

## THE ADDRESS BUS

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## PORT TO PORTAL -- Editorial

I have a more than a couple of things I want to discuss with you as I present this issue for your inspection. The first and foremost of these is to apologize to you for the "messy" publishing schedule this year and to offer something by way of explanation. I owe you that. As you probably gleaned from my installments on software testing (the third of which is in this issue), I've been employed as a **mainframe computer software tester** since July of '89. My employer is (and was) one of the larger educational testing and service organizations. However, though working in an extremely challenging job, I **started** as a temporary. And the absence of a protective net if anything should go awry and the lower fixed wage usually paid to temporaries became something of a burden late last year. So I began hunting for a permanent position.

If you've done any job hunting recently, you know just how time-consuming and frustrating that can be. I'm inclined to think that **no** response to resumes and letters of application is worse than a prompt and outright rejection. I had a "fair" share of both! Fortunately, last spring my "temporary" employer decided to expand its permanent testing staff by six in my department. I gained one of those slots in mid-June.

Being once again permanently employed means, among other things, that I have more time to devote to this newsletter. My first requisite has been to catch up on the issue schedule. That's the reason for the double-issues you've seen of late. And because the end of the calendar year is fast approaching, I plan to put out just **one** more, to close out the year. With the **new** year, I fully expect to be back on track. I think both you and I will beat the drums for that!

Returning to the present, acquisitions in the software department have been few, so there is no Software List this issue. Absent, too, from this issue is the second installment in the hardware troubleshooting series. I'm writing that article myself, but haven't yet finished it. Among other things, the replacement of a furnace blower has gotten in the way; that article will appear next time. As it was, I ended up **cutting** some material I

wanted to run anyway!

Finally and most importantly, with the end of the calendar almost upon us, its time to renew. But because of the rising cost of production, I **also**, regrettably, have to announce a price increase! The new rate (U.S. and Canada) will be \$15 per year (overseas, please add \$4). **However**, that doesn't take effect until the first of Jan. If you get your check to me **before** New Years, the old, \$12, rate applies. I'll even accept two-year renewals at the old rate, **provided** they arrive before 1 Jan. So check your last issue number printed on the address label. If that equals "27", the **next** double-issue will be your last. Write that check now before you forget!

Kirk L. Thompson

## THE EIGHT-BIT R/W -- Letters

**Dual-Format HS.** [From Charles Horn, Horn Engineering Assoc., Garland, TX] "The HDOS-CP/M hard-sector dual-format disk that you requested is enclosed. Your request prompted me to dig out HDOS and finish the job. This disk is now fail-safe. The HDOS and CP/M partitions are both protected from over-running each other. Flags on the dummy HDOS files are set to SLW. The dummy CP/M files are hidden away on User 15 and set to R/O and SYS so as to be out of sight. The CP/M capacity is 45K. The DIRECT.SYS file has been reduced from 18 to 2 sectors, for a maximum of 22 HDOS file names and a file capacity of 182 sectors. The RGT.SYS file has been hidden in the unused second sector of the cluster that is occupied by GRT.SYS.

"This is a floppy disk. A duplicate master is on the back side. I advise that you DUP a working copy of this disk and put it away in a safe place. You and I may have the only copies in the world.

"I presume that this disk is compatible with HDOS 3. Since my HDOS system is highly customized and contains Super Sysmod, I have found no need to generate an HDOS 3 system. If you can, I advise that you test it.

"...If I can be of further help, please let me know." [Thanks, indeed, for putting the finishing touches on the dual-format disk, Charles. Readers will find it included in the next issue's "Software Listing" since there isn't one in this issue. And though formatted with old HDOS version 1.6, I checked and it's upward-compatible with 3.0x! -Ed.]

**Creating Dual-Format SS Diskettes.** [From William Lindley, LS Software, 8139 E. Mawson Rd., Mesa, AZ 85207, 602/380-9175] "Some Comments about dual-format diskettes:

"Our PC89LINK software is distributed on dual-format diskette, and is available on both hard and soft sector. To create a soft sector dual-format disk, just use SINGLE density--this makes a disk with the same characteristics as the normal hard sector disk--and follow the procedure you'd use on a hard sector disk.

"For my dual-format master disk, I created a CP/M file (with R/O and SYS attributes) which occupied the space used by HDOS. This prevented either operating system from writing over the

other's space.

"To do this, I formatted two disks under HDOS. Then I booted CP/M and used DFX (a sector-dump utility) to determine which was the first CP/M cluster containing an HDOS file (one of DIRECT.SYS, RGT.SYS, and GRT.SYS).

"The second file (call it HDOS.SYS), occupied the whole rest of the disk (the space reserved for all your HDOS files). I then deleted the first file.

"Then I used DFX to copy the CP/M directory from the first disk to the second. This second disk now contains a CP/M 'file' which is really the HDOS file space. MAKE A COPY ONTO YOUR 'FIRST' DISK RIGHT AWAY!

"Any way you look at it though, it's a bother. I made my master disk several years ago and proceeded (thankfully!) to forget the details.

"By the way, I'd like to recommend shareware disk #UX13.1 from Public Brand Software (1-800-426-DISK). This disk contains 22DISK and 22NICE, which let you read and write soft-sector H-89 CP/M disks, and run CP/M programs, on any PC! When I run Software Toolworks' C/80, it runs much faster on a 20MHz 386 with hard disk under 22NICE than it does on a [stock] 2MHz floppy-based H-89." [Thanks for your description of how you prepared your soft-sector dual-format disk, Bill. I didn't think it could be done! -Ed.]

**Auto-Rep.** [From Bernard L. Waltuck, West Palm Beach, FL] "I installed Lee Hart's 'Quickie Auto-Repeat Circuit' (Jan-Apr 1991, p. 12) in my antique (vintage 1978) H-19. It required one further modification. I had to cut the trace on the back side of the board that runs from the 'top' end of R413 (next to the keyboard encoder) to pin 1 of RP1 in order to completely isolate the RP network from the 12v power supply. Many thanks to you and Lee and the rest for not only keeping the H-19/89 alive but growing.

"Now if somebody could give me a speedup mod for my H-8 with a Z80 board, that would be great!" [You're quite welcome, Bernie. Are there any speedups available for the H-8, with or without the Z80 card? -Ed.]

**Uniform v. Media Master.** [From Peter Shkabara, Anapro Corp., P.O. Box 1987, Blythe, CA 92226, 612/922-3919] "I no longer have a hard disk (nor 80 track drive) on my H-89 and my 386 PC with 'UniForm' does not do a good job of recognizing the various Heath disk formats, and it does not at all recognize user areas! 'Media Master' (which I also have) does recognize more of the Heath formats and also user areas but it is ever so much harder to use. You might put into print my comments on Microsolutions' 'UniForm'. Their product is a very good design, but they do not respond to supporting the Heath formats very well. I sent them all sample disks and pertinent information over two years ago and still no response from them. They said that they would do it if I paid them several hundred dollars for custom work."

**Of WD-40 and Vegetable Oil.** [From Tom Stenzel, Detroit, MI] "...The last issue I received is 22/23. Please let me know if that is the last issue out. I'd hate to miss one.

"Also I have a few notes for your magazine. This letter is also on the disk (written with NewWord 2.17) with the **Staunch** label stuck to it, so you can pull any part of it you like without typing:

"Suggesting that WD-40 be used to rejuvenate printer ribbons shows that we've forgotten the warning in issue 3, that it damages the print head. I have found this to be true.

"Speaking of lubricating, I once mentioned the noise my Tandon 100-4's make when used, and our contract computer repairman (where I work) suggested vegetable oil for the slides! Incredibly, I tried it! Don't do it. It did make the drives quiet for awhile, but then they went dead silent, as the head was glued to the rails! Cleaning with alcohol fixed them, but it was aggravating.

"Also, the commutator in a Tandon's rotation motor (probably any brand of drive) can short out. This can load a power supply (H/Z-37 included) so that no drive will work, since all disks rotate when any one of them is accessed. The motor normally will run about 150 mA no load, and 250-300 mA pulling a disk. I saw a H-89 thrown out for this." [Thanks for your comments, Tom, particularly the warning about shorted motors. You might also tell your contract computer repairman that the only thing worth putting on disk drive head guide rails (in general), or that head-positioning worm gear in Siemens/Wangco drives in particular, is a lubricant containing Teflon. Example brands include DOW-200, BREAK-FREE, SP-60, or TRI-FLOW. Check the list of ingredients on any spray can carefully and use the stuff sparingly. A little goes a long way! You might check Dan Jerome's discussion of floppy drive maintenance in issue #10, too. -Ed.]

**Deadly Heat.** [From Tom Slavik, Waco, TX] "I would like to share an experience with your readers that I had recently. I replaced the chips on my H89A's TLB to the CMOS IC's referred to [in] the [letter] by Biff Bueffel in **Staunch** issue #21/22 [p. 6]. By the way the chip at U413 is 74LS32, not 74LS132. The TLB will not work with 74LS132 in that slot. Now on to my problem. My machine worked fine for about 10 to 15 minutes, then my video would begin to deteriorate to the point of being illegible. My text looked like the wall from The St.Valentines Day Massacre (full of holes). I opened the case looking for a possible bad connection or some source of the problem. After a few minutes I noticed the video improving. The machine would work fine with the case open.

That's when I realized what was the cause of the problem. Heat! Apparently the CMOS chips were not as heat tolerant as their predecessors. This is when I isolated the true source of the problem; my cooling fan! My cooling fan was pointed downward, supposedly keeping my transformer comfortable. The fan was blowing downward on my transformer. The air could not exit to the rear or right of the case (no vents) and in front sits the internal drive. The hot air off of the transformer was taking the path of least resistance exiting between the CPU and TLB boards. These boards generate enough heat without having heat from another source being dumped on them. Hot air naturally rises. This rising air finds the path of least resistance, which is the vents at the top rear of the case. Guess what's back there? You've got it! The cooling fan (I'm using the term loosely

now) is now sucking part of this hot air back into the machine completing the cycle. This setup was actually creating a heat buildup; something I never would have realized except for the CMOS chips' inability to operate in this environment. This is why it was taking 10 to 15 minutes for the problem to develop. I turned the fan over to blow out of the case and my problem is solved.

"As most of you know the bottom of the case of the '89 is vented. As the parts in your machine heat up the surrounding air, it begins to rise, creating a partial vacuum pulling up cooler air from under the machine. This hot air, seeking the path of least resistance, now finds the cooling fan which blows the hot air out into the room. After I turned the fan over, my working environment became noticeably warmer. The fan is now doing it's job, dissipating heat instead of concentrating it." [Keeping the inside of the '89 cool is **always** a debatable question, Tom. Lee Hart's (controversial) traversal of the issue in #16 (p. 5) is only one approach to solving the problem. My guess is that when you start loading down the '89 with add-ons, the one sure way to an **individual** solution is to experiment. In some instances, this may only require flipping the fan over to blow in the opposite direction as you discovered. In others, when a lot of boards have been added inside the cabinet (such as my own installation where I have two floppy interfaces, the stock serial interface, C.D.R.'s RAMdrive boards, and a wealth of cabling obstructing airflow), more radical measures may be in order, such as total replacement of the stock fan and surgery on the cabinet. The bottom line, as always, is to come up with something that works for **your** setup! -Ed.]

**Positive Feedback While Testing Drive Rotational Speed from the Monitor.** [From Hank Lotz, 2024 Sampson Street, Pittsburgh, PA 15221] "...[N]ice to see (right on page one [of issue #24]) that someone actually read and apparently liked my article [in #22/23]. I hope the 'subroutines' idea does catch on, as it was quite popular, and is something we can all use. It's also something that I thought might stir more participation in writing for **Staunch**.

"Staying with #24, I like your and Dan's article on troubleshooting. Also, its future installments sound very promising. Regarding the first full paragraph on p.9, where you say 'drive 0 (only!)' let me point you to the 'Buggin' HUG' letter in **REMark** of May 1983, p.9, from R. C. Perkins. (You may already be aware of this. [Actually not; see below! -Ed.]) This contains a routine I've used over the years and it works great! This lets you test drives 1 and 2 also! Be sure to read the third paragraph carefully, where **REMark's** editor gives the byte for the third drive (which would be 'drive 2').

"On the same (troubleshooting article) topic, I have seen various complaints about keyboard problems for years. I'm thinking mainly of key-bounce problems. After some 9 years of operation of my own H-89A, I do notice an increasing occurrence of this phenomenon, but it's still relatively infrequent that I see a character repeat. At least it's not bad enough to do anything about yet, except possibly for preventative maintenance purposes. I'm therefore

wondering if a lot of the people who experienced the problem failed to keep a dust cover on their machines? I've always kept mine covered; so maybe that's a factor in preventing the deterioration. That would stand to reason **if** the trouble is caused by dirt more than by, say, oxidation.

"The following paragraph is styled as though it were addressed to Lee [Hart], in case you want to publish it:

"Dear Lee, I think Clay Montgomery's portable H-89 idea is a very exciting one, especially as presented by you in #24, page 3. You wanted feedback; let me give it a try. For one thing, I definitely agree the screen must be 25x80. A lot of my suggestions are based on close agreement with the existing H-89 because I'd want to use the new machine almost interchangeably with the old. The CP/M part is, **for me**, a must, but could it also run HDOS so you'd have a better crack at getting enough takers? Would you have licensing problems, since we are only licensed to run our existing CP/M on only one machine (even if they **don't** sell it anymore!)? And please seize the 4MHz opportunity while you're at it, preventing all the upgrade kits right at the outset! I'd also have to be able to 'play' my existing H-17 floppies on the new model. A RAM drive I personally could live without on the portable. Don't chintz on the keyboard; we wouldn't want a cheesy one, but one with a nice feel and good response. Otherwise it can be 'el cheapo' except try to preserve as many of the existing features as feasible. Some kind of a compatible '25th line' is important for use with current utilities; but who cares, for example, about 'key click'? **Perhaps** the graphics could be left off, but map them into a bit-bucket so existing progs at least **don't crash** or print garbage. Do keep reverse video. And the keypad edit functions are important. Lee, maybe you ought to query us further on specifics...."

[Thanks for your remarks, Hank. In particular, thanks for the reference to R.C. Perkins' letter in **REMark** #40, which I managed to miss! For you other readers who aren't as eagle-eyed as Hank, I'll summarize. Testing the rotational speed of hard-sector drives two and three requires inputting a short program at the monitor prompt. This should work for **any** stock monitor, whether MTR-88, -89, or -90, and possibly for third-party chips. I'll give the required inputs in octal and split-octal since only MTR-90 will recognize hexadecimal. MTR-90 also normally comes up recognizing octal key-entry. You can check this by typing "R" at the monitor prompt. MTR-90 will display "Radix "; hitting <RETURN> will display the number base currently recognized. If you have MTR-88 or MTR-89, the terminal will beep at you if you try this, so no harm is done.

[To test the **second** drive, enter the following. What you enter is boldfaced and ignore the values given by the x's. Notice that a press of the **space-bar** separates the numbers entered into each address. A carriage return **terminates** entry.

H: Substitute **040100<RETURN>**  
040100 xxx **041<space-bar>**



```

040101 xxx 371<space-bar>
040102 xxx 006<space-bar>
040103 xxx 315<space-bar>
040104 xxx 100<space-bar>
040105 xxx 006<space-bar>
040106 xxx 076<space-bar>
040107 xxx 000<space-bar>
040110 xxx 062<space-bar>
040111 xxx 002<space-bar>
040112 xxx 040<space-bar>
040113 xxx 076<space-bar>
040114 xxx 024<space-bar>
040115 xxx 303<space-bar>
040116 xxx 255<space-bar>
040117 xxx 006<RETURN>

```

H: Program Counter 040100<RETURN>

H: Go <RETURN>

If you botch something during program entry, hit the DELETE key; this returns you to the monitor prompt. Now repeat the "Substitute" command and **only** press the space-bar to get you down to where you made your mistake. As you do this, notice that what you previously entered is still intact. **Before** you press that final carriage return, insert a disk into the drive. Once you've given the "Go" command, the drive's ready-light will light and the rotational speed for that drive will display.

[Let the test run for perhaps 15 seconds to allow the speed to settle down, record the speed if you like, then perform a hard-reset. Regrettably, doing this reset **removes** the program you just entered from memory, but there's no other way of terminating the test. So, to test the third drive, you'll have to **reenter** the program from scratch. When you do that, make one change. At address 040114, instead of 024, key **030**. Everything else will be the same, except for the drive. And there you have it. My thanks to Hank for mentioning this invaluable nugget of information. -Ed.]

**Other Troubleshooting Resources.** [From Safford K. Magee, Audubon, NJ] "...In your and Dan Jerome's article on '89 troubleshooting, you requested subscribers to let you know of any books, manuals, or software we have found especially helpful in troubleshooting the '89. I have two items that I think are really good for use in backing up the Heath manuals.

1. A book titled **Microcomputer Operation, Troubleshooting, and Repair** by Robert T. Paynter. Copyright 1986 by Prentice-Hall. Hardcover, 413 pages. Except for one chapter on 16-bit systems, all of the rest is basically 8-bit. Covers basic concepts through analyzing complete microcomputer systems, fault symptoms and fault analysis. A nice feature is that a high percentage of the circuits, schematics, and discussion is based on our Heath '89. Have forgotten the cost, but it is a good value.
2. A software program, "H-17 Disk Support System (H17DSS)" published by The Soft Firm / P.O. Box 1125 / Picayune, MS 39466 / 601-798-0740. For H/Z-89 or H-8 running CP/M. An elaborate set of software tools for diagnosing and recovering from

errors encountered with H-17 disk drives. I have found these programs easy to use, very comprehensive, and very effective. I paid \$65.00 in 1983 when I made my purchase. Have no knowledge of present condition...."

[Thanks for the input, Safford. I've **ordered** the Paynter book through a local bookstore. The expected cost is some \$46, higher than I anticipated, so I'll report to the readership on actual cost once I receive a copy. I've also written to and tried calling The Soft Firm, but my letter was returned and the phone has been disconnected. -Ed.]

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**Pete on CP/M**

By Peter Shkabara

[Concluded from the last issue. -Ed.]

**Question 4:** Using Super Zap, Hank could not duplicate the logical to physical sector mapping. What is wrong? Answer: Perhaps nothing. Let us discuss sector mapping three ways under CP/M. First, each disk has a physical sector that is written to it by the disk controller. The number of bytes for each sector is chosen by the programmer who designed the particular system but it is always a multiple of 128 bytes. Sector sizes of 128, 256, 512, 1024, 2048 and even 4096 bytes can be found. The large sectors are usually on hard disks. CP/M always deals with sectors of only 128 bytes each. So... the BIOS takes care of reading a physical sector and feeding it to CP/M 128 bytes at a time. So the **first step** is the physical to logical sector relationship.

Step two of disk sectoring has to do with computer speed. Physical sector numbering start with 1 (except Kaypro which starts with 0) and goes up to the maximum that will fit onto the disk (some constant value). If the sectors are numbered consecutively (1, 2, 3 etc), writing them or reading them back may be a problem. Remember that the disk is spinning. If the controller just got through writing (or reading) the first sector, it may not be able to prepare itself to write the second sector before that sector actually is present at the read/write head. If this happens, the controller will have to wait a complete revolution of the disk till sector two comes around again. No problem here except that things get really slow. A solution is to have sector interleave. That is, sector 1 comes first but sector 2 does not show up till the 3rd or even 4th physical sector position. This is the "skip count" for sectors. For an 8 sector format we might have a skip of 2 with a sequence of 1, 3, 5, 7, 2, 4, 6, 8 or better with a skip of 3 giving a sequence of 1, 4, 7, 2, 5, 8, 3, 6. The latter can be seen to be more even.

Step three comes from the way the disk is formatted. The sector number marks are written at the time the disk is formatted. The sector interleaving discussed in step two is done by the read/write software of CP/M. However, the format process also has a possibility of adding its own interleave. There is no need to include a sector skip during formatting since formats are written a track at a time and not sector by sector. Some programmers have nonetheless included sector skip at

format time. If formatting includes sector skip, then read/write would not need to have it also - but don't count on it always being that way!

Now back to the original question. The version of Super Zap that Hank was using reports sectors as CP/M logical (128 byte) ones but presented in the physical order that they are recorded. How is that for confusion?

**Question 5:** DDT lets you set a breakpoint at a given address. Can it be made to break for a given value in a register? Answer: Boy has it been a long time. I do not remember DDT allowing breakpoints! DSD (from Echelon) and SID (from DRI) do, but does DDT? Anyway, the desire to stop execution when a given register value is encountered is a reasonable request. It can be done, but I don't know how to do it with DDT. I have used emulators to do it, but can't think of any debugger that includes the feature. Anyone out there know of one?

**Question 6:** Because floppy disks sometimes get bad sectors, it would be nice to be able to reformat just a single track. Can you come up with a patch for FORMAT to do this? Answer: I could, but it would be too time consuming. Instead, I can modify my own AFORM program to include this feature. AFORM was released by me as shareware a little while ago. [Readers will find it listed in issue #20/21, p. 2. -Ed.] Very few responses so far. Seems that nobody out there is interested in it. I hate doing work which is not appreciated so no more on this line till I get some positive feedback. Since my work is now done on a 386 PC clone, I have little need for the routines I write in Z80 code. All of the Z80/-H-89 stuff I am doing for you, the **Staunch** readers. I enjoy doing it, but if you do not need it why should it be done?

**Question 7:** The DUP program which came with CP/M 2.2.04 works fine, but the version from 2.2.03 had some head loading problems. Do you know what was wrong, and how or if it was officially corrected? Answer: Sorry, I was not even aware of the problem. Note that there seem to have been several revision levels of both 2.2.03 and 2.2.04 CP/M packages. It is possible that some of them had DUP problems but I am not familiar with them. Also, head loading has to do with some control lines on the disk cable as well as jumpers on the drive itself. This, of course, implies that the brand of drive affects operation. All of this means that some people may have had problems and other did not.

**Question 8:** Can the write protect tab on a floppy disk be circumvented through software? Answer: No. The write protect sensor is part of the disk drive and prevents the drive, **not** the controller from writing to the disk. So it does not matter what the software tells the controller to do, the drive will not write if the sensor says that the disk is write protected. This is true for all disk types: 8", 5-1/4" and 3-1/2". The drive itself could be modified simply by jumpering the sensor into a write enable state. This would allow the drive to write to the disk regardless of the write protect status. I have done this on one of my own drives to allow writing to floppy disks which don't have a notch. Such disks

are used by some software companies for distribution of their programs.

**Question 9:** Why does DDT lower itself in the TPA (RAM area) when it is used in conjunction with KEYMAP? Answer: DDT loads itself into high TAP RAM area to allow room for the program being debugged. Actually, DDT first loads in at address 100 Hex just as any other CP/M program would. When it starts running, it reloads itself in high memory. It detects where high memory limit is by looking at a CP/M memory pointer. If KEYMAP (or other memory resident program) has been loaded first, the pointer would have been modified by KEYMAP to protect itself from other programs. KEYMAP wants other programs to think that TPA is smaller. DDT buys the false info and loads itself accordingly. This is a potential problem area for memory resident programs. If some program does not do the checking quite right, it is possible to cause a system crash.

That is all for now - hope to have another contribution without such a long delay. Be sure to give me feedback, or you will only get what I want to write, not necessarily what you want to read.

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### The Linkage Loader

(A column of reader-furnished routines)

**README.BAT for HDOS 3.0x.** [From Bob Phillips, Charlotte, MI] I included most of Bob's letter and the code he included in issue #24 (p. 1). But because of space limitations, I had to "axe" some of it since he included a "wealth" of material. However, I think HDOS 3.0x users will find of interest the batch file he included to allow me to read his letter excerpted there. After minor editing for column width, it ran:

```
cls
ec $ $ Kirk . . .
ec $ $ This batch file will display a letter to you
pause $s
cls
type %1staunch.let
cls
ec $ $ Thanks for taking time to read this letter..
ec $ $ This disk need $epNOT$eq be returned..
ec $ $ Bob Phillips.
```

At the beginning of the actual letter file, he also included the escape sequence:

```
<E>x1<E>Y8 <E>K<E>Y8DTouch <E>p<SCROLL><E>q
<E>H<E>E<E>[
```

Here and below, I'm using "<E>" to represent the ESCape character (ctrl-[). For those of you unfamiliar with the H/Z-19 terminal codes, the first line "enables" the terminal's 25th line (ESC x1), moves the cursor to that line (ESC Y8<space>), erases it (ESC K), positions the cursor at the 37th position along the line (ESC Y8D), and displays the phrase "Touch <SCROLL>" with the latter word in reverse video (ESC p, word or phrase, ESC q). The second line homes the cursor to the top leftmost

position on the screen (ESC H), clears the screen (ESC E), and enables "hold screen" mode (ESC []).

Then, to halt the display every screenful and again at the end of the letter, Bob, inserted

```
<E>H<E>E
```

into his text every 24 lines. This latter simply "homes" the cursor to the top left screen corner (ESC H) and clears the display (ESC E).

As a consequence, I could **page** through his letter with a press or two of that little-used "SCROLL" key at the bottom left on the keyboard. As I noted above, **very** nifty.

If you use this technique, the only addition I might suggest is either of two alternatives that accomplish the same thing, but in different ways. The first of these is: at the last occurrence in the text, include ESC \ (to **disable** hold screen mode) and ESC y1 (to disable the 25th line). The second alternative is: include ESC z alone. This latter escape sequence resets the terminal to its "power-up" configuration and will automatically disable hold screen mode and the 25th line, as well as clear the screen and home the cursor. If you don't do one or the other of these, some strange things (such as the computer **appearing** to lock up) can occur while using other software (such as a text editor) because hold screen mode is still set. I would also clear the 25th line simply as a part of my general clean-up at the end of the operation.

I should also add that these ESCape sequence do **not** require a batch file to operate. You get the same function if you merely **TYPE** the file to the terminal under either CP/M or HDOS. Simple ASCII editors, such as PIE or TXTPRO, permit you to embed the non-printing ESCape character (27 decimal) in files directly. More sophisticated editors, such as Magic Wand, require something like the latter's OUT command and a print run to format your text. But many thanks for your illuminating material, Bob.

=====

### This 'n' That

by Hank Lotz / 2024 Sampson St. / Pgh, PA 15221

**Update on KEYMAP for Magic Wand:** I have now implemented the subject idea, first suggested in **Staunch** #13, p.12. There, I advised using the f5 key as the KEYMAP FUNCTION SHIFT since f5 is seldom used by Wand's EDIT. Now I say use the ERASE key instead of f5, since Wand **never** uses the ERASE key! -- it just beeps if you hit it. But not if KEYMAP is installed with ERASE configured to be the FUNCTION SHIFT!

I'm still finding good things to put on the keys for EDIT. Many of them are command-screen instructions. For example, I have a file I edit from time to time where I always have to set up tabs in EDIT. The command I need is T14,18,28,0 so the first ten of these chars go onto a function key: "T14,18,28,.". KEYMAP's limit is ten chars to a key, so I don't have room for the "0 CR", but it's little trouble to type those last two manually.

Also, I do frequent saves during EDIT sessions, by hitting the X command. This creates a file named SAVE (the default name). After I've typed X, and

SAVE is on disk, I continue working for a while. When I feel it's time for another "spot save" I don't want to just hit X again because that would **overwrite** my last SAVE file. That's bad because I'm not covered if power fails **during** that write -- I'd lose my only copy. So, this time I type X=SAVE2. I alternate between X and X=SAVE2, and I Kill the older file once the newer is recorded. (The reason I Kill the older save file is so that if power fails I won't have two files to examine to see which is current. This came from **experience!**) Thus, two of my function keys are "X=SAVE2" and "KSAVE2". I could have added the RETURNS on those function keys too, but it's better to hit RETURN manually in cases like these.

Another useful thing I found stems from the fact that CTRL-X doesn't work in EDIT. To cancel a long command line or correct a typo in it, you sometimes have to backspace all the way to the prompt. So I put a string of 10 BACKSPACES on the WHITE function key. For cases when the 10 aren't enough I just summon them twice. Don't worry about transmitting too many; EDIT ignores the excess.

Incidentally, you may have observed you **cannot** just hit the backspace key to map a BACKSPACE into KEYMAP, because the cursor will just back up! In order to put a BACKSPACE on a KEYMAP key you have to remember that BACKSPACE is represented by CTRL-H, which in turn is represented by ^H in KEYMAP. And ^H is **two** chars, so you can squeeze only 5 BACKSPACES into KEYMAP's 10-byte fields on the CRT. The way around this is to **patch** ten 08 hex bytes into KEYMAP.COM, either with Super Zap (etc.), or using the DDT/SAVE method. This is true of any control char represented by two bytes, for example, ^Q for "cursor left" in Bill Derby's Command Line Editor (CLE).

**CLE Update Gets Installed:** I purchased Bill Derby's updated version of CLE (just mentioned above) in 1989, and didn't get it installed until late 1990. I had been content with the old version. But in reorganizing some software files, I was newly confronted with it and decided to try it out. I ended up permanently installing it!

I have a few comments on (and additions to) Bill Derby's recommendation for KEYMAP keys for CLE, see **Staunch** #18, p.7. Bill is right, KEYMAP is a real boon with CLE; so much so, in fact, that I'm tempted to invoke that trite old comparison to sliced bread!

On the page just cited, Bill uses a string of four ^Q's on the IL key. In a personal letter to me he mentioned using eight ^Q's, and I myself prefer ten of them to move the cursor further, faster. As noted in the foregoing item in this column, you must **patch** these into KEYMAP if you want more than 5. Bill alerted me to that in his letter.

In the whole collection of goodies in #18, p.7, and with all of CLE's features, you still never get to see a **list of command lines entered**. So I programmed a function key to **list** 5 commands at a time. Press the key again to list the next 5, and so on. With a list, you can spot a desired command quicker, and step to it comfortably. My "**list**" key uses 10 CTRL bytes, so you must patch it in, as we have said. It consists of five sets of the string ^E^R. In other words it looks like this:

```
^E^R^E^R^E^R^E^R^E^R
```

## VENDOR UPDATE

(Concluded from p. 12)

"We spent 12 thou at Osborne's liquidation auction in '82 or so and acquired most of their software stock. We still have inventory of most items, except dBASE II - which [has] only 6 left at \$195.00 each plus \$4.50 p & h (per order).

"These are full versions including manual (mostly) and are valid serial numbers useful in eventual upgrades to msdos versions. WordStar, dBASE II, Personal Pearl, executives' database manager, SuperCalc and Grammatic are directly upgradable to msdos versions for about 20 to 30% of their usual wholesale prices. Many are also usable in 'competitive upgrades' such as our SuperCalc version 1 plus \$80 to Borland for Quattro Pro, msdos.

"We also have SIG/M (tm ACGNJ, Inc.) and CP/M UG (tm) public domain libraries totalling about 800 5" disks. Complete libraries available, on hard disk or floppies, \$2500/set. Minimum order \$40.00 (plus our \$4.50 p/h), includes 3-disk index, variety disk of several programs and printout listing." [Software mentioned in the material Don Johnson sent and not included above specifically are WordStar 2.26, SpellGuard, MailMan, FORTH, the Microsoft BASIC interpreter, DRI's and Microsoft's BASIC compilers, WordPac, FORTRAN-80 compiler, SuperSort, DataStar, Personal Pearl, Real Estate Investor for SuperCalc, and Personal Datebook. -Ed]

**Poseidon Electronics.** [From Ralph S. Lees, Jr. / Poseidon Electronics / 103 Waverly Place / New York, NY 10011 / 212-777-9515] "Many thanks for the note and interest in our project, and GREAT to see that someone else is supporting the 8-bit computers.

"...I...enclose that Complete Catalog that has over 300 disks available, please note that the disks marked NOT AVAILABLE do exist and consist of such things as dBASE II, WordStar, SuperCalc 2, most of the languages, etc.

"Now to the question of formats, we are able to format for more than 140 types of CP/M among them to be more specific we have the ability to format for Heath Magnolia SS and DS--the following are the Zenith machines and their formats Z-37 SSSD, Z-90 SS, Z-89/90 DS, Z-100 SS and Z-100 DS... [These are all soft-sector. -Ed.]

"Again many thanks for the letter and copy of your publication and know that we are here to 'help' if need and we can." [This company is oriented toward the Commodore 64 and 128, as the early offerings in the hefty, photocopied material sent me demonstrates; only Commodore formats are listed. Poseidon's sources include SIG/M, FOG (First Osborne Group), (apparently) Commodore itself, the CKUG library (for Kaypro), and Herne Data Systems (for C-128 products). Very much a mixed bag, so if you order, do so carefully! The hardcopy catalog costs \$10; disk pricing is: 1st disk, \$16.00; 2nd, \$12.00; 3rd and subsequent, \$7.00. **All checks must be made payable to Ralph Lees**, otherwise they will be returned! You should also **already** have NULU and UNARC to recover many of the files from their respective libraries; these are **not** provided by Poseidon! -Ed.]

**Central Computer Products.** If you're still interested in acquiring the latest version of WordStar, this is now the cheapest source I know of. As I noted in issue #19, the price is \$150, but this is cheaper than any other distributor. Further, Central Computer's "CP/M Times" catalog contains a wide selection of mostly unavailable commercial software. Some titles, such as selections from Software Toolworks' old library, can also be obtained from other vendors, among them, Quikdata and TMSI. The public domain software listing I recall from prior catalogs is no longer there, however.

One thing I noticed in the most recent catalog I received is that Central Computer is beginning to **charge** for the catalog. Cost is \$3, but to offset that expense is a \$5 coupon for use against your next order. Coupons are also included if your order exceeds \$50. But as you browse through the catalog, carefully read the fine print and note the system symbol in the description. Some of the software is specifically for makes like Commodore, Kaypro, Macintosh, Osborne, and TRS-80. Be careful of any special printers supported by the item you're interested in, as well. There's also a small selection of PC hardware and software at the end of the catalog. For more information or to order the "CP/M Times" catalog, contact:

Richard Carmen, Customer Support / Central Computer Products / 330 Central Ave. / Fillmore, CA 93015 / 805-524-4189, (orders) 800-456-4123

**Small Computer Support.** Here's another vendor I've noted previously (#20/21, p. 14), though only parenthetically. Its "modus operandi" is similar to that of **Sound Potentials** above. That is, individual "titles" are listed separately in its \$2.00 catalog. But that's where the comparison ends. Here, you list the items you want, your computer model, and the desired format. Then you mail that list to Lee Bradley. He prepares a printed directory of the material and sends that to you along with an invoice. Once you return the invoice with payment, he prepares the disk(s) for you. Overall cost could well be **lower** than any of the p.d. software vendors discussed above since what he charges you depends **only** on the **number** of disks necessary for your custom package. That cost is **\$5 per disk**.

Lee also has a number of general packages. These cost \$15 each and include: games, word processing (including ZDE), an Epson-compatible-printer graphics package, "time manager" (with a CP/M rendition of Borland's SIDEKICK), a "small" C compiler/assembler/linker, a database package for mailing lists, a public-domain COBOL compiler, and a minimal (that is, single-screen) spreadsheet program written in Turbo Pascal. Lee is also a Z-System distributor, handling NZCOM, Z3PLUS, ZSDOS, BDS Z, and ZMAC.

Finally, Small Computer Support's catalog does **not** mention the disk formats it can handle. But since Lee is located near the "hotbed" of Z-System support there in Connecticut, I would guess that **both** hard- and soft-sector are available. Anyway, for further information write or call:

Lee Bradley / Small Computer Support / 24 E. Cedar St. / Newington, CT 06111 / voice: 203/666-3139, data: 203/666-1100



# Figures for "A Pro. Method for Software Testing, Pt. 3", p. 9.

Figure 1: Partial Preliminary Test Matrix for REALINT.

Tst #	Input (type REAL)	Exp. Output (type REAL)	Actual Result	Comments
1	999999999.9	1000000000.0		max. positive
2	999999999.5	1000000000.0		rnd up to max. pos.
23	. . 0.0	. . 0.0		function handles 0
45	-999999999.51	-1000000000.0		rnd dwn to min. neg.
46	-999999999.90	-1000000000.0		min. negative

Figure 2: Completed Test Matrix for REALINT.

Tst #	Input (type REAL)	Exp. Output (type REAL)	Actual Result	Comments
1	999999999.9	1000000000.0	1000000000.0	max. positive
2	999999999.5	1000000000.0	1000000000.0	rnd up to max. pos.
3	999999999.4	999999999.0	1000000000.0	rnd dwn frm max.pos.
4	888888888.5	888888889.0	888888888.0	8-digit rnd up
5	888888888.4	888888888.0	888888888.0	8-digit rnd dwn
6	7777777.5	7777778.0	7777777.0	7-digit rnd up
7	7777777.4	7777777.0	7777777.0	7-digit rnd dwn
8	666666.5	666667.0	666666.0	6-digit rnd up
9	666666.4	666666.0	666666.0	6-digit rnd dwn
10	55555.5	55556.0	55555.0	5-digit rnd up
11	55555.4	55555.0	55555.0	5-digit rnd dwn
12	32767.5	32768.0	32767.0	rnd up frm + max int.
13	32767.4	32767.0	32767.0	rnd dwn to + max int.
14	4444.5	4444.0	4445.0	4-digit rnd up
15	4444.4	4444.0	4444.0	4-digit rnd dwn
16	333.5	334.0	334.0	3-digit rnd up
17	333.4	333.0	333.0	3-digit rnd dwn
18	22.5	23.0	23.0	2-digit rnd up
19	22.4	22.0	22.0	2-digit rnd dwn
20	1.5	2.0	2.0	1-digit rnd up
21	1.4	1.0	1.0	1-digit rnd dwn
22	0.5	1.0	1.0	rnd up to 1
23	0.4	0.0	0.0	rnd dwn to 0
24	0.0	0.0	0.0	function handles 0
25	-0.50	0.0	0.0	rnd up to 0
26	-0.51	-1.0	0.0	rnd dwn to -1
27	-1.50	-1.0	-1.0	neg. 1-digit rnd up
28	-1.51	-2.0	-1.0	neg. 1-digit rnd dwn
29	-22.50	-22.0	-22.0	neg. 2-digit rnd up
30	-22.51	-23.0	-22.0	neg. 2-digit rnd dwn
31	-333.50	-333.0	-333.0	neg. 3-digit rnd up
32	-333.51	-334.0	-333.0	neg. 3-digit rnd dwn
33	-4444.50	-4444.0	-4444.0	neg. 4-digit rnd up
34	-4444.51	-4445.0	-4444.0	neg. 4-digit rnd dwn
35	-32768.50	-32768.0	-32767.0	rnd up to - max int.
36	-32768.51	-32769.0	-32768.0	rnd dwn frm - max int.
37	-55555.50	-55555.0	-55554.0	neg. 5-digit rnd up
38	-55555.51	-55556.0	-55555.0	neg. 5-digit rnd dwn
39	-666666.50	-666666.0	-666665.0	neg. 6-digit rnd up
40	-666666.51	-666667.0	-666666.0	neg. 6-digit rnd dwn
41	-7777777.50	-7777777.0	-7777776.0	neg. 7-digit rnd up
42	-7777777.51	-7777778.0	-7777777.0	neg. 7-digit rnd dwn
43	-88888888.50	-88888888.0	-88888887.0	neg. 8-digit rnd up
44	-88888888.51	-88888889.0	-88888888.0	neg. 8-digit rnd dwn
45	-999999999.50	-999999999.0	-999999999.0	rnd up frm min.neg.
46	-999999999.51	-1000000000.0	-1000000000.0	rnd dwn to min. neg.
47	-999999999.90	-1000000000.0	-1000000000.0	min. negative



(Patch in 12 hex for each "R, 05 hex for each "E.)

I did not arrive at this arbitrarily; I've found it to work best and be the most convenient of the variations I tried. (For one thing, "E"R is better than "R"E.) I sacrificed minor refinements (such as a leading or trailing "X, etc.) to get a five-long list. In practice there's no detrimental effect. The last item on the list will execute if RETURN is pressed, but this is not different from what you always get with CLE's "R. It isn't necessary to clear anything to list more lines; just strike the function key again. Or, to back up one line in the list, hit Bill's DOWNARROW key.

And about that DOWNARROW key -- in case you're curious, the \* in that DOWNARROW string (we're still on p.7 of #18, bottom col 1) could actually be any printable char, it could even be a space. It's just there to provide a warm body for the "U to "get to the left of," and thus make CLE produce the previously recalled line when the "R is hit. (If the cursor is at the right-hand end, "R steps the other way in the list.) Also, note "Q would work as well as "U in that string as it also moves left.

Finally, a word about the first item on Bill's list, the insert-mode toggle. He sets up the toggle key with "Q"Udelete. (As he notes, delete is 7FH and must be patched in.) I changed this string to "Q"Udelete"U on my keypad. Adding the final "U returns the cursor to the beginning of the line. Most of the times when I hit this "insert mode" toggle, I am not already at the beginning of the line, so when the toggle key moves the cursor to the start of the line, I know positively that key closure occurred -- it's nice to see something happen when you press the key! Also, it's better than the right-hand end of the line because at the left end the cursor is on a character. If I now wish to test for mode status (insert or overtype), I retype the same char the cursor is on. That way, if it inserts, it just duplicates that char, so I can recover by hitting delete w/o needing to move the cursor; and I know I'm in insert mode. If it overtypes, no harm is done and I know I'm in overtype mode. In either case, if it's not the mode I need, I just do another toggle, and don't need a second test. This takes twenty minutes to explain and 1 second to perform!

**Converting QUERY!3 Files to Text:** Because of the availability of Kirk's TXT2Q3 to go from text to DTB, it's now commonplace to also want to convert DTB to text for mass-editing, because you know TXT2Q3 will get it snugly back into DTB format so easily later.

Well, the usual way to generate that text file (from the QUERY DTB) is through QUERY's SEARCH module, simply because one of SEARCH's options does just that -- converts to text. But SEARCH doesn't put linefeeds into the text file -- just carriage returns. This is quickly remedied by throwing the file in and out of Magic Wand (be sure to use Wand's MBN command to inhibit TAB chars).

But using SEARCH's text output also has another drawback, a matter of format -- SEARCH writes only one field to a line. On a recent project, I was bugged by this limitation because I saw I could edit more swiftly if I could have several of the fields on the same line of text.

I don't know why I never thought of it before, but QUERY's CALC, too, writes DTB's to disk as text! And in any format you wish! So I let CALC make my text file for me, instead of SEARCH! Each record had 5 fields and I wanted the first 4 on line 1 and the fifth on line 2. I told CALC to use the \ character as a field separator because I knew \ did not appear anywhere in my DTB file. Then in my editor, after editing the text, I merely replaced all the \s with CR's. The fields were then all one-per-line, the way TXT2Q3 likes them, and I went back into DTB form with no problem!

One caution: You can get mighty fancy with CALC, but for this purpose you've got to be careful to output all the fields, and in their same sequence as in the DTB, so that TXT2Q3 will put them back in the right sequence.

Remember, this new idea was for ease of text-editing. However, it does bring up other new ideas: What if you want to change the sequence of fields? Then with care and within limits the CALC/TXT2Q3 combo can be a very nice alternative to REDESIGN! And another thing I realized after doing this article is there's no way in REDESIGN to combine several existing fields into one! But if you use CALC first to convert to text as we discussed, you can not only combine fields, but in any order you wish. You can then make a more flexibly "redesigned" DTB by converting back that new text with TXT2Q3. I came upon this because I just had a need for it. It works, and I don't know a better way to do it.

=====

#### CONTACTS

(A Wanted/For Sale/Wanted Column)

**Tom Stenzel** (5868 Minock, Detroit, MI 48228) "One MPI-99-G printer, with working electronics, and a shot print head. Can be used for parts. First postcard sent to me gets it. I would like to be reimbursed for the UPS cost."

**Tom Slavik** (5205 Links Drive, Waco, TX 76708) Tom called me late last month and over the phone gave me a list of software he want's to sell. This material includes: on hard-sector - BIOS-80 (\$12), Jupiter dbms (\$12), HUG KEYMAP (\$5), Magic Wand (\$2), HUG CheapCalc (\$4), Setup disk for CP/M 2.2.04 (\$3), and 30 to 40 name-brand hard-sector disks (50 cents each); on soft-sector - WordStar 2.26 (no manual) plus Mailmerge (w/ manual) (\$10) and CP/Emulator (no manual) to run CP/M on IBM PC's.

**Darwin K. Newcom** (3709 Camino Capistrano NE, Albuquerque, NM 87111) "I am out of the H-89 world. My computer had hardware problems and when no one wanted it for free here in Albuquerque, I threw it away. However, I kept all the manuals and software because originally I thought I might try to run the CP/M stuff using my son's 386 machine and an emulator. But I gave up that thought when I realized that most of the software is on hard-sector disks."

"Enclosed is a list of the software, manuals, and books that are available to anyone for the shipping costs. The printed material weights about 100 pounds. The disks probably add up to about two pounds including the cases."

"I will throw away anything that isn't spoken for by January 1992." [The inventory Darwin sent me included back issues of **REMark**, **BUSS**, **H-SCOOP**, and **Staunch**. Individual books covered CP/M, BASIC, and Turbo Pascal. The manuals were for HDOS, CP/M, BASIC-80, the BASIC compiler, and M-80. Software includes: HUG's CheapCalc and two disks of utilities; the HDOS 2.0, CP/M 2.2.03, and CP/M 2.2.04 distribution disk sets; Microsoft's M-80 and BASIC-80 for CP/M; Borland's Turbo Pascal 3.00A with Turbo Database Toolbox 1.2; JRT Pascal 2.1; TMSI's Write-Hand-Man; Software Toolworks' PIE editor and UVMAC Z80 macro assembler for CP/M; Creative Engineering's CUBE SOLVER 1.0; Anapro's 4MHz speedup software for CP/M; and Quikdata's 400K DK17V4 for HDOS, HW-8-37 H-17 Diagnostics, BIOS-80 V5, and HS-102 Utilities (the last three for CP/M). The HUG material is on soft-sector; the remainder is on hard-. -Ed.]

**Lee Groff, WWSB** (P.O. Box 460, Brookshire, TX 77423, 713/934-4659) "Kirk: I accept (and appreciate!) your kind offer [to run an ad] - enclosed is my [emended] ad from **Nuts & Volts**..."

Heathkit H89 computer, MPI 99-G printer, complete with HDOS, Microsoft, WordStar, X-Y plot programs (3), basic tutorial (4), lots of games, MathPak, MailMerge, etc. \$50.00 FOB.

**Mark L. Ebel** (Union Electronics, 700 S. Dubuque St, Iowa City, IA 52240, 319/338-6165) For sale: a Televideo Portable PC model TPC-II, with 7" green inboard monitor, XT keyboard, 2 DD/DS XT floppy drives, and 250K RAM, upgradable to 640K. Comes with MSDOS 3.2 and some software. \$350.

**Tim Zmudzinski** (P.O. Box 73, South Bend, IN 46624, 219/288-2003) "...I'm ... interested in any WordStar 4.0 patches, etc., you may have...."

**Bob Groh** (420 Sunview Circle, Blue Springs, MO 64014, 816/228-6402 most evenings after 8 PM CST or Saturdays) "Just a quick line to tell you that I have already gotten rid of my H-47s - therefore re. my request to run an ad for them - please don't!..."

"Well, I do still have some stuff to sell so maybe you could put the following ad or a reasonably close approximation in the next available issue -

**For Sale or Trade.** Longtime Heath user is cleaning house of surplus computer gear and has the following looking for new homes - make me an offer that'll cover UPS and leave me something left over or maybe you have something you would like to trade (computer stuff such as Z-100 or S-100, model airplane, model railroad or ham radio gear?) -

- o ANGEL Intelligent Printer Buffer for sale. 64K buffer plus converts serial to parallel or parallel to serial or serial to serial. Includes cables to go from serial output on computer to parallel printer. Virtually brand new.

- o Older H-89 with H-77 with 2 hard-sector drives - old reliable! Full 64K memory, 3 serial ports plus a catch-all of software, manuals, etc.

- o Somewhat newer H-89 with H-17 and H-37 cards but no drives. Works well **except** H-37 develops

sector errors when it get hot. Has PS: mods, 64K memory, 3 serial ports, etc. Will also box up a mystery box of software, manuals, etc. to go along with it.

- o H-25 printer and stand with several ribbons and manual. Works great but is being replaced by a new printer and I need the room...."

**E.F. Van Nostrand** (2415 Perry Avenue, Edgewood, MD 21040, 301/679-4148 eves) "For Sale - H-89, 64k @ 4MHz; excellent condition; soft-sector, running CP/M 2.2.04; SSD int. drive, DSD ext. drive, plus software & documentation, including WordStar, SuperCalc, utilities, & lots more. Whole package for \$100 (negotiable). Also, Serial/Parallel printer buffer, \$25.00. Send SASE for software list or call Frank...."

**Rod Schmidt** (436 5th St. E., Halstad, MN 56548, 218/456-2635 between 6:30 and 10 PM CDT) "Please remove my name from your list of possible subscribers to **The Staunch 8/89'er** since I finally gave up and joined the ranks of the IBM compatible owners. I enjoyed the issues of **The Staunch 8/89'er** received during my subscription period, but there is no chance of my requesting a subscription renewal.

"My H-89 HEATHKIT received little use, and I don't know what to do with it now that it has been replaced. If you or any of your friends or any of your subscribers are interested in it, please let me know. Of course I would like to get something for it, but I realize that it doesn't command much anymore, so I would be willing to part with it simply for the cost of shipping. For now, the unit is simply taking up space, and I would rather it be used by someone, even if only for spare parts.

"If there is anyone interested in this unit, please have them contact me by letter or call...."

**William H. Allen** (P.O. Box 390879, Anza, CA 92539-0879) "...Unfortunately, I have had to give up on my '89, it just couldn't handle all of the things I needed to do.

"I still have it and would be happy to see that it goes to a deserving home. If you know of anyone who would like to have it, give them my name. It is an '89A with C.D.R. RAM. I also have several programs e.g. SuperCalc, Datastar, CP/M, ... HDOS vols. I & II, and WordStar. I also have two external hard sector drives hooked to it. If some tax deductible person or group wants it they can have it for free, otherwise I would part with it all for \$20 plus shipping costs.

"I was sorry to have to give up on the old machine, but I just didn't have the time to keep trying to upgrade for every new job I had to do.

"...I do wish you the best of luck with keeping a very worthwhile newsletter going. I got a lot out of the issues I got."

**The Staunch 8/89'er** (P.O. Box 548, West Branch, IA 52358, 319/643-7136 eves and weekends) I'm looking for someone with WordStar vers. 3.0 and 3.3 to volunteer to test some patches I recently received. These are undocumented, so I would like to find out exactly what they do and how well they work before I include them in **Staunch's** catalog. I'll

send enough information to get you started and you may keep the patches when finished. They require DDT and SUBMIT to execute.

=====

**A Professional Method for Program Testing:**  
Part 3 -- Numeric, Single-Input-Parameter Routines  
and Introducing the Matrix as a Planning Tool  
By Kirk L. Thompson

In the last installment of this series (issue #20/21), I discussed some of the theoretical and practical background you will need when designing tests for modules in your programs. Be sure you have read that before you proceed with this installment. Also be sure you have keyed in the REALINT function given there, an equivalent function in the high-level language you normally use, or have played with the built-in "integer" function of that language. Here we (finally!) begin designing and entering actual tests for a function. But first I want to briefly discuss two other topics.

**Test References.** There are a large number of books and articles available on software testing. The one I recommend below has over 250 references in its own bibliography. Unfortunately, none of these are specifically for the hobbyist programmer. The best of these books also **presupposes** some knowledge of testing!

But if you're interested in more background than I can delve into here, arguably the best available book on the subject, and the one I recommend, is: **The Complete Guide to Software Testing** (1988 [2nd ed.]) by Bill Hetzel. It's only available from the publisher, QED Information Sciences / P.O. Box 181 / Wellesley, MA 02181 / 617-237-5656. The cost is \$39.95 plus \$3 shipping. Be warned, however, that this book is intended for mainframe and large software publishers. One of the things it discusses at some length is management of large programming projects. However, it covers much of the theory of testing and describes some of the testing utilities available for larger systems. Hence, it supplements my discussion of the **practice** of testing. If you're professionally involved with programming, this book is a must.

You might also check some of the programming books you have, or ones at the bookstore or public library. Often these include sections on testing. However, like Hetzel's, they usually deal only with generalities, not the nitty-gritty, the what and how-to, I'll be covering in this series.

**Applicability.** Moreover, another thing I had better mention before I go any further into this series--indeed, I should really have discussed it earlier!--is that this professional testing method is most applicable to large programs. Those small ones you complete in only an evening or weekend will usually be so limited in scope that you can test all features "off the cuff." I've done that myself with short utility programs. Larger projects, however, are where the more organized and "professional" approach described here will aid in ensuring that your programs function as intended. Further, once you've built a library of tested routines, even your

quick-and-dirties will be quicker to write and cleaner to test because you've already done much of the spade-work.

**A Test Matrix for REALINT.** Probably the easiest way to lay out the tests you anticipate using on a module is to construct a table of the numbers you expect to input and the output you anticipate. You should also include a column for the actual output you get and another describing what you're testing. In testing circles, this table is called a "matrix;" you may be familiar with the term from mathematics where it's used to describe two-or-more-dimensional arrays. For real-number-to-integer conversion functions, such as Turbo's or other languages' INT, or the REALINT function given last time, the test matrix could look like Figures 1 and 2 on this issue's insert. Of course, the contents of a particular matrix will depend on the inputs, outputs, and function of the routine being tested. We'll see a number of them as this series progresses because they are an essential tool in organizing the testing process.

Figure 1 shows part of the matrix for REALINT and illustrates the matrix layout for the tests I anticipate doing, their inputs, and their expected outputs. The actual results aren't given there because this preliminary matrix is my test **planning** document. The second matrix is given in full in Figure 2 and includes the actual output I saw when testing REALINT with TBENCH under Turbo Pascal. (I might note that the output from Lucidata will be somewhat different; the two compilers handle numbers differently--Turbo is rather cleaner.)

Now, what are the tests I use and **why** am I using them? You should already be familiar with some of those in Figure 2. These are the "extremes" (tests 1, 23, and 46) and the "close-calls" around +32767 (tests 12 and 13), zero (tests 21 and 22, 24 and 25), and -32768 (tests 34 and 35) I recommended last time. I've added all the others because, unlike built-in functions, the source for REALINT is open to my observation. That is, REALINT is a "white box" as I described last time. And one of the things I noticed in the code is:

```
WHILE NUM >= 1 BEGIN
  NUM := NUM / 10;
  EXP := EXP + 1;
  PLACES := PLACES + 1
END;
```

Here, the function is successively dividing the input number by 10 until it's less than 1. Later, the input is **rebuilt** by the reverse process. So I want to test **every** power of 10 between the extremes. This is to ensure that the decomposition and reconstruction of the input occurs correctly. The strings of the same digits you see in many of the tests, such as the 8's in tests 4, 5, 42, and 43, are merely a convenient means for me to keep tabs on the **number** of significant digits in each input number.

By coincidence, this also provides the chance to test all digits (0 through 9) as inputs to be sure the routine will spit back what it received. In most of the test cases you prepare for your own numeric routines, you **won't** have to do that. Most numeric



routines don't disassemble an input number, then reassemble it as this one does. Hence, you can usually get by with the "basic four" I described in the last installment (extremes, mid-ranges, boundaries, and close-calls).

Next, compare the expected output with the actual for each test. Here is where reality meets the cheese grater! The first thing to observe is that, in general, the output matches my expectations. The digits to the left of the decimal point are generally the same in both columns. However, this routine is supposed to **round** the input. So double-check those digits immediately to the left of the decimal points. As you can see, for positive numbers, I expect inputs with .5 to round **up** to the next higher whole number and inputs with .4 to round **down** to the preceding whole number. This works as expected in tests 1, 2 and 15 through 22, but fails miserably for all the rest!

For negative numbers, inputs with .5 are supposed to round **up** to the next larger whole number and those with .51 are to round **down** to the lower whole number. The "round ups" work in tests 24, 26, 28, 30, 32, and 44; the "round downs" **only** in the last two tests on the matrix! This function definitely has problems!

Parenthetically, I might observe that one thing that will help the negatives is to edit the main section of the function (near the end; see issue #20/21, p. 10) to read:

```
BEGIN {realint}
  IF NUM > 0 THEN REALINT := REALTRUNC (X + 0.5)
  ELSE REALINT := REALTRUNC (X - 0.5)
END; {realint}
```

And that's the only "fix" I'll suggest for this routine. Still in all, this series is concentrating on the **testing** aspects of software development, not the repair of faulty functions!

**The Matrix as Documentation.** Further, I have yet another recommendation. Even after you've tested and achieved your expectations from a routine and its matrix, **don't** throw the latter away! That matrix is as important a piece of documentation as your source code and any notes you might have used as you developed your routine. Heed the advice that Pete Shkabara, in the very first installment in his series on CP/M in issue #16 (p. 9), gave about the importance of saving development notes for future reference. There may come a time when you want to modify a routine to do something slightly different. That test matrix will help demonstrate what the routine was originally designed to do. It will probably also help you design tests for the modified routine.

Rolling over previously-written code and tests is a time-honored tradition in large software houses. It's one of the concepts behind "structured programming." Time and money are saved if a programmer can use a library routine that's already known to function properly or can easily modify one to do something else. You might as well take advantage of the concept, too. And a roll-over is much easier if documentation from the prior development effort is available. So file the test matrix along with your

development notes and that hardcopy of the source code.

**Assignment.** What you need now is experience in using this professional test method. Probably the easiest way to gain it is to methodically test the **built-in** numeric functions provided by your favorite high-level language, whatever it might be. Read the description of each in the language's manual. Now prepare a test matrix based on that description and what we've covered thus far. As I mentioned above, in most cases you won't need any other tests than the basic four. Then make any simple modifications you need to TBENCH to call each of them and have at it. For purposes of output review, you may find it easier to dump the inputs and results to your printer, but that isn't really necessary at this stage. The inputs you'll be using and outputs you'll be seeing can be easily handled on the computer screen.

When you get to the mathematical functions (such as square root, exponent, and trigonometric functions), you'll undoubtedly find it easier to use a hand-held calculator to determine the results you expect. But don't be surprised if there are differences to the right of the decimal point between what a calculator tells you the answer should be and what the computer gives. If you were to repeat identical tests with the **same** function but in another language, you'll undoubtedly see slightly different output, too. As an example of this, Turbo gives 66.667033 as the square root of 4444.5. The MBASIC interpreter for CP/M will **only** produce a single-precision result, 66.6671, even if the input is double-precision, when "asked" to display the function's output directly with PRINT SQR(4444.5#). If the result of the computation is placed in a double-precision variable and that variable displayed, for example,

```
NUM#=4444.5: SQNUM#=SQR(NUM#): PRINT SQNUM#
```

the result is 66.66708374023438. My programmer's calculator, a Casio CM-100 and limited to 10 digits, gives 66.66708333 for this same input and function. Differences to the extreme right of the decimal point are to be expected and are a matter of **both** the inherent limitations in computing equipment (as I discussed at greater depth in the previous installment) and the philosophy of the group that developed the particular language. In most circumstances, these shouldn't be a problem. The exceptions will be those instances where you want to "maximize" the precision of your result. And, as the example above demonstrates, I wouldn't trust the MBASIC interpreter's result for many mathematical functions much beyond the single-precision answer it "prefers" giving for many of them. If you absolutely **need** math precision, MBASIC is not the language to use!

In any case, check out the built-in mathematical functions of the languages you prefer. This will provide you with much-needed experience and will probably reveal some quirkiness as mentioned above. The latter is to the good; you should know them **before** you use these functions. You don't want to mistake foibles in the language for bugs in your own code!



Next time, I'll turn to another type of "numeric, single-input-parameter" function, the look-up table. This type of function is often used to calculate percentages of an input where the percentage rate changes over the input range of the function. Examples are the tables used to calculate income and social security taxes. Because the rate changes, additional tests beyond those we've already covered are necessary. But if you have questions about any of the material I've covered thus far, be sure to write.

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#### VENDOR UPDATE

**Micronics Technology.** [From Darrell C. Pelan / Micronics Technology / Suite 159, 54 Dalriada Road / Montgomery, AL 36109 / voice: 205/244-1597, BBS: 205/244-0192] "First, please let me apologize for taking so long to answer your three letters. I was 'offered' a new job last April that entails working 65+ hours a week, leaving little time for anything else. Thanks for writing ... I sell the ZGPR-based NZ.COM from Plu\*Perfect and ZSDOS. The major problem in creating a public domain CP/M was Heath releasing their own BIOS code and FORMAT program. We could have gotten around the SYSGEN and MOVCPM programs without a lot of problem.

"I'm still working on an HDOS version of the WIN89 and the next version of MT Modem. I'll keep you posted of any new developments. I will consider doing an article on troubleshooting the H-88 [hard-sector] controller and will get you a definite answer in the next couple of weeks. I have done some work/troubleshooting it in the past. I just repaired an '89 that would come [up] with the boot prompt, but the keyboard was dead. It was an H-88 that I had previously added the grounding straps from the '89 model to, but I still checked the usual burned-out keyboard decoder and bad keyboard cable. It turned out to be the -12 volt regulator on the Terminal Logic Board. After replacing that, everything worked fine. [Knowing this] might save someone else from taking the front of their '89 apart when the problem is really elsewhere.

"Thanks for your hard work keeping the '89 community informed. My BBS is on Fidonet, node 1:375/17, and I would be curious how many 8-bit types know about the national Heath Echo available on BBS's like mine across the country. I, like many, limit my CompuServe time due to the \$12.50 per hour charge. Fidonet is free (the cost paid by Sysops like myself) or at worse a long-distance phone call. Even so, a long distance call is cheaper than CompuServe. I haven't seen many 8-bit messages in the Heath Echo and would like to encourage 8-bit computer owners to use this valuable resource to stay in touch. I guess I'll get off the soapbox now and mail this."

**Sound Potentials.** Here's a vendor I spotted while browsing through the pages of **The Z-Letter** last spring. Like many others, it provides public domain software titles. However, one thing sets it apart from other such distributors. Instead of providing software based on the disk in some library (such as SIG/M's), it has broken out specific related items

and these are available on an individual basis. So if you're only interested in something specific on one of those other distributor's disk, you **don't** have to fuss with material you don't need. You can pick and choose exactly what you want from Sound Potentials and combine individual items on the soft-sector format of your choice.

A number of collections are also available. One of these is a sampler (including a number of generic utilities, plus VDE ver. 2.66) occupying almost 300K in the **compressed** file-format Sound Potentials uses. Other collections are for the Kaypro, a second set of utilities, COM games, dBASE II programs, WordStar utilities, text formatters, assembly language utilities, library programs, and six collections of games for MBASIC. All of these collections go for \$10 a disk plus shipping. Executable utilities are provided to view the directories of, and extract the files from, the on-disk libraries.

On the other hand, the individual software titles number well over 700 and range in price from 20 cents to almost \$12.50. Cost depends on the size of the item and the latter ranges from 4K to 246K. Shipping is \$4 per order. Sound Potentials supports over 180 formats, **all** soft-sector. The outfit runs MULTICOPY and UNIFORM on a Kaypro 4, so is limited to 48-tpi, single- and double-sided and 96-tpi, double-sided H/Z or 48-tpi, single- and double-sided Magnolia CP/M formats. If you absolutely need hard-sector, I would be happy to provide media conversion for you.

For more information or a hardcopy catalog (costing \$2) write to:

Richard E. Brewster / Sound Potentials / P.O. Box 46 / Brackney, PA 18812

**Third-Party MicroPro Support.** I reported in #22/23 (p. 11) that Elliam Associates appeared to be the only source for the new WordStar. As usual, I misspoke! I just received literature from a company in New York State that handles mostly older MicroPro products for both CP/M and PC machines. Included are InfoStar 1.54, SuperSort 1.6, and WordStar 4.0 for our equipment. Prices seem a bit steep to me--for example, the last goes for \$180--but are close to those I've seen elsewhere (but see below); the upgrades, if you already have an earlier version of a product, are cheaper (by about a third) than buying it brand-new. Of particular interest if you already have WordStar 3.3 or 3.31 is a MailMerge/-spelling checker package for \$48. For further information, contact:

Uta Milewski, Manager / Trio Company / 3290 Genesee / Cheektowaga, NY 14225 / 716-892-9630

**P.D. Software Copying.** [From Don Johnson / The Public Domain Software Copying Company / 33 Gold St, Suite L-3 / New York, NY 10038 / 212-732-2565, 800-221-7372, FAX 202 732 2497] "Thanks for your letter of interest. Our versions of CP/M software are from Osborne, and are not specific to Commodore 128 nor any other. They run ok on most machines, because Osborne used an ADM3 or Televideo standard terminal emulation. The only problem machine is Kaypro 2X, which cannot run SuperCalc nor BASCOM. In

nearly ten years of distributing these programs, that is the only problem machine we've found.

"We've sold many to Heath/Zenith Owners, including hard sector format. If your Users are able to use hard or soft, we however recommend the soft sector format for orders from us. It's easier to make. We support all 5.25" and most 3.5" CP/M formats, also offer a data conversion service to other machines.

(Concluded on the insert)

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#### MISCELLANY

**No P.D. CP/M!** In issue #17, I discussed the possibility of Heath releasing its proprietary materials for CP/M-80. You may recall that Darrell Pelan of Micronics Technology prompted me to explore this. Although the original response from Heath pres. William Johnson indicated that he would contact me when a decision was made, I'd heard **nothing** in over a year. So when my schedule eased after mailing issue #22/23, I wrote to find out what was going on. Shortly thereafter, I received a letter from Heath vice-president Charles Gilmore. The bulk of his reply is presented below; I'll make a few remarks after it to wrap up the question.

Mr. Gilmore wrote: "As you quite correctly pointed out in your letter, there have been some substantial changes here at Heath. Two of the big changes are: First, Heath is now focusing its efforts on two market areas--Home Automation and Education, and Second, HUG (now ZUG) has been transferred to Zenith Data Systems. All this to say, Heath's focus on computers is diminishing and HUG is now the Zenith Data System's User's Group, and is focusing on the support of Zenith Data Systems product.

"These things have effected our ability to support older product and discontinued packages such as CP/M. After investigating the potential release of CP/M for the Heath machines, it appears we have two problems which prevent our doing so. First, as you suspected, we have licensing problems with DRI. CP/M, even in its modified form [specific to the H-8 and H/Z-89] is not/was not a Heath product, but rather a modified DRI product which was licensed to Heath for specific use in specific situations. Amendments of this license would be required to release CP/M as you suggest, and this represents a time consuming, costly effort in support of a now obsolete product. Second, we are no longer in possession of the exact release level sources which would be required to issue the product. The sources in our files have potential modifications which

would have to be thoroughly investigated before any such release could be undertaken. This also represents a time consuming and costly effort to support a discontinued product.

"In short, we cannot find a way to release CP/M as you request without a significant effort and, as you are aware, we must confine significant efforts to supporting products offered to and used by a broad spectrum of users. Personally, I am sorry we seem to have reached this point, but I must support the decision as the one which is best for a majority of our customers. Certainly, I know it would be fun for the devoted H-8/89 users to have access to this software, but I am sure you also understand our position.

"All of us at Heath wish you the best of success in your efforts to keep support of the H-8/89 alive--they were indeed great products."

By way of a wrap-up, the license Heath has from DRI seems to me to be the major stumbling block. As Mr. Gilmore observes, such licenses are usually quite restrictive. As an example of such restrictiveness, I learned many years ago that Magnolia Microsystems of Seattle could **only** sell its version of CP/M-80 if accompanied by a hardware item! That's how I got my own copy way back when.

But there remains the problem of providing generic CP/M for those new users acquiring their '8's and '89's on the second-hand market. A version for our systems is now **very** hard to find. In that regard, Pete Shkabara's release of his Z-System materials to **Staunch** (announced in issue #22/23) was opportune--thanks, Pete--over the short-term. But we may **not** have to be satisfied with that in the long-term. David A.J. McGlone, publisher of **The Z-Letter** (briefly described in issue #20/21, p. 13) is presently negotiating a license with DRI to sell CP/M. If he is able to close that deal, the next step will be to approach the OEM's (such as Heath) to obtain their individual permissions to distribute proprietary code. Of course, I'll let you know how all this turns out as soon as David announces it in **The Z-Letter**.

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