

# PEEK (65)

The Unofficial OSI Users Journal

P.O. Box 347  
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## Column One

As you can see immediately, PEEK(65) has changed. In response to the expressed desires of our readers, we have gone to full size, 8 1/2 X 11 format. This change is a significant one, and has been an adventure for us. Let me share some of it with you.

A number of readers have told us our "funny" size was a problem. The first 10 issues of PEEK (65) would not fit into a standard loose-leaf binder, there was no place to punch holes if it would, it would not stack with other magazines, etc., etc. So we decided to change.

Perhaps I should explain that the reason for the odd size in the first place was that we owned a press which would not take paper larger than 8 1/2 X 14. So going to the larger size meant that we had to find a larger press at a reasonable price, or the use of a larger press, which is still harder, considering that PEEK (65) is not a gold mine. Help came in the form of the printshop of a nearby educational institution, which was willing to help out with this educational project for a very reasonable price.

Then, once the overall page size was decided, it remained only to figure out how to fit in the columns, the ads (some of which were already on hand, at the old size), the margins (we were determined to leave enough space in the center margin for holes for loose-leaf binders), to calculate how many spaces per column line, how many lines per column page, how many pages per issue to retain the same

quantity of information (and the same mailing rate) and to lay it all out. Now, after days of hard work, the calculations are done, the magazine is laid out (except of course for the hole into which Column One is to fit) and the only casualty was our own ad, for Goodies for OSI Users, which will be back next month in its usual place with a few new goodies!

Another change which has come with our larger size is -- larger size. I mean larger ad sizes, more square inches per page, more room for oversize listing and larger type in the bargain. I am determined that you, our readers, will retain all the advantages you have had, plus greater readability. No more squinting at teeny ads with 700 words of type in them. No more Basic lines broken up onto 4 or 5 lines of type. Clearer, more proportionally spaced type.

All of this had required conversion to another printer (we hope to get a better typing element for it, but that will take some time) and a complete reworking of ad sizes and rates as well. If you have received a rate card from us, it is now out of date. Ask for a new one. And take a look at the introductory special on the ad rate sheet. If you have anything to offer to the OSI community, you can afford an ad in PEEK (65). Low ad rates encourage communication and help us all learn more about our computers, even if they don't make editors rich.

Now, it is up to you. We are prepared to present your articles to the OSI public in what I hope is a better, more readable and savable format.

Editor: Al Peabody

Vol. 1, No. 11 Nov. 15, 1980

We will print your computer related cartoons with the best ink we can find, on a new, clearer press. But only if you send them to us! Dust off that typewriter or console and send us your contribution. If you have WP-2, you will save these tired fingers a lot of exercise. We will return your disk post haste. A little thought before listing out a program will also save us a lot of nasty error prone typing. Just keep in mind that a PEEK (65) single column is 30 characters wide and a double column is 63 wide. Better yet, send a disk and know that your listing will be just as you wrote it. In return, we will give you instant fame and wealth beyond the dreams of avarice (would you believe \$5 to \$25, depending on size and quality?).

As always, I am proud of this month's issue. We have received some complaints about too little information for the ClP/SII owner. Herewith, page after page of good hardware and software dope for the SII man. Plus good information for the C3B owner, and most everyone in between. If your machine is not well represented, wait till next month.

And wait till January! The January 1981 issue will feature a complete cross index to all 12 issues in 1980. (There, I said it! Now I have to do it!) Look at the top line of your address label. Encoded there is your expiration date, the last PEEK (65) you will receive; for example 8012 means that NEXT MONTH will be your last PEEK (65). If your label says 8012, use the subscription for on the last page to be sure you will get the first annual index!

*al*

## MODIFYING THE OSI VIDEO DISPLAY

by James Loos  
750 S. Dickerson  
Arlington, VA 22204

The ClP and its companion Superboard 11 from Ohio Scientific are certainly fine machines. They offer a lot of nice features at a very attractive price. My only complaint is that the video display is somewhat anemic. The ClP displays 24 lines of 24 characters. As a recent graduation of LED type displays, I was thrilled to have any kind of video display. But in time the 24 X 24 format became rather restrictive.

I wanted to put more information onto the screen and so I considered three possible approaches. At first I considered buying one of the many S-100 video boards available and adapting it to work with the ClP. Besides the obvious high cost involved, this approach would mean that I would probably be

unable to use the character generator supplied by OSI which features upper and lower

case and many graphic characters. Except for premium boards most video displays use a 5 X 7 dot matrix. Then I thought about building my own video display interface from scratch. This way I could retain the features that I liked while incorporating others that were missing. However the prospect of duplicating perhaps 90% of the circuitry that was already on the board was not very appealing. Finally I turned my attention to modifying the video circuitry on the 600 board. After studying the situation I came up with a modification that would double the number of characters per line. My modified ClP can now display 29 lines of 48 characters. This is certainly not the ultimate video display, but the modification route has the advantage of being simple and relatively inexpensive. The parts needed for this modification are: two TTL ICs, two 2114 static RAMs, one 5V 2716 EPROM, two resistors, and two capacitors. The parts cost me less than \$50.

The ClP is billed as a starter system and beginning hobbyists may have some reservations

about tackling a modification such as this. While the modification does involve cutting some foil traces and doing a bit of rewiring, if you have ever successfully assembled a kit you should have no trouble.

### CAVEAT MODIFICATOR

Anyone considering this modification should keep in mind that there is a price to be paid for putting more characters on the screen. The

modification changes the display memory map, so some of your programs will have to be rewritten. Programs that output with PRINT statements should be OK, but those that POKE characters or graphic elements into specific locations on the screen will need to be rewritten. If you have a heavy investment in this type of software, it may not be worth while for you to do this modification.

Hardware and software are closely integrated in any computer and the ClP is no exception. Some of the supporting firmware will need to be changed for this

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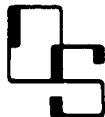
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modification to work properly. As mentioned previously, you will need to buy and have programmed a 5V 2716 EPROM. Prices of these chips are dropping, but this remains the single biggest expense and hassle involved in the modification.

The modification doubles the video data rate so you will need a monitor or converted TV with a bandwidth of approximately 4MHz. The characters may not appear sharp or legible if you are using a color TV or a black and white TV with an RF modulator.

#### IF YOU'RE STILL INTERESTED...

For those who have not turned to the next article let me outline in general what the modification does. The CLP in stock form has 1K of display memory located from D000-D3FF. We will add another 1024 bytes of RAM from D400 to D7FF and change the address decoding a bit to make it work. The 600 board increments the video display memory address once every two microseconds and clocks out the resulting video dots at 4MHz. We will modify

the circuitry so that the address is incremented every microsecond and the dots are clocked out at a 8MHz rate. Therefore 32 horizontal lines of 64 characters will be output. Allowing time for blanking and retrace, something less than this will be visible on the screen. If OSI is correct in claiming that a stock CLP will display a maximum of 30 lines of 30 characters, then a modified one should give a maximum of 30 lines of 60 characters depending on the monitor used. Because of overscan I can display 48 characters to leave a little blank space on either side.

We will also change the code in the BASIC support ROM U13 to make it clear the entire 2K of display memory on reset and trick the video driver routine into thinking that it is working in a C4P with 2K of video display RAM.

Now for some preliminaries before we get down to cases. There are no identifying legends on the board so it will take some extra effort to positively identify the IC or foil trace before you cut or solder a wire. In some cases the foil trace that we are interested in runs under the IC to the pin so you will not

be able to visually identify it. You will need an ohmmeter for these. Try to cut the foil traces as close as possible to the pin of the IC involved to avoid inadvertently affecting other circuits. If I had followed my own advice my mod would have worked the first time that I turned it on. As it turned out, it worked the second time.

Do not use an industrial strength Weller soldering gun

for soldering. A 15 Watt soldering pencil should be sufficient. Do not drag your feet across the carpet to see how large an arc you can throw when touching the board. It would be a good idea to touch something else to dissipate any static charges before you touch the board itself.

#### HARDWARE MODIFICATIONS

Now disassemble your machine so that you can get to both sides of the board. Locate U20 on the board. Identify and cut the foil trace to pin 1 of U20. I used a machinist's scribe to scratch through the foil traces. Remember that the IC pin numbering is reversed when you flip the board over. Connect pin 1 and pin 2 of U20 together. RVE and WVE now go low for addresses D000-D7FF.

Cut the foil to pin 11 of U55. Connect pin 11 of U55 to pin 9 of U21 (A10). 30 gauge wire-wrap wire works very nicely. MCS now becomes MCS1 and is low for the address D000-D3FF. It is used to enable the first K of display RAM.

Connect pin 13 of U55 to pin 16 of U55. This jumper is used for test purposes and will be removed later. Connect pin 14 of U55 to pin 8 of U21 (A10). Pin 12 of U55 now becomes MCS2 and will be used to enable the second K of display memory. This signal goes low for addresses D400-D7FF.

Locate U56 on the board. Identify and cut the foil trace to pin 2 of U56. Connect pin 1 and pin 2 of U56 together. VA now goes low for addresses D0000-D7FF.

Add two 2114 RAMs to the board. All pins of the two new RAMs are connected in parallel to the existing display memory chips U39 and U40 except pin 8. Pin 8 of each new RAM chip is connected

to pin 12 of U55 (MCS2). I added the two RAMs to my board by putting one 2114 right on top of U39 and the other on top of U40 and soldering each pin of the new chips to its corresponding number on U39 and U40. Pin 1 was soldered to pin 1, pin 2 to pin 2, and so on with the exception of pin 8. If you use this method, take care not to damage the ICs when soldering.

The 2114 RAM chips that I used for the display memory have an access time of 450 ns. The chips supplied by OSI have an access time of 550 ns. 550 ns may or may not be fast enough depending on the access time of the character generator ROM. There may not be enough time to get valid data out of both the RAMs and the character generator ROM before the video shift register is loaded using 550 ns RAMs. Assuming that the character generator ROM has an access time in the neighborhood of 500 ns, the timing gets a bit close even for 450 ns RAMs. I simply do not know, I have not tried the slower chips. My 450 ns RAMs do work fine, however.

I suggest that you stop here and check out the work so far. Any problems that arise will be easier to identify and correct now. I ran the following short BASIC program to verify the address decoding and enable signals:

```
10 FOR X=53248 TO54271
20 POKE X,85
30 IF PEEK(X)<>85 THEN 100
40 NEXT X
50 FOR X=54272 TO 55295
60 POKE X,170
70 IF PEEK(X)<>170 THEN 100
80 NEXT X
90 PRINT "TEST COMPLETE":END
100 PRINT "ERROR IN";X:END
```

The screen will fill with "U's". The second K of display RAM will fill with another character but it will not be visible on the screen. You will, however, be able to see the dashes on the screen as the second K of display memory is accessed. If you do not get the "TEST COMPLETE" message, go back and check over your work.

Using the proto pads provided on the board, wire the 74LS123 and 74LS00 as shown in figure 2. These are the TTL ICs, resistors and caps that must be added. The 74LS123 is a dual monostable. One monostable triggers on the

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that it loads eight dots from the character generator and clocks them out in serial once every micro-second.

Now back at U55, remove the jumper at pin 13 and cut the foil that grounds pin 10. Connect pin 10 to pin 1 of the 74LS00 (C15). Connect pin 13 of U55 to pin 3 of the 74LS00 (C15).

At the display RAM address multiplexers (U53, U54, and U55) we must disconnect all the signals from the counter and reconnect them so that the address is incremented each microsecond. At U53, cut the foil traces to pins 3, 6, 10, and 13. At U54 cut the traces to pins 3, 6, 10, and 13. At U55 cut the foils to pins 3 and 6. Now at U53, connect pin 3 to pin 12 of U30 (C2). Connect pin 6 to pin 11 of U30 (C3). Connect pin 10 to pin 14 of U59 (C4). Connect pin 13 to pin 13 of U59 (C5). At U54 connect pin 3 to pin 12 of U59 (C6). Connect pin 6 to pin 11 of U59 (C7). Connect pin 10 to pin 11 of U60 (C11). Connect pin 13 to pin 14 of U61 (C12). At U55 connect pin 3 to pin 13 of U61 (C13).

leading edge of the CLK pulse and the other triggers on the trailing edge. The negative going 75 ns pulse from each monostable is combined by the NAND gate to give an output that is twice the frequency of the input. This output of approximately 8 MHz will be our new video clock and is used to clock the dots out of the video shift register. The other two gates simply invert the CLK and C15 signals.

Cut the foil to pin 2 of U42. The trace to pin 2 or U42 runs in under one end of the chip and out the other. You will have to cut the foil on both ends of the chip and then provide a jumper around U42 to maintain the continuity of the foil trace.

Cut the foil to pin 1 of U43. Connect the VIDEO CLK (pin 8 of the 74LS00) to both pin 2 of U42 and pin 1 of U43. Cut the foil to pin 12 of U19. Connect pin 12 of U19 to the CLK signal that was generated

with one of the spare NAND gates. We have now modified the video\_shift register so

Connect pin 6 to pin 12 of U61 (C14).

The hardware portion of the modification is now complete. Look things over and when you are satisfied that everything is in order, power up the computer. The screen will be filled with random characters. Hit the break key and the top half of the screen will clear. "D/C/W/M" should appear somewhere in the middle of the screen. We want to run a program to fill the screen with a recognizable character; "X"s are ideal. Remember that the display memory now runs from 53271 to 55295. You will notice that the characters are half as wide as previously. Adjust the vertical height and linearity controls on your TV or monitor until the characters are of normal proportions.

If you are satisfied with the appearance of the display at this point then skip on to the firmware modifications. However, I found that on my display the dots on a horizontal line would tend to merge together and bloom objectionably. Adjusting my TV

brightness and contrast controls did not completely eliminate the problem. A further modification of U43 provided the solution. The signal T3 generated by U43 is simply a delayed replica of the video clock. T3 is used to load the shift register and is also routed to U56 to control the width of the dots on the screen. Unfortunately T3 in its present form is not much help in providing for good resolution when running at our increased speed. Figure 1D shows the changes that I made to U43. The NAND gate is the one remaining in the 74LS00 package. Cut the foils between pins 9, 10, and 11 of U43. Make sure that pin 11 of U43 is still connected to U19. Connect pin 11 of U43 to the input of the NAND gate. Connect the output to pin 9. Connect pin 1 and pin 10 of U43 together. Cut the foil to pin 13 of U56. Connect pin 13 of U56 to pin 8 of U43 (T4). The video dots will be "on" for approximately 40 ns, the amount of propagation delay through the four gates. This will improve the resolution dramatically, but will also reduce the intensity of the display considerably. You may find it necessary to adjust R58 on the 600 board to bring things back to normal.

#### FIRMWARE MODIFICATION

The OSI BASIC-IN-ROM is written to accommodate both the C1P and the C4P. The video driver routine looks to the support ROM to find out which machine it is in. By changing three words in the ROM we can simulate a C4P which displays 32 lines of 64 characters. These changes allow us to start the cursor anywhere in the lower quarter of the screen and print up to 60 characters per line if our TV or monitor will allow it. Figure 3 details the changes that I made to the support ROM U13. FFEO holds the starting position of the cursor counting from D700. In my case the cursor starts at D78A. The value in FFEL is one less than the number of characters at which the display scrolls. 2F gives 48 characters per line. Refer to figure 1-1 in your Challenger Character Graphics Reference Manual. This is the display memory map for the 540 board in the 32 X 64 format. The display memory map for this modification is exactly the same except that all the locations are not visible. This figure will aid you in determining the exact values for FFEO and FFEL to suit your

particular application. FFE2 holds a flag to tell the video routine that we have 2K of display memory. This value must be 01.

There is the problem of how to clear the entire 2K of display memory on reset. The C1P normally will only clear from D000 to D3FF. Since locations FCD6 through FCFB are not used in the original ROM, I located a screen clear subroutine there. FF24 calls this subroutine on reset. Locations FF29 through FF34 are filled in with NOP's. An added benefit to this approach is that this screen clear subroutine can be called from Basic with the USR function.

FEOD allows for clearing the entire screen when "M" is selected. Changes to locations FEC4, FEC7 and FED6 move the machine code monitor display seven positions to the right on the screen. The monitor address display now starts at D0D0. Blank spaces are inserted into D0D4 and D0D5. Once again you may wish to adjust these values slightly.

The socket for the support ROM U13 is set up through the use of jumpers to accommodate a variety of ROMs and PROMs. Check the socket and verify that it is configured for a 5V 2716. Pin 18 must be connected to MCS. Pin 20 must be connected to 02. Pin 21 must be connected to +5V. Once you have your EPROM programmed, install it in its socket and check out your computer carefully. If there are any changes necessary, you may of course erase and reprogram the 2716.

This modification is by no means the most elegant nor does it make the most efficient use of memory. But it is a solution and it works. With careful work and attention to detail, any owner of a C1P or Superboard II should be able to at least double the number of characters that they can display. Should anyone experience difficulties in getting this modification to work properly, please feel free to drop me a line. There are no guarantees, of course, but I will help if I can.

If you want to modify your TV to accommodate direct video entry or if you wish to learn more about TV timing requirements, you will find a wealth of information in Don Lancaster's TV Typewriter Cookbook.

The photographs accompanying this article were taken by Mike LaBelle.

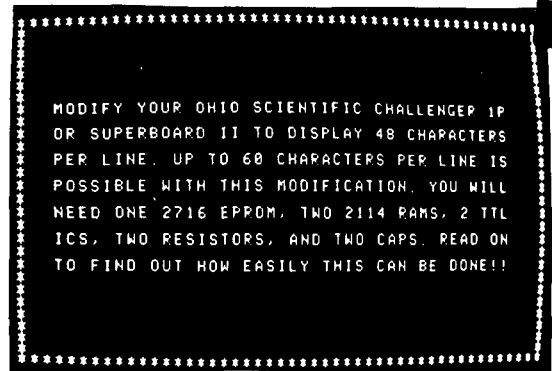


Photo #1. The results speak for themselves.

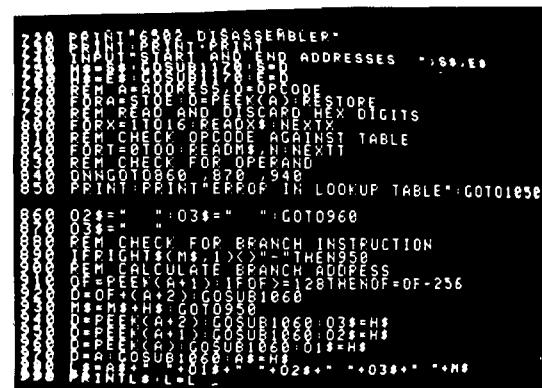


Photo #2. A typical listing. With 48 characters per line you can fit a bigger slice of the program onto the screen at one time.

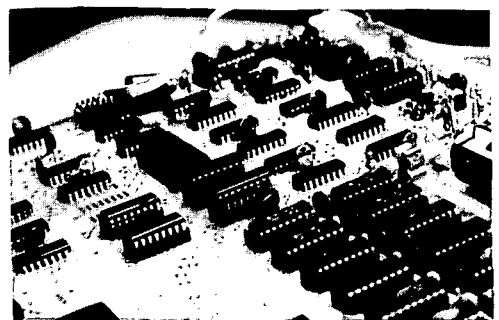


Photo #3. The display RAMs are visible in the center of the photo. The additional RAMs were soldered directly to the existing chips.



Photo #4. The 30 gauge wires used for making connections are just barely visible in this photo.

ROM Location	Change to:	ROM Location	Change to:
FCD6	48	FE0D	D8
FCD7	98	FEC4	D4
FCD8	48	FEC7	D5
FCD9	A9	FED6	D0
FCDA	20		
FCDB	A0		
FCDC	00	FF24	20
FCDD	99	FF25	D6
FCDE	00	FF26	FC
FCDF	D0	FF27	A0
FCE0	99	FF28	00
FCE1	00	FF29	EA
FCE2	D1	FF2A	EA
FCE3	99	FF2B	EA
FCE4	00	FF2C	EA
FCE5	D2	FF2D	EA
FCE6	99	FF2E	EA
FCE7	00	FF2F	EA
FCE8	D3	FF30	EA
FCE9	99	FF31	EA
FCEA	00	FF32	EA
FCEB	D4	FF33	EA
FCEC	99	FF34	EA
FCED	00		
FCDE	D5		
FCEF	99		
FCF0	00	FFE0	8A
FCF1	D6	FFE1	2F
FCF2	99	FFE2	01
FCF3	00		
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FCF5	C8		
FCF6	D0		
FCF7	E5		
FCF8	68		
FCF9	A8		
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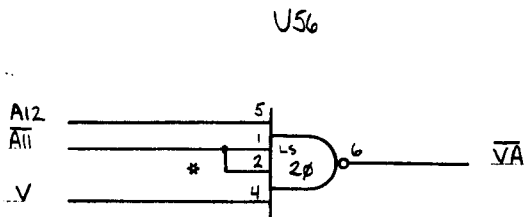
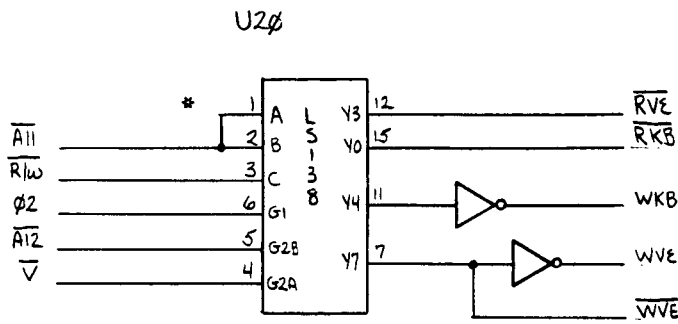


Figure 1A. Modifications to U20 and U65. Changes are indicated by asterisks.

**CORRECTION!**

In Kurt Gritter's letter to ED, on page 15 of the last issue, the tenth line of the DISK CHANGE UTILITY dump should read:

"00003E0B 90 ? 04" NOT 8D.

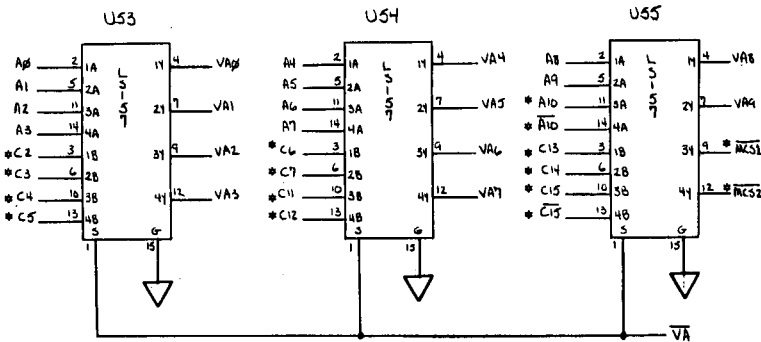


Figure 1B. Modifications to U53, U54, and U55. Changes are indicated by asterisks.

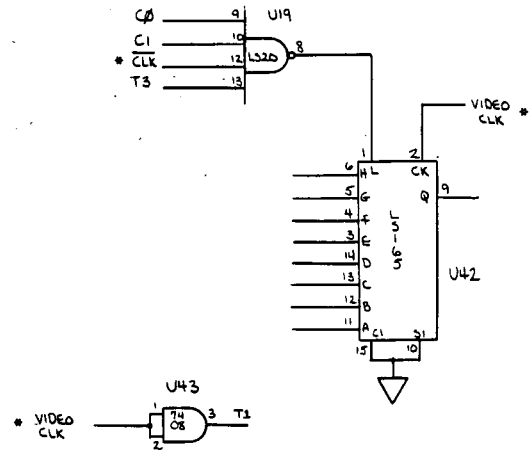


Figure 1C. Modifications to U19, U42, U43. Changes are indicated by asterisks.

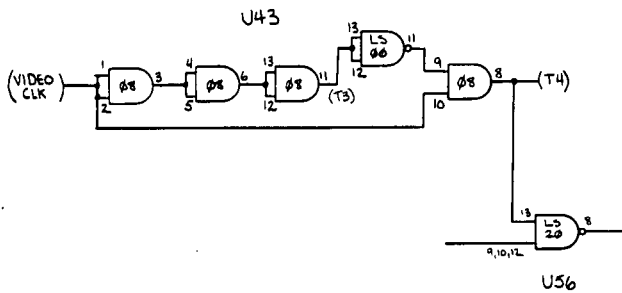


Figure 1D. Further Modifications to U43

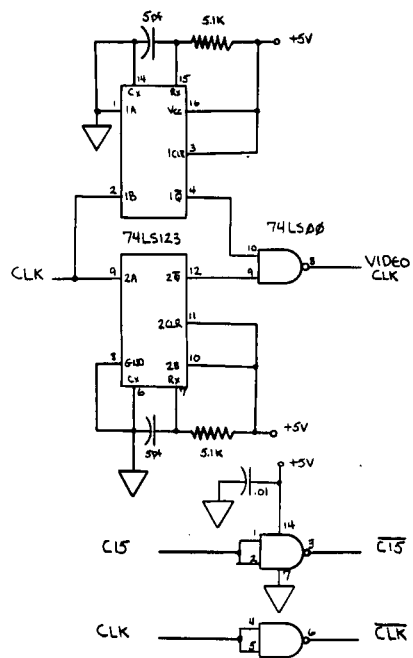


Figure 2. Circuits to be added to the 600 board.



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Automatic data back-up is provided for floppy diskettes or Winchester hard disks using either the back-up routines provided with the software or standard system utilities or hard disk managers.

A demonstration package is provided with every BUS-II order. This "demo" files diskette contains an abbreviated but illustrative Chart of Accounts which can be used to quickly and effectively demonstrate the various features of the BUS-II package. A second files diskette is also included containing an extensive Model Chart of Accounts which can be adapted for use by most small businesses.

All Digital Technology software systems allow the operator to "set" the program to the type video terminal and printer used. The operator selects the terminal and printer types from the list provided in the "TERMINAL & PRINTER OPTION" program (option '0', BUS-II System Selectors).

Nearly all popular video terminals, including those specified below, are supported and are user-selectable from the Terminal Options menu:

NULL (NO SCREEN FORMATTING)  
MICRO-TERM ACT-IV  
MICRO-TERM ACT-V  
LEAR SIEGLER ADM-3A  
BEEHIVE 150/152  
BEEHIVE 160/162  
HEATH WH9  
HAZELTINE 1420  
HAZELTINE 1500  
INFOTON I-100  
INTERTEC INTERTUBE  
ADDS REGENT  
SOROC IQ-120  
TELEVIDEO TVI-912/920

Currently supported output devices are user-selectable from the Printer Ports menu:

SERIAL (RS-232) OSI 430 OR D&N MICRO CA-6  
STANDARD (CENTRONICS) PARALLEL INTERFACE  
SPECIAL PARALLEL INTERFACE (DIABLO & NEC 5500)  
SERIAL (RS-232) OSI 550 (CA-10-X)

A number of additional features are provided by the terminal and printer control program--'DEVSET', an exclusive feature of Digital Technology software. DEVSET controls form length for all BUS-II reports, so program modification is usually unnecessary. For a full discussion, refer to DEVSET user notes and technical information.

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P.O. BOX 178590  
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BUS-II  
BOOKKEEPING & ACCOUNTING SYSTEM  
GENERAL LEDGER

Digital Technology's BUS-II General Ledger client accounting system allows up to 99 clients. The General Ledger accepts a maximum of 500 accounts in the Chart of Accounts. The system permits up to 999 General Ledger transactions per month. The General Ledger is interactive with the BUS-II Accounts Receivable, Accounts Payable, and optionally, with BUS-II Payroll.

Complete operating instructions are on-line at all times in the form of extensive "user memos".

Branch accounting permits up to 5 separate divisions or "profit centers" with a combined balance sheet. Up to 5 multiple totals for sub-groups within account categories are possible.

12-month or 13-period accounting year may be selected.

A Cash Receipts Journal, Cash Disbursements Journal, and a General Journal are maintained within the General Ledger.

Chart of Accounts file maintenance: add, change, delete.

Highly flexible formatting of financial reports--title, subtotal, and total account titles are maintained within the chart of accounts.

Automatic posting to G/L accounts. The system will not accept batches which are out-of-balance.

The internal audit trail records the type of transaction, point of origin, destination, date, and amount.

Using the inquiry routines, the operator may examine the audit trail or account details at any time.

General Ledger Reports:

- CHART OF ACCOUNTS
- BALANCE SHEET
- INCOME STATEMENT
- TRANSACTION LISTING
- DETAILED GENERAL LEDGER REPORT
- CASH RECEIPTS JOURNAL REPORT
- CASH DISBURSEMENTS JOURNAL REPORT
- GENERAL JOURNAL REPORT

A CPA Extensions package for BUS-II is optionally available which provides for the special needs of the public accountant. Information will be provided upon request.

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## BUS-II

### BOOKKEEPING & ACCOUNTING SYSTEM

#### ACCOUNTS RECEIVABLE

Digital Technology's BUS-II Accounts Receivable module allows 400 customer accounts. Complete customer information including address is maintained as part of the customer record. The system allows 900 open invoices per month. Additional Accounts Receivable modules may be added as needed providing expansion capabilities for larger businesses.

Interactive transaction entry provides automatic posting to the General Ledger. The system checks invoice numbers, customer names and numbers, and proper batch balance before posting to the General Ledger. All transactions may be edited before posting to the General Ledger. Optionally, multiple General Ledger income account posting allows A/R posting to as many as 9 G/L Income accounts for sales by "departments".

Complete operating instructions are on-line at all times in the form of extensive "user memos".

Open invoices are carried forward until paid. A summary balance is maintained and carried forward for each customer reflecting current month and year-to-date totals.

The system prepares aging reports based on last date to be considered. Thus aging reports may be prepared for any required time period.

The internal audit trail will provide both daily and monthly listings.

Complete customer file maintenance: add, change, delete.

Detailed customer statements may be produced for all accounts or for certain specified accounts. Statements show all invoice amounts and dates, credits, adjustments, as well as past due balances in 30-, 60-, 90-, and 120-day categories. Optional service charges on past due accounts--percentage or fixed amount.

Optional Order Entry Program prepares invoices automatically using a "fill in the blank" format.

#### Accounts Receivable Reports:

- DAILY TRANSACTION LISTING
- MONTHLY TRANSACTION LISTING
- DETAILED ACCOUNTS RECEIVABLE REPORT
- A/R STATUS REPORT (ALL ACCOUNTS)
- STATEMENTS (WITH PAST DUE NOTICES)
- OPEN INVOICE LISTING
- A/R ACCOUNT DETAIL
- AGED ACCOUNTS RECEIVABLE (VARIABLE PERIOD)
- AGED TRIAL BALANCE REPORT
- A/R MAILING LABELS

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## BUS-II

### BOOKKEEPING & ACCOUNTING SYSTEM

#### ACCOUNTS PAYABLE

Digital Technology's BUS-II Accounts Payable module is configured to carry 200 vendor accounts. 199 Accounts Payable transactions are permitted monthly. Additional Accounts Payable modules may be added as needed, allowing expansion capabilities for larger businesses.

Payables are entered using a "fill in the blank" format. Interactive data entry with automatic posting to the General Ledger allows the user to specify up to 5 General Ledger accounts for each invoice. Data requested includes vendor number (or, if temporary vendor, name and address), invoice number, date received, date due, percent discount. Temporary vendors are automatically removed from the files. All transactions may be examined and edited before posting.

Complete operating instructions are on-line at all times in the form of extensive "user memos".

Automatic check printing or manual check writing may be selected. A check register is provided for both hand-written or computer-generated checks.

Checks are printed on standard "stub-over-check" pin-feed rolls. Checks may be selected for payment by date or by vendor. Discounts are taken into account when paying invoices. Paying by vendor allows the user to examine all invoices in detail and pay only those which he chooses.

An audit trail, which may be examined by the operator at any time, is maintained within the Accounts Payable module.

Complete vendor file maintenance: add, change, delete.

#### Accounts Payable Reports:

- VENDOR LISTING
- TRANSACTION LISTING
- PAYABLE LISTING
- PAYABLES DUE OR PAST DUE
- SELECT CHECKS TO BE WRITTEN BY DATE
- SELECT CHECKS TO BE WRITTEN BY VENDOR
- PRINT CHECKS
- CHECK REGISTER
- A/P MAILING LABELS

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BUS-II  
BOOKKEEPING & ACCOUNTING SYSTEM  
PAYROLL

Digital Technology's BUS-II Payroll module allows complete employee record keeping for up to 200 employees. The system maintains complete employee information for all employees in the master file. Use of multiple payroll modules allows operation to handle any number of employees.

Complete operating instructions are on-line at all times in the form of extensive "user memos".

Multi-state payroll deductions--up to 5 states that withhold taxes and 10 states that do not withhold taxes.

Automatic check printing or manual check preparation may be selected. Prints payroll checks, W-2 forms, 941 reports, etc.

Federal, state, city, and county tax withholding.

Calculates payroll according to pay period specified:

WEEKLY  
BIWEEKLY  
SEMIMONTHLY  
MONTHLY

Withholding taxes may be computed on either tax tables or percentage basis.

Payroll computation for both salaried employees and regular employees, with overtime pay, special pay, and bonuses.

Complete employee file maintenance: add, change, delete.

Can be used in stand-alone or interactive mode (minor programming required) in conjunction with BUS-II Accounts Payable and/or BUS-II General Ledger.

The operator may examine the files at any time using the Inquiry routines.

Payroll Reports:

W-2 FORMS  
941 FORMS  
PAYROLL CHECKS  
PAYROLL CHECK REGISTER  
PERIOD PAYROLL REPORT  
QUARTERLY PAYROLL REPORT  
EMPLOYEE FILE INQUIRY  
EMPLOYEE STATUS REPORT  
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'TCP' Terminal Control Program for polled keyboard disk systems (only). For data file manipulation and upload/download/tokenize of Basic programs! Disk with 16-page manual is \$39.95. Manual only is \$2.99

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All prices are postpaid--no "hidden" handling charges. All run in BK on any OSI C1, C2 or C4 tape based computer. All are rechecked twice on each tape and are covered by a limited replacement warranty, return for replacement.

**BOB RETELLE**  
2005 WHITTAKER RD., YPSILANTI, MI 48197

COMPUTER SCIENTIST  
(C) 1980, Wallace Kendall

I don't propose to give yet another definition of "profession" or of "science," but a while back I met a computer scientist who made an impression on me, and I think you'd like to know him.

I know that there have been changes in my computer scientist friend since I last saw him, but I will tell you what I saw then. Time deals inexorably with us all, and at some stages of life it seems to rush us along helter-skelter.

Although I don't propose to define what a science "really is", I'll mention some of the things I think about when I hear the word.

First, of course, a scientist has a body of knowledge about his subject.

Second, that knowledge is organized. It is not a collection of bits of information, of answers for trivia quizzes. The manner in which the information is organized is the key for access and communication, and thus the organization is an important part of the science itself.

Communication is basic; until information is shared, the researcher gets no credit for it, and until his research is successfully repeated by someone else, his credit is only tentative.

A scientist, like the rest of us, has plenty of grounds for humility about his knowledge. Of all he knows, 99% was taught to him by other people. That's not a rounded figure -- round it off, and it's likely

to turn out to be 100%. Any of us can be very proud to have learned well from others, and exceedingly proud indeed of any original ideas we have had -- that is, we can be proud of them if we followed up on them, proved that they were correct, and then communicated them to others. And communication requires both a sender and a receiver, each with the appropriate skills.

The name of the computer scientist who started these reflections is Jonathan. When I first met him, a few months ago, his age was 22 months. I had stopped to get a computer program from his father, and while his father and I were busy on the other side of the room, Jonathan told his mother that he wanted to use the computer. She turned the C8-P on for him, called up one of the programs his father had written for him, and left him at the console.

Exactly as any child caresses a familiar toy, Jonathan caressed the keyboard. Each time he pressed a character key, the program would display the character, greatly enlarged, on the monitor, and Jonathan would pronounce it. He had control keys to make the displayed characters larger or smaller. There were some characters he couldn't name, and occasionally he would call for help.

After about ten minutes, Jonathan's father and I were ready to copy a program from one disk to another. His father told him that we were ready, and without any comment Jonathan slipped off the stool and went away to play with something else -- which brings

me to one final characteristic of a scientist: discipline.

Every scientist yearns to discover a new field of knowledge, to open up undiscovered territory for exploration. And every one, or nearly every one, plows an old field, trying to extend just a bit further a weathered furrow that someone else opened long ago.

A distinguishing characteristic of a scientist is that he asks small questions of Nature -- not large ones. The scientist who reaches too far into the unknown and brings back too sweeping an answer is likely to find himself in some difficulty with his peers.

Time deals inexorably with us all -- but not always harshly.

The young seem to have the knack of using it well. They ask small questions of Nature, but they remember her answers, and they ask the questions incessantly.

In less than two years Jonathan became fluent in the English language, learned a great deal about the complicated culture we live in, and mastered enough of a complicated computer technology to control equipment that intimidates many grownups.

I reflect: Have I accomplished that much in the last two years? The last ten?

How about you?



## ADS

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## LETTERS

ED:

To expand a little on Ed Carlson's tidbit in the Sept. issue, I have found that the CHR (96) blank is a good way to detect when an object is leaving (or about to leave) the playing field in a graphics game. For instance, in a pinball game, you can put a row of 96s across the bottom of the "table". To you, it looks no different than any blank space, but to the ball, it is a solid barrier. When the ball detects a 96, it has left the game.

Another good application is in writing games for the C2/C4 in the 32 character mode. By putting columns of 96s at the edges, you can detect when your spaceship is about to go into the "no man's land" or the right-hand side of the unused display memory and put it back at the beginning of the row, so it "wraps around" properly. It is good to use the 96s instead of some other character because of the varying widths of different CRT displays. No matter what the screen display width is, the barriers are invisible to the player.

In answer to a question from Ed in an earlier issue, the characters from 211 to 214 are profiles of a "WWII" prop airplane. In a manner similar to the Enterprise characters, 211 & 212 are the right facing plane and 213 & 214 are the left facing plane. Credit for this revelation must go to Steve Jones. As soon as he told me about them, I went right out and wrote "Red Baron," a dogfight game.

When converting a board game, I like Checkers or Othello, use CHR (232) for the White pieces and CHR (226) for the

Black. You'll be amazed how much better they look than \* and + or B and W.

Finally, not to be plugging any one company over another, but in the interests of answering as many questions as possible, many of the questions and problems I've read in PEEK (65) can be answered simply by reading the catalog and journal available from Aardvark Technical Services. All the "where can I get--" (a C1 cursor program; a Garbage Collector Fix ROM; a Modem Program; a memory expansion board; a better Monitor ROM; etc.) can be answered right there.

Bob Retelle  
Ypsilanti, MI.

\* \* \* \* \*

ED:

Being an OSI Dealer, I am naturally interested in all aspects of information concerning OSI products. Therefore, I subscribe to both OSIO and PEEK (65). I find them both interesting and informative.

Now for the problem. In the September issue of PEEK (65),

some fixes were sent in for the DMS programs INSERT and REMOVE. In the October issue of OSIO, the fixes are also listed. Since credit is given to the same person, why are the fixes different? Line 485 isn't even close to being the same. In the changes to INSERT section, lines 605, 611, and 615 do not match either. In the changes to REMOVE section, line 701 is different, and the OSIO version does not even show a line 710.

In my opinion, the purpose of publishing a fix to a program is to save other people the time and effort of finding and correcting a similar problem. If we must debug a fix published in a magazine, its effectiveness is greatly diminished. I would like to see the corrected version of Mr. Compton's program change.

James S. Isabella  
Poland, OH

James:

We published Mr. Compton's letter as we received it. He apparently sent another version to OSIO. Mr. Compton, what is the latest version? Send it in and we will print it!!

AL

\* \* \* \* \*

ED:

I have just completed modifying my C1 to 64 ch/line. To do so, I purchased a kit from Progressive Computing in Canada.

The kit includes a cassette of the new video driver software, an 11.8MHz crystal, some sockets and TTL IC's (one of which proved to be defective). The documentation has all the facts you need, but they are not arranged very well. At \$40.00, I feel the kit is over priced. It does not include any RAM, nor does it mention the price of their new monitor ROM (which they claim is ready) containing the video driver software.

This project taught me how durable the C1 is. I'm still amazed that I could solder in all those jumpers and piggy-back the IC's without burning a one! I had visions of unseen static changes on the end of my soldering iron

during the last phase. I guess that the wire that I clipped to the tip of the iron and connected to the C1's ground may have prevented any static buildup.

My video monitor is a solid-state portable TV which I've modified for direct video input. The display is sharp and clear. I'm told that a conventional TV with an RF modulator input does not have sufficient bandwidth for a 64 character display.

If I had to do it over, I'd buy just the plans for \$19.00 (still too high), then the monitor ROM. The rest of the kit (sockets & IC's) shouldn't cost more than \$6.00, except for the RAM's.

Another surprise in the circuit was that the character generator ROM required no pipeline delays at the faster clock speed. The C4 schematic shows that OSI inserted flip-flop buffers just before the character generator.

Based on the results, the mod is worth the time involved. As a bonus, one gets a choice of baud rates and a one or two Mhz CPU clock. If you now have or are planning to connect a printer to your C1, I feel that the 64 character display is a must. One drawback is that C1 software, especially games, is incompatible with the new display. For such programs, the user should include the option of switching to 32ch./line.

Bruce Showalter  
Abilene, TX  
Bruce:

Thanks for a nice report. Others - write to us about your experiences.

Al

\* \* \* \* \*

ED:

I believe I have a fix for the infamous 1861 cycle bug in RND(X). In OS-65D V3.2 use POKE 8034,130 just once before using RND(X) and the bug disappears! The formula for a permanent fix is:

DISK!"CA 4000=05,1"  
POKE 17762,130  
DISK!"SA 05,1=400018"

This fix will probably work for versions prior to 3.2.

(Continued on P. 14)

CASSETTE CORNER  
 by David A. Jones  
 8902 SW 17 Terrace  
 Miami, FL

This column is dedicated to, but by no means limited to, the small system Superboard II and ClP users. By small system, I mean one without a disk drive and one whose owner does not envision getting one in the near future. Not that I'm against disks, but it's a matter of economics and a main factor in deciding on the SII was its price.

Primary emphasis will be on hardware improvements and support software rather than applications. There are a multitude of sources for application programs and since these applications are so varied their use is limited to the select group whose interests are the same. Of common interest to us all though, is convenience in loading and running these programs, i.e., a good operating system. Obviously computing is enjoyed by all of us, otherwise we wouldn't be reading this, but at times it can become a real chore if the support software is deficient or non-existent. Thus the subject of this first column is a solution to a disturbing deficiency in the OSI ROM BASIC/MONITOR.

HOW TO STOP THE DISPLAY WHEN LISTING A PROGRAM.

In data communications, when a local terminal is receiving data from a remote source and it is desired to halt the incoming data temporarily a DC3 (control S) is transmitted to the remote end, causing it to stop transmission. When the local terminal is ready to receive again, a DC1 (control Q) is sent and the remote responds by resuming transmission.

```

10 0000      ;OUTPUT CONTROL
20 0000      ;BY DAVID A. JONES
30 0000      KBRD=$DF00
40 0000      OUTPUT=$FF69
50 0222      *=0222
60 0222 48    PHA
70 0223 A9F6  LDA #$F6      SELECT ROW 3
80 0225 8D00DF STA KBRD
90 0228 A9C0   LDA #$C0      SELECT COLUMNS 0 & 1
100 022A 2C00DF BIT KBRD     STOP? (CONTROL S)
110 022D D00C   BNE CONT     IF NOT, CONTINUE
120 022F A9FC   WAIT LDA #$FC      ROW 1
130 0231 8D00DF STA KBRD
140 0234 A9C0   LDA #$C0      COLUMNS 0 & 1
150 0236 2C00DF BIT KBRD     RESUME? (CONTROL Q)
160 0239 D0F4   BNE WAIT     KEEP LOOKING IF NOT
170 023B 68     CONT PLA
180 023C 4C69FF JMP OUTPUT  BACK TO ORIGINAL PATH
  
```

We can use this same scheme to stop the output of the SII/ClP if we consider the keyboard/CRT to be the local end and the computer itself to be the remote end. We can command the CPU to list a program and when the point of interest in the listing appears on the screen a control S is typed thus halting the output at that point. After we have examined the point of interest, a control Q is typed and the output is resumed from the point where it halted. This may be repeated as many times as necessary. Of course, initiating the SAVE mode first makes it easier to locate the desired point. While there are ways to get around this in BASIC, they won't work when using the Assembler/Editor or Monitor.

The routine is short. It occupies only 29 bytes and can reside anywhere in memory as all branches are relative, but the handiest place is of course \$0222. The first listing is a BASIC program which pokes the machine language routine into RAM and sets the output vector to point to this routine rather than \$FF69. The second listing is the assembly listing of the routine itself. When loaded into \$0222 the routine works equally well with ROM BASIC, the OSI Assembler/Editor and the OSI Extended Monitor. On my own machine, it is located in PROM at location \$FB30 and is always enabled and available. Once the BASIC program is loaded and executed, the program may be deleted or written over, but if a cold or

```

50000 REM OUTPUT CONTROL
50001 REM BY DAVID A. JONES
50002 FORX=0TO29:READY:POKE546+X,Y:NEXT
50003 DATA72,169,246,141,0,223,169,192,
      44,0
50004 DATA223,208,12,169,252,141,0,223,
      169,192
50005 DATA44,0,223,208,244,104,76,105,
      225,0
50006 POKE538,34:POKE539,2
  
```

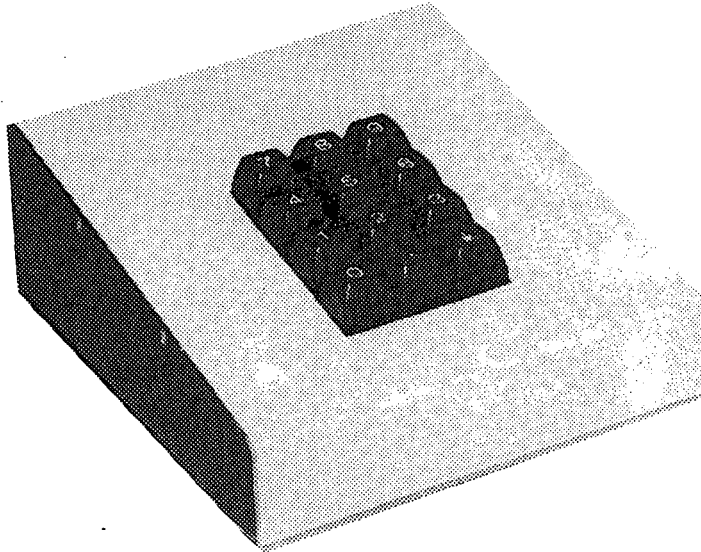
warm start is executed, it will be necessary to poke in the new output vector again as this gets initialized during the restart procedure.

The BASIC program listed starts at line 50000 to facilitate loading if you already have a program loaded and afterwards decide that you want this in there too.

My own system consists of a Superboard II which I modified for 32 characters per line, a direct connected 12" TV for a monitor, a Livermore Star modem, and of course a cassette for program storage. I replaced the Monitor ROM with a PROM when I did the hardware modifications and a whole new world was opened, as I can now customize the monitor to fit my needs. Of course it is desirable to remain compatible with other SII/ClP's so one should exercise caution when changing the monitor. Since I don't have a disk system, all the monitor support for the drives can be removed and this space used for improved cassette support. If in the future I should get a disk, I would of course replace the disk support, and the cassette support would no longer need to be located in PROM.

I doubt that I'm the only one who has replaced the ROM monitor with a PROM and would like to know how many others have also done so. In addition, what did they change when they did. I'll be telling you more about the modifications I made in future columns.

# OSI



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(continued from p. 11)

OSI, or actually MICROSOFT, uses a multiplicative/additive generator for RND(X). The fix simply "diddles" the constants from 11879546,4 and 3.92767778E-8 to 11879546,5 and 2,63581994. The first number is the multiplier and the second is the addend. I discovered the fix after a few trials and some tests. The new generator has an unknown but large cycle (?7.500,000), and passed a 100 bucket test using 100,000 samples (each percentile was equally likely).

Gary A. Sitton  
Houston, TX.

\* \* \* \* \*

ED:

I have a tip for people who have error problems with some recorders. I have a super-board II. For many months I used a G. E. recorder with no trouble. The only problem with the G. E. recorder was that it had no counter. Since it is a pain to use a recorder without a counter, I purchased a Radio Shack CTR-39 recorder. When I loaded previously recorded tapes, it worked perfectly, but when I recorded a program on the CTR-39 and then reloaded it in the computer, I got a lot of random errors.

Looking at the recorder diagram, I noticed that when the switches were set for record and an earphone was inserted, it broke a circuit which placed a ten ohm resistor across the output of the recorder. The earphone is probably eight ohms, to ground, so the load seen by the audio output stage is about the same whether the earphone is plugged in or not.

Looking at the computer diagram, I noticed a .01 mfd. capacitor and a resistor in series with the input from the recorder. This high impedance load apparently upset the recorder in the record mode, but not in the play mode.

To solve this problem, I soldered an eighteen ohm resistor across the input of the computer, at the back edge of the board near the input capacitor (C10 on Sams Photo-Facts diagram). You must be careful to connect the resistor from the input side of the capacitor to ground.

The resistor cured my error problems with the CTR-39 and had no detrimental effect on the G. E. recorder.

I could have put the resistor in the recorder or in the cable. I decided to put it in the computer to enable the computer to work with any recorder. Although my trouble was with the Radio Shack machine, this same problem could occur with other recorders.

For the man wanting to connect an I.B.M. Selectric to his computer, I designed a board containing a 6522 V.I.A. and decoding for address 0000 which drives an I.B.M. I/O Selectric.

The 6522 has sixteen lines which can be individually programmed as inputs or outputs. It also contains four control lines, two timers, and a shift register.

My program reads the video memory and prints anything on the screen. The program is in machine language and takes up less than one K of memory. I intend (when I get time) to make it capable of printing a program when I type list or run.

I have drawn and etched the board I used. It contains a 6522 and decoding for seven additional 6522s. I am considering having some boards professionally etched to sell as bare boards, as kits, or assembled and tested. I am in the process of connecting this board to an Aim 65. I see no reason that it would not work with any 6502 computer; the addressing is changeable by switching address lines.

If anyone interested in this board will send me a note and a S.A.S.E., I will decide by the response whether or not to have the boards etched.

Martin Montgomery  
905 Middle Dr. New Whiteland,  
IND. 46184

\* \* \* \* \*

ED:

I would like to add to the comments of Kurt Barber in issue #9.

1) Since DELETING a file only changes the first character in only the DIREC\*tory header, a file may be "restored" by replacing

this character (CHR\$(1)) with the original character. (This must be done before PACKING, of course.)

2) Each "record" in the DIREC\*tory is 16 bytes long (as is the file header), but Kurt only describes 15. The last (16th) character is referred to as the "File Header Pointer". I must confess that, even though I know how it is calculated, I do not understand why. I have plugged in several different values, and all seem to work. Can anyone clear this up?

3) The FIND command works well in the DIREC\*tory. It is a great help in speeding up the CREATE program when you have a large number of files in the DIREC\*tory.

A) First look for your new filename with the FIND command. (fill the new filename with spaces on the right to a length of 6.) if INDEX(CH)<>1E9 then that filename already exists, and can't be used.

B) IF INDEX(CH)=1E9 THEN INDEX(CH)=0. Create a string of nulls (CHR\$(0)) of length 6, and FIND it. IF INDEX

(CH)=1E9 then the DIREC\*tory is full. IF INDEX(CH)<>1E9 AND INT(INDEX(CH)/16)=INDEX(CH)/16 THEN next available DIREC\*tory address = INDEX(CH)+16 (allow for the skipped file header).

C) With USR(X), now write the file header to the beginning of the new file and to the DIREC\*tory.

4) I would like to see a DEL line command for OS-65U.

Carl Eidbo  
Fargo, ND.

\* \* \* \* \*

ED:

Does anyone know how to change the NUCLEUS program so that you can multiply or add three fields and insert it in another field?

Don Olson:  
Cadillac MI

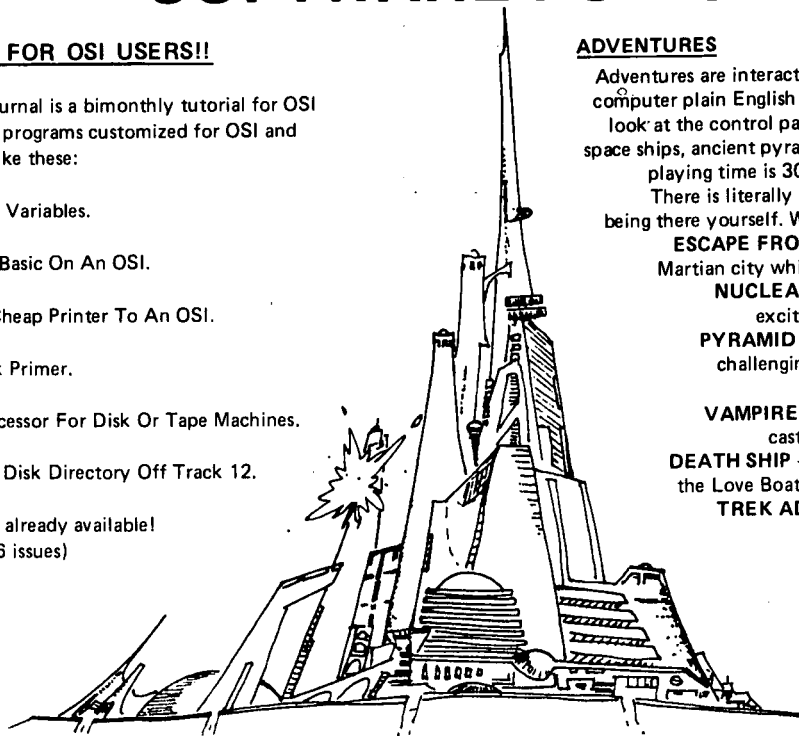


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