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**THE EIGHT-BIT R/W -- LETTERS**

**RAMdrives.** [From Julian Loui, Framingham, MA]  
 "Thank you very much for your recent letter and for printing my letter to Pat Swayne in the Jan-Feb, 1990, issue [#16] of **The Staunch 8/89'er**. I am really overwhelmed by everyone's eagerness to help and am grateful that the 8-bit Heath machines are still supported by such dedicated organizations as **The Staunch 8/89'er**, **The SEBHC Journal** and **REMark**.

"I must apologize for not having informed you sooner that I've been able to use my Magnolia RAMdisk software under Heath's CP/M by following the advice offered by a fellow **SEBHC** subscriber named Pete Roberson. Pete and I both agree that the hardware does not work at 4 MHz. On the other hand, it works very nicely at two megahertz and I must point out it's really a pleasure to use a RAMdisk. It's so fast and noiseless.

Thank you and your readers very much again for all the assistance." [My pleasure, Julian. -Ed.]

[From Tim Boyle, RFD 1 Box 39, Newport, NH 03773-9703, 603-863-3414] "I have CDR Systems [RAMdrive] board with half meg of memory. I purchased HDOS 3 shortly after it was done but don't have software to use the memory board. Do you know if anyone has written the software? Is it available?" [C.D.R. never distributed software for HDOS 3.0, Tim. But I suggest you contact either Richard Musgrave (Mighty/Soft, P.O. Box 11164, Kansas City, MO 64119) or Terry Hall (516 E. Wakeman, Wheaton, IL 60187-3760). Rich has modified the HDOS 3.0 system and fixed a few bugs for use with C.D.R.'s product. -Ed.]

**REMark Faux Pas.** [From Hank Lotz, Pittsburgh, PA]  
 "...[P]lease mention to our readers that the same ASCII article by Mortimer that I cited in #16 [p. 11] as appearing in the **REMark** of April, 1987, also appears in the **REMark** of December, 1987!! I just discovered this. I noticed minor variations in punctuation and sentence placement, but it is the same article. Was this repeat intentional, or did they goof?" [I think it was a flub, Hank. With few

exceptions, that December issue was the last **REMark** to carry 8-bit-oriented articles (yes, it's been that long!). Indeed, much of that issue was devoted to our machines and I suspect HUG unloaded everything accepted on the subject there. -Ed.]

**Quikdata.** [From Joseph Caruana, Mt. Pleasant, SC]  
 "I have read your newsletters from cover to cover and have found them very informative. They are increasing[ly] more important as Zenith's policies continue to neglect those longtime and continual supporters of the Heath/Zenith brand. I was dismayed at their latest decision to drop the distributors like Quikdata." [Most of us were, Joe. But Henry Fale is coping rather handily. And as he mentioned in **H-SCOOP**, he plans to continue supporting our equipment, including **stocking** HDOS 3.02 as soon as I receive the printed manual for it. -Ed.]

**Model Railroad.** [From Stephen Evans, Mt. Lebanon, PA] "I am using the H-8 to control a model railroad per Bruce Chibbs' articles in **Model Railroader** in 1985-86. Lots of good info about interfacing and device control in those articles." [Take note, model rail fans! -Ed.]

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**QUERY!3 Closely Examined and Newly Explained**  
 (An Exhaustive Analysis in 2 Parts) -- Part 2  
 by Hank Lotz and Kirk L. Thompson

**Analysis of the Modules.** (Continued from Part 1.)

**WRITER.** This report generator uses an external command file to format its printout. You make that file with any text editor, using the command language in the manual. You can print fields from your database, or **any** text strings, or sums of fields that are numeric. You control cursor or printhead position and paging. Sums can be up to 13 digits; up to 5 decimal places. Commands must be upper case, but text to be printed may be mixed upper and lower.

**WRITER** will print page numbers at top center only. And you can't type 2 or more spaces in a row in a text string, but you can work around this by piecing your string and using the "X<no.>" command to generate the needed spaces.

We found 2 **WRITER** bugs. The documented "G" command supposedly toggles "automatic form feed" on/off, at the end of your defined page length. But when you try it, **WRITER** gives "ILLEGAL COMMAND" and terminates. Work-arounds are possible.

Second, you cannot conveniently terminate the 8-bit versions once printout begins. Neither **ESCAPE** nor **CTRL-C** work. The manual suggests a dry run on a few records flagged "deleted", but this won't always tell you much about multipage layouts.

**AUTOPRO.** This compiles a machine-language batch-processor program from an instruction file prepared with your editor. The file's limit is 768 characters. Long, complicated jobs may require more than one batch program.

(Continued after the Software List on p. 2)

## SOFTWARE LISTING

## For CP/M Only

## Famous Public Domain Utilities and Games

(Selected by Dan Jerome)

Here's an extensive collection of CP/M utilities and games. Included are two games, CHESS, and PACMAN; utilities for reading LBR files; various directory programs; a disassembler; FINDBAD for isolating bad sectors on diskettes; NSWAP; UNERASE; utilities for squeezing or unsqueezing, crunching or uncrunching files; a sort utility; a memory test program, and more. Documentation is minimal to non-existent, which gives you the opportunity to experiment. These 29 programs are recommended additions to your library of utilities. This package requires 276K of disk-space.

## TETRIS/KLUTZ/README

(Supplied or written by Lee Hart)

This collection of "fun stuff" includes different versions of the video game, TETRIS (by John Shin; modified for the '19/89/90 terminal by Lee), Captain Klutz (a video comic book for the '19/89/90, by Lee), and README. In the last, Lee demonstrates how to create a text file that you can type to the screen, print, or run as a .COM file! It's almost all in that first line of "text" in the file. This package occupies 107K.

## Utilities and Speller for VDE

(From KaftorWare)

If you are using VDE, the WordStar-compatible editor listed on #12's insert, here are some utilities you could find interesting. This package includes a spelling checker with large (56K) dictionary and creation utility (this speller could also be used with WordStar); CAVDE, a preprocessor that will divide files larger than 32K into 750-line parts for editing with VDE, then after editing is complete will concatenate the parts; custom printer (VDP) libraries for the Gemini Star 10X/15X or C.Itoh 8510/NEC 8023 so you may use these printers' features with VDE; and VDKCOM, that compiles a text file into a (VDK) file of macros, permitting creation and editing of complicated key macros with VDE. Also in this package are two versions of ZDE, upgrades of VDE that fix some bugs in the latter and that are specifically for use with ZCPR and ZSDOS, although they will also run under CP/M 2.2 and CP/M Plus; and ZDKCOM, that does for ZDE what VDKCOM does for VDE. NULU is supplied to recover the files from their libraries. Most of the files are also crunched, so UNCRUNCH is included. This package requires 333K of disk-space for distribution.

## HMODEM II Ver. 2.1

(By Harold D. Maney)

This telecommunications package was "reviewed" by Nelson Howard last issue (p. 3). Its key features are: XMODEM, YMODEM, ZMODEM, and ASCII file transfers; user-settable parameters for the dialing directory; a HOST mode with password protection for

a limited-access BBS host; printer echo and screen print; H-19/89 user-customized keypad macros; status bar on the terminal's 25th line; transfer rates up to 19.2K baud; capture of screen data in a disk file; configurable by the user; sorted disk directory display; and support for Ultra-ROM and SUPER-19 terminal upgrades. It requires an H-8/H-19 or '89/90, a Z80 CPU, 48K TPA, and a standard serial I/O interface using the 8250 chip. It can run at either 2 or 4 MHz and be used for direct computer-to-computer transfers if XON/XOFF is enabled. The distribution package supports Hayes-compatible modems, but this may be altered. On-disk documentation is extensive; support and printed documentation are available for \$25 from the author. This package occupies 140K on-disk.

## QL41

(From KaftorWare Corp.)

QL41 is a flexible and powerful file viewing utility. It combines some of the best features of popular utilities such as LUX, LT, VLU, and LIST62 with unique features of its own, including hex display and a fast access, file-reference-by-number, system for LBR directory and "batch" viewing/extractions. The original 114K library has been divided into two sections for hard-sector distribution. The package includes NULU and UNCRUNCH to recover the files. It requires 141K of disk-space.

## 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) or double-sided (DS/SD) hard-sector and soft-sector, single- or double-sided, for both HDOS and CP/M. All disks are 40-track (48 tpi) only. Use the "disk-space" figures in the descriptions to gauge how many disks are required for each package (standard hard-sector will hold up to 90K, SS soft-up to 185K, DS soft- up to 380K). Please clearly indicate the format you are supplying or require. If you desire DS 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 / P.O. Box 548 / West Branch, IA 52358

## QUERY!3 Closely Examined (Continued from p. 1)

The "L<oad>" command requires that you specify both the drive (even if default) and the file extensions (.ABS, .COM, or .EXE) for QUERY!3 programs. You should also include the extension for the data file. AUTOPRO works only with QUERY!3's programs.

AUTOPRO also has a few problems. Under HDOS and MSDOS if your instruction file exceeds the 768 bytes your system hangs (--long files not tried on CP/M

yet.) The only way out is a hardware reset.

AUTOPRO is deficient in error messages during the compile; you'll usually find instruction-file errors only during execution. **TIP:** Run through your procedure first, **by hand**, while dumping the screen to your printer. Then use the hardcopy as the source for your batch code.

**WRITER and CALC Differences.** Be aware that command files of WRITER and CALC are **not** compatible. CALC adds many new commands, and some WRITER commands exist in CALC with additional parameters. WRITER's lame "G" is legal in CALC, but has a different meaning. An additional (definition) section exists at the top of CALC's command file, and its summary section is **after** the main. (WRITER's is **before**.) Having recognized that incompatibilities exist, we can now look at CALC's modules:

**PREPARE.** This program is a tutor, editor, and simple applications generator for CALC. PREPARE creates a command file in CALC's language, guiding you in constructing each command as you prepare your first applications. It goes into more detail than the manual. It's good **as a tutorial**, but for repetitive use, the screenfuls of instructions get tedious.

If you change your mind, you cannot redo a command from within the tutorial. The only way to change (or add to) a section once you exit PREPARE, is via the built-in editor or an external one. Also, you can't save a command file within the tutorial if you haven't set up a "Main" section, because a "Main" section is **required** in every CALC command file.

The simple built-in line editor numbers its lines, and can handle only so many. (CALC itself is not limited in this way.) It shouldn't take you long to graduate to your own editor.

PREPARE has one significant bug (duplicated in the documentation). In assignment statements, they tell you to put a "D" before the command specifying which database field (working, result, or constant) is to be assigned to one of the 26 variables (or to a working data file field). The problem is, "D" is CALC's command to **print** fields and has no place in an assignment; its use here makes CALC cry error and expire. **TIP:** On pages 10-8 and 10-12 of the CALC manual, at the "x=v\*z" command, cross out the leading "D"'s inside the square brackets that give the syntax for the fields. If you use PREPARE to set up this statement, you'll have to **correct its output command file afterwards**.

**CALC.** This is the heart of QUERY!3's add-on package, and is simple to run. It asks for 7 items:

1. name of an optional result data file to store computations made by the summary section
2. name of your working data file
3. number of records per pass. You can print up to 4 records on a line (default = 1 per pass)
4. name of command file telling CALC what to do
5. name of optional constant data file to store and retrieve fixed numeric and string data
6. report destination (printer, screen, or disk)
7. which records in the working file to process (all, deleted, or undeleted)

CALC's optional files give it great power. So does its command language, which will:

- o print any text strings

- o page and/or position the printhead (or cursor)
  - o format string and numeric output (9 options)
  - o read from "constant" and "working" data files
  - o write to the result data file
  - o form expressions with 4 arithmetic operators and the SQRT and ABS functions, from numeric constants, data fields, previously-set-up calculations, and variables
  - o define up to 30 expressions for calculations
  - o assign calculation results to a working data field (overwriting what was there) or to 26 optional variables in the command file.
  - o use 3 IF...THEN constructions whose execution depends on whether a specified field is empty or not, or whether a search condition is true
  - o define 10 printer codes up to 10 dec codes each
- The power is there, but you must write your own command file. CALC offers **extreme** flexibility (and in an overworked example like printing labels it goes far beyond PRINTER's abilities.)

The command file for CALC consists of up to 6 sections. In the "Definition" section, you set up printer codes and predefined calculations. The "Initialization" section defines printed-page characteristics and sets calculation "accuracy." A "Report Header" section can print a title page. The "Page Header" section repeats at the top of each page and can include the page number where you like. The "Main" section is where processing of your data file's records actually occurs. And the "Summary" section, executed once at the end, summarizes what occurred in the "Main" section.

In complex applications, most of the problems we encountered were setting up equations in the critical "Definition" section, where almost all calculations must be **predefined**. These **predefinitions exclude the assignment operation ("=" command)** which may appear only in the "Main" and "Summary" sections.

Comments (preceded by semicolons) are allowed. But, **within sections**, CALC has indigestion if comments **begin** lines. You may comment **outside sections** -- and even on the same line **after commands**. But if that line includes an expression (equation), your comment is seen as part of the expression, so CALC says, "Formula is in incorrect format"! Commenting in CALC requires greater care than in WRITER.

Error-trapping is extensive. CALC reports errors to you from a bevy of self-explanatory messages, and then terminates. The line number of the error is displayed, but this number is the location in the **entire** command file, not in an individual section. So editing with PREPARE's editor is harder than with other line-numbering editors, such as Software Toolworks' PIE.

We noticed a quirk in the way CALC sends code sequences to the printer. Things function according to Hoyle unless the sequence you send contains a 13 (decimal). CALC will spuriously follow a 13 (the ASCII code for carriage return) with a 10 (ASCII linefeed). For example, the Diablo 630 code to reset the printer is 27,13,80. But it arrives at the printer as 27,13,10,80. The 10 interrupts the sequence, so the 80 (an ASCII "P") gets printed and the reset code fails. An instruction can work when 13 is a **trailing** value (as in 27,31,13), but an unwanted linefeed gets generated at the printer by the 10 CALC automatically appends (27,31,13,10).



**Differences in the HDOS and CP/M Versions.** Some behavior of QUERY!3 is peculiar to a given system:

**CP/M.** 1) To alert you to a quirk with AUTOPRO: If you name a source file CONTROL.AUT, then AUTOPRO, of course, generates CONTROL.COM. But let's say you **then** want to **alter** the CONTROL.AUT source and **rerun** AUTOPRO. If you don't ERASE the old CONTROL.COM first, a **new** CONTROL.COM will **not** replace the old on disk! **TIP: Manually ERASE** the old CONTROL.COM **first**. Otherwise, AUTOPRO leaves the **old** CONTROL.COM intact! It just creates a new, same-named, zero-length directory extent! (Fortunately, when **that** happens, a simple "ERA CONTROL.COM" properly gets rid of **both** directory entries for you, and the next AUTOPRO run writes your new output file.) By the way, an (unverified) hazard of this quirk is, you might **use** a CONTROL.COM thinking it's been updated when it hasn't, and thus, say, access a wrong database without realizing it.

2) Bad results were obtained using HUG's KEYMAP with QUERY!3. With KEYMAP loaded by its "normal method" (below CP/M) there was strange, possibly dangerous, system-level behavior **after** a QUERY session: head accesses on a drive other than the one selected, a hung system after a DIR list, or a refusal of the system to reinvoke QUERY!3. These problems were absent if KEYMAP was loaded at the top of memory above a 63k system, but **then**, when a KEYMAP key was used during a QUERY run, an occasional character was dropped.

3) As received, CP/M's CALC refused to write its output to **disk**. CALC asked for an output file name, but regardless of the user's response, it only repeated the question. The ESCape key brought a "Sequence aborted" message, but to no avail; CALC **still** kept requesting a file name! Only a hardware reset would break out. After correspondence, Hughes Hoyle sent a distribution disk without the problem.

**HDOS.** 1) In the HDOS version's manual, Appendix 3 ("Notes to HDOS Heathkit Novices"), contains a blatant error on page 10-6. It instructs you to run SET from within PIP to set the terminal options. Of course, you can't do that.

2) In using the software, you must be sure to have properly MOUNTed your data-file disk. Forget, and you'll see "No such Database currently exists!" when you try to access it. That message is not very helpful in diagnosing the real problem.

3) If you use screen dump drivers to record your activity on a printer (as for later setting up an AUTOPRO file), you may have problems. One public domain driver, HC:, doesn't work at all. And T & E Associates' excellent ET: only does a **screen** dump from the point where you hit the control sequence for a full echo (CTRL-P)! A screen dump command (CTRL-T) with this driver doesn't do a thing. And this applies to hitting the control sequences both inside QUERY!3's programs **and** at the system prompt before calling them.

4) The HDOS version exhibits no serious bugs. In fact, both PRINTER and WRITER (otherwise extremely hard to stop) do respond to CTRL-Z CTRL-Z under HDOS, as a last resort. But as this is HDOS's general abort, you return to the system prompt, not the QUERY menu. CTRL-Z CTRL-Z also works in REDESIGN, however your new (but aborted) output file

will be totally unusable!

5) As distributed, only LP: is recognized by the modules. If you run a second printer, you must rename its device driver to LP.DVD to use it.

**Weaknesses.** The most serious flaw in all of QUERY!3 is lack of protection for existing files. Any file created can potentially be overwritten if you aren't careful. Exceptions are the concatenations that REDESIGN and ADD do. If you accidentally combine files or ADD unwanted material, you can recover. Overwritten files are another story. **Back up your files when using QUERY!3.**

Next, it is so difficult (or impossible) to abort many operations.

Finally, the ubiquitous use of the extension, ".DTB", even for command files, can be confusing. We recommend establishing your own system of filename extensions to keep database files, PRINTER format files, REDESIGN transfer files, WRITER command files, and CALC command files distinguishable from each other.

**Strengths.** QUERY!3 is easy to use because of at least four things: its menu, good error-trapping at the prompts, mnemonic commands in the command-driven programs, and help screens in same. But we stress it's the **total** package, including CALC, that we recommend.

The total package **despite its flaws** provides near-relational DBMS power at a file-manager price.

Don't deprive yourself of this package because of any "flaw" we have reported. Merely backing up your files will protect you -- and if you exercise care, you should never need to access those backups! For ordering info see the end of Part 1, in issue #17.

## CONTACTS

(A Wanted/For Sale/Swap Column)

**Mark Goddard** (4007 NE 6th Ave., Ft. Lauderdale, FL 33334, 305-565-4839 [days]) Mark has 10 years-worth of **REMark** magazines for sale, beginning with #1. When he called, he didn't give me a price, but said shipping would be prepaid.

**Randy D. Cooper** (18514 Lippitzaner, Cypress, TX 77433-1114, 713-463-6211) "...I no longer own an H89, but I have some H89 enhancement components that I'd like to sell to a current user. My H89 ... went for \$135 at an auction in 1988. I retained the MMS soft-sector controller and software to sell to someone who wants to upgrade their system."

**Randy Schimka** 9154 Irvington Ave., San Diego, CA 92123) "I have an H89 and an H47 drive set (new heads) that I would like to sell. I also have a CDR SuperRAM 89 board, too. Do you know of anyone that would be interested?"

**Peter Sokolosky** (1230 N 3620 W, Vernal, UT 84078) "A number of years ago I assembled a H/Z-89 computer as part of a microcomputer course. Since that time I have not utilized it much and now wish to sell it ... The computer is operational and comes complete the HDOS manuals and diskettes, the Heath BASIC manual, all the assembly instructions, and some new

hard sectored diskettes. Anyone with your group is welcome to correspond with me at the above address."

**Harry Bailey** (P.O. Box 6487, Panama City, FL 32404) "You ran an ad for me the first of the year [actually #15 -Ed]. I had one reply and he offered \$75.00 for one Z89. Lets try one more time that I have two Z89's, a bunch of Z89 parts and software available and if they send a self addressed and stamped envelope I will send ... [an inventory] to them for their consideration. Thanks." Harry's inventory includes one machine with only the hard-sector controller, one drive, and 32K; the other with **both** hard- and soft-sector controllers, one internal HS and two 96-tpi external drives, and 64K. By way of odds and ends, he has components for the power supply, boards, new and used drives, CP/M software, the HDOS 2.0 manual, and hardware manuals. He also has a **damaged** Z-19 terminal.

**Joe James** (P.O. Box 1966, Hereford, TX 77045) Joe wants to sell his H-8/19/17 system. It includes the H-8-5 interface, hardware manuals, sections of the HDOS 2.0 manual, cassette software, and software from Software Toolworks. He's asking \$150 or best offer, plus shipping.

**Bruce Micales** 3482 Valley Woods Dr., Verona, WI 53593, 608-833-7350 after 7 pm Central). "I have been a user of the H89 for several years, however, I switched to the H100. Unfortunately, I have neglected the H89 and I would like to sell the great machine to a more deserving soul. The system I have is as follows:

- Z90 with 64K RAM, two 360K double-sided, double-density (soft-sector) floppy drives
- Hard-sector disk controller (HE-181-3055)
- System operation manual for the Z-90 computer
- CP/M-80 versions 2.203 and 2.204 (BIOS listings and manuals included)
- SUPERCALC
- MICROSOFT BASIC (MBASIC-80)
- TURBO PASCAL for CP/M-80 (Version 1.00)
- TURBO TUTOR for CP/M-80 (Version 1.00)
- HRUN HDOS Emulator for CP/M-80 (HARD Sectored disks; A, B, and C)
- MAPLE for CP/M-80 Modem Appls. Effector (Hard Sectored Disk)
- CP/M ASCIRITY (RTTY program for amateur radio operators)
- AIRPORT Flight Controller Game
- One external 5.25" disk drive with power supply

"All these programs come with the original documentation and are on soft sectored disks unless otherwise noted...."

**Tony Venticinque** (536 Redwood Rd., Bolingbrook, IL 60439) "I am trying to locate software to convert my excess H8's into a dedicated printer server. While I am interested in any software that would convert it into a buffer, what I really hope for is something more elaborate. If other owners of multiple H8's would be interested, maybe there is a potential commercial product or joint effort possible. Between the front panel's keypad, display and bell, the user could control the H8 without a terminal. If the

program were on 2K EPROMs, there would be no need for a disk drive. If the starting address were the same as the program on the H17 Card, the monitor would even default to the proper address. With the H8-2 Parallel Card, the H8-4 Multiport Serial I/O Card and the H8-5 Parallel Serial I/O and Cassette Interface Card, the H8 has more I/O ports than some very expensive commercial units. The H8-5 not only has a serial port, but also a pair of relay outputs. Since the serial ports on both cards can be addressed to any available I/O address, it would be possible to create a unit with more ports than commercial units can handle. The hardware can be used to create a full featured printer server including ... a buffer, automatic switching and (if a H8-2 is available) interface conversion.

"I am also looking to buy some upgrade products for my other H8. I am especially interested in buying either a Z80 CPU card or an origin-0 modification. Other hardware I am interested in includes an interface for the H47 disk drives, a H8 prototyping card, a H8 wirewrapping card, a gold motherboard, side panels with built-in fans, and a power supply upgrade. Recently I bought a H8 graphics board and a music board. I would be interested in corresponding with other owners of these boards."

**Manfred Deffner** (Gebelsbergstrasse 28, 7000 Stuttgart-1, WEST GERMANY) "I have a TRIONYX 16-bit CPU board (16B-H8) [for my H-8] which I got as a kit, but when it was [done] it did not operate. In order to fix the bug I should have any kind of help (schematics, etc.). I wrote several times to the TRIONYX people but they did not respond. And in the meantime they seem to be out of business. Perhaps, it is possible to send this 'emergency message' out by 'THE STAUNCH', and I can find anybody who is experienced with this board.

"I regret whatever has happened to the TRIONYX people. The products which they made were outstanding, but they had a strange communication behaviour."

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#### Development of the CLE Command Line Editor (For Residence in a CP/M Operating System) By William S. Derby, Livermore, CA

**CLE Objectives.** However sophisticated, most of the classical operating systems have been notoriously unforgiving of the user who makes a mistake while typing input to the system. A command line typically consisting of up to 80 characters must often be retyped in its entirety--all because of one little error. Once a command line has been entered, the CP/M operating system does not allow it to be recovered for correction of errors. The banked CP/M Plus system does allow a reasonable editing capability of the current and most recently entered line, but it usurps several of the control characters including the ^G bell character in the process. The MS/DOS operating system allows the recovery of the most recently entered line with a difficult-to-use invisible correction facility.

Several programs with the capability to edit and recall command lines have been developed for the MS/DOS operating system. The CED program described

in the December, 1988 and July, 1989 issues of REMark offers this capability for MS/DOS on both the IBM PC and the Zenith Z100. The CLE command line editor provides the capability for a standard CP/M 2.2 system.

The CLE command line editor was developed on a Heath/Zenith H89 according to the following design criteria.

- \* It must be able to operate in any CP/M 2.2 environment.
- \* It must not depend on any modifications to the system.
- \* It must use only 8080 instructions recognized by ASM.
- \* It must allow the editing and recall of command lines.
- \* It must not usurp any of the usable control characters.
- \* It must maintain a clear display under all conditions.
- \* It must fit in a 1K block above or below the system.
- \* It must be easy to use and to install in the system.

**CLE Implementation.** The CLE program uses a simple and straightforward implementation scheme that imposes minimum impact on already existing system conventions. Since it uses only 8080 instructions, it can be constructed on any computer with a CP/M system by using the ASM assembler supplied with the system. It has been successfully implemented on Kaypro II and Z100, as well as on H89 computers.

When installed, the CLE program communicates intimately with the BDOS code standard in any CP/M 2.2 system. All the functions of the CP/M system are undisturbed by the presence of the command line editor; and since the CCP is unaffected, the CLE program will also work in systems like ZCPR that replace the CCP. A special version of the CLE program with the editor incorporated into the BIOS is available for the H89 computer.

The code that interprets command lines in a standard CP/M system is entered from a jump table in the BDOS whenever a BDOS function 10 is requested to read the console buffer. This function is used by many CP/M programs as well as by the CCP for normal CP/M command lines. When the CLE program has been installed and its address placed in the appropriate location in the BDOS jump table, the read-console-buffer function is intercepted by the CLE command line editor. Operation of the CLE program requires that the BDOS jump table be updated after each warm start; this is performed in the BIOS whenever the CLE program is installed.

The installation of any program that stays in memory below the BDOS in a CP/M system usurps valuable program space and invites conflict with other programs that also reside in this area of memory. Many of these programs such as the CCP, XSUB, DDT, DG, KEYMAP, Wordstar, and Write-hand Man already conflict with each other. To avoid any further conflict it is advisable to install the CLE program above the BIOS. Making room for this usually requires successive MOVCPM, SYSGEN, and CONFIGUR operations. These operations have frightened away many brave CP/M explorers but all the required

programs are included with a standard CP/M system, and on a step-by step basis the procedure is fairly straightforward. The steps are reviewed in the documentation provided with the CLE program.

**CLE Operation.** The CLE command line editor makes the correction of errors detected anywhere in a command line convenient before the line is transmitted to the system. It also maintains a 256-character buffer that holds the most recently entered command lines so they can be recovered for further editing and reentry to the system. Sixteen command lines with an average length of 15 characters may typically be in the buffer during normal use.

To allow the editing of characters positioned anywhere on the line, some of the CP/M control characters needed to be redefined. The redefined characters were chosen carefully to minimize the impact on established usage, and to extend their original meanings in the most natural way possible. All except four keyboard entries used to minimal advantage by the CP/M system behave exactly the same as in the standard system; except they enter the line where the cursor is positioned, and this need not be at the end of a line. The CONTROL-Q and CONTROL-S characters (usually written ^Q and ^S) are used to move the cursor one position to the left and right respectively. The ^R character can be used successively to recall previously transmitted command lines, and the ^U character moves the cursor alternately to the beginning and to the end of the line.

The tab character advances the cursor past the next multiple of eight columns on the console but it does not enter the line unless the cursor is positioned at the end of the line. The backspace and delete keys delete the previous and current characters respectively; but when the cursor is positioned at the end of the line, the delete key toggles the insert/delete mode for characters that subsequently enter the line.

When the cursor is advanced beyond 80 columns on the console or when a line is split (with the ^E character), the display is often garbled by the standard CP/M system. Both these conditions as well as the display of tab and control characters are handled correctly by the CLE program. Flexibility and control of long lines is gained since the ^E character splits the line at the position of the cursor when the CLE program is in effect.

**CLE Installation.** Automatic loading of the CLE program is performed each time the system is turned on when the CLE installation program has been initiated on the boot disk. The CLE installation program is a 1K file that loads the CLE program into a 1K block of memory. Construction of the installation program requires probing the CP/M system for some key system addresses, assembling the program source with the key addresses installed, and building the program that loads the resulting CLE program into memory. Finally, the system can be told to load the CLE program each time a cold start is performed. These operations can all be performed by files included on the CLE disk along with easy step-by-step instructions to facilitate the process.

The presence of the CLE installation program on

**H D O S 3 . 0 2 R E A D Y T O S H I P****The System and On-Disk Manual are Now Available**

An upgrade to HDOS 3.0, as distributed by William G. Parrott Jr. for some years, is now available to the H-8 and H/Z-89/90 user. The system was prepared by Richard Musgrave (MIGHTY-SOFT, Kansas City, MO) and the voluminous documentation was written and edited by Daniel N. Jerome (Burnsville, MN) who keyed and updated the HDOS 2.0 manual for **The Staunch 8/89'er**.

The system will boot on virtually all '89/90's. One exception appears to be those equipped with D.G.'s SUPER89 CPU board. Any H-8 **must** be capable of remapping memory as when booting CP/M. Hence, the latter requires a Z-80 CPU ("ORG-0") card and front-panel ROM such as XCON8. (PAM-8 will **not** work!) Like ver. 3.0, 3.02 remaps memory and loads the **entire** system at the bottom of memory. There are no overlays. Moreover, most software written for HDOS 2.0 will run without modification under 3.02. Exceptions include those programs which directly access the MTR or H-17 ROMs (those addresses are now used for other purposes), Steve Robbins' EDIT19 (but a patched version is available from **Staunch**), and Softshop's UD.DVD. In most cases, commercial or public domain substitutes are available for these programs. Contact **Staunch** for further information.

Device drivers for all common media types (H-17, H-37, and H-47) are included. Drivers for other types may be obtained from the HDOS 3.0 seven-disk set. Almost any generic terminal may also be used (even the H-9!) because the terminal driver is separate from the system core. However, a number of the utilities on the distribution disks **require** the H/Z-19/89. If you are **not** using the latter, include this information when ordering.

If you are presently running HDOS 2.0, you should be able to move your **printer** device driver to 3.02 without difficulty. The one known exception is Softshop's UD.DVD; it will lock up any 3.0 system! If you need a printer driver, contact **Staunch**; it has a library of them for many off-makes and -models, including a replacement for UD.DVD by Rick Streeter. Suitable drivers are also available from commercial sources, such as Lindley Systems.

Enhancements beyond those provided by HDOS 3.0 include: MEGAPIP, a DOS shell; many new BATCH commands; HALT, which will execute SHUTDOWN.ABS or .BAT before exiting the system; and 8 user areas, similar to CP/M's USER or MSDOS's subdirectories.

The documentation for this immediate release is **on-disk**; when printed on standard 9-1/2 x 11 fanfold, it is 3 inches thick! The package includes a 3-inch, D-ring binder and section dividers for the 14 chapters. A **printed** manual is in preparation and if you order the system with the latter, the system will be promptly shipped with adequate documentation to get you started. The printed manual will be shipped as soon as it becomes available at no additional cost.

The price of the package, no matter which manual version you order, is \$60, including U.P.S. shipping (continental U.S. only; HI, AK, and Canada please add \$6 for air parcel; overseas \$8 for surface mail or \$30 for air parcel). When ordering, clearly indicate the manual (on-disk or commercially printed) you want, the media (standard or double-sided hard-sector; single- or double-sided soft-sector; or eight-inch) you need, and shipping method if applicable. All 5-1/4" disks are formatted at 40-track (48-tpi). If you desire **both** manuals, there is an additional \$30 charge. Send your orders and enquiries to:

Kirk L. Thompson  
Editor, **The Staunch 8/89'er**  
#6 West Branch Mob Hom Vil  
P.O. Box 548  
West Branch, IA 52358  
Home phone: 319-643-7136



## Advertisement

## H89 GOODIES GALORE

June 1990

TMSI and I have a new home! Instead of unpronounceable Dowagiac (known locally as "Dogpatch"), I now reside in Holland MI, famous for its spectacular tulip festival. But moving makes it painfully clear just how much stuff I have, and how little room I have for storage. So it's time for a sale!

## NEW PRODUCTS

444+61 decoder PROM puts Z89-37 instead of H17 in rightmost I/O slot	\$10
LP001 LOW-POWER KIT 444-142, 444-61, 444-83 in low-power CMOS. Includes MTR-90, cuts power by 250mA. Specify if non-Heath ROMs at U516-U520	29
LP002 MTR-90A (MTR-90 with 38400 baud support) Use with Superset to boot at 38400 baud for 4x faster screen operation	10
FF001 FLICKER-FREE kit eliminates screen flicker, cuts power consumption for cooler operation.	29
FF002 SUPERSET combines H19, HUG/Watzman, Super19 UltraROM, FF001 all in one. Prog.function keys 38400 baud, screen-saver, on-screen time/date, help menus, white screen, interlace, much more	49
FF003 SUPERFONT adds 8 fonts incl. GTPROM, Z100, VT-100, IBM-PC, 160x100 graphics, math, greek, bright/dim, double-wide chars, super/subscripts	29
FF004 SUPERCLOCK adds battery backup for clock, 2nd page screen RAM, screen save/restore, user defined menus, fast animation, and windows!	29
FF005 SUPERKEY uses CAPS-LOCK for "typewriter shift" operation Don't need SHIFT key in BASIC or CP/M commands.	10
WHM01 WRITE-HAND-MAN, a "sidekick" for CP/M Hit BREAK for instant access to a calculator, phonebook, notepad, calendar, view files, disk directory.	29
WHM00 WHM upgrade for Superset/Superclock owners full-screen VIEW, double-size CLIPBOARD, pop-up EDITor, screen dumps, and more!	10
Cleveland Codonics Imaginator graphics board with stock and Tektronix ROMs (brand new!)	75

## USED EQUIPMENT

Z121 (Z100 w. internal monitor) 5 MHz 192K RAM two DS 5-1/4" drives, manuals, software, etc.	\$200
10MB CMI Winchester and controller for above 8 MHz speed-up kit for above	150 50
H89A, 64K, 3 serial, Z89-37, 1 40T DS drive	150
H89 with 48K, 2 serial, H17, 1 40T SS drive	75
H77 dual drive cabinet and PS only, with cables (free installation if you buy drives, too)	40
non-Heath dual drive cabinet and power supply for 2 FH 5-1/4" drives side-by-side horizontal	30
non-Heath dual 8" drive cabinet and power supply for 2 FH 8" drives side-by-side horizontal	50
Hayes 300 baud Smartmodem (the real thing!)	35
Okidata u82 dot-matrix 160 cps printer, ser+par	75

## INTEGRATED CIRCUITS

4116 16K dynamic RAM 250 nSec (set of 8)	\$5
4164 64K dynamic RAM 200 nSec (set of 8)	12
41256 256K dynamic RAM 150 nSec (set of 8)	20
444-19 CPU H17 boot ROM	3
444-29 TLB character generator	2
444-37 TLB keyboard decoder	2
444-40 CPU MTR-88 boot ROM (H17 only)	1
444-41 CPU bank 0 decoder PROM (MTR-88/89)	1
444-42 CPU memory PROM (48K, HDOS only)	1
444-43 CPU I/O PROM (H17, 3-port)	1
444-46 TLB program ROM	3
444-61 CPU I/O decoder PROM (H17/37/47/67, 3-port)	6
444-62 CPU MTR-89 boot ROM (H17/47)	2
444-66 CPU "org-0" memory PROM (64K CP/M or HDOS)	4
444-81 Z89-37 I/O control PAL	5
444-82 Z89-37 interrupt control PAL	5
444-83 CPU bank 0 decoder PROM for MTR-90	4
444-84 CPU MTR-90 boot ROM (40T H17/37/47/67)	4
444-142 CPU MTR-90 boot ROM (80T H17/37/47/67)	6
78H05 +5v 5 amp regulator	5
78H12 +12v 5 amp regulator	5

## CABLES

134-1074 34-pin internal disk drive cable	\$10
134-1107 40-pin H47/67 drive cable	3
134-1141 11-pin CPU-to-TLB power cable	5
134-1144 34-pin internal/external drive cable	15
134-1158 16-pin Z89-37-to-CPU cable	6
134-1163 34-pin external drive cable	15
134-1298 50-pin ext.drive cable (CDR, Magnolia 8")	5

## DISK DRIVES

FDD100-5 Siemens 40T SS FH 5-1/4" disk drive	\$15
TM100-4 Tandon 80T DS FH 5-1/4" disk drive	45
SA850 Siemens DS FH 8" disk drive	60
8" DSDD blank disks (price per 10)	5
5-1/4" DSDD blank disks, soft-sector (per 10)	5

## BOARDS

H19/89 Terminal Logic Board	\$30
H19A/89A Terminal Logic Board	40
H89 CPU board (with 48K RAM and latest ROMs)	50
H89A CPU board (48K RAM, latest ROMs)	65
H88-1 H17 hard-sector controller	20
H88-3 3-port serial I/O	15
H88-16 16K RAM board (brings H89 up to 64K)	35
Z89-11 3-port I/O (2 serial, 1 parallel)	40
Z89-37 H37 soft-sector controller	75

...and this is only a PARTIAL list! Call or write if you don't see what you need, and I'll do my best to help. Henry Fale at Quikdata stocks my Z89-37 Disk Controller, Write-Hand-Man, and Superset products. Quikdata is one of the H89's earliest supporters and has an excellent reputation for fast delivery, good pricing, and great service. MC/VISA and foreign customers, order these products from Quikdata Inc, 2618 Penn Circle, Sheboygan WI 53081, telephone 414-452-4172. For other items, order from me directly.

TMSI c/o Lee Hart, 323 W. 19th Street, Holland, MI 49423, 616-396-5085



the boot disk activates the command line editor whenever the CP/M system is used. The name of a program or submit file to be invoked after the CLE program has been installed can also be specified. Means are provided to easily unload the CLE program to restore the standard CP/M system and release the 1K block of memory for other purposes. The installation program may, of course, be invoked to install or reinstall the CLE program any time the CP/M system is in use.

Memory conflicts and installation procedures can be eliminated altogether if the command line editor is incorporated into the BIOS. The CLE program can be incorporated into the BIOS in any CP/M 2.2 system that runs on the H89. This requires a modification of the BIOS.ASM file used to generate the system. A submit file provided on the CLE disk can be used to perform the modifications needed. A MAKEBIOS procedure must be performed on the modified BIOS.ASM file. This produces a BIOS.SYS file that generates a system 3/4K to 1K larger than the original system, but the command line editor will be incorporated into the BIOS of the resulting system.

**CLE Enhancement.** In order to be operational on any computer with a CP/M 2.2 system, the CLE program avoids use of the keypad on the H89. This can, however, be activated to great advantage when the KEYMAP program (available from HUG) is used in conjunction with the CLE program on the H89. When installed, the KEYMAP program uses an additional 1K block of memory; and the KEYMAP installation program is another 4K file needed on the boot disk to initiate the keypad each time the system is turned on.

The KEYMAP program may be installed above or below the system. As with the CLE program, installation above the system is advised. Whenever both the CLE and KEYMAP programs are installed above (or both are installed below) the system, the CLE program must be installed above the KEYMAP program. This is because the KEYMAP program overwrites 6 bytes below its 1K block and the CLE program has no 'spare bytes' at the top of its 1K block of memory. Before installing both programs above the system, a CP/M system with 2K of free space above the system must be generated.

When using both CLE and KEYMAP, the keypad should be set as follows:

- \* Set IC to ^Q^U followed by the delete character to toggle insert mode.
- \* Set UPARROW to ^X^R to successively recall previous command lines.
- \* Set DC to the delete character to delete the current character.
- \* Set LEFTARROW to ^Q to move the cursor one position to the left.
- \* Set HOME to ^U to move the cursor to the beginning and end of the line.
- \* Set RIGHTARROW to ^S to move the cursor one position to the right.
- \* Set IL to ^Q^Q^Q^Q to move the cursor 4 positions to the left.
- \* Set DOWNARROW to ^X^\*^U^R to recall a previously recalled command line.
- \* Set DL to ^X to delete the current line.

Since the KEYMAP setup program does not accept the delete character directly, an alternate character must be used; this can then be changed to the delete character (7FH) with DDT. With KEYMAP version 1.1 locations 0314H and 0328H should be changed; this should be followed with a SAVE 14 CLEMAP.COM command.

When both CLE and KEYMAP are installed with the above mappings, the right and left arrow keys on the keypad perform their natural functions, and the up and down arrow keys recall previous commands with the natural conventions used by the CED program for MS/DOS. The mapping of the other keypad characters makes use of CLE even more convenient. The two programs are natural companions.

When the keypad is needed for other uses, the CLE mappings must be disabled. When other KEYMAP mappings are needed, the KEYMAP program that makes the CLE mappings may have to be unloaded. Two programs available at no cost from the author facilitate these operations; the programs are described on page 1 of **Staunch** #13.

Programming and using the CLE command line editor have provided a greatly enhanced understanding and appreciation for the standard CP/M system. What it lacks in sophistication it makes up for in simplicity. With enhancements like CLE and KEYMAP it can still offer ever increasing power and utility without the need to replace its vital parts. KEYMAP is available from HUG (part #885-1230) for \$20; CLE is available for \$15 from the author (W. S. Derby, PO Box 2041, Livermore, CA 94550).

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#### VENDOR.UPDATE

**Daisywheel Supplier.** One reference I pulled out of a freebie publication (**Used Computer Locator**) recently was a source for daisywheels and ribbons. For example, the 15 cpi printwheel I do **Staunch** with on my Diablo 630 is hard to find without going directly to Diablo/Xerox. But this source stocked them. It also has printwheels and ribbons for Qume, Silver Reed, Ricoh, Brother, IBM, NEC thimbles, and other off-make daisywheel printers. Strongly recommended; write or call:

Bill Allbritton and Assoc. / 2603 Artie St., Suite 16 / Huntsville, AL 35805 / 205-536-3879

Bill is also offering a \$2 credit to **Staunch** subscribers on **in-stock** merchandise, so be sure to mention your source of information!

**Discontinued CP/M Software in Original Packages.** Lenny Geisler, editor of the friendly competition (**SEBHC Journal**), is selling "vintage" software and educational materials (marked EC below). Some of this stuff is packaged as "demos," with the manual pages over-stamped in red. But the software is still very usable, as I can attest since I ordered one of them. Lenny's listing is as follows:

Item	Description	Price
-----	-----	-----
SJ-1	Programming in FORTRAN (EC)	*39.95
SJ-2	Microsoft FORTRAN v.3.4	*39.95

SJ-3	Programming in COBOL (EC)	*29.29
SJ-4	COBOL-80 v.4.0 w/documents	*29.95
SJ-5	Programming in MBASIC (EC)	*29.95
SJ-6	MBASIC-80 soft-sector	*39.95
SJ-7	MBASIC-80 hard-sector	*39.95
SJ-8	MBASIC-80 w/manual	*29.95
SJ-12	SoftStuff CPS modem pkg	8.96
SJ-13	MicroPro SUPERSORT	29.95
SJ-14	MicroPro MAILMERGE	29.95
SJ-15	MicroPro DESPOOLER	29.95
SJ-16	MICROSTAT database w/manual	49.95
SJ-19	Peachtree GENERAL LEDGER	39.95
SJ-20	Peachtree ACCOUNTS PAYABLE	39.95
SJ-22	Clark GENERAL LEDGER	21.95
SJ-23	Clark INVENTORY	21.95
SJ-24	MicroPro DATASTAR dbms	21.95
SJ-27	SoftStuff MYCHESS (1 only)	19.95

Items marked with an asterisk (\*) denote packages that are 10% off if the language is paired with its matching educational course. Prices also include shipping in the continental U.S. **only** and returns **won't** be accepted if opened. Format conversion (soft- to hard-sector, the reverse, or from 8-inch) is \$5 per 5-1/4-inch destination. Lenny also called me and remarked that he has the CP/M operating system on 8-inch media; he's offering 10% off on these, too.

Further, Lenny has other software you might find of interest:

Item	Description	Price
CGD#OS	CP/M-80 Games Disk 0 (soft-sect)	6.96
CGD#OH	CP/M-80 Games Disk 0 (hard-sect)	7.96
HPCP#OS	HDOS 2.0 Programmers Care Package (Misc. ABS and BAS utils) (soft)	3.00
HPCP#OH	HDOS 2.0 Prog. Care Pkg (hard)	3.66
WSKPS	WordStar ver. 4 Keypatch for H/Z-19/89 Function Keys (soft-sect)	12.50
WSKPH	WordStar Keypatch (hard-sect)	13.50
HTXTS	HDOS 2.0, 3.0 TEXTPROcessor ver. 4.1 DEMO (soft-sector)	2.50
HTXTH	HDOS TXTPRO DEMO (hard-sector)	2.50
CTXTS	CP/M TXTPRO DEMO (soft-sector)	2.50
CTXTH	CP/M TXTPRO DEMO (hard-sector)	2.50

The last four items are only **demonstration** packages for a good, but (regrettably) discontinued, text editor for HDOS and CP/M.

**TMSI/Lee Hart.** You've undoubtedly noticed the ad from Lee Hart on this issue's insert by now. Lee called me late in May and we chatted for almost an hour. One thing we discussed was Housemaster and the documentation he was looking for (#17, p. 5). He mentioned he would be willing to assemble a hardware/software package (with or without the built-in clock) based on it if there is enough interest. Projected price is \$50 to \$100 for a system to control household lighting, appliances, etc., using a **dedicated** '89/90.

He also mentioned that he has some "reject" soft-sector (H-37) controllers for sale. These are "guaranteed not to work" because they were assembled from kit and botched (parts in the wrong places or solder bridges). You could buy them for parts or refurbish them yourself. Price range is \$20-\$30. Lee

also told me he has **not** been able to reach the 50-piece minimum quantity for the '89/90 internal drive shield mentioned in #13 (p. 6) and #16 (p. 8). So he plans to approach the sheet metal fabricator for a quote with the 32 orders he has. The cost will undoubtedly go up, so if you haven't contacted him before, do so immediately!

Finally, Lee noted that the capabilities of ROMs for the terminal logic board (TLB) for the '19 and '89/90 has increased substantially since Heath designed the board. The part Heath used only held 8K, but plug-compatibles these days can hold up to 32K. Lee is wondering if anyone can suggest applications for the terminal that would use the additional room. For Lee's address, see his ad.

=====

### The ULTIMATE Driver Review

By Daniel N. Jerome

**INTRODUCTION.** At long last there is an excellent printer driver available which will work with ease on both HDOS 2.0 and HDOS 3.0 or 3.02 [also available for CP/M -Ed.]. This driver is called "The Ultimate Driver," and it is available from Lindley Systems, 4257 Berwick Place, Woodbridge, VA 22192 (703) 590-8890.

This driver will allow you to operate any Epson or compatible printer [such as Panasonic, Gemini, and Mannesman Talley -Ed] to access all of the printer codes for maximum efficiency of your printer. It will even print documents with the eighth bit set to 1, such as a WordStar file or Benton Harbor BASIC. In the past, it has been my experience, that certain printers such as the Epson MX-80 will choke on ASCII files prepared by WordStar, since WordStar documents are prepared with the 8th bit set to high (i.e., logic 1).

**DEFAULT SETTINGS.** The built-in printer settings are as follows:

FEATURES	DEFAULTS
-----	-----
TAB n	Tab settings (0 = printer's)
FF/NOFF	Formfeed on close
PORT n	Port address (octal)
MASK n	Selects printer busy bits
READY n	Bit values for printer ready
BAUD n	Printer baud rate
LEFT n	Inserts spaces at left margin
PAGE n	Line number where driver adds ff
FORM n	Form length set by driver
HELP	Current settings of all options

For serial interface, default settings are: 9600 baud, 1 stop bit, no parity, eight-bit words.

**NOTE:** After the following SETS are performed (HDOS 2.0), in order for them to work you must reboot the system. If you are in HDOS 3.0 or higher, the it is easier to first unload LP.DVD using the UNLOAD command prior to performing the SETS. You do not need to reboot.

In the case of options LEFT, PAGE, and FORM, a value of zero causes the option to be disabled. To view the current settings, first insure that the program "SET.ABS" is on your disk, and then type:

## SET LP: HELP

To change the settings to suit your needs, type:

```
SET LP: PAGE 60
SET LP: FORM 66
SET LP: LEFT 10
```

NOTE: These settings are standard, and they assume that you are printing at 10 or 12 characters per inch (CPI). If you want to print at 17 CPI, the settings would be as follows:

```
SET LP: PAGE 80
SET LP: FORM 88
SET LP: LEFT 10
```

Some printers, such as the Epson MX-80, come with no tabs set, or have their tabs set at every 10 spaces instead of every 8 spaces. This driver overcomes these problems by allowing you to create a new tab default. In this case, simply type:

```
SET LP: TAB 8
```

**SETTING THE I/O OPTIONS.** The "Mask" sets the I/O options for printer ready state. For the serial interface, the "Mask" settings possible are as follows:

```
MASK 040, READY 040 -
  Monitor Data Set Ready (DSR), RS-232 pin 20:
  Send characters when signal is HIGH.
MASK 000, READY 000 -
  Monitor Data Set Ready (DSR), RS-232 pin 20:
  Send characters when signal is LOW.
MASK 020, READY 020 -
  Monitor Clear to Send (CTS), RS-232 pin 4:
  Send characters when signal is HIGH.
MASK 020, READY 020 -
  Monitor Clear to Send (CTS), RS-232 pin 4:
  Send characters when signal is HIGH.
```

**PRINTER UNIT OPTIONS.** Device names LP0: (LP:), LP1:, LP2:, LP3:, and LP4: are available through either port 340Q or 320Q. The following defaults are provided:

```
LP0: - Continues action with the current printer
      setup.
LP1: - 5 CPI enlarged print.
LP2: - 8.25 CPI condensed enlarged print.
LP3: - 10 CPI emphasized print.
LP4: - 17 CPI condensed print.
```

Each of the defaults may be reprogrammed to any desired sequence.

With LP0:, the user could send an ASCII string to the printer to set it to any kind of printing mode he desires. For example: write an ASCII file and send it down the line using your LP.DVD. This will condition the printer to print to that specification the next time you attempt to print a file using LP0:. The OCTAL string 033Q, 115Q, 022Q, 033Q, 170Q, 060Q, 033Q, 062Q will condition an Epson or compatible printer to print out the next file at 12 characters per inch (elite) and 6 lines per inch (LPI). As long as you don't change the instructions

or turn the printer off, LP0: will be conditioned to print in the Elite mode. If you are required to send the conditioning string in HEX instead of OCTAL, just convert the values shown above. For example, in HEX, the same string is as follows: 1B, 4D, 12, 1B, 78, 30, 1B, 32. Each of the two printer code expressions mean the same thing.

In addition, the printer unit defaults may be modified by the use of macros; details below. You may change the number of units to 8 (i.e., LP0: thru LP7:). This modification process involves changing the Ultimate Driver source code of the file, MAXMAC.ACM, and changing the statement in MXSET.ACM on line 2 to read CPI 5 to CPI MAXMAC+1 and reassembling the driver. In this case you may assign sixteen bytes to each printer unit that you wish to change.

**DRIVER FEATURES:** Special Printer Features. Special printer features may be programmed by the use of character conversions built into the driver. For details, see the on-disk files MXGUIDE.DOC and CODES.MX.

**Electronic Typewriter.** The on-disk program, TP.ABS, may be used for line by line typing/printing. Each time you type one line and press the <RTN>, it will print that line. The default printer unit is LP:. If desired, you can change the printer unit to any other unit.

**Print Flow Control.** The printer may be stopped without loss of characters by pressing CTRL-S. The driver will stop sending characters until CTRL-Q is pressed. Note: If your printer has a buffer, the printer will continue to print until the buffer is empty.

**Screen Print (HDOS 2.0 Only).** With the driver loaded into memory, press CTRL-P. This toggles the "echo" mode, and whatever appears on the screen will be printed. All escape characters in a file will be passed directly to the printer.

**Escape and Control Codes.** Special printer features may be programmed by use of the conversion routines built into the driver. The tilde character (~) is reserved as a control code conversion character. When this character is encountered, it sets an internal switch in the driver, but is not sent to the printer. Then the next character is examined. For example:

```
~ - Sends a NULL to the printer (ASCII 0).
~A - Sends a CTRL-A to the printer (ASCII 1).
~l - Sends a form feed to the printer (ASCII 12).
~M - Sends a carriage return to the printer (ASCII
    13).
~N - Enables double-width printing (ASCII 14).
~[ - Sends an escape (ASCII 27) to the printer. This
    serves as an "attention - prepare for next
    code" device, and is used with other codes.
```

Example: Escape-S is the super/subscript command. The printer requires further modification in order to turn the appropriate feature on. The expression:

```
~[ S0
```

where ~[ is the escape, S calls out "superscript," and the zero enables the command. This turns on "superscript."

Other escape command symbols for Epson-compatibles are:

-	Underline toggle
-	Overline toggle
T	Pitch select
U	Uni/Bidirectional
W	Wide/Normal print
a	Justification select
h	Double/Quadruple size select
P	Proportional spacing toggle
x	NLQ/draft characters toggle
w	Single/Double height select
-	Normal/Slashed zero

**MACROS.** Up to five macros (0 thru 4) are programmable, however up to eight may be defined if the driver is modified. These macros are defined to be the initialization sequences for LP0: thru LP4:, **but these may be reprogrammed.**

If the driver is loaded into memory, one programming of the macro will remain in memory until the system is rebooted (or in HDOS 3.02 is unloaded). If the LP.DVD is not loaded into memory, the macros will be cancelled, and the unit will return to its original state.

To create a macro, the special sequence `~*M` is used. The special sequence is followed by a number from 0 to 4 and another \*. For example: `~*M2*` will send macro #2. Unless the macros are reprogrammed, this would be the same as utilizing unit LP2:.

To reprogram a macro, the special sequence `~#` is used.

- The number of the macro to be programmed (i.e., 0 thru 7).
- Either zero [0] or one [1]. Use zero for normal print; use one for double-width lines.
- The new macro definition, up to 15 characters.
- The sequence terminates with `~#`.

For example, a typical macro:

```
~#00~[E~[H~#
```

This redefines macro zero [0]. The sixteen character maximum is **after** the control conversion, and the macro shown is considered to be 4 characters in length. CAUTION: If the sixteen character length is exceeded, the macro will be erased. This prevents leaving the printer in a weird state.

A macro may be erased, for example: `~#7~#` erases macro 7.

**SUMMARY.** This is a real neat printer driver, and the first universal one to be capable of functioning in the HDOS 3.02 environment. It works extremely well, but in order to make it do your bidding, you should plan to spend a little time reading the manual provided by Lindley Systems and be willing to experiment to gain "hands-on" experience.

[This printer driver runs under HDOS 2.0 and 3.0/3.02, as Dan notes above. It also comes as a .COM program for CP/M that patches BIOS.SYS for your printer. Versions support not only Epson-compatibles, such as the Panasonic Dan discusses, but also NEC 8023/C.Itoh Prowriter, MPI, Okidata, and Heath's H-25. Price is \$20 each on either hard- or soft-

sector. Lindley Systems is also offering **\$5 off** on the driver to anyone who mentions this article! So be sure you do that when you order. -Ed.]

=====

### A Professional Method for Program Testing:

Part 1

by Kirk L. Thompson

This is the first in a short and (probably) irregular series about program testing. This is a topic of interest to you programmers no matter what language you may write in. For purposes of illustration, I'll use Pascal throughout, mainly because that language emphasizes modularity. However, the principles I discuss can apply just as well to BASIC, C, FORTRAN, or even assembler.

For Pascal implementations, my discussion will encompass **both** Lucidata and Borland's Turbo version 3.0; vendors for both of these packages are given below. In most cases, my comments will apply to both. In others, the differences between the two will be wide enough that separate elaboration will be required. I might also add that the code I present should run, with no modification, under both. On occasion, the extensions that Turbo provides beyond Lucidata's could simplify the code and I'll point these out.

**Library Construction.** Advanced languages usually provide some means of combining external code with the program you are currently writing. This could be the MERGE statement in Microsoft BASIC (to add source code) or a linker such as Microsoft's L80 (to combine previously-compiled modules). Both Lucidata and Turbo emphasize the assembly of libraries at the source code level. One way to build such a personal library of functions, procedures, and fragments is to copy them out of the multitude of books on Pascal. This is a good source of undoubtedly quality material, but you will often have to modify them to suit your needs or style and the peculiarities of your implementation. Another method is to write, as you accumulate experience in the language, short programs that perform very narrowly defined functions or to write these modules in the context of a larger program. Once you have them working properly, you can alter the source for use as "include" files.

However, some conversions don't work well this way, perhaps because of the complexity of the input and output requirements, the "canned" function doesn't quite do what you want, or you need the output as a variable parameter rather than a value one. Another approach, the one I'm going to discuss in this first installment, is to test your external modules, whether canned or home-grown, on a "test bench." This is a simple, general-purpose, and easily-modified program "shell" that lets you closely and reproducibly control I/O while you debug a module **in isolation.**

And isolation is exactly what you want when testing a new module. (Integration testing comes later.) If another part of your program that uses a given procedure is malfunctioning, you often can't tell whether the bug is in the procedure or in the program section that calls it. So prior testing of procedures and functions in isolation will not only



give you greater confidence in your modules. It can also help you locate bugs in other parts of your code.

Further, I'll discuss how to **design** tests to debug your modules. I've had plenty of experience doing that between July of last year and April of this. I was employed as one of a team testing a large financial analysis system that runs on an IBM mainframe. So I'll let you in on many of the secrets the "pros" use. These techniques could easily apply to any language, as I mentioned above, but I'll begin covering them in the next installment. First the "test bench."

**The Test Bench.** The program listing is at the end of this installment. As you can see, it's extremely simple, but intentionally so. You'll find there a number of constants and variables declared. You'll observe, too, that there are minor differences between Lucidata and Turbo in this section. Also notice that I'm setting up a printer in case I need it. When I do this, the external "file" identifier in the program header **must** be there, otherwise the compiler vigorously objects; try it if you don't believe me. But these are "set" pieces and you don't need to use them if the module you're testing doesn't require them. I leave them there and use them as required. Pascal may gag when you try using something you haven't declared, but it doesn't care if you declare something but never use it! (Of course, you waste memory by doing it, but for a program this small, that's immaterial.) By leaving them there, the tools you'll need to work on your functions or procedures are always on the bench, so to speak.

After the constant and variable declarations, I pull in the module I plan to test. The one illustrated here is INT().PAS, which I'll discuss next time in the context of the testing method. Fortunately, the conventions for include files under both Turbo and Lucidata are the same. Both also default to an extension of ".PAS", so if you're using something different (not a bad idea), you'll need to specify it.

Next is a boolean function used to test termination of the REPEAT/UNTIL loop in the main section of TBENCH. It accepts keyboard output from you and returns the values, TRUE or FALSE.

Finally, I come to the main program block. Here I'm explicitly assigning the variable "PRINTER" to the system hardcopy device. Of course, if you're running HDOS, you'll have to change LST: to LP: or whatever device name you use for your printer. You **also** should LOAD the device before calling the program. I've also commented out the code required to open a channel to the printer and send an initial linefeed. But with just a few keystrokes, I can use it for output. Finally, within the REPEAT/UNTIL block, I embed the code I need to test the module in question.

**Assignment.** Each installment of this series will include some things in this section to try out. Even if you aren't using Pascal, fiddle with the equivalent statements or features in the language you **do** regularly use. These are intended to give you "hands-on" experience in test design and to guide you in considering some of the issues involved

in testing.

Now the genesis of this series occurred while I was preparing a function to compute the integer value of a real number greater than MAXINT (32,768) for Lucidata Pascal. Turbo already has such a function, INT, but it has a peculiarity as we'll see next time. Meanwhile, if you have Turbo, investigate INT. For both Turbo and Lucidata, explore the differences between the standard functions, ROUND and TRUNC. Set up TBENCH to aid your exploration; **don't** just look in the manual since we're looking for kinks the manuals don't mention! (You need to know what these are if you want accurate and reliable results from these functions!) As you fiddle with these, consider what kinds of tests you should use to ensure they're working properly.

If you use TBENCH for these explorations, you can temporarily delete or comment out the line pulling in the include file since all three functions are built in. If you regularly use a language other than Pascal, send **your** version of TBENCH and I'll print it here. Next time, I'll begin discussing module testing in the context of "live" examples. My code examples will be in Pascal, of course, but that language is, itself, a good example of what a programming "pseudocode" could look like. So I don't think you'll have much trouble converting to other languages. But if you need assistance applying this information, don't hesitate to contact me.

#### Sources:

**Lucidata Pascal** for CP/M and HDOS (by Larry Reeve and David Gibby): Kirk L Thompson / P.O. Box 548 / West Branch, IA 52358 / \$25 postpaid; includes 100-page hardcopy manual; not as fast or as "extended" as Turbo (hence closer to Niklaus Wirth's original on the latter score); for more information, see the Software List in #9 or write.

**Turbo Pascal** for CP/M (by Borland International): Alpha Systems Corp. / 711 Chatsworth Place / San Jose, CA 95128 / 408-297-5594 or Sage Microsystems / 1435 Centre St. / Newton Centre, MA 02159-2469 / 617-965-3552; both sources charge \$60 plus shipping; lightning compile and execution and a large number of nice extensions; neither source supports hard-sector, but I would be happy to convert formats for you.

#### LISTING

```
PROGRAM TBENCH (PRINTER);
{A user-modifiable "envelope" for testing
functions and procedures.}

CONST
    FF = #12; {use this declaration for Turbo}
    { FF = CHR(12); use this one for Lucidata}

VAR
    I, X, Y, Z : INTEGER;
    IREAL, R   : REAL;
    C          : CHAR;
    PRINTER    : TEXT; {use this for Turbo}
    { PRINTER  : FILE OF CHAR; this for Lucidata}
    SPACE4     : ARRAY [1..4] OF CHAR;

{$I INT()} {name of your include file}
```

```

FUNCTION NOTAGAIN : BOOLEAN;
  VAR C : CHAR;
  BEGIN
    WRITELN;
    WRITELN ('Another run? ');
    REPEAT
      WRITE (' (Y/N) and <RETURN>: ');
      READLN (C)
    UNTIL C IN ['y', 'Y', 'n', 'N'];
    WRITELN;
    NOTAGAIN := C IN ['n', 'N']
  END; {notagain}

BEGIN {main}
  SPACE4 := '    '; {4 spaces btwn the quotes}
  ASSIGN (PRINTER, 'LST:'); {for CP/M}
{ ASSIGN (PRINTER, 'LP:'); for HDOS}
{ REWRITE (PRINTER);
  WRITELN (PRINTER); }
  REPEAT
{   your test code goes between REPEAT and UNTIL,
    for example;}
    WRITELN;
    WRITE ('Enter a REAL number to be rounded: ');
    READLN (R);
    WRITELN (R:17:7, ' becomes', INT (R):17:7);
    WRITELN
{   end custom code}
  UNTIL NOTAGAIN
END.

```

#### MISCELLANY

**Quikdata's DKFMDV4.DVD.** [From James L. Entenman, 2350 Gerald St., Napa, CA 94558] "I'd been thinking about running HDOS on soft sector for quite some time now. Hard sector disks were getting hard to find and very limited in space for all the files I have.

"I'm running a Magnolia Microsystem double-density controller which is incompatable with any Heath soft sector drivers that I've found. I called Kirk Thompson and explained what I was looking for. He advised me to try the DKFMD HDOS 37/47 Magnolia 77316 driver from Quikdata, Inc. It was a \$50 investment and I'm happy to say it works great.

"The device driver disk I received has been updated and is now called DKFMDV4.DVD. It contains the files DVDDKGEN.ABS, DKFMDV4.DVD, and STATFMD.ABS. It enables the MMS controller to be used with up to four 8-inch drives and/or four 5-inch drives. It also offers support for CPU's with software-switchable speeds on 8-inch drives. This software is written for HDOS 2.0 but it seems to work fine with HDOS 3.0.

"The installation is fairly simple. First copy the files onto an initialized and sysgened disk. The disk should include the INIT.ABS and SYSGEN.ABS files. Next rename the device driver file to any two letters wanted except SY.DVD. I used DK.DVD [this is the **standard** device name for HDOS secondary drives -Ed.] and will use it for the following explanations to avoid confusion. Now run the program DVDDKGEN DK:Y where "Y" is the maximum disk drive hardware number used. I have two drives DK0: and DK1: so in this case "Y"=1.

"Use the SET DK: (option) to configure the device driver as a whole for either 8-INCH or

N08-INCH. There is also a MHZ bit option which is used with 8-inch drives.

"For each separate disk drive, use the SET DKn: (option). These options include STEP nn where nn is the seek step time in milliseconds, SIDES1 or SIDES2, and TRKS1X or TRKS2X (specifies whether or not the disk drive has twice the standard number of tracks per side). I'm using double-sided, 40-track drives and running the step options at 6 milliseconds, SIDES2, and TRKS2X.

"To insure that the drives will contain the proper information run the program STATFMD DK:. If the information is incorrect redo the SET DKn: (option). It's important to have the correct information before initializing because the only way to change it later is to reinitialize the disk.

"Reboot the system disk. It now contains the new soft-sector device driver. Put blank soft-sector disks in the MMS drive(s) and use the INIT program for each drive unit wanted. After initialization is complete, SYSGEN the disk(s). Reboot the hard-sector disk (if running HDOS 2.0). That's all there is to it. From the hard-sector drive, MOUNT the soft-sector drive(s) and away you go. If you boot from the soft-sector drive [see the discussion of soft-sector HDOS in **Staunch #3 -Ed.**] use SYn: as the primary drive name. To access the hard-sector drive from it mount DK: and the drive is now accessible. This secondary drive file DK.DVD is on the disk(s) due to the SYSGEN function already performed.

"On a fully initialized soft-sector disk you can get about 634k bytes. That's about 5 times the space on a hard sector disk.

"I'm also using a 77318 128k RAM board which I purchased from Magnolia Microsystems some time back. I was using it for CP/M, but thought about using it for HDOS. I contacted Henry Fale of Quikdata and he told me the software was still available for 10 dollars without any documentation. The software is called CACHEMMS.ABS/AXMMS.DVD. I purchased it and found that it works fine under HDOS 2.0. All you do is use the INIT program on this driver and then mount it. I was wondering if anyone has gotten this driver to work under HDOS 3.0? If so, I'd really like to hear about it."

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