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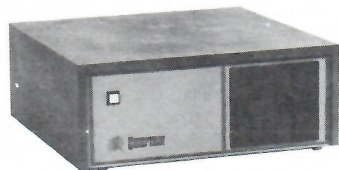
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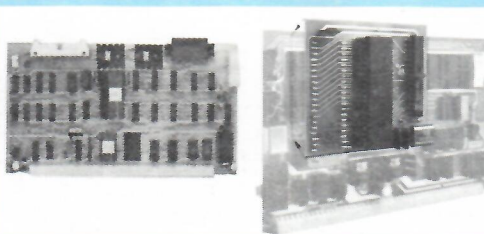


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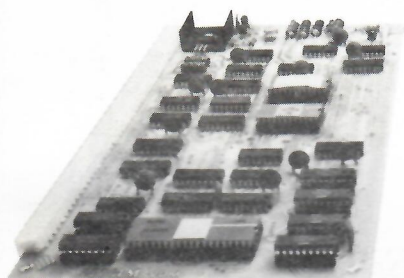
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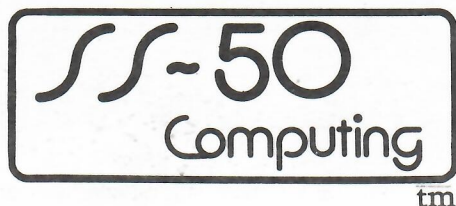
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Publisher/Editor
Ken Orme

Assistant Publisher/Editor
Robert Wood

Review Editor
Gary Manning

Office Manager
Typesetting/Camera
Bonnie J. Orme

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SS-50 Computing
133 North Mayfield Ave.
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Send Correspondence To:

SS-50 Computing
P.O. Box 398
Garland, Utah 84312
Phone
[801] 257-5733

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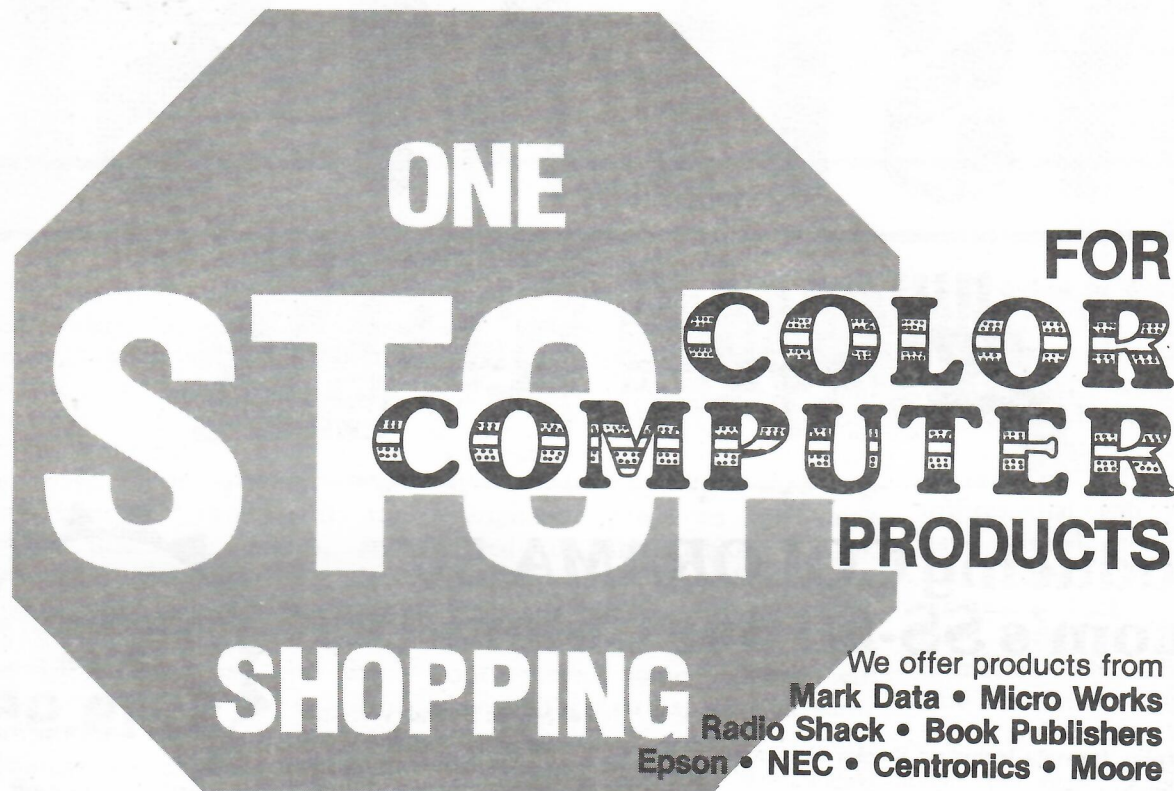
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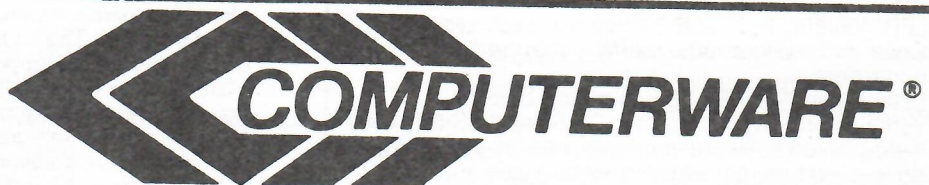
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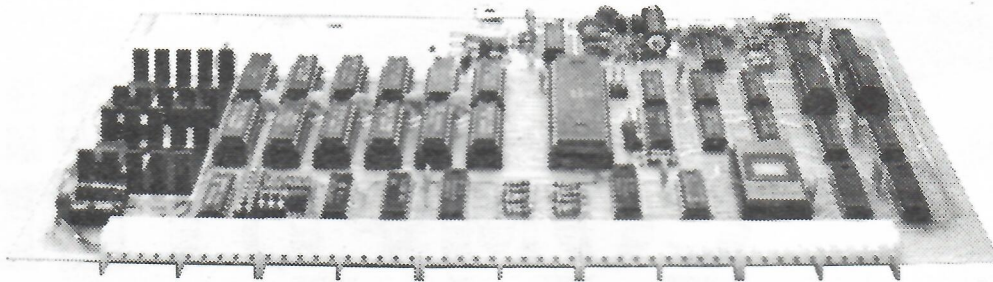


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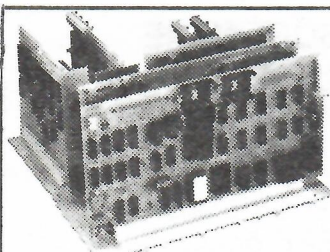
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Instant display control: The COLORAMA-50™ is memory mapped: your MPU has direct, instant access to display RAM and display control registers.

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- **Mix in Sound:** With the optional modulator installed, you can complement your colorful displays with software-controlled audio.

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- **Cassette I/O Option:** Add a few inexpensive components to the on-card circuitry provided and use an audio cassette for program/data storage.

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- **Operating Software:** Included in the comprehensive users manual is a listing of a display operating system and cassette controller that may be implemented as a callable subroutine function from BASIC or existing operating systems. The programs are optionally available in a plug-in ROM for just \$69.95.

System Requirements

The COLORAMA-50™ is pin- and outline-compatible with the Percom System-50™ bus, the SS-50A (SS-50) bus and the SS-50C bus. The composite video-sync signal output will directly drive a color (or BW) video monitor. The output may be modulated for operation with a standard (NTSC) TV set. A modulator is not included. The COLORAMA-50™ card occupies 8-Kbytes of memory in the upper half of a 64-Kbyte memory space. Included on-card is 1-Kbyte of display RAM which will accommodate alphanumeric displays, semigraphic displays and two low-density full-graphic displays. For the higher density graphic displays, additional display RAM is required. The optional RAM ICs may be installed on the card.

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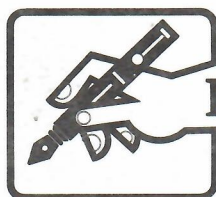
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EDITORIAL

by Ken Orme

The world of microcomputers seems to be in continual change, with new systems arriving and others leaving. The one fact that seems to remain constant is that there are those of us who are the "experimenters" and will try various interfaces, boards, and software. The S-100 bus experimenters are almost gone, and so that leaves our group and those who use the 6502 microprocessors. Have you noticed how many of the 6502 machines are coming around to the 6809 lately? There seems to be something about the 6809 that attracts those who would like to eventually do something besides just play.

Even though I have mentioned all this before, I still am amazed at the number of people that are jumping on the 68000 wagon. It seems that the other 16 bit machines may have one or two new systems compared to 12 or 14 of those using the 68000! That's a very good indicator of where the market will be later on.

And, just as I was saying that there probably will not be a way to get the 68000 on the SS-50 bus, Motorola is announcing that they will have a version of the 68000 that will fit on a 24 address bus (such as the SS-50C). From the information we have, it will be called the 68008. If all lives up to expectations, there will probably be a 16 bit chip on the SS-50 bus by the third quarter of 1983, and possibly

even sooner! That beats trying to change the whole bus structure around just for the 16 bit machines. I'm sure that there are other problems to consider before you could "plug it in and run", such as peripheral speeds vs the clock speed of the 68000. Also, memory may be the biggest limiting factor, since there are a lot of different boards out there, some which will handle the extra speed and some that won't. I will not predict much more, but thought that you might be interested.

NUMBERS

Since we are still behind, the one way to make it so that some of you don't feel you are getting an old copy, is to simply number the issues and put the year along with it. We will still get the same number out per year, and you may see two issues within 35 or 40 days of each other, so don't panic about not seeing the date.

SUBMITTING ARTICLES

During the past two months, we have changed over to an SS-50 bus typesetting system. As you will note, we are still using the "real" typesetting, rather than just a word processor, but we have combined the computer with the typesetter. The reason that I bring this up is to let you know that we will now prefer to get any articles from you on a

FLEX 5 1/4 or 8 inch disk, as a text file. We will then copy your text, edit it, set it up for the typesetter, and output it without having to re-key all the information from you. Also, any software such as utilities that you would like to have printed should be sent on the media for which it is written. That is, if it's for OS-9, send it on an OS-9 formatted disk. The same holds true for Smoke Signal DOS-69, FLEX, and Percom systems. The size doesn't matter, except in the case of Percom, where it should be 5 1/4 only. From there, we will print out the listing so that it will be uniform and so we don't have some listings that are almost impossible to read and others that are perfect.

We would like to get any articles that you would care to send in, and hope that this method makes it easier for us all. And, yes, we will return your disk. If there are disks that we have problems reading, we will notify you and have you send a hard copy.

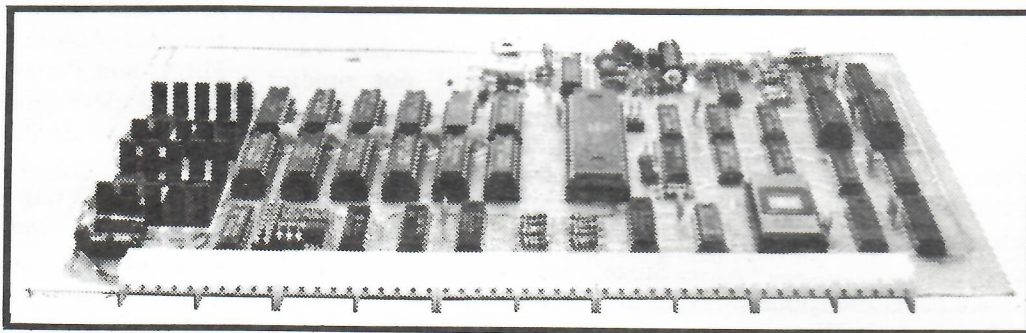
This new method will also make it possible to get articles over a modem later on as well as make it easy to distribute articles and software to you over the phone. When the modem is working, we will let you know.

Keep sending the information, and we will try to help others get the same satisfaction that you have with your program!

[SS-50]

TOWARDS MORE PICTURES AND LESS SPEECH

The Colorama-50



by Thomas H. Hunt
30001 Wagner
Warren, MI 48093

One of the latest entries into the ever-expanding area of graphics hardware is Percom's *COLORAMA-50* board. The Colorama-50 is basically an SS-50 adaptation of their Electric Crayon color graphics system.

While the Electric Crayon is

intended to be a self contained add-on to the TRS80, the Colorama-50 version plugs directly into the SS-50 buss. Designed around the Motorola 6847 Video Display Generator (VDG), the Colorama-50 brings a versatile memory-mapped color

display to the SS-50 computers.

By now every reader is probably aware that the 6847 VDG is the same chip used in the Radio Shack Color Computer. This is mentioned as a point of reference only -- this review

does not intend to pit the Colorama-50 against the Color Computer. As most of us have convenient access to a Radio Shack store, we can easily get a first-hand view of the 6847's color and pixel resolution capability. Generally speaking, any static display generated by the Color Computer can be reproduced with the Colorama-50. The display differences come about only in the degree of animation capabilities that are available. Depending upon the individual application, this may or may not pose any limitations.

Understanding the Colorama-50 is primarily a matter of becoming familiar with the many functions of the 6847 VDG. With this in mind, I will present a brief overview of the 6847's operational modes. Once over this hurdle, we will be in a better position to understand the features, pros and cons, and the compromises that all combined to make the Colorama-50. Finally, a software package is included in this article that provides all the color graphics drivers necessary to use the Colorama-50. Also included is an applications program that will allow you to create, from the keyboard, almost any desired color image on your TV set.

68-47 OR FIGHT

The general idea behind a chip like the 6847 is quite easy to grasp. It provides an interface that takes one dimensional data in RAM and displays it as two dimensional (think of it as an X,Y grid) on a color TV set. Actually, the 6847 is intended to provide signals to another chip, the MC1372, which generates the

actual NTSC composite color signal. The output of the MC1372 is then in turn fed into an RF modulator which places the signal on some unused TV channel. So there you have it -- data in RAM equals an X,Y display on a TV set, in color no less!

Like most graphics chips, the 6847 VDG can be placed in several "modes". This is accomplished by placing the appropriate binary code on the mode control input pins. The 6847 has a total of 11 modes available -- one alphanumeric, two semigraphic, and eight full graphic. Do not let 11 modes deter you in any way. There are only about four of them that can be considered unique. The chip was actually designed to minimally function with as little as 512 bytes of RAM. RAM can be added in distinct increments up to 6K to obtain more resolution. The end result is that several of the modes are simply replications of each other, but at higher resolution.

RESOLUTION

The term "resolution", when applied to chips of the 6847 genre, is perhaps more meaningful when broken up into two parts -- color resolution and pixel (dot) resolution. Strictly speaking, a single pixel is the smallest dot on the screen that the chip is capable of generating. With the 6847 this is always 256 x 192 in all modes. However, I will define an "effective pixel" as the smallest square on the screen that can be individually controlled by the user. Depending upon the mode then, an effective pixel may consist of

one or more single pixels. Finally, color resolution itself has two aspects -- how many different colors can an effective pixel take on, and how many of them have to be the same color before a color change can occur. These concepts will become clearer as the individual modes are discussed.

CHIP MODES

For example, in Semigraphics-4 mode the entire screen is divided into a coarse grid of 32 x 16 blocks. Each block is further broken down into four effective pixels. Each effective pixel in turn consists of 24 (6 x 4) single pixels which cannot be individually controlled. Therefore, the effective resolution to the user is 64 x 32 controllable squares. This is also the only mode in which all eight possible colors are simultaneously available. Unfortunately, only the coarse grid blocks can contain different colors, making an effective color resolution of 32 x 16 x 8. In other words, you can turn on or off each of the four effective pixels in a block, but all four must be the same color.

Semigraphics-6 mode is the same concept, but effective pixel resolution is increased by dividing each block into six parts instead of just four. Unfortunately, color resolution is also modified by breaking the eight colors up into two sets of four. Only one set can be displayed on the screen at a time. This color set division is also true for subsequent color modes.

The next eight modes are

termed full graphic modes. Four of them are color graphic modes where each effective pixel can be one of four colors. Pixel resolution goes from 64 x 64 to 128 x 192. It takes two bits in memory to map into one effective pixel. The other four provide higher pixel resolution but only two colors are available per pixel. Pixel resolutions range from 128 x 64 to the full 256 x 192. The mapping is one bit for each pixel.

The alphanumeric mode is self-explanatory. In this mode, 16 rows of 32 characters can be displayed. The 6847 has an internal ROM that contains a 64 character ASCII subset. Actually, there is a twelfth mode that allows the user to select an external ROM character generator instead of the internal one. However, this option is not implemented on the Colorama-50.

This, then, is the building block that dictates the performance of Colorama-50.

THE POSTMAN COMETH

I always have an indescribable feeling, somewhere between uncontained excitement and utter panic, every time the postman finally presents me with "that plain brown box". Will this turn out to be a Pandora's Box, or will it really give my computer the near magical abilities claimed in the brochures? So far PERCOM has yet to totally disappoint me. After opening the box, the initial encounter with Colorama-50 does not tarnish this image.

The board layout is quite good, and that all important first impression of component

symmetry, balance, and orientation passes with flying colors. Assembly is just as good. No detectable board warpage, all components neatly in place, properly seated, and flowsoldered. Even the color bands on every resistor are lined up! So far, so good -- kudos to the layout and assembly line personnel.

WHEN ALL ELSE FAILS... READ INSTRUCTIONS

Documentation included with the hardware consists of two thirty-page booklets -- a User's Manual (mostly concerned with hardware), and a supplement describing some available software. The printing of the manuals represents somewhat of a departure from Percom's usual 8 1/2 by 11 format. The two booklets are only 6 x 8, but the printing is both professional and legible.

The User's Manual presents all aspects of the hardware in a very understanding style. The average reader should have no trouble grasping the board's functions and getting it up and running. A complete schematic, board layout, and parts list are also included. I will defer comment on the Software Supplement until later.

BOARD MEETING IN SESSION...

Alas, beauty is only a flowsolder layer deep. The final outcome still depends on the quality and usefulness of the functions provided by the designers. First and foremost, all 6847 modes (except external ROM) are implemented. However 6K of RAM is required to

support this and Percom provides only 1K standard with the board. Of course, they will sell you the board with more memory, but it is probably less expensive to plug them in yourself (the RAM area is fully socketed).

For video output, Percom has provided a driver circuit that puts out a 75 ohm, NTSC compatible composite video signal. This is great if you happen to own an expensive color monitor. Most of us, however, will probably have to be content with using an ordinary color TV set. In this case, an RF modulator (not included because of some rather sticky government regulations) will be required.

So one must now trot out to the local Radio Shack, part with an additional \$17, and return with their ASTEC RF modulator, and don't forget the cable! Colorama-50 has space on the board conveniently designed to accept the ASTEC modulator. As another option, Percom describes how you can put your own parts on the board to construct an RF modulator. I do not recommend this option unless you have had some RF experience, are masochistic, or some combination thereof.

Actually I had some minor problems with the ASTEC modulator. The ASTEC puts the video on TV channel 3 or 4, which are apparently susceptible to RF interference generated by the computer. Sure enough, after firing up the board, I got a considerable amount of herringbone effect (background picture interference). I was using a SUP-R-Mod (channel 33) modulator on another board and decided to try it -- the problems vanished! Then I noticed that the SUP-R-MOD output cable was

looped several times through a large (1" dia.) ferrite core. Simply using this cable with the ASTEC considerably cut down on the interference level and produced a very acceptable picture.

The Colorama-50 also includes an on-board cassette I/O interface circuit for data storage on audio cassettes. Ostensibly, this is to aid in a minimal system configuration. It can supply the terminal functions as well as the mass storage functions. Not a bad idea, if you have need for it.

Another nice feature is an on-card socket that will accommodate a 2716 EPROM. I made a quick use of this space by placing my software drivers there. Percom was also far-sighted enough to provide separate buffers for the 2716. This accessing the EPROM does not disturb screen RAM.

Miscellaneous features include a 2-bit (no dis-parity intended) I/O port with one bit as input and the other as output. Another flip-flop on the board, which can be toggled by software, feeds the audio input to the ASTEC modulator. Thus elementary audio tones can be mixed with the video signal and will be heard through the TV speaker. Finally, horizontal and vertical sync signal bits may be polled by the computer as well as strapped to provide an interrupt.

MEMORY MAPS ARE MADE OF THIS?

Being a memory-mapped video board, the Colorama-50 requires an 8K block of address space. Unfortunately, it is further restricted to any even 8K block

in the upper 32K of the memory map. As the board fully supports extended addressing, this should pose little or no problems to 6809 users on the SS-50C buss. However, 6800 users may be hard-pressed to find 8K of room in the upper 32K. For 6800, the board may have to be modified to address in the lower 32K.

The first 6K of the Colorama-50 memory map is the video RAM area. The last 2K bytes address the EPROM. Percom has stolen four bytes from the EPROM for use as control ports. Writing to the first control port address sets up the 6847 modes. The next three, respectively, toggle the cassette output. Reading from any of the four control ports returns a status byte which monitors inputs and sync signals.

THE GOOD...

On the positive side, Percom appears to have put together some reasonably powerful graphics hardware that produces some very impressive static displays. The applications for such a display will be limited only by one's imagination. As the human mind easily responds to graphic images, almost any area of computer applications can be considerably enhanced by adding a little graphics "icing on the cake".

The most obvious application for the Colorama-50 is in the area of data presentation. Untold thousands of different graphs, plots, and charts can be dreamed up to visually represent data of all forms. For starters, make up a ten pile histogram and fill it up with random numbers to test you BASIC's RND function. Watch it

grow, you may be surprised! Plots of personal data vs time may show up some otherwise hidden aspects. This may include time plots of salary level, savings account status, food and utility expenditures, even golf and bowling scores.

Static displays, especially in the process control area, are almost becoming a necessity. How about a color status display for that Home Security/Energy Management System you have been dreaming about? Or a computer generated control panel for your model railroad?

For leisure time, the Colorama-50 can be used to make outstanding displays for certain games. Games that fall in this category include Checkers, Chess, Othello, Backgammon, and all varieties of card games.

THE BAD,

There is one area, however, where the Colorama-50 cannot effectively compete -- real time animation. There are two basic reasons that account for this limitation, both of them stemming from design oversights in the 6847 itself.

The first reason is the lack of an adequate solution to the memory contention problem. Remember that the 6847 must be continually accessing the screen memory during active scan times to provide screen refresh. If the CPU wishes to update this RAM area, the 6847 must be temporarily prohibited access. This results in unwanted data (snow) being randomly splattered on the screen. This is extremely annoying when one is expecting to see an image move smoothly across the screen.

the COLORAMA-50's solution is to provide the CPU access to the horizontal and vertical sync signals generated by the 6847. Memory updates during these periods will not disturb the display. This is entirely adequate for static or slowly changing displays, but hardly fast enough to meet the demands of real time animation. Design limitations in the 6847 make more amenable schemes, such as memory cycle interleaving, very difficult to realize.

Even if the memory contention problem was resolved, or just simply ignored, another more limiting factor would then prevail. It all starts with the basic incompatibility between data orientation in memory vs on the screen. Memory is one dimensional while the screen is two dimensional. The ramifications of this are best visualized by looking at a specific example.

Suppose we wish to draw a small square on the screen, consisting of 8 x 8 pixels, and then move it around. On the screen this two dimensional figure appears to be continuous. In human terms, it is totally obvious that specifying the X,Y coordinate of any corner is all that is necessary to define the figure's position on the screen. Unfortunately, the 64-bit pattern that makes up this figure is not all located together in a nice packet inside the video RAM. Instead, it is scattered throughout the RAM.

Just to draw the figure, the absolute address of each byte must be calculated from the X,Y coordinate. Then the particular bit is picked out and operated upon. Only then can the RAM be updated. This must be repeated 64 times -- a tremendous software burden! Now

to animate the figure, we must continually erase it and redraw it at a new position. Even a 6809 running at 2 Mhz. is hard pressed to keep this up on anything but the simplest of figures. Remember that real time animation requires that objects be smoothly moved in only a handful of milliseconds.

This type of animation, dreamed by most graphics programmers, is variously called single-plane, backdrop, or playfield animation. There are, of course, techniques and modifications that can be done to improve the situation -- after all, the Color Computer appears to animate, doesn't it? However, I will reserve further discussion on these points as a topic for another article.

...AND THE UGLY

Invariably, whenever the topic of Color Graphics comes up in a group, there are a few that can only conjure up an image of an idiot with a joystick playing Arcade-type games. It is extremely unfortunate that these individuals cannot seem to see beyond this minor application and look into the myriad of other applications now opening up. We had better face it -- graphics is fast becoming a powerful weapon in the never ending human-computer interface battle. Busses that do not have powerful graphics hardware and software may soon be relegated to a small corner in the museum of computer history.

TV OR NOT TV...

Although boards designed

around the 6847 chip are intended to pipe right into an "ordinary color TV", I must add a word of caution. Do not think for one moment that you can simply dust off that old color TV in the basement, hook it up, and expect to get the same results pictured in the magazine ads. The resolution of the COLORAMA-50, though modest by some standards, is still sufficient to overtax the capabilities of most TV sets.

The problem is mainly in the color convergence area. Most TV sets cannot converge (position) the red, blue, and green beams accurately enough over the entire screen to produce well defined color boundaries. For example, a small yellow square drawn in one corner may appear very smeared and multicolored around the edges. Yellow may only be apparent in a few pixels near the center of the square.

Very careful color alignment on two of my older sets improved the picture from "absolutely intolerable" to "mildly disappointing". On the positive side, a 4-year old Heathkit and a 1-year old RCA XL100 to me both produced acceptable results. However, these matters still fall into a highly subjective realm. Take heart though; users of the Atari, Apple, and Color Computer all face these problems, too.

SOFT WHERE?

One of the biggest stumbling blocks to mass usage of graphics on the SS-50 buss is the lack of a good software base. The hardware is just

beginning to appear and, predictably, the software takes a while to catch up. To make matters worse, unlike Apple, Atari, et al, there is no "standard" hardware/software configuration. This also implies that we lack the set of powerful graphics primitive commands that are baked into our ready-built cousins. Writing a complex applications program that utilizes readily available primitives is one thing. But to first have to write these sometimes not so obvious commands is often enough to turn aside even the most determined of individuals.

In the supplementary manual included with the board, Percom alludes to the availability of some 6809 software called CGOS 9.0. The first few pages describe using the dozen-plus commands that provide some very useful features. Unfortunately, the source listing is only partially included. In conversations with Percom, I gathered that CGOS 9.0 was never really completed due to a manpower shift in favor of higher priority projects. Oh well, they have to earn a living, too. However, there is a complete listing of a cassette loading/reading program included in the supplement.

Hopefully to help, and not to add to the confusion, I am offering a 6800 version of a graphics package. The driver package, COLOR4, allows the applications programmer to easily manipulate all graphics features of the Colorama-50. All modes, except the text mode, are supported. The user views each mode as an X,Y grid of the appropriate dimensions. I have left it up to the programmer to insure that the

X,Y coordinates chosen do not exceed the limits of the particular mode. If exceeded, the programs will not bomb, but some unexpected points may be set.

COLOR4 provides subroutines for setting the color, changing graphics modes, clearing or filling the screen, manipulating any X,Y point, and drawing a best fit line between any two X,Y pairs of coordinates. Lines and individuals pixels can be set, reset, or complemented (toggled) depending upon the contents of a register called PMODE. This should be more than sufficient to give everyone a good head start towards using the Colorama-50. For considerably faster performance, delete the sections of code that wait for retrace times.

To illustrate using the driver package, I have also included two applications programs. The first program, SKETCH, depicts usage with an assembly language program. SKETCH is an excellent program to use to become familiar with the operation of the Colorama-50. Simply stated, SKETCH turns the TV set into a keyboard-controlled drawing pad. Individual pixels and lines can be drawn in any color and moved around. Any graphic or pixel mode can be selected. A H(elp) command will display a command summary on the system terminal. Those familiar with graphics will recognize this as a "rubber-band line" program.

The second program illustrates one possible way to access the subroutines with BASIC user routines. The program is called RANDOMLINES and does exactly that -- random lines of various colors are drawn using graphics mode 8.

The program was written using TSC Cassette Basic. I have also included a chart that summarizes the BASIC statements to be used to perform the most common types of graphic manipulations.

I realize that I have been a bit sketchy in describing the uses and features of this package. However, a little study of the source listings and the Percom User's Guide should fit everything together.

FINALE, FINALLY...

There is little doubt that computer graphics is an area of rapidly growing importance. Color graphics, in particular, is probably the most visually spectacular. In a sense, Colorama-50 should be considered a pioneering effort in this area -- and a good one at that. All things taken into account, it has substantially more viable applications than limitations.

Percom has indicated to me that the COLORAMA-50 with 1K memory will go on sale this summer for around \$95.00. At these prices, it represents an excellent value received vs dollar spent investment. If nothing else, the unique graphics programming experience you will gain is worth the price of the board.

Software is still sparse, and what is presented here barely scratches the surface. Although the utilities represent a minimally complete set, there is much room for improvement. Improved software will generate a demand for improved hardware and vice-versa. And so, here's to a more colorful future!

[SS-50]


```

00001 NAM SKETCH
00002 OPT D.S.NO:
00003 *WRITTEN BY TOM HUNT
00004 *ALL RIGHTS RESERVED;
00005 *****
00006 * PROGRAM ETCH - A - SKETCH
00007 * GRAPHICS APPLICATION PGM TO ALLOW USER TO DRAW
00008 * LINES ON A GRAPHICS DISPLAY. THE PGM IS CURSOR
00009 * BASED -- THE LINE WILL FOLLOW THE CURSOR.
00010 * THE FOLLOWING COMMANDS ARE AVAILABLE:
00011 * K = MOVE CURSOR UP
00012 * L = MOVE CURSOR LEFT
00013 * < = MOVE CURSOR DOWN
00014 * > = MOVE CURSOR RIGHT
00015 * D = DRAW A LINE FOLLOWING THE CURSOR
00016 * S = SET THE LINE ALREADY DRAWN
00017 * C = CLEAR CURSOR FROM LINE
00018 * R = RESET SCREEN
00019 * N = NORMAL MODE
00020 * I = COMPLEMENT MODE (DEFAULT)
00021 * H = HELP (DISPLAY CMD LIST)
00022 * G = SET GRAPHICS MODE (0-9)
00023 * T = SET COLOR (TINT) 0-7
00024 *****
00025 * REVISION HISTORY
00026 * VER 1.0 ORIGINAL
00027 * VER 1.1 ADD COMPLEMENT MODE
00028 * VER 1.2 MODIFY FOR COLORAMA-50
00029 *****

```

SYSTEM LINKS

* * *	0000	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020
XREG	0000	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020
YREG	0001	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021
XEND	0002	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022
YEND	0003	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023
LSAVE	0004	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024
MODE	0005	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025
INCH	0006	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026
OUTCH	0007	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027
PXEL	0008	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028
LINE	0009	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029
741F	0010	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030
741C	0011	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031
GRNIT	0012	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032
CSET	0013	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0033
GNSET	0014	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0033	0034
7428	0015	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0033	0034	0035
GMODE	0016	0017	0018	0019	0020	0021	0022	0023	0024	0025	0026	0027	0028	0029	0030	0031	0032	0033	0034	0035	0036
GCODE	0017	0018																			

```

00001  NAM          COLOR4
00002  OPT          D,S,NOG
00003  *WRITTEN BY TOM HUNT
00004  * COPYRIGHT 1981
00005  *****
00006  * THIS IS A SET OF PRIMITIVE GRAPHICS DRIVERS TO
00007  * MANIPULATE A LINEAR-ADDRESSED VIDEO BOARD THAT
00008  * HAS BEEN SET UP FOR INDIVIDUAL PIXEL CONTROL. THE
00009  * SOFTWARE IS CAPABLE OF HANDLING UP TO 256 X 256
00010  * RESOLUTION
00011  * THE PROGRAMMER INTERFACES TO THE DRIVERS BY
00012  * VIEWING THE SCREEN AS AN X,Y CARTESIAN GRID WITH
00013  * THE ORIGIN (0,0) IN THE UPPER LEFT HAND CORNER
00014  * OF THE CRT. THE FUNCTIONS PROVIDED ARE:
00015  * 1. PIXEL -- SET ANY X,Y PIXEL
00016  * 2. LINE -- DRAW A LINE BETWEEN TWO X,Y POINTS.
00017  * NOTE: IF PMODE=0, ABOVE ROUTINES WILL ERASE.
00018  * IF PMODE=$FF, PIXELS WILL COMPLEMENT.
00019  * 3. INIT -- INITIALIZE THE COLORAMA-50 BOARD.
00020  * 4. SCRLR -- LOAD SCREEN MEMORY WITH ANY BYTE
00021  * (USUALLY A CLEAR SCREEN).
00022  * 5. CSECT -- CHANGE COLORS (0-7)
00023  * 6. GMSCT -- CHANGE GRAPHICS MODE (0-9)
00024  *****
00025  * REVISION HISTORY:
00026  * VER 1.1  SPEED UP PIXEL
00027  * VER 1.2  SPEED UP LINE
00028  * VER 1.3  ADD COMPLEMENT MODE
00029  * VER 1.4  IMPROVE DRAW
00030  * VER 1.5  ADD FAST EXITS
00031  * VER 2.0  MODIFY FOR COLORAMA-50
00032  * VER 2.1  ADD INDEXED PIXEL DRIVERS
00033  * VER 2.2  ADD WAITS FOR HOR/VERT RETRACE

```

SYSTEM EQUATES

* \$BFF0	GPRT \$A0	EQU \$A0	COLOR MODE PORT
000038	BASADM EQU		
000039	VIDWDM EQU	\$A000	
000040	VIDWDM EQU	\$A000	
000041	SCREND EQU	\$B7FF	
000042	SPORT EQU	\$B7FF	
000043	USRVAL EQU	\$BFF2	
000044		\$0046	
000045			
000046			
000047			
000048	XREG RMB	1	
000049	YBEG RMB	1	
000050	XEND RMB	1	
000051	YEND RMB	1	
000052	MASK RMB	2	
000053	XCOUNT RMB	1	
000054	XMOVE RMB	1	
000055	YMOVE RMB	1	
000056	XCHANG RMB	1	
000057	YCHANG RMB	1	
000058	XINC RMB	1	
000059	YINC RMB	1	
000060	TEMPS1 RMB	1	
000061	TEMPS2 RMB	1	
000062	PIXDVR RMB	2	
000063	BMOV RMB	2	
000064	GMODE RMB	1	
000065	COLOR RMB	1	
000066	CCODE RMB	1	
000067	CCODE RMB	1	
000068	LSAVE RMB	2	
000069	PMODE RMB	1	
000070	FILL RMB	1	


```

00142 108E CE 11B7 START1 LDX #CMTBL
00143 1091 BD FIAC INCH
00144 1094 A1 00 OVER CMP A
00145 1096 26 04 BNE LOOK
00146 1098 EE 01 LDX 1,X
00147 109A 6E 00 JMP 0,X
00148 109C 08 INX
00149 109D 08 INX
00150 109E 08 INX
00151 109F 8C 11E1 CPX
00152 10A2 26 F0 BNE
00153 10A4 20 E8 BRA
00154
00155 * * * MOVE THE CURSOR UP
00156 CURSUP LDA A
00157 10A8 26 02 BNE UP1
00158 10AA 20 E2 BRA START1
00159 10AC 4A UP1 DEC A
00160 10AD 97 26 STA A
00161 10AF 20 25 BRA
00162
00163 * * * MOVE THE CURSOR DOWN
00164
00165 CUDOWN LDA A
00166 10B1 96 22 CMP A
00167 10B3 91 27 BNE DOWN
00168 10B5 26 02 BNE START1
00169 10B7 20 D5 DOWN INC A
00170 10B9 4C STA A
00171 10BB 97 26 BRA
00172 10BD 20 18
00173
00174 * * * MOVE THE CURSOR LEFT
00175
00176 CULEFT LDA A
00177 10C0 26 02 BNE LEFT
00178 10C2 20 CA BRA START1
00179 10C4 4A LEFT DEC A
00180 10C6 97 25 STA A
00181 10C8 20 0D BRA
00182
00183 * * * MOVE THE CURSOR RIGHT
00184
00185 CURITE LDA A
00186 10CB 96 21 CMP A
00187 10CD 26 02 BNE RIGHT
00188 10CF 20 ED BRA START1
00189 10D1 4C RIGHT INC A
00190 10D3 97 25 STA A
00191 10D5 20 00 BRA
00192
00193 * * * CHANGE SCREEN TO REFLECT NEW INPUT
00194
00195 UPDATE LDA A
00196 10DB 96 20 BEQ
00197 10DD 27 27 MOVCLR CURSOR MOVE ONLY
00198 10DE 81 FF LDA A
00199 10E0 26 07 CMP A
00200 10E2 8D 60 BNE UP3
00201 10E4 8D 60 BSR SETLIN
00202 10E6 20 08 BRA UP2
00203 10E8 7F 0019 UP3 CLR
00204 10EA 8D 56 BSR SETLIN
00205 10EC 8D 741F BSR LINE
00206 10EE 7C 0019 INC
00207 10F0 26 25 LDA A
00208 10F2 96 25 STA A
00209 10F4 97 31 LDA A
00210 10F6 96 26 STA A
00211 10F8 97 22 BSR
00212 10FA 8D 46 SETLIN
00213 10FC ED 741F BSR LINE
00214 10FE 20 8D START2
00215 1100 20 8D BRA
00216 1102 20 8D EXIT

```

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00143 748B 4F SCRCR CLR A
00144 748C 2D 0016 TST
00145 748F 26 02 BNE SCR1
00146 7491 86 80 LDA A
00147 7493 CE A000 SCR1 LDY FOR SG 4
00148 7496 A7 00 STA A
00149 7498 08 INX
00150 7499 BC B800 CPX
00151 749C 26 F8 BNE SCR2
00152 749E 39 RTS
00153
00154 * * *
00155 *****
00156 * * * PIXEL ROUTINE FOR GRAPHIC MODES 3, 5, & 7 *
00157 *****
00158 LDA A
00159 749F 96 01 YBEG
00160 74A1 D6 00 LDA B
00161 74A3 58 ASL B
00162 74A5 56 LSR A
00163 74A6 20 04 ROR B
00164
00165 * * *
00166 *****
00167 * * * SET A PIXEL IN HIRIS MODE 256 X 192 *
00168 *****
00169 * * * ENTRY POINT FOR BASIC PGMS. POKE X *
00170 *****
00171 * * * XCOORD INTO XBEG & Y COORD INTO YBEG, MODE=0. *
00172 *****
00173 * * * FIRST, CONVERT X,Y TO MEMORY ADDR. *
00174 *****
00175 * * *
00176 GPIXEL LDA A
00177 74AB 96 01 YBEG
00178 74AD 44 LDA B
00179 74AF 56 XBRG
00180 74B0 44 LSR A
00181 74B2 56 LSR A
00182 74B4 97 0D ROR B
00183 74B6 D7 0E STA A
00184
00185 * * *
00186 *****
00187 * * * NOW GET THE MASK *
00188 *****
00189 * * *
00190 LDA A
00191 74C0 A6 00 XBRG
00192
00193 * * *
00194 *****
00195 * * *
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00213 1101 96 19  MOVCUR LDA A  MODE
00214 1103 81 FF  CMP A  $FFF
00215 1105 27 03  BEQ  MOV1
00216 1107 7F 0019  CLR  MODE
00217 110A 96 22  MOV1  LDA A  YCUR
00218 110C D6 21  LDA B  XCUR
00219 110E D7 00  STA B  XBEG
00220 1110 97 01  STA A  YBEG
00221 1112 BD 7422  JSR  PIXEL
00222 1115 96 19  LDA A  MODE
00223 1117 81 FF  CMP A  $FFF
00224 1119 27 03  BEQ  MOV2
00225 111B 7C 0019  INC  MODE
00226 111E 96 25  MOV2  LDA A  XNEXT
00227 1120 97 21  STA A  XCUR
00228 1122 97 00  STA A  XBEG
00229 1124 96 26  LDA A  YNEXT
00230 1126 97 22  STA A  YCUR
00231 1128 97 01  STA A  YBEG
00232 112A BD 7422  JSR  PIXEL
00233 112D 20 D0  BRA  START2
00234
00235
00236
00237 112F 86 01  *DRAW LINE AND SET LINE COMMANDS
00238 1131 97 20  *
00239 1133 96 21  DRAW  LDA A  $1
00240 1135 97 23  SET  LDA A  XCUR
00241 1137 96 22  LDA A  XBASE
00242 1139 97 24  STA A  YBASE
00243 113B 20 C2  BRA  START2
00244
00245
00246
00247 113D 7F 0020  *XCLR COMMAND
00248 1140 20 BD  *
00249 1142 96 23  CLEAR CLR  DRAWFL
00250 1144 20 BD  BRA  START2
00251
00252 1146 96 24  *PASS PARAMETERS TO GRAPHICS LINE GENERATOR
00253 1148 97 01  *
00254 114A 96 21  SETLIN LDA A  XBASE
00255 114C 97 02  STA A  XBEG
00256 114E 96 22  LDA A  YBASE
00257 114F 97 03  STA A  XCUR
00258 1150 97 03  STA A  XEND
00259 1152 39  LDA A  YCUR
00260 1154 97 03  STA A  YEND
00261 1156 97 03  RTS
00262
00263
00264 1158 97 03  *MODE COMMANDS
00265 115A 97 03  *
00266 115C 86 FF  COMP  LDA A  $FFF
00267 115E 97 19  STA A  MODE
00268 1160 97 01  BRA  START2
00269 1162 97 01  NORMAL LDA A  $1
00270 1164 97 19  STA A  MODE
00271 1166 97 20  BRA  START2
00272
00273
00274 1168 97 20  *INPUT A COLOR COMMAND
00275 116A 97 20  *
00276 116C 97 20  COLOR  LDX  $CRLF
00277 116E 97 20  JSR  PDATA1
00278 1170 97 15  LDX  $MSG1
00279 1172 97 15  JSR  PDATA1
00280 1174 97 15  AND  A  $7
00281 1176 97 15  STA A  CCODE
00282 1178 97 15  ADD  A  $30
00283 117A 97 15  JSR  QUITCH
00284 117C 97 15  LDA A  CSET
00285 117E 97 15  LDA A  MODE

```

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00214 74EB 26 04  HCLR1
00215 74ED C5 02  BIT  B
00216 74EF 27 F5  BEQ  HCLR
00217 74F1 A4 00  HCLR1 AND A  HSET1
00218 74F3 20 E2  BRA
00219
00220 74F5 F6 B8F0  *
00221 74F8 C5 01  LDA B  GPORT
00222 74FA 26 04  BIT B  $1
00223 74FC C5 02  BNE  HCOMPL
00224 74FE 27 F5  BIT B  $2
00225 7500 A8 00  BEQ  COMPL
00226 7502 20 D3  HCOMPL EOR A  HSET1
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00235 7504 96 03  *
00236 7506 D6 01  VLINE LDA A  YEND
00237 7508 10  LDA B  YBEG
00238 7509 26 04  SBA
00239 750B DE 0F  BNE  VLINE1
00240 750D 6E 00  LDX  PIXDVR
00241 750F 22 04  JMP  ONE POINT ONLY EXIT
00242 7511 70 000A  VLINE1 BHI  VLINE2
00243 7514 40  NEG  YCHANG
00244 7515 97 08  NEG  A
00245 7517 DE 0F  VLINE2 STA A  YMOVE
00246 7519 AD 00  LDX  PIXDVR
00247 751B 5F  JSR  B
00248 751C 96 01  CLR  B
00249 751E 9B 0A  VLINE3 LDA A  YBEG
00250 7520 97 01  ADD  A  YCHANG
00251 7522 37  STA A  YBEG
00252 7523 DE 0F  PSH  B
00253 7525 AD 00  LDX  PIXDVR
00254 7527 33  JSR  B
00255 7528 5C  PUL  B
00256 7529 D1 08  INC  B
00257 752B 26 EF  CMP  B
00258 752D 39  BNE  VLINE3
00259
00260
00261
00262 752E DE 0F  *HORIZONTAL LINE FAST EXIT
00263 7530 AD 00  *
00264 7532 5F  HLINE LDX  PIXDVR
00265 7533 96 00  JSR  B
00266 7535 9B 08  HLINE1 LDA A  XBEG
00267 7537 97 00  ADD  A  XINC
00268 7539 37  STA A  XBEG
00269 753A DE 0F  PSH  B
00270 753C AD 00  LDX  PIXDVR
00271 753E 33  JSR  B
00272 753F 5C  PUL  B
00273 7540 D1 07  INC  B
00274 7542 26 EF  CMP  B
00275 7544 39  BNE  HLINE1
00276
00277
00278
00279 7545 DE 0F  *DIAGONAL LINE FAST EXIT
00280 7547 AD 00  *
00281 7549 5F  DLIN LDX  PIXDVR
00282 754A 96 00  JSR  B
00283 754C 9B 08  DLIN1 LDA A  XBEG
00284 754E 97 00  ADD  A  XINC
00285 754F 97 00  STA A  XBEG

```


OS-9 MACRO TEXT EDITOR

by Ken Orme

The Macro Text Editor for OS-9 from Microware is a powerful editor that allows all the normal text editing of any line-oriented text editor, plus the addition of edit macros. The editor also allows some character oriented commands. It resides in approximately 7K

of memory with the actual editor requiring about 5K of RAM.

Some of the other features that make it nice include the ability to have more than one temporary buffer area (you may have multiple read or write files open simultaneously), allowing for a lot of flex-

ibility with files. All of the OS-9 commands are able to be called from "inside" the editor, eliminating the need to exit the editor to do something else. Still another nice feature is the ability to repeat commands, either a single one or a group of commands one or more times. Included with this

feature is the ability to check on a condition before repeating.

The text editor uses some 31 single keystroke commands to manipulate the text and the pointer. The thing that makes it better than some other text editors is that the syntax used with the program is a superset of the BASIC09 editor. Therefore in order to start using the editor, you won't have to begin another course of syntax revision. It gets bad enough knowing three or four BASIC's not to mention all the other programs. As with most good programs, this one allows more than one command to be entered on a single line. Spaces are used as delimiters for this function. Many of the regular control functions are supported, such as control X to delete the whole line, a control A repeats the previous line, and a control W will halt the output to the screen so you may stop it where you want with any other key resuming the output.

A few words about numeric and string parameters should be mentioned so that you can understand some of the syntax and limitations: If there is no number given where our examples have a "n" listed, it will default to 1 (usually one line). Numbers may be from 0 to 65535 and the "*" is used to represent infinity.

EDITOR COMMANDS

As mentioned in previous articles, OS-9 based software helps you to know what program you are using by the letter used in the prompt. The Macro Text Editor is no different. It uses the "E:" prompt which is the same as the editor in BASIC09, but normally you would know which program you called

in. To begin inserting text, you space once between the prompt and the beginning of your text, the same as BASIC09 when used without line numbers. Like the BASIC09 editor, you insert new text prior to the current line when doing this. There is another type of insert used, where you use the form "I n /text/". This will insert a line containing n copies of the text in the line. An example of this is where "I 40 /*/" will insert 40 stars in one line. The main purpose of this command is to be able to insert lines in a macro because no space prior to text may be used with the macro.

Some of the other commonly used "addition" and "deletion" commands include the "D" command, used to delete a line or "D n", used to delete n lines. The "K n" command kills n characters. The form "E n/string/" will extend n lines of text with the string given. An example would be "E 3 /XX/" would add "XX" to the end of the next three lines. The "U" command will "unextend" or truncate the line.

EDITING COMMANDS

There are many edit commands used with the OS-9 editor. One of the most common used is the "L", used to "list" or display text. The form "L *" lists from the current pointer to the end, and "L 5" lists the next five lines. It should be noted that the L command does *not* move the pointer. It is moved with pointer commands. The up arrow moves the pointer to the beginning, and the "/" moves it to the end. A carriage return will move the pointer to the next line and display it, with the "+ n" allowing you to move forward n lines and the "- n"

moving the pointer backwards n lines. Both the plus and minus commands also display the lines as the pointer moves. Since the editor is also character oriented, there are commands to move the pointer to the correct character, too. A right arrow n moves it forward n characters and a left arrow n moves it backward n characters.

Other editing commands include "S n /str/" which will allow you to search n lines for the string str. A syntax "C n /str1/str2/" will change the first string with the second string for n lines. The "A n" command sets the search anchor to a specific column number to begin searching from, if desired. The "T n" sets a tab to column n. The shell may be called directly with a ".shell text" command line. The form "M n" adjusts the workspace memory to n bytes and the .size command displays the workspace size. There is also a command for turning the verify on or off, which tells you the changes that have been made. The "Q" is used to quit editing. If you specified a file when you began, the text in the buffer will be output to that file.

FILE USAGE

There are some file commands to help work with new text from a file or to put text into a file. The ".new" command will save the current text in the output file and get new text from the input file. This is especially for the purpose of working on files larger than memory. The ".read str" command will close the current input file and open the file named str. And a nice feature to get back to the original read file is to say '.read ""'.

The write command works just the same, except with the output file. The "R n" command reads n lines from the buffer input file, and the "W n" command writes n lines to the buffer output file. As you can see, there are many possible file combinations available with the editor.

The buffers also have some edit commands. For instance, so that you may see the names of the buffers and macros, there is the ".dir" command which will display the secondary buffer name(s) under the \$ symbol and the primary buffer under the * symbol. The command "B n" switches to the alternate edit buffer. In addition, there is a "P n" command which puts n lines into the secondary buffer from the primary buffer and the "G n" command, which gets n lines from the secondary edit buffer.

FAIL FLAGS

One of the hardest things to get a handle on is the "fail flag". When the edit command cannot complete its operation, the editor sets an internal "fail flag". After the fail flag has been set, the editor will *not* execute any more commands until: (1 The end of a command line is reached, (2 The end of the current command loop is reached, or (3 A ":" command is encountered. One exception to this is when you use an "*" after the command. Remember, the "*" means infinity. The fail flag will not be set with the asterisk because it means to continue until there is nothing more to do. You may set the fail flag with some test conditions such as test for end of file, test for end of buffer, and other such con-

ditions. There are many of them, so we won't go into them in this review. Let it suffice to say that there are enough of them to test for any condition that you will probably encounter. There is also a method for conditional execution of commands. It is commanded by using a colon (:) before the command(s). It allows the editor to skip commands after the colon up to the end of the current line (or loop) if the fail flag is clear, or if the fail flag is set to clear the flag and execute the commands after the colon.

As mentioned earlier, there are ways of repeating commands any number of times. This is done by placing the command(s) within the square brackets, followed by a number n which says to repeat the command(s) n times.

MACROS

Since the name of the program we are talking about is the "Macro Text Editor", now comes the macro information. You may not have a lot of use for macros, but any time you have a frequently used sequence of commands, you could make a macro containing them which can be called with a simple command and causes the editor to carry-out the commands just as though you had typed in the entire sequence of commands. The macros are created simply by calling the macro command with a name and then describing the type and order of its parameters. Any of the normal command lines may be used in the macro except the space (as mentioned earlier) or the carriage return. The macro may contain parameters that may be passed on to the commands. For instance, you could make a macro "Change \$str1 \$str2 #n"

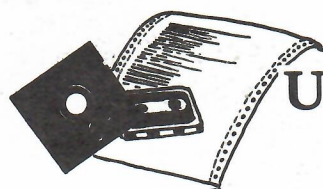
with the body of the parameter "C /\$str1/\$str2/ #n". This macro would be executed by typing the following: ".Change 'this' 'that' 5". The first parameter (\$str1) would be passed the string variable 'this' and the second one 'that', with the number 5 being passed for the #n.

To open a new macro, simply type ".MAC //". Since there is no name given, the macro editor will make a new one. Next, you must name the macro by hitting the space and then typing the name, followed by any parameters needed (in the order needed). The body may then be typed in by giving the commands along with the parameters in the proper sequence. To end the macro try typing ".ENDM". According to the manual(s) that we have, it should end. However, typing every known way of ending does not end the macro. How about your version? Does it do the same? Maybe our version 2.00 is due for an upgrade, or there is an error in the manual.

SUMMARY

The manual is quite good in the tutorial area, with many pages devoted to helping you through the commands. There is a nice command summary in the back, and a set of error messages and their meaning as well. All in all, the Macro Text Editor is a good package, with the exception of the macro problem. For a line/character oriented editor, there are many powerful commands, and very little that could be improved on. We have used it to write files for the OS-9 Assembler (covered next issue) and it has worked out fine. - Now, where's my macro?

[SS-50]



Utility Corner

MEMORY DUMP UTILITY

By Carl Kreider
22305 CR28
Goshen, IN 46526

Here is my memory dump transient. This utility program will run with the boundaries specified in the command line or it will prompt you if you forget. The program may also be "warm started" by entry at the org address plus three bytes.

(Editor's Note: This program came with a letter published several issues ago, and although we have tried the program which works fine, we hesitated publishing it without more comments on the operation. However, since we have room this issue we will publish it now and those of you that don't understand will soon catch on. Be sure to read the comments of the source and you will get some help there.

The program is written for the 6800, but may be modified for the 6809 with few changes. Also, the equate names given will help those who would like to run the program in Smoke Signal DOS. The OS-9 crowd will not need this if they have debug.

Try the program, you'll like it!)

```

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
MEMDUMP
OPT PAG,NOC,NOS
#DUMPS CORE FROM ONE SPECIFIED ADDRESS TO ANOTHER.
#NO PROVISION IS MADE FOR ROUNDING STARTS.
#WARM START ASKS FOR LIMITS SO IT RUNS STAND-ALONE
#OR FROM THE COMMAND LINE.
*
*SYNTAX - MEMDUMP,SSSS,EEEE
*WHERE SSSS=START ADDR & EEEE=END ADDR
*
AD03 ZWARM EQU $AD03
AD18 ZPUTCH EQU $AD18
AD1B ZLINEI EQU $AD1B
AD1E ZOUTST EQU $AD1E
AD24 ZCRLF EQU $AD24
AD42 ZGETHN EQU $AD42
*
A100 TCA EQU $A100
*
A100 ORG TCA
*
>A100 7E A14A JMP START
*
GO DO IT

```

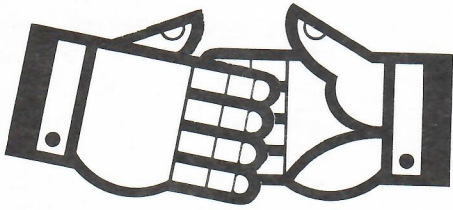


```

23 A103 8E RSTART LDX *TTOFRM GET LIMITS
24 A106 BD JSR PDATA
25 A109 BD JSR 7LINE1
26 A10C 20 BRA DUMP1
27
28 *
29 *RUN OF THE MILL PDATA ROUTINE
30 *REQUIRED BECAUSE THE FLEX STRING PRINT ROUTINE
31 *DOES A CR,LF FIRST!!!
32 PDATA1 BSR OUTCH
33
34 A10E 8D 1F
35 A110 30 01
36 A112 A6 84
37 A114 81 04
38 A116 26 F6
39 A118 39
40
41 *PRINT A HEX BYTE AS TWO ASCII CHARS
42 OUTCH TAB
43 LSR4
44 LSR4
45 LSR4
46 LSR4
47 LSR4
48 LSR4
49 LSR4
50 LSR4
51 LSR4
52 LSR4
53 LSR4
54 LSR4
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57 LSR4
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59 LSR4
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88 LSR4
89 LSR4
90 LSR4

```

[SS-50]



OS-9 EXCHANGE

by Gary Manning

Back in issue #1 (Jan-Feb 1980) we mentioned how to construct an interrupt timer for less than \$10 based on the MM5369 programmable oscillator boards that are widely available. (Digital Research Parts of Texas, Polypaks, etc. These boards use a 3.5MHz crystal and divide down to 60Hz output. The output can be connected to the C1 line on the "B" side of an MPLA or similar parallel I/O board to give a 60 Hz interrupt. In fact the oscillator board is so small that it can be glued to the edge of the MPLA board and take its power from it also.

This should be of interest to those who have, or are considering getting OS-9, since the system must have an inter-

rupt timer in order to use the multiprogramming and timesharing capabilities. Besides, it sure beats the cost of a dedicated interrupt timer board or a full blown real time clock.

To use these timer boards with OS-9, there are some problems to consider, the first of which is that OS-9 expects a 10Hz interrupt whereas the timer sends them at 60Hz. Probably the best solution is to connect a divide by 6 counter between the output of the oscillator board and the C1 line. Such a counter would be inexpensive and easy to make up. This would cost some in hardware but would cut down on the number of interrupts and their associated overhead by a factor of 6,

although you probably wouldn't notice the difference.

The second solution is to use a software patch which is cheap and easy and offers an example of how to modify an OS-9 memory module. I will present the second approach here.

Another problem is that if you have a parallel board in the first place, you probably have a printer on it, and wouldn't want to move it down to port 5. If you aren't using the "B" side of the board you can tell OS-9 to look up to port 7 (or some other port if need be) for the interrupt.

The module we need to change is named CLOCK. You may, and probably should, examine it by first SAVEing it on the disk and then DUMPing it to the

terminal or printer. Since the module is position independent, the listing will address each byte relative to the start of the module. These are the addresses that I will use. At \$07 is the attributes/revision byte, 81. The revision must be increased so that the new module will supercede the old one. In this case an 82 will do. At \$0C is the port address of the timer, 52. If you wish to move the board to port 7 then change this byte to 72, otherwise leave it alone. At \$8D is the expected number of interrupts per second in HEX, \$0A. Change this byte to \$3C for 60Hz. At \$93 is the number of ticks per time slice, 01. Set this byte to 06 for 60Hz. Be sure that you have the timer on the correct port before you make any changes. If you turn off the system you will lose the program. If you move the board with the power on you may damage it.

Use DEBUG (the interactive debugger) to make these changes to the module (see example). Now execute SETIME to start the clock, and see if the software clock keeps proper time by executing the DATE t or DIR commands. When the module works properly, SAVE it in the CMD5 directory.

OS9:DEBUG

Interactive Debugger

DB: L CLOCK
B000 87

DB: . .+7
B007 81

DB: =82
B008 2F

DB: . .+0C-8
B00C 52

DB: =72
B00D 43

DB: . .+8D-0D
B08D 0A
DB: =3C
B08E 97
DB: . .+93-8E
B093 01
DB: =06
B094 97
DB: Q
OS9:

Although the module works now if you try to load it the system will reject it because CRC and possibly the header parity will be wrong. You should now update the module with the proper CRC and header parity with the VERIFY command: VERIFY<LOCK >clk U. This will copy clock with the proper CRC and header parity into a module called CLK. Now make the module executable: ATTRCLK E and delete clock: DEL CLOCK. Now rename CLK to CLOCK: RENAME CLK CLOCK, a you are finished with the modification.

Other Things To Try

If you have a disk capable of track to track access times less than 30-40ms for 5" or 15-20ms for 8" you may increase the step rate by changing byte \$14 in the Device Descriptor for the disk drives (D0, D1, etc.). This byte is set at 00 but may be set to as high as 03. Each increase by one increases the step rate about two times or less depending on the controller and disk size. You may also wish to change other bytes in the initialization table depending on your drives, i.e. 40 track instead

of 35 (Byte \$17), double density instead of single (Byte \$16), etc. This information is listed on page 30 of the System Programmers Guide. After you make any changes, save and verify the module like was discussed for CLOCK.

The device descriptor for the parallel printer (P) was written for the MPL2 board. If you wish to use an MPLA board, change byte \$26 from 02 to 01. This will tell the system that there are four addresses on the board instead of sixteen.

As you can see, you may get several revised modules that need to be loaded after booting up. You can have the system load them for you by including the commands in the STARTUP file. Since the startup file cannot be appended, you will need to DELETE the old one and BUILD a new one. You may wish to list the old one to know what to copy over if desired.

OS9:LIST STARTUP
-P
LOAD DO
LOAD CLOCK
LOAD P
PRINTERR
SETIME
P

I hope that this will help clear up some problems and help you to get over the "Module-phobia" sometimes associated with OS-9. These "different" methods can be confusing, but that's where OS-9 gets many of its features. Besides, the manuals usually have the answers if you can "dig them out". I find that I like the system more and more as I finally understand how things work.

[SS-50]



New Products

TAPE BACKUP OPTION FOR WINCHESTER

SMOKE SIGNAL, manufacturers of the CHIEFTAIN Series of business computers, and PATHFINDER Series of Development Systems, announces tape streamer backup as an option for the company's line of 8-inch and 5¼-inch Winchester-based systems. The tape streamer is now a standard option to any CHIEFTAIN and PATHFINDER Winchester system for an additional \$1500 to list prices of the computer system. The tape streamer will store up to 20 Megabytes on ¼-inch cartridge tape.

With a tape streamer, the computer systems can now transfer 20 Megabytes of data in less than five minutes at 90 ips. The CHIEFTAIN/PATHFINDER Series also incorporate two means of backup with the streaming tape drive: file by file, or a complete backup with one single command. Drive-to-tape and tape-to-drive data transfer is provided.

The CHIEFTAIN/PATHFINDER Series of Winchester computer systems are based around 5¼-inch and 8-inch Winchesters ranging from 4 up to 60 Megabytes of storage and more. All systems are based around the state-of-the-art 6809 2 MHz microprocessor, and all computers come standard with 64K of RAM. Both CHIEFTAIN and PATHFINDER have standard options of operating Smoke Signal's DOS69D operating system of the UNIX comparable multi-user, multi-tasking operat-

ing system - OS-9 LEVEL I & LEVEL II. CHIEFTAIN computers have application software, business accounting software, data base management applications and special applications available.

For further information please contact: Deborah Conrad, Manager or Jim Allday, National Sales Manager, at Smoke Signal Broadcasting, 31336 Via Colinas, Westlake Village, CA 91362, (213) 889-9340.

WRITE 'N SPELL

WRITE 'N SPELL is a companion program to the SPELL 'N FIX (formerly called MAGIC SPELL). It is a spelling correction program. This program helps you to spell words right the first time before you have to resort to SPELL 'N FIX to fix them.

WRITE 'N SPELL is a dictionary lookup program which is used with your text editor. As you write your text, each time you come to a word whose spelling you are unsure of, you invoke WRITE 'N SPELL by typing a control character. This system allows you to then search through its dictionary to check on the correct spelling. Within a few seconds you're back in your editor, sure that your word is spelled right on the first try.

WRITE 'N SPELL is available now for 6800 and 6809 systems using Technical Systems Consultants' Text Editor and Flex. Other versions, including SSB and Screditor III versions as well as OS-9 and Color Computer versions, will be available soon. A disk system with a minimum of two drives and at least 40K of RAM is required.

The WRITE 'N SPELL is priced at \$75.11 with the same 10,000 plus word dictionary that is supplied with SPELL 'N FIX. SPELL 'N FIX owners who already

have the dictionary can get WRITE 'N SPELL for \$60.75. An optional super dictionary of 75,000 words is available for \$150 additional; this option requires disk storage of at least 250K bytes per drive.

This program is available from Star-Kits, P.O. Box 209, Mt. Kisco, New York 10549.

COMPUTERWARE INTRODUCES FINANCE PROGRAMS #1

Computerware introduces its FINANCE PROGRAMS #1 on cassette for the Radio Shack Color Computer.

Finance Programs #1 is a useful home/business software package that extends the use of the Color Computer beyond fun and games to the practical applications of finance. Divided into two categories, LOANS and INVESTMENTS, this program package makes all of the usually laborious calculations in a matter of moments, making financial decisions faster and easier for the home user and businessman.

Finance Programs #1 costs only \$21.95 and is available directly from Computerware at Box 668, 1472 Encinitas Blvd., Encinitas, CA 92024.

Z809 CP/M ON THE SS50 BUS

You can now run the industrial standard CP/M operating system on your 6800/6809 SS50 computer system. CP/M provides you with the ability to run ANSI Standard Basic and the large body of CP/M based software. The use of CP/M will greatly increase the software capability of your SS50 system.

The Z809 board is a combined hardware and software system for SS50 Bus Computers. With this integrated approach, bringing up CP/M is as easy as plugging in the Z809 board and booting the system.

The Z809 system is compatible with standard CP/M formatted disks so that software is easily exchanged or ported to other systems. The Z809 does not replace the CPU board presently in your SS50 system but works with it in a symbiotic relationship to enhance both the Z809 and your 6800/6809 CPU.

Contact: Meta Lab Computers, 2888 Bluff Street, Suite 106, Box 1559, Boulder, Colorado 80306.

SOFTWARE PACKAGES FOR 6809 and OS-9 SYSTEMS

Epstein Associates announces a unified graphics I/O package for the OS-9 Operating System. GRAFPAK generates graphics displays on any video board or terminal that supports point plotting.

The coPILOT is a Pilot-like interpreter ideal for the first-time computer-user in educational and industrial training applications. coPILOT features easy manipulation of character strings, a BASIC09-type editor and a HELP command which prompts with a list of available commands and their explanations. coPILOT is a stepping stone to BASIC09.

PAINT is a multi-cursor, multi-palette, menu-driven graphics program for generating schematics, animation and other displays with simple keyboard commands. User-definable figures can be created and recalled - all with single keystroke commands. Circles, lines, rectangles

and fills are also created with single keystrokes. Paint works with any video board or terminal that supports direct cursor addressing and point plotting including the GIMIX 512x512 and 80x24 video boards as well as color.

A development tool by the name of KONPROM which permits OS-9 generated object code, procedures and data files to be PROMed is also a software package from Epstein Associates. This requires a KONTRON MPP-S PROM Programmer. The package includes modem controls for downloading code over telephone lines and remote control of programmer. KONPROM can be modified by Epstein Associates for other programmers using standard protocols and having remote control features.

Prices for these packages and other worthwhile packages can be obtained by writing: Epstein Associates, 3657 Woodhead Drive, Northbrook, Illinois, 60062.

ANNOUNCING...68000 MICRO NEWS

A new magazine which will cover the Motorola 68000 micro-processor and related hardware and software products is being printed. The first issue will have a capsule summary of all available computers. Later issues will have more coverage of each system. A magazine that will put all the information about 68000 computers, software, and applications in one convenient place will help insure the success of these products.

Information concerning this publication can be obtained by writing 211 North Seventh Street, Allentown, Pa. 18102, or calling the President, David A. Bollmann at (215) 439-8888.

SPELL - TEST The Easy Way to Find Spelling Errors

To help you find those deadly spelling errors, the Frank Hogg Laboratory has released SPELL - TEST (tm) for FLEX (tm) based 6809 microcomputers. It will also be available for Microware's OS-9 operating system.

SPELL-TEST is completely menu driven and is very friendly to the user. The design goal was to make SPELL - TEST so simple to operate that a secretary could run it without picking up the manual. Hogg believes that goal has been met.

SPELL - TEST lets you check your spelling interactively -- by reading each word in context.

SPELL - TEST stops and points to all words that are possibly misspelled. When it stops you may Accept the word as it is, Accept it and Save it for use in an optional dictionary later, or may Replace it.

If you prefer, SPELL - TEST will also let you check your words individually -- you'll see only one word at a time and misspelled words stick out like a sore thumb. You also have the option of printing a complete list of words, either misspelled or valid. After you have checked the words, SPELL - TEST lets you Build a file of the words you want to save or Write a new -- Corrected -- text file to your disk. Your original masterpiece is saved, errors and all, in a backup file.

SPELL-TEST sells for \$195 for the object code on a standard FLEX disk. The source code may be purchased for an additional \$100. It is available from Frank Hogg Laboratory, 130 Midtown Plaza, 700 East Water Street, Syracuse, NY 13210. Orders may be made by phone at 315-474-7856. VISA and MASTER CARD are welcomed.

STYLOGRAPH™

6809
WORD PROCESSING SYSTEM

STYLOGRAPH 2.0

All of the convenience and features for which Stylograph is well known plus:

- True proportional printing on specialty printers.
- Files longer than memory.
- "Help" command to aid in learning.
- New menu driven, self prompting functions.
- Left and right scrolling for pages larger than screen.
- Embedded printer control commands allowed.
- Simplified method for underline, bold-face, superscript, etc.
- Supports NEC, Diablo, Qume, 737, and 739 printers.
- Can be user configured for virtually any terminal or printer.

\$295, manual \$15, updates from old versions \$180.

STYLOGRAPH 3.0

This version is designed for "tty" printers but is otherwise identical to version two. It does not support specialty characteristics such as superscript, subscript, incremental printing, and proportional printing.

\$195, manual \$15, updates from old versions \$90.

STYLOGRAPH MAIL MERGE

This program takes files of variables, such as names and addresses, and inserts them into a Stylograph text file for automated mail list generation. It will also allow a number of Stylograph text files to be appended at printout time so that page numbers and headings will be continuous in the printout.

\$125, manual \$10.

STYLOGRAPH SPELLING CHECKER

This is a valuable addition to any word processing application. It checks all words in a manuscript against an internal dictionary. The dictionary included has a vocabulary of over 20,000 words and is fully expandable. New words encountered in the text may be added to the dictionary making the creation of custom tailored and foreign language dictionaries a snap.

\$145, manual \$10.

When ordering specify operating system (FLEX™, Uniflex™, or OS-9™) and disk size. VISA & MC accepted. 20% discount on 3 program order.

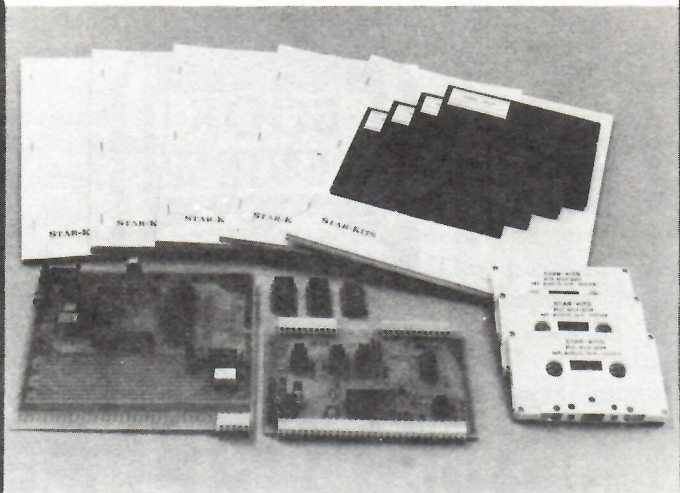


STYLO SYSTEMS

BOX 238 WILLIAMSVILLE, NY 14221

716-634-2466

STAR-KITS



6800 HARDWARE

SBC-02 single board computer uses 6802 with RAM, ROM, I/O. Ideal controller, intelligent interface, and more. Printed circuit board is \$25, complete controller kit \$75, wired and tested \$150. Also available: HUMB-BUG (see below), Basic in ROM, etc.

CT-PS serial/parallel interface card. ACIA-type interface for RS-232C terminal and/or a parallel keyboard. Makes keyboard look like a terminal with absolutely no program patching. Ideal for video board based systems. Bare board \$20, complete kit \$55, wired \$100.

6800 AND 6809 FIRMWARE

6800 HUMB-BUG monitor. Totally MIKBUG compatible, plus single-stepping, multiple breakpoints, formatted memory dumps, multiple port control and more. "Fantastic!" say our customers. 2K version \$40 on 2708 or 2716 EPROM with source listing. Alternate versions, including video board versions available.

6809 HUMB-BUG-09 has all the features of 6800 HUMB-BUG and more. Not just a compatible monitor, but a debugging package and system I/O manager as well. Two ROMs, manual and full program listing for \$75. Also available in video board versions.

6800 AND 6809 SOFTWARE

BASIC UTILITY PACKAGE rennumbers, pretty-prints, prints variable and transfer indexes, compares, shortens Basic programs. On Percom or miniFlex* disk for \$30.

CHECK 'N TAX balances your checkbook, finds errors, prepares income tax data. On Percom, miniFlex*, Flex 2.0* or Flex 9* disk for \$40.

SORT-MERGE—the only one for Percom disk systems, sorts even full-disk files. \$35.

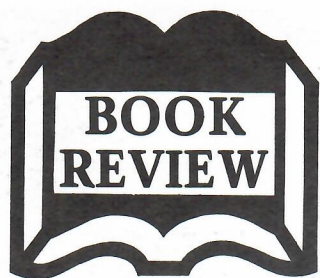
NEWTALK for your 6800 or 6809 system makes it talk to you. This memory dump utility outputs through a music board or any PIA port. \$30 on Percom or Flex 2/9 disk, or cassette.

6800 CROSS-ASSEMBLER written in Basic. Assemble 6800/6802 programs on your new 6809 (or your 370 at work!). Available on 5" disk, KC cassette, or TRS-80 Level II cassette for \$9.95.

GAME PACK with Eliza and 3-D Tic-Tac-Toe. 5" disk or KC cassette \$15.

Send s.a.s.e. for catalog. For detailed information, buy any manual for \$5 and get \$6 credit toward purchase. (* is a trademark of Technical Systems Consultants.)

STAR-KITS, P.O. Box 209, Mt. Kisco NY 10549



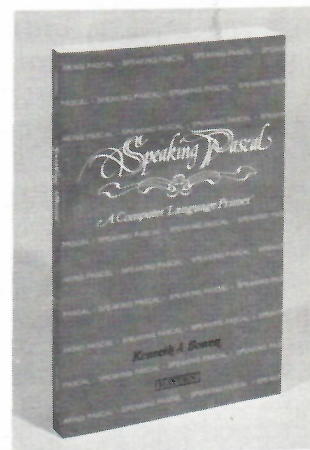
Speaking Pascal

A COMPUTER LANGUAGE PRIMER

By Kenneth A. Bowen

Hayden Book Co., Inc.

236 pages



by Ken Orme

Speaking Pascal is a book written for those who are interested in learning the Pascal language. In the 236 pages of this book you are taken on a short course in Pascal that almost everyone will grasp. The author has written the text in a non-mathematical approach that allows those who have never heard of Pascal to grasp the meaning and the program examples. This book is a good in-

troductory text that does not require the reader to have any programming experience to be able to understand it.

Mr. Bowen presents this book in ten chapters with five appendix topics. Although the book is written for what is commonly the international standard Pascal, it is easily adapted to other versions if needed. There are a few examples that use other versions which are noted in the text.

Even though the ten chapters

have longer names, they may be summed up as chapters named: Introduction, Expressions, Real Numbers and Strings, Iteration, Conditionals, I/O and Files, Arrays, Procedures and Functions, Records, and Program Design. Each chapter (except chapter one), has some exercises at the end of it which allows those who are trying to learn to program a means of testing themselves. It is handy for anyone who teaches

classes on introductory Pascal programming.

Though chapter one is the introductory chapter, the author gets off to a great start by presenting a simple program to illustrate Pascal and to have you read through it to gain an understanding of what it is doing. It seems very effective and is a great way to start this kind of book. He presents most of the terms that are used in the book in a short, in-context definition. Mr. Bowen presents the idea of having conversations with the computer and continues this trend throughout the book. It seems like a good approach, especially for the novice programmer.

The second chapter is called "Money Talk" and introduces integer expressions. The way Pascal works with integers is not only introduced here, but explained in a very understandable manner. The introduction to program structure is given in this chapter. And to help with integer thinking, a program called "Change" dealing with money is used for examples.

The information dealing with real numbers and strings is covered in chapter three which helps open your eyes to the wide variety of possibilities for programs. The author includes a couple short, concise programs which illustrate the subject very well.

Once you start to read chapter four on iterations, you start to really see the power of the computer and how the program can do some powerful things. The FOR/DO, WHILE/DO REPEAT/UNTIL, and infinite loops are covered here. Some very good example programs are presented to illustrate iterations.

The IF/THEN/ELSE is covered in the fifth chapter with more examples and information. Since the reader has a fairly good background of commands and syntax by this time, the author includes more exercises that are a bit more complicated than those at first.

The chapter on I/O and files gives the reader insight into organizing and reading/writing files. Formatted I/O is also introduced. Another point that is worth mentioning is that Mr. Bowen uses an approach of outlining the Pascal program before you actually write the final code. This outline form is not a "flowchart" or other device, but a true top to bottom approach first in English, then in Pascal.

The seventh chapter called "Table Talk" gives another nice approach by the author. Since the chapter is on arrays, the idea of a table comes to mind, such as a multiplication table. Mr. Bowen goes a step beyond this and introduces not only the array table, but the food table as the program topic. A program called Diet is introduced and worked out which illustrates the use of arrays. The string array is covered using this same approach.

Procedures and functions are shown in a nice way in chapter eight. With the approach that very long programs are hard to read and debug, the idea of using subprograms is introduced and explained. Both functions and procedures are covered in the example program. Mr. Bowen emphasizes that the Pascal program should be easy to read, and that the procedures and functions should fall in a naturally occurring order.

Even though chapter nine has a rather large typo on the second page of the chapter, it

still presents the topic of records very well. Again, a well suited example helps this chapter illustrate records and their use.

The tenth chapter covers program design and gives special emphasis on the top down program development and programming style. The program developed in the chapter deals with making the comments in Pascal "prettier" by placing them in boxes. This is helpful in talking about programming style.

The appendix has five subjects: Pascal at a Glance, Reserved words for Pascal, Intrinsic Functions and Procedures, Character Code Tables, and UCSD Pascal. Since the book is using standard Pascal, UCSD Pascal differences are covered (at least the major ones) in the appendix on UCSD Pascal. The others should be self-explanatory.

Even though the comments here are on a chapter by chapter basis, emphasis as to the way the book is written should be clear. Mr. Bowen seems to have a very good overall approach and very little can be improved on. I felt that he could have kept the vocabulary somewhat smaller, thus allowing the book to be read and understood by the high school student as well as college students. I probably go too far the other way, but there is a way to present things simply and still effectively.

Overall, the book is very good and is a must for those who have never programmed in Pascal before and are attempting to learn. There are other books on the subject, but this one is one of the best I have ever seen for beginning Pascal.


```

00284 117C 36 PSH A #1
00285 117D 86 01 LDA A #1
00286 117E 97 19 STA A MODE
00287 1181 BD 7422 JSR A PIXEL
00288 1184 32 UPDATE CURSOR
00289 1185 97 19 RESTORE MODE
00290 1187 7E 1082 STA A MODE
00291 JMP
00292 * HELP -- DISPLAYS COMMAND LIST ON CRT
00293 *
00294 118A C6 0C HELP LDA B #12
00295 118C CE 1384 LDX #CLRF
00296 118F BD E07E JSR PDATA1
00297 1192 5A F7 DEC B
00298 1195 26 F7 BNE HELP3
00299 1195 CE 138A LDX #MSGTBL
00300 1198 DF 2D STX TEMP
00301 119A EE 00 LDX 0,X
00302 119C BD E07E JSR PDATA1
00303 119F DE 2D LDX TEMP
00304 11A1 08 INX
00305 11A2 08 INX
00306 11A3 8C 13E2 CPX
00307 11A6 26 F0 BNE
00308 11A8 39 RTS
00309 *
00310 11A9 8D DF HELP2 BSR
00311 11AB 7E 1082 JMP
00312 *
00313 * DOS EXIT COMMAND
00314 *
00315 11AE 96 2A DOS LDA A ECHO
00316 11B0 DE 2B LDX ECHADD
00317 11B2 A7 00 STA A 0,X
00318 11B4 7E C000 JMP
00319 *
00320 * COMMAND LOOKUP TABLE
00321 *
00322 11B7 44 CMDTBL FCC /D/ DRAW LINE
00323 11B8 12F FDB DRAW
00324 11BA 53 FCC /S/ SET LINE
00325 11BB 133 FDB SET
00326 11BD 4E FCC /N/ NORMAL MODE
00327 11BE 159 FDB NORMAL
00328 11C0 49 FCC /I/ COMPLEMENT MODE
00329 11C1 1153 FDB COMP
00330 11C3 43 FCC /C/ CLEAR LINE
00331 11C4 113D FDB CLEAR
00332 11C6 4B FCC /K/ CURSOR UP
00333 11C7 10A6 FDB CURSUP
00334 11C9 4C FCC /L/ CURSOR DOWN
00335 11CA 10B1 FDB CUDOWN
00336 11CC 2C FCC /J/ CURSOR LEFT
00337 11CD 10BE FDB CULEFT
00338 11CF 2E FCC /O/ CURSOR RIGHT
00339 11D0 10C9 FDB CURITE
00340 11D2 47 FCC /G/ SET GRAPHICS MODE
00341 11D3 1015 FDB GRMODE
00342 11D5 48 FCC /H/ HELP INFO
00343 11D6 11A9 FDB HELP2
00344 11D8 54 FCC /T/ SET TINT OR COLOR
00345 11D9 115F FDB COLOR
00346 11DB 52 FCC /R/ RESET SCREEN
00347 11DC 104E FDB RESET
00348 11DE 45 FDB /E/ EXIT TO DOS
00349 11DF 11AE FDB DOS
00350 *
00351 * MESSAGE STRINGS
00352 *
00353 11E1 43 MSG1 /COLOR (0-7)??
00354 11E4 04 FCB 4
00355 11EE 47 MSG2 /GRAPHICS MODE (0-9)??

```



```

00356 1202 04 00356 75C6 23 10 00356 75C6 23 10 00356 75C6 23 10
00357 1203 54 00357 75C8 90 07 00357 75C8 90 07 00357 75C8 90 07
00358 120E 04 00358 75CA 97 12 00358 75CA 97 12 00358 75CA 97 12
00359 122F 4E 00359 75CC 96 00 00359 75CC 96 00 00359 75CC 96 00
00360 1242 04 00360 75CE 98 09 00360 75CE 98 09 00360 75CE 98 09
00361 1243 20 00361 75D0 97 00 00361 75D0 97 00 00361 75D0 97 00
00362 1258 04 00362 75D2 96 01 00362 75D2 96 01 00362 75D2 96 01
00363 1259 4C 00363 75D4 98 0A 00363 75D4 98 0A 00363 75D4 98 0A
00364 1269 04 00364 75D6 97 01 00364 75D6 97 01 00364 75D6 97 01
00365 126A 3C 00365 75D8 37 00 00365 75D8 37 00 00365 75D8 37 00
00366 127A 3E 00366 75D9 3E 0F 00366 75D9 3E 0F 00366 75D9 3E 0F
00367 128B 04 00367 75DB AD 00 00367 75DB AD 00 00367 75DB AD 00
00368 128B 04 00368 75DD 33 00 00368 75DD 33 00 00368 75DD 33 00
00369 128C 52 00369 75DE 5C 00 00369 75DE 5C 00 00369 75DE 5C 00
00370 129C 04 00370 75DF D1 07 00370 75DF D1 07 00370 75DF D1 07
00371 129D 44 00371 75E1 26 CD 00371 75E1 26 CD 00371 75E1 26 CD
00372 12AC 04 00372 75E3 39 00 00372 75E3 39 00 00372 75E3 39 00
00373 12AD 53 00373 75E5 39 00 00373 75E5 39 00 00373 75E5 39 00
00374 12BD 04 00374 75E6 D6 00 00374 75E6 D6 00 00374 75E6 D6 00
00375 12BE 43 00375 75E8 58 00 00375 75E8 58 00 00375 75E8 58 00
00376 12DE 04 00376 75F9 58 00 00376 75F9 58 00 00376 75F9 58 00
00377 12DF 4E 00377 75EA 44 00 00377 75EA 44 00 00377 75EA 44 00
00378 12E1 04 00378 75EB 56 00 00378 75EB 56 00 00378 75EB 56 00
00379 12E2 49 00379 75EC 20 05 00379 75EC 20 05 00379 75EC 20 05
00380 12F5 04 00380 75ED 5C 00 00380 75ED 5C 00 00380 75ED 5C 00
00381 12F6 48 00381 75F7 44 00 00381 75F7 44 00 00381 75F7 44 00
00382 1306 04 00382 75F8 8B A0 00 00382 75F8 8B A0 00 00382 75F8 8B A0
00383 1307 47 00383 75F9 8B A0 00 00383 75F9 8B A0 00 00383 75F9 8B A0
00384 131F 04 00384 75FA 56 00 00384 75FA 56 00 00384 75FA 56 00
00385 1320 54 00385 75FB 97 0D 00 00385 75FB 97 0D 00 00385 75FB 97 0D
00386 1330 04 00386 75FC 44 00 00386 75FC 44 00 00386 75FC 44 00
00387 1331 45 00387 75FD D7 0E 00 00387 75FD D7 0E 00 00387 75FD D7 0E
00388 1340 04 00388 75FE 00 00 00388 75FE 00 00 00388 75FE 00 00
00389 1341 20 00389 75FF D6 00 00389 75FF D6 00 00389 75FF D6 00
00390 1351 04 00390 7601 C4 03 00 00390 7601 C4 03 00 00390 7601 C4 03
00391 1352 3D 00391 7603 CB 18 00 00391 7603 CB 18 00 00391 7603 CB 18
00392 1362 04 00392 7605 D7 05 00 00392 7605 D7 05 00 00392 7605 D7 05
00393 1363 20 00393 7607 DE 04 00 00393 7607 DE 04 00 00393 7607 DE 04
00394 1372 04 00394 7609 A6 00 00 00394 7609 A6 00 00 00394 7609 A6 00
00395 1373 48 00395 760B DE 0D 00 00395 760B DE 0D 00 00395 760B DE 0D
00396 1383 04 00396 760D D6 19 00 00396 760D D6 19 00 00396 760D D6 19
00397 1384 0D 00397 760F 27 1C 00 00397 760F 27 1C 00 00397 760F 27 1C
00398 1384 0D 00398 7611 2B 17 00 00398 7611 2B 17 00 00398 7611 2B 17
00399 1384 0D 00399 7613 16 00 00399 7613 16 00 00399 7613 16
00400 1384 0D 00400 7614 D4 14 00 00400 7614 D4 14 00 00400 7614 D4 14
00401 138A 1384 00401 7616 43 00 00401 7616 43 00 00401 7616 43
00402 138C 1384 00402 7617 37 00 00402 7617 37 00 00402 7617 37
00403 138E 1341 00403 7618 F6 B8F0 00 00403 7618 F6 B8F0 00 00403 7618 F6 B8F0
00404 1390 1243 00404 761B C5 01 00 00404 761B C5 01 00 00404 761B C5 01
00405 1392 1363 00405 761D 26 04 00 00405 761D 26 04 00 00405 761D 26 04
00406 1394 1384 00406 761F 27 F5 00 00406 761F 27 F5 00 00406 761F 27 F5
00407 1396 1352 00407 7621 27 F5 00 00407 7621 27 F5 00 00407 7621 27 F5
00408 1398 1352 00408 7623 A4 00 00 00408 7623 A4 00 00 00408 7623 A4 00
00409 139A 1352 00409 7625 33 00 00409 7625 33 00 00409 7625 33
00410 139C 135A 00410 7626 1B 00 00410 7626 1B 00 00410 7626 1B
00411 139E 1384 00411 7627 7E 7AD7 00 00411 7627 7E 7AD7 00 00411 7627 7E 7AD7
00412 13A0 1373 00412 7628 1B 00 00412 7628 1B 00 00412 7628 1B
00413 13A2 1243 00413 7629 7E 7AD7 00 00413 7629 7E 7AD7 00 00413 7629 7E 7AD7
00414 13A4 129D 00414 762A 1B 00 00414 762A 1B 00 00414 762A 1B
00415 13A6 1384 00415 762B 1B 00 00415 762B 1B 00 00415 762B 1B
00416 13A8 1259 00416 762C 1B 00 00416 762C 1B 00 00416 762C 1B
00417 13AA 1243 00417 762D 1B 00 00417 762D 1B 00 00417 762D 1B
00418 13AC 12AD 00418 762E 1B 00 00418 762E 1B 00 00418 762E 1B
00419 13AE 1384 00419 762F 1B 00 00419 762F 1B 00 00419 762F 1B
00420 13B0 126A 00420 7630 1B 00 00420 7630 1B 00 00420 7630 1B
00421 13B2 1243 00421 7631 1B 00 00421 7631 1B 00 00421 7631 1B
00422 13B4 12BE 00422 7632 1B 00 00422 7632 1B 00 00422 7632 1B
00423 13B6 1384 00423 7633 1B 00 00423 7633 1B 00 00423 7633 1B
00424 13B8 127B 00424 7634 1B 00 00424 7634 1B 00 00424 7634 1B
00425 13BA 1243 00425 7635 1B 00 00425 7635 1B 00 00425 7635 1B
00426 13BC 12CF 00426 7636 1B 00 00426 7636 1B 00 00426 7636 1B
00427 13BE 1384 00427 7637 1B 00 00427 7637 1B 00 00427 7637 1B

```



```

00429 762A 7E 74F5 CPIX1 JMP COMPL COMPLEMENT MODE
00430
00431 762D 7E 74E5 CPIX2 JMP CLEAR RESET TO DEFAULT COLOR
00432
00433 *****
00434 ***** SET THE "COLOR" REGISTER. DESIRED COLOR CODE
00435 ***** IS PLACED IN "CCODE". CALLING "CSET" PLACES THE
00436 ***** APPROPRIATE MASK IN "CMODE". DEPENDING UPON THE
00437 ***** CURRENT MODE IN "CMODE". THE C88 BIT AT GPORT IS
00438 ***** ALSO CHANGED, IF NECESSARY. 80 BE CAREFUL--THIS
00439 ***** AFFECTS THE ENTIRE SCREEN!
00440 *****
00441 ***** COLOR CODES:
00442 ***** 1 = YELLOW
00443 ***** 2 = BLUE
00444 ***** 3 = RED
00445 ***** 4 = BUFF
00446 ***** 5 = CYAN
00447 ***** 6 = MAGENTA
00448 ***** 7 = ORANGE
00449 *****
00450 *****
00451 *****
00452 *****
00453 *****
00454 *****
00455 *****
00456 *****
00457 *****
00458 *****
00459 *****
00460 *****
00461 *****
00462 *****
00463 *****
00464 *****
00465 *****
00466 *****
00467 *****
00468 *****
00469 *****
00470 *****
00471 *****
00472 *****
00473 *****
00474 *****
00475 *****
00476 *****
00477 *****
00478 *****
00479 *****
00480 *****
00481 *****
00482 *****
00483 *****
00484 *****
00485 *****
00486 *****
00487 *****
00488 *****
00489 *****
00490 *****
00491 *****
00492 *****
00493 *****
00494 *****
00495 *****
00496 *****
00497 *****
00498 *****
00499 *****
00500 *****

```

```

00428 13C0 129C
00429 13C2 12A3
00430 13C4 12E2
00431 13C6 1384
00432 13C8 12F6
00433 13CA 1243
00434 13CC 1307
00435 13CE 1384
00436 13D0 1248
00437 13D2 1243
00438 13D4 1320
00439 13D6 1384
00440 13D8 1248
00441 13DA 1243
00442 13DC 1331
00443 13DE 1384
00444 13E0 1384
00445 13E2 13E2
00446
00447
00448
00449
00450
00451 13E2 3F
00452 13E7 7F
00453 13EC 1F
00454 13F1 5F
00455
00456

```

```

SYMBOL TABLE:
XBEG =0000 YREG =0001 XEND =0002 YEND =0003 LSAVE =0017
MODE =0019 INCH =E1AC OUTCH =E1D1 LINE =741F
GRINIT=741C CSET =7425 GSET =742B GCODE =0016
CCODE =0015 PDATA1=E07E SCRLR=742B SCR1 =742E DOSADD=C000
DRAWFL=0020 XCUR =0021 YCUR =0022 YBASE =0024
XNEXT =0025 YMAX =0027 XMAX =0028 NOECHO=0029
ECHO =002A ECHADD=002B TEMP =002D INIT =1000 GRMODE=1015
START1=108F RESET =104E RESET1=1073 RESET2=1078 UP1 =10AC
CUDOWN=1081 DOWN =10B9 CULEFT=10BE LEFT =10C4 CURITE=10C9
RIGHT =10D1 UPDATE=10D6 UP3 =10E7 UP2 =10F2 START2=10FF
MOVCUR=1101 MOV1 =110A MOV2 =111E DRAW =112F SET =1133
CLEAR =113D SETLIN=1142 COMP =1153 NORMAL=1159 COLOR =115F
HELP =118A HELP3 =118C HELP1 =1198 HELP2 =11A9 DOS =11AE
CMTBL=11B7 TAREND=11DE MSG1 =11E1 MSG2 =11EE MSG3 =1203
MSG4 =122F SPACES=1243 MSG5 =1259 MSG6 =126A MSG7 =127B
MSG8 =128C MSG9 =129D MSG10 =12AD MSG11 =12BE MSG12 =12CF
MSG13 =12E2 MSG14 =12F6 MSG15 =1307 MSG16 =1320 MSG17 =1331
MSG18 =1341 MSG19 =1352 MSG20 =1363 MSG21 =1373 CRLF =1384
MSGTRL=138A TBLEND=13E2 GRTRL =13E2
TOTAL ERRORS 00000

```



```

*****
SUMMARY CHART: Use of Graphics Utilities in a BASIC environment.
*****
1. For convenience, assign variables to absolute routine addresses:
   10 C1=29724:C2=29727:C3=29730:C4=29733
   20 C5=29736:C6=29739:C7=29745

2. Set address of BASIC's user routine:
   30 POKE 68,119:POKE 69,137
   40 Z=USR(C1)

3. To initialize:
   40 Z=USR(C1)

4. To set graphics mode:
   50 POKE 22,G:Z=USR(C5) where G=Desired Mode (0-9)

5. To clear screen:
   60 Z=USR(C6)

6. To set color of upcoming pixels:
   70 POKE 21,C:Z=USR(C4) where C=Desired color (0-7)

7. To set pixel mode:
   80 POKE 25,M where M=1 pixels turned on
   M=0 pixels turned off
   M=255 pixels complemented

8. To fill screen (set background color):
   90 POKE 26,B:Z=USR(C7) where B= value of byte to be placed
   in every screen location.

9. To manipulate an X,Y pixel:
   100 POKE 0,X:POKE 1,Y:Z=USR(C3)

10. To draw a line between XB,YB and XE,YE:
   110 POKE 0,XB:POKE 1,YB:POKE 2,XE:POKE 3,YE:Z=USR(C2)

*****

```

```

5 REM RANDOM LINE PROGRAM FOR COLORAM-50
10 REM ASSIGN JUMP TABLE ADDRS TO COLOR4
20 C1=29724:C2=29727:C3=29730:C4=29733
30 C5=29736:C6=29739:C7=29745
35 REM SET ADDRESS OF USER ROUTINE
40 POKE 68,119:POKE 69,137
90 A=3:B=1:C=0
100 Z=USR(C1):POKE 22,8:Z=USR(C5)
110 Z=USR(C6):POKE 25,1
120 POKE 0,127*AND(0)
130 POKE 1,191*AND(0)
140 FOR I=1 TO 100
150 POKE2,127*AND(0)
160 POKE3,191*AND(0)
170 POKE21,1*AND(0)+B:Z=USR(C4)
180 Z=USR(C2)
190 NEXT I
200 FOR I=1 TO 1000:NEXT I
210 Z=USR(C6)
220 FOR I=1 TO 500:NEXT I
230 IF C=1 THEN C=0:B=1:GOTO 120
240 IF C=0 THEN C=1:B=5:GOTO 120
250 END

```

00501	767A	C4	01	AND B	#1	
00502	767C	1B		ABA		INDEX INTO TABLE
00503	767D	8B	04	ADD A	#4	
00504	767F	97	05	STA A	MASK+1	POINT TO MASK
00505	7681	DE	04	LDX	MASK	
00506	7683	A6	00	LDA A	0,X	FETCH IT
00507	7685	DE	0D	LDA B	TEMPS1	POINT TO SCREEN
00508	7687	D6	19	PHODE		CK PIXEL MODE
00509	7689	27	21	BEQ	CLEAR	
00510	768B	2B	2F	BNE	COMPL	
00511	768D	F6	BF	LDA B	GPOR	WAIT FOR RETRACE
00512	7690	C5	01	BIT B	#1	
00513	7692	26	04	BNE	SGR42	
00514	7694	C5	02	BEQ	#2	
00515	7696	27	F5	BEQ	SGR41	SET PIXEL
00516	7698	AA	00	ORA A	0,X	MASK LUMINANCE
00517	769A	8A	0F	AND A	#0F	ADD IN COLOR
00518	769C	9B	14	ADD A	COLOR	
00519	769E	F6	BF	LDA B	GPOR	
00520	76A1	C5	01	BIT B	#1	
00521	76A3	26	04	BNE	SGR44	
00522	76A5	C5	02	BEQ	#2	
00523	76A7	27	F5	BEQ	SGR43	
00524	76A9	A7	00	STA A	0,X	LOAD IT
00525	76AB	39		RTS		
00526				*		
00527	76AC	43		CLEAR	COM	RESET PIXEL
00528	76AD	F6	BF	LDA B	GPOR	
00529	76B0	C5	01	BIT B	#1	
00530	76B2	26	04	BNE	SGR47	
00531	76B4	C5	02	BEQ	#2	
00532	76B6	27	F5	BEQ	SGR45	
00533	76B8	A4	00	AND A	0,X	
00534	76BA	20	DE	BRA	SGR46	
00535				*		
00536	76BC	F6	BF	COMPL	LDA B	GPOR
00537	76BF	C5	01	BIT B	#1	
00538	76C1	26	04	BNE	SGR48	
00539	76C3	C5	02	BEQ	#2	
00540	76C5	27	F5	BEQ	COMPL	
00541	76C7	A8	00	EOR A	0,X	
00542	76C9	20	CF	BRA	SGR46	
00543				*		
00544				*		*****
00545				*		MANIPULATE A PIXEL IN SEMI-GRAPHICS MODE 6.
00546				*		64 X 48 EFFECTIVE RESOLUTION. TWO SETS OF 4
00547				*		COLORS EACH AVAILABLE. STORE COORDS AND PMODE
00548				*		AS ALWAYS.
00549				*		*****
00550				*		*****
00551	76CB	86	20	LDA A	#20	
00552	76CD	97	0D	STA A	TEMPS1	
00553	76CF	96	01	LDA A	YBEG	DIVIDE YBEG BY 3
00554	76D1	48		ASL A		
00555	76D2	48		ASL A		
00556	76D3	97	0E	STA A	TEMPS2	DIVIDEND
00557	76D5	4F		CLR A		
00558	76D6	5F		CLR B		
00559	76D7	79	00	E SLOOP	ROL	TEMP2
00560	76DA	49		ROL A		
00561	76DB	81	03	CMP A	#3	DIVISOR
00562	76DD	2D	04	RLT	SG61	
00563	76DF	80	03	SUB A	#3	FORM QUOTIENT
00564	76E1	DA	0D	ORA B	TEMPS1	
00565	76E3	74	00	LSR	SG61	
00566	76E6	24	FF	BCC	SGLOOP	
00567	76E8	97	17	STA A	LSAVE	STORE LUMINANCE POINTER
00568	76EA	96	00	LDA A	XBEG	NOW FORM REL ADDR
00569	76EC	48		ASL A		TOSS OUT 2 MSB'S
00570	76ED	48		ASL A		
00571	76EE	54		LSR B		B STILL HAS Y DIV BY 3

WHERE HAVE ALL THE COMPUTER KITS GONE?

by Harold Mauch

I like to visit computer stores and listen to the questions of customers.

Some ask about a common fruit; others ask about the health of a deceased gentleman from Fort Worth.

A few ask for a computer they can build themselves.

"I'm sorry," they're told, "but we don't carry kits any more. Too much hassle."

"If you like to experiment, we have a gee-whiz dandy Chroma Dazzler that can speak 16 languages, maintain 32,768 recipes, schedule 65,536 appointments and balance your checkbook.

And you don't even have to know how to program. We're offering this little gem today for just \$1,999.99, and that includes disk storage."

Just \$1,999.99?

Many a computerist bought a SWTP or other SS-50

computer because of the processor. Or because they enjoy building kits. But I suspect more than a few bought kits because it was the one way they could afford to own a computer. No doubt there's a substantial market for computer kits. So why aren't there more computer kit manufacturers?

I think I know the answer.

The fine efforts of SWTP notwithstanding, much System-50 hardware and software came out of the spare bedrooms, garages and basements of fledgling, but determined entrepreneurs.

Let's suppose you want to become just such an entrepreneur, and in the process maybe we'll find the answer to the question about the scarcity of kit vendors.

You decide to get into the computer kit business. Why kits? Well, you can't afford to start up an assembly operation. Besides, you honestly want to give prospective customers the lowest price possible. A

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GENERAL INTEREST

Double-Density Adapter for System-50

Many people have asked if our double-density adapter, which we developed for the TRS-80☆ computer, could be used with the SS-50 bus disk controller. Unfortunately, it is *not* a simple plug-in-and-run situation for either the Percom or SWTP controller. However, the Doubler, as the Percom TRS-80☆ double-density adapter is called, can be easily connected to the older Smoke Signal controller. Dale French, one of our System-50 technical specialists, is working out the details for connecting the DOUBLER™ modifications along with the OS-9 driver in the next issue of the Peripheral.

price 15% above cost seems reasonable.

Design through hardware prototyping is easy. After all, you are a senior designer -- at TI no less. You do a little fine-tuning of the design and get prototypes made. Now the fun begins.

A small ad in Byte and a small stock of kit parts wipes out most of the family savings. You confidently reassure your wife, however, and together you wait for the orders to roll in.

Meanwhile, you hawk a few kits to members of the local computer club. And spend the next several weeks solving their individual problems -- cold solder joints, wrong capacitor polarities and owner design "Improvements" that don't work.

Finally your ad appears in Byte. You soar like an eagle. (Hon, we're gonna be rich!)

You resist the urge to buy up all the new Byte magazines at the local computer store, limiting yourself to a mere 10 copies. Of course mother back in Toledo gets one. (Look Ma, I've got my own business!)

The Byte ad makes you an instant expert, so naturally you're invited to give a demo at the next computer club meeting. Is this the beginning of fame?

By now the ad has been out a week. You've had a few callers (keep that damn dog quiet while I'm on the phone!), and a few people have written for more information. (More information? Good grief, the ad copy took two days to write and gives everything but the length of the heat sink bolts.)

Never mind. You take the Byte ad, and with the help of your wife's thesaurus, grind out a data sheet. You include specifications for the heat sink fastener.

Before long the postman is delivering your bills in a basket: an invoice for the data sheet printing, a Byte invoice for the next ad insertion, a phone bill that infuriates your wife (Hon, call the phone company, I know I didn't make *that* many long-distance phone calls.), and so on.

Your boss at TI is beginning to make snide remarks about the lagging status of your work project. But these are trifles compared to the next bomb?: a design flaw in the kit! (Oh, my God! How can I face the computer club again.)

You design out the flaw but can't ship because the new IC for the fix isn't available. The complaints begin. "Wherein hell's my kit -- you promised it four weeks ago."

One irate customer wants his money back. Another demands to know why the users manual doesn't explain how to use the product with his home brew 4004 machine. Both promise scathing letters to Byte, the Better Business Bureau and their congressmen. (God, my gut aches.)

The new ICs finally arrive. Your wife calls you at work to tell you the UPS driver won't take a personal check. (Cashier's check or money order, please.)

You tell the boss that son #2 seems to be having an attack of appendicitis, and must be rushed to the hospital. Then you rush to the bank, withdraw \$475 from the wife's Christmas Club account and race to the house. Wife suspects, but you jump back in the car before the questions start. Back at work you tell the boss it was a false alarm, "The little nipper just ate too many fresh cherries, heh, heh."

More than a few long-distance callers, saying they weren't about to buy a pig-in-a-poke, want to know the whereabouts of dealers in their area. So you decide to line up dealers.

The first dealer doesn't have the courtesy to say goodbye when you suggest a dealer cost of 5% off retail. Neither does the second dealer, the third, etc. You soon learn that retailers expect--indeed need-- a 35% mark up. Or thereabouts.

You call an old college friend, one who switched from engineering to a business major, and plead your case. After he stops laughing (why did I tell him we price at 15% above costs), and after discussing cash flow and return on investment, he offers to help -- for a piece of the action. (Maybe these business majors are really the smart ones after all?)

At any rate you raise the price and start calling dealers again. Now the price is OK, but the dealers won't carry kits: too much hassle. (No fools, these dealers.) So willy-nilly, you get into the business of assembling electronic modules. You start slow. Boy, do you start slow -- one employee, an ex-TI assembler needing part time work, a soldering iron and flux, a solder sucker and a few hand tools. The lady assembler is competent: her only question concerns getting paid. Nothing serious.

In the unlikely event (as you tell yourself) that you can't "meet payroll," you decide to seek a bank loan. Bankers make unsecured loans about as often as smog-free days occur in Los Angeles, so you pledge your car, the house, a quart of blood and a pound of flesh--but get the loan.

You meet the payroll, i.e., you pay the lady assembler. She smiles, looks at the check, frowns, shrugs and disappears forever. You're out of the assembly business.

It's time, you decide, to sit down and take a real hard look at the business. You call a buddy, a fellow industrialist of kindred interests, and together do a (sound of bugles, roll of drums) COST ANALYSIS. All things considered -- parts bagging errors, solder bridges, troubleshooting over the telephone and letters, letters, letters -- you conclude that...

Kits cost more!

And that, weary reader, is the bottom line. It costs more to produce, market and support kits (with the

emphasis on support) than it costs to produce and sell assembled and tested units.

It is enlightening, in this respect, to compare the price of a Heathkit color TV kit to the price of a comparable RCA, Magnavox or Quasar set. There's little difference. Yet, the customer will always insist that kits be priced substantially lower.

Unfortunately -- for those of us who would rather build a kit -- few kit suppliers become very successful. And it appears that we will be getting those few kits that are available from a UPS delivery man, after placing a long-distance call that's answered from a phone in a bedroom or garage.

OF INTEREST -- Harold Mauch, president of Percom Data Company, recently announced that Percom and Access Unlimited, a computer retailer, have agreed to join in a cooperative venture which will make Access Unlimited a retailer of Percom System-50 (SS-50) products.

Access Unlimited is a Richardson, Texas-based mail-order and direct sales retailer of computer equipment, software and parts.

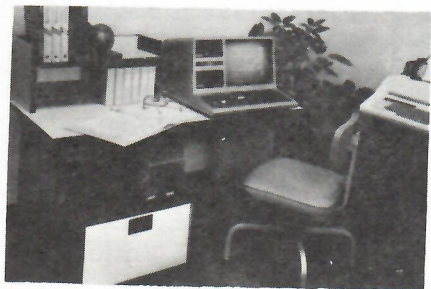
Manufacturers and software vendors other than Percom also will be contacted.

The program calls for Access to become one of the largest, if not the largest, integrated, full-line source of 680X products for the sophisticated System-50 market place.

Interested suppliers can reach Access Unlimited at:
401 N. Central Expressway #600
Richardson, Texas 75080
(214) 690-0206

NEW PRODUCTS

Although this section usually features new System-50 hardware and software products, in this issue we would like to mention two computing "Accessory" items that we have carried for only a short time but which are proving to be very popular.



System Desk, Printer Stand --Custom-designed to Percom specifications, this system of low-cost computer

furniture organizes your computer station into a compact, convenient arrangement of accessories and peripherals.

☆ Furniture quality styling and finish.

☆ Modular design lets you customize to particular needs.

☆ Units knock down for shipment -- delivery is right to your door.

☆ Snap-locking fasteners -- no tools required for reassembly.

System Desk

The under-desk module accommodates either one or two drawers, and can be located either to the right or to the left. The drawers, which are on ball-bearing rollers, have a full-width opening in the rear for equipment cabling.

The riser shelf can be used to support a display unit, hold reference manuals, etc. The riser also can be positioned either to the left or to the right.

Printer Stand

The under-desk module plays a dual role, serving either as the desk bay or, with an optional top added, as a printer stand. With the top in place, the printer stand and desk are the same height.

Specifications --The desk is 48" wide, 24" deep and 26-½" high (typing height). The riser is 23" wide and 11" deep. The riser shelf can be at 7-½" or 11" above the desk top. The desk bay inside dimensions are 16" wide by 16" deep by 10½" clearance height. The printer stand (under-desk module with top in place) is 24" wide by 24" deep by 26-½" high. Finish is wood and durable plastic laminate.

To order or for additional literature, call toll-free 1-800-527-1222.



Microline 80 Printer

No other serial dot-matrix printer has so many features for the price:

- ☆ Prints upper and lower case characters in standard-condensed- and double-width faces.
- ☆ Prints block graphic characters.
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Editors Note-

A supplement to the Peripheral is available from Percom Data Company. The supplement includes more specific information - - for example, additional notes on product improvement and maintenance. This supplement may be obtained from Percom by calling our toll-free order number, 1-800-527-1222. From within Texas, call (214) 340-7081.

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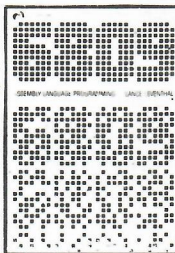
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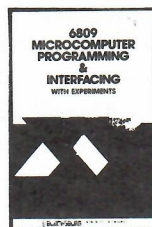
6809 Assembly Language Programming

This book presents a thorough introduction to assembly language programming and a complete discussion of the 6809 instruction set. It starts at a very basic level and builds into actual programming techniques, I/O structures, and hardware interfaces. By Lance Leventhal. 530 pages. Order No. 357 **\$16.99**



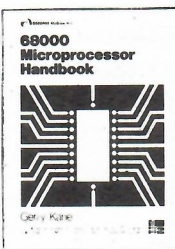
6809 Microcomputer Programming and Interfacing/Experiments

This book is written to give sound information on how to program and interface the 6809-the high performance 8-bit microprocessor. It contains seven chapters and four appendices and is valuable as a "cookbook" aid when working with the 6809. By Andrew Staugaard, Jr. - 304 pages - Order No. 21798 **\$13.95**



68000 Microprocessor Handbook

This handbook gives a complete comprehensive picture of the 16 bit 68000 microprocessor, its timing, and special features. Also, several practical application problems and discussed and it is compared to other 16 bit devices. By Adam Osborne - 220 pages. Order No. 411 **\$6.99**



MC6809 Cookbook

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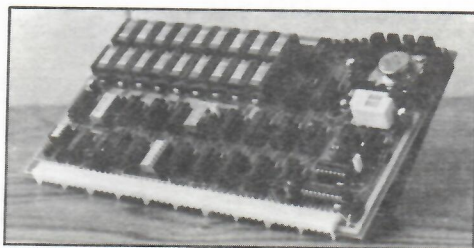
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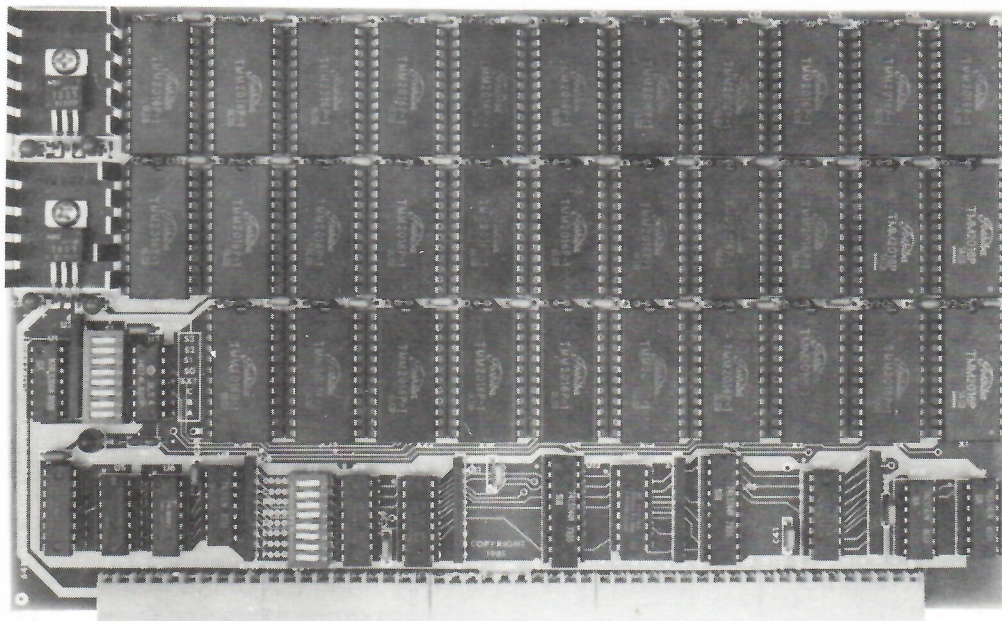
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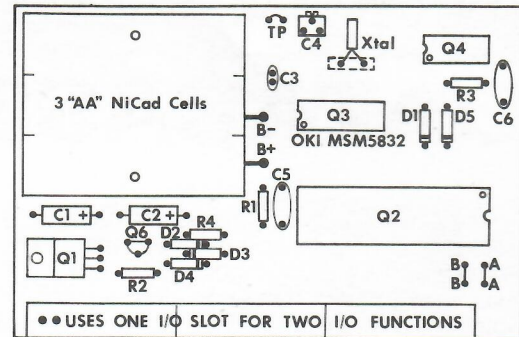
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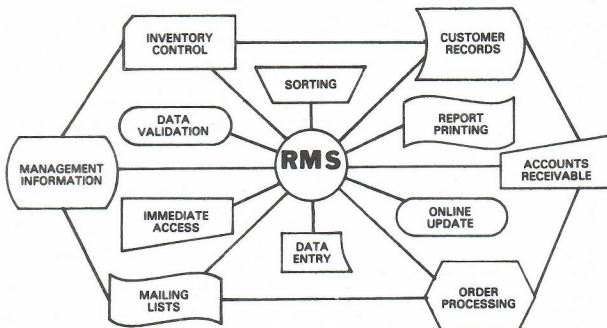
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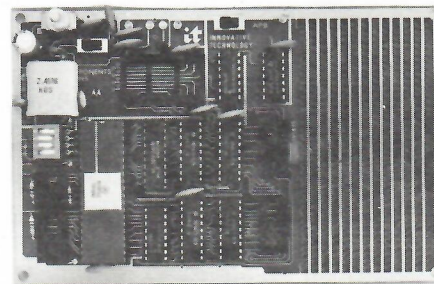
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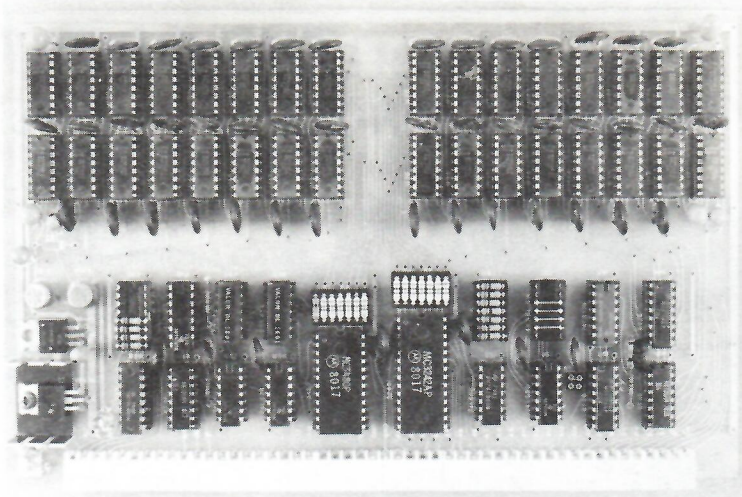
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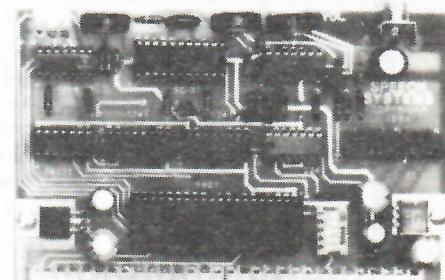
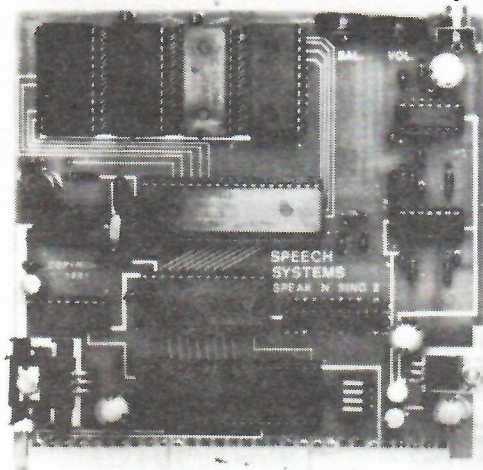
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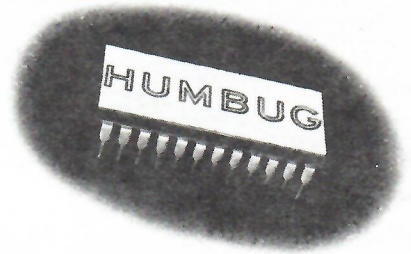
HUMBUG provides full I/O control from the keyboard. Turn a printer port on and off; enable a user-written port; pause when the screen is full; even turn off your main terminal output and let the program run without being slowed down by output. A printer spooling feature provides a 1K RAM buffer for your printer, and overlaps printing with processing for greater speed. But there is more.

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