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LIBERTY

PRODUCT REVIEW by Rick Swenton

LEE HART'S SUPERSET UPGRADE KIT
(For The Ultimate H19/H89 Screen)
by
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Being the local technical expert has its advantages. Your friends come to you for help installing their latest and greatest upgrade and you get to see if their investment was worth it with no financial risk of your own. Sometimes you also get to see products so fantastic that you just can't resist spreading the word on how great they are. This is the case with Lee Hart's "Superset" upgrade kit for our venerable H/Z 8-bit machines and terminals.

The Superset is a comprehensive modification for the H19 terminal logic board (TLB). Its creator, Lee Hart of TMSI, took some very brilliant concepts and combined them into one of the most dramatic Heath 8-bit computer enhancements we have ever seen. To quote the Superset manual, "Superset adds a new dimension to your Heath/Zenith H/Z19 terminal or H/Z89 series computer". This is a very broad statement, therefore some explaination is necessary.

First, the Superset consists of a series of hardware modifications. Included in this series is a separate product called the "Flicker-Free Modification". We have all seen those blasted "flickers" when the H19 screen data is changing. They are most annoying during a full-screen game display which includes reversed video. As animation changes figure positions around the screen, background and characters are polluted with random video static. Lee Hart determined that a few changes to Heath's original circuitry could eliminate flicker and yield a high quality display. While he was at it, he included low-power CMOS replacement ICs. Not only do they use less power, they are faster than the TTL ICs which they replace.

For those hardware hackers wanting a deeper technical discussion, H/Z19 and H/Z89 screen flicker is caused by the Z80 CPU and 6845 CRT controller having to share the same screen memory. When the Z80 needs to read or write to screen memory, it has priority over the CRT controller and "steals" memory. What Lee did was to install faster RAM chips for the screen memory and apply a higher (3MHZ) clock frequency to the memory multiplexer. This means that the screen memory is constantly switching back and forth between Z80 and 6845 at the 3MHZ rate. Now all memory reads and writes are synchronized to the Z80 clock. The Z80 no longer has to "steal" memory. When the Z80 wants memory, the 6845 doesn't, and vice-versa.

To summarize thus far, we have reduced TLB power consumption and heat dissipation, eliminated screen flicker, and increased the TLB CPU speed to 3 MHz. Operation at 38,400 baud is now possible and 19,200 baud may the new norm.

The next part of Superset is the software (sometimes called "firmware" because it's on a Read-Only Memory I-C) upgrade. Superset includes a new program ROM for the TLB. Because Superset includes so many new features, the additional software doesn't fit Heath's original 4k ROM. Superset's ROM increases program memory size from 4K to 32K! (Actually, the 32K EPROM is not full but it gives you an idea of how much power is being added.) Some of you may be familiar with other TLB ROM upgrades such as HUG's Watzman ROM or the Super-19 ROM. The Superset ROM adds features to the H19 much the same as these earlier ROMs. But Superset does this with much more power, and it does it with class!

Superset adds three character fonts to the standard H19 character set. Font 1 is standard H19 characters. Font 2 is a DEC VT-100 character set with thin-line graphics characters. Font 3 is NORCOM's GT-PROM with bold face alphanumeric and special graphics characters. Font 4 is a set of special symbols including math and Greek.

The optional Superfont ROM will add 4 more fonts if you desire. Font 5 is an H29 character set with superscripts, subscripts, Greek letters and fine-line graphics. Font 6 is a VT-100 character set but with both single-width and double-width characters. Font 7 is a special graphics font. Each character cell is broken into 8 parts, 2 dots wide by 4 dots high. Finally Font 8 is an IBM PC monochrome display font. If you have ever used a PC with a monochrome display (MDA), this font on the H19 is VERY haunting. You get the "creeps" when you look at the H19 because the screen looks like a PC display!

Superset provides a digital 24 hour on-screen clock-and-calendar display on the 25th line. Escape (control) codes enable, disable, or set the clock and calendar. The optional Superclock IC is an enhancement which provides similar clock and calendar support but in hardware. It's a nifty IC which improves clock accuracy. It has a long-lived back-up battery which is actually "piggy-backed" onto the Superclock IC. The Superclock IC also contains an additional 2K of static memory. This is used to give the H19 an extra "page" of screen display. Using an Escape (control) code, you can flip-flop between screen page 1 and screen page 2.

Superset adds several new display options. You can now enable "reverse screen" mode. This is a true reverse screen with black characters on a white background. And an internal screen-saver mode automatically blanks the screen after 15 minutes of inactivity. The screen turns back on when you type any key or when the host sends any character to the screen. The screen-saver can be enabled or disabled with an Escape code.

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There's also the improved interlace mode with reduced flicker. Normally, the H19 display is drawn with 250 horizontal scan lines which are repeated 60 times a second. Because so few scan lines are used, the individual lines are quite visible to the naked eye. Using interlace, the number of scan lines is doubled to 499 lines, but it takes twice as long to write a full screen. Because of this, you will notice a pulsation in the brightness of the screen. It will be very noticeable at high brightness or with white tubes. Interlace mode is very useful for photographing the screen. Without a high-persistence phosphor tube, interlace mode probably isn't widely used, but it's there when you need it.

One of Superset's most impressive features is what Lee Hart calls "Magic Menus". A magic menu is a window into the Superset control logic. Actually it's an on-screen window which pops up in the middle of the screen. Inside the window is a menu of available commands. Almost anything which can be set with an Escape code can be selected from a Magic Menu screen. When you are done, the window disappears and your screen is restored with the original display intact. I must admit that I've been flaunting my "new" H19 to my MS-DOS friends. Now my H19 "does windows", and not just Magic Menu windows either!

If you have installed the optional Superclock, a second page of screen memory is available as we mentioned earlier. Using an Escape (control) code, you can define a size of a window, write the info you desire into the window on screen page 2, then you can swap the screen area defined by the window between page 1 and page 2. This "windowing" is slick and really irritates my MS-DOS friends. You can define window size from a single character to an entire screen.

Lee Hart has provided a BASIC demo program listing which shows off the power of windows. This demo program creates a window in the shape of a round "smile" which moves around the screen like a bouncing ball without disturbing any text or graphics you may happen to have on the screen in the background. This is accomplished by writing/displaying/saving/-restoring the screen with window commands. It's impressive.

Superset makes local function keys available for multiple-key tasks. Pressing CTRL and a function key will perform the function locally--that is--the function will be done inside the H19 without sending the function key code to the host computer. You can locally operate the cursor position keys, the ERASE key, select fonts, set modes, display menus and transmit the date or time to the host with the local function keys.

Superset provides for additional video attributes and cursor displays. Instead of only reverse video, you can enable the eighth bit of the character code to control reverse video, blinking, or select a character from the upper half of the extended character set from the optional Superfont ROM. You can also select any combination of blinking, steady, block, underline or none for the cursor.

Installation

The Superset is not a project for the neophyte user. It requires that you locate and cut printed circuit board traces, are able to count IC pins, solder, and can perform detailed electronic wiring. This installation procedure is more intricate than most original Heathkit assembly procedures. In general, if you feel you have ability to understand and carry out directions such as: "solder a small wire to pin 35 of U8 and run the wire to the foil hole just below U6 pin 4", you shouldn't have trouble. But if you're unsure of your skills, Lee will install the Superset for you. This will cost $25 if you send Lee your working H19 terminal logic board (TLB) or $50 plus parts if you installed Superset yourself, broke the TLB, and THEN send it in. (This is still a good deal!)

Installation concentrates mostly on rewiring the TLB. Since the original wiring is the circuit board foil pattern, the only way to change it is to cut certain foil runs and install new wires at indicated connection points.

Another part of the installation is installing "piggy-back" sockets. This is how Lee installs a 28 PIN EPROM in a 24 pin socket! Because the Superset and Superfont reside in EPROM IC's which are physically larger than the original Heath parts, a special technique allows the larger EPROMS to be installed on the circuit board. The "piggy-back" socket is a low-profile 28 pin IC socket. 24 pins of this socket plugs into the existing EPROM (or ROM) socket leaving four pins hanging over the edge of the original socket. Wires are attached to the overhanging pins and routed to points on the board. The new 28 pin EPROM is plugged into the 28 pin piggy back socket.

Perhaps viewed by purists as the most "kludgey" part of the installation, there are places where you remove an IC, bend out one of its' pins, re-install the IC, and then solder a wire directly to the bent-out pin. There are very good reasons for doing this instead of cutting traces and installing new wired connections. Some of the foil traces which need to be cut are just too difficult or impossible to get to, such as those which run under an IC socket. Bending out and soldering to the lead directly at the IC preserves the PC board from almost certain damage caused by trying to cut all of the hard to locate traces. Now the worst thing which can happen is that you damage the IC by breaking off a pin. But ICs are cheap and easy to replace; an entire PC board isn't.

This "lead-bending" certainly does not look that good on the surface of the TLB but let me emphasize that the re-

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wiring is solid in design and will transform your TL8 into a mighty contender. I can't see a simpler way to make required wiring changes.

In his manual, Lee includes instructions for both older H19 and newer H19A terminal logic boards. The illustrations are crisp and detailed as well as easy to follow. There are even "Testing and Repairs" and "In Case of Difficulty" sections to help you with diagnosing potential or real problems. Keep in mind that there are several problems which could crop up and ruin your day such as one--wiring mistakes (your fault). Another problem is traceable to original Heath parts which may be too slow to operate at 3 MHz. The Z80 CPU, 6845 CRT Controller or 2112 RAM ICs may require replacement with faster parts. This is done at your expense as these parts are not included in the Superset kit. So far I have installed four Superset upgrades and I have not needed to replace other parts. Personally, I would replace the Z80 with a 4-MHz Z80A anyway. Lee also offers alternate wiring and alterations to help you cope with a system speed problem.

Near the end of the manual there is a "Questions and Answers" section. In this section you will find information on general theory and Superset compatibility with other products. The manual is over 80 pages long and is very comprehensive.

Late Breaking News

Lee has informed me that he is completing some upgrades to the Superset. He's added programmable function keys. The top row function keys can send any of several "canned" sequences in addition to any user-defined sequence stored in the non-volatile (battery-backed-up) Superclock RAM. For CP/M they send DIR, REN, ERA, PIP, STAT, etc. (What?! No ED?! Sorry, I lost control for a minute.) For HDOS, they send CAT, SYO:, MOUNT, DISMOUNT, etc. For BASIC, they send LOAD, SAVE, LIST, FOR, NEXT, etc.

Function keys can be automatically labeled on the 25th line. Like the clock/calendar display, they automatically vanish when a program uses the 25th line, and re-appear when the 25th line is discarded by the program. This makes it easy to send normal H19 sequences during word processing, or CP/M functions when you return to the operating system.

As of this writing, Lee has sent me the latest Superset ROM upgrade which includes the function key options, but I have not yet installed it.

Lee requested that I not discuss any planned future enhancements to Superset in this review. Lee doesn't believe in telling people about things which do not yet exist (described by some folks as "vapor ware"). He wants you to know about what he has already done, not what he's planning

to do. Let me tell you that this guy is truly inspired and I believe that we have yet to see the last of Lee's fabulous ideas!

Conclusion

Have I said enough? This is one very slick product! The only drawback I could find is that you may need technical assistance during installation if you are not handy with a soldering iron or uncomfortable with the idea of locating and cutting circuit board traces. While the installation procedure is slightly more complex than original Heathkit building, I doubt that many will find it difficult. Just "read the book"...carefully.

Ordering Information:

Superset, Superfont and Superclock products are available directly from

Lee Hart
28612 Middle Crossing Road
Dowagiac, MI 49047
(616) 782-3980

Call Lee for current prices.

Another source is Henry Fale at

Quikdata, Inc.
P.O. Box 1242
Sheboygan, WI 53082-1242
(414) 452-4172

As of Henry's 3/89 catalog, the prices listed are

Superset $57 (includes Flicker-Free Modification)
Superfont $25
Superclock $39
Flicker-Free Mod. alone $35

Quikdata accepts major credit card orders.

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Next Issue

I shall be releasing my CP/M software for the X-10 CP-290 computer interface. This is the device sold by Heath which allows your computer to control any X-10 power module in your home. The X-10 system is a series of power control products which can remotely control lights and appliances in your home by "carrier current" digital signals sent over existing power lines. There is a wide variety of modules from wall switch/-dimmers to appliance modules and duplex receptacles. It is

REVIEW finis -- THE POWER OF PIP

also compatible with products sold by other firms, such as Stanley, Lightmaker, and Radio Shack.

The CP-290 interface comes with software for either the IBM-PC or the Macintosh. Until now, I don't believe that anyone has created a full-featured interface software package for CP/M.

I will offer my programming efforts to the SEBHC community in the form of a product overview and a description of software development and operation.

Don't forget to order your Superset! [Please tell Lee or Henry that you read about it in the SEBHC JOURNAL -- ed]

--::<<[[8]]>>::--

The POWER of PIP
by
Roger Bliss
7700 Clarks Lake Road
Chelsea, MI 48181-9420

Many JOURNAL readers are reporting unusual problems with CP/M text files written with some type of "word processor" rather than with a no-frills text editor. For example, WordStar and many other processors use unique printer or formatting control codes which cause unexpected--and some-times disasterous--results when embedded in a "document" (non-ASCII) text file. For example, WordStar "document" files TYPEd on an H19 or H/Z 89 screen are virtually impos-ible to read because embeded commands cause the Terminal Logic Board to print scrambled ASCII and graphics, or worse, one continuously-scrolling jumble of characters. Often you must re-set the computer to regain control over the TLB!

With printers, especially if you have a Heathkit printer--model H25 or higher--with FINA's Epson-compatable firmware modification installed, you may be dismayed when you get Greek letters, wierd ibm graphic characters and symbols instead of plain English printouts. (See example in the June '89 JOURNAL.)

Be of good cheer; there's a simple way around the problem. Let's assume you want a hardcopy of the instructions on that new software disc. The instructions read OK when TYPEd on screen, but are printed in Greek after you entered "PIP LST:=B:README.DOC<cr>"! You did nothing wrong, but you didn't enter "[Z]" between "..DOC" and the RETURN key. That command resets the embedded printer commands (rather like removing scales from a fish) so the file prints without any Greek or other non-English characters. It also works when you PIP files between disc drives, or onto the same drive with new file names.

Below is a condensed list of CP/M's PIP.COM powerful command set. Any other operating system, such as HDOS, DOS, or MS-DOS has any single utility which is so outstandingly powerful and useful.

PIP's Powerful Command Set

PIP destination=source1[option],source2[option]
    Copies and combines files between discs and I/O devices. Source and destination can be any disc drive (A: thru P:), or console keyboard (CON:), or printer (LST:, LPT:).

PIP A:=B:filename   copy filename from B: disc to A: disc
PIP CON:=LETTER.TXT   copy LETTER.TXT to console
PIP A:NEW=B:OLD   copy OLD from B: to A: and rename it NEW
PIP B:=*.TXT   copy all .TXT files to the B: disc
PIP LETTER=HEAD,BODY

    combine files HEAD and BODY into LET-TER
PIP B:=PROGRAM.COM[V]

    copy and verify the file PROGRAM.COM
PIP LST:=CON: connects CONsole to LST device; ctrl-Z to exit
    (uses printer like a typewriter)
PIP d:TEXTFILE=CON: works similar to above but saves an ASCII file on drive d:--use ctrl-Z to exit and complete the file
PIP LST:=LETTER[T8P]

    copy LETTER to the printer, expanding tabs into 8 spaces, with a new page every 60 lines

PIP Options: [Options are enclosed in "[" and "]" brackets; example:

    PIP A:=B:BIOS.SYS[RV]<cr>

Dn	Delete characters past column n
E	Echo transfer to console
F	remove Form-feeds (page ejects)
Gn	Get from user n
H	Hex data transfer
I	Ignore :00 in hex file
L	convert to Lower case
N	add line Numbers to each line
O	Object file transfer; ignore control Zs (^Z)
Pn	start new Page every n lines (default is 60)
Qs^Z	Quit copying from source at string s
R	Read SYStem files
Ss^Z	Start copying when string s is found
U	convert to Upper case
V	Verify that data was written correctly
W	Write over Read-Only files
Z	Zero parity bit (bit 7)

For more information PLEASE see CP/M instruction manual.

The READER'S MAIL BOX

Dear Lenny,

Here's my cheque to extend my SEBHC JOURNAL subscription another year. I enjoy the JOURNAL very much since my only source of information is magazines & newsletters. I've been unable to find any other H/Z users in this area.

Perhaps someone could help me with my [computer] problem. I have an H89A with Magnolia controller and two 8-inch drives plus two 5-1/4-inch soft-sector floppies, the H17 hard-sector controller with the original internal single-sided drive.

I bought HDOS 2.0 on 8-inch discs when the H/Z store in Sacremento, CA was reducing their inventory, and obtained Ultimeth's DKFMDV4.DVD from QUIKDATA. Henry sent me this driver on a hard-sector 5-1/4" disc with what he said was the essential software to get HDOS off the 8-inch disc and then make it run.

Unfortunately, all I can do is boot Henry's disc, but then I'm lost. I've never been able to run HDOS. HELP!

CHARLES P THOMAS, 61 Condor Circle, Carson City, NV 89701; phone 702-882-8738

[Sorry, Charlie, but I don't know anything about the software and that Magnolia controller. But I'm sure there must be at least ONE reader who has knowledge about it (Henry, if you see this, get it touch with Charlie!) and may be able to provide you with enough advice to make HDOS work. It's entirely possible that you could contact Magnolia for help, even though they no longer support much of anything in our 8-bit world. I know that Magnolia did once support hard-sector drives as well as soft-sector and 8-inch plus hard discs uder their version of CP/M, but under HDOS...that's another story. Anyway, Good Luck! -- ed]

Dear Lenny,

I know you've supplied this information before in the JOURNAL, but I'm going the lazy route by asking you instead of looking it up in my back issues.

What I need is the name of a supplier of good-quality HARD SECTOR 5-1/4" discs for my H89.

Enclosed is a SASE.

JOHN C CLEMENT, 6940 E Girard 205, Denver, CO 80224

[Thanks for the stamped envelope! I used it to send you DISC MOVERS business card. Miriam Campbell--DISC MOVER's motivating force--is a very reliable business lady. I buy both HARD SECTOR and soft sector discs from her. Of 100 hard-sector discs only one gave me a bad-sector error when init'ed in an HDOS 80-track drive, but it worked ok in a 40-track drive. As yet I haven't had any trouble with her soft-sector discs in 40 or 80 track drives under CP/M or HDOS. Miriam buys her discs directly from the factory without any labels on them or the jackets. Last price I paid her for a hundred hard-sector discs was roughly 85 cents each, about the same for 100 high-density soft-sector discs. Another source is LYBEN COMPUTER SYSTEMS, 1050 E Maple Road, Troy, MI 48083; phone 313-589-3440. They're asking $15.90/box of ten 3M-Scotch 745-10 RH hard-sector, $14/box of ten Dysan 107/2D RH, and $15.50/box of ten Verbatim Datalife MD550-10 RH discs. These are intended for 40 track drive use--but they most always run ok in 80 track drives. LYBEN also sells bulk discs but I've never bought any from them so can't make a recommendation. They do ship phone'n plastic orders the next day, and so does Miriam Campbell. Call or write DISC MOVERS at: 8534 McCormick Blvd, Skokie, IL 60076, phone 312-769-3727. And do let us know how you're doing, Real Soon Now! -- ed]

Dear Lenny,

Thanks for [introducing] the new multi-year renewal [rates]! I hate renewals since they seem to get lost in the shuffle and then I miss an issue or two. Enclosed is a cheque for two years.

Can you or any of your readers give me an EASY way to change output ports on my I/O board? It's an H&H Computer Enterprises serial/parallel board with two serial ports and 3 parallel ports.

Another item I could find useful would be a list of differences in HDSO and CP/M MBASIC. I use CP/M exclusively and occasionally would like to convert some of the programs you've published. Or could you include the differences between CP/M and HDOS in all the programs you publish?

Thank you for your publication! I am at entry level on every thing I do. You and your readers have been a great deal of help to me.

WILLIAM A JACOB iii, 10220 66th Avenue SE, Olympia, WA 98503

[Hey, Bill! The I/O board I can't help you with but I'm sure at least ONE other subscriber has had a similar problem with the H&H unit. Expect to hear from someone Real Soon Now! As to the differences between HDOS MBASIC Ver 4.82 and CP/M-80 MBASIC Ver 5.1 (and up), they'd fill a book! In fact,

More READER'S MAIL BOX

there's a very good book out which you may be able to find at your local library--"The BASIC Handbook", 2nd Ed, by David A Lien, TAB Publishing Company. If the library doesn't have it you can buy it from any good bookstore for perhaps $14.95 and tax. Believe me, I've worn my copy down to almost bare paper I use it so much! Most of the MBASIC programs in the JOURNAL will run under either CP/M or HDOS except for the difference in printer output. ACES.BAS won't run under HDOS without extensive revision because it uses Version 5.1's RANDOMIZE command. I've been playing around with that peculiarity in my "spare" time but haven't yet gotten it to work properly under V4.82...maybe someday... But any of the BENTON HARBOR BASIC programs will run ok with either MBASIC version without any changes except for one. Just don't try to use the BHB RENUM-BER program on any MBASIC program because it surely will TRASH everything! (I can't imagine WHY some people don't understand the PLAIN ENGLISH I use in those README.DOC files...maybe I should enclose a hardcopy wrapped around every disc we sell...) I'm happy to hear that you find our new 2-year subscription plan to your liking. Getting your subscription in to us this early saves us both lots of work! Thanks a heap. -- ed]

:::
UNTIMELY DEMISE...   SEXTANT/BUSS's UNTIMELY DEMISE...   SEXT
:::

Since Sextant/BUSS Publish Company HAS OFFICIALLY GONE OUT OF BUSINESS, it looks as if the SEBHC JOURNAL is going to be picking up more subscribers Any Day Now. There's a message from Charlie Flotto on CompuServe's ZENITH Bulletin Board to the effect that Sextant Is No More... That leaves just REMark, H-SCOOP, The Staunch 8/89er, and us to carry the torch onward and upward.

We had recently sent some advertising copy to Sextant's Washington DC office, expecting it to appear in the Early Summer issue, but according to Henry Fale's H-SCOOP #112 and our own records, issues 41, 42, and 43 didn't come out. And the "current issue" (#44, Early Summer) shall never appear...

Phoned our "account executive" at Sextant's advertising house (JE Publishing Representatives) and he implied that Sextant/BUSS had gone belly up due to lack of advertising revenue, not because of poor editorial policy. You can expect to see the ad we'd sent to Sextant appear somewhere in the September issue of REMark...

Footnote: The SEBHC JOURNAL is supported solely by subscriptions, sale of back-issue sets and software discs; a good reason for you to renew your subscription NOW if it is in danger of expiring soon. (Save money! Sign up for two years!) And please get in touch with all your favourite 8-bit vendors and tell 'em of our no-charge, full-page advertising policy...

:::
FAREWELL SEXTANT...   GOOD LUCK CHARLIE...   FAREWELL SEXTANT
:::

Dear Lenny,

Just finished reading the latest JOURNAL issue...it was a good one with lots of discussion. Thanks for the SEBHC JOURNAL and all the hard work you're putting into it.

I caught Karl G Ruling's letter & have sent him an HDOS-3 system disc with batch files on it and some explanation as to how batch files work. Basically, a batch file, whether on an HDOS3 or an MS-DOS system is a list (or batch) of commands. Both these systems look for a file named AUTOEXEC.BAT upon bootup. If the system finds AUTOEXEC.BAT, the system then executes each command as if it were typed in by the operator at the keyboard. Generally, any command which can be typed on the terminal keyboard can be put into a batch file. That's how I get my system to remind me to enter the current time before formatting and sysgening discs.

I've found batch files under both HDOS-3 and MS-DOS to be quite fascinating. Using some of the special codes available under HDOS-3 I can create boxes with messages displayed inside them. For example, an AUTOEXEC.BAT file can be made to display a menu of all the programs which you normally use, and by typing the first letter of a program's name--followed by a carriage return they will immediately run. On exiting a menu-called program, the menu returns on-screen ready for the next operation. You can work away to your heart's contentment!

ALLIE C LINGO, P O Box 118, Dierks, AR 71833-0188

[Hey, Allie! HDOS 2.0 has a similar function, but the batch file must be included in an assembly-language program named PROLOGUE.ABS. If you have used Jim Texiera's SuperSysMod HDOS-2 upgrade, you can also write similar programs called DOCOMs which work somewhat similarly. For example, I created one for the SEBHC JOURNAL subscriber data-base discs which looks somewhat like this: DOCOM GOBABY=LOAD LP:;MOUNT SY1:; MOUNT DK0:;MOUNT DK1:. When it's done, my printer is online and all discs are up & ready to go. Of course, HDOS-3 has taken the concept far beyond this simple stage. If you run both an H/Z 8-bit and H100 (for example), you don't have so much to remember between the two systems with AUTOEXEC.BAT working similarly. It's rather like driving two cars with automatic transmissions; they may look and feel differently, but shifting gears is quite the same. One thing about Super-SysMod I prefer is the fact that you can use any number of DOCOM files--you're not limited to only one batch which executes ONLY ON BOOTUP. Each file can be given a single-letter name so it's called from the keyboard with only two key strokes. Well, you lose some and you gain some... -- ed]

Dear Lenny,

More 8-bit business... There's nothing hard about installing 3-1/2" drives in an H/Z89. I bought some from Radio Shack when they had some external drives for the Tandy EX-1000 on sale for $99/ea. These are Tokyo Electro-Acoustical Company (TEAC) FD 35Ns. I removed the drives from their Tan-

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dy housing, made a couple mounting adaptors, and slipped them into the 89's drive enclosure (the solid metal one is preferred as it provides better EMI shielding). Then I made a new 36-conductor ribbon cable with connectors crimped on for the two drives. I had to make a special "Y" connector adaptor to go between the original single drive power plug because the 3.5-inch drives use smaller connectors.

You don't need any special software to use these 3-1/2 inch drives. Just call up CONFIGUR and change the drive I/O to 96tpi and 6ms step time. CP/M was written to support all types of drives, even those which weren't even built yet. CP/M thinks these drives are regular 96tpi types.

When you FORMAT a disc in a 3-1/2-inch drive it comes out with 80 tracks and 624k of free space. Now if you're already running 5.25" 96tpi drives, installing the smaller ones won't be of much advantage except for disc storage space. But if you take the road I followed, straight from hard sector to soft sector and 3-1/2-inch drives, it opens a whole new world for the H/Z89. My CP/M version doesn't offer extended density during formatting, but I believe if yours does, then you could get 720k from the 3.5-inch drives. Somebody let me know if I'm wrong, I don't want to start any gossip!

If you don't want to make your own drive mounts, JAMECO will be glad to sell you a couple ($20 minimum order). Also, you might buy drives from a different source and they may all ready come with adaptors and mounts.

The only problem I had with EMI, I cured rather easily by salvaging the old copper and mu-metal shield which covered the original single drive. First I straightened the bottom bend by squeezing it in a vice and then used a nibbler to cut the sheet to fit around the power transformer and mounting hardware. I also got a piece of electrical fibreboard--like the black sheet covering the TLB's backside--and stuck it to the shield's inside to insulate it from the drive enclosure. I then installed it by just pushing it in place and then grounded it to the GREEN a-c power conductor. WORKS GREAT!

Please note that I've been a subscriber for only a couple months, but have already gotten so much help from all over the country that it's hard keeping up! I have very little time for my computer (or my "best and only friend"--what my wife & kids call the computer) especially in summer time. I wish to thank everybody for the help they've given me. I now know that I'm not the only one left using an H/Z89; keep the eight bits running!

DICK BUTLER, RFD #1, Box 303, Springvale, ME 04083

[Thanks, Dick, for the "little drive" news! If it wasn't for my having a vast amount of cash tied up in numerous full and half-height 40 and 80 track double-sided drives, I might consider going teeny-weeny myself! In your case, going from just one single-sided hard-sector drive to two 3-1/2 inchers is a vast improvement in storage capacity. But do you have a drive left which you can read standard 5.25" discs on? Handy if you buy software which comes only in that size... -- ed]

TABLE OF CONTENTS, Concluded

LET'S LIGHTEN UP!

EUREKA!   by Munro Ferguson

THE QUEST FOR ARTIFICIAL INTELLIGENCE IS FRAUGHT WITH UNEXPECTED FRUSTRATIONS AND SETBACKS.

CLINK GRIND

THIS VARIABLE INPUT WON'T SOLVE THE GLITCH IN THE MAINFRAME'S DEBUGGING SOFTWARE.

JUST TRANSPOSE THE POLYNOMIAL IN THE REVISED SEARCH VECTOR.

BUT, $a_0 x^n, a_1 x^{n-1} + a_n = K$

NO! $K = \sqrt[3]{RUS \frac{\phi}{4}} + C!$

SO ? $(d \log_c K) dT = \Delta H / RT^2$, STUPID!

YEAH, WELL $T d x + W d y = 0$, NEWT BRAIN!

ARGGH!?   GNRRR!

SHOOT. SYSTEM'S DOWN AGAIN.

ANOTHER REPROGRAMMING JOB. DARN, WE'LL BE UP ALL NIGHT.

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