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McVIDEO UPGRADE AVAILABLE

IT REALLY WORKS!

by Stan Sokolow

In the last issue, I reported my preliminary experiences with the MicroComplex video upgrade for Sol. My Sol was a very early model (Rev D), so I expected it to be a tough test-case. I did report some problems, but just after the Proteus News went into the mail, I received the repaired unit and a phone call from Bob Hogg of MicroComplex. He explained that the early Sol's had a few timing problems, including slow 8080 microprocessors. He made a change to the video board to be more tolerant of these timing variations, and expected no further problems with mine. He was right. It works great.

At the Computer Faire, I exhibited my Sol with the video board in operation. People loved the crisp display it gives on the BMC monitor. They also liked the new features Bob has put into his version of Solos, which I call "McSolos" for "Micro-Complex Solos". (The "Mc..." was Bob's idea originally, calling his NorthStar DOS equivalent operating system "McDOS". I like it so much, I've given McNames to everything he makes. So we have McVideo, McFloppy, McSolos, and coming soon McWinchester. The names are kind of catchy, aren't they? I hope McDonald's Corporation doesn't have a copyright on all of them already.)

To review for those who didn't read the previous article, the McVideo upgrade is a circuit board custom made for the Sol. It is not an S-100 board and does not use any of the five S-100 slots in the Sol. Primarily, it converts the Sol's video display so that it can be switched between the usual 16x64 display format and the more standard 24x80 format. I say "primarily" because it does a lot more than that.

Other features include: (1) a sonic alert can be sounded under software control (it beeps); (2) the upgrade eliminates the annoying screen snow that was due to the video being switched off momentarily during update of the video RAM; (3) it allows the Sol's dedicated address space (ROM, RAM, video RAM) to be disabled under software control so that you can have a full 64K of RAM in the S-100 bus; (4) two latched output bits are available for custom use, such as disabling other memory mapped boards in the system; (5) it relocates Sol's address space from C000 to F000 when switched into the 24x80 mode; (6) it replaces Sol's slow RAM with very fast RAM for compatibility with future upgrades that speed up the Sol; and (7) the character generator is not changed, so the display still gives the same high-quality character font.

The video display monitor you use now may have to be adjusted or replaced with a better quality unit to provide the crisp characters this board is capable of producing. That may be an extra expense, but don't forget that you sit and stare at that tube all the time you use the computer. Your eyes and nerves deserve a good quality display.

To make full use of the board, you should use it in

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NEW VERSATILE DISK CONTROLLER: FLOPPY, HARD DISK, CLOCK IN ONE BOARD

There is a new disk controller on the market which offers high performance in one S-100 board compatible with Sol. Not only that, but it is plug compatible with the PerSci disk used in the Helios system. Named the "Versatile Floppy Disk Controller" (VFDC), this board is so good for Sol users, that Proteus has arranged to be a dealer for it.

Its use is not limited to the Helios, but Helios owners will rejoice to know that this board is a no-hassle plug-in replacement for the Helios controller board set that will give IBM compatible soft-sectoring instead of the unique Helios format. This will let Helios owners run CP/M 2.2 and buy software from virtually any source, instead of being dependent upon the limited software available from Lifeboat Associates on Helios CP/M.

This board provides a dual density 8" floppy disk controller, a high-speed parallel interface for an intelligent Winchester drive, and a calendar clock module. All of the functions use I/O ports rather than memory mapped addresses, so the board uses no address space. Both the hard disk and floppy access the system memory through Direct Memory Access (DMA) so that the Sol can continue to do useful work while the controller transfers data to and from memory. The calendar clock maintains date and time-of-day down to thousandths of seconds, and it continues to function with an onboard battery when the computer system is turned off.

The floppy disk controller portion of the board uses the Western Digital dual density floppy disk contoller chip, which means that it is able to perform the fast-seek with the PerSci drives. Many controllers on the market now use the NEC chip or equivalent, which is an elegant floppy disk controller but it can only step the drive at 1 ms maximum rate. The PerSci will accept step pulses in a rapid burst to do the fast-seek, but the NEC chip can't do that. The WD chip can. It provides IBM compatible, soft-sectored format (IBM 3740 single-density format, IBM system 34 double-density format).

Moreover, the controller and software know all about the PerSci drive's unique features. Many controllers are totally confused by the fact that the PerSci drive has both heads ganged together on one seek mechanism. (That is, when drive 0 seeks, so does drive 1.) The cable pinouts of the PerSci are non-standard, so most manufacturers do not support the PerSci directly, requiring cuts and jumpers on the controller and/or the drive pcb to swap the signals around. This VFDC controller has a configuration plug which adapts the board to the drive pinouts with no cutting. The adapter plug can be set up for any kind of drive. The special PerSci signals for Seek Complete, Spindle Motor Enable, and Direct Head Load are all supported by the board.

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conjunction with the MicroComplex Dual Personality Module. Together, these two boards will provide the hardware and software to let you run the Sol with modern software needing a 24x80 screen, and still revert to the old Sol mode for running your old software.

Use of the 24x80 mode is easy if you treat Sol as a console device through calls to McSolos. All of the standard entry offsets have been preserved. Software that uses the memory-mapped video directly, however, will need modifications to know the new origin (FC00) and size of the display RAM. I have quickly patched PTDOS's console driver to use the F-origin entry points, but haven't had time to modify the PTDOS memory-mapped EDIT. The navigational editor (the one that "yanks" text as a stream) should work fine until EDIT is altered. If someone wants to work on EDIT, I'll be happy to send the source code if they don't have it already. I'm sorry to say that modifying WordWizard will not be possible, so it will have to be used in the 16x64 mode.

I am completely satisfied with the McVideo board and am sure you will be, too. Proteus has arranged to be a dealer for the MicroComplex products, so that we can derive some needed income from the sales. Factory service will still be available for any problem we can't handle, but Proteus will try to take some of the work off of Bob's shoulders so he can get on with his designs for more Sol upgrades. He's working on a Z-80 board, which should be available by the time of the next Proteus News. We'll have to call it "McZol", of course.

Bob's also thinking about an 8088 board, but other things have to come first. He wants to wait until the IBM'ers have developed lots of 8088 software anyway. I have noticed that 8088/8086 versions of the same ol' software available already for CP/M-80 cost about twice as much right now.

The Dual Personality Module, programmed with the new McSolos, is available from Proteus for $95. The McVideo board is $295 through Proteus, fully assembled. Not a bad price when you consider that it makes the Sol over in so many ways. And I guarantee you'll be happy with it. If not, let me know why and return it in good condition within 30 days for a full refund of your purchase price.

Consult the Proteus catalog in this issue for more details.

NEW VERSATILE DISK - CON'T FROM PAGE 1

The hard disk interface circuitry is designed to connect directly to the PRIAM "SMART" interface which controls up to four PRIAM disk drives of 10 to 158 megabytes each. You can now give your Sol or S-100 computer truly mass storage in one S-100 slot. The hard disk uses DMA for access to system RAM, so I/O can overlap processing.

The calendar clock uses the National Semiconductor MM58167 chip which provides time and date in digital form. That is, the following digits can be read: thousandths of seconds, hundredths of seconds, tenths of seconds, seconds, minutes, hours, day of week, day of month, and month. The onboard battery provides approximately one year between battery changes under normal use. When the system is turned on, the clock chip derives power from the computer; but when turned off, the battery continues the clock without interruption.

Having date and time available gives your system new power. Here are some examples. Your software can reliably determine the time by reading the clock using the clock utility program. This is very useful for "date-and-time-stamping" your files when they are changed, so that you can be certain of which file is the latest. Programmers will find this handy for keeping source code revisions in order during frequent changes as debugging is taking place. (A video-oriented editor which can read the date and time into the edited file is available for CP/M with this board.)

Security break-in attempts in business systems can be logged with date and time for later investigation. That is, it is not good enough just to provide password protection to keep non-authorized users out of files they shouldn't access. You also need to be aware of the attempt to breach the security of the system so the culprit can be found. This is a key technique in discovering embezzlement attempts in financial systems.

The clock would also allow high-security systems to have an automatic lock-out based upon a timer routine, so that someone trying to discover a password by running through all possible permutations will be slowed down to one attempt every 10 minutes or something like that, making this exhaustive search method truly exhausting.

Using a log-file, your system can keep track of the date and time of hardware errors that give early warning of malfunctions. For example, rather than just retrying a disk read that fails, why not log the date, time, disk drive, and diskette identification onto a trouble log file. Periodically you can run a program which summarizes the trouble log so you can look into why the disk is getting flakey before it fails completely. With some imagination, I'm sure users will come up with more applications for the calendar clock.

The VFDC board uses I/O ports A0 - BF and E0 - EF hex. These port addresses do not conflict with the Sol or Helios ports (which use F0 - FF), so the board can be used in a system with a Helios controller as well. To install the configured board in a Sol instead of the Helios boards, all you do is remove the Helios boards from the Sol, unplug the drive cable from the Helios controller, plug it onto the new controller, and put the controller into a bus slot of the Sol. No changes are necessary inside the drive, so at any time you can put the Helios controller back into the system.

However, you should be clear on one point. The Helios format disks cannot be written with the VFDC. Processor Tech used a unique recording format that cannot be used by other controllers on the market. It may be possible to read Helios disks with a special transfer program using the VFDC, but this is not yet clear. So, file transfer from the Helios format to the IBM format must be done by connecting two drives to the same computer (one with Helios controller and the other with the IBM compatible controller) or by connecting two different machines and passing data by serial or parallel port.

A number of Proteus members have the Tarbell single-density controller and Helios controller connected to the same drive using a multiplexer feature of the old Tarbell board. They are able to pass data from the Helios format to the single-density IBM format using different slots in the same drive. I'm sure that members who want to convert old files to the new format will be able to arrange something with these people. Proteus will provide a referral service for this. Anyone interested in doing this data transfer for a reasonable fee should contact me to get on our list.

Of course, files can be moved from one format to the other via cassette tape. Richard Greenlaw's TAPEDISK and DISKTAPE utilities move CP/M files to and from Sol's cassette tape. Our tape librarian Lewis Moseley can provide you with these utilities.

The board does not provide an automatic bootload ROM, so you must have a bootload routine (about 20 to 30 bytes) in ROM

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somewhere. A modified version of Solos in 2708 or 2716 EPROMs, having both the Helios bootload and the VFDC controller's bootload routines, is available too.

Now about price. The assembled and tested VFDC board with a 70 page manual and a diskette having CP/M BIOS source code, disk formatting and copying utilities, disk diagnostic routines, and clock utility, sells for $495. A kit version, which also includes an assembly manual, sells for $395. A ready-to-boot CP/M 2.2 for VFDC in a standard Sol is $170. Included with the CP/M are a diskcheck command (similar to the PTDOS DCHECK), file compare, and disk recovery programs.

The modified bootload-Solos in EPROM (2708 or 2716) is $20. If you have one of the old personality modules that does not take the 2708, 2716, or 9216 ROM Solos, you will need to get another personality module. We recommend the dual personality module made by MicroComplex, for $95. This has been described in previous issues of Proteus News. It is available from Proteus also. When ordering it, specify that you want the bootload for Helios and VFDC. This personality module has the advantage that it is compatible with the MicroComplex video upgrade to 24x80 screen and 64K RAM.

The CP/M 2.2 BIOS for the VFDC in an upgraded Sol, with the 24x80 display, will be available soon. Purchasers of the VFDC or 24x80 display from Proteus will be able to get the BIOS for only mailing and diskette costs as soon as it is ready. The BIOS allows the upgraded Sol to work with 64K contiguous memory by switching out the Sol's dedicated address space when not in use.

If there is sufficient interest, I will put together a kit consisting of the necessary components to upgrade a two-slot Helios drive to contain a Priam hard disk in to empty space inside the Helios cabinet, along with the required power supply components, cables, controller, etc. The price of a 35 megabyte hard disk kit would be about $5000. Also available are 10 or 70 megabyte versions. Let me know if you are interested.

65K RAM Memory Modification For The Sol-20

Reprinted from "Microsystems" magazine.

by Jim Spann

Don't give your Sol to the trash man; a savior is here! This simple modification gives the Sol Terminal Computer* a new lease on life by moving the VDM* and Solos* memory to the Sol's internal data bus (where it belonged anyway), so it no longer interferes with the S-100 memory address space. Now you can run all those big memory programs without having to buy a new computer, and still have access to all the Solos utility routines. And all old programs will execute properly.

A minor wiring change and the addition of two integrated circuits is required to extend the usability of the Sol Terminal Computer. This feat is accomplished by the use of a memory management flip-flop, controlled by a unused output port in the Sol. The parts required are a SN74LS74 (flip-flop) and SN7406 (open collector inverter).

The required circuit changes can be made without cutting any printed circuit board traces. The technique of hanging the IC pin to be changed outside of the socket and soldering a wire to it can save much wear and tear on the circuit board (Figure 1). The two chip memory management control circuit can be assembled on a small vector board and mounted inside the Sol under the keyboard as shown in Figure 2.

The following steps refer to the Sol schematics and drawings in the Sol manual. *Be sure to unplug and remove any S-100 boards during these steps.*

•Step 1. Build the custom memory management control circuit as shown in figure 3 on a small vector board. Set this board to one side. It will be used in a later step.

•Step 2. (This step moves the display memory data output signals from the S-100 bus to the Sol's internal bus.) Lift all the output pins of the tri-state I.C.s (see drawing 4) U29 and U89 and tie to the internal bus signal INT 0—INT 7, (see drawing 1). The internal bus runs all over the Sol mother board; use any handy INT 0—INT 7 signals to connect to. Be sure to mark-up changes and keep a accurate set of prints of your computing system.

PIN 13 of U89 (74LS367) to "INT 0" PIN 10 of U79 (74LS253)
PIN 11 of U89 (74LS367) to "INT 1" PIN 6 of U79 (74LS253)
PIN 13 of U29 (74LS367) to "INT 2" PIN 10 of U65 (74LS253)
PIN 9 of U29 (74LS367) to "INT 3" PIN 6 of U65 (74LS253)
PIN 7 of U29 (74LS367) to "INT 4" PIN 10 of U78 (74LS253)
PIN 11 of U29 (74LS367) to "INT 5" PIN 6 of U78 (74LS253)
PIN 3 of U29 (74LS367) to "INT 6" PIN 10 of U66 (74LS253)
PIN 5 of U29 (74LS367) to "INT 7" PIN 6 of U66 (74LS253)

•Step 3. (This step modifies the control of the internal/external multiplexer (U66, U78, U65, U79—see drawing 1) to allow the data from the display to get to the processor.)
Lift PIN 2 of U44 (74LS00) and tie it to PIN 1 of U44.

•Step 4. (This step moves the MWRITE signal of the internal RAM, so that it may be controlled by the memory management circuit.)
Lift PIN 9 of U44 (74LS00) and tie to PIN 14 of U46 (8T30). See drawing 4.
Lift PIN 13 of U24 (74LS04) and tie to PIN 14 of U46 (8T30). See drawing 2.

•Step 5. At this point the Sol computer should operate normally. Plug it in and try some programs that use the display; TARGET is a good test program. If the system does not work there is a wiring error, so double check everything and try again.

•Step 6. In step 6 the connection of the memory management circuit board is installed. Mount the memory management board and connect the circuit to VCC (+5 Vdc) and ground. This power comes from the Sol mother board. Connect to the following signals to the Sol. See figure 2 and drawing 2.

74LS74 PIN 1 (reset) to (S-100 signal POC) PIN 12 of U77.
74LS74 PIN 3 (clock) to (OUTPUT FCH) PIN 11 of U35.
74LS74 PIN 2 (data) to (S-100 signal D0) PIN 2 of U80.
7406 PIN 8 to PIN 3 of U34.
7406 PIN 1 and PIN 13 to PIN 6 of U23.
7406 PIN 2 to (S-100 signal MWRITE) PIN 11 of U50.
7406 PIN 12 to (S-100 signal FRDY) PIN 1 of U49.

This completes the modification of the Sol.

•Step 7. The system should operate normally; retest as in step 5. If there are any problems check the memory management flip-flop to make sure the Power On Clear (POC) resets it to a low level at PIN 5.

Theory of Operation

When the computer is first turned on the memory control flip-flop is cleared via the Power-On-Clear signal (POC). This signal is also generated when a restart is performed (holding both the upper case and repeat keys down). The Sol will operate normally with the Solos/display RAM/ROM memory block enabled.

The memory control flip-flop controls accesses (reads/writes) to the C000—CFFF hex memory block. This block 4K Solos/display RAM/ROM or a 4K RAM (can be part of a larger memory plane) memory on the S-100 bus. In other words the memory control flip-flop switches in the internal Solos memory or the external S-100 memory.

Operation

Software control of the memory management flip-flop is accomplished via the output instruction OUT FC and bit 0. If bit 0 is set to a zero (0) then this is normal Sol operation. If bit 1 is set to a one this enables the memory on the S-100 bus.

The programming example illustrates how to have a full 65K RAM system and use the Solos utilities with CP/M . The cold boot switches off the internal memory and turns on all RAM external memory.

Software Rules

These rules should be kept in mind when using this system.

1) Do not switch to the internal memory (Solos) if the STACK is in the C000—CFFF address area. Save the stack first, or the program will not be able to find its way back.

2) Do not switch to the internal memory from insided the C000—CFFF address area. ■

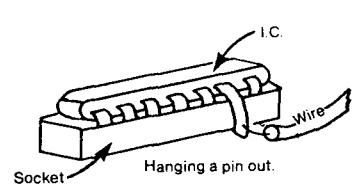

Figure 1.

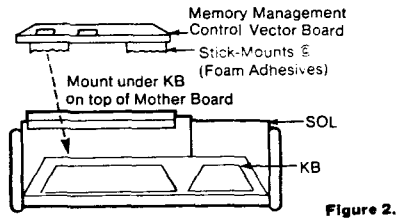

Figure 2.

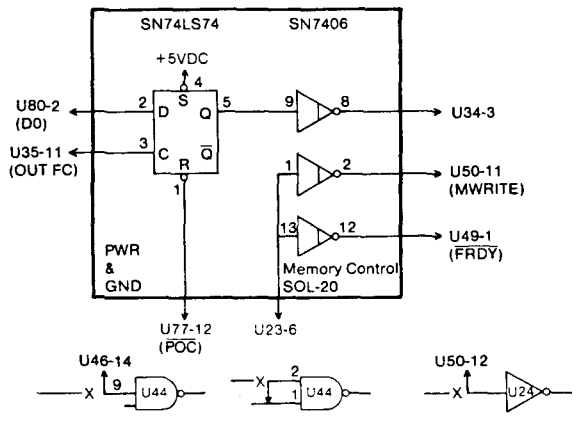

Figure 3.

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The following is an example of a CP/M interface using the memory management modification.

```
;
memsw   equ     0FCH            ;output that control the memory
solon   equ     0               ;solos on, normal operation
solof   equ     not solon and 0FFH      ;enables all ram
;
ainp    equ     0C01FH          ;SOLOS entry points
aout    equ     0C019H
aout    equ     0C01CH
ainp    equ     0C022H
stat    equ     0FAH            ;Keyboard status
char    equ     0FCH            ;Keyboard data in
;
boot:   lxi     sp,stack

        mvi     a,solof         ;turns off solos rom/ram area
        out     memsw
          .
          .
          .

        jmp     cpm;
;
wboot:  lxi     sp,stack

        mvi     a,solof         ;turns off solos
        out     memsw
          .
          .
          .
        jmp     gocpm
;
;    I/O ROUTINES
;*****************************************************
;
const:  in      stat            ;Sol KB
        cma
        ani     1
        rz
rtn:    mvi     a,0ffh
        ret
;
conin:  in      stat            ;Sol KB
        ani     1
        jnz     conin
        in      char
        ora     a
        jz      conin
        ret
;
reader: mov     a,l             ;serial port
        lxi     h,ainp
        jmp     memctrl         ;send it to solos
;
punch:  mov     b,c              ;for adout
        mvi     a,l              ;serial port
        lxi     h,aout
        jmp     memctrl ;send it to solos

;       MEMCTRL
;       memory control
;       26 nov  79
; This program maps the solos area (C000 - CFFF) on & off.
; To allow for 64k byte operation of the Sol and still have
; access to the Solos software contain in the C000-CFFF area
; which includes the VDM, the following procedure is required.
;
; Power On Clear enables the Solos area so the first thing
; the boot program should do is turn off the Solos area.
;
; NOTE: THIS PROCEDURE MUST EXECUTE OUTSIDE OF THE C000-CFFF
;       ADDRESS SPACE.
;
; Program calling sequence example:
;*****************************************************
conout  push    h               ;save h we need it
        lxi     h,sout          ;vector to vdm in solos
        call    memctrl
        pop     h               ;restore h
        ret
;*****************************************************
;
memsw   equ     0FCH            ;output that control the memory
solon   equ     0               ;solos on, normal operation
solof   equ     not solon and 0FFH      ;enables all ram
;
memctrl shld    vector+1        ;store vector
        lxi     h,0
        dad     sp              ;get stack
        shld    stkreg          ;save it
        lxi     sp,stack        ;get a local stack outside
                                ;C000 - CFFF range
        mvi     a,solon         ;turn on solos so we have access
        out     memsw
vector  call    0               ;get set on entry
        mvi     a,solof         ;turn off solos area
        out     memsw
        lhld    stkreg          ;recover org stack
        sphl
        ret
stkreg  dw      0
        ds      20
stack   dw      0

        end
```

HARDWARE INTERRUPTS FOR THE SOL

by Stan Sokolow

Leon Winter in Bukidnon, Philippines, has written asking about using interrupts to drive his Hytype printer off of a parallel port. Other Proteus members have from time to time asked about implementing interrupts on the Sol. We haven't yet had anyone actually write a how-to article on adding vectored interrupts to the Sol, but I would sure like to have one.

In this issue, Dr. Howe has a letter mentioning he has developed an interrupt driven real-time multi-tasking system with his Sol/Helios. I've asked him to send me details so I can write an article on it. If anyone else has done something with interrupts, please let me know.

Just to get people thinking about interrupts, here's a little background information.

The way the Sol and most of today's microcomputers handle input/output is known as the polling method. When the program wants to read the keyboard, it first issues an input instruction directed at the keyboard's status port address. This puts the keyboard status byte into a register inside the 8080 microprocessor, where the program can test it. One bit in the byte is assigned to the flag which signals if a key has been pressed since the last time the keyboard data was read. The program keeps looping through the status read and test until the flag indicates a key has been pressed. Then the keyboard data port is read, obtaining the ASCII code for the key, and the program moves on.

The trouble with this method is that the program can do very little while it is in the loop, unless you are willing to risk loss of a keystroke by not reading the keyboard soon enough before another key is pressed.

Wouldn't it be nice if the processor could set things up so that the keyboard taps the processor on the shoulder, so to speak, when it needs to be read. The processor could go on doing other more useful work between keystrokes, without risking loss of data. This method is known as the interrupt method, and the "tap on the shoulder" is the interrupt signal.

The 8080 processor has a pin which can be used to signal that the current program is to be interrupted while a special subroutine is called. The programmer will set up the subroutine (known as the interrupt service routine) to do the desired task (read the keyboard in our example) and then return to the interrupted main program just where it left off.

Actually, the 8080 is able to have many interrupt service routines. The hardware that initiates the interrupt signal can supply the 8080 with either a RESTART instruction or a CALL instruction to designate where the interrupt service routine is located. This is known as a vectored interrupt, since the hardware can point (vector) the processor to the right address.

The Sol has no device for placing the RESTART or CALL onto the data bus, so it can only do polled input/output. However,

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PerSci 277 to 270 Conversion

by David Reis

March 25, 1982

It may be of interest to PROTEUS NEWS subscribers that PerSci 277 Disk Drives are being sold at very reasonable cost by Qantel Corp. (Hayward, CA). Actually, the drives are being sold by bid, but due to the lack of the market Qantel had anticipated for the drives they are accepting the minimum bid of $200.00. These drives are being sold "as is" and virtually all of them need service; however, without guaranteeing it Qantel states that most drives only need to be aligned. I've bought three of these drives and essentially found this to be the case.

There are five items that someone who purchases one of these drives from Qantel should be aware of if they intend to use it in a Helios system:

First: these drives have duel density data separators installed and the Helios requires the single density data separator. This is the small PCB on the left side of the drive towards the top front corner. The single density separator is necessary because the duel density separator decodes the READ DATA expecting Modified Frequency Modulation (MFM) formated data while single density (eg. Helios) is recorded using "simple" Frequency Modulation (FM) format. These two formats are not at all compatable. A new single density data separator from PerSci costs about $100; used ones can be bought for considerably less. Shops that service PerSci drives are likely sources of used data separators.

Second: there are four (4) signals that Qantel cut the traces for on the Data and Interface (D&I) PCB (the large PCB on the right hand side of the drive) between the 50 pin connector and the main body of the board:

PIN	SIGNAL
8	Seperated Index
16	Direct Head Load
20	Seperated Sector
46	Read Data

Qantel soldered leads from their own pluss to the cut traces (from the edge connector) which should be removed and then jumpers added to restore continuity to the 50 pin connector. This requires removing the two hold-down screws at the bottom corners of the D&I PCB and swinging the board up on the hinges at its top to get at the solder side of the board.

Third : the front bezel diskette eject switches are not active as Qantel relied on remote eject signals from the 50 pin connector (from the pluss mentioned in the above paragraph). The following wiring changes are one method to activate these switches:

Relay 0 / Switch 0 (Left bezel switch, forward relay*)

1) Remove the large white wire jumper between the relay contact with the small white wire and the relay reed.
2) Move the violet wire from the contact with the gray wire to the contact with the white wire.
3) Attach the green wire** from switch 0 to the relay contact with the orange wire.

Relay 1 / Switch 1 (Right bezel switch, rear relay*)

1) As above.
2) As above.
3) Attach the brown wire** from switch 1 to the relay contact with the brown wire.

* Both relays are found screwed to the bottom plate at the rear of the drive.
** These wires (from the bezel switches) are attached to the third plug Qantel added to the drive.

Fourth: the write protect circut is active and depending on personal preference may or may not be defeated. To defeat this feature simply unplug P19 & P20 (Write Protect 1 & 0) on the top row of connectors of the Data and Interface PCB.

Fifth: Qantel/PerSci 277 disk drive D&I PCBs are configured for double density using soft sectoring (D&I PCB 200263-012). Processor Technology/PerSci 270/277 disk drive D&I PCBs were configured for single density using hard sectoring (D&I PCB 200263-007). The following changes/deletions should be made to confisure these drives for use in a Helios system:

PerSci/Qantel 277 ----> PerSci/Processor Technology 270
(D&I PCB 200263-012) (D&I PCB 200263-007)

1) Change R88 & R94 to 4.75 Kohms (1/4 W, 5%).
2) Change C40 & C41 to 1 microfarad (Tantalum, 35V)
(All of the above components are found just to the right and left of U10 and establish the index & sector pulse widths from it).
3) Change U11 (select Module DIP) to one described in the Helios II Disk Memory System Manual, Section 8, Fig 15; or, if only one duel drive is in the system simply Delete U11.
4) Jumpers:

	Delete	Add	270 Function
a)	W-X	W-Y	Sector Sep One Shot Trig 0
b)	AB-AC	AB-AA	Sep. Sector Pulse Output
c)	AD-AE	AD-AF	Sector Sep One Shot Trig 1
d)	AH-AJ	AH-AK	Sep. Index Pulse Output
e)	AW-AV	AW-AU	+5 to U11,14
f)	BH-U11,10	BH-BJ	Ties Sep Sector to Data Sep
g)	U32,5-U32,1	-----	

5) Sector 0: Jumper 32 to the pad immediatly to its right (to the right of U27).
Sector 1: Jumper 32 to the pad immediatly to its right (to the left of U16).

Additionally, the following "directory" of sources for various Helios components may be of interest to those who would like to build a Helios system.

PerSci 277 Duel Disk Drive (as is). . . . . ca. $200.00
Richard Abbas, Purchasing
Qantel Corp. (415) 887-7777 ex 2318
Hayward, CA

Helios Power Supply PCB (bare board). $10.00
David Tanconie
Silicon Technology (415) 967-8250
Box 70421
Sunnyvale, CA 94086

Helios (and Sol) Transformers $15.00
Dealin' Electronics
735 Loma Verde (415) 493-5930
Palo Alto, CA 94303

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IMSAI Cabinet for one PerSci Disk Drive $50.00
WW Component Supply Inc.
1771 Junction Ave. (408) 295-7171
San Jose, CA 95112
(The Helios Power Supply PCB & Transformer fit in this cabinet very conveniently. The Helios Indicator PCB is easily adapted to this cabinet by drilling some holes in the front panel for the LEDs and attaching a photo-reproduction of the indicator panel depicted on ps. 4-4 of the Helios II User's Manual for front panel dress).

Assorted Helios Components and Systems
Charles Terry
Special Pals (713) 666-1316 Home
4211 Bellaire Blvd. (713) 666-3515 Work
Huston TX, 77025
(Such things as Helios controllers & Formatter boards, indicator PCBs, and some cabinet parts).

Helios Documentation & Software
PROTEUS

This information is only provided for reference and its accuracy can not be guaranteed.

David Reis
1843 Vassar Avenue
Mountain View, CA 94043

LOCATING SAA 1027 CHIP AND CONVERTING ECBASIC TAPE TO DISK
by John Whiting

For those who are interested in such things (assuming this letter gets published), my system is a Rev. E SOL with Measurement & Systems Controls 65 K memory board, Objective Design's Programmable Character Generator, Ackerman Digital's Noisemaker board, Microcomplex's North Star look-alike disk controller, a Paper Tiger 560 G, and one and a half BASF disk drives that I bought used.

I say "one and a half drives" because the motor controller chip has died on one of them. It's a SAA 1027 chip, whatever the devil **that** is. I've got BASF trying to locate one for me, but it couldn't hurt to ask the readers of PROTEUS to help, and it might help someone else who is trying to find a source for this (and other obscure) part(s).

The other thing on my mind is that I keep hearing about a program that is supposed to convert ECBASIC to a CP/M-compatible BASIC, and include a utility for converting ECBASIC tape files to disk files. While I'm using McDos (Microcomplex's N* look-alike) right now, I'd like to go to CP/M eventually, and I think I'd like a disk version of ECBASIC better than I would some of the others available. (If anyone is interested, I'm trying to write a machine language program that will fool N* BASIC into thinking that input from an ECBASIC text-mode tape is coming from the keyboard. This would allow fairly easy conversion from tape to disk without having to worry about single-byte keyword conversions.)

Guess that's about it. Keep up the good work!

Regards,

John A. Whiting

CONTINUED....

John A. Whiting
230 S. Coronado St. #21
Los Angeles, California
3/4/82 90057

(Ed. note: Funny you should ask about the ECBASIC conversion to CP/M. The following flyer describes the product. Many Proteus members have written in praise of it. It is still available from TAD Enterprises. An improved, disk-oriented version of this BASIC adapted to CP/M and will be available in the future.--Stan.)

TAD Enterprises
P. O. Box 257
Hazelcrest, Illinois 60429

Good News!

TAD Enterprises has just completed a new software product for systems that utilize Processor Technology SOLOS or CUTER and CP/M. The program converts Processor Technology Extended Cassette BASIC to a DISK Basic that runs under the Digital Research CP/M 1.4 Disk operating system. Some significant items of interest are listed below:

***Easy to install - No knowledge of assembly language needed**
***All tape functions have been converted to DISK**
***A tape-disk-tape transfer utility program is included**
***Program will relocate to any 32K or larger CP/M system**
***System is supplied on a 1200 Baud CUTS cassette**
***User must supply own copy of BASIC Rev. A**
***Program uses SOLOS/CUTER I/O for console communications**
***Program overlays the CCP for maximum memory utilization**
***Features include a program TRACE command, User definable filetype**
*** User printer driver, SNGL command for single drive systems**

Now you can upgrade your system to use a disk without losing all of your software and data files. It's as easy as loading and running the utility program included on the supplied cassette. (Patches are also included for BASIC5 conversion.)

The Basic on CP/M system requires 32K or more of RAM. It occupies approximately 20K on disk. The available free space in a 32K CP/M system with matrix functions deleted is about 15 or 16K bytes. (depends on how big your BIOS is)

Price of $49.95 includes cassette and users manual (Manual only $5)

(A 15% discount will be given to all orders of 5 or more.)
(Ill. residents add 6% for tax)

Send check or money order to:

TAD Enterprises
P.O. Box 257
Hazelcrest, IL 60429

CP/M is a trademark of Digital Research
SOLOS/CUTER are trademarks of Processor Technology Corp.

(Program will also work with CP/M 2.0)

AN ADS NOISEMAKER PROGRAM FOR A 38-KEY PIANO

by Frank Gizinski

As far as my Sol 20 goes I'm sort of a Rip Van Winkle. Shortly after finishing the kit I put a hole in my car windshield with the top of my head in an accident. The Sol was all right but I had memory damage. About the time I was coming around again I saw Mr. Hallen's article in Kilobaud where he mentioned moving his sense switches to the front panel. Sounded like a great idea at the time, but, after a few hours of spastic desoldering I had fairly well ruined the Sol's main circuit board. This was about the time Processor Technology went out of business so I got a replacement board from Advanced Computer Products, which didn't work. I then handed it to what was then known as the Milwaukee Computer Store. I got it back nine months later and it still didn't work but, eventually, I found and repaired an open connection between U47-5 and U45-10 and I was back in business, complete with sense switches on the front panel where the Sol logo used to be.

In the meantime I saw the article in the December, 1979, Microcomputing "Extending the Altair Bus" so I got myself a big blue Vector UP1 box, a Sunny International power supply and an 88 slot motherboard, on sale somewhere. The board had the name Godbout on it and seems to have been made for the Vector box. Then I soldered four, five foot 50 conductor cables to two cutdown blank S-100 boards, every other conductor being a ground but no power connections made. That was something I wouldn't care to try again, it was like giving mouth-to-mouth resuscitation to a boa constrictor. The whole thing turned out pretty well, I was lucky with my hacksaw work and the thing even looks pretty good. There are cutouts on one side of the box for ten RS-232 connectors, on the other side I found room for a plug, an on-off switch, a five inch speaker with a volume control, a Sonalert, and a surplus Sol fan, although my two Artec 32k boards aren't cooking each other in there any more with all that room. I call the thing Gizinski's Pole-Lution, no rights reserved.

I'm still running cassette and have two little control boxes with Read-Write and Manual-Computer switches. I also have 2" speakers, with on-off switches in the boxes. The speakers come in handy sometimes to let you know that you remembered to switch to Read when you're saving something and such. I note that some people have mentioned that the GRT Microsoft BASIC tape I/O didn't work. I finally, by accident, read something back in that I had saved using GRT one day and eventually found on page 11 of their manual that you had to make sure "the leader tone is present before inputting from the tape.", soyou need a speaker to hear it. Can't see any advantage to the GRT BASIC though. The only problem I ever had with P T BASIC was with string operators until I figured out what Mr. Moseley was trying to tell me in his "Programming Quickies" on strings in Proteus, Vol. 2, #5.

Yours truly,
Frank Gizinski

The following is a program for the ADS Noisemaker which will give you a 38 key piano. I've got my Noisemaker addressed at I/O 0F4H,the keys used are "Z" through "/" and "Q" through "Return". Q is middle C and "S" "D" "G" "H" "K" "L" ";" "2" "3" "5" "7" "6" "9" "0" " " and "[" are the sharps. I calculated the frequency for the notes assuming that the clock frequency for the Sol is 2.045MHZ, sound about right but I can't find the darned tuning fork that's around here someplace. I punched out dots from a white self-adhesive label and put them on the front of the sharp keys to remember where they are. ..

ADS NOISEMAKER PROGRAM FOR A 38-KEY PIANO

```
7000
7000
7000
7000
7000
7000
7000
7000 2A CC 70
7003 EB
7004 2A CA 70
7007 06 26
7009 DB FA
700B 2F
700C E6 01
700E CA 09 70
7011 DB FC
7013 FE 1B
7015 CA 04 C0
7018 BE
7019 CA 26 70
701C 23
701D 13
701E 13
701F 05
7020 CA 00 70
7023 C3 18 70
7026 3E 07
7028 D3 F4
702A 3E FE
702C D3 F5
702E 3E 08
7030 D3 F4
7032 3E 10
7034 D3 F5
7036 3E 00
7038 D3 F4
703A 1A
703B D3 F5
703D 3E 01
703F D3 F4
7041 13
7042 1A
7043 D3 F5
7045 3E 0C
7047 D3 F4
7049 3E 17
704B D3 F5
704D 3E 0D
704F D3 F4
7051 3E 00
7053 D3 F5
7055 C3 00 70
7058 5A
7059 53
705A 58
705B 44
705C 43
705D 56
705E 47
705F 42
7060 48
7061 4E
7062 4D
7063 4B
7064 2C
7065 4C
7066 2E
7067 3B
7068 2F
7069 51
```

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ADS NOISEMAKER PROGRAM FOR A 38-KEY PIANO

```
0010          ORG    7000H
0020 *
0030 *    NOISEMAKER PIANO
0040 *    11/02/81
0050 *    Frank Gizinski
0060 *
0070 NOISE    EQU    0F4H    S1 IS SET FOR I/O 0F4H
0080 A1       LHLD   VALAD
0090          XCHG
0100          LHLD   CHARD
0110          MVI    B,38    NUMBER OF NOTES
0120 IPT      IN     0FAH    SAME AS SINP
0130          CMA
0140          ANI    01
0150          JZ     IPT
0160          IN     0FCH
0170          CPI    1BH     ESC TO MONITOR
0180          JZ     0C004H
0190 FIND     CMP    M
0200          JZ     SOUND
0210          INX    H
0220          INX    D       LINE UP BOTH COARSE AND FINE
0230          INX    D       VALUES WITH CHAR
0240          DCR    B
0250          JZ     A1
0260          JMP    FIND
0270 SOUND    MVI    A,07    ENABLE CONTROL
0280          OUT    NOISE
0290          MVI    A,0FEH  ENABLES TONE A, REGISTER IS
0300          OUT    NOISE+1 NEGATIVE TRUE
0310          MVI    A,08    AMPLITUDE A REGISTER
0320          OUT    NOISE
0330          MVI    A,10H     SET TO VARIABLE, DETERMINED
0340          OUT    NOISE+1   BY ENVELOPE GENERATOR
0350          MVI    A,00    CHANNEL A TONE
0360          OUT    NOISE
0370          LDAX   D       FINE TONE
0380          OUT    NOISE+1
0390          MVI    A,01    CHANNEL A TONE
0400          OUT    NOISE
0410          INX    D
0420          LDAX   D       COARSE TONE
0430          OUT    NOISE+1
0440          MVI    A,0CH   ENVELOPE PERIOD CONTROL
0450          OUT    NOISE
0460          MVI    A,17H     SET NOTE LENGTH, VARY IT AND
0470          OUT    NOISE+1   SEE WHAT SOUNDS RIGHT TO YOU
0480          MVI    A,0DH   ENVELOPE SHAPE CONTROL
0490          OUT    NOISE
0500          MVI    A,00      I THINK THIS IS THE CLOSEST
0510          OUT    NOISE+1   TO A PIANO SHAPE
0520          JMP    A1      BACK FOR NEXT KEY PLAYED
0530 CHAR     DB     5AH
0540          DB     53H
0550          DB     58H
0560          DB     44H
0570          DB     43H
0580          DB     56H
0590          DB     47H
0600          DB     42H
0610          DB     48H
0620          DB     4EH
0630          DB     4DH
0640          DB     4BH
0650          DB     2CH
0660          DB     4CH
0670          DB     2EH
0680          DB     3BH
0690          DB     2FH
0700          DB     51H     Q, MIDDLE C
```

```
706A 32              0710        DB      32H
706B 57              0720        DB      57H
706C 33              0730        DB      33H
706D 45              0740        DB      45H
706E 52              0750        DB      52H
706F 35              0760        DB      35H
7070 54              0770        DB      54H
7071 36              0780        DB      36H
7072 59              0790        DB      59H
7073 37              0800        DB      37H
7074 55              0810        DB      55H
7075 49              0820        DB      49H
7076 39              0830        DB      39H
7077 4F              0840        DB      4FH
7078 30              0850        DB      30H
7079 50              0860        DB      50H
707A 40              0870        DB      40H
707B 5E              0880        DB      5EH
707C 0D              0890        DB      0DH
707D 5B              0900        DB      5BH
707E 18              0910 VALUE  DB      18H
707F 05              0920        DB      05
7080 CF              0930        DB      0CFH
7081 04              0940        DB      04
7082 8A              0950        DB      8AH
7083 04              0960        DB      04
7084 49              0970        DB      49H
7085 04              0980        DB      04
7086 0B              0990        DB      0BH
7087 04              1000        DB      04
7088 D1              1010        DB      0D1H
7089 03              1020        DB      03
708A 9A              1030        DB      9AH
708B 03              1040        DB      03
708C 66              1050        DB      66H
708D 03              1060        DB      03
708E 36              1070        DB      36H
708F 03              1080        DB      03
7090 08              1090        DB      08
7091 03              1100        DB      03
7092 DC              1110        DB      0DCH
7093 02              1120        DB      02
7094 B3              1130        DB      0B3H
7095 02              1140        DB      02
7096 8C              1150        DB      8CH
7097 02              1160        DB      02
7098 68              1170        DB      68H
7099 02              1180        DB      02
709A 45              1190        DB      45H
709B 02              1200        DB      02
709C 24              1210        DB      24H
709D 02              1220        DB      02
709E 06              1230        DB      06
709F 02              1240        DB      02
70A0 E9              1250        DB      0E9H    MIDDLE C
70A1 01              1260        DB      01
70A2 CD              1270        DB      0CDH
70A3 01              1280        DB      01
70A4 B3              1290        DB      0B3H
70A5 01              1300        DB      01
70A6 9B              1310        DB      9BH
70A7 01              1320        DB      01
70A8 84              1330        DB      84H
70A9 01              1340        DB      01
70AA 6E              1350        DB      6EH
70AB 01              1360        DB      01
70AC 59              1370        DB      59H
70AD 01              1380        DB      01
70AE 46              1390        DB      46H
70AF 01              1400        DB      01
70B0 34              1410        DB      34H
70B1 01              1420        DB      01
70B2 22              1430        DB      22H
70B3 01              1440        DB      01
70B4 12              1450        DB      12H
70B5 01              1460        DB      01
70B6 03              1470        DB      03
70B7 01              1480        DB      01
70B8 F4              1490        DB      0F4H
70B9 00              1500        DB      00
70BA E7              1510        DB      0E7H
70BB 00              1520        DB      00
70BC DA              1530        DB      0DAH
70BD 00              1540        DB      00
70BE CD              1550        DB      0CDH
70BF 00              1560        DB      00
70C0 C2              1570        DB      0C2H
70C1 00              1580        DB      00
70C2 B7              1590        DB      0B7H
70C3 00              1600        DB      00
70C4 AD              1610        DB      0ADH
70C5 00              1620        DB      00
70C6 A3              1630        DB      0A3H
70C7 00              1640        DB      00
70C8 9A              1650        DB      9AH
70C9 00              1660        DB      00
70CA 58 70           1670 CHARD  DW      CHAR
70CC 7E 70           1680 VALAD  DW      VALUE
```

Frank Gizinski

Please make note of the correct phone number for Data Delay Devices Co. mentioned in the article "16 KRA Data Delay", Vol 4 #5/6, page 27----(201) 772-1106.

ENCYCLOPEDIA PROCESSOR TECHNICA IS READY

The Complete Guide to Processor Tech Products

We have just put finishing touches onto eleven volumes of the Encyclopedia we mentioned in prior issues, and we are planning two more. The full set of volume tables of contents and prices appear in the Proteus catalog inserted in the center of this issue.

You will notice that the EPT, as we call it, includes nearly all of the manuals and updates, along with items from Proteus News that are of general usefulness. There is some original material that has never been published before.

The service manuals will be especially helpful to those who do their own maintenance. The diagnostic programs mentioned in the manuals (SOLT and DISKT) are available from Proteus to complement the Encyclopedia.

We've worked hard to organize this mass of material and bind it in attractive, loose-leaf folders. As new material becomes available, we will print supplements to be inserted into the volumes. We are sure you will find this an invaluable resource in the years to come.

FIXING SOL TO "VANISH"
by Wayne Wilson

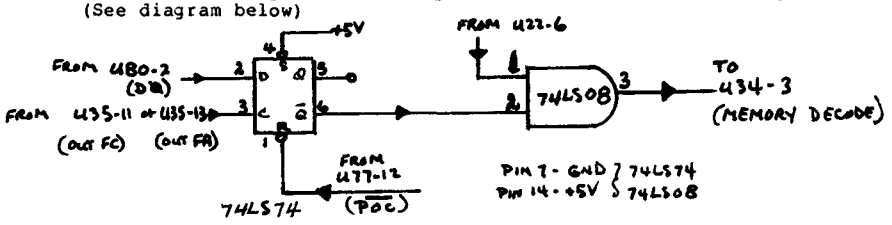
8022 - 117th Street
Delta, B.C. V4C 6A9
CANADA

Dear Stan,

I have been running a 56K CP/M system with Solos at F000H for a couple of years now and have often thought it would be nice to squeeze alittle more memory into my system. I run Morrow's DJ2D controller which resides at E000H, this of course has limited me to 56K. Your article in the May-August issue - 'Make Sol Vanish' seemed the answer. Burn new proms at F800H for the controller board, put Solos back at C000H, add another 6K of RAM for a total of 62K....but wait a minute...How the heck did you get the mod with the 74LS74 as shown to work. In my Sol, the connection from pin 6 of the LS74 (Q-NOT) to pin 3 of U-34 (Memory decode) seemed to be a conflict situation. In fact, it decoded C000, D000 and E000 the same (that is as C000). After scratching my head for awhile and looking at the schematic it seemed the only way to make this mod work was to gate the signal from pin 6&8 of U-22 to pin 3 of U-34. This theory was tested and it works fine. The chip used is a 74LS08 (or 7408) 'AND' gate. It also was piggy backed on another chip to pick up +5 (pin 14) and GND (pin 7). The gating was added as follows:

1. Remove U-34 and bend out pin 3 and carefully tin with solder.
   Re-insert U-34 in socket.
2. Connect a wire from pin 6 of U-22 to pin 1 of the 74LS08.
3. Connect a wire from pin 6 of the 74LS74 to pin 2 of the 74LS08.
4. Connect a wire from pin 3 of 74LS08 to pin 3 of U-34.

On POWER UP or RESET pin 2 of 74LS08 goes HIGH due to the LS74 F-F being reset. This allows the signal from 6&8 of U-22 to be gated thru to U-34 and be decoded. When Bit 0 of port FA is set to 1 and toggled into the flip flop, pin 2 of the 74LS08 goes LOW. This inhibits the gate and the O/P (pin 3 of 74LS08) also goes low. This prevents memory decode and presto Solos is gone. (See diagram below)



IMPROVED ASL2 MULTIWRITER DRIVER

by Wayne Wilson

In the May-August issue you printed my Custom I/O Printer Driver for an ASL2 Multiwriter with a Diablo Hytype 1 printer assembly. That version featured 'handshaking' and collected 'white spaces' which allows the print carriage to move horizontally to next print location in one big tab rather than by printing individual spaces. I have now updated this driver to also collect 'linefeeds' and move the paper vertically in one big tab rather than by individual linefeeds. The updated driver follows:

```
*****************************************************************
*                          ASL2                                 *
* Custom I/O printer driver for Multiwriter printer with Hytypel*
* assembly.  Handshake for 1200 baud and collected spaces.      *
*                          (10 cpi)                             *
*****************************************************************
coull   XRA     A
        STA     TAB
SEROUT  PUSH    H       ;H/L WILL BE USED
        PUSH    D       ;ALSO D/E
        LHLD    FFEED   ;GET THE CURRENT COUNT
        XCHG            ;FOR L/FEEDS AND FOR
        LHLD    RIGHT   ;SPACES
        MOV     A,C
        CPI     20H     ;CHECK FOR A SPACE
        JZ      INC10   ;HOLD CARRIAGE, COLLECT SPACES
        LDA     SPACES  ;CHECK TO SEE IF
                        ;LAST PRINTABLE CHARACTER
        CPI     01      ;WAS A SPACE.
        JNZ     LFEED   ;IF NOT GO CHECK FOR LINE FEED
                        ;
                        ;AFTER COLLECTING SPACES
                        ;SEND OUT ONE BIG TAB.
                        ;
        MOV     A,C
        STA     TEMPRY  ;SAVE THE LAST PRINTABLE
                        ;CHARACTER IN AFTER SPACES
        CALL    BFLAG   ;SEND OUT THE BUFFER FLAG
        CALL    WAIT    ;LOOK FOR ANSWER-BAK, THEN MOVE
        MVI     C,01CH  ;LEAD IN CODE FOR A MOVE COMMAND
        CALL    SOUT
        MOV     C,H     ;NOW SEND OUT DIRECTION
        CALL    SOUT    ;    OF MOTION
        MOV     C,L     ;AND HOW FAR TO MOVE THE
        CALL    SOUT    ;    CARRIAGE
        XRA     A       ;TIME TO RESET
        STA     RIGHT   ;THE TAB REGISTER
        STA     RIGHT+1
        STA     SPACES  ;AND LOWER THE FLAG
        LDA     TEMPRY  ;GET CHARACTER BEING STORED
        MOV     C,A     ;PUT IT IN C REG.
        JMP     LFEED   ;CHECK IF CHAR. A L/F
SOUT    CALL    colpt   ;SEND A CHARACTER OUT
        LDA     CHRCNT  ;GET CHARACTER COUNT
        INR     A       ;BUMP THE COUNT
        STA     CHRCNT  ;STORE NEW COUNT
        CPI     60      ;SENT 60 CHARACTERS?
        JZ      WAIT    ;IF SO STAND-BY
        CPI     55      ;IF 60, IS IT 55?
        JNZ     BACK    ;IF NOT, GET MORE
BFLAG   MVI C,  05H     ;IF=55, SEND OUT BUFFER MARKER
        CALL    colpt   ;TO DIABLO
BACK    LDA     SPACES  ;GET FLAG
        CPI     1       ;CHECK FOR SPACES
        JZ      RTRN    ;GET MORE MOTION DATA
        LDA     LFD     ;GET L/F FLAG
        CPI     1       ;SEE IF IT IS RAISED
        JZ      RTRN    ;GET MORE VERT. MOTION DATA
POPS    POP     D
        POP     H
RTRN    RET             ;BACK FOR MORE
WAIT    IN      0F8H    ;GET STATUS
        ANI     040H    ;MASK FOR SOL SER. DATA READY
        JZ      WAIT    ;LOOP ROUND TILL READY
        IN      0F9H    ;GET DATA
        ANI     07FH
        CPI     07FH    ;IS IT DIABLO ANS-BAK
        JNZ     WAIT    ;IF NO TRY AGAIN
        XRA     A       ;AFTER ANS-BAK, RESET
        STA     CHRCNT  ;RESET THE COUNTER
        JMP     BACK    ;RETURN FOR MORE
```

CON'T ON PAGE 10

```
;
;SPACES COLLECTED HERE BASED ON 60 INCREMENTS PER
;INCH (5 increments per char. for 12 cpi)
;     (6 increments per char. for 10 cpi)
;
INC10   MVI     A,1     ;RAISE THE `SPACES` FLAG
        STA     SPACES
        LDA     TAB     ;FIND OUT IF WE ARE
        CPI     1       ;PRINTING 12 cpi
        JZ      INC12   ;IF YES, SWITCH TO 12
        MOV     A,L     ;INCREMENT MOVE COUNT BY 6
        ADI     6       ;6/60TH INCREMENT FOR 10 CPI
        MOV     L,A
        JMP     MASK    ;CHECK THE HIGH ORDER BIT
INC12   MOV     A,L     ;INCREMENT MOVE COUNT BY 5
        ADI     5       ;5/60TH INCREMENT FOR 12 CPI
        MOV     L,A
MASK    ANI     80H     ;MASK FOR HIGH ORDER BIT
        CPI     80H     ;WHEN COUNT OVER 127
        JZ      HROUT   ;GO INCREMENT "H" REG.
        SHLD    RIGHT   ;IF NOT, STORE THE COUNT
        JMP     POPS    ;GO BACK FOR MORE STUFF
HROUT   MOV     A,L     ;IF COUNT OVER 127
        SUI     128     ;BY HOW MUCH
        MOV     L,A     ;PUT REMAINDER BACK IN L
        INR     H       ;COUNT EXTRA IN `H`
        SHLD    RIGHT
        JMP     POPS    ;THEN GO BACK FOR MORE
LFEED   MVI     A,0AH
        CMP     C       ;COMPARE FOR LINEFEED
        JNZ     CTAB    ;CHECK IF LAST CHAR. WAS L/FEED
        MVI     A,1
        STA     LFD     ;RAISE THE L/FEED FLAG
        MOV     A,E     ;INCREMENT VERTICAL MOTION INDEX
        ADI     8       ;8 INCR./LINE - 6 LPI
        MOV     E,A
        ANI     80H     ;MASK FOR HIGH ORDER BIT
        CPI     80H     ;IF COUNT OVER 127
        JZ      DROUT   ;GO INCREMENT D REGISTER
        JMP     STOR    ;OTHERWISE STORE IT
DROUT   MOV     A,E     ;IF COUNT OVER 127
        SUI     128     ;BY HOW MUCH
        MOV     E,A     ;PUT REMAINDER BACK
        INR     D       ;EXTRA COUNTS IN D
STOR    XCHG            ;SWAP H/L AND D/E
        SHLD    FFEED   ;STORE THE COUNT
        XCHG            ;PUT EVERYTHING BACK
        JMP     POPS
CTAB    LDA     LFD     ;GET FLAG
        CPI     1       ;CHECK FOR PREVIOUS L/FEEDS
        JNZ     SOUT    ; IF NOT, SEND CHARACTER OUT
VTAB    MOV     A,C
        STA     VTEMP   ;SAVE CHARACTER
        CALL    BFLAG   ;SEND OUT BUFFER FLAG
        CALL    WAIT    ;WATCH FOR ANS-BAK, THEN GO
        MVI     C,01CH  ;LEAD-IN CODE FOR MOTION
        CALL    SOUT
        MOV     C,D     ;SEND OUT DIRECTION
        CALL    SOUT    ;    OF  MOTION
        MOV     C,E     ;AND HOW FAR TO MOVE
        CALL    SOUT    ;    THE PAPER
        MVI     A,10H
        STA     FFEED+1 ;RESET PAPER MOTION BIT
        XRA     A
        STA     FFEED   ;RESET FORMFEED REGISTER
        STA     LFD     ;RESET FLAG
        CALL    DELAY   ;STALL FOR BIG TABS
LDA     VTEMP   ;GET CHARACTER BEING HELD
        MOV     C,A
        JMP     SOUT    ;SEND IT OUT
DELAY   LXI     H,3FFFH ;SET UP COUNTER FOR DELAY
        DCX     H       ;COUNT DOWN
        MOV     A,H     ;CHECK FOR ZERO
        CPI     00H
        JNZ     DELAY   ;NOT ZERO, MORE DELAY
        RET
CHRCNT  DB      00H
SPACES  DB      00H     ;1 IF PREVIOUS CHARACTER WAS A SPACE
RIGHT   DW      0000H   ;HERE WE COUNT ALL THE COLLECTED SPACES
TEMPRY  DB      00H
TAB     DB      00H     ;12 cpi IF FLAG IS '1'
FFEED   DW      1000H   ;COUNT VERTICAL INCREMENTS AND SET MOTION
LFD     DB      00H     ;LINEFEED FLAG
VTEMP   DB      00H
;
*****************************************************************
*                                                               *
*    Set flag for printing at 12 cpi on ASL2 Multiwriter.       *
*                                                               *
*****************************************************************
coul2   MVI     A,1     ;Set up flag for
        STA     TAB     ;printing 12 cpi.
        JMP     SEROUT  ;To main print routine
*****************************************************************
*                                                               *
*            SEND CHARACTER OUT SERIAL PORT                     *
*                                                               *
*****************************************************************
colpt   IN      0F8H            ;GET SOL SERIAL STATUS
        RAL                     ;PUT HIGH BIT IN CARRY
        JNC     colpt           ;LOOP UNTIL BUFFER EMPTY
        MOV     A,C             ;GET CHARACTER READY
        OUT     0F9H            ;SEND IT OUT
        RET
```

REVIEW OF VIO-X VIDEO BOARD
by Wayne Wilson

For the information of other Sol users, I have been using a VIO-X 80x24 Intelligent Video Board for several months now. The board was easy to implement and ran first time in my SOL without a problem. The addition of the 80x24 display was like having a new computer. I personally feel that the 80x24 display is that extra something missing from the Sol.

The board is S-100, well layed out and nicely silk screened. It uses the Intel 8275 CRT controller with an on board 8085 microprocessor and 4K of RAM. The board operates outside the system via 2 ports, so does not use any system RAM. The display rate is very fast (effectively 80,000 baud according to the manual). At any rate it is fast and I didn't feel slowed down after the memory mapped display of the Sol.

The display is a 80x25 line format (25th line is a status line) using a 5x7 character set in a 7x10 dot matrix. There is a full upper and lower case ASCII alphanumeric character set (true descenders) plus 32 special characters for Escape and Control characters. An optional 2732 character generator is available with an alternate 7x10 contiguous line and block graphics set. (I have not tried this option).

A second board, the VIO-X2 is also offered with a 7x7 character set ib a 9x10 matrix allowing high-resolution characters. This version also includes expanded firmware for block mode editing and light pen location. Contiguous graphics characters are not supported. (I have not used this version). Just included for info purposes.

Both versions support a full set of control characters and escape sequences...including controls for video attributes, cursor XY Positioning, cursor toggle (ON/OFF) and scroll speed. There is

CON'T ON PAGE 11

an on board Real Time Clock which displays on the bottom right hand corner of the screen on the 25th line. It is a 24 hour clock and is easily set from the keyboard. (ie: ESC>112532 produces the following display 11:25:32). The clock can also be read from the host system. Video attributes are:

Flash Character
Inverse Character
Underline Character
Dim Character

The board can be addresses to any port pair in the IEEE-696 host system (S-100). Inputs are provided for parallel keyboard and light pen and an output for audio signalling.

Other features:

High speed operation
Port mapped
Forward/Reverse scroll of 2 page screen
Transparent mode
Interrupt operation compatible with MP/M
Blinking or Non-blinking cursor

The video attributes possible are as follows:

Normal
Dim
Blinking
Blinking dim
Inverse
Inverse dim
Inverse blinking
Inverse blinking dim
Underline
Underline dim
Underline blinking
Underline blinking dim
Underline inverse
Underline inverse dim
Underline inverse blinking
Underline inverse blinking dim

Basically the VIO-X emulates a Soroc terminal. I have run software written for a Soroc without any problem. The plus is that this board also has video attributes not available on the Soroc and some pretty flashy displays can be produced as a result for business applications. The 80x24 display is great for word processing applications as well.

The board comes assembled c/w a 32 page manual, parts list and schematic diagram. The manual is not too bad and no trouble was experienced in getting the board up and running with it, as well as trying out the various features.

I have tried other boards on the market prior to this and basically took a chance when ordering this board based on the description in the Advertisement. It sounded like it had the features I was looking for and the price was reasonable compared to others.

The board is supplied by W. W. Component Supply, Inc.
1771 Junction Ave.
San Jose, CA 95112
Tel:(408) 295-7171
Advertised price: $295.00 (U.S.).

CONTINUED....

I guess it's apparent I'm happy with this product. It is pleasing to get a product that lives up to the claims in the Ad. I am aware of several other people using this same video board also in Sols and to my knowledge they feel as I do, that it has added new life to the old beast.

Yours truly

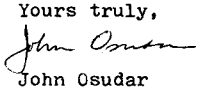
Wayne Wilson

Electric Pencil Using N*DOS

by John Osudar

It's been too long since I last wrote you. You must be really busy, judging from the double issues of the newsletter. My SOL is sick, so I'm actually typing this on a real typewriter (!!!); so excuse please the blotches of Liquid Paper.
Several things I want to say, so here goes:
First, many thanks to Joe Maguire for his fine articles, especially on fixing the SOL.
Second, memory boards. My old 16KRA (original) recently breathed its last, after serving surprisingly well for 4½ years. In a desperate search for a replacement during the holidays, I came across a company called Memory Merchant, selling a 16K static for $174 including shipping. It took just over a week to get the board, and it sure seems to be worth the money. Interested readers should check Memory Merchant's ads in BYTE. I may even buy their 64K board, if I can scrape up the money! (By the way, if anyone is interested in an old non-functioning 16KRA, for spare parts, as a museum piece, or if they think they might be able to fix it, I'm quite willing to part with it!)
Third, regarding Electric Pencil I Version SS running with disk I/O. I've got Pencil relocated to an origin of 2D00H for my North Star system, and could supply instructions for relocating to any other page boundary (e.g. 100H for CP/M?) I also have a set of disk I/O routines that use the N* DOS to replace SOLOS cassette functions, allowing PENCIL to do disk I/O. If you will make my mailing address available in the newsletter, I'm willing to accept a limited amount of correspondence on this matter. By the way, a note to Bob Johnson of Boulder, CO (letter on p. 31 of V4#3/4): I get Pencil to send control characters to my Paper Tiger by using a little software printer driver, which transforms a two-character sequence (tilde followed by any character) to the corresponding control code. For example, to send control-P to enter proportional spacing mode, I include a tilde followed by P in the text. It's not perfect, but it works!
Finally, regarding Earl Dunham's letter about Bob Hogg, PTDOS, etc.: Why can't PROTEUS provide some financial backing for potential developers of new SOL hardware or software, or at least assure interested parties (such as Mr. Hogg) of some level of member interest in such products? We've all got enough invested in our SOL systems that improving our existing systems is preferable to scrapping them, and buying something new.
That's about it for this letter, Stan. Looking forward to the next newsletter, and continued prosperity for you and PROTEUS in 1982.

Yours truly,



John Osudar

P. O. Box 1451
Homewood, IL 60430-0451

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24 X 80 CONVERSION AND THE NOVICE INSTALLER
by Philip N. Barnhart

Dear Stan:

I have had Micro Complex's 24 X 80 screen up and running for over a month now with my new BMC KG-12C monitor also sold by Micro Complex. I agree with all the favorable comment in the latest PROTEUS NEWS. It works great with my configuration which includes Discus 2D with CP/M 2.2.

I have one additional comment. I know one end of a soldering iron from the other by noting the temperature difference after it has been plugged in for a while. Yet I had no trouble following the installation instructions for the 24 X 80 board or the DPM. The whole thing was up and running in about 3 hours not counting the time it took to write the new interface I needed from CP/M (If your BIOS does not reference any of the internal SOLOS routines but only the jump table, the only modification of the BIOS which should be needed is to change the SOLOS reference from page C0 to F0).

Bob Hogg has been extremely helpful and available during the several times I called him, even at 9:30 pm when he helped me correct one minor installation problem over the phone.

The new screen almost doubles the amount of information which I can access at one time and makes the SOL much more useful for word processing and data entry than before. I use MINCE for program entry and word processing. Its split screen capabilities were lost on me with the old VDM. Half of the screen simply could not hold enough lines to be useful. Now half of the screen holds only one less line than the entire screen did before.

I can hardly wait for the Z-80 upgrade Bob Hogg is working on. It will allow us to run Z-80 software and at almost double the clock speed, or at the same slow clock speed if your memory is not up to it.

Philip N. Barnhart
1709 Rose Street
Berkeley, Ca 94703

HELP NEEDED INTERFACING N*DOS 5.2D TO SOL
by Robert R. Walling

Dear Mr. Sokolow:

I recently purchased North Star's new DOS5.2D/BASIC and thought I would be able to use the NorthStar Input/Otput routine for SOL Computer written by Joe Maguire, Feb 79, found in volume 2, number 3 issue of the newsletter. Ifound that I was not able to interface these routines successfully with the new DOS5.2D. I thought perhaps Mr. Maguire or some other SOL owner may have been successful in accomplishing this and would be willing to share the information. I would certainly appreciate any assistance that PROTEUS may offer. Thank you.

Robert R. Walling
9308 Edmonston Rd.
Apt-304
Greenbelt, Md.
20770

Sincerely,

Robert R. Walling

RING THE BELL ON A SERIAL DEVICE BEFORE PRINTING
by David L. Dalva II

I have recently acquired a Micro Complex 80 by 24 line board for my Sol. The installation is not hard. You start off by removing the mother board from the Sol's chassis in order to facilitate working and installing the new module. After this is done, some of the chips on the Sol mother board are removed. Next unsolder two connections to the Personally module. Solder in a small jumper connection. Plug in the 20 by 80 module. Plug in the new Personally module. Test the Sol before assembling it.

The board works well. In CP/M you can run a 58k system on an 24 by 80 screen which allows almost all of the CP/M software to run without extensive changes.

Micro Complex has also made use of the LOAD key on the Sol to boot the system at either C000H or F000H depending on the setting of the switch on the Personally module which also enables the screen for the correct size, 16 by 64 at C000H to run standard Sol or Ptdos or 24 by 80 at F000H for CP/M. They have also added some new commands to the Personally module including a memory test, a ASCCI dump, a fill command, enter ASSCI character string, a move memory block move, a compare memory block and other commands. They have eliminated the tape commands. They also sent a new listing of SOLUS which they have reassembled.

I have not had any trouble in installation or in operation. A phone call to Bob Hogg results in a prompt and knowledgeable answer.

I am enclosing a small program to ring the bell on a serial device before printing. It checks that the printer is on and that the local key is set correctly. I believe with the correct port it will work on a parallel port also.

I have been using PT's Business Basic in the D000H version and have found that it works very well in a business environment. The Common command allows the passing of values from one program to another. You are able to lock out the MODE SELECT key and to prevent the listing or stopping of a program in Basic. It also encodes the listing on the disk so that it will not make sense if printed. A Business Basic program will not run under regular PT Basic. Programs may be transferred by being saved in the Text mode which is readable by both versions of Basic.

Sincerely;

David L. Dalva II

```
10 REM.   ************************************************
20 REM.   *  Test printer before allowing printing        *
30 REM.   *  Program name       :     PRINTS              *
40 REM.   *  Created            :     28 Dec 1981         *
50 REM.   *  Version            :     1.01                *
60 REM.   *  Last modified      :      4 Jan 1981         *
70 REM.   *  Checked            :     DLDII               *
80 REM.   *  Ref.               :     none                *
90 REM.   ************************************************
91 REM
92 REM.              X4$   =  Name of report tobe printed
93 REM
100 SET CM=0: CURSOR 1,0: PRINT "": CURSOR 1,10
105 PRINT "If Diablo sounded then printer is ready to proceed"
110 OUT 249,7: REM.            Sounds bell on Serial device
120 CURSOR 2,0: PRINT "": CURSOR 2,20: SET CP=1
125 PRINT " SPACE BAR ";: SET CP=0: INPUT (1,0)"  to continue   ",A$
130 CURSOR 1,0: PRINT "": CURSOR 2,0: PRINT ""
135 CURSOR 2,17: PRINT "NOW PRINTING : ";X4$
140 REM
150 REM.    If you have installed the Micro Complex 80 by 24
160 REM.    then the command "OUT 252,7" will cause the Sol's
170 REM.    bell to sound.
```

SD EXPANDORAM I MEMORY, 16KRA DELAY, ANOTHER SELECTRIC DRIVER
by D.A. Howe

I have promised for some time to send some of the information that I have acquired on the Sol Systems along to the readers of Proteus. Some of the comments in the latest issue (Vol. 4 #3/4) that I received today prodded me to action.

— SD Expandoram I Memory —

I have two of the Expandoram I memories that I have been using for over a year in two different Sol-Helios systems. SD Systems was little help in providing the correct jumper configuration, but once this configuration was established the boards provided good service. The only trouble I have had was related to dust in the IC sockets. Both boards were build from kits. I use the following modifications (refering to the pin numbers marked on the Expandoram I Board):

Connect Jumper	Cut Jumper
E32 to E33	E31 to E32
E19 to E20	E21 to E20
E2 to E3	
E9 to E18	
E5 to E6	
E7 to E8	
E10 to E11	E11 to E12
E15 to E16	
E22 to E24	E22 to E23
E25 to E26	E26 to collector of Q1
E28 to E30	
R10 (wire in place of R10)	
U25 Pin #3 to S-100 Pin #99	
U4 Pin #3 to U4 Pin #14	
	U4 Pin #3 to U4 Pin #5

It is of course always necessary to make sure all solder flux residue is removed from any home assembled board.

— 16KRA Delay Unit —

I have several of the 16KRA memory boards. Early on one of the delay units failed and I suggested to one of my students who was working with the Sol at that time that it could probably be replaced by a series of CMOS gates and he came up with a circuit using the 74C902 IC. The 74C902 CMOS non-inverting buffers were selected because each gate has an approximate progation delay of 50 nanoseconds when operated on a +5 volt supply. The delays of 100ns, 150ns, 250ns and 350ns can then easily be achieved by connecting two, three, five and seven of the 74C902 buffers in series. The delay was removed from the PC board and a Socket installed in place of it. Then the two IC were installed one on top of the other (piggy-back fashion) by bending and soldering the appropiate pins (and a few bits of wire for internal jumpers between individual buffers). This substitution has been in use over a year without any problems.

— Another Selectric Driver —

I have been using a Selectric typewriter that I purchased from Pacific Offic Systems of Palo Alto for some time. The Selectric unit they sell was originally installed in a GTE terminal. For this function GTE added a PC board to the bottom of the bare Selectric 725 mechanism and installed in their case. Pacific Office Systems bought the used unit, added their own PC board (still using the GTE addition) to provide an interface to a standard parallel port (I believe they also have a serial board) and an EPROM code converter from ASCII to Selectric code. This sounds complicated but it all works most of the time.

(The principal problem being that the Selectric mechanism requires frequent mechanical adjustments.) At the time I bought the printer I had a Sol3 driver on one of the system disks I had at the time. Sol3 is configured for a serial port. Only four statements need to be changed to produce a useful driver. These are:

OUT F9 to OUT FA (change from output to the serial to the parallel port)

This statement is located near the end of the Sol3 program. And five lines farther on:

IN F8 to IN FA
ANI 0A2H to ANI 4
CPI 80H to CPI 0

After using this driver for a while I found the need for a more sophicated driver. (By this time I had modified the 725 mechanism with a 27 tooth index rachet gear to a 715, single pass film ribbon, with a 54 tooth index rachet gear and adjusted the index mechanism so that it would perform half line index under computer control; thus allowing exponents and subscripts to be printed from Word Wizard documents.) So I further modified the Sol3 driver to support underlining (by using the back space) and to pause (by typing a non-printing character, 5CH or 7CH) while the type ball is changed (to allow different fonts or math symbols to be inserted) and continue when the C/R is pressed. I will provide the program on disk for a future library disk if it is desired.

This letter has been on my letter disk for three months now and I have not found time to finish it. So I will send out what I have written and say that I am operating a real time clock system and an interrupt driven multitask system that I have implemented on the SOL-Helios system. I will be happy to answer inquires on the development of either of these items. For the next several months I will be in Jeddah, Saudi Arabia and can be reached at the following address:

Dr. D.A. Howe
Department of Applied Sciences
College of Engineering
King Abdulaziz University
P.O. Box 9027
Jeddah, Saudi Arabia

I would also like to hear from anyone else in Jeddah operating a Sol.

December 21, 1981

Sincerely,

D.A. Howe

SOL-20 BACKPLANE PROBLEMS?
by Bob Marsh

Are you having problems with intermittent system operation that goes away if you bnag the S-100 cards or unplug/re-plug them? This seems to be a common complaint of SOL-20 users, caused by the low spring tension of the TI connector used by PTC. (IMSAI and others had the same problem with these connectors.) Let's get together and have some new backplane PCB's made that will use AMP or Sullins connectors. I have access to the PCB artwork and it's ready to go. Estimated cost in small quantities $40. AMP connectors run about $3 to $4. Let me know via Proteus ASAP if you are interested in this, and we'll do it.

Bob Marsh
Proteus
1690 Woodside, St#219, Redwood City, CA 94061

H/Z-25 PRINTER

Equipment Review by Jeff Tom

After a long wait, I think I've found a printer I can stick with, the H/Z-25 Printer. A friend at work was the one who showed me the ad for the printer, initially. Almost immediately, I was certain that this was the printer for me. The price is $1095 for the kit, and $1595 for the assembled version. I opted for the kit, and with the $200 trade-in on my H-14 Printer, it made the price fairly reasonable.

The kit comes in two boxes, and if you get it through the mail, your mailperson will hate you forever, as it weighs 82 lbs. Heathkit followed its usual form of pre-assembling easily damaged components, so the only circuit board that needs to be assembled is the controller, the other 3 circuit boards are assembled (and tested?), thereby increasing your chances of having the printer work the first time. It took me about 16 hours to build the kit, and all but an hour or two was mechanical assembly. The kit is the same as the commercial version, so mechanical alignment and fit are excellent.

The printer consists of 3 major assemblies, not counting the cabinet. These are the Printer assembly, Paper Feed assembly, and the Electronics assembly.

The print head is what I have heard called a "ballistic head", so the heat problem associated with the H-14 is gone. The print head is positioned by a stepper motor, via a drive belt, which means head position control is positive and accurate. Signals are transmitted to the head via flat ribbon cables. An interesting touch. The printer uses a cartridge ribbon. It is easy to change, but I am not sure if there is a second source for this part.

The Paper Feed assembly has two tractor-feed sets. One above the print platen, and one below it. Both of these units are driven by a stepper motor and belt, so paper movement is good, both up and down.

The Electronics assembly consists of the power supply, and a board cage. These are air-cooled by a fan. There are 3 boards used. A Head Driver, a Motor Driver, and a Logic Board. The printer is controlled by a Z-80 u-processor, and has several K of ROM, and 1K of RAM, although only 256 bytes are used as the input buffer. LED's are used extensively on all three boards, so monitoring signals and status is quick and easy, if necessary.

Assembly of the printer was straight forward, and although a long process, it was easily accomplished. At light off, one wire of the print head would not operate. A quick look at the LED's showed me that the signal was being processed, and a continuity check showed me that the ribbon and print head were good. When I was re-assembling everything, I noticed that one of the ribbon cables did not appear to be seated in its connector cover very well. I pushed the cable into its cover, and everything worked.

The incident related above is a strong point in favor of owning this printer. If the unit goes down, you have all the schematics, diagrams, and descriptions, to aid you in repairing it, as well as store and factory parts support with no minimum charge. One of the drawbacks of owning this unit is its size. At 26" x 18", it is BIG.

Some of the features that I was looking for and found in this printer were; descenders, bi-directional printing, underlining capability, speed, and adjustable print pitch. The H/Z-25 has all that and more. Add double width characters, high speed line feed after 4 consecutive line feeds, limited graphics, handles forms from 3 1/2 inches to 17 inches, form feed control, variable line spacing, programmable horizontal and vertical tab settings to name a few more features. Oh yes, there is a "beeper" to get your attention too.

Interfacing the unit is by serial transmission using either the 20 ma. loop or RS-232 Interface. It is impossible to modify this unit like the H-14 as the DB25-P connector is soldered to the logic board. I had to make up a "null-modem cable" (REMEMBER: The SOL is an intelligent TERMINAL, so it looks for data on the same pins as the printer. The CTS and RTS lines, and Data IN and Data OUT lines must be criss-crossed.). I am using the same printer driver that I used with the H-14. Many of the printers features can be controlled by either switch setting or software. In the latter case, the printer recognizes ESCAPE sequences, or control codes to set up various things. Most of them do not effect the SOL, but some do. This makes a mess out of your screen at times, if your printer driver echoes output to the screen, as mine does, or if you imbed these codes in a text file using EDIT. The only thing left for me to do is to rewrite some of the custom routines for my text processor (POW, DDJ #29), to take greater advantage of the things the printer can do.

It remains to be seen if internally generated heat will affect performance and reliabilty, but for now, I am totally satisfied with my H-25.

There is one unused socket on the logic board that is reserved for future use, and I heard a rumor that there would be an add-on feature out this summer to give the printer "letter quality" print. Maybe...

In my opinion, I think its a darn good printer for the money, and worthy of your consideration if you are looking for a new printer.

Shown below are the printer's graphics characters.

MICROBYTE IN SAN JOSE HAS SOL PARTS FOR SALE

Microbyte Computer Systems
2798 South Bascom Avenue
San Jose, CA 95124 (408) 377-4685

We have the following for sale at very reasonable prices.

1. Sol-20 running no RAM boards - 750.00
2. Sol-20 , power supply had diodes 700.00
3. 16KRA RAM board parts missing - 50.00
4. Micropolis single drive with controller model- plus cable, diskette and P.S. - 900.00
5. Format controller bare board-RevE PC301004 Assy No.301003 (one only) -15.00
6. two CUTS bare boards - 10.00 each.
7. GPM with Cuter ROM A&T - 50.00
8. Ius 8K RAM (2102's) without PAMS-works - 30.00
9. Tektronix T912 dual trace storage scope 10 MHZ BEW with probe - 950.00

Call us or write us to order. Please enclose check or M.O.

CATALOGUE OF PROTEUS PRODUCTS AND SERVICES

April 1, 1982

(Note: All prices are in U.S. dollars.)
See ordering information.

SOL & S-100 HARDWARE

Item M1: McVideo 24x80 video upgrade for Sol. $295.00

Plugs onto main Sol board, 24 lines by 80 columns. Uses no S-100 slots. Audio beep generator. Fast RAM for compatibility with future processor speed-up conversion. Switches back to 16x64 for compatibility with old software. Eliminates screen snow, optionally vanishes out of RAM space. Requires new Solos or Dual Personality Module (see Item M2). NOTE: your present video monitor may not have adequate resolution (bandwidth) for the smaller characters, so you may need higher quality video monitor. Installation is not difficult, but takes some care and a little soldering.

Item M2: McDPM -- Dual Personality Module. $95.00

Replaces Solos personality module and has two EPROMs (2716). Switch on back of module (accessable without opening Sol covers) selects which EPROM is active. When used with the McVideo upgrade (item M1 above), the switch also selects Sol RAM, ROM, and video to be at C000 or F000 address, and sets video display form (16x64 versus 24x80). Programmed with various versions of Solos (see below).

The new McSolos is an altered version of Solos which replaces the tape I/O commands with other commands, such as Test Memory, Dump Ascii, Move Memory Block, etc. It also provides for a selectable auto-bootload on power-on/reset, or bootload on LOAD key. See description of McSolos in Proteus News, Volume 5 Number 1. (Custom versions available, request price quotation.)

Standard configurations:

Configuration A = 2716 EPROMs in both C000 and F000 socket, programmed with same version of McSolos except the C000 origin McSolos provides 16x64 video routines, while F000 McSolos provides 24x80 routines.

Select this configuration if you want to have identical Solos monitor features in the C and F modes. To use tape routines, you should load them from disk or replace your old personality module temporarily. (Note: a Processor Tech personality module will still work after installation of the Dual Personality module, but a minor change must be made to it first; explained in installation guide.)

Configuration B = Empty socket C000 and board jumpered to accept 9216 masked ROM in C000 socket; you move your original Solos ROM into this. Socket F000 has a programmed 2716 EPROM containing McSolos with video output routines for 24x80 screen.

Select this configuration if you want your Sol to function completely normally with the Dual Personality Module switched to C000 setting, including tape routines, but to talk to the 24x80 screen properly when Sol is relocated to F000.

Configuration C = unprogrammed 2716 EPROMs in both sockets.

Select this configuration if you don't plan to use the 24x80 video upgrade, can program your own 2716's, and want to relocate Sol's address space to F000 for more contiguous RAM space or if you want to do something special in Solos.

When ordering, specify which configuration and which disk controller bootload routine to include in the McSolos:
1. Helios controller.
2. NorthStar. Specify ROM origin and DOS origin.
3. Tarbell single density controller.
4. Versatile Disk Controller (Proteus item M5).

(Controllers that bootload by executing an address that ends in double zero, such as F800, will bootload using the auto-jump feature of the McSolos. Other controller bootload routines are available at extra cost.)

Owners of earlier version of the Dual Personality Module can have the EPROMs reprogrammed for use with the video upgrade for $15 each. To avoid loss of use of your machine during EPROM re-programming, you can send the programming fee plus a $25 deposit with the order, we will ship programmed EPROMs, you install them, and you send the old EPROMs back for refund.

Item M3: McFloppy Disk Controller. $450.00

A NorthStar work-alike, fast hard-sectored format, but better than NorthStar's. S-100 and Sol compatible. Up to 96 tpi DS, DD. All digital for reliability. Up to 816 K per mini-diskette with appropriate disk drive. One S-100 board. Onboard ROM relocates to any address, with selectable switch. The McDOS (tm) disk operating system included works like NorthStar's DOS. CP/M available from Lifeboat Associates for 48 track drives. Soon, a CP/M-work-alike for 96 track drives will be available.

NEW!
ITEM M4: SOL Keyboard Customizer & Maintenance Kit $35.00

A replacement for the Z18 keyboard encoder ROM on Sol's keyboard pc-board, plus 16 re-legendable keytops and spare parts for keyboard. Full instructions included.

The new ROM encoder sets the high order bit (bit7) when any of the 15 keys on the numeric keypad section are depressed, to distinguish them from the corresponding key on the main alphanumeric section. The other 7 bits are unchanged from their usual coding. All other keys function normally.

In some Sol's, installation of the ROM is merely a matter of unplugging the old one and plugging in the new one. In newer Sol's, some soldering is required.

The re-legendable keytops are for replacing the 15 numeric keypad keytops, plus one spare. They allow you to place your own labels on the keys, under a protective clear cover, thus defining them to be whatever functions you desire. Programs can interpret the keytops to have special meaning. In CP/M, your BIOS can identify the function keys by the high order bit being set. It should then substitute other characters for these special keys.

One suggested application: Relabel the keys to have commonly used word-processing function names. This way, you don't have to memorize the control-character sequences to do insertion, deletion, previous-page, etc. If you use several different editors, for example, let the BIOS translate your single key command into the appropriate code for the particular editor in operation.

CP/M users should investigate the SMARTKEY CP/M utility for defining special function keys described in Byte magazine, March 1982 page 477, available from FBN Software, 1111 Sawmill Gulch Road, Pebble Beach, CA 93953, (408) 373-5303. This routine intercepts the console input data and substitutes a

user-defined string of keypresses for selected keys. For example, if you frequently access a dial-up network such as The Source, you can use one key to enter the whole sign-on access sequence. Installation of SMARTKEY requires little or no software expertise.

NEW!
Item M5: Versatile Disk Controller $495.00

In one S-100 board, this controller provides three major features: dual-density 8" floppy disk controller, Priam SMART bus hard-disk / tape interface, and real-time calendar/clock. Both disk controller interfaces use DMA to communicate with S-100 bus system. The board uses no address space.

The floppy disk controller comes configured to be a directly plug-compatible replacement for the Helios controller. That is, it interfaces to the PerSci 270 diskette drive as used in the Helios disk system. This allows Helios owners to use standard CP/M soft-sectored 8" diskettes (single or double density). A configuration header allows the controller to be adapted to many floppy drives, such as the Shugart. It will handle single-density and double-density IBM standard format, single or double sided 8" drives. Uses DMA and does not take up any system address space. (Note: Some Processor Technology old 16KRA and 32KRA memory boards, the ones with the long horizontal bar heat sink, will not work with DMA.)

The hard disk interface is plug-compatible with the Priam SMART bus, allowing use of any Priam hard disk and/or any other high-speed devices (such as tape drives) that use the SMART interface. Disk drives are available in 10, 35, 70, and 156 megabyte size. Tape drives are available from several vendors with SMART bus interfaces. This allows industry-standard tape drives (1/2" and 1/4") to be attached to the same cable as the disk for back-up capability. Controls up to 4 devices. Uses DMA and does not take up any system address space.

The real-time calendar/clock maintains time-of-day, day-of-week, and date. The clock keeps working even when the system power is off, through use of an on-board battery. The computer can read the time and date through I/O ports.

CP/M is available for this controller for $170, ready to run on a Sol-20. The CP/M disk includes a number of extra utilities, diagnostics, etc. Text editor with special command for reading time and date into the edited text is available. See software section of catalog.

Helios owners: it is easy to install. Unplug the Helios boards from the Sol. Unplug the disk drive cable from the Helios controller board. Plug cable onto the Versatile Disk Controller, plug controller into one Sol slot, insert a modified personality Solos EPROM in the Sol, and you're ready to bootload. Request price quotation for kit to upgrade a Helios to contain an 8" hard disk drive (10 to 70 megabytes) inside the same cabinet.

Request price quotation for Priam disk drives.

Versatile Disk Controller (VDC)	$495.00
Also needs the McDPM or Bootload ROM to provide bootloading.	
McDPM (Proteus item M2) with McSolos & VDC bootload	95.00
Bootload ROM only (specify 2708's or 2716) with Solos	25.00
CP/M 2.2 ready-to-boot in Sol-20 with VDC	170.00

Item M6: Helios safety retrofit kit $35.00

Capacitor and fuses, with complete instructions for fixing a design fault in Helios power supply that will in time burn out and could cause serious damage to the disk drive. See Proteus News vol. 4 number 3/4 for full explanation.

DOCUMENTATION

Encyclopedia Processor Technica (EPT)

This is a multiple volume collection of all of the documentation we have on Processor Technology products. The volumes and prices are described below. All of the manuals and updates we listed in the past are now discontinued items. It was just too hard to keep reproducing bits and pieces for people. Instead, all of the material and more is available in the Encyclopedia. As future ideas and improvements come up, we will be issuing more pages for the volumes.

See complete listing of chapters in Appendix I at the end of this catalogue.

Volume 1: History and Basic Operation of the SOL	$35.00
Volume 2: SOL Technical Manual	45.00
Volume 3: Programming the SOL Computer	35.00
Volume 4: Programming Manuals	50.00
Volume 5: ALS-8 Manual and User Notes	30.00
Volume 6: PTC Memory Boards	45.00
Volume 7: PTC Input/Output Boards	40.00
Volume 8: The Helios Disk System Manuals	35.00
Volume 9: Helios Service Manual	55.00
Volume 10: Programming with the Helios Disk System	60.00
Volume 11: SolPrinter & Hytype Technical Manual	60.00
Volume 12: Sol a la Carte...(to be published in near future).	

SOFTWARE

Item P10: Discontinued.

Item P11A: GAMEPAC 1 (Target, Life, Pattern, Zing games) including manual. On Sol/CUTS cassette, runs with SOLOS/CUTER in Sol-20 or S-100 system with VDM. $5.00

Item P12: Source code for Optional Precision Disk BASIC 1.1 mod 0, Disk BASIC/5 and BUSINESS BASIC.

License for personal use	$100.00
On 3 Helios disks (PTDOS format)--license required.	90.00

Item P13 Discontinued.

Item P14: Source code for ALS-8 program development system consisting of memory-to-memory assembler for 8080 microprocessor assembly language, video editor, and 8080 simulator.

License for personal use.	$50.00
On Helios disk in PTDOS format.	30.00
ALS-8 manual and users notes in EPT Vol. 5.	

Item P15: Source code for PTDOS, the Processor Tech disk operating system, including most command files.

License for personal use.	$100.00
On Helios disks (3)	90.00

Item P16: Helios diagnostic programs source disk.
On Helios disk $30.00
Documentation appears in EPT Vol. 9. 45.00

Item P17: EDIT, cassette-to-cassette editor that allows editing of the source files on tape. It edits files in SOLOS/CUTER byte-mode (256 byte blocks), PTDOS CTAPE format, or Extended Cassette BASIC text (T) format. Will edit files that are too large to fit into memory, since it edits block by block. Also includes Pack and Unpack routines that change block-mode files to byte-mode files. (Useful for changing Solos/Cuter SAved files into 256-byte block files, and vice versa. For example, ALS-8 and BASIC source files.)

On Sol/CUTS cassette in eXEcutable form $30.00
Manuals in EPT Vol. 4

Item P18: ASSM cassette-to-cassette assembler that will assemble source files too large to fit into memory in one load. Works well in conjunction with EDIT above.
On Sol/CUTS cassette in eXEcutable form $ 30.00
Manual in EPT Vol. 4.

Item P19: Nevada COBOL compiler, a subset of ANSI-74 COBOL for CP/M and MP/M disk operating system. Requires 32K RAM and one disk drive. By Ellis Computing. Available on most disk formats. $149.95

NEW!
Item P20: Nevada PILOT.
An extended version of PILOT language, by the original PILOT designer: John Starkweather, PhD. Designed for computer aided instruction, including control of video cassette recorder and voice response units. Easy to program for data entry, medical history taking, programmed instruction and testing. Available in most disk formats. Requires 32K CP/M disk system. Specify which type of disk you have. $149.95

Item P21: PTC Cassette PILOT on eXEcutable cassette. $30.00
Manual is in EPT Vol. 4.

Item P22:
PTC Extended Cassette BASIC executable cassette. $30.00
Manual in EPT Vol. 4.

Item P23: DISKT
Helios disk test program for diagnosing Helios hardware problems. On eXEcutable cassette. $30.00
Explained in EPT vol. 8 & 9.

Item P24: SOLT
Sol test program for diagnosing hardware problems
On eXEcutable cassette $30.00
Manual in EPT Vol. 2.

NEW!
Item P25: Nevada EDIT.
The CP/M version of Processor Technology's fast video editor, in the style of the ALS-8, PILOT, and PTDOS editors. Will work with memory mapped displays such as the Sol or VDM, as well as most terminals on the market. Designed for programming, not word-processing, although it can be used with text output formatting programs. Features single key commands for scrolling, block moves, search and replace, settable tab stops, file insertions, etc. Customizes itself for terminal's characteristics by menu selection. Available for most CP/M disk systems.

$119.95

NEW!
Item P26: VDC Edit.
A CP/M-compatible editor resembling the PTDOS video-oriented editor, but having extra features, including command to read time and date into the edited file from the VDC calendar/clock. This is designed for use by programmers to keep track of the versions of programs. You can do this by insertion of date and time of last modification into remarks in the source file. See the VDC clock/calendar feature described in Proteus Item M5. This is a programming editor, not a word processor.

On single-density CP/M 8" soft-sectored diskette $119.95

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SUBSCRIPTIONS AND BACK ISSUES

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Item PN2: Proteus News back issue set, 1979.....$15.00
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Item PN4: Proteus News back issue set, 1981.....$24.00
Item PN5: Proteus News, current subscription, 1982.....$30.00
(Foreign addresses, via airmail printed-matter, current subscription--US funds only--US $38.00)
(NOTE: Proteus News is a periodical and thus exempt from California sales tax. Prices include postage.)

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SERVICES

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Item S1: Disk updates $25.00
We will update your PTDOS to level 1.5 mod 1, or any Basic Software Group original disk (WordWizard, AccPac, MailMaster, MailSort) to the latest known revision level. See page 18 of Proteus News volume 4, number 1, Jan/Feb 1981 for latest revision numbers.

Item S2: Membership List (Partial) $10.00
Roster of Proteus members in your area (excluding those who have requested their name not be made public). Approximately 100 names and addresses in the zip code area of your choice for $10.00. We do not sell membership lists to non-members, nor do we sell the whole list.

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2. California residents add 6% sales tax on all items except Proteus News and services.

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b. Hardware (items with "M" item numbers) add 3% of total price to cover shipping, handling, and insurance to domestic addresses (US, Canada, Mexico). Add 6% of total price for air shipment to other foreign addresses.

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HELIOS LIBRARY DISKS

Library diskettes are donated programs. They are generally in public domain, unless copyrighted by the author within the program itself. All disks are $35.00 each, but if you donate an acceptable program for the library (on diskette), you will get a $20.00 credit toward a library diskette.

H - 1

Documentation of Files on this diskette

SOLOS:S A copy file for standard and my extended version of SOLOS. The original source was obtained from the CP/M users group. Proc. Tech. may have rights to this program. My mods are public. Functions with or without extension PROM board in memory. Can be used for Standard SOLOS by conditional assembly. Uses files named SOLOSn:S. (Donated by Ron Parsons.)

SOLOS:D Further documentation of the files SOLOS:S, etc above.

COPYF:S Copies the files listed after command (separated by commas) from disk 0 to disk 1 preserving attributes. Requests permission to rewrite an existing file. (Donated by Ron Parsons.)

RELOC:S Relocation program from July 1977 Byte.

NFILES?S Prints the number of files on the unit "/u" (Donated by Ron Parsons.)

FSDISP:S Displays the free space map on the unit "/u" (Donated by Ron Parsons.)

REMNUM:S Removes line numbers (first five cols.) from named files. (Ron Parsons)

INTSEL:S Interrupt driven background Selectric driver. To be (?) described in PTCs ACCESS. (Ron Parsons.)

SFILES:S Displays a compact list of all files on the unit given as parameter "/u". If no unit given, uses default. Name stands for "Short Files". (Ron Parsons.)

SFILES Command image for the Short Files command above. Recognizes the "/u" parameter.

PRROM:S Standalone Cromemco Bytesaver prom-programmer (SOLOS) (Ron Parsons.)

REORG:S A PTDOS disk reorganize. Copies all files from unit zero to unit one. Does not rewrite existing files. (Ron Parsons)

COMPAR:S Compares the two PTDOS files named listing differences Assembly source file. (Ron Parsons)

SOL:S Assembly source code for PTDOS command "SOLOS" which turns control over to SOLOS. Assumes SOLOS is at C000 as in the SOL. Once in SOLOS, the command "PT" will get back to PTDOS, assuming it is still unharmed in memory. (Stan Sokolow)

DSTAT EDBASIC program for descriptive statistics (mean, etc) (Stan Sokolow)

PRINTER Driver for selectric terminal (IBM 2741 compatible) on SOL's serial port. Uses SOL built-in RAM and PTDOS driver area. BE SURE TO CHANGE TYPE TO "D" BEFORE USING! Output device only. (Input not implemented.) System reset will wipe out initialization part of driver, so be sure to load new image of it. (Donated by Stan Sokolow.)

DMOVE:S Assembly source code for a delimited-move subroutine. It moves bytes from a source address to a destination address until count is reached or a delimiter byte is encountered. Unlike PTDOS's PSCAN routine, DMOVE lets the user define his own set of delimiter bytes. Additional explanation is in the code's remarks. (Donated by Stan Sokolow.)

LD List directory in alphabetical order, file names only. DOESN'T READ PARAMETERS; ALWAYS USES DEFAULT UNIT. (Donated by Chuck Ellis.)

S Jumps to SOLOS but gives description of all SOLOS commands first. Adds custom commands to get back to PTDOS. (Donated by Chuck Ellis.)

NEWGET This is a corrected version of the GET command that was originally released in PTDOS 1.4.0. It automatically will GET device files without RETYPE'ing them by hand. You can copy NEWGET to GET on your working diskettes. (Donated by Processor Technology Corporation.)

NEWFILES A corrected version of the FILES command which recognizes Upper and Lower case letters as equivalent in file names. The FILES released in PTDOS 1.4.0 treated the two cases differently when searching for files that match bracketed substring specifications. Eg., FILES s> and FILES S> found different files in the original version, but this version is corrected. (Donated by Processor Technology Corp.)

FOUR Generates random "four-letter words". Mode Select terminates and returns to PTDOS. Words are displayed in large block letters on the video screen. Rated PG --Parental Guidance recommended.

HELP Provides a brief explanation of PTDOS commands. If a command file name is given as the argument after the name HELP, an explanation of the named command will appear. Otherwise, a summary of the HELP command is given. (Donated by Processor Technology Corp.)

HELP:D This is the reference data for the HELP command. HELP expects this file to be on the default unit.

MIND:S Assembly language source for the MIND Robot Control Language by Lichen Wang, see DR. DOBBS JOURNAL, Sept 77, revised by Ken Anderson, DR. DOBBS, May 78. (Donated by Earl Herr.) IN ALS-8 FORMAT <A>.

PASCAL The Stanford Micro Pascal System, dated 9-13-78, from Stanford Linear Accelerator Center, Stanford University. (Donated by Sassan Hazeghi, Computer Group, S.L.A.C.) Essentially the entire P-code implementation of the PASCAL computer language, as implemented for the IBM 360/370 computers. Except for generalized FILE declarations and passing FUNCTIONS/PROCEDURES as parameters, it adheres to the standard PASCAL as defined by Jensen and Wirth in the 1974 PASCAL User Manual and Report. It is NOT the U.C.S.D. system. The Stanford version runs under PTDOS, and thus it can pass data to other programs not written in PASCAL using normal PTDOS file structures. This preliminary release does not have the REAL arithmetic implemented in the interpreter, so only 16-bit integer arithmetic can be used, even though REAL will compile. We expect to have the REAL arithmetic in a future library release.

See file PAS.DOC for a more complete description. The source PASCAL for the compiler, post-processor, and the assembly source for the interpreter are NOT on this diskette. SOURCE CODE IS ON NEXT VOLUME OF THE LIBRARY.
TO RUN THIS SYSTEM YOU SHOULD HAVE 48K CONTIGUOUS RAM FROM THE BOTTOM UP, TO HOLD PTDOS AND THE PASCAL SYSTEM. MORE MEMORY CAN BE UTILIZED, BUT IT TAKES MODIFICATION TO THE INTERPRETER. A VERY LARGE PROGRAM (THE PASCAL COMPILER ITSELF) WAS COMPILED IN THAT WAY ON A SOL. See the interpreter source code for the instructions on modifying it for 64K memory.

PAS.DOC Documentation for the Stanford Micro Pascal System.

THE FOLLOWING FILES ARE RELATED TO PASCAL AND ARE DESCRIBED IN "PAS.DOC": PAS.S, PASM.S, PINTRP.S, PASCAL, PASM, PINT, COMPILE, RUN, TEMP.T, TEMP.P, QUEENS:S, SORT:S, XREF:S, SOMA:S POBJ, F:S, PAS.CMPL, PAS.DEFS, INITPATB.

FOOTBALL An EDBASIC program for 2 player video football. Self-documenting. (Donated by Gerry Fricke; adapted to disk BASIC by Stan Sokolow.)

NOTICES Important legal notices regarding this diskette.

WARRANTY The limited warranty on this diskette.

FEEDBACK Explanation of how to report problems you encounter with this diskette's programs.

CONTENTS OF PROTEUS DISK H2

PAS.S Source code for the SLAC Pascal compiler, written in Pascal. Read the file PAS.DOC on Proteus disk H1 for background information on the compiler. Also see Proteus News, Vol 2, No 2 and following issues for more details on SLAC Pascal. The object file from this program is on disk H1, along with all the supporting programs to compile Pascal programs of moderate size. Compiling PAS.S requires the 64K version of the SLAC system. Disk H1 has the 48K version. See INTRP.S below for information on creating a 64K version.

PASM.S Source code for the post-processor (assembler) of the SLAC Pascal compiler.

RUN.S Source code in 8080 assembly language for the RUN command that is described in PAS.DOC on disk H1.

COMPIL.S Source code in 8080 assembly language for the COMPILE command described in PAS.DOC on disk H1.

INTRP.S Source code in 8080 assembly language for the run-time interpreter that executes the compiled SLAC Pascal object programs. This interpreter simulates a pseudo-computer whose "machine language" is known as "P-code". Read the comments in the code to see how to reconfigure the interpreter to run in more memory space. The more space the interpreter has for the P-code, the larger the programs it can run. To compile a program as large as the Pascal source code PAS.S, you must reassemble the interpreter to utilize all available space in a 64K Sol. PLEASE NOTE: This is still only a preliminary version of the interpreter. Although the compiler will produce P-code for floating point arithmetic (REAL variables), the present interpreter will not execute these P-codes because the floating-point package has not been implemented. For the present, just avoid REAL variables. In future volumes of the Proteus library, we expect to have an updated version which implements floating point operations.

INTRPn.S where n=1,2,3,4. These are the portions of the interpreter for SLAC Pascal P-code. INTRP.S copies them into the input stream of the PTDOS assembler ASSM. They were divided this way just for ease of editing with EDIT.

SORT.B A sorting program for sorting a data file. This program is written in EDBASIC and uses the Shell sorting method. The READ statement will need to be modified to fit your file's data. The key items which the sort looks at to place the record in order can be modified. See the REM statements in the program.

SORT.F Similar to SORT.B, but written in PTC FORTRAN.

DSORT An EDBASIC program to create data files for SORT.B

DRAGON DRAGON ISLAND game. Hunt the dragon in his dark caves and win the hand of the princess.

WARRANTY The limited warranty on this diskette.

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FEEDBACK How to report errors you find.

CONTENTS This file.

H - 3

1979CAL The 1979 calendar.

AUTO.SYS, AUTO, RATES, RATES-C, CHANGE, R.FILE-S, R.FILE-C
An insurance agency software package, for rating CSL or split limits automobile insurance. Read text file AUTO.SYS for complete explanation. [Martin Hill, Jr.]

SETDATE, DATE?,DATE:S
A 'SAFE' program to set the date in PTDOS global area, designed to be placed in START.UP primarily. DATE? similarly fetches the date from memory for checking. SETDAT:S and DATE:S are their respective source codes.

HEAD
A header program. Before you list your program, you will want to XEQ HEAD. HEAD will print out the name of your program, ask you to GET and then LIST the program you want. At the end of your listing, XEQ E and you will now be back at video control. The SET OF= command is on line 88; change it to have the name of your output driver. Mine is PRNT1 for a Centronics 701 and PRNT3 for an old communi- cations printer. [Donated by Roy Heybrock.]

HGRAPH:S
HGRAPH:S is an extended basic bar-graph program which includes 4 functions used in plotting numeric bar graphs. An array is passed to the function to produce the bar graph. Included are functions to create both axes plus an overlay grid. Also histograms may be drawn by passing the median value to the plot function along with the array.

HYTYPE
PTDOS driver for Diablo HyType printer using Processor Tech's HyType interface board and plugged into the parallel port of the Sol. This driver is WordWizard compatible.

It assumes a Courier 10 printwheel, or equivalent arrangement. It is based on the SolPrinter2 driver, with references to the extra features of the SolPrinter interface deleted. [S Sokolow]

MEMTEST
A 48K memory test. Test lower 48K memory. Puts BEL character out after each cycle. To quit, reset system and re-boot.

MTEST:D
Documentation of MEMTEST.

OKIDATA
Source code for PTDOS driver to operate Okidata printer on serial port of Cromemco TU-ART interface board.

PRNT1
Centronics 701 driver. [Donated by Roy Heybrock.]

PRNT3
Driver for an old communications printer. [?] [Donated by Roy Heybrock.]

S154C
PTDOS & WordWizard driver for a Selectric terminal IBM 2741-type, Correspondence coded, on the Sol serial port, modified to do 134.5 baud. [Stan Sokolow]

RETIR
An updated version of RETIR on H1 disk to change graph headings that were not set up right. [Donated by Roy Heybrock, CFP.]

MASTERMD
This is a dual mastermind game. Two people play at the same time on two different game boards. The game features a none repeat of numbers within the matrix, automatic return, and a more than one game set to determine the winner. Each play enters his or her try as part of one large entry. (i.e. The first player enters a guess and a comma. The second player writes his guess on the other side of the comma and the machine automatically continues without the need for the carriage return. [Michael Richardson]

CAL$$$
I teach Mechanical Technology at Saunders Technical High School in Yonkers. This program will print Mechanical Technology - as easy as Pi on the top of a calendar. What's nice about the program is that the calendar is generalized so that any year in the 20th century can be entered and an accurate calander will be produced. There is also an interesting generalized, large print, printing of the year. (This is what is taking the time between the picture printing and the calendar printing) [Michael Richardson]

S0, S1, S2, S3, S4, S5
My start up programs. [Michael Richardson]

CALENDAR
A program to give the day of the week and the number of days old you are. It also gives the Julian day number for those of us who are into Astronomy. [Michael Richardson]

MULTABLE
A multiplication practice program. [Michael Richardson]

SUMTABLE
An addition practice program. [Michael Richardson]

W1
A program that I use whenever I go on a diet. The data is recorded in data steps at the end of the program. Each time a new day is entered the program expects the data to be the day number, the food, the calories, and the weight at the beginning of the day. (The weight is omitted for all other entries on that day.) There are alphabetized calory counts for some of the foods already written into the program in REM statements. [Michael Richardson]

W2
A graph drawing program that I use whenever I go on a diet that is drastic enough for me to use program W1. [Michael Richardson]

TT
The program I use to automatically right hand justify a letter. [Michael Richardson]

T
The program I use to print a file I've already right justified. It is info protected (I attribute). [Mike Richardson]

CMPF.A
File compare command, in assembly source code. See the program comments. [Tom M. Quinn]

MEMBNK.A
Memory bank-select, Cromemco-style. See the source code. [Tom M. Quinn]

BAUD.A
Command to select baud rate on 3P+S board. [Tom M. Quinn]

LOOK.A
Command to find specified bytes in memory or in a disk file. [Tom M. Quinn]

SETPRT.A
Command to initialize TI 810 printer. [Tom Quinn]

TI810.A
TI 810 printer driver based upon Sol Printer 3 driver. [Tom M. Quinn]

SORT.F
Shell sorting in PTDOS-FORTRAN. [Earl Dunham]

SORT.B
Same as SORT.F, but written in BASIC. [Earl Dunham]

DSORT
A BASIC program which creates data files for SORT.B [Earl Dunham]

PROCESS
A video-type editor to be used with the EDITOR program. To learn how to use PROCESS, run the BASIC program EDITOR. When it asks for the file name, enter PROCES:D. That file contains commands to PROCESS and also doubles as an example as to the usage of EDITOR. [Al Smith]

EDITOR
EDITOR:D contains information on using the commands available within the basic program EDITOR. To use EDITOR:D you must run EDITOR from basic. When asked for file name input EDITOR:D. [Al Smith]

LETTER
A letter from Al Smith regarding PROCESS and EDITOR.

L
Device driver for parallel printer. [Michael Richardson]

PROGRAMS
Explains the programs submitted by Michael Richardson.

STARTERS
Explains the starter programs by Michael Richardson.

EDIT:D
A brief explanation by Michael Richardson of why he renamed the PTDOS editor from EDIT to E. It also has a brief synopsis of the EDIT features.

BOOT:S The source for the Helios bootstrap loader.

COPYCA:S A screen doodling program which places a duplicate copy in memory for saving. Good for designing playing fields for video games.

DSKPORTS Equates for the Sol ports serving Helios Gives port definitions and bit equates for all the ports used by the Sol for comunicating with Helios.

DOSIO:S
An I/O routine for the Sol for use with the North Star Microdisk system. Includes many desirable features.

8KRA:S Memory test programs:
16KRA:S
16K-1:S
32KRA:S
32K-1:S
48K-1:S A collection of memory test programs tailored
MTEST:S for the various boards produced by PTC. [J. Maguire]
[Editor's note: This MTEST is not same as MTEST:D on this disk]

OCTAL:S An Octal Enter and Dump routine. Gives ASCII values and a Hex address for reference.

PABAS:S Is the source code for Lichen Wang's Palo Alto Tiny Basic from early issues of Doctor Dobb's Journal. A few enhancements in this version.

SPINWR:S NEC Spinwriter 5510/5520 device driver. A bi-directional, logic seeking printer driver fully compatible with WordWizard. It includes "space averaging"- an ability to restructure the line producing "type set" quality printing.

TERM:S The missing TERM command from Sol Bootload prom.

ZAP:S Zap let's you defeat the attribute protection of PTDOS. UNZAP:S gets you back. Use with caution!!

The New and Better H - 4

PATCH1.5 is a program to allow the reatributing of attribute protected files on PTDOS 1.5 (not 1.4). See text file HOWDY for more information on operation.

MESSAGE,
!MESSAGE,
BUILD,
MES.S,
MES.TEMP are a group of programs that were done for fun. Studying the source code is a good way (maybe) to understand how to use the overlay handler and how to interface to PTDOS in general. See text file HOWDY for more information on operation.

FORMAT is the text formatter originaly described in Software tools, by Kernighan and Plauger. This version was written by Mike Gabrielson and printed in the May 79 issue of Dr. Dobb's. See text file HOWDY for more information on operation.

PRIMES is a fast program for generating prime numbers. See text file HOWDY for more information.

FACTOR is a program to factor an integer into it's prime. See text file HOWDY for more information.

KWIKSORT is a quiksort or partition-exchange sort. It is neat in that it utilizes user-definable multi-line functions recursively, with automatic stacking of local variables.

QUIKSORT same as above but with modifications suggested by Knuth.

HEAPSORT from Knuth

SHELSORT from Knuth

SORT is another sort suggested by Knuth which seems to approach the speed of the quiksort but may not have the diadvantages(when the file is in order, for example) Knuth rates the mathematical evaluation of this sort at 50 points, his maximum.

MAZE is another example using recursive functions. The object is to find the longest possible word in a given matrix of random letters. The words are allowed to twist and turn as much as necessary but must not use the same letter twice. Try words like: location, tatterdemalion, pharmacutical to see it work. (Should be entered in lower case)

FIND+ was originally inspired by the IEEE micro-mouse contest. This was the best program I came up with, and it naturally uses a recursive function. Note that it will require lots of memory to run! SET your BUffer = 9000h and use the MBASIC on this disk.

FIND another mouse program but with a unique idea that causes interesting behavior sometimes. Consider an array where the walls are values at 999 and the corriders are set at 0 and the "cookie" is set at -1. Have the mouse increment any location he's at by 1 and then go to the lowest adjacent number. It words but looks funny sometimes. Also takes much less memory than FIND+. Watch its behavior in the top right corner.

PERMTEST-generates all the permutations of a given array in order. Makes a good problem. This algorithm from Dijkstra.

ACCOUNTS is a sample list of accounts used with BANKERS.

BANKERS is a program to enter deposits and withdrawals, and obtain readout of total and percentages.

CREATFIL will create random file of accounts. Used with BANKERS program.

EXPENSES is a sample list of expenditures for use with BANKERS.

PERSONAL is a program to create serial file of names or titles which may then be converted to a random file if desired using SER.RNDM program. For use with BANKERS.

SER.RNDM is a program to convert serial files to random access files for use with BANKERS.

gameDOC is some documentation on the game programs that follow:

ELIZA...CHASE...AMAZE...MMIND...BIORYM...LUNAR.1

EDIT+H19 is a short program to allow the use of the Heath H19 terminal with the PTDOS editor to use the terminals special function keys.

NUMSTR,
ADD.WK See specific documentation on these two programs.

QUME is a driver and source code which allows the QUME SPRINT 5 printer to operate at 1200 baud. Has build in handshaking.

SPO,
SPB are simple serial-port output drivers. Their source codes are SPO.S and SPB.S, which may be reassembled, etc. through MAKDRIVR macro.

TENSORTS compares ten sorting algorithms in EDBASIC, including three versions of the Shell-Metzner, quicksort, heapsort, plain and Woodrum merges, delayed-replacement, selection and bubble.

w

CONTENTS OF THIS DISKETTE H5

This diskette contains the source and/or object code for a few device drivers. Those with type IW are WordWizard-compatible printer drivers. The source code for these begins with the lower case "w", as in "wSol3". To use the object code, GET the driver onto your system disk, RETYPE it type "D" for driver, and then use it.

The SolPrinter drivers (mSol3, wSol3, mSol2, etc.) were written by the Basic Computer Group, Ltd., in Vancouver, B.C., for use in WordWizard, MailMaster, etc. They may be used with any software, but be careful where they load to be sure they don't overlap other programs. The source code may be re-ORG'd to other locations. The programs beginning with "m" meet the specifications of MailMaster and the AccPac programs. The drivers beginning with "w" are for WordWizard and support bi-directional logic-seeking printing in a foreground/background mode. This is described in PTC updates specifying requirements for WordWizard drivers. They may be used by PTDOS in general, but will only give the special features for WordWizard if set in word-processing mode by a control/status call.

The Sol2 is a Diablo Hytype II printer metal printwheel printer, interfaced to revision E Sol parallel port using the PTC interface for the printer. If you have this printer but a revision D Sol, you will need to make an adapter cable that reverses one set of data lines as described in the Sol manual. This driver assumes you have the revised Hytype interface which was named the SolPrinter interface. The original Hytype interface did not support some of the status conditions, such as paper-out, so the status test in the driver will need to be modified.

The Sol2E is the same as Sol2, but using the plastic printwheel Diablo.

Hytype driver is a Sol2E driver modified to support the original Hytype interface designed by PTC, not the later SolPrinter one.

Sol3 is a driver for a serial printer attached to the Sol serial port. It was designed for the SolPrinter3 which was a Diablo 2300 matrix printer, but it has also been used successfully with other printers, including the Epson MX-80.

DEC is a DecWriter driver for the Digital Equipment Corporation Decwriter. It can easily be modified for most common printers on the serial or parallel port.

XEROX or 1610 or WPXER are drivers for the Diablo/Xerox 1610 or 1620 daisy-wheel terminals. They support ETX/ACK protocol and bidirectional printing.

CDC is driver for Control Data 9317 matrix printer.

SPIN is for NEC Spinwriter.

TI810 is for Texas Instruments 810 printer.

If you modify these programs and reassemble them, please remember that PTDOS requires all drivers to be loadable as one logical block. The assembler doesn't usually create image files in this format. To convert the object file into a single-block image file, use the command:
EXTRACT file,S
which will "scrunch" the file into one block if possible. The scrunched file can be RETYPE'd into type "D" for driver. The physical blocksize doesn't matter, but you should chose a block-size for efficiency. See the PTDOS manual for more info on this matter.

YOU CAN DISCOVER WHERE THE DEVICE DRIVERS LOAD BY RETYPE'ING THE FILE TO "I." AND GIVING THE COMMAND:
EXTRACT filename
Don't forget to RETYPE it back to "D". Object files that aren't of device type "D" can be EXTRACT'ed without RETYPE'ing.

CONTENTS OF H-6 DISKETTE

Special Note: The contents of this diskette are essentially the work of one author: Stephen Maguire. Steve is a 19 year old engineering student at the University of Arizona at Tucson. At the urging of his dad, Joe Maguire, Steve is placing these programs at the disposal of Proteus members, for their own use, rather than offering them for sale. (However, all rights are retained. Some programs may be offered for sale in the future to the TRS-80 market.) Steve's only request is that if you make or have suggestions for improvements, please contact him at the address given in the listings.

STRIP:S	A Basic program which will remove all REMarks from another Basic program which is stored on a PTDOS disk.
CONVRT:S	This Basic program will convert ALS-8 text files to the PTDOS format. This includes the removing of all line numbers. The program can also convert PTDOS text files back to the ALS-8 format. All line numbers will be restored.
STORY:S	An Extended BASIC program to solve the problem of the three shipwrecked sailors and their monkey. (This problem was given as a term project in a Basic programming course.) Can be modified to solve for any number of sailors.
RAIDER:S	An assembly language file that copies RAIDRn:S into the assembler input stream.
RAIDRn:S	(in 3 parts) The SOURCE code for the Space Invaders video game. This is the video game which the Japanese spent over 600 billion yen ($2,730,000,000.00!!!) playing in thousands of bars and coffee shops all over Japan. It is identical to the original arcade version with the exception of sound effects. (The author was involved in programming the original) This program alone is worth more than the price of this disk!
MEDIT:S	An assembly language file that copies the 5 part file MEDITn:S into the assembler input stream.
MEDITn:S	An object code editor (a machine code or memory contents editor as opposed to a text editor) with all of the features of EDIT plus special ones such as Mode Toggle (Ascii/Hex) etc. Great for examining or patching programs for which you do not have the source code.
MEDIT:D	Documentation for MEDIT
PAS.IO:S	Sol I/O routine for NorthStar Pascal Version 1.0 It recognizes the GOTOXY feature so that no user GOTOXY routine need be written. It contains such features as a print toggle. Typing control/p sends the output stream to PRINTER: instead of to CONSOLE: Another control/p flips it back.
STARWR:S	The source code for a Starwars video game. Shoot the Imperial TIE fighters before they get you. May The Force be with you!
COLSNn:S	(in 2 parts) The source code for the Collision video game. With 16 playing fields, 3 difficulty levels and a demonstration mode. Great for kids!
SPINWR:S	An improved version of the Spinwriter printer driver SPINWR:S which was on User disk H3.
SPIN:D	Updated documentation for SPINWR:S.
SPINUP:D	A summary of the updated features of SPINWR:S and SPIN:D found on this disk.
SPIN	A device file assembled from SPINWR:S.
BIOPLT:S	The complete source for a BASIC biorhythm plotter. This program is too large to be run on a standard Sol with only 48K of memory. BIOPLOT below is a version with all REMarks removed which can be loaded and run under PTDOS Extended Disk BASIC.
BIOPLOT	A compacted version of the biorhythm plotter. This can use the WordWizard print drivers if the Basic is initialized with the matrix operations deleted. This program can plot to the screen or to any width printer, as well as to text files on the disk. Complete user control over EVERYTHING!
BIOTEXT	This is a text file used by BIOPLT:S/BIOPLOT. This file contains in depth descriptions of all the commands in the biorhythm plotter. Other pertinent text is also contained in this file.
Z80CVT:S	A Basic program that converts 8080 assembly language source files into TRS-80 type Z80 mneumonics. Now you can write programs for the lucrative TRS-80 market using your PTDOS editor!
SIMUL:S	Solves simultaneous equations.
SIMLOD:S	Saves equations in the data file below.
SIMUDATA	The data file for holding equations to be solved.

H - 7

This file lists the contents of this diskette, H-7 from the Proteus Library.

This diskette contains programs which were donated by a number of people. I feel that due credit should be given to the authors and have therefore grouped the programs by author.

For further information please read the files WARRANTY and FEEDBACK.

Charles L. Athey, III
Proteus Librarian

The following were donated by Frank J. Sanders. These programs handle personal finances.

ACCOUNTS	- SAMPLE LIST OF ACCOUNTS
BANKERS	- PROGRAM TO ENTER DEPOSITS AND WITHDRAWALS, AND OBTAIN READOUT OF TOTAL AND PERCENTAGES
CREATFIL	- CREATE RANDOM FILE OF ACCOUNTS
EXPENSES	- SAMPLE LIST OF EXPENDITURES
PERSONAL	- PROGRAM TO ENTER DAILY OR WEEKLY EXPENDITURES,AND OBTAIN READOUT OF TOTALS AND PERCENTAGES
SERIAL	- PROGRAM TO CREATE SERIAL FILE OF NAMES OR TITLES WHICH MAY THEN BE CONVERTED TO A RANDOM FILE IF DESIRED USING SER.RNDM PROGRAM
SER.RNDM	- PROGRAM TO CONVERT SERIAL FILES TO RANDOM ACCESS FILES

Here is a group of programs from Preston Briggs of Interactive Computing.

PATCH1.5 is a program to allow the reatributing of attribute protected files on PTDOS1.5 (not 1.4). I don't have the source code unfortunately but it is pretty simple. Type PATCH1.5 and it will execute and return to PTDOS. Then REATR the file(s). For safety, you should re-boot afterwards as PTDOS will continue to ignore the attribute protects.

MESSAGE, !MESSAGE, BUILD, MES.S, and MES.TEMP are a group of useless programs I did for fun. Studying the source is a good way (maybe) to understand how to use the overlay handler and how to interface to PTDOS in general.

MESSAGE will type a random (almost) message on the screen whenever run. I use it in my START.UP file to avoid the same old boot-ups over and over.

!MESSAGE is a utility file that contains the 32 messages that MESSAGE may choose from. !MESSAGE should be on the default diskette.

MES.S is the source code for MESSAGE.

BUILD is a DO file that I use to create or replace messages in the utility file !MESSAGE. It expects to run on the default disk and requires !MESSAGE and MES.TEMP.

MES.TEMP is the source file for a message.

FORMAT is the text formatter originally described in Software Tools, by Kernighan and Plauger. This version was written by Mike Gabrielson and printed in the May 79

issue of Dr. Dobb's. I added the necessary interfacing to work with PTDOS. Mostly what I'm donating here, is the typing effort. I don't think it violates anything and Gabrielson includes no copyright message so I assume it is for general use. I did not include the comments when I entered the code so one should reference Dr. Dobbs and Software Tools for help with the program. Type FORMAT sourcefile, outfile. Enter #1 in outfile to run to screen. FORMAT.S is the source file. TEXT is a sample file to be formatted.

Extended Disk BASIC programs:
(actually, these should all run on extended cassette BASIC too)

PRIMES is a fast program for generating prime numbers. The algorithm is from a fairly recent CACM article by Gries. I'm sorry I don't have the date. The program could be extended by using PEEKs and POKEs instead of an array to represent the sieve as each element in the sieve can have only two values.

FACTOR is a program to factor an integer into it's prime components. It utilizes the same algorithm as the PRIMES program and could be extended in the same way.

KWIKSORT is a quiksort or partition-exchange sort. Is neat in that it utilizes user-definable multi-line functions recursively, with aoutomatic stacking of local variables.

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PERMTEST generates the all the permutations of a given array in order. Makes a good problem. This algorithm from Dijkstra.

The following program was donated by Larry McDavid of LMC Engineering, Anaheim, Ca.

LOADM - PTDOS image-file load to memory. This program reads PTDOS image-type files into system memory starting at a user-selected address. The image-file block headers are used to control the loading of each file block so that the final loaded format is identical to that resulting from entering the filename as a command. The source is LOADM.C, and the documentation file is LOADM.D.

The following program was donated by Ben C. Stapleton Jr. of Office Supply Inc., Portsmouth, Ohio

PHONUM:S EDBASIC program converts Phone Numbers to Words. Each Phone Number generates 2187 different words.

The following programs were donated by Jay Parsons of Somerset Data Systems, Inc. Bernardsville, NJ.

ROBOTS is an old game involving hiding from killer robots.

TENSORTS compares ten sorting algorithms in EDBASIC, including three versions of the Shell-Metzner, quicksort, heapsort, plain and Woodrum merges, delayed-replacement, selection and bubble.

The following program to help convert between CP/M and PTDOS format files was donated by Gib Zeratsky, GreenLake, WI.

CPM-TXT Documentation in file CPM-TX.D

The following programs were donated by Earl J. Dunham of La Habra, Ca.

Weekly Reporting programs: ADD.WK, ANYMO, NUMSTR, WK.DOC

CONVERT : a comprehensive english<=>metric convertsion program.

STR-SORT : an unusual way of sorting strings, using the Shel-Metzer sort algorithm.

HELIOS Library Disk H-8
April 16, 1981

This disk contains the small C compiler as implemented by Ron Cain and inhanced by Ed Hirgelt.

Cc - The running compiler/
Cc?.c - C source for the compiler.
Cc?.a - 8080 ASSM source for the compiler, the results of compiling the compiler.
C80LIB.A - The runtime support package for the Sol-Helios system.
CcDef - The common definitions needed by the compiler.
Cc.Txt - A description of each routine in the compiler.
Cc.Use - A short description on how to use the compiler.
Setup.a - An assembly routine which the compiler generates a call to to setup the C environment.
Test.c - A sample C program.

Please address any questions to Chuck Athey (415) 449-8337, 5571 Shorehaven Circle, Livermore, Ca 94550.

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A SIDE BENEFIT TO ELECTRIC PENCIL VERSION SS
by H. Leon Winter

I have some more mods to Electric Pencil version SS. This new one allows control characters to be placed in the text buffer. I've been wanting to do this so I can cause certain things to happen in a printer handler. A side benifit came by surprise. That was reverse video characters which can now live in the EP text buffer too. The control characters also have their MSB set, but this is no problem for the printer handler to sort out.

The program works simply enough and should not hamper the typest. If the MODE SELECT key is pressed then the next character will be ored with 80H and put in the text. The next key pressed will be back to normal. If the MODE SELECT is pressed twice then all following characters will ored with 80H stored. This will continue until the MODE SELECT key is pressed a third time which caused the mode to return to normal. There are 3 keys which can not be stored in text in this program. They are MODE SELECT, LINE FEED and DELETE. I felt these should retain their usual fuction at all times. A small change in the program could modify this.

I had to get by 4 hrutles on this one. The first was to find a way to get a control character in in the first place. EP uses every control character available to perform immediate control action. So I needed some way to stop this. There is one key that EP does not use and that is MODE SELECT. So that part was solved - just write a routine that checks for MODE SELECT and then follow it with the control character or alphanumeric to be placed in text.

The next part was how to handle the control characters after they get to the VDM. Many of these have an effect on the display we don't want if our desire is to embed them in text for later use. I needed some way to "hide" them. This was easily handled with an ORI 80H instruction.

Then came the problem with the way EP handles the text buffer. Everytime something is moved in the buffer, which is practically constantly while inputting text, all the text gets shoved through a ANI 7FH shaped hole which unmasks our control character. As soon as this happens all sorts of things begin to change in the display! So I had to find these. There were five places where this occures.

The last was where to put the routine, considering that EP likes to clear all memory on start up. I could disable this, but I rather like it for several reasons. So I chose instead to make room by squeezing the message data for EP's command sub set. This gave me the bytes I needed plus an additional **36** for future use!

The following locations in version SS need to be changed to NOP's. Each address pair had been an ANI 7FH before.
261, 262; 4A2, 4A3; 4B4, 4B5; 4C1, 4C2; 8D3, 8D4.

Location 0090H had been CD 39 09 which called one of EP's keyboard input routines. Change this to CD 23 0D which calls the start of the new control character routine.

The following listing is the modified message data for the EP command sub set.

```
0C82: 54 20 52 45 41 44 00 52 00          ; T READ   R
0C8B: 54 20 53 41 56 45 00 57 00          ; T SAVE   W
0C94: 57 4F 52 44 20 23 00 58 00          ; WORD #   X
0C9D: 52 43 52 44 20 23 00 59 00          ; RCRD #   Y
0CA6: 43 20 A0 41 46 54 00 43 41 41 00    ; C  AFT   CAA
0CB1: 43 20 42 46 52 A0 00 43 41 42 00    ; C BFR    CAB
0CBC: 43 4C 20 53 59 53 00 43 4C 52 00    ; CL SYS   CLR
0CC7: 4A 53 54 49 46 59 00 4A 30 2D 31 00; JSTIFY   J0-1
0CD3: 4C 4E 20 53 50 43 00 53 31 2D 35 00; LN SPC   S1-5
0CDF: 50 47 20 53 50 43 00 41 32 2D 00    ; PG SPC   A2-
0CEA: 50 47 20 4C 45 4E 00 47 2D 37 32 00; PG LEN   G-72
0CF6: 4C 46 54 20 4D 52 00 4D 30 2D 00    ; LFT MR   M0-
0D01: 50 41 47 45 20 23 00 4E 31 2D 00    ; PAGE #   N1-
0D0C: 50 52 54 20 4C 4E 00 50 30 2D 00    ; PRT LN   P0-
0D17: 4C 4E 45 20 4C 4E 00 4C 32 35 2D 00; LNE LN   L25-
0D23: SPACE AVAILABLE FOR ROUTINES = 90 BYTES
0D7D: START OF NEXT MESSAGE FILE          ; TIME
```

The source for the ConTroL INput (CTLIN) follows with an HEX dump. I haven't written a printer driver yet to make use of the added control features. We're just having fun with the inverse video. It's nice to know that the capability is now in EP for this and should come in handy for a Hytype driver I've got on the back burner. My regards to you, Stan, and to the members.

Sincerely,

H Leon Winter

H Leon Winter
Summer Institute of Linguistics
Nasuli, Malaybalay
Bukidnon, Philippines, 8201

ASSM 0D23 5000

```
0D23                    0100 * CONTROL CHARACTER INPUT ROUTINE FOR ELECTRIC PENCIL
0D23                    0105 *
0D23                    0110 * ALLOWS CONTROL CHARACTERS TO BE "HIDDEN" IN TEXT
0D23                    0120 * ALLOWS REVERSE VIDEO CHARACTERS TO BE IN TEXT ALSO
0D23                    0130 *
0D23                    0140 * WRITTEN BY H. LEON WINTER            FEB 1982
0D23                    0150 *  AT NASULI, MALAYBALAY, BUKIDNON, PHILIPPINES, 8201
0D23                    0160 *
0D23                    0170 * EQUATE TABLE
0D23                    0180 KYBD2   EQU   0939H     ONE OF EP'S KEYBOARD ROUTINES
0D23                    0190 *
0D23                    0200 * IN ADDITION TO THE CHANGES NOTED IN THE DOCUMENTATION,
0D23                    0210 *  WHICH INCLUDE THE NEW COMMAND SUB SET MSG DATA AND THE
0D23                    0220 *  5 ANI 7FH'S THAT ARE REPLACED WITH NOP'S, THERE IS THE
0D23                    0230 *  INITIAL CALL TO THIS PROGRAM.  THE LINE OF CODE AT 0090H
0D23                    0240 *  IN VER. SS OF EP MUST BE CHANGED FROM CD 39 09
0D23                    0250 *  TO CD 23 0D
0D23                    0260 *
0D23                    0270 CTLIN   ORG   0D23H     1ST FREE BYTE AFTER SUB SET MSG
0D23 CD 39 09           0280         CALL  KYBD2     CHARACTER USUALLY INPUT FROM HERE
0D26 79                 0282         MOV   A,C      EXAMINE CHARACTER
0D27 FE 7F              0284         CPI   7FH      IS IT A DELETE KEY?
0D29 C8                 0285         RZ    .        MAINTAIN DELETES FUNCTION
0D2A FE 0A              0287         CPI   0AH      MIGHT BE A LINE FEED
0D2C C8                 0288         RZ    .        IF SO, MAINTAIN IT ALSO
0D2D 3A 62 0D           0290         LDA   FLAG     SEE IF IN SPECIAL MODE OR NOT
0D30 B7                 0300         ORA   A        IF FLAG IS 0 ALL IS NORMAL
0D31 C2 52 0D           0310         JNZ   MSSET    IS SET FOR SPECIAL MODE
0D34                    0320 *
0D34                    0330 * NOT IN SPECIAL MODE IF HERE
0D34                    0340 *
0D34 79                 0350         MOV   A,C      EXAMINE CHAR THAT WAS INPUT
0D35 B7                 0360         ORA   A        CHECK FOR MODE SELECT KEY
0D36 CA 3A 0D           0370         JZ    MODE1    COMES THROUGH ANI 7FH IN KYBD2
0D39 C9                 0380         RET   .        STILL NORMAL MODE, PUT CHAR TO CRT
0D3A                    0390 *
0D3A                    0400 * IF HERE THEN MODE SELECT KEY WAS INPUT FOR MODE CHANGE
0D3A                    0410 *
0D3A 3E 01              0420 MODE1   MVI   A,01H    SET UP FOR MODE CHANGE
0D3C 32 62 0D           0430         STA   FLAG     FLAG NOW REFLECTS CHANGE
0D3F CD 39 09           0440         CALL  KYBD2    NOW GET CHAR TO BE CHANGED
0D42 79                 0450         MOV   A,C      CAME BACK IN C
0D43 B7                 0460         ORA   A        0 IF ANOTHER MODE SELECT
```

CON'T ON PAGE 16

```
0D44 CA 4F 0D            0470          JZ    MODE2     IF SO THEN NEED ANOTHER CHANGE
0D47                     0480 *
0D47                     0490 * IF HERE THEN JUST NEED TO INPUT 1 SPECIAL CHARACTER
0D47                     0500 *
0D47 F6 80               0510          ORI   80H       REVERSE AND HIDE CHARACTER
0D49 4F                  0520          MOV   C,A       NEXT ROUTINE WILL LOOK IN C
0D4A AF                  0530          XRA   A         CLEAR A TO FIX FLAG
0D4B 32 62 0D            0540          STA   FLAG      FLAG NOW SET FOR NORMAL MODE
0D4E C9                  0550          RET   .         NOW PUT CHAR TO CRT
0D4F                     0560 *
0D4F                     0570 * HERE BECAUSE CHANGE IS NOW SET TO THE SPECIAL MODE
0D4F                     0580 *
0D4F C3 23 0D            0590 MODE2    JMP   CTLIN     BEGIN INPUT IN SPECIAL MODE
0D52                     0600 *
0D52                     0610 * SPECIAL MODE HOLDS UNTIL ANOTHER MODE SELECT KEY
0D52                     0620 *
0D52 79                  0630 MSSET    MOV   A,C       EXAMINE CHARACTER
0D53 B7                  0640          ORA   A         ZERO IF MODE KEY
0D54 CA 5B 0D            0650          JZ    CLRMS     TO CLEAR SPECIAL MODE
0D57                     0660 *
0D57                     0670 * IF HERE THEN REMAIN IN SPECIAL MODE AND DO REVERSE VIDEO
0D57                     0680 *
0D57 F6 80               0690          ORI   80H       ADD BIT FOR REVERSE
0D59 4F                  0700          MOV   C,A       SET UP FOR NEXT ROUTINE
0D5A C9                  0710          RET   .         PUT TO CRT
0D5B                     0720 *
0D5B                     0730 * HERE TO CLEAR THE SPECIAL MODE
0D5B                     0740 *
0D5B AF                  0750 CLRMS    XRA   A
0D5C 32 62 0D            0760          STA   FLAG      FLAG NOW IN NORMAL STATUS
0D5F C3 23 0D            0770          JMP   CTLIN     GO GET A CHAR FOR CRT
0D62                     0780 *
0D62                     0790 * THE FOLLOWING BYTE IS THE STORAGE FOR THE MODE STATUS
0D62                     0800 *
0D62 00                  0810 FLAG     DB    00        INITIALIZE IN THE MORMAL MODE
0D63                     0820 *
0D63                     0830 * THERE ARE 36D FREE BYTES REMAINING FROM THIS POINT
0D63                     0840 *
0D63                     0850 *
```

```
0D23  CD 39 09 79 FE 7F C8 FE 0A C8 3A 62 0D B7 C2 52
0D33  0D 79 B7 CA 3A 0D C9 3E 01 32 62 0D CD 39 09 79
0D43  B7 CA 4F 0D F6 80 4F AF 32 62 0D C9 C3 23 0D 79
0D53  B7 CA 5B 0D F6 80 4F C9 AF 32 62 0D C3 23 0D 00
```

ADAPTING ELECTRIC PENCIL TO SOL AT F000 HEX FROM C000
by Louis Bucklin

Enclosed is my check for renewal of Proteus. My thanks to you for your continuing efforts to bring us useful information about the Sol.

By way of contribution I am enclosing a listing of changes that I found necessary in order to adapt Electric Pencil to the Sol at F000 hex from C000 hex. It became painfully obvious rather quickly that unless one run's all software at F000 hex, the time and potential error of switching becomes too burdensome.

I made considerable effort to contact Michael Shrayer Software before attempting to track down the changes in the code that were required. But, letters were returned and phones proved to be disconnected. I found this unfortunate not only because searching for the changes was time consuming, but because it appears that all hope now for the upgrading of the Pencil has disappeared. While Pencil remains for me perhaps the single most effective piece of software written specifically for the Sol, it could benefit from error removal and extension.

In some ways the departure of the Electric Pencil is a little bit like the demise of the Sol--though I expect the reasons were quite different. It is an enormously valuable piece of software. There ought to be a means of keeping this alive. I am surprised that Shrayer didn't sell rights to the Pencil instead of allowing it simply to die. This would have been useful, especially for those who would like to further update the Sol to the larger screen. Perhaps there is someone who knows what has happened who could help on this. I suspect that this shift may be more complex than simply changing addresses.

In any event, the attached listing may be of some use to Proteus readers. The code addresses are relevant only to the Electric Pencil Ver SS-II for the teletypewrite, not for those which have the custom printer drivers. Hence, before changing any code, one should check version numbers. These are to found at addresses 110-15F hex. Also, since there may be several editions of this version one should also check to determine if the old values, as shown below, are in their proper locations. If not, they may be near by. For those who have other versions, my guess is that there would not be any other changes that those specified. Hence, it is only a matter of searching for the specified codes. Other than simply changing addresses in ram for the display, important changes were necessary in order to inform Pencil when the end of the display ram had been reached. This is the reason for the substitution of so many 00 for D0 codes.

Sincerely yours,

Louis P. Bucklin

March 7, 1982
1061 Via Alta
Lafayette, CA 94549

(Ed. note: I had an interesting conversation with someone who says he testified as an expert witness in a lawsuit between Michael Shrayer and the Vector Graphic computer company. It seems Shrayer tried suing Vector Graphic, claiming they had infringed on his copyright of Electric Pencil in their word processing software. The expert showed that large sections of Shrayer's code were identical to Processor Tech's code in the Software #1 editor, so Shrayer's case was shot down (he wasn't original author) and he skipped town to avoid counterclaims. That's why Electric Pencil disappeared from the marketplace, the story goes.---Stan.)

Code Changes to Adapt Electric Pencil to F000 on the Sol
Use for Version SS-II 12

Addr	OlCd	NwCd	Addr	OdCd	NwCd
171	36	3E	D6C	CC	FC
171	0D	00	EA3	CD	FD
17B	CD	FD	EDA	CC	FC
26A	CD	FD	EF0	CD	FD
28A	CC	FC	F1F	CC	FC
3CD	CF	FF	F39	CC	FC
3D6	CF	FF	F50	CC	FC
515	22	2D	F6A	CD	FD
516	2E	27	F81	CD	FD
644	CC	FC	F98	CD	FD
656	D0	00	FB3	CD	FD
820	CD	FD	10EA	CD	FD
970	CD	FD	1106	CC	FC
984	D0	00	1108	D0	00
A10	CD	FD	114D	CD	FD
A2D	D0	00	11D8	D0	00
A58	D0	00	11E2	C0	F0
A5E	CD	FD	120D	C0	F0
A62	CD	FD	1238	C0	F0
A65	CE	FE	128A	CD	FD
ACO	CD	FD	12DC	CE	FE
D3C	CC	FC	12FB	CE	FE
D43	CC	FC	1304	CE	FE
D69	CC	FC	130F	CE	FE

#

Addr = address in hex
OdCd = old code NwCd = New Code

HELP NEEDED ON 1200 BAUD TAPES, G2 MICROSOFT AND McKELVEY' MCP
by Alastair Preston

I have several questions that readers of PROTEUS/NEWS may be able to answer for me. As background info, I am running an S100 system under CUTER (ROM) with a Z80 Cpu, 32K memory, 3P&S, CUTS and a VB1B video board set at C000H,

1) The CUTS board works fine at 300 Baud, and reads commercial 1200 baud tapes, but will not load "1200" baud tapes it has written. I suspect that the problem is in the 1200 baud write circuitry, but despite changing the relevant chips, the problem remains. Who knows how to fix this? Do you know of any reasonable repair shops in this area?

2) In view of all the discussion re moving SOLOS to F000, nothing has been said about CUTER-- are replacement ROMs available to put CUTER at F000 ?

3) I have both ECBasic and G2 Microsoft Basic; Has anyone implemented the ECBasic cassette routines in G2 ? (i.e. FILE#,PRINT#, READ#,REWIND# and CLOSE#). MICROSOFT does not have the source code for G2 Basic and are unable to help.

4) In implementing M. McKelvey's "Micro Communication Package" (P/N v.3, #5/6), I have had trouble with the text transmission routines; they output everything including the line count bytes, line numbers and the non ASCII coding at the beginning of each line of a Basic listing, I was able to handle assembly listings and text produced with ALS8 and EDIT by reassembling the program with an extra INC H to skip one character at the beginning of each line , and editing out the line numbers in the recieving system's file. Any attempt to send a Basic listing bombs as the number of characters preceeding the line number is not constant. Has anyone solved this? Also, since I do not have a disk system yet, I would like to use cassetts instead. My attempts to make use of the rather limited information in the CUTS and CUTER manuals have been unsuccessful; I just have'nt figured out the proper procedure yet. Any suggestions?

5) I am assembling a disk controller board with hopes of being able to get some drives in the future if my economy improves. Is or will PTDOS be available on standard 5 1/4" disks? [Ed. note: Not in our plans.]

6) Does anyone know of an available Z80 assembler/editor (Zilog mnemonics) on CUTS tape; also a useable database and any Adventure games ?

Sincerely,

15 D Twin Terrace,
Edmonton, Alberta,
Canada, T6K 1V4
8 February 1982

Alastair Preston.

MORE ON MY GENERAL LEDGER PROGRAM
by Franz J. Hirner

Dear Stan,

Thank you for publishing the GENERAL LEDGER program. I had hoped that you would print the program listings but I imagine due to the length it was impossible. I recieved several requests for North*Star Single Density disk copies as well as Double Density. I am happy to provide either version to members for $25.00. While it is a lot of work, in view of the response I will also supply printed listings of the programs for $25.00 for those members who are not able to use the North*Star format.

Keep up the good work.

Sincerely,

631 Matsonia Drive
Foster City, California 94404
February 12, 1982

Franz J. Hirner

AN ALTERNATE 80X24 VIDEO UPGRADE
by Michael Carter

While the Micro Complex 80x24 upgrade (Vol 4, #5/6) is certainly impressive and a very welcome addition to the Sol repertoire, I would like to bring an alternative to the attention of your readers.

My partner and I are just completing the design of a 80x24 video board which offers several advantages over most alternative video boards including the Micro Complex product. By utilizing an on-board Z80 which is dedicated to handling the video function, it offers all the advantages of a memory-mapped display, without the overhead of address space or CPU time. All the necessary software will be contained in on board EPROM. In addition, it offers user programmable characters and limited high resolution graphics.Tentative specifications are:

80x24 display
Z80A processor, 4MHz
512 user programmable characters (128 defined on initialization, can be redefined)
4K EPROM
16K RAM
HI-RES graphics - 640*288 (Implemented with the programmable character generator)
Keyboard port - type-ahead buffer
Centronics printer port
Light pen interface
RF shielding on all high frequency components
Superscripts, subscripts, underline, strike-thru, blanking, half-intensity, flashing, inverse, etc.

The initial configuration is for an S100 video card. However, since I have two SOL's and regard them fondly, we will consider (if there is sufficient demand) producing a version specifically for the SOL, eg. as a piggy-backed board similar to the Micro-Complex . At the same time, we would arrange to disable SOLOS under software control (there would be no need for it, since the video driver routines would be located on the video board) and thus allow for a full 64K of RAM. We would also include a 4 MHz Z80 upgrade for the main processor.

I therefore invite interested readers to write to me at the above address, expressing their interest. We would expect to have the boards produced by approximately mid-year. We would be willing to sell bare boards, kits or fully assembled and tested units, and would expect the latter to sell at a price comparable with the Micro Complex board.

Regards

Michael Carter

4 Richardson St
Garran ACT 2605
AUSTRALIA

PS. For three years, I have puzzled over why SOLOS was located at C000 rather than (eg.) at F000. My partner has suggested a reason: C000 makes it simple to implement the PHANTOM with an Exclusive OR.

(Editor's note: Solos was located at C000 for compatibility with other products in the early Processor Tech line, namely ALS-8 firmware and VDM-1. When the biggest memory boards were 4K bytes, 48K seemed enormous and having Sol at C000 was no handicap.)

RELOCATE MDOS AND INTERFACE ECBASIC TO A MICROPOLIS DISK DRIVE

by Ron Shenk

The Problem

After adding a Micropolis Mod II disk drive to my SOL computer I had two BASIC interpreters, PT's ECBASIC which I had been using up to that time and the Micropolis disk basic which I call MBASIC. Both have nice features: MBASIC supports random access disk files, can achieve up to 60 decimal digits of accuracy if desired, and has nice program tracing. On the other hand, ECBASIC supports IF..THEN..ELSE, has a gem of an editor and most significantly is FAST. Typically MBASIC requires 30% more time to execute the same program.

How nice it would be if ECBASIC could be interfaced to the disk drive.

The Solution

Since both MDOS and ECBASIC occupy the same space in memory, one had to be moved. I had other applications which could benefit from a copy of MDOS at the top of memory, so I chose to move it. Two such benefits are: 1) one can use Micropolis' very fine DEBUGger to single step any CP/M .COM program, and 2) one can convert CP/M files into MDOS files and vice-versa.

With some effort I found all the addresses in MDOS, about 1600 in total, and wrote the program MDOSMOVER to increment them all by XX00H for any hex digits XX and move the code to its new location. I call this relocated disk operating system RDOS, mine occupies 92B1H to BB00H.

Needed next was a disk executive for EXBASIC. SDEXEC sits above RDOS and requires 512 bytes of memory. Upon initialization SDEXEC modifies four I/O vectors in ECBASIC and some code in RDOS. At this point all input goes through SDEXEC but is completely transparant to ECBASIC. The executive takes charge however when it sees CONTROL D and prompts for a disk command. The commands are:

DOS (to exit ECBASIC and enter RDOS)
SOD "parameters" (to save a program on disk)
FEED "parameters" (to load a program from disk)
REPLACE "parameters" (to update a disk file)
and RET (to return to ECBASIC).

The resulting marriage between ECBASIC and SDEXEC I call SDBASIC. SDBASIC works with source code on a character by character basis. When saving a program using SOD the executive decides to close the file when it receives END (blank,E-N-D,blank) or READY either from the keyboard or as the last statement of the program. By using source code the programs are transportable. A BASIC program written within the correct syntax of both BASIC's can be disk loaded and run on both (I also have rigged SDEXEC to work with MBASIC). Working with source code also has another advantage, programs LISTed while connected to a time-sharing service or other remote site and downloaded to disk can simply be fed and run. It is easy to modify SDEXEC to download source data arriving at the serial port.

For anyone interested, I have included a printout of SDEXEC. Further I can supply MDOSMOVER or SDEXEC on printout, on cassette tape, or on Micropolis Mod II diskette along with documentation. For a printout of MDOSMOVER please send $4. For a diskette or a tape, please send $15 for MDOSMOVER, $10 for SDEXEC or $20 for both.

Ron Shenk
329 Robin Hood Rd.
Atlanta, Ga. 30309

```
0050 *
0054 *                  SDEXEC
0056 *
0058 * A DISK DRIVER FOR ECBASIC (REV. A) ON MICROPOLIS
0062 * USES MDOS ROUTINES AND IS COMPATIBLE WITH MDOS DISKETTES
0066 * THIS AND MDOS MUST BE MOVED TO A LOCATION ABOVE BASIC
0070 * CLOSES FILES UPON ENCOUNTERING READY OR  END  NOT
0074 * WITHIN QUOTES.  INCLUDE END STATEMENT AS LAST LINE
0078 * OF A BASIC PROGRAM.
0082 *
2004 ********************************************************
2008 BASEADDR     EQU   2B00H
2012 CREATE       EQU   0166CH
2016 WTINXPOSI    EQU   018BAH
2020 DOSADDR1     EQU   2022H
2024 DOSADDR2     EQU   1C8FH
2028 DOSADDR3     EQU   1C95H      ;DISKERR
2032 DOSSTRTUP    EQU   1598H
2036 DOSADDR4     EQU   204DH      ;COMTAB PTR
2040 DOSADDR5     EQU   2053H      ;NO MATCH BYTE
2044 MCOMTAB      EQU   20C0H      ;MICRO COM TABLE
2048 DOSADDR6     EQU   2059H      ;NO MATCH JMP
2052 INCRECPOS    EQU   015A0H
2056 KSTAT        EQU   0C02EH
2060 BUFSET       EQU   025B0H
2064 OPENFILE     EQU   01709H
2068 RFINXPOSI    EQU   0187AH
2072 CLOSEFILE    EQU   01754H
2076 DISKERROR    EQU   01C8FH
2080 VDMOT        EQU   0C054H
2084 NASCPAR      EQU   029ACH     ;29AC
2088 DRIVEN0      EQU   029D7H     ;29D7
2092 INBUF        EQU   01A0H
2096 FILEBUFFER0  EQU   0264BH
2100 ASCIIBUFF    EQU   029E3H     ;29E3
2104 UIPRT        EQU   0C800H
2108 UOPRT        EQU   0C802H
2112 IPORT        EQU   0C806H
2116 OPORT        EQU   0C807H
2120 ERRORMSG     EQU   01CB1H
2124 SCRATCH      EQU   0163CH
2126 @APP         EQU   2B00H      ;OFFSET FOR SDEXEC
2128 ********************************************************
2132 LAYDOWN      EQU   $
2136 OFFSET       EQU   LAYDOWN-BASEADDR
2140              JMP   INTLZ-OFFSET
2144 EXEC         NOP
2148 EXEC1        DW    0
2152              CALL  KSTAT
2156              RZ
2160              CPI   04
2164              RNZ
2168              PUSH  H
2172 ADR1         LXI   H,DPROC-OFFSET
2176 ADR2         SHLD  EXEC1-OFFSET
2180              MVI   A,0C3H     ;JMP
2184 ADR3         STA   EXEC-OFFSET
2188 ADR4         LXI   H,GETLIN-OFFSET
2192 ADR5         SHLD  BRNCH1-OFFSET
2196              POP   H
2200 DPROC        PUSH  B
2204              PUSH  D
2208              PUSH  H
2212              LXI   H,0
2216              DAD   SP
2220 ADR6         SHLD  SPFIX-OFFSET
2224 BRNCH        JMP   GETLIN-OFFSET
2228 BRNCH1       EQU   BRNCH+1
2232 GETLIN       LXI   H,EPRMPT-OFFSET
2236 ADR7         CALL  CILINE
```

CON'T ON PAGE 19

```
2240                DCR   B
2244 ADR8           CNZ   DOSADDR1
2248 ADR9           CC    DOSADDR2
2252 COMNOTFND      MVI   A,0BH      ;NOT FOUND CODE
2256 ADR10          CALL  ERRORMSG   ;OUTPUT ERROR MESSAGE
2260                MVI   A,0DH
2264 ADR11          JMP   RETN-OFFSET
2268 RETN           LHLD  SPFIX-OFFSET
2272                SPHL
2276                POP   H
2280                POP   D
2284                POP   B
2288                RET
2292 INTLZ          LXI   H,EXEC-OFFSET
2296                SHLD  0586H      ;IN SOL BASIC IN
2300                SHLD  267BH
2304                SHLD  2699H
2308                SHLD  26A4H
2312                SHLD  26F3H
2316 ADR12          LXI   H,DOSADDR3 ;DISKERR
2320                MVI   M,0C9H     ;SO RDOS RETURNS TO BASIC
2324 ADR13          LXI   H,COMTAB-OFFSET
2328 ADR14          SHLD  DOSADDR4
2332 ADR23          LXI   H,COMNOTFND-OFFSET
2336 ADR15          SHLD  DOSADDR5   ;IF NO MATCH
2340 ADR16          CALL  NULEXEC-OFFSET
2344                PCHL             ;TO SOL BASIC
2348 NULEXEC        LXI   H,0
2352 ADR17          SHLD  EXEC-OFFSET
2356 ADR18          SHLD  EXEC1-OFFSET
2360                RET
2364 COMTAB         DTH   'DOS'
2368 ADR19          DW    DOS-OFFSET
2372                DTH   'RET'
2376 ADR20          DW    INTLZ-OFFSET
2380                DTH   'FEED'
2384 ADR21          DW    FEED-OFFSET
2388                DTH   'SOD'
2392 ADR22          DW    SAVE-OFFSET
2396                DTH   'REPLACE'
2400 ADR24          DW    REPLACE-OFFSET
2404 * DTH 'BASIC'
2408 *ADR26 DW INTLZ-OFFSET
2412                DB    0          ;END OF TABLE
2416 DOS            LXI   H,DOSADDR3 ;DISK ERR
2420                MVI   M,0C3H
2424 ADR27          LXI   H,MCOMTAB  ;COM TAB
2428 ADR28          SHLD  DOSADDR4
2432 ADR29          LXI   H,DOSADDR6
2436 ADR30          SHLD  DOSADDR5   ;IF NO MATCH
2440 ADR31          CALL  NULEXEC-OFFSET
2444                SHLD  IPORT      ;HERE AND OPORT TOO
2448 ADR32          JMP   DOSSTRTUP
2452 FEED           LXI   H,FMAIN-OFFSET
2456 ADR33          SHLD  BRNCH1-OFFSET
2460 ADR34          CALL  BUFSET     ;IN RDOS
2464 ADR35          CALL  OPENFILE   ;IN RDOS
2468 ADR36          JC    QUIT-OFFSET
2472                MVI   C,20H
2476 ADR37          JMP   GOBCK-OFFSET
2480 FMAIN          CALL  KSTAT
2484                CPI   80H
2488 ADR38          JZ    RESET-OFFSET
2492                MVI   B,0        ;FILENO
2496 ADR39          CALL  RFINXPOSI
2500 ADR40          JC    QUIT-OFFSET
2504 GOBCK          MOV   A,C
2508                CPI   0AH
2512 ADR41          JZ    FMAIN-OFFSET
2516 ADR42          JMP   RETN-OFFSET
```

```
2520 QUIT           PUSH  PSW
2524                CPI   02
2528 ADR43          JZ    QUIT1-OFFSET
2532                MOV   A,C
2536                CPI   13H
2540 ADR44          JZ    QUIT1-OFFSET
2544                POP   PSW
2548 ADR45          CALL  DISKERROR
2552                PUSH  PSW
2556 QUIT1          POP   PSW
2560 RESET          MVI   B,0        ;FILENO
2564 ADR46          CALL  CLOSEFILE
2568 ADR47          CALL  NULEXEC-OFFSET
2572                MVI   C,0DH
2576 ADR48          JMP   GOBCK-OFFSET
2580 SAVE           CALL  BUFSET     ;SETS DRIVE #, BUF ADDR
2584                MVI   B,0        ;FILENO
2588                MVI   D,08       ;FILE TYPE
2592 ADR49          CALL  CREATE
2596 ADR50          JC    QUIT-OFFSET
2600 ADR51          LXI   H,LIST-OFFSET
2604 ADR52          SHLD  LPRTAB-OFFSET
2608 ADR25          LXI   H,QTKWC-OFFSET
2612                MVI   M,02       ;2 KEYWORDS
2616 ADR53          LXI   H,INRTN-OFFSET
2620 ADR54          SHLD  BRNCH1-OFFSET
2624 ADR55          LXI   H,OTRTN-OFFSET
2628                SHLD  UOPRT
2632 ADR56          LXI   H,KW1-OFFSET
2636 ADR57          SHLD  KW1AD-OFFSET
2640 ADR58          SHLD  KW1PTB-OFFSET
2644 ADR59          LXI   H,KW2-OFFSET
2648 ADR60          SHLD  KW2AD-OFFSET
2652 ADR61          SHLD  KW2PTB-OFFSET
2656 INRTN          LHLD  LPRTAB-OFFSET
2660                MOV   A,M
2664                INX   H
2668 ADR62          SHLD  LPRTAB-OFFSET
2672                CPI   80H
2676 ADR63          JC    SDIT-OFFSET
2680                LXI   H,0
2684 ADR64          SHLD  EXEC-OFFSET
2688 ADR65          SHLD  EXEC1-OFFSET
2692                LXI   H,OPORT
2696                MVI   M,3
2700 SDIT           ANI   7FH
2704 ADR66          JMP   RETN-OFFSET
2708 OTRTN          PUSH  PSW
2712                PUSH  B
2716                PUSH  D
2720                PUSH  H
2724                LXI   H,0
2728                DAD   SP
2732 ADR67          SHLD  SPFIX-OFFSET
2736                MOV   A,B
2740                CPI   22H
2744 ADR68          LDA   QTKWC-OFFSET
2748 ADR69          JNZ   QUOTE-OFFSET
2752                XRI   80H
2756 ADR70          STA   QTKWC-OFFSET
2760 QUOTE          RLC              ;BIT 8 TO CARRY & 1
2764 ADR71          JC    DISK-OFFSET
2768                PUSH  PSW
2772 ADR72          LXI   H,KW1PTB-OFFSET
2776 ADR73          CALL  ADD-OFFSET
2780 NXTKW          DCX   H          ;HL PTS TO HIGH BYTE
2784                PUSH  H          ;OF CUR KW PTR TBL
2788                MOV   A,M
2792                DCX   H
2796                MOV   L,M
2800                MOV   H,A        ;HL PTS TO CUR KW CHAR
```

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```
2804              MOV   A,M
2808              SUB   B
2812              INX   H           ;PT TO NXT KW CHAR
2816 ADR74        JZ    SETCHR-OFFSET
2820              CPI   80H         ;LAST BYTE?
2824 ADR75        JZ    EXIT-OFFSET
2828              POP   D           ;RESET CHR PTR
2832              POP   PSW
2836              PUSH  PSW
2840              PUSH  D
2844 ADR76        LXI   H,KW1AD-OFFSET
2848 ADR77        CALL  ADD-OFFSET
2852              DCX   H
2856              MOV   A,M
2860              DCX   H
2864              MOV   L,M
2868              MOV   H,A
2872 SETCHR       POP   D           ;HL PTS TO NXT KW CHR TO CHECK
2876              MOV   A,H         ;STORE HL IN CUR KWPTB
2880              STAX  D           ;DE PTS TO HIGH BYTE
2884              DCX   D           ;OF CUR KWPTB ADDR
2888              MOV   A,L
2892              STAX  D
2896              XCHG              ;HL PTS TO NEW CUR KWPTB+1
2900              POP   PSW
2904              SUI   02
2908              PUSH  PSW
2912 ADR78        JNZ   NXTKW-OFFSET
2916              POP   PSW
2920 DISK         MOV   C,B
2924              MVI   B,0         ;FILE NO
2928 ADR79        CALL  WTINXPOSI
2932 ADR80        JC    ERR-OFFSET
2936 GBACK        LHLD  SPFIX-OFFSET
2940              SPHL
2944              POP   H
2948              POP   D
2952              POP   B
2956              POP   PSW
2960              JMP   VDMOT
2964 ADD          ADC   L
2968              MOV   L,A
2972              RAL
2976              ANI   01
2980              ADD   H
2984              MOV   H,A
2988              RET
2992 ERR          CALL  ERRORMSG
2996 EXIT         POP   H
3000              POP   PSW
3004              MOV   C,B
3008              LXI   H,0PORT
3012              XRA   A
3016              MOV   M,A
3020              MOV   B,A
3024 ADR81        CALL  WTINXPOSI
3028 ADR82        CALL  CLOSEFILE
3032 ADR83        JMP   GBACK-OFFSET
3036 REPLACE      CALL  BUFSET
3040 ADR84        CALL  SCRATCH
3044 ADR85        JMP   SAVE-OFFSET
3048 KW1          DT    ' END '
3052              DB    8DH
3056 KW2          DTH   'READY'
3060 LIST         DT    '   LIST'
3064              DB    8DH
3068 EPRMPT       DTH   'COMMAND?'
3072 KW1PTB       DW    0
3076 KW2PTB       DW    0
```

```
3080 KW1AD        DW    0
3084 KW2AD        DW    0
3088 LPRTAB       DW    0
3092 QTKWC        DW    0
3096 SPFIX        DW    0
3600 ************************************************
3602 SDEMODTBL    EQU   $
3604              DW    LAYDOWN+2,ADR1+2
3606              DW    ADR2+2,ADR3+2,ADR4+2,ADR5+2,ADR6+2
3608              DW    BRNCH+2,GETLIN+2
3610              DW    ADR7+2,ADR8+2,ADR9+2,ADR10+2,ADR11+2
3612              DW    RETN+2,INTLZ+2
3614              DW    ADR12+2,ADR13+2,ADR14+2,ADR15+2,ADR16+2,ADR17+2
3616              DW    ADR18+2,ADR19+1,ADR20+1,ADR21+1,ADR22+1
3618              DW    ADR23+2,ADR24+1,ADR25+2
3619 * DW ADR26+1
3620              DW    DOS+2,FEED+2
3622              DW    ADR27+2,ADR28+2,ADR29+2,ADR30+2,ADR31+2,ADR32+2
3624              DW    ADR33+2,ADR34+2,ADR35+2,ADR36+2,ADR37+2,ADR38+2
3626              DW    ADR39+2,ADR40+2,ADR41+2,ADR42+2,ADR43+2,ADR44+2
3628              DW    ADR45+2,ADR46+2,ADR47+2,ADR48+2
3630              DW    SAVE+2,INRTN+2,GBACK+2,ERR+2,REPLACE+2
3632              DW    ADR49+2,ADR50+2,ADR51+2,ADR52+2,ADR53+2,ADR54+2
3634              DW    ADR55+2,ADR56+2,ADR57+2,ADR58+2,ADR59+2,ADR60+2
3636              DW    ADR61+2,ADR62+2,ADR63+2,ADR64+2,ADR65+2,ADR66+2
3638              DW    ADR67+2,ADR68+2,ADR69+2,ADR70+2,ADR71+2,ADR72+2
3640              DW    ADR73+2,ADR74+2,ADR75+2,ADR76+2,ADR77+2,ADR78+2
3642              DW    ADR79+2,ADR80+2,ADR81+2,ADR82+2,ADR83+2,ADR84+2
3644              DW    ADR85+2
3646              DD    0
3648 ENDTBL2      EQU   $
```

THE AMATEUR'S GUIDE TO A 62K CP/M SYSTEM WITH MCSOLOS AND DISC JOCKEY 2D, VERSION B

by Philip N. Barnhart

April 4, 1982

I installed a Micro Complex 80 x 24 VDM in my trusty old SOL in December of 1981. I had been running a 48k CP/M system for a couple of years with Morrow Design's double density 8 inch controller, Disc Jockey 2d, version B. The standard version of the DJ2DB locates its bootstrap prom and ram from E000H to E7FFH. With the top of my useable memory at C000H because of solos anyway, E000H was well out of the way. Then along came MCSOLOS and the 80 x 24 VDM. Not only did I nearly double my screen size, great for my word processing and program development chores, but SOLOS also got moved to F000H. Now the limit on my useable memory was no longer the SOLOS module but instead the DJ2DB. I lived with a "mere" 56k CP/M system for three months until I developed a crazy idea. Maybe I could have a 62k CP/M system!

There was something in your article on the new big screen (in the Proteus News, Vol. 4, No. 5/6, p.1) about being able to "turn off" MCSOLOS and MCVDM "by outputting 1s to the two high order bits of port FC." That gave me my brilliant/crazy idea. Perhaps I could move the DJ2DB to F800H thus leaving room for a 62k CP/M system, and only turn on MCSOLOS and MCVDM when I wanted access from the keyboard or to the screen. This would leave me with a somewhat complex bootup procedure but would gain me 6k of space for my system.

I quickly called Morrow about a "Relocation Package" for the contoller on a Friday. On Tuesday I drove over and picked it up for $60.00 plus tax (your credit card number will get it shipped UPS also). The Relocation package consists of two chips and a rewrite of CP/M (They will want your CP/M serial number for that). I modified the new CP/M BIOS to turn MCSOLOS on and off when a keyboard or screen access was needed and proceeded to modify the disc controller board by pulling two old chips and installing the two new ones exactly as I had been told. It worked great on the first try, right?

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Wrong. When I turned the computer on the little lights on the front of both of the disc drives came on at once. I knew something was wrong. I turned it off and looked for smoke. Seeing none, I settled down to find out what was wrong. Stan, your hardware freaks already know the problem, but for those who know about a much (or as little) as I do, let me finish the story. It has a happy ending.

With a little thought I realized that when Micro Complex said they put MCSOLOS and MCVDM on an internal bus, separate from the S-100 bus, they did NOT mean that the signals from the two busses did not interfer with each other at the same address location. I assumed that MCSOLOS was interfering with the memory mapped I/O of the controller located at the same address. Sure enough, when I entered and executed a short program to turn off MCSOLOS, the drives settled down and behaved the way they are supposed to when the machine is turned on.

I realized that to make this overlap of addressing work I would have to configure the DJ2DB to be off when MCSOLOS was on and on when MCSOLOS was off. Is that possible? A long puzzled look at the DJ2DB documentation (always keep, but never read, the documentation for anything until you are stuck) suggested a way out. The DJ2DB can be configured to turn itself off at reset or on power up and to turn itself on or off depending upon the output on port 40H. Since I had never needed to turn the controller off before, it was set up to ignore port 40H and to be on all the time.

FIXING THE CONTROLLER BOARD: Three changes to the DJ2DB S-100 board are needed. (1) The jumper, J4, located between 2A and 3A at the top left of the board must be changed from A-B to A-C. Simply pull the little connector off of the top two pins and push it back on the bottom two pins. The middle pin is used either way. This change turns the board off at power on and at reset. (2) Connect a jumper from J3A to one of the 8 pads just above it between 11C and 12C. This enables the "bank select" feature through port 40H. I chose the pad labeled "7" because it required the shortest piece of wire and also would require the shortest modification to my BIOS as I will explain latter. (3) Turn paddle 7 of switch 1 to the "on" position (Switch 1 is located at 5D). This change inserts one wait state in bus cycles which read from the 2708 EPROM on the DJ2DB controller board. The Morrow documentation says this paddle must be off for 2MHz operation and must be on for faster than 2MHz operation. Why it is needed for this configuration with no change in clock speed I do not know, but on my SOL the DJ2DB with only changes (1) and (2) is "dead" and with all three it works fine.

SOFTWARE FIXES: The theory of this modification is that the system runs with MCSOLOS off all the time except when access to the keyboard or the screen is needed. The relocation package from Morrow comes with a relocated boot loader and system equates which expect to find the DJ2DB located at F800H. I had to modify the references to SOLOS to Fxxx from Cxxx to run with MCSOLOS at all. In addition I had to insert code like the following to turn off the DJ2DB and turn on MCSOLOS before each call to a SOLOS routine and just the opposite afterward.

Morrow's version of CP/M 2.2 for SOL comes with three special routines for input from SINP and output to SOUT. Changing those special routines and making one additional change in the warm boot procdure is all that is necessary, 43 bytes total. In COTTY, delete the jump to SOUT, and in its place insert the following:

```
        xra     a       ;turn off dj2db
        out     040h    ;by o/p 0 in bit 7
        out     0fch    ;turn on mcsolos by o/p 0 in bits 6 & 7
        call    sout    ;0f019h
        mvi     a,0c0h  ;turn off mcsolos by o/p 1 in
        out     0fch    ;bits 6 & 7 and turn on dj2db by
        out     040h    ;o/p 1 in bit 7
        ret
```

In CSTTY similar code should surround the call to sinp as follows:

```
CSTTY   xra     a       ;turn dj2db off and mcsolos on
        out     040h
        out     0fch
        call    sinp    ;get character from keyboard
        push    psw     ;save character
        mvi     a,0c0h  ;turn mcsolos off and dj2db on
        out     0fch
        out     040h
        pop     psw     ;retrieve character
(continue balance of CSTTY as written)
```

Change CITTY beginning at CONIN3 as follows:

```
CONIN3  out     040h    ;turn dj2db off and mcsolos on
        out     0fch
conin31 call    sinp    ;get a character from keyboard
        jz      conin31 ;wait until there is one
        push    psw     ;save character
        mvi     0c0h    ;turn mcsolos off and dj2db on
        out     0fch
        out     040h
        pop     psw     ;retrieve character
        ret
```

In addition, inserting the following code at "wboot" will allow a direct warm boot from MCSOLOS. This is handy if you need to use a reset for any reason and the resident CP/M system is intact.

```
wboot   mvi     a,0c0h  ;turn mcsolos off and dj2db on
        out     0fch
        out     040h
(continue with existing code)
```

The only other issue is how to get from MCSOLOS at F000H to DJ2DB at F800H to cold boot the CP/M system. I have solved it with a somewhat inconvenient kludge. There is plenty of room in the MCSOLOS prom to allow the "load" key to download the short program described below and then jump to it. I just haven't gotten around to having a new prom burned yet. I cold boot as follows: First, in MCSOLOS, type, EH 0<cr>. This allows you to enter hex code directly into memory at 0. Then enter the following 9 bytes: 3E C0 D3 FC D3 40 C3 00 F8, return to command mode and enter EX 0<cr> or WB<cr>. If everything is right the 9 byte program will turn off MCSOLOS, turn on DJ2DB, and jump to DJ2DB's cold boot routine. Thereafter, the switching of MCSOLOS and DJ2DB will be transparent to the user.

For the Relocation Package write or call Morrow Designs, 5221 Central Avenue, Richmond, Ca. 94804, (415)524-2104.

Stan, keep up the great work. Without Proteus News to get the word out we would not know about the great new products for the SOL from Micro Complex and I would still be running 48k and a little screen.

Sincerely yours,

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Philip N. Barnhart

TELECOMMUNICATIONS SYSTEM FOR THE SOL/HELIOS II COMPUTER
by Allen Fincher

This program consists of three files that comprise a telecommunications system using the SOL/Helios II as a smart terminal. They have been submitted to Proteus for inclusion in the Helios library.

The program was written mainly for communicating with THE SOURCE, a time-sharing information utility located in McLean, Virginia (Source Telecomputing Corp., 1616 Anderson Road, McLean, VA 22102). It will automatically log you onto THE SOURCE via either TELENET or TYMNET, two telephone carrier companies. The auto-log feature checks the carrier detect signal from a modem to determine when to start the log-on sequence. While used primarily for THE SOURCE, provisions are included for manually logging onto any time-share system by selecting that option when the menu is displayed, although there may be conflicts between my program control code outputs and a non-SOURCE network (listed below).

While the program listing is copyrighted, I grant the original purchaser of the disk the right to make copies for his own use, and to assemble, use, and modify as desired so long as it is not sold or used commercially. I ask that you please honor this request. A lot of time, and connect-time expense, was involved in writing it.

Besides logging you automatically onto THE SOURCE, you can also upload data to, and download data from, the time-share computer.

The origional version of this program is written in Z-80 on my S-100 computer. Since I don't have a SOL, there is a remote possibility that corrections will be necessary to make the program run properly. I've tried to provide a program that can be assembled, loaded, and run without anything more than having you include some data in a few places in the source listing.

Because I wrote my current monitor by combining CUTER and a Z-80 monitor, I believe that I understand the necessary protocol for I/O operations via SOLOS (I also had the source listing of SOLOS Version 1.3, Release 77-03-27 to go by). I would like to gratefully acknowledge Fr. Thomas McGahee for his Proteus articles on the SOLOS output routines which supplied the serial status port bit definitions. Also, he noted that the SOL serial port is wired as a terminal, not a computer (see Proteus vol. 3, no. 4). This means that a modem can be connected directly to the SOL serial port without crossing any of the wiring between them. This program, with the terminal keyboard read routine modified for my system, has been tested on-line with THE SOURCE.

Here are the instructions for assembling the program:

1. If you use either TELENET or TYMNET as your telephone network, you will have to set the conditional assembly flags that are near the end of the TELCOM:S file. Set the appropriate EQUate to 1 and the other EQUate to 0. If you have access to both networks, then assemble this program twice equating first one of the networks, and then the other using two object files. I named by two files TELENET and TYMNET for simplicity. Also, make the data at SYSNAM in the Change Password routine in file TLCM2:S match the name of your object file.

2. Make any changes to the ONLINE routine necessary to make it work with your modem. It is supposed to wait until the modem has locked onto the time-share system carrier signal.

3. If you are a subscriber to THE SOURCE, enter the necessary data to the LOGON data statements near the end of TLCM2:S. I would suggest that you DO NOT include your password in the source listing. Instead, change it in the disk object file using the Change Password command when the menu is displayed. Because of "filter" routines, the password cannot contain control characters.

4. Assemble TELCOM:S, then perform an EXTRACT command to consolidate the object code into one record as follows:

   EXTRACT objectfilename,S

   If this is not done, the Change Password command will not be able to find the data in the disk object file.

The I/O of your SOL does not have to be defined (using I= or O=) before running the program. The terminal output is sent to an internal VDM driver and the SOL keyoard is used as the terminal keyboard. The modem I/O routines dynamically change the pseudo port by calling the AINP and AOUT vectors in SOLOS.

Because most time-share systems expect your terminal to have an 80-column display, I wrote the internal VDM driver to move any word that may be cut in two onto the next line. Most time-share systems also expect the terminal to have 24 lines, so to prevent text from scrolling off the top of the screen before you can read it all, press CTRL-S when desired to stop the system from transmitting, then press CTRL-Q to cause it to resume.

The menu options are:

1: Connect to The Source
2: Manual log-on
3: Change Source password
4: Quit & return to PTDOS

Option 1 automatically logs you onto THE SOURCE if you have included the necessary information in the data statements as outlined above.

Option 2 skips the auto-log routines and puts you directly into the main program I/O loop (terminal simulator).

Option 3 allows you to change your SOURCE password that is in the disk object file of the program your are running. THE NAME OF THE OBJECT FILE FOR THE PROGRAM YOU ARE RUNNING MUST HAVE BEEN ENTERED AT 'SYSNAM' IN THE SOURCE LISTING.

Option 4 will return you to PTDOS. You should sign-off of the time-share system before doing this.

The commands available are SEND, SAVE, and CATalog. They are entered by first typing a left-brace "{" and then the command.

Example: {SAVE filename/u

will save all incoming text in file 'filename' on unit 'u' until you enter "}". All incoming text is displayed on the VDM also. Anything you type between the "{" and carriage return is NOT sent to the modem, neither are the brace or the carriage return; they are strictly local. These commands can be used at any time that there is no incoming text.

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The SAVE command saves all incoming text in the file 'filename' as noted above. If the file does not exist, it will be created with type T, and with a block size of 4C0. All text is saved in a buffer. When 24 lines have been received, a CTRL-S is automatically sent to the network to stop the flow, and after all residual characters have been received, the buffer will be transfered to PTDOS. Since PTDOS also maintains a buffer, the transfer may not always result in an actual disk write taking place. After the transfer has taken place, a CTRL-Q is automatically sent to the network to tell it to resume sending.

The SEND command sends a file to the time-share system. When the end of the file is reached, the file will be closed (as shown by "}" being displayed) and the terminal bell (if you have one) will beginning ringing at about a 1 second rate and the message "(Press MODE to continue.)" will be displayed. Because this program has "filter" routines to prevent sending or receiving most control characters, object files cannot be handled. The actual through-put will seem slow (about 10 to 15 characters/second). This is caused by the program looking for an echoed character before sending the next one so that if the network pauses to service another customer, none of your data will be lost.

The CAT command will display the filenames of all type T files on unit 1 on the screen. They are not arranged alphabetically. When this command is used, a CTRL-S is automatically sent to the network, as is a CTRL-Q after listing the file names.

The following keys/control codes perform special local or remote functions:

CTRL-F: returns you to the menu.

The MODE key is used to abort commands, with the exception of the CAT command (PTDOS apparently ignores it as long as you are not in PTDOS). It is also used to abort the auto-log feature in case of problems; it skips to the main terminal loop so that you can manually log on to the system. If pressed during SAVE or SEND operations, the files will be closed and control will be returned to the main loop. The MODE character is NOT transmitted.

The DEL key may be used as back-space. It is changed to a CTRL-H (BS) when typed.

ESCape: used by THE SOURCE for sending electronic mail.

CTRL-E: used by THE SOURCE for identifying the ID of the person to whom you are chatting.

CTRL-G: sends a bell character.

CTRL-H: used by THE SOURCE as back space.

CTRL-P: used by THE SOURCE to terminate/abort an operation.

CTRL-Q: tells the telephone carrier network to resume sending after having sent a CTRL-S.

CTRL-S: tells the telephone carrier network to stop sending (pause).

(Editor's note: The source files will appear in the next Helios H-disk issued. We're waiting to fill it a little more.)

HARDWARE INTERRUPTS FOR THE SOL CON'T FROM PAGE 4

this feature can be added to the Sol by providing a vectored interrupt chip and associated hardware.

The Intel 8214 is a priority interrupt control unit. It has 8 interrupt request pins, coming from 8 interrupting devices (such as the keyboard, serial port, etc.) and one interrupt output pin that goes to the 8080's interrupt input pin. The 8214 monitors the 8 inputs and if any want service, it signals the 8080 and puts the RESTART instruction corresponding to the request into the 8080 via the data bus. The RESTART comes in 8 types (RST 0 through RST 7) which act like one-byte call instructions to predetermined addresses in the beginning of memory. If several requests come in at the same time, the 8214 can select the one with the highest priority first (determined by which pin it is assigned to). The processor can control the action of the 8214 in a limited way.

The Intel 8259A is a more sophisticated interrupt controller that can be programmed by output instructions directed to it through output port addresses. It works in a similar fashion to the 8214, but outputs a CALL instruction and the 16 bit address of the interrupt service routine. So it allows the interrupt service routines to begin anywhere in memory. The way it determines the priority of interrupts can be altered in many more ways than the 8214.

Several interrupt controllers can be cascaded together to allow more than 8 levels, but usually 8 is all that is needed.

So to get Leon Winter's Hytype printer to signal the 8080 when it is ready for another character, Leon will have to add an interrupt controller and hook up the printer's ready signal to one of its request pins (perhaps through an inverter if the signal has the opposite meaning than the controller wants).

He also has to provide an interrupt service routine that will know how to get more data to send to the printer. This is usually done through an area of RAM set aside as a buffer. His computing program puts bytes into the buffer and enables the printer to interrupt the computer. Whenever the interrupt occurs, the service routine checks to see if data is waiting in the buffer, and if so sends out another character to the printer.

This clears the ready signal (printer is busy) so the interrupt request is turned off and the service routine can return control to the main computing program where it left off. When the buffer is empty, the printer interrupt has to be disabled, so that the computer is not constantly being interrupted by the idle printer. The 8259A gives complete control in designating which interrupting devices are enabled or disabled. The 8214 allows a priority level to be set by the program, disallowing lower priority devices to interrupt the system.

Priority interrupt S-100 boards used to be made, but I haven't seen them for a long time, probably because most interrupt driven systems put the chip on the CPU board now. Anyway, it is a waste of a slot to do it that way. We should do it by piggybacking onto the Sol.

The 8214 requires four bits of one output port as its control port (to let the 8080's program set the priority threshhold). It should be possible to squeeze this out of the Sol's address decoder. However, the 8259A requires more ports for complete implementation, so it will be trickier to install.

In any case, the Sol has to be modified by installation of jumpers as described in the PTC update for vectored interrupt. These will prevent the onboard address decoder from becoming confused by the interrupt instruction that is placed onto the data bus.

If anyone has figured out just how and where to put the 8214 or 8259A onto a Sol, please send us the details. The whole story will appear in the Encyclopedia Processor Technica and as much as possible will go into Proteus News.

KEYBOARD IN THE TROPICS
BY H. Leon Winter

I have just struggled through 3 days of keyboard troubles on my Sol-20. After I finally figured out, and fixed the problem, I thought that others might run into this and would be interested in the solution. If I've missed seeing information on this published in past Proteus News and this is not a new account of the problem and the cure, Stan, please just file this letter.

My Sol lives in the tropics so this trouble may turn up sooner here than in the States, but it still can and may have happened to some of the members. One symptom was an unstable keyboard such that certain keys would not work at times. The most unsettling symptom was the generation of characters without anyone touching the keys! I could turn on the Sol and it would add 2 or 3 chatacters here and there. Or I could leave it, then come back later and find the screen full of garbage. If this happens to you, don't turn the Sol off. Grab a pencil and paper and jot down some of what you see. This will help solve the mystery.

After I scratched my head, I looked up the keyboard section in the Sol systems manual and reread it. This is always a good practice when any trouble is incountered. The time spent reading will more then pay you back in shortened trouble shooting time!

I made an assumption that the characters that "randomly" appeared on the screen had significance. Ultimatly nothing is random in digital logic. I was rewarded as I studied schematic X-22. The common factor appeared in the key matrix part of the drawing. In my case, it was pin 4 of the analogue multiplexer, U-22 which is a 4051. All of the screen garbage could be traced to this line including the fact that every time I'd touch REPEAT the computer would reset itself. (I had changed my keyboard some 2 years before so the REPEAT and BREAK were the resetting keys. It bugged me to have to be always retoggling the ALPHA SHIFT key after every reset! The BREAK key is also on pin 4 of U-22 hense the reset.)

The next thing was to grab my trusty logic probe. I have the type of probe that can be switched between either TTL or CMOS logic families. As it turned out, this feature was a help that I would not have known before doing this particular fix. Going along the input pins of U-22 with the prob in the TTL position, I could find no diference, all the lines read high as they should if all is well. But all was not well so I though about the fact that this is high Z circuitry and switched the prob to CMOS. Now the fault became quite evident. All the other lines still had a brite red high LED on the probe, but the offending line was dim.

The input lines on both U-22 and U-19 are pulled high by 33K ohm resisters. So something must be acting as a low impedance on pin 4 for the level to read as it did. Carefully, I removed all the screws holding the key assembly to the circuit board. Then I used the "end of my nose", as technicians call it, and traced the line from pin 4 to each of the keypads it services. On my way along this line I came upon 2 places where there was a patch of corosion across several closely orientated traces. (Living in the tropics, this type of thing does not surprise me as we have a high humidity. I think that living in a place where there was salt air could do this too or just age.) When I cleaned these, the keyboard troubles disappeared. The cleaning device I used was a fiberglass circuit board cleaning brush. This does a very good job of cleaning boards and is not as destructive as a little wire brush would be.

If you have the board apart for this or any other reason, take advantage of the siturtion and do a good cleaning of the keypads on the circuit board. I use clean gauze and rubbing alchol. Then dry the surface off with another clean gauze. Carefully reassemble the board. When all the screws are started, tighten them evenly but not too tight. Remember: this is not the head casting on your Chevy engine, it's very thin plastic! There is not much loading on the board and there are so many screws that lightly is more than tight enough.

There, Stan, is the tale of trouble found. I always like happy endings, hi. Thank you for putting out Proteus. I get a lot from what others contribute, as I'm sure you do too.

Sincerely,

H Leon Winter

H Leon Winter
Summer Institute of Linguistics
Nasuli, Malaybalay
Bukidnon, Philippines, 8201

LETTERS TO THE EDITOR:

...in Response to Bruce Diller's Keyboard Fix

Seasons Greetings to you and yours. I hope this letter finds you in good health, and ready to start the new year.

For Christmas, I bought my SOL a new printer that has true descenders, and full width paper capabilities. Since my job requires me to write reports and tabulate information, both these features are useful for me, while others might not find it so.

I have been meaning to write in response to some articles in your last issue. I have had 3 failures on my 16KRA board, and in each case I have been able to plug in a new IC and get it back on the line. One failure was in the refresh counter, one was with the Page Multiplexer, and one was one of the memory address drivers. Of the three, the last mentioned one was the hardest to fix, as the 75365 chip is as rare as hen's teeth. I was able to locate some for a $50 minimum order. I now have some of every chip on the board. As Joe says, eventually the delay line may go, and then it will be the end of it. My last memory acquisition was a Godbout "RAM XX" board populated to 24K. It is a static memory board, and it seems to me that it generates less heat than either of my 2 dynamic memory boards. In reponse to Bruce Diller and his keyboard fix, while his suggestion may work, it may also be weakening his circuitry. The original pads are backed with mylar, not aluminum foil, and it is non-conductive. On drawing X-25 of the Sol Manual, it indicates that the signals are capacitively coupled, (even your fingertip will make the circuit work) so by shorting the circuitry repeatedly, one may be encouraging component failure. I have been fighting key drop-out since day 1,and my latest experiment has been to loosen the screws that hold the keyboard to the keyboard printed circuit board. I stumbled on this by accident. After dismantling the keyboard for its annual cleaning, I had the usual problems getting all the keys to work. When I loosened the screws to shift alignment of the board, all the keys worked, so I simply tightened the screws enough to keep the big chunks of dirt out. Perhaps board distortion is the problem, and not dirt.

I anxiously await the next issue of PROTEUS NEWS, which I know will be out soon, as it is membership renewal time.

As always,

Jeff Tom

(Editor's note: The keyboard customizer kit in the new Proteus catalog includes extra foam contact pads from Keytronics, the keyboard maker. When your keys die, now you can fix them the right way. Personally, I never had one go bad, but if one did it would be costly to repair -- Keytronics has a $50 minimum order. That's why I include a few pads in the kit.)

...On McDPM, N*Disk, The Last Memory

Dear Stan:

I just received Vol. 4 #5/6 of PROTEUS NEWS with the renewal notice. A check to cover my subscription for 1982 is enclosed. The coming year would feel pretty empty without the regular delivery of the NEWS.

I have made some rather significant changes related to my SOL-20 this past year. I acquired and installed Micro Complex's Dual Personality Module. Not in its "standard" configuration, but with SOL's dedicated address space in the range E000 - EFFF. This required a rewrite of Micro Complex's SOLOS MONITOR and a revision of the wiring changes on the PCB. My reason for a departure from what might appear the idle was to avoid the exorbitant price North Star quoted for an alternate set of PROMS for my single density disk system. I was never happy with North Star's choice of the range E800 - EBFF for the single density disk controller. While the price was still the reasonable $25, I purchased a set of PROMS for the range FC00 - FFFF and used the range F000 - FBFF for an exceptional useful debugging routine (disassembler, single or multiple step tracer, string searcher, and program relocater) held on 2708 EPROMS. That left the range E000 - EFFF the next best choice for the new Personality Module.

I have also been one who has parted company with the rest of the North Star users by placing the disk operating system (DOS) on EPROMS in the address range beginning with D000. This required disassembling the standard DOS and BOOT and rewriting the entire system in assembly language compatible with the INTEL 8080. The pay-off was relocatability and the addition of exit commands to SOLOS, to the debugger, to NS BASIC's warm start (0004), and to CP/M. Oh yes, my version of DOS performs the unit disk management functions, namely, zeroing a specified disk drive, reading a specified sector from a specified drive and writing a specified sector from a specified drive, all of which makes for simplicity in the design of BIOS in my version of CP/M for the North Star disk system. Incidently, I do not intend to use the Micro Complex PM for switching SOLOS between the locations F000 and C000. I much prefer calling the "old" SOLOS into RAM at C000 from disk when I need to perform any operations with tape. In fact, I have removed the 2716 containing the old version from Micro's module to reduce unnecessary current drain from the PCB voltage regulator. A future project will be to extract the tape routines from old SOLOS and tuck them into some space I have available on EPROMS above D000.

The second rather extensive modification of the total system was the replacement of the LA-36 DEC printer-keyboard by the Microline 83A Printer. Since I have frequent occasions to let my SOL talk to an AMDAHL 470V/8 via a 300 baud modem, some fix was necessary in order to avoid taking the metal raps off of the SOL each time a change from 1200 baud to 300 baud was made. Of course, there was no good justification for replacing the LA-36 if the higher speed (120 cps) of the Microline printer was not readily available. The solution was to bring three leads out to a single-pole double-throw (center neutral) switch on the wall via three unused pins on jack J1 of the serial port. This joined my panel of switches for either routing the transmission of data to the AMDAHL or to the Microline printer. At the same time, software changes to NS BASIC and my assembler in order to take advantage of the top of form (TOP) function available on the Microline were suggested. Now the jump to the top of the next page after printing 62 lines is automatic.

My very next project will be to organize and install THE LAST MEMORY board which I have on order from Static Memory Systems in Freeport, Ill. This is the board that uses the new 2016 byte-wide 16K static RAM's which are replacable with 2716 EPROM's. The organization of the board will be as follows:

0000 - CFFF	RAM with 26 on-board 2016 memory chips
D000 - DFFF	ROM with 2 on-board 2716 EPROM's
E000 - EFFF	2 empty sockets. Space for SOLOS PM
F000 - FBFF	ROM with 2 on-board 2716 EPROM's (see note)
FC00 - FFFF	0 empty socket. Space for NS controller (see note)

Note: The last two address ranges are in conflict with the 2K boundaries between sockets. By design of the board, an empty socket occupies no address space. Actually there is no conflict with the address space covered because the FF HEX bytes read from the selected empty socket disable the read data buffer. Since the North Star controller requires only 1K, and I can find good use for the 3K from F000 to FBFF for debugging routines, I have proposed to Static Mememory Systems that I fill the 1K half (FC00-FFFF) of the last 2716 that conflicts with the controller with FF's. They agreed their "FFH detector" (a 74LS30 IC) would not discriminate between these FF's as apposed to those coming from an empty socket, would turn off the read data buffer and would therefore avoid any conflict with the overlapping disk controller. I believe that they were very pleased with the added flexibility which their board is found to have.

I was a little worried what my next project would be until the PROTEUS NEWS arrived. But now I can look forward to a 24X80 screen! Let us know all the details on your own experience in the next issue.

Thanks again for your thoughts and the news from others. If you feel that this rambling letter is of interest to others, don't hesitate to include it in the NEWS.

Regards,

P.O.Box 2240
Ann Arbor, MI 48106
January 22, 1982

Bob

Robert C. F. Bartels

Dear Stan:-

This is a postscript to my letter of Jan. 22, 1982. The Last Memory from Static Memory Systems arrived Feb. 9, 1982, has been installed in my SOL and works beautifully. The backplane board now contains only the North Star controller and the Last Memory. As explained in my last letter, the higher address half of a 2716 EPROM overlaps the address space into which the N* controller is mapped. There is, however, absolutely no conflict between these two since the half of the 2716 which maps into the address space common to both is filled with FFH bytes.

I repeat, the Last Memory performs exceptionally well and the power consumption has been reduced considerably. I have only one fault to find with the board. I am sure that my complaint would not be shared by many. I would have preferred that Static Memory Systems used "port addressing" for bank selection as does Godbout on the XIII memory board rather than their method of decoding the eight (8) IEEE-696.1 extended address lines on the S-100 bus. These lines were not defined when SOL was conceived. I have been using the port addressing to turn off the portion (16K) of my Godbout board which overlaps a SSM Microcomputer Products EPROM programmer. Thus, when burning an EPROM, I would plug the programmer board into the alternate S-100 socket on the top of the backplane and my burn program would send the disabling byte to memory via the 8080 OUT instruction prior to beginning the burn sequence. I can, of course, remove the Last Memory board and replace it with the old complement of RAM and ROM boards when the occasions arise to burn other EPROM's. But I am toying with the idea of using a VECTOR plug board to hold the bank select circuitry for disabling/enabling a segment of the Last Memory board via one of the unused extended memory lines on the S-100 bus. Don't yet know how to do it, but that's the fun of having a personnel computer not made untouchable by IBM.

CON'T ON PAGE 26

The plan mentioned in the last letter for extracting parts of the tape routines from SOLOS has been implemented. The commands SAVE, LOAD, YANK and CAT are now contained in a 4K utility subsystem that was described in the last letter as my "debugging routine" and which contained a disassembler and other useful programming tools. This subsystem resides on EPROM and is callable from the SOL Monitor with the command UT. When in the utility subsystem, the command

LOAD name (addr)

for getting a named file from tape and loading it as specified in the header or at the optional address (addr) is the same as with GET under SOLOS. The name LOAD for this command rather than GET was chosen to maintain consistency with the syntax used in my North Star BASIC where a file is pulled from the disk also with a LOAD. The utility subsystem command

YANK name (addr)

performs the same task as the LOAD with the exception that the tape CRC READ errors are ignored. Commands SAVE and CAT perform the same tasks as do those with the same names in SOLOS.

As one who prefers the use of disks and who uses tapes only infrequently, and then mostly for backing up the system programs, I have only one tape drive. Also, I have never used any tape speed other than 1200 baud. Hence my versions of the tape routines in the utility subsystem will operate only with tape drive #1 and at 1200 baud. The purpose of this was program space economy.

Again, if you think that the previous letter and its postscript are of interest to the members, include them -- or parts thereof -- in the NEWS.

Yours truly,

Bob

P.O.Box 2240
Ann Arbor, MI 48106

Robert C. F. Bartels

...Finding a Z80 Dissaassembler

It recently occured to me, that with the introduction of the Z80 upgrade for the SOL forthcoming from Micro Complex, there could be some possibility of converting Z80 programs available for other machines for use on the SOL/Z80, and for those like myself who are running Z80/System B or similar machines under CUTER. Graphics programs may be a problem for the SOL and VDM1 users, but could be used by those using video boards with graphics capability. (SOL users could forego the main video circuits and use an S100 graphics board such as the SSM VB1.)

I have for some time been trying to get the Sorcerer version of "Adventure" running on my system -- their cassette format is virtually identical to, and apparently copied from, CUTS. The only differences are the sixth character of the header (55h rather than 00), and the block length (one extraneous character extra at the end of a block, for CRC checks). My only troubles have been in (not) deciphering the direct video output routines. A good Z80 dissassembler would help, but I can't find one. Perhaps some liasion with the SORCERER users group could produce some results - such as a short interface routines to enable cross - loading of CUTS and Sorcerer tapes. We would benefit by access to their Z80 software and they could make use of the Proteus Cassette Library, particularly the Disk- tape programs. Hope these ideas don't sound too far-fetched! Oh, and don't forget all that TRS-80'system' software waiting to be converted!

15 D Twin Terrace,
Edmonton, Alberta,
CANADA, T6K 1V4
22 February 1982

Yours,

Alastair Preston

Alastair Preston

...Key Repeating and Underlining

Stan,

I have enclosed my subscription renewal form, along with a check in the amount of $24 to cover the cost. I really value this newsletter as I'm sure others do- and we all appreciate your effort in all the responsibilities associated with PROTEUS. If there is anything I can do to lighten the load, please let me know.

I appreciated all the good words and reviews regarding Bob Hoss's 80x24 screen mod. I haven't purchased it yet, but it probably is just a matter of time(and money). I also think the Z-80 mod would be a real asset for our SOL machines.

I am still using a single density N* disk controller, and will probably upgrade to Bob Hoss's new double density N* compatible controller board. However I would like to hear from other users who have purchased it, and find out how they like it.

A couple of months ago I implemented the 'key' repeat hardware mod(submitted by Jack Kinney, Vol. 4 no. 1), and it works great, it eliminates the need to hold down the repeat key - a nice little useful feature.

Another hardware mod I implemented was changing the solid cursor to an underline. I never did like that BIG white rectangular cursor, so I opted for the underline. This modification was written up in Dr. Dobbs Journal (March 81), specifically for the VDM board. I wrote the author regarding the mod for the SOL, and he sent me a detailed diagram - I will try to get his permission to pass it along to PROTEUS for other readers to try if they wish. It works well, however with some of PT's early game software that used the solid cursor you don't get the same affect. Although I haven't tried it - a switch could be installed to select either solid or underline cursor.

Another computer related goal this year will be to get CP/M up and running under N* DOS. I met another SOL owner in town the other night at a CP/M users group meeting and he has version 2.2 up. My reluctance so far has been the fact that I do not have a DD Dual disk system yet. I seems to me that CP/M needs a DD Dual disk system to be really effective.

Best Regards,

Rick

Rick Downs

RICHARD E. DOWNS JR.
P.O. BOX 440357 • AURORA, COLORADO 80044-0357

FOR SALE SOL 20 8K of static RAM. B&W Panasonic monitor available. SOLUS personality module. Call (415) 948-5832 evenings for more information. Richard F. Otte

---

ALS-8 assembly language development system in ROM for Sol--$75. Extremely fast 8080 assembler, editor, simulator on 8 K EPROM board by Processor Tech. Software documentation in Proteus's Encyclopedia Processor Technica volume 5.
HELIOS disk controller/formatter board set for sale -- $200. In excellent, error-free condition. This is a spare board set we no longer need. Use it as a back-up in case yours goes out or to swap-in as a diagnostic tool. Software and documentation available.
Contact Proteus, 1690 Woodside Road, #219, Redwood City, CA 94061, (415) 368-2300.

FOR SALE: North Star SA-400 Disk Drive (for SOL) including cabinet, power supply, S-100 controller board (SD) and cable. Also a 16KRa Memory board. $350.00 or best offer. Contact: Terry Walters, 441 Swallow Ct. Livermore, CA 94550 (415) 449-0536.

FOR SALE-
Sol 64K with 2 slot Helios and Panasonic monitor/TV. Software includes Word Wizzard, Mail Master, Fortran(which has been debuged and works!), Regular Basic, Basic org. at D000 and Test Programs on Disk and tape. Original Fortran, Basic and Sol System Manuals , PTDOS manual zeroxed. Condition excellent with hardware updates where indicated. This, as my other two Sols has been entirely trouble free. Reason for selling is simply that I have one Sol at work and two at home. $2700.00

Dick Black,
2721 St. Paul Street, Baltimore Md., 21218, 301-366-1075

FOR SALE-
Centronix model 700s, uppercase unidirectional parallel with 14" tractor. Clean, like new 450.00

Dick Black,
2721 St. Paul Street, Baltimore Md., 21218, 301-366-1075

As-is Sol-20, needs work, (no response when turned on), 2X16 KRA boards. Make offer.
Sanyo 9" video monitor, dual quad density Micropolis drives. Make offer.
Louis T. Jemas 1840 Church St. San Francisco, CA
(415) 772-4375 days, (415) 824-3229 eves.

FOR SALE

PT Sol, Helios II System with 9" Sanyo VM 4092 Monitor and Okidata 110 Printer. Printer is RS 232 with tractor.Has Sol Rev.D with 48K memory, PTDOS 1.5 (mod 2), Serial port driver for printer, Extended Disc basic and several games, etc. Excellent condition and full documentation.

H.W. Chamberlain, 1253 Hawthorne St. Alameda, CA 94501 (415) 521-0221

For Sale

Several Sols available at Comart Limited, Little End Road, Eaton Socon, St Neots, Huntingdon, Cambridgeshire PE19 3JG
Telephone 0480 215005 Telex 32514 Comart G.

FOR SALE
IBM model 2315 disc packs, fits several other drives. $110.00 each. Tape, 1/2 inch wide, on 10 inch reels, in boxes. $6.00 each.
Bob Schaeffer (907) 344-0082 6-11 PST
PO Box 4-1983, Anchorage, AK 99409

FOR SALE -- SOL 20 48K -- two North Star drives, Heathkit monitor. Lots of software including CP/M, CBASIC, ECB 'disc' basic, games, etc. $1200. Works fine. Upgrading to 8" system. Texas Instruments 743 printer/terminal $750. Gerry Fricke, 435 S. Charter, Monticello Il 61856. (217-762-7143).

WANTED
Documentation for a Wang model 701A printer.
Gary E. Lunsford Home (803) 766-0909
1888 Halo Lane Work (803) 554-5565 X 427
Charleston, SC 29407

WANTED
A program for SOL-20 (32K Memory-TapeCassette Storage) RTTY to run on 8080.
Fred Saluna WA6WQZ (415)228-2817 Home-leave message on recorder
(415)645-0088 Office-leave message

WANTED
PTC 3 P+S, working board. Urgent
Mark Berger
1305 Oxford St. Berkeley, CA 94709, (415)843-3214

WANT AD
I am looking for a cassette based version of SOL-FORTH for sale at a reasonable cost. I have purchased the Mitchell E Timin version of Forth, for running on a CP/M 2.2 system.

Mick Kerwick
17Chapel St,
Carrick-on-Suir
Co. Tipperary
IRELAND

Proteus needs a 4 KRA manual for Vol. 6 of the Encyclopedia Processor Technica. If you have one, please send it to us. We will make a copy and return it ASAP.

WANTED
Walnut sides for SOL-20 and power supply.
Bob Schaeffer (907) 344-0082 6-11 PST
PO Box 4-1983, Anchorage, AK 99509

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COMPLETE PROTEUS CATALOGUE IN CENTER SECTION

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And more, and more....

P R O T E U S / N E W S

A news journal for owners and users of Processor Technology Corporation computer equipment. Published by Proteus, 1690 Woodside Road, Suite 219, Redwood City, California 94061-3483,USA, telephone (415) 368-2300.

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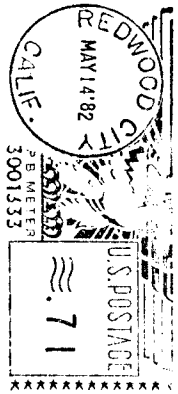
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