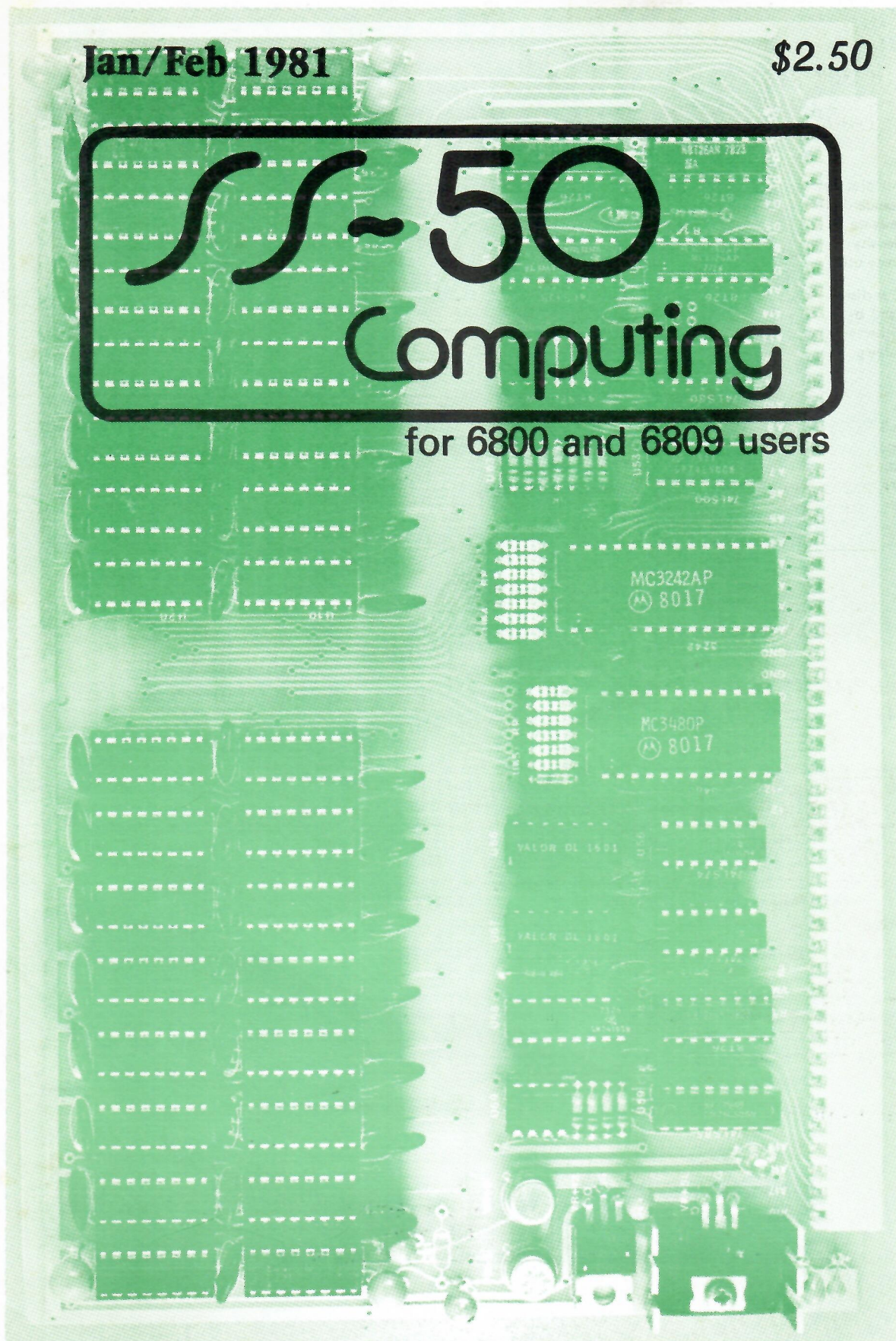


Jan/Feb 1981

\$2.50

S-50 Computing

for 6800 and 6809 users



6809 DISK SYSTEMS

All disk systems are supplied with our version of FLEX 9, the world standard disk operating system for the 6809. Our systems normally operate in double density format, but they are compatible with single density, or single sided recording formats. FLEX is supplied with over forty utilities, many of which are only available with our systems.

Our disk systems offer you mass storage at low cost. The cost per thousand bytes of storage for our various systems is shown in the chart. Other 6809 disk systems have costs up to three times greater for the same general type drive.

TYPE	CAPACITY	COST
D-5	720,000 bytes	\$1.80 per/K
DT-5	1,400,000 bytes	\$1.16 per/K
DMF-2	2,400,000 bytes	\$1.04 per/K
CDS-1	16,000,000 bytes	\$.27 per/K

D-5 Two double sided, double density, 5" disk drives with a total on line capacity of 720,000 bytes of data. Includes cabinet, power supply, connecting cable and controller. Controller will operate up to four drives. This is an ideal disk system for small stand alone word processing systems, or for businesses that do not work with large inventories.

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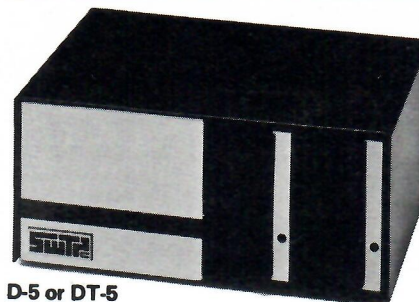
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D-5 or DT-5



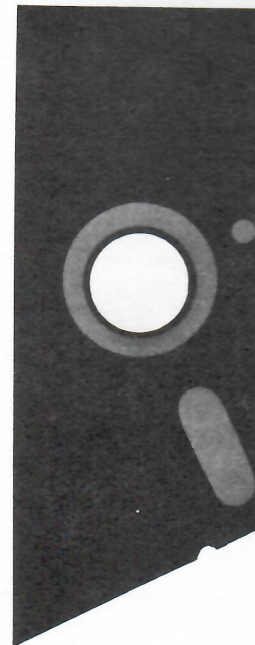
DMF2



CDS-1



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FLEX™ is the most operating system microprocessors. years, it has become standard. FLEX is amount of 6800, being marketed now available a editor and asser

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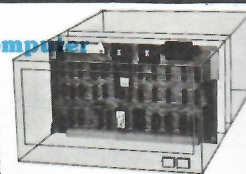
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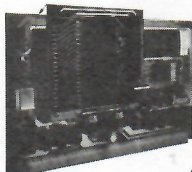
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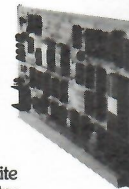
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M48SS 16-Kbyte DYNAMIC RAM CARD

\$399.95 REGULAR \$499.95

Save \$100!

• Memory is organized as three independent 16-Kbyte blocks. Each block may be located in any of the four 16-Kbyte zones of a 64-Kbyte address space • Special "map-out" strapping can be used to depose any 8-Kbyte block from upper 32-Kbyte memory • Uses type 4116 RAM chips • 16-Kbyte RAM expansion kit includes extra RAM chip, plus sockets and other parts. Kit price is \$99.95.

This soon-to-be-announced color VDG card for the SS-50 bus features eleven colorful display formats in 2 to 8 colors, plus 2-color alpha-numerics; full graphic resolutions from 64X64 pixels to 256X192 pixels; memory-mapped instant display control; low-cost modulator option for TV interface; 1-Mbyte extended addressing; cassette I/O option; and, operating software. Introductory price is only \$219.95.



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DCB-4
Disk Master
Double Density Controller
and DOS68D Double
\$449.00

The new DCB-4 is a truly statement which allows up to 3661 on a single 5 1/4" disk and has features:

- Up to four 5 1/4" and four handled in the same system, finable logical unit table, compatible with future hardware.
- Under software control, the following for any drive:
 - ☆ Single sided or double sided
 - ☆ Single density or double density
 - ☆ 5 1/4" or 8"
 - ☆ Stepping Rate.
 - ☆ 40 track or 35 track sided 5 1/4" drives.
 - ☆ User can select the system rotation.
- Occupies only 16 bytes (F760-F76F standard). Uses 16 byte address space.
- Can read and write a single On-board buffer memory rupt capability in interrupt. Once data transfer has more processor time is required.
- Contains extended decoding extended addressing per SS can be enabled by an option.
- SSB provides a means for written by older versions read by DOS68D. All new by DOS68D can be read by of DOS68. DOS68 is SSB' ting system.
- Track 0 of side 0 is recording per IBM standard.
- Phase-locked-loop assures gritty attainable.

All of these features are available delivery on one standard 5 1/4" x SS-50C card for only \$449.00. DOS68D version 5.1, MONITOR diskette, and a manual with the :

SMOKE

313

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Presents

3 Powerful New SS-50/SS-50C Boards

DCB-4

Disk Master

Double Density Controller Board
and DOS68D Double Density DOS
\$449.00

The new DCB-4 is a truly state-of-the-art development which allows up to 366K bytes to be stored on a single 5¼" disk and has these outstanding features:

- Up to four 5¼" and four 8" drives can be handled in the same system with a user definable logical unit table. (DOS68D will be compatible with future hard disk systems).
- Under software control, the user can select the following for any drive:
 - ☆ Single sided or double sided operation.
 - ☆ Single density or double density data.
 - ☆ 5¼" or 8".
 - ☆ Stepping Rate.
 - ☆ 40 track or 35 track density on double sided 5¼" drives.
 - ☆ User can select the system boot configuration.
- Occupies only 16 bytes of memory space (F760-F76F standard). User selectable to any 16 byte address space.
- Can read and write a single sector by itself. On-board buffer memory allows full interrupt capability in interrupt driven systems. Once data transfer has been initiated, no more processor time is required.
- Contains extended decoding circuitry for extended addressing per SS-50C bus which can be enabled by an option jumper.
- SSB provides a means for copying software written by older versions of DOS68 to be read by DOS68D. All new media formatted by DOS68D can be read by all older versions of DOS68. DOS68 is SSB's 6800 disk operating system.
- Track 0 of side 0 is recorded in single density per IBM standard.
- Phase-locked-loop assures highest data integrity attainable.

All of these features are available for immediate delivery on one standard 5¼" x 9" 50 pin SS-50/SS-50C card for only \$449.00. The price includes DOS68D version 5.1, MONITOR object code on diskette, and a manual with the source listing.

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6809CPU Board
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The most versatile 6809 CPU Board on the market is now available from Smoke Signal Broadcasting and has the following features:

- Standard 2 MHz operation. (Shipping 1.5 MHz until August 80)
- 20 bit address generation for up to 1 Mbyte of memory. Uses an improved address translation RAM which is compatible with present extended addressing schemes yet requires much less overhead when used in multi-user systems.
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- Standard 1K of RAM on board.
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- NMI line is user selectable to work with either SS-50 or SS-50C busses.

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32K

Memory Board

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The first and only 32K Static Ram Board on standard size (5¼" x 9") SS-50/SS-50C Bus Circuit Card is made by Smoke Signal.

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- Guaranteed 2MHz operation (tested at 2.2 MHz).
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M-32-X 32K Memory Board is priced at \$539.00.

M-24-X 24K Memory Board expandable to 32K, is \$439.00.

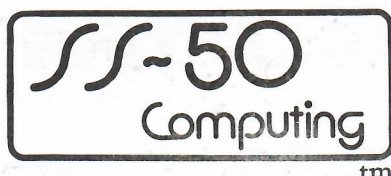
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by

I recently asked some questions. The writer was asking a system and a system. He was interested in a small business. He was interested in the other. He stated that he was getting an SS-50. He hadn't seen various system. He was stuck. He wouldn't do. He wouldn't get. He mentioned that the advantages of the 6809 so that features.

In answer to that with the barriers as far as word processing have to admit that we can't afford 6800. I suppose being sold by 6800 we are inclined to write. However, most available on the 6800 to run on the 6800 the software people support the 6800 barriers in the system.

As far as systems are concerned, they are as cost-effective as many, many are.

You still get a density, it is available in disks built-in separate, you can want a Winchester it's available.



Editorial

by Ken Orme

I recently received a letter which asked some questions that we could all take some time to think about. The writer was interested in purchasing a system and is considering a 6809 system. He further stated that he was interested in word processing and small business applications, in addition to the other personal computing that most of us enjoy. However, he stated that he was concerned about getting an SS-50 bus system because he hadn't seen very many ads for various systems and he didn't want to get stuck with something that wouldn't do what he wanted, or wouldn't get support. He also mentioned that he would like to know the advantages of the SS-50 bus and/or the 6809 so that he could compare the features.

In answering him, I explained that with the 6809, there are no barriers as far as application programs or word processing. The one thing we have to admit as SS-50 bus users is that we can't answer the same for the 6800. I suppose with the 6800 not being sold by SWTPc any more, that we are inclined to feel that it is a lost cause to write new programs for it. However, most of the things that are available on the 6809 can be re-written to run on the 6800 as well. If some of the software people will continue to support the 6800, it, too, will have no barriers in the small business areas.

As far as systems and peripherals are concerned, the SS-50 bus systems are as cost-effective as the others, and many, many are more cost-effective.

You still get what you pay for. If you need or want dual density or quad density, it is available. If you want disks built-in the mainframe or separate, you can get them. If you want a Winchester hard-disk system, it's available. For those that don't

want to or can't afford to buy a disk system, many different tape systems are still available. Video boards are also prevalent and you have a choice of several different manufacturers.

Modems may be interfaced as well as many different printers. Even computer portraits and other such applications may be done with the SS-50 bus systems. Time-sharing, real-time applications and many other processes are all available for those that desire them.

Software is coming along well, since we are able to purchase word processing, PASCAL, FORTRAN, Accounts Receivable, Accounts Payable, General Ledger, Inventory, Payroll, Check Ledger, and many other types of application software.

System software has also increased and some of it is much better than you can find on any other micro system.

The advantages of one system verses another are not truly known by the people using the system. They just happen to get used to the system they are working with, and therefore don't know the good and the bad compared with other systems. I have worked with several different systems and BASICS, three of which are on the SS-50 bus. Out of all the systems it seems to me that those on the SS-50 bus are the easiest to work with and learn. That may be from the fact that the SS-50 system was the first one I learned, but from a learning standpoint, it still seems the easiest to learn for most people.

That is perhaps the main reason a lot of hobbyists and experimenters are purchasing 6800 and 6809 systems.

Interfacing is quite easy, and costs aren't as expensive as with most of the other buses.

Many of the things that a person wants, software-wise, will have to be generated by themselves or others doing similar things. Very seldom do you purchase an application package that fits your immediate needs, the needs you will have in a year *and* the needs you will have in five years. Our needs are usually changing and therefore the software will need some changes, too. We should know enough about our system, BASIC (or other language used) and the peripherals used to make the changes that are

necessary. Therefore, as an owner/operator of a system, I feel we should get one that we can understand enough to do the above.

At the same time, we need to have a system that may be changed to suit various peripherals and devices and one that may expand as we need to improve it.

There are several other factors you should consider, depending on what you are going to do with the system. If you are doing a lot of small-business applications, you should *not* limit yourself to the 40 column-screen "all-in-one" machines, since 80 columns is almost a necessity for that use. Multi-user capability is sometimes a consideration for educational and business applications.

I feel that any of the things that can be used with the S-100 bus that aren't used on the SS-50 bus right now, can be applied to the SS-50 bus with a little desire from our group.

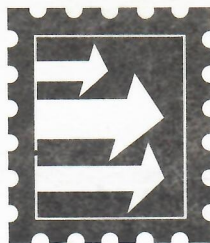
We don't have anything to make us feel like we are holding the short end of the stick. Just the opposite.

[SS-50]

Beginning with this issue, we will be including the **Peripheral** newsletter from Percom Data Company. Although this part of the magazine is a "paid portion", it has a lot to offer. There are several ideas given that should help the hobbyist and experimenter. News of upcoming products and other features will be included. It will be a complete newsletter inside our magazine.

One of the major reasons for this addition is that we hope to be of benefit to all groups using the various machines and peripherals available. While it is physically impossible to be able to cover everything for everyone, we hope that this will at least help get closer to reaching our goal.

Many readers have asked about back issues again. We found a few more when we moved out of the other office. So far we still have a few of No. 1 through No. 4 which we sell for \$3.00 each, postpaid (to U.S.A.). Foreign orders should include \$1.65 (U.S.) for air postage for each issue. There are not many left, so first come, first served.



Letters

Dear Editor,

Thanks for your kind words in your Sept-Oct. issue about DYNAMITE, our 6809/6800 disassembler/source generator. We now have about a hundred copies of DYNAMITE all over the world, and users do seem to be very pleased with this product.

Let me just comment on the second-last paragraph of your article, in which you discuss disk-file size. The size of DYNAMITE's output file is generally about 3 times that of the input file containing the object code to be "DYNAMITED". Of course, this ratio depends heavily upon the exact nature of the code being disassembled. But for typical 6800 and 6809 software the ratio 1:3 is quite close.

The largest 6800 or 6809 object code program of which I am currently aware is TSC's excellent EXTENDED BASIC interpreter, which fills 78 blocks of disk. DYNAMITE will convert this into roughly 300 blocks, which will fit on even the smallest minifloppy (35 tracks, single-side, single-density) if you start with a clean working disk.

H. Joseph Turner, Jr.
President, Computer Systems Center
Chesterfield, Missouri

I appreciate the report on the code ratio for DYNAMITE. What I intended to convey by the paragraph on size is that if a person were going to disassemble a large file and then work on it with the editor, there would not be room on one disk for both the text file and the backup. This is not a problem with DYNAMITE any more than with any other large text file on a small disk.

Ed.

BOAZ

With the advent of the ability to address memory, it was most of us that it was to be used, with capacity memory consumption. In memory would be the exception rather than the rule. Many SS-50 users are paying prices for the TR which are steadily decreasing, dynamic boards at \$4116.

Well BOAZ about it. They have their D64KB, a 6 board which will 6800 (SS-50) bus a bus. It features things which are getting price every day. refresh and also is 20 bit extended Power consumption the full 64K requiring 12 volts at .150 A or .007 Amps. The 9 real space save, sir all you need to do and you will fill the two 50 pin boards.

BOAZ D64KB Dynamic Memory Board

With the advent of the 6809 and its ability to address up to 1024K of memory, it was quickly apparent to most of us that if extended addressing was to be used, we needed to have large capacity memory boards and low power consumption. In addition, inexpensive memory would be nice, but it has been the exception rather than the rule. Many SS-50 users have seen memory prices for the TRS-80, Apple and PET steadily decrease, but there were no dynamic boards around that used the 4116.

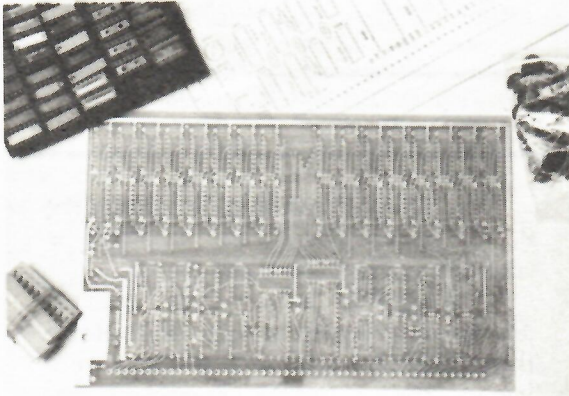
Well BOAZ Co. did something about it. They have made available their D64KB, a 64K dynamic memory board which will work with both the 6800 (SS-50) bus and the 6809 (SS-50C) bus. It features the 4116 memory chips which are getting more reasonable in price every day. It uses transparent refresh and also is compatible with the 20 bit extended addressing mode. Power consumption is very low with the full 64K requiring only .5 Amps at 5 Volts. Other power requirements are 12 volts at .150 Amps., and -5 volts at .007 Amps. The 9 x 5.8 inch board is a real space save, since for most systems all you need to do is add a CPU board and you will fill the system with only two 50 pin boards.

The D64KB comes in kit form, the P. C. board alone less memory or completely assembled and tested.

The board is a high quality, double-sided epoxy design with plated through holes, silkscreened component layout and a solder mask on the bottom. The parts that we received were also of good quality and only one capacitor was missing out of all the parts. The 18 page instruction manual is quite complete and consists of three major parts; the building instructions, the section on theory of operation including timing charts, and the parts location diagrams.

As with any new product, there is a page with corrections on it, which will be taken care of with the next printing. The instructions are written much like those found in the leading 6809 Computer kit. The first three instruction words are: "Install all resistors." The best part is that there are only three resistors that go directly on the board. However, we point this out to so that you realize the color code and basic building knowledge is necessary. Unlike some of the manuals that we have seen, this one elaborates the important points and explains in detail when necessary. But there are

two points we found to be a slight problem. One problem was the tantalum capacitor marking. The "normal" tantalum has the polarity marked with a plus sign. However, the ones we received did not. There was a dot in the center of the capacitor to help polarize them, but we feel an explanation or drawing in the manual would help a lot. The other problem came after completion of the board. It took quite a bit of searching to find out



about the selector jumpers (or switches) used to address the board. Also, the information about a jumper to install when *no* extended addressing is used was in the "theory" section instead of a section on testing or setting up the board. In fact, our suggestion is to have a section of setting up and addressing the board which is separate from the theory part. This allows you to find the information much faster. Everything that we could determine indicated that the addressing is for 32K and above only. With all the switches off, S-BUG said "32K" and incremented by 4K with each switch selected.

All construction went very quickly with about three hours spent in reading and building. Most of the resistors are mounted in component carriers which speeds up construction. The only hangup we had was a diode with leads about twice the size of the holes in the P.C. board. A small bit was available, so we just opened up the holes and

soldered the diode on both sides. The corrections mentioned to set the diode on top to solder it. It also mentioned that care must be taken when soldering a board populated with as many ICs as found on the D64KB. The holes for some of the capacitors are quite close to the memory chips and can be filled with solder when installing one part or the other. Sockets are recommended and are included with the kit that we ordered. All of our staff feels that the sockets are worth the cost, especially when using CMOS chips.

The instructions from BOAZ tell you to check voltages before installing the ICs. A very good point which is very important. After we found the voltages to be what they should, we inserted all the TTL chips. The CMOS circuits were then inserted following normal precautions. We first installed 16K to give it the "smoke test". Then having passed it okay, we put in the remainder of the memory. It worked like a charm! After running the memory test on it for two hours, we felt it was performing fine.

Aside from the addressing information problems, the manual is quite complete in the theory of operation. It gives a complete circuit diagram, a partial memory diagram, component carriers, outline diagram, and two timing diagrams. Also a specification sheet and parts list is included.

Since this board could logically be the only memory in the whole system, BOAZ has a jumper which allows you to switch the upper 32K with the lower 32K. Thus if a bad chip occurs in the area required by the monitor, you will be able to isolate it easier.

BOAZ offers this fine board in many kit options and a wired version, all less memory. That way you can take advantage of all the latest prices on 4116s. At the time of writing, there are several companies offering them for \$3.50 each in quantity one and some as low as \$3.00---that means your memory

continued on page 28

STYLO

From SONEX S of the best micro...A v called STYLO the many feat get to shor processor ha that are easy have you runr very short tin of the best v to run it is with both feet feel that it i

Since I am wr the use of t will notice a print style a the ease by wh be edited a really nice. commercial ty at least equal

One of the fir noticed when the manual wa make **boldface** underlining, the features a good word p text editor. these, Stylogr overlining, s subscript feat

STYLOGRAPH WORD PROCESSOR

By Ken Orme

From SONEX Systems comes one of the best reasons to own a micro...A word processor called STYLOGRAPH. Besides the many features that I will get to shortly, this word processor has instructions that are easy to learn and can have you running with it in a very short time. In fact, one of the best ways to learn how to run it is just to "jump in with both feet" and try it. I feel that it is the only way.

Since I am writing this with the use of the system, you will notice a difference in print style and quality, but the ease by which the text may be edited and changed is really nice. It beats many commercial typesetters and is at least equal to most.

One of the first things that I noticed when reading through the manual was the ability to make **boldface** type and to do underlining, since these are the features that distinguish a good word processor from a text editor. In addition to these, Stylograph also has the overlining, superscript, and subscript features.

Trying out the features of the software indicated to me that as with all systems, you must learn the control keys and how to use them properly. As with some of the other systems, this one uses the shape and location of a "block" of the keys to allow cursor control. They are in the following pattern:

I
J K L

The keys allow you to see the direction in which the cursor will move. The 'K' key is an express key to move the cursor from one end of the line to the other. By the way, all the keys may be re-defined with the information contained in the manual. I use an H-19 terminal and find that with the keys set up for the right-hand keypad and in the shifted mode (so that you don't have to hold down the shift key), it makes it much easier to remember which keys do what.

At first, I felt trapped by the way the cursor immediately went to the right side of the screen and just sat there. I tried (in vain) to move it one

direction or the other, only to have the terminal "beep" at me. The bell indicates an incorrect function attempt and happened because I forgot that to start typing in text I must first type a ";". The semi-colon starts Stylograph in the insert mode. This is also for making corrections to the text or adding to it.

Numerous control keys are used to do such things as delete a word, a complete line or a character. A control N will name the error that occurred when the bell sounded. A control "P" will replace the text on the screen with information such as input and output file names, format parameters and operating modes and the amount of memory left. When you press the same sequence again, you return to what you were doing and right where you left off. Another feature is the tabbing function control characters. These allow you to set tabs, clear tabs and move the cursor to a tab position. I found that the tab key on the H-19 was useful when modified to work with Stylograph. In the printing industry, a discretionary hyphen is where you tell the typesetting machine the place to enter a hyphen if it is necessary. With this software, it is called a "Ghost Hyphen", but it has the very same nice feature.

Some of the other features of the system with regard to moving the text around are really nice. Depending on the terminal that you use, you may scroll up or down with the "U"

and the "M" keys respectively. The "O" and the "." key allow you to move the entire screen length at a time. If that doesn't allow you to get there quickly enough, use the "P" key to call a page number and it will go right there. The pages are automatically generated by Stylograph and are called "serial" pages to distinguish between them and the printed page number. I found that the "F" (find) key is quite useful if you aren't sure which page the information is located on. The software will then move ahead to the first occurrence of the word you give it, and then either keep looking or stop, depending on your choice. The replace function is also nice. It allows you to replace some or all of the occurrences of a particular string with the one that you specify.

By putting in a marker, you can also move a string from one place in the text to another. Similarly, I found the duplication feature useful for re-occurring words or even paragraphs. With the "Z" (for zap) command you may remove a large portion of text without having to do it a line at a time. Again, this is set up with markers so that only the portions of text marked with the proper key will get "zapped".

When it comes to printing out the information, many times the formatting is the key to making it look good. With the Stylograph software I can center, right justify, justify or set it up for no justify-

ication. S length, the number, and commands give flexibility, do it with ease.

Here is a list of commands that STYLOGRAPH:

Centering
Right Justify
Justify
No Justify
Line Length
Indent
Single Indent
Page Length
New Page
Page Number
Define Header
Define Footer
End Definition
Set Spacing
Space Lines
Vertical Tab
Left Margin
Character Spacing
Vertical Spacing
Comments

These commands along with a couple of shortcuts copied or at the end of the book. page lists the commands for the various control sequences default parameters be changed to if you know the desire to do

The command macro (a "/") allows you to kill the text, kill the working on, or text with a file time that y

ication. Setting the line length, the page length and number, and other such format commands gives you a lot of flexibility, yet allows you to do it with ease.

Here is a list of the format commands that may be used with STYLOGRAPH:

- Centering
- Right Justification
- Justify
- No Justify
- Line Length
- Indent
- Single Indent
- Page Length
- New Page
- Page Number
- Define Header
- Define Footer
- End Definition
- Set Spacing
- Space Lines
- Vertical Tab
- Left Margin set
- Character Spacing
- Vertical Spacing
- Comments

These commands are summarized along with the others on a couple of sheets that may be copied or at least taken out of the book. Also, another page lists the constants used for the various escape and control sequences and the default parameters. These may be changed to fit your needs if you know how and have the desire to do it.

The command mode (entered with a "/") allows you to save the text, kill the text you were working on, or to "append" the text with a file called in any time that you want. This

allows "boiler plate" text editing, making it possible to write letters with paragraphs from several text sources. Since our version runs under the FLEX™ operating system, any command that may be called from FLEX may be called by first typing the "+" and then the command line. This is the way to see what is on the catalog or possibly to delete a file on the disk. I'm sure that you must watch what you call in from FLEX, so you don't kill off the program or the file.

By the way, you may also exit to FLEX by typing in the word FLEX after the "Command =" prompt. In the same way the "NEW" command is called, which is the way to erase the text that is currently in the memory.

PRINT is the command to have the text in memory printed out on the printer. This then looks for a print driver named STYPRINT.CMD. This driver is to be renamed from the current one that works with the printer you use. In my case it was a modified "S.CMD" because the printer I use is a serial one. Once PRINT is called for, the Print Driver is loaded from the disk and then a couple of prompts ask you if it should stop for new pages and if you want to limit the number of pages. If the return key is pressed for both of these questions, then the printer fires up and outputs the text unless an "S" key is pressed, which stops it until any other key is pressed.

As I talked to the people at Sonex Systems, it seems that very few problems have occurred with the software, and those problems that have occurred were usually with the printer or the print driver. As the manual points out, make sure that you have a print driver that is functioning with your printer before you blame the software.

Some of the staff and I feel that there could be more prompts given to aid in the "breaking in" of a new person who will use the system. Most of the people who help with things like word processing are not always versed in using the computer, FLEX and some of the different approaches. It seems that a prompt for the name of a file to save it to would be nice, even though the manual explains the defaults. The approach of some of the other word processors is good where the important prompts are printed on the top (or side) of the screen, and in some cases are able to be shortened or removed entirely by experienced operators.

There are other features that could be incorporated into this system which have not been asked for by enough of us. On the other side of the coin, I know of at least one system for the S-100 bus that has so many features the average user will never learn them all, or use them. However, one of the features that may possibly be available soon for STYLOGRAPH is true proportional spacing. I'm sure it will depend on how

many are interested in it and how many are willing to spend some more money to get that feature.

For the price, STYLOGRAPH is one of the best buys for a word processor on the market today. It comes with versions for most terminals and Nec, Diablo, Qume and tty type printers. In addition to the FLEX operating system, there is a STYLOGRAPH for the OS9 system being finished and should be available by the time you read this.

Yes, I feel that word processing is an important part of computing, and that Sonex System's STYLOGRAPH is a very worthwhile investment for the 6809 user.

SS-50



Utility Disk 1

FEATURING:

[1] **BASASM V2**
A BASIC Assembler

[2] **DDISSEM**
A Disk Disassembler
Disassembles directly
from the disk.

[3] **SDCOPY**
A Single-Disk Copy

All three utilities
\$15.00
(with source)

Available on 5 1/4 inch FLEX 2.0 disk.
(*09 versions of #1 and 3 included)

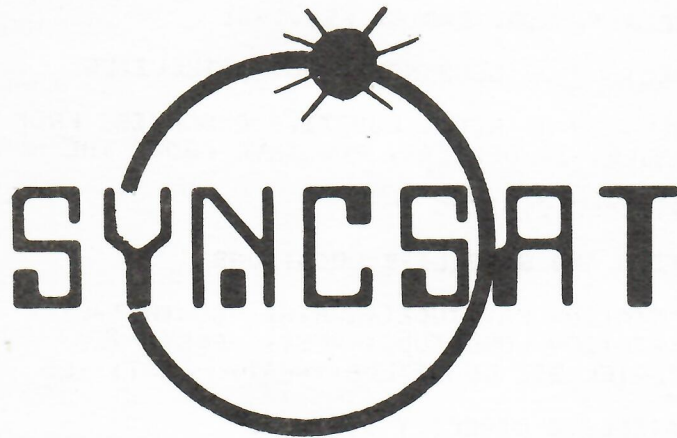
Send cash, check, money order
or charge it on VISA or MC. [No COD's]

SS-50 Computing
P.O. Box 398 Garland, Utah 84312

Program "Sy determine the chronous Satell satellites are photography an cause they appe an observer on chronous satelli about 22,240 n around the earlt the earth rotates

The directio sky can be des elevation angles measured positiv at the observe ample, east is a degrees, south i 270 degrees and an angle measu horizon at the c negative elevati object is below t be seen.

Inputs requir sat'' are the o



by David Eagle
Lakewood, Colorado

Program "Syncsat" can be used to determine the direction of Geosynchronous Satellites. These types of satellites are useful for weather photography and communications because they appear stationary relative to an observer on the ground. Geosynchronous satellites are placed in orbits about 22,240 miles high and revolve around the earth at the same rate that the earth rotates on its axis.

The direction of any object in the sky can be described by azimuth and elevation angles. Azimuth is an angle measured positive clockwise from north at the observer's location. For example, east is an azimuth angle of 90 degrees, south is 180 degrees, west is 270 degrees and so forth. Elevation is an angle measured positive above the horizon at the observer's location. A negative elevation angle means the object is below the horizon and cannot be seen.

Inputs required by Program "Syncsat" are the observer's latitude and

longitude and the satellite's longitude, in degrees. North latitudes are positive and south latitudes are negative. West longitudes are positive and east longitudes are negative.

The Program begins with house-keeping chores and then asks for the observer and satellite locations. The software then checks to see if the satellite is directly overhead. For any satellites overhead, the elevation angle is 90 degrees and the azimuth angle is 0 degrees. If the satellite is not overhead, the elevation angle is computed. Tests are then performed to determine if the azimuth angle is directly north, east, south or west in either the northern or southern hemispheres. If none of these cases are true, the azimuth angle is calculated.

The Program then prints the results and prompts the user for another station and/or satellite calculation.

Several examples are included to illustrate the features of Program "Syncsat".


```

0010 * PROGRAM "SYNCSAT", C.D. EAGLE, FEB.1981
0020 *
0030 * COMPUTES DIRECTION OF GEOSYNCHRONOUS SATELLITES
0040 *
0050 * AZIMUTH= ANGLE, IN DEGREES, POSITIVE CLOCKWISE FROM NORTH
0060 * ELEVATION= ANGLE, IN DEGREES, POSITIVE ABOVE THE HORIZON
0070 *
0080 HOME :LINE=100:D0=57.2957795
0090 *
0100 * REQUEST STATION AND SATELLITE LOCATIONS
0110 *
0120 PRINT :INPUT "STATION LATITUDE(+NORTH, -SOUTH)",L1
0130 PRINT :INPUT "STATION LONGITUDE(+WEST, -EAST)",L2
0140 PRINT :INPUT "SATELLITE LONGITUDE(+WEST, -EAST)",L3
0150 *
0160 * CHECK FOR SATELLITE DIRECTLY OVERHEAD
0170 *
0180 LET A= ABS(L3-L2):B= ABS(L1):IF A<.05 IF B<.05 THEN E=0:D=.5*PI
0190 IF A<.05 IF B<.05 P.#7,TAB(10);"DIRECTLY OVERHEAD":GOTO 420
0200 *
0210 * COMPUTE ELEVATION ANGLE
0220 *
0230 LET A= (L2-L3)/D0:B= COS(L1/D0)*COS(A)
0240 LET C= SQR(1-B*B):D= ATAN((B-.151269174)/C)
0250 *
0260 * SPECIAL CASES (AZIMUTH NORTH, EAST, SOUTH OR WEST)
0270 *
0280 IF A=0 IF L1<0 THEN E= 0:GOTO 420
0290 IF A=0 IF L1>0 THEN E= PI:GOTO 420
0300 IF A>0 IF L1=0 THEN E= .5*PI:GOTO 420
0310 IF A<0 IF L1=0 THEN E= 1.5*PI:GOTO 420
0320 *
0330 * COMPUTE AZIMUTH ANGLE
0340 *
0350 LET F= SIN(A)/C:G= -B*TAN(L1/D0)/C
0360 IF ABS(F)<1E-10 THEN E= 0:GOTO 420
0370 LET E= (2-SGN(F))*PI:IF ABS(G)<1E-10 GOTO 420
0380 LET E=E+SGN(F)*SGN(G)*(ABS(ATAN(F/G))-.5*PI)
0390 *
0400 * PRINT RESULTS
0410 *
0420 PRINT #7:P.#7,TAB(10);"STATION LOCATION"
0430 PRINT #7:P.#7,TAB(15);"LATITUDE",L1;TAB(50);"LONGITUDE",L2
0440 PRINT #7:P.#7,TAB(10);"SATELLITE LONGITUDE",L3
0450 PRINT #7:P.#7,TAB(15);"AZIMUTH",E*D0;TAB(50);"ELEVATION",D*D0
0460 *
0470 * REQUEST ANOTHER STATION AND/OR SATELLITE
0480 *
0490 PRINT :INPUT "ANOTHER STATION(1=YES, 0=NO)",H:IF H=1 GOTO 120
0500 PRINT :INPUT "ANOTHER SATELLITE(1=YES, 0=NO)",H:IF H=1 GOTO 140
0510 END

```

STATION LOCATI

LATITUDE

SATELLITE LONG

AZIMUTH

STATION LOCATI

LATITUDE

SATELLITE LONG

AZIMUTH

DIRECTLY OVER

STATION LOCATI

LATITUDE

SATELLITE LONG

AZIMUTH

STATION LOCATI

LATITUDE

SATELLITE LONG

AZIMUTH

STATION LOCATI

LATITUDE

SATELLITE LONG

AZIMUTH

PROGRAM SYNCSAT

STATION LOCATION

LATITUDE	45	LONGITUDE	104
SATELLITE LONGITUDE	75		
AZIMUTH	141.906716	ELEVATION	30.7319033

STATION LOCATION

LATITUDE	-45	LONGITUDE	104
SATELLITE LONGITUDE	75		
AZIMUTH	38.0932995	ELEVATION	30.7319033

DIRECTLY OVERHEAD

STATION LOCATION

LATITUDE	0	LONGITUDE	105
SATELLITE LONGITUDE	105		
AZIMUTH	0	ELEVATION	89.9999993

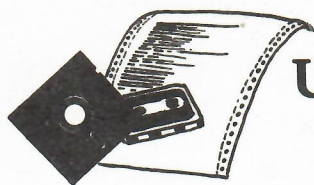
STATION LOCATION

LATITUDE	-67.5	LONGITUDE	-107
SATELLITE LONGITUDE	-95.4		
AZIMUTH	347.473313	ELEVATION	13.5599629

STATION LOCATION

LATITUDE	45	LONGITUDE	108
SATELLITE LONGITUDE	108		
AZIMUTH	179.999999	ELEVATION	38.1699211

[SS-50]



Utility Corner

RELOCATE YOUR P.I.C. FILES

by Joe Turner

Here's a new FLEX (tm TSC) utility to add to your collection. RELOCATE will move your P.I.C. (position independent code) files to any specified address. This is especially helpful when you are working with binary files that are composed of several non contiguous segments, as without RELOCATE the usual way to move these files is to use RUN to get them into the desired memory area, then several SAVES, one for each segment, then an APPEND. Not at all fun. Or, if you are working with binary files that would overwrite FLEX if loaded into memory, some help is clearly needed.

I find a regular need to move 6809 programs (from another system containing removable ROM at \$C000, without mentioning any names, but its initials are Radio Shack) for disassembly by our DYNAMITE (tm CSC) disassembler package. Load one of these babies into its usual address, and it's "Goodbye,

FLEX". Until I finally wrote RELOCATE, I used EXAMINE (from the TSC 6809 DIAGNOSTICS package) to manually change the binary file load and transfer addresses. That works, but takes some time, and is quite tedious and error-prone. RELOCATE just works.

Understanding the Problems

To understand the problems involved, we need to consider how binary files are stored by FLEX. This is explained in detail on page 45 of the FLEX Advanced Programmer's Guide (a part of the standard TSC or SWTPC FLEX package). Each binary record is composed of up to 255 bytes which can have a load address beginning anywhere in the 64K memory address space.

RELOCATE gets from its command line this value from the input file encountered, relocations which is then subtracted from the input file is the same as the original again from the beginning of the time the constant is subtracted earlier is subtracted from the transfer address output file is written just as the input file load and transfer addresses by the constant offset.

Notice that, even though Control Blocks, use any dedicated memory was done deliberately techniques of eliminating RAM. One of the problems where the other is used to hold the course, in a moment this most likely because Y won't generally. But in this that does all (which requires 6800 compatibility just sitting there, used for something and 185, Y is pushed and then subtracted position-independent

In a similar case of GETHEX, and stack (line 102 subtracted from I addressing, which is different.

Line 133 shows pushed onto the counter is later (line stack-relative address of an extra pull in clean up the stack done with a LEAS accomplishes the incrementing S by previous condition

RELOCATE gets a new load address from its command line, and subtracts this value from the FIRST load address encountered, resulting in an offset, which is then held constant. The input file is then rewound, and read again from the beginning, only this time the constant offset calculated earlier is subtracted from each load and transfer address encountered. The output file is written a byte at a time, just as the input file is read, only all the load and transfer addresses are modified by the constant offset.

Notice that, except for the two File Control Blocks, RELOCATE doesn't use any dedicated storage RAM. This was done deliberately to illustrate some techniques of eliminating such dedicated RAM. One of these is seen in line 110, where the otherwise unused Y register is used to hold the constant offset. Of course, in a more complex program, this most likely wouldn't be done because Y would be used more generally. But in a simple program like this that does all its I/O through FLEX (which requires arguments in X, for 6800 compatibility), the Y register is just sitting there, and might as well be used for something. Later, in lines 127 and 185, Y is pushed onto the S stack, and then subtracted from D in a position-independent manner.

In a similar case, X holds the result of GETHEX, and is pushed onto the S stack (line 102) and subsequently subtracted from D using stack-relative addressing, which is position-independent.

Line 133 shows a byte counter being pushed onto the S stack, and that counter is later (line 137) accessed with stack-relative addressing. Note the use of an extra pull instruction (line 140) to clean up the stack. This is sometimes done with a LEAS 1,S instruction which accomplishes the same thing, namely incrementing S by one to restore its previous condition.

A FEW MORE DETAILS OF RELOCATE

While I'm on my soap-box, let me also point out a few other details of RELOCATE, these not having anything to do with relocatability, but which are considered (by me, at least) to be desirable ways to do things.

You will note that the listing of RELOCATE begins with line 4, rather than line 1. What happened to the first three lines? This is the key to correct pagination with TSC's Macro Assembler. The first three lines consist of a OPT PAG pseudo-op, a TTL pseudo-op with title, and a PAG directive to force a new page. When you call the assembler, then, include on the command line the option "P1" (it must be the last option specified) to cause the listing to begin on page one, rather than on page zero.

Of course, for this utility to be of any use in relocating programs to RUN at other addresses, the programs to be moved must consist of P.I.C. This means that the program must be written so that it will behave properly regardless of where it is placed in memory. There are several features of the 6809 microprocessor that makes it easy to write programs that have this attribute, and some of these features are used in RELOCATE, which itself is P.I.C., AND CAN BE RUN AT ANY ADDRESS. Let's consider some of the techniques needed to produce P.I.C.

THE KEY TO P.I.C.

The key to P.I.C. is making all internal program references with relative-addressing modes, and equally important, making external references, such as to the operating system, with absolute addressing. For example, RELOCATE uses two FCBs (file control blocks), one for read, and one for write. These are both at the end of the utility,

and will move if the utility is moved. Therefore all references to the FCBs within RELOCATE are made with a relative addressing mode, in this case with Program Counter Relative, or PCR addressing.

Line 67 of our utility contains such a reference. If the conventional "LDX #FCB" were used, this would have been an absolute reference, and the utility could not run at another address. Note that if the reference were to FLEX's internal SYSFCB at \$C840, the reference MUST be made with absolute addressing for RELOCATE to be relocatable. Something has to stand still, and FLEX is it.

Most programs will contain many BSR's (branch to subroutines), and these use relative addressing. Just don't forget that when the branches exceed their usual 7-bit range, use the relative LBSR (long branch to subroutine) rather than the absolute JSR (jump to subroutine) when calling subroutines WITHIN the utility. An example of this is in line 104 of RELOCATE. However operating system calls MUST be obsolete, as in line 76. Remember, FLEX doesn't move.

Notice the version number, beginning in line 61. This is compatible with SWTPC's VER utility, but will yield a not-very-useful version number of 129 if TSC's VERSION is used. I much prefer *Southwest's* method of handling this aid to program maintenance, although it is quite different from the simple method originally proclaimed (but not always used) by the folks in West Lafayette.

FLEX requires that a flag be set to indicate a binary file has been opened for read or write. This is always done just after the file has been opened (as in lines 79 and 80). Unfortunately the FLEX manual forgets to warn that this flag must be reset after doing a REWIND of an open file, as in lines 112-118. Do it.

IN CONCLUSION

Those of us who are fortunate enough to have a printer that prints lower-case characters should take advantage of our blessings and use lower case wherever possible in commenting programs. Readability is definitely enhanced. Don't worry about the people with old-fashioned printers that print only 64 of the ASCII characters. Most of the older printers are designed to automatically print an "A" for an "a", and so on, and for those that don't, the printer driver can easily be modified to set bit 5 low for all alphabetic characters, thereby taking care of the problem.

This advice goes double for messages within the program that are going to be seen when the program runs (error messages and so on). You and others are going to have to look at this stuff for a long time. Make it pretty!

TSC's excellent 6809 Macro Assembler does have a few shortcomings, one of them being an inability to sense or directly indicate a wasted 16-bit constant offset in PCR instructions. The programmer has the responsibility of inserting a " " before the referenced label, as in line 143. Each one you put in shortens the program by one byte, assuming the target label is close enough. Look at the object code produced to see if any 16-bit offsets could be reduced to 8 bits. Anything over 007F is wasteful. Note that line 124 comes within one byte of this, for example.

I hope that these comments will help you to think about P.I.C. a little more before you write your next utility. And when you're finished with your program, don't keep it to yourself. Publish it! You may save someone else the time and trouble required to write another useful utility.

RELOCATE ut

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57 C100
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59 C100
60
61 C102
62 C103
63 C104
64 C105
65 C106
66
67 C107
68 C10B
69 C10E
70
71 C112
72 C114
73
74 C117
75 C119
76 C11B
77 C11E


```

4          * RELOCATE position-independent-program
5
6          * by Joe Turner   January 9, 1981
7
8          *   Computer Systems Center
9          *   13461 Olive Blvd.
10         *   Chesterfield, MO  63017
11         *   (314) 576-5020
12
13         * This utility was written for publication in
14         * SS-50 COMPUTING.  It is hereby placed in the
15         * public domain.
16
17         * This FLEX (TM of TSC) utility allows changing the
18         * default load address of any binary file.
19         * Naturally, the file must be written as position-
20         * independent-code in order to run at the new
21         * address!
22
23         * To operate, call program as follows:
24
25         * RELOCATE,<input file>,<output file>,<load addr.>
26
27         * Both input and output file specifications default
28         * to .CMD extension on the current WORKING drive.
29
30         * The desired load address for the (new) output
31         * file is given in hexadecimal (with no leading $).
32
33
34         CD03  WARMS  EQU  $CD03  courtesy of TSC
35         CD1E  PSTRNG EQU  $CD1E  likewise
36         CD2D  GETFIL EQU  $CD2D  "
37         CD33  SETEXT EQU  $CD33  "
38         CD42  GETHEX EQU  $CD42  "
39
40         D403  FMSCLS EQU  $D403  "
41         D406  FMS    EQU  $D406  "
42
43         003B  SPCCMP EQU  59      space-compression flag
44
45         0001  OPENRD EQU  1      open for read command
46         0002  OPENWR EQU  2      open for write command
47         0005  REWIND EQU  5      rewind file command
48
49         0002  CMD    EQU  2      default extension
50
51         0002  BINREC EQU  $02     start of record indicator
52         0016  XFRADR EQU  $16     transfer address indicator
53
54         0008  EOF    EQU  8      end-of-file error
55         0004  EOT    EQU  4      string terminator
56
57         C100          ORG  $C100  position-independent
58
59         C100 20  05      RELOC  BRA  START
60
61         C102 81          FCB  $81  version # 1.9:1
62         C103 2E          FCB  ^
63         C104 89          FCB  $89
64         C105 3A          FCB  ^
65         C106 81          FCB  $81
66
67         C107 30  8D 01D1  START  LEAX  RDFCB,PCR
68         C10B BD  CD2D      JSR    GETFIL  get input file name
69         C10E 1025 0098     LBCS  INSPER
70
71         C112 86  02      LDA  #CMD
72         C114 BD  CD33      JSR  SETEXT
73
74         C117 86  01      LDA  #OPENRD
75         C119 A7  84      STA  0,X
76         C11B BD  D406     JSR  FMS      open input file
77         C11E 1026 008D     LBNE  INOPER

```



```

157
158 C1A5 30 8C 67 DSKERR LEAX <DERRMS,PCR
159 C1A8 20 E7 BRA EXIT
160
161 C1AA 30 8C 7D INSPER LEAX <INSPMS,PCR
162 C1AD 20 E2 BRA EXIT
164 C1AF 30 8D 0097 INOPER LEAX INOPMS,PCR
165 C1B3 20 DC BRA EXIT
166
167 C1B5 30 8D 00AD OUTSER LEAX OUTSMS,PCR
168 C1B9 20 D6 BRA EXIT
169
170 C1BB 30 8D 00C8 OUTOER LEAX OUTOMS,PCR
171 C1BF 20 D0 BRA EXIT
172
173 C1C1 30 8D 00DF NOADDR LEAX NADRMS,PCR
174 C1C5 20 CA BRA EXIT
175
176 C1C7 30 8D 00F6 NOTBIN LEAX NOTBMS,PCR
177 C1CB 20 C4 BRA EXIT
178
179 C1CD 81 16 CHKXFR CMPA #XFRADR xfer addr. flag ?
180 C1CF 26 D1 BNE CHKEND
181
182 C1D1 8D 21 BSR WRITE copy it
183
184 C1D3 8D 08 BSR RDADDR get transfer addr.
185 C1D5 34 20 PSHS Y
186 C1D7 A3 E1 SUBD 0,S++ modify it
187 C1D9 8D 15 BSR WRADDR store in output file
188 C1DB 20 8E BRA MAINLP
189
190 C1DD 8D 07 RDADDR BSR READ read address MS byte
191 C1DF 1F 89 TFR A,B save it
192 C1E1 8D 03 BSR READ read LS byte
193 C1E3 1E 89 EXG A,B put in proper order
194 C1E5 39 RTS
195
196 C1E6 30 8D 00F2 READ LEAX RDFCB,PCR read one byte
197
198 C1EA BD D406 RDWR JSR FMS read or write one byte
199 C1ED 26 AB BNE CHKEOF
200
201 C1EF 39 RTS
202
203 C1F0 8D 02 WRADDR BSR WRITE write address MS byte
204 C1F2 1F 98 TFR B,A get LS byte
205
206 C1F4 30 8D 0224 WRITE LEAX WRFCB,PCR write one byte
207 C1F8 20 F0 BRA RDWR
208
209 C1FA 52 65 6C 6F COMPMS FCC "Relocation complete.",EOT
210 C20F 44 69 73 6B DERRMS FCC "Disk file read/write error",EOT
211 C22A 49 6E 70 75 INSPMS FCC "Input file specification error.",EOT
212 C24A 49 6E 70 75 INOPMS FCC "Input file can't be opened.",EOT
213 C266 4F 75 74 70 OUTSMS FCC "Output file specification error.",EOT
214 C287 4F 75 74 70 OUTOMS FCC "Output file can't be opened.",EOT
215 C2A4 41 64 64 72 NADRMS FCC "Address specification error.",EOT
216 C2C1 46 69 6C 65 NOTBMS FCC "File not in binary format.",EOT
217
218 C2DC RDFCB RMB 320 read FCB
219 C41C WRFCB RMB 320 write FCB
220
221 END RELOC

```

0 ERROR(S) DETECTED

SYMBOL TABLE:

BINREC 0002	CHKEND C1A2	CHKEOF C19A	CHKXFR C1CD	CMD 0002
COMPMS C1FA	DERRMS C20F	DSKERR C1A5	EOF 0008	EOT 0004
EXIT C191	FINISH C18E	FMS D406	FMSCLS D403	GETFIL CD2D
GETHEX CD42	INOPER C1AF	INOPMS C24A	INSPER C1AA	INSPMS C22A
MAINLP C16B	NADRMS C2A4	NOADDR C1C1	NOTBIN C1C7	NOTBMS C2C1
OPENRD 0001	OPENWR 0002	OUTOER C1BB	OUTOMS C287	OUTSER C1B5
OUTSMS C266	PSTRNG CD1E	RDADDR C1DD	RDFCB C2DC	RDWR C1EA
READ C1E6	RECLP C182	RELOC C100	REWIND 0005	SETEXT CD33
SPCCMP 003B	START C107	WARMS CD03	WRADDR C1F0	WRFCB C41C
WRITE C1F4	XFRADR 0016			

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FIXING I/O BUGS IN SWTPC BASIC 3.5

Geoffrey A. Gass
Portland, Oregon

Those who purchased the SWTPC DMAF-1 for a 6800 system in 1978-1979 received Robert Uiterwyk's FLEX-compatible DISK BASIC 3.5 as part of the software package.

With it came two I/O bugs--one of long standing and rather minor, and the other brand new and potentially catastrophic.

It's long been a feature of SWTPC BASIC's that up to 8 I/O devices may be independently addressed in INPUT and PRINT statements. It's also been a feature that the I/O routines always test a called I/O port to see that an interface is actually installed before trying to read or write data.

Unfortunately, the test used is valid only for a *parallel* interface. The software reads the fourth interface register, which, for a parallel interface, is the control register for the "B" side of the PIA. The internal logic of the PIA is such that bits 5 and 6 of this register cannot both be high at the same time. If the software sees \$FF here, it "knows" that there is no interface here, and outputs an error message.

For a serial interface, however, reading the fourth port address reads the ACIA *data* register, and for a port configured for 8 data bits, \$FF is not

only possible, but in some systems will be a probable data byte.

So here's a minor bug that's been with SWTPC (and also MSI) BASIC's for a long time--occasional or frequent refusal to read from or write to a serial port.

CHANGE THE ROUTINE

The fix is to change the PORSET routine, to look at two consecutive interface registers, and generate the error message only if *both* read \$FF (see lines 770-820 in the listing). In a serial interface, the status register, which appears at the even-numbered addresses, cannot have bits 1 and 3 both high at the same time. A reading of \$FF for both registers means there cannot be either an ACIA or a PIA at the port address.

That takes care of the minor bug.

NOW for the Catastrophic One

An I/O port is identified in a BASIC I/O statement by a number, which may

be computed by expression if the desires--e.g., "PF". Since there are only I/O driver routines, be provided to trap i

Earlier version BASIC interpreters indicated port-number up 8 or greater jump pointer to "ERR arithmetic).

In BASIC 3.5, wrinkle was added jumping directly to a program assigned number of any illegal then put jumps to routine where the output and initializers should be in the least, that was the i

MISCALC

Unfortunately was miscalculated. jumps for "Port 9" bytes--and the initial jump wound up "RND" text in the Bombsville!

Rather than create 9" and a jump-table 81, the revised code simply gets the correct 79) into ACC A, and to reach the error-rot

The two fixes most of the code by \$14AD. In the pr \$14A8 was tossed out the WAI that sometimes not the CLI instruction

If any further patch this area, the INX I can be thrown out, at \$14AA changed to freeing up three byte

be computed by evaluation of an expression if the programmer so desires--e.g., "PRINT #(N*M-6)". Since there are only 8 sets of pointers to I/O driver routines, some means must be provided to trap illegal values here.

Earlier versions of Uiterwyk's BASIC interpreters simply checked the indicated port-number, and if it came up 8 or greater jumped directly to a pointer to "ERROR #6" (Illegal arithmetic).

In BASIC 3.5, though, a new wrinkle was added. Rather than jumping directly to an error routine, the program assigned "Port 9" as the number of any illegal expression, and then put jumps to the error-message routine where the "Port 9" input, output and initialization routine pointers should be in the I/O jump table. At least, that was the intent.

MISCALCULATED

Unfortunately, the arithmetic was miscalculated. The computed jumps for "Port 9" were off by two bytes--and the initialization routine jump wound up walking into the "RND" text in the function table -- Bombsville!

Rather than creating a phony "Port 9" and a jump-table offset of $9 \times 9 = 81$, the revised code of the listing here simply gets the correct offset ($\$4F = 79$) into ACC A, and uses it at PORST4 to reach the error-routine pointers.

The two fixes together relocate most of the code between \$1461 and \$14AD. In the process, a NOP at \$14A8 was tossed out (not needed: it's the WAI that sometimes needs a NOP, not the CLI instruction).

If any further patching is needed in this area, the INX INX INX at \$14A6 can be thrown out, and the instruction at \$14AA changed to JSR 3,X (AD 03) -- freeing up three bytes.

continued page 26

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```

00010      NAM      BASICIOP Patch to BASIC 3.5
00020      *          Rev 0.0   September 9, 1980
00030      OPT      O,S,NOG

```

```

00510 146A 86
00520 146C 20
00540 146E 16
00550 146F 48
00560 1470 48
00570 1471 91
00580 1473 26
00590 1475 39

```

00050 *External References

```

00070      0034      POSIT EQU      $34
00080      00B9      SPSKIP EQU     $0B99
00090      0096      CTLPOR EQU     $96
00100      0869      NUMEVL EQU     $0869
00110      075F      NUMCK EQU      $075F
00120      1657      ILARTH EQU     $1657
00130      0090      PORADR EQU     $90
00140      0106      JMPTAB EQU     $0106
00150      008C      OUTADR EQU     $8C
00160      008E      INADR EQU      $8E
00170      0CE9      ERRORS EQU     $0CE9

```

```

00610 1476 36
00620 1477 97
00630 1479 86
00640 147B 97
00650 147D 32
00660 147E 48
00670 147F 1B
00680 1480 CE
00690 1483 DF
00700 1485 DF
00710 1487 9B
00720 1489 97
00730 148B 8B
00740 148D 97
00750 148F 96
00760 1491 27
00770 1493 DE
00780 1495 A6
00790 1497 81
00800 1499 26
00810 149B A1
00820 149D 26
00830 149F C6
00840 14A1 7E

```

```

00190 1438      ORG      $1438

```

00210 *CTLP sets up control-port I/O

```

00230 1438 96 96      CTLP   LDA A   CTLPOR   Port number for Control
00240 143A 20 25      BRA     PORCHK

```

```

00700 1485 DF
00710 1487 9B
00720 1489 97
00730 148B 8B
00740 148D 97
00750 148F 96
00760 1491 27
00770 1493 DE
00780 1495 A6
00790 1497 81
00800 1499 26
00810 149B A1
00820 149D 26
00830 149F C6
00840 14A1 7E

```

00260 *PORSET establishes I/O port (default = Control port

```

00280 143C DE 34      PORSET LDX      POSIT      Scan pointer
00290 143E BD 0B99      JSR      SPSKIP      Get next non-space character
00300 1441 81 23      CMP A   #$23      Check for "#"
00310 1443 26 F3      BNE      CTLP      No #; get default port
00320 1445 08      INX      Was a #
00330 1446 BD 0869      JSR      NUMEVL      Evaluate Port # expression
00340 1449 27 10      BEQ      PTERM      Have a terminator?
00350 144B 81 2C      CMP A   #$2C      A comma, maybe
00360 144D 27 0B      BEQ      PDELIM
00370 144F 81 3B      CMP A   #$3B      Semicolon?
00380 1451 27 07      BEQ      PDELIM
00390 1453 81 3A      CMP A   #$3A      Colon?
00400 1455 27 04      BEQ      PTERM      Terminates this statement
00410 1457 7E 1657      JMP      ILARTH      Call it illegal arithmetic.
00420 145A 08      PDELIM INX      Past delimiter
00430 145B DF 34      PTERM  STX      POSIT      Scan pointer
00440 145D BD 075F      JSR      NUMCK      Check for 1-255 only
00450 1460 17      TBA      OK. Value is in ACC B.

```

```

00860 14A4 DE
00870 14A6 08
00880 14A7 08
00890 14A8 08
00900 14A9 0F
00910 14AA AD
00920 14AC 0E
00930 14AD 39

```

```

00470 1461 81 08      PORCHK CMP A   #$08      7 is highest valid Port #
00480 1463 25 09      BCS      PORST1      Looks OK.
00490 1465 7F 0090      CLR      PORADR      Set MSB = 00
00500 1468 97 91      STA A   PORADR+1  LSB = bum number

```

```

00950
POSIT 0034
SPSKIP 00B9
CTLPOR 0096
NUMEVL 0869
NUMCK 075F
TOTAL ERRORS 0

```


00510	146A	86	4F	LDA A	#\$4F	Value to reach error pointers
00520	146C	20	12	BRA	PORST4	
00540	146E	16		PORST1	TAB	Port number into ACC B
00550	146F	48		ASL A		X2
00560	1470	48		ASL A		X4
00570	1471	91	91	CMP A	PORADR+1	Check current port
00580	1473	26	01	BNE	PORST2	Not the same. Set up new one.
00590	1475	39		RTS		No change. Exit now.
00610	1476	36		PORST2	PSH A	Save Port #
00620	1477	97	91	STA A	PORADR+1	LSB set
00630	1479	86	80	LDA A	#\$80	MSB is always \$80
00640	147B	97	90	STA A	PORADR	
00650	147D	32		PUL A		Port #, X4
00660	147E	48		PORST3	ASL A	X8
00670	147F	1B		ABA		X9
00680	1480	CE	0106	PORST4	LDX	#JMPTAB Start of I/O jump table
00690	1483	DF	8C	STX	OUTADR	Output routine reference
00700	1485	DF	8E	STX	INADR	Input routine reference
00710	1487	9B	8D	ADD A	OUTADR+1	LSB
00720	1489	97	8D	STA A	OUTADR+1	0106 + 9 X Port # = OUTADR
00730	148B	8B	03	ADD A	#3	For input routine
00740	148D	97	8F	STA A	INADR+1	INADR now set
00750	148F	96	90	LDA A	PORADR	MSB. Should be \$80
00760	1491	27	11	BEQ	INZSET	00? Bummer. Error sequence.
00770	1493	DE	90	LDX	PORADR	Get complete address
00780	1495	A6	03	LDA A	3,X	Check 4th register
00790	1497	81	FF	CMP A	#\$FF	Look for unwired port
00800	1499	26	09	BNE	INZSET	OK
00810	149B	A1	02	CMP A	2,X	Check 3rd register
00820	149D	26	05	BNE	INZSET	Not also \$FF? OK.
00830	149F	C6	26	LDA B	#\$26	'Invalid port' error
00840	14A1	7E	0CE9	JMP	ERRORS	
00860	14A4	DE	8E	INZSET	LDX	INADR Address of input routine
00870	14A6	08		INX		
00880	14A7	08		INX		
00890	14A8	08		INX		Plus 3 = INZ routine
00900	14A9	0F		SEI		
00910	14AA	AD	00	JSR	0,X	Do initialization
00920	14AC	0E		CLI		Re-enable interrupts
00930	14AD	39		RTS		
00950				END		
POSIT	0034	ERRORS	0CE9	ILARTH	1657	PORCHK 1461
SPSKIP	0B99	CTLP	1438	PORADR	0090	PORST1 146E
CTLPOR	0096	PORSET	143C	JMPTAB	0106	PORST2 1476
NUMEVL	0869	PDELIM	145A	OUTADR	008C	PORST3 147E
NUMCK	075F	PTERM	145B	INADR	008E	PORST4 1480
						INZSET 14A4
TOTAL ERRORS 00000						

[SS-50]

continued from page 8

chips will cost less than \$100.00 for 64K! Not bad at all--compare that to a few short years ago.

The prices for a complete kit less memory is \$190.00. If you prefer not to build a kit, the assembled and tested board (without 4116's) is only \$230.00. For other options, see the ad in this issue, or contact BOAZ Co., Box 18081, San Jose, Ca. 95158.

This board is designed very well, it works well, and the price is excellent. For anyone interested in expanding their system, the BOAZ D64KB is an excellent 64K dynamic memory.

[SS-50]



New Products

The Mdisk +09 is a new 6809 DOS for the LFD-400 disk system written specifically for the 6809 processor. It includes many advanced features found only in large disk operating systems without the large requirements made by such systems and also allows a much more flexible environment in which it will operate. It allows the user to have mixed 35,40 and 80 track drives in the same system and to use the full potential of each drive with enhanced step rate for both 40 and 80 track drives. The user also has control over error checking whether using data compare, read checking or no file checking at all for maximum throughput.

Mdisk +09 features a resident command set and the File Information Block (FIB) system for disk file communication.

With all of these advanced features, Mdisk +09 only occupies 3K of address space, with a choice of EPROM on the disk controller card, EPROM on the CPU card, or in RAM.

Additionally, 1K of RAM selectable by the user.

It is also an excellent DOS for use in a switchable 6800/6809 system. This may be accomplished by locating Mdisk +09 on the processor card and the 6800 DOS on the disk controller.

Instructions necessary to switch from 6800 to 6809 and I/O switching is supplied with it.

For further information contact: Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110, (702) 452-0632.

UniFLEX Gains Sort/Merge Package

Technical Systems Consultants, Inc. has announced the availability of a full-disk sort/merge package for operation with the 6809 UniFLEX Operating System. Written in 6809 assembler language, the package features a convenient operator interface and very fast sorts. Any size and type file may be sorted with parameters for the sort supplied as part of the command line, through use of a "parameter editor", or in an existing parameter file. The package sorts files of any size by breaking them into multiple, temporary files which are individually sorted and then merged into one. It also performs merges on previously sorted files. But input and output can be routed to most any device through the facilities of UniFLEX. Some of the packages features include, any size, fixed or variable length input records, fixed or variable length fields, up to 20 input to output keys, key length of up to 250 characters, supports ascending or descending and right or left justified keys, user-definable sorting sequence, run-time messages, and a powerful record select/exclude feature. A single quantity license is \$100.00 with maintenance available for \$50.00 per year from Technical Systems Consultants, Inc., P.O. Box 2570, West Lafayette, IN 47906. Telephone: (317) 463-2502, Telex: 276143.



Garland, Texas

This is issue number "Peripheral." This release a year ago, and during the next direction of the SS-50 is unclear.

6809-based computers have been introduced by users but the market has not expanded as Tandy, Apple and others.

TSC, Microware and others are doing good 6809 systems more lucrative applications. Visicalc, Profile, Elec which spur the sale of computers in the small market virtually nonexistent.

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WHETHER THE SS-50 BUS?

by Harold Mauch
President, Percom Data Company

This is issue number four of the Percom "Peripheral." This issue was planned for release a year ago. However, at that time and during the months that followed direction of the SS-50 bus market was unclear.

6809-based computers for the SS-50 bus have been introduced by several manufacturers but the market for SS-50 bus products has not expanded as fast as the market for Tandy, Apple and other personal computers.

TSC, Microware and others are developing good 6809 *systems* software but the more lucrative *applications* software such as Visicalc, Profile, Electric Pencil and Scripsit, which spur the sales of Tandy and Apple computers in the small business market, are virtually nonexistent.

On the other hand, hardware variations of the SS-50 bus computer are much more easily implemented, and are more cost effective than variations of either the Tandy or the Apple computer.

Consequently, we feel the SS-50 bus computer is more adaptable to the needs of the experimenter-oriented computer hobbyist and to the systems designer configuring a control or specific application computing system.

With this conclusion in mind, Percom engineers have developed several SS-50 and SS-30 bus modules ranging from a six-shot motherboard to a color video display generator and a 48K dynamic memory card. Several of the new modules are described in this newsletter as well as suggested system configurations.

If you are a computer experimenter, you will enjoy Wayne Smith's article on "Plywood Computers".

The number of LFD-400 mini-disk system Users Group Diskettes has grown to ten and now includes the source of the 6809 disk drivers, plus software to build a complete semi-intelligent terminal using our SBC/9 and ELECTRIC WINDOW video display cards.

Incidentally, you should keep an eye on Percom TRS-80 advertising. Many of the products featured are easily connected to SS-50 bus computers -- for example, SPEAK-2-ME-2, the SPEAK 'N SPELL adapter, and the ELECTRIC CRAYON color graphics generator. (Secret: The ELECTRIC CRAYON uses a 6802 to perform its magic!)

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PLYWOOD PRODUCTS

by Wayne Smith

A few weeks back, I was complaining to our Marketing Manager about how the small computer industry as a whole had abandoned the experimenter and that there just wasn't a cheap way to get into micro computing anymore. He indignantly informed me, number one, that, "WE do not use the word 'cheap'". WE use the word "inexpensive," and, number two, if I thought things were bad now, I should wait until January 1st when the FCC rules on home computer EMI take effect. Well,

January 1st has come and gone. The prices haven't made any dramatic swing up but they haven't come down, either. (So much for forecasts by our Marketing Manager.)

The objective of this article is to discuss some of the techniques I used to bring up my "inexpensive" personal system and some of the "inexpensive" systems developed for testing in the lab at Percom.

The first and most important problem I was faced with was how to start.

After hours (with calculator in hand) brainstorming, think-tanking, etc., and after throwing out the idea of making an aluminum enclosure out of old Dr. Pepper

cans, it dawned. Curiously, 3/4" x 16-1 ideal size. I felt very scrap I found in my have precisely those c have to cut it! (The i garage to garage.)

Figures A and B give and installation meth. Hose clamps and "L" mounting large caps. into the plywood base sound tie points, an inexpensive six-slot SS-30 motherboard Percom. These uni right into each other s can be added later -- depending upon syste and SS-30 proto boar take a notion to lear "Built from Scratch".

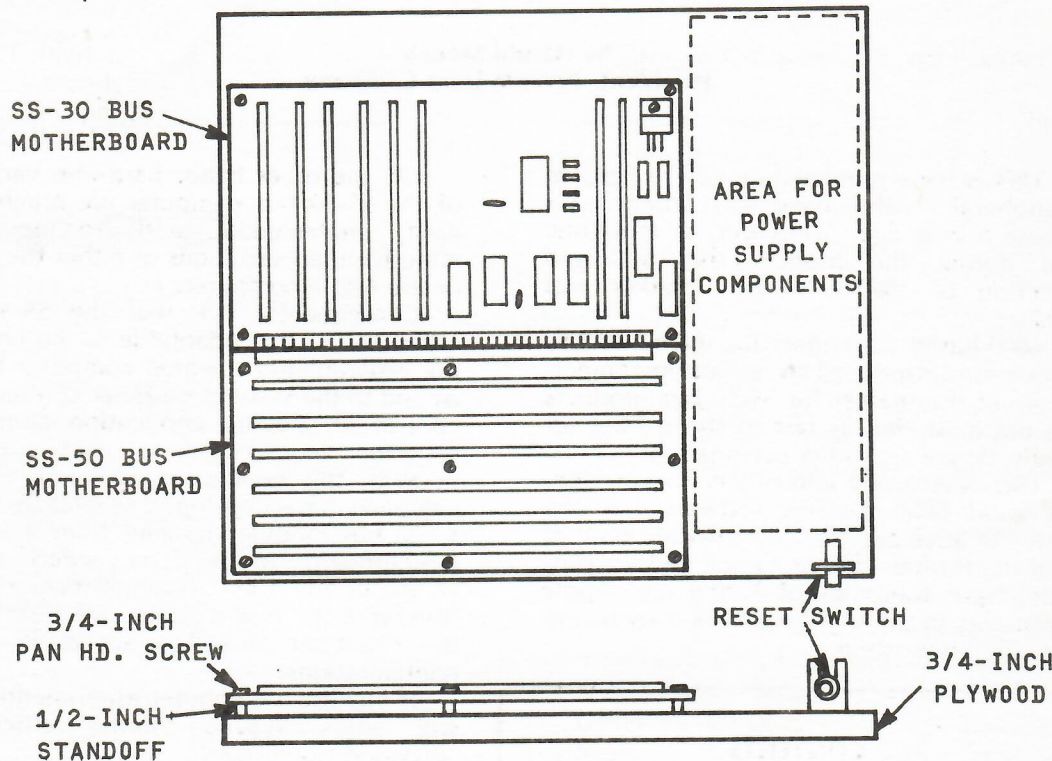


FIGURE A

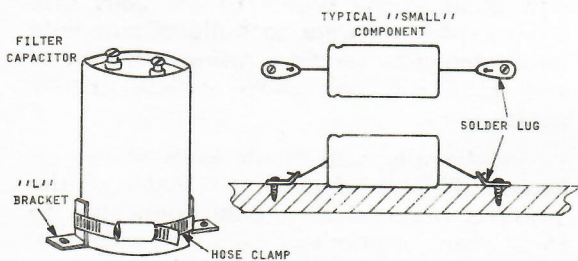


FIGURE B

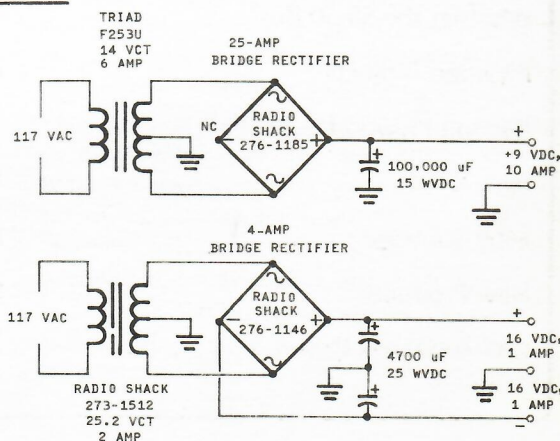
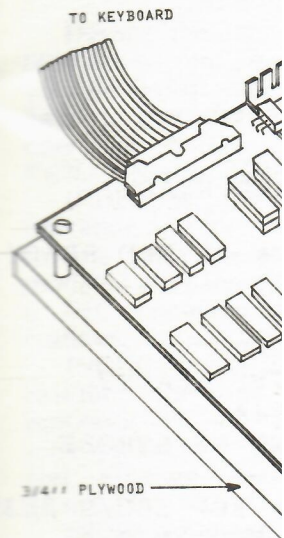


FIGURE C

TWO-BOARD DATA TER



cans, it dawned on me...plywood! Curiously, 3/4" x 16-1/8" x 15-1/4" was the ideal size. I felt very fortunate when the scrap I found in my garage turned out to have precisely those dimensions, so I didn't have to cut it! (The ideal size will vary from garage to garage.)

Figures A and B give a suggested layout, and installation methods for components. Hose clamps and "L" brackets are ideal for mounting large caps. Solder lugs screwed into the plywood base provide mechanically sound tie points, and, lest "WE" forget, inexpensive six-slot SS-50 motherboards and SS-30 motherboards are available from Percom. These units conveniently plug right into each other so that an SS-30 section can be added later -- or left off altogether -- depending upon system needs. Both SS-50 and SS-30 proto boards are available if you take a notion to learn the true meaning of "Built from Scratch".

A good power supply spec would be 10 A at -16 Vdc, unregulated. A schematic of a supply that meets these specifications is shown on page 2. Remember, you need 8,000 to 10,000 microfarads/amp on your supply to get no more than 0.5 ripple (all calculations +/- 2 dB). Careful! If you use a surplus supply, check it out thoroughly or your "inexpensive" computer will turn into an expensive smoke generator.

Many variations of the "Plywood Computer" can be invented. My favorite is one where I do away with the motherboard altogether and plug two boards into each other. See Figure C. This can be a very powerful configuration! An SBC/9 (6802 version) and an ELECTRIC WINDOW instantly form a data terminal (with DB-25 interconnect). A parallel keyboard can be interfaced to the SBC/9 superport and a video monitor to the ELECTRIC WINDOW.

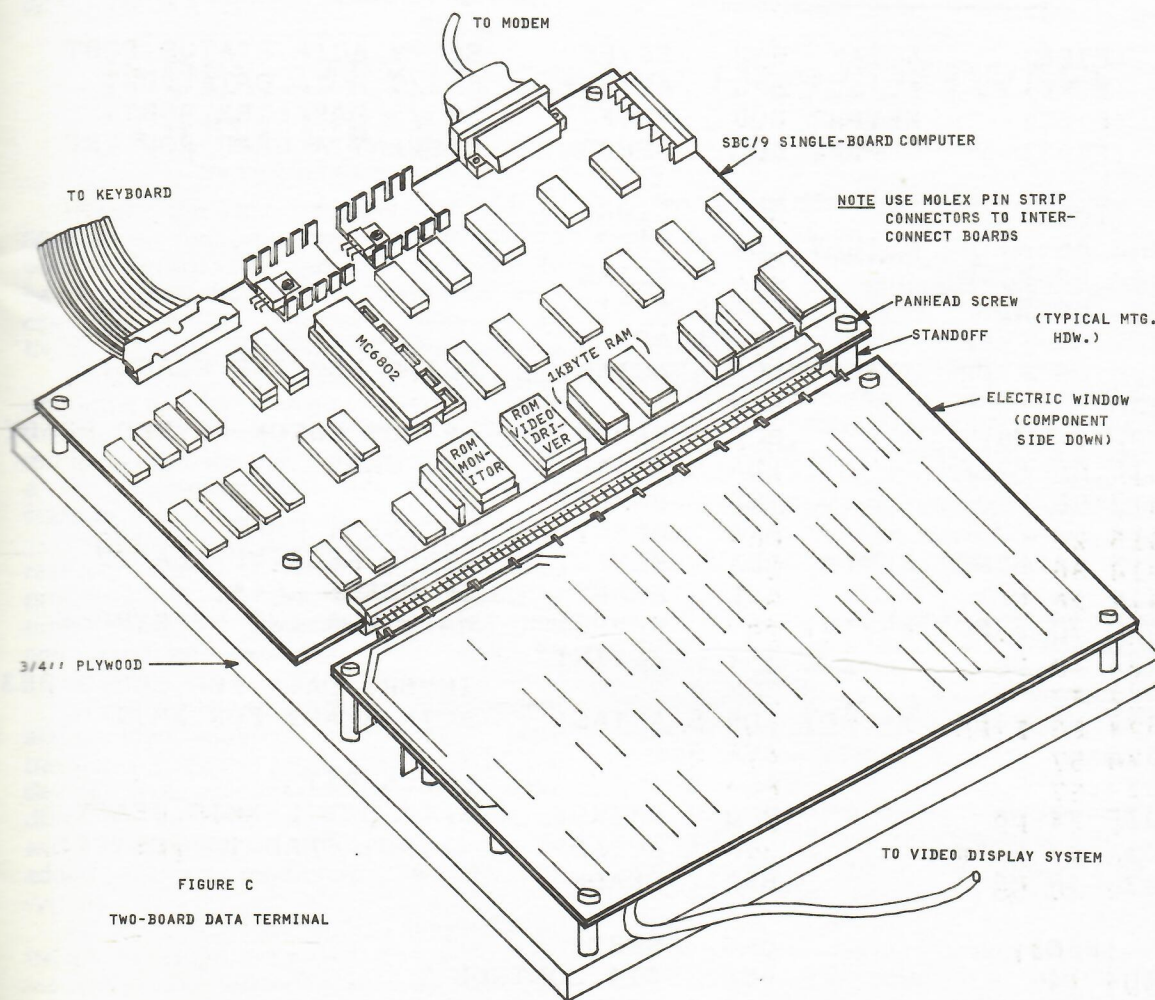


FIGURE C
TWO-BOARD DATA TERMINAL

Special purpose projects like this also limit the need for large power supplies. (SBC/9 + ELECTRIC WINDOW = 3 A at +10 V, 1 A at +15 V, 1 A at -15 V). This also could be done with our COLORAMA card to form an intelligent color graphics terminal.

Another system idea would be to mate the SBC/9 with the Percom 48K dynamic RAM card, forming a very compact system. Any boards used in this configuration could easily be reclaimed for other projects at any time.

I hate to say it, but the FCC will need equal time at this point. Unshielded micro's do have a tendency to radiate RFI. If you build a computer that makes your neighbor's TV go bananas, you are responsible for correcting the situation. Volumes have been written on the subject so if you run into trouble, consult your local library or Radio Amateur's Handbook.

BEYOND PLYWOOD

by Phil Sanders

The seed for Wayne Smith's cheap plywood project discussed elsewhere in this issue of the Peripheral was born of necessity as much as blue-skying. One day we came up short a data terminal, and the "instant" plywood terminal he mentions became an inexpensive semi-intelligent terminal that took the place of an ADM-3.

The inexpensive plywood terminal consists of an SBC/9 configured for a 6802, an ELECTRIC WINDOW, SS-50 bus connectors and an ELECTRIC WINDOW driver EPROM that plugs into the SBC/9 \$F800 ROM socket.

The power of this system is that it can be configured, modified, or added to by changing the firmware. In other words, you can construct a terminal to satisfy your needs through software.

For example, our change the video interlace to 24 x 64 non-interlace with a This video driver and LFD-400 Users Gr On page four is the the inexpensive p stand-alone, semi-in

TERMINAL

Configures the syst unicate with outside input by the keyboa port are routed to ar ACIA. Consequentl (gives commands, d system. Input from the SBC/02 (SBC/ character routine, let also talk to SBC/02. configuring the St WINDOW as a termi

INDEX. YOU'LL

By Phi

Despite the rece 6809 advertising, yo your 6800 processor have a powerful a operating system. INDEX (Interrupt Dri INDEX is the operating and file m for the 6800 microj modeled after the di a DEC computer features.

INDEX, being i real-time operating processor will not ha time sitting in a so and program exe increased.

INDEX is file and and allows limite transfer I/O is the : device type; INDI difference between a and it doesn't matter added without mc system.

All file control is INDEX. Consequent matically close all prevent disk crashes.

(F7FE)	ACIAS	EQU	\$F7FE
(F7FF)	ACIAD	EQU	ACIAS+1
(F7FC)	KEYPRT	EQU	\$F7FC
(F803)	DSPLAY	EQU	\$F803

SBC/9 ACIA STATUS PORT
SBC/9 ACIA DATA PORT
SBC/9 PARALLEL PORT
DISPLAY A CHAR ROUTINE

(1000)		ORG	\$1000
1000 86 03	MSTRST	LDA A	#\$03
1002 B7 F7FE		STA A	ACIAS
1005 86 51		LDA A	#\$51
1007 B7 F7FE		STA A	ACIAS
100A B6 F7FE	READY	LDA A	ACIAS
100D 47		ASR A	
100E 24 08		BCC	KEYIN
1010 B6 F7FF		LDA A	ACIAD
1013 BD F803		JSR	DSPLAY
1016 20 F2		BRA	READY
1018 B6 F7FC	KEYIN	LDA A	KEYPRT
101B 2A ED		BPL	READY
101D 7D F7FC	KEYIN1	TST	KEYPRT
1020 2B FB		BMI	KEYIN1
1022 43		COM A	
1023 F6 F7FE	XMTRDY	LDA B	ACIAS
1026 57		ASR B	
1027 57		ASR B	
1028 24 F9		BCC	XMTRDY
102A B7 F7FF		STA A	ACIAD
102D 20 DB		BRA	READY

ACIAS RECEIVE READY?

IF NOT CHECK KEYBRD READY
GET CHAR

GET NEXT CHAR
KYBRD RECEIVE READY?
IF CHECK ACIA
WAIT FOR END OF STROBE

INVERT DATA FOR SBC/9 8835
ACIA READY FOR XMIT

CHECK BIT 1
WAIT UNTIL XMIT READY
OUTPUT CHAR TO TESTEE

(FBD4)		ORG	\$FBD4
FBD4 14		FCB	\$14 CONTROL T
FBD5 10 00		FDB	MSTRST
00	ERROR(S) DETECTED		

For example, our drive allows us to change the video format from 24 x 80 interlace to 24 x 64 interlace or 16 x 64 non-interlace with a couple of key strokes. This video driver and others are available on LFD-400 Users Group Diskette UGD-6. On page four is the routine that configures the inexpensive plywood terminal as stand-alone, semi-intelligent data terminal.

TERMINAL COMMANDS

Configures the system so it will communicate with outside systems. Characters input by the keyboard through the parallel port are routed to an outside system by the ACIA. Consequently, the keyboard talks (gives commands, data, etc.) to an outside system. Input from the ACIA is routed to the SBC/02 (SBC/9 with 6802) input character routine, letting the outside system also talk to SBC/02. This is the basis for configuring the SBC/02 and ELECTRIC WINDOW as a terminal.

INDEX...TRY IT. YOU'LL LIKE IT!

By Phil Sanders

Despite the recent hoopla and rash of 6809 advertising, you don't have to discard your 6800 processor and 6800 programs to have a powerful and sophisticated disk operating system. Instead, upgrade to INDEX (INterrupt Driven EXecutive).

INDEX is the most powerful disk operating and file manager system available for the 6800 microprocessor. INDEX was modeled after the disk operating systems of a DEC computer and has many UNIX features.

INDEX, being interrupt driven, is a real-time operating system in which your processor will not have to waste processing time sitting in a software loop; data flow and program execution will also be increased.

INDEX is file and I/O device independent and allows limited pipe-lining. Data transfer I/O is the same regardless of the device type; INDEX doesn't know the difference between a disk file and a printer, and it doesn't matter. Thus, devices may be added without modifying the operating system.

All file control is handled internally by INDEX. Consequently, INDEX will automatically close all open files and thereby prevent disk crashes.

Type-ahead is permitted by buffered I/O to external devices. As you type in the current line, the previous line is simultaneously being processed.

Also there is a multi-level directory and many other 'big' computer features.

INDEX is supported by editors, assemblers, compilers, and Percom Super BASIC. Plus, Percom continues its INDEX upgrade policy in which LFD-400 users can upgrade their MPX programs to INDEX for a nominal fee. And a special added attraction: The INDEX Advance Programmers Guide (Use INDEX to its maximum power while learning advanced programming techniques) has been reduced to \$29.95.

Don't throw away your present processor and investment for a new and expensive disk operating system when much of the same power is available with INDEX. And much, much cheaper. Quit the rat race. Try INDEX, you'll like it.

6809 SOFTWARE

By Tim McKee

The MPX/9 DOS and PSYMON Monitor

We have developed a disk operating system for use with our 6809 PSYMON operating system that is quite different from its 6800 predecessor. It is called MPX/9, and is available off-the-shelf.

MPX/9 consists of two pieces, a ROM to be placed in the LFD400 card and a diskette containing the actual disk operating system. The ROM contains the Read-Sector and Write-Sector routines, and a routine that will read the contents of track 0 sector 0 into memory and execute it. Sector 0 on track 0 contains a "boot" that will control the loading of the actual disk operating system. The book that we supply will start searching for the highest 4K block of memory, below the address of the disk controller card, and proceed to load MPX/9 into that memory. The boot will then transfer control to MPX/9.

This structure presents a dilemma to assembly language programmers who are used to performing a "JSR" to a routine in the DOS: the programmer wouldn't know from one system to the next where the highest 4K of memory would be located! We structured this software so that the user never needs to know where MPX/9 is

located. All operating system software calls are made by executing an "SW13" instruction followed by a one-byte number signifying what operation you desire.

MPX/9 links directly to PSYMON. In fact, it requires PSYMON to operate. PSYMON is a 1Kbyte OS for the 6809. While it provides the usual monitor commands and breakpoint management PSYMON's true power is in its structure and extensibility. PSYMON may be tailored for nearly any configuration. This is done using a unique "look-ahead" feature and a Device Control Block (DCB). The "look-ahead" feature allows a user-written routine to alter pointers used by PSYMON. The DCB allows PSYMON to be nearly I/O device independent by leaving details of the I/O to the specific I/O device driver. The Device Control Block (DCB) structure of PSYMON is expanded by commands that will search the DCB list for a specific DCB, delete a DCB from the linked list of DCBs, and add a DCB to the linked list of DCBs. Some very good examples of this are found on UGD-9, an LFD-400 User Group Diskette, in the source file for the LIST utility.

MPX/9 allows the user to open and close files by filename, to perform sector-by-sector Read/Write to the disk, and to perform character-stream I/O to the disk.

The following is a complete list of MPX/9 system calls

- 0) Return to PSYMON monitor.
- 1) Execute I/O request.
- 2) Output character to console.
- 3) Input character from console.
- 4) Print string on console.
- 5) Get HEX number from console.
- 6) Print 4-digit number in hex.
- 7) Print 2-digit number in hex.
- 8) Return to MPX/9.
- 9) Get a line of input from terminal.
- 10) Skip spaces in line of text.
- 11) Go to next word in line of text.
- 12) Process text line as MPX/9 command.
- 13) Report error to console.
- 14) Locate a file.
- 15) Locate a free space on disk for file.
- 16) Read a disk directory.
- 18) Initialize a File Control Block.
- 19) Open a file.
- 20) Close a file.
- 21) Read a character from a file.
- 22) Write a character to a file.
- 23) Read a sector from a file.
- 24) Write a sector to a file.
- 25) Load a memory segment.

- 26) Save a memory segment.
- 27) Compare two ASCII strings.
- 28) Move a block of memory.
- 29) Get a decimal number from text string.
- 30) Get a hex number from text string.
- 31) Print decimal number and space.
- 32) Delete a file.
- 33) Locate a DCB.
- 34) Add a DCB.
- 35) Delete a DCB.

6809 Super BASIC

Super BASIC is available to run on the 6809 with MPX/9. It is faster and has several additions (see patches elsewhere in this issue of the Peripheral). And -- good news -- the price of Super BASIC is now only \$29.95.

FLEX/9 Overlays

We also have overlays that will convert FLEX 9.0 software to operate on a Percom LFD-400 mini-disk system. This software, called FLEXTRAN/9, requires two drives, and 8K of memory at \$C000. This mapping necessitates relocating your LFD-400 controller to the \$E000 range. Complete instructions are supplied with the software. (FLEX 9.0 must be purchased from TSC or a TSC distributor.)

NEW PRODUCTS

We've introduced a number of new SS-50 bus products since the last issue of the Peripheral. Thumbnail descriptions of the principal ones are set forth below. These briefs were prepared by Dale French of our technical staff.

M24SS Static RAM Card: A 24-Kbyte static RAM board organized into three independent 8-Kbyte blocks. Works with either the standard SS-50 or the 1-Mbyte extended addressing bus. Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 8- and 16-Kbyte configurations.

M48DSS Dynamic RAM Card: A low power 48-Kbyte dynamic RAM board organized into three independent 16-Kbyte blocks. Works with either the standard SS-50 bus or the 1-Mbyte extended addressing bus.

Comes assembled, Users manual includes diagnostic memory test. 16- and 32-Kbyte versions.

ColoRAMa-50: A 1-Mbyte VDC board. Generates semi-graphic displays. Resolutions range from 64 x 64 pixels. Displays in two colors, depending on the display and four-color display. Board is designed for low cost Radio Shack display. Comes with 16-Kbyte RAM which provides semigraphics and graphic display form 2-Kbyte EPROM. Closes low-cost file storage includes source listing with 1-Mbyte extended memory in the upper address space. Includes additional RAM for modes.

The COLOR CONNECTION card assembly which interfaces the 6809-based TRS-80 to the SS-50 bus. The card allows access to LFD-400 RAM expansion, ELECTRIC WINDOW, and processing quality BW card.

SS-50 Bus Motherboard system bus card that extends the SS-50 bus for serial extender card for serial

SS-50 Bus Motherboard up to eight 30-pin components required I/O extension motherboard.

Since the last Peripheral new 680X programs. Two new 6809 releases where in this issue. MPX/9, a 6809 DDC systems, and a 6809 BASIC.

To place an order for literature, call our 1-800-527-1592. For information call (214

Comes assembled, burned-in and tested. Users manual includes source listing of diagnostic memory test. Also available in 16- and 32-Kbyte versions.

ColoRAMa-50: A memory-mapped color VDC board. Generates alphanumerics, semi-graphic displays. Full graphic resolutions range from 64 x 64 pixels to 256 x 192 pixels. Displays in two, four or eight colors, depending on the display resolution. Two- and four-color displays may be complemented. Board is designed to accommodate a low cost Radio Shack modulator for TV set display. Comes with one Kbyte of display RAM which provides for alphanumeric, semigraphics and two low-density full graphic display formats. Also provides for 2-Kbyte EPROM. Cassette I/O provides for low-cost file storage. Users manual includes source listing of display OS. works with 1-Mbyte extended addressing bus. The ColoRAMa-50 occupies an 8-Kbyte block of memory in the upper half of a 64-Kbyte address space. Board accommodates additional RAM for higher density display modes.

The COLOR CONNECTION: A cable/circuit card assembly which is used to adapt the 6809-based TRS-80 Color Computer to the SS-50 bus. The COLOR CONNECTION allows access to LFD-400 mini-disk storage, RAM expansion, interfacing (via the ELECTRIC WINDOW, e.g.) to a word-processing quality BW display system, etc.

SS-50 Bus Motherboard: A seven-slot system bus card that can also be used as an extender card for servicing function cards.

SS-50 Bus Motherboard Kit: Accommodates up to eight 30-pin I/O cards. Supplied complete with PC board connectors and components required for application as an I/O extension motherboard for the SS-50 bus.

Since the last Peripheral was issued, many new 680X programs have been released. Two new 6809 releases, mentioned elsewhere in this issue of the Peripheral, are MPX/9, a 6809 DOS for our LFD disk systems, and a 6809 version of Percom Super BASIC.

To place an order or request product literature, call our toll-free order number, 1-800-527-1592. For additional technical information call (214) 272-3421.

LFD-400 Users Group

To permit all LFD-400 users an information exchange forum, we have formed an LFD-400 Users Group. This newsletter will be used to inform users of contributed programs and suggestions. However, software will be distributed on diskette for a nominal charge to cover cost of reproduction and distribution.

NOTE: User Group Diskettes #1, #2 and #3 were described in the last issue of the Peripheral.

LFD-400 UGD #4

This diskette is dedicated to Motorola's Micro Chroma 68 and its TVBUG monitor. Included are over a dozen video displays and several source listings from the Percom ELECTRIC CRAYON to use as driver examples. System Requirements:

Micro Chroma 68 with TVBUG
LFD-400EX (at least one drive)
7K of RAM at \$0000

LFD-400 UGD #5

HEXLD1: Hex loader with offset. Source and object files.

BASEDT: Links Peter Stark's BASIC Editor from Jan. '79 Kilobaud to MPX. Source and object files. Submitted by Doug Beck.

OTHELO: A game in Percom Super BASIC. Submitted by Doug Beck.

TTT\$: Tick-Tac-Toe in Strubal. Submitted by Doug Beck.

ALIGN: Program for drive alignment. Source and object files. Submitted by W. A. Arrera.

HEXLD2: Hex loader with offset. Source and object files. Submitted by W. A. Arrera.

LIST: Print program with universal print driver. Source and object files. Submitted by K. J. Kroeker.

HEXLD3: Hex loader with offset. Source and object files. Submitted by Val Walker.

PRMLDR: Hex loader with offset for Index. Source, object, and Help files. Submitted by Joe Sasser.

CONCAT: Program to copy and concatenate files. Source and object files. Submitted by Rex Klopfenstein, Jr.
DINDEX: Master file directory in alphabetical order. Use with Percom Super BASIC. Source and object files. Submitted by Peter Stark.
GRAPHIC: Controller for the SWTPC GT 6144 Graphics Terminal. Object and Help files. Submitted by Donald Taylor.

LFD-400 UGD #6

New diskette January 1981

VIDEO+: Deluxe 6800 video driver for 64 x 16 memory mapped video board; includes changes to MICROBUG monitor to allow it to be used with VIDEO+. Submitted by Gary Calvert.

VIDEO9: 6809 video driver for a 64 x 16 memory mapped video board and PSYMON operating system. This listing does not require a 6809 assembler as Gary used an interesting technique to produce 6809 op-codes on a 6800 assembler. Submitted by Gary Calvert.

SWTPAT: Patch and other tips to modify SWTBUG monitor for operation with WINDEX. Submitted by Tim McKee.

VIDRVR: Deluxe video driver for the ELECTRIC WINDOW. Submitted by Phil Sanders.

MISCEL: Two commands that may be added to VIDRVR; one permits the ELECTRIC WINDOW and SBC/9 configured for 6802 to communicate with another system, the other configures VIDRVR for a 'typewriter' mode.

LFD-400 UGD #7

This diskette contains the source files for the MPX/9 disk operating system and the 6809 disk driver ROM. These source files are on a 6800-compatible disk and may be edited, assembled, etc. with existing 6800 software, or they may be converted to 6809 format with your system REMAP utility. (See UGD #8).

LFD-400 UGD #8

This diskette contains the source files for the MPX/9 disk boot, the REMAP utility and the COPY utility. These source files are in 6800 format, same as UGD #7.

LFD-400 UGD #9

This diskette contains the source files for UGD #10 in 6800 format same as UGD #7.

LFD-400 UGD #10

MPX/9 utility system diskette. Contains the following utilities:

- Serial Line Printer driver
- Vector output to any device
- Print formatted directory
- List a file
- Load a hex (S1-S9) file with offset
- Execute commands from a text file
- Disk sector editor
- Certify a diskette
- Create a text file
- Verify the readability of a diskette
- Memory test

Ed. Note

A supplement to this issue of the Peripheral is available from Percom Data Company. The supplement includes more specific information -- for example, notes on product improvement and maintenance -- and a 'short-form' product price list. This supplement, which is automatically mailed to subscribers of the Peripheral, may be obtained from Percom by calling our toll-free order number, 1-800-527-1592. From within Texas, call (214) 272-3421.

TRADEMARKS APPEARING IN THIS ISSUE OF THE PERIPHERAL:

Percom Data Company, Inc.: ColoRAMa-50, the COLOR CONNECTION, ELECTRIC CRAYON, ELECTRIC WINDOW, EXDOS, INDEX, LFD-400, LFD-800, ModulEX, MPX/9, PSYMON and SBC/0.

Blue Hat Software Company: DIXIE

Motorola Corp.: EXBUG, EXORciser, MICROBUG, MICRO CHROMA, MIKBUG and MINIBUG.

Star-Kits Company: HUMBUG

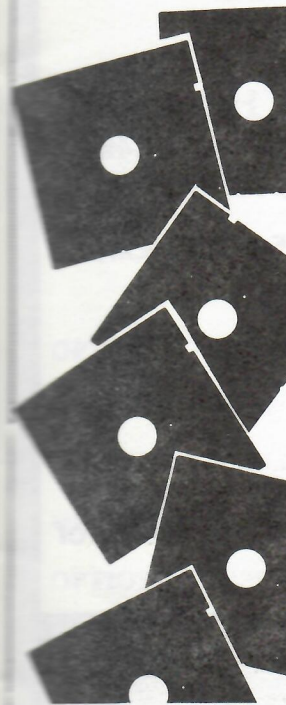
Tandy Radio Shack Corp.: TRS-80

Technical Systems Consultants, Inc.: FLEX

GIMI
 32 K 6809 PLUS System mit 2
 GIMIX 32 K S
 16 K RAM erweiterbar auf 32
 24 K RAM erweiterbar auf 32
 32 K RAM
 Speicher IC 2114
 450 ns .. DM 9,80 300 ns
 GIMIX
 80 x 24 Zeichen Video Karte
 64 x 16 Zeichen Video Karte
 GIMIX
 6809 PLUS CPU mit Datum, Ba
 GIMIX Interfac
 Serielles Interface RS 232c
 Parallel Interface, zwei Ar
 Serielles Interface RS 232c
 Parallel Interface, acht Ar
 5" Floppy Kontroller, singl
 5 1/4 Floppy Kontroller, sing
 5" Floppy Kontroller, SD of
 5" Floppy Kontroller, doub

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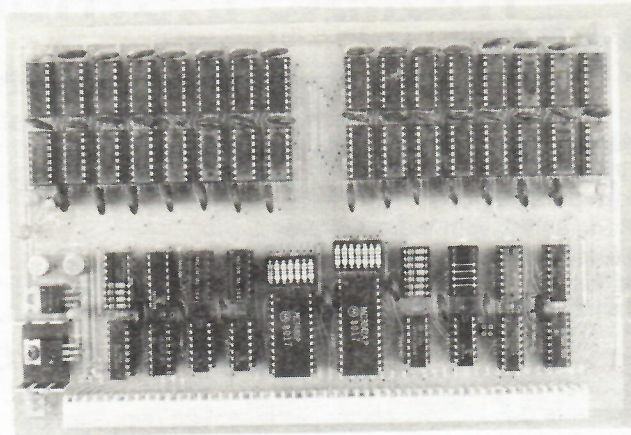
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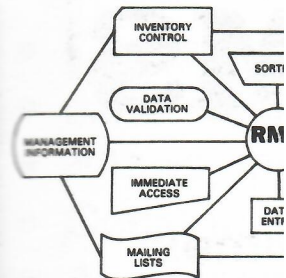
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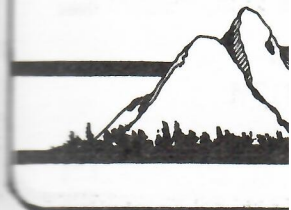


ANNOUNCING...



A PROGRAM
DE-BUGGI

By
Edgar M. (E



6809

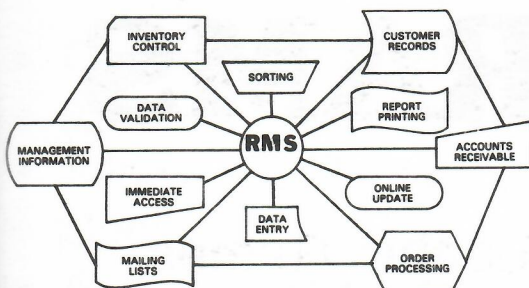
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By

Edgar M. (Bud) Pass, Ph.D

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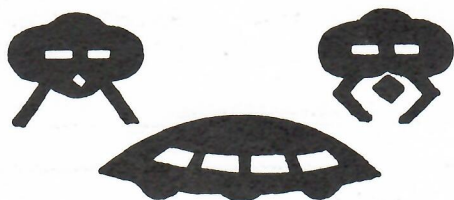
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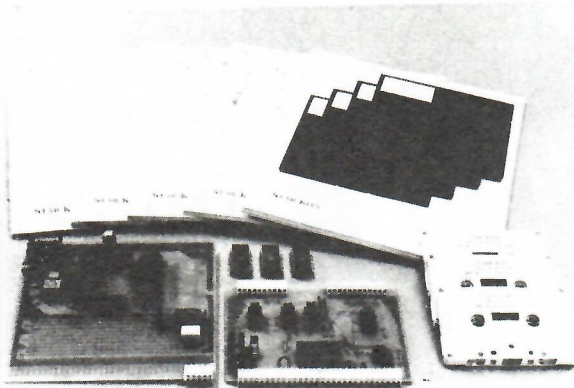


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68000 Microprocessor Handbook

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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

MC6809 Cookbook

This cookbook explains the basic operation of the 6809 and the 6809E microprocessors. Everything from the timing and clock information to the instruction set are covered. By Carl D. Warren - Order No. 1209 \$11.95

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MINDSK09 & MINDOS09 3-2708 EPROM's 89.00
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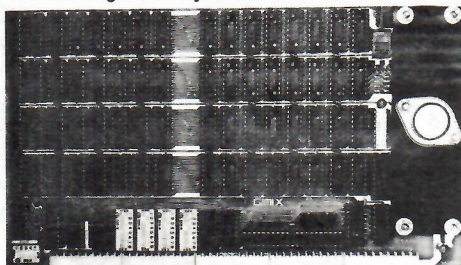
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- Decoding for 4 Extended Address Lines (allows memory decoding up to 1 megabyte)
- DIP-switch to set extended addressing or disable it
- 4 separate 8K blocks, addressable to any 8K boundary by DIP-switch
- Each 8K block may be individually disabled
- Write protect either of two 16K sections
- Low power consumption — uses 2114L low power RAMS
- Fully Socketed
- Gold Bus Connectors
- Guaranteed 2MHz operation

To Substitute CMOS RAM, add \$100.00 for 16K, \$150.00 for 24K, \$200.00 for 32K.

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U.S. orders add \$5 handling if order is under \$200.00. Foreign orders add \$10 handling if order is under \$200.00.

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8 Port RS 232 Serial	318.46
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