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CONCLUSION. The TSC Sort/Merge package is one of the finest pieces of software available for the 6800 microprocessor to date. For $75.00 you can do the same job performed by many of the so called data base management programs which run in BASIC. In fact, you can do more, do it faster, and with less memory overhead. This review has only touched the highlights. The package can do a lot more.

SMITHBUG (A Review)

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Not Just Your Average 6800 Bug

Recently I had been organizing some of my favorite utility routines and was preparing to expand the command table in SWATBUG (my present monitor) to accomodate them.

It was at that time that I was asked to evaluate the SMITHBUG monitor from Ed Smiths' Software Works for 68 Micro Journal. After becoming acquainted with the features of SMITHBUG, my efforts to expand SWATBUG came to a sudden halt. SMITHBUG contained all of my proposed additions for SWATBUG plus many more sophisticated features.

SMITHBUG is supplied in either a SWATBUG or a SMARTBUG compatible version and requires a 6850 ACIA at $8004 (SWATBUG version) or $8008 (SMARTBUG version).

SMITHBUG resides at the top of memory ($F800-$FFFF) and can be operated in conjunction with SWATBUG or SMARTBUG, or it may be used as a stand alone monitor. Also you must have an EPROM board in your system which will accept 2716 EPROMS or the SWTP A-2 processor board can be used.

If SMITHBUG is to be used with SWATBUG for example, SWATBUG will need to be copied into another 2716 EPROM and addressed at it's usual $E000 address. The reason for this is that full address decoding was not used for the monitor socket on the SWTP processor boards and SWATBUG is mirrored 8 places from $E000 through $FFFF and this would cause double addressing. When using SMITHBUG at $F800 and SWATBUG at $E000 on the A-2 processor board turn the HI-PROM switch off, the monitor switch off, and the 4K-8K switch on.

Now let's get to the super features that SMITHBUG provides. "R" Register dump displays the values of all the 6800 registers along with labels so you don't forget what order they are displayed in. Also the processor status register is shown bit by bit with each bit labeled. "D" Disassemble program starting at a specified address. The disassembler converts a machine language program to standard mnemonic symbols. The object address for relative branches and indexed operations are displayed as well as a print out of all ASCII characters. The disassembler is advanced to the next instruction by pressing the space bar. "T" Trace will single step programs starting at a specified address for debugging. The space bar is used to advance to the next instruction and a register dump is displayed for each instruction. Also a disassembled listing is shown for each instruction which makes it easy to follow program flow. The trace function can be aborted at any time by pressing the return key.

Since Trace will only step through RAM, jumps to addresses above $E000 are sensed and the single stepping will continue after program flow returns to the main program. "1" or "2" inserts one or two software interrupts at specified addresses. When an SWI is encountered a register dump will normally follow. However, provision has been made for the user to vector to a user written breakpoint routine. If an SWI is encountered while in the Trace mode the Trace mode may be re-entered by typing "K".

This covers the more complex features supported by SMITHBUG. The remainder of the features will only be discussed briefly.

SMITHBUG has a memory dump feature which will dump $80 bytes on the CRT and interprets all ASCII characters on the line below the hex dump.

Also there is a block move routine, and similar to SWATBUG, a find (one hex byte) routine, a memory examine and change routine, a GOTO user program command, and a jump to user program.

Some other unique features of SMITHBUG include an insert command which will fill memory with a particular byte between specified addresses, a fill memory with ASCII characters from keyboard, command, and a terminal echo on/off command.

A jump to $8020 is included to cold start the Smoke Signal Broadcasting BFD-68 disk system. I changed this jump to go to my SWATBUG disk boot. Also there is a jump to a disk operating system soft start entry point. I also changed this

jump to fit my particular disk operating system.

Another jump vector can be utilized to send all output to a hard copy device driver routine.

The only thing that is missing is a tape input/output routine, but if you have a disk system or if you use SMITHBUG in conjunction with another monitor which supports tape this is no problem.

I found it convenient to change the code in SMITHBUG to jump to SWATBUG with a "$" which is the SWATBUG prompt. I also added to the command table in SWATBUG so that I could jump to SMITHBUG by typing ">" which is the SMITHBUG prompt. These changes are easy to make since the program resides in EPROM.

I have found SMITHBUG to be a complete and very useful monitor combining many of the utilities which I used to have to load separately when I needed them.

PATCH DISK SAVE & LOAD TSC TAPE BASIC

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IN CASE YOU HAVN'T TRIED IT, TSC'S NEW BASIC IS REALLY SUPER... IT IS ULTRA FAST, ACCURATE, AND FULL OF HELPFUL FEATURES. BUT MY PURPOSE IS NOT TO TELL YOU ALL ABOUT TSC'S BASIC. IT IS FOR THOSE OF YOU WHO (LIKE ME) COULDN'T WAIT FOR THE DISK VERSION, BUT WOULD RATHER SAVE & LOAD PROGRAMS TO & FROM DISK INSTEAD OF TAPE...

AFTER YOU HAVE ADDED THIS LITTLE PATCH TO TSC'S BASIC, AND YOU WANT TO SAVE A PROGRAM. YOU TYPE SAVE (JUST LIKE ALWAYS). YOU WILL THEN BE ASKED FOR THE FILE NAME. THE DEFAULT EXTENSION IS .TXT AND THE DEFAULT DRIVE IS THE ONE THAT HAS BEEN ASIGNED AS THE WORK DRIVE. IN BOTH CASES YOU MAY OVERRIDE THE DEFAULTS BY SPECIFYING YOUR DESIRES. THE PROCESS IS IDENTICAL FOR LOADING PROGRAMS, EXCEPT THAT YOU ENTER BY TYPING LOAD WHILE IN BASIC. THIS PATCH SHOULD WORK EQUALLY WELL WITH EITHER MINIFLEX OR WITH FLEX, AND THE DIFFERENCES ARE GIVEN IN THE SOURCE. YOU WILL ONLY NEED TO CHANGE THE EQUATES FOR THE SYSTEM YOU ARE USING.

WRITTING THIS PATCH WAS AIDED BY THE METHOD TSC USED TO IMPLEMENT THE TAPE SAVE AND LOAD ROUTINES. FOUR SUBROUTINE CALLS ARE USED, THESE ARE: TINCH, TOUCH, TAPEON, AND TAPEOFF. THESE SUBROUTINE CALLS ARE INTENDED BY TSC TO BE USED AS FOLLOWS:

TINCH	READ A CHARACTER FROM TAPE
TOUCH	WRITE A CHARACTER TO TAPE
TAPEON	TURN TAPE ON
TAPEOFF	TURN TAPE OFF

HOWEVER, WE USE THE TINCH VECTOR TO CALL A ROUTINE TO READ A CHARACTER FROM DISK. AND THE TOUCH VECTOR IS USED TO WRITE A CHARACTER TO DISK. THE TAPEON VECTOR OPENS A FILE FOR READ OR WRITE. FINALLY, THE TAPEOFF VECTORS TO OUR CLOSE FILE SUBROUTINE.

ALL OF THE SUBROUTINES ARE EXPECTED BY BASIC TO PRESERVE THE CONTENTS OF THE B AND X REGISTERS. THIS IS TAKEN CARE OF BY THE SAVE AND RESTOR SUBROUTINES IN OUR PATCH. ERROR HANDLING IS PROVIDED THROUGH FLEX'S RTPERR SUBROUTINE AND ALL OPEN FILES ARE CLOSED SHOULD ANY ERROR OCCUR.

THE OPEN SUBROUTINE CALLS THE SAVE SUBROUTINE, ATTEMPTS TO FIND IF IT IS SUPPOSED TO BE SAVING OR LOADING, PROMPTS FOR THE FILE NAME, AND OPENS THE FILE. OPEN RETURNS TO BASIC THRU THE RESTOR SUBROUTINE. THE METHOD USED HERE TO DETERMINE WHERE THE CALL TO THE OPEN SUBROUTINE CAME FROM COULD PERHAPS BE USEFUL TO YOU IN OTHER PROGRAMS THAT YOU MAY WRITE. SO LETS LOOK AT IT IN A BIT OF DETAIL. YOU WILL NOTE THAT OPEN, AFTER PRESERVING THE X AND B REGISTERS, TRANSFERS THE STACK POINTER TO THE INDEX REGISTER. THIS POINTS THE INDEX REGISTER TO THE TOP OF THE STACK. THEN THE INDEX REGISTER IS LOADED, INDEXED. THIS PUTS THE ADDRESS ON THE TOP OF THE STACK INTO THE INDEX REGISTER. AS YOU ARE PROBABLY AWARE, WHEN A SUBROUTINE IS CALLED, THE 6800 PUSHES THE RETURN ADDRESS ONTO THE STACK. BY USING THE PROCEDURE JUST OUTLINED, THE RETURN ADDRESS IS PLACED IN THE INDEX REGISTER. IT DOES NOT DISTURB EITHER THE STACK OR THE STACK POINTER. IN TSC TAPE BASIC THERE ARE TWO CALLS TO THE TAPEON SUBROUTINE, THEY ARE LOCATED AT $0719 IN BASIC'S SAVE ROUTINE AND AT $07B2 IN BASIC'S LOAD ROUTINE. THE SUBROUTINE CALL AT $0719 RESULTS IN $071C (THE ADDRESS OF THE INSTRUCTION FOLLOWING THE SUBROUTINE CALL) BEING PUSHED ONTO THE STACK. LIKEWISE, THE CALL AT $07B2 PUTS