

THE ADDRESS BUS

PORT TO PORTAL.....	Below
THE EIGHT-BIT R/W.....	1, 3
SOFTWARE LIST.....	2
Cooling the H89.....	5
by Lee Lart	
CONTACTS.....	8
Pete on CP/M.....	9
by Peter Shkabara	
VENDOR.UPDATE.....	10
Square One, Pt. 2.....	11
by Hank Lotz	
Insert:	
Subject Index to 1989 (five pages)	
MISCELLANY (p. 6 of insert)	

PORT TO PORTAL -- Editorial

You've undoubtedly noticed that this issue is late arriving in your mailbox and I must apologize for that. However, my employer made extremely heavy demands on my time during and beyond the month I would normally devote to assembling this issue. But I'm not the only one running tardy, either: Lenny Geisler mailed his last two issues of **SEBHC Journal** for '89 at the same time and **The Computer Journal** had printer problems that delayed its #42. (I might add that **TCJ** will be printing a brief history of HDOS written by me shortly.)

Overleaf, in this issue's software list, you'll find **FILEBASE** database manager that **EWDP Software** (Indianapolis, IN) is releasing as "shareware." Strictly speaking, this is **not** public domain though distribution is free. The term generally means that a vendor will provide documentation, support, and updates **if** you send him a modest fee. Some vendors distributing shareware expect **all** users to pay the fee and this is a common arrangement in the PC world.

In the case of **FILEBASE**, the implications of the on-disk documentation are that this dbms package is so easy to use that you need not register **unless** you want the printed documentation and support. Given the small charge (\$30) and the power of the package, I regard this as cheap.

Finally, if you are new to these pages, you should know that **all** back issues of **Staunch** are still available. If interested, write or call; you'll find my address and home phone number on the issue's last page.

Kirk L Thompson

THE EIGHT-BIT R/W -- Letters

Downloading from 8". [From Robert Groh, 420 Sunview Circle, Blue Springs, MO 64014] "Wow, a year has slipped by! Enjoy your magazine ... I still have not cured my problems with disk read [errors] on soft sector so maybe [I'll] leave both my daughter's machines set to hard sector. Expect to buy a copy of Livingston Logic's BIOS-80 V5 as soon as money permits.

"I have been using WordStar 4.0 on the H-89's with soft sector and can heartily recommend it. I

can download from 8" disks (one of the formats WS 4.0 is available on) to soft sector if anyone should need it...." [Thanks for the offer, Bob. You might check David Young's letter later in this column for one possible solution to your CP/M disk read errors. - Ed.]

Copyrights, Economics, Software, and Potential. [From L. Van Hemelryck, Mill Creek, WA] "I have a couple of comments with regard to Lee Hart's remarks about copyrights in issue #14: by suggesting that software vendors place in the public domain the programs they no longer support, there is no intent to deprive developers of a [remuneration] for their effort. As long as the software remains available, the user has to evaluate if what is offered is worth the price. Only when [conditions], because of a dwindling demand or other considerations, appear to make further marketing uneconomical, should one hope that a product is released to the public domain rather than to the 'circular file'.

"The 8-bit world is different from the IBM PC-compatible, and even from the MAC world, in more than just economic size. Where the latter emphasizes applications, the former at least lets you glimpse at the operating system and invites you to tinker with it. I think 8-bit users tend to be more interested in how their systems do their work, than in the (superficial) brilliance of a program's output. The remaining 8-bit users are either recipients of salvaged hardware or die-hard hackers. (Let us hope that some who stumbled on some superior 8-bit hardware by accident may develop a hacker's taste.)

"Given that a lot of 8-bit software got somehow 'separated' from its documentation (if there ever was some), I think the market is more for [the] documentation than for the programs themselves. Publications such as this one and **The SEBHC Journal** are channels through which such documentation can be disseminated, as is **The Computer Journal** for a larger community. The interest Lee and others have seen for their operating manuals seems to corroborate the opinion I expressed above. Why not sell any available manual, and maybe write some new ones? They may be more difficult (onerous) to copy than the actual programs.

"In the same issue Peter Shkabara hints at the many things he has learned about the Heath 8-bit systems, in the many years he has been involved with them. The problem is in identifying where to start, not knowing what the potential audience wants to know. This problem is compounded by the potential audience not knowing what to ask for! Why not get Peter together with Lee Hart and Rick Swenton: together they could start a forum which could complement the original Heath documentation." [Thanks for the thoughtful remarks, Ludo. Another distribution technique a vendor could venture for economically non-viable software is "shareware." See this issue's editorial for a definition of the term and the **Software Listing** for the first such offering by **Staunch**, from **EWDP Software**.]

(Continued on p. 3 after the Software List)

SOFTWARE LISTING

For CP/M Only

CPH
(By Grant Gustafson)
(Provided by Peter Shkabara)

This is a utility to transfer files from HDOS disks to CP/M. It will run under CP/M-80, CP/M-85, and CP/M-86 on the '89 (and presumably H-8) and H/Z-110 and -120 with hard- or soft-sector drives and supports these formats, plus 8-inch, in all densities. It will read **all** standard HDOS 2.0 Heath formats and the 18-sector-per-track format provided by some third-party soft-sector drivers. CPH can read HDOS 3.0 hard- and soft-sector media. It will also run under LLL's BIOS-80. Besides HDOS source media, you should also have a CP/M disk formatted with 256-byte physical sectors, hard- or soft-sector, single- or double-sided, single- or double-tracked (48 or 96 tpi), but **not** extended DD (!), under CP/M 2.2.03 or 2.2.04. This serves as a format **sample** before attempting to read a **similarly**-formatted HDOS disk. So on an H/Z-100, you will need one or more sample disks formatted on an '8 or '89. The program front-end is similar to Anapro's EMULATE and CPC packages, allowing tagging of one or more files to be moved to CP/M, moving those file(s), disk logging, viewing on the screen, directory display, and a track/sector dump (view only). Prompting if a file will be overwritten, filename changing, query at each copy operation, binary and ASCII file transfer, and aborting (with CTRL-B) are provided. A "debug" mode is present to temporarily change some of the defaults. The package occupies 54K, including C source code and documentation.

FILEBASE

(By Tom Markowitz, EWDP Software)

FILEBASE is a "variable-length field" database manager which EWDP is releasing as shareware (see this issue's editorial for a definition of that term). Fields are in "comma-delimited ASCII" format, such as those created by BASIC and other higher-level languages or WordStar's MAILMERGE add-on. Defining field length or type (character or numeric) are therefore **not** required when setting up a database. Functions include adding fields, appending records, calculations, indexing, joining existing fields, restructuring the file layout, sorting, and printing reports and/or labels. The comma-delimited records may also be converted to fixed-length records and the reverse. Special sorts may be done on last names, ZIP codes, and dates. Logical tests during record selection for reports and sub-files include greater than, less than, equals, and variants. Wildcards are also possible. If you want support and a printed manual, registration information is embedded in the program. But the package is menu- and prompt-driven, so most may never need the manual. More information may be found on the insert to **Staunch** #12 (p. 4); the extra utilities mentioned there are not included here, but may be obtained with a full (\$30) registration. A two-drive, soft-sector or double-

sided and/or double-tracked (96 tpi) hard-sector, system is recommended since the executable modules themselves (which chain between four .COM and three .OVL files) need 178K! This package occupies 216K.

For HDOS Only

Horn Engineering Package
(By Charles Horn, Horn Engineering)

This is the package for HDOS that Charles Horn mentioned in #15 (p. 9). It includes a device driver for the Epson MX-80 printer (with or without GRAFTRAX) with a spooler option and assembler source code. Also in the package is software specifically for use with 1K of **static RAM** installed between 020.000A and 023.377A (1000h to 13FFh) in the '89's monitor (sockets U523 and U525 on the CPU board). A pair of 2114 chips (rated for 250 ns or less) are required; these modules will **not** work under HDOS 3.0 because memory is remapped, though they could be rewritten as pseudo-device drivers. These small programs are: CONVERTL.ABS (converts input numbers to decimal, split-octal, and hexadecimal), CLOCK.ABS (a simple clock running off HDOS's TICCNT clock), SCLOCK.ABS (a clock that displays time on the screen), CONTROLZ.ABS (processes a CTRL-Z abort in HDOS STAND-ALONE, correcting a "bug" in 2.0), SPOOL.ABS (a simple print spooler for use with your existing printer driver), HCL.ABS (emulates CP/M's CTRL-P to echo what goes to the screen to the printer, also has CTRL-T to dump the screen to the printer), and LOMEM.TST (to test the static RAM chips). Pseudo-device-driver versions of the clock programs are also provided. Assembler source for all but the spooler and LOMEM.TST are included. This package occupies 558 sectors.

CATALOG

(By David A. Shaw)

This small, nifty package is a file and disk inventory system for HDOS. It requires HDOS 2.0 (it will **not** run under 3.0), an H-8/H/Z-19 or H/Z-89/90, at least 48K (56K recommended), and two drives **minimum**. Though the author discusses its use **only** with hard-sector drives (either Heath's standard driver or HUG's or Quikdata's UltiMeth drivers), it also runs on soft-sector without modification. It supports printer drivers named LP: or AT: as defaults. The disks to be catalogued are inserted into SY1:, so a copy may be required on each bootable type if you are running different media types (for example, hard- and soft-sector). The package permits you to compile catalogs from a number of disks; delete specific volume nos. from the database; and print all, select volume numbers, files with specific names (including wildcards), and exclude files with certain flags. If necessary you may specify a non-standard printer driver, print on **both** sides of the paper (by printing odd and even page numbers separately), and set the left margin. This package occupies 148 sectors.

Placing an Order

Your cost for this software depends on what you supply:

Formatted disk(s) and self-addressed, stamped return
 mailer \$2.00 per disk
 Formatted disk(s) without mailer \$4.00 per disk
 No disk(s) or mailer \$6.00 per disk

Disk formats available are standard (SS/SD) and double-sided (DS/SD) 48-tpi hard-sector and 40-track (48 tpi) soft-sector, single- or double-sided, for both HDOS and CP/M. Please clearly indicate the format you are supplying or require. If you desire double-sided hard- or any soft-sector format, I will pack multiple items onto one disk. I will **not** subdivide a disk. Send mailorders to:

Kirk L Thompson / **The Staunch 8/89'er** / #6
 West Branch Mob Hom Vil / Rte 1 / West Branch,
 IA 52358

THE EIGHT-BIT R/W (Continued from p. 1)

Drive Pressure Pads. [From Bob Olson, Hemet, CA] "I have a few comments about the head load pressure pads on Siemens (Model 82) drives. I had a drive that quit working and after much troubleshooting I finally found that the head load pad had come loose and fallen out. The pad is attached to a small plastic button that just snaps into the head load arm. After making a few long distance calls trying to locate a Siemens parts department I gave up. After a bit of head scratching I went through my old obsolete 8-track tapes and found one that used felt pads. I disassembled it, cut a piece of felt out, and glued it to the button. It seems to work OK, although I have to admit that the drive has not seen a lot of use since the fix, so I am not sure about reliability of my job. I would like to do the job correctly by replacing the button with a new one. If any of your readers know of a supplier for this part I hope they will pass the information along (with price if possible). By the way, the Wangco (Model 82) drive that I have appears to be identical to the Siemens." [Thanks for the tip, Bob. And I believe the reason why the Wangco looks like the Siemens is because the latter German conglomerate bought out Wangco some time after Heath began using Wangco's drives. Based on research I did for an article on HDOS to appear shortly in **The Computer Journal**, the Wangco's were the most reliable 5-1/4" drives available when Heath designed the floppy subsystem for the H-8. -Ed.]

8" HDOS 3.0?. [From Alex Bodnar, Oxford, PA] "I ... wanted to ask if you know of anyone with HDOS 3.x on EIGHT inch H/Z-47 format. I wait with baited breath for the **Staunch** and the **SEBHC** to come to my mailbox. I read them both cover to cover and I think some of it actually sinks in!!! I just got an H-37 for an H8 and [have] put it in my development system." [I, too, am wondering if anyone has HDOS 3.0 running on 8-inch. It should be possible since a driver for the '47's is on the device driver distribution disk. -Ed.]

Letter from Canada. [From Roger Dupuis, Longueuil, Quebec] "For your and other readers information, I installed the SuperSet with SuperFont on my H-89 and it works quite well, except for SuperClock: it does not update the battery back-up

time/date. All I get is some number (like 01-01-01 for the date). Talking with Lee Hart, it seems that some H-89's have this problem and not much can be done... So, I use SuperSet as second page display only! Any help would be appreciated.

"I modified some characters on both my H-89 SuperFont and Epson MX-80 in order to get a French accent [mark] easily from any word processor, HDOS or CP/M, screen and printer. I called Lee Hart a few times and got quite good help over the phone.

"I also bought the MIX C compiler and I'm not excited with it. I have some problems compiling a big program, even if I break it down into pieces... Plus the COM file is quite big (a bit smaller than the source code itself)! Any comments about [Jim Hendrix's] SMALL-C or C/80 from Software Toolworks?

"I need information for buying dBASE II from Ashton-Tate, running on my H-89 (CP/M). I might buy second hand... I read years ago that Fox Software had a similar database program that was faster and program-compatible with dBASE. Still available? Is there any user running dBASE II on the H-89? Does it support the H-89 in its installation so I can have formatted screens?

"I tried MTMDM's early version and had a mixed success. I was able to download some compressed files from CompuServe using XMODEM format but had problems capturing ASCII files! For ASCII capture, I use another communication program, called HMODEM which is specifically designed for the H-89 and is very nice. But I had some problems with it downloading compressed files (it provides XMODEM, YMODEM, and ZMODEM [protocols]). HMODEM has a phone directory among its options... It fully uses the H-89 screen, like the "PROCOMM" window [on PC's] for the status of the transferred files... MTMDM has a lot less options... There is no phone directory, no macro [facility], the option being the speed of your call. Are there any other people who have tried this software? ... For the time being, I use my IBM clone to download compressed files using Crosstalk Mark IV or PROCOMM Plus.

"I joined other H-89 members on CompuServe and found it interesting (and expensive from Canada). But I found what I was looking for: a genealogy program for my H-89 (called Family Ties). I also got a new version of MEX communication software (version 1.14) not yet installed (some problem with overlays...).

"I tried a database program called PCFILE from Jim Button for CP/M and it seems to work fine, except it does not have a formatted screen so the screen looks bad and has some number (6) in a few places like some command for positioning... Family Ties uses a formatted screen and it is nice on the H-89 screen!..." [Thanks for your letter, Roger. Unfortunately, I personally can't field too many of your questions about C compilers. dBASE II can still be had, but not, I believe, from Ashton-Tate! The terminal installation utility includes the H-19. And I've already had several people order Steve Meyerson's programmer's notebook listed in issue #15, including Lee Hart, so you might check with him for possible sources. -Ed.]

Comments on #15. [From Lee Hart at his new address, 323 West 19th Street, Holland, MI 49423, 616-396-5085] "Embedding H19 terminal codes in QUERY

[see #15's insert]: A stock H19 takes quite a while to clear the screen; thus any command immediately following an ESC z, ESC E, or ESC J can get lost. The ESC Y cursor position command is also slow, because it does a multiplication to compute the screen address. That's why you had trouble when you followed a clear screen immediately with cursor positioning. The pair took so long to execute that you overflowed the H19's 128-character input buffer.

"This problem is worse at 19200 baud, or if you run the CPU at 4 MHz. It gets better if you speed up the terminal's Z80 to 3 MHz (or more), or add NULLs to your command string after the clear-screen command.

"For a **sure** cure, add handshaking or install a SuperSet. The SuperSet's clear screen algorithm is 3 times faster, and it uses a lookup table for fast cursor positioning.

"To William Wayland: If the terminal gets knocked into some goofy state, you can reset it by pressing OFF-LINE, then ESC x. This resets the terminal to the power-up state **without** resetting the computer.

"Sometimes this doesn't work. For instance, your program (or its insane twin) could have locked the keyboard by sending an ESC } command. The 'secret' command to unlock the H19 keyboard is CTL-T-Y-Backspace (all 4 keys at once). This is the "X2" key you see on your H19 schematic, but which was left off the keyboard at the last minute.

"To Hank Lotz: CP/M's PIP can force all characters in a file to uppercase (or lowercase), or clear the 8th bit to make searches and comparisons easier. Follow the source file name with [U] to force uppercase, [L] to force lower, or [Z] to zero the 8th bit (to turn WordStar files into ASCII).

"PIP can also do searches and extract pieces of a file. [S textstring ^Z] starts copying when it finds 'textstring', and [Q endstring ^Z] stops at 'endstring'. Put multiple commands inside one set of brackets. For example, this PIP command would print just your address from a mailing list file containing hundreds of addresses. It starts printing at your name, ends with your ZIP code, converts it to uppercase, and clears the 8th bit:

```
PIP LST:=ADDRLIST[SKirk Thompson^ZQWest Branch,
IA 52358^Z UZ]
```

"To William Jacob: You can't (or shouldn't) change I/O assignments inside MBASIC, dBASE II, or other application programs. It is the **operating system's** job to define your physical devices. Programs should use the device names defined by the operating system (A:, B:, C:, etc., for disk drives; RDR:, CON:, LST:, etc., for serial/parallel devices).

"This is done in Heath CP/M by the CONFIGUR program. When you add a new device like the H&H board, someone needs to change the BIOS and supplement the CONFIGUR program so the new device can be used by your existing software. When done right, **all** existing programs use the new device automatically. For example, all printed output goes to your new parallel printer port.

"Sadly, many hardware suppliers didn't do it right. The user is stuck with the task of modifying the operating system on his own. At least Heath

supplied source code for the BIOS and the tools needed to edit and re-assemble it.

"In theory, you could patch dBASE II, SuperCalc, etc., to support a new device. But this is very difficult without source code, and you would have to do it separately for every single program you use.

"Yes, I know the PC/Apple world expects everyone to patch every program to support new hardware devices. But that's because their operating systems are so complex and poorly documented that you have no choice.

"I recommend adding the software driver for your new I/O device to the BIOS and assign it to one of the existing I/O device names. Then you can test it right from the console by PIPing data to/from it. Once it works satisfactorily, the IOBYTE can re-direct output to it, so every program uses it automatically. You could also have the BIOS check keyboard inputs for a 'hot key', to let you change the IOBYTE 'on the fly', while running any program."

Corrosive Wirewrap. [From Stanford R. (Bob) Evans, Hemet, CA] "...I can't seem to find any of the square pins that Dan Jerome used to re-work the chintzy plugs on the CPU board [see #10, p. 7]. You might print a note to that effect--someone must have a source. And the **absolute** best contact cleaner and corrosion preventer is 'Cramolin', by CAIG Laboratories, Escondido, CA. An 'Electronic Maintenance Kit' sells for about \$18.00, has brushes, swabs, lint-free wipes, and enough cleaner to last a lifetime, just using it on one or two H/Zs ... (I just had the P116 connection go out right in the middle of a letter the other day--very disconcerting!!!)" [Bob, you might check your electronic parts dealer for "wirewrap" pins or wire; these are the equivalent of the square pins Dan discussed in his maintenance survey. -Ed.]

FORTRAN Resources Revisited. [From Ronald Pannatoni, Franklin, NC] "The FORTRAN edition of **Numerical Recipes: The Art of Scientific Computation**, which I mentioned in the previous edition of **Staunch**, can be ordered directly from the publisher, Cambridge University Press. Outside New York state call toll-free 800-872-7432; inside New York state call toll-free 800-227-0247. The order number is 38330-7; the date of publication is 1986. The FORTRAN edition is still in print, although **Books in Print** evidently does not list it. The current price is \$44.50.

"Let me note that chapter 12 of this book, on Fourier transform methods, has a few subroutines that use the COMPLEX data type. Regrettably, Microsoft FORTRAN-80 has no provision for complex arithmetic, and the RATFOR preprocessor cannot repair this deficiency. However, these subroutines include only some simple complex additions, multiplications and arrays, so it is fairly straightforward to rewrite the subroutines in real arithmetic. This task is aided by the fact that the book explains in detail how all the subroutines work.

"Finally, it may be possible to obtain FORTRAN-66 code for the subroutines in this edition, which would bypass the need for the RATFOR preprocessor. My copy of the book gives the following address for information about 1966

versions of the subroutines: Numerical Recipes Software, P.O. Box 243, Cambridge, MA 02238. I cannot guarantee that this source is still available, though. I still think it would be more expedient as well as educational to use RATFOR to make the translations on one's own." [Thanks for the update, Ron. I might add further that if anyone is looking for a title from a university press and the local bookstore is unable to help, try: CUP Services, 750 Cascadilla St., P.O. Box 6525, Ithaca, NY 14851, 607-277-2211. Its shipping charge is about \$2; book price will, of course, vary. I stumbled onto this outlet while looking for a non-computer book a short time back. -Ed.]

Crunched Z67. [From Ralph Money, Largo, FL] "To Dick Shotwell: As a former Z67 user myself, I can sympathize with your crunched controller board. When mine shrieked its death rattle, I was left hard diskless, but the floppy still worked fine as hardware unit 1, or software drive C or F (depending on whether it was booted up as primary or secondary). Of course, if your Z67 floppy cannot be accessed, read no further. But if it can, you should be able to connect both your SigmaSoft unit and the Z67 to the '89, one as primary device and the other as secondary device, then PIP your 8" disk data to the other system (hard or floppy). The Z67 interface board can go in any of the three right-hand slots: Just jumper the board for the proper slot...."

Terminal Resistors. [From David E. Young, Ontonagon, MI] "...I fixed the problem with the two external Tandon 96 tpi drives which I called you concerning approximately two months ago. Mr. Lee Hart of TMSI and Mr. Rich Swenton in the **SEBHC Journal** as well as yourself had suggested checking for extra terminating resistors on the drives. Mr. Fale of Quikdata, Inc. helped me via phone to determine that both drives had terminating resistors. I removed the proper one and everything works like a charm since then. I obtained that system used, so whoever had it before put up with a lot of BDOS errors over the years! Thanks to everyone for all the help!

"Another interesting and obscure point: I obtained an ALPS LPX600 laser printer, which comes with downloadable fonts. The fonts are on IBM-compatible disks. So, I obtained Anapro's CPC and copied them over to CP/M format. They would not work, but it was not due to any problem with the CPC program which had copied them flawlessly. The problem was that they were apparently copy-protected not to work without the MSDOS downloading program provided with the printer. The number at the beginning of each font file was an erroneous value. It took a lot of work for me to figure this out. When this value is corrected, the fonts work perfectly with MagicSeries [see issue #'s 9 (p. 7) and 10 (p. 6) for information about this laser printer package]. By the way, Magic puts out stunning proportional print on the ALPS." [You're entirely welcome for the assistance, Dave. To remind other readers, a terminal resistor pack should only be on the last disk drive in a chain, whether hard- or soft-sector. And thanks, too, for the laser printer tip. -Ed.]

=====

Cooling the H89

by Lee A. Hart

An amazing amount of misinformation has been written about the H89's alleged overheating problems and power supply deficiencies. People have advised adding extra or oversized fans, hacking holes in the case, and all manner of part replacements and rewiring. Even Heath contributed its share of fuzzy thinking to the situation, with changes that only made matters worse.

The usual premise is that there is a "design defect" in the H89, which must be fixed by some brute-force solution. Balderdash! In my 8 years experience with dozens of H89s, I've never seen an overheating problem in any machine that was properly built, used, and maintained.

For instance, I have two H89s. The first has 64K of RAM, 3 serial ports, and H17 and CDR disk controllers with 2 internal 5-1/4" and 2 external 8" drives. A series resistor cuts the fan speed in half, because I don't like the noise. This machine has run flawlessly even in last summer's 100+ temperatures. I'm the one who "broke down" and couldn't work because of the heat!

My favorite H89 has an H-1000 CPU board (with its 4MHz Z80, 8MHz 8086, and 1 meg RAM), 3-port board, H17 and H37 controllers, and 4 external 5-1/4" drives. It began life as an H19 terminal, and though it's been upgraded to an H89 power supply, it still has the original H19 power transformer, and NO FAN AT ALL!

My point is that there is nothing intrinsically wrong with the H89 that proper assembly and a few simple modifications can't cure. There's no need for drastic measures. So here's an engineer's perspective on keeping your H89 cool and collected.

Red Heat. Heat is the enemy of all electronic components. Most parts in an H89 are rated to work properly from 0-70 C, but every 10 degree C rise in temperature cuts the life of an IC in half. Those powers of 2 pile up fast; a part good for 100,000 hours (over 11 years) at 0 C. will die in just 781 hours at 70 C. Thus it behooves us to keep temperatures as low as possible.

Nothing in an H89 should run any hotter than 30 C (55 F) above ambient. In other words, if your room temperature is 25 C (77 F), nothing should be above 25+30 = 55 C (132 F), or you'll have reliability problems. Since the hottest part is the least reliable, our task is to find the hot spots, and cool them off.

The old "calibrated finger" is adequate for a quick check. Turn on your H89 and let it run at least an hour. Then turn it off, open the case, and quickly feel all the major components and heat sinks. Pay particular attention to anything that runs too hot to touch. A metal surface over 50 C (122 F) usually causes you to involuntarily jerk your hand away. Plastics (like an IC) have to be above 60 C (140 F) to evoke this response. Below this, you can easily leave your finger in contact for at least several seconds.

Power Supply Heat Sink. The hottest spot is usually the power supply heat sink; that piece of aluminum standing vertically under the fan. Heath

figured this out a bit late, and added 3 black finned heatsinks to the voltage regulators. But they also switched to a weaker fan to cut noise, and told you to stuff cables between the heatsink and right-hand card guide to block off the airflow.

First, be sure all the parts on the heatsink run about the same temperature. This verifies that the screws are tight, and the thermal grease is successfully transferring heat to the heatsink. If any part is noticeably hotter, remove it. Clean off any old grease, and remount it with a fresh supply. Don't use clear silicone grease; it's a lubricant, not a heat conductor. Use the white zinc-loaded stuff which has a higher thermal conductivity.

Don't jam the serial port and disk cables against the heatsink. I recommend routing them low, between the right card guide and raised plastic tower that supports the power supply. It's harder to get them in there, but the reward is a cooler and more reliable machine.

The fan blows air over the right side of the heatsink, but the parts that need cooling (and the black finned heatsinks) are all on the left side, where they get no air. To correct this silliness, remove the 4 screws that mount the power supply board. Push the heatsink right to increase the angle of the bend, so the top edge is about 1/2" farther right. Now replace the power supply board screws. Bend or move the ground lugs slightly if they bump into the large filter capacitor.

Now replace the cover and repeat your thermal tests. You should be rewarded with a noticeably cooler-running machine.

Blow Up Your H89. Heath had no fan at all on the H19. When the H89 was introduced, they added a Rotron "Sprite" fan to keep things cool. But people complained about the noise. So Heath switched to the quieter ETRI or IMC Pewee "Boxer" fan. Unfortunately, this silence was accompanied by a 30% reduction in airflow. This was a bad move, particularly for customers on 50Hz power, where fans run 20% slower to begin with. I personally find the IMC fan particularly obnoxious, because it has an annoying whine.

The fan originally mounted on a flat plate, which let most of the hot air simply run around in circles without leaving the case. Heath later fixed this by adding sides to the plate to force air to use the top grille.

At various times, Heath recommended mounting the fan to blow air up or down. I've found down is best, because it cools the power supply better (normally the hottest spot). So be sure you have the mounting plate with sides, and a Rotron fan blowing down.

Finally, don't overlook the obvious. The air vents on the top and bottom of the case are there for a reason. Don't sit it on a soft carpet that blocks the bottom, or pile papers or disks on top.

If you're like me, you've expanded your H89 far beyond Heath's expectations. Extra memory, disk drives, faster clock speeds, and racks full of accessory boards all contribute their share to heat buildup. The stock 90 watt power supply is adequate for any Heath configuration, but can be overstressed by too many add-ons.

If your H89 fails the "finger test" even with the above mods, there are two ways to make it run

cooler. 1) Remove heat from the case faster, or 2) don't generate the heat in the first place. An extra fan like the Kres mod won't help; it just stirs the same hot air around in circles. In fact, the heat produced by the fan itself is trapped in the case too, which just makes things worse.

Many people advocate chopping holes in the case above the fan. This is pretty drastic for the benefits achieved. The slots do restrict airflow; a Rotron Sprite is rated 34 CFM (cubic feet per minute) in free air, but only moves 23 CFM through an H89 (by actual measurement). But even removing the slots entirely only increases it to 27 CFM, because of all the other obstructions in the tortuous path followed by the air through an H89.

A better way is a fan that moves more air. At first thought this ain't easy; it requires a physically bigger fan, or running the same fan faster. Bigger is out due to space problems, and AC motors can't run faster unless you increase the line frequency.

The answer is a fan that runs on 12-24 volts DC. Modern DC fans use brushless motors that are just as quiet and reliable as their AC counterparts. Yet they can run faster and thus deliver more air. The Rotron Sprite SD12B1 is physically identical to the AC version, delivers 35 CFM at 12VDC, 50 CFM at 16VDC, and 65 CFM at 20VDC. It is available from Digikey for \$20.74. Equivalents are the Pamotor 8112G, and Panasonic FBH-08A12H.

I suggest powering it from the H89's unregulated -18VDC supply. It runs virtually no load, and so has no problem supplying 150-250mA for a DC fan. A 10-50 ohm 2W series resistor can be added to adjust the speed/airflow/noise level as desired.

Bridge Rectifier BR1. I'll assume that everyone knows the yellow wires from the power transformer should be soldered directly to the AC input terminals of the bridge rectifier, BR1. If they are routed through the power supply board, connector P101 will eventually burn up. It's a 5-amp connector, running right at its maximum current.

Bridge rectifier BR1 is a common target for "improvements". Heath originally used a 10-amp part, recognized by its fat solder lugs. They later switched to a 15-amp unit, with thin flexible solder lugs. The bridge often fails in heavily loaded H89s. People tried 25-amp or even 35-amp bridges, but even these fail after a while.

This is an excellent example of fuzzy thinking. The bridge only carries 5 amps, so it's not dying from a current overdose; heat is the killer. A higher-current bridge accomplishes nothing, because it still has to dissipate exactly the same amount of heat. To make the bridge last, you have to cool off the heatsink. The techniques described above are the best way to do it.

Technology to the Rescue. Modern technology now offers a more elegant solution; don't generate the heat in the first place. The same goodies that make new computers smaller and more efficient can be applied to the H89 as well. Heath thoughtfully used industry-standard parts and socketed everything, making upgrades a cinch.

BR1 heating can be cut in half by Schottky rectifiers. They have 1/2 the voltage drop of silicon

INDEX to Issue #'s 10 through 15

Introduction:

There are a few "subtle" differences between this index and the one prepared for issue #'s 1 through 9 by **Staunch's** creator, Hank Lotz, and included in issue #10. For one, Hank prepared that one by hand; this one was done by Kirk Thompson primarily with an indexing package titled SUPERDEX (from Spite Software, Portland, OR). When Kirk ran into a bug in that software, the use of MicroPro's SUPERSORT and manual editing with PeachText yielded the equivalent of what SUPERDEX's formatter could have output, although it took, of course, longer to prepare. The individual entry style is also slightly different, but that is explained below. Finally, on two points there are no differences in preparation: both indices were columnized with Hank's MCOLS package (available from **Staunch**) and, except for the page headers, were photoreduced.

How to use this index:

Suppose you are interested in the serial interface board. The entry for this subject reads like this:

Serial interface board, #11:8a; #13-Isrt:1; #14:7b,8

References to the board will be found in issue #'s 11, 13, and 14. Issue numbers are separated by semicolons. The page numbers in an individual issue immediately follow a colon and are separated by commas. Lower case letters (a and b) indicate that the information is either in the left (a) or right (b) columns. If there is no letter, check the entire page.

"Isrt" is used for "Insert". References will be found in the insert to the given issue number. Often the insert is **also** paginated and this is marked, like the issues, by a colon and numbers, separated by commas, following "Isrt".

Many of the entries are cross-referenced, but if you don't see what you're looking for, try another word or phrase.

Books and magazines are marked as such (in parentheses) after an entry. Software titles in **Staunch's** library are followed by the name of the individual or company who wrote or supplied them also in parentheses.

3-1/2" diskettes, #14:9b
4 Mhz mods, #12-Isrt:4b
8-inch drives, #14:10a
8080, #10:2b; #11:6a; #13:7b; #14:6b,7a,11b
8250 serial chip, #11:8a

- A -

Abandonment of CP/M, #13:1b
ACANAL (by Gary Appel)
 HDOS, #15:2b
 CP/M, #14:2a
Accessory service, Heath factory, #13-Isrt:1
 See also: Service fees, Heath factory
Accumulator, #13:11a
ACGNJ, #12:8a
Ad insert, #13:1a
Advanced CP/M Users, #14:4a
ADVENTURE, #10:5b; #11:4b
Advertisers
 Generic Computer Products, #11-Isrt;
 #14-Isrt; #15-Isrt
 Micronics Technology, #11-Isrt
 TMSI/Lee Hart, #14-Isrt
Advertising, #13-Isrt:2
After-the-sale support, #14:1b
Algorithm, #12:6b,7a; #15:7a
ALGORITHM (newsletter), #15:8b
Alpha Systems Corp., #11:8a; #12-Isrt:4b;
 #14:3b; #15:8b
Alternative printers, #12-Isrt:3a
Anapro Corp., #12:2b,4b,5a,Isrt:4a; #14:3a,4a
Anapro CP/M Utilities (by Peter Shkabara),
 #14:3a
Anderson-Jacobson printer driver, #13:3a
ANSI mode, #13:3a
Apollo XI, #13:1a
Apollo XIII, #13:1a
Apple computers, #14:6b,9b,12a
ARK04 (by Brian Moore), #14:2b
Arkay Engravers, #15:8a
Armstrong, Neil, #13:1a

Artificial life, #15:8b
ASCII, #10:4a,4b; #12:5b,Isrt:3b; #13:6b;
 #15:7a,Isrt
ASM, #10:3b; #12:1b,8a; #13:1b,7b; 14:4b
Assembler, #10:2a,2b; #11:6a; #12:6b;
 #13:5a,6a,7b; #14:7a,11b; #15:2b,3a,8b
Assembly language, #12:1b,5b,6b; #13:6a,8a;
 #14:6,7; #15:2a,7a
Assembly of the HDOS source code, #15:2b
AT&T 473, #12-Isrt:3a
Atanasoff, John, #14:12
Atanasoff: Forgotten Father of the Computer
 (book), #14:12b
Authors, article
 Hall, Terry, #15:6a
 Hart, Lee, #10:3a; #11:2b
 Jerome, Dan, #10:6b; #11:1a; #13:8a;
 #14:4b,7b; #15:4b
 Lindley, William, #15:6b
 Lotz, Hank, #12:5b; #13:4a; #14:6a;
 #15:7a
 Reeve, Whitham D., #15:10a
 Streeter, Richard, #11:6a
 Thompson, Kirk, #13:10a
 Van Hemelryck, Ludovic, #12:2a
 Waltuck, Bernard, #12:7a; #10:4a
AUTODIFF, #10:5b
AUTOPRO, #15-Isrt

- B -

Baseball cards, #14:4a
BASGEN Program Generator (by James Czebi-
 niak), #11-Isrt
BASIC source code, B.H. (by Heath Co.),
 #15:2b
BASIC, Benton Harbor, #10:4a
BASIC, #11:3b; #12-Isrt:4b; #13:6b; #14:3b,
 6,7a; #15:1b,2b,3a,8b
BBS, #10:6; #11:8a; #14:10b
BDOS, #12:1b,4b,5b; #13:4b,5a,7b; #15:8b
Beginners, #14:6a; #15:8b

Benton Harbor BASIC source code (by Heath
 Co.), #15:2b
Bilofski, Walt, #10:6a; #14:3b
BIOS-80 V5, #10:2a; #15:12b
 See also: Livingston Logic Labs, LLL
BIOS, #10:2a; #12:1b,4b; #13:1b,8a; #14:3a,
 10; #15:8b,12b
Bohon, Thomas, #12:5a
Borland International, #11:8a; #12-Isrt:4b;
 #14:3b
Boxer fan, #11:1b
BREAK-FREE, #10:8a
Brooks, Herm, #14:10a
Brother printers, #12-Isrt:3a; #13:3a
Buffer, #13:4b,5a,7b,9a; #14:6a; #15:4b,5a
Bug, #11:7; #12:6b,7a; #14:3b
BUSS, #13:8a,Isrt:1
BUSS Directory, The, #13:8a
BYTE (Magazine), #13-Isrt:2
Bytes, #12:3b,5b; #14:6; #11:7a; #12:3b,4,6b;
 #14:6b

- C -

C, #10:5b; #14:6b; #15:1b,8b
C.D.R., #14:10a
C.D.R. SuperRAM 89 board, #12-Isrt:4a
C.Itoh printers, #12-Isrt:3a; #14:11a
C/80, #11:4b; #14:11b; #15:1b,2b
 See also: Toolworks C
C/80 MATHPAK, #10:5b; #14:11b
CALC, #13:10,11a,12a; #15-Isrt
CALL, #12:6a,6b
Capability, chip, 8080 vs. Z80, #11:6a
Capitol Heath Users Group (CHUG), #10:4a
Card punch and reader, #14:12a
Carriage, drive head, #10:8a
Cassette interface, #10:2a
CCP, #12:1b; #13:1b,12b,8a; #15:8b
Central processing unit, #14:6b
Chicago, #13:3b
CHUG, #10:4a

Circulation, #11:1b; #13-Isrt:2; #14:1a
 Circulation, air, #11:1b
 Clandestine copyright infringement, #10:2a
 CLE, #13:1a,7b,8a
 Cleaning, #10:8a
 Clock, hardware or software, #15:6a
 Clone, #10:3a; #12:1b,8a; #14:3b,4a
 Close-out specials, #14:4a
 CMP, #11:7b; #13:4b
 Cogswell, Mike, #12:1a
 Command Line Editor, #13:1a,7b,8a
 COMPACTA, #12:7b
 COMPACTA for HDOS 3.0, #12:7a
 Compatibility
 chip, 8080 vs. Z80, #11:6a
 controller, #12:2b
 CP/M, #12:2b
 FILEBASE dbms, with WordStar, dBASE, BASIC,
 etc., #12-Isrt:4b
 format, #12:3a
 operating system, #12:4b
 Complex numbers
 general, #11:3a
 addition of, #11:3a
 multiplication of, #11:3a
 CompuServe, #10:1a; #11:8a; #14:10b
 See also: Katz, Joe
 Computational routines, FORTRAN, #15:1b
 COMPUTER CHEF, #14:11b
 Computer Chronicles, The, (TV prgm), #15:9b
 Computer Journal, The, (magazine), #15:8
 Computers, early history of, #14:12a
 Comrex CR-II/III printer, #12-Isrt:3a
 CONTACTS, #10:2a; #11:2b; #12:1b, #13-Isrt:1;
 #14:4b; #15:3b
 Control characters, #10:4a
 Controller boards
 general, #11:1b,7a,8b; #14:11b
 hard-sector, #11:7a; #15-Isrt
 soft-sector, #11:1b; #12:3,4; #13:6a,7a;
 #14:4a,10a; #15:10a,Isrt
 Copper braid, #10:7b
 COPY, #11:7b; #13:4b
 Copyright busting, #10:1a; #14:1b
 Copyright office, #10:1b
 Copyrights, #10:1a,1b; #13:1b; #14:1b
 CP/EM Emulator, HUG's, #11:7b
 CP/M PLUS, #12:8a
 CP/M to HDOS (file transfer), #10:3b
 See also: HDOS to CP/M
 CP/M-80, #10:4a,5b,6; #14:4b,9b; #11:1a,6b,7,
 8a; #12:1b,2b,4b,5,7a,8a,Isrt:4a; #13:1b,
 2b,4b,5a,6b,7,10b,11,12a; #14:4a,8b,11,
 12a; #15:1b,2,7,8,9,10b,11b,12
 CPU circuit board, #13-Isrt:1
 CPU, #10:2; #11:1a,6b,8a; #12:6b; #13:5a;
 #14:6b,7; #15:10
 CRASH,ABS, #12:1a
 CRT, #11:1b; #12:5a; #13:12a
 CSD, #11:7b
 CTOH, #10:4a
 CTRL-'P'atch (by Ron Clifford), #11-Isrt
 CTRL-A, #13:4b
 CTRL-C, #11:7a; #13:3a,5a,10a
 Cumulative index (issues 1 - 9), #10-Isrt
 Custom key caps, #15:8a

- D -

DATA, #12:6,Isrt:4b
 Data blocks, #12:3a
 Database, #10:6a; #12:1a,Isrt:4b; #13:10,11;
 #14:10b; #15:2a
 Dataproducts DP5582, #12-Isrt:3a
 DATESTAMPER, #14:10b

dBASE II, #12-Isrt:4b; #14:4a,10b; #15:2a
 dBASE II Programmer's Notebook (by Steve
 Meyerson), #15:2a
 DDT, #11:6b; #12:6b; #13:1b,2b,3a,12b; #14:
 10a
 Debugging utility, #11:6b
 Defined answers, #13:11a,12a
 Defined fields, #13:10b,11,12a
 Deflection yoke, #13:6a
 Derby, William, #11:7; #13:1a,7b,8a
 Derby utilities, #13:4b,8a
 Derriere, #10:2a
 Des Moines REGISTER (newspaper), #14:12b
 Device drivers, #10:4a; #12-Isrt:3a; #13:
 2a,3a,8b; #15:9a
 See also: HDOS FORTRAN library
 Diablo printer driver, #13:3a
 Diablo printers, #12-Isrt:3a
 Diagnostic utilities, #15:11a
 Digital Research, #12:1b,8a; #14:3b
 DIM, #10:4b
 DIMS (by Dan Dugan), #14:2a
 DIRECT.SYS, #13:8b; #15:6a
 DIRIDL, #15:6b
 Disk Drive Preventive Maintenance (article
 series by Dan Jerome), #10:6b; #11:1a
 Disk exercizer, #13:7a
 Disk Exploration: The DS Kaypro Disk and the
 H-89 (article by Ludovic Van Hamelryck),
 #12:2a
 Disk formatting, #14:10a
 Disk Movers, #14:11a
 DISKFN, #13:5a,6a
 Disks, hard-sector, #14:11a
 DK:, #10:4a
 Doing Math with QUERY13's Calc Report Gener-
 ator (article by Kirk Thompson), #13:10a
 Dot matrix printer, #14:7b
 Double density, #11:8b; #12:2b,3a,4a
 DOW-200, #10:8a
 Downloadable fonts, #11:4b; #12-Isrt:4b
 Drive cleaning kits, #10:8b
 Drive programming, #10:7a; #15:10b
 Drive shields, H-89 internal, #13:6a
 Drive speed test, #10:8b; #11:1a
 Drives, #10:6b,8; #11:1,2a,7a,8b; #12:2,4b;
 #13:4b,6a,7a; #14:9b,10a; #15:10,11b,12,
 Isrt
 See also: Hard-sector, Soft-sector
 Dual-format (HDOS-CP/M) disks, #15:9a
 Dupont Company, #10:8a
 Dust, #11:2a
 Dust covers, #11:2a
 Dynax-Fortis 15/25/35 printer, #12-Isrt:3b

- E -

Early history of computers, #14:12a
 Eastman Kodak, #14:10a
 Eckert, J. Presper, #14:12a
 ED, #12:8b
 ED-A-SKETCH, #14:11b
 EDIT, #12:8b; #13:1b,12a
 See also: Magic Wand
 EDIT19, #12:5a; #13:8a; #14:4b,5,6a; #15:4b,
 5,6
 EDIT19 (by S. and K. Robbins), #12-Isrt:1b
 EDIT19.PRO, #15:5b
 Editorial material, #13:1a
 EDITX.ASM, #13:1b
 EDSAC, #14:12a
 EDVAC, #14:12
 EFORM, #12:2b,4b
 Electrical noise, #13:6a
 Electronic bulletin boards, #10:1a

See also: BBS
 ELIZA, #14:11b
 Elliam Assoc., #10:6a
 EMULATE, #12:2b,4b,5a,Isrt:4b; #14:4a
 Enamel, battleship grey, for H89 cabinet,
 #11:1b
 Enhanced Derby CP/M utilities, #11:7a
 ENIAC, #14:12
 Environment, #11:2a; #13:6a,7b,10a
 Epson printers, #11:4b; #12-Isrt:3; #14:3a,
 8b,11a; #15:9a
 Equation, fractal, #11:2b
 ESC sequences, #13:7a
 Escape codes, #11:6b; #12:8a; #14:9b,10a;
 #15:1,Isrt
 EWOP Software, #12-Isrt:4b
 Extended density, #14:4a

- F -

Factory service department, #13-Isrt:1
 See also: Service fees, Heath factory
 Factory support, #14:4a
 Fair price, #14:1b
 Fale, Henry, #11:2a,8b; #13:3b,7a,8a,Isrt:2;
 #14:3b,8b,9b,11b
 Fan, #11:1b; #13:6; #14:11b
 FBE SPOOLDISK, #14:7b
 Fee-typing, #13:4a
 Felt pressure pad, #15:4a
 FILEBASE dbms, #12-Isrt:4b
 FIND/REPLACE, #10:3a
 First Capitol Computers, #10:6a
 Floating-point calculations, #10:3b
 Floppies, #11:8b; #14:6b
 See also: Disks
 Floppy Disk Computer Services, #10:7a; #11:2a
 Floppy disk drives, #11:8b
 Floppy, #12:2b; #13-Isrt:1
 Floto, Charles, #13:8a,Isrt:2
 Flyback transformer, #13:6a
 FM,ABS, #12:1a
 For sale
 See: CONTACTS
 FOR-NEXT, #10:4b; #13:6b
 Format, #12:4a
 FORMAT.COM, #13:2b,3a; #14:4a
 Formats, disk, #10:6b; #15:2b
 Formats, native 5-1/4", #12:2a
 Formatting, disk, #14:10a
 FORTH, #11:4b; #15:8b
 FORTRAN, #13:5a,6a; #14:6b,7a,11b; #15:1a,4a,
 12a
 FORTRAN library, HDOS (by Rick Lutowski),
 #13:2a
 Four MHz mods, #12-Isrt:4b
 Fractal Graphics on the H89 (article by Lee
 Hart), #11:2b
 Fractals, #10:1a; #11:2b,4; #12-Isrt:3b
 Fractals on the MPI printer, #12-Isrt:3b
 Fragments (article by Hank Lotz), #13:4a

- G -

Gaps, format, #12:3a
 Geisler, Leonard, #10:1a; #12:5b; #13:3b,7;
 #14:11a; #15:9b
 See also: SEBHC Journal
 Genicom 3320 printer, #12-Isrt:3b
 Getting the Most Out of EDIT19 (article ser-
 ies by Dan Jerome), #13:8a; #14:4b; #15:
 4b
 Gibson, Dean, #10:2a
 See also: UtiMeth
 GOSUB, #13:6b

- GOTO, #13:6b
 Graphics, #10:1a; #11:2b,3b,4b; #13:7a
 See also: HDOS FORTRAN library
 Graphite lubricant, #10:8a
 Gray-scale, #11:3b,4a
 Group Bull, #15:9b
 Group Reservation Table (GRT.SYS), #12:1a
 Gustafson, Grant, #12:1a
- H -
- H-17, #11:7a,8a; #15:6b,9
 H-25 printer, #13:3a
 H-37, #11:8; #12-Isrt:4b; #13:8b; #14:11b;
 #15:6b,10a,11b
 H-77, #11:1b,2a; #15:10a,11a
 H-8, #10:2b; #11:8b; #12:4b,7a,Isrt:3a; #13:
 1a,6a; #14:6b,10a,11a
 H-8/19, #10:2b; #12:5a
 H-8/89, #10:4a
 H-88-1 floppy controller, #13:6,Isrt:1; #15:
 10b
 H-88-3 serial interface, #13-Isrt:1
 H-88-9, #13:6b
 H-89, #10:2a; #11:1a,2b,7b,8b; #12:2,4,
 Isrt:4b; #13:6,7b,8a; #14:1b,6b,7b,10b,
 11b; #15:8a,9,10
 H-89/90, #12-Isrt:3a
 H-SC00P, #13:7a,8a,Isrt:1; #14:4a,11b; #15:9b
 H/Z-17 Diagnostic (by Heath Co.), #11-Isrt
 H/Z-37 Diagnostic (by Heath Co.), #11-Isrt
 H/Z-89, #12:5a
 H/Z-89/90, #13:1a
 H/Z-100, #12:5a; #13:1a
 Hair, #11:2a
 Hall, Terry, #13:3b; #15:5b
 See also: Authors, article
 Hard-sector diskettes, #14:11a; #15:10a
 See also: Soft-sector drives
 Hard-sector, #10:6b; #11:7a,8a; #12:2b; #13:
 3a,6a,7a,8b,Isrt:1; #14:10b; #15:3b,4a,
 9b,12,Isrt
 Hardware, public domain, #13:1b
 Hart, Lee, #10:1a,3a; #13:1b,6a; #14:1b,9b,
 11b; #15:8,9b
 See also: Authors, article
 HDOS (general), #10:2a,4a,5b,6; #11:7b,8;
 #12:1a,5a,Isrt:3a,4b; #13:3a,4b,6b,7,8a,
 9b,12a; #14:5a,8b,9b,10b,11; #15:1b,2b,
 7a,8a,9a,10b,11b
 HDOS 1.6, #15:9a
 HDOS 2.0, #10:1b,4a; #11:1a; #12:1,7a; #14:
 9b,11a; #15:3,6,7a,11a,12a
 HDOS 2.0 manual (by Heath Co.), #10:1b;
 #13:2b
 HDOS 2.0 manual (Update), #11-Isrt
 HDOS 2.0 operating system (by Heath Co.),
 #12-Isrt:1a
 HDOS 2.0 source code (by Heath Co.), #12-
 Isrt:1a
 HDOS 3.0, #10:1a,2a,4a; #11:6,7; #12:7; #14:
 9b,11a; #15:3b,6a,7a
 HDOS 3.0 documentation, #14:3a
 HDOS 3.0 operating system (by W.Parrott, R.
 Musgrave), #12-Isrt:1a
 HDOS 3.0 to HDOS 2.0 File Transfer (article
 by William Lindley), #15:6b
 HDOS 3.02 system and manual, #13:3b; #15:3b
 HDOS FORTRAN library (by Rick Lutowski),
 #13:2a
 HDOS source code, assembly of, #15:2b
 HDOS to CP/M (file tranfer), #10:3b
 See also: CP/M to HDOS
 HDOS wizard (Bill Parrott), #11:6b
 HDOSVOL0.SYS, #15:6b
- HDTV, #15:9b
 Head banging, #15:3b
 Head carriage, drive, #10:8
 Head position, print, #12:5b
 Head positioner, drive, #10:8a
 Heads, drive read/write, #10:8b; #12:4a
 Heath Co., #10:1b,2; #11:1; #12:2,3b,4b,
 Isrt:4b; #13:2b,6,Isrt:1; #14:3b,4,11;
 #15:1a,3a,9b,10,11
 Heath factory service fees, #13-Isrt:1;
 #14:11a
 Heath H-25 printer, #13:3a
 Heath Users' Group
 See: HUG
 Heath/Zenith Computers & Electronics, #11:2a
 Heathkit, #10:2a; #11:2a
 Herman, Paul, #13:1a
 Hewlett Packard Laserjet, #14:10b
 High-definition TV, #15:9b
 High-level language(s), #14:7a
 High-voltage corona, #13:6a
 Higher languages, #14:7a
 Hoggies, #14:3b,4a
 Horn Engineering, #15:9a
 How to Get the Most Out of EDIT19 (article
 series by Dan Jerome), #13:8a; #14:4b;
 #15:4b
 Hoyle and Hoyle Software, Inc., #12:1a;
 #13:10a,12a
 HP 2603a, #12-Isrt:3b
 HS-001: General Utilities & Toys (from Quik-
 data), #12-Isrt:1b
 HS-002: Word Processor & Editor (from Quik-
 data), #12-Isrt:1b
 HS-003: H-19 Graphics/printer Pics (from
 Quikdata), #12-Isrt:2a
 HS-004: H-19 Graphics/printer Pics II (from
 Quikdata), #12-Isrt:2a
 HS-005: Misc. BASIC Programs (from Quikdata),
 #12-Isrt:2a
 HS-006: Challenger (from Quikdata), #12-
 Isrt:2a
 HS-007: HDOS 2.0 Patches (from Quikdata),
 #12-Isrt:2a
 HS-008: Selectric & Misc. Drivers (from Quik-
 data), #12-Isrt:2a
 HS-009: Misc. BASIC Programs (from Quikdata),
 #12-Isrt:2a
 HS-010: Multi-key Sort (from Quikdata), #12-
 Isrt:2a
 HS-011: From the U. of Houston (from Quik-
 data), #12-Isrt:2a
 HS-013: Multipurp. DUP/DUMP/H-8 Routines
 (from Quikdata), #12-Isrt:2b
 HS-014: MBASIC Utils & Goodies (from Quik-
 data), #12-Isrt:2b
 HS-016: FHANDLR/RS232C/ALTER (from Quikdata),
 #12-Isrt:2b
 HS-017: Daisygraph (from Quikdata), #12-
 Isrt:2b
 HS-018: MX-80 Support (from Quikdata), #12-
 Isrt:2b
 HS-019: HDOS Utilities (from Quikdata), #12-
 Isrt:2b
 HSORT, #15:7a,8a
 Hub, broken or cracked, #10:6b,7a
 HUG, #10:2; #11:7b; #12:1b,Isrt:4b; #13:1a,
 3,12a; #14:3b; #15:3b,7a,8a,12a
 HUG software engineer, #12:1b
 Huggies, #14:1b,3b,9b
- I -
- IBM, #13-Isrt:2; #14:9b
 IBM 3740 8" format, #12:2a,3a
 IBM Page Printer, #12-Isrt:3b
 IBM Proprinter X24, #14:8b
 IBM-compatible, #14:11a
 Imaginary numbers, #11:3a
 Index, #10:1a; #13:1b; #14:10b; #15:7a
 Index hole, floppy, #12:3a,4a
 Index mark, floppy, #12:3b
 Index marks, format, #12:3a
 Index, cumulative (#'s 1 - 9), #10-Isrt
 INIT.ABS, #11:1a
 INPUT, #10:4a; #13:4b
 Interfaces, #12:2b
 Interleaved sectors, #12:4b
 Inverse video, #13:9b
 See also: Reverse video
 Iowa State College, #14:12a
 Isopropyl alcohol, #10:8
- J -
- jb Technologies, #11:8b
 JDL 750e printer, #12-Isrt:3b
 Jerome, Dan, #11:1a,8a; #13:3b; #15:3b
 See also: Authors, article
 Jorgenson, Tom, #10:2a,6a
 JRT Microdevices, #10:7b
 Juki 6100 printer, #12-Isrt:3b
 Jumper, #10:7; #15:10b
- K -
- Kaftoware Corp., #10:6a; #14:10a
 Katz, Joe, #10:1a,6b; #11:8a
 See also: CompuServe, Zenith Forum
 Kaypro, #10:6b; #12:2,3b,4; #13:7b; #14:4a,
 10b,12a; #15-Isrt
 Key caps, custom, #15:8a
 KEYMAP, #12:8b; #13:1,3a,12
 Keyword, #12:5a
 Kodak, #14:10a
 Kres Engineering, #13:6b
 KX-P1091I printer, #14:7b
 KX-P1092I printer, #14:7b
 KX-P1124 printer, #14:7b,8a
 KX-P3131 printer, #14:7b
 Kyocera Laser printer, #12-Isrt:3b
- L -
- L80, #10:2b
 Language(s), high-level, #14:7a
 Languages and the CPU (article by Hank Lotz),
 #14:6a
 Laws of supply and demand, #14:1b
 Lawsuit, #10:6a; #14:3b
 Letters, #10:1a; #12:1b; #13-Isrt:2; #14:1b;
 #15:1b
 Limited-circulation publications, #13:8a
 Lindley Systems, #11:7b; #14:11a
 Lindley, William, #11:7b; #14:11a
 See also: Authors, article
 LINE INPUT, #10:4a; #13:4b
 LISP/80, #10:5b; #14:11b
 LIST, #13:6b
 Livingston Logic Labs, #10:2a; #15:12b
 See also: LLL
 Livingston, Ray, #10:2a; #14:3b
 LLIST, #10:4b
 LLL, #10:2a; #15:12b
 LOAD, #12:1b; #13:6b
 Lotus 1-2-3, #14:3b
 Lotus Development Corp., #14:3b
 Lotz, Hank, #12:1b; #13:3a; #15:1a
 See also: Authors, article
 Low memory kit for the H-89, #15:9a

LP.DVD, #10:4,5b; #13:8b
 LPRINT, #10:4b; #12:5b,6b,7a
 LQ-2500 printer, Epson, #14:8b
 Lubricant, graphite, #10:8a
 Lucidata Pascal, #10:1a
 See also: Pascal
 Lyben Computer Systems, #11:2a; #14:11a;
 #15:10a

- M -

M-80 macro assembler, #10:2b; #12:6b; #13:6a;
 #15:2b,4a
 Machine language, #10:3a; #14:7a
 Mackintosh, Allan, #14:12b
 Magic Wand, #10:3; #12:5b,8a; #13:1b; #14:3a
 MagicSeries laser printer package, #10:6a
 Magnolia Microsystems, #10:2a; #12:1b,Isrt:
 4b; #14:10a; #15:12b
 Maintenance, #10:6b,8a
 Major surgery, #10:8a
 Mandelbrot set, #11:2b; #15:8b
 equation, #11:2b
 Mannesmann Tally 85/490 printer, #12-Isrt:3b
 Manufacturer, #10:1a,7b
 MAP (by Peter Shkabara), #14:3a
 MATH WHIZ (by Ron Clifford), #11-Isrt
 Mathematical, #10:3b
 Mauchly, John, #14:12
 MBASIC, #10:1a,4; #11:3b,4b; #12:5b,6,7a,
 Isrt:3b,4b; #13:4,5a; #15:4
 Media conversion, #11:8a; #14:12a
 Media Ministries, #12:2a
 MEGAPIP, #11:6a
 MEI Microcenter, #11:8a
 Microcomputing (magazine), #10:8a; #13-Isrt:2
 Micronics Technology, #11:7b,8a; #14:10b
 MicroPro, #12-Isrt:3; #14:12a
 Microsoft, #10:1; #11:4b; #12:6b; #13:6a;
 #14:3b; #15:1b,4
 Midwestern Diskette, #15:10a
 Mini-conference, #13:3b
 MISCELLANY, #12:1b; #13:12a; #14:12a; #15:
 12a,Isrt
 Mnemonics, #14:7a; #15:1b,2a
 Mollenhoff, Clark, #14:12b
 Morrow, #14:4a,12a
 Moss, William, #12:7b
 MOVPCM, #15:12b,Isrt
 MPI printers, #14:11a
 MSDOS, #10:5b; #13:12a; #14:10b,11a; #15:
 8b,9a
 MTLIST (by Darrel Pelan), #14:2b
 MTMDM, #14:10b
 MTMDM (by Darrel Pelan)
 CP/M, #14:2b
 HDOS, #14:3a
 Mu-metal shield, #13:6a
 Musgrave, Richard, #11:6a; #13:3b
 MX missile, #12:8a
 MX-80, #10:2b; #15:9a
 MYCALC, #10:5b; #14:11b
 MYCHESS, #14:11b
 MYSPELL, #10:5b; #14:11b

- N -

Native 5-14" floppy formats, #12:2a
 Neanderthal, #13:1a,8a; #15:9b
 Near-letter quality, #14:8a
 NEC ELF 360 printer, #12-Isrt:3b
 NEC/C.Itoh printers, #14:11a
 New Developments in HDOS 3.0 (article by
 Richard Streeter), #11:6a
 New Prize Printer, A (article by Dan Jerome),

#14:7b
 NewLine Software, #10:1
 Nisho NP-910/2410 printer, #12-Isrt:3b
 Non-standard hardware/software, #13:8a
 Northwest Digital graphics board, #11:4a
 Shell-Metzner sort, #15:7a
 Numbers, real, imaginary, and complex, #11:3a
 Numerical Recipes: The Art of Scientific Com-
 putation (book), #15:1b
 NZ.COM, #14:10b

- O -

Obituary, Sextant/BUSS, #13-Isrt:2
 Of Reserved Tracks, Pie and Wand (article by
 Lee Hart), #10:3a
 Okidata printers, #10:4a; #11:3b,4b; #14:11a
 See also: Printers
 Olympia ESW 2000C printer, #12-Isrt:3b
 Opcodes, #11:6a; #12:6b; #14:6b,7
 Osborne, #10:6b; #12:2a; #14:10b,12a

- P -

Pad, felt pressure, #15:4a
 Panasonic disk drives, #10:7a
 Panasonic printers, #12-Isrt:3b; #14:7b,9b
 Paper clips, #10:7a
 Parrott, William, #11:6; #13:6b
 Pascal, Turbo, #11:4b,8a; #12-Isrt:4b; #14:
 3b; #15:8b
 Pascal, #10:1a; #11:8a; #13:10a; #14:6b;
 #15:8b,9a
 PATCH (by William Rink), #11-Isrt
 Patch
 general, #11:6b,7a; #12:1a,6b,7a; #13:2b,
 3a,4b; #14:4a
 for MP.ABS, #11:6b
 for SYSCMD.SYS, #11:6b
 Patents, #14:12b
 PC Tech Journal, #13-Isrt:2
 PC-clone, #11:3b
 PC-FILE 80, #14:10
 PC89LINK, #14:11a
 PCPT, #14:11b
 PeachText, #10:3a; #12:5b,8a; #13:12b
 PeachText 5000, #10:3a
 Pelan, Darrell, #11:7b; #14:10b
 Peripherals, #14:6b
 Picture tube, #13:6a
 PIE (editor), #10:3a,5b; #11:8a; #12:7b,8;
 #12:8b; #14:3a,11b
 PIP, #10:5a, #11:6,7; #12:7b; #13:4b,6b;
 #15:6a
 Piracy, software, #11:7b; #14:1b
 Plu*perfect Systems, #12-Isrt:4a; #14:10b
 POKE, #12:6a
 Ports, #10:4a; #14:6b
 Positioner, drive head, #10:8a
 Postal Service, U.S., #14:1a
 Power transformer, #13:6a
 Pre-compensation (on soft-sector controller),
 #15:11b
 Prime 90, #12-Isrt:3b
 Printer alternatives, #12-Isrt:3a
 Printer codes, #12:8; #13:10b; #15-Isrt
 Printer drivers, #13:3a
 Printers
 general, #12-Isrt:3; #13:12a; #14:6b
 dot matrix, #14:7b
 newer 24-pin, #11:7b
 See also specific makes/models
 Professionals, #15:8b
 Program listings
 DISKFN.MAC (for FORTRAN), #13:5a

HSORT mods for HUG's pkg, #15:7a
 incrementing counts in QUERY!3 CALC,
 #13:11b
 MANDEL.BAS, #11:4b
 MPI 99 subroutine for Mandelbrot set,
 #12-Isrt:3b
 READLP.BAS, #10:5a
 subroutine to send tabs to printer (ASM &
 MBASIC), #12:6a
 Programming languages, #14:6a
 Programming plug, drive, #10:7; #15:10b,11,
 12a
 Programming socket, drive, #10:7
 Promotional, circulation, #14:1a
 Protocols, #10:4a; #12:2b,4b
 Public domain hardware, #13:1b
 Public domain software, #10:1,2a,6a; #11:8a;
 #12:1b,5,8a,Isrt:4a; #13:1b,7a; #14:1b,
 3b,10b; #15:4b,9a

- Q -

Q-tips, #10:8a
 QMS KISS, #12-Isrt:3b
 QSE/LABEL.BAS (by Bob Phillips), #14:3a
 Quality, #14:1
 QUERY!2 dbms, #13:10b
 QUERY!3 dbms, #12:1a; #13:10a,12a; #15-Isrt
 Quikdata, Inc., #10:2a,6b,7a; #11:2a,8b; #12:
 8a; #13:3a,6a,7a; #14:8b,11b; #15:1b,12
 Quill brand diskettes, #11:8b
 Qume Letterpro Plus, #12-Isrt:3b

- R -

R/W head, #12:4a
 Radio Shack, #10:8a; #12-Isrt:4a
 Random I/O, #10:4a
 Rank newcomer, #14:6a
 RATFOR (FORTRAN preprocessor), #14:11b; #15:
 1b
 Rawn video tape and head cleaner, #10:4b
 REACH (modem program), #11:8a
 READ, #12:6a
 Real numbers, #11:3a
 Registers, CPU, #13:5a; #14:6b
 REMark (magazine), #10:6b; #14:4a,11a; #15:8a
 Renewal, #14:1a; #15:1b
 Retrofit the H89/H77 for Double-sided, 96-tpi
 Drives (article by Witham Reeve), #15:10a
 RETURN, #13:6b
 Reverse video, #12:8b; #13:6b,7a; #15-Isrt
 Richards, R.K., #14:12b
 Rotron fan, #11:1b
 Royal typewriters, #10:2b

- S -

S-MAIL (by Steve Meyerson), #15:2a
 Sappers, #10:2a
 SAVE, #13:1b,6b
 SCALL(s), #13:2b
 SCAN, #11:7a; #13:4b
 Schlumberger, Ltd., #15:9b
 Scientific American (magazine), #11:2b; #14:
 12b
 SD, #11:7b; #13:4b
 SEBHC Journal (newsletter), #10:1a,6b; #12:
 5b,6a; #13:1b,3b,7a,8a; #14:4a,11a; #15:
 9b
 See also: Geisler, Leonard
 Sector data field, #12:3a
 Sector ID labels, #12:3a
 Serial chip, 8250, #11:8a
 Serial interface board, #11:8a; #13-Isrt:1;

#14:7b,8
 Serial ports, #14:11a
 Serial/parallel port converter, #12-Isrt:4b
 Service, #11:1a; #14:11a
 Service fees, Heath factory, #13-Isrt:1;
 #14:11a
 Set Help Addition for UD.DVD (article by Bernard Waltuck), #10:4a
 Sextant (magazine), #10:6b; #13:8a,Isrt:1,2;
 #14:4a; #15:8a,9a
 Sextant Publishing, #13:8a,Isrt:1
 Shkabara, Peter, #12-Isrt:4a; #14:4a
 Shugart disk drives, #10:7a; #15:12a
 Siemens disk drives, #10:7a,8a; #11:2a,8b;
 #12-Isrt:4b; #15:4a,10,11,Isrt
 SIG/M, #12:8a; #15:9b
 Single density recording, #12:2,3a
 SK-203 (printer buffer), #10:2a
 Small claims court, #10:1b
 Smith-Corona D200, #12-Isrt:3b
 Smoking, #11:2a
 Soft-sector
 general, #10:2; #11:1,8b; #12:2; #13-
 Isrt:1; #15-Isrt
 controller, #13:6a, #15:11b
 diskettes, #15:10a
 Software, #10:1,2,3b,6a; #11:7b,8; #12:1a,2,
 5,8b,Isrt:4a; #13:1a,3a,7,12a,Isrt:2;
 #14:1b,3b,4,7b,8a,10,11; #15:8a,9a,11a
 Software listings, #11-Isrt; #12-Isrt;
 #13:1a,2a; #14:2a; #15:2a
 Software Toolworks, #10:1a,5b,6a; #11:8a;
 #12:5a,Isrt:4b; #13:7a; #14:3b,11b;
 #15:1b
 Software Wizardry, #10:6a; #12:1a
 Software/support crunch, #14:4a
 Sort, Shell-Metzner, #15:7a
 See also: HDOS FORTRAN Library
 SP-60, #10:8a
 Spectre Technologies, #10:6a
 SPELL, #14:11b
 Sperry Rand, #14:12b
 Spite Software, #10:6a
 Split-screen conferencing, #14:10b
 SPOOL-N-60, #14:11b
 Square One for Computerfiles, Pt. 1 (article
 by Hank Lotz), #14:6a
 Star Micronics printers, #12-Isrt:3a
 Star NL-10/RADIX 15 printers, #12-Isrt:3b
 Staunch 8/89'er, The, #10:1b; #12:5b; #14:4a
 Stealing, #14:1b
 Stop Your Clock! (article by Terry Hall),
 #15:6a
 Streeter, Richard, #10:1a
 See also: Authors, article
 String, #12:6b,7a
 String too long error, MBASIC's, #12:7a
 SUB, #11:7b; #13:4b
 SUBMIT, #11:7b; #12:1b; #13:8a
 Subscriptions, #13:7b,11a,Isrt:2; #14:1a,4a
 Sunflower Software, #12-Isrt:4b
 Super SYSMOD, #11:6a
 Super ZAP, #10:5b; #14:11b
 Super-19 (terminal ROM), #11:7b; #13:6b
 SUPERCALC, #10:2a
 Superclock, #13:6b; #15:4b,6a
 Supermath1, #10:2b
 SuperRAM89, #12:1a
 Superset, #11:4a,7a; #13:6b; #15:4b
 Swab, #10:8
 Swap
 See: CONTACTS
 Swayne, Pat, #12:1b; #13:1,4b; #15:7a,8b
 SYSQMD.SYS, #11:6a,7a
 SYSGEN, #15-Isrt

SZAP, #10:5b; #14:11b
 - T -
 T & E associates, #12:1a
 Tab character, #10:3a; #12:5b,6b,7a; #14:5b
 Tandon disk drives, #10:6b,7; #11:2a; #15:
 10,11,Isrt
 Tape head cleaner, #10:8b
 Task, #15:6a
 Task function, expanded, for HDOS 3.02,
 #11:6b
 Teflon, #10:8
 Televideo, #14:4a,12a
 Terminal, H-19, #10:7b; #11:6a,8a; #12:7a;
 #15:1b
 Terminal bell (ASCII code 7), #15-Isrt
 Terminal code chart, #15:1a
 Terminal codes, #14:10a; #15-Isrt
 Terminal I/O, #13:5a
 Terminal logic board, #13-Isrt:1
 TEST17 (diagnostic utility), #11:1a
 TEST37 (diagnostic utility), #11:1a; #15:11a
 Text, #10:5b; #11:8a; #14:11b
 Text capture, #14:10b
 TextTools, #12:5a
 Thompson and Fambry Inc., #10:8a
 TI 850/857, #12-Isrt:3b
 Tigertronics, #12-Isrt:4b
 TMSI, #13:6a; #14:9b
 Todd, Robert, Jr., #12:8a; #15:9b
 Toolworks C, #10:5b
 Toscano, John P., #14:7b
 Transformer
 flyback, #13:6a
 power, #13:6a
 Tri-Flow lubricant, #10:8a
 Trigonometry, #11:3a
 TT, #10:5a
 Turbo Pascal, #11:4b,8a; #12-Isrt:4b; #14:3b;
 #15:8b,9a
 See also: Pascal
 Turbo Pascal Advanced Applications (book),
 #15:9a
 TV, high-definition, #15:9b
 Two Bad Problems with Tabs in MBASIC (article
 by Hank Lotz), #12:5b
 TXTPRO, #10:1b; #12:8a

- U -

UD.COM, #14:8b
 UD.DVD, #10:4a; #14:8b
 UDUMP, #12:1a; #15:6a
 Ultimate printer drivers, #11:7b; #14:11a
 UtiMeth, #15:12a
 See also: Gibson, Dean
 UtiMeth hard-sector device driver (HDOS),
 #15:12a
 Ultra-ROM, #13:6b
 UNARC16 (by Robert Freed), #14:2b
 UNIVAC, #14:12b
 University of Pennsylvania, #14:12b
 UNKEY.ASM, #13:1b
 UPC printer drivers, #11:7b; #14:11a
 User-programmable-character printer drivers,
 #11:7b; #14:11a
 UTL, #12-Isrt:4b
 UVMAC, #10:2a; #14:11b

- V -

VCR head cleaner, #10:8b
 VCR swab, #10:8b
 VDE, #12:8; #13:3a

VDE (by Eric Meyer), #12-Isrt:1a
 VENDOR.UPDATE, #10:5b; #11:7a; #12:5a,Isrt:
 4a; #13:1b,8a,Isrt:1; #14:9b; #15:8a
 Vendors, #10:5b; #11:7b,8b; #12:5a; #13:8a,
 Isrt:2; #14:1b,4a; #15:9a
 Very Welcome Mod for HUG's HSHORT Utility (ar-
 ticle by Hank Lotz), #15:7a
 Video, #10:8a; #11:1b
 Video, reverse
 See Reverse video
 Video board, #11:1b
 Vulcan's Computer Buyer's Guide, #15:10a

- W -

Waltuck, Bernard, #10:4b
 See also: Authors, article
 Wangco drives, #15:11b
 Wanted
 See CONTACTS
 WD1797 chip, Western Digital, #12:3
 Western Digital controller chip, #14:4a
 WH-88-16 memory expansion board, #13-Isrt:1
 Whisper fan, #11:1b
 WIDTH, #12:6b,7a
 WIN89 harddisk system, #11:8a; #14:11a
 WordStar, #10:2a,6; #12:8,Isrt:1a,3,4b; #14:
 3a,12a
 Worm gear, #10:8a
 Wraparound, terminal, #12:7a; #13:4b
 WRITE-HAND-MAN, #10:3b; #14:3b
 WWIG, #14:11b

- X -

XMODEM, #11:8a
 XMODEM file transfers, #11:8a; #14:10b

- Z -

Z-67, #11:2b
 Z-100, #11:3b,7b
 Z-100 LIFELINE (newsletter), #13:1a,8a
 Z-89-37 controller, #12:3b
 Z-LETTER, The, (newsletter), #15:8b
 Z-system, #10:6b; #12:1b,Isrt:4b; #15:8b
 Z3PLUS, #12-Isrt:4b
 Z80 CPU, #10:3b; #11:6a; #12:8a; #14:6b,11b;
 #15:2a,8b
 Z80 Software Gourmet Guide and Cookbook
 (book), #10:3b
 Z80/8080 Assembler (by John Curtis), #11-Isrt
 Z8E (by Rick Surwillo), #15:2a
 ZCPR, #12:1b,Isrt:4b; #13:8a; #15:8b
 Zenith, #10:1a; #11:2a; #12:1b,4a; #14:11b;
 #15:9b
 Zenith Data Systems, #12:1b; #15:9b
 Zenith Forum (CompuServe), #10:6b; #14:10b
 ZNOTE89 BBS, #10:6b
 ZS-DOS, #14:10b; #15:8b

MISCELLANY

HDOS 2.0 and 3.02 Compared. [From Dan Jerome, Burnsville, MN] "Just a few reflections follow on the differences between HDOS 2.0 and HDOS 3.02:

"**DEVICE DRIVERS:** The same device drivers used on HDOS 2.0 may not work on HDOS 3.02. For instance, the famous 'UD.DVD' will not work, and indeed it will crash your HDOS 3.02 disk. Bill Lindley has a very nice printer driver called the 'Ultimate Driver,' and this driver will work well on either version of HDOS. [A review of this driver will appear later in the year. -Ed.]

"**'TT.DVD,'** which controls the screen, is now a system file, rather than the 'hidden file' as it is incorporated in HDOS 2.0.

"HDOS 2.0 limits you to 5 device drivers (i.e., a program with a filename extension of .DVD.) In HDOS 3.02, one can load numerous device drivers. In addition, by a simple command from the HDOS prompt, HDOS 3.02 will allow you to load and unload device drivers at will.

"**BINARY PROGRAMS:** Most of the HDOS 2.0 .ABS files will cross over with no problem. For instance, QUERY database and the T&E Utilities. However, some programs just refuse to run. If you care to experiment with this, you probably will not damage your disk. I never have, but there is always the exception. To insure against such a problem, keep 2 or 3 current copies of your main system disk.

"**INIT AND SYSGEN:** INIT and SYSGEN are much more convenient to use on HDOS 3.02, since when you finish with a new disk, the system disk remounts automatically. This is much less nerve-racking than the old system.

"In HDOS 3.02, one is limited to 16 sectors-per-track [on soft-sector], which is the HDOS 2.0 version's standard.

"**OVERLAYS:** HDOS 3.02 has no overlays. The entire nucleus of the system is found in one file, 'HDOS30.SYS' at 40 sectors. Other system files are similar: 'DIRECT.SYS,' 'GRT.SYS,' 'RGT.SYS,' 'SYS-CMD.SYS,' and 'PIP.ABS.' The 'SYSCMD.SYS' and the 'PIP.ABS' files have been greatly enhanced to produce many new commands and features. You will amazed what this new version can do when you first start working with it.

"**AUTOEXEC.BAT:** This facility is also a part of the new HDOS. It is capable of performing many wonders, but most people use it to customize their prompt and to start the software clock, which also requires 'CLOCK.TAS' ('CLOCK89.TAS' is used if you have a D-G Electronics super CPU.) This batch file can execute any series of commands limited only by your own imagination.

"**ERRORMSG.SYS:** This file goes by the same name as the one used in HDOS 2.0, but a close inspection of the file indicates that it is really quite different. Many new error messages have been included and some of the old ones have been modified to provide better descriptions.

"**SUMMARY:** Naturally, there are many new features of HDOS 3.02 that I cannot include in this brief summary, therefore only random highlights have been covered. As for my own opinion, I much prefer working with HDOS 3.02 than either CP/M-80 or HDOS 2.0. There is that much improvement... It's my personal opinion that those who programmed HDOS 3.02 must have been half magician."

A Menu-Driven Front-End Using Derby's SUB.COM. There are occasions when CP/M's SUBMIT facility simply doesn't cut the mustard. For example, you may have an application you use very rarely, so you might want to display a **menu** at bootup as an initial guide, make a selection from it, and then continue with one or more other batch files before exiting to CP/M. SUBMIT doesn't permit this con-

veniently.

I encountered this very situation recently when I set up Spite Software's SUPERDEX package to prepare the annual index for this issue. I wanted to use **both** WordStar (with HUG's KEYMAPper) and PeachText from the same disk. (WordStar is required because SUPERDEX expects to see its files as source for an index. I also didn't want to learn all those CTRL codes WS requires, hence KEYMAP and one of my keyboard overlays [see the insert to **Staunch #7**] to tell me which keys do what. Some of my editing [more than I expected as it turned out!] would be performed with old, familiar PeachText.)

But with KEYMAP automatically loaded on cold-boot, there was a conflict since PeachText expects **different** sequences than WordStar from the special function keys and keypad. To use the latter, I would have to **unload** KEYMAP manually (using Bill Derby's UNKEY [see **Staunch #13**, p. 1]) or come up with another approach to the problem. Enter Bill's SUB.COM, an "enhanced" SUBMIT utility that features, among other things, an interactive mode and the ability to call **other** batch files from that mode's prompt.

The key to the solution was to put off loading KEYMAP till **after** the menu. There was where I would select whether to load it in preparation to using WordStar or simply exit to use PeachText or whatever. Presenting the menu and activating SUB's interactive mode is simplicity itself. Here's my cold boot .SUB file:

```
;SETTING SYSTEM SPEED...
CLOCK 4
;
;           WORDSTAR/SUPERDEX
;           START-UP MENU
;
;           W . TO LOAD KEYMAP FOR 'WORDSTAR'
;           <RETURN> . TO EXIT TO SYSTEM
SUB
```

Comments are, as usual under CP/M, preceded by a semicolon. These merely tell me what's going on and display the menu I'm after. The only actual commands in this file are "CLOCK 4", which kicks the system clock up to 4 MHz, and "SUB". The crux of this batch file is that last command, "SUB". This puts SUB.COM into its interactive mode and this is indicated by a semicolon (;) prompt.

At this point, I can either key another command (such as the "W" suggested by the menu) or hit return to exit. When I press "W" and <RETURN>, SUB looks for **another** batch file with the name W.SUB and executes the commands in it. In my case, this second batch file is:

```
;
;LOADING KEYMAP FOR WORDSTAR...
KEYWS T
;
;           PRESS <RETURN> TO EXIT
```

As in the previous example, the comments tell me what's going on or what to do. The "KEYWS T" loads KEYMAP **above** the operating system since I normally set the top of available memory to 63K. That makes room for utilities such as KEYMAP or C.D.R.'s RAMdrive software so they are completely out of the way.

But one thing to remember is that once SUB.COM's interactive mode is activated, the **only** escape to the operating system is by pressing <RETURN>. And this is what I'm prompting immediately above after KEYMAP loads.

SUB.COM is part of a package of enhanced utilities for CP/M and can be ordered for \$25 from William Derby at: P.O. Box 2041, Livermore, CA 94550, 415-443-1741 (after 6 pm, Pacific time). For more information on them, see issue #'s 11 (p. 7) and 13 (p. 7). Finally, my thanks to Bill for clarifying the use of SUB's interactive mode.

diodes, and so generate 1/2 the heat. I don't know of a pre-built Schottky bridge, but you can buy four individual 10-amp 50 PIV Schottky diodes from Mouser for \$4.30 each. Install them H19-style on the power supply board, taking care that their integral heatsink tabs don't touch.

Note that a Schottky bridge raises the unregulated +8.5v supply about 1 volt. Thus it doesn't change the total amount of heat generated; it just relocates it to the +5v regulators. But it is useful if you're using an H19 transformer.

The H19 power transformer is a bit smaller, and can be recognized because it mounts to the inner set of holes on the bottom of the case. Here's what an H89 power supply actually delivers with each of these transformers:

Supply voltage	H89 transformer	H19 transformer
-----	-----	-----
+8v supply	+10v @ 5 amps	+8v @ 4 amps
+18v supply	+20v @ 2.5 amps	+18v @ 250 mA
-18v supply	-20v @ 250 mA	-18v @ 250 mA

The main drawback is that you can't run any internal disk drives; there isn't enough +12v power available. The current rating of the +8v supply is slightly lower, though it doesn't matter much since 1 amp of it used to go to internal disk drives.

The main advantage of the H19 transformer is efficiency; it puts out HALF the heat thanks to its lower unregulated voltages. The voltage regulators in the power supply have to knock these unregulated voltages down as needed, burning up the difference as heat. For instance, the H89 drops +10v down to +5v at 5 amps, which generates $(10-5)*5 = 5*5 = 25$ watts of waste heat. The H19 transformer reduces this to $(8-5)*4 = 12$ watts.

The higher voltages were needed by the 78H05 and 78H12 voltage regulators, which quit working if their input falls within 3.5v of their output. So Heath upped the voltages from the H89 power transformer to meet this minimum even with low AC line voltages.

Installing an H19 transformer is easy. It mounts the same, and has identical leads and color codes. The 78H05 (+5v 5amp) regulator should be replaced with an LM323K (+5v 3amp, \$3.49 from Jameco) which works fine with the lower input voltage. The +12v and second +5v regulators are no longer needed without internal disk drives, but can be left in place.

The Alphabet Soup of IC Numbers. The TTL family of integrated circuits is 20 years old, and still going strong. Their functions have become as standardized as screw threads. New high-tech versions are available that offer speed and power advantages, yet drop right into the same sockets as the original parts.

CMOS in particular has come of age. Originally a slow, micropower technology for battery-operated watches and calculators, CMOS has improved to be just as fast as TTL, yet takes a tiny fraction of the power. Thanks to CMOS my H-1000 has twice the speed and 16 times the memory, yet takes no more power than a stock H89. My Z89-37 soft-sector controller runs on 150mA, not the 300mA of Heath's. My Low-Power, Flicker-Free, and Superset kits cut

power consumption by 100-300mA each. An H89 with all of them winds up taking HALF the power. That's why my H89 doesn't need a fan!

I've been using CMOS for years, even though it costs more. But most companies couldn't care less about power or heat buildup (after all, YOU pay the electric bill and repair costs). So most of your H89 boards are stuffed full of power-hungry chips. But that can be fixed. Most of them are in sockets, and IC prices are so low that \$50 will replace half the chips in your system!

A discussion on nomenclature is now in order. IC part numbers generally follow a code. They begin with 1 or more letters, specifying the manufacturer. Next come 2 digits (74~, 27~) to specify the family to which the part belongs (logic, memory). Then come a series of letters, describing the performance (L=low power, C=CMOS, etc.). Next another series of 1-3 digits, which is the actual part number. Finally, 1 or more letters to specify the type of package (plastic, ceramic). Thus SN74LS00N translates to:

```

                                     made by Texas Instruments
      /-----/-----/-----/-----/-----/-----/
     / / / / / / / / / / / / / / / / / / / / / / / / / / / /
    / / / / / / / / / / / / / / / / / / / / / / / / / / / /
   / / / / / / / / / / / / / / / / / / / / / / / / / / / /
  / / / / / / / / / / / / / / / / / / / / / / / / / / / /
 / / / / / / / / / / / / / / / / / / / / / / / / / / / /
/ / / / / / / / / / / / / / / / / / / / / / / / / / / /
SN 74 L S 00 N

```

The manufacturer's code and case style letters are usually left off for talking purposes. The vast majority of parts are interchangeable regardless of manufacturer or case style.

So here's the trick. Replace each 74LS- IC with its equivalent 74HC- or 74HCT- part (H=high speed, C=CMOS, T=TTL compatible). For example, a 74LS00 can be replaced by a 74HCT00 to cut power consumption 10:1 or more. The 'T' option is not necessary, but guarantees compatibility when 74LS and 74HC parts are intermixed. Likewise, 74S- parts can be replaced by 74F- (F=fast) for a 4:1 power savings. Just look them up in a Jameco or Digikey catalog.

Sometimes engineers use logic gates in a non-logical manner. In such cases a CMOS part may not work, or may require other circuit changes. If there are resistors and capacitor on the IC's inputs, a CMOS replacement may not work quite the same. On the H89 CPU board, this means U501 (the crystal oscillator), and U562 (dynamic RAM timing) should be left alone, or the RC values trimmed to produce the same time delays.

Finally, there are a few ICs that can be removed entirely. If you never run HDOS 1.6 or 2.0 with hard-sector disks, U522-25 can be removed, to save 50 mA each. The hard-sector board can be removed entirely if you don't use H17 disks. If you don't need all 3 serial ports, remove U603, U607, and U608 from the 3-port board to save 80 mA.

Suppliers. I've found the following companies to be reliable sources of the parts mentioned in this article. Jameco is usually cheapest, but often supplies surplus parts. Digi-Key and Mouser sell new parts.

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097

Digi-Key Corp.
701 S. Brooks Ave.
Thief River Falls, MN 56701
(800) 344-4539

Mouser Electronics
2401 Hwy. 287 N.
Mansfield, TX 76063
(800) 346-6873

[If you're interested in a package price on the parts mentioned in this article, contact Lee at his new address:

TMSI c/o Lee Hart
323 West 19th Street
Holland, MI 49423
(616) 396-5085

He also phoned me in late November and mentioned that he hasn't yet made the minimum order of 50 H-88-9-style, sheet metal, internal disk drive shields for the '89 he discussed in issue #13 (p. 6). This is highly recommended if you're running internal soft-sector drive(s) of **any** type. See also Witham Reeve's article in #15 (p. 10). Price of the sheet metal parts (only) is \$15; a full kit to modify an '89 for installation of internal full- or half-height drive(s) is \$25. This **may** be the last call, so don't miss the opportunity! ~Ed.]

=====

CONTACTS

(A Wanted/For Sale/Swap Column)

Emil Riedel (2301 St. Francis, Sulphur, LA 70063)
"I have some items to get rid of--sale/free:

Perkin-Elmer printer - free
DEC LA-36 - free
4 ~ H89's - various systems & prices negotiable
Box of electronics parts & old projects - \$20

"Interested parties can write or leave a message at 318/625-8991. Shipping costs will be added to all prices."

Julian Loui (8 Summer Lane, Framingham, MA 01701; referred by Pat Swayne, HUG Software Engineer)
"Early this year I purchased Magnolia's 128K RAM hardware/software package for my 64K H89, thinking that I might be able to use it under my Heath CP/M operating system. At least that was the impression the owner of Magnolia gave me when I placed my order.

"After the merchandise arrived, I had no difficulty in installing the hardware. However, the software was a completely different story. When I called up Magnolia's owner, he just shrugged off the matter and said that he could not help me since I was not using Magnolia's CP/M. Nor did he let me talk to some of his customers who had been using his 128K RAM (disk) under Heath's CP/M. Unfortunately, the original vendor of this package's software is no longer around.

"I will appreciate it very much if you can give me some pointers in this matter or names of some HUG members who have installed this package under

Heath's CP/M...."

Harold Harfoot (Electronic Control Service, 4430 S.W. 34th Drive, Ft. Lauderdale, FL 33312, home: 305-983-8193) "Still need schematics and/or some info. on Z-67. I have [the] Z-67 Winchester drive system operational manual and Z-67 Software utilities, including 8" floppy to set up disk. (I got 2 of the Memorex 101 EOM drives, a Z-67 controller board for inside the Z-67 and a spare Z-67 interface card.) I have tech manuals on the drives and some info. in the original manual. Also I need a card/controller board and 5-1/4" Winchester for an outboard H89 (for MSDOS operation)."

Dale Welty (6372 Cymal St, Anaheim, CA 92807) "I have some magazines I would donate to anyone willing to pay shipping. They include:

Sextant, issues 1 thru 28

REMark, several years

Microsystems Journal, Mar 85 - Dec 88

Computer Language, Sep 84 - Sep 88

Dr. Dobb's Journal, Jul 82 - Aug 88"

Robert E. Hedgcock (5445 E. Harbor Drive, Fruitland Park, FL 34731, 904-728-8198) "...[A]fter much anguish and [in] view of the fact I no longer have room for my H 89 (and all its stuff) and have two other computers (Z 151 and portable) I have made the very difficult decision to sell my H 89. This is like parting with one of my children but I no longer have a place to put it ... This system has been lightly used and has never been abused." [Compiled from a two-page inventory: system -- green CRT, 64K, internal standard hard-sector drive, two external 96-tpi soft-sector drives in cabinet with controller, cassette interface (not installed), dust covers, temperamental Diablo 1355 w/ external power supply and Design Technology serial interface; hardware manuals; system software -- CP/M 2.2.03 and 2.2.04, HDOS 2.0; applications -- BASIC-80, Cobol-80, SuperCalc, ROOTS89, ROOTS/M, Excalibur DBMS, SuperSort, WordStar, Magic Wand; hard- and soft-sector diskettes.]

Wallace Barford (Box 352, Mocksville, NC 27028, 919-998-2789) "FOR SALE: **NEW** CDR RAM II board with SASISOFT Version 1.0 RAM 89 Hard Disk Software and Instruction Manual unopened in original box, \$250 w/o chips what are not needed to install hard drive. Add chips to increase RAM from 512K to 1 Meg. Price includes shipping and insurance...."

John Barford (P.O. Box 434, Hudson, NY 12534, 518-828-5994) "FOR SALE: H89 with 6MHz Speed Up, Hard Sector Drive, 1 40-Track and 1 80-Track both soft sector drives, 20 Meg Hard Drive, CDR RAM boards with 1 Meg of RAM, 64K Angel Print Buffer, Anapro [CPC] and Emulate software, and an MPI Printer. All in running condition. Software included: Magic Wand, Supercalc, BASIC-80 and Compiler, Cobol, FORTRAN, QUERY!2, and more. Will sell as complete system for only \$800 or best offer...."

Ed J. Skrobiszewski (2455 S. 550 W., Perry, UT 84302) "I ... have the following H89 items for sale (prices include shipping cost):

1. Quick 'P' Parallel Interface Board	\$45.00
2. H89 Replacement Backplate - Kres Eng.	\$12.00
3. MAG/base Database Mngt. System	\$55.00
4. ABACUS Accounting Program	\$30.00
5. Mitsubishi M2896 8" Disk Drive	\$55.00
6. H77 Power Supply w/2 Tandon 100-2	\$90.00

"The Quick P board and the 8" drive are brand new; never used. The MAG/base DBM program is on 8" disks, however I transferred it to CP/M H89 DSDD disks. I can also put it on 5-1/4 hard-sector disks if someone is interested in it."

Dick Shotwell (546 Grandview Drive N., Twin Falls, ID 83301) "FOR SALE. A complete H-11 system including a board so the system will run CP/M. Write for a complete list of components and price (which is very reasonable!).

"Operational H89 with an onboard hard sector drive, an outboard H77 dual hard sector drive and a 267 10MB hard disk sub-system. The hard disk is not working but probably can be fixed by someone smarter than me. \$300.00 for the whole system. You pay the freight."

David E. Young (402 Houghton St., Ontonagon, MI 49953) "Wanted: A Magnolia RAM Expansion and RAMdisk software."

Thomas Hayton (RD#1 Box 1885, Arlington, VT 05250, 802-375-9504) "Your Issue #15 discusses doubling Hard-Sector capacity. I have several suitable double sided drives which I intend to mount in several different configurations in my three drive H89A.

"Question: **REMark** #32, Sept. 1982, published an article by Van C. Baker - 'Expanding Your H89 Disk Space on a Shoestring Budget'. It does not contain enough information for my purposes. Perhaps some of your readers have explored the problem further. If so I would like to hear from them."

Dominic Pruccacino (P.O. Box 3028, Hartford, CT 06103) "Where can I get a used Heath H-11 with HT-11 and the 8 inch drives? I know RT-11, FORTRAN-IV, BASIC-11, MACRO-11 and I would be delighted if I could find one working and cheaply available...."

=====

Pete on CP/M
by Peter Shkabara

Topic: Patches to CONFIGUR.COM

...I had a bit of time to look over the files [for patching CONFIGUR and MOVCPM] and found some clarification to the patches but also noted that much of the work was done with DSD (a DDT type of product) in real time. What this means is that some of the patches where never documented. The listings I sent to you represent an attempt to record the changes after the fact! Note that there were some errors in the listing for version 03 of CONFIGUR. Let this be a reminder to all those hackers out there that documentation is important for future reference.

I will now attempt to explain the internal operation of CONFIGUR and try to clarify the meaning of the listing entries. Some of the less obvious

things that the program does is check for the version of BIOS, version of BDOS, the s/n of BDOS and allows patching of the BDOS to eliminate the ECHO ON DELETE. For normal operation, this is all ok. But if an advanced user begins to modify the system by adding ZRDOS or ZSDOS, the various checks may prove to be disastrous. The following locations in CONFIGUR should be of interest to some of you. The label names are strictly mine and have no relation to anything **Heath** may have done.

LOGO	beginning of the main sign-on message
LOGOEND	end of the message area
EXIT	an exit routine which restores the stack pointer
STACK	location where the stack pointer is saved at startup
VERNO	location of CONFIGUR version # (in binary)
VERTST	routine to test BIOS version (03 or 04)
VERTSTE	end of version test code
BADCAL	call to test BDOS version number
BADCD1	call to get CP/M s/n (stored in BDOS)
BADCD1E	end of calling code area
BADCD2	start of routine to patch BDOS for ECHO ON DELETE
BADCD2E	end of BDOS 'ECHO' patch routine
TABLE	beginning of selection vector table
VECT2	dispatch vector table for menu items
MENU1	display of ECHO ON DELETE in menu
MENU2	display of AUTOMATIC COMMAND LINE in menu

Corrected locations for the above labels [by CP/M version no.]:

	V03	V04
	-----	-----
LOGO	0301h	0307h
LOGOEND	038Bh	0391h
EXIT	0248h	024Bh
STACK	34BEh	37C6h
VERNO	0103h	0103h
VERTST	01BAh	01BAh
VERTSTE	01CDh	01CDh
BADCAL	01EAh	01EAh
BADCD1	0208h	0208h
BADCD1E	021Dh	021Dh
BADCD2	04C5h	04D3h
BADCD2E	04DAh	04E8h
TABLE	0501h	050Fh
VECT2	???	18A7h
MENU1	0928h	095Bh
MENU2	1991h	19C1h

I don't remember the significance of the dispatch vector table. It seems that it was a set of pointers for loading of the HL registers and then doing a PCHL or something like that. It has been a long time and I did not take proper notes. The item identified as TABLE is simply a sequence of three bytes. The first byte of each set of three is an ASCII value starting with 'A' and continuing for each menu selection option. The next two bytes contain the address of the routine which is to be run for that selection. As usual, the low order byte comes first.

Changes in the ECHO ON DELETE and AUTOMATIC COMMAND LINE options would mainly be of interest to Z-System users. Other patch locations may interest others. Even if you do not wish to change anything

in CONFIGUR, it would be a good experience for leaning how to 'dissect' a program with DDT. Armed with the above information, DDT, and some knowledge of assembly language can reveal the workings of the Heath configuration program.

Unfortunately, that is all the time I have for now. My school schedule is coming to an end in December, and my lifestyle may return to normal (if that is possible). At least I will be working only two jobs instead of four! I still plan to teach two evening classes (C language and BASIC programming).

Give us some feedback so that Kirk will know whether to fire me or keep me on as a writer!

Listing

```
; CONFIG.Z80
; Patches to Heath CONFIGUR.COM
;
;   ANAPRO Corporation
;   8895 Pino Solo Ave
;   Atascadero, CA 93422
;   (805) 466-4284
;
;   Copyright 1986 by Peter Shkabara
;
;----- Revision History -----
;   7-18-86
;   file created from patches already made
;   8-20-89
;   for general release
;-----
; Pertinent notes
;-----
FALSE EQU 0
TRUE  EQU 1

CR EQU 0DH
LF  EQU 0AH
;-----
; version equates
;-----
V03 EQU TRUE
V04 EQU NOT V03

      IF V03
LOGO EQU 0301H
LOGEND EQU 038BH
EXIT EQU 0248H
STACK EQU 34BEH
; Z-Sys
BADCAL EQU 01EAH ; eliminate CALL
LOGOZ EQU 02BDH ; start new logo
BADCD1 EQU 0208H ; fill with zero
BADCD2 EQU 04C5H
VECT1 EQU 0530H
VECT2 EQU 18A7H
MENU1 EQU 0928H ; echo on delete
MENU2 EQU 1991H ; auto cmd line
ENDIF

      IF V04
LOGO EQU 0307H
LOGEND EQU 0391H
EXIT EQU 024BH
STACK EQU 37C6H
; Z-Sys
BADCAL EQU 01EAH ; eliminate CALL
```

```
LOGOZ EQU 02BDH ; start new logo
BADCD1 EQU 0208H ; fill with zero
BADCD2 EQU 04D3H
VECT1 EQU 0530H
VECT2 EQU 18A7H
MENU1 EQU 095BH ; echo on delete
MENU2 EQU 19C1H ; auto cmd line
ENDIF
```

```
;-----
DS LOGEND-$,0 ; fill with zero

IF $ GT LOGEND
.PRINT 0,Excess code in LOGO area - must
stop at 0390H
ENDIF

;----- End of file -----
=====
```

VENDOR.UPDATE

TMSI/Lee Hart. "...I moved! I've been working since last August for Robertshaw Controls in Holland, MI. It is 68 miles from Dowagiac, so I wound up spending 3 hours a day on the road (in good weather). This was like working 12-hour days, so very little was getting done at TMSI.

"I put an offer on a house in late October, and finally closed on it ... [in late January]. I am currently moving in, so another couple weeks of chaos is likely. Anyway here is my new address:

TMSI c/o Lee Hart
323 West 19th Street
Holland, MI 42432
phone 616-396-5085

"Please publish this for my valued friends and customers, and send my **Staunch 8/89'er** to this address...."

DYNACOMP. After a certain amount of "negotiation" and a check, I managed to get a catalog from DYNACOMP, Inc. This catalog is **not** free; it costs \$3.50 (by check or plastic), but if you order something, you're sent catalogs for another two years. Most of the software is available for a **number** of systems, including CP/M, MSDOS, Apple, Atari, Commodore 64, and TRS-80. Some items require MBASIC. But I haven't seen most of the titles anywhere else, except for listings from the usual public domain catalogs. Though DYNACOMP carries other software, it's heavily into engineering and statistics packages, so could be worthwhile exploring just for that.

But be warned: though the prices listed often seem reasonable, there are media conversion and shipping charges to be added! The latter is a reasonable \$4.50. The former is something else; the standard charge for media conversion is \$5 a disk. (The list of supported formats **doesn't** include hard-sector!) If you need double-density (because of the size of the package), that's an extra \$3 per disk. So these "surcharges" can add up pretty fast.

For example, to see what delivery was like, I ordered a 44,000-word ASCII dictionary that lists for \$9.95. To this, I had to add media conversion

for \$10 (since the package normally occupies two disks) and \$6 for DD (to squeeze it onto those disks). Total cost, including shipping, was \$30.45. Delivery of the dictionary was by U.P.S. and prompt.

Now I'm not trying to scare you off, just make you aware of "hidden" costs. As I mentioned above, I think the catalog is worth the browse. Contact:

DYNACOMP, Inc.
DYNACOMP Office Building
178 Philips Road
Webster, NY 14580
800-828-6772 (24-hr order phone)
716-265-4040 (9 to 5 Eastern office)

=====

Square One for Computerphiles

Part 2 -- ASCII Characters VS Other Data Types

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

A Little Knowledge. I twist the old saw, but maybe **too much** knowledge can be dangerous, too -- at the beginning! You're in big trouble once you get smart enough to totally appreciate that a computer's memory does **not** store characters (as such). Good-bye to blissful ignorance! The knowledge that **all it really stores are bits** (1's and 0's) can sure make a person start asking questions.

For example: **How** does a computer tell when an 8-bit byte is **meant** as a character code and when it is **meant** as a pure number? There, I'll bet, we've hit upon a popular stumbling block!

How the machine tells the difference is something you should get sorted out in your own mind, or you could run into later confusion when programming. And my aim for this article is, that after you've read it through, an answer will have taken shape. I'm handling fundamental material here, but it can get involved, and I know it used to haunt me. Old-timers, if you read thoughtfully you will probably profit in an unexpected way.

Ground Rules. You'll be hearing "ASCII" spoken here because inside the memory of our computers, characters (i.e., letters, numerals, and all other symbols) are **represented** by the ASCII binary code (1's and 0's).

But this article looks at the concept of ASCII with a programmer's eye. You know, a nuts-and-bolts approach. If it's history, discussion, and tableaux you want, please see the informative ASCII write-up by Kenneth Mortimer in **REMark**, April 1987 [and Frank Hutchison will explore the same subject from a "layman's" view in the next issue -Ed.].

Obstacles to Communication. A pesky semantics problem always pops up when people want to talk about ASCII characters (or text) **versus** numerical data. Programmers speak of data as "ASCII" or "binary" when they want to differentiate between "characters" or "quantities" (respectively). That's the common usage, but you must understand that in reality **all** data is stored in **binary**. (I myself occasionally resort to "binary" to mean "numerical value and not ASCII," but that's still a cop-out. The trouble is, if we say "a number" to mean quantity, well, that can also mean "a numeral" so it still might sound like we're talking ASCII!) On the

other hand, talking about **just ASCII** is easier because there are lots of terms that aren't ambiguous: ASCII, symbol, character, letter, text, etc. But this is a fine point, and will seldom bother people who have a clear understanding of the overall situation.

But I can see other threats to a reader's attaining that understanding. For one thing, different computer languages have different ways of storing data. FORTRAN, for example, **can** store a small integer value in only 1 byte, whereas BASICs usually require at least 2. The saving factor with that, though, is it doesn't alter what I'll try to get across. To simplify matters I won't go into **detailed** explanations of handling, where sizes (and "types") of variables are different. (Trust me, it **can** be explained!) The underlying concept is independent of any particular language.

How the Computer Does It. The question before us (2nd paragraph of this article) gives way more readily if we look at a byte of data. Let's say we have 1 byte of data in memory to be output (in **some** format) to the screen by a program. Let's say the byte's bit pattern is 01011000 (58 hex). Now, that happens to be an **integer** value of 88 decimal, but it is **also** the **ASCII code** for the character "X"!

The computer **hardware** is already designed such that **if we just send the 01011000 byte as is** to the console output port, the "X" will be displayed. That's very straightforward, but that's not the whole solution. First a choice has to be made. Something **first** has to recognize whether or not we **want** to send the byte **as is**! Remember, the **value** of our byte is 88. Well, we might need to display **that stored value**, namely 88, on the screen, and **not** interpret it as an "X". And if we indeed opt to print the 88, then a few things must be done with the byte before transmitting it to the output port, because we'd need to print an "8" followed by another "8" onto the screen. Thus, **two** bytes would have to be output, instead of just one. That kind of "**conversion**" is taken care of by internal routines supplied with the language software we are using. But obviously, the **choice** (which way to display it) must come first -- in the flow of the program.

Thus, we see that it is the **software** -- the programs we ourselves write, together with the programming-language library software itself -- that decides whether a data byte in memory is to be interpreted as ASCII or a numerical value, and then tells the hardware what to do.

The Secret. The main point is there's no self-contained "magic meaning" to any byte in memory. The "X" character in my program looks just like the 88 value in yours. A byte is not intrinsically ASCII, nor is it intrinsically numerical for that matter, except that the software gives it those meanings. One illustration of this truth is that you can display the **same byte** as **both** ASCII and numerical, if you desire (and we'll do that in a moment). The part that **can** be confusing **if you let it**, is that **anything** you see on the screen is displayed there in ASCII, even the numerical values. If we just display an "X", well **of course** that's ASCII. But if we display the ASCII code of "X", which is the integer value 88, then what actually gets displayed

are **two ASCII "8" characters**. Many people actually panic at this idea! But you have to display even a numerical value as ASCII numerals or you can't see it, and the conversion routines do take care of this for you.

Another Example. By the way, **input** data undergoes type-conversion also; I'm using output bytes as examples just because I think it's **easier**, both to understand and to write about.

Going through another example will be helpful. I said before that each language has its own way of storing data. Well, each one also has its own way of handling data conversions. In MBASIC the variable-names are set up such that, say, "J%" can hold an integer, but "J\$" must be used to hold an ASCII character code. The language knows what conversion to perform because it recognizes the variable type before transmitting to the display terminal or printer. The selected mode of transmission is then carried out by accessing the proper set of instructions from the library routines. But even so, provision is **still** made for you to examine the "integer value" of a so-called "ASCII" byte. For example, take J\$="Z". If you do a PRINT J\$ you get a "Z" on the screen. But if you do a PRINT ASC(J\$) you will see the value 90 that represents the "Z" (as on any ASCII chart). I'm sure this is no news to anyone; I use it as an illustration to substantiate what I'm trying to convey.

Conversely, let's use J% now. If you let J%=90 and then PRINT J% you get 90 on the screen. But PRINT CHR\$(J%) shows a "Z". The provision is still there to **show the byte** either way, but the byte itself, meanwhile, does not change.

Even if you don't care a hoot about FORTRAN, stick around a minute; it's a wonderful tool to further this lesson. And we won't need two distinct variable names as we did in MBASIC with its J% and J\$. In FORTRAN the **same** integer variable can hold an integer, or an ASCII code for a character. For example, with the statement J=90 it's possible to set a declared single-byte variable named J to contain the value 90. Alternatively, you could say J='Z' (because, again, Z is 90 on the ASCII chart). To all appearances J would be 90 in the first case, and the character Z in the second, and indeed it **can** correctly be thought of this way. However, **internally** there would be **no** difference: The byte at address J would hold 90 either way, even if J='Z' was executed. (If you wonder how this situation can be, that just helps point up the need for articles like this!)

As before, the software still controls the interpretation of J as "ASCII" or "numeric" upon output. But instead of different variable names (like J% and J\$) to signal the data type, FORTRAN employs "FORMAT statements." (You'll see how in a minute.) And in place of MBASIC's PRINT statement, the WRITE statement is used in FORTRAN.

In FORTRAN, "WRITE(1,100) J" means to write J to unit #1 (the screen) according to FORMAT statement #100. This is then accompanied by a FORMAT statement labeled "100". (I will omit all "carriage controls"

from FORMATS for simplicity's sake -- this is not a FORTRAN lesson!)

```
J=90      (or J='Z' can be used here;
           it doesn't matter!)
```

```
WRITE(1,100) J
100 FORMAT(I6)
```

The above would cause J to be displayed as 90 on the screen. This is because of the "I" in the FORMAT. It means write J as "Integer". The "6" means allow for six digits. Since the FORMAT tells the program what library routines to use to convert the byte for output purposes, the "I6" is called the "conversion specification."

Now, to cause J to display as the "Z", a different FORMAT would be used:

```
J=90      (or J='Z' will do too.)
WRITE(1,200) J
200 FORMAT(A1)
```

The "A" in 200 effectively means "no conversion." In other words J is sent "as is"! And as I mentioned earlier, if a bit pattern is sent to the terminal "as is," it will trigger the output hardware to display ASCII. The "1" means allow for displaying one character.

To print both forms of J in one statement:

```
J=90      (yes, here again, J='Z' would work also.)
WRITE(1,300) J,J      (notice we list J twice,
300 FORMAT(I6,A1)      so we give 2 conv. specs.)
```

Here, the first J in the WRITE list would show as 90 and second as "Z". Both items would appear on the same line on the screen.

Beyond the coding differences, the mechanism is similar to that used by MBASIC, and consists of conversion routines embodied in the program language. What I really wanted to show was that the byte itself is not inherently ASCII **or** numerical **as it is stored**, and I think by now this is abundantly clear. The programmer uses the **software** to interpret the data to his or her best advantage! It's another case where the computer does exactly what you tell it and **only** what you tell it. Garbage in, garbage out!

THE STAUNCH 8/89'er, created by Hank Lotz, is a bimonthly newsletter on 8-bit H/Z computers. The editor is Kirk L. Thompson; #6 West Branch Mob Hom Vil; Route 1; West Branch, IA 52358; home: 319-643-7136. Subscriptions always start and end with the calendar year. Rate: \$12.00/year. (Overseas, add \$4.) Single copies: \$2. Make checks payable to "Kirk L. Thompson". **Staunch** pays authors for their articles; write for an author's guide. It also accepts commercial ads for a modest fee; contact the editor. Neither this newsletter nor its editor is responsible for damages or losses resulting from use of any information presented herein. Info from **THE STAUNCH 8/89'er** may be reprinted only if this publication's name and address is included. Credit should also be given to authors and other sources of said material, if known. This publication is archived by the University of Iowa Libraries. CP/M is a registered trademark of Digital Research, Inc. REMark is a registered trademark of Heath/Zenith Users' Group.

EOF