was really staring at it. He couldn't believe it. (Bill now laughs about it.)

When I came back into the room, Bill said, "OK, you really have to advertise in Byte. We'll make a special effort and give you credit."

I said, "I don't know, our studies show we won't get a good response from Byte."

Bill countered: "Well, for the first run, we'll give you a special rate."

So we got the agency discount, guaranteed placement in the first 75 pages (normally 10 percent extra), and he gave us 60 days to pay. (We couldn't have paid for it if it hadn't worked.)

The ad broke in November, and that month we took in 1100 orders. So the ad was paid for. The second month we took in 2500 orders. The third month and after, we were running 4,000 to 5,000 orders per month. At that point we didn't need money.

Even though we were shipping 5,000 orders per month, we didn't have a computer. We were hand writing invoices, working nights. The writing on the labels was my wife's or mine, until we could program a computer to handle the orders.

In February we did $350,000 and we had four people in the company. We were working 24 hours a day. We couldn't program anymore so suddenly we had to hire people. Now we have 50

people, a complete shipping department, and we have passed $1 million per month.

If it hadn't worked with Bill McCaffey, we probably wouldn't be here (we certainly couldn't have run that four-color full-page ad in Byte which cost over $9,000).

In the beginning we duplicated our own disks, printed our own labels, and took our mail to the post office. We weren't ready for the kind of response we got. We thought maybe we would sell 300 or 400.

Start-up Costs

A printer agreed to give us credit so when we placed the ad we already had 5,000 manuals in hand. I had two months to pay for them. Probably we could have started the company with about $20,000 or $30,000 without credit. But when you have too much money, you spend it. If we had had $30,000 we would have bought a hard disk-based machine (instead of floppy-based), and we would have bought a copier instead of going next door for copies. If you don't have money you become creative.

It sounds stupid, but the problem most of those venture-funded companies have is they are spending someone else's money and they are spending it for dumb things. You know a company called DayFlo? Their ads say, "Garbage in, information out." They paid $35,000 for a company to tell them that they should change their name from Gilchrist Software to Dayflo.

Ashton-Tate paid $250,000 to produce the ad for dBASE III. (You know, "Turn the page, we're going to do a number on you.") That was just for the artwork.

How To Do Ads

Don't use ad agencies. First, when they place ads, they take 15 percent on top of what they pay the magazines. Second, they don't know what the hell software or hardware is. Then they'll hire a graphics person and charge you 25 percent more than they pay out.

So you should do what we do: handle everything in-house. We do the ads, layout and placement. We use friends who are good graphics people. They make more money, we lose less money and everybody's happy. You know what you want so you can do just as well as an agency.

There are two advertising routes for starting out. If there is one magazine you should advertise in, it is Byte. Their figures are true: it is really read by 400,000 people world-wide. When the ad breaks in Byte we can see our response go up like crazy and 10 days later we see the response going down. We're in 18 magazines now. Last month, AdTrack reported we were the software company advertising the most. The reason is that we are mostly direct mail.

The other magazines that pay to advertise in are the special interest group publications like Micro Cornucopia and the Boston Computer Society magazine. Readers of these magazines are usually knowledgeable people who recognize a reasonable product at a reasonable price.

Products We're Looking For

Since we work on compilers, there are areas that we don't have time to work on, or we don't have the right expertise. We'd love to have a dBASE 4 or a Framework for $49.95. If we don't do it, someone else will. We'd be happy if someone wanted to do it and work with us. We'd love to do a big trick on Ashton-Tate or Lotus.

■ ■ ■

DIGITAL dynamics

KAYPRO OWNERS

Now, we have something for (almost) every one of you!

4-84

At last, the real time clock in the 4-84 IS good for something — the complete TIMEPRO system is available as single programs, or as a complete set:

SEETIME.COM continuously displays the time and date (in either standard or military time) on the 25th line of the screen — all the time you use your Kaypro.

TD.COM time and date stamps your disk files. Automatically detects which files have been added or modified since TD was last run and updates the time and date only for those files. Does automatic backup, too.

APPT.COM maintains your calendar of appointments and other reminders. Includes archiving capabilities and several utilities.

2-84, 2X-84

As you probably know, the main computer board of these two systems is identical to the 4-84, except that Kaypro left out the components for the real time clock and modem. We have the forgotten real time clock components, complete with instructions, ready to install.

II, 4 ('83)

Time and speed are yours with our easily installed SPEEDPRO-5RTC 5 megahertz speedup board with real time clock. Shipped complete with the full TIMEPRO series of 12 programs — a whole disk full (192K) of software.

All TIMEPRO programs are accompanied by programs for setting the time and date and by source code in several computer languages to demonstrate the use of the real time clock in your own programs.

THE BOTTOM LINES

SEETIME.COM	$ 29.95
TD.COM	$ 39.95
APPT.COM	$39.95
ALL ABOVE, PLUS SEVERAL ADDITIONAL PROGRAMS	$ 89.95
TIMEPRO DOCUMENTS ON DISK (credited toward complete TIMEPRO system)	$ 14.95
2/2X REAL TIME CLOCK KIT	$ 49.95
CLOCK KIT & TIMEPRO	$109.95
SPEEDPRO-5RTC & TIMEPRO	$129.95
SPEEDPRO-5+ SPEEDUP BOARD	$ 89.95

(Prices exclusive of shipping.)

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FREE CATALOG

KAYPRO USERS DISKS
for Kaypro II, 4 and 10 $12.00 each

KayPro Disk K1
Modem software

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 "UN-ERA" 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.

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

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

KayPro Disk K3
Games

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

KayPro Disk K6
Word Processing Utilities

KayPro Disk K7
Small C Version 2 Compiler

KayPro Disk K8
Small C Version 2 Source

KayPro Disk K9
ZCPR

KayPro Disk K10
Assemblers

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

KayPro Disk K13
Source of fig-FORTH

KayPro Disk K14
Smartmodem Programs

KayPro Disk K15
Hard Disk Utilities

KayPro Disk K16
Pascal Compiler

KayPro Disk K17
Z80 Tools

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

Kaypro Disk K20
Color Graphics Routines

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 ZPCR files. You get ZPCR 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!

ZPCR, 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

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

Kaypro Disk K26
EPROM Programmer & Character Editor

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).

Kaypro Users Disk K28
Modem 730

DISK $12.00 ea.
postage paid

Write or call
for a free catalog
(also included with each order from)

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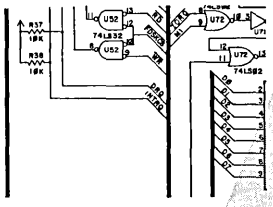
PRICELESS

UPGRADES

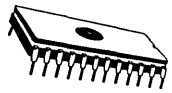
Schematic Packages
Finally, a complete schematic for your portable Kaypro, logically laid out on a single 24" by 36" sheet, plus a very complete illustrated Theory of Operation that's keyed to the schematic. You'll get detail information on your processor board that's available nowhere else.
For instance, 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
Kaypro 10 (pre-84) $20
Kaypro 84 series (II & 4) $20
All prices include postage.

Special Offer!
Your First Schematic Package (If you also order subscription) $10



ROM'S 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 "f" 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. 3. Throws away null characters.
2. Faster disk accesses. 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).

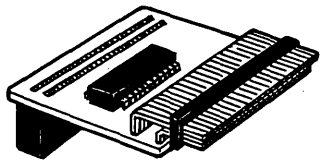
Note: These ROMs will not work in the Kaypro 10 or the latest Kaypro 4 with graphics (it contains the Kaypro 10 board). We are working on new ROMs for these systems.

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

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 Decorder Board for only $39.95
Watch for 4-84 and 10-84 compatible ROMs coming soon.



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VISA

More Goodies 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 transer 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-CRAPS, 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-ZZSOURCE, 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 extrace 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 fromWayne 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 BBI. 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 BBI, BBII, or XEROX 820-I as a remote CP/M system using a Hayes Smartmodem compatible modem. Includes programs to allow restricted access.

USERS DISK #28 - VFILER and Extended 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.

Fire In the Valley

Book Review By Charlie Berry

Rt. 8, Box 6A
Chapel Hill NC 27514

The book *Fire in the Valley* is the story of the microcomputer and its development. This new book captures the excitement of the early 1970s when engineers were engineers and hobbyists were hobbyists and they worked together to create a computer revolution.

Authors Freiberger and Swaine have written a series of short vignettes, each a self-contained insight into the people and events that shaped (and are still shaping) this incredible field.

Early Hardware

Two magazines, *Popular Electronics* and *Radio Electronics* were most instrumental in spreading the word on the new hardware. On July 1974, *Radio Electronics* published an article on the Mark-8 computer (based on the Intel 8008 chip) complete with plans. *Popular Electronics* made its entry into this field in its January 1975 issue with a cover story on the Altair computer (based on the newer Intel 8080 chip).

It turned out that the Altair on the cover of *Popular Electronics* was actually an empty box (sound familiar?). A shipping problem prevented the first Altair from arriving in New York on time.

The Altair was available in kit form from MITS, a struggling Albuquerque electronics company. (MITS had almost lost its shirt a year before when the bottom dropped out of the calculator market.)

Of course, once the article ran, MITS was deluged with orders. Their delivery was slow, their quality was poor, and their service was nonexistent. However, hobbyists were ecstatic. MITS lasted only a couple of years—it was killed by its undependable product and a gaggle of new competitors.

Early Software

Alan Cooper and Keith Parsons wanted to write an accounting package to run on the early Altair computer. When they found Gordon Eubanks, the Navy man who had written BASIC-E (and released it to the public domain), they proposed that he and they get together and really upgrade the language.

The development of Eubanks' new BASIC was a crash project with sessions often running until 3 a.m. Alan Cooper would say something like, "Why don't you put a WHILE loop in?" Gordon would answer, "Sounds good to me," and they'd put it in.

Then Cooper and Parsons set out to make $50,000 a year (their goal) by founding Structured Systems Group, and writing business software (in CBASIC of course) for new Altairs. Their first ad was primarily for CBASIC but it contained a small mention of a $995 general ledger package at the bottom.

They figured that the only response to the ledger package would be complaints that it cost three times as much as the Altair. When they got their first order for the business software, they made a copy of the ledger program, inserted it and the manual in a zip-lock bag and shipped it off. Before they knew it, back came a check for $995. So Cooper and Parsons took the whole staff (what there was of it) out for pizza.

Three weeks later, another order arrived and there was another pizza. In fact, the pizza ritual continued for two months, but eventually, with people sending in checks for thousands of dollars, they had to quit the custom. They were getting tired of pizza for breakfast, lunch, and dinner.

Part of their success could have been the casual atmosphere at Structured Systems. For instance, Parsons' girlfriend made phone sales while sunbathing nude in the yard behind their "office." (And that's the true skinny.)

Conclusion

Fire in the Valley captures the spirit and history of the microcomputer world as well, I believe, as *The Soul of a New Machine* described the world of Data General. It is fascinating reading.

Fire In The Valley
By Paul Freiberger and Michael Swaine
Published by Osborne/McGraw-Hill
ISBN 0-88134-121-5
$9.95

■ ■ ■

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/A867. 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 transfering 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.

More ROMS: Fast monitor ROMs for speed freaks and our famous 'better than Texas' character ROM (V2.3) for screen freaks.
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Micro Cornucopia

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the subject. He is one of the founders of SIG/M, the largest, most active purveyor of public domain software in the world.

Dave Hardy, the S-100 columnist for Microsystems, will also be switching his column over to Micro C. Microsystems was the only magazine I am aware of which supported this very technical group of folks. It will be great to have Sol and Dave with us. Each brings a wealth of expertise to Micro C.

I have been calling Micro C the "Single Board Systems Journal" to let people know that we didn't support bus type systems like the S-100. After all, Microsystems was supporting them. Now that Microsystems is no more, I guess we'll have to be the "Single Board (and More) Systems Journal."

Is The Computer Hobbyist Dead?

Initially, most micros were built by their owners. Now that percentage is very very small and getting smaller. Much smaller. Who is willing to build a system when it's cheaper simply to buy one? (I, for one, am certainly willing to build.)

Sol mentioned that great numbers of technical hobbyists used to build their own radios (I built my own two-transistor radio in 1959; the parts cost about $15). He pointed out that very few people are building AM transistor radios nowadays.

He feels that computer hobbyists are heading in the same direction. In time, the Big Boards and Slicers will no longer be available as kits and people will no longer be interested in upgrading their Kaypros by modifying the hardware.

Over the long term, he may be right. I have no desire to dig into a $3.95 Japanese AM radio. And if I had a $29.95 lap computer that were as tightly packed with parts as a radio, I might not be willing to spend a week trying to add a second serial port.

However, there are those of us who are very interested in modifying and building our own systems. Perhaps we are a minority, but minorities have their rights, too, and I think the S-100 folks might make interesting compatriots.

RIP More Magazines

Microsystems isn't the only publication to byte the dust this month. It's just the most significant to me. Microcomputing and PC-Jr have also gotten thumbs down from their corporate fathers and everyone keeps saying we've only seen the tip of the iceberg. I won't miss Microcomputing (a Wayne Green mag) or PC-Jr (another Ziff-Davis piece).

Newsstand sales have dropped very significantly this year, with some newsstands dropping computer pubs altogether. I understand that even Byte's newsstand sales have dropped by 20 percent since spring.

We started nosing around to see if one of the regular distributors would be interested in distributing Micro C, but it doesn't look promising. A few computer stores are carrying Micro C and we have gotten reports that some of them have sign-up sheets so anxious customers can be guaranteed a copy. (You'd think they might subscribe, wouldn't you?)

For large magazines, even a slight drop in circulation is very important because large circulation woos advertisers, and magazines count on advertising revenue for their survival. (Most of the subscription money gets hijacked by their subscription services.)

Anyway, things are fine as long as those big magazines are growing, but if circulation declines, advertisers start dropping out (and those that stay insist on paying less). So the exponential growth in revenue can somer-sault into an exponential death curve.

No Culture

I'm beginning to wonder if the demise of computer magazines (and a recent decline in computer sales) may be due to something no one has dealt with. It's possible that the general public is just getting tired of technical this and technical that. What they really want is some culture.

So I took a close look to see if there were any way we could add some culture to Micro C. (I know that we are too technical to appeal to everyone who buys a computer, but with a little culture we would appeal to many of those who refuse to buy a computer.)

How many computer magazines have even considered the needs of this audience? (Of course, a number of computer mags are doing their best to disinterest those who have already bought computers, but that is a different task.)

Anyway, I started nosing around to see if we could come up with some culture that would fit in Micro C. In the process I found out that: Culture is often dry and dull. Culture usually wears three-piece suits. Culture sometimes lives in petri dishes or on old bread. Culture is very old. Culture is hard to understand. Culture has no obvious value. However, I have also noticed that culture can be quite humorous (but only accidentally, of course).

So, I'm making a commitment to culture. There is a Culture Corner in this issue and I see it as an off-again, on-again, off-again sort of thing. (Does that mean it's an irregular feature?) Anything non-technical (especially anti-technical) is fine just as long as it has some culture.

Renewals Fold

Actually there has been an increase in renewals (folks have been increasing them right before inserting them into the envelopes), but a few have complained about the size of the renewal form (very large) versus the size of our return envelope (very small).

After a number of folks wrote to us indicating that their most difficult design project was getting their completed renewal form into our envelope I decided to come up with a definitive procedure to handle this important task and I have tried to document it to military specs.

Insertion Procedure:

1. Fold renewal form in half (reduces it from 8 1/2 by 11 to 8 1/2 by 5 1/2).
2. Fold the result in thirds (reduces the form to 2 5/6 by 5 1/2).
3. Insert folded piece into envelope.
4. Make sure payment is enclosed (the most important step).

Uninsertion Procedure:

1. This procedure is classified.

Cheap Hard Drives

Bill Siegmund is an expert on two subjects, the BBII and the winchester drives, so I called him after a Hamilton-Avnet salesman came through.

Xebec has announced the Owl, which is a 5 meg winchester with a built-in winchester controller. Xebec has not announced the price but Bill thinks it will be in the $500 range. Well, that doesn't

sound too bad until you hear the rest.

First, standard Xebec controller cards are showing up on discounters' shelves for a little over $100 each, 603S 10 meg drives are selling for about $395, and 5 meg Seagate units are going for around $200.

Now, don't call Bill and ask him where to get the drives. Different surplus shops have them at different times. The best way to locate these units would be to watch Computer Shopper or start asking around in your local CP/M user group for the names of the local surplus shops.

The surplus houses (such as Cascade Electronics or BG Micro) purchase overstocked materials from original manufacturers. For example, they have drives at incredible prices as long as they last, but when they run out, they may not have drives at all for a while.

A lot of computer manufacturers have gone out of business lately and those that are still going are dumping their 5 meg drives and going to 10 or 20 meg.

Caveat Emptor

Bill feels that Adaptec makes the best controller, but it sells for over $200. The original Xebec S1410 controllers are generally available for $140. The S1410 really set the interface standard for controller cards. Shugart came out with a copy of the S1410 called the SA1410 but the early Shugart units had some timing problems that made them less than compatible. Shugart later replaced these early units with truly compatible versions (but beware of super deals on early Shugart controllers).

Meanwhile

Everything is in an uproar in the winchester world. Dysan is trying just to keep its head above water and a lot of the little companies that depended on Dysan to purchase their little sub-assemblies have gone under.

The standard practice now is for drive manufacturers to design and prototype their new drives in the U.S. Once they are sure the design is sound and the units are manufacturable, they move production overseas. In a very short time they have boat-loads of new drives showing up on Pacific docks.

If the drives don't sell because of manufacturing problems or lack of market, then they get scrapped or sent to surplus dealers.

Bill is looking forward to getting some of the new 3.5" 10 meg Rodimes. He says Compaq and Televideo have been soaking up all the production so far, but Televideo has been doing very badly (manufacturing problems and poor acceptance) so its allocation may soon show up on the open market. He also said he's watching to see if Seagate is going to start manufacturing its 100 meg drives. The price should be around $1600.

Technical Help

In small companies like Micro C, all technical help comes from the technical staff. If we were to answer the increasing number of technical calls all day long, we wouldn't finish any new designs and we wouldn't get a chance to write or edit technical articles.

So, we are taking technical calls between 9:00 a.m. and 12:00 noon Pacific Time, Monday through Friday. Alice, Tracey, Dorcas, and Cary do their best to answer questions you have about our products, but if you need a definitive answer about a burning question, try us in the mornings. (Please note that though our answers may be definitive, that's no guarantee they are correct.)

Another Single Board Computer

The Servo 8 is a new, very compact single board system, which, like the Little Board, fits onto the side of a 5 1/4" drive (just as the original BBI fit onto the side of an 8" unit).

The Servo 8 is a 64K, 6 MHz Z80 system with a 1793 floppy disk controller. It supports four 5 1/4" and four 8" drives simultaneously. It also has a SASI interface, a connector for Mitsubishi 1.6 Mbyte drives, a real time clock, two serial ports (150 - 153.6K baud), one centronics port, and an expansion bus. The Servo 8 requires only +5V at 1.4 amps. Like the little board, you must use an external monitor with the Servo 8.

An expansion board with 128K and additional ports is also available.

Price for the computer is $495 (in onesies) with CBIOS object file. CP/M is $70 extra (their cost).

For more information, contact Servo Computer Company, Box 566, Gold Beach OR, 97444. 503-247-2021.

■ ■ ■

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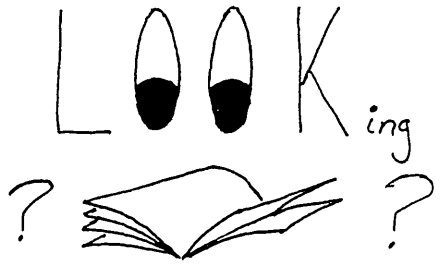

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LETTERS

(continued from page 3)

Dear Editor,

I just finished putting my system together and it works great. I am using the big board, a Power General switching power supply, an Electrohome monitor, a Jameco keyboard and two FD100-8 drives. It all worked the first time, without a single problem. I then added a solid state relay to the disk motors (Micro C #2) with no problem.

You may be thinking that I have been deprived of the debugging pleasure that is supposed to come with a big board project, but when I connected my H14 Heath kit printer, it did not work so which gave me several hours of pure joy.

I used E8BIOS.HEX on user disk #9 to set up serial port b for the heath printer. since I am a novice and don't really know what I'm doing, I just followed the instructions on user disk #2 to install it. It worked except that the printer uses an "XON XOFF" protocol and the bios on user disk #9 is using the CTS-RTS hardware protocol.

I created an "f.com" file just like the one on page 5 of micro-c #2. I set the baud rate at 300 which is slower than the mechanical speed of the printer that way the printer buffer never filled with characters. After using f.com for a few days, I decided to try changing the baud rate in the bios.

I used the PFM monitor and changed the baud rate byte from 07 (1200) to 05 (300). I then sysgened the code back onto drive A:

I also installed Wordstar so I could send you this letter. It works great too. I contribute the success of my project and this happy moment to Micro C. A novice would have a rough time without it.

Dan Wise WA4BBU
RT 2 Box 914
Kings Mountain NC 28086

Dear Editor,

I'd like to see someone come up with CPM 3 for the BB II (bank switched) I am quite sure I'm not the only one to think about this but I need help. Anyone want to help?

Dr Andre Michel
Fac. Univ. N-D, Dept Chimie
Rue De Bauxelles, 61
B-5000 Namur Belgium

Dear Editor,

As a deaf man with a BS in civil engineering, I consider a handicap something to be solved. I've come up with several ideas which could aid handicapped people, and I would appreciate feedback from Micro C readers.

First, someone might design a curser controlled by the head or eyes. An old application of this is a special helmet worn by a weapons man on a plane or helicopter that points the weapon system in the same direction the helmet is pointing.

It would be even better if someone could develop something that could detect eye movement and eye blinks. Perhaps it could be a laser system of some sort.

While the idea above is especially applicable to quadriplegics, the second idea below, a computer terminal providing tactile feedback, is suited to the blind.

Sightless folks could stick their fingertips into a thimble-like solid state device which would provide braille feedback. I've considered several possibilities, including translating video into braille. If Micro C readers have questions about what I'm doing, or have any suggestions, I'd enjoy hearing from them.

Scott Rich
1640 E. 1140 N.
Logan UT 84321

Dear Editor,

Can you recommend any books for learning to use M80 and Mac? The manuals are impossible to understand.

Reimar Goetzke
Box 543
Lynden WA 98264

Editor's Note:

Sorry! We don't know of anything specifically for M80. Since M80 is a Z80 or 8080 assembler, you might try some of the books on programming the Z80. This will give you a better perspective on how an assembler is used, making the job of learning M80 easier.

Dear Editor,

My husband and I built a Xerox 820 and are interested in corresponding with others who have done the same. The system worked well for a while, but now we are having disk drive problems. We'd like to meet with other people from New York to compare problems and solutions.

Robin and Louis Sommo
33 Bay 14th St.
Brooklyn NY 11214

Dear Editor,

While my broken fingers are mending after trying to play "ALIENS" at 4 MHz, I'm writing to give a work of caution regarding CPU's.

I got an SGS Z80A in a "JimPack." With the cover off the Kaypro-II, it works fine at 4 MHz; but with cover on and the unit warm, it won't run with out bugging up the works even at 2.5 MHz.

Also at 4 MHz, my disk has seemingly unlimited capacity! Using D-COM to read the directory I find that no matter how much space I have used, I always have 195K left. Could this be my new PRO-MONITOR, or when I get a Z80B will the bytes left be correct?

A question for the "SLICER" guru's (oh, how I envy their smarts): will it be able to run programs for the Tandy 2000? It would be great to have a format supported by a major force in the field.

Harvey DeGering
1245 E. Washington Blvd.
Pasadena CA 91104

Editor's note:

The problem is most likely with the Z80B. See the Issue 18 Letters Column. You might also need to replace the PIOs with PIO-As.

Dear Editor,

Can I buy the debugger called SID and how about the price? If I use the LIST command will it show the Z80 mnemonics (DDT shows the 8080 code)?

Michael Johansson
Tjadern 8
17562 Jarfalla
Sweden

Editor's note:

SID is available from Direct Software–see their ad in Byte magazine. You actually want ZSID for Z80 mnemonics but we're not sure where to get it. Try Digital Research of California.

Dear Editor,

I have my BB mounted in an Ampex D80 terminal. It has an amber screen and looks really nice. I have been running the board at 4 MHz with UniFORTH for about 9 months and just got CP/M from Wilcox Enterprises. I've also ordered JRT Pascal. I'd like to hear from BB I users in the Grand Rapids area.

I have access to several D80 terminals in various stages of repair at reasonable prices.

Kevin Tyrrell
1221 Colorado SE
Grand Rapids, MI 49506

Dear Editor,

I enjoy Micro C very much although a good bit of it goes over my head.

I have a Kaypro II and I would like to make the great eight modification (issue #15). If I purchase your Pro-Monitor 8 package, would I still be able to add an 8" drive without having to kludge things together (keep in mind that I'm a relative beginner)?

Clifford H. Taylor
1700 Leslie Ave.
Las Vegas NV 89101

Editor's note:

Dana's been doing a lot of work on the new versions of the PRO-8 package. First, there is the PRO-8+ disk which gives you the utilities you need when you add up to two additional 5" drives to the system.

Plus, we are working on another version that will allow you to add 8" drives. It will be compatible with the 8 upgrade.

Dear Editor,

I would like to complement you on the Kaypro schematic which you are marketing. This week my Kaypro II failed at work. It had two problems.

First, I couldn't read data from the B drive, and second, my printer was losing characters, and sometimes whole words.

My dealer found a bad logic board on the B drive. That cost me $135.

When I tried the Kaypro out at home, the print problem still existed. It was too late in the day to return it to the store, so I took it to work with me the next day to see what I could find out. I felt that this print problem might be software rather than hardware.

After exhaustively testing the software, I decided it was a hardware problem. Since I had access to test equipment and the dealer charged $60 an hour for labor, I took a stab at doing my own repairs.

The minute I took the top off, I had five helpers; all technicians with the dreaded kibitz disease. We proceeded with a scope and your schematic and found that when the data was being output to the printer some of the signals weren't coming up to full voltage and then we lost sync. When this happened, the printer lost characters.

After 4 hours we located the problem. It was U73 the busy ret—from the printer. Apparently when the printer buffer was full, the busy was not properly halting the data flow. I replaced U73 with another 74LS04 that I purchased from a parts house for $1 and the computer was back up.

There is no possible way that I could have attempted these repairs without your schematic and theory of operation. At the hourly rate the dealer was charging, I figure the net savings including the cost of the schematic was $219.

Since I suspected that the cause was a power line spike, I built a line conditioner. It consists of three transient suppressors and a four-outlet power strip.

The parts can be purchased from Radio Shack for $22. The suppressors are part #276-570 and are installed across all three leads of the power strip.

R. F. Loftus
3156D Texas Ct.
Great Lakes IL 60088

Dear Editor,

I really liked your lambastation (a shelter for young sheep) of the GTEK programmer. I bought a single EPROM programmer for my employer recently and avoided difficulties on the perfectly rational basis that the GTEK ad looked like it had been put together by kidnappers. I wound up purchasing the PROMPRO-7 for $489 from Logical Devices, Inc., 1321-E N.W. 65th Pl., Ft. Lauderdale, FL 33309. It worked fine, had reasonable documentation, and had human beings to answer the phone.

Gregor Owen
35 Admiral St.
Port Jefferson Station
New York NY 11776

Dear Editor,

My first issue of Micro C came today, and already you've moved me to take pen in hand. Issue 19, page 19, documented your woes with the GTEK gang programmer. I mused a bit, as I had received the same day a software upgrade for my trusty GTEK 7128. We seem to have different luck; perhaps different gnomes built our programmers, as mine is rugged and reliable.

Sounds like you got a GTEK lemon or two. And you didn't mention that their literature carries the repeated statement that "All GTEK products are fully warranted against defects in workmanship and materials." A $200 restocking fee on defective equipment hardly sounds like a comprehensive warranty.

Unfortunate situation, but your special editorial treatment still doesn't seem consistent or fair. An editorial slam is bad enough; a facing full page ad for the competition (mentioned in the article) adds insult to injury.

As you said, there are advantages to having a magazine of your own. Maybe one of them is getting to make up your own rules.

In spite of the nature of my letter, I like the magazine. You keep writing and I'll keep reading.

Bob Jenner
110 Long Sands Rd.
York Maine 03909

Editor's note:

I received calls and letters supporting both sides of this fence. Most people who have had GTEK programmers for a while are really happy with them. Perhaps I was just unlucky, perhaps their quality has dropped recently—I don't know. My mind has reopened slightly.

Meanwhile, my new Southern Computer Corp (SCC) programmer died (it quit burning ROMs) and I had to send it back for repair (gang programmers and I don't seem to get along). Their service wasn't quite as fast as GTEK's but the unit programmed ROMs when I got it back. Later I discovered that the serial interface didn't work (the problem turned out to be a second-sourced part that wasn't compatible with the design) so it's going back a second time.

Oh well, the SCC is still much easier to use, much more powerful (CRCs and all), and it lets me edit data in its memory before burning the ROM (the GTEK I had didn't have any memory).

As for the ad and its placement (Issue 19, page 18), I have mixed feelings, too. I had Alice call them about advertising after I had written the review (blast). Whether they chose to advertise or not couldn't have changed the article.

I thought they should advertise in Micro C because I thought they offered the best value in a gang programmer and I felt that you folks should know about it. (In fact, if I had time, I'd review all products before letting manufacturers advertise in Micro C.)

I agree that the juxtaposition of the ad and the column (as well as the timing) does look suspicious, but we get calls, almost daily, from prospective advertisers wanting to know if their product will be reviewed in the next issue. They want to advertise in the issue with the review, and, of course, they want their ad opposite the review (even though they are only hoping that the review will be favorable).

A few manufacturers, when sending a review sample, have asked to have final edit on a review. I have returned those products without looking at them. Other times I have gotten word that a review I've received from a "reader" was written or edited by the manufacturer. Those reviews were canned.

■ ■ ■

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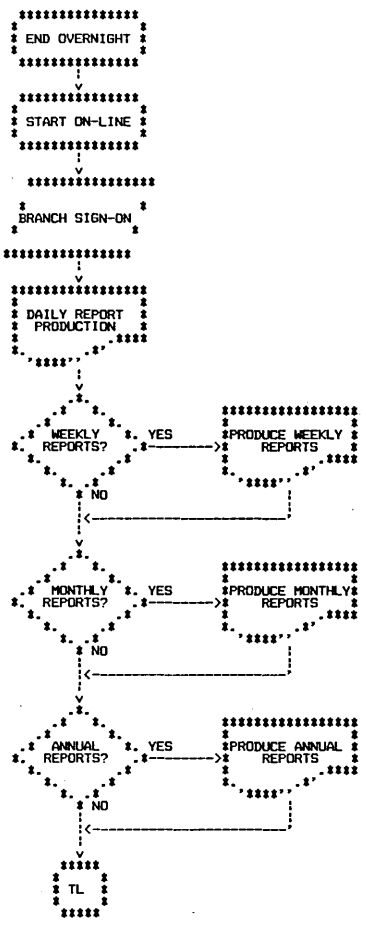

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TECHNICAL TIPS

Keep Your Kaypro

In Micro C Issue #19 in the Kaypro Column, you discussed Kaypro's going to lunch while auto-dialing. Your suggestion was to buy another microprocessor. I have another idea:

Buy two 40-pin wire-wrap sockets, three 14-pin sockets, three buffer ICs, and something to mount them all on.

First, remove the Z80 from its socket and place it in one of the sockets mounted on the prototype board. Cut the pins on that socket to half length. Then solder wires from the mP inputs to the corresponding pins on the longer socket. Now solder wires from the outputs of the mP to the inputs of the buffers and from the outputs of the buffers to the corresponding pins of the socket with the long legs. Finally, connect the supply pins of the buffers to the power supply rails in the computer and insert the pins of the uncut socket into the original Z80 socket (on the computer). That ought to work.

Also, in the SBASIC Column, someone mentioned that SBASIC has no EOF indicator. It does. Just test for ASCII character 26 (control Z).

I would like to know anyone knows how I can configure/modify any version of BYE to work with my 4-84 with the internal modem.

Bill Tuck
Rt. 1 Box 222
Alberta VA 23821

DSDD/SSDD Compatibility

Here is a useful tip when installing a DSDD drive along with a SSDD drive.

After installing a Pro-8 ROM package, I placed the double sided drive in the A position. Then I placed a single sided disk with sysgen in A to boot the system. With a format2 and sysgen in B, I then tried to format and sysgen a new disk in A to double sided. Not realizing that one cannot boot in one format and then format in another, all my attempts to boot A in DSDD failed.

Finally, the light dawned! Initially the double sided drive must be in position B. Format the first double sided disk in B, then move the DSDD drive to A, boot in double sided, and then format and sysgen. Moral: In drive A, boot up in whatever format you intend to work with in that drive.

Only one drawback remains: there is a 15-second pause when using both single and double-sided disks.

PIP lets you copy either way with no problem, but other programs like Wash 14 will sit and think about it for almost 15 seconds before acting. And my serial printer beeps, then waits 15 seconds before printing starts. With WORDSTAR and THE WORD PLUS on A, operation is normal except for that 15-second delay when paging with CTL C. Using the same format on both drives still works normally.

Harvey DeGering
1245 E. Washington Blvd
Pasadena CA 91104

Speeding Up the Blinkin' 820

I found the slow blink of the CRT display of characters with bit 7 set to be extremely irritating, as well as rendering the display illegible. The blink attribute is more useful when it blinks faster. This is easily achieved by a minor hardware modification. Cut the trace going to pin 8 of U49 (74LS393) and connect it instead to pin 9, 10 or 11 according to whether you wish to multiply the blink rate by 2, 4, or 8. The last gives half-intensity characters with some flicker and is useful for providing contrasting characters, but it makes the cursor harder to locate over a small character such as a period.

Richard Parsons
RR #1
Mount Albert Ont. Canada L0G 1M0

Quicker Fix For BBI Video

As pointed out by Wesley Ebisuzaki in Micro C Issue #18, Big Boards sometimes have a problem with their composite video output. Mine had the characteristic dim vertical and bright horizontal mentioned by Ebisuzaki, but his quick fix wouldn't work on my board.

The fix I came up with is even quicker than Ebisuzaki's and completely cured the problem in my system.

Capacitor C 142 in the feedback circuit of XOR gate U 94 is critical because it has only 20% tolerance. Try exchanging C 142 with other capacitors having the same or slightly higher value until you find the rare bird. In my case, a 47 pF cap from the junk box did the trick perfectly well.

Christian Phaneuf
P.O. Box 1107
972 Guillaume Boisset
Cap-Rouge Quebec Canada G1Y 3E4

Free Samples From Texas Instruments

I have come across a good deal for those who have not yet gone to double density on their BBI. In recent issues of "Electronic Engineering Times," Texas Instruments has had ads offering free samples of their WD2797 floppy disk controller chip. You must fill out and send in the form in the ad.

This chip is identical to the WD2795 controller with the exception that it uses a true rather than an inverted data bus. Robert Carroll's article in Micro C Issue #16 details the conversion to the WD2795. The only additional modification required to use the WD2797 is to replace U99 and U100 with 74LS243s (non-inverting bus transceivers) instead of 74LS242s (inverting bus transceivers).

The free controller chip more than offsets the cost of replacing U99 and U100 ($50 vrs. 2x$1.20).

Ronald R. Swager
1515 N Lincoln Ave #17
Springfield IL 62702

Fast Boot From Slow ROMS

When increasing the speed of the BBI, it's really not necessary to change the PFM ROM(s) from the slower 2716 to the faster 2716-1. I have a system up at 5 MHz now which has never failed to boot from PFM in two 2716s. Simply drive the

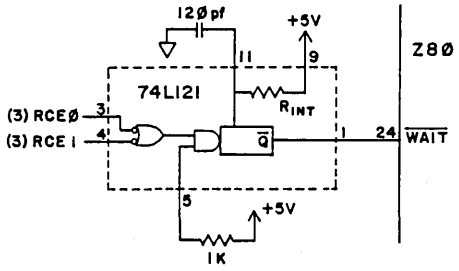
TECHNICAL TIPS

Z80 WAIT line from a 74121 or L121 one-shot as shown in the following figure. Since the intent of the WAIT line is to allow the Z80 to wait on slow I/O devices, this scheme works well.

By using Rint and a capacitor value around 120 Pf., approximately 200 NS can be added to the ROM access time. For the purists in the crowd, the slower access time is only critical for the execution of the first 10H bytes since only they incur the faster instruction fetch cycle times on ROM access. Subsequent ROM accesses are at the slower fetch cycle times and probably would do fine without the wait states.

The scheme below requires only one trace cut and the addition of three wires plus Cext, +5V and ground. There is room on the BBI between U85 and U88 to locate the one-shot socket. I glued mine on a stand-off to the component side of

Fast Boot Scheme



the board and drilled a small hole near it for wiring access to the bottom of the board. If a L121 were used instead of a 121, the wait would be longer because of Rint being larger in the L121, but you can hardly tell the difference.

D.L. Carlyle
1107 Horseshoe Lane
Blacksburg VA 24060

Repairing BBI System Clock

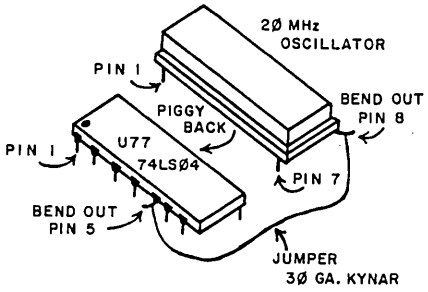
When my BBI system clock quit for the fourth time, I bought a 20 MHz crystal oscillator from JAMECO. This is a single-component oscillator in a package compatible with DIP integrated circuits. The oscillator requires +5V and provides a TTL level output signal.

The +5V requirement and the shape of the package cause minor difficulties when installing the oscillator in a BB. I solved the problem by placing the oscillator on top of U77. First remove U77 and bend out pin 5. Then bend out what would be pin 8 on the oscillator, if the oscillator were a 14 pin DIP device. Place the oscillator on top of U77 and carefully solder pins 1,7 and 14 to the corresponding pins of U77. Install a jumper between pin 8 of the oscillator and pin 5 of the 74LS04 (U77). Then place U77 back in the socket, leaving pin 5 bent out. With this modification you may leave the old clock components in place in case you need to go back to the old crystal.

I still don't know why my old clock stopped, but since the modification, it's been running reliably.

Pat Coleman
6529 Creekwood Ct.
Mobile AL 36609

Oscillator Placement



OSCILLATOR PINOUT
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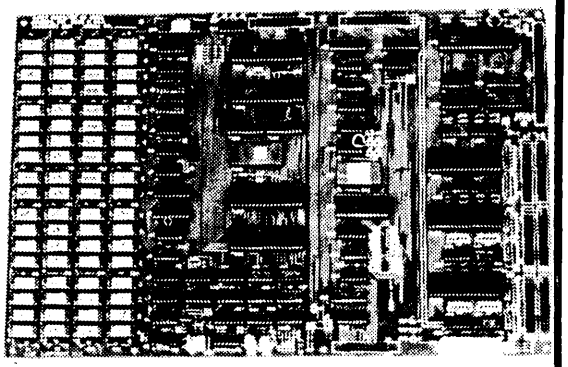

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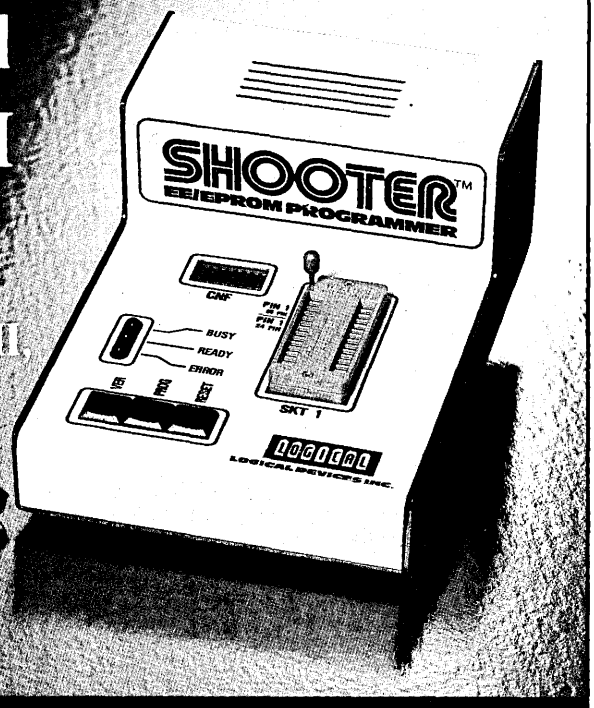

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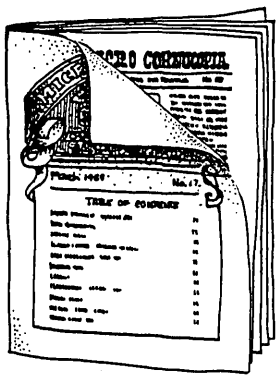

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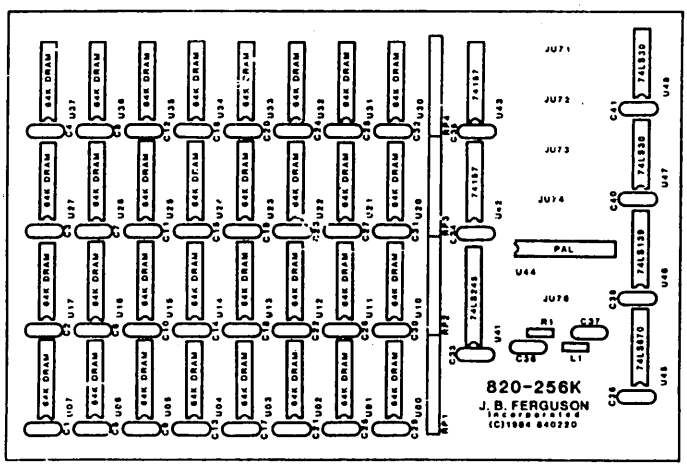

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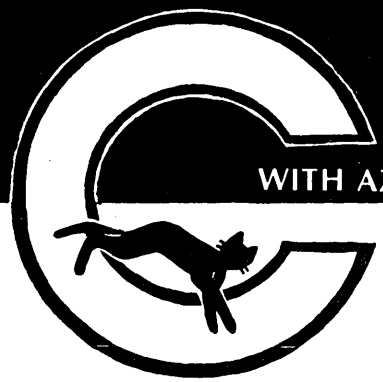

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