

EDITED AND REPRINTED MAY 1981  
MANY PRICES QUOTED IN THIS ISSUE ARE OBSOLETE,  
PLEASE CHECK LATEST "GREEN SHOPPING LIST."

SSSS	S	S	S	S	SSSS	S	S	S	S	SSSS	SSS	SSSS
S	S	S	S	SS	SS	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S	S	S	S
SSSS	SSS	S	S	S	SSS	SSSS	SSS	SSSS	S	SSSS	S	SSSS
S	S	S	S	S	S	S	S	S	S	S	S	S
S	S	S	S	S	S	S	S	S	S	S	S	S
SSSS	S	S	S	S	S	S	S	S	SSSS	SSS	SSSS	

THE SYM-1 USERS' GROUP NEWSLETTER  
INTRODUCTORY ISSUE - SEPTEMBER 1979

SYM-PHYSIS is a bimonthly publication of the SYM Users' Group, P. O. Box 315, Chico, CA. 95927. SYM-PHYSIS and the SYM Users' Group (SUG) are in no way associated with Synertek Systems Corporation (SSC), and SSC has no responsibility for the contents of SYM-PHYSIS. SYM is a registered trademark of SSC. SYM-PHYSIS, from the Greek, means the state of growing together, to make grow, to bring forth.

We welcome for publication all articles dealing with any aspect of the SYM-1, and its very close relatives. Authors retain all commercial copyrights. Portions of SYM-PHYSIS may be reproduced by clubs and educational institutions, and adaptations of programs for other computers may be freely published, with full credit given and complimentary copies provided to SYM-PHYSIS and the original author(s). Please include a self-addressed stamped envelope with all correspondence.

Editor/Publisher: H. R. "Lux" Luxenburg  
Business/Circulation: Jean Luxenburg

SUBSCRIPTION RATES:

USA/Canada \$9.00 for a volume of 6 issues; overseas \$12.50. Make checks payable in US dollars to "SYM Users' Group," P. O. Box 315, Chico, CA 95927, Telephone (916) 895-8751.

WHO, WHERE, WHY, WHAT, WHEN, HOW:

We (that's an editorial "we") teach computer science courses at California State University at Chico (about 90 miles north of Sacramento). The CSUC microcomputer laboratory facility was based on ten 6800-based single board micros. While these were adequate for an introduction to the subject, their versatility was far less than KIM's, whose hard copy outputs via an ASR 33 TTY could be submitted to an instructor for help in debugging, and for grading purposes.

More advanced students were using my personal KIM, for which I had developed mountains of utility, and other, software, and which had been expanded to include graphical (oscilloscope) and musical interfaces. My original KIM became dedicated, by default, to student use, and had to be replaced by a newer system, with more memory and I/O capability. One big problem with the KIM setup was the limited port capability. I had to settle for 6 bit D/A and A/D, rather than the 8 bits I wanted for music and graphics. Besides, KIM had to be depowered to permit inter-

change of my two output boards, and this slowed up demonstrations. I had learned earlier, the hard way, by burning up one of the port pins in a 6530 chip, not to change accessory boards with power on. My hardware requirements were certainly met by my new VIM (Versatile Interface Module, SYM's original name), but it took several months to convert the most important software from KIM to SYM. Some is still not yet converted.

I am certain that the existence of the KIM-1/6502 USER NOTES, now greatly expanded into the 6502 USER NOTES, and from which The First Book of KIM was born, and Robert Tripp's PLEASE package, and Peter Jennings' MICROCHESS helped to sell a lot of KIMs. Tripp's early work with the 6502 has expanded into the monthly publication MICRO. In the "early" days nearly every article in both the NOTES and MICRO were of help to a KIM user. Now only a small portion of the material is helpful to the SYM beginner (but very helpful). The remainder is of value to the advanced SYMMER; some of my best programs have been adapted from programs originally developed for APPLE, PET, KIM, OSI, etc. Now that I have RAE available, it will be easy to adapt 6800 programs, too. The "different" 6800 instructions can be treated as macros in RAE.

I believe there is a definite need for a SYM users information interchange. I am constantly impressed with just how powerful the SYM is with just the on-board expansion and an added terminal (which need not be that expensive); I would like to learn more from other users, and pass on some of what I have learned to others. That is one reason for SYM-PHYSIS. Another reason is to provide to beginners and old-timers alike a source of, and a directory to, immediately usable SYM software.

~~Enclosed in this introductory issue of SYM-PHYSIS is a subscription form for your use. We will hold all checks received for subscriptions until enough have been received to reach the break-even point. If the decision is GO, Volume 1, Number 1, dated Jan-Feb 1980, will be in your hands by December 15, 1979, in time for a Christmas gift! Each issue will be at least the equivalent of 20 single spaced typewritten pages. That's a lot of software and documentation for the price!~~

BOOK RECOMMENDATIONS:

Camp, R. C., T. A. Sway, C. J. Triska: "Microcomputer Systems Principles-Featuring the 6502/KIM," Matrix Publishers, Inc., Portland, OR, 1978.

Camp, R. C., T. A. Sway, C. J. Triska: "Microprocessor Systems Engineering," Matrix Publishers, Inc., Portland, OR, 1979 (a revised version of the above, featuring the AIM).

Foster, Caxton C.: "Programming a Microcomputer-6502," Addison Wesley Publishing Co., Reading, MA, 1978.

Zaks, Rodnay: "Programming the 6502," SYBEX, Berkeley, CA, 1978.

Zaks, Rodnay: "6502 Applications Book," SYBEX, Berkeley, CA, 1979.

## SYM-1 TAPE DIRECTORY

Here are three different types of listings for a modified version of the program of the same name by John Gierwic, in MICRO #8, pages 35-37. The original version used the 7-segment displays, was for the original SUPERMON, and was interrupted only by RESET. The revised version uses the terminal for display, is for SUPERMON Version 2, and can be interrupted by the terminal break key being held down until the end of the SYNCH search. It even starts and stops the recorder under computer control. It is fully relocatable and is callable as a subroutine or as a USR function from SYM BASIC or TINY BASIC and returns after terminal break. Those without a terminal may update the original version by noting the changed addresses for Version 2. There was also a typo in the original version. The correct address for SCAND should be 8906 (not 890B). It's handy to be able to review the ID numbers to refresh your memory; also since RAE, SYM BASIC, and TINY BASIC use different starting addresses for their files, you can even identify the type of file from its starting address.

## &gt;ASSEMBLE LIST DIRECTORY - Source Code Version

```

0001      .OS
0010      .BA $F00
0020
0030 ;      DATA LOCATION DECLARATIONS
0040
0050 ID      .DE $9A
0060 SAL      .DE $9B
0070 SAH      .DE $9C
0080 EAL      .DE $9D
0090 EAH      .DE $9E
0100 MODE      .DE $FD
0130
0140 LATCHL      .DE $A004
0150
0160 ;      SYM MONITOR ROUTINES USED
0161
0170 ;      THOSE MARKED *NEW* ARE SUPERMON
0180 ;      VERSION 2 ADDRESSES
0189
0190 OUTBYT      .DE $82FA      ;PRINT A AS 2 HEX DIGITS
0200 COMMA      .DE $833A      ;PRINT A COMMA
0210 SPACE      .DE $8342      ;PRINT A SPACE
0220 CRLF      .DE $834D      ;PRINT <CR> <LF>
0230 OUTCHR      .DE $8A47      ;PRINT ASCII FROM A
0240 TSTAT      .DE $8B3C      ;CARRY SET IF BRK KEY DOWN
0250 ACCESS      .DE $8B86      ;UNWRITE PROTECT SYS RAM
0255 EX10      .DE $8D4E      ;*NEW*
0260 SYNC      .DE $8D52      ;*NEW*
0270 START      .DE $8DA9      ;*NEW*
0280 RDCHTX      .DE $8DE1      ;*NEW*
0290 RDBYTH      .DE $8DE5      ;*NEW*
0300 RDBYTX      .DE $8E26      ;*NEW*
0310

```

SYM-PHYSIS 0-3

```

0320
0321 ;      BEGIN MAINLINE
0322
0F00- 20 86 8B 0330 BEGIN      JSR ACCESS
0F03- A0 80 0340      LDY $80      ;SELECT HI SPEED MODE
0F05- 20 A9 8D 0350 NXT.FILE  JSR START      ;INIT TAPE ROUTINES
0F08- A9 1F 0360      LDA $81F      ;SET UP TIMER
0F0A- 8D 04 A0 0370      STA LATCHL
0F0D- 20 52 8D 0380 FIND      JSR SYNC      ;SEARCH TAPE FOR RECORD
0F10- 20 E1 8D 0390 READ      JSR RDCHTX      ;GET CHARACTER
0F13- C9 2A 0400      CMP $*
0F15- F0 06 0410      BEQ TEST
0F17- C9 16 0420      CMP $816      ;SYNC CHARACTER?
0F19- D0 F2 0430      BNE FIND
0F1B- F0 F3 0440      BEQ READ
0F1D- A5 FD 0450 TEST      LDA *MODE
0F1F- 29 BF 0460      AND $8BF
0F21- 85 FD 0470      STA *MODE
0F23- 20 26 8E 0480      JSR RDBYTX
0F26- 85 9A 0490      STA *ID
0F28- 20 26 8E 0500      JSR RDBYTX      ;GET SAL FROM TAPE
0F2B- 85 9B 0510      STA *SAL
0F2D- 20 26 8E 0520      JSR RDBYTX      ;GET SAH FROM TAPE
0F30- 85 9C 0530      STA *SAH
0F32- 20 E5 8D 0540      JSR RDBYTH      ;GET EAL
0F35- 85 9D 0550      STA *EAL
0F37- 20 E5 8D 0560      JSR RDBYTH      ;GET EAH
0F3A- 85 9E 0570      STA *EAH
0F3C- 20 4D 83 0580      JSR CRLF
0F3F- A9 2E 0590      LDA $*
0F41- 20 47 8A 0600      JSR OUTCHR
0F44- A9 53 0610      LDA $*S
0F46- 20 47 8A 0620      JSR OUTCHR
0F49- A9 32 0630      LDA $*2
0F4B- 20 47 8A 0640      JSR OUTCHR
0F4E- 20 42 83 0650      JSR SPACE
0F51- A5 9A 0660      LDA *ID      ;PRINT THE
0F53- 20 FA 82 0670      JSR OUTBYT      ; ID NUMBER
0F56- 20 3A 83 0680      JSR COMMA
0F59- A5 9C 0690      LDA *SAH      ;PRINT
0F5B- 20 FA 82 0700      JSR OUTBYT      ; THE
0F5E- A5 9B 0710      LDA *SAL      ; STARTING
0F60- 20 FA 82 0720      JSR OUTBYT      ; ADDRESS
0F63- 20 3A 83 0730      JSR COMMA
0F66- C6 9D 0740      DEC *EAL      ;DECREMENT
0F68- A5 9D 0750      LDA *EAL      ; THE
0F6A- C9 FF 0760      CMP $8FF      ; ENDING
0F6C- D0 02 0770      BNE CONT      ; ADDRESS
0F6E- C6 9E 0780      DEC *EAH
0F70- A5 9E 0790 CONT      LDA *EAH      ;PRINT
0F72- 20 FA 82 0800      JSR OUTBYT      ; THE
0F75- A5 9D 0810      LDA *EAL      ; ENDING
0F77- 20 FA 82 0820      JSR OUTBYT      ; ADDRESS
0F7A- 20 4D 83 0830      JSR CRLF

```

SYM-PHYSIS 0-4

```

OF7D- 20 3C 8B 0840      JSR TSTAT      ;BREAK KEY DOWN?
OF80- 80 02 0850          BCS RETURN      ;IF SO, STOP
OF82- 90 81 0860          BCC NXT.FILE
OF84- 4C 4E 8D 0870 RETURN JMP EX10       ;STOP TAPE AND RETURN
                                0880      .EN

```

LABEL FILE: [ / = EXTERNAL ]

```

/ID=009A      /SAH=009C      /SAH=009C
/EAL=009D      /EAH=009E      /MODE=00FD
/LATCHL=A004   /OUTBYT=82FA   /COMMA=833A
/SPACE=8342    /CRLF=834D   /OUTCHR=8A47
/TSTAT=8B3C    /ACCESS=8B86   /EX10=8D4E
/SYNC=8D52     /START=8DA9   /RDCHTX=8DE1
/RDBYTH=8DE5   /RDBYTX=8E26   BEGIN=0F00
NXT.FILE=0F05  FIND=0F0D    READ=0F10
TEST=0F1D      CONT=0F70    RETURN=0F84

```

#### DIRECTORY - Disassembled Version

```

OF00- 20 86 8B JSR 8B86
OF03- A0 80 LDY #80
OF05- 20 A9 8D JSR 8DA9
OF08- A9 1F LDA #1F
OF0A- 8D 04 A0 STA A004
OF0D- 20 52 8D JSR 8D52
OF10- 20 E1 8D JSR 8DE1
OF13- C9 2A CMP #2A
OF15- F0 06 BEQ 0F1D
OF17- C9 16 CMP #16
OF19- D0 F2 BNE 0F0D
OF1B- F0 F3 BEQ 0F10
OF1D- A5 FD LDA FD
OF1F- 29 BF AND #BF
OF21- 85 FD STA FD
OF23- 20 26 8E JSR 8E26
OF26- 85 9A STA 9A
OF28- 20 26 8E JSR 8E26
OF2B- 85 9B STA 9B
OF2D- 20 26 8E JSR 8E26
OF30- 85 9C STA 9C
OF32- 20 E5 8D JSR 8DE5
OF35- 85 9D STA 9D
OF37- 20 E5 8D JSR 8DE5
OF3A- 85 9E STA 9E
OF3C- 20 4D 83 JSR 834D
OF3F- A9 2E LDA #2E
OF41- 20 47 8A JSR 8A47
OF44- A9 53 LDA #53
OF46- 20 47 8A JSR 8A47
OF49- A9 32 LDA #32
OF4B- 20 47 8A JSR 8A47
OF4E- 20 42 83 JSR 8342
OF51- A5 9A LDA 9A
OF53- 20 FA 82 JSR 82FA
OF56- 20 3A 83 JSR 833A
OF59- A5 9C LDA 9C

```

```

OF5B- 20 FA 82 JSR 82FA
OF5E- A5 9B LDA 9B
OF60- 20 FA 82 JSR 82FA
OF63- 20 3A 83 JSR 833A
OF66- C6 9D DEC 9D
OF68- A5 9D LDA 9D
OF6A- C9 FF CMP #FF
OF6C- D0 02 BNE 0F70
OF6E- C6 9E DEC 9E
OF70- A5 9E LDA 9E
OF72- 20 FA 82 JSR 82FA
OF75- A5 9D LDA 9D
OF77- 20 FA 82 JSR 82FA
OF7A- 20 4D 83 JSR 834D
OF7D- 20 3C 8B JSR 8B3C
OF80- 80 02 BCS 0F84
OF82- 90 81 BCC 0F05
OF84- 4C 4E 8D JMP 8D4E

```

#### DIRECTORY - Object Code

```

.V OF00,OF86 with Checksum
OF00 20 86 8B A0 80 20 A9 8D A7
OF08 A9 1F 8D 04 A0 20 52 8D 9F
OF10 20 E1 8D C9 2A F0 06 C9 DF
OF18 16 D0 F2 F0 F3 A5 FD 29 65
OF20 BF 85 FD 20 26 8E 85 9A 99
OF28 20 26 8E 85 9B 20 26 8E 61
OF30 85 9C 20 E5 8D 85 9D 20 56
OF38 E5 8D 85 9E 20 4D 83 A9 84
OF40 2E 20 47 8A A9 53 20 47 06
OF48 8A A9 32 20 47 8A 20 42 8E
OF50 83 A5 9A 20 FA 82 20 3A 76
OF58 83 A5 9C 20 FA 82 A5 9B 16
OF60 20 FA 82 20 3A 83 C6 9D F2
OF68 A5 9D C9 FF D0 02 C6 9E 32
OF70 A5 9E 20 FA 82 A5 9D 20 73
OF78 FA 82 20 4D 83 20 3C 8B C6
OF80 80 02 90 81 4C 4E 8D B0
40B0

```

SYM-PHYSIS 0-5

#### SOFTWARE RECOMMENDATION: The SYM/KIM Appendix to The First Book of KIM

For beginning SYMMERS, or those with absolutely no extensions to their SYMs, I strongly recommend "The SYM/KIM Appendix to 'The First Book of KIM'," by Robert A. Peck, P. O. Box 2231, Sunnyvale, CA 94087. (The FBOK was edited by F. J. Butterfield.) Mr. Peck has provided complete SYM modifications for all of the programs in the Games and Diversions section of FBOK except CLOCK and TIMER (which are better handled using the the 6522 on-board timers), and MUSIC BOX (which does require a cassette with monitor feature or an external speaker). When I first got my KIM, my favorite computer recreations were CRAPS, BLACKJACK and WUMPUS from FBOK. Thanks to the "Appendix," I now have WUMPUS and BLACKJACK back again on the SYM. One day soon, I'll have my KIM dump all of its FBOK programs in KIM format rather than Butterfields' "Hypertape" (see FBOK for this), and set them running on SYM thanks to the Appendix. Price for the Appendix alone is \* for the Appendix plus FBOK is for the FBOK alone is California sales tax, post paid, from Mr. Peck. All programs will run with either SUPERMON or SUPERMON Version 2. \*SEE BELOW

For a general discussion of KIM/SYM conversions see "The First Book of KIM-on a SYM" by Nicholas Vrtis, MICRO #14, pages 35-37.

For a discussion of the use of the 6522 Timer, see "SYM-1 6522-Based Timer" by John Giersic, MICRO #11, pages 31-32.

For an alternate set of modifications for the FBOK WUMPUS program and for mods to FBOK MUSIC BOX see "Wumpus and Music Box Mods for SYM," by Jim Adams, 6502 USER NOTES #14, page 20.

#### RAE NOTES:

For the past several months two of us here have been working with a pre-release version of Synertek's Resident Assembler Editor, RAE. Our version was on cassette; the production versions will be available in both a single 8K ROM chip, and a pair of 4K ROMs. The specs for RAE have been widely publicized by Synertek Systems, so we won't repeat them here. RAE is a full features assembler, with macro capability, conditional assembly features, and a relocating loader patch in RAM. It has been a real pleasure to give up "hand-assembly", not because it was so hard to enter the initial version of a program, but because by the time you made a half-dozen or so modifications, involving deletions, insertions, relocations, etc., the original documentation is hopelessly out of date. Some of the programs which you will see in issues of SYM-PHYSIS do not exist anywhere in source code form, and are available only in the dis-assembled form. Incidentally, we are working on a "symbolic disassembler" for SYM which will insert (non-mnemonic) labels for variables and referenced lines. This will permit easy mods; can't estimate its completion date as yet! As an example of the text editing capabilities of RAE, we present this edition of SYM-PHYSIS. We will have some suggestions on how to use RAE more effectively in our next issue, when more of you have installed RAE in your system.

\* APPENDIX \$4.75, FBOK 11.00, SYM-PHYSIS 0-6  
 APPENDIX WITH FBOK \$14.50  
 FOR OVERSEAS DELIVERY ADD \$4.00 U.S.FUNDS FOR FBOK OR FBOK & APPENDIX  
 OR FOR APPENDIX ALONE ADD \$1.50 U.S.FUNDS  
 CALIFORNIA SALES TAX IS APPLICABLE TO CALIF. RESIDENTS ONLY.

# RAE NOTES (continued):

The pseudo-ops used in RAE-1 differ from those used in the MOS Technology/System 65 assemblers. As an aid in converting source codes from one format to another, the following example illustrates how the listing for SUPERMON Version 2 would look in RAE format. Compare it with the listings given in the third printing (June 1979) of the SYM-1 Reference Manual. There are two other differences: L, LABEL and H, LABEL in RAE (see lines 340 and 360 in "Terminal Control Patch for BASIC") translate to <LABEL and >LABEL, respectively.

## ASSEMBLE LIST

```

0010 ;EXAMPLE TO ILLUSTRATE HOW
0020 ;SUPERMON VERSION 2 WOULD
0030 ;BE ASSEMBLED USING RAE
0040 ;
0050 .BA $A600
A600- 0060 SCPBUF .DS $20
0070 RAM .DI =
A620- 0080 JTABLE .DS $10
A630- 0090 TAPDEL .DS 1
A631- 0100 KMBDRY .DS 1
0110 ;LEAVE A GAP HERE FOR CON-
0120 ;VENIENCE IN ILLUSTRATION
0130 .BA $A63D
A63D- 0140 SCRD .DS 1
0150 RC .DI SCRD
A63E- 0160 SCRE .DS 1
A63F- 0170 SCRF .DS 1
A640- 0180 DISBUF .DS 5
A645- 0190 RDIG .DS 1
A646- 0200 .DS 3
A649- 0210 PARN .DS 1
0220 ;LEAVE A GAP
0230 .BA $A680
0240 PADA .DE $A400
0250 PBDA .DE $A402
0260 .BA $8000
8000- 4C 7C 8B 0270 MONITR JMP MONENT
8003- 20 FF 80 0280 WARM JSR GETCOM
8006- 20 4A 81 0290 JSR DISPAT
8009- 20 71 81 0300 JSR ERMSG
800C- 4C 03 80 0310 JMP WARM
0320 ;LEAVE A GAP
0330 .BA $8147
0340 .BY $FF $FF $FF
B147- FF FF FF 0350 DISPAT CMP #$0D
B14A- C9 0D 0360 ;LEAVE A GAP
0370 ;ZERO PAGE ADDRESSING
0380 .BA $829F
B29F- 86 FF 0390 STX $FF
0400 ;LEAVE A LONG GAP
0410 .BA $8FA0

```

SYM-PHYSIS 0-7

```

0420 DFTBLK .DI =
8FA0- 00 C0 0430 .SE $C000
8FA2- A7 8B 0440 .SI TTY
8FA4- 64 8B 0450 .SI NEWDEV
8FA6- 00 00 0460 .SE $0000
8FAB- 00 02 0470 .SE $0200
0480 ;DEFINE SELECTED INTERNAL
0490 ;LABELS TO PERMIT ASSEMBLY
0500 ;OF THIS EXAMPLE
0510 MONENT .DI $8B7C
0520 GETCOM .DI $80FF
0530 ERMSG .DI $8171
0540 TTY .DI $8BA7
0550 NEWDEV .DI $8B64
0560 ;END OF EXAMPLE
0570 ;NOTE THAT THE 'RELATIVE
0580 ;ADDRESSES' GIVEN AFTER
0590 ;THE ERROR COUNT BELOW ARE
0600 ;RELATIVE TO THE LAST .BA
0610 ;IN THE SOURCE CODE
0620 .EN

```

LABEL FILE: [ / = EXTERNAL ]

SCPBUF=A600	RAM=A620	JTABLE=A620
TAPDEL=A630	KMBDRY=A631	SCRD=A63D
RC=A63D	SCRE=A63E	SCRF=A63F
DISBUF=A640	RDIG=A645	PARN=A649
/PADA=A400	/PBDA=A402	MONITR=8000
WARM=8003	DISPAT=814A	DFTBLK=8FA0
MONENT=8B7C	GETCOM=80FF	ERMSG=8171
TTY=8BA7	NEWDEV=8B64	
//0000,8FAA,8FAA		

Note that the SUAM II Version of the 6502 assembler used by Mr. Vrtis for his HEX PROGRAM VERIFY PROGRAM uses a still different set of pseudo-ops. It is left as an exercise for the reader to provide the necessary translation for SUAM II!

## SOFTWARE RECOMMENDATIONS: TINY BASIC

We find Tom Pittman's TINY BASIC for the 6502 extremely useful in SYM, even though we also have SYM BASIC (BAS-1). Because TINY is in RAM (0200-0AC6) it is easy to set at and customize. TINY BASIC is available from ~~Kitty Pittu Computers, P. O. Box 23189, San Jose, CA 95153, for \$5.00. We recommend you also get the TB Experimenters Kit at the same time, for an additional \$10.00 (Californians add \$.65 for sales tax). We hope we can make arrangements with Mr. Pittman to distribute a SYM readable cassette with enhancements, since he offers only a punched paper tape version.~~

\* the SYM USERS' GROUP with cassette.  
See Issue #2-27

SYM-PHYSIS 0-8

MERGE, RENUMBER, and FIND for SYM:

In "Inside PET BASIC," by Jim Butterfield, MICRO #8, pages 39-41, appear three useful utilities for PET. These are UNLIST (a procedure for merging programs), FIND, and RESEQUENCE (actually RENUMBER).

UNLIST is not even indirectly adaptable to SYM because it makes use of certain commands and procedures not found in SYM BASIC, e.g., OPEN, CLOSE, CMD, PRINT #, etc. In the next issue we will publish one of several of the MERGE, DELETE, APPEND, etc., programs we have worked out for SYM. We have tested these out (and they work fine!) as extensions of the Terminal Control Patch published elsewhere in this issue; we still want to try out and compare three alternate approaches to patching. One is to call through USR. Two is to trap the SAVE and LOAD calls (this will permit us to "name" our files (a la PET). Three is to trap the SN and FC errors (if we can) to permit us to add new commands to SYM BASIC. Haven't found out how to do this latter; we're still trying to implement the GET instruction which is available as a token.

RESEQUENCE (RENUMBER) and FIND, however, are easily modified for SYM, by changing the tokens, and the PEEK AND POKE locations, and correcting the typographical errors in lines 60010, 60240, and 60250 in the original. We have modified RENUMBER to ask for the start and step values (together with a few other minor mods), and relocated FIND. Until you have MERGE available these must be entered from tape previous to starting any program development, and, until you have DELETE available, you must, on a line-by-line basis, wipe these out or they will be SAVED with your final program.

To use RENUMBER, enter GOTO 60000 as a direct command. It should be noted that in addition to GET mentioned above, GO is also a reserved word, i.e., a token. SYM BASIC will treat GO TO and GOTO as equivalent, although the first is stored as C5 20 9E, and the second as 88. FIND and RENUMBER will not; RENUMBER will work correctly only with GOTO in the BASIC program. RENUMBER is very slow; and should eventually be replaced by a machine language version (see "The Ultimate PET Renumber," by Don Rindsbers, MICRO #11, pages 37-47, for an example of how this might be done). We haven't pried sufficiently into SYM BASIC to do so, however, nor do we personally intend to do so. Our approach will be to pass the programs to RAE, which is written in machine language, and patch RAE to do the editing, resequencing, etc.

Because RENUMBER is so slow on long programs, and appears to be doing nothing, we added the instruction at 60185 so we could be kept posted on its progress. This should be deleted for a hard copy terminal to save paper.

To use FIND to locate any string, enter the string at line 0 with no space, e.g., OCOS, OPOKE, O Q%, etc., then enter GOTO 60500 as a direct command. If you wish to be able to find all references to a variable, for example, EX, it is necessary to have it enclosed by spaces everywhere it is used in the program, and also in the dummy instruction at 0. Otherwise you will have too many "false-alarms."

#### SYM BASIC RENUMBER/FIND

```
60000 CLEAR:INPUT"Start, Step?";M1,IN:PRINT:PRINT:REM RESEQ 8/5/79
60010 T=0:DIMVZ(99),WZ(99):GOSUB60160:FORR=1TO1E3:GOSUB60210
60020 IFGTHENGOSUB60090:NEXTR
60030 GOSUB60160:FORR=1TO1E3:N=INT(M/256):POKEA-1,M-N*256
60040 POKEA,N:V=L:GOSUB60070:WZ(J)=M:GOSUB60170:IFGTHENNEXTR
60050 GOSUB60160:FORR=1TO1E3:GOSUB60210:IFGTHENGOSUB60110:NEXTR
60060 PRINT"Finished":END
60070 J=0:IFT<>0THENFORJ=1TOT:IFVZ(J)<>VTHENNEXTJ:J=0
60080 RETURN
60090 IFV<>0THENGOSUB60070:IFJ=0THENT=T+1:VZ(T)=V
60100 RETURN
60110 GOSUB60070:IFJ=0THENRETURN
60120 W=WZ(J):IFW=0THENPRINT"Insert ????" in line";L:RETURN
60130 FORD=ATOB+1STEP-1:X=INT(W/10):Y=W-10*X+48:IFW=0THENY=32
60140 POKED,Y:W=X:NEXTD:IFW=0THENRETURN
60150 PRINT"Insert";WZ(J);"in line";L:RETURN
60160 F=513:M=M1-IN
60170 A=F:M=M+IN
60180 F=PEEK(A)+PEEK(A+1)*256:L=PEEK(A+2)+PEEK(A+3)*256:A=A+3:G=L<6E4
60185 PRINTL,G
60190 RETURN
60200 S=0
60210 V=0:A=A+1:B=A:C=PEEK(A):IFC=0THENGOSUB60170:ONG+2GOTO60210,60190
60220 IFC<>136ANDC<>140ANDC<>161ANDC<>SGOTO60200
60230 A=A+1:C=PEEK(A)-48:IFC=-16GOTO60230
60240 IFC=0ANDC<=9THENV=V*10+C:GOTO60230
60250 S=44:A=A-1:RETURN
60500 A=513:X=PEEK(517):REM FIND 4/6/79
60510 FORK=A+4TOA+B3
60520 P=PEEK(K):IFP=XTHENGOSUB60570
60530 IFP<>0THENNEXTK
60540 A=PEEK(A)+PEEK(A+1)*256:Z=PEEK(A+2)+PEEK(A+3)*256
60550 IFA<>0ANDZ<6E4THEN60510
60560 PRINT"Finished":END
60570 FORL=1TO80:Y=PEEK(517+L):IFY<>0THEN60590
60580 PRINTZ:RETURN
60590 IFY=PEEK(K+L)THENNEXTL
60600 RETURN
```

#### PERIODICAL RECOMMENDATIONS:

Here are some periodicals which will be especially helpful to SYMMERS:

MICRO-The Magazine of the APPLE, KIM, PET and OTHER 6502 Systems; P.O. Box 6502, Chelmsford, MA 01824. Monthly, \$15.00 per year/12 issues.

6502 USER NOTES; \*P.O. Box 33093, N. Revere, OH 44133. Bimonthly, \$13.00 per volume/4 issues.

\*No longer published, but back issues still available.  
Under Periodical Recommendations. See Issue #2-2

# HEX PROGRAM VERIFY PROGRAM

Did you ever find a handy program in a newsletter or magazine, key it in, and wonder how many keying mistakes you are going to have to find? I purchased the hex dump version of Tom Pittman's "TINY BASIC", and was faced with over 3K of code to enter, and no check digits to tell me if I got it in right. I decided to borrow a technique used in most data entry shops and verify the code by keying the same thing twice. The theory is that if you key the same thing twice, chances are that you won't make the same mistake twice in the same place. The theory works. I entered TINY in, verified it (catching a half dozen mistakes) and it worked. The process doesn't take twice as long to do, since you can go a little faster because you know that mistakes will be caught later.

The program logic is relatively simple. It displays the starting address on a line, and accepts input for the number of bytes specified at \$02, without displaying them first. The value entered is compared to the existing data, and if they are equal the current address is incremented, and either another byte is accepted, or a new line is started. The only tricky parts come if a non-hex digit is entered, or the two values don't match. If the non-hex character is a carriage return, INBYT sets the equal flag, and the program starts over on a new line. This is handy if your listing happens to have unequal length lines for some reason. If the non-hex wasn't a carriage return, then it was just a typo, and the program outputs one or two backspaces depending upon whether the first or second character was the non-hex. The puts the cursor back to the start of the entry for that byte.

When the input byte and the existing byte don't match, there really is no way for the program to know which is the correct one. The solution is the beep the beeper, tell you what the existing value is, and accept a replacement value from the terminal. The existing value is displayed to help resolve the difference, in case you are off a column or row in your listing. The cursor is also backspaced so that all the keying occurs in the same place on the screen. This keeps the screen looking like the listing. If any non-hex character is entered as part of the replacement byte, the program figures you and/or it are confused, and starts over on the same byte.

If you don't have a CRT that responds to the backspace character, you may want to NOP most of the code that does the backspacing. I would suggest that you at least output some sort of character so that you can look back and see what happened.

Operation of the program is simple. Locations \$00 and \$01 are used to contain the current address of the program that is being verified. Do an SD command to store the starting address there, and start the verify program. It is completely relocatable, so it can be put most anywhere that the program to be verified isn't. As I mentioned earlier, location \$02 contains the number of bytes input before a new line is started. The purpose of the new line is to display a reference address so you can check where you are at in the listing.

SUAM - V2.1 (03/79)

LOC ----OBJECT----

0000 00 02 00004 CURAD  
0001 10 00005 FERLINE

0003 20 40 83 00007 NEWLINE  
0004 A6 01 00008 LDH  
0005 A5 00 00009 LDA  
0006 20 F4 82 00010 JSR  
0007 A6 02 00011 LOX

000F 20 42 83 00013 GETLOOP  
0010 20 09 81 00014 GETCHR  
0011 20 0E 00015 BCC  
0012 F0 0E 00016 TWOHEX  
0013 F0 0E 00017 BEQ  
0014 A7 03 00018 LDA  
0015 20 47 2A 00019 BVC  
0016 20 47 2A 00020 JSR  
0017 00 00 00021 JSR  
0018 00 00 00022 BNE

0025 A0 00 00023 TWOHEX  
0026 01 00 00024 LDY  
0027 F0 1F 00025 CMP  
0028 20 72 84 00026 BEQ  
0029 A7 08 00027 JSR  
0030 20 47 8A 00028 LDA  
0031 20 47 8A 00029 JSR  
0032 F0 00 00030 LDA  
0033 20 F4 8C 00031 JSR  
0034 A7 0C 00032 LDA  
0035 20 47 2A 00033 JSR  
0036 20 47 2A 00034 JSR  
0037 20 09 81 00035 JSR  
0038 00 00 00036 BCS  
0039 01 00 00037 STA

004A E0 00 00039 NEXTONE  
004B 00 02 00040 BNE  
004C E0 01 00041 INC  
004D CA 00 00042 DEX  
004E F0 80 00043 BEQ  
004F 00 8A 00044 BNE

81F9  
82F4  
82FA  
8342  
834E  
8972  
8A47  
END OF PASS 2-ERRORS=  
LOC ----OBJECT----

8972  
8340  
0000  
0012  
000F  
8109  
0003  
004A  
0017  
82FA  
8A47  
82FA  
0002  
8342  
0025

SYM-PHYSIS

0-11

6502 ASSEMBLER - SUAM II VERSION

HEX PROGRAM VERIFY PROGRAM

00A 2,\$200 CURRENT ADDRESS AREA  
DC 1,16 BYTES PER LINE  
JSR CRLF START OF A NEW LINE  
LDX CURAD+1 GET CURRENT ADDRESS  
LDA CURAD  
JSR OUTXAH AND OUTPUT IT  
LOX PERLINE SET # OF BYTES/LINE  
JSR SPACE LEADING SPACE OF READABILITY  
JSR INRYTE GET 2 HEX DIGITS = 1 BYTE  
BCC TWOHEX BRANCH IF BOTH WERE HEX  
BEQ NEWLINE C/R MEANS HE WANTS TO START NEW LINE  
LDA \$S08 ELSE MOVE CURSOR BACK  
BVC \*+5 ONLY ONCE IF 1ST DIGIT WAS NON-HEX  
JSR OUTCHR TWICE IF IT WAS THE SECOND DIGIT  
JSR OUTCHR  
BNE GETCHR UNCONDITIONAL - GET ANOTHER TRY  
LDY #0 SET 'Y' TO ZERO  
CMP (CURAD),Y COMPARE INPUT AGAINST EXISTING  
BCC NEXTONE EQUAL IS SUPER  
BEEF ELSE BEEP THE BEEPER FROMGIE  
LDA \$S08 AND BACKUP 2 PLACES  
JSR OUTCHR  
LDA (CURAD),Y GET EXISTING VALUE  
JSR OUTBYT OUTPUT IT AS HEX VALUES  
LDA \$S0F HERE WE GO BACKING UP AGAIN  
JSR OUTCHR SO HE WILL OVERTYPE  
JSR OUTCHR  
JSR INRYTE NOW GET THE OTHER VALUE  
BCS NOTHEX CONFUSED -- START THIS BYTE AGAIN  
STA (CURAD),Y OTHERWISE STORE THE RIGHT VALUE  
INC CURAD BUMP CURRENT ADDRESS  
BNE \*+6  
INC CURAD+1  
DEX  
BEQ NEWLINE COUNT THE BYTES ON THIS LINE  
BNE GLTLOOP START NEW LINE IF DONE  
ELSE GO GET NEXT BYTE INPUT

00046 \*\*\*\*\*  
00047 \* SYM-1 SYSTEM MONITOR ADDRESS REFERENCES  
00048 \*\*\*\*\*  
00049 INRYTE EQU \$6109 INPUT 2 HEX DIGITS AS ONE BYTE  
00050 OUTXAH EQU \$82F4 OUTPUT X & A AS 4 HEX DIGITS  
00051 OUTBYT EQU \$82FA OUTPUT A AS 2 HEX DIGITS  
00052 SPACE EQU \$8342 OUTPUT ONE SPACE  
00053 CRLF EQU \$8340 OUTPUT CARRIAGE RETURN / LINE FEED  
00054 BEEF EQU \$8972 BEEP THE ONBOARD BEEPER  
00055 OUTCHR EQU \$8A47 OUTPUT A AS ASCII CHARACTER  
00000 \*\*\*\*\*  
00001 \*\*\*\*\*  
00002 \*\*\*\*\*  
00003 \*\*\*\*\*  
00004 \*\*\*\*\*  
00005 \*\*\*\*\*  
00006 \*\*\*\*\*  
00007 \*\*\*\*\*  
00008 \*\*\*\*\*  
00009 \*\*\*\*\*  
00010 \*\*\*\*\*  
00011 \*\*\*\*\*  
00012 \*\*\*\*\*  
00013 \*\*\*\*\*  
00014 \*\*\*\*\*  
00015 \*\*\*\*\*  
00016 \*\*\*\*\*  
00017 \*\*\*\*\*  
00018 \*\*\*\*\*  
00019 \*\*\*\*\*  
00020 \*\*\*\*\*  
00021 \*\*\*\*\*  
00022 \*\*\*\*\*  
00023 \*\*\*\*\*  
00024 \*\*\*\*\*  
00025 \*\*\*\*\*  
00026 \*\*\*\*\*  
00027 \*\*\*\*\*  
00028 \*\*\*\*\*  
00029 \*\*\*\*\*  
00030 \*\*\*\*\*  
00031 \*\*\*\*\*  
00032 \*\*\*\*\*  
00033 \*\*\*\*\*  
00034 \*\*\*\*\*  
00035 \*\*\*\*\*  
00036 \*\*\*\*\*  
00037 \*\*\*\*\*  
00038 \*\*\*\*\*  
00039 \*\*\*\*\*  
00040 \*\*\*\*\*  
00041 \*\*\*\*\*  
00042 \*\*\*\*\*  
00043 \*\*\*\*\*  
00044 \*\*\*\*\*  
00045 \*\*\*\*\*  
00046 \*\*\*\*\*  
00047 \*\*\*\*\*  
00048 \*\*\*\*\*  
00049 \*\*\*\*\*  
00050 \*\*\*\*\*  
00051 \*\*\*\*\*  
00052 \*\*\*\*\*  
00053 \*\*\*\*\*  
00054 \*\*\*\*\*  
00055 \*\*\*\*\*  
00056 \*\*\*\*\*  
00057 \*\*\*\*\*  
00058 \*\*\*\*\*  
00059 \*\*\*\*\*  
00060 \*\*\*\*\*  
00061 \*\*\*\*\*  
00062 \*\*\*\*\*  
00063 \*\*\*\*\*  
00064 \*\*\*\*\*  
00065 \*\*\*\*\*  
00066 \*\*\*\*\*  
00067 \*\*\*\*\*  
00068 \*\*\*\*\*  
00069 \*\*\*\*\*  
00070 \*\*\*\*\*  
00071 \*\*\*\*\*  
00072 \*\*\*\*\*  
00073 \*\*\*\*\*  
00074 \*\*\*\*\*  
00075 \*\*\*\*\*  
00076 \*\*\*\*\*  
00077 \*\*\*\*\*  
00078 \*\*\*\*\*  
00079 \*\*\*\*\*  
00080 \*\*\*\*\*  
00081 \*\*\*\*\*  
00082 \*\*\*\*\*  
00083 \*\*\*\*\*  
00084 \*\*\*\*\*  
00085 \*\*\*\*\*  
00086 \*\*\*\*\*  
00087 \*\*\*\*\*  
00088 \*\*\*\*\*  
00089 \*\*\*\*\*  
00090 \*\*\*\*\*  
00091 \*\*\*\*\*  
00092 \*\*\*\*\*  
00093 \*\*\*\*\*  
00094 \*\*\*\*\*  
00095 \*\*\*\*\*  
00096 \*\*\*\*\*  
00097 \*\*\*\*\*  
00098 \*\*\*\*\*  
00099 \*\*\*\*\*  
00100 \*\*\*\*\*  
00101 \*\*\*\*\*  
00102 \*\*\*\*\*  
00103 \*\*\*\*\*  
00104 \*\*\*\*\*  
00105 \*\*\*\*\*  
00106 \*\*\*\*\*  
00107 \*\*\*\*\*  
00108 \*\*\*\*\*  
00109 \*\*\*\*\*  
00110 \*\*\*\*\*  
00111 \*\*\*\*\*  
00112 \*\*\*\*\*  
00113 \*\*\*\*\*  
00114 \*\*\*\*\*  
00115 \*\*\*\*\*  
00116 \*\*\*\*\*  
00117 \*\*\*\*\*  
00118 \*\*\*\*\*  
00119 \*\*\*\*\*  
00120 \*\*\*\*\*  
00121 \*\*\*\*\*  
00122 \*\*\*\*\*  
00123 \*\*\*\*\*  
00124 \*\*\*\*\*  
00125 \*\*\*\*\*  
00126 \*\*\*\*\*  
00127 \*\*\*\*\*  
00128 \*\*\*\*\*  
00129 \*\*\*\*\*  
00130 \*\*\*\*\*  
00131 \*\*\*\*\*  
00132 \*\*\*\*\*  
00133 \*\*\*\*\*  
00134 \*\*\*\*\*  
00135 \*\*\*\*\*  
00136 \*\*\*\*\*  
00137 \*\*\*\*\*  
00138 \*\*\*\*\*  
00139 \*\*\*\*\*  
00140 \*\*\*\*\*  
00141 \*\*\*\*\*  
00142 \*\*\*\*\*  
00143 \*\*\*\*\*  
00144 \*\*\*\*\*  
00145 \*\*\*\*\*  
00146 \*\*\*\*\*  
00147 \*\*\*\*\*  
00148 \*\*\*\*\*  
00149 \*\*\*\*\*  
00150 \*\*\*\*\*  
00151 \*\*\*\*\*  
00152 \*\*\*\*\*  
00153 \*\*\*\*\*  
00154 \*\*\*\*\*  
00155 \*\*\*\*\*  
00156 \*\*\*\*\*  
00157 \*\*\*\*\*  
00158 \*\*\*\*\*  
00159 \*\*\*\*\*  
00160 \*\*\*\*\*  
00161 \*\*\*\*\*  
00162 \*\*\*\*\*  
00163 \*\*\*\*\*  
00164 \*\*\*\*\*  
00165 \*\*\*\*\*  
00166 \*\*\*\*\*  
00167 \*\*\*\*\*  
00168 \*\*\*\*\*  
00169 \*\*\*\*\*  
00170 \*\*\*\*\*  
00171 \*\*\*\*\*  
00172 \*\*\*\*\*  
00173 \*\*\*\*\*  
00174 \*\*\*\*\*  
00175 \*\*\*\*\*  
00176 \*\*\*\*\*  
00177 \*\*\*\*\*  
00178 \*\*\*\*\*  
00179 \*\*\*\*\*  
00180 \*\*\*\*\*  
00181 \*\*\*\*\*  
00182 \*\*\*\*\*  
00183 \*\*\*\*\*  
00184 \*\*\*\*\*  
00185 \*\*\*\*\*  
00186 \*\*\*\*\*  
00187 \*\*\*\*\*  
00188 \*\*\*\*\*  
00189 \*\*\*\*\*  
00190 \*\*\*\*\*  
00191 \*\*\*\*\*  
00192 \*\*\*\*\*  
00193 \*\*\*\*\*  
00194 \*\*\*\*\*  
00195 \*\*\*\*\*  
00196 \*\*\*\*\*  
00197 \*\*\*\*\*  
00198 \*\*\*\*\*  
00199 \*\*\*\*\*  
00200 \*\*\*\*\*  
00201 \*\*\*\*\*  
00202 \*\*\*\*\*  
00203 \*\*\*\*\*  
00204 \*\*\*\*\*  
00205 \*\*\*\*\*  
00206 \*\*\*\*\*  
00207 \*\*\*\*\*  
00208 \*\*\*\*\*  
00209 \*\*\*\*\*  
00210 \*\*\*\*\*  
00211 \*\*\*\*\*  
00212 \*\*\*\*\*  
00213 \*\*\*\*\*  
00214 \*\*\*\*\*  
00215 \*\*\*\*\*  
00216 \*\*\*\*\*  
00217 \*\*\*\*\*  
00218 \*\*\*\*\*  
00219 \*\*\*\*\*  
00220 \*\*\*\*\*  
00221 \*\*\*\*\*  
00222 \*\*\*\*\*  
00223 \*\*\*\*\*  
00224 \*\*\*\*\*  
00225 \*\*\*\*\*  
00226 \*\*\*\*\*  
00227 \*\*\*\*\*  
00228 \*\*\*\*\*  
00229 \*\*\*\*\*  
00230 \*\*\*\*\*  
00231 \*\*\*\*\*  
00232 \*\*\*\*\*  
00233 \*\*\*\*\*  
00234 \*\*\*\*\*  
00235 \*\*\*\*\*  
00236 \*\*\*\*\*  
00237 \*\*\*\*\*  
00238 \*\*\*\*\*  
00239 \*\*\*\*\*  
00240 \*\*\*\*\*  
00241 \*\*\*\*\*  
00242 \*\*\*\*\*  
00243 \*\*\*\*\*  
00244 \*\*\*\*\*  
00245 \*\*\*\*\*  
00246 \*\*\*\*\*  
00247 \*\*\*\*\*  
00248 \*\*\*\*\*  
00249 \*\*\*\*\*  
00250 \*\*\*\*\*  
00251 \*\*\*\*\*  
00252 \*\*\*\*\*  
00253 \*\*\*\*\*  
00254 \*\*\*\*\*  
00255 \*\*\*\*\*  
00256 \*\*\*\*\*  
00257 \*\*\*\*\*  
00258 \*\*\*\*\*  
00259 \*\*\*\*\*  
00260 \*\*\*\*\*  
00261 \*\*\*\*\*  
00262 \*\*\*\*\*  
00263 \*\*\*\*\*  
00264 \*\*\*\*\*  
00265 \*\*\*\*\*  
00266 \*\*\*\*\*  
00267 \*\*\*\*\*  
00268 \*\*\*\*\*  
00269 \*\*\*\*\*  
00270 \*\*\*\*\*  
00271 \*\*\*\*\*  
00272 \*\*\*\*\*  
00273 \*\*\*\*\*  
00274 \*\*\*\*\*  
00275 \*\*\*\*\*  
00276 \*\*\*\*\*  
00277 \*\*\*\*\*  
00278 \*\*\*\*\*  
00279 \*\*\*\*\*  
00280 \*\*\*\*\*  
00281 \*\*\*\*\*  
00282 \*\*\*\*\*  
00283 \*\*\*\*\*  
00284 \*\*\*\*\*  
00285 \*\*\*\*\*  
00286 \*\*\*\*\*  
00287 \*\*\*\*\*  
00288 \*\*\*\*\*  
00289 \*\*\*\*\*  
00290 \*\*\*\*\*  
00291 \*\*\*\*\*  
00292 \*\*\*\*\*  
00293 \*\*\*\*\*  
00294 \*\*\*\*\*  
00295 \*\*\*\*\*  
00296 \*\*\*\*\*  
00297 \*\*\*\*\*  
00298 \*\*\*\*\*  
00299 \*\*\*\*\*  
00300 \*\*\*\*\*  
00301 \*\*\*\*\*  
00302 \*\*\*\*\*  
00303 \*\*\*\*\*  
00304 \*\*\*\*\*  
00305 \*\*\*\*\*  
00306 \*\*\*\*\*  
00307 \*\*\*\*\*  
00308 \*\*\*\*\*  
00309 \*\*\*\*\*  
00310 \*\*\*\*\*  
00311 \*\*\*\*\*  
00312 \*\*\*\*\*  
00313 \*\*\*\*\*  
00314 \*\*\*\*\*  
00315 \*\*\*\*\*  
00316 \*\*\*\*\*  
00317 \*\*\*\*\*  
00318 \*\*\*\*\*  
00319 \*\*\*\*\*  
00320 \*\*\*\*\*  
00321 \*\*\*\*\*  
00322 \*\*\*\*\*  
00323 \*\*\*\*\*  
00324 \*\*\*\*\*  
00325 \*\*\*\*\*  
00326 \*\*\*\*\*  
00327 \*\*\*\*\*  
00328 \*\*\*\*\*  
00329 \*\*\*\*\*  
00330 \*\*\*\*\*  
00331 \*\*\*\*\*  
00332 \*\*\*\*\*  
00333 \*\*\*\*\*  
00334 \*\*\*\*\*  
00335 \*\*\*\*\*  
00336 \*\*\*\*\*  
00337 \*\*\*\*\*  
00338 \*\*\*\*\*  
00339 \*\*\*\*\*  
00340 \*\*\*\*\*  
00341 \*\*\*\*\*  
00342 \*\*\*\*\*  
00343 \*\*\*\*\*  
00344 \*\*\*\*\*  
00345 \*\*\*\*\*  
00346 \*\*\*\*\*  
00347 \*\*\*\*\*  
00348 \*\*\*\*\*  
00349 \*\*\*\*\*  
00350 \*\*\*\*\*  
00351 \*\*\*\*\*  
00352 \*\*\*\*\*  
00353 \*\*\*\*\*  
00354 \*\*\*\*\*  
00355 \*\*\*\*\*  
00356 \*\*\*\*\*  
00357 \*\*\*\*\*  
00358 \*\*\*\*\*  
00359 \*\*\*\*\*  
00360 \*\*\*\*\*  
00361 \*\*\*\*\*  
00362 \*\*\*\*\*  
00363 \*\*\*\*\*  
00364 \*\*\*\*\*  
00365 \*\*\*\*\*  
00366 \*\*\*\*\*  
00367 \*\*\*\*\*  
00368 \*\*\*\*\*  
00369 \*\*\*\*\*  
00370 \*\*\*\*\*  
00371 \*\*\*\*\*  
00372 \*\*\*\*\*  
00373 \*\*\*\*\*  
00374 \*\*\*\*\*  
00375 \*\*\*\*\*  
00376 \*\*\*\*\*  
00377 \*\*\*\*\*  
00378 \*\*\*\*\*  
00379 \*\*\*\*\*  
00380 \*\*\*\*\*  
00381 \*\*\*\*\*  
00382 \*\*\*\*\*  
00383 \*\*\*\*\*  
00384 \*\*\*\*\*  
00385 \*\*\*\*\*  
00386 \*\*\*\*\*  
00387 \*\*\*\*\*  
00388 \*\*\*\*\*  
00389 \*\*\*\*\*  
00390 \*\*\*\*\*  
00391 \*\*\*\*\*  
00392 \*\*\*\*\*  
00393 \*\*\*\*\*  
00394 \*\*\*\*\*  
00395 \*\*\*\*\*  
00396 \*\*\*\*\*  
00397 \*\*\*\*\*  
00398 \*\*\*\*\*  
00399 \*\*\*\*\*  
00400 \*\*\*\*\*  
00401 \*\*\*\*\*  
00402 \*\*\*\*\*  
00403 \*\*\*\*\*  
00404 \*\*\*\*\*  
00405 \*\*\*\*\*  
00406 \*\*\*\*\*  
00407 \*\*\*\*\*  
00408 \*\*\*\*\*  
00409 \*\*\*\*\*  
00410 \*\*\*\*\*  
00411 \*\*\*\*\*  
00412 \*\*\*\*\*  
00413 \*\*\*\*\*  
00414 \*\*\*\*\*  
00415 \*\*\*\*\*  
00416 \*\*\*\*\*  
00417 \*\*\*\*\*  
00418 \*\*\*\*\*  
00419 \*\*\*\*\*  
00420 \*\*\*\*\*  
00421 \*\*\*\*\*  
00422 \*\*\*\*\*  
00423 \*\*\*\*\*  
00424 \*\*\*\*\*  
00425 \*\*\*\*\*  
00426 \*\*\*\*\*  
00427 \*\*\*\*\*  
00428 \*\*\*\*\*  
00429 \*\*\*\*\*  
00430 \*\*\*\*\*  
00431 \*\*\*\*\*  
00432 \*\*\*\*\*  
00433 \*\*\*\*\*  
00434 \*\*\*\*\*  
00435 \*\*\*\*\*  
00436 \*\*\*\*\*  
00437 \*\*\*\*\*  
00438 \*\*\*\*\*  
00439 \*\*\*\*\*  
00440 \*\*\*\*\*  
00441 \*\*\*\*\*  
00442 \*\*\*\*\*  
00443 \*\*\*\*\*  
00444 \*\*\*\*\*  
00445 \*\*\*\*\*  
00446 \*\*\*\*\*  
00447 \*\*\*\*\*  
00448 \*\*\*\*\*  
00449 \*\*\*\*\*  
00450 \*\*\*\*\*  
00451 \*\*\*\*\*  
00452 \*\*\*\*\*  
00453 \*\*\*\*\*  
00454 \*\*\*\*\*  
00455 \*\*\*\*\*  
00456 \*\*\*\*\*  
00457 \*\*\*\*\*  
00458 \*\*\*\*\*  
00459 \*\*\*\*\*  
00460 \*\*\*\*\*  
00461 \*\*\*\*\*  
00462 \*\*\*\*\*  
00463 \*\*\*\*\*  
00464 \*\*\*\*\*  
00465 \*\*\*\*\*  
00466 \*\*\*\*\*  
00467 \*\*\*\*\*  
00468 \*\*\*\*\*  
00469 \*\*\*\*\*  
00470 \*\*\*\*\*  
00471 \*\*\*\*\*  
00472 \*\*\*\*\*  
00473 \*\*\*\*\*  
00474 \*\*\*\*\*  
00475 \*\*\*\*\*  
00476 \*\*\*\*\*  
00477 \*\*\*\*\*  
00478 \*\*\*\*\*  
00479 \*\*\*\*\*  
00480 \*\*\*\*\*  
00481 \*\*\*\*\*  
00482 \*\*\*\*\*  
00483 \*\*\*\*\*  
00484 \*\*\*\*\*  
00485 \*\*\*\*\*  
00486 \*\*\*\*\*  
00487 \*\*\*\*\*  
00488 \*\*\*\*\*  
00489 \*\*\*\*\*  
00490 \*\*\*\*\*  
00491 \*\*\*\*\*  
00492 \*\*\*\*\*  
00493 \*\*\*\*\*  
00494 \*\*\*\*\*  
00495 \*\*\*\*\*  
00496 \*\*\*\*\*  
00497 \*\*\*\*\*  
00498 \*\*\*\*\*  
00499 \*\*\*\*\*  
00500 \*\*\*\*\*  
00501 \*\*\*\*\*  
00502 \*\*\*\*\*  
00503 \*\*\*\*\*  
00504 \*\*\*\*\*  
00505 \*\*\*\*\*  
00506 \*\*\*\*\*  
00507 \*\*\*\*\*  
00508 \*\*\*\*\*  
00509 \*\*\*\*\*  
00510 \*\*\*\*\*  
00511 \*\*\*\*\*  
00512 \*\*\*\*\*  
00513 \*\*\*\*\*  
00514 \*\*\*\*\*  
00515 \*\*\*\*\*  
00516 \*\*\*\*\*  
00517 \*\*\*\*\*  
00518 \*\*\*\*\*  
00519 \*\*\*\*\*  
00520 \*\*\*\*\*  
00521 \*\*\*\*\*  
00522 \*\*\*\*\*  
00523 \*\*\*\*\*  
00524 \*\*\*\*\*  
00525 \*\*\*\*\*  
00526 \*\*\*\*\*  
00527 \*\*\*\*\*  
00528 \*\*\*\*\*  
00529 \*\*\*\*\*  
00530 \*\*\*\*\*  
00531 \*\*\*\*\*  
00532 \*\*\*\*\*  
00533 \*\*\*\*\*  
00534 \*\*\*\*\*  
00535 \*\*\*\*\*  
00536 \*\*\*\*\*  
00537 \*\*\*\*\*  
00538 \*\*\*\*\*  
00539 \*\*\*\*\*  
00540 \*\*\*\*\*  
00541 \*\*\*\*\*  
00542 \*\*\*\*\*  
00543 \*\*\*\*\*  
00544 \*\*\*\*\*  
00545 \*\*\*\*\*  
00546 \*\*\*\*\*  
00547 \*\*\*\*\*  
00548 \*\*\*\*\*  
00549 \*\*\*\*\*  
00550 \*\*\*\*\*  
00551 \*\*\*\*\*  
00552 \*\*\*\*\*  
00553 \*\*\*\*\*  
00554 \*\*\*\*\*  
00555 \*\*\*\*\*  
00556 \*\*\*\*\*  
00557 \*\*\*\*\*  
00558 \*\*\*\*\*  
00559 \*\*\*\*\*  
00560 \*\*\*\*\*  
00561 \*\*\*\*\*  
00562 \*\*\*\*\*  
00563 \*\*\*\*\*  
00564 \*\*\*\*\*  
00565 \*\*\*\*\*  
00566 \*\*\*\*\*  
00567 \*\*\*\*\*  
00568 \*\*\*\*\*  
00569 \*\*\*\*\*  
00570 \*\*\*\*\*  
00571 \*\*\*\*\*  
00572 \*\*\*\*\*  
00573 \*\*\*\*\*  
00574 \*\*\*\*\*  
00575 \*\*\*\*\*  
00576 \*\*\*\*\*  
00577 \*\*\*\*\*  
00578 \*\*\*\*\*  
00579 \*\*\*\*\*  
00580 \*\*\*\*\*  
00581 \*\*\*\*\*  
00582 \*\*\*\*\*  
00583 \*\*\*\*\*  
00584 \*\*\*\*\*  
00585 \*\*\*\*\*  
00586 \*\*\*\*\*  
00587 \*\*\*\*\*  
00588 \*\*\*\*\*  
00589 \*\*\*\*\*  
00590 \*\*\*\*\*  
00591 \*\*\*\*\*  
00592 \*\*\*\*\*  
00593 \*\*\*\*\*  
00594 \*\*\*\*\*  
00595 \*\*\*\*\*  
00596 \*\*\*\*\*  
00597 \*\*\*\*\*  
00598 \*\*\*\*\*  
00599 \*\*\*\*\*  
00600 \*\*\*\*\*  
00601 \*\*\*\*\*  
00602 \*\*\*\*\*  
00603 \*\*\*\*\*  
00604 \*\*\*\*\*  
00605 \*\*\*\*\*  
00606 \*\*\*\*\*  
00607 \*\*\*\*\*  
00608 \*\*\*\*\*  
00609 \*\*\*\*\*  
00610 \*\*\*\*\*  
00611 \*\*\*\*\*  
00612 \*\*\*\*\*  
00613 \*\*\*\*\*  
00614 \*\*\*\*\*  
00615 \*\*\*\*\*  
00616 \*\*\*\*\*  
00617 \*\*\*\*\*  
00618 \*\*\*\*\*  
00619 \*\*\*\*\*  
00620 \*\*\*\*\*  
00621 \*\*\*\*\*  
00622 \*\*\*\*\*  
00623 \*\*\*\*\*  
00624 \*\*\*\*\*  
00625 \*\*\*\*\*  
00626 \*\*\*\*\*  
00627 \*\*\*\*\*  
00628 \*\*\*\*\*  
00629 \*\*\*\*\*  
00630 \*\*\*\*\*  
00631 \*\*\*\*\*  
00632 \*\*\*\*\*  
00633 \*\*\*\*\*  
00634 \*\*\*\*\*  
00635 \*\*\*\*\*  
00636 \*\*\*\*\*  
00637 \*\*\*\*\*  
00638 \*\*\*\*\*  
00639 \*\*\*\*\*  
00640 \*\*\*\*\*  
00641 \*\*\*\*\*  
00642 \*\*\*\*\*  
00643 \*\*\*\*\*  
00644 \*\*\*\*\*  
00645 \*\*\*\*\*  
00646 \*\*\*\*\*  
00647 \*\*\*\*\*  
00648 \*\*\*\*\*  
00649 \*\*\*\*\*  
00650 \*\*\*\*\*  
00651 \*\*\*\*\*  
00652 \*\*\*\*\*  
00653 \*\*\*\*\*  
00654 \*\*\*\*\*  
00655 \*\*\*\*\*  
00656 \*\*\*\*\*  
00657 \*\*\*\*\*  
00658 \*\*\*\*\*  
00659 \*\*\*\*\*  
00660 \*\*\*\*\*  
00661 \*\*\*\*\*  
00662 \*\*\*\*\*  
00663 \*\*\*\*\*  
00664 \*\*\*\*\*  
00665 \*\*\*\*\*  
00666 \*\*\*\*\*  
00667 \*\*\*\*\*  
00668 \*\*\*\*\*  
00669 \*\*\*\*\*  
00670 \*\*\*\*\*  
00671 \*\*\*\*\*  
00672 \*\*\*\*\*  
00673 \*\*\*\*\*  
00674 \*\*\*\*\*  
00675 \*\*\*\*\*  
00676 \*\*\*\*\*  
00677 \*\*\*\*\*  
00678 \*\*\*\*\*  
00679 \*\*\*\*\*  
00680 \*\*\*\*\*  
00681 \*\*\*\*\*  
00682 \*\*\*\*\*  
00683 \*\*\*\*\*  
00684 \*\*\*\*\*  
00685 \*\*\*\*\*  
00686 \*\*\*\*\*  
00687 \*\*\*\*\*  
00688 \*\*\*\*\*  
00689 \*\*\*\*\*  
00690 \*\*\*\*\*  
00691 \*\*\*\*\*  
00692 \*\*\*\*\*  
00693 \*\*\*\*\*  
00694 \*\*\*\*\*  
00695 \*\*\*\*\*  
00696 \*\*\*\*\*  
00697 \*\*\*\*\*  
00698 \*\*\*\*\*  
00699 \*\*\*\*\*  
00700 \*\*\*\*\*  
00701 \*\*\*\*\*  
00702 \*\*\*\*\*  
00703 \*\*\*\*\*  
00704 \*\*\*\*\*  
00705 \*\*\*\*\*  
00706 \*\*\*\*\*  
00707 \*\*\*\*\*  
00708 \*\*\*\*\*  
00709 \*\*\*\*\*  
00710 \*\*\*\*\*  
00711 \*\*\*\*\*  
00712 \*\*\*\*\*  
00713 \*\*\*\*\*  
00714 \*\*\*\*\*  
00715 \*\*\*\*\*  
00716 \*\*\*\*\*  
00717 \*\*\*\*\*  
00718 \*\*\*\*\*  
00719 \*\*\*\*\*  
00720 \*\*\*\*\*  
00721 \*\*\*\*\*  
00722 \*\*\*\*\*  
00723 \*\*\*\*\*  
00724 \*\*\*\*\*  
00725 \*\*\*\*\*  
00726 \*\*\*\*\*  
00727 \*\*\*\*\*  
00728 \*\*\*\*\*  
00729 \*\*\*\*\*  
00730 \*\*\*\*\*  
00731 \*\*\*\*\*  
00732 \*\*\*\*\*  
00733 \*\*\*\*\*  
00734 \*\*\*\*\*  
00735 \*\*\*\*\*  
00736 \*\*\*\*\*  
00737 \*\*\*\*\*  
00738 \*\*\*\*\*  
00739 \*\*\*\*\*  
00740 \*\*\*\*\*  
00741 \*\*\*\*\*  
00742 \*\*\*\*\*  
00743 \*\*\*\*\*  
00744 \*\*\*\*\*  
00745 \*\*\*\*\*  
00746 \*\*\*\*\*  
00747 \*\*\*\*\*  
00748 \*\*\*\*\*  
00749 \*\*\*\*\*  
00750 \*\*\*\*\*  
00751 \*\*\*\*\*  
00752 \*\*\*\*\*  
00753 \*\*\*\*\*  
00754 \*\*\*\*\*  
00755 \*\*\*\*\*  
00756 \*\*\*\*\*  
00757 \*\*\*\*\*  
00758 \*\*\*\*\*  
00759 \*\*\*\*\*  
00760 \*\*\*\*\*  
00761 \*\*\*\*\*  
00762 \*\*\*\*\*  
00763 \*\*\*\*\*  
00764 \*\*\*\*\*  
00765 \*\*\*\*\*  
00766 \*\*\*\*\*  
00767 \*\*\*\*\*  
00768 \*\*\*\*\*  
00769 \*\*\*\*\*  
00770 \*\*\*\*\*  
00771 \*\*\*\*\*  
00772 \*\*\*\*\*  
00773 \*\*\*\*\*  
00774 \*\*\*\*\*  
00775 \*\*\*\*\*  
00776 \*\*\*\*\*  
00777 \*\*\*\*\*  
00778 \*\*\*\*\*  
00779 \*\*\*\*\*  
00780 \*\*\*\*\*  
00781 \*\*\*\*\*  
00782 \*\*\*\*\*  
00783 \*\*\*\*\*  
00784 \*\*\*\*\*  
00785 \*\*\*\*\*  
00786 \*\*\*\*\*  
00787 \*\*\*\*\*  
00788 \*\*\*\*\*  
00789 \*\*\*\*\*  
00790 \*\*\*\*\*  
00791 \*\*\*\*\*  
00792 \*\*\*\*\*  
00793 \*\*\*\*\*  
00794 \*\*\*\*\*  
00795 \*\*\*\*\*  
00796 \*\*\*\*\*  
00797 \*\*\*\*\*  
00798 \*\*\*\*\*  
00799 \*\*\*\*\*  
00800 \*\*\*\*\*  
00801 \*\*\*\*\*  
00802 \*\*\*\*\*  
00803 \*\*\*\*\*  
00804 \*\*\*\*\*  
00805 \*\*\*\*\*  
00806 \*\*\*\*\*  
00807 \*\*\*\*\*  
00808 \*\*\*\*\*  
00809 \*\*\*\*\*  
00810 \*\*\*\*\*  
00811 \*\*\*\*\*  
00812 \*\*\*\*\*  
00813 \*\*\*\*\*  
00814 \*\*\*\*\*  
00815 \*\*\*\*\*  
00816 \*\*\*\*\*  
00817 \*\*\*\*\*  
00818 \*\*\*\*\*  
00819 \*\*\*\*\*  
00820 \*\*\*\*\*  
00821 \*\*\*\*\*  
00822 \*\*\*\*\*  
00823 \*\*\*\*\*  
00824 \*\*\*\*\*  
00825 \*\*\*\*\*  
00826 \*\*\*\*\*  
00827 \*\*\*\*\*  
00828 \*\*\*\*\*  
00829 \*\*\*\*\*  
00830 \*\*\*\*\*  
00831 \*\*\*\*\*  
00832 \*\*\*\*\*  
00833 \*\*\*\*\*  
00834 \*\*\*\*\*  
00835 \*\*\*\*\*  
00836 \*\*\*\*\*  
00837 \*\*\*\*\*  
00838 \*\*\*\*\*  
00839 \*\*\*\*\*  
00840 \*\*\*\*\*  
00841 \*\*\*\*\*  
00842 \*\*\*\*\*  
00843 \*\*\*\*\*  
00844 \*\*\*\*\*  
00845 \*\*\*\*\*  
00846 \*\*\*\*\*  
00847 \*\*\*\*\*  
00848 \*\*\*\*\*  
00849 \*\*\*\*\*  
00850 \*\*\*\*\*  
00851 \*\*\*\*\*  
00852 \*\*\*\*\*  
00853 \*\*\*\*\*  
00854 \*\*\*\*\*  
00855 \*\*\*\*\*  
00856 \*\*\*\*\*  
00857 \*\*\*\*\*  
00858 \*\*\*\*\*  
00859 \*\*\*\*\*  
00860 \*\*\*\*\*  
00861 \*\*\*\*\*  
00862 \*\*\*\*\*  
00863 \*\*\*\*\*  
00864 \*\*\*\*\*  
00865 \*\*\*\*\*  
00866 \*\*\*\*\*  
00867 \*\*\*\*\*  
00868 \*\*\*\*\*  
00869 \*\*\*\*\*  
00870 \*\*\*\*\*  
00871 \*\*\*\*\*  
00872 \*\*\*\*\*  
00873 \*\*\*\*\*  
00874 \*\*\*\*\*  
00875 \*\*\*\*\*  
00876 \*\*\*\*\*  
00877 \*\*\*\*\*  
00878 \*\*\*\*\*  
00879 \*\*\*\*\*  
00880 \*\*\*\*\*  
00881 \*\*\*\*\*  
00882 \*\*\*\*\*  
00883 \*\*\*\*\*  
00884 \*\*\*\*\*  
00885 \*\*\*\*\*  
00886 \*\*\*\*\*  
00887 \*\*\*\*\*  
00888 \*\*\*\*\*  
00889 \*\*\*\*\*  
00890 \*\*\*\*\*  
00891 \*\*\*\*\*  
00892 \*\*\*\*\*  
00893 \*\*\*\*\*  
00894 \*\*\*\*\*  
00895 \*\*\*\*\*  
00896 \*\*\*\*\*  
00897 \*\*\*\*\*  
00898 \*\*\*\*\*  
00899 \*\*\*\*\*  
00900 \*\*\*\*\*  
00901 \*\*\*\*\*  
00902 \*\*\*\*\*  
00903 \*\*\*\*\*  
00904 \*\*\*\*\*  
00905 \*\*\*\*\*  
00906 \*\*\*\*\*  
00907 \*\*\*\*\*  
00908 \*\*\*\*\*  
00909 \*\*\*\*\*  
00910 \*\*\*\*\*  
00911 \*\*\*\*\*  
00912 \*\*\*\*\*  
00913 \*\*\*\*\*  
00914 \*\*\*\*\*  
00915 \*\*\*\*\*  
00916 \*\*\*\*\*  
00917 \*\*\*\*\*  
00918 \*\*\*\*\*  
00919 \*\*\*\*\*  
00920 \*\*\*\*\*  
00921 \*\*\*\*\*  
00922 \*\*\*\*\*  
00923 \*\*\*\*\*  
00924 \*\*\*\*\*  
00925 \*\*\*\*\*  
00926 \*\*\*\*\*  
00927 \*\*\*\*\*  
00928 \*\*\*\*\*  
00929 \*\*\*\*\*  
00930 \*\*\*\*\*  
00931 \*\*\*\*\*  
00932 \*\*\*\*\*  
00933 \*\*\*\*\*  
00934 \*\*\*\*\*  
00935 \*\*\*\*\*  
00936 \*\*\*\*\*  
00937 \*\*\*\*\*  
00938 \*\*\*\*\*  
00939 \*\*\*\*\*  
00940 \*\*\*\*\*  
00941 \*\*\*\*\*  
00942 \*\*\*\*\*  
00943 \*\*\*\*\*  
00944 \*\*\*\*\*  
00945 \*\*\*\*\*  
00946 \*\*\*\*\*  
00947 \*\*\*\*\*  
00948 \*\*\*\*\*  
00949 \*\*\*\*\*  
00950 \*\*\*\*\*  
00951 \*\*\*\*\*  
00952 \*\*\*\*\*  
00953 \*\*\*\*\*  
00954 \*\*\*\*\*  
00955 \*\*\*\*\*  
00956 \*\*\*\*\*  
00957 \*\*\*\*\*  
00958 \*\*\*\*\*  
00959 \*\*\*\*\*  
00960 \*\*\*\*\*  
00961 \*\*\*\*\*  
00962 \*\*\*\*\*  
00963 \*\*\*\*\*  
00964 \*\*\*\*\*  
00965 \*\*\*\*\*  
00966 \*\*\*\*\*  
00967 \*\*\*\*\*  
00968 \*\*\*\*\*  
00969 \*\*\*\*\*  
00970 \*\*\*\*\*  
00971 \*\*\*\*\*  
00972 \*\*\*\*\*  
00973 \*\*\*\*\*  
00974 \*\*\*\*\*  
00975 \*\*\*\*\*  
00976 \*\*\*\*\*  
00977 \*\*\*\*\*  
00978 \*\*\*\*\*  
00979 \*\*\*\*\*  
00980 \*\*\*\*\*  
00981 \*\*\*\*\*  
00982 \*\*\*\*\*  
00983 \*\*\*\*\*  
00984 \*\*\*\*\*  
00985 \*\*\*\*\*  
00986 \*\*\*\*\*  
00987 \*\*\*\*\*  
00988 \*\*\*\*\*  
00989 \*\*\*\*\*  
00990 \*\*\*\*\*  
00991 \*\*\*\*\*  
00992 \*\*\*\*\*  
00993 \*\*\*\*\*  
00994 \*\*\*\*\*  
00995 \*\*\*\*\*  
00996 \*\*\*\*\*  
00997 \*\*\*\*\*  
00998 \*\*\*\*\*  
00999 \*\*\*\*\*  
01000 \*\*\*\*\*  
01001 \*\*\*\*\*  
01002 \*\*\*\*\*  
01003 \*\*\*\*\*  
01004 \*\*\*\*\*  
01005 \*\*\*\*\*  
01006 \*\*\*\*\*  
01007 \*\*\*\*\*  
01008 \*\*\*\*\*  
01009 \*\*\*\*\*  
01010 \*\*\*\*\*  
01011 \*\*\*\*\*  
01012 \*\*\*\*\*  
01013 \*\*\*\*\*  
01014 \*\*\*\*\*  
01015 \*\*\*\*\*  
01016 \*\*\*\*\*  
01017 \*\*\*\*\*  
01018 \*\*\*\*\*  
01019 \*\*\*\*\*  
01020 \*\*\*\*\*  
01021 \*\*\*\*\*  
01022 \*\*\*\*\*  
01023 \*\*\*\*\*  
01024 \*\*\*\*\*  
01025 \*\*\*\*\*  
01026 \*\*\*\*\*  
01027 \*\*\*\*\*  
01028 \*\*\*\*\*  
01029 \*\*\*\*\*  
01030 \*\*\*\*\*  
01031 \*\*\*\*\*  
01032 \*\*\*\*\*  
01033 \*\*\*\*\*  
01034 \*\*\*\*\*  
01035 \*\*\*\*\*  
01036 \*\*\*\*\*  
01037 \*\*\*\*\*  
01038 \*\*\*\*\*  
01039 \*\*\*\*\*  
0104

# DISASSEMBLER

To use DISASSEMBLER enter SAL and SAH of the program to be disassembled at \$F0, \$F1. At \$F2 enter \$3F for 66 line/page printing terminals, or \$16 for 24 line/screen CRT terminals. Start DISASSEMBLER at \$2000. After each halt, re-start with a G and RETURN. To relocate the program a whole number of pages change only the high order addresses 20 and 21 to the new page numbers. The extra AAs are merely space fillers.

This version of DISASSEMBLER for the SYM is based upon the KIM version in 6502 USER NOTES #14, page 4, by Bob Kurtz and Eric Rehnke, which in turn was based upon an earlier version by Steve Wozniak and Allen Baum, published in Doctor Dobbs' Journal, Sept 1976. Page zero addresses do not conflict with SYM BASIC.

.M F0  
00F0,24,00  
00F1,21,20  
00F2,FF,  
.G 2000

2000-	20 06 20	JSR	2006
2003-	20 35 80	JSR	8035
2006-	A5 F2	LDA	F2
2008-	85 F8	STA	F8
200A-	20 1A 20	JSR	201A
200D-	20 F5 20	JSR	20F5
2010-	85 F0	STA	F0
2012-	84 F1	STY	F1
2014-	C6 F8	DEC	F8
2016-	D0 F2	BNE	200A
2018-	F0 E9	BEQ	2003
201A-	20 DB 20	JSR	20DB
201D-	A1 F0	LDA	(F0,X)
201F-	A8	TAY	
2020-	4A	LSR	A
2021-	90 0B	BCC	202E
2023-	4A	LSR	A
2024-	80 17	BCS	203D
2026-	C9 22	CMP	#22
2028-	F0 13	BEQ	203D
202A-	29 07	AND	#07

202C-	09 80	ORA	#80
202E-	4A	LSR	A
202F-	AA	TAX	
2030-	BD 22 21	LDA	2122,X
2033-	80 04	BCS	2039
2035-	4A	LSR	A
2036-	4A	LSR	A
2037-	4A	LSR	A
2038-	4A	LSR	A
2039-	29 0F	AND	#0F
203B-	D0 04	BNE	2041
203D-	A0 80	LDY	#80
203F-	A9 00	LDA	#00
2041-	AA	TAX	
2042-	BD 66 21	LDA	2166,X
2045-	85 F3	STA	F3
2047-	29 03	AND	#03
2049-	85 F4	STA	F4
204B-	98	TYA	
204C-	29 BF	AND	#BF
204E-	AA	TAX	
204F-	98	TYA	
2050-	A0 03	LDY	#03
2052-	E0 8A	CPX	#8A
2054-	F0 0B	BEQ	2061
2056-	4A	LSR	A
2057-	90 0B	BCC	2061
2059-	4A	LSR	A
205A-	4A	LSR	A
205B-	09 20	ORA	#20
205D-	88	DEY	
205E-	D0 FA	BNE	205A
2060-	C8	INY	
2061-	88	DEY	
2062-	D0 F2	BNE	2056
2064-	48	PHA	
2065-	B1 F0	LDA	(F0),Y
2067-	20 0C 21	JSR	210C
206A-	A2 01	LDX	#01
206C-	20 EC 20	JSR	20EC
206F-	C4 F4	CPY	F4
2071-	C8	INY	
2072-	90 F1	BCC	2065
2074-	A2 03	LDX	#03
2076-	C0 04	CPY	#04
2078-	90 F2	BCC	206C
207A-	68	PLA	
207B-	A8	TAY	
207C-	B9 80 21	LDA	2180,Y
207F-	85 F5	STA	F5
2081-	B9 C0 21	LDA	21C0,Y
2084-	85 F6	STA	F6
2086-	A9 00	LDA	#00
2088-	A0 05	LDY	#05

208A-	06 F6	ASL	F6
208C-	26 F5	ROL	F5
208E-	2A	ROL	A
208F-	88	DEY	
2090-	D0 F8	BNE	208A
2092-	69 3F	ADC	#3F
2094-	20 04 21	JSR	2104
2097-	CA	DEX	
2098-	D0 EC	BNE	2086
209A-	20 EA 20	JSR	20EA
209D-	A2 06	LDX	#06
209F-	E0 03	CPX	#03
20A1-	D0 12	BNE	20B5
20A3-	A4 F4	LDY	F4
20A5-	F0 0E	BEQ	20B5
20A7-	A5 F3	LDA	F3
20A9-	C9 E8	CMP	#E8
20AB-	B1 F0	LDA	(F0),Y
20AD-	B0 1C	BCS	20CB
20AF-	20 0C 21	JSR	210C
20B2-	88	DEY	
20B3-	D0 F2	BNE	20A7
20B5-	06 F3	ASL	F3
20B7-	90 0E	BCC	20C7
20B9-	BD 73 21	LDA	2173,X
20BC-	20 04 21	JSR	2104
20BF-	BD 79 21	LDA	2179,X
20C2-	F0 03	BEQ	20C7
20C4-	20 04 21	JSR	2104
20C7-	CA	DEX	
20C8-	D0 D5	BNE	209F
20CA-	60	RTS	
20CB-	20 F8 20	JSR	20F8
20CE-	AA	TAX	
20CF-	E8	INX	
20D0-	D0 01	BNE	20D3
20D2-	C8	INY	
20D3-	98	TYA	
20D4-	20 0C 21	JSR	210C
20D7-	8A	TXA	
20D8-	4C 0C 21	JMP	210C
20DB-	20 4D 83	JSR	834D
20DE-	A5 F1	LDA	F1
20E0-	A6 F0	LDX	F0
20E2-	20 D4 20	JSR	20D4
20E5-	A9 2D	LDA	#2D
20E7-	20 04 21	JSR	2104
20EA-	A2 03	LDX	#03
20EC-	A9 20	LDA	#20
20EE-	20 04 21	JSR	2104
20F1-	CA	DEX	
20F2-	D0 FB	BNE	20EC
20F4-	60	RTS	
20F5-	A5 F4	LDA	F4

20F7-	38	SEC	
20F8-	A4 F1	LDY	F1
20FA-	AA	TAX	
20FB-	10 01	BFL	20FE
20FD-	88	DEY	
20FE-	65 F0	ADC	F0
2100-	90 01	BCC	2103
2102-	CB	INY	
2103-	60	RTS	
2104-	84 F7	STY	F7
2106-	20 47 8A	JSR	8A47
2109-	A4 F7	LDY	F7
210B-	60	RTS	
210C-	84 F7	STY	F7
210E-	20 FA 82	JSR	82FA
2111-	A4 F7	LDY	F7
2113-	20 3C 8B	JSR	8B3C
2116-	90 01	BCC	2119
2118-	00	BRK	
2119-	60	RTS	
211A-	AA	TAX	
211B-	AA	TAX	
211C-	AA	TAX	
211D-	AA	TAX	
211E-	AA	TAX	
211F-	AA	TAX	
2120	AA AA 40 02 45 03 D0		08,B6
2128	40 09 30 22 45 33 D0		08,A1
2130	40 09 40 02 45 33 D0		08,7C
2138	40 09 40 02 45 B3 D0		08,D7
2140	40 09 00 22 44 33 D0		8C,15
2148	44 00 11 22 44 33 D0		8C,5F
2150	44 9A 10 22 44 33 D0		08,BE
2158	40 09 10 22 44 33 D0		08,88
2160	40 09 62 13 78 A9 00		21,88
2168	01 02 00 80 59 4D 11		12,D4
2170	06 4A 05 1D 2C 29 2C		23,EA
2178	28 41 59 00 58 00 00		00,04
2180	1C 8A 1C 23 5D 8B 1B		A1,8D
2188	9D 8A 1D 23 9D 8B 1D		A1,DA
2190	00 29 19 AE 69 A8 19		23,17
2198	24 53 1B 23 24 53 19		A1,FD
21A0	00 1A 5B 5B A5 69 24		24,23-
21A8	AE AE A8 AD 29 00 7C		00,79
21B0	15 9C 6D 9C A5 69 29		53,BD
21B8	84 13 34 11 A5 69 23		A0,6A
21C0	D8 62 5A 48 26 62 94		8B,EA
21C8	54 44 C8 54 68 44 E8		94,C6
21D0	00 B4 08 84 74 B4 28		6E,C4
21D8	74 F4 CC 4A 72 F2 A4		8A,D4
21E0	00 AA A2 A2 74 74 74		72,90
21E8	44 68 B2 32 B2 00 22		00,F4
21F0	1A 1A 26 26 72 72 88		C8,A8
21F8	C4 CA 26 48 44 A2 CB		96,96

## RECORDER NOTES:

SUPERMON Version 2 (on a ROM chip marked 02-0012-B) seems to have solved most of our recorder problems. Three of us local SYMMERS can now exchange programs on cassette with no problems, other than perhaps a minor adjustment of the volume control. With the exchange ROM comes a set of three resistors, a capacitor and a jumper wire to upgrade our SYMS to the current production model. Haven't yet installed my sets, but two of the SYMMERS have; they tell me they can now read others' cassettes without even a volume control adjustment. This increased readback reliability will make it really feasible to distribute SYM software on cassette. (more about this below.)

Have not yet tried the corrected KIM format, even though I also have a KIM. Because of earlier problems with the KIM format I transferred my earlier software from KIM to SYM via a borrowed ASR 33 TTY using punched paper tape (ugh!). It is still not possible to read KIM tapes which record over \$FE, \$FF because this destroys the current value of BUFADL, BUFADH. Reading in over the stack area is no problem, however, unless you need the data stored there.

When we begin to distribute software on cassette another feature of SUPERMON Version 2 will be very helpful. Instead of dead leader, SY1.1 generates 6 seconds of SYNCH, which can be increased up to over 6 minutes(!). This will provide plenty of time to adjust volume controls. I would prefer to distribute software in the high speed format, reserving the slower KIM format for exchange with AIM and KIM systems. With my KIM, "Hypertape" was used exclusively; SYM will not accept these tapes, of course. Since there is now an easy way (see page 6) to convert the same programs from the "First Book of KIM" for SYM use, I will re-activate my old KIM, re-record the games in KIM format and enter them into SYM, make the mods and re-enjoy them.

And now a couple of hints: It's kind of reassuring to monitor the tape read visually or aurally, especially if you are having tape read problems. A scope can be used at the Extension Connector, E-X, but it is far simpler to permanently connect a transistor radio earphone across Application Connector pins A-L and A-1 and listen.

Had an extra earphone, so I plugged it into the earphone Jack of the write recorder. Now I can monitor both S2 and L2 (or SAVE and LOAD, as they are called in BASIC, or PUT and GET, as they are called in RAE) by ear. It's reassuring to hear the data go by. I have learned to recognize many programs by their sound. I use blocks of AA, rather than 00 or EA to fill unused memory areas. This was originally done so I could more easily locate unused areas with a Verifw; it also turns out that AA has a more musical sound!

If you are using two recorders, one for read and one for write (which works beautifully with RAE), beware of ground loops! I am using a single AC adaptor to power both recorders, so they are effectively grounded together at the adaptor. Until the ground lead from the Audio In Jack at the read recorder was disconnected, the ground loop hum made operation impossible. You may have similar problems with a single recorder when

both the record and Playback Jacks are connected simultaneously. If so, try removing the ground lead to the Playback Jack.

The most cost effective recorder we have found is the Sanyo Recorder, Model 1530A. It lists for under \$25.00, and every few months our two local super drugstores have them on sale for under \$20.00. We have 6 of them in use here and plan to get many more.

We were curious to see if SYM would accept second generation tapes, duped from one recorder to another, so we bought a Radio Shack attenuating patch cord (42-2152) to make the tests. Results were excellent; SYM read the duped tapes as easily as originals, with only one stipulation. Because of the common AC adaptor problem mentioned above (on the scope it was observed that each recorder reflected a sawtooth waveform back into the power supply), it was necessary to run one recorder on its internal batteries. Hence, either use separate AC adaptors or modify the attenuating patch cord to eliminate the ground connection to the read Jack. The reason for this experiment was to check out the feasibility of mass production of SYM tapes by audio means. Of course, for low volume production it is very simple to write a short program using .E (Execute) to make multiple dumps directly from SYM in both .S2 and .S1 formats on tapes for distribution.

## QUESTIONS FROM THE EDITOR ????

We have published the program DIRECTORY in three formats - source code (RAE), disassembled form, and object code with check sum, so that you (and we) could compare the amount of space required to publish each format. While the source code is the most useful form, it does take lots of space compared to the object code. It looks like in the very near future (like next issue, in fact) we will have more programs to publish than we will have room for. One answer, the expensive one, is to go for more pages. The worst answer is to print only object code. My own feeling is to publish the disassembled form, wherever possible, to get more programs in, since the disassembled form is much more helpful for relocation purposes than is the object code. Of course if you have the disassembler available (you should, because it's published in this issue) we could save space by printing only object code. You could then enter and disassemble, then use Butterfield's RELOCATE from FBOK (or modify by "hand"), and SYM's Block Move to set the program where you want it. So we ask you the following questions: Would you prefer more programs, but in disassembled format or full source code at the expense of fewer programs? Would you want to purchase at a fixed price per page, full source listings for selected programs? Would you want to purchase (your cassette or mine) source code (RAE format) or object code on tape? (When RAE is more widely available source code will be the first class way to go.) What would you be willing to pay for programs on paper (per page)? For a readable cassette? Would you prefer a monthly? Please let us hear from you and give us your input.



## A USEFUL EXTENSION FOR SYM BASIC

The following program is an extension of an original program due to Carl Moser, by Thomas Gettys, 535 W. 12th. St., Chico, CA 95926, and correspondence and questions should be directed to him (self-addressed stamped envelope, please). Mr. Moser supplied the original program and other ideas in personal correspondence and telephone conversations. Thanks to the insights which he provided, we have been able to extend SYM BASIC in numerous ways, including APPEND, DELETE, "named" files etc. The idea of providing an input line buffer to BASIC can obviously be extended to a full page buffer for more elaborate editing. As an extension to APPEND one can pass BASIC programs to RAE for editing, including resequencing, commenting, etc., and to SYM BASIC for execution. The I/O vectoring capability in SUPERMON is a very powerful tool for these kinds of tasks.

## A TERMINAL CONTROL PATCH FOR SYM BASIC

The terminal control patch is intended to be used with the SYM ROM BASIC and a CRT-type terminal, providing upgraded line editing features and other conveniences, such as automatically linking the trisonometric package to BASIC and allowing for an easy exit to the SYM monitor.

Deleting single characters with the rubout (or delete) key makes for a very unreadable display; using the "@" character to cancel a line is unconventional and thus hard to remember, and exiting to SUPERMON with X=USR(&"8035",0) is impossible! These aspects give one the impression of poor quality software, when actually the SYM BASIC is of high quality. Such considerations motivated the design of the terminal control patch to eliminate this illusion by improving the man-machine interface.

### Control Functions

CONTROL C	Exit to the SYM monitor. Return to BASIC via the monitor G command.
CONTROL H	Delete the previous character. The character is erased from the screen.
CONTROL X	Cancel the current line. The entire line will be removed from the screen.

### Additional Features

\*Cassette SAVE/LOAD functions remain operational after exiting and re-entering BASIC.

\*Automatic linkage to the trisonometric package.

\*The memory size default is user defined.

\*Enables lower case input to BASIC.

\*Hex strings can be specified with a "\$".

## HOW TO USE THE TERMINAL CONTROL PATCH

Enter the object code from the listings provided. In order to relocate this code you need only change the addresses found in the macro expansions. The code is located so that the trig package exactly fits behind it (0EC7-0FFF, assuming you have 4K of memory on your SYM).

Cold start BASIC via the monitor command "G 0DE0". If you enter a carriage return in response to the "MEMORY SIZE" query then the numbers (in ASCII) in memory locations 0EC1-0EC5 will be passed to BASIC. This is to provide space for the terminal patch automatically. If you should hit the RESET key for some reason, warm start BASIC via the monitor command "G 0E94".

## ASSEMBLE LIST

```

0010          .BA $0DE0
0020
0030 ;*****
0040 ;*
0050 ;*   TERMINAL CONTROL PATCH FOR THE SYM-1 BASIC.
0060 ;*
0070 ;*   COPYRIGHT 1979 BY C. MOSER
0080 ;*   ALL RIGHTS RESERVED
0090 ;*
0100 ;*****
0110 ;
0120 ;
0130 ;FUNCTIONS
0140 ;-----
0150 ; CTRL C   GO TO SYM MONITOR
0160 ; CTRL H   DELETE LAST CHARACTER
0170 ; CTRL X   DELETE CURRENT LINE
0180 ;
0190 ;EXTRAS
0200 ;-----
0210 ;
0220 ; PATCHES IN THE TRIG PACKAGE
0230 ; MEMORY SIZE DEFAULT IS USER CHOSEN
0240 ; ALLOWS LOWER CASE INPUT TO SYM BASIC
0250 ; ALLOWS HEX STRINGS TO BE DESIGNATED WITH A "$"
0260 ; CASSETTE OPERATIONS WORK AFTER EXIT AND RE-ENTER
0270 ;
0280 ;*****

```

```

0310 ;      DOUBLE STORE MACRO DEFINITION
0320
0330 !!!DS      .MD (DATA ADDRS) ;PUT DATA IN ADDRS
0340          LDA #L,DATA
0350          STA ADDRS
0360          LDA #H,DATA
0370          STA ADDRS+1
0380          .ME
0390
0400
0410 ;      ADDRESS DECLARATIONS
0420
0430 TRIG.PATCH .DE $00C4      ;TRIG PATCH LOCATION
0440 BUFFER      .DE $0135      ;INPUT BUFFER
0450 TRIG.START  .DE $3F68      ;ENTRY TO TRIG PACKAGE
0460 BASIC.COLD  .DE $C000      ;COLD START TO BAS-1
0470 BASIC.WARM  .DE $C27E      ;WARM START TO BAS-1
0480 OUTVEC      .DE $A663      ;OUTPUT TRANSFER VECTOR
0490 INVEC       .DE $A660      ;INPUT TRANSFER VECTOR
0500 RESXAF      .DE $8A3E      ;RESTORE ALL BUT A AND F
0510 INTCHR      .DE $8A58      ;INPUT CHARACTER ROUTINE
0520 ACCESS      .DE $8B86      ;UNWRITE PROTECT SYS RAM
0530
0540
0550
0560 ;      BEGIN MAINLINE
0570
ODE0- 20 86 8B 0580 TCP.START JSR ACCESS
ODE3- A9 00 0590          LDA #0
ODE5- 8D BF 0E 0600          STA NUMBER ;FLAG CRT BUFFER CLEAR
0610          DS (INITIAL INVEC+1)
ODF2- 4C 00 C0 0620          JMP BASIC.COLD
0630
0640
0650 ;      PATCH IN TRIG PACKAGE AND SET MEMORY
0660 ;      SIZE DEFAULT TO PROTEC THIS PROGRAM
0670
0680 INITIAL      DS (TRIG.START TRIG.PATCH)
0690
ODFF- 20 44 0E 0700          JSR GET.LINE ;INPUT MEMORY SIZE
OE02- C0 01 0710          CPY #1      ;<CR> ONLY?
OE04- D0 0C 0720          BNE TCP      ;IF NOT, SKIP DEFAULT
OE06- 88 0730          DEY          ;ELSE USE TABLE VALUES
OE07- B9 C1 0E 0740 LOOP      LDA TABLE,Y ;GET NEXT CHARACTER
OE0A- 99 35 01 0750          STA BUFFER,Y ;PUT IT IN BUFFER
OE0D- C8 0760          INY
OE0E- C0 06 0770          CPY #6      ;LAST CHARACTER?
OE10- 90 F5 0780          BCC LOOP      ;IF NOT, DO NEXT ONE
0790
0800 TCP          DS (GETCHR INVEC+1)
0810          PLA
081D- 68 0820          PLA
081E- 18 0830          CLC
081F- 90 0A 0840          BCC LINE+3

```

SYM-PHYSIS

0-19

```

0870 ;      BASIC CALL FOR CHARACTERS ENTRY POINT
0880
0890 GETCHR      PLA
0900          PLA
0910          LDA NUMBER ;CRT BUFFER EMPTY?
0920          BNE CHAR      ;BRANCH IF NOT
0930
0940 ;      GET A NEW LINE
0950
0960 LINE        JSR GET.LINE
0970          STY NUMBER ;SAVE # CHARS. INPUTTED
0980          LDA #0
0990          STA INDEX ;POINT TO START OF BUFFER
1000
1010 ;      PASS BASIC NEXT CHARACTER
1020
0E33- AC C0 0E 1030 CHAR      LDY INDEX
0E36- B9 35 01 1040          LDA BUFFER,Y
0E39- EE C0 0E 1050          INC INDEX ;UPDATE BUFFER POINTER
0E3C- CE BF 0E 1060          DEC NUMBER ;UPDATE COUNT REMAINING
0E3F- C9 0D 1070          CMP #0
0E41- 4C 3E 8A 1080          JMP RESXAF ;RETURN TO BASIC
1090
1100 ;      GET NEXT LINE, CHECK FOR EDIT
1110 ;      CONTROL CODES AND HEX STRINGS
1120
0E44- A0 00 1130 GET.LINE      LDY #0
0E46- 20 B9 0E 1140 LP.GET      JSR INPUT ;GET A CHARACTER
0E49- 99 35 01 1150          STA BUFFER,Y
0E4C- C8 1160          INY ;UPDATE BUFFER POINTER
0E4D- C9 0D 1170          CMP #0 ;IS IT A <CR>?
0E4F- D0 01 1180          BNE HEX.CHECK
0E51- 60 1190          RTS ;IF SO, RETURN
1200
0E52- C9 24 1210 HEX.CHECK      CMP #'$ ;IS IT A $?
0E54- D0 12 1220          BNE "H.CHECK
0E56- 20 B9 0E 1230          JSR INPUT ;IF SO GET NEXT CHARACTER
0E59- C9 22 1240          CMP #' " ;IS IT A " ?
0E5B- D0 EC 1250          BNE LP.GET+3 ;IF NOT, NOT A HEX STRING
0E5D- 99 35 01 1260          STA BUFFER,Y ;OTHERWISE SAVE "
0E60- A9 26 1270          LDA #'& ;BASIC HEX CHARACTER
0E62- 99 34 01 1280          STA BUFFER-1,Y
0E65- C8 1290          INY ;BUMP BUFFER POINTER
0E66- 10 DE 1300          BPL LP.GET ;CONTINUE PROCESSING
1310
0E68- C9 08 1320 "H.CHECK      CMP #8 ;IS IT A CTRL H?
0E6A- D0 0A 1330          BNE "X.CHECK
0E6C- 88 1340          DEY ;IF SO BACK UP POINTER
0E6D- 88 1350          DEY ; FOR CTRL H AND CHAR.
0E6E- 30 D4 1360          BMI GET.LINE
0E70- 20 AE 0E 1370          JSR SP.BS ;ERASE CHARACTER
0E73- 18 1380          CLC
0E74- 90 D0 1390          BCC LP.GET ;GO GET NEXT CHARACTER

```

SYM-PHYSIS

0-20

```

0E76- C9 18 1410 ^X.CHECK CMP #18 ;IS IT A CTRL X?
0E7B- D0 09 1420 BNE ^C.CHECK
0E7A- 88 1430 CLEAR.LINE DEY ;REMOVE LINE FROM SCREEN
0E7B- F0 C7 1440 BEQ GET.LINE
0E7D- 20 A9 0E 1450 JSR BS.SP.BS
0E80- 18 1460 CLC
0E81- 90 F7 1470 BCC CLEAR.LINE
1480
0E83- C9 03 1490 ^C.CHECK CMP #3 ;IS IT A CTRL C?
0E85- D0 BF 1500 BNE LP.GET ;IF NOT, CONTINUE INPUT
1510 DS (INTCHR INVEC+1)
0E91- 00 1520 BRK ;IF SO, RESET INVEC
0E92- EA 1530 NOP ; AND BREAK TO MONITOR
0E93- EA 1540 NOP
1550
1560 ; ENTRY POINT AFTER A CTRL C
1570
0E94- A9 00 1580 ^C.ENTRY LDA #0
0E96- 8D BF 0E 1590 STA NUMBER ;FLAG CRT BUFFER EMPTY
0E99- 20 86 8B 1600 JSR ACCESS
1610 DS (GETCHR INVEC+1)
0EA6- 4C 7E C2 1620 JMP BASIC.WARM
1630
1640
1650 ; TCP SUPPORT ROUTINES
1660
0EA9- A9 08 1670 BS.SP.BS LDA #8 ;PRINT SPACE,BKSPACE,SPACE
0EAB- 20 63 A6 1680 JSR OUTVEC
1690
0EAE- A9 20 1700 SP.BS LDA #' ;OUTPUT BACKSPACE, SPACE
0EB0- 20 63 A6 1710 JSR OUTVEC
0EB3- A9 08 1720 LDA #8
0EB5- 20 63 A6 1730 JSR OUTVEC
0EB8- 60 1740 RTS
1750
0EB9- 20 58 8A 1760 INPUT JSR INTCHR ;INPUT A CHARACTER
0EBC- 29 7F 1770 AND #7F
0EBE- 60 1780 RTS
1790
1800
1810 ; STORAGE AND DATA DECLARATIONS
1820
0EBF- 1830 NUMBER .DS 1 ;NO. OF CHARS. IN BUFFER
OEC0- 1840 INDEX .DS 1 ;INDEX INTO BUFFER
OEC1- 30 33 35 1850 TABLE .BY '03552' ;MEMORY SIZE DEFAULT DATA
OEC4- 35 32
OEC6- 0D 1860 .BY 13 ;CARRIAGE RETURN
1870
1880 END.PGM .EN

```

(several null lines were deleted to save space)

SYM-PHYSIS 0-21

LABEL FILE: [ / = EXTERNAL ]

```

/TRIG.PATCH=00C4 /BUFFER=0135 /TRIG.START=3F68
/BASIC.COLD=C000 /BASIC.WARM=C27E /OUTVEC=A663
/INVEC=A660 /RESXAF=8A3E /INTCHR=8A58
/ACCESS=8886 TCP.START=0DE0 DATA=0E21
ADDRS=A661 INITIAL=0DF5 LOOP=0E07
TCP=0E12 GETCHR=0E21 LINE=0E28
CHAR=0E33 GET.LINE=0E44 LP.GET=0E46
HEX.CHECK=0E52 ^H.CHECK=0E68 ^X.CHECK=0E76
CLEAR.LINE=0E7A ^C.CHECK=0E83 ^C.ENTRY=0E94
BS.SP.BS=0EA9 SP.BS=0EAE INPUT=0EB9
NUMBER=0EBF INDEX=0EC0 TABLE=0EC1
END.PGM=0EC7
//0000,0EC7,0EC7

```

#### SUPERMON Version 2 (SY1.1):

Some of the audio features of SY1.1 are described in the section RECORD-ER NOTES. A few of the other features are described here. Since hitting the Reset key reinitializes system RAM to default values it's nice to avoid the use of Reset if your program requires non-default values in system RAM.

SY1.1 Provides two helps in this matter. The CR key on the hex pad will abort a tape load if you change your mind, or if you have put in a non-existent ID number (or, in RAE, forgotten an EOF marker). Also TSTAT at \$8B3C now checks for Break key down on both the 20ms loop (TTY) and the RS-232 (CRT) terminals. I have rewritten most of my programs which have infinite loops (graphic and audio) to include a JSR TSTAT with appropriate action on return to permit stopping with terminal Break, rather than Reset.

The display of the cassette ID number is nice, since you may have forgotten what numbers you have used on the tape. It will also help you to identify a tape prepared by RAE. RAE uses ID-00 for all its records, so the absence of ID numbers indicates a RAE file.

Since Version 2 is so inexpensive \*\$15.00 + 6% California sales tax, ~~shipping free in the US from either Sunotek Systems or us, including the latest edition of the GYM-1 Reference Manual, June 1979~~ we will not support programs written in Version 1. The program DIRECTORY, for example, is valid only for Version 2. While most of the changes affect only the cassette portion of SUPERMON, we will feel free, for example, to use subroutines from that portion in non-cassette programs. For example JSR SYNC5 at \$8D76 could be used (preceded by PHA PHA if necessary to cancel the PLA PLA in USSRQ) to permit the CR hex pad key to serve as a Break key in infinite loops. Of course if this were used, an extra JSR STTC at \$8DBB would be needed to retossle the tape deck control.

\*\$16.00 U.S.FUNDS FOR US/CANADA  
\*\$17.00 U.S.FUNDS FOR EUROPE AIR MAIL DELIVERY  
\*\$18.00 U.S.FUNDS FOR ASIA/PACIFIC AIR MAIL DELIVERY

SYM-PHYSIS 0-22

\*\*the MON 1.1 ENHANCEMENT MANUAL.

# SOFTWARE RECOMMENDATION: A 2K Symbolic Assembler for the 6502

The only time during my professional career when I actually programmed for a living was during the period 1949-1952, for the SWAC (NBS Western Automatic Computer) and a series of magnetic drum based airborne computers. This was long before the days of assemblers, so we assembled by hand. We didn't call it hand-assembly, we called it coding. My very first experience with an assembler, and it was a very pleasant learning experience, was with "A 2K Symbolic Assembler for the 6502." This was developed by Robert Ford Denison, RD5 Teeter Road, Ithaca, NY 14850, for the KIM, and is adaptable to SYM by merely changing from the KIM to SYM equivalents of CRLF, OUTCH (OUTCHR), GETCH (INCHR), and OUTSP (SPACE).

In a brief note in the Aug-Sep 1978 issue of MICRO #6, Bob offered a free "sneak preview" of the assembler to get user feedback on the documentation. I have been using the 2KSA since last October, until I obtained RAE (the SSC 8K assembler), and one of my students is using it now on his SYM. The program and its documentation are models of what programs and documentation should be, and I recommend this program highly to the low budget beginner for a number of reasons.

First, by studying the documentation, the beginning assembly language programmer will learn much about clean, structured programs and their documentation, and how to write assembly language programs.

Second, the 2K program, even in a 4K SYM, leaves a lot of room for the applications program. If the SYM is expanded to 8K with the W7AAY board mentioned elsewhere in this issue, the 2KSA can be either left where it is (0200-09FF) or moved up out of the way to the very top of the RAM. It can also be PROMmed or EPROMmed to fit into the otherwise unused 2K block at F000-F7FF. Explicit detailed instructions on relocation and modification are given in the manual.

Third, the user does not even need an elaborate terminal. The author describes in his Appendix A: "An Inexpensive I/O System," how to interface a Qwerty keyboard for under \$35.00, and gives the software for driving the KIM segment displays. This software can be easily modified for SYM, but one of my students went this one better, by using the scope driver program given in the SYM-1 manual as the basis for using a scope as his output terminal. The manual even shows how to modify the 2KSA to match a 32 column width terminal; this is just the right length to match the 32 byte scope buffer provided by SUPERMON. Of course, a "real" terminal is much nicer.

The 2KSA does not use the standard MOS Technology mnemonics; rather it uses the same mnemonics used in MICRO, which put the addressing mode information in the opcode rather than with the operand. For me, this is no problem; once I start thinking with either set of mnemonics, I continue without thinking further about it. I plan to have three SYM systems, two fully expanded with RAE in ROM, one for school, one for home and one in which the ROM sockets are for special applications. In this special purpose SYM I will use the 2KSA in RAM (or possibly ROM) for applications program development.

SYM-PHYSIS 0-23

Copies of the 2KSA manual may be obtained from ~~either Mr. Denison at the above address, or from~~ the SYM Users' Group for ~~\$19.00 plus \$1.00~~ for first class postage. Cassette tapes of "2KSA" are available from SUG in combined SYM/KIM dumps, for ~~\$5.00~~ postpaid. California addresses please add 6% sales tax. SEE BELOW

## HARDWARE RECOMMENDATION: W7AAY 4K Memory Expansion Board

Two of us have added the W7AAY 4K memory expansion boards to our systems, and will be adding them to two more systems soon. We already had 4K RAM on-board, and the SSC MBC016 16K RAM off-board. These latter are normally addressable only at 8K boundaries, and we needed 4K more to fill the gap at 1000-1FFF. The W7AAY boards are almost on-board, in that the board is mounted on the SYM-1 board itself in the logo area. The board holds ten 2114 chips, two of which were removed from sockets U12 and U19. The board connects to SYM with two 16 wire Jumpers with 16 pin DIP Plugs going to the now empty sockets at U12 and U19 and four added wires to pick up the 10, 14, 18 and 1C signals, either from chip U1, pins 7, 9, 10, and 11, or from the applications connector pins A-F, A-H, A-K, and A-J (a Jumper is needed at HH, 41). We tried both methods, and both work well. I placed a piece of thick cardboard over the logo area and the expansion board rests on the cardboard, supported in place by the Jumper cables. I like to think of having 8K on-board RAM. The boards, plus instructions, are available from John Blalock, ~~3054 West Evans Drive, Phoenix, AZ 85025, for \$5.00~~ and a stamped, self-addressed envelope. ~~XP.O. BOX 39356, PHOENIX, ARIZONA 85069.~~ PRICE \$8.00

See "SYMple Memory Expansion," by John M. Blalock, MICRO #15, pages 42-43, for a description of the board. See, also, "Another KIM-1 Expansion," by John M. Blalock, Kilobaud MICROCOMPUTING #33 (September 1979), pages 130-133, for ideas on how to add 24K to SYM-1. Now, wouldn't it be nice if Mr. Blalock would design a similar extension board to hold all of the EPROMS we would like to insert into the one available socket at U23!

## QUESTIONS TO THE EDITOR ????

We don't have any questions from readers this issue (only our own), but we propose the following. If you have questions we can answer easily, we will, if you address and stamp a return envelope. We will publish those of general interest. If we at SYM-PHYSIS can't answer your questions we will put your questions in our SYM-pathy column and ask our readers to come up with a solution. We know that the SYM documentation does not answer all of our (the SYM users) requirements, but we hope SYM-PHYSIS will.

## SOFTWARE/HARDWARE DISTRIBUTION:

If you have SYM software and/or hardware you wish to market, contact us. We can use RAE-1 to prepare the manuals and listings, and can advertise and distribute through the SYM Users' Group.

\* MANUAL \$11.00 US/ CANADA  
PRICES OBSOLETE UNDS AIR MAIL TO EUROPE  
SEE LATEST "GREEN SHOPPING LIST" FOR CURRENT PRICES  
\$ 6.75 US. FUNDS AIR MAIL TO ASIA/PACIFIC

# LETTERS TO THE EDITOR:

Here is our very first letter to the editor. Mr. Vrtis explains in his last paragraph, better than we can, the reason for SYM-PHYSIS.

August 14, 1979

Nicholas J. Vrtis  
5863 Pinetree S.E.  
Kentwood, Mi. 49508

Dear Dr. Luxenberg:

I hope that the enclosed article will be of some use to you for the SYM Users' Newsletter. I would have gotten back to you sooner, but your letter arrived while I was on vacation.

I don't know if this article is the type of stuff you wanted for the Newsletter, but I figured that if you wanted to get it out some time around mid-September, I had better just send it along with my answer that I would like to contribute.

I will be looking forward to the Newsletter. The problem with writing for MICRO is that they only include one SYM article per issue usually, and when it is mine, I've already read it. It will be nice to read a number of articles about the SYM.

Sincerely,

*Nick*  
Nick

*P.S. The Verity of #00-#54 is 2331, and the diary at the end is SP 0,54 with WXXRC = #15*

## FORMAT FOR SUBMISSIONS:

All typewritten or computer generated manuscripts, listings, etc., submitted will be pasted up within a 10" by 15 1/2" (horizontal) area on 11" by 17" sheets and reduced 70% for printing. Some materials will be Xerox reduced 64% prior to pasteup to save space if legibility permits. See Nicholas J. Vrtis' excellent article, "Hex Program Verify Program," for an example of how your material will look after this treatment.

SYM-PHYSIS

0-25

## EDITOR'S NOTES:

\*One of the local SYMMERS had some problems reading with SUPERMON Version 2 tapes saved with the original SUPERMON. Version 2 initializes some of its cassette parameters into RAM where you can set at them and modify them. By changing the value of HSBDRY in \$A632 according to the procedure described in Technical Note No.72-SSC, April 1979, he was able to read and convert his tapes. Two others of the local group did not have this problem.

\*Synertek Systems Corporation has published a series of Technical Notes during the past year or so. Nine of them, as listed below have been bound into one volume. This volume is available from the SYM User's Group at ~~\$3.00~~ plus ~~\$1.00~~ for first class postage (Californians please add 6% sales tax).

TN 22	SYM-1	Input/Output Pins Utilization
TN 35	SYM-1	Updates for "VIM" Reference Manual
TN 49	SYM-1	Sample Programs
TN 50	SYM-1	Display Routine
TN 52	SYM-1	Time Delay Using 6532 Timer
TN 53		Trigonometric Functions for Synertek BASIC
TN 54	SYM-1	Power-Up to User ROM
TN 59	SYM-1	Modification for Inputting Lower Case Characters
TN 72		Cassette Data Reading Using SYM-1 High Speed Format

\*David B. Schaechter, 14053 Fenton Lane, Sylmar, CA 91342, has available OTHELLO for the 1K SYM-1. I have seen a copy of his source code; but have not yet received the cassette object code. I suggested to Dr. Schaechter that, for people unfamiliar with the same, he also include a description of the rules of the same. Contact him directly for price and other information.

\*We will be teaching a week-end course called "Microprocessor Fundamentals," for the University of California at Davis, January 25-27, 1980. The course fee is \$450.00, and each student will receive a SYM-1 and power supply plus some software goodies. For a bulletin on this course, contact University Extension, UCD, Davis, CA 95616.

## COMING ATTRACTIONS:

We have a number of graphic and audio packages for future issues; publication of these depends on how large a portion of our subscribers have added the necessary D/A and A/D interfaces. We also have more utility packages, depending on the interest shown. There is no way of telling what kinds of contributions you readers will be sending in, so we too will be surprised by the next issue. See you then... Lux

\* TECHNICAL NOTES  
\$4.10 inc. POSTAGE  
PRICES OBSOLETE  
SEE LATEST "GREEN SHOPPING LIST" FOR CURRENT PRICES  
SEE LATEST "FUNDS ASIA/PACIFIC AIR MAIL"

SYM-PHYSIS

0-26



## Synertek Systems

CORPORATION

150 S. WOLFE RD. • SUNNYVALE, CA 94086 • TELEPHONE (408) 988-5689  
P. O. Box 552 • SANTA CLARA, CA 95052 • TWX: 910-778-0135

BULK RATE  
U.S. Postage

PAID

Chico, CA 95927  
Permit # 430

October 1979

Dear SYM Owner:

We are happy to announce the beginning of a new publication devoted solely to SYM users, the "SYM-Physis." The newsletter is published by Dr. H. R. Luxenberg of the California State University at Chico. Dr. Luxenberg, who is a professor of computer science, has wide experience with microcomputers and is especially knowledgeable in the SYM system. We at Synertek Systems are happy to see him publish this newsletter.

"SYM-Physis" promises to be of great value to all SYM users, whether your emphasis is hobby or OEM. Problems, programs, games, etc., will be discussed and will be of interest to many of you. Of course, articles by you the user are requested for publication.

Subscriptions to the newsletter can be obtained by completing the form on the last page of the newsletter. Make all checks payable to SYM Users' Group.

Happy reading and good luck to "SYM-Physis."

Sincerely yours,

SYNERTEK SYSTEMS  
Marketing Department

**SYM-PHYSIS**  
SYM-1 Users' Group  
P.O. Box 315  
Chico, CA 95927

TIME VALUE PRINTED MATTER

Address Correction Requested