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Covering the T199/4A, the Myarc 9640 and compatibles

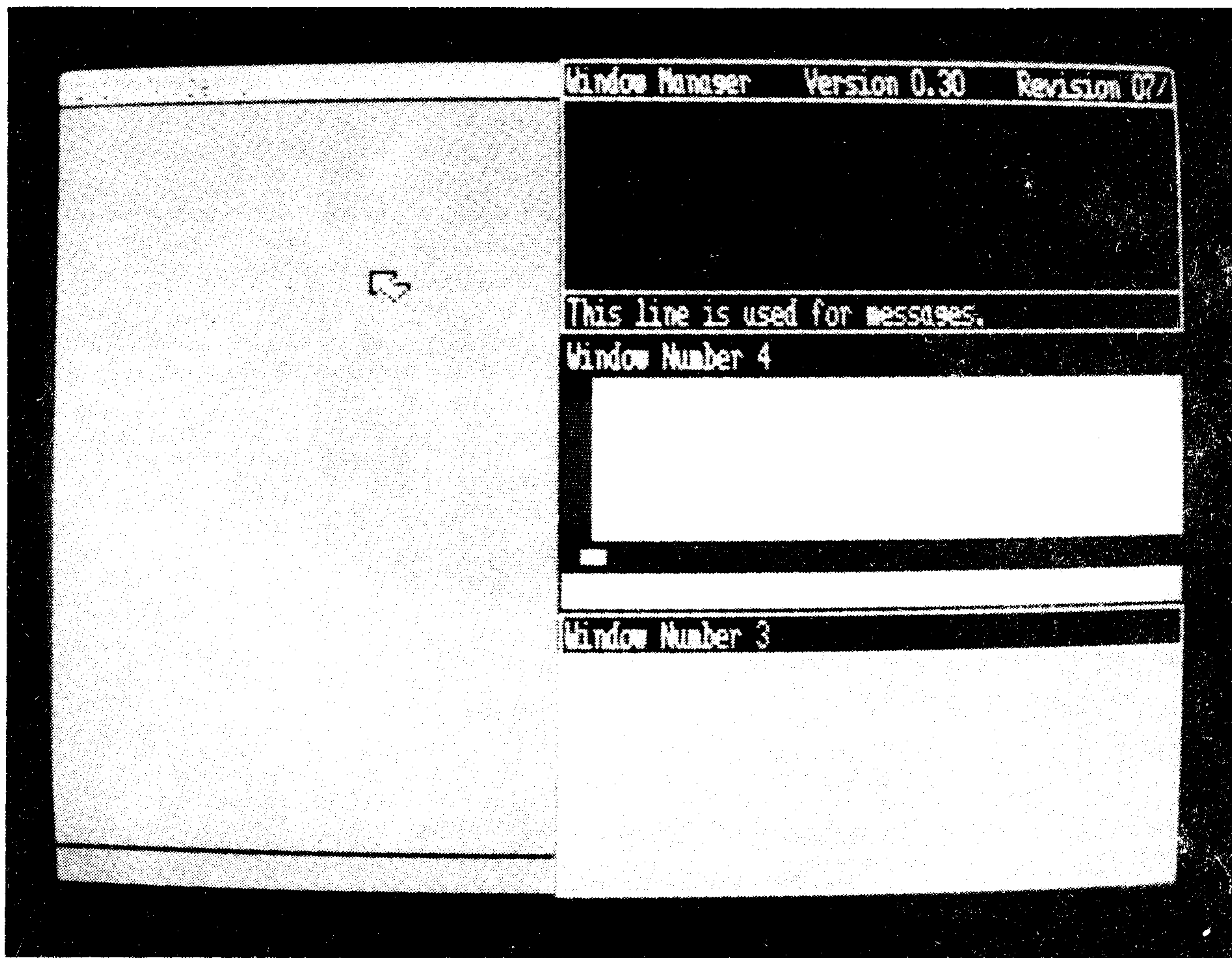
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# MICROpendium

Volume 5 Number 8

September 1988

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**Myarc's GEM does windows** (see Comments)

## INSIDE

- ✓ More MICRO-WORD
- ✓ Review of the Hard & Floppy Disk Controller
- ✓ Getting technical with the Yamaha 9938 chip
- ✓ Steven Shaw on Turbo Pasc 99



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# Contents

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### Regena on BASIC

Reflections in a grid.....Page 10

### Turbo Pasc 99

New, powerfull language is similar to standard Pascal, yet friendly for BASIC users.....Page 16

### Demystifying assembly

John Birdwell on input from readers on his MICRO-WORD word processor.....Page 20

### Video chips

Tony Lewis continues his series with a discussion of the Yamaha 9938 used by Myarc and DIJIT.....Page 24

### Tips for new hard disk users

Things to check out before using the Myarc Hard and Floppy Disk Controller Card.....Page 32

### Geneve 9640

Mike Dodd on MDOS 1.10.....Page 34

Jack Riley answers questions on Myarc's Geneve and on its Hard and Floppy Disk Controller.....Page 37

### Reviews

Myarc Hard and Floppy Disk Contoller.....Page 40

Game Writers Pack I and Graphic Lister.....Page 41

### Newsbytes

Upcoming fairs, the Tigercub is still hanging in there, and more bulletin board news.....Page 42

### User Notes

A one-line catalog program, a couple of CALL LOADs, tip for RAM-disk users and a sample AUTOEXEC file for the Geneve.....Page 44

Classified.....Page 47

#### Programming conventions

Here are some tips to help you when entering programs from MICROpendium:

1. All BASIC and Extended BASIC programs are run through Checksum, the numbers that follow exclamation at the end of each program line. Do not enter these numbers or exclamation points. Checksum was published in the October 1987 edition.
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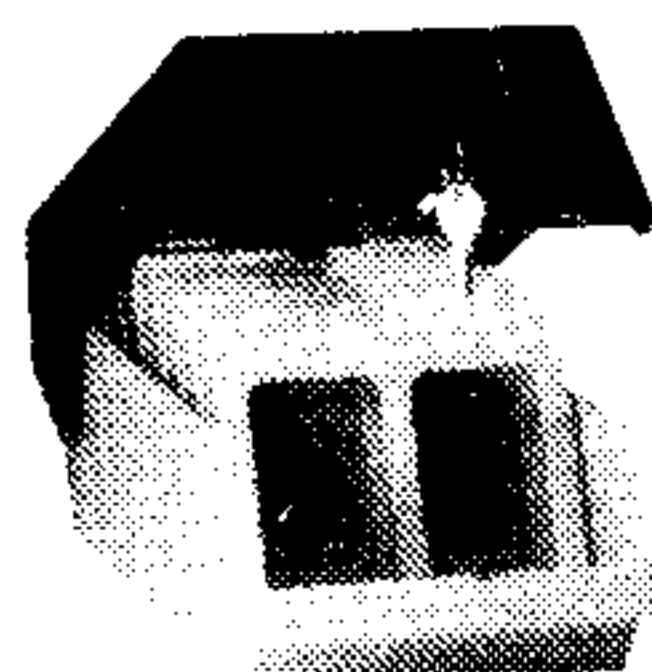
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# Comments

## Myarc Q&A starts; HFDC is fine

This month marks the start of a question and answer series about Myarc products. Readers with questions are invited to submit them in writing to MICROpendium. We'll do our best to get them answered in print.

Speaking of Myarc, this month we're reviewing the Hard & Floppy Disk Controller. Also, for new HFDC users, there's a tip sheet to help you use the card. It's the only product that will allow you to have 20 megabytes of disk storage online with data transfer rates that approach the speed of a

available for users of the HFDC. I've seen versions numbered V1.08 and V1.09 posted for downloading, too. Myarc has V1.10 finished but that is not the final product, as had been originally anticipated. It is very close to the final version, however. Incidentally, Myarc is going to show the finished Advanced BASIC at the Seattle TI fair this month.

### NEW WORD PROCESSOR

Triton's most recent catalog features a new word processor called "Press." The program was written by Charles Earl, of TELCO fame, and is being marketed by Asgard Software. This feature-laden program looks like a real winner. It has everything from a built-in spelling checker with a 120,000-word dictionary to user-defined macros and pull-down menus. It sells for only \$59.95 and is expected to be ready for delivery by Nov. 1. We expect to have a review of it as soon as the program is officially released. This is the new word processor I have hinted about in this space the past few months. It appears to be the most significant in word processing for the 4A since Companion came out four five years ago.

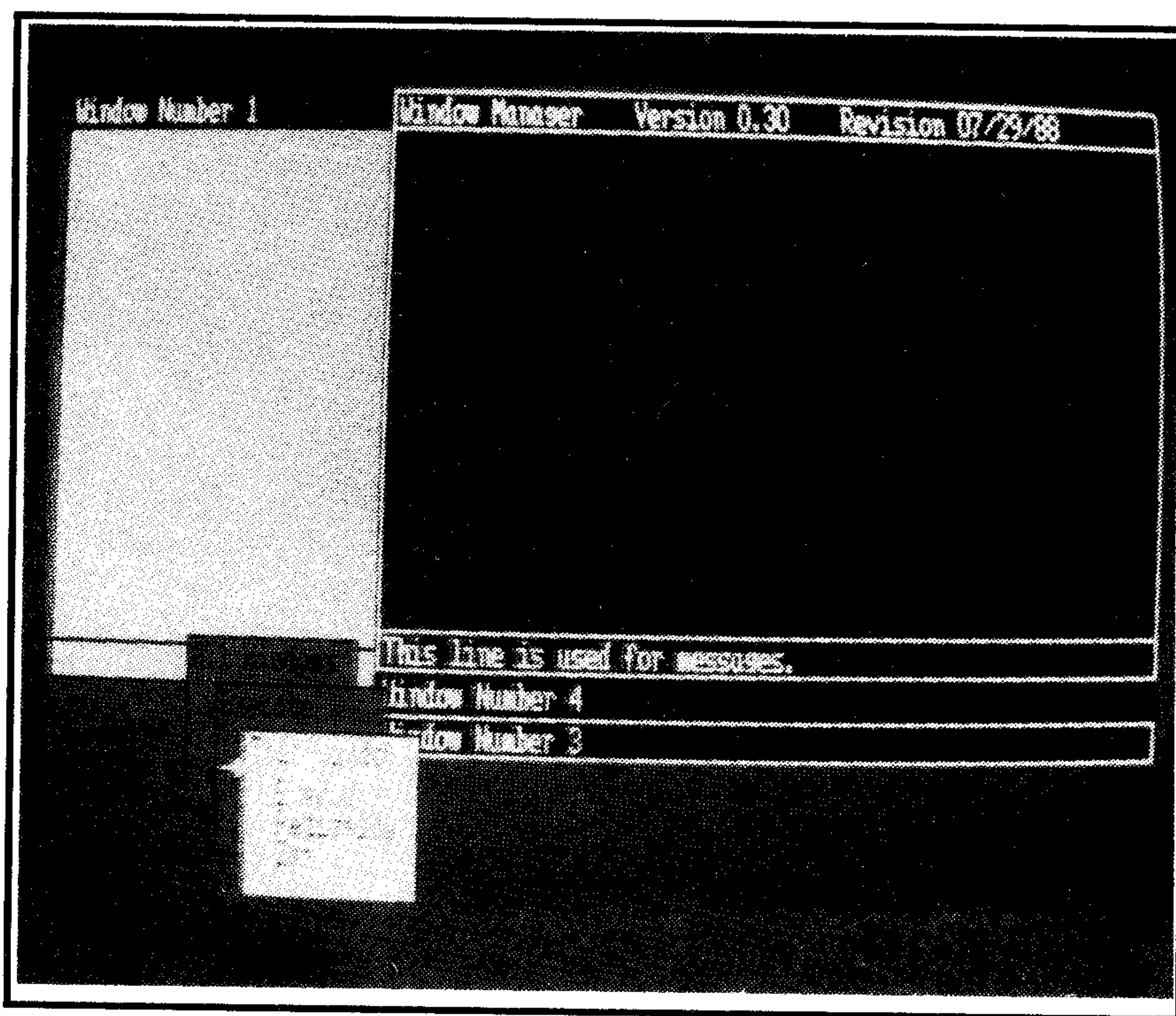
### AN MBX CONNECTION

Barry Boone, who recently released a completely rewritten version of his Archiver program — now V3.02 — is working on a program that will allow MBX owners to actually write programs to run on the system. I don't have a lot of details to relate, but my understanding is that users will be able to write

Extended BASIC programs for the device. However, this isn't going to be distributed as a fairware product, like Archiver.

### COMING UP

In October, we'll be running an article about the four major telecommunications networks as they relate to the TI. Also, we'll have a tutorial on FUNLWEB designed to get users up and running on the latest versions of the Australian operating environment for the TI. And, if we've got enough space, an article about using Texament's TI-Base database program. This month we weren't able to fit Charles Kirkwood's c99 column in, but we'll pick it up again next month.



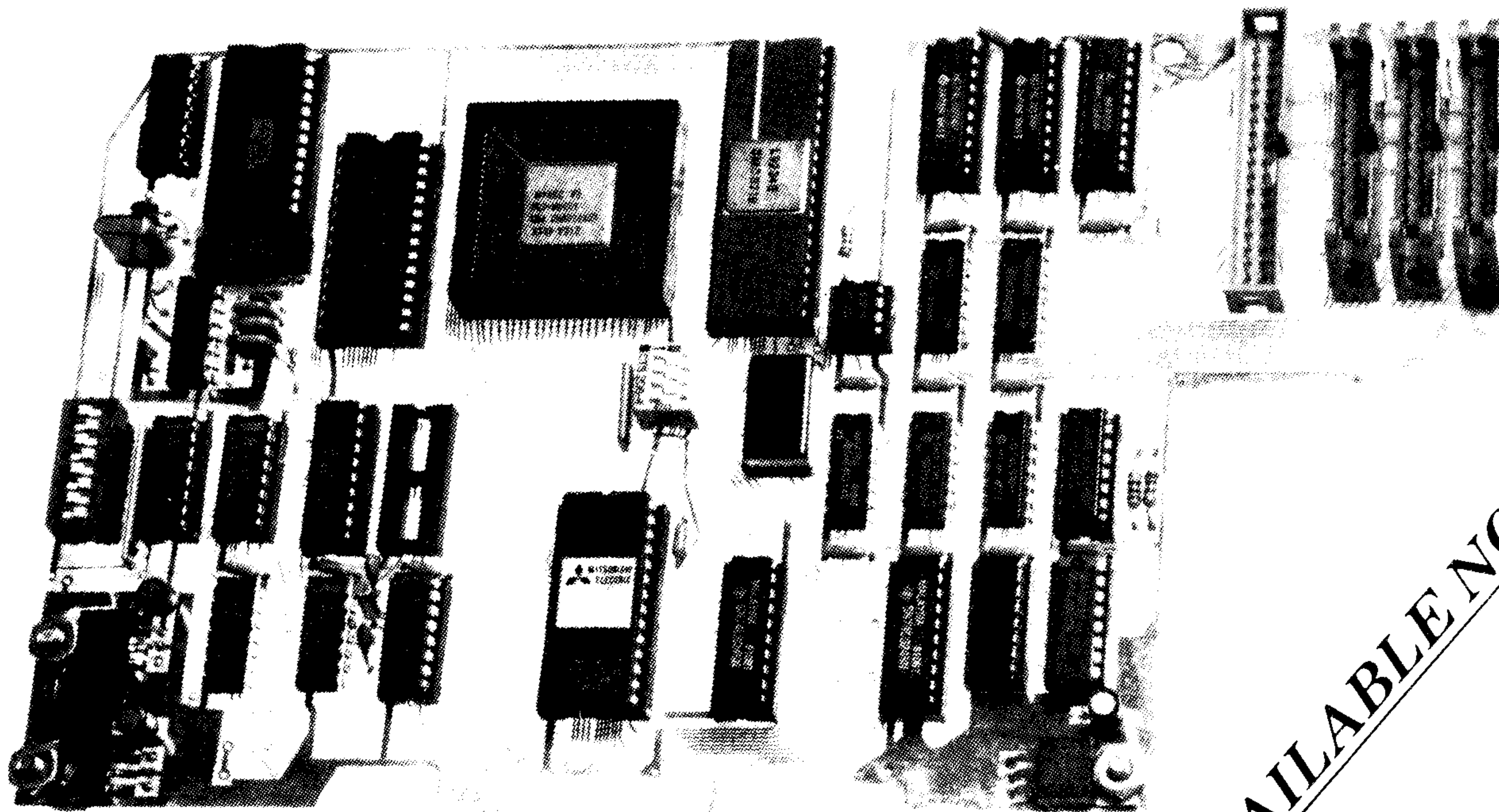
RAMdisk (depending on the hard drive it is used with).

Above is a photo of a screen from Myarc's windowing program for the Geneve, GEME. A second photo is on the cover. This photo shows several defined windows — the user determines their size and shape — as well as a partially visible pop-up action menu at the lower left. Notice that the version number is 0.30. Obviously, this software isn't ready for distribution yet, but the photo should give you an idea of what to expect. The program will allow Geneve users to run several programs at the same time, moving from one to another via windows.

As for a timetable on delivery of final versions of MDOS, GPL, Pascal and Advanced BASIC, keep your eyes on late October. There are several versions of MDOS available on bulletin boards now, including MDOS 1.06 and higher. These, along with MDM5 V1.23 and GPL 1.03, were made



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# Feedback

## Line number length won't affect memory

Regena (August 1988) states that she has occasionally used lower line numbers (e.g. NUM 1,1) to save memory. TI BASIC and TI Extended BASIC use two bytes to save the line number, regardless of its printed length. Thus, line number 1 takes as much memory as line number 10000. It makes no difference.

Tony Lewis' article on the 9918A VDP chip contains an error. He states that "the VDP keeps track of the sprites, not the 9900" and thus, "If you have a LOAD switch for your console, you may have seen the sprites still moving, even though the rest of the screen was frozen by pressing the switch." The VDP chip does keep track of all aspects of sprites, *except* motion. Automatic motion of sprites is controlled by an interrupt routine in the console ROM chip. Thus, if the computer were truly locked up, the sprites would immediately cease motion. This is also true for the 9938 VDP chip.

**Mike Dodd**  
Oliver Springs, Tennessee

## Super X-BASIC with Navarone Widget

John Guion, who sells the Super X-BASIC upgrade, also includes very detailed documentation on how to upgrade Super X-BASIC to work with the widget.

This information was worth the cost of the upgrade.

**Dan Eicher**  
Indianapolis, Indiana

## 'Hostile takeover'

I'm confident anyone who is a member of a TI user group realizes how vital they are in providing us 99ers with support, news and insight. We are particularly fortunate here in the San Fernando Valley because we have a great collection of talented members. Our meeting attendance is impressive and support outstanding.

One member was especially recognized at our last meeting. Steve Mehr presented him with a specially duplicated and framed cover of the July 1988 issue of MICROpendium. Roger Merritt survived the southern

California freeway system from Orange County to present him with a special certificate which referred to his "short, hostile take-over of MICROpendium." And every member in attendance applauded his efforts.

I refer, of course, to Ray Kazmer. His programming talents are impressive and his support of our club is never ending. We all feel truly fortunate to have Ray as a member of the SVF 99ers and take this opportunity to tell him so publically. Thanks, Ray!

**Jim Edwards**  
President, SFV User Group  
La Crescenta, California

## Satisfied customer

I do not believe I have received a single issue of MICROpendium from which I have not learned or derived something of value to the operation of my TI99/4A system.

The most recent major item is without any doubt John Guion's Super Extended BASIC module modification mentioned in Newsbytes (June 1988).

I wrote for the brochure July 14, received it on July 27, sent my order on the same day and had the components at 11:45 a.m. on Aug. 11. Please note that this is by U.S. and Canada Post from California to North Bay, Ontario, 200 miles north of Toronto!

The instructions were so clear, the job so easy, that it was done and working before lunch, and this included an extra mod (\$1 extra) which allows the full, regular use of the Navarone Widget with the Triton Super Extended BASIC module.

Not only does this work as advertised, but when using the widget, I no longer lose everything in my CorComp Memory Plus when I hit the reset button!

As an aside, I have for some time been working on an up-to-eight-module widget-type module expander I read about in the "New 99ers" newsletter from New Westminster, British Columbia. I have not had it working yet, but if I ever do, it will provide 11 module-based programs!

As I wrote to Mr. Guion, his mod has also made things easier when powering up after pulling the plug to avoid our currently frequent thunderstorms, as I use the E/A feature to load and run the copying pro-

gram on my "RAM-load" disk itself. I have to reload as there is no power backup on the CorComp RAMdisk.

John Guion has here one very satisfied customer!

**Patrick S. Graham**  
North Bay, Ontario, Canada

## Not really new

Croaker game (June 1988): Is there really the need of publishing another game from the long list of Froggers, Q-Berts and Pac-mans? Oh, I don't want to say that this program isn't good at all! But I see no reason why I should type in such programs from any magazine, because if I would look in my disk-index I would find at least eight or 10 programs of this kind.

I would like to see really new programs. And if there aren't any new programs take this place for publishing news about the 99er.

**Michael Rittweger**  
Kiel, West Germany

## About the index

About the index for MICROpendium (*began running April 1988—Ed.*); I wrote it because I needed it, and only later realized that the rest of us do too. The magazine has been like a fascinating textbook, and with the contents dependent on my not very good memory. Since I am very interested in becoming TI99/4A knowledgeable, I have spent much time searching through issue after back issue for this and that bit of information. Knew it was there, but where?

The index is admittedly not too consistent. I began by abbreviating to the bone, in my innocence attempting to get it all into memory at once. When THAT didn't work, I slowly achieved a more relaxed attitude, finally abbreviating where necessary to stay inside a 40 character line. This is my first attempt at such a thing, so the early years are not well cross-indexed. Year '87 is better, and '88 will be better yet. There will be mistakes. When you spot one, and if you have the disk, which should be eventually available, it's not too hard to change the responsible data statement.

**Elton Schooling**  
Sacramento, California



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## BASIC

# Reflections in a grid

By REGENA

Here is a program that combines some of the features of some of my earlier programs. A grid is shown on the screen. You may use the arrow keys to move the cursor around, then press the ENTER key when you want to place a square in the design. Press the space bar to change the color of the cursor.

When you press ENTER, the square appears where the cursor is and is "reflected" onto seven other squares in the grid. The design is symmetric around the horizontal and vertical center lines and also around the diagonals. All the drawing takes place only in the upper right quadrant of the screen.

Many needlework and quilting designs use this symmetry, so you may design handwork using this program. Draw on the screen in the colors you want, then press "H" for a hardcopy of the pattern. The colors are translated into alphabetic characters, and a key for the colors is also printed. You may then use the printed pattern for quilting, needlepoint, cross stitch, lace net or even printing on graph paper.

To print the design on your printer, you will probably need to adjust the OPEN statement of Line 930. I have used "RS232.BA=600" for my TI printer, but you can change this to your own printer configuration that you ordinarily use.

If you want to change the background color on the grid on the screen, change the screen color number in Line 320. I used cyan, but you may prefer white, or another color.

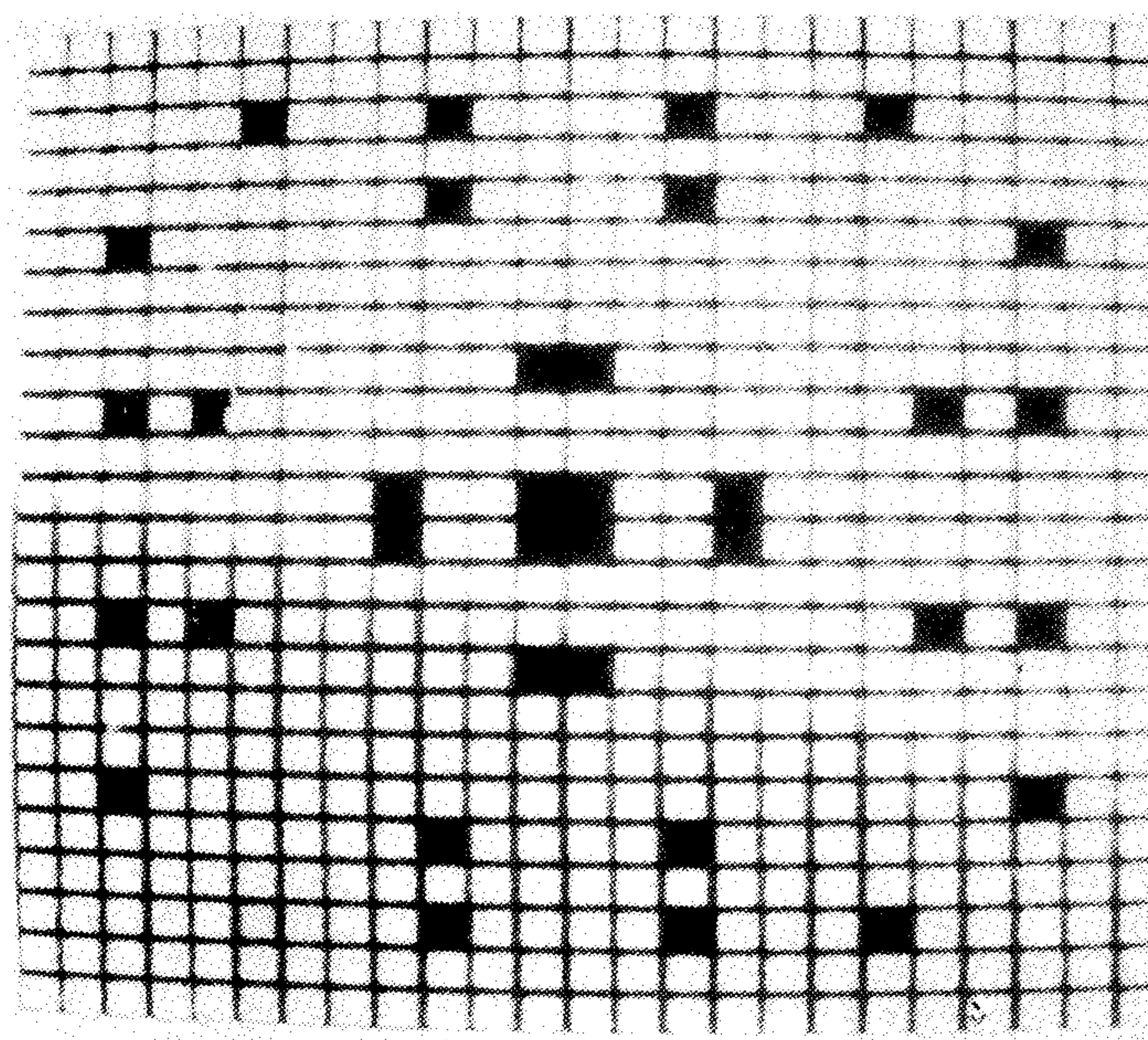
Lines 100-160 print the brief instructions. Line 170 redefines character 45 for the grid square. Lines 180-220 define the squares of different colors, two solid squares in each color set. Lines 230-250 keep the title screen until a key is pressed to start.

Line 260 clears the screen, then Lines 270-310 define more characters for color squares. Line 320 sets the background color of the screen. Lines 330-350 draw the grid on the screen. Lines 360-390 initialize variables used in moving the cursor around the screen. CLR is the color and starts with black. G2 is the new square of color. ROW and COL are the row and column where the cursor is located, and it starts in the center of the screen.

Line 400 determines what character G is in a position. Line 410 makes a beeping tone when a move is made. Lines 420-440 define G1, which is a character number used to "blink" the cursor. Line 450 detects a key pressed. Lines 460-470 blink the cursor when a key is not pressed.

Line 480 branches to Line 930 if the key "H" is pressed for a printed hardcopy. Line 490 branches to Line 800 if the ENTER key is pressed to place a square of color. Line 500 branches to Line 720 if the space bar is pressed to change colors. Lines 510-700 move the cursor dependin on the arrow key pressed. All other keys pressed are ignored. The IF COL ... and IF ROW ... statements make sure the cursor stays in the upper right quadrant of the grid.

Lines 710-780 change the color. Lines 720-740 increment the color number CLR. After color number 16, the color number starts over at 2. Lines 750-770 determine what the character number will be corresponding to the color number. Notice that character numbers are the first two numbers in each color set of



8. For example, 88 is medium green, 89 is light green, 96 is dark blue, 97 is light blue, 104 is dark red, 105 is cyan, etc.

Lines 790-910 place the color square where the cursor is, then "reflect" the square to the other positions. Line 800 places the first square of color under the cursor. Lines 810-830 place the colors in the other three quadrants. If you want the reflections to take place only horizontally and vertically (and not diagonally), you can add a Line 835 GOTO 400.

Line 840 determines if the square is exactly on one of the diagonals, in which case only the three reflections need to be placed. Lines 850-860 calculate factors used in placing the other four reflected squares in Lines 870-900.

Lines 920-1270 contain the printing routine. Line 930 is the OPEN statement that defines your printer configuration. Remember to change it for your own printer! Lines 950-1080 loop through the rows and columns. Line 970 determines the character GG in the position. Lines 980-1000 print a period if the square is the background color. (By the way, you better change Line 1020 if you change the background color in Line 320.) Line 1040 determines the color number depending on the character GG found in the position. Line 1050 prints the appropriate alphabetic character depending on the color number.

Lines 1090-1240 print a color key. Line 1250 advances the paper to the top of the next page. Line 1260 closes #1 for the printer. Line 1270 branches back to the main program so you can continue designing. Line 1280 ends the program.

*If you prefer to save typing effort, you may have a copy of this program by sending \$3 and a blank cassette or diskette plus a stamped, self-addressed mailer to REGENA, P.O. Box 1502, Cedar City, UT 84720.*

(See Page 11)



## REGENA ON BASIC—

```

100 REM REFLECTIONS !024
110 CALL CLEAR !209
120 PRINT TAB(8); "REFLECTION
S" !202
130 PRINT : : "USE THE ARROW
KEYS TO MOVE." !037
140 PRINT : "PRESS <ENTER> TO
SET COLOR." !116
150 PRINT : "USE <SPACE> TO C
HANGE COLOR." !125
160 PRINT : "USE 'H' FOR HARD
COPY." : : !158
170 CALL CHAR(45, "FF81818181
8181FF") !063
180 FOR S=2 TO 7 !073
190 CALL CHAR(8*S+80, "FFFFFF
FFFFFFFF") !232
200 CALL CHAR(8*S+81, "") !121
210 CALL COLOR(S+7, S*2+1, S*2
+2) !105
220 NEXT S !233
230 PRINT "PRESS ANY KEY TO
START." !183
240 CALL KEY(0, K, S) !187
250 IF S<1 THEN 240 !249

260 CALL CLEAR !209
270 CALL CHAR(88, "FFFFFFFF
FFFFFF") !024
280 CALL CHAR(89, "") !169
290 CALL COLOR(8, 3, 4) !182
300 CALL CHAR(81, "FFFFFFFF
FFFFFF") !017
310 CALL CHAR(80, "") !160
320 CALL SCREEN(8) !153
330 FOR ROW=1 TO 24 !029
340 CALL HCHAR(ROW, 5, 45, 24) !
175
350 NEXT ROW !142
360 CLR=2 !154
370 G2=81 !106
380 ROW=12 !227
390 COL=17 !206
400 CALL GCHAR(ROW, COL, G) !19
1
410 CALL SOUND(100, 165, 2) !13
2
420 G1=G !125
430 IF G2<>G THEN 450 !255
440 G1=45 !106
450 CALL KEY(0, K, S) !187

460 CALL HCHAR(ROW, COL, G1) !2
41
470 CALL HCHAR(ROW, COL, G2) !2
42
480 IF K=72 THEN 930 !222
490 IF K=13 THEN 800 !087
500 IF K=32 THEN 720 !007
510 IF K<>69 THEN 560 !050
520 IF ROW=1 THEN 410 !072
530 CALL HCHAR(ROW, COL, G) !19
2
540 ROW=ROW-1 !106
550 GOTO 400 !224
560 IF K<>83 THEN 610 !096
570 IF COL=17 THEN 410 !102
580 CALL HCHAR(ROW, COL, G) !19
2
590 COL=COL-1 !054
600 GOTO 400 !224
610 IF K<>68 THEN 660 !149
620 IF COL=28 THEN 410 !104
630 CALL HCHAR(ROW, COL, G) !19
2
640 COL=COL+1 !053

```

(See Page 12)



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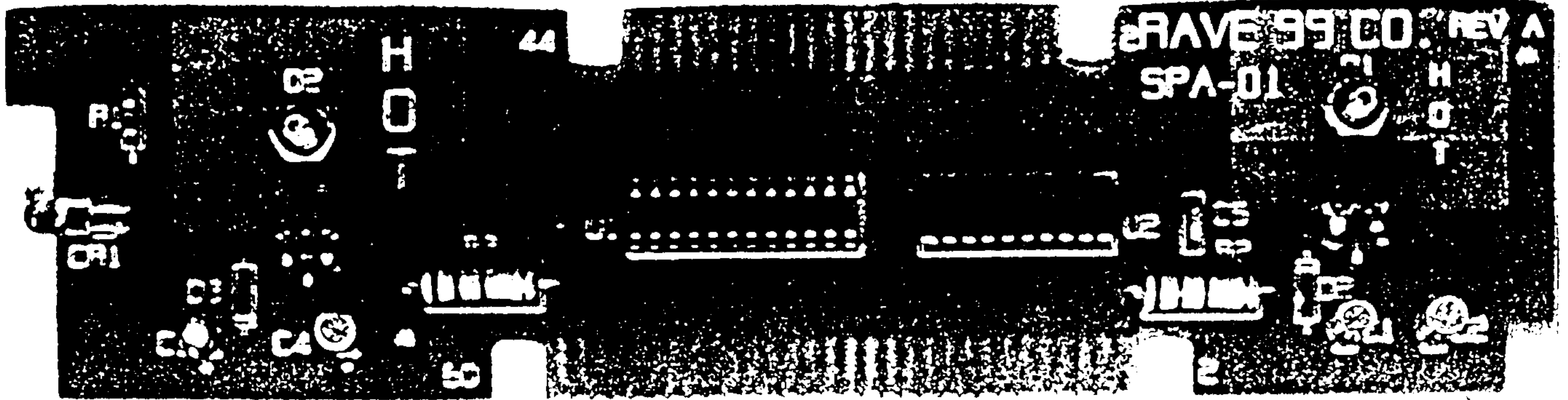


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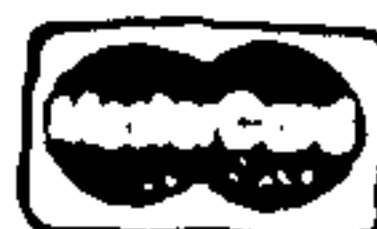



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**ANIMATED XMAS CARD (11)** This is the original animation by Ray Kazmer that made him an overnight superstar in the TI community. This classic is also referred to as "Woodstock" among TI'ers.  
**PRINTART DEMO (4)** This 2-disk side collection prints well known comic and TV personalities out on your printer.  
**FIGURE STUDY (14)** This is a collection of programs that print Playboy type center-folds out on your printer.  
**MONA LISA PRINTOUT (9)** This program prints a near photo quality picture of Mona Lisa on your printer. You won't believe the quality!  
**SPACE SHUTTLE DEMO (7)** An outstanding music/graphics program that salutes the U.S. space program. Its almost like watching a film.  
**STAR/EPSON DEMO (15)** A 2-Disk side collection of programs to show you what your printer can really do. Also a great graphics tutorial with examples!

**GOTHIC PRINT DISK (10)** This program lets you type a message and then prints it out in Old English style. Looks like hand lettered calligraphy. Great for invitations, announcements.  
**SIDEWAYS PRINTOUT (16)** Lets your printer print sideways. Great for spreadsheets and banners. Includes two versions and new Multiplan enhancements.  
**VIDEO GRAPHS (41)** This disk is sold as a backup to owners of the discontinued TI Video Graphs module. We can only legally provide it to module owners.

## TELECOMMUNICATIONS

**TELCO (57)** This program has been rated as one of the best telecommunications programs for the TI-99/4A. A user supported program that contains everything you need to upload and download data with your modem. Supports all baud rates and protocols.

## APPLICATIONS

**WILL WRITER (23)** Enter your answers to a group of questions and this program writes out a complete will.  
**MEDICAL ALERT (25)** Contains many menu accessible files on what to do until the doctor or paramedics come. Could easily save a life!  
**ENGINEERING CALCULATIONS (24)** A 2-disk side collection dozens of engineering and technical formulas. Does calculations, conversions, and even designs electrical circuits. Even contains medical and communications data and formulas.  
**LABEL MAKER (29)** A pair of programs that let you make quick and easy labels for all purposes. Mail, disks, files etc. Uses standard tractor labels and even makes a graphic picture with the label text.  
**INFOCOM RAPID LOADER (47)** A must for owners of Infocom 99/4A games. Loads games in seconds instead of minutes. Easy to use!  
**GENEALOGY (67)** Now you can enter and arrange your family tree and print out copies for your relations. Also can be used if you breed animals such as dogs, cats or horses.  
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APPLICATIONS

BASIC

## APPLICATIONS

(continued)

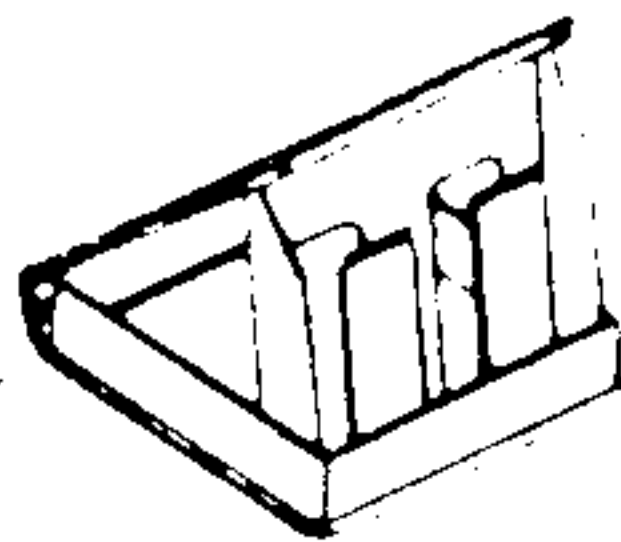
**HEBREW TYPEWRITER (66)** This program converts your 99/4A from english to hebrew. A great tool for religious studies. Can be combined with a screen dump program to print out the text from the screen. A great way to learn how to do the same with other languages. To get you in the mood, we also included a music/graphics program of "Fiddler" on this disk!

**ARTIFICIAL INTELLIGENCE (40)** This disk includes the famous computer program "Eliza" where the computer responds to your problems and questions in a manner that is almost human. Save a bundle on what you would pay a shrink for the same services. Also includes one of the better biorhythm programs so you can really take control of your emotional problems at one sitting.

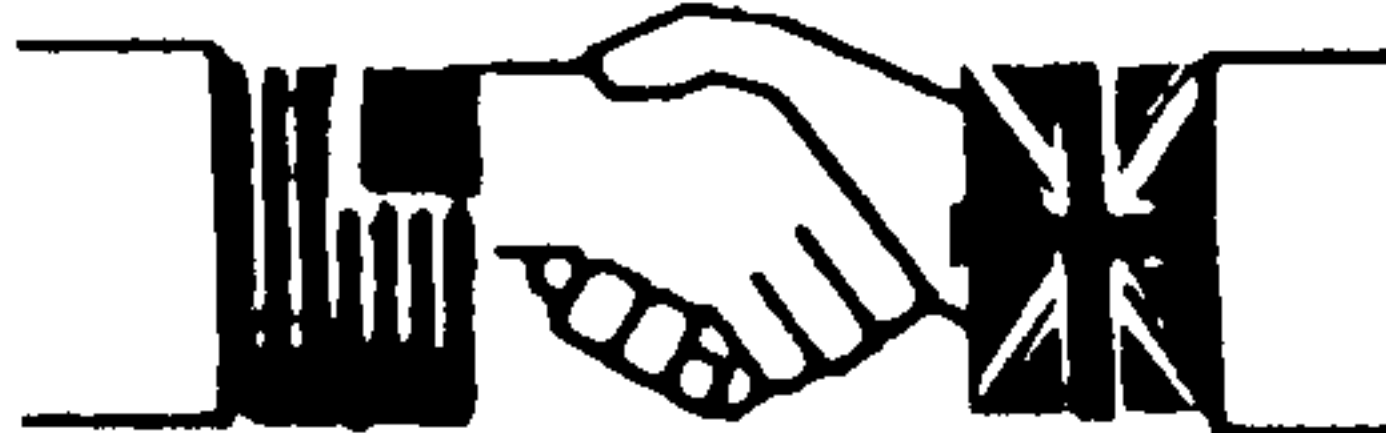
**LOTTO SELECTOR (8)** This program selects numbers for use in the various state lotto games and even runs a simulated lotto game. Unprotected so it is easily modified for additional games.

## BONUS

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## TI PROGRAMS FROM AROUND THE WORLD

**LAPD COOKBOOK (37)** A complete computer collection of great recipes compiled by an LA cop who is also a gourmet chef. Whenever he went to a top eating place he would hit the chef up for a recipe. 2 disk sides completely menu selectable.

**ORIGINAL TI SALES DEMO (5)** This disk given to TI dealers by TI back in 1980, includes demonstration programs with graphics, speech, PRK, TE-1, and even includes the famous game TI-TREK which we reprogrammed to run on the TE-II module instead of the discontinued Speech Editor.

## UTILITIES

**HACKER CRACKER (53)** A collection of the top disk copy programs including the best of the track copiers. One or more of these programs will copy almost all protected disks. Both TI & CorComp compatible programs are included. 2 disk drives are required on most of these programs.

**SCREEN DUMP (55)** This program allows you to printout what you see on the screen while running a disk, cassette or module program. Instructions included. Requires a Star or Epson compatible printer.

**DUMPIIT (3)** This disk lets you copy a number of TI modules to disk. Editor Assembler module and Vidget (cartridge expander) recommended for best results. Some programming knowledge will be helpful!

**TI DIAGNOSTICS (19)** This program released by TI loads into the TI Mini Memory module and then lets you test your system. Better than diagnostics on a disk since if your disk system was not working properly, you would not be able to use it. Complete with all documentation on a second disk side.

**DISK MANAGER II (62)** This is the TI Disk Manager II module on disk. Now if your module goes, you are protected. Sold as a backup to owners of the module. Loads with exbasic.

**LOADERS & CATALOGERS (28)** A collection of the best catalog and menu/loader programs we have seen. Ready to be put on your own program disks.

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**TI FORTH DEMO (17)** This disk released by TI demonstrates the power of the programming language Forth for music and graphics. Requires 32K and Editor Assembler Module.

**FUNNELWEB FARM UTILITY (42)** This program from down under puts many of the most often used application and utility programs at your fingertips. Complete with documentation on two disk sides.

A NOTE ABOUT DEMO DISKS: TEX-COMP's demo disks are a collection of disks containing unique and entertaining features which we believe will help you get more out of your TI-99/4A. Some if not all of them are in the public domain. However, in certain cases, the author requests a contribution if you use and enjoy it. While you are not legally obligated to do so, we at TEX-COMP encourage your assisting these talented programmers if you enjoy their work. That is why we offer these disks at such a low price.

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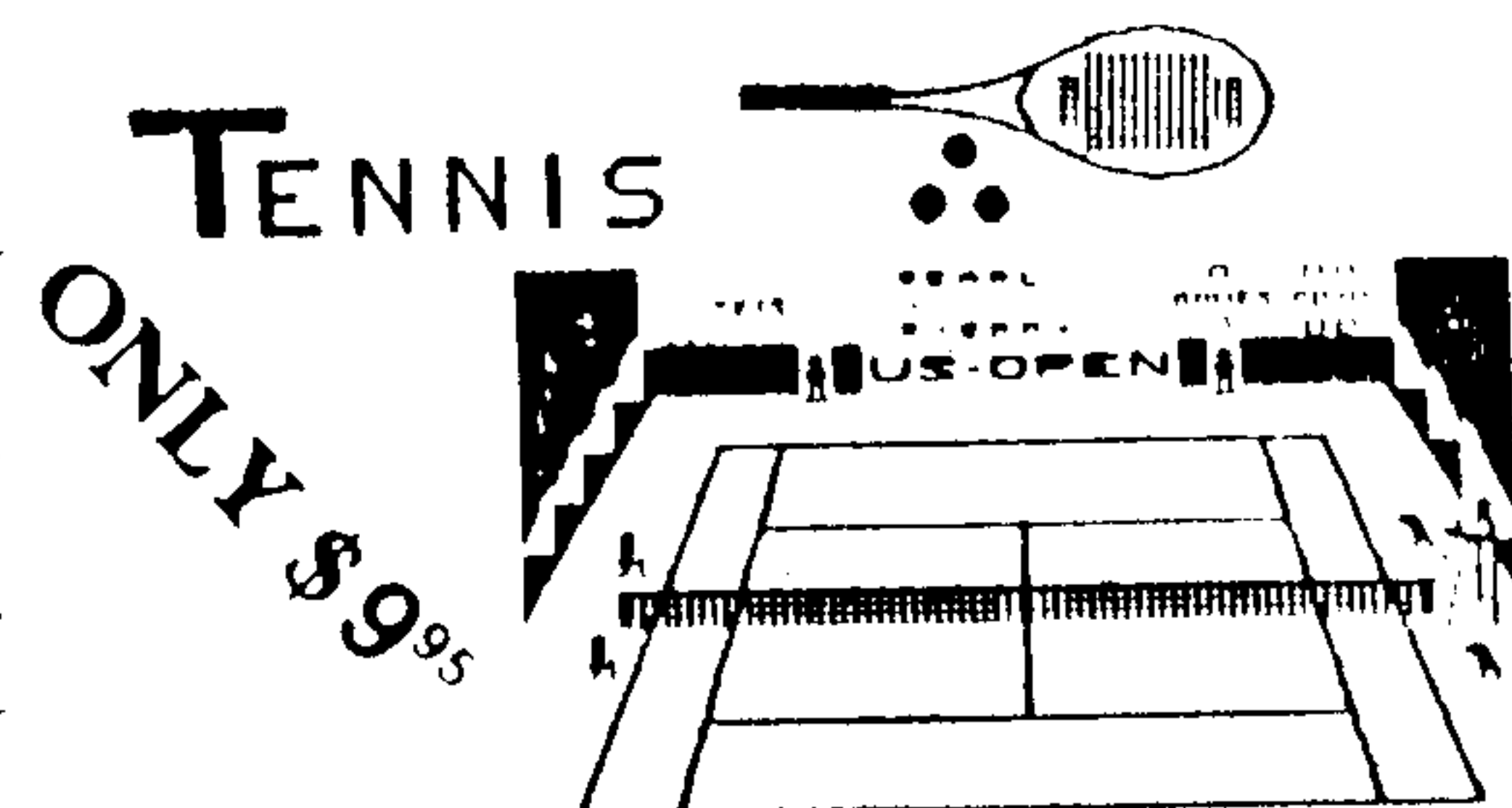
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# Turbo Pasc 99 similar to standard Pascal, yet friendly for BASIC users

By STEPHEN SHAW

Turbo Pasc 99 is marketed by L.L. Conner Enterprise, 1521 Ferry St., Lafayette, IN 47904 (317-742-8146). It retails for \$59.95. It requires a TI99/4A, memory expansion, disk system and Editor/Assembler.

TP99 is a fairly new, powerful language for the TI99/4A. At the time of writing it required the use of the Editor/Assembler module — finished programs would not run from Funnelweb or other loaders.

This article is not a full review — that will follow after I have had more time to familiarize myself with TP99. This article is based on first impressions, which are very favorable.

## CLOSE TO STANDARD PASCAL

For the first time ever I have been able to put together a program which runs in machine code (apart from some trivial bench tests). I have found TP99 to be extremely friendly in use, and sufficiently close to Standard Pascal to use a Standard Pascal text book to learn everything I need to write a program.

TI released USCD Pascal, which is an extension of Standard Pascal. The TI release was a "true" USCD Pascal, which enabled the ready transfer of p-code between different computers. TP99 has gone in a different direction — it is also an extension of Standard Pascal, but instead of pushing for inter-machine compatibility, this package is written to ease the transition from Extended BASIC — with such procedures as KEY for instance, which follows our familiar CALL KEY.

Pascal buffs may find the package lacks power compared to versions of Pascal they are familiar with, but the "average" non-Pascal user will find it quite powerful, especially if the TOOLBOX disk is purchased, to add access to many more procedures we know and love from Extended BASIC, such as sound and sprites.

The routine is fairly simple — first write your Pascal program. BASIC users familiar with keying programs straight into the keyboard may find the discipline of Pascal a little hard at first, but will find their BASIC programming will benefit too,

once they become familiar with the strict top-down writing of Pascal — and writing your program on paper first really does become essential!

## PRODUCES 9900 SOURCE CODE

TP99 has a very nice editor, which you use to key your programs in, and you then compile the Pascal code, very quickly. Syntax checking at compilation time is first class. If there is a syntax error, you drop back into the Editor with the cursor near the error, and an error code which you must look up. My most frequent error was to miss the semicolons off the ends of lines.

The compiler will produce TI 9900 source code, which you must assemble using the Editor/Assembler or other assembler. Note that the source code will commence with a copy directive, which may need its disk number changing!

Once the source code has been assembled into object code, you may use the Linker to run the program, or to produce a memory image file which you can load with the Editor/Assembler module, without using the Linker.

Use of a RAMdisk helps quite a bit. The process of producing a piece of working code is not too difficult once you drop into the routine.

This is not Borland's Turbo Pascal. It is close to "standard" ISO Pascal, amended to make it more friendly for programmers used to the TI99/4A.

ISO Pascal items NOT supported are: file, in, packed, record, set, type, with, char, ord, pred, round, sqr, succ, trunc, odd, reset, rewrite, dispose, new, pack, unpack.

Items included but not in ISO PASCAL (some replacing items above): Block, Module, Relative, Stream, String, Open, Seek, Append, Close, Asc, Cursor, Key, Screen, minint, pi, graphics, text, putln, cfs, cir, cis, cri, crs, csi, csr, len, int, rnd, seg, tan, randomize.

Variations on ISO pascal are: Strings are within double quotes "string" instead of 'string'. REAL must be specified as 4, 6 or 8 bytes — if you select 8 you have normal XBASIC precision.

STRING type must have a length

specified in [].

My first use of TP99 was to run some benchtests, devised by the U.K. magazine Personal Computer World.

## TURBO PASCAL BENCHMARKS

The Pascal code will first be given followed by the timing and possibly some notes. (Remember: You do not need a p-Code card to run Turbo Pascal.)

```
PROGRAM intmath;
VAR t,
    i,x,y : INTEGER;
BEGIN
  writeln(".....");
  t := 0;
  FOR t := 1 TO 100 DO
  BEGIN
    x := 0;
    y := 9;
    writeln("start");
    FOR i := 1 TO 1000 DO
    BEGIN
      x := x + (y * y - y) DIV y
    END;
  END;
  writeln("---",x);
END.
```

The timing on this program equates to a benchmark of 0.337 seconds for 1000 loops, which compares well with a benchmark of 0.48 seconds for C99.

```
PROGRAM realmath;
VAR t,
    i : INTEGER;
    x,y : REAL[4];
BEGIN
  writeln(".....");
  FOR t := 1 TO 5 DO
  BEGIN
    x := 0.0;
    y := 9.9;
    FOR i := 1 TO 1000 DO
    BEGIN
      x := x + (y * y - y) / y;
    END;
  END;
  writeln("***END...",x);
END.
```

REALMATH using numbers of 4 bytes, took 8.20 seconds for 1000 loops, compared to 17.7 seconds for plain, ordinary (See Page 17)



## TURBO PASC 99—

(Continued from Page 16)

TI Basic.

```

PROGRAM triglog;
VAR i : INTEGER;
    x,y : REAL[4];
BEGIN
  writeln(".....");
  x := 0.0;
  y := 9.9;
  FOR i := 1 TO 400 DO
    BEGIN
      x := x + sin( arctan( cos( ln(y))));
    END;
  writeln("***",x);
END.

```

This was slow and the equivalent of 1000 loops took 625 seconds, which compares badly to 360 seconds in Extended BASIC. Moral: don't use TP99 if there is a lot of trig.

```

PROGRAM textscrn;
VAR i : INTEGER;
BEGIN
  text;
  writeln("START");
  FOR i := 1 TO 1000 DO
    writeln("1234567890qwertyuiop",i);
    writeln("***",i);
  END.

```

This one took 69 seconds for a 1000 loop, comparing badly with c99, which took just 38.7 seconds.

```

PROGRAM store;
VAR i : INTEGER;
    f : STREAM[80];
BEGIN
  writeln("START");
  open(f,"DSK2.TEXT",output);
  FOR i := 1 TO 1000 DO
    putln(f,"1234567890qwertyuiop");
  close(f);
  writeln("*****");
END.

```

This took 61.4 seconds, compared to 83 seconds in Myarc XB and 131 seconds in TI XB. Notice how easy disk access can be.

## RESULTS

Benchmarks are not the be all and end all of a computer language, although an advertiser can give the impression a language is incredibly fast by telling you what it is fast at, and not telling you what it is slow at. Turbo Pasc 99 seems to be comparable with c99 overall, sometimes better sometimes not.

Personally I found it much easier to use Turbo Pasc 99 — I even made it write to disk! Look how short the STORE program is.

If you are a TI p-code user you may find these codes a little odd. I can assure you they work exactly as printed here. If you have a TI p-code card, why not run comparative tests and let me know the times?

The answers printed out by the math results were: intmath 8000, realmath 8.9E3 (both same as TI BASIC) and triglog -2.2021E2, compared to -2.20497E2 from TI BASIC — this minor inaccuracy is due to using only 4 bytes for the variable rather than 8, but we could have used 8 if we had wanted such accuracy.

After the ease of writing the bench tests, I plucked up courage to write a program I have wanted for a long time — a flexible machine code LIFE program. It really was fairly easy to write the code, and here for the first time ever I produced a program that did something in machine code.

Allow me to share the code with you — it also illustrates a little more of the syntax that TP99 uses

## TURBO PASC 99 PROGRAM

Very very few readers will own TP99 right now — but for those with disk drives, here is a lengthy sample of a program written in TP99, to enable you to see how it appears, and for those of you with TI Pascal, you can see how the syntax varies. Professional Pascal users may be interested to see how arrays are passed to procedures.

This is the first ever Pascal program written by me, and is based on a TI BASIC program in the book "Dynamic Games for

your TI99/4A" by Scott Vincent. I have wanted a flexible LIFE simulation in machine code, but not found any suitable, so I have taken advantage of Pascal to see what I can do.

In this version, you first set up the LIFE starting position by keying A for life and SPACE for no life, to fill a 12x12 grid. I have not put any cursor control in — it just moves over each line in turn, left to right.

The outer frame has fixed status — it will affect the inner 10x10 grid, but no changes will occur in the frame: if you put life there it will stay there. This enables you to experiment with variations on the normal isolated life universe. To help spot the frame, the cursor is a + in the frame and a ? in the 10x10 grid.

You have the option of allowing automatic changes in generations, or keying them. If you select automatic, you may return to the set up section just by pressing a key. If you select keyed progress, to get back to the set up screen involves quickly pressing two different keys, one after the other.

There is one "bug" left in — the counter G is of integer type but there is no test for maxint, so after some 32000 odd generations the program will bomb out.

LIFE patterns may: Die out or reach a stable pattern.

Cycle between patterns — changing between two patterns is the most common, but I have created a 4-pattern cycle.

As a variant of the above, a pattern has been found in which a "bullet" is regularly produced from a cluster, and moves off screen.

It takes about a second for each generation — much faster than is possible in TI BASIC. It would be simple to amend the size of the life universe, but the larger the universe the longer the creation time.

Here is the Pascal code, entire, and as successfully compiled.

## Life in Turbo Pasc 99

{ PASCAL CODE -----}

PROGRAM life;

```

VAR k,z: INTEGER;
    m,n: ARRAY[12,12] OF INTEGER;

```

PROCEDURE rules;

```

VAR k,status: INTEGER;
BEGIN
  cls;

```

(See Page 18)



## TURBO PASC 99—

(Continued from Page 17)

```

writeln(" LIFE");
writeln(" first set up start position");
writeln(" Put life forms into a");
writeln(" 10 x 10 grid ");
writeln(" by pressing A or space");
writeln(" (The 10x10 grid is in a frame-");
writeln(" making a 12x12 grid in total:");
writeln(" If you place life in the frame");
writeln(" it will never die, and can ");
writeln(" constantly create new life if");
writeln(" the proper life conditions are met");
writeln(" ");
writeln(" There is no cursor control.");
writeln(" Generation starts after 144th");
writeln(" key press");
writeln(" When prompted indicate if you");
writeln(" want to prompt each generation");
writeln(" with a Keypress, or let the");
writeln(" program go full tilt.");
writeln(" ");
writeln(" Press any key to continue");
writeln(" Stephen Shaw Jan 1988");
REPEAT
  key(3,k,status)
UNTIL status=1;
END;

```

```

PROCEDURE draw(VAR m,n:ARRAY[12,12] OF INTEGER);
  VAR row,col:INTEGER;
  BEGIN
    FOR row:=1 TO 12 DO
      BEGIN
        FOR col:=1 TO 12 DO
          BEGIN
            m[row,col]:=n[row,col];
            cursor(row+2,col+5);
            IF m[row,col]=1 THEN
              write("0")
            ELSE
              write("~");
          END;
        END;
      END;
    END;
  END;

```

```

PROCEDURE think(VAR m,n:ARRAY[12,12] OF INTEGER);
  LABEL rerun;
  VAR c,g,k,s,t,y,z:INTEGER;
  BEGIN
    cls;
    cursor(2,2);
    writeln(" Press K to key generations");
    writeln(" Or any other key for auto");
    writeln(" ");
    writeln(" When all life ceases,");

```

```

write(" Press a key to restart");
REPEAT
  key(3,y,c)
UNTIL c=1;

{ y = 75 TO key prompt }
cls;
g:=0;
REPEAT
  g:=g+1;
  FOR k:=2 TO 11 DO
    BEGIN
      FOR z:=2 TO 11 DO
        BEGIN
          c:=m[k-1,z-1]+m[k-1,z]+m[k-1,z+1];
          c:=c+m[k,z-1]+m[k,z+1];
          c:=c+m[k+1,z-1]+m[k+1,z]+m[k+1,z+1];
          IF (m[k,z]=0) AND (c=3) THEN
            n[k,z]:=1;
          IF (m[k,z]=1) AND ((c=2) OR (c=3)) THEN
            n[k,z]:=1;
          IF (m[k,z]=1) AND ((c>3) OR (c=0)) THEN
            n[k,z]:=0;

          key(3,t,s);
          IF s=1 THEN
            GOTO rerun;
        END;
      END;
    END;
  cursor(24,2);
  write("generation ",g);
  draw(m,n);
  IF y=75 THEN
    REPEAT
      key(3,k,s)
    UNTIL s=1;
  UNTIL false;
  rerun:
END;

PROCEDURE setup(VAR k,z:INTEGER;VAR m,n:ARRAY[12,12] OF INTEGER);
  VAR j,jj:INTEGER;
  BEGIN
    REPEAT
      REPEAT
        cursor(k+2,z+5);
        IF (k=1) OR (k=12) OR (z=1) OR (z=12) THEN
          write("+")
        ELSE
          write("?");
        REPEAT
          key(3,j,jj);
        UNTIL ((j=32) OR (j=65)) AND (jj=1);

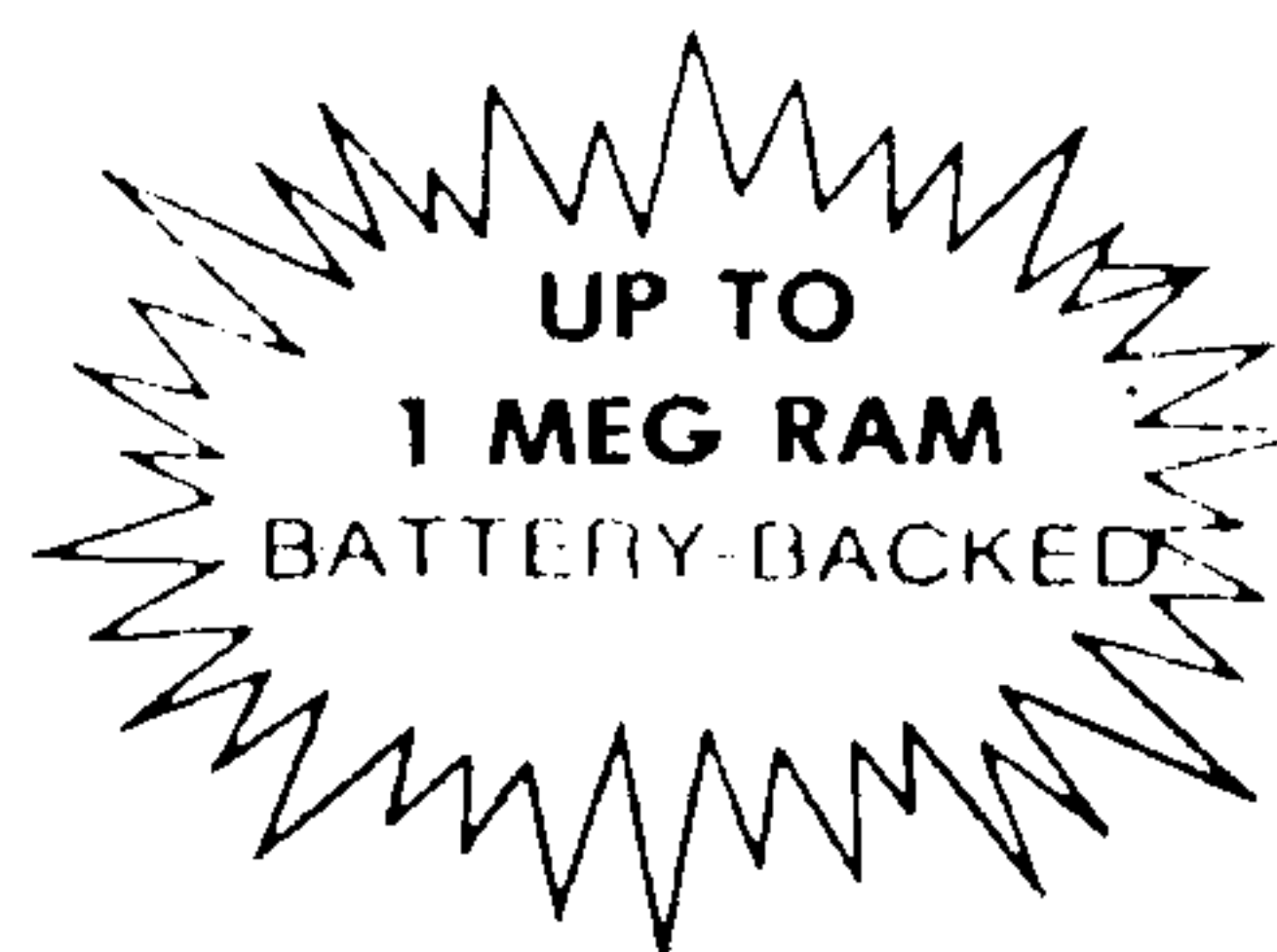
        IF j=65 THEN

```

(See Page 20)



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By John Guion and Robert Jones  
 Produced by HORIZON COMPUTER  
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## Demystifying assembly

## Features of MICRO-WORD outlined

By JOHN BIRDWELL

I hope this column has been a moving experience for you I know it has been for me. My moving has been back to the Chicago area. By the time this is published I will hopefully be all settled in my new home and be ready to get the October article out. Beginning with this issue please address all correspondence directly to me. My new address is John Birdwell, 1310 Kent Court, Wheaton, Il 60187.

In the July article there is an error which occurred when it was typeset. On page 18 the third line of the CLS routine reads LI R1,. This should read LI R1,' ' that is two spaces between the single quotes. Thanks to Marc Levine for pointing out this error.

I have begun to receive input on the features readers would like to see. Listed below are some of those which are within the scope of this project.

- Toggle to allow only displayable ASCII characters (ie. no control characters.)
- Make blocks marked for copy, delete, etc. appear in inverse video.
- Tabline (done in August issue).
- True lower case (done in August issue).
- Catalog disk.
- Screen dump without leaving editor.
- Display a dash line to indicate the point where a physical print page ends.
- Use of command keys like Turbo Pascal and Wordstar instead of a command line.

- Help windows like Telco.
- A configuration file containing the following:
  - Foreground and background colors.
  - Default data drive.
  - Keyboard macro definitions.
  - Printer defaults.
  - User defined tab settings.
- Votes both ways for horizontal scroll and for windowing like TI-Writer. (This month's program allows for both.)
  - Printer control by control characters.
  - Auto word wrap.
  - Allows start cursor at the start of file after a load.
- Also requested is to make the source code available for a fee. This will be done. Please continue to provide input on the desired features you would like but make is soon as once we get locked into going in one direction it may not be possible to accommodate your desires.

Dan Eicher asked about making this program work with the ADVDP card. This is the 80-column card from DIJIT which uses the same 9938 video display processor as the Geneve. Although I do not have an ADVDP card to test this with, all that should be required to do this is to remove the instruction JEQ ITSA4A from the IN-IT code.

Jerry Bohnert reports a problem with an INVALID REGISTER error on the line SFIRST B @INIT. Assuming Jerry has changed the copy directives as correct in the August issue the error has to be in the

label INIT since that would be the register the error is indicating.

This month we will begin to store data into memory like a word processor should. This will require several changes to the existing source code so read the listing section carefully. We will be using the memory above the code to store data with the plan being to move our program to the lower 8K there by leaving most of the upper 24K available for data. Next month I'll publish a list of patches you can make to the SAVE utility so that it will load into high memory. This will give us pages >2800->4000 for our program to load, or 6K of code space. To keep maximum flexibility the format of the stored data will be kept simple, at least for now. All data keyed will be stored as is onto memory with a hex FF marking the end of data.

The display is re-painted after each key. To do this and to allow for the scrolling of the display on the 4A each line is built in a buffer starting at the left margin and ending at either a carriage return (hex 0D) or the right margin. A set of pointers is maintained which indicate where in the line the display is to start and end. The line or appropriate section of it is then displayed. This is repeated for all 22 lines. We could add more intelligence to the display routine and re-display only what is really needed but this would result in differing performance based upon how much has to be done. By re-writing all 22 lines we can ex-

(See Page 21)

## TURBO PASC 99—

(Continued from Page 18)

```

BEGIN
  cursor(k+2,z+5);
  write("0");
  m[k,z]:=1;
  n[k,z]:=1;
END
ELSE
  BEGIN
    cursor(k+2,z+5);
    write("");
    m[k,z]:=0;
    n[k,z]:=0;
    END;
    END;
    UNTIL z=13;
    z:=1;
    k:=k+1;
    UNTIL k=13;
    END;
    END;
    cls;
    rules;
    REPEAT
      k:=1;
      z:=1;
      cls;
      text;
      setup(k,z,m,n);
      think(m,n);
    UNTIL false;
    END.
  { This is the actual program!:- }
  BEGIN

```



## MICRO-WORD—

(Continued from Page 20)

pect close to the same performance at all times and adjust things, such as the keyboard repeat rate, accordingly.

If you would like to obtain a copy of this source code send \$3 plus a blank, formatted diskette and a stamped self-addressed mailer to John Birdwell, 1310 Kent Court, Wheaton, IL 60187.

## MORE MICRO-WORD

```

*
*
***** Filename = MICRO-EQU
*
* Add to EQU section
*
*****
LBUILD EQU >2000      * Low memory 132 bytes for building a display line
*****
*
* In PTNTAB change FOR,BACK,UP,DOWN to IGNORE
*
* ADD the following to the DATA section
*****
DLCOL DATA 0      * Logical left column
DRCOL DATA 0      * Logical right column
*****
* NOTE: DSCROL will set the amount of horizontal scroll that will take
*       place when the right display column is reached
*       a value of 1 causes a scroll increase to window the display
*       20 causes a window like TI-Writer
DSCROL DATA 20    * Horizontal scroll amount
BEGDSP DATA FREE  * Current address of text in memory
CPL DATA 0        * Total # of character per line
*****
*
*
***** Filename = MICRO-INIT
* Add Before the B @MAIN instruction
*****
MOV @ONELIN,@DRCOL * Set right display column
DRC @DRCOL         * Correct to column position (39 for a 4a)
LI R15,FREE       * Set r15 to start of data store
MOVB @FF,*R15     * Set to end of data
MOV R6,R14        * Set to cursor position on line
*****
B @MAIN           * INITIALIZATION COMPLETE BEGIN THE PROGRAM
*
***** Filename = MICRO-MAIN
* Add the following to the start
*
*****
* FIRST SHOW THE CURRENT CURSOR POSITION ON THE TAB LINE
MAIN MOV R14,R0    * Invert the next position on the tab line
AI R0,TABLIN     * add to start of tabline
MOVB *R0,R1      * Get the current character
ANDI R1,>7F00     * Turn off inverse
MOVB R1,*R0     * Put it back
LI R0,22        * Show active section of tabline
MPY @ONELIN,R0
MOV R1,R0       * Now pointing to correct VDP location
MOV @DLCOL,R1  * Starting left column
AI R1,TABLIN   * From start of tab line
MOV @ONELIN,R2 * Line length
BLWP @VNRW    * SHOW IT
*****
* Remove the following through BLWP @VSBW
*
* MOV @CURPOS,R0 * GET CURSOR POSITION
* BLWP @VSBW     * GET THE CHARACTER THERE
* ANDI R1,>7E00  * TURN OFF THE INVERSE

```

```

* BLWP @VSBW      * WRITE IT BACK
*****
BL @GETKY        * GO GET A KEY AND RETURN WITH IT IN R1
*
***** Filename = MICRO-DISP
* Replace the SHOW routine with the following
*
SHOW MOVB *R15,R5 * Save current character
MOV R4,*R15+     * Load key to memory
CB @FF,R5        * At the end of memory now
JNB SHOW1        * No
MOVB @FF,*R15    * Yes set new end of memory
CI R15,>FFF8     * At the end of useable memory?
JNB SHOW1        * No
DRC R15         * Yes backup
B @MAIN         * and get out
SHOW1 C @RMARTL,@CURPOS * At right margin
JNB SHOW2       * No
MOV @LMARL,@CURPOS * Yes, set back to left margin
MOV @LMAR,R14   * Set cursor on line position
CLR @DLCOL     * Set display left column to zero
MOV @ONELIN,@DRCOL * Set display right column to display width
DRC @DRCOL     * Correct to column number
A @ONELIN,R6   * Set cursor to start of next line
BL @BEGLIN     * Point to beginning of this line
A @LMAR,R6     * Plus left margin
C R6,@R0E     * Go beyond display
JLT SHOW4      * Not yet
MOV @CPL,R0    * Must scan for hard return or for line length
MOV @BEGDSP,R1 * Start of display memory
SHOW1A CB *R1+,@CR * Got at hard return
JREQ SHOW1B   * Yes
DRC R0        * Decrement line length
JNB SHOW1A   * Continue search
SHOW1B MOV R1,@BEGDSP * Set new start of display
S @ONELIN,R6 * Backup a display line
JMP SHOW4    * Continue
SHOW2 C R14,@DRCOL * At right screen edge
JLT SHOW3    * No
A @DSCROL,@DLCOL * Scroll display right amount required
A @DSCROL,@DRCOL * both left and right
S @DSCROL,R6  * Subtract scroll amount
INC R6        * Correct range
INC @CURPOS   * Next position on cursor line
INC R14      * Next column on line
JMP SHOW4
SHOW3 INC @CURPOS * Next position on tab line
INC R14      * Next position on line
INC R6       * and display
* Now display the screen
SHOW4 CLR R0      * Start of display
MOV @DLCOL,R1 * Left display column start
AI R1,LBUILD  * Add start of line build for display start
MOV @ONELIN,R2 * Display for line length
LI R0,22     * Show 22 lines
MOV @BEGDSP,R7 * Location in data to start
SHOW5 LI R3,LBUILD * Clear line build to spaces
LI R4, ' '   * 2 spaces at a time
SHOW5A MOV R4,*R3+ * Load 2 spaces
CI R3,LBUILD+80 * Done 80
JNB SHOW5A   * If not do 2 more
MOV @CPL,R4  * Maximum characters/line
MOV @LMAR,R3 * Start fill at left margin
AI R3,LBUILD * Position into build line
SHOW5B MOVB *R7,R5 * Save write to write
CB @FF,R5    * End of text
JREQ SHOW7   * Yes go clear the rest of display
MOVB *R7+,*R3+ * Load byte to line build
CB @CR,R5    * Just load a hard return
JREQ SHOW6   * Yes go show this line
DRC R4       * Decrement characters on line count

```

(See Page 24)



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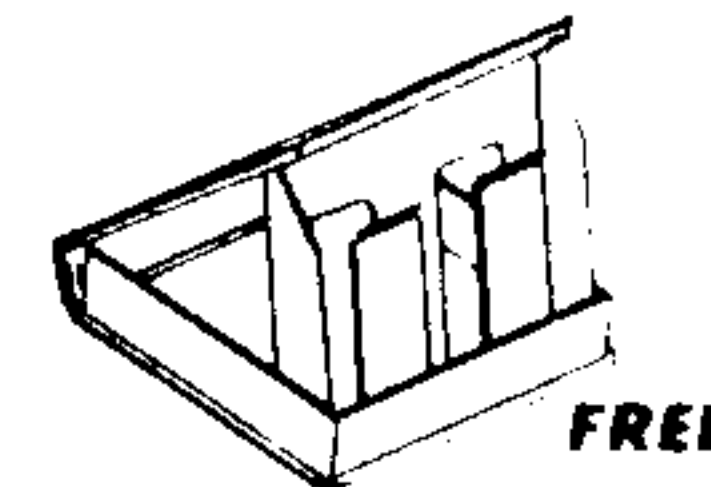
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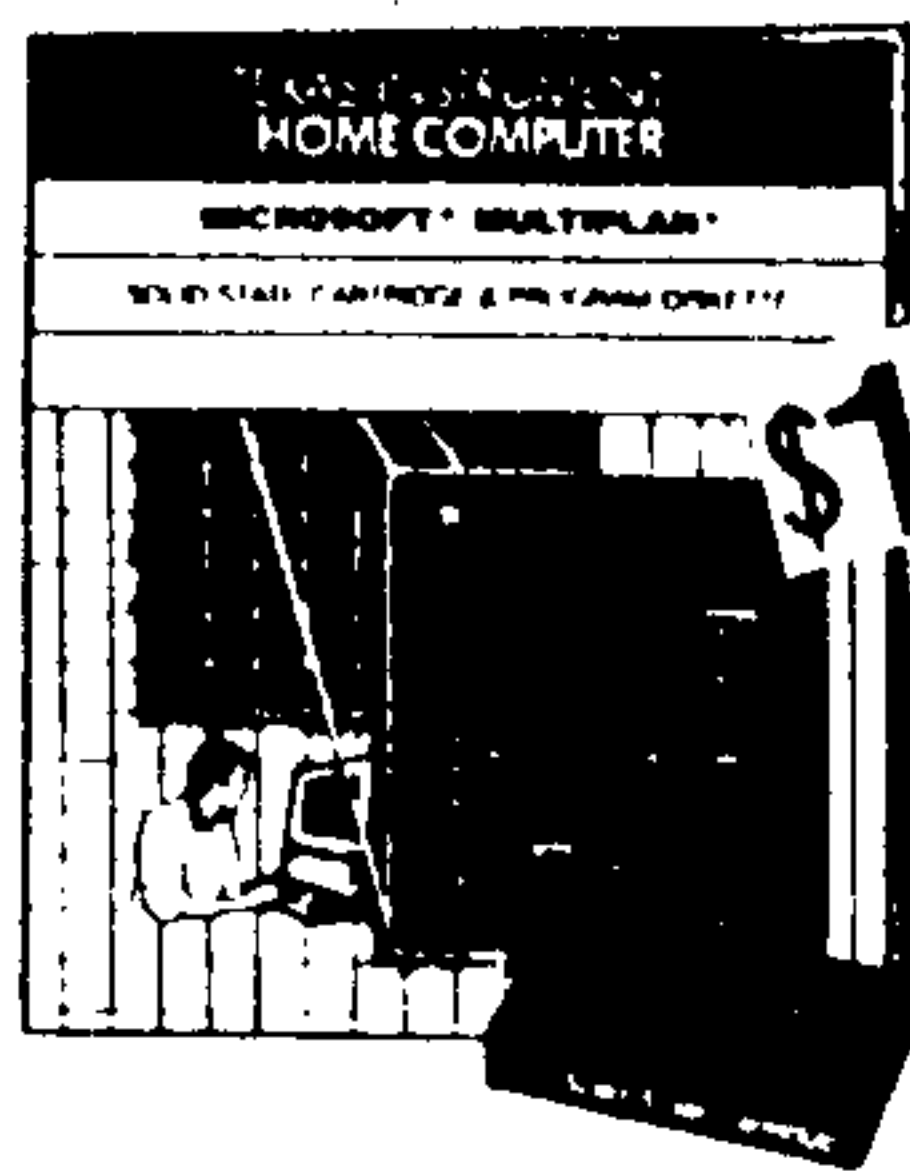
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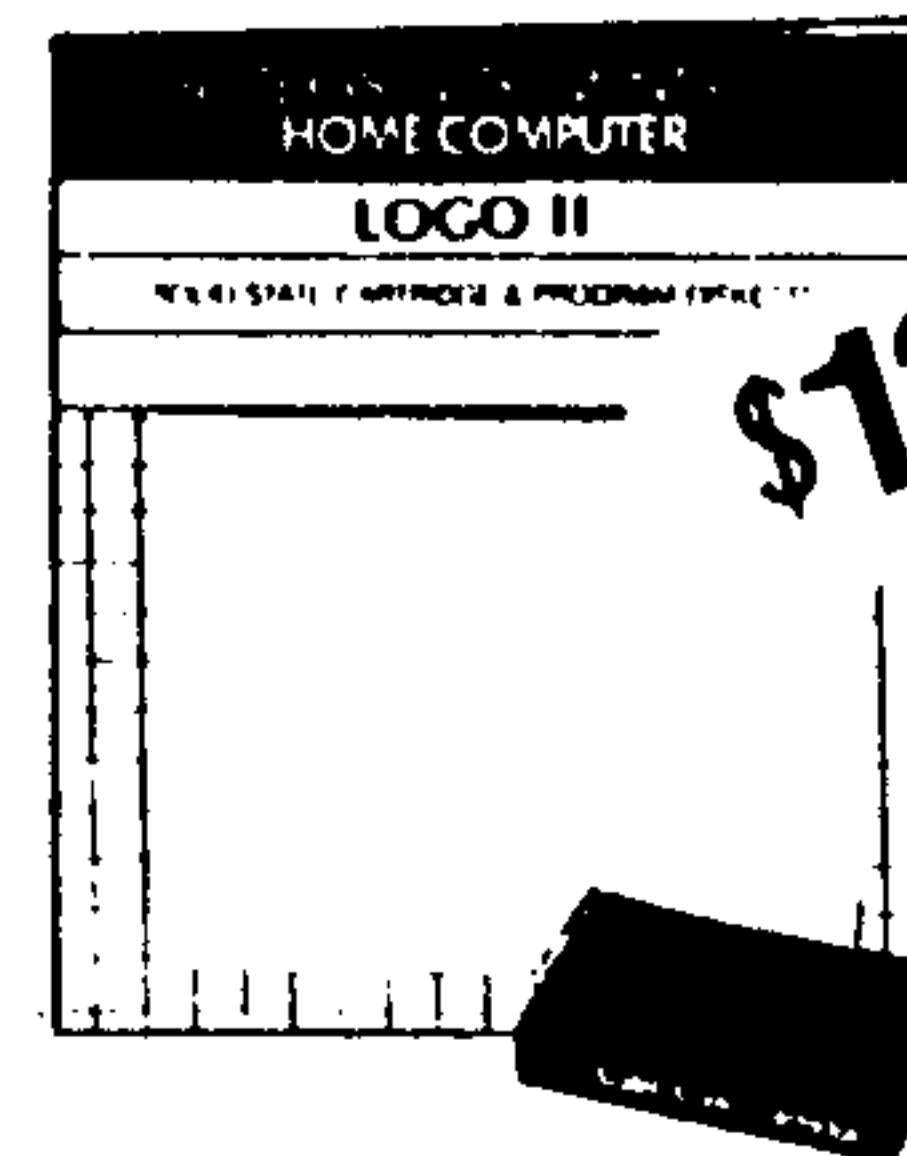
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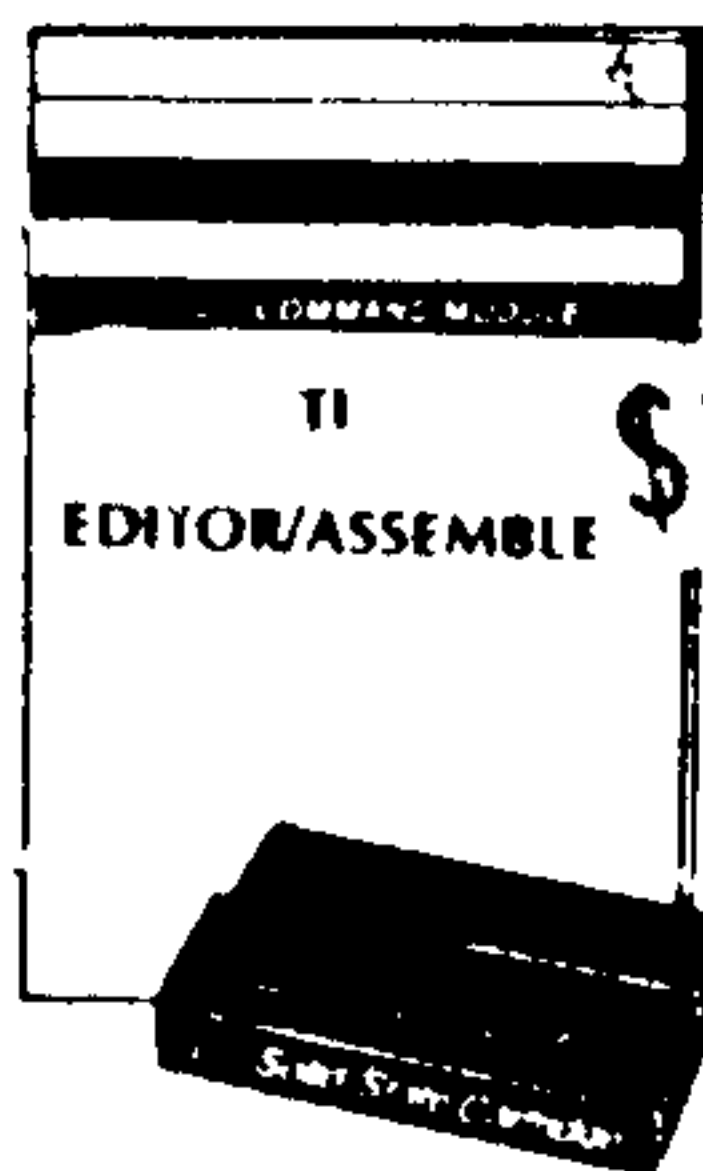
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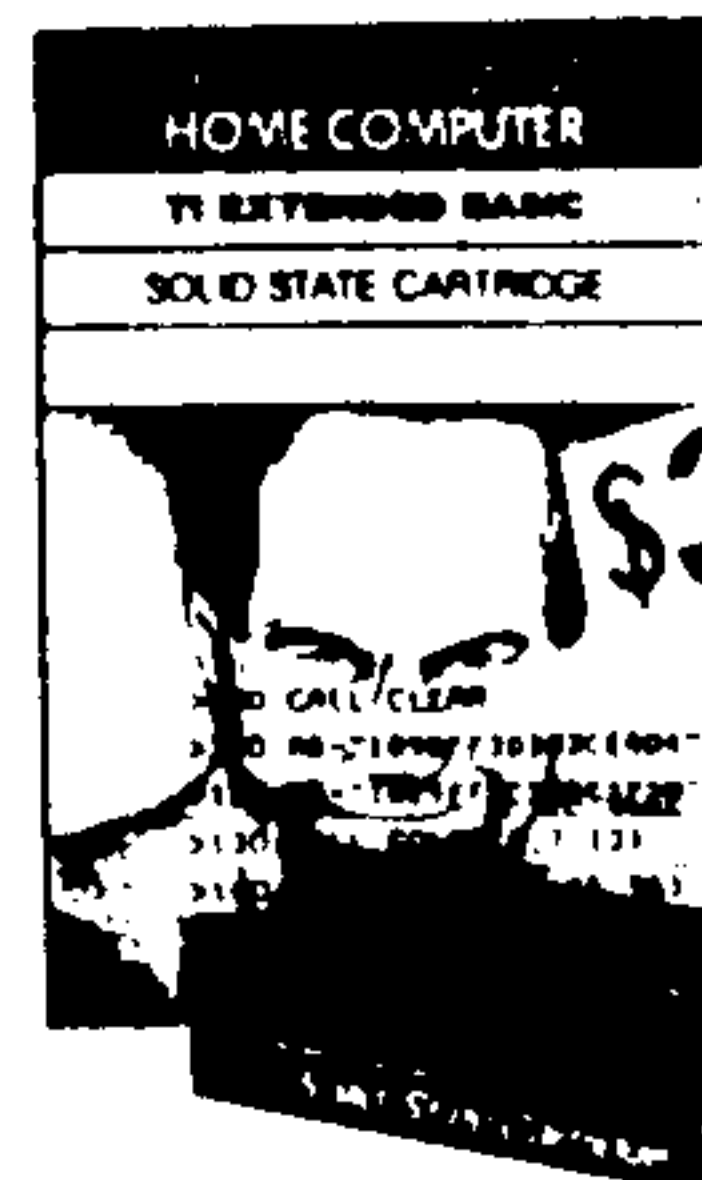
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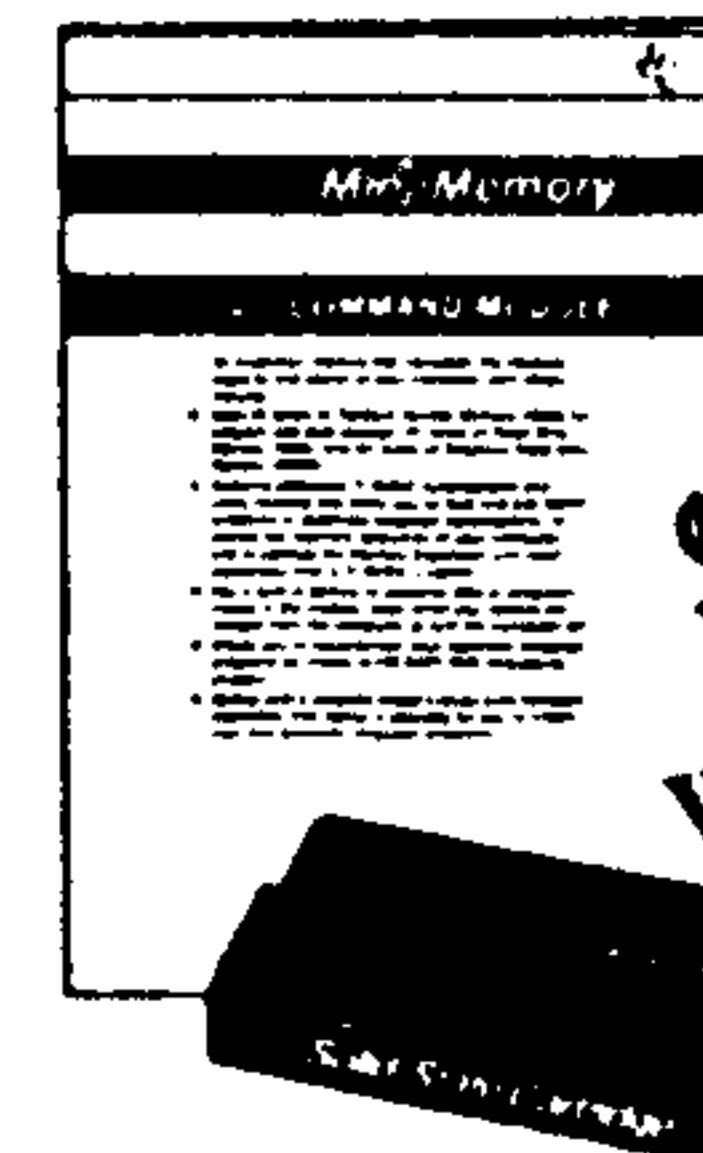
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# Myarc, DIJIT rely on Yamaha 9938

By TONY LEWIS

The video chip used in the 99/4A, the TMS9918A, was discussed in some detail in the August issue of MICROpendium, but what about the 9938 VDP used in both the Myarc 9640 and DIJIT Systems' Advanced Video Processor Card (AVPC)?

This chip, as we will see shortly, is one of the most complex peripheral chips developed for use with display terminals and personal computers. But it wasn't developed by TI. Yamaha and Microsoft jointly developed the chip.

According to what I have been told, the V9938's history is something like this: when TI committed to develop the 99/8 computer, the company realized it needed something more powerful than, but compatible with, the 9918A. The 99/8 prototypes in existence today do not have a 9938 VDP inside, but rather some custom video circuitry to emulate some of the 9938's features. Since TI pulled the plug on development of the 99/8 in 1983, further development of the Advanced Video Display Processor (AVDP) chip was stopped, too. (TI did not stop work on all video

chips. A subsequent article will cover how TI leap-frogged ahead to the state of the art 340XX video processors, which were originally numbered as an extension of the 99/91 video family.)

Yamaha and Microsoft came into the picture in the early 1980s due to the MSX computer standard. The MSX standard was developed by Microsoft and embraced by Japan (and virtually by no one else). As part of the original MSX design standard, the video chip was the TMS9918A(!). When the MSX-2 standard was developed, they needed an upgraded video chip (80 columns, etc.) that was still upwardly compatible with the 9918A. With TI out of the picture, Yamaha and Microsoft developed the 9938 on their own, and it is marketed by Yamaha today as the V9938.

As with the previous article, this article will discuss some of the hardware aspects of the V9938, and not the software used by the 99/4A or Geneve systems to drive the AVDP. It is assumed that you have read the 9918A article. Access to a TI data manual for the 9918A, and the Yamaha

data manual for the V9938 is mandatory for a full understanding of how to use the 9938.

This chip is so complex that an in-depth discussion of each feature is impossible; therefore, only the major features of the 9938 will be highlighted. Consult the data manual for more details. Yamaha's address is provided at the end of this article. Once again, I am not an expert on the 9938, so please bear with me if you spot a mistake.

## THE V9938 ARCHITECTURE

Compared to the 9918A, the V9938 is truly an advanced video processor, capable of driving an analog RGB monitor, composite monitor or television (with a modulated signal). The major design features offered by the chip are as follows:

- Full bit-mapped mode.
- 32, 40 and 80 column text display.
- Access to pixels using X and Y coordinates.
- Fundamental video commands implemented by hardware, not the main processor: AREA MOVE, LINE, SEARCH, etc..

(See Page 26)

## MICRO-WORD—

(Continued from Page 21)

```

*
JNB SHOW5B      * No do some more
SHOW6 BLWP @VMBW * Show this line
A @ONELIN,R0    * Next display line
DEC R8          * Done 22
JNB SHOW5      * No do next line
SHOW6A B @MAIN  * Done
SHOW7 BLWP @VMBW * Show the last line
LI R3,LBUILD   * Prepare to space out the rest of display
LI R4,
SHOW7A MOV R4,*R3+
CI R3,LBUILD+80
JNB SHOW7A
SHOW7B A @ONELIN,R0 * Next line
DEC R8          * All done
JNQ SHOW6A     * Yes leave
BLWP @VMBW     * Place out line
JMP SHOW7B     * Do next
*
* To the end of the TABSET routine add the following before the RT
*****
* Now figure the number of characters per line
MOV @RMARTL,R0 * Get right margin amount
S @LMARTL,R0   * Subtract left margin from right
INC R0        * Plus 1 to get absolute number
MOV R0,@CPL   * Save characters/line
*****
RT            * RETURN TO CALLED

```

```

*
***** Filename = MICRO-KEYS
* Add the following before the RT in the GETKY routine
*****
MOV R14,R0    * Set tab line position back to inverse
AI R0,TABLIN
MOVB *R0,R1   * Get the character
ORI R1,>8000  * Turn back on inverse
MOVB R1,*R0   * Put byte back
*****
RT            * RETURN
*
* Remove the following from the end of the GETKY routine
MOV @CURPOS,R0 * INVERT TAB LINE CHARACTER
BLWP @VSB     *
AI R1,>8000    * PLACE INTO INVERTED CHARACTER SET
BLWP @VSB     * WRITE IT BACK
*
* Replace the ENTKEY code with the following
*****
ENTKEY MOVB @CR,R4 * Load c/r character to key save
MOV @RMARTL,@CURPOS * Set to right margin
B @SHOW      * Let show do the work
*****
* Delete BACK,FOR,UP,DOWN routines
*****
*

```



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# VIDEO CHIPS

(Continued from Page 24)

- Digitize and external synchronization.
- Programmable color palette (512 colors total).
- Analog RGB video output and composite output available.
- More sprites per horizontal line.
- Hardware support for mouse and light pen.
- Maximum 512 x 212 pixel display.
- Maximum 256 colors displayed simultaneously.

Like the 9918A, the 9938 is designed to be a memory mapped device that communicates with the main processor (CPU) via a series of Command, Control, and Status registers (see Fig. 2). It also provides all the signals needed to control up to 192K of Dynamic RAM (DRAM), interface to external video signals, and accept input from a mouse and light pen. It is interesting to note that while the V9938 has 64 pins, it is a "shrink DIP" chip, which means that it takes up the space of an ordinary 40-pin chip. This non-standard design has also created many headaches for the printed circuit board designers. (See Fig. 1 for pinout.)

### INTERFACING THE V9938

The V9938 has no main CPU address lines, and is meant to be used as a memory-

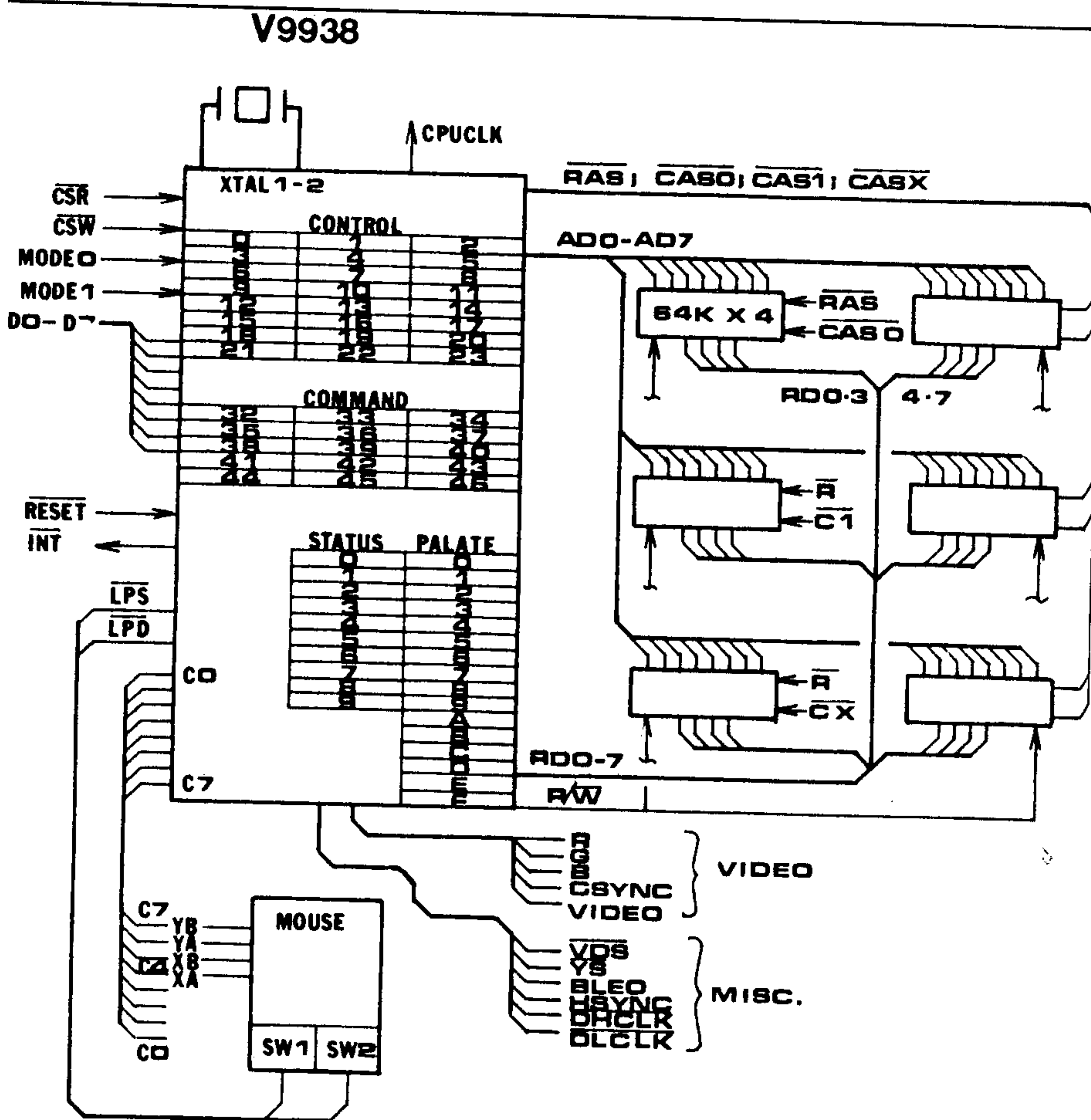


Fig. 2

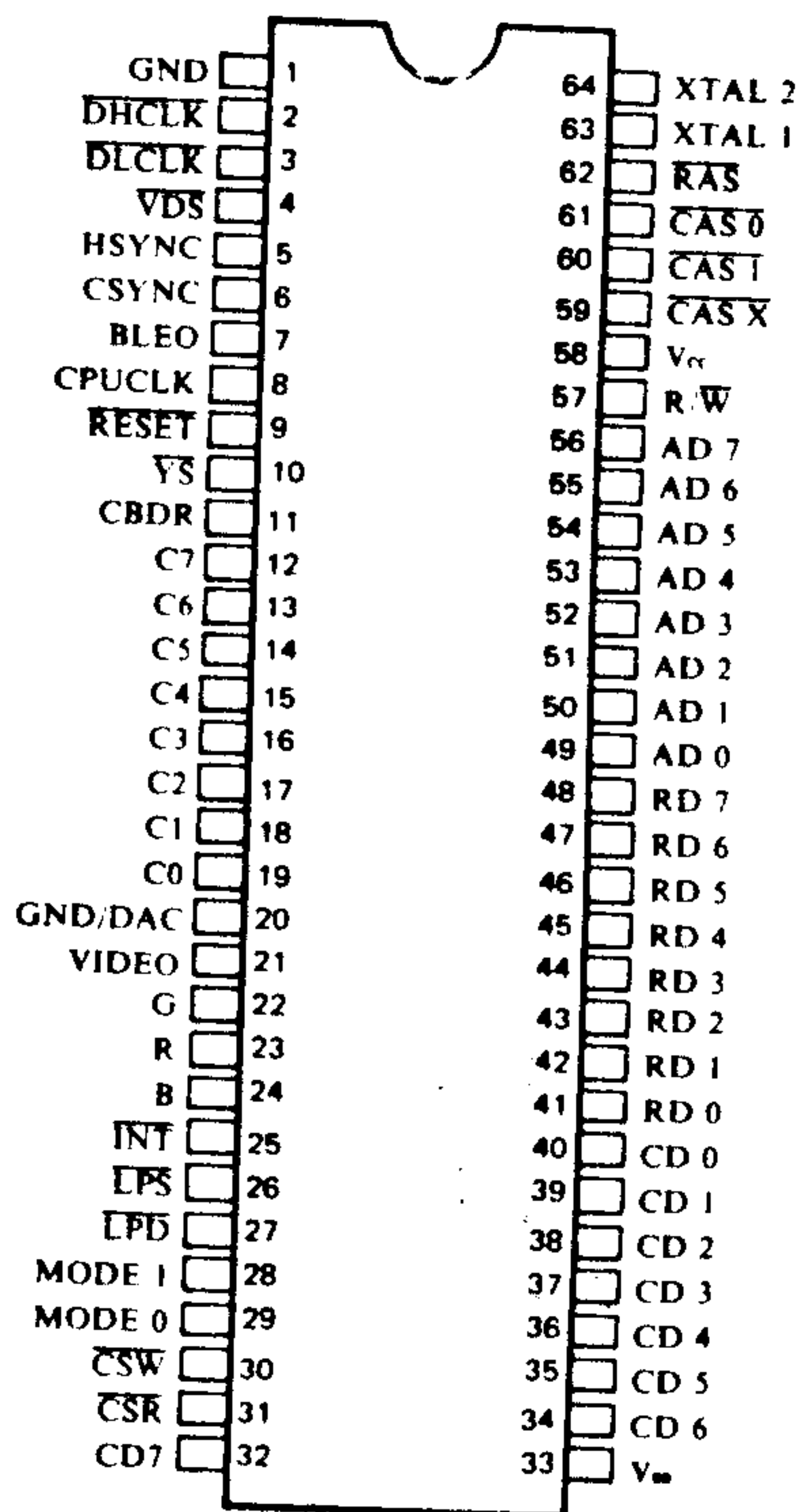


Fig. 1

mapped device. One may communicate with the 9938 by use of 8 data lines, 4 control lines, and an interrupt line. See the table below for a listing of the access "ports" and how they are used on the AVDP:

| Port | Function                      | Mode0 | Mode1 |
|------|-------------------------------|-------|-------|
| 0    | VRAM data access              | 0     | 0     |
| 1    | Read/Write to registers       | 1     | 0     |
| 2    | Color Palette register access | 0     | 1     |
| 3    | Register Indirect access      | 1     | 1     |

Don't bother looking in the Yamaha manual for explanations of the ports or how to set the Mode0/1 pins to access them. There are no references as how to access the ports! Ports 0 and 1 duplicate the same functions as on the 9918A; access to Ports 2 and 3 are through manipulating the Mode1 pin. And as with the 9918A, you communicate with the AVDP by sending and receiving data through a series of registers.

The interrupt pin generates a low signal at the end of each active display scan. This

is useful for mouse routines. A reset line clears the chip when the computer is reset. The timing crystal is rated at 21.47 Mhz, and the CPUCLK line produces a signal at 1/6 the crystal frequency. No GROMCLK signal is produced. See Fig. 2 for more interface details.

### OTHER AVDP INTERFACES

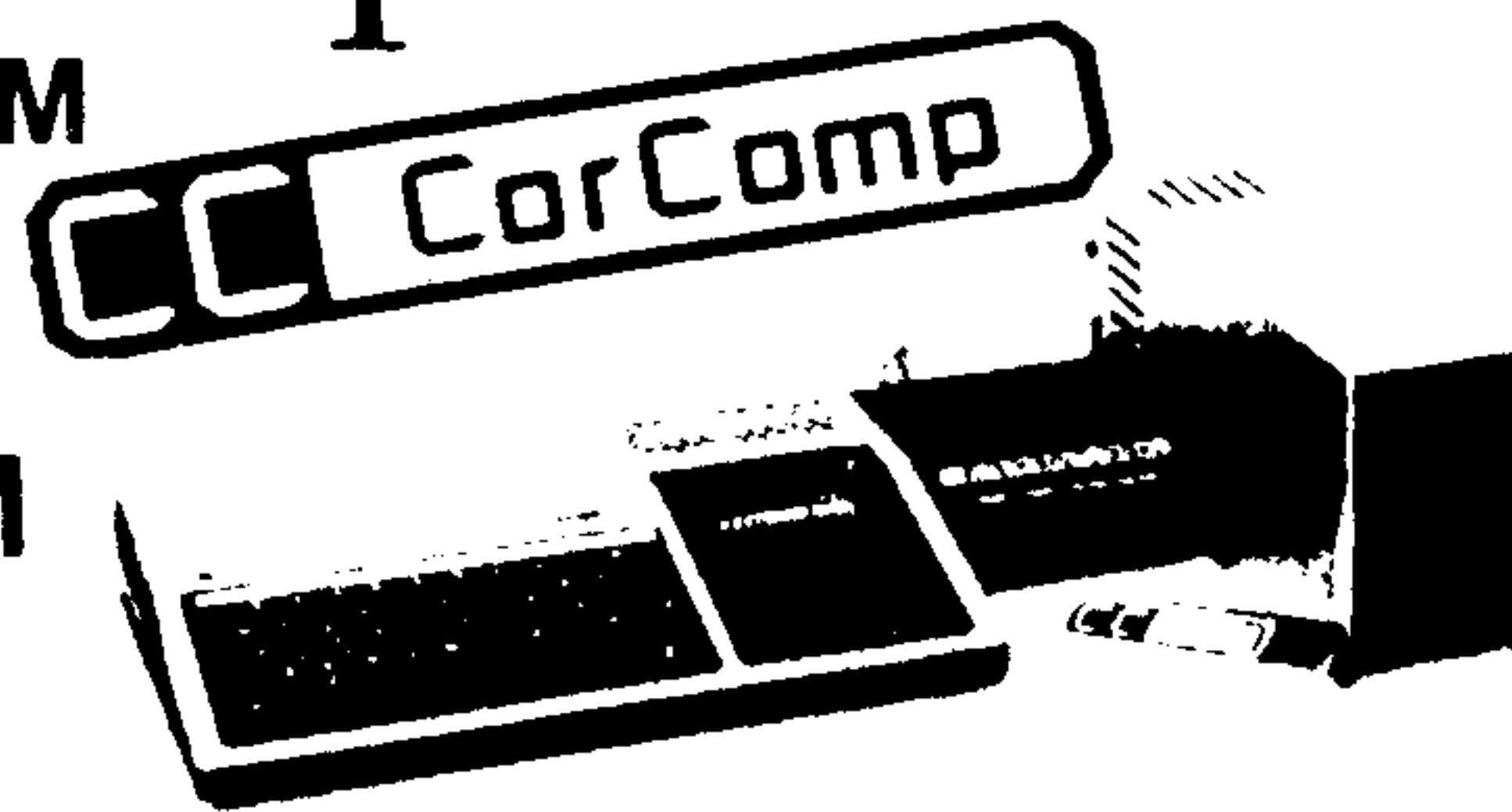
The 9938 interfaces to a variety of dynamic RAM, from 16K x 1 to 64K x 4. The maximum memory with the minimum number of chips is achieved with 4464 type 64K x 4 DRAM. A full 128K bytes of video memory is accomplished with just 4 chips; you get 192K bytes with 6 chips. Refer to the 9918A article for details on how dynamic RAM is accessed. The 9938 can access 128K of video memory plus an extra 64K "expansion" RAM. This expansion RAM is a nice place to stick extra screen information or data without interfering with the regular video memory section. High speed memory data move commands (covered later) can transfer information

(See Page 28)



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## VIDEO CHIPS

(Continued from Page 26)

from one 64K block to another very rapidly.

The 9938 can directly access either a light pen or a two-button quad mouse (see Fig. 3). With a light pen, the AVDP rapidly scans the screen by activating each pixel one at a time. When the light pen detects the flash, the 9938 stores the screen position in the appropriate registers. The light pen can also have a user-activated switch to activate the read. This is useful for simple screen data input or "paint" routines.

The mouse interface is for a quadrature-type mouse such as a Microsoft or Logitech bus mouse with the signal lines XA, XB, YA, and YB. These signals produce two square wave signals, 90 degrees out of phase, for both the X (left/right) and Y (up/down) directions. These signals are produced only when the mouse is moved and the chip counts the pulses produced during a given interval; the distance the mouse has moved is directly proportional to the counts accumulated. The difference in the phase (-90 or +90 degrees) between the "A" and "B" signals for a given direction tells the chip whether the mouse was moved up or down, left or right. The 9938 interprets all of this automatically and stores the mouse movement information in two's complement form in the mouse registers. By reading these registers after each screen interrupt, you can track the mouse's movement across the screen. Input from the 2 mouse buttons drive the same two lines as the light pen.

The R(ed), G(reen), and B(lue) signals, along with the CSYNC (composite horizontal and vertical synchronization) signal drive an analog RGB monitor. The VIDEO signal outputs to a composite monitor; this can also be translated by the TI modulator to drive a TV set. Needless to say, the advanced display modes such as 80 columns and 512 x 212 pixels can be read only on the RGB type monitors. There are about half a dozen other miscellaneous signals (VDS, YS, etc.) that are used for digitizing and external signal interfacing. These signals are not covered very well by the Yamaha manual, and are not discussed further in this article.

**AVDP REGISTERS**

Wow! Does this chip have the registers: 24 Control registers, 15 Command registers, 16 color palette registers and 10

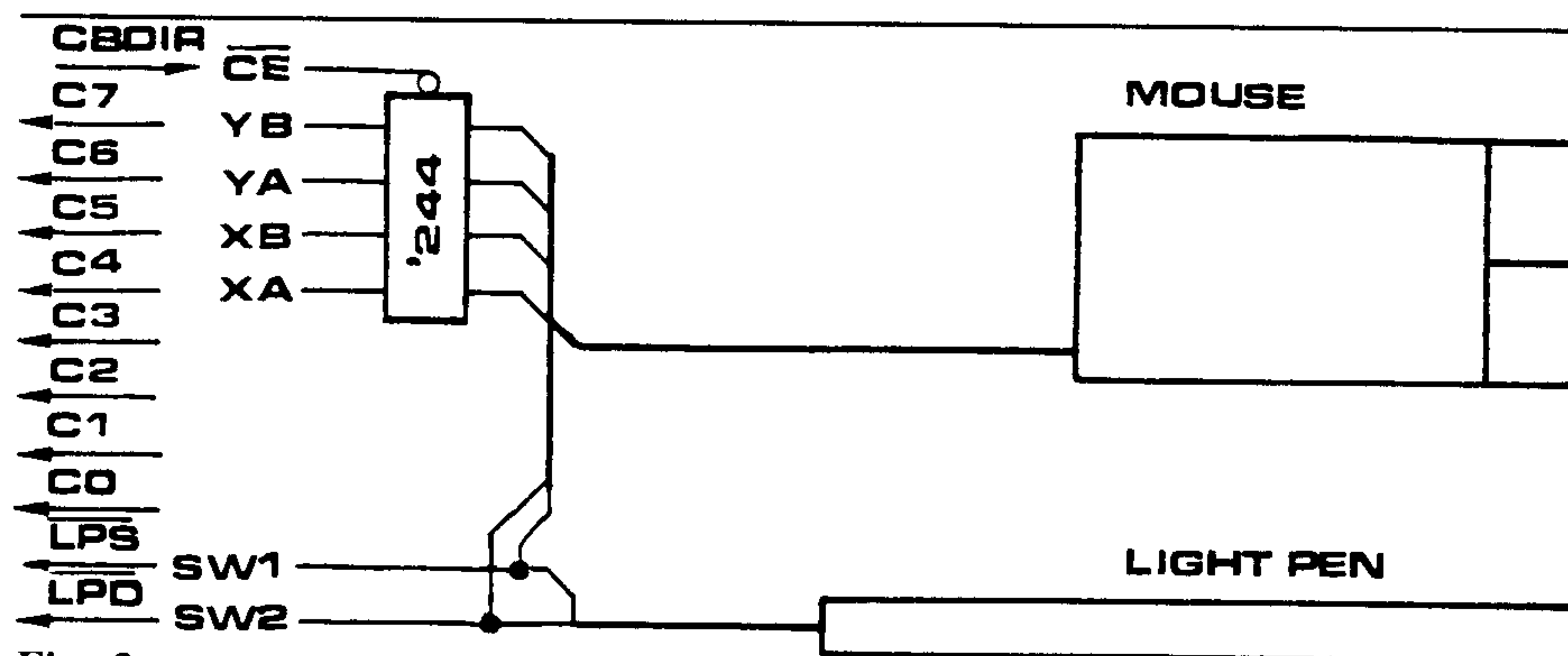


Fig. 3

Status registers. Each of the original 9918A command and status registers are duplicated by the 9938 to maintain compatibility. But look at all those extra registers! That should give you an inkling of how powerful and flexible this chip can be. Below is a simplified listing of what the registers' functions are. It would take a couple of full issues of MICROpendium to explain each register in detail. The Yamaha manual does a reasonable job in explaining how the registers are accessed and used.

**Register Function(s)****A. CONTROL****"Mode"**

- 0 alters display mode and interrupts
- 1 sprite information, display mode
- 8 color bus, mouse, light pen information, VRAM type
- 9 select total horz. pixel #, simultaneous mode

**"Table Base Address"**

- 2 pattern name table
- 3 color table (low)
- 10 color table (high)
- 4 pattern generator table
- 5 sprite attribute table (low)
- 11 sprite attribute table (high)
- 6 sprite pattern generator table

**"Color"**

- 7 TEXT 1 + 2 foreground/background
- 12 TEXT 2 foreground/background for blinking
- 13 blinking period
- 20 color burst Reg. 1
- 21 color burst Reg. 2
- 22 color burst Reg. 3 set upon initialization

**"Display"**

- 18 display adjust
- 23 display offset
- 19 interrupt line

**"Access"**

- 14 VRAM access base address
- 15 status register pointer
- 16 color palette pointer
- 17 control register pointer

**B. COMMAND**

- 32 Source X low
- 33 X high

**Register Function(s)**

- 34 Y low
- 35 Y high
- 36 Destination X low
- 37 X high
- 38 Y low
- 39 Y high
- 40 Pixel # X low
- 41 X high
- 42 Y low
- 43 Y high
- 44 color register
- 45 argument register
- 46 command register

**C. STATUS**

- 0 vert. scan int., 5th sprite, collision
- 1 light pen/mouse Switch 1+2, horz. scan int.
- 2 transfer ready, V/H scan, boundry color display field
- 3 column reg. low
- 4 column reg. high
- 5 row reg. low
- 6 row reg. high
- 7 color register
- 8 border X reg. low
- 9 border X reg. high

**D. COLOR PALETTE**

- 0-F establish 16 out of 512 colors to be displayed in various display modes

Once again, refer to the Yamaha manual for details on the individual registers and how they are accessed.

**VIDEO DISPLAY MODES**

The 9938 and 9918A have the following display modes in common: Graphics I, Graphics II, Multicolor, and Text (I). The AVDP goes beyond the 9918A with these new display modes:

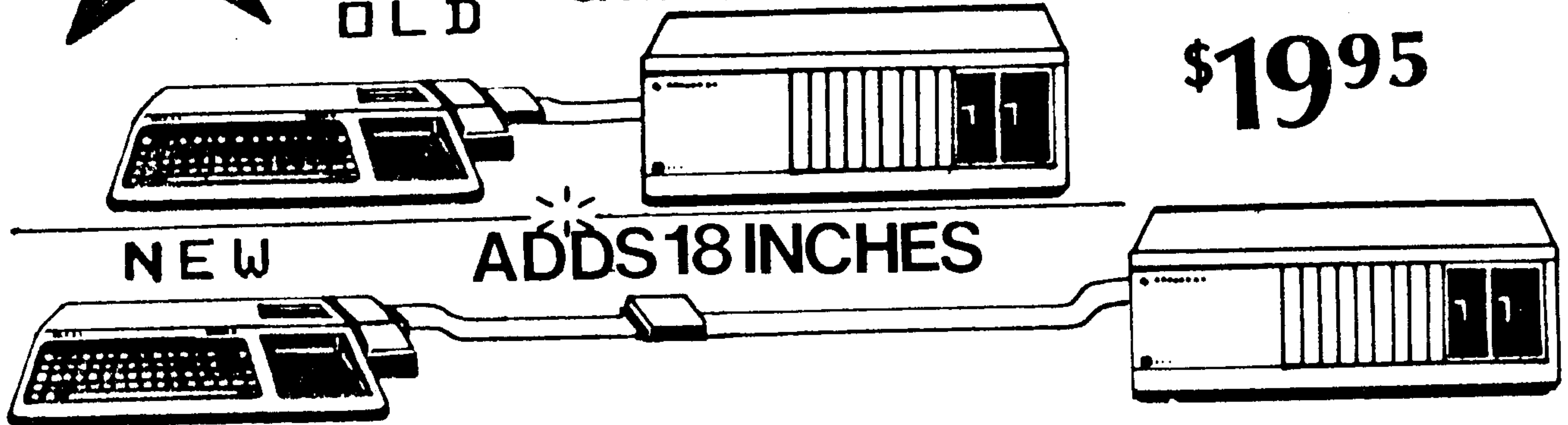
| Mode       | Features   |
|------------|--|
| TEXT 2     | -80 columns by 24 or 26½ lines<br>-4 of 512 colors, and blinking attribute<br>-blinking interval user programmable |
| GRAPHICS 3 | -same as GRAPHICS II except that 8 sprites are allowed per line (vs. 5 for Graphics II)                            |
| GRAPHICS 4 | -bit map mode, 256 x 212 or 192 pixels   |

(See Page 30)



# NEW P-BOX EXTENSION

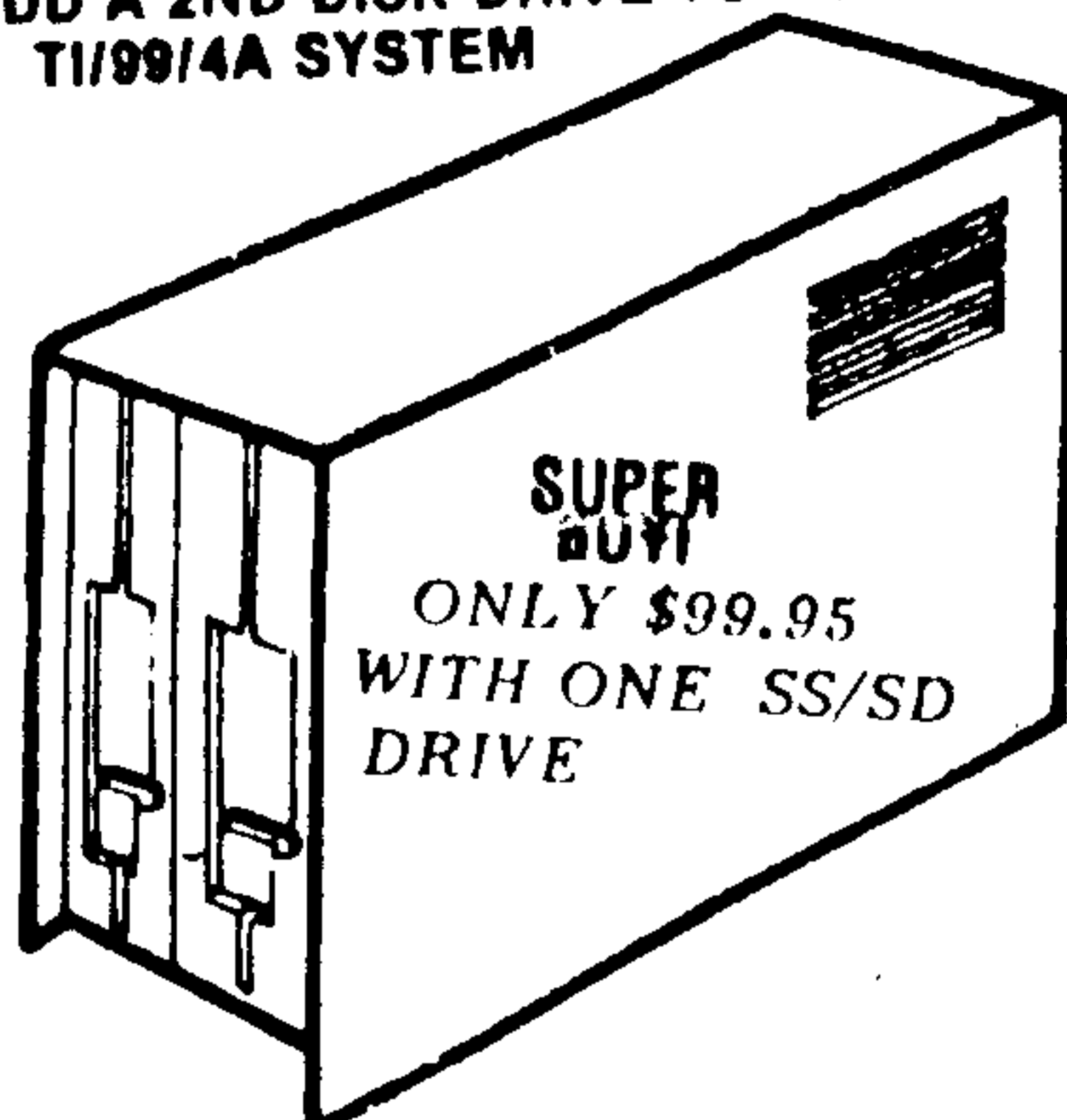
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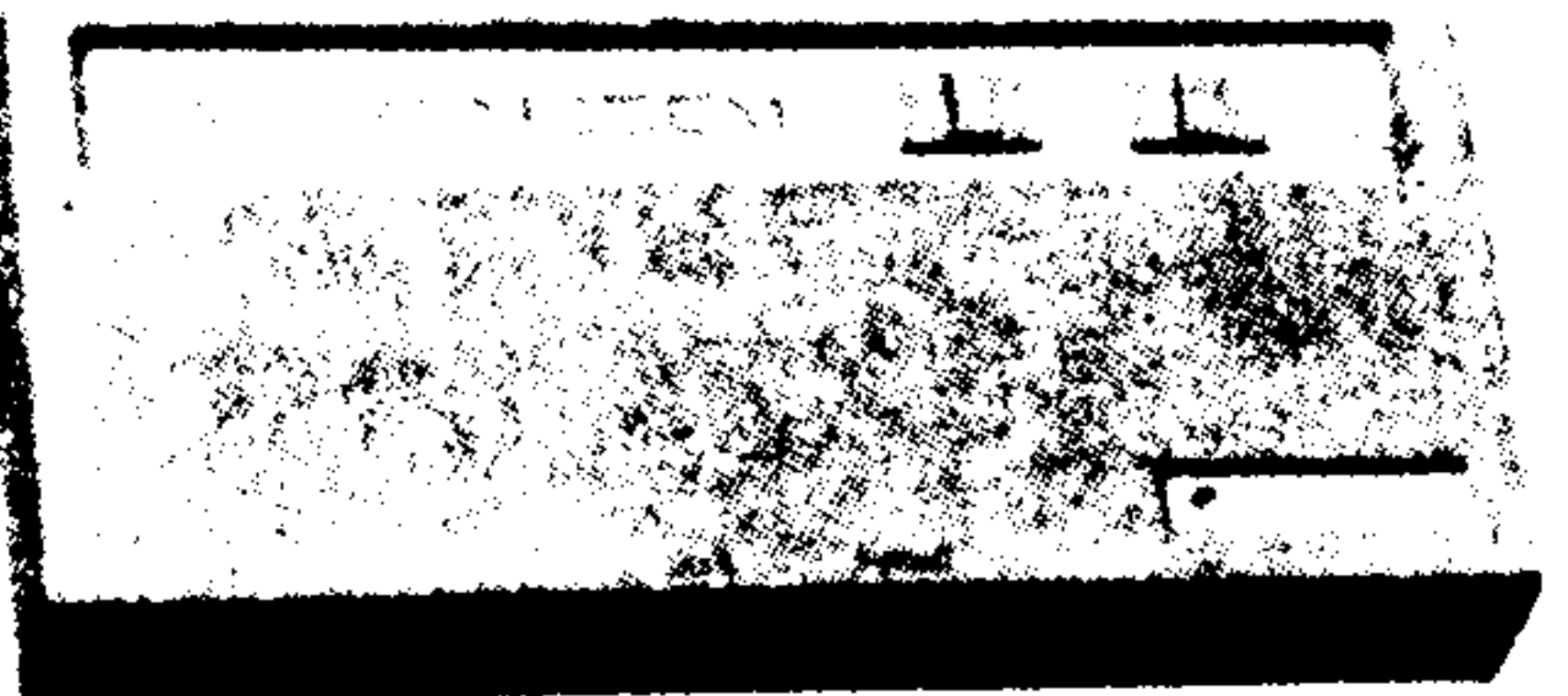
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## VIDEO CHIPS

(Continued from Page 28)

| Mode       | Features  |
|------------|---|
| GRAPHICS 5 | -16 of 512 colors per screen<br>-8 sprites per line<br>-bit map mode, 512 x 212 or 192 pixels                         |
| GRAPHICS 6 | -4 of 512 colors per screen<br>-8 sprites per line<br>-same as 5, but with 16 of 512 colors per screen                |
| GRAPHICS 7 | -bit mapped mode, 256 x 212 or 192 pixels<br>-256 colors per screen out of 256 colors possible<br>-8 sprites per line |

Obviously, TEXT II and GRAPHICS 6 and 7 are the advanced display modes available only with an appropriate RGB monitor *and* a generous amount of VRAM (64-128K). GRAPHICS 6 and 7 come close to IBM's new VGA display modes. Most composite monitors are not adequate to display these modes clearly; combination composite/RGB monitors capable of displaying about 600 x 200 pixels can be purchased at a discount price below \$300. (I predict that once you use a RGB monitor, you'll never want to see a composite monitor or TV set again.)

One more item: the 9938 can display in

either an interlaced or non-interlaced mode. The non-interlace mode is preferred, particularly if you use the graphics extensively. An interlaced monitor will trace the odd-numbered rows, then the even-numbered rows of a screen, unlike the non-interlaced design which will display all rows in order. The interlaced monitor must have "long persistence" display to keep the display from looking "jumpy." Unfortunately, long persistence displays have a tendency to smear fast moving displays, such as sprites.

## HARDWARE COMMANDS

To increase the speed of some commonly used functions, the designers of the 9938 added several commands that are executed by the AVDP without intervention from the main processor (CPU). Commands are executed by writing data to Reg. #46. All parameters used by the commands are first set in Reg. #32-45. When the command is completed, the execute bit is reset to 0. If you want to stop a command, you can execute a 'STOP'. These commands are used only in the bit map modes, 4-7. All pixels are accessed in X-Y coordinates, which greatly eases the burden on the

programmer.

The commands and their functions are listed below:

| Command | Function  |
|---------|---|
| HMMC    | high speed move of data from the CPU to VRAM            |
| YMMM    | high speed move of data from VRAM to VRAM, Y dir. only  |
| HMMM    | high speed move of data from VRAM to VRAM, X+Y dir.     |
| HMMV    | high speed move of data from VDP to VRAM; 'paints' area |
| LMMC    | logical move of data from CPU to VRAM                   |
| LMCM    | logical move of data from VRAM to CPU                   |
| LMMM    | logical move of data from VRAM to VRAM                  |
| LMMV    | logical move of data from VDP to VRAM                   |

"Logical moves" means that functions such as AND, OR, NOT, etc. are done between the source and destination pixels.

|       |   |
|-------|---|
| LINE  | draws a straight line in VRAM                               |
| SRCH  | searches for border color left or right of a given position |
| PSET  | draws a dot in VRAM; does logical operations                |
| POINT | reads a pixel at x,y; returns color of pixel                |
| STOP  | stops execution of above commands                           |

(See Page 31)

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By Cynthia Becker

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## VIDEO CHIPS

(Continued from Page 30)

## REAL WORLD APPLICATIONS

The MSX-2 computer standard may or may not be flourishing in Japan or elsewhere, but you'd be hard-pressed to find a MSX computer here. Fortunately for us, there are three separate products that use the 9938 in the TI environment: Mechatronics and DIJIT Systems' 80-column cards, and the Myarc 9640. I do not claim to be an expert on any of these products; most of the following commentary is second-hand, except for the DIJIT AVPC card.

The Mechatronics card, apparently, was meant to sit beside the console, not in the PE Box. Since the 9918A is removable, the designers ran a ribbon cable and plug to the 9918A socket to intercept various signals. The card was accessed as a file, i.e. through Open, Print, Input and Close commands in BASIC, which limited its capability for compatibility greatly. Exact capabilities of this device, and current availability are unknown. Perhaps a reader can update us on the status of this product.

The Myarc Geneve 9640 computer uses the V9938 with 128K of video RAM in the form of four 64K x 4 DRAM. There are apparently no provisions for use of the extra 64K expansion RAM. Options such as

digitization, external synchronization, etc. do not appear to be feasible with the current model because the full color bus is not brought out. The 9938 is probably memory mapped into the same locations as the 9918A on the 99/4A for software compatibility.

Last, but not least, the 9640 uses a 3 button mouse. Wait a minute — doesn't the 9938 have inputs only for *two* buttons? It indeed does, but the third Myarc mouse button drives an interrupt line to the 9995, which uses a separate software scheme to track its status.

The DIJIT Systems' AVPC card is probably the closest anyone will come to exploiting all the features available from the Yamaha V9938. In addition to the previous products capabilities, this PE Box card has 192K of VRAM and can support digitizing and external video overlay with the help of another device currently being developed. The AVPC is claimed to be 99 percent compatible with existing /4A software (in 32- or 40-column mode, of course). Modifications have been done to several programs already to expand displays to 80 columns.

To install the card, a minor modification needs to be done to the /4A motherboard — one pin on the 9918A is bent, and a

trace on the PC board is cut to allow the video address signals to go to the PE box.

Two minor operating problems have surfaced with the AVPC. It seems that the RS232 cards have a bug in their DSR ROMs that could cause them to lock up under certain circumstances. DIJIT has a replacement EPROM that corrects this error. And the Horizon RAMdisk has operating problems, too. DIJIT notes that this is due to some software oversights in the Horizon card, not the AVPC. The former problem is due to the fact that the TI PE box has only one interrupt line. -INTA. The PE box has the capability to allow two levels of interrupts, via the

(See Page 32)

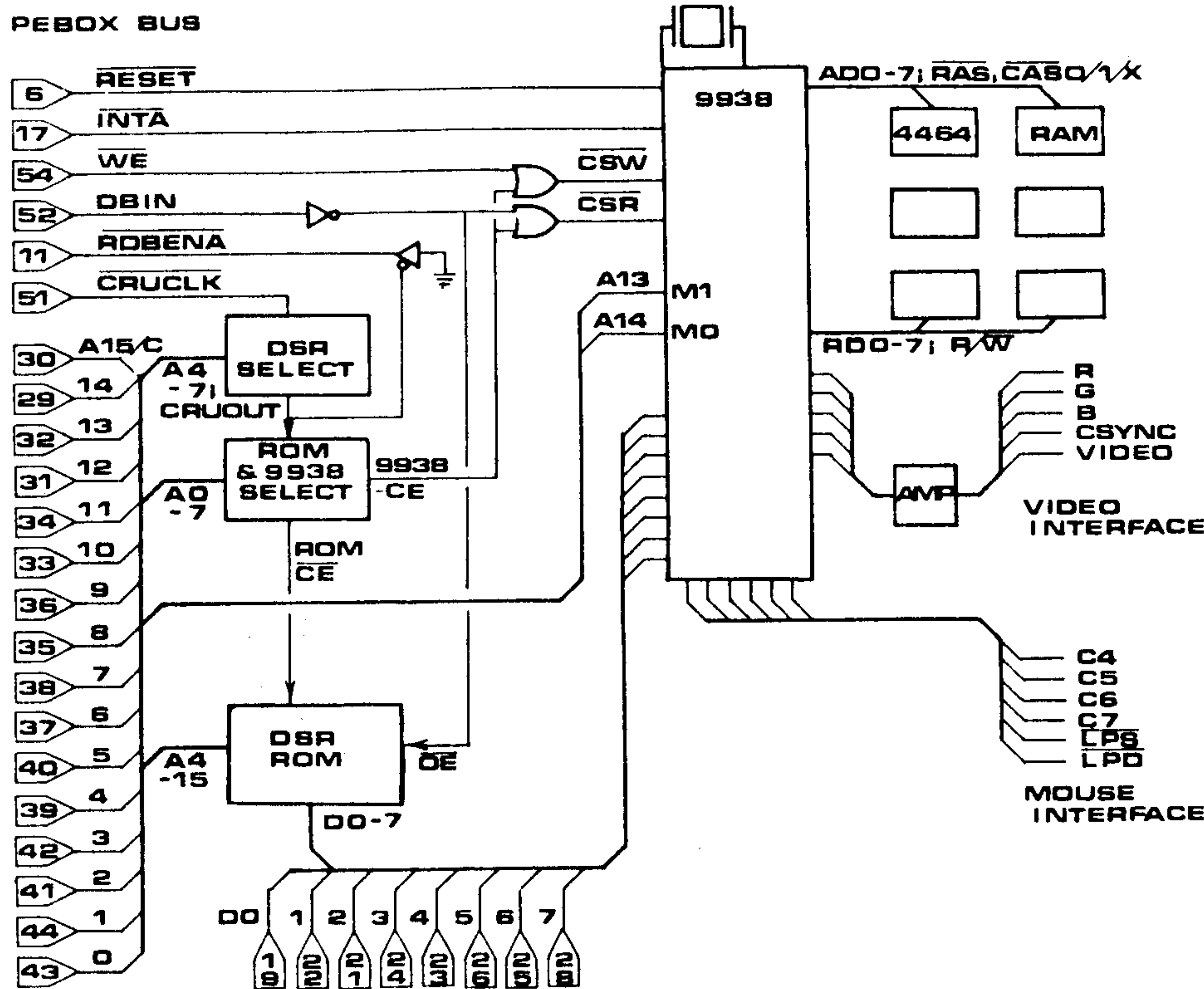


Fig. 4

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## VIDEO CHIPS

(Continued from Page 32)

signals interrupt sense enable A and B, but the /4A does not take advantage of this feature.

DIJIT Systems also has a programmer's package coming out this year for the card. They also maintain information on a local bulletin board system (619-278-8155), such as how to make custom cables for various mice for use with their card.

### A SIMPLE V9938 DESIGN

Well, now you've read about all the wonderful things the V9938 can do, and you're ready to send \$35 or so to Yamaha for a chip and data manual so you can wire up your own video card.

If you just want video and the mouse/light pen interface, then it really would not be that hard to do (see Fig. 4). As long as you were willing to accept the 9938 as a peripheral device in a Device Service Routine (DSR) location, then the design is a "simple" one. Either a LS138, LS154 or custom PAL device could be used to interpret the DSR, ROM, and 9938 select functions from the appropriate signals. An 8K DSR ROM would hold the software needed for the interface, and six TMS4464 DRAMs provide 192K of video

RAM. The video signals would need amplification to properly drive the monitor, and the mouse interface is shown in Fig. 3.

From a software point of view, the easiest way to access the 9938 is via file commands, like the Mechatronics card. A slicker way would be to define BASIC CALL commands just for the card; the /4A operating system can access the DSR ROM to implement the new "CALL DISPLAY80" commands. One drawback to this scheme is that Extended BASIC **does not** search the DSR ROMs for new CALL commands while in a program that is running. The best all around solution, in my opinion, is use of a GRAM KRACKER or GRAMULATOR device to modify the TI operating system to recognize the card.

### CONCLUSIONS

The Yamaha V9938 is a powerful, upwardly compatible successor to the 9918A that has found its way into several PE boxes around the country. If you are interested in exercising your 9938 to its fullest potential, or are interested in developing your own design, I encourage you to contact Yamaha International for a copy

of the data manual, and current pricing of single quantity V9938 chips. Be sure you have a 9918A or 9118 data manual from TI handy also to fill in the gaps. A simpler solution would be to purchase one of the fine products that utilizes the V9938, and have the software in place to make it run. If you have questions or comments concerning this article, forward them to MICROpendium, or directly to the author (Tony Lewis, 409 Drolmond, Raleigh, NC 27615), or on CompuServe CIS 73357,1730.

### References

*TMS 9918A/28A/29A Video Display Processors Data Manual*

*V9938 MSX-Video Technical Data Book*  
*TI-99/4A Console and Peripheral Expansion System Technical Data*

Readers who are interested in purchasing a V9938 or data manual, may write Yamaha for current pricing and availability: Yamaha Systems Technology, 6600 Orangethorpe Ave., Buena Park, CA 90620; Attn: Mr. Bob Star.

Note: if you have technical questions concerning the V9938, it is recommended that you write Yamaha at the above address.

# Tips for new hard disk users

Here are a few reminders and suggestions for readers who have or are considering the new Myarc Hard & Floppy Disk Controller card.

1. Make sure the DIP switches are set for CRU > 1100 when running as a floppy and hard controller and CRU > 1000 when running as a hard disk controller only. (You have to remove the clamshell cover to do this.)

2. If the card seems to perform erratically, try plugging it into a different slot on the PEB.

3. Check to make sure you've got a version H7 EPROM. The EPROM should be labeled and you can also check it by entering a "V" at the main MDM5 menu screen. If the EPROM is a lower number, such as H3, contact Myarc about obtaining a replacement.

4. Make sure you have an adequate power supply. The PEB power supply won't handle a hard drive reliably.

5. It's recommended that you have the hard drive and PEB connected to a power-strip so that everything can be turned on simultaneously.

6. If you are using the hard drive with a Geneve and can't get it to boot the SYSTEM/SYS file from the hard drive (assuming the SYSTEM/SYS file is in the root directory and LOAD/SYS is in the subdirectory WDS1.DSK1; or you get an error message to the effect that the system can't find the HFDC, verify that the CRU base is set for > 1000 on the DIP. If it is set for anything else,

the system may not find it. Although the DIP allows you to set a variety of CRU locations for the HFDC, some of them will be used by other cards in the PEB and others simply won't work with the HFDC. (This holds true only until the HFDC is able to support floppy drives on the Geneve. Then you would set the DIP to CRU > 1100 in all cases.)

7. Read the manual thoroughly and experiment. Try out different formatting defaults.

8. When installing your hard drive, make sure that it is right-side up. Many hard disk manuals assume that the hard disk will be installed in a PC and don't bother to explain what right-side up is. If you have a question about it, contact the vendor or the manufacturer to make sure. On a Seagate drive, the drive activity light should be in the lower left hand corner.

9. Double-check all cable connections between the PEB and the hard and floppy drives. The connectors on the HFDC are marked so that you can match the No. 2 slot of the connector with the No. 2 pin of the HFDC. The colored edge of the ribbon connectors is a visual cue.

10. When inserting or removing the HFDC from the PEB, make sure that the power has been off for several minutes. Then, make sure it goes in or comes out straight. Do it with two hands. There is a possibility of shorting it out if it is pulled out haphazardly and

(See Page 33)



## HARD DISK TIPS—

(Continued from Page 32)

the protruding end rubs against the metal guides in the back of the PEB.

11. If you can't get some programs to load properly from a hard disk, re-read the manual on subdirectory organization. Make sure that programs that require a volume name — such as Multiplan TAMP — are kept in directories with the following example pathname: WDS1.DSK.VOLUMENAME.PROGRAMNAME.

12. With the 99/4A, make sure that your last floppy drive has a terminating resistor pack. I tried out a system that had two floppies

connected to a CorComp disk controller, the last drive of which did not have a terminating pack. While it ran just fine with the CorComp controller, when I replaced it with the HFDC I couldn't access the floppies.

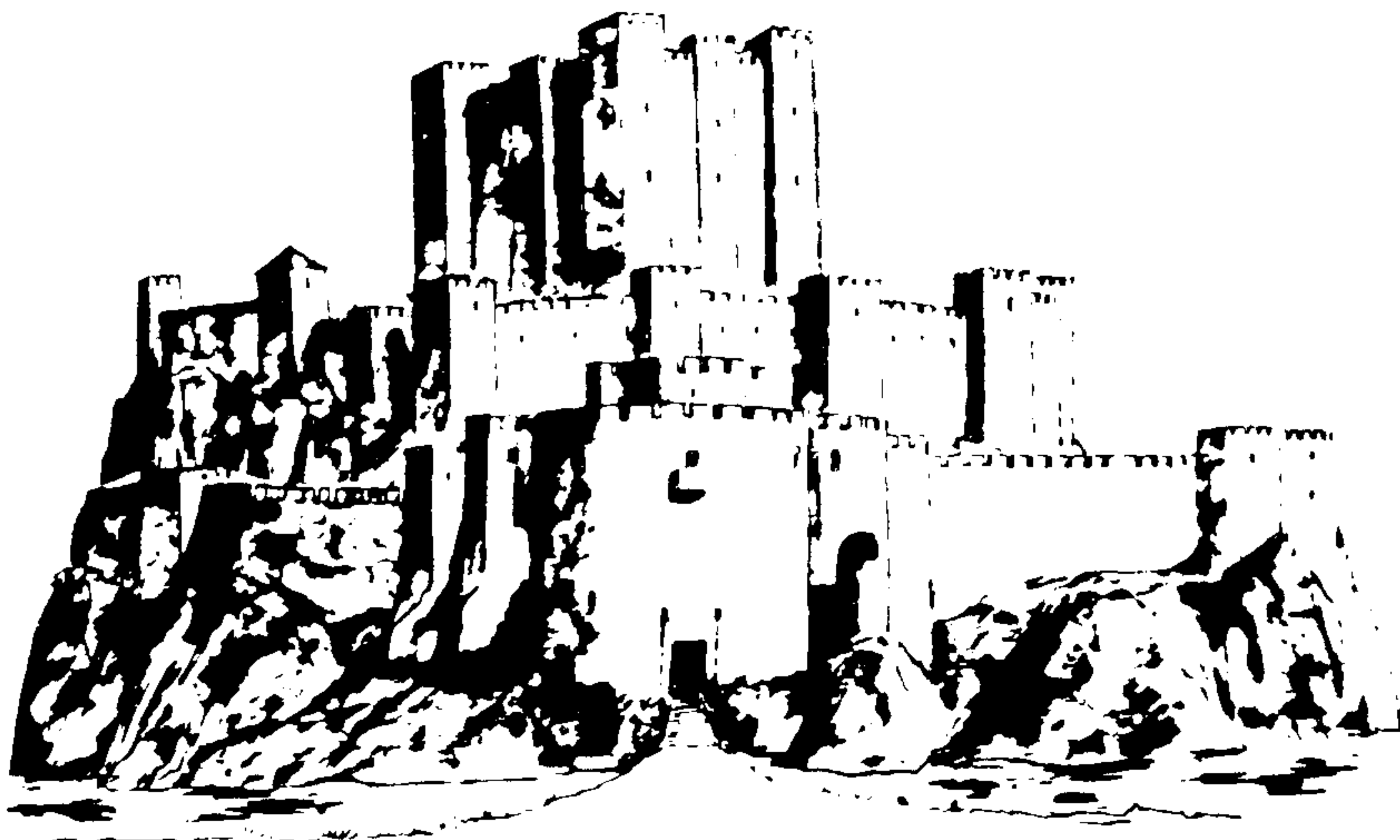
13. When booting a Geneve from the hard drive, if you use an AUTOEXEC file, the file must be located on DSK1. The HFDC apparently looks for physical DSK1 for the AUTOEXEC file. The final version of MDOS should correct this.

14. MDOS in its current version does not fully support hard disk operations. If you use the proper command structure and

find that the hard disk doesn't respond, then that command probably isn't functional. Don't waste a lot of time trying to do things from MDOS that it can't do. When version 1.1xH comes out, everything should work as described in the manual.

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## Geneve

# MDOS 1.10 to use extensions

By MIKE DODD

Many users have asked about the next version of MDOS; what the changes will be, when it will be officially released, etc. No one knows when it will be released. When it is, the version number will be V1.10.

One major change in it will be the ability to carry over the internal RAMdisk between MDOS and GPL. You can set up a RAMdisk in MDOS, load it with files (you can use a batch file to do this), enter GPL, work with the files, go back to MDOS, and the files will still be there. The present version of MY-Word (V1.1) and MDM3 (V2.1) are incompatible with the new version of GPL. MY-Word has been upgraded to fix this (V1.2). Spokesman Jack Riley said that Myarc has not yet modified MDM3 to run with MDOS V1.10 but that the company will do the modification at some future date, and will ship it with MDOS.

Another change is that the DIR function

will now display the time and date stamp if used in 80-column mode (MODE 80). In 40-column mode, the display format is much the same as before.

Paul Charlton has also added a feature that will allow specifying a file type from MDOS with the use of extensions. The back quote is used to mark the extension, then you can use D, V, F, I, P and a number to specify the file type. For example: typing COPY \*'DF128 B: would copy all DIS/FIX 128 files from the current drive to the B: drive. Using DEL \*'I would delete all INTERNAL files from the current drive. ATTRIB +P \*'P would protect all program image files. You can also use the method to create files with the COPY CON command: typing COPY CON C:TEST'DF54 would allow you to type into a DIS/FIX 54 file named TEST on the C: drive.

MYARC has released an interim version of MDOS (V1.06) and GPL that was released with the HFDC. V1.06 contains

some of the changes that will be in V1.10 (in particular, the carry-over from MDOS to GPL of the internal RAMdisk), but not all. When V1.10 is complete, it will be mailed to all registered Geneve owners.

### CHANGING COLORS

The following program is relatively simple, but serves a useful function. The program allows a user to easily change the screen colors in MDOS. This is especially useful for readers with monochrome monitors who wish to use the 80-column mode. After creating the file, you can access it by typing SCREEN fg bg (assuming SCREEN is the filename). *The mnemonic fg* is the foreground color (1-16), and *bg* is the background color. Typing SCREEN 16 1 would set the screen colors to white on black. You could access the program from within your AUTOEXEC file, so as to have your choice of colors automatically come up upon booting the machine.

(See Page 35)

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## GENEVE—

(Continued from Page 34)

To enter the program, use MY-Word's Program Edit mode. Assemble with the CR options, and use Paul Charlton's linker program to create a program image file loadable from MDOS.

The program uses three subroutines:

- CMDSTR is Charlton's routine to fetch the command line.
- SHOTXT will display a text string on the monitor.
- GETNUM will convert an ASCII number (positive integers only) to a 16-bit binary number.

CMDSTR and SHOTXT have appeared in this column before (April 1988 issue). GETNUM assumes that the byte at CMDLIN is the length of the input remaining. The routine will parse until it reaches the end of the input line (as determined by the length byte at CMDLIN), a space, or a comma. Any other non-numeric character will cause the routine to jump to ERROR, which generates an error

message on the monitor.

**PROGRAM EXPLANATION**

Lines 0001-0012 are comments and the initial setup.

0013-0026 places a page of RAM in the >E000 page. This is necessary for the SHOTXT routine.

0027-0034 fetch the command line into CMDLIN.

0035-0048 parse the two input numbers. Since the input numbers are base 1 (1-16), and assembly uses base 0 (0-15), we must subtract one from both numbers. Following this, the foreground color and background color are placed together (four bits each, foreground color first) in the Least Significant Byte (LSBy) of R2.

0049-0056 write the colors to VDP Register 7 and return to MDOS. Notice that the interrupts are disabled before accessing VDP, and re-enabled afterwards. If MDOS were to process an interrupt between the two VDP write instructions, the VDP address might be destroyed, which

would cause unpredictable results. By temporarily disabling the interrupts, that problem can be avoided.

0057-0059 generate the error message (" \_\_Error \_\_") and return to MDOS.

0061-0079 is the GETNUM routine. R2 is used as the accumulator. Every time a new digit is fetched, it is converted to binary, the accumulator is multiplied by 10, and the new digit is added to the accumulator. The multiplication has the effect of shifting the number one place-digit to the left to make room for the new digit.

0081-0125 is Charlton's CMDSTR routine, which fetches the command line.

0127-0140 is the SHOTXT routine, which displays text on the monitor. This is done by moving each byte of text to the >E000 page, then calling the WriteTTY routine. The data must be moved to the >E000 page before calling WriteTTY.

0144-0164 contain miscellaneous data, bytes, text, and the CMDLIN buffer.

**CHANGE COLORS IN MDOS**

```

0001 * MDOS Screen Color Set
0002 * Copyright 1988 by Mike Dodd.
0003 * Written for MICROpendium magazine.
0004 *
0005 * format: SCREEN fground bground
0006 * fground = foreground color (1-16)
0007 * bground = background color (1-16)
0008
0009     DXOP SYS,0
0010
0011 * Start of program
0012     LWPI >F000           Load workspace pointers
0013 * Get a page of memory at >E000
0014     LI R0,1             Get page opcode
0015     MOV R0,R1           Get one page
0016     MOV R0,R2           Local page 1
0017     CLR R3              Slow RAM is fine
0018     SYS 2MEM           Memory management XOP
0019     MOV R0,R0           Error code
0020     JNE ERROR          If any error, go to error routine
0021     LI R0,3             Map page opcode
0022     LI R1,1             Local page 1
0023     LI R2,7             Execution page 7
0024     SYS 2MEM           Memory management XOP
0025     MOV R0,R0           Error code
0026     JNE ERROR          If any error, go to error routine
0027 * Get the command line
0028     LI R1,CMDLIN       Buffer
0029     MOVB 2H06,*R1+     Write maximum length
0030 *
0031 *
                                (Length = two digits, plus a space,
                                plus two more digits, plus a null

```

(See Page 36)

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## GENEVE—

(Continued from Page 35)

|             |   |                                    |                            |                            |                                      |
|-------------|---|------------------------------------|----------------------------|----------------------------|--------------------------------------|
| 0032 *      |   | terminator.)                       | 0098                       | MOVB 2(R2),R6              | count of chars to move               |
| 0033        | BL 2CMDSTR  | Get it                             | 0099                       | SRL R6,8                   |                                      |
| 0034        | JNE ERROR   | If any error, report it            | 0100                       | INCT R6                    |                                      |
| 0035        | BL 2GETNUM  | Get foreground color               | 0101 *                     |                            |                                      |
| 0036        | MOV R2,R7   | Save                               | 0102 NXTNOD MOV R2,R3      | cursor within node         |                                      |
| 0037        | JEQ ERROR   | If 0, then error                   | 0103                       | INCT R3                    |                                      |
| 0038        | CI R7,16  | Greater than 16?                   | 0104                       | MOV R2,R4                  |                                      |
| 0039        | JH ERROR  | Yes -- error                       | 0105                       | AI R4,8                    | pointer to end of node               |
| 0040        | DEC R7  | Minus one for assembly offset      | 0106 *                     |                            |                                      |
| 0041        | SLA R7,4  | Move to next nybble                | 0107 NODL1 MOVB *R3+,*R5+  |                            |                                      |
| 0042        | BL 2GETNUM  | Get background color               | 0108                       | DEC R6                     |                                      |
| 0043        | MOV R2,R2   | Is it equal to 0?                  | 0109                       | JEQ NODJ1                  |                                      |
| 0044        | JEQ ERROR   | Yes -- error                       | 0110                       | C R3,R4                    |                                      |
| 0045        | CI R2,16  | Greater than 16?                   | 0111                       | JL NODL1                   |                                      |
| 0046        | JH ERROR  | Yes -- error                       | 0112                       | MOV *R2,R2                 | this link never zero if valid string |
| 0047        | DEC R2  | Minus one for assembly offset      | 0113                       | JMP NXTNOD                 |                                      |
| 0048        | A R7,R2   | Put foreground color in register   | 0114 *                     |                            |                                      |
| 0049        | AI R2,>8700   | VDP write-to-R7                    | 0115 NODJ1 CLR R0          |                            |                                      |
| 0050        | LIMI 0  | Turn interrupts off                | 0116                       | JMP NODRET                 |                                      |
| 0051        | SWPB R2   |                                    | 0117 *                     |                            |                                      |
| 0052        | MOVB R2,2VDP1   | VDP port 1 (address port)          | 0118 NOWSTR CLR R0         |                            |                                      |
| 0053        | SWPB R2   |                                    | 0119                       | MOVB R0,2-1(R1)            |                                      |
| 0054        | MOVB R2,2VDP1   |                                    | 0120                       | MOVB R0,*R1                |                                      |
| 0055        | LIMI 2  | Turn interrupts back on            | 0121                       | JMP NODRET                 |                                      |
| 0056 DONE   | BLWP 2>0000   | Return to MDOS                     | 0122 *                     |                            |                                      |
| 0057 ERROR  | BL 2SHOTXT  | Display text                       | 0123 BADLEN SET0 R0        |                            |                                      |
| 0058        | DATA ERRTXT   | Error text                         | 0124 NODRET MOV R0,R0      |                            |                                      |
| 0059        | JMP DONE  | Return to MDOS                     | 0125                       | RT                         |                                      |
| 0060        |   |                                    | 0126                       |                            |                                      |
| 0061 GETNUM | CLR R2  | Start with 0                       | 0127 *                     | Display text on the screen |                                      |
| 0062 GN1    | MOVB 2CMDLIN,R0   | Get length                         | 0128 SHOTXT MOV *R11+,R0   | Get address of length byte |                                      |
| 0063        | JEQ GN2   | No more characters -- must be done | 0129                       | MOVB *R0+,R2               | Get length byte                      |
| 0064        | SB 2H01,2CMDLIN   | Minus one                          | 0130                       | JEQ SHORET                 | Null length - don't display anything |
| 0065        | MOVB *R1+,R0  | Get character                      | 0131                       | SRL R2,8                   | To LSBY                              |
| 0066        | CB R0,2SPACE  | Space?                             | 0132                       | MOV R2,R3                  | Save                                 |
| 0067        | JEQ GN2   | Yes -- must be done                | 0133                       | LI R1,TEXTBUF              | Text buffer                          |
| 0068        | CB R0,2COMMA  | Comma?                             | 0134 SHOTX1 MOVB *R0+,*R1+ | Move                       |                                      |
| 0069        | JEQ GN2   | Yes -- must be done                | 0135                       | DEC R3                     | Any more to move?                    |
| 0070 *      | Make sure it's really a number                          |                                    | 0136                       | JNE SHOTX1                 | Yes                                  |
| 0071        | SB 2H30,R0  | Minus ASCII offset                 | 0137                       | LI R1,TEXTBUF              | Text buffer                          |
| 0072        | CB R0,2H39  | '9'                                | 0138                       | LI R0,>27                  | WriteTTY opcode                      |
| 0073        | JH ERROR  | Not a number -- error              | 0139                       | SYS 2VID                   | Video XOP                            |
| 0074        | MPY 2D10,R2   | Multiply what we have by 10        | 0140                       | SHORET RT                  | Return                               |
| 0075        | MOV R3,R2   | Move result back to right place    | 0141                       |                            |                                      |
| 0076        | SRL R0,8  | To LSBY                            | 0142                       | *****                      |                                      |
| 0077        | A R0,R2   | Add to accumulator                 | 0143                       |                            |                                      |
| 0078        | JMP GN1   | Get another number                 | 0144                       | TEXTBUF EQU >E000          |                                      |
| 0079 GN2    | RT  | Return                             | 0145                       | VDP1 EQU >F10A             |                                      |
| 0080        |   |                                    | 0146                       |                            |                                      |
| 0081        | *****   |                                    | 0147                       | VID DATA 6                 | Video XOP number                     |
| 0082 *      |   |                                    | 0148                       | MEM DATA 7                 | Memory XOP number                    |
| 0083 *      | convert command args into string                        |                                    | 0149                       | D10 DATA 10                |                                      |
| 0084 *      | by J. Paul Charlton                                     |                                    | 0150                       |                            |                                      |
| 0085 *      |   |                                    | 0151                       | CLS BYTE >01,>1A           | Length of one, ^2 to clear screen    |
| 0086 *      | IN: R1 points to string buffer (byte after length byte) |                                    | 0152                       | ERRTXT BYTE 13             | Error message - length of 13         |
| 0087 *      | length byte must have max length of buffer              |                                    | 0153                       | TEXT '---Error---          | Actual text                          |
| 0088 *      |   |                                    | 0154                       | BYTE >0D,>0A               | CRLF                                 |
| 0089 *      | OUT: oK R0=0 equal flag SET                             |                                    | 0155                       | H01 BYTE >01               |                                      |
| 0090 *      | error R0=-1 equal flag RESET                            |                                    | 0156                       | H06 BYTE >06               |                                      |
| 0091 *      |   |                                    | 0157                       | SPACE BYTE ' '             |                                      |
| 0092        | CMDSTR MOV 2>0128,R2                                    | get pointer to command string      | 0158                       | COMMA BYTE ','             |                                      |
| 0093        | JEQ NOWSTR  | zero length string                 | 0159                       | H30 BYTE >30               |                                      |
| 0094        | CB 22(R2),2-1(R1)                                       | compare lengths of strings         | 0160                       | H39 BYTE >39               |                                      |
| 0095        | JHE BADLEN  | string too long for the buffer     | 0161                       |                            |                                      |
| 0096        | MOV R1,R5   | cursor to caller's string buffer   | 0162                       | CMDLIN BSS 7               | Buffer for command line              |
| 0097        | DEC R5  |                                    | 0163                       |                            |                                      |
|             |   |                                    | 0164                       | END                        |                                      |



## Myarc Q&A

# Geneve, HFDC questions addressed

This is the first of a continuing series of question and answer interviews about Myarc products. Jack Riley is the spokesman. Readers are welcome to submit questions in writing to MICROpendium. Some answers are condensed for space considerations.

### What are the most common problems reported by Geneve users?

Most of it, when it first started, was simply learning to use the system. And probably most of it still is a matter of the consumer base by and large not being accustomed to an operating system, since the 4A didn't have one. Like how to set up autoexec files. Probably we'll go through that again with the release of DOS in October.

We've had some problems from consumers with the clock in test mode, they couldn't access the floppy disk controller correctly. We've added code in DOS to eliminate that as far as we can. We cannot redesign the CPU that TI built in the 9900. We have to make due with what they did.

There have been no real problems on the hardware side since day one. On the software side, most of it has been a matter of how do you do things.

### What's the most common problem reported with the Hard and Floppy Disk Controller?

The most common problem is bad hard drives or marginal hard drives. Consumers making the mistake of buying a cheap drive, and that's not the place to do it. It's fine to buy a cheap floppy drive, but a hard drive is not only a drive, it is where all your data is. With a floppy, if a drive goes bad you can remove your floppy and replace the drive. You can't do that on a hard drive. So that's not the place to try to pinch pennies.

### Is there a substantial body of information in the MDOS and HFDC manuals that is no longer valid, given that they were written before the accompanying software was finished?

I would say not. The manuals as they were written didn't even talk about MY-Word. The major portion of the addenda had to do with MY-Word. Another major portion of the addenda had to do with saving cartridges. There's nothing in the

manual about how to save cartridges. So, we had to cover that.

The actual number of commands (in MDOS) that have been changed or modified were relatively small. I think it only takes up a page of the addenda, and there's only a couple of changes in Advanced BASIC. The manual, of course, was written on the DOS side, and Myarc Disk Operating System was written from a command level to emulate MS-DOS. To write the manual based on the better written MS-DOS manuals was fairly simple.

### What's been added to MDOS since the manual was written, besides the minor changes to the ATTRIB command?

Features we've added that were not intended to be included that we've given the community gratis, such as the autoexec redirect commands. The manual shows a lot of commands as being external. In fact, there's only one external command. That's the graphics command.

The other differences I can think of, the manual talks about shifting your screen left or right to get it centered. Well, there's no reason to do that since it's handled automatically in the 9938 chip. So that command is no longer valid. Another change was that TI mode was not a separate piece of software, ie. GPL. As the manual described it, it was much more flexible making it a separate program unto itself. And, therefore, setting speed, etc. is done in GPL instead of from DOS. There's no reason to have that in DOS anymore.

### Messages on several bulletin boards suggest that Myarc is going to send out two EPROMs with each HFDC. Is this true?

That was an earlier approach, to send two EPROMs: one slow, one fast. But we decided to solve it from a software standpoint. So version 1.24 or higher of MDM5 allows the consumer to set the head step speed to suit his hard drive, as opposed to earlier versions which did not. It was all done in the EPROM itself. The speed is set from 0 through 7, the lower the number the faster. For example, a 28 millisecond average access drive will use an interlace of 2 and a head step of 0.

### What if someone used a faster in-

terlace or head step speed than a particular hard drive was meant to handle. What would happen?

The format speed would slow down drastically, because it could not get to the track, settle in place and read it correctly. Or you'll get lots of errors. For instance, with the V1.25 of MDM5, to format a 28 ms drive takes 5 minutes 45 seconds on average, as opposed to about 30 minutes for V1.23. So, if it takes, say, 20 minutes to format using the newer version of MDM5, you know you've got the wrong settings. But it's not going to hurt anything.

### How many kilobytes of RAM are reserved for the print spooler in MDOS when operating in TI mode.?

It's always a 16K spooler. It's a default. Of course, you can partition more than that if you want to.

### Where does the 640K RAM of the Geneve go to?

512K of it is program RAM. 128K is video. Then you've got 32K that's static RAM that's never been counted.

### How much does SYSTEM/SYS take up when it's loaded?

I'm not sure, I think it's 208K. (The 208K comes from the 512K of available program RAM—Ed.) To run your program, both GPL and DOS utilize the 32K which no one's ever counted, which is upgradable to 64K. In GPL mode, in  
(See Page 38)

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## MYARC Q&A—

(Continued from Page 13)

Editor/Assembler, for example, the user's got exactly the same amount of program RAM as he's got in the /4A.

This does not include MY-Word, (80-column) Multiplan and MDM3 V2.11 which use "pages" of memory. We are reworking DOS and GPL that will be more memory-efficient and will work essentially this way: while you're in DOS mode, even though you used a TI MODE in your autoexec, the pages of memory that GPL will claim and use for extended memory are yet unnamed. It doesn't claim those until you actually load GPL, at which point the memory required is claimed. Those page numbers, as it were, are passed on to GPL, and GPL then has them available for extended memory programs. So, if you then were to load MDM3, it would look at that memory location and say 'these are the pages available to me' and use those. The net result is that when you're in DOS you have more memory available. It requires rewriting at least the memory management portion of MY-Word, Multiplan and GPL. So, when we send out software in October, we'll be sending new versions of those also. It also means that those new versions of DOS and GPL won't be compatible with earlier versions.

**The Myarc expansion memory card increases the amount of program RAM for the Geneve, right?**

Yes. You could partition it as a RAM-disk if you wanted to.

**But it would be available through MDOS and not through GPL?**

GPL is the name we chose to mean "TI mode." When you go into it you're emulating as closely as is technically possible a /4A. Therefore, programs like Editor/Assembler have only available to it the same amount of memory that they had on a /4A. Now, programs that have been modified, and there's only three at this point — that doesn't mean others could not be — take advantage of the same memory. So, if some programmers wanted to write or modify programs that work for the /4A to take advantage of increased memory they could.

**Is MY-Word going to load at the A > prompt?**

First of all, Myarc has never advertised that MY-Word would load from DOS. In fact, what we advertised initially was that it would be TI-Writer upgraded to increased memory and 80-columns. Subsequently, it was so modified that we renamed it MY-Word because we added commands, put it in 80x26, and on and on. After doing this, there was one addenda that was sent out in error listing programs that would load from the A > of DOS. That was Advanced BASIC and Pascal. Inadvertently, MY-Word was listed in there. That was our mistake. Subsequent and previous addendas never listed it as loading from the A >.

The reason is quite simple. Though source code did exist for the editor portion of TI-Writer, source code did not and to our knowledge does no longer exist for the formatter. So there is no way to rewrite that code. And, since with the newer DOS

and GPL loading MY-Word with an autoexec is almost transparent, we've essentially given you the same thing. Now, it doesn't make sense for us to spend our resources rewriting the formatter portion of MY-Word, rather than doing MY-Pro-Word.

**What about the apparent delay in getting the HFDC to the market?**

Early last year we had a hard and floppy disk controller card that is not the one we have finished. The primary difference is the streamer tape backup. At that point in time, the capacity was essentially the same (four floppies, 3 hard disks up to 134 megabytes each), but it didn't have streamer tape backup. Well, logically it didn't make a lot of sense to offer that kind of capacity on a hard drive with no way to back it up except floppies. So streamer tape was apparently needed. Our dealers agreed, people like Roger Dooley at Tenex and Darryl Dheinwith Dhein's Wholesale. We had been saying up until then that we were essentially ready to release this card, which we were. It was going to be released without MDM5, it was going to use essentially the software the (Myarc WDS100) personality card used. Once deciding to include streamer tape backup, that was estimated to take about 8-12 weeks. In fact, the engineering on that card, so Lou Phillips tells me, was much more difficult than the 9640 was. That's the reason for the delay.

At the same time, we were delaying it, we decided to do an assembly language version of MDM3, upgrading it to MDM5 and adding the features you now see. That originally was going to be done by Innovative Programming. Obviously, that didn't work out. We subsequently changed it to Mike Dodd, who took the source code of MDM3 and modified it. And then it was finished essentially by John Birdwell. So, it's not a misleading of anyone early on that the card was essentially finished. And it's also the reason for the price change.

Even in the IBM market where you get very inexpensive cards because of the high volume, there is no card available for less than the \$325 cost of the Myarc HFDC that includes a hard and floppy controller, streamer tape backup and cables.

## Horizon releases P-GRAM card

Horizon Computer is producing the P-GRAM card, a GROM emulation card for use with the TI99/4A.

The card will save and run modules and compatible with files saved by the GRAM-Kracker or Cart-Save, according to the manufacturer. The card was developed by John Guion and Robert Jones.

The manufacturer says a fully documented source code and user manual (provided as a DV80 file on disk) allows the user to save modules, edit them, load them to card and run. The P-GRAM card is said to contain 72K of battery-backed RAM (1p CMOS): 40K for GRAM emulating, 16K for module RAM bank-switched and 16K of DSR RAM, also bank-switched. An optional clock is available.

The card requires peripheral expansion box, 32K and disk drive. A P-GRAM kit is \$150, with clock kit for \$20; a fully assembled P-GRAM is \$180, \$200 with clock. For information or to order contact Bud Mills Services, 166 Dartmouth Dr., Toledo OH 43614.



## Myarc Hard &amp; Floppy Disk Controller

# It was worth the wait

By JOHN KOLOEN

I think it is safe to say that Myarc has its hard and floppy disk controller under full control. The card itself has been operational for months, but the operating software, including an EPROM, have been upgraded constantly throughout the summer. With the release of Version 1.23 of the Myarc Disk Manager 5 (MDM5) and the Version H7 EPROM, the card becomes a valuable asset with either the TI99/4A or the Myarc 9640.

The final hard disk version of MDOS (to be numbered something over 1.10H) is due at any time. Unofficial version numbers 1.08 and 1.09 have appeared on bulletin boards in recent weeks but the final product for hard disk users will be Version 1.1xH, the "H" standing for hard disk.

Trying to review the HFDC is complicated by the fact that its performance depends somewhat on whether it is run on a 4A or a Geneve. On the 4A it is fully operational, controlling both hard and floppy disks. On the Geneve, until the finished MDOS is available, it controls only hard drives — floppies are still controlled with a floppy disk controller. Even so, the HFDC runs at about 90 percent of its potential without the final MDOS. The final MDOS should improve its DOS-level control of hard disks — such as being able to create and remove directories from the A> prompt — but nothing that can't be done through MDM5 either on the Geneve or the TI. MDM5 runs in 40 columns on both computers.

**Performance:** The only other hard disk system available for the TI was Myarc's WDS100 system, which used a "personality" card to interface with the TI. A 10-megabyte configuration of this system retailed for about \$2,000 when you could get one and gave the user no choice in terms of what hard disk to use or how to format it. You got what Myarc delivered. While the WDS100 performed well, its disk manager was written in Extended BASIC and was tedious to use, though it provided users with access of up to 10 megabytes of storage, with much faster input/output than is possible with floppies. But compared to the modern hard drives

## Review

### Report Card

Performance.....A  
Ease of Use.....A  
Documentation.....A  
Value.....A  
Final Grade.....A

**Cost: \$325 (includes MDM5 and cables)**  
**Manufacturer: Myarc Inc., P.O. Box 140, Basking Ridge, NJ 07920, (205-854-5843)**

**Requirements: TI99/4A or Geneve 9640, hard disk drive (non RLL type), (expansion memory for 4A), Extended BASIC or Editor/Assembler, MDOS V.1.06 and GPL 1.03 or higher for Geneve**

that the HFDC supports, the WDS100 system was a tortoise.

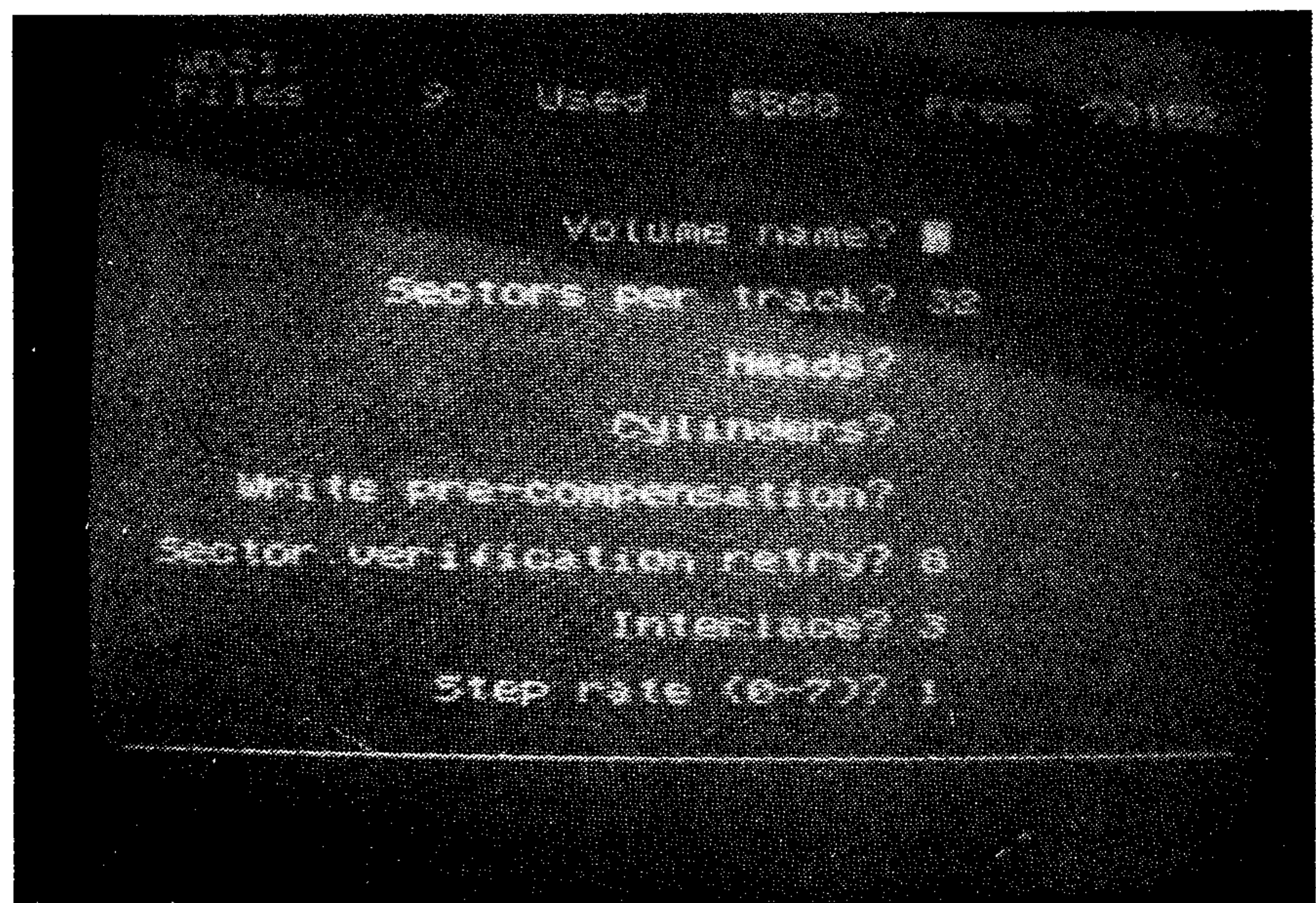
The hard drive I use with the HFDC is a 20-megabyte, half-height Seagate 225, not among the fastest in the Seagate lineup. A 125 is much faster and only nominally more costly, though it is not as widely available. Even so, data transfer with the 225 is brisk. Here is an example, using a 43-sector BASIC game program, operating out of Extended BASIC (times are in seconds):

| Device disk | Load | Save |
|-------------|------|------|
| Hard disk   | 3.5  | 3.5  |
| Floppy      | 9    | 18   |
| RAMdisk     | 3    | 3    |

Similarly, using MY-Word, a 46-sector document is saved or loaded in all of three seconds. (When writing a file to a hard disk for the first time, the process may take slightly longer. When rewriting to the file, maximum speed is achieved.)

The drive is housed in an external hard drive chassis that includes its own 45-watt power supply and quiet cooling fan. This cost about \$120 new. (Most late-model hard disks use less than 20 watts so it would be feasible to have two half-height hard drives in the chassis. In fact, it is wired for two hard drives.) I also have a surplus hard drive enclosure and power supply that cost \$35 but I had to rewire it for the hard drive. If you are not at all handy with hardware projects, I highly recommend ordering an assembled and tested chassis/power supply. I also recommend the use of name-brand hard drives. The documentation for them is usually worlds beyond the documentation that comes with the cheaper brands. Manufacturer support, too, is likely to be much better on a name-brand than an off-brand. If you know what you are doing with hard drives, by all means take chances. If you don't, stay with

(See Page 40)





## MYARC HFDC—

(Continued from 39)

proven technology.

The actual speed of reading/writing to a hard disk depends on the hard disk. Factors such as the average access time and interlace are generally determined by the manufacturer of the hard drive. Suffice it to say that the faster the drive, the more expensive it is. Generally, too, the larger the drive in terms of storage capability, the faster it is likely to be. (Incidentally, the Seagate 225 has a head access time of 65 milliseconds, while the Seagate 125 has an access time of 27 milliseconds.)

The card has two sets of DIP switches: one to set the CRU base of the card and another used to control floppy drives. The floppy switches allow the user to configure floppies as 40 or 80 track, and step rates from 16 to 2 milliseconds.

After configuring the switches and installing the card, Myarc Disk Manager 5 is loaded from Extended BASIC or Editor/Assembler. The user can check the version number of the EPROM by pressing "V" at the main menu. Version H7 or higher is recommended.

MDM5 is menu driven and the documentation walks the user through the formatting process. However, for a new user, much of the process will be unclear. Here are the parameters the user must set prior to formatting a hard drive (based on V.1.23 of MDM5):

Volume Name:  
Sectors/Track: (32)  
Heads:  
Cylinders:  
Write Precompensation:  
Sector Verification: (8)  
Interlace: (12)  
Step Rate (0-7):

The numbers in parentheses for sectors/track, verification and interlace are defaults.

Users would refer to their hard disk manual to determine the number of heads and cylinders. (A 20-megabyte hard drive typically has 4 heads and 615 cylinders per head.) Once these numbers are entered, a number appears as a recommended default for write precompensation. For a hard drive with 615 cylinders, the default entry is 464. However, the hard drive manufacturer may provide a recommended range for write precompensation. Use

that as your guide.

Without going into any explanation, generally, the lower the number, the faster the hard disk will operate. However, since not all hard disks are created equal, users may want to experiment. There is no need to be concerned about damaging a hard disk by the settings you select for the formatting process. It is a simple matter to reformat a hard drive.

One way to gauge whether the settings you select are optimum for the drive is to make note of the time it takes for the drive to be formatted. The faster it formats, the more optimum the settings you've selected. While only relatively fast hard drives would use, say, a Step Rate of 0, many might be able to accommodate a 1. Regardless of what you do, a drive should take well under ten minutes to be formatted. Anything longer should cause the user to reformat the drive with faster settings.

Whether you are running an HFDC on a Geneve or a 99/4A, the hierarchical structure of hard disk directories is the same. The only difference is that from MDOS you can refer to the root directory of the hard disk by a letter, C> for instance. Otherwise, from programs that run out of the GPL interpreter on the Geneve or on the /4A, the tree-like subdirectory names would be the same. For example:

Suppose you wanted to load a program such as Multiplan, which requires the volume (or disk) name to be TIMP. The following would be entered from GPL on the Geneve: WDS1.DSK.TIMP.MP (assuming that you named your Multiplan cartridge files MP).

Similarly, if you were to try to load Multiplan from a /4A, you would enter WDS1.DSK.TIMP.MP (assuming you named your Multiplan cartridge files MP). If you use a Multiplan cartridge in the GROM port, you would load the Multiplan program files from WDS1.DSK.TIMP. as well.

Only from MDOS would there be a difference. At that point, the Geneve user could refer to the hard disk using a letter, such as E>.

MDM5 supports all the standard disk manager functions: copying, deleting, formatting, protecting, moving, etc. files and programs. It is also quite efficient at backing up a hard disk drive to floppies.

A useful feature of the HFDC that is absent from the WDS100 system is its support for floppy emulation files. This works only when the HFDC is used to control both floppies and hard disks. Through MDM5, it allows the user to actually copy the entire contents of a floppy disk to a hard disk directory as a single file. The user then designates this as an emulation file. What this means is that the HFDC will search for this file as if it were in physical drive DSK1. Thus, programs that are required to load from physical floppy drive 1 can be loaded from the hard drive. The user can create many emulation files, though only one can be active at any one time.

The emulation feature isn't a big deal, however, since most programs that load from floppy drive 1 will also load from the following hard drive subdirectory: WDS1.DSK1.PROGNAME.

One aspect of the HFDC that is not operational on either the /4A or Geneve is the streamer tape backup system. Operating software for it is not available at this time, so backup has to be done with floppies, which is how it is done by the majority of PC hard disk users.

**Documentation:** The HFDC manual is similar to the WDS100 manual. It has been updated, of course, for MDOS. (The operation of the HFDC is also similar to the WDS100 system.) It takes the user through the formatting stage and provides an explanation of how to set up subdirectories. There is also a lengthy reference section detailing software interface specifications, pinouts, error messages, trouble shooting procedures and a section on the use of the HFDC with Extended BASIC programs. I would like to have seen more examples to illustrate various procedures, but the manual by and large is more than adequate.

**Ease of Use:** Getting accustomed to a hard disk depends on the user. Once the nature of a subdirectory system becomes obvious, it should become second nature.

**Value:** At \$325, the hard disk controller is an expensive item, particularly when you consider the cost of a hard disk and power supply. (Cabling consists of standard 34-pin and 20-pin connectors.)

If you are serious about your computing  
(See Page 44)



## Game Writers Pack 1 and Graphic Lister

# Two for the road

By HARRY BRASHEAR

It's been a while since I have bough any heavy duty programs to get my review teeth into. However, there are dozens of neat little programs that come along on almost a weekly basis that definitely require attention.

Up to now I haven't gotten into them because they are hard to review. You either like a little program or you don't, so I'm going to present two on one page, one I did like, the other I didn't.

The first is something that has apparently fallen out of the woodwork, not here, but in England.

Have you ever heard of a Collins Starter Pack? No? Don't feel bad, I've been here for seven years and I was as much in the dark as you are. As nearly as I can gather, these starter packs were produced by a publisher in England under license from Texas Instruments. For some reason, they never got to the shelf and my guess is that, since the copyright is for 1983, TI dropped us before they made it. Anyway, these starter kits sat around in a warehouse all this time and they have finally been brought out into the sunlight. As of this writing, I don't know who will distribute them in this country or how much they will be. I assume we'll find out soon enough.

There are four kits, Starter Pack 1 and 2 and Game Writers Pack 1 and 2. The one I have in hand is "Game Writer's Pack 1," and I think it's neat!

The pack consists of a two-sided cassette with three programs on each side, and a manual of about 96 pages. The intention of the manual is to explain how the programs on the cassette were written and how they work. The book doesn't duplicate the cassette programs; however, it shows you smaller programs that use subroutines similar to the runnable programs.

No big deal, you say? Oh, yes, it is! Does the statement,  $R=R-(K=88)+(K=69)$ , boggle your brain a little? If it does, buy the pack! This manual shows you how that line works, and why it is the most efficient to use. All of the little games use this kind of formulation and they work remarkably well for console BASIC. Frankly, if you were to learn everything in this little

## Review

### Report Card — Game Writers Pack I

Performance ..... A  
Ease of Use.....B  
Documentation ..... A  
Value ..... A  
Final Grade.....A-

Cost: U.S. \$23 for 10 Collins Packs (Game Writers Pack I one of four titles in pack) air mail, \$14 surface mail.

Manufacturer: Parco Electrics, 1 Manor Close, Weston, Honiton, Devon, UK EX14 0PE.

Requirements: cassette recorder

book, you would be on your way to being one heck of a programmer. The subroutines are nothing short of genius, and there are plenty of them to ponder. We TIers of tiny memory (the RAM, that is) must be efficient coders in today's Extended BASIC, but the good BASIC programmers of the old days had to be even better.

I can say little more about this package except that I think it's worth the cost. You can't go wrong if you want to learn to be a better programmer.

I have always been of the opinion that one should first learn to speak and write English before delving into another language. I think that also holds true for computer languages. It doesn't matter which one you start with, just learn everything you can about it before passing on your program to the rest of the world. In this case, someone has fallen in love with c99 and decided to take a great concept, overdo it, and dump it to the public before he knew the language.

In all fairness to this program, I will tell you that the documentation on the disk is excellent, and if you follow the instructions to the letter, and don't blow an input, the program will do what it says it will. I found more ways of coming up with a blank screen in this thing than you could shake a stick at. Every time I made a mistake and

### Report Card for Graphic Lister

Performance ..... C  
Ease of Use.....C  
Documentation ..... A  
Value ..... C  
Final Grade.....C+

Cost: \$11.50

Manufacturer: Nameloc Software, 3971 S.E. Lincoln, Portland, OR 97214

Requirements: Expansion memory, disk system, printer

went to look for a way out, I got in deeper trouble. The program is NOT bulletproof, even though one of the first paragraphs in the docs tells you that it has many error traps. But I'm getting ahead of myself. Let me first tell you about the concept of the program:

Graphic Lister could have filled in a hole that has existed in printer graphics for a long time. Not so much the label maker part of it, but the ability to address fanfolded 3x5 and 4x6 cards from a mailing list, and also put a return address in the corner. It will print 8½x11 letterheads, or, if you like, a size parameter of your choice.

You are allowed to use TI-Artist 1x1 fonts to do this and you may also include small instances along with the labeling. If you elect not to use an Artist font, the standard printer font is also allowed.

When you boot the program (auto-load in Extended BASIC), you get "Beaxs," the disk based Editor/Assembler from Italy, to finish loading from. There are actually three programs on the disk, "ONE," "TWO" and "THREE." Each program progressively gives you more options. For the life of me, I have no idea why everything wasn't put into one program. I did notice that each program used three image files. Was this inefficient programming or do I blame that on the c99 language?

The first program allows you to load a font, align the printer or print out the mail-

(See Page 44)



# Newsbytes

## Tigercub Tips on disk

Jim Peterson of Tigercub Software has prepared several more issues of his Tips from the Tigercub newsletter and has mailed them, together with his Tigercub Software catalog, on a DS/SD disk to more than 100 user groups which have continued to mail him their newsletters. The disk is available to any other user group newsletter editor who requests it.

Peterson says Tigercub Software will remain in business for at least another year, and he hopes to offer some new product or service in the coming year.

For information, write Tigercub Software, 156 Collingwood Ave., Whitehall, OH 43213.

## California 'share-fair' set for Oct. 9

Ten southern California TI users groups are holding a Fall-4-A-Share-Fair from noon to 5 p.m. Oct. 9 at the BACKS Community Building in Placentia, California.

Admission is free, according to Bill Harms, a coordinator of the event.

The community center is near a picnic area with barbecue pits and playground equipment available, he said, so he advises bringing a picnic lunch. A soft drink table will be available.

Commercial enterprises participating include DataBioTics, CorComp, Tex-Comp, Comprodine, T.A.P.E. Ltd., L.A. Group Marketplace, Data Depot and L&M Systems (Myarc).

Harms said more than 300 fairware program disks from two large local libraries will be available and door prizes will be awarded.

Presentations and demos will be featured, he said.

A consignment table will offer the opportunity to buy or sell items.

Sponsoring groups and their coordinators include Riverside, Ed Butcher; Pomona, Gene Bohot; SFV, Jim Edwards; Brea, Rodger Merritt and Ken Hamai; Orange, Jim Swedlow; El Toro, Phil Barnes; Los Angeles, Chick DeMarti; Club 99 (Covina), Tim Remley; San Diego, [unclear] Pierce; TICO (Oxnard), Richard Par- [unclear] and Harms.

For further information, contact Harms

at 6527 Hayes Court, Chino, CA 91710 or (714) 628-1334 (evenings).

## Software needed to help man talk

Charles Roberts of the Ozark 99er User Group writes that the group has "encountered a young man that is completely paralyzed, except for a little use of his right arm and the thumb and first two fingers of his right hand. We are putting together a TI99/4A system from donations of the group and from individual members. We hope to provide him with a voice and a way to pass the time, and maybe increase his physical dexterity. We need software that will allow a choice of phrases to be changed by single key entries and then if the particular phrase is not available, a way to compile a phrase with as few key presses as possible. With the use of the speech synthesizer he will then be able to talk, which he cannot do now. We need games that do not require any speed or numerous key strokes from the person playing the game. If any of your readers know of any software that can be used in this situation or know of any other project of this kind we strongly desire to hear about it."

Contact Roberts c/o the Ozark 99er User Group, P.O. Box 147, Springfield, MO 65801 or (417) 831-7470.

## Donaldson Software releases programs

Donaldson Software has released two new games and plans release of a word processing program in October.

In New World Voyages, the user, in the service of King George II, as captain of the 132-foot warship the "Broadsword" explores the islands of the Pacific Ocean for a minimum period of 16 months to a maximum period of 99 months. With a cargo of trinkets and utensils the player attempts to trade with the islands' natives for precious stones, furs, coral and amber. He must also take care of his 40 men and return home to England with as many sailors as possible.

Some of the islands' inhabitants are hostile while the majority of the populations offer exotic articles for the player's items

of trade, in addition to supplying food to continue the voyage.

Upon return to England the player is given an audience with the king, who will remark on the expedition, give the player a rating and bestow a reward based on the success of the voyage.

The game is programmed in Extended BASIC and sells for \$12.95 U.S.

In Titan's Revenge the player's mission is to stop the Titans from occupying seven asteroid bases between the orbits of Mars and Jupiter before they reach Earth. As commander of Earth's forces the player must determine the base under attack, acknowledge the enemy's attacking fleets' strength and decide what class of fighters to send to defend the base — all within 30 seconds.

There are two levels of play to the game, programmed in TI BASIC. It sells for \$9.95 U.S.

D.S. Writer is described as a simple program designed to write business letters which can also be used to write documents. Letters and pages can be edited and saved to disk or cassette for further analysis or editing. It comes complete with a 10-page instruction manual which instructs how business letters are written. It has special features for Axiom GP250x printers, and also insert/deletes for easy editing, according to the manufacturer.

It is programmed in Extended BASIC and will sell for \$12.95 U.S.

For more information or to order, write Donaldson Software, 521 Lievre St., Buckingham, Quebec, Canada J8L 2C2.

## Charlton, Hoddie address user group

Paul Charlton and J. Peter Hoddie were guest speakers at the August meeting of the Front Range 99er Computer Club in Colorado Springs.

Charlton is the author of Fast Term and of MDOS, the operating system for the Myarc 9640, and a collaborator on MY-Art. Hoddie is the author of Font Writer and Pre-Scan It.

Charlton demonstrated MY-Art and a new program that will load GIF graphics files

(See Page 43)



# Newsbytes

(Continued from Page 42)

and convert them to TI-Artist, MY-Art or RLE format.

Hoddie demonstrated his Graphics Expander program, which will enlarge or reduce the fonts from TI-Artist and CSGD. Another program, MacFlix, operates on either the TI99/4A or the 9640 and loads MacPaint graphics and will save them out in TI-Artist or MY-Art format. He also presented the database program First Base, written in c99 by Warren Agee with some routines by Hoddie. The soon-to-be-released program contains a utility that will convert PRBASE files to First Base format.

## Seattle fair set Sept. 21

The third annual State of Washington TI99/4A Convention is set for 9 a.m.-4 p.m. Sept. 24 at the Seattle Center Snoqualmie Room.

The convention is sponsored by user groups in the state of Washington.

For information, contact Barbara Wiederhold, 6102 Roosevelt Way, N.E., Seattle, WA 98115 or (206) 522-6558. After hours BBS is (206) 361-0895 24 hours.

## Chicago Faire set for Nov. 12

The sixth annual Chicago TI-Faire will be held Nov. 12 at the Holiday Inn in Algonquin, Illinois.

A social mixer will be held the evening of Nov. 11.

Tickets are \$4 to the fair, \$4 to the mixer, and \$10 to the dinner the night of Nov. 12.

For information contact Marcy Brun, Chicago Area TI99/4A Users Group, P.O. Box 578341, Chicago IL 60657, or hot line (312) 695-9291.

The fair is in conjunction with the Milwaukee TI-Faire Nov. 13 at the Quality Inn, 5311 So. Howell Ave., Milwaukee, Wisconsin.

For information on the Milwaukee Faire, contact Gene Hitz, Milwaukee Area 99/4A Users Group, 4122 N. Glenway, Wauwatosa, WI 53222 or (414) 535-0133. The fair is sponsored by the Milwaukee Group and the Wisconsin 99er Computer Council.

## New number for The KEEP BBS

The KEEP BBS, which has a TI-SIG, is now on line at a new phone number, (805) 495-1479.

The medieval-theme board is the home of the Tri-Valley 99ers and of the KEEP's Gaming Guild, which deals in medieval culture studies, archery tourneys and fantasy games. Sysop and king is Greg McGill.

The 24-hour board operates at 300, 1200 and 2400 baud.

## Mid-Evil BBS on line

The Mid-Evil BBS in Greenacres, Florida, operates at 300, 1200 and 2400 baud at (407) 969-3134.

Stanley Krajewski, sysop, says all callers are active members of the 24-hour board from the first call.

The TI-Net board has 10 message bases and a gameroom and casino.

Krajewski says, "Callers can fight each other and progress with experience and gold with each call."

## Genial releases MacFlix and FirstBase

Genial Computerware recently released a graphics program called MacFlix that allows TI and Geneve users to access Macintosh graphics. Also, Genial's Graphics Expander program has been updated to include the ability to shrink graphics and fonts.

Genial is expected to start shipping FirstBase, a database manager by Warren Agee, this month.

MacFlix, by J. Peter Hoddie, allows TI and Geneve users to access graphics created with the Macintosh's MacPaint. MacFlix allows users to load, view, print, and save MacPaint graphics.

MacFlix will save a MacPaint image as a TI-Artist screen which can be manipulated with most TI graphics programs. MacFlix supports Epson compatible and Prowriter printers. MacPaint pictures are available on all major telecommunications networks, many local BBS's, and through user groups.

Geneve users may use MacFlix in high-

res mode, with or without interlace. On a 9640, MacFlix can display more than a standard Mac screen. MacFlix also saves images in both MY-Art formats.

MacFlix comes with a conversion routine that lets users move MacPaint pictures to and from PC disks using PC-Transfer.

Written in assembly language, MacFlix runs on a 99/4A with Extended BASIC, Editor/Assembler or Super-Cart, or a Geneve.

MacFlix is priced at \$15. Those who order before Sept. 30 will receive a bonus disk of Macintosh pictures.

Graphics Expander V.2.0 is used with graphics created with TI-Artist, CSGD, Font Writer II and other graphics software. Features include:

- Compatible with TI-Artist Fonts and Instances, and CSGD Fonts and Small Graphics.
- Converts graphics between TI-Artist and CSGD formats.
- Can stretch and shrink graphics by user selectable factors from -8 to 8.
- Graphically displays conversions to eliminate guess work.
- Provides Upside-down, Invert, Mirror and Rotate functions.
- Built in Catalog and Delete file options.

Included with the program is a copy of BIG-TYPE. This program allows users to load any TI-Artist font (can handle fonts over 200 sectors in size) and type it onto any TI-Artist picture.

Graphics Expander is available for \$10. Owners of earlier versions of Graphics Expander may receive the upgrade by returning their original and \$3 to Genial.

To order, send check or money order, plus \$1 for shipping and handling, to: Genial Computerware P.O. Box 183 Grafton, MA 01519.

Credit Card orders (Visa, MC, AmEx) may be placed through Disk Only Software at 1-800-456-9272.

For a catalog of Genial Computerware products for the 99/4A and 9640, send a self-addressed, stamped envelope to the address above.

## Archiver upgrade

Barry Boone released Archiver V3.02 in (See Page 44)



# Newsbytes

(Continued from Page 43)

mid-August. It is a fairware product. According to Boone, most users send \$15 for the program. It is widely available on BBS systems, user groups and through other fairware channels.

Archiver 3.02 was rewritten from scratch in four days, according to Boone. Debugging took substantially longer. (The previous version of the program was V2.4). The program is used to compress programs and files so that they take up less space on a disk. The primary advantage is in telecommunications, where transmission time is billed by the minute. To use archived programs, end users decompress them with Archiver 3.02, restoring them to their original size.

The upgraded Archiver has a more efficient user interface than previous versions. Archiver 3.02 allows users to compress and extract (decompress) files and programs, including the ability to extract individual files from an archived collection of files. Users can also catalog the contents of arcfiles. Archiver provides a number of file disk utilities, including copying, deleting,

unprotecting and renaming files. The disk utilities are called from the main menu, unlike previous versions in which the users went through two menu screens to activate utilities. Files in DV/80 format may be read with the View Text File function. Archiver includes a menu prompt to load FUNLWEB.

The most obvious change in Archiver is that the program now carries prompt responses as defaults. In other words, when you answer a prompt, the response reappears whenever the prompt is redisplayed. Also, Archiver 3.02 allows a hard copy printout when cataloging disks or arcfiles. According to Boone, Archiver 3.02 is compatible with earlier versions.

To order a copy, send a postage-paid return mailer and floppy disk to: Barry Boone, P.O. Box 1233, Sand Springs, OK 74063.

## Users groups get disk offer

Jack Sughrue, author of software including Plus!; \*Impact/99\*; and Textware, Soft-

ware & Elsewhere is offering four disks of his 99/4A articles to 4A newsletter editors or user group libraries.

These public domain articles include reviews and other comments about happenings in the TI world and may be used freely by any user group. In return, Sughrue asks to be placed on the newsletter mailing list.

To get the ready-to-print files, user groups should send four initialized SS/SD diskettes or two initialized DS/SD diskettes with mailer and postage, or send \$5 and the author will provide disks and mailer. If sending money, specify SS/SD or DS/SD. Write Jack Sughrue, Box 459, East Douglas, MA 01516.

*Newsbytes is a column of general information about products, services and activities relating to TI users. The publisher does not necessarily endorse products listed in this column. Vendors, manufacturers and others are encouraged to submit items for consideration. Photos will be used when space permits. Materials cannot be returned.*

## User Notes

### More on Multiplan and slash zero

This comes from Jack Youngs, of

### TWO PROGRAMS—

(Continued from Page 41)

may also load a small instance to go with the text.

Program THREE allows you to do everything the first two did, but you now have a 1½-inch label option and you can use a little larger instance.

I guess the first thing you do with the disk is blow away the first two programs and just get into the third. At least that way it cuts down on your suffering.

Apparently there are some earlier versions of this program around called Label-maker, because a conversion program is on the disk to change your old mail list to one acceptable to Graphic Lister. If the program is new to you, a list maker is includ-

Bellerose, New York. He writes:

In your July (1988) issue, User Notes, there was an article on slashing the zero in Multiplan. It was also said there was a quirk in the slashing of the zero in that

ing list on 1-inch labels. You may use any of the aforementioned formats or you may type from the keyboard.

The second program will allow you to do everything program ONE did, but you ed also. The list maker is in Extended BASIC and is as good in operation as any program I have seen of this type. It worked flawlessly, was super friendly and the menus were very nice looking. *See what I mean?*

My advice to Nameloc is to take Graphic Lister and redo it in XBASIC. Add a function to print the message on the other side of the postcards and run it back out to us again. The concept is great; Graphic Lister in c99 is not.

when the zero was in reverse video, the zero was not slashed.

To correct the quirk, I continued searching the MPCHAR file to the sixth sector (004F), about halfway down the sector (starting at 128) you will find the following hex code:

```
FFE7 DBDB DBDB 2BE7
```

Just replace the above code with the following:

```
FFE7 DBD3 CBCB 9BE7
```

Of course, I made a working copy of Multiplan and used Disk Utilities to make the changes (any sector editor will do).

## One-line catalog program is handy

This handy one-line was devised by John Martin of the Jackson County 99ers. The computer won't accept the entire line in one bite, so enter as much of the line as you can, then press FCTN 8 (REDO) and

(See Page 45)



# User Notes

(Continued from Page 44)

cursor down to the last character and continue entering the remainder of the line.

The program prints a disk catalog to the screen and can be easily modified to output to a printer by changing the device as defined by the OPEN statement. File types are abbreviated in the catalog display and the protect designation is signified by a zero (unprotected) or a -1 (protected).

```
1 IF F THEN INPUT #1: A$, A, J,
K :: IF J THEN PRINT A$; TAB(
12); J; TAB(18); SEX$(B$, ABS(A*
2)+1, 2); K; TAB(27); A<0 :: GOT
O 1 ELSE RUN ELSE B$="AVDFDV
IFIVFG" :: INPUT "DKK": F ::
OPEN #1: "DKK"&STR$(F)&".", IN
TERNAL, RELATIVE, INPUT :: GOT
O 1 !213
```

## Making the most of a RAMdisk

The following is by Robert E. Barnes, and appeared in the Greater Tampa Bay TI User Group newsletter.

Before I got my RAMdisk, almost all my programs ended with a CALL PEEK(2, A, B) :: CALL LOAD(-31804, A, B). This does a reset which returns Extended BASIC to the TI title screen. (An expansion memory is required.)

After I got my (Horizon) RAMdisk, I got exasperated with the delay which the computer did a reset then reloaded MENU to return to the John Johnson Menu screen. While reading a sister newsletter, I discovered that all I had to do was replace the CALL PEEK, CALL LOAD with DELETE "MENU" and the computer immediately reloads Menu. This, of course, was in the documentation but it took someone else's article for it to sink in.

By the way, the CALL PEEK, CALL LOAD above is a nice way to return to the title screen from within an Extended BASIC program if you don't have a RAMdisk.

(The author of the article Barnes refers to above is John Paine. The article appeared in the newsletter of TISHUG in Carlingford, New South Wales, Australia.—Ed.) Here is the remainder of Paine's article.

The following example is the listing of a simple program that prints documents

and is well worth having on a RAMdisk as a permanent utility. When used with the print buffer, it reloads the menu and allows me to do other things while the printer chugs along.

```
100 CALL CLEAR !200
110 OPEN #1: "PIO", OUTPUT !16
7
120 INPUT "FILENAME-> ": A$ !
074
130 OPEN #2: A$, DISPLAY , VARI
ABLE 80, INPUT , SEQUENTIAL !2
04
140 IF EOF(2) THEN 170 !217
150 INPUT #2: A$ :: PRINT #1
: A$ !235
160 GOTO 140 !219
170 CLOSE #1 :: CLOSE #2 !17
7
180 DELETE "MENU" !153
```

## Check CALL INIT

Want to check whether CALL INIT has

been executed? Why should you? Well, if it has, and you inadvertently run a CALL INIT, it will wipe out any assembly language routines in memory. The following CALL PEEK, which appeared in the Computer Voice newsletter, and elsewhere, will check for CALL INIT and if it has been executed will go to line number 20. Here's the line:

```
10 CALL PEEK(8198, A, B) :: IF A=170
AND B=85 THEN 20 ELSE CALL INIT
```

## Faster restart

Here's a CALL LOAD that can be used to replace a RUN statement in an Extended BASIC program to increase the speed of restarting the program. Here's the CALL LOAD:

```
CALL LOAD(-31962, 160, 4)
```

According to Barry Ensley, of the Kansas City 99ers, this speeds up the restart of a program by turning off the pre-scan function the second time a program is run.

## An AUTOEXEC file for MDOS users

This brief tutorial on writing an AUTOEXEC file on the 9640 was written by Jane Laflamme and appeared in the newsletter of the Ottawa TI99/4A User

Group. The recommended way to write AUTOEXEC files is from MY-Word, which makes it easy to edit. Writing a file from MDOS using the COPY CON com-

mand doesn't permit editing. She writes:

This is a very quick tutorial on how to create an AUTOEXEC file and a few ideas on how to manipulate it. The following is my AUTOEXEC file. And explanation of how it works is in parenthesis to the right of each command. Do not include these parenthetical remarks in an AUTOEXEC file that you create.

| MDOS COMMAND                          | EXPLANATION  |
|---------------------------------------|--|
| ECHO OFF                              |  |
| MODE 80                               | (80 column text screen)  |
| SPOOL 16                              | (Print spooler installed)  |
| RAMDISK 180                           | (Double-sided, single-density RAMdisk)   |
| ASSIGN C=DSK5:                        | (You have to give it a letter to access)   |
| ASSIGN E=DSK6:                        | (Same as above)  |
| ECHO DSK5 is Drive C and double-sided | (To let me know it is installed)   |
| ECHO DSK6 is Drive E                  | (Same as above)  |
| ECHO Print Spooler installed          | (ECHO will print text to screen)   |
| ECHO                                  | (This will echo blank if no text)  |
| ECHO Good Morning... Have a good day! | (Makes me feel good in the morning)  |
| ECHO                                  |  |
| A:CONFIG-16                           | (This command will load program into MDOS from drive A. After exiting the CONFIG-16 program, the AUTOEXEC will take back control.) |

```
ECHO
ECHO
```

(See Page 46)



# User Notes

(Continued from Page 45)

ECHO Hit any key twice for GPL —  
ECHO CTL. C to abort GPL load.

PAUSE

(To allow for CTL. C command)

PAUSE

(To go into GPL)

ECHO ON (Following command will now be printed on the screen so you will know that it is being executed.)

E:GPL

As in the above example, the AUTOEX-

ing AUTOEXEC file will create a menu that will execute the file "M". First create your AUTOEXEC file.

EC file can run another file. The follow-  
MODE 80

ECHO OFF

ECHO MENU

ECHO - - - -

ECHO

ECHO A....CONFIG-16

ECHO B....GPL

ECHO C....MYART

ECHO

ECHO

(Type "M" followed by a space, and then the letter of the selected program...)

Save the above from MY-Word with the Print File (PF) option, and strip control characters with the "C" command. For

command "COPY CON AUTOEXEC". (COPY whatever follows, typed on the CONsole, and name it AUTOEXEC. When you have finished typing, press CTL-Z, which saves it to the active drive, usually "A".)

Now, create the "M" file.

example: "PF" (ENTER), "C  
DSK1.AUTOEXEC" (ENTER).

Or type it directly into MDOS with the

IF %1==A DSK1.CONFIG-16

IF %1==B DSK6.GPL

IF %1==C ECHO INSERT MYART DISK INTO DRIVE A

PAUSE

A:MYART

Note: If you select option C from the AUTOEXEC file, I have paused the execution of MY-Art to allow you to switch disks. Also, if you use option B, you must assign DSK6 as E, as in my first example, which, of course, I didn't do in the "menu" AUTOEXEC file.

Save this file, as you did with the AUTOEXEC file, with the PF option of

MY-Word or the COPY CON M comand from MDOS.

These are just a few ideas on how to manipulate an AUTOEXEC file. Also, you can run another AUTOEXEC file from a different disk in the active drive if you are still in MDOS by pressing the Control, Alternate and Delete keys simultaneously.

## Pulling out the stops on E/A bug

This tip was originally published by Danny Michael in the Shoals 99ers newsletter. It has to do with a bug in the ASSM2 file of TI's Editor/Assembler.

If you want to use PIO as an output device for a LIST, you have to put a full stop after it to make it work — ie. PIO. — due to an error in the ASSM2 file. The error is in the DSRLNK routine which the assembler uses — it doesn't use the same

routine that a program calls.

The assembler internally uses a modified VSBR routine which returns data to R0 instead of the usual R1, but whoever wrote the internal DSRLNK forgot this. As a result, the assembler looks at R1, and the program uses an incorrect name length when scanning for the device name. The period causes the routine to exit, and catches the error.

To permanently fix this, use a sector editor on the ASSM2 file, and look for code 04 20 AA BE 00 00 D1 C1. It is usually in the eighth sector of the file.

Change the last C1 into a C0 and the assembler will work as it is supposed to. No need to add a full stop after PIO anymore.

## RS232 with PIO?

Here's a way to avoid wasting a lot of printer paper while trying to debug a program that outputs to a parallel port. The advice comes from the TI User Group of Orange County (California).

Suppose you are writing a program that does a great deal of printing. There is a bug somewhere in the middle of the printing instructions resulting in an I/O error message.

Every time you try to find it, however, you must wait while your printer wastes a lot of paper getting to the problem. What to do?

Redirect the output from PIO to RS232.BA=9600. Unlike the parallel port, the serial port does not wait for a ready signal to return from the printer. So, all of the print instructions will go out through the RS232 channel into the ozone until you find the problem. Setting the baud rate at 9600 speeds things up. The default rate is 300 baud, which leaves plenty of time for a cup of coffee.

## Sorting with PR Base

Sorting of data with PR Base is based on ASCII strings, according to Stephen Shaw, of the TI99/4A User Group of the United Kingdom. Thus, he notes, everything works according to the ASCII values of the characters. This means that though a 4 comes after a 2, 22 will come before 4. To get around this, use leading zeroes with numbers you are sorting by, then the sort will be what you expect — 02, 04 followed by 22.

Also, selective indexing search works on your input up to the first space, so that "good day" will only work on "good". To use the whole phrase, insert a question mark between the words — "good?day".



# Classified

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