Line Numbering Editor and Microbasic Interpreter

As a service to our customers we are providing source listings of a Line Numbering Editor and Microbasic Interpreter within this newsletter. The Editor was written by Robert H Uiterwyk and the Microbasic by Robert Uiterwyk and Bill Turner. These individuals are SWTPC 6800 Computer System users and are not employees of SWTPC. We would like to thank them for their contribution to our first newsletter and are happy to say the programs are not proprietary and are free for public use.

The Editor consumes 1.3K of user memory and will easily operate within the minimal 2K system. This Editor is compatible with our paper tape Assembler. It is not at present compatible with the cassette tape version of the assembler. The Microbasic Interpreter on the other hand requires 3.15K of user memory and thus requires at least a 4K system to run. Long Basic programs (more than 35 statements) will necessitate the use of more than 4K of memory. The instructions for Microbasic assume the reader has some prior experience with Basic programming. If you do not, the following source offers several outstanding books on the subject:

The People's Computer Co.
PO Box 310
Menlo Park, Ca.   94025

The most instructive of which is called Basic Programming by Kemeny and Kurtz. Take note that Microbasic is an abbreviated Basic and does not have some of the features of a full Basic package. Both programs are listed in assembled source form and will have to be entered manually the first time around. It is suggested that you make a tape duplicate of the program after you get it loaded so that you will not have to enter it manually again. The Editor program uses memory locations ØØ2Ø thru Ø544 inclusive while the Microbasic uses locations ØØ2Ø thru ØCA3 inclusive. When entering the programs from the assembled listings, the first column of data is the memory address while the second column contains the actual data to be loaded. The following example shows how the first few bytes of the Editor would be loaded:

```
ØØ2Ø ØØØØ        ØØ2Ø ØØ        ØØ2A Ø53D        ØØ2A Ø5
                 ØØ21 ØØ                         ØØ2B 3D
ØØ22 ØØØØ        ØØ22 ØØ        ØØ2C Ø53D        ØØ2C Ø5
                 ØØ23 ØØ                         ØØ2D 3D
ØØ24 ØØØØ        ØØ24 ØØ        ØØ2E Ø53D        ØØ2E Ø5
                 ØØ25 ØØ                         ØØ2F 3D
ØØ26 ØØØØ        ØØ26 ØØ        ØØ3Ø ØØ          ØØ3Ø ØØ
                 ØØ27 ØØ        ØØ31 ØØ          ØØ31 ØØ
ØØ28 ØØØØ        ØØ28 ØØ        ØØ32 ØØ          ØØ32 ØØ
                 ØØ29 ØØ        ØØ33/ØØ          ØØ33 ØØ
```

All of the memory data will be loaded sequentially unless you encounter an ORG statement which means the next block of data will be loaded at a different memory address. You should find that the program counter addresses are loaded as you are entering the program, so typing a G after program entry should start the program. Should you have questions about the programs, write Mr. Robert H. Uiterwyk, 4402 Meadowwood Way, Tampa, Florida 33624. We in turn will send out any program "patches" or notes in the next issue of our newsletter.

TEXT EDITOR VERSION 3.2

This program is a text editor which accepts numbered lines of text and stores them in computer memory in sequence of line numbers. It allows for the insertion, replacement and deletion of text lines. The program uses subroutines and memory within the mikbug^R ROM and its associated RAM. The program is initiated by first loading the editor program and then setting locations AØ48 and AØ49 to a Ø1 and ØØ respectively and finally by typing a "G" for Go to User Program.

PROCEDURES FOR USE

GENERAL

*   A carriage return (C/R) signifies the completion of entry of data.
*   Line feeds are superflous, as a C/R will initiate a linefeed.
*   A "Control X" typed anytime during data entry (Prior to a C/R) will delete the entire input line and allow for its reentry.
*   A "Control O" typed will backspace to last character entered (The computer will echo a _ to signify the backspace).
*   Line numbers can consist of one to four digits separated by a space from the rest of the line.
*   Hitting the "Break" key at anytime will terminate the current computer operation and cause a "Ready" response.

ENTRY OF LINES

*   Type in a line number, followed by a space, followed by text. Terminate with a C/R.
*   The input buffer is 64 characters long. Extra characters are ignored.
*   Entry of more than four digits in a line number will cause the last four digits entered to be used.

INSERTION OF LINES

*   To insert a line between two lines, merely use a line number in between the two line number's involved. (For example, to insert a line in between lines 60 and 70, use any line number between 61 and 69.)

REPLACEMENT OF PREVIOUSLY ENTERED LINE

*   Merely retype the line using the same line number as the line you wish to replace.

DELETION OF PREVIOUSLY ENTERED LINE

*   Type the line number,followed immediately by a C/R (No intervening space.).

COMMANDS

* (Any command can be abbreviated to 2 letters)

LISTING THE FILE

* Type "LIST" - Lists the entire file
* Type "LIST (LINE NUMBER)" - Lists the file, starting at the line number specified through to the end of the file.
* Type "LIST (LINE NUMBER) - (LINE NUMBER)" - (Two line numbers separated by a hyphen) lists the file, starting at the first line number specified through the second line number specified.

RESEQUENCING THE FILE

* Type "RESEQ" - Renumbers the file, starting with 0010 and incrementing by 10.
* Type "RESEQ (LINE NUMBER)" - Renumbers the file, starting with the line number specified and incrementing by 10. Entering a starting line number that would cause a 4 digit overflow causes the command to be treated as a "RESEQ" without a line number.

DESEQUENCING THE FILE

* Type "DESEQ" - Causes removal of line numbers.
* Caution! The file must be resequenced prior to entering additional lines.

SAVING THE FILE

* Type "SAVE" - Causes a specially formatted output of the file with leader and trailer.

LOADING A FILE

* Type "LOAD" - Inputs a file from a tape previously created by a "SAVE" command.

OTHER COMMANDS

* Type "SCRATCH" or "CLEAR" - Clears the file buffer and reinitializes all pointers and counters. (A clear is automatically performed upon program start.)
* Type "AUTO" - Causes the computer to type sequential (by ten) line numbers. Allows for data entry without operator entry of line numbers.
* Type "AUTO (LINE NUMBER)" - Same as auto but with line number specifing the starting line number. (The Auto mode is exited by hiting the break key or by hiting "Control X" to delete the computer generated line number and then entering any other command besides "AUTO".)
* Type "PATCH" - Branches the program to Mikbug control, but then typing a G under Mikbug control will reenter the program without destroying the text file. (As long as the reset button has not been pushed.)

MESSAGES

* "READY" - Computer response upon start of program and upon completion of each command.
* "WHAT?" - Improper command, or improper line number (maybe no space following?).
* "CORE FULL" - Text buffer has now taken all available RAM memory. Lines must be deleted or file cleared. The last line was not stored.

NOTE 1. The program preserves locations $AØ48 and $AØ49 so that pressing the restart button and then entering "G" will always cause restarting of the program (Although the text file will be lost).

NOTE 2. For those I/O devices without a "BREAK" key, the rapid multiple hitting of a "NULL" key will do the same as a "BREAK" key.

NOTE 3. Memory locations $Ø1CE through $Ø1D4 contain $ØD, $ØA, $15 and four $00. This is the C/R and L/F string. The $15 and the four $00 can be replaced by the user to conform to the needs of his personal I/O terminal.

NOTE 4. Locations $Ø122 through $Ø125 contain $1Ø, $16, $ØØ, $ØØ. This string is output at the start of a list and can be changed by the user to suit his personal form control requirements.

NOTE 5. The program automatically determines the amount of RAM memory available.

NOTE 5. Memory locations $0538 and $0539 contain $E1D1 (Address of OUTEEE in Mikbug^{R}). Memory locations $Ø53B and $Ø53C contains $E1AC (Address of INEEE in Mikbug). The user can change these addresses to the addresses of his personal I/O routines if he is using non standard I/O.

NOTE 7. Please transmit information concerning any "Bugs" found to:

Robert H. Uiterwyk
4402 Meadowwood Way
Tampa, Florida 33624

Mikbug^{R} is a registered trademark of Motorola, Inc.

```
                NAM     EDITOR
          *
          *             BY ROBERT H. UITERWYK
          *
          *
          *          ******* VERSION 3.2 ********
          *
          *THIS PROGRAM ASSUMES THAT THE MOTOROLA MIKBUG ROM I
          *INSTALLED AND THAT ITS ASSOCIATED 128 BYTE RAM IS A
          *PRESENT
```

```
0020                ORG     $20
0020 0000    INDEX1 FDB     $0000
0022 0000    INDEX2 FDB     $0000
0024 0000    INDEX3 FDB     $0000
0026 0000    INDEX4 FDB     $0000
0028 0000    SAVESP FDB     $0000
002A 0546    NEXTBA FDB     END
002C 0546    WORKBA FDB     END
002E 0546    SOURCE FDB     END
0030 00      WORKLN FCB     0
0031 00             FCB     0
0032 00             FCB     0
0033 00             FCB     0
0034 00      HIGHLN FCB     0
0035 00             FCB     0
0036 00             FCB     0
0037 00             FCB     0
0038 00      AUTOFL FCB     0

008C                ORG     $008C
008C 00C0    BUFNXT FDB     $00C0
008E 00C0    ENDBUF FDB     $00C0
00C0                ORG     $00C0
00C0 0040    BUFFER RMB     $40
0100                ORG     $0100
0100 7E 0205 PROGM  JMP     START
0103 0D      RDYMSG FCB     $0D
0104 0A             FCB     $0A
0105 0A             FCB     $0A
0106 15             FCB     $15
0107 52             FCC     /READY/
0108 45
0109 41
010A 44
010B 59
010C 04             FCB     $04
010D 0D      WHTMSG FCB     $0D,$0A,$15
010E 0A
010F 15
0110 57             FCC     /WHAT/
0111 48
0112 41
0113 54
0114 04             FCB     04
0115 0D      OVEMSG FCB     $0D,$0A,$15
0116 0A
```

```
0117 15
0118 43                     FCC
0119 4F
011A 52                     /CORE FULL/
011B 45
011C 20
011D 46
011E 55
011F 4C
0120 4C
0121 04                     FCB     $04
0122 10           PGCNTL    FCB     $10
0123 16                     FCB     $16
0124 00                     FCB     $00
0125 00                     FCB     $00
0126 04                     FCB     $04
0127 43           COMMAN    FCB     'C
0128 4C                     FCB     'L
0129 0205                   FDB     START
012B 52                     FCB     'R
012C 45                     FCB     'E
012D 03B7                   FDB     RENUM
012F 4C                     FCB     'L
0130 49                     FCB     'I
0131 034B                   FDB     CLIST
0133 4C                     FCB     'L
0134 4F                     FCB     'O
0135 04E8                   FDB     LOAD
0137 53                     FCB     'S
0138 41                     FCB     'A
0139 04AC                   FDB     SAVE
013B 50                     FCB     'P
013C 41                     FCB     'A
013D 0393                   FDB     PATCH
013F 53                     FCB     'S
0140 43                     FCB     'C
0141 0205                   FDB     START
0143 44                     FCB     'D
0144 45                     FCB     'E
0145 0524                   FDB     DESEQ
0147 41                     FCB     'A
0148 55                     FCB     'U
0149 03E5                   FDB     AUTO
014B 0004         SPARE     RMB     4
014F 86 3F        INPUT     LDA A   #$3F
0151 BD 0540                JSR     OUTCHE
0154 CE 00C0      CNTLIN    LDX     #BUFFER
```

```
0157 BD 0543 INPUT1 JSR      INCHE
015A 81 00          CMP A    #$00
015C 26 03          BNE      INPU11
015E 7E 02E4        JMP      READY
0161 81 18   INPU11 CMP A    #$18
0163 27 2D          BEQ      DEL
0165 81 0D          CMP A    #$0D
0167 26 0A          BNE      INPUT2
0169 8C 00C0        CPX      #BUFFER
016C 26 2B          BNE      IEXIT
016E BD 01C2        JSR      CRLF
0171 20 E1          BRA      CNTLIN
0173 81 0A   INPUT2 CMP A    #$0A
0175 27 E0          BEQ      INPUT1
0177 81 0F          CMP A    #$0F
0179 26 0D          BNE      INPUT3
017B 86 5F          LDA A    #$5F
017D BD 0540        JSR      OUTCHE
0180 8C 00C0        CPX      #BUFFER
0183 27 D2          BEQ      INPUT1
0185 09             DEX
0186 20 CF          BRA      INPUT1
0188 8C 00FF INPUT3 CPX      #BUFFER+63
018B 27 CA          BEQ      INPUT1
018D A7 00          STA A    0,X
018F 08             INX
0190 20 C5          BRA      INPUT1
0192 CE 01A2 DEL    LDX      #DELMSG
0195 8D 14          BSR      PRINT
0197 20 BB          BRA      CNTLIN
0199 86 04   IEXIT  LDA A    #$04
019B A7 00          STA A    X
019D DF BE          STX      ENDBUF
019F 8D 21          BSR      CRLF
01A1 39             RTS
01A2 20      DELMSG FCC      / DELETED/
01A3 44
01A4 45
01A5 4C
01A6 45
01A7 54
01A8 45
01A9 44
01AA 04             FCB      04
     01AB    PRINT  EQU      *
01AB 8D 0E          BSR      PRINT1
01AD 20 13          BRA      CRLF
01AF BD 0540 PRINT2 JSR      OUTCHE
     8004    PIAD   EQU      $8004
01B2 B6 8004        LDA A    PIAD
01B5 2B 03          BMI      PRINT3
01B7 7E 02E4        JMP      READY
01BA 08      PRINT3 INX
01BB A6 00   PRINT1 LDA A    0,X
01BD 81 04          CMP A    #$04
01BF 26 EE          BNE      PRINT2
01C1 39             RTS
01C2 FF 01D6 CRLF   STX      CRTEMP
01C5 CE 01CE        LDX      #CRLFST
```

```
01C8 8D F1          BSR      PRINT1
01CA FE 01D6        LDX      CRTEMP
01CD 39             RTS
01CE 0D      CRLFST FCB      $0D
01CF 0A             FCB      $0A
01D0 15             FCB      $15
01D1 04      CRENU  FCB      $04
01D2 00             FCB      $00
01D3 00             FCB      $00
01D4 00             FCB      $00
01D5 04             FCB      $04
01D6 0000    CRTEMP FDB      0000
01D8 DE 24   LIST   LDX      INDEX3
01DA 9C 26   LIST1  CPX      INDEX4
01DC 27 06          BEQ      LEXIT
01DE BD 01AB        JSR      PRINT
01E1 08             INX
01E2 20 F6          BRA      LIST1
01E4 39      LEXIT  RTS
01E5 81 30   TESTNO CMP A    #$30
01E7 2B 04          BMI      NONO
01E9 81 39          CMP A    #$39
01EB 2F 02          BLE      YESNO
01ED 0D      NONO   SEC
01EE 39             RTS
01EF 0C      YESNO  CLC
01F0 39             RTS
01F1 A6 00   SKIPSP LDA A    0,X
01F3 81 20          CMP A    #$20
01F5 26 03          BNE      ESKIP
01F7 08             INX
01F8 20 F7          BRA      SKIPSP
01FA 39      ESKIP  RTS
01FB 86 30   CWORKN LDA A    #$30
01FD CE 0030        LDX      #$0030
0200 A7 00   CWORK1 STA A    0,X
0202 08             INX
0203 8C 0034        CPX      #$0034
0206 26 F8          BNE      CWORK1
0208 39             RTS
0209 BD 021A FIRSTN JSR      LINENO
020C 25 ED          BCS      CWORKN
020E 96 32          LDA A    WORKLN+2
0210 4A             DEC A
0211 81 2F          CMP A    #$2F
0213 26 02          BNE      FIREXT
0215 86 29          LDA A    #$29
0217 97 32   FIREXT STA A    WORKLN+2
0219 39             RTS
021A DF 22   LINENO STX      INDEX2
021C A6 00   LINE1  LDA A    0,X
021E 81 20          CMP A    #$20
0220 27 12          BEQ      OKNO
0222 81 04          CMP A    #$04
0224 27 0E          BEQ      OKNO
0226 81 2D          CMP A    #$2D
0228 27 0A          BEQ      OKNO
022A 08             INX
022B BD 01E5        JSR      TESTNO
022E 24 EC          BCC      LINE1
```

```
0230 0D       BADNO  SEC
0231 DE 22           LDX     INDEX2
0233 39              RTS
0234 9F 28    OKNO   STS     SAVESP
0236 DF BC           STX     BUFNXT
0238 8D C1           BSR     CWORKN
023A DE BC           LDX     BUFNXT
023C 8E 0033         LDS     #WORKLN+3
023F C6 04           LDA B   #$04
0241 09       OK3    DEX
0242 A6 00           LDA A   0,X
0244 36              PSH A
0245 9C 22           CPX     INDEX2
0247 27 03           BEQ     OK4
0249 5A              DEC B
024A 26 F5           BNE     OK3
024C 9E 28    OK4    LDS     SAVESP
024E 0C              CLC
024F 39              RTS


0250 96 32    SEQNO  LDA A   WORKLN+2
0252 8B 61           ADD A   #$61
0254 19              DAA
0255 84 0F           AND A   #$0F
0257 8A 30           ORA A   #$30
0259 97 32           STA A   WORKLN+2
025B 96 31           LDA A   WORKLN+1
025D 89 60           ADC A   #$60
025F 19              DAA
0260 84 0F           AND A   #$0F
0262 8A 30           ORA A   #$30
0264 97 31           STA A   WORKLN+1
0266 96 30           LDA A   WORKLN
0268 89 60           ADC A   #$60
026A 19              DAA
026B 84 0F           AND A   #$0F
026D 8A 30           ORA A   #$30
026F 97 30           STA A   WORKLN
0271 39              RTS
0272 CE 0033 FINDNO  LDX     #WORKLN+3
0275 9F 28           STS     SAVESP
0277 0D              SEC
0278 A6 00    FIND1  LDA A   0,X
027A A2 04           SBC A   4,X
027C 09              DEX
027D 8C 002F         CPX     #WORKLN-1
0280 26 F6           BNE     FIND1
0282 24 33           BCC     HIBALL
0284 DE 2E           LDX     SOURCE
0286 08       NUMCMP INX
0287 08              INX
0288 08              INX
0289 8E 0032         LDS     #WORKLN+2
028C 0D              SEC
028D C6 04           LDA B   #$04
028F 32       FIND3  PUL A
0290 A2 00           SBC A   0,X
```

```
0292 34              DES
0293 34              DES
0294 09              DEX
0295 5A              DEC B
0296 26 F7           BNE     FIND3
0298 08              INX
0299 24 11           BCC     NEXT4
029B DF 2C           STX     WORKBA
029D 31              INS
029E C6 04           LDA B   #$04
02A0 32       FIND4  PUL A
02A1 A1 00           CMP A   0,X
02A3 26 16           BNE     FEXIT-1
02A5 08              INX
02A6 5A              DEC B
02A7 26 F7           BNE     FIND4
02A9 0C              CLC
02AA 20 10           BRA     FEXIT
02AC A6 00    NEXT4  LDA A   0,X
02AE 08              INX
02AF 81 04           CMP A   #$04
02B1 26 F9           BNE     NEXT4
02B3 9C 2A           CPX     NEXTBA
02B5 26 CF           BNE     NUMCMP
02B7 DE 2A    HIBALL LDX     NEXTBA
02B9 DF 2C           STX     WORKBA
02BB 0D              SEC
02BC 9E 28    FEXIT  LDS     SAVESP
02BE 39              RTS
02BF 9F 28    MOVLIN STS     SAVESP
02C1 8E 002F         LDS     #WORKLN-1
02C4 C6 04           LDA B   #$04
02C6 32       MOVLI2 PUL A
02C7 A7 00           STA A   0,X
02C9 08              INX
02CA 5A              DEC B
02CB 26 F9           BNE     MOVLI2
02CD 86 20           LDA A   #$20
02CF A7 00           STA A   0,X
02D1 08              INX
02D2 9E 28           LDS     SAVESP
02D4 39              RTS
02D5 DE 2E    START  LDX     SOURCE
02D7 DF 2A           STX     NEXTBA
02D9 DF 2C           STX     WORKBA
02DB BD 01FB START1  JSR     CWORKN
02DE DE 30           LDX     WORKLN
02E0 DF 34           STX     HIGHLN
02E2 DF 36           STX     HIGHLN+2
02E4 8E A047 READY   LDS     #$A047
02E7 86 04           LDA A   #04
02E9 B7 01D1         STA A   CREND
02EC 7F 0038         CLR     AUTOFL
02EF CE 0103         LDX     #RDYMSG
02F2 BD 01AB         JSR     PRINT
02F5 CE 00C0 NEWLIN  LDX     #BUFFER
02F8 96 38           LDA A   AUTOFL
02FA 27 10           BEQ     NEWL3
```

```
02FC BD 0250          JSR      SEQNO
02FF BD 02BF          JSR      MOVLIN
0302 86 04            LDA A    #$04
0304 A7 00            STA A    0,X
0306 CE 00C0          LDX      #BUFFER
0309 BD 01BB          JSR      PRINT1
030C BD 0157 NEWL3    JSR      INPUT1
030F CE 00C0          LDX      #BUFFER
0312 BD 01F1 LOOP1    JSR      SKIPSP
0315 A6 00            LDA A    0,X
0317 BD 01E5          JSR      TESTNO
031A 25 03            BCS      LOOP2
031C 7E 03F3          JMP      NUMBER
031F A6 00   LOOP2    LDA A    0,X
0321 81 04            CMP A    #$04
0323 27 D0            BEQ      NEWLIN
0325 08               INX
0326 E6 00            LDA B    0,X
0328 08               INX
0329 DF BC            STX      BUFNXT
032B CE 0127          LDX      #COMMAN
032E A1 00   LOOP3    CMP A    0,X
0330 26 08            BNE      LOOP4
0332 E1 01            CMP B    1,X
0334 26 04            BNE      LOOP4
0336 EE 02            LDX      2,X
0338 6E 00            JMP      0,X
033A 08      LOOP4    INX
033B 08               INX
033C 08               INX
033D 08               INX
033E 8C 014F          CPX      #SPARE+4
0341 26 EB            BNE      LOOP3
0343 CE 010D WHAT     LDX      #WHTMSG
0346 BD 01AB          JSR      PRINT
0349 20 AA            BRA      NEWLIN
034B CE 0122 CLIST    LDX      #PGCNTL
034E BD 01AB          JSR      PRINT
0351 8D 4F   CLIST1   BSR      STTNO
0353 25 30            BCS      CLIST2
0355 BD 021A          JSR      LINENO
0358 25 2B            BCS      CLIST2
035A BD 0272          JSR      FINDNO
035D DE 2C            LDX      WORKBA
035F DF 24            STX      INDEX3
0361 DE BC            LDX      BUFNXT
0363 BD 01F1          JSR      SKIPSP
0366 A6 00            LDA A    0,X
0368 81 2D            CMP A    #$2D
036A 26 1D            BNE      CLIST3
036C 08               INX
036D BD 01F1          JSR      SKIPSP
0370 A6 00            LDA A    0,X
0372 81 04            CMP A    #$04
0374 27 13            BEQ      CLIST3
0376 BD 021A          JSR      LINENO
0379 25 0E            BCS      CLIST3
037B 7C 0033          INC      WORKLN+3
037E BD 0272          JSR      FINDNO

0381 DE 2C            LDX      WORKBA
0383 20 06            BRA      CLIST4
0385 DE 2E   CLIST2   LDX      SOURCE
0387 DF 24            STX      INDEX3
0389 DE 2A   CLIST3   LDX      NEXTBA
038B DF 26   CLIST4   STX      INDEX4
038D BD 01D8          JSR      LIST
0390 7E 02E4          JMP      READY
0393 CE 02E4 PATCH    LDX      #READY
0396 FF A046          STX      $A046
0399 8E A040          LDS      #$A040
039C BF A008          STS      SP
        A008 SP       EQU      $A008
039F 7E E0E3          JMP      CONTRL
        E0E3 CONTRL   EQU      $E0E3
03A2 BD 01F8 STTNO    JSR      CWORKN
03A5 DE BC            LDX      BUFNXT
03A7 A6 00   STTNO2   LDA A    0,X
03A9 81 04            CMP A    #$04
03AB 27 08            BEQ      STTBAD
03AD BD 01E5          JSR      TESTNO
03B0 08               INX
03B1 25 F4            BCS      STTNO2
03B3 09               DEX
03B4 39               RTS
03B5 0D      STTBAD   SEC
03B6 39               RTS
03B7 8D E9   RENUM    BSR      STTNO
03B9 25 03            BCS      RENUM5
03BB BD 0209          JSR      FIRSTN
03BE DE 2E   RENUM5   LDX      SOURCE
03C0 9C 2A   REN1     CPX      NEXTBA
03C2 27 16            BEQ      REN3
03C4 BD 0250          JSR      SEQNO
03C7 24 05            BCC      RENUM6
03C9 BD 01F8          JSR      CWORKN
03CC 20 F0            BRA      RENUM5
03CE BD 02BF RENUM6   JSR      MOVLIN
03D1 A6 00   REN2     LDA A    0,X
03D3 08               INX
03D4 81 04            CMP A    #$04
03D6 26 F9            BNE      REN2
03D8 20 E6            BRA      REN1
03DA DE 30   REN3     LDX      WORKLN
03DC DF 34            STX      HIGHLN
03DE DE 32            LDX      WORKLN+2
03E0 DF 36            STX      HIGHLN+2
03E2 7E 02E4          JMP      READY
03E5 86 FF   AUTO     LDA A    #$FF
03E7 97 38            STA A    AUTOFL
03E9 8D B7   AUTO1    BSR      STTNO
03EB 25 03            BCS      AUTO5
03ED BD 0209          JSR      FIRSTN
03F0 7E 02F5 AUTO5    JMP      NEWLIN
03F3 BD 021A NUMBER   JSR      LINENO
03F6 24 03            BCC      NUM1
03F8 7E 0343          JMP      WHAT
03FB BD 0272 NUM1     JSR      FINDNO
03FE 24 0A            BCC      DELREP
```

```
0400 DE 2C          LDX    WORKBA
0402 9C 2A          CPX    NEXTBA
0404 27 20          BEQ    CAPPEN
0406 8D 4F          BSR    INSERT
0408 20 19          BRA    NEXIT
040A DE BC   DELREP LDX    BUFNXT
040C BD 01F1        JSR    SKIPSP
040F A6 00          LDA A  0,X
0411 81 04          CMP A  #$04
0413 26 0A          BNE    REPLAC
0415 DE 2A          LDX    NEXTBA
0417 9C 2E          CPX    SOURCE
0419 27 08          BEQ    NEXIT
041B 8D 15          BSR    DELETE
041D 20 04          BRA    NEXIT
041F 8D 11   REPLAC BSR    DELETE
0421 8D 34          BSR    INSERT
0423 7E 02F5 NEXIT  JMP    NEWLIN
0426 8D 2F   CAPPEN BSR    INSERT
0428 DE 30          LDX    WORKLN
042A DF 34          STX    HIGHLN
042C DE 32          LDX    WORKLN+2
042E DF 36          STX    HIGHLN+2
0430 20 F1          BRA    NEXIT
0432 9F 28   DELETE STS    SAVESP
0434 DE 2C          LDX    WORKBA
0436 9E 2A          LDS    NEXTBA
0438 5F             CLR B
0439 A6 00   DEL2   LDA A  0,X
043B 34             DES
043C 08             INX
043D 5C             INC B
043E 81 04          CMP A  #$04
0440 26 F7          BNE    DEL2
0442 9F 2A          STS    NEXTBA
0444 DE 2C          LDX    WORKBA
0446 F7 044E        STA B  DEL5+1
0449 9C 2A   DEL4   CPX    NEXTBA
044B 27 07          BEQ    DELEX
044D A6 00   DEL5   LDA A  0,X
044F A7 00          STA A  0,X
0451 08             INX
0452 20 F5          BRA    DEL4
0454 9E 28   DELEX  LDS    SAVESP
0456 39             RTS
0457 D6 BF   INSERT LDA B  ENDBUF+1
0459 D0 BD          SUB B  BUFNXT+1
045B CB 05          ADD B  #$05
045D F7 046A        STA B  TEST6+1
0460 F7 046C        STA B  TEST7+1
0463 F7 0482        STA B  OFFSET+1
0466 DE 2A          LDX    NEXTBA
0468 4F             CLR A
0469 A7 00   TEST6  STA A  0,X
046B A6 00   TEST7  LDA A  0,X
046D 26 34          BNE    OVERFL
046F 96 2B          LDA A  NEXTBA+1
0471 1B             ABA
0472 97 2B          STA A  NEXTBA+1
```

```
0474 86 00          LDA A  #$00
0476 99 2A          ADC A  NEXTBA
0478 97 2A          STA A  NEXTBA
047A 9C 2C   INS2   CPX    WORKBA
047C 27 07          BEQ    BUFWRT
047E 09             DEX
047F A6 00          LDA A  0,X
0481 A7 00   OFFSET STA A  0,X
0483 20 F5          BRA    INS2
0485 DE 2C   BUFWRT LDX    WORKBA
0487 9F 28          STS    SAVESP
0489 8E 002F        LDS    #WORKLN-1
048C C6 04          LDA B  #$04
048E 32      BUF2   PUL A
048F A7 00          STA A  0,X
0491 08             INX
0492 5A             DEC B
0493 26 F9          BNE    BUF2
0495 9E BC          LDS    BUFNXT
0497 34             DES
0498 32      BUF3   PUL A
0499 A7 00          STA A  0,X
049B 08             INX
049C 81 04          CMP A  #$04
049E 26 F8          BNE    BUF3
04A0 9E 28          LDS    SAVESP
04A2 39             RTS
04A3 CE 0115 OVERFL LDX    #OVEMSG
04A6 9E 28          LDS    SAVESP
04A8 BD 01AB        JSR    PRINT
04AB 39             RTS
04AC C6 40   SAVE   LDA B  #$40
04AE 86 3C          LDA A  #$3C
        8007 PIASB  EQU    $8007
04B0 B7 8007        STA A  PIASB
04B3 86 12          LDA A  #$12
04B5 BD 0540        JSR    OUTCHE
04B8 86 FF   SAVE0  LDA A  #$FF
04BA BD 0540        JSR    OUTCHE
04BD 5A             DEC B
04BE 26 F8          BNE    SAVE0
04C0 4F             CLR A
04C1 B7 01D1        STA A  CREND
04C4 DE 2E          LDX    SOURCE
04C6 DF 24          STX    INDEX3
04C8 DE 2A          LDX    NEXTBA
04CA DF 26          STX    INDEX4
04CC BD 01D8        JSR    LIST
04CF C6 20   SAVE1  LDA B  #$20
04D1 86 03          LDA A  #$03
04D3 8D 6B          BSR    OUTCHE
04D5 86 FF   SAVE2  LDA A  #$FF
04D7 8D 67          BSR    OUTCHE
04D9 5A             DEC B
04DA 26 F9          BNE    SAVE2
04DC 86 14          LDA A  #$14
04DE 8D 60          BSR    OUTCHE
04E0 86 34          LDA A  #$34
04E2 B7 8007        STA A  PIASB
```

```
04E5 7E 02E4          JMP    READY
04E8 DE 2E    LOAD    LDX    SOURCE
04EA 86 3C            LDA A  #$3C
04EC B7 8007          STA A  PIASB
04EF 86 11            LDA A  #$11
04F1 8D 4D            BSR    OUTCHE
04F3 8D 4B            BSR    OUTCHE
04F5 8D 4C    LOA2    BSR    INCHE
04F7 81 03            CMP A  #$03
04F9 27 1B            BEQ    LOAEX
04FB 81 0D            CMP A  #$0D
04FD 26 02            BNE    LOA3
04FF 86 04            LDA A  #$04
0501 81 0A    LOA3    CMP A  #$0A
0503 27 F0            BEQ    LOA2
0505 81 00            CMP A  #$00
0507 27 EC            BEQ    LOA2
0509 81 15            CMP A  #$15
050B 27 E8            BEQ    LOA2
050D 81 12            CMP A  #$12
050F 27 E4            BEQ    LOA2
0511 A7 00            STA A  0,X
0513 08               INX
0514 20 DF            BRA    LOA2
0516 86 13    LOAEX   LDA A  #$13
0518 8D 26            BSR    OUTCHE
```

```
051A 86 34             LDA A  #$34
051C B7 8007           STA A  PIASB
051F DF 2A             STX    NEXTBA
0521 7E 02DB           JMP    START1
0524 DE 2E    DESEQ    LDX    SOURCE
0526 9C 2A    DESEQ1   CPX    NEXTBA
0528 27 13             BEQ    DESEXT
052A C6 05             LDA B  #$05
052C 86 00             LDA A  #$00
052E A7 00    DESEQ2   STA A  0,X
0530 08                INX
0531 5A                DEC B
0532 26 FA             BNE    DESEQ2
0534 A6 00    DESEQ3   LDA A  0,X
0536 08                INX
0537 81 04             CMP A  #$04
0539 26 F9             BNE    DESEQ3
053B 20 E9             BRA    DESEQ1
053D 7E 02DB  DESEXT   JMP    START1
0540 7E E1D1  OUTCHE   JMP    OUTEEE
     E1D1     OUTEEE   EQU    $E1D1
0543 7E E1AC  INCHE    JMP    INEEE
     E1AC     INEEE    EQU    $E1AC

A048                   ORG    $A048
A048 0100              FDB    PROGM
```

SYMBOL TABLE

```
INDEX1 0020  INDEX2 0022  INDEX3 0024  INDEX4 0026  SAVESP 0028
NEXTBA 002A  WORKBA 002C  SOURCE 002E  WORKLN 0030  HIGHLN 0034
AUTOFL 0038  BUFNXT 00BC  ENDBUF 00BE  BUFFER 00C0  PROGM  0100
RDYMSG 0103  WHTMSG 010D  OVEMSG 0115  PGCNTL 0122  COMMAN 0127
SPARE  014B  INPUT  014F  CNTLIN 0154  INPUT1 0157  INPUI1 0161
INPUT2 0173  INPUT3 0188  DEL    0192  IEXIT  0199  DELMSG 01A2
PRINT  01AB  PRINT2 01AF  PIAD   8004  PRINT3 01BA  PRINT1 01BB
CRLF   01C2  CRLFST 01CE  CREND  01D1  CRTEMP 01D6  LIST   01D8
LIST1  01DA  LEXIT  01E4  TESTNO 01E5  NONO   01ED  YESNO  01EF
SKIPSP 01F1  ESKIP  01FA  CWORKN 01FB  CWORK1 0200  FIRSTN 0209
FIREXT 0217  LINENO 021A  LINE1  021C  BADNO  0230  OKNO   0234
OK3    0241  OK4    024C  SEQNO  0250  FINDNO 0272  FIND1  0276
NUMCMP 0286  FIND3  028F  FIND4  02A0  NEXT4  02AC  HIBALL 02B7
FEXIT  02BC  MOVLIN 02BF  MOVLI2 02C6  START  02D5  START1 02DB
READY  02E4  NEWLIN 02F5  NEWL3  030C  LOOP1  0312  LOOP2  031F
LOOP3  032E  LOOP4  033A  WHAT   0343  CLIST  034B  CLIST1 0351
CLIST2 0385  CLIST3 0389  CLIST4 038B  PATCH  0393  SP     A008
CONTRL E0E3  STTNO  03A2  STTNO2 03A7  STTBAD 03B5  RENUM  03B7
RENUM5 03BE  REN1   03C0  RENUM6 03CE  REN2   03D1  REN3   03DA
AUTO   03E5  AUTO1  03E9  AUTO5  03F0  NUMBER 03F3  NUM1   03FB
DELREP 040A  REPLAC 041F  NEXIT  0423  CAPPEN 0426  DELETE 0432
DEL2   0439  DEL4   0449  DEL5   044D  DELEX  0454  INSERT 0457
TEST6  0469  TEST7  046B  INS2   047A  OFFSET 0481  BUFWRT 0485
BUF2   048E  BUF3   0498  OVERFL 04A3  SAVE   04AC  PIASB  8007
SAVE0  04B8  SAVE1  04CF  SAVE2  04D5  LOAD   04E8  LOA2   04F5
LOA3   0501  LOAEX  0516  DESEQ  0524  DESEQ1 0526  DESEQ2 052E
DESEQ3 0534  DESEXT 053D  OUTCHE 0540  OUTEEE E1D1  INCHE  0543
INEEE  E1AC  END    0546
```