EN0AD-1.0

VAX 11/730 CONSOLE ROM

EP-EN0AD-DL-1.0
1 OF 2 DEC 1987

digital
MADE IN USA

EN0AD-1.0

VAX 11/730 CONSOLE ROM

EP-EN0AD-DL-1.0
2 OF 2 DEC 1987

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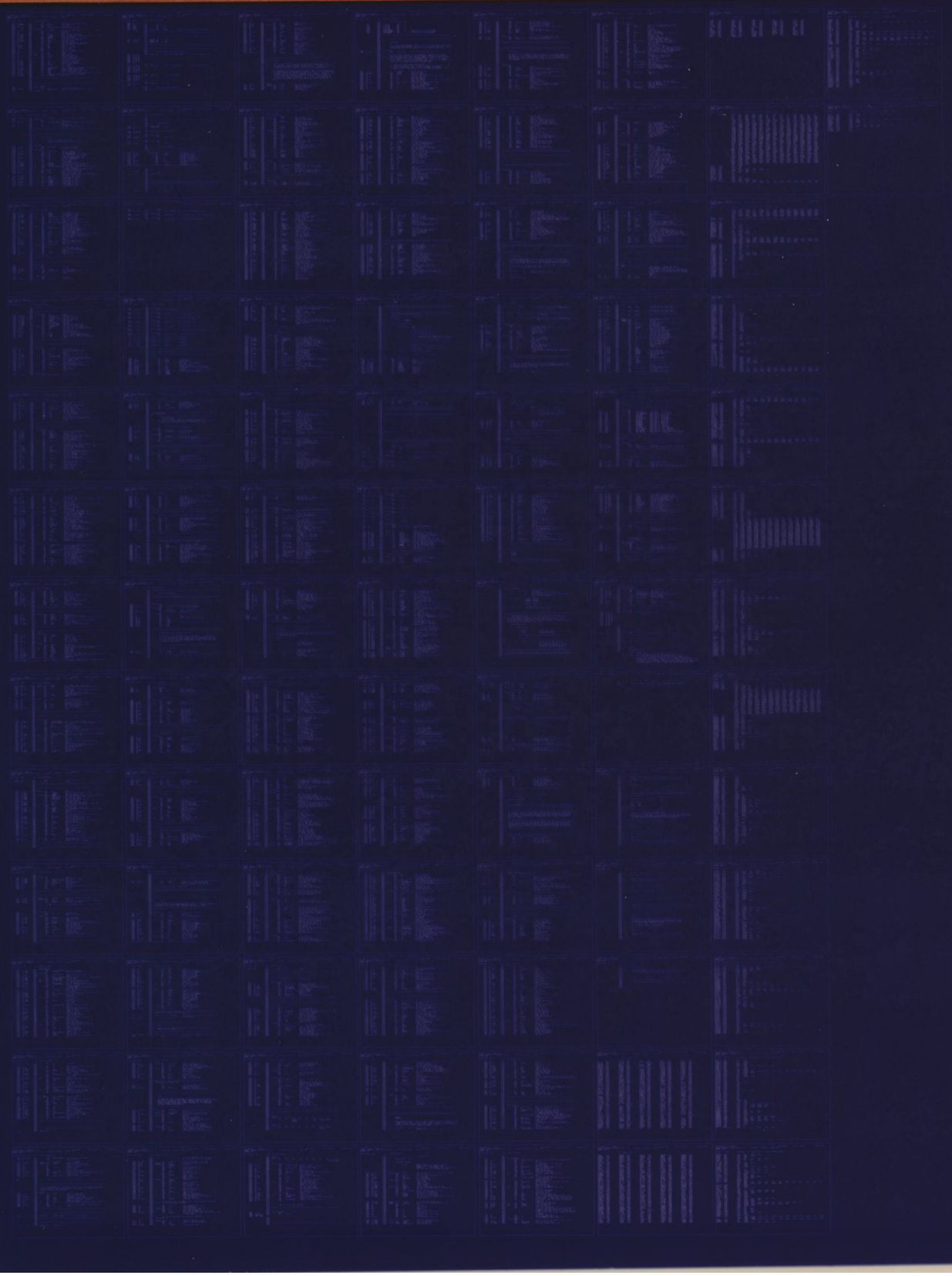

PRODUCT ID: ZZ-EN0AD-1.0

PRODUCT TITLE: 11/730 CONSOLE ROM DOCUMENT

DECO/DEPO: 1.0

DATE: 21-SEP-1987

DEPARTMENT: SASE

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```
Error Addr  Code          Seq   Source statement

                            1   ;*****************************************************************************
                            2   ;
                            3   ;       RAM003  V00
                            4   ;
                            5   ;*****************************************************************************
                            6
            =0000           7   UPC14A  EQU     00H     ;(RO)   UPC bit <14>.  Asserted high.  <MSB>
                            8
            =0001           9   MISC2   EQU     01H     ;(RO)   Misc bit 2      <MSB>
            =0001          10   BOOTSW  EQU     01H     ;(RO)   Boot Switch.  Asserted low.  <LSB>
                           11
            =0002          12   DCLO    EQU     02H     ;(RO)   DC LO Flag.  Asserted high.  <MSB>
            =0002          13   HLTFLG  EQU     02H     ;(RO)   Halt Flag.  Asserted low.  <LSB>
                           14
            =0003          15   ALLOWP  EQU     03H     ;(RO)   Enable Control P Halt Flag. Asserted low. <LSB>
            =0003          16   SECURE  EQU     03H     ;(Same as ALLOWP)
                           17
            =0004          18   READJ2  EQU     04H     ;(RO)   Bit 07 equals J2.  <MSB>
            =0004          19   APTFLG  EQU     04H     ;(RO)   APT Present Flag. <LSB>
                           20
            =0005          21   OK5V    EQU     05H     ;(RO)   5 volts OK Flag.  Asserted high.  <MSB>
                           22
            =0006          23   SLWCLK  EQU     06H     ;(RO)   Slow (100Hz) Clock.  <MSB>
            =0006          24   REMOTE  EQU     06H     ;(RO)   Remote Disable Flag. Asserted low.  <LSB>
                           25
            =0007          26   OKV15   EQU     07H     ;(RO)   15 Volts OK Flag.  Asserted high.  <MSB>
            =0007          27   BOOTEN  EQU     07H     ;(RO)   Boot Enable Flag.  Asserted low.  <LSB>
                           28
            =0008          29   WCSB0   EQU     08H     ;(WO)   WCS Write Data Register, Byte 0
            =0009          30   WCSB1   EQU     09H     ;(WO)   WCS Write Data Register, Byte 1
            =000A          31   WCSB2   EQU     0AH     ;(WO)   WCS Write Data Register, Byte 2
                           32
            =001C          33   ITDB    EQU     01CH    ;(R/W)  Timer Data Register
            =001D          34   ITCSR   EQU     01DH    ;(R/W)  Timer Status Register
                           35
            =0020          36   SUMREG  EQU     020H    ;(RO)   Ready and Done Bit Summary register
                           37   ;
                           38   ; 07     06      05      04      03      02      01      00
                           39   ;
                           40   ;Timer   Power   Remote  TU-58   Local   TU-58   Remote  Local
                           41   ;Int.    Fail    RCVR    RCVR    RCVR    XMIT    XMIT    XMIT
                           42   ;        Time    Done    Done    Done    Ready   Ready   Ready
                           43   ;        Out
                           44
            =0020          45   CLRCLK  EQU     020H    ;(WO)   Clear CPU Clock Run
            =0021          46   SETCLK  EQU     021H    ;(WO)   Set CPU Clock Run
                           47
            =0022          48   CLRSS   EQU     022H    ;(WO)   Clear Clock Single Step
            =0023          49   SETSS   EQU     023H    ;(WO)   Set Clock Single Step
                           50
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Error Addr  Code          Seq   Source statement

            =0024          51   CLRCSK  EQU     024H    ;(WO)   Clear CSR clock
            =0025          52   SETCSK  EQU     025H    ;(WO)   Set CSR clock
                           53
            =0026          54   CLRUPK  EQU     026H    ;(WO)   Clear the UPC clock
            =0027          55   SETUPK  EQU     027H    ;(WO)   Set the UPC clock
                           56
            =0028          57   SETMCI  EQU     028H    ;(WO)   Set Memory Control Init
            =0029          58   CLRMCI  EQU     029H    ;(WO)   Clear Memory Control Init
                           59
            =002A          60   SETMCK  EQU     02AH    ;(WO)   Set Memory Control Clock
            =002B          61   CLRMCK  EQU     02BH    ;(WO)   Clear Memory Control Clock
                           62
            =002C          63   CLRTMR  EQU     02CH    ;(WO)   Stop timer
            =002D          64   SETTMR  EQU     02DH    ;(WO)   Start timer counting
                           65
            =002E          66   CLRBSY  EQU     02EH    ;(WO)   Clear Unibus Bus Busy
            =002F          67   SETBSY  EQU     02FH    ;(WO)   Set Unibus Bus Busy
                           68
            =0030          69   SETDCL  EQU     030H    ;(WO)   Set DC LO
            =0031          70   CLRDCL  EQU     031H    ;(WO)   Clear DC LO
                           71
            =0032          72   SETACL  EQU     032H    ;(WO)   Set AC LO
            =0033          73   CLRACL  EQU     033H    ;(WO)   Clear AC LO
                           74
            =0034          75   INITL   EQU     034H    ;(WO)   Clear Unibus Init
            =0035          76   INITH   EQU     035H    ;(WO)   Set Unibus Init
                           77
            =0036          78   CLRWCK  EQU     036H    ;(WO)   Clear WCS Write Clock
            =0037          79   SETWCK  EQU     037H    ;(WO)   Set WCS Write Clock
                           80
            =0038          81   CLRCSR  EQU     038H    ;(WO)   Clear the CSR Serial Input
            =0039          82   SETCSR  EQU     039H    ;(WO)   Set the CSR Serial Input
                           83
            =003A          84   CLRBLK  EQU     3AH     ;(WO)   Unblock the 100Hz clock
            =003B          85   SETBLK  EQU     3BH     ;(WO)   Block the 100Hz clock
                           86
            =003C          87   CLRLIT  EQU     03CH    ;(WO)   Clear the Run Light
            =003D          88   SETLIT  EQU     03DH    ;(WO)   Set the Run Light
                           89
            =003E          90   SETPAG  EQU     03EH    ;(WO)   Set the WCS Page
            =003F          91   CLRPAG  EQU     03FH    ;(WO)   Clear the WCS Page
                           92
            =0040          93   TRDB    EQU     040H    ;(R/W)  Remote Data Buffer
            =0041          94   TRSR    EQU     041H    ;(RO)   Remote Status Register
            =0042          95   TRMODE  EQU     042H    ;(R/W)  Remote Mode Registers 1 and 2.  See
                           96                           ;comment below
            =0043          97   TRCR    EQU     043H    ;(R/W)  Remote Command Register
                           98
            =0044          99   TUDB    EQU     044H    ;(R/W)  TU-58 Data Buffer
            =0045         100   TUSR    EQU     045H    ;(RO)   TU-58 Status Register
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Error Addr  Code          Seq   Source statement

            =0046         101   TUMODE  EQU     046H    ;(R/W)  TU-58 Mode Registers 1 and 2.  First access
                          102                           ;gets MR1, second gets MR2.  Reading the TUCR
                          103                           ;forces the internal pointer back to MR1.
            =0047         104   TUCR    EQU     047H    ;(R/W)  TU-58 Command Register
                          105
                          106
                          107
                          108
            =0048         109   TTDB    EQU     048H    ;(R/W)  Terminal Data Buffer
            =0049         110   TTSR    EQU     049H    ;(RO)   Terminal Status Register
            =004A         111   TTMODE  EQU     04AH    ;(R/W)  Terminal Mode Register 1 and 2.  First access
                          112                           ;gets MR1, second gets MR2.  Reading the CR forces
                          113                           ;the internal pointer back to MR1
            =004B         114   TTCR    EQU     04BH    ;(R/W)  Terminal Command Register
                          115
                          116
                          117
                          118
                          119
            =0080         120   READ    EQU     080H    ;(RO)   Console Read Register
                          121
            =0082         122   CPUACK  EQU     082H    ;(RO)   Acknowledge from CPU.  <LSB>
                          123
            =0083         124   CPATTN  EQU     083H    ;(RO)   Attention from CPU.  <LSB>
                          125
            =0084         126   UPC14   EQU     084H    ;(RO)   UPC bit <14>.  <LSB>
                          127
            =0085         128   CSR07   EQU     085H    ;(RO)   CSR bit <07>.  <LSB>
                          129
            =0086         130   CSR15   EQU     086H    ;(RO)   CSR bit <15>.  <LSB>
                          131
            =0087         132   CSR23   EQU     087H    ;(RO)   CSR bit <23>.  <LSB>
                          133
            =00A0         134   ENBPAR  EQU     0A0H    ;(WO)   Enable Stall on Parity Error
            =00A1         135   DISPAR  EQU     0A1H    ;(WO)   Disable Stall on Parity Error
                          136
            =00A2         137   VSHIFT  EQU     0A2H    ;(WO)   Set the V-BUS to Shift Mode
            =00A3         138   VNORML  EQU     0A3H    ;(WO)   Set the V-BUS to Normal Mode
                          139
            =00A4         140   SETTIM  EQU     0A4H    ;(WO)   Set the Interval Timer Interrupt
            =00A5         141   CLRTIM  EQU     0A5H    ;(WO)   Clear the Interval Timer interrupt
                          142
            =00A6         143   ENBMEM  EQU     0A6H    ;(WO)   Enable Memory References
            =00A7         144   DISMEM  EQU     0A7H    ;(WO)   Disable Memory References
                          145
            =00A8         146   SETACK  EQU     0A8H    ;(WO)   Set Console Acknowledge
            =00A9         147   CLRACK  EQU     0A9H    ;(WO)   Clear Console Acknowledge
                          148
                          149   ;NOTE:  The Console Acknowledge signal is also used as the UPC
                          150   ;Serial Input.  When used this way the sense is inverted.  To simplify
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Error Addr  Code          Seq   Source statement

                          151   ;matters the next two equates are included.
                          152
            =00A8         153   CLRUPC  EQU     0A8H    ;(WO)   Clear the V-BUS Serial Input
            =00A9         154   SETUPC  EQU     0A9H    ;(WO)   Set the V-BUS Serial Input
                          155
            =00AA         156   SETATN  EQU     0AAH    ;(WO)   Set Console Attention
            =00AB         157   CLRATN  EQU     0ABH    ;(WO)   Clear Console Attention
                          158
            =00AC         159   SETPFI  EQU     0ACH    ;(WO)   Set Power Fail Interrupt
            =00AD         160   CLRPFI  EQU     0ADH    ;(WO)   Clear Power Fail Interrupt
                          161
            =00AE         162   SETHLT  EQU     0AEH    ;(WO)   Set the Console Halt bit
            =00AF         163   CLRHLT  EQU     0AFH    ;(WO)   Clear the Console Halt bit
                          164
            =00CC         165   WRITE   EQU     0CCH    ;(WO)   The Console Write Register
                          166
            =00EC         167   YBUSRD  EQU     0ECH    ;(WO)   Causes Y-BUS to be loaded into
                          168                           ;       Console Read register
                          169
                          170
            =005C         171   BACKSL  EQU     05CH
            =0002         172   RCVDON  EQU     02H
            =0080         173   UPCFLG  EQU     080H
            =0020         174   SPACE   EQU     020H
            =003A         175   COLON   EQU     03AH
            =0080         176   DACTIV  EQU     080H
            =0040         177   AACTIV  EQU     040H
            =0004         178   DFLAG   EQU     04H
            =0002         179   AFLAG   EQU     02H
            =0001         180   SPCFLG  EQU     01H
            =0042         181   AAFLAG  EQU     042H            ;A Flag and A Active Flag combined
            =000F         182   ASMASK  EQU     0FH
            =00F0         183   DLMASK  EQU     0F0H
            =0000         184   EXMCOD  EQU     00
            =0001         185   DEPCOD  EQU     01H
            =0001         186   UPCADR  EQU     01H
            =0080         187   USED    EQU     080H
            =00DF         188   LCMASK  EQU     0DFH
            =00FE         189   DELMSK  EQU     0FEH
            =0080         190   ATFLAG  EQU     080H
            =0000         191   PSLADR  EQU     00
            =1000         192   CONSMS  EQU     01000H
            =0457         193   DELAY1  EQU     01111
            =0050         194   MAXCNT  EQU     80              ;Maximum number of input characters for CNSOLE
                          195
                          196   ;Error Codes follow:
                          197   ;
            =0001         198   CRD_CODE        EQU     1       ;
            =0002         199   CFERR_CODE      EQU     2       ;
            =0003         200   SYN_CODE        EQU     3       ;
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Error Addr  Code          Seq   Source statement

            =0004         201   MEM_CODE        EQU     4       ;
            =0005         202   COMM_CODE       EQU     5       ;
            =0006         203   CLOCK_CODE      EQU     6       ;
            =0007         204   NACKCMND_CODE   EQU     7       ;
            =0008         205   NACKDATA_CODE   EQU     8       ;
                          206
                          207
            =000D         208   CR      EQU     0DH
            =000A         209   LF      EQU     0AH
            =0009         210   TAB     EQU     09H
            =007F         211   DELETE  EQU     07FH
            =001B         212   ALTMOD  EQU     01BH            ;
            =0012         213   CNTRLR  EQU     012H
            =000F         214   CNTRLO  EQU     0FH
            =0003         215   CNTRLC  EQU     03H
            =0015         216   CNTRLU  EQU     015H
            =0013         217   CNTRLS  EQU     013H
            =0011         218   CNTRLQ  EQU     011H
            =0010         219   CNTRLP  EQU     010H            ;Control P
            =007B         220   BASE    EQU     07BH            ;Base loaded into register H for fast decode
            =0018         221   CNTRLX  EQU     018H            ;Control X(temporary for breadboard)
            =007F         222   PARMSK  EQU     07FH            ;Parity Mask
            =000D         223   BREAK   EQU     0DH             ;Break value for USART
            =0004         224   TUINIT  EQU     04H             ;
            =0015         225   TUPREP  EQU     015H            ;Normal USART CR value
            =F9C0         226   DIVSR1  EQU     0F9C0H          ;
            =FFD8         227   DIVSR2  EQU     0FFD8H          ;
            =FFF0         228   DIVSR3  EQU     0FFF0H          ;
                          229
            =0016         230   FASUPC  EQU     16H
                          231
                          232
            =0007         233   ALARM1  EQU     07H             ;This will set the internal pointr
                          234                                   ;of the 9513 to point to the Alarm registers
                          235
            =0017         236   MASTER  EQU     017H            ;This will set the internal pointer of
                          237                                   ;the 9513 to point to the Master Mode register
            =0A0C         238   MSTRCD  EQU     0A0CH           ;Code for Master Mode Register
                          239
            =0001         240   CG1MOD  EQU     01              ;This will set the internal pointer of
                          241                                   ;the 9513 to point to Counter Group 1 Mode
                          242                                   ;Successive writes to the ITDB will cause the
                          243                                   ;pointer to increment through the Mode, Load and
                          244                                   ;Hold registers of each group
                          245
            =0019         246   HOLD1   EQU     019H            ;Set the internal pointer of the 9513
                          247                                   ;to point to the Hold register for Counter 1.
                          248                                   ;Successive reads will allow the Hold register
                          249                                   ;of each group to be examined.
                          250
```

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Error Addr  Code          Seq   Source statement

            =001C         251   HOLD4   EQU     01CH            ;Point to the group 4 hold register and group
                          252                                   ;increment
                          253
            =00A3         254   SAVE12  EQU     0A3H            ;Save counters 1 and 2
            =00B8         255   SAVE45  EQU     0B8H            ;Save counters 4 and 5
                          256
            =0043         257   LOAD12  EQU     043H            ;Load counters 1 and 2 from the Load registers
            =0058         258   LOAD45  EQU     058H            ;Load counters 4 and 5
                          259
            =0023         260   ARM12   EQU     023H            ;Arm counters 1 and 2 for counting
            =0038         261   ARM45   EQU     038H            ;Arm counters 4 and 5
                          262
            =007B         263   LA1245  EQU     7BH             ;Load and Arm counters 1,2,4 and 5
                          264
            =0063         265   LARM12  EQU     063H            ;Combines Load and Arm operations
            =0078         266   LARM45  EQU     078H            ;Load and arm counters 4 and 5
                          267
            =0064         268   LARM3   EQU     064H            ;Load and Arm counter 3
                          269
            =0062         270   LARM2   EQU     062H            ;Load and arm Counter 2
                          271
            =0083         272   DARM12  EQU     083H            ;Stops counting
                          273
            =00F1         274   STEP1   EQU     0F1H            ;Single step counter 1
                          275
            =00F2         276   STEP2   EQU     0F2H            ;Single step counter 2
                          277
            =000C         278   CGFOUR  EQU     0CH             ;Point to Counter Four Load register
                          279
            =000D         280   CGFIVE  EQU     0DH             ;Point to Counter Five Load register
                          281
            =4080         282   STACK   EQU     04080H  ;
                          283
            =4C00         284   MMSTRT  EQU     04C00H          ;
                          285
                          286
                          287
                          288
                          289   ;*************************************************************************
                          290   ;*************************************************************************
                          291   ;The following are entry points into ROM
                          292
            =0000         293   BEGIN   EQU     0       ;
            =000B         294   XVEC    EQU     0BH             ;
            =0013         295   MODVEC  EQU     13H             ;
            =001B         296   PWRVEC  EQU     1BH             ;
            =0040         297   INIVEC  EQU     40H             ;
            =0043         298   SCVEC0  EQU     43H             ;
            =0046         299   GS_VECTOR       EQU     46H             ;
            =0049         300   RSVEC   EQU     49H             ;
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Error Addr  Code          Seq   Source statement

            =004C         301   PWRVE1  EQU     4CH             ;
            =004F         302   FU_VECTOR       EQU     4FH     ;FixUp Vector
            =0052         303   DUMMY1  EQU     52H             ;FFU (For Future Use)
            =0055         304   TPINIT  EQU     55H             ;
            =0058         305   TPINI1  EQU     58H             ;
            =0079         306   TUERR2  EQU     79H             ;
            =0081         307   TUERR3  EQU     81H             ;
            =0086         308   TUERR   EQU     86H             ;
            =0095         309   TU_SEND_PACKET  EQU     95H             ;
            =00DE         310   CHKSUM_WORD     EQU     0DEH            ;
            =00F9         311   COPY    EQU     0F9H            ;
            =00FB         312   COPY1   EQU     0FBH            ;
            =0104         313   SAVESP  EQU     104H            ;
            =0108         314   SAVSP1  EQU     108H            ;
                          315
            =0398         316   CRD_VECTOR      EQU     398H    ;
                          317
            =080F         318   TALK_VECTOR     EQU     80FH            ;Vector in ROM to Talk routine
                          319
                          320
            =4080         321           ORG     04080H          ;
                          322
                          323   ;*****************************************************************************
                          324   ;
                          325   ;       The following address are accessed by the ROM and must remain
                          326   ;       fixed.
                          327   ;
4080  00                  328   RAMVAL: DB      0               ;Ram Valid Flag
4081  00                  329   SWPOS:  DB      0               ;Switch Position Flag
4082  00                  330   BYTSUM: DB      0               ;Storage for byte checksum
4083  0000                331   TOCNT:  DW      0               ;Word wide Time Out Count work area
4085  00                  332   TOCNT1: DB      0               ;Byte wide Time Out Count work area
4086  0000                333   SPBUFF: DW      0               ;Stack Pointer storage area
4088  0000                334   HLBUFF: DW      0               ;Storage for HL
                          335
408A  00                  336   COLD:   DB      0               ;Keep the COLD and CODFLG bytes contiguous
408B  00                  337   CODFLG: DB      0
                          338
408C  00                  339   RETRY:  DB      0               ;
                          340
408D  02                  341   SNDPAK: DB      02              ;Flag byte for commands
408E  0A                  342   MSGCNT: DB      10              ;Message byte count
408F  02                  343   OPCODE: DB      2               ;
4090  00                  344   MODIFR: DB      0               ;Modifier byte
4091  00                  345   UNIT:   DB      0               ;Unit number
4092  00                  346   SWITCH: DB      0               ;
4093  0000                347   SEQNUM: DW      0               ;Sequence number
4095  0000                348   BYTCNT: DW      0               ;
4097  0000                349   BLOCK:  DW      0               ;Block to start from
                          350
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Error Addr  Code          Seq   Source statement

     4099   0000          351   MODADR: DW      0             ;Address storage for sequencing through the
                          352                                 ;Modem Control routines
     409B   00            353   LODFLG: DB      0             ;
     409C   00            354   DIRFLG: DB      0             ;
     409D   00            355   INDFLG: DB      0             ;
                          356
     409E   0000          357   WRDSUM: DW      0             ;Storage for Word checksum
                          358
     40A0   0000          359   SNDADR: DW      0             ;
     40A2   00            360   SNDCNT: DB      0             ;
                          361
     40A3   =0004         362   LODADR: DS      4             ;Address storage for Loads
                          363
     40A7   00            364   LODCNT: DB      0             ;Byte count for Loads
                          365
     40A8   0000          366   PAKCNT: DW      0
                          367
     40AA   =000A         368   ENDPAK: DS      10                  ;
                          369
     40B4   00            370   TEMP:   DB      0             ;Temp area
                          371
     40B5   00            372   PFFLAG: DB      0             ;Power Fail in progress flag
                          373
     40B6   00            374   PUBFLG: DB      0             ;Power Up Boot Flag
                          375
     40B7   0000          376   MSGADR: DW      0             ;Storage for Error Message address
                          377
     40B9   0000          378   MYPC:   DW      0             ;Storage for 8085 Error PC
                          379
     40BB   00            380   OFLAG:  DB      0             ;
     40BC   00            381   OCOPY:  DB      0             ;
                          382
                          383
     40BD   00            384   WRKMSK: DB      0             ;
     40BE   00            385   LRMASK: DB      0             ;
     40BF   00            386   MSKCPY: DB      0             ;
                          387
     40C0   00            388   SAVCHR: DB      0
                          389
     40C1   0000          390   PRIADR: DW      0             ;
     40C3   00            391   PRICNT: DB      0             ;
                          392
     40C4   0000          393   XADRES: DW      0             ;Address storage for X commands while in ROM
     40C6   0000          394   XCOUNT: DW      0             ;Count storage for X commands while in ROM
                          395
     40C8   0000          396   CNTADR: DW      0             ;Address of the character count
     40CA   0000          397   BUFADR: DW      0             ;Storage for Address of Character Buffers
                          398
     40CC   00            399   RETRYI: DB      0             ;Retry counter for Tape Init
                          400
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Error Addr  Code          Seq   Source statement

     40CD   00            401   SFLAG:  DB      0               ;
                          402
     40CE   00            403   DELFLG: DB      0               ;
                          404
     40CF   00            405   CCFLAG: DB      0               ;
                          406
     40D0   00            407   SILFLG: DB      0               ;Silo Active Flag
     40D1   00            408   SIBIAS: DB      0               ;Storage for Silo Input Bias
     40D2   00            409   SOBIAS: DB      0               ;Storage for Silo Output Bias
                          410
     40D3   00            411   RUNFLG: DB      0               ;
                          412
     40D4   00            413   NOTYPE: DB      0               ;
                          414
     40D5                 415   WCS_LOAD_FLAGS:
     40D5   00            416           DB      0               ;Bit 00 =  POWER.CMD done, bit 01 = CODE0n.CMD
                          417                                   ;done.
                          418
     40D6   00            419   APTLOD: DB      0               ;
                          420
     40D7   00            421   SPEND:  DB      0               ;
     40D8   00            422   QPEND:  DB      0               ;
                          423
     40D9   00            424   MIPFLG: DB      0               ;Modem In Progress flag
                          425
     40DA   00            426   SAVMSK: DB      0               ;
                          427
     40DB   00            428   DISCNT: DB      0               ;Disconnect Count
                          429
                          430
            =40F0         431           ORG     40F0H           ;
                          432
     40F0   0000          433   MSGBUF: DW      0               ;
     40F2   00            434   SNDFLG: DB      0               ;
     40F3   00            435   CPFLAG: DB      0               ;
     40F4                 436   SLOW_CLK_FLG:
     40F4   00            437           DB      0               ;
                          438
                          439
            =40FD         440           ORG     40FDH           ;Put these last flags at the very end
     40FD                 441   CRD_FLAGS:
     40FD   00            442           DB      0               ;Customer Runnable Diagnostics Flags
     40FE   00            443   CTLDIS: DB      0               ;Control C and P checking disable flag
     40FF   00            444   NOCHK:  DB      0               ;Auto LF disable
                          445   ;
                          446   ;
                          447   ;       End of this group of fixed addresses
                          448   ;
                          449   ;*****************************************************************************
                          450
```

```
Error Addr  Code          Seq   Source statement

                          451
                          452
                          453   ;*********************************************************************************
                          454   ;
                          455   ;
            =4100         456           ORG     04100H          ;
                          457
                          458
     4100   C3 420C       459   START:  JMP     MYLOAD          ;Go get the rest of the code
     4103   C3 4288       460   GOSV:   JMP     SETAPT          ;Used by X commands out of the ROM
                          461
                          462   ;*********************************************************************
                          463   ;
                          464   ;       Start of Parameter passing block.  Loads are accomplished by
                          465   ;       putting the necessary information in this block and then calling
                          466   ;       LDXPRP.
                          467   ;
     4106   00            468   UNITX:  DB      0               ;
     4107   43 4F 4E      469   FNBUF:  DB      'CONSOL'        ;
     410A   53 4F 4C
     410D   2E             470   DOTBUF: DB      '.'
     410E   45 58 45       471   EXTBUF: DB      'EXE'
     4111   4C00           472   SBUFFR: DW      04C00H          ;
     4113   0000           473           DW      0
     4115   06             474   QUAL:   DB      6               ;
     4116   00             475   SUCCES: DB      0
                          476
     4117   C3 4500       477   LODVEC: JMP     LDXPRP          ;Go to this entry point
     411A   C3 46CB       478   DIRVEC: JMP     LSTPRP          ;Go to this entry point
     411D   C3 4C22       479   PARERR: JMP     PARVEC          ;Go to this vector
     4120   C3 4C25       480   ACLO:   JMP     ACVECT          ;Jump to the ACLO Vector
                          481
     4123   CD 0108       482   GLVECT: CALL    SAVSP1          ;
     4126   C3 4A4D       483           JMP     GETLIN          ;
                          484
     4129   CD 0108       485   GCVECT: CALL    SAVSP1          ;
     412C   E7             486           RST     4               ;Go to GETCHR
     412D   C9             487           RET                     ;Leave
                          488
     412E   CD 0108       489   SLVECT: CALL    SAVSP1          ;Go mark the SP value
     4131   F7             490           RST     6               ;Go to Send Line
     4132   C9             491           RET                     ;Leave
                          492
     4133   CD 0108       493   SLVEC1: CALL    SAVSP1          ;Go mark the SP value
     4136   EF             494           RST     5               ;Special entry to SNDLIN
     4137   C9             495           RET                     ;Leave
                          496
     4138   CD 0108       497   SCVECT: CALL    SAVSP1          ;Go mark where the SP is
     413B   DF             498           RST     3               ;Go to SNDCHR
     413C   C9             499           RET                     ;Leave
```

```
Error Addr  Code           Seq   Source statement

                           500
     413D   CD 0108        501   RSVECT: CALL    SAVSP1          ;Go mask the SP value
     4140   CD 0049        502           CALL    RSVEC           ;Go read the top of the silo
     4143   78             503           MOV     A,B             ;Put the character in A for ENKAA
     4144   C9             504           RET                     ;Leave
                           505
     4145   CD 0108        506   GSVECT: CALL    SAVSP1          ;Go mark the SP value
     4148   CD 0046        507           CALL    GS_VECTOR               ;Go get the top of the silo
     414B   78             508           MOV     A,B             ;Put the character in A for ENKAA
     414C   C9             509           RET                     ;Leave
                           510
     414D                  511   RET_VECTOR:
     414D                  512   T_VECTOR:
     414D   C3 4B3C        513           JMP     CRD_RD_TEST     ;Go check for CRD or RD.
                           514
     4150   00             515   DEFDRV: DB      0               ;
                           516
     4151   C3 001B        517   PUVEC:  JMP     PWRVEC          ;Go to Power Up
                           518
     4154   45 4E 4B       519   MICMON: DB      'ENKAA',0,'.EXE'
     4157   41 41 00
     415A   2E 45 58
     415D   45
                           520   ;
                           521   ;       End of Parameter block
                           522   ;
                           523   ;*****************************************************************************
                           524
     415E   0000            525   REMAIN: DW      0
     4160   0000            526   QUO:    DW      0
                           527
     4162   0000            528   CMPADR: DW      0               ;
                           529
                           530
     4164   00              531   FNDFLG: DB      0
                           532
     4165   00              533   LODDST: DB      0
                           534
     4166   0000            535   LENGTH: DW      0
                           536
     4168   0000            537   TMPBUF: DW      0               ;Temp buffer
     416A   0000 0000       538   TEMP1:  DW      0,0             ;
     416E   0000 0000       539   BYTES:  DW      0,0             ;
     4172   0000            540   PACKS:  DW      0               ;
                           541
     4174   0000            542   BLKNUM: DW      0               ;
                           543
     4176   0000            544   POINTR: DW      0
                           545
     4178   00              546   ENTYPE: DB      0
```

```
Error Addr  Code           Seq   Source statement

                           547
     4179   00             548   MYCNT:  DB      0               ;Count for booting
                           549
                           550
     417A   00             551   BYTE00: DB      0               ;
     417B   00             552   BYTE01: DB      0               ;
                           553
     417C   0000           554   DIRADR: DW      0               ;
                           555
     417E   00             556   SEGNUM: DB      0               ;
                           557
     417F   0000           558   INCCNT: DW      0               ;
                           559
     4181   00             560   ALTFLG: DB      0               ;
     4182   00             561   CMDVAL: DB      0               ;
                           562
     4183   01             563   CMPTB1: DB      01              ;
     4184   80             564           DB      128             ;
                           565
     4185   02             566   CMPTB2: DB      02              ;
     4186   0A             567           DB      10              ;
                           568
     4187   00             569   COUNT:  DB      0
                           570
     4188   04             571   XFRPAK: DB      04
     4189   00             572           DB      0
     418A   =0004           573   XFRADR: DS      4
     418E   =0004           574   XFRCNT: DS      4
                           575
     4192   =0002           576   XFRBUF: DS      2
                           577
     4194   00             578   DIRVAL: DB      0
     4195   00             579   DIRUNI: DB      0
                           580
     4196   00             581   CLKFLG: DB      0               ;
                           582
     4197   00             583   PARFLG: DB      0
     4198   00             584   PARTMP: DB      0               ;
                           585
     4199   00             586   SAVCNT: DB      0               ;
                           587
     419A   00             588   SAVEB0: DB      0               ;
     419B   00             589   SAVEB1: DB      0               ;
     419C   00             590   COPYB0: DB      0               ;
     419D   00             591   COPYB1: DB      0               ;
     419E   0000 0000       592   SAVE:   DW      0,0             ;Reserve 4 byte of storage
                           593
     41A2   0000           594   PNTR1:  DW      0
                           595
     41A4   =0003           596   CSRBUF: DS      3
```

```
Error Addr  Code          Seq   Source statement

     41A7   =0003          597   NOPBUF: DS      3
     41AA   =0004          598   SWAP:   DS      4
     41AE   =0002          599   SAVUPC: DS      2
     41B0   0000           600   TRKUPC: DW      0
     41B2   0000           601   TRKUP1: DW      0               ;
                           602
     41B4   00             603   LIMIT:  DB      0               ;
     41B5   0000           604   LIMSP:  DW      0               ;
                           605
     41B7   00             606   WARM:   DB      0               ;
                           607
     41B8   0000           608   SAVADR: DW      0               ;
                           609
     41BA   03 5E 55       610   CONTLU: DB      3,'^U',CR
     41BD   0D
                           611
     41BE   03 5E 52       612   CONTLR: DB      3,'^R',CR               ;
     41C1   0D
                           613
     41C2   0B             614   LSTBUF: DB      11
            =0006          615           DS      6               ;Buffer to hold Filenames for printing
     41C9   2E             616           DB      '.'             ;
            =0003          617           DS      3
     41CD   0D             618           DB      CR              ;
                           619
     41CE   43 4F 4E       620   CONSOL: DB      'CONSOL.EXE'    ;
     41D1   53 4F 4C
     41D4   2E 45 58
     41D7   45
                           621
     41D8   06 20 20       622   DRVFIL: DB      6,'  DD0:'      ;
     41DB   44 44 30
     41DE   3A
                           623
     41DF   0F 0D 0A       624   CONMSG: DB      15,CR,LF        ;
     41E2   20 20 43       625           DB      '  CONTINUING'  ;
     41E5   4F 4E 54
     41E8   49 4E 55
     41EB   49 4E 47
     41EE   0D             626           DB      CR              ;
                           627
     41EF   13             628   FNFMSG: DB      19              ;
     41F0   3F 34 30       629           DB      '?40  FILE NOT FOUND'           ;
     41F3   20 20 46
     41F6   49 4C 45
     41F9   20 4E 4F
     41FC   54 20 46
     41FF   4F 55 4E
     4202   44
                           630
```

```
Error Addr  Code          Seq   Source statement

     4203   03 3E 3E      631   PROMPT: DB      3,'>>>'          ;
     4206   3E
                          632
     4207   04 4D 49      633   MICPRO: DB      4,'MIC>'                ;
     420A   43 3E
                          634
                          635   ;*****************************************************************************
                          636   ;*****************************************************************************
                          637
                          638   ;*****************************************************************************
                          639   ;
                          640   ;       MYLOAD:         Self Load routine
                          641   ;       MYLDER:         Self Load Error handler
                          642   ;
                          643   ;       MYLOAD is entered from START, which is where the ROM jumps when it
                          644   ;manages to load from the Boot Block of the TU-58 tape.  Here we attempt to
                          645   ;find CONSOL.EXE or ENKAA.EXE (the Micro Monitor).  If neither can be found on
                          646   ;either drive, then we go back to the ROM because not enough code has been
                          647   ;loaded to do anything interesting.
                          648   ;
                          649   ;       MYLDER is used to print messages regarding any of the errors that might
                          650   ;occur as we search for CONSOL.EXE or ENKAA.EXE on either Drive 1 or 0.
                          651   ;
                          652   ;
                          653   ;       REGISTERS:      A =     General use
                          654   ;                       B =     Counter
                          655   ;                       DE =    Source String pointer
                          656   ;                       HL =    Destination pointer.
                          657   ;                               General purpose pointer.
                          658   ;                               Output string (ASCII) pointer.
                          659   ;
                          660   ;       SUBROUTINES:    COPY1
                          661   ;                       LDXPRP
                          662   ;
                          663   ;       FLAGS AND COUNTERS:
                          664   ;
                          665   ;               (CLEARED)       MYCNT
                          666   ;               (SET)
                          667   ;               (READ)          MYCNT-  Limits number of passes through
                          668   ;                                       MYLOAD to 4.
                          669   ;                                   -   Used to determine when to flip UNIT and
                          670   ;                                       CODFLG.
                          671   ;                               UNIT-   Determines which unit we ask LDXPRP
                          672   ;                                       to access.
                          673   ;                               CODFLG- Determines which file name argument
                          674   ;                                       to pass to LDXPRP.
                          675   ;                               SUCCES
                          676   ;               (WRITTEN)       MYCNT-  Incremented each time we pass through
                          677   ;                                       MYLOAD.
                          678   ;                               UNITX-  Copied from UNIT before calling LDXPRP.
```

```
Error Addr  Code          Seq   Source statement

                          679   ;                       UNIT-   Flipped on passes through MYLOAD
                          680   ;                               when MYCNT is odd.  Keeps track of unit
                          681   ;                               we are currently accessing.
                          682   ;                       CODFLG- Flipped on passes through MYLOAD when
                          683   ;                               MYCNT is even.  Keeps track of which
                          684   ;                               file we are searching for.
                          685   ;
                          686   ;
                          687   ;
    420C  AF              688   MYLOAD: XRA     A       ;Make a 0
    420D  32 4179         689           STA     MYCNT   ;Zero out this counter
    4210  3A 4091         690   1$:     LDA     UNIT    ;Get the unit we powered up with
    4213  32 4106         691           STA     UNITX   ;Put it here
    4216  21 4107         692           LXI     H,FNBUF ;Point to the File Name area
    4219  11 41CE         693           LXI     D,CONSOL ;Point to this source
    421C  06 0A           694           MVI     B,10    ;Set up a count of 10 decimal
    421E  3A 408B         695           LDA     CODFLG  ;Get the code flag
    4221  1F              696           RAR             ;Check the LSB
    4222  D2 4228         697           JNC     2$      ;If zero, don't change the source
    4225  11 4154         698           LXI     D,MICMON ;Otherwise, change it
    4228  CD 00FB         699   2$:     CALL    COPY1   ;Go copy it over
    422B  CD 4500         700           CALL    LDXPRP  ;Go do the load
    422E  3A 4116         701           LDA     SUCCES  ;Get the success code
    4231  A7              702           ANA     A       ;Check for 0
    4232  CA 4296         703           JZ      SETVAL  ;Go set the Ram Valid bit
    4235  3E 0D           704           MVI     A,CR    ;Get a carriage return
    4237  DF              705           RST     3       ;Go send it
    4238  CD 4266         706           CALL    MYLDER  ;Go print an error message
    423B  21 4179         707           LXI     H,MYCNT ;Point to this count
    423E  34              708           INR     M       ;Bump it
    423F  7E              709           MOV     A,M     ;Get it into A
    4240  21 4091         710           LXI     H,UNIT  ;Point to the present Unit number
    4243  FE 02           711           CPI     2       ;Check the count
    4245  DA 4253         712           JC      4$      ;If it is 1, go flip the Unit Number
    4248  CA 4250         713           JZ      3$      ;If it is 2, go flip the Code Flag
    424B  FE 03           714           CPI     3       ;See if it is 3
    424D  CA 4253         715           JZ      4$      ;If it is 3, go flip the Unit Number
    4250  21 408B         716   3$:     LXI     H,CODFLG ;Flip the Code Flag
    4253  7E              717   4$:     MOV     A,M     ;Get whatever we are pointing at
    4254  EE 01           718           XRI     01      ;Flip it
    4256  77              719           MOV     M,A     ;Save the new value
    4257  3A 4179         720           LDA     MYCNT   ;Check the count
    425A  FE 04           721           CPI     4       ;We're done if it equals 4
    425C  CA 4C2B         722           JZ      PVECTR  ;Use this vector to go back to the ROM
    425F  21 41DF         723           LXI     H,CONMSG ;Point the Continuing message
    4262  F7              724           RST     6       ;Go send it out
    4263  C3 4210         725           JMP     1$      ;Go try again
                          726
    4266  2A 40B7         727   MYLDER: LHLD    MSGADR  ;Get the address of the error message
    4269  F7              728           RST     6       ;Go print it
```

```
Error Addr  Code           Seq   Source statement

     426A   3A 4116        729           LDA     SUCCES          ;Get the success code
     426D   FE 02          730           CPI     2               ;Check for Drive (Init) type error
     426F   C8             731           RZ                      ;Leave if it is
     4270   3A 4091        732           LDA     UNIT            ;Get the Unit #
     4273   F6 30          733           ORI     030H            ;Make it ASCII
     4275   32 41DD        734           STA     DRVFIL+5        ;Store it
     4278   21 41D8        735           LXI     H,DRVFIL        ;Point to this message
     427B   F7              736           RST     6               ;Go send it out
     427C   3A 4116        737           LDA     SUCCES          ;Get the success code byte
     427F   3D              738           DCR     A               ;See if it is one by trying to make it zero
     4280   C0              739           RNZ                     ;Leave if not
     4281   21 4107        740           LXI     H,FNBUF         ;Point to the file name
     4284   3E 0A          741           MVI     A,10            ;Count for printing
     4286   EF              742           RST     5               ;Go print it
     4287   C9              743           RET                     ;Leave
                            744   ;
                            745   ;*****************************************************************
                            746
                            747   ;*****************************************************************
                            748   ;
                            749   ;       SETAPT
                            750   ;       SETVAL
                            751   ;
                            752   ;       SETAPT is the entry point used to transfer control from ROM to RAM
                            753   ;as the result of a successful downline load (X/U 4100 3F00) to load up the
                            754   ;RAM when a TU-58 is unavailable.  We come here from the GOSV vector that the
                            755   ;ROM X command jumps to when it finishes.  We set up a few flags and then fall
                            756   ;through to SETVAL.
                            757   ;
                            758   ;       SETVAL sets up the Default Drive number, sets the Ram Valid flag and
                            759   ;then goes to GOSTRT.  GOSTRT is a Vector that is loaded when either CONSOL.EXE
                            760   ;or ENKAA.EXE is loaded.  If CONSOL.EXE is loaded, it will send us to the code
                            761   ;that tries to load up the Micro Code and Boot up the machine.
                            762   ;
                            763   ;
                            764   ;       REGISTERS:      A = General use
                            765   ;                       HL = Pointer to RAMVAL
                            766   ;
                            767   ;       FLAGS:  (CLEAR) CTLDIS- Control Character Checking Disable
                            768   ;
                            769   ;               (SET)   APTLOD- Loaded from APT
                            770   ;                       CODFLG- Code Flag.  (0=CONSOL.EXE, 1=ENKAA.EXE)
                            771   ;                       DEFDRV- Default Drive (TU-58)
                            772   ;                       RAMVAL- Ram Valid (CONSOL.EXE or ENKAA.EXE loaded)
                            773   ;
     4288   AF              774   SETAPT: XRA     A               ;Make a 0
     4289   32 40FE         775           STA     CTLDIS          ;Turn this off
     428C   3C              776           INR     A               ;Make a 1
     428D   32 40D6         777           STA     APTLOD          ;Set the Loaded via APT flag
     4290   3A 4C2E         778           LDA     CODFL1          ;Get the assembled in version of this flag
```

```
Error Addr  Code          Seq   Source statement

     4293   32 408B       779           STA     CODFLG          ;Put it where it belongs
     4296   3A 4106       780   SETVAL: LDA     UNITX           ;Get the unit number
     4299   32 4150       781           STA     DEFDRV          ;Set the default drive number
     429C   21 4080       782           LXI     H,RAMVAL        ;Point to this flag byte
     429F   36 01          783           MVI     M,1             ;Set it
     42A1   C3 4C00       784           JMP     GO_START        ;This will vector us to the correct place
                          785   ;
                          786   ;*****************************************************************
                          787
                          788
                          789   ;*****************************************************************
                          790   ;
                          791   ;       TUERR1:         TU-58 File Not Found error
                          792   ;
                          793   ;       This piece of code puts an error number in A and the address of
                          794   ;an error message in HL and then jumps to a common error handler.
                          795   ;
                          796   ;       REGISTERS:      A = Error Number
                          797   ;                       HL = Error Message address
                          798   ;
     42A4   3E 01         799   TUERR1: MVI     A,1             ;Error code for Success byte
     42A6   21 41EF       800           LXI     H,FNFMSG        ;Address of File Not Found Message
     42A9   C3 0086       801           JMP     TUERR           ;Go to this shared code
                          802   ;
                          803   ;*****************************************************************
                          804
                          805
                          806   ;*****************************************************************
                          807   ;
                          808   ;       CNTLR:          Control R handler.
                          809   ;
                          810   ;
                          811   ;
                          812   ;       REGISTERS:      A =     General use
                          813   ;                       HL =    Pointer to ^R string
                          814   ;                               Pointer to correct Prompt
                          815   ;                               Pointer Command Line Count and Buffer
                          816   ;
                          817   ;       SUBROUTINES:    SNDLIN
                          818   ;
                          819   ;       FLAGS:  (CLEAR) DELFLG- Delete Flag
                          820   ;
     42AC   21 41BE       821   CNTLR:  LXI     H,CONTLR        ;Point to the ^R string
     42AF   F7            822           RST     6               ;Go print it
     42B0   21 4203       823           LXI     H,PROMPT        ;Point to my prompt
     42B3   3A 408B       824           LDA     CODFLG          ;See who is here
     42B6   1F            825           RAR                     ;Is it set?
     42B7   D2 42BD       826           JNC     CNTLR1          ;Jump if not set
     42BA   21 4207       827           LXI     H,MICPRO        ;Point to the MIC Prompt
     42BD   F7            828   CNTLR1: RST     6               ;Go print it
```

```
Error Addr  Code          Seq   Source statement

     42BE   2A 40C8       829           LHLD    CNTADR          ;Point to the character count
     42C1   7E            830           MOV     A,M             ;Get the count
     42C2   A7            831           ANA     A               ;See if zero
     42C3   CA 4A58       832           JZ      GETLI0          ;If zero,don't do anything
     42C6   F7            833           RST     6               ;Go print it
     42C7   AF            834           XRA     A               ;Make a 0
     42C8   32 40CE       835           STA     DELFLG          ;Zero the Delete Flag
     42CB   C3 4A58       836           JMP     GETLI0          ;Go get the next character
                          837   ;
                          838   ;*****************************************************************
                          839
                          840
                          841   ;*****************************************************************
                          842   ;
                          843   ;       CNTLU:          Control U handler
                          844   ;
                          845   ;       This handler prints an ^U, clears the Command Line Buffer Count
                          846   ;and then uses the the Control P vector to get to the correct idle loop in
                          847   ;either CONSOL.EXE or ENKAA.EXE
                          848   ;
                          849   ;
                          850   ;       REGISTERS:      A =     General use
                          851   ;                       HL =    Pointer to ^U string
                          852   ;                               Pointer to Command Line count
                          853   ;
                          854   ;       SUBROUTINES:    SNDLIN- Send Line
                          855   ;
                          856   ;
  42CE   21 41BA          857   CNTLU:  LXI     H,CONTLU        ;Point to this string
  42D1   F7               858           RST     6               ;Go print it
  42D2   AF               859           XRA     A               ;Make a 0
  42D3   2A 40C8          860           LHLD    CNTADR          ;Get the address of the count
  42D6   77               861           MOV     M,A             ;Zero the count
  42D7   C3 4C2B          862           JMP     PVECTR          ;Go to the correct idle loop
                          863   ;
                          864   ;*****************************************************************
                          865
                          866
                          867
                          868   ;*****************************************************************
                          869   ;
     =42F6                870           ORG     42F6H           ;Don't change this address
                          871
  42F6   0000             872   DIRSEG: DW      0               ;
  42F8   0000             873   NXTSEG: DW      0               ;
  42FA   0000             874   HIGHST: DW      0               ;Number of Highest Segment open
  42FC   0000             875   EXTRAS: DW      0               ;Number of Extra Words per entry
  42FE   0000             876   STRBLK: DW      0               ;Block where the files in this segment begin
                          877
                          878   ;*****************************************************************
```

```
Error Addr  Code          Seq   Source statement

                          879   ;*****************************************************************
                          880
            =4300         881           ORG     4300H           ;Now we will set aside a 512 byte area for the
                          882                                   ;Directory Buffer
                          883
     4300   0000          884   DIRBUF: DW      0               ;
     4302   =01FE         885   NAMES:  DS      510             ;
                          886
                          887
                          888
                          889   ;*****************************************************************
                          890   ;*****************************************************************
                          891   ;
            =4500         892           ORG     04500H          ;
                          893   ;
                          894   ;       LDXPRP:  This is the TU-58 handler.  The parameter passing block
                          895   ;at 4106H must be loaded with the parameters controlling the Load prior
                          896   ;to calling LDXPRP.  The handler then attempts to locate and load the
                          897   ;file.  To do this it uses the List handler (which performs the Directory
                          898   ;function) as a subroutine.  Hooks have been added to the List handler
                          899   ;to allow it to interact with LDXPRP, the LODFLG and FNDFLG in particular.
                          900   ;       If the file is found, the Load handler uses the information generated
                          901   ;by List regarding the location and length of the file on the tape to
                          902   ;initiate a read from the tape.  There may be multiple requests because the
                          903   ;driver divides the block count by 16 and asks for the file in chuncks that
                          904   ;are no greater than 16 blocks (8k bytes) at a time.
                          905   ;
                          906   ;       REGISTERS:      A =
                          907   ;                       B =
                          908   ;                       C =
                          909   ;                       D =
                          910   ;                       E =
                          911   ;                       H =
                          912   ;                       L =
                          913   ;                       BC =
                          914   ;                       DE =
                          915   ;                       HL =
                          916   ;
                          917   ;       SUBROUTINES:    LIST8
                          918   ;                       LIST
                          919   ;                       COPY
                          920   ;                       SUBDIV
                          921   ;                       WRTNOP
                          922   ;                       LDUPC
                          923   ;                       LOADA
                          924   ;                       LDCSR1
                          925   ;
                          926   ;
                          927   ;       FLAGS:  (CLEAR) FNDFLG- File Found Flag
                          928   ;
```

```
Error Addr  Code           Seq   Source statement

                           929   ;               (SET)   LODFLG- Load In Progress flag
                           930   ;
                           931   ;
     4500   CD 0104        932   LDXPRP: CALL    SAVESP          ;Go save the stack value
     4503   3A 4106        933           LDA     UNITX           ;Get the specified Unit #
     4506   32 4091        934           STA     UNIT            ;Put it here
     4509   CD 0058        935           CALL    TPINI1          ;Go init the drives
     450C   AF             936           XRA     A               ;Make a 0
     450D   32 4164        937           STA     FNDFLG          ;Zero the File Name Found flag
     4510   3C             938           INR     A               ;Make a 1
     4511   32 409B        939           STA     LODFLG          ;Set the load flag
     4514   3A 4194        940           LDA     DIRVAL          ;Check the directory valid flag
     4517   1F             941           RAR                     ;Is it set
     4518   D2 4544        942           JNC     DIFUNI          ;Jump if not
     451B   3A 4091        943           LDA     UNIT            ;Get the unit number
     451E   21 4195        944           LXI     H,DIRUNI        ;Point to the unit number of the Directory
     4521   BE             945           CMP     M               ;Are they the same?
     4522   C2 4544        946           JNZ     DIFUNI          ;Jump if not
     4525   3A 417E        947           LDA     SEGNUM          ;Get the segment number
     4528   FE 01          948           CPI     1               ;Check it
     452A   C2 4544        949           JNZ     DIFUNI          ;Jump if it is not a 1
                           950                                   ;NOTE:Accumulator now contains 1
     452D   21 430A        951           LXI     H,DIRBUF+10     ;Set up this pointer
     4530   22 417C        952           SHLD    DIRADR          ;Save the pointer
     4533   21 FFFE        953           LXI     H,-2            ;Set up a minus 2 bias
     4536   39             954           DAD     SP              ;Add the SP value in
     4537   22 41B5        955           SHLD    LIMSP           ;Save it
     453A   CD 46E3        956           CALL    LIST8           ;Use this entry. (NOTE: A=1 from above, so
                           957                                   ;Limit Flag will be set at LIST8 entry)
     453D   3A 4164        958           LDA     FNDFLG          ;Check the File Found Flag
     4540   1F             959           RAR                     ;Is it set?
     4541   DA 454E        960           JC      LOADX3          ;Jump if found
     4544   CD 46D9        961   DIFUNI: CALL    LIST            ;Go find the file
     4547   3A 4164        962           LDA     FNDFLG          ;Get the File Found Flag
     454A   1F             963           RAR                     ;Check it
     454B   D4 42A4        964           CNC     TUERR1          ;Jump if it wasn't found
     454E   21 40A3        965   LOADX3: LXI     H,LODADR        ;Point to the Load Address Buffer
     4551   11 4111        966           LXI     D,SBUFFR        ;Point to the Start Address Buffer area
     4554   CD 00F9        967           CALL    COPY            ;Go copy the Start Address into the Load Address
     4557   2A 4166        968           LHLD    LENGTH          ;Get the length
     455A   22 415E        969           SHLD    REMAIN          ;Put it in the Remainder area
     455D   11 FFF0        970           LXI     D,DIVSR3        ;Get the divisor(2's comp of 010H)
     4560   CD 4875        971           CALL    SUBDIV          ;Go see how many times it goes
     4563   3A 4115        972           LDA     QUAL            ;Check for load to WCS
     4566   FE 07          973           CPI     07              ;Is it?
     4568   C2 45A1        974           JNZ     LOADA           ;Jump if it isn't
     456B   D3 20          975           OUT     CLRCLK          ;Stop the clocks
     456D   D3 A7          976           OUT     DISMEM          ;Turn off memory
     456F   CD 4993        977           CALL    WRTNOP          ;Write a NOP to the CSR
     4572   2A 40A3        978           LHLD    LODADR          ;Get the address
```

```
Error Addr  Code          Seq   Source statement

     4575   22 41AA       979           SHLD    SWAP            ;Store it here
     4578   22 41B0       980           SHLD    TRKUPC          ;Save a copy here also
     457B   21 41AA       981           LXI     H,SWAP          ;Point to it
     457E   CD 49D1       982           CALL    LDUPC           ;Go put it in the UPC
     4581   2A 41AA       983           LHLD    SWAP            ;Get the old UPC
     4584   22 41AE       984           SHLD    SAVUPC          ;Save it for a bit
     4587   AF            985           XRA     A               ;Make a 0
     4588   32 4187       986           STA     COUNT           ;Initialize the B0,B1,B2 counter
     458B   CD 45A1       987           CALL    LOADA           ;Go do the load
     458E   21 41AE       988           LXI     H,SAVUPC        ;Point to where the UPC was saved
     4591   CD 49D1       989           CALL    LDUPC           ;Go restore it
     4594   CD 49A7       990           CALL    LDCSR1          ;Go restore the CSR
     4597   D3 A6         991           OUT     ENBMEM          ;Turn on memory
     4599   3A 4196       992           LDA     CLKFLG          ;Check the clock flag
     459C   1F            993           RAR                     ;Is it set?
     459D   D0             994           RNC                     ;Leave if not
     459E   D3 21          995           OUT     SETCLK          ;Turn if back on if set
     45A0   C9             996           RET                     ;Leave
                           997
     45A1   2A 4160        998   LOADA:  LHLD    QUO             ;Get the quotient
     45A4   7C             999           MOV     A,H             ;Put the high byte into A
     45A5   B5            1000           ORA     L               ;Or in the low byte
     45A6   CA 45B6       1001           JZ      LOADB           ;Jump if 0
     45A9   2B            1002           DCX     H               ;Decrement the count
     45AA   22 4160       1003           SHLD    QUO             ;Save the new value
     45AD   21 0010       1004           LXI     H,016           ;This is the blocking size
     45B0   CD 45C3       1005           CALL    LOAD1           ;Go do the load
     45B3   C3 45A1       1006           JMP     LOADA           ;Jump back
                          1007
     45B6   2A 415E       1008   LOADB:  LHLD    REMAIN          ;Get the remainder
     45B9   7C            1009           MOV     A,H             ;Must check for 0 Remainder
     45BA   B5            1010           ORA     L               ;Or in the low byte
     45BB   C4 45C3       1011           CNZ     LOAD1           ;Call Load1 one more time if Remainder not 0
     45BE   AF            1012           XRA     A               ;Make a 0
     45BF   32 409B       1013           STA     LODFLG          ;Zero this flag
     45C2   C9            1014           RET                     ;Leave
                          1015
     45C3   3A 4187       1016   LOAD1:  LDA     COUNT           ;Get the count value
     45C6   32 4199       1017           STA     SAVCNT          ;and save a copy
     45C9   22 4168       1018           SHLD    TMPBUF          ;Save the block size
     45CC   06 09         1019           MVI     B,09            ;Count for shifting
     45CE   CD 46BE       1020           CALL    MULSHF          ;Go do a shift multiply
     45D1   22 4095       1021           SHLD    BYTCNT          ;The result is the Byte count
     45D4   22 418E       1022           SHLD    XFRCNT          ;Save it here for adding later
                          1023                                   ;and for sending to the CPU
     45D7   2A 4168       1024           LHLD    TMPBUF          ;Get the block size again
     45DA   06 02         1025           MVI     B,02            ;Multiply by 4
     45DC   CD 46BE       1026           CALL    MULSHF          ;Go do it
     45DF   22 40A8       1027           SHLD    PAKCNT          ;This is the number of 128 byte packets
     45E2   22 4172       1028           SHLD    PACKS           ;Save this value for possible retries
```

```
Error Addr  Code            Seq   Source statement

     45E5   2A 4174        1029            LHLD    BLKNUM          ;Get the Starting Block
     45E8   22 4097        1030            SHLD    BLOCK           ;Put it in the Send Packet
     45EB   3E 09          1031            MVI     A,09            ;Retry count
     45ED   32 408C        1032            STA     RETRY           ;Store it
     45F0   21 418A        1033            LXI     H,XFRADR        ;Point to a the XFR address area
     45F3   11 40A3        1034            LXI     D,LODADR        ;Point to the current address
     45F6   CD 00F9        1035            CALL    COPY            ;Save a copy of it
     45F9   21 4188        1036    LOAD1X: LXI     H,XFRPAK        ;Point to the XFR Packet just in case
     45FC   3A 4115        1037            LDA     QUAL            ;Get the Qual byte
     45FF   FE 03          1038            CPI     03              ;Check for P or V
     4601   DC 514E        1039            CC      SNDMSG          ;Go send the XFR Packet
     4604   AF             1040            XRA     A               ;Make a 0
     4605   32 4082        1041            STA     BYTSUM          ;Zero the bytsum
     4608   CD 0095        1042            CALL    TU_SEND_PACKET  ;Go send the command packet
     460B   3A 4115        1043            LDA     QUAL            ;Get the Qualifier byte
     460E   32 4165        1044            STA     LODDST          ;Set the load destination
     4611   21 4183        1045            LXI     H,CMPTB1        ;Point to this compare table
     4614   22 4162        1046            SHLD    CMPADR          ;Save it
     4617   3E 80          1047            MVI     A,128           ;Bytes in packet
     4619   CD 48C0        1048            CALL    TURCV           ;Go get the data
                           1049    ;
                           1050    ;       If TURCV encounters a non-fatal error, it will return with the
                           1051    ; Z bit clear.
                           1052    ;
     461C   C2 4663        1053            JNZ     FIXERR          ;If error, go fix things up
     461F   CD 492F        1054            CALL    GETEND          ;Go get the END Packet
                           1055    ;
                           1056    ;       If GETEND encounters a non-fatal error, if will return with the
                           1057    ; Z bit clear.
                           1058    ;
     4622   C2 4663        1059            JNZ     FIXERR          ;If error, go fix things up
     4625   3A 4115        1060    LOAD2X: LDA     QUAL            ;Check for a P or V load
     4628   FE 03          1061            CPI     03              ;Is it?
     462A   D2 463A        1062            JNC     LOAD3X          ;Jump if not
     462D   CD 5186        1063            CALL    RCVMSX          ;Go get the Packet from the CPU
     4630   3A 71C6        1064            LDA     RCVDAT          ;Check the checksum
     4633   21 4082        1065            LXI     H,BYTSUM        ;Point to my byte checksum
     4636   BE             1066            CMP     M               ;Compare them
     4637   C2 466B        1067            JNZ     FIXER1          ;Jump if not equal
     463A   2A 4174        1068    LOAD3X: LHLD    BLKNUM          ;Get the Starting Block address
     463D   11 0010        1069            LXI     D,016           ;This is how may blocks we have read
     4640   19             1070            DAD     D               ;Add this to the block address
     4641   22 4174        1071            SHLD    BLKNUM          ;Update the starting block address
     4644   3A 4115        1072            LDA     QUAL            ;Get the qualifier
     4647   FE 06          1073            CPI     06              ;See if this is a U load
     4649   C8             1074            RZ                      ;Leave if it is
     464A   21 40A3        1075            LXI     H,LODADR        ;Now we must fix the address
     464D   D2 4656        1076            JNC     LOAD4X          ;Check for WCS load
     4650   01 418E        1077            LXI     B,XFRCNT        ;This is how many bytes to add
     4653   C3 6251        1078            JMP     ADDAD1          ;Go add them
```

```
Error Addr  Code            Seq   Source statement

                            1079
     4656   2A 41B0         1080  LOAD4X: LHLD    TRKUPC          ;Get the updated UPC
     4659   22 40A3         1081          SHLD    LODADR          ;Save the new value
     465C   2A 419A         1082          LHLD    SAVEB0          ;Get the last two bytes of the block
     465F   22 419C         1083          SHLD    COPYB0          ;Copy them to here
     4662   C9              1084          RET                     ;leave
                            1085
                            1086
     4663   3A 4115         1087  FIXERR: LDA     QUAL            ;Get the Qual byte
     4666   FE 03           1088          CPI     03              ;Is this a Main Memory load?
     4668   DC 46A6         1089          CC      FIXCPU          ;Go fixup the CPU if it is
     466B   2A 4172         1090  FIXER1: LHLD    PACKS           ;Get the Packet count back
     466E   22 40A8         1091          SHLD    PAKCNT          ;Put it in the Packet Count location
     4671   3A 4115         1092          LDA     QUAL            ;Get the qual byte
     4674   FE 07           1093          CPI     07H             ;Is it WCS space
     4676   CA 4685         1094          JZ      FIXER2          ;Jump if WCS load
     4679   21 40A3         1095          LXI     H,LODADR        ;Point to the Load address area
     467C   11 418A         1096          LXI     D,XFRADR        ;Point to the old address
     467F   CD 00F9         1097          CALL    COPY            ;Go copy the old address over
     4682   C3 45F9         1098          JMP     LOAD1X          ;Go try again
     4685   3A 4199         1099  FIXER2: LDA     SAVCNT          ;Get back the pointer that tell which byte
                            1100                                  ;to load
     4688   32 4187         1101          STA     COUNT           ;And fix the count
     468B   2A 419C         1102          LHLD    COPYB0          ;Get the last bytes from the last block
     468E   7D              1103          MOV     A,L             ;Get the low byte
     468F   D3 08            1104          OUT     WCSB0           ;Send it to byte 0
     4691   7C              1105          MOV     A,H             ;Get the high byte
     4692   D3 09           1106          OUT     WCSB1           ;Send it to byte 1
     4694   2A 40A3         1107          LHLD    LODADR          ;Get the unmodified address
     4697   22 41B0         1108          SHLD    TRKUPC          ;Restore the Tracking address
     469A   22 41AA         1109          SHLD    SWAP            ;Get ready to fix the UPC
     469D   21 41AA         1110          LXI     H,SWAP          ;Point to it
     46A0   CD 49D1         1111          CALL    LDUPC           ;Go load the UPC
     46A3   C3 45F9         1112          JMP     LOAD1X          ;Go try again
                            1113
     46A6   2A 40A8         1114  FIXCPU: LHLD    PAKCNT          ;Get the packet count
     46A9   2B              1115          DCX     H               ;Reduce it by one
     46AA   7C              1116          MOV     A,H             ;Put the high byte in A
     46AB   B5              1117          ORA     L               ;Or in the low byte
     46AC   C2 46B3         1118          JNZ     FIXCP1          ;Jump if not zero
     46AF   CD 5186         1119          CALL    RCVMSX          ;Go get the packet from the CPU
     46B2   C9              1120          RET                     ;Leave
     46B3   22 40A8         1121  FIXCP1: SHLD    PAKCNT          ;Save it
     46B6   06 80           1122          MVI     B,128           ;Count of 128
     46B8   CD 514E         1123          CALL    SNDMSG          ;Send garbage to the CPU
     46BB   C3 46A6         1124          JMP     FIXCPU          ;Loop back
                            1125
                            1126
     46BE   37              1127  MULSHF: STC                     ;Set the carry
     46BF   3F              1128          CMC                     ;and clear it
```

```
Error Addr  Code          Seq   Source statement

     46C0   7D            1129  MULSH1: MOV     A,L             ;Get the low byte
     46C1   17            1130          RAL                     ;Rotate it
     46C2   6F            1131          MOV     L,A             ;Put it back
     46C3   7C            1132          MOV     A,H             ;Get the high byte
     46C4   17            1133          RAL                     ;Rotate it
     46C5   67            1134          MOV     H,A             ;and put it back
     46C6   05            1135          DCR     B               ;Decrement the count
     46C7   C2 46C0       1136          JNZ     MULSH1          ;Loop if not done
     46CA   C9            1137          RET                     ;Leave when done
                          1138
                          1139
                          1140
     46CB   AF            1141  LSTPRP: XRA     A               ;Make a 0
     46CC   32 409B       1142          STA     LODFLG          ;Zero the Load Flag
     46CF   3C            1143          INR     A               ;Make a 1
     46D0   32 409C       1144          STA     DIRFLG          ;Set this flag
     46D3   CD 0104       1145          CALL    SAVESP          ;Go save the stack value
     46D6   CD 0058       1146          CALL    TPINI1          ;Go init the drives
     46D9   21 0006       1147  LIST:   LXI     H,6             ;Make the Block address 6
     46DC   22 4097       1148  LIST1:  SHLD    BLOCK           ;Put in the Block part of the Packet
     46DF   AF            1149          XRA     A               ;Make a 0
     46E0   32 417E       1150          STA     SEGNUM          ;and this counter
     46E3   32 41B4       1151  LIST8:  STA     LIMIT           ;Init this flag
     46E6   2A 42FE       1152          LHLD    STRBLK          ;Get the starting block value
     46E9   22 4174       1153          SHLD    BLKNUM          ;Set up this pointer
     46EC   CD 478C       1154  LIST7:  CALL    GETONE          ;Go get a byte
     46EF   CD 478C       1155          CALL    GETONE          ;Get the one after it
     46F2   FE 08         1156          CPI     8               ;Is it End of Segment?
     46F4   CA 476D       1157          JZ      ENDSEG          ;Jump if it is
     46F7   32 4178       1158          STA     ENTYPE          ;Otherwise save the Entry type for a moment
     46FA   CD 482B       1159          CALL    RAD50           ;Go get the file name and extension
     46FD   3A 409B       1160          LDA     LODFLG          ;See if this is a Load Command
     4700   1F            1161          RAR                     ;Put the flag in the Carry
     4701   DA 472F       1162          JC      LIST4           ;Jump if it is
     4704   3A 4178       1163          LDA     ENTYPE          ;Get the entry type back
     4707   FE 04         1164          CPI     4               ;
     4709   C2 4710       1165          JNZ     LIST2           ;Don't print if it is not permanent
     470C   21 41C2       1166          LXI     H,LSTBUF        ;Point to the Listing Buffer
     470F   F7            1167          RST      6              ;Go print it
     4710   01 0006       1168  LIST2:  LXI     B,06            ;Add the 6 bytes we normally skip over
     4713   2A 42FC       1169  LIST3:  LHLD    EXTRAS          ;Get the number of extra words per entry
     4716   CD 4823       1170          CALL    MUL2            ;Go multiply by two
     4719   09            1171          DAD     B               ;Add them here
     471A   22 417F       1172          SHLD    INCCNT          ;Save the count
     471D   CD 478C       1173  BMPPNT: CALL    GETONE          ;Go get a byte
     4720   2A 417F       1174          LHLD    INCCNT          ;Get the count
     4723   2B            1175          DCX     H               ;Reduce it
     4724   22 417F       1176          SHLD    INCCNT          ;Put it back
     4727   7C            1177          MOV     A,H             ;High byte to A
     4728   B5            1178          ORA     L               ;OR in the low bye
```

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Error Addr  Code          Seq   Source statement

     4729   C2 471D      1179            JNZ     BMPPNT          ;Loop if not done
     472C   C3 46EC      1180            JMP     LIST7           ;Loop until Endseg with Next Segment=0
                         1181
                         1182
     472F   21 41C3      1183    LIST4:  LXI     H,LSTBUF+1      ;Point to where the RAD50 has been unpacked
     4732   11 4107      1184            LXI     D,FNBUF         ;Point to the File Name Buffer area
     4735   06 0A        1185            MVI     B,10            ;Number of bytes in filename.ext
     4737   1A           1186    LIST5:  LDAX    D               ;Get a character
     4738   BE           1187            CMP     M               ;Are they the same?
     4739   C2 4759      1188            JNZ     LIST6           ;Jump out if not
     473C   23           1189            INX     H               ;Bump one pointer
     473D   13           1190            INX     D               ;and the other
     473E   05           1191            DCR     B               ;Decrement the count
     473F   C2 4737      1192            JNZ     LIST5           ;Loop if not done
     4742   3A 4178      1193            LDA     ENTYPE          ;Get the entry type
     4745   FE 04        1194            CPI     4               ;Is it a Permanent Entry?
     4747   C2 4759      1195            JNZ     LIST6           ;Jump if not
     474A   CD 484A      1196            CALL    GETTWO          ;Get the next two bytes
     474D   2A 417A      1197            LHLD    BYTE00          ;Get the two bytes into HL
     4750   22 4166      1198            SHLD    LENGTH          ;This is how long the file is
     4753   21 4164      1199            LXI     H,FNDFLG        ;Point to the File Found Flag
     4756   36 01        1200            MVI     M,01            ;Set it
     4758   C9           1201            RET                     ;and leave
                         1202
     4759   CD 484A      1203    LIST6:  CALL    GETTWO          ;Get the next two bytes
     475C   2A 417A      1204            LHLD    BYTE00          ;Get the two bytes into HL
     475F   EB           1205            XCHG                    ;Put them in DE
     4760   2A 4174      1206            LHLD    BLKNUM          ;Get the Starting Block Number
     4763   19           1207            DAD     D               ;Add them
     4764   22 4174      1208            SHLD    BLKNUM          ;Save the amount
     4767   01 0004      1209            LXI     B,04            ;Want to skip only 4 bytes
     476A   C3 4713      1210            JMP     LIST3           ;Go do it
                         1211
                         1212
                         1213
     476D   3A 41B4      1214    ENDSEG: LDA     LIMIT           ;Check the limit flag
     4770   A7           1215            ANA     A               ;Is it set?
     4771   C2 4787      1216            JNZ     ENDSE1          ;Jump if it is
     4774   2A 42F8      1217            LHLD    NXTSEG          ;Get the Next segment number
     4777   7D           1218            MOV     A,L             ;Put the low byte in the Accumulator
     4778   B4           1219            ORA     H               ;OR in the high byte
     4779   CA 4787      1220            JZ      ENDSE1          ;Jump if 0
     477C   2B           1221            DCX     H               ;Subtract 1
     477D   CD 4823      1222            CALL    MUL2            ;Go multiply value in HL by two
     4780   01 0006      1223            LXI     B,06            ;This is the base block number of Directory
     4783   09           1224            DAD     B               ;Add it to Next Segment
     4784   C3 46DC      1225            JMP     LIST1           ;Loop back to a place that will store this
     4787   AF           1226    ENDSE1: XRA     A               ;Make a 0
     4788   32 409C      1227            STA     DIRFLG          ;Zero this flag
     478B   C9           1228            RET                     ;and leave
```

```
Error Addr  Code            Seq   Source statement

                            1229
                            1230
                            1231
     478C   21 417E         1232  GETONE: LXI     H,SEGNUM        ;Point to my Segment Half counter
     478F   7E              1233          MOV     A,M             ;Get it
     4790   A7              1234          ANA     A               ;Check for 0
     4791   CA 47AE         1235          JZ      GETON2          ;Jump if 0
     4794   3A 417D         1236          LDA     DIRADR+1        ;Get the high byte of the address
     4797   FE 45           1237          CPI     045H            ;Is it 45(hex)?
     4799   C2 47D7         1238          JNZ     GETON4          ;Jump if it isn't
     479C   3A 41B4         1239          LDA     LIMIT           ;Get the limit flag
     479F   A7              1240          ANA     A               ;Is it set?
     47A0   CA 47A8         1241          JZ      GETON1          ;Jump if not set
     47A3   2A 41B5         1242          LHLD    LIMSP           ;Get the true SP value
     47A6   F9              1243          SPHL                    ;Set up the SP
     47A7   C9              1244          RET                     ;Leave
     47A8   7E              1245  GETON1: MOV     A,M             ;Get my Segment Half counter again
     47A9   FE 02           1246          CPI     02              ;See if it is 2
     47AB   CC 42A4         1247          CZ      TUERR1          ;Error if it is
     47AE   21 4300         1248  GETON2: LXI     H,DIRBUF        ;Set up this address
     47B1   22 41B8         1249          SHLD    SAVADR          ;Save the address
     47B4   CD 47E0         1250          CALL    GET512          ;Go get half a segment
     47B7   21 417E         1251          LXI     H,SEGNUM        ;Point to my segment-half counter
     47BA   34              1252          INR     M               ;Bump it
     47BB   7E              1253          MOV     A,M             ;Get it
     47BC   FE 02           1254          CPI     2               ;Is it now two?
     47BE   21 4300         1255          LXI     H,DIRBUF        ;Point to the buffer (doesn't affect CC's)
     47C1   CA 47D4         1256          JZ      GETON3          ;Jump if it is
     47C4   EB              1257          XCHG                    ;Move the address into DE
     47C5   21 42F6         1258          LXI     H,DIRSEG        ;Point to this area
     47C8   06 0A           1259          MVI     B,10            ;Set up a count
     47CA   CD 00FB         1260          CALL    COPY1           ;Go copy these 10 bytes over
     47CD   2A 42FE         1261          LHLD    STRBLK          ;Get the block where these files start
     47D0   22 4174         1262          SHLD    BLKNUM          ;and put it here where we can work on it
                            1263
                            1264  ;NOTE:  We came back from COPY1 with the correct address in DE
                            1265
     47D3   EB              1266          XCHG                    ;Put DE into HL
     47D4   22 417C         1267  GETON3: SHLD    DIRADR          ;Save the address
     47D7   2A 417C         1268  GETON4: LHLD    DIRADR          ;Get the address
     47DA   7E              1269          MOV     A,M             ;Get the data
     47DB   23              1270          INX     H               ;Bump the address
     47DC   22 417C         1271          SHLD    DIRADR          ;Put the updated address back
     47DF   C9              1272          RET                     ;Leave
                            1273
     47E0   21 408C         1274  GET512: LXI     H,RETRY         ;Point to the retry counter
     47E3   36 09           1275          MVI     M,9             ;Set up for 8 retries
     47E5   2A 41B8         1276  GT512A: LHLD    SAVADR          ;Get the address
     47E8   22 40A3         1277          SHLD    LODADR          ;Put it here
     47EB   21 4165         1278          LXI     H,LODDST        ;Point to the Load Dest. byte
```

```
Error Addr  Code          Seq   Source statement

     47EE   36 06         1279          MVI     M,06            ;Specify Ram
     47F0   21 4183       1280          LXI     H,CMPTB1        ;Point to this compare table
     47F3   22 4162       1281          SHLD    CMPADR          ;Save it
     47F6   21 0200       1282          LXI     H,512           ;Set up byte count
     47F9   22 4095       1283          SHLD    BYTCNT          ;Put it in the Byte Count part of the Packet
     47FC   CD 0095       1284          CALL    TU_SEND_PACKET  ;Send the Command Packet
     47FF   21 0004       1285          LXI     H,04            ;Set up the packet count number
     4802   22 40A8       1286          SHLD    PAKCNT          ;Put it in the packet count
     4805   3E 80         1287          MVI     A,128           ;Load up the byte count for the Receive routine
     4807   CD 48C0       1288          CALL    TURCV           ;Go get the segment
     480A   C2 47E5       1289          JNZ     GT512A          ;If no good, try again
     480D   CD 492F       1290          CALL    GETEND          ;Go get the End Packet
     4810   C2 47E5       1291          JNZ     GT512A          ;Try again if error
     4813   3E 01         1292          MVI     A,01            ;Get ready to set the DIRVAL flag
     4815   32 4194       1293          STA     DIRVAL          ;Set it
     4818   3A 4091       1294          LDA     UNIT            ;Get the unit number
     481B   32 4195       1295          STA     DIRUNI          ;Copy the unit number
     481E   21 4097       1296          LXI     H,BLOCK         ;Point to the block number
     4821   34            1297          INR     M               ;Bump it
     4822   C9            1298          RET                     ;Leave
                          1299
                          1300
     4823   AF            1301  MUL2:   XRA     A               ;Clear the carry
     4824   7D            1302          MOV     A,L             ;Get the low byte
     4825   17            1303          RAL                     ;Rotate it
     4826   6F            1304          MOV     L,A             ;Put it back
     4827   7C            1305          MOV     A,H             ;Get the high byte
     4828   17            1306          RAL                     ;Shift it left
     4829   67            1307          MOV     H,A             ;Put it back
     482A   C9            1308          RET                     ;Leave
                          1309
                          1310
                          1311
     482B   21 41C3       1312  RAD50:  LXI     H,LSTBUF+1      ;Point to area where the first three bytes go
     482E   CD 483A       1313          CALL    RAD50A          ;Go get the two bytes and convert them
     4831   21 41C6       1314          LXI     H,LSTBUF+4      ;Point to the area for the second three
     4834   CD 483A       1315          CALL    RAD50A          ;Do it for the next three
     4837   21 41CA       1316          LXI     H,LSTBUF+8      ;Area for the Extension
     483A   22 4168       1317  RAD50A: SHLD    TMPBUF          ;Save the address
     483D   CD 484A       1318          CALL    GETTWO          ;Go get the two bytes to be converted
     4840   2A 417A       1319          LHLD    BYTE00          ;Get the data into HL
     4843   22 415E       1320          SHLD    REMAIN          ;Put them in Remainder
     4846   CD 4857       1321          CALL    DIV50           ;Go divide by 50(8)
     4849   C9            1322          RET                     ;Leave
                          1323
                          1324
                          1325
     484A   CD 478C       1326  GETTWO: CALL    GETONE          ;Go get a byte
     484D   32 417A       1327          STA     BYTE00          ;Store it
     4850   CD 478C       1328          CALL    GETONE          ;Get another
```

```
Error Addr  Code          Seq   Source statement

     4853   32 417B       1329          STA     BYTE01          ;Store it
     4856   C9            1330          RET                     ;Leave
                          1331
                          1332
     4857   11 F9C0       1333  DIV50:  LXI     D,DIVSR1        ;Get the value of the first Divisor (F9C0H)
     485A   CD 4875       1334          CALL    SUBDIV          ;Go subtract until underflow
     485D   3A 4160       1335          LDA     QUO             ;Get the first character
     4860   CD 4895       1336          CALL    RADCVT          ;Go convert the character
     4863   11 FFD8       1337          LXI     D,DIVSR2        ;This is the two's complement of 28H
     4866   CD 4875       1338          CALL    SUBDIV          ;Go divide by 28h
     4869   3A 4160       1339          LDA     QUO             ;Get the second character
     486C   CD 4895       1340          CALL    RADCVT          ;Go convert it
     486F   3A 415E       1341          LDA     REMAIN          ;Get the third character
     4872   C3 4895       1342          JMP     RADCVT          ;Go convert it
                          1343
                          1344
                          1345
     4875   21 0000       1346  SUBDIV: LXI     H,0             ;Make a word of zero
     4878   22 4160       1347          SHLD    QUO             ;Zero the quotient area
     487B   2A 415E       1348  SUBDV1: LHLD    REMAIN          ;Get the dividend
     487E   7C            1349          MOV     A,H             ;Get the high half
     487F   E6 80          1350          ANI     080H            ;Check for MSB set
     4881   19            1351          DAD     D               ;This is equivalent to Subtracting 28**2
     4882   C2 4888       1352          JNZ     SUBDV2          ;Jump if the original number was negative
     4885   7C            1353          MOV     A,H             ;Get the high byte of result of subtraction
     4886   17            1354          RAL                     ;Check the carry
     4887   D8            1355          RC                      ;Leave if underflow
     4888   22 415E       1356  SUBDV2: SHLD    REMAIN          ;Otherwise, update the Remainder
     488B   2A 4160       1357          LHLD    QUO             ;Get the quotient
     488E   23            1358          INX     H               ;Increment it
     488F   22 4160       1359          SHLD    QUO             ;Save it
     4892   C3 487B       1360          JMP     SUBDV1          ;Loop
                          1361
                          1362
     4895   FE 1B         1363  RADCVT: CPI     01BH            ;What is it?
     4897   CA 48A6       1364          JZ      SKP321          ;Jump if it is 01BH
     489A   D2 48AB       1365          JNC     SKP320          ;Jump if not a letter
     489D   A7            1366          ANA     A               ;Check for 0
     489E   CA 48B7       1367          JZ      SKP523          ;Jump if it is
     48A1   F6 40          1368          ORI     040H            ;Make it ASCII
     48A3   C3 48B7       1369          JMP     SKP523          ;Jump over the rest
     48A6   3E 24          1370  SKP321: MVI     A,024H          ;This is the conversion
     48A8   C3 48B7       1371          JMP     SKP523          ;Jump over rest
     48AB   FE 1C          1372  SKP320: CPI     01CH            ;Is it this?
     48AD   C2 48B5       1373          JNZ     SKP319          ;Jump if not
     48B0   3E 2E          1374          MVI     A,02EH          ;This is the conversion for this code
     48B2   C3 48B7       1375          JMP     SKP523          ;Jump over
     48B5   C6 12          1376  SKP319: ADI     012H            ;Conversion for numbers
     48B7   2A 4168       1377  SKP523: LHLD    TMPBUF          ;Get the address back
     48BA   77            1378          MOV     M,A             ;Send the character to the buffer
```

```
Error Addr  Code          Seq   Source statement

     48BB   23            1379          INX     H               ;Bump the pointer
     48BC   22 4168       1380          SHLD    TMPBUF          ;Save the address
     48BF   C9            1381          RET                     ;Leave
                          1382
                          1383
                          1384
     48C0   32 40B4       1385  TURCV:  STA     TEMP            ;Save the byte count here
     48C3   3A 40B4       1386  TURCV3: LDA     TEMP            ;Get the byte count
     48C6   32 40A7       1387          STA     LODCNT          ;Put it here
     48C9   D7            1388          RST     2               ;Go get a character
     48CA   2A 4162       1389          LHLD    CMPADR          ;Get address of the appropriate compare table
     48CD   BE            1390          CMP     M               ;Is the Flag Byte good?
     48CE   C4 0081       1391          CNZ     TUERR3          ;Leave if not
     48D1   32 409E       1392          STA     WRDSUM          ;The low byte has to be included in the checksum
     48D4   D7            1393          RST     2               ;Get the byte count
     48D5   2A 4162       1394          LHLD    CMPADR          ;Get the address of the compare table
     48D8   23            1395          INX     H               ;Bump it
     48D9   BE            1396          CMP     M               ;Is the byte count good?
     48DA   C4 0081       1397          CNZ     TUERR3          ;Leave if not
     48DD   32 409F       1398          STA     WRDSUM+1        ;This byte must also be included in the checksum
     48E0   D7            1399  TURCV1: RST     2               ;Go look for a character
     48E1   21 40A7       1400          LXI     H,LODCNT        ;Point to the count
     48E4   CD 00DE       1401          CALL    CHKSUM_WORD     ;Go checksum it (data in B when we return)
     48E7   3A 4165       1402          LDA     LODDST          ;Check to see where the data is going
     48EA   FE 06         1403          CPI     06              ;This is the value for a Load to Ram
     48EC   DA 5957       1404          JC      MEMLOD          ;MEMLOD will do further checking
     48EF   C2 4A09       1405          JNZ     WCSLOD          ;Go to WCSLOD if not less than or equal to 6
     48F2   2A 40A3       1406          LHLD    LODADR          ;Get the Destination address
     48F5   7C            1407          MOV     A,H             ;Get the high byte of the address
     48F6   FE 7E         1408          CPI     7EH             ;Check for the protected area
     48F8   CA 4900       1409          JZ      TURCV2          ;Don't write the data if address too big
     48FB   70            1410          MOV     M,B             ;Send the data out
     48FC   23            1411          INX     H               ;Bump the pointer
     48FD   22 40A3       1412          SHLD    LODADR          ;Save the address
     4900   21 40A7       1413  TURCV2: LXI     H,LODCNT        ;Point to the count
     4903   35            1414          DCR     M               ;Decrement the count
     4904   C2 48E0       1415          JNZ     TURCV1          ;Loop if not done
     4907   D7            1416          RST     2               ;Go get the low byte of the checksum
     4908   21 409E       1417          LXI     H,WRDSUM        ;Point to the low byte of the checksum
     490B   BE            1418          CMP     M               ;Check it
     490C   C2 4924       1419          JNZ     TRYCHK          ;Go see about returning
     490F   D7            1420          RST     2               ;Get the high byte
     4910   21 409F       1421          LXI     H,WRDSUM+1      ;Point to the high byte of the checksum
     4913   BE            1422          CMP     M               ;Is it equal to the calculated
     4914   C2 4924       1423          JNZ     TRYCHK          ;Go see about returning
     4917   2A 40A8       1424          LHLD    PAKCNT          ;Get the packet count
     491A   2B            1425          DCX     H               ;Decrement it
     491B   22 40A8       1426          SHLD    PAKCNT          ;Save the new value
     491E   7C            1427          MOV     A,H             ;Double register decrement doesn't set
     491F   B5            1428          ORA     L               ;Condition codes, so check this way
```

```
Error Addr  Code          Seq   Source statement

     4920   C2 48C3       1429           JNZ     TURCV3          ;Loop if not done
     4923   C9            1430           RET                     ;Leave when done
                          1431
     4924   CD 0058       1432   TRYCHK: CALL    TPINI1          ;Go init the tape drive
     4927   21 408C       1433           LXI     H,RETRY         ;Point to the retry counter
     492A   35            1434           DCR     M               ;Reduce the count
     492B   C0            1435           RNZ                     ;Leave with the Z bit clear to indicate error
     492C   CD 0079       1436           CALL    TUERR2          ;Leave this way if we use up the retries
                          1437
                          1438
     492F   21 4165       1439   GETEND: LXI     H,LODDST        ;Set up the load Dest.
     4932   36 06         1440           MVI     M,06            ;Make the dest the ram
     4934   21 4185       1441           LXI     H,CMPTB2        ;Point to this table
     4937   22 4162       1442           SHLD    CMPADR          ;Save the address
     493A   2A 40A3       1443           LHLD    LODADR          ;Get the low two bytes of the address
     493D   E5            1444           PUSH    H               ;Save them
     493E   21 40AA       1445           LXI     H,ENDPAK        ;Point to the storage for the End Packet
     4941   22 40A3       1446           SHLD    LODADR          ;Store it
     4944   21 0001       1447           LXI     H,01            ;Packet count of 1
     4947   22 40A8       1448           SHLD    PAKCNT          ;Store it
     494A   3E 0A         1449           MVI     A,10            ;Bytes in End Packet less checksum
     494C   CD 48C0       1450           CALL    TURCV           ;Go get it
     494F   C0            1451           RNZ                     ;Leave if Z bit clear
     4950   21 40AA       1452           LXI     H,ENDPAK        ;Point to the End Packet
     4953   7E            1453           MOV     A,M             ;Get the first byte
     4954   FE 40         1454           CPI     040H            ;Is it good?
     4956   C4 0079       1455           CNZ     TUERR2          ;Leave if not
     4959   23            1456           INX     H               ;Point to the Success Code
     495A   7E            1457           MOV     A,M             ;Get it
     495B   FE 02         1458           CPI     02              ;Is it 0 or 1?
     495D   D4 0079       1459           CNC     TUERR2          ;Leave if it isn't
     4960   23            1460           INX     H               ;Bump pointer
     4961   3A 4091       1461           LDA     UNIT            ;Get the unit number we asked for
     4964   BE            1462           CMP     M               ;Is it correct
     4965   C4 0079       1463           CNZ     TUERR2          ;Error if not
     4968   23            1464           INX     H               ;Point to the next byte
     4969   3A 4092       1465           LDA     SNDPAK+5        ;Get the Switch byte
     496C   BE            1466           CMP     M               ;Is it correct?
     496D   C4 0079       1467           CNZ     TUERR2          ;Leave if not
     4970   23            1468           INX     H               ;Point to the next byte
     4971   7E            1469           MOV     A,M             ;Get it
     4972   23            1470           INX     H               ;Bump pointer
     4973   B6            1471           ORA     M               ;OR in the next byte
     4974   C4 0079       1472           CNZ     TUERR2          ;Error if the last 2 bytes weren't 0
     4977   23            1473           INX     H               ;Point to the low byte of the byte count
     4978   3A 4095       1474           LDA     BYTCNT          ;Get low byte of Command Packet byte count
     497B   BE            1475           CMP     M               ;Are they equal?
     497C   C4 0079       1476           CNZ     TUERR2          ;Leave if not
     497F   23            1477           INX     H               ;Point to the high byte of the byte count
     4980   3A 4096       1478           LDA     BYTCNT+1        ;Get the high byte of Byte Count
```

```
Error Addr  Code          Seq   Source statement

     4983   BE            1479          CMP     M               ;Check it
     4984   C4 0079       1480          CNZ     TUERR2          ;Leave if not the same
     4987   23            1481          INX     H               ;Bump pointer
     4988   7E            1482          MOV     A,M             ;Get next to last byte
     4989   23            1483          INX     H               ;Point to last byte
     498A   B6            1484          ORA     M               ;OR in the last lbyte
     498B   C4 0079       1485          CNZ     TUERR2          ;Leave if not 0
     498E   E1            1486          POP     H               ;Get the low two bytes of the old address
     498F   22 40A3       1487          SHLD    LODADR          ;Put them back
     4992   C9            1488          RET                     ;Return to caller
                          1489
                          1490
                          1491
                          1492  ;*****************************************************************************
                          1493  ;
                          1494  ;       WRTNOP:
                          1495  ;
                          1496  ;
     4993   E5            1497  WRTNOP: PUSH    H               ;Save HL on the stack
     4994   21 41A9       1498          LXI     H,NOPBUF+2      ;Point to high byte of NOP buffer
     4997   36 DB         1499          MVI     M,0DBH          ;Load high byte of NOP
     4999   2B            1500          DCX     H               ;Decrement the pointer
     499A   36 00         1501          MVI     M,0H            ;Load the middle byte of the NOP
     499C   2B            1502          DCX     H               ;Decrement the pointer
     499D   36 15         1503          MVI     M,015H          ;Load the low byte
     499F   CD 49A4       1504          CALL    LDCSR           ;Go load the CSR
     49A2   E1            1505          POP     H               ;Restore HL
     49A3   C9            1506          RET                     ;Leave
                          1507
                          1508
     49A4   22 41A2       1509  LDCSR:  SHLD    PNTR1           ;Save the address
     49A7   06 18         1510  LDCSR1: MVI     B,24            ;This is the number of bits to be shifted
     49A9   D3 A1         1511          OUT     DISPAR          ;Turn off parity
     49AB   D3 A2         1512          OUT     VSHIFT          ;Set the V-Bus to shift mode
     49AD   D3 38         1513  1$:     OUT     CLRCSR          ;Clear the input to the CSR
     49AF   2A 41A2       1514          LHLD    PNTR1           ;Get the address of the data to be loaded
     49B2   0E 03         1515          MVI     C,03            ;Count for shifting
     49B4   DB 87         1516          IN      CSR23           ;Get the MSB out of the CSR
     49B6   1F            1517          RAR                     ;Put it in the carry
     49B7   CD 4A00       1518          CALL    LSHIFT          ;Go shift 3 bytes
     49BA   D2 49BF       1519          JNC     2$              ;Jump if no carry from shifting
     49BD   D3 39         1520          OUT     SETCSR          ;Set the input bit
     49BF   D3 25         1521  2$:     OUT     SETCSK          ;Set the CSR clock
     49C1   D3 24         1522          OUT     CLRCSK          ;and then clear it
     49C3   05            1523          DCR     B               ;Decrement the count
     49C4   C2 49AD       1524          JNZ     1$              ;
     49C7   D3 A3         1525          OUT     VNORML          ;Set V-BUS to normal mode
     49C9   3A 4197       1526          LDA     PARFLG          ;Check the parity flag
     49CC   1F            1527          RAR                     ;Is it set?
     49CD   D0            1528          RNC                     ;Leave if not
```

```
Error Addr  Code          Seq   Source statement

     49CE   D3 A0         1529          OUT     ENBPAR          ;Turn Parity back on
     49D0   C9            1530          RET                     ;
                          1531  ;
                          1532  ;*****************************************************************************
                          1533
                          1534
                          1535
                          1536  ;*****************************************************************************
                          1537  ;
                          1538  ;       LDUPC:
                          1539  ;
     49D1   22 4176       1540  LDUPC:  SHLD    POINTR          ;Save the Address of the buffer
     49D4   A7            1541  LDUPC1: ANA     A               ;Clear the Carry
     49D5   06 0F         1542          MVI     B,15            ;Count for shifting the UPC
     49D7   0E 02         1543          MVI     C,2             ;Number of byte to shift accross
     49D9   2A 4176       1544          LHLD    POINTR          ;Get the Address of the new UPC
     49DC   CD 4A00       1545          CALL    LSHIFT          ;Preshift to align the UPC
     49DF   D3 A2         1546          OUT     VSHIFT          ;Put the V-Bus in shift mode
     49E1   D3 A8         1547  1$:     OUT     CLRUPC          ;Clear the UPC Serial Input
     49E3   DB 84         1548          IN      UPC14           ;Get the MSB of the new UPC
     49E5   1F            1549          RAR                     ;Put it in the carry to check it
     49E6   0E 02         1550          MVI     C,2             ;Number of bytes to shift accross
     49E8   2A 4176       1551          LHLD    POINTR          ;Pointer to data to be shifted
     49EB   CD 4A00       1552          CALL    LSHIFT          ;Go do it
     49EE   D2 49F3       1553          JNC     2$              ;Don't change Serial In if MSB=0
     49F1   D3 A9         1554          OUT     SETUPC          ;Set the S.I.
     49F3   D3 27         1555  2$:     OUT     SETUPK          ;Set the UPC clock
     49F5   D3 26         1556          OUT     CLRUPK          ;Clear it
     49F7   05            1557          DCR     B               ;Decrement the overall shift count
     49F8   C2 49E1       1558          JNZ     1$              ;Jump if not 0
     49FB   D3 A3         1559          OUT     VNORML          ;When done, return V-Bus to normal mode
     49FD   D3 A9         1560          OUT     CLRACK          ;Clear this Flag
     49FF   C9            1561          RET                     ;Leave
                          1562  ;
                          1563  ;*****************************************************************************
                          1564
                          1565
                          1566  ;*****************************************************************************
                          1567  ;
                          1568  ;       LSHIFT:
                          1569  ;
     4A00   7E            1570  LSHIFT: MOV     A,M             ;GET BYTE
     4A01   17            1571          RAL                     ;
     4A02   77            1572          MOV     M,A             ;PUT IT BACK
     4A03   23            1573          INX     H               ;BUMP THE POINTER
     4A04   0D            1574          DCR     C               ;
     4A05   C2 4A00       1575          JNZ     LSHIFT          ;
     4A08   C9            1576          RET                     ;
                          1577  ;
                          1578  ;*****************************************************************************
```

```
Error Addr  Code          Seq   Source statement

                          1579
                          1580
                          1581  ;*********************************************************************************
                          1582  ;
                          1583  ;       WCSLOD:
                          1584  ;
     4A09   3A 41B1       1585  WCSLOD: LDA     TRKUPC+1        ;Get the high half of the address
     4A0C   FE 50         1586          CPI     50H             ;Check the high byte of the address
     4A0E   D2 4900       1587          JNC     TURCV2          ;Jump if not less than 50H
     4A11   21 4187       1588          LXI     H,COUNT         ;Point to the count
     4A14   7E            1589          MOV     A,M             ;Get it
     4A15   3C            1590          INR     A               ;Bump the count
     4A16   77            1591          MOV     M,A             ;Put it back
     4A17   FE 02         1592          CPI     02              ;Check for 1, 2 or 3
     4A19   78            1593          MOV     A,B             ;Get the character(doesn't affect CC's)
     4A1A   DA 4A36       1594          JC      WRBYT0          ;Jump if 1
     4A1D   CA 4A3E       1595          JZ      WRBYT1          ;Jump if 2
     4A20   D3 0A         1596          OUT     WCSB2           ;Write WCS register 2
     4A22   D3 37         1597          OUT     SETWCK          ;Clock the U word in
     4A24   D3 36         1598          OUT     CLRWCK          ;Reset the clock
     4A26   D3 27         1599          OUT     SETUPK          ;Clock the UPC
     4A28   D3 26         1600          OUT     CLRUPK          ;Reset the clock
     4A2A   AF            1601          XRA     A               ;Make a 0
     4A2B   77            1602          MOV     M,A             ;Zero the counter
     4A2C   2A 41B0       1603          LHLD    TRKUPC          ;Get the whole address
     4A2F   23            1604          INX     H               ;Bump it
     4A30   22 41B0       1605          SHLD    TRKUPC          ;Save it
     4A33   C3 4900       1606          JMP     TURCV2          ;Leave
                          1607  ;
                          1608  ;*********************************************************************************
                          1609
                          1610  ;*********************************************************************************
                          1611  ;
                          1612  ;       WRBYT0
                          1613  ;       WRBYT1
                          1614  ;
                          1615  ;       Write Byte 0 or 1 of the WCS loading register
                          1616  ;
     4A36   D3 08         1617  WRBYT0: OUT     WCSB0           ;Send it to byte 0
     4A38   32 419A       1618          STA     SAVEB0          ;Save byte 0
     4A3B   C3 4900       1619          JMP     TURCV2          ;Leave
                          1620
     4A3E   D3 09         1621  WRBYT1: OUT     WCSB1           ;Write it to byte 1
     4A40   32 419B       1622          STA     SAVEB1          ;Save byte 1
     4A43   C3 4900       1623          JMP     TURCV2          ;Leave
                          1624  ;
                          1625  ;*********************************************************************************
                          1626
                          1627
                          1628
```

```
Error Addr  Code          Seq   Source statement

                          1629  ;*****************************************************************************
                          1630  ;
     4A46   E7            1631  CLLTLK: RST     4               ;Keep things up
     4A47   CD 080F       1632          CALL    TALK_VECTOR     ;Go do the talk stuff
     4A4A   C3 4A58       1633          JMP     GETLI0          ;Skip the next part
                          1634
     4A4D   22 40C8       1635  GETLIN: SHLD    CNTADR          ;Save the address of the count
     4A50   23            1636          INX     H               ;The buffer starts after the count storage area
     4A51   22 40CA       1637          SHLD    BUFADR          ;Save the pointer
     4A54   AF            1638          XRA     A               ;Make a 0
     4A55   32 4082       1639          STA     BYTSUM          ;Zero out the Byte Checksum area
     4A58   3A 7E04       1640  GETLI0: LDA     TLKFLG          ;Get the Talk Flag
     4A5B   1F            1641          RAR                     ;Is it set?
     4A5C   DA 4A46       1642          JC      CLLTLK          ;Jump if it is
     4A5F   3A 40BE       1643          LDA     LRMASK          ;Get the Local/Remote Mask
     4A62   FE 81         1644          CPI     81H             ;See if Local is set
     4A64   C2 4A74       1645          JNZ     GETLIA          ;Jump if not
     4A67   DB 01         1646          IN      BOOTSW          ;Get the Boot Switch
     4A69   1F            1647          RAR                     ;Put it in the carry
     4A6A   DA 4A74       1648          JC      GETLIA          ;Jump if not asserted
     4A6D   3A 408B       1649          LDA     CODFLG          ;See if the console is loaded
     4A70   1F            1650          RAR                     ;Check the bit
     4A71   D2 57E4       1651          JNC     BSPREP          ;Go try to boot things up
     4A74   CD 0046       1652  GETLIA: CALL    GS_VECTOR       ;Go look for characters via the Silo
     4A77   D2 4A58       1653          JNC     GETLI0          ;Loop if no character found
     4A7A   78            1654  GETLI1: MOV     A,B             ;Get the character
     4A7B   E6 7F         1655          ANI     7FH             ;Clear the MSB
     4A7D   FE 1C         1656          CPI     1CH             ;Look for less than 1CH
     4A7F   D2 4A91       1657          JNC     GETLI4          ;Jump if not
     4A82   FE 15         1658          CPI     CNTRLU          ;Look for ^U
     4A84   CA 42CE       1659          JZ      CNTLU           ;Jump if it is
     4A87   FE 12         1660          CPI     CNTRLR          ;Look for ^R
     4A89   CA 42AC       1661          JZ      CNTLR           ;Jump if it is
     4A8C   FE 1B         1662          CPI     ALTMOD          ;Look for ALT MODE
     4A8E   CA 4B2E       1663          JZ      ALTCHK          ;Jump if it is
     4A91   FE 7F         1664  GETLI4: CPI     DELETE          ;Look for a Delete
     4A93   CA 4B0E       1665          JZ      RUBOUT          ;Jump if it is
     4A96   32 40B4       1666          STA     TEMP            ;Save the character for a while
     4A99   3A 40CE       1667          LDA     DELFLG          ;Get the Delete Flag
     4A9C   1F            1668          RAR                     ;Is it set?
     4A9D   DA 4B04       1669          JC      SNDDEL          ;Jump if it is
     4AA0   2A 40C8       1670  GETLI2: LHLD    CNTADR          ;Get the address of the Character Count
     4AA3   11 4182       1671          LXI     D,CMDVAL        ;Point to the Command Valid flag
     4AA6   1A            1672          LDAX    D               ;Get the flag
     4AA7   3D            1673          DCR     A               ;See if it is zero
     4AA8   C2 4AAD       1674          JNZ     GETLI3          ;Jump if it was
     4AAB   12            1675          STAX    D               ;Make it zero
     4AAC   77            1676          MOV     M,A             ;Zero the count
     4AAD   3A 40B4       1677  GETLI3: LDA     TEMP            ;Get the character back
     4AB0   FE 61         1678          CPI     061H            ;Check for less than 'a'
```

```
Error Addr  Code          Seq   Source statement

     4AB2   DA 4ABC       1679            JC      GETLI5          ;Jump if it is
     4AB5   FE 7B         1680            CPI     07BH            ;Check for less than '('
     4AB7   D2 4ABC       1681            JNC     GETLI5          ;Jump if not
     4ABA   E6 DF         1682            ANI     LCMASK          ;Get rid of Lower Case
     4ABC   32 40B4       1683    GETLI5: STA     TEMP            ;Save the character
     4ABF   2A 40CA       1684            LHLD    BUFADR          ;Get the address of the buffer
     4AC2   77            1685            MOV     M,A             ;Put the character in the buffer
     4AC3   EB            1686            XCHG                    ;Save HL for a bit
     4AC4   2A 40C8       1687            LHLD    CNTADR          ;Get the address of the count
     4AC7   7E            1688            MOV     A,M             ;Get the count
     4AC8   FE 50         1689            CPI     MAXCNT          ;Check for max
     4ACA   CA 4AD3       1690            JZ      GETLI6          ;Jump if at max
     4ACD   34            1691            INR     M               ;Otherwise, bump the count
     4ACE   EB            1692            XCHG                    ;Restore HL
     4ACF   23            1693            INX     H               ;Bump the Buffer address
     4AD0   22 40CA       1694            SHLD    BUFADR          ;Save it
     4AD3   3A 40BE       1695    GETLI6: LDA     LRMASK          ;Get the Local/Remote Mask
     4AD6   E6 40         1696            ANI     40H             ;See if this is an APT character
     4AD8   C2 4AF6       1697            JNZ     GETLI8          ;Jump if APT
     4ADB   3A 40B4       1698            LDA     TEMP            ;Get the character back
     4ADE   FE 20         1699            CPI     20H             ;See if it is unrecognized control char
     4AE0   D2 4AF5       1700            JNC     GETLI7          ;Jump if it isn't
     4AE3   FE 0D         1701            CPI     CR              ;Is it a Carriage Return?
     4AE5   CA 4AF5       1702            JZ      GETLI7          ;Jump if it is
     4AE8   FE 0A         1703            CPI     LF              ;Is it a Line Feed?
     4AEA   CA 4AF5       1704            JZ      GETLI7          ;Jump if it is
     4AED   3E 5E         1705            MVI     A,'^'           ;Get the Up Arrow
     4AEF   DF            1706            RST     3               ;Go send it out
     4AF0   3A 40B4       1707            LDA     TEMP            ;Get the character
     4AF3   F6 40         1708            ORI     40H             ;Set the bit to convert the character
     4AF5   DF            1709    GETLI7: RST     3               ;This calls the SNDCHR routine
     4AF6   3A 40B4       1710    GETLI8: LDA     TEMP            ;Get the character
     4AF9   FE 0D         1711            CPI     CR              ;See if it was a carriage return
     4AFB   C2 4A58       1712            JNZ     GETLI0          ;If not, go look for the next character.
     4AFE   3E 01         1713            MVI     A,1             ;Make a one
     4B00   32 4182       1714            STA     CMDVAL          ;Set this flag
     4B03   C9            1715            RET                     ;and leave
                          1716
                          1717
     4B04   AF            1718    SNDDEL: XRA     A               ;Make 0
     4B05   32 40CE       1719            STA     DELFLG          ;Clear it if it was set
     4B08   3E 5C         1720            MVI     A,'\'           ;Get a backslash
     4B0A   DF            1721            RST     3               ;Go print it
     4B0B   C3 4AA0       1722            JMP     GETLI2          ;Go rejoin the main flow
                          1723
                          1724
     4B0E   2A 40C8       1725    RUBOUT: LHLD    CNTADR          ;Get the address of the count
     4B11   AF            1726            XRA     A               ;Make a 0
     4B12   BE            1727            CMP     M               ;See if the count is already 0
     4B13   CA 4A58       1728            JZ      GETLI0          ;Jump if it is
```

```
Error Addr  Code          Seq   Source statement

     4B16   35            1729          DCR     M               ;Reduce the count by one
     4B17   21 40CE       1730          LXI     H,DELFLG        ;Point to the Delete Flag
     4B1A   BE             1731          CMP     M               ;See if the delete flag is set
     4B1B   C2 4B22        1732          JNZ     RUBOU1          ;If set, don't print another backslash
     4B1E   34             1733          INR     M               ;Set the flag
     4B1F   3E 5C          1734          MVI     A,'\'           ;Get a backslash
     4B21   DF             1735          RST     3               ;Go print it
     4B22   2A 40CA        1736  RUBOU1: LHLD    BUFADR          ;Point to the Buffer
     4B25   2B             1737          DCX     H               ;Decrement the pointer
     4B26   22 40CA        1738          SHLD    BUFADR          ;Save the new value
     4B29   7E             1739          MOV     A,M             ;Get the character
     4B2A   DF             1740          RST     3               ;Go print it
     4B2B   C3 4A58        1741          JMP     GETLI0          ;Then rejoin the GETLIN flow
                           1742
                           1743
                           1744
                           1745
     4B2E   3A 4182        1746  ALTCHK: LDA     CMDVAL          ;Check the command valid flag
     4B31   A7             1747          ANA     A               ;If set, this is the first character on line
     4B32   3E 0D          1748          MVI     A,CR            ;Put a Carriage Return in A just in case
     4B34   CA 4ABC        1749          JZ      GETLI5          ;Jump if not set
     4B37   2A 40C8        1750          LHLD    CNTADR          ;Get the pointer to the last command
     4B3A   F7             1751          RST     6               ;Go print it
     4B3B   C9             1752          RET                     ;Leave
                           1753
                           1754
                           1755  ;*****************************************************************************
                           1756  ;
                           1757  ; This is the routine that decides how to make the transition from CONSOL.EXE
                           1758  ; to ENKAA.EXE (aka MICMON).  It is a little tricky (I was pressed for space)
                           1759  ; so I will explain it step by step.
                           1760  ;
                           1761  ;       1)  First I get the CODFLG.  Note that if CONSOL is resident, CODFLG
                           1762  ;       will equal 0, and if ENKAA is resident it will equal 1.  Since ENKAA
                           1763  ;       should be found on Drive 0, and CONSOL should be found onDrive 1,
                           1764  ;       flipping this flag and using it for the Unit number for reading in the
                           1765  ;       new code will work, and we don't have to test the state of the bit at
                           1766  ;       all.
                           1767  ;
                           1768  ;       2)  Next I test for either Modem In Progress (MIPFLG) OR CRD (either
                           1769  ;       Auto or Menu mode, it doesn't matter).  If neither is true, then we put
                           1770  ;       the flipped CODFLG in the Stack Pointer and jump down into the ROM to
                           1771  ;       go through the Self Test and come up from scratch.  The LSB of the SP is
                           1772  ;       the only state saved through the Self Test.
                           1773  ;
                           1774  ;       3)  By setting the OFLAG using the CRD_FLAGS, we save testing for what
                           1775  ;       is going on.  Only the LSB of the OFLAG byte is tested by those routines
                           1776  ;       that check it.
                           1777  ;
                           1778  ;
```

```
Error Addr  Code          Seq   Source statement

     4B3C               1779   CRD_RD_TEST:
     4B3C   3E 06       1780           MVI     A,6             ;We have to set up the correct address space in
     4B3E   32 4115     1781           STA     QUAL            ;the QUAL byte.
     4B41   21 4C00     1782           LXI     H,4C00H         ;Get this address
     4B44   22 4111     1783           SHLD    SBUFFR          ;Store it here
     4B47   21 408B     1784           LXI     H,CODFLG        ;Point to this flag
     4B4A   7E          1785           MOV     A,M             ;Get it into A
     4B4B   32 4091     1786           STA     UNIT            ;Set up the TU-58 Unit Number
     4B4E   EE 01       1787           XRI     1               ;Flip the Code Flag
     4B50   77          1788           MOV     M,A             ;Put the new value back.
     4B51   5F          1789           MOV     E,A             ;Also put it in E.
     4B52   AF          1790           XRA     A               ;Make a 0
     4B53   57          1791           MOV     D,A             ;Zero D.
     4B54   32 4080     1792           STA     RAMVAL          ;Clear out the Ram Valid flag.
     4B57   3A 40FD     1793           LDA     CRD_FLAGS       ;Point to the CRD Flags byte
     4B5A   32 40BB     1794           STA     OFLAG           ;Set the Control O Flag accordingly.
     4B5D   21 40D9     1795           LXI     H,MIPFLG        ;Point to the Modem In Progress Flag.
     4B60   B6          1796           ORA     M               ;OR them together
     4B61   C2 420C     1797           JNZ     MYLOAD          ;Go to the MYLOAD entry if (MIP OR CRD).
     4B64   EB          1798           XCHG                    ;Otherwise, put DE in HL,
     4B65   F3          1799           DI                      ;turn off the interrupts,
     4B66   F9          1800           SPHL                    ;and jam HL into the Stack Pointer.
     4B67   C3 0004     1801           JMP     BEGIN+4         ;Go do the self test and destroy almost
                        1802                                   ;everything.
                        1803   ;
                        1804   ;*****************************************************************
                        1805
                        1806
                        1807
                        1808
                        1809
          =4B80         1810           ORG     4B80H           ;
                        1811
     4B80 =0040         1812   CHRSIL: DS      64              ;64 byte character silo
     4BC0 =0040         1813   SRCSIL: DS      64              ;64 byte character source silo
                        1814   ;
                        1815   ;*********************************************************************
                        1816
                        1817
                        1818
                        1819
                        1820
                        1821   ;#####################################################################
                        1822   ;
                        1823   ;Starting at 4C00H we can have either CONSOL.EXE or MICMON.EXE
                        1824   ;
                        1825   ;*********************************************************************
                        1826   ;
          =4C00         1827           ORG     04C00H          ;
                        1828
```

```
Error Addr  Code          Seq   Source statement

     4C00                1829  GO_START:
     4C00   AF           1830          XRA     A                ;Make a 0
     4C01   32 40D5      1831          STA     WCS_LOAD_FLAGS   ;Clear both flags.
     4C04   21 729D      1832          LXI     H,VERMSG         ;Point to this message
     4C07   F7           1833          RST     6                ;Go print it
     4C08   3A 40D6      1834          LDA     APTLOD           ;See if we got here via X command
     4C0B   1F           1835          RAR                      ;Is the APTLOD flag set?
     4C0C   D2 5F99      1836          JNC     COLD_BEGIN       ;Jump if not
     4C0F   C3 4C32      1837          JMP     IDLE             ;Otherwise, go to the IDLE LOOP
                         1838
                         1839
            =4C22        1840          ORG     04C22H           ;
                         1841
     4C22   C3 5E56      1842  PARVEC: JMP     PARITY           ;
     4C25   C3 5DE5      1843  ACVECT: JMP     ACFAIL           ;
     4C28   C3 4C32      1844  CVECTR: JMP     IDLE             ;
     4C2B   C3 4C32      1845  PVECTR: JMP     IDLE             ;
     4C2E   00           1846  CODFL1: DB      0                ;Flag to be used when X/U 4100 brings in
                         1847                                   ;MICMON or CONSOL
     4C2F   C3 6A18      1848  TMRVEC: JMP     TMRSRV           ;Go service the I.T. overflow
                         1849
                         1850  ;*****************************************************************
                         1851  ;*****************************************************************
                         1852  ;-----------------------------------------------------------------
                         1853  ;The following is the Nebula Console software.  Overall this code consists of
                         1854  ;an input routine that brings in a command string, routines that implement
                         1855  ;each command, a parser that, if called, pigeonholes information about the
                         1856  ;command string for use by the calling command, and various routines that:
                         1857  ;(1) manipulate addresses and data,
                         1858  ;(2) handle errors,
                         1859  ;(3) communicate with the CPU, the Console terminal and the TU-58,
                         1860  ;(4) handle Power Up, Power Down and Boot functions.
                         1861  ;-----------------------------------------------------------------
                         1862
                         1863
                         1864
                         1865
                         1866
                         1867
                         1868
                         1869  ;The following are maps of the Flag and Qual bytes:
                         1870  ;
                         1871  ;
                         1872  ;        07      06      05      04      03      02      01      00
                         1873  ;
                         1874  ;FLAGS   DACTIV  AACTIV  N.U.    N.U.    N.U.    DFLAG   AFLAG   SPCFLG
                         1875  ;
                         1876  ;FLAGS1          N.U.    N.U.    N.U.    N.U.    *       -       +
                         1877  ;
                         1878  ;FLAGS2 N.U.     N.U.    N.U.    N.U.    N.U.    N.U.    NACTIV  NFLAG
```

```
Error Addr  Code          Seq   Source statement

                          1879  ;
                          1880  ;FLAGS3 N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    SACTIV  SFLAG
                          1881  ;
                          1882  ;OFLAG  N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    O FLAG
                          1883  ;
                          1884  ;DELFLG N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    DELFLG
                          1885  ;
                          1886  ;LODFLG N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    LOAD FLAG
                          1887  ;
                          1888  ;RFLAG  N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    N.U.    R FLAG
                          1889  ;
                          1890  ;QUAL   (D.L. CODE)     N.U.    N.U.    (       ADDRESS SPACE CODE              )
                          1891  ;
                          1892
                          1893
                          1894
                          1895
                          1896
                          1897
                          1898
                          1899  ;*****************************************************************
                          1900  ;
                          1901  ;       CNSOLE
                          1902  ;
                          1903  ;       The following is the Console Mode idle loop and the normal entry
                          1904  ;  point to it.
                          1905  ;
    4C32   31 4080        1906  IDLE:   LXI     SP,STACK        ;Fix up the Stack Pointer
    4C35   3A 409D        1907          LDA     INDFLG          ;Check the Indirect Command flag
    4C38   1F             1908          RAR                     ;Put it in the carry
    4C39   D4 4C42        1909          CNC     CNSOLA          ;If not set use the normal console code
    4C3C   DC 4C5E        1910          CC      CNSOLB          ;If set use the special code
    4C3F   C3 4C32        1911          JMP     IDLE            ;Loop back
                          1912
    4C42   AF             1913  CNSOLA: XRA     A               ;Make a zero
    4C43   32 40BB        1914          STA     OFLAG           ;Zero this flag
    4C46   CD 4CCF        1915          CALL    PRPSUB          ;Go prep some flags
    4C49   21 4203        1916          LXI     H,PROMPT        ;Point to the prompt
    4C4C   F7             1917          RST     6               ;Go print it
    4C4D   21 7000        1918          LXI     H,CHRCNT        ;Point to the Character Count location
    4C50   CD 4A4D        1919          CALL    GETLIN          ;Go get a line
    4C53   21 7001        1920          LXI     H,CHRBUF        ;Point to the character buffer
    4C56   22 40CA        1921          SHLD    BUFADR          ;Save the address
    4C59   CD 4C7B        1922          CALL    CNSOLX          ;Go use a common subroutine
    4C5C   AF             1923          XRA     A               ;Clear the carry
    4C5D   C9             1924          RET                     ;and go back to the idle loop
                          1925
    4C5E   CD 4C94        1926  CNSOLB: CALL    INDTST          ;Go check the Indirect Command buffer
    4C61   C8             1927          RZ                      ;Leave if we ran out
    4C62   CD 4CCF        1928          CALL    PRPSUB          ;Go prep some flags
```

```
Error Addr  Code          Seq   Source statement

     4C65   21 4203       1929          LXI     H,PROMPT        ;Point to the prompt
     4C68   F7            1930          RST     6               ;Go print it
     4C69   3A 721B       1931          LDA     INDCNT          ;Get the count
     4C6C   2A 40CA       1932          LHLD    BUFADR          ;Get the address
     4C6F   EF            1933          RST     5               ;Special entry to Send Line
     4C70   CD 4C7B       1934          CALL    CNSOLX          ;Go use this subroutine
     4C73   3A 4116       1935          LDA     SUCCES          ;Check the success code
     4C76   A7            1936          ANA     A               ;Is it zero?
     4C77   CA 4C5E       1937          JZ      CNSOLB          ;Loop back
     4C7A   C9            1938          RET                     ;Leave if non-zero
                          1939
     4C7B   CD 5DB1       1940  CNSOLX: CALL    MARKSP          ;Go mark where we came from
     4C7E   2A 40CA       1941          LHLD    BUFADR          ;Get the address of the command buffer
     4C81   CD 4D23       1942          CALL    SPSTRP          ;Go strip off the spaces
     4C84   23            1943          INX     H               ;Bump the pointer beyond the command
     4C85   22 40CA       1944          SHLD    BUFADR          ;Save the address
     4C88   21 7101       1945          LXI     H,COUNT1        ;Point to the Compare table
     4C8B   11 7114       1946          LXI     D,ADRES1        ;Point to the Address Table
     4C8E   CD 4CFA       1947          CALL    DECODE          ;Go figure it out
     4C91   CD 5D1E       1948          CALL    SYNERR          ;Error if no match
                          1949
     4C94   06 00         1950  INDTST: MVI     B,0             ;Zero this counter
     4C96   2A 721C       1951          LHLD    INDADR          ;Get the current pointer value
     4C99   22 40CA       1952          SHLD    BUFADR          ;Save it
     4C9C   CD 4CC6       1953          CALL    GETCHK          ;Get the first character in this line
     4C9F   A7            1954          ANA     A               ;Is it zero?
     4CA0   C2 4CA7       1955          JNZ     INDTS1          ;Jump if not zero
     4CA3   32 409D       1956          STA     INDFLG          ;Zero this flag
     4CA6   C9            1957          RET                     ;Leave with the Z bit set
     4CA7   FE 0D         1958  INDTS1: CPI     CR              ;See if it is a Carriage Return
     4CA9   CA 4CB6       1959          JZ      INDTS2          ;Jump if it is
     4CAC   04            1960          INR     B               ;Bump the count
     4CAD   FC 5D1E       1961          CM      SYNERR          ;If minus, the count is G.T. 128
     4CB0   CD 4CC6       1962          CALL    GETCHK          ;Go bump the pointer and check it
     4CB3   C3 4CA7       1963          JMP     INDTS1          ;Loop back
     4CB6   7E            1964  INDTS2: MOV     A,M             ;Get the next character
     4CB7   FE 0A         1965          CPI     LF              ;Is it a line feed
     4CB9   C4 5D1E       1966          CNZ     SYNERR          ;Error if not
     4CBC   23            1967          INX     H               ;Bump the pointer
     4CBD   22 721C       1968          SHLD    INDADR          ;Save the new address
     4CC0   78            1969          MOV     A,B             ;Put the count in A
     4CC1   3C            1970          INR     A               ;Bump it to count the CR but not the LF
     4CC2   32 721B       1971          STA     INDCNT          ;Save it
     4CC5   C9            1972          RET                     ;Return to do the command
                          1973
     4CC6   7C            1974  GETCHK: MOV     A,H             ;Get the high half of the address
     4CC7   FE 7E         1975          CPI     7EH             ;Has it gone out of range?
     4CC9   CC 5D16       1976          CZ      CF_ERROR        ;Error if set
     4CCC   7E            1977          MOV     A,M             ;Put the data in A
     4CCD   23            1978          INX     H               ;Bump the pointer
```

```
Error Addr  Code          Seq   Source statement

     4CCE   C9            1979          RET                     ;Leave
                          1980
                          1981
     4CCF   AF            1982  PRPSUB: XRA     A               ;Make a zero
     4CD0   32 7213       1983          STA     FLAGS           ;Start zeroing things out
     4CD3   32 7214       1984          STA     FLAGS1          ;
     4CD6   32 7215       1985          STA     FLAGS2          ;
     4CD9   32 7216       1986          STA     FLAGS3          ;
     4CDC   32 7217       1987          STA     RFLAG           ;
     4CDF   32 7218       1988          STA     QUAL1           ;
     4CE2   32 4115       1989          STA     QUAL            ;
     4CE5   32 409B       1990          STA     LODFLG          ;
     4CE8   32 721F       1991          STA     MICFLG          ;
     4CEB   32 721E       1992          STA     STPFLG          ;
     4CEE   32 71B3       1993          STA     NEWAS           ;
     4CF1   32 71B2       1994          STA     NEWDL           ;
     4CF4   32 7223       1995          STA     IFLAG           ;
     4CF7   D3 AF         1996          OUT     CLRHLT          ;Turn off the Halt to the CPU
     4CF9   C9            1997          RET                     ;Leave
                          1998  ;
                          1999  ;
                          2000  ;*****************************************************************
                          2001
                          2002  ;*****************************************************************
                          2003  ;
                          2004  ;       DECODE
                          2005  ;
     4CFA   46            2006  DECODE: MOV     B,M             ;Get the count
     4CFB   23            2007  DECOD1: INX     H               ;Bump the Compare Table pointer
     4CFC   BE            2008          CMP     M               ;The accumulator contains the character to be
                          2009                                  ;decoded
     4CFD   CA 4D07       2010          JZ      MATCH           ;If a match, then jump
     4D00   13            2011          INX     D               ;Bump the Address Table pointer
     4D01   13            2012          INX     D               ;Twice
     4D02   05            2013          DCR     B               ;Decrement the Count
     4D03   C8            2014          RZ                      ;If 0, return
     4D04   C3 4CFB       2015          JMP     DECOD1          ;Else, repeat the loop
                          2016
     4D07   E1            2017  MATCH:  POP     H               ;Since we are not going to execute a return
                          2018                                  ;we must fix the Stack
     4D08   1A            2019          LDAX    D               ;Get the low half of the address
     4D09   6F            2020          MOV     L,A             ;Put it in L
     4D0A   13            2021          INX     D               ;Point to the high half of the address
     4D0B   1A            2022          LDAX    D               ;Get the high half of the address
     4D0C   67            2023          MOV     H,A             ;Put it in H
     4D0D   E9            2024          PCHL                    ;Exit, stage left
                          2025  ;
                          2026  ;*****************************************************************
                          2027
                          2028
```

```
Error Addr  Code          Seq   Source statement

                          2029
                          2030  ;The REPEAT flows make sure that a Repeat command is not followed by a
                          2031  ;Repeat command, and that a Repeat command is seperated from the following
                          2032  ;command by at least one space.
                          2033
     4D0E   21 7217       2034  REPEAT: LXI     H,RFLAG         ;Point to the RFLAG
     4D11   35            2035          DCR     M               ;Check for already set
     4D12   36 01         2036          MVI     M,1             ;Set it in case it wasn't
     4D14   CC 5D1E       2037          CZ      SYNERR          ;If it was set, then we have R followed by R.
     4D17   2A 40CA       2038          LHLD    BUFADR          ;Else, check to see that at least one space
     4D1A   7E            2039          MOV     A,M             ;trails the R command
     4D1B   FE 20         2040          CPI     SPACE           ;Is there a space after the R?
     4D1D   CA 4C7B       2041          JZ      CNSOLX          ;Jump back if there is
     4D20   CD 5D1E       2042          CALL    SYNERR          ;If not, error
                          2043
                          2044
                          2045  ;*****************************************************************
                          2046  ;
                          2047  ;       SPSTRP
                          2048  ;
                          2049  ;       This subroutine searches the buffer pointed to by HL until something
                          2050  ; otherthan a space is found.  It then returns with the character in A and HL
                          2051  ; still pointing to the memory location where it found the character
                          2052  ;
     4D23   7E            2053  SPSTRP: MOV     A,M             ;Get the character
     4D24   FE 20         2054          CPI     SPACE           ;Is it a space?
     4D26   C0            2055          RNZ                     ;If not a space, return.
     4D27   23            2056          INX     H               ;Else, bump the pointer and keep looking
     4D28   C3 4D23       2057          JMP     SPSTRP          ;
                          2058  ;
                          2059  ;*****************************************************************
                          2060
                          2061
                          2062
                          2063
                          2064
                          2065  ;*****************************************************************
                          2066  ;
                          2067  ;       PARSE
                          2068  ;
                          2069  ;
     4D2B   21 71FE       2070  PARSE:  LXI     H,ABUFFR        ;Point to the area to be cleared
     4D2E   16 08         2071          MVI     D,08            ;Number of bytes to be cleared
     4D30   CD 6AFC       2072          CALL    ZBUF1           ;Go do it
     4D33   3A 409B       2073  PARSE1: LDA     LODFLG          ;Check for the Load flag
     4D36   1F            2074          RAR                     ;Put it in the carry
     4D37   CD 4FC5       2075          CALL    GETNXT          ;Get the next character
     4D3A   21 715D       2076          LXI     H,COUNT3        ;HL gets the Compare Table pointer
     4D3D   11 716A       2077          LXI     D,ADRES3        ;DE gets the Address Table pointer
     4D40   D2 4D50       2078          JNC     PARSE2          ;Skip the next section if not a Load
```

```
Error Addr  Code          Seq   Source statement

     4D43   FE 2E         2079           CPI     '.'      ;Is the character a Dot?
     4D45   CA 4E3B       2080           JZ      DOT      ;Go to a special handler if it is.
     4D48   06 05         2081           MVI     B,5      ;Otherwise change the count
     4D4A   CD 4CFB       2082           CALL    DECOD1   ;Go figure things out
     4D4D   C3 4D53       2083           JMP     PARSE3   ;Jump over the other call
     4D50   CD 4CFA       2084   PARSE2: CALL    DECODE   ;Go decode the character.
     4D53   5F            2085   PARSE3: MOV     E,A      ;If the character being decoded is not
                          2086                            ;something special, like a +, or an S,
                          2087                            ;then it is assumed that it should be
                          2088                            ;a Hex digit.  Therefore it is either
                          2089                            ;part of the address or the data.  Only one
                          2090                            ;address field and one data field
                          2091                            ;are allowed.  The character is saved in
                          2092                            ;D while some testing is performed.
     4D54   01 7213       2093           LXI     B,FLAGS  ;Load BC with the FLAGS address.
     4D57   0A            2094           LDAX    B        ;Get the Flags
     4D58   1F            2095           RAR              ;Check the Space Flag
     4D59   D4 5D1E       2096           CNC     SYNERR   ;If not set, error.
     4D5C   1F            2097           RAR              ;Else, check the A Flag
     4D5D   DA 4D71       2098           JC      PARSE4   ;If the Address field has been terminated, go
                          2099                            ;check the Data field.
     4D60   3A 409B       2100           LDA     LODFLG   ;Check for Load flag
     4D63   1F            2101           RAR              ;Put it in carry
     4D64   DA 4D8D       2102           JC      FNFLOW   ;If Load, go to the File name flow
     4D67   21 71FE       2103           LXI     H,ABUFFR ;Load HL to point to the Address Buffer
     4D6A   0A            2104           LDAX    B        ;Get the Flags again
     4D6B   F6 40         2105           ORI     AACTIV   ;Set the Address Active Flag
     4D6D   02            2106           STAX    B        ;Store it away
     4D6E   C3 4D83       2107           JMP     PARSE5   ;Go share some code
     4D71   1F            2108   PARSE4: RAR              ;Check the D Flag
     4D72   DC 5D1E       2109           CC      SYNERR   ;If this field has been terminated then no
                          2110                            ;more data can be accepted.
     4D75   3A 409B       2111           LDA     LODFLG   ;Going to check the Load Command Flag
     4D78   1F            2112           RAR              ;Put it in the carry
     4D79   DA 4DDA       2113           JC      EXTFLW   ;If set, go to the Extension Flow
     4D7C   21 7202       2114           LXI     H,DBUFFR ;Else, not done with the Data Field yet
     4D7F   0A            2115           LDAX    B        ;Get the Flags
     4D80   F6 80         2116           ORI     DACTIV   ;Set the Data Active flag
     4D82   02            2117           STAX    B        ;Store it
     4D83   7B            2118   PARSE5: MOV     A,E      ;A gets the character again
     4D84   CD 4DF4       2119           CALL    CNVERT   ;Convert ASCII to Hex
     4D87   CD 4E0D       2120           CALL    SHIFT    ;Go shift in the digit
     4D8A   C3 4D33       2121           JMP     PARSE1   ;Loop back
                          2122
     4D8D   0A            2123   FNFLOW: LDAX    B        ;Check the AACTIV Flag
     4D8E   E6 40         2124           ANI     AACTIV   ;Is it set?
     4D90   C2 4DC0       2125           JNZ     FNFLW1   ;Jump if it is
     4D93   3E 44         2126           MVI     A,'D'    ;Get the ASCII for D
     4D95   BB            2127           CMP     E        ;Is the character a D?
     4D96   C2 4DC0       2128           JNZ     FNFLW1   ;Jump if not
```

```
Error Addr  Code          Seq   Source statement

     4D99   2A 40CA       2129           LHLD    BUFADR          ;Get the current address
     4D9C   BE            2130           CMP     M               ;Check the next letter
     4D9D   C2 4DC0       2131           JNZ     FNFLW1          ;Jump if not equal
     4DA0   23            2132           INX     H               ;Bump the pointer
     4DA1   56            2133           MOV     D,M             ;Put the next character in D for a moment
     4DA2   23            2134           INX     H               ;and Bump the pointer again
     4DA3   3E 3A         2135           MVI     A,':'           ;Put value for colon in A
     4DA5   BE            2136           CMP     M               ;Check it
     4DA6   C2 4DC0       2137           JNZ     FNFLW1          ;Jump if not equal
     4DA9   7A            2138           MOV     A,D             ;Get the device number
     4DAA   CD 4DF4       2139           CALL    CNVERT          ;Go change from Hex to ASCII
     4DAD   FE 02         2140           CPI     02              ;Check it
     4DAF   D4 5D1E       2141           CNC     SYNERR          ;Leave if it isn't 0 or 1
     4DB2   32 4106       2142           STA     UNITX           ;Store it
     4DB5   23            2143           INX     H               ;and bump the pointer
     4DB6   22 40CA       2144           SHLD    BUFADR          ;now update the saved address
     4DB9   21 7212       2145           LXI     H,DEVFLG        ;Point to this flag
     4DBC   34            2146           INR     M               ;Set it
     4DBD   C3 4DD3       2147           JMP     FNFLW2          ;Go set the Address Active flag
     4DC0   21 7210       2148   FNFLW1: LXI     H,FNCNT         ;Point to the Count
     4DC3   7E            2149           MOV     A,M             ;Get it
     4DC4   FE 06         2150           CPI     06              ;Is the File Name Buffer full?
     4DC6   CC 5D1E       2151           CZ      SYNERR          ;Leave if it is
     4DC9   3C            2152           INR     A               ;Otherwise, bump the count
     4DCA   77            2153           MOV     M,A             ;and store it
     4DCB   2A 720C       2154           LHLD    FNPTR           ;Get the Address
     4DCE   73            2155           MOV     M,E             ;Store the character
     4DCF   23            2156           INX     H               ;Bump the Address
     4DD0   22 720C       2157           SHLD    FNPTR           ;And save this new value
     4DD3   0A            2158   FNFLW2: LDAX    B               ;Get the Flags byte
     4DD4   F6 40         2159           ORI     AACTIV          ;Set the AACTIV flag
     4DD6   02            2160           STAX    B               ;and put it back
     4DD7   C3 4D33       2161           JMP     PARSE1          ;Go back to the Parser
                          2162
     4DDA   21 7211       2163   EXTFLW: LXI     H,EXTCNT        ;Point to the Extension Count
     4DDD   7E            2164           MOV     A,M             ;and get it
     4DDE   FE 03         2165           CPI     03              ;See if the Extension Buffer is full
     4DE0   CC 5D1E       2166           CZ      SYNERR          ;Leave if it is
     4DE3   3C            2167           INR     A               ;Otherwise bump the count
     4DE4   77            2168           MOV     M,A             ;and store it
     4DE5   2A 720E       2169           LHLD    EXTPTR          ;Get the pointer to the Extension Buffer
     4DE8   73            2170           MOV     M,E             ;Store the character
     4DE9   23            2171           INX     H               ;Bump the pointer
     4DEA   22 720E       2172           SHLD    EXTPTR          ;and save the new value
     4DED   0A            2173           LDAX    B               ;Get the flags
     4DEE   F6 80         2174           ORI     DACTIV          ;Set Data Active flag
     4DF0   02            2175           STAX    B               ;and put it back
     4DF1   C3 4D33       2176           JMP     PARSE1          ;Go back to the parser
                          2177   ;
                          2178   ;*****************************************************************************
```

```
Error Addr  Code          Seq   Source statement

                          2179
                          2180
                          2181
                          2182
                          2183
                          2184  ;*****************************************************************
                          2185  ;
                          2186  ;       CNVERT
                          2187  ;
                          2188  ;       CNVERT changes ASCII representations of Hex into true Hex (Binary)
                          2189  ; digits.  If the character to be converted is not in the range of Hex
                          2190  ; digits (ASCII), an error occurs.
                          2191  ;
    4DF4   FE 30          2192  CNVERT: CPI     030H            ;Is the character less than 0.
    4DF6   DC 5D1E        2193           CC      SYNERR          ;If it is, error
    4DF9   FE 3A          2194           CPI     03AH            ;Else, check to see if is in the range
                          2195                                   ;from 0 to 9.
    4DFB   DA 4E0A        2196           JC      CNVER1          ;If it is, no convert necessary.
    4DFE   FE 41          2197           CPI     041H            ;Else, see if less than letter A
    4E00   DC 5D1E        2198           CC      SYNERR          ;If it is, error
    4E03   FE 47          2199           CPI     047H            ;Else, see if it is less than letter G
    4E05   D4 5D1E        2200           CNC     SYNERR          ;If it is not, error
    4E08   C6 09          2201           ADI     09H             ;Else, turn ASCII A-F into Hex
    4E0A   E6 0F          2202  CNVER1: ANI     0FH             ;Clear the high nibble
    4E0C   C9             2203           RET                     ;Adios
                          2204  ;
                          2205  ;*****************************************************************
                          2206
                          2207  ;*****************************************************************
                          2208  ;
                          2209  ;       SHIFT
                          2210  ;
                          2211  ;       SHIFT is a routine to shift a Hex digit into the low nibble of a buffer
                          2212  ; area.  It expects the address of the buffer to be in HL and saves this
                          2213  ; address on the Stack before it does anything.  When it is done it restores
                          2214  ; HL with the original address.
                          2215  ;
    4E0D   5F             2216  SHIFT:  MOV     E,A             ;Save the digit for a while.
    4E0E   06 04          2217           MVI     B,04            ;Count for the number of bits to be shifted in.
    4E10   0E 04          2218  SHIFT1: MVI     C,04            ;Count for number of bytes to shift accross
    4E12   E5             2219           PUSH    H               ;Save the address on the Stack
    4E13   AF             2220           XRA     A               ;This will clear the carry
    4E14   CD 4A00        2221           CALL    LSHIFT          ;Go do the shift
    4E17   E1             2222           POP     H               ;Restore HL
    4E18   05             2223           DCR     B               ;Decrement the bit count.
    4E19   C2 4E10        2224           JNZ     SHIFT1          ;If not zero, do it again.
    4E1C   7B             2225           MOV     A,E             ;Get the digit into the accumulator.
    4E1D   B6             2226           ORA     M               ;OR the digit into low nibble of low byte
    4E1E   77             2227           MOV     M,A             ;Store it.
    4E1F   C9             2228           RET                     ;Leave.
```

```
Error Addr  Code           Seq   Source statement

                           2229  ;
                           2230  ;*****************************************************************
                           2231
                           2232
                           2233  ;*****************************************************************
                           2234  ;
                           2235  ;       DLMCHK
                           2236  ;
                           2237  ;       DLMCHK (Delimiter Check) is used to set the A and D Flags.  If a
                           2238  ; delimiter is encountered and the Data Active Flag is set, the D(ata) Flag
                           2239  ; is set.  If the D Active Flag is not set but the A Active is set, the
                           2240  ; A(ddress) Flag is set.  If neither Active Flag is set, nothing happens.
                           2241  ;
    4E20   01 7213         2242  DLMCHK: LXI     B,FLAGS         ;Point to the Flags
    4E23   0A              2243          LDAX    B               ;Read in the Flags
    4E24   17              2244          RAL                     ;Check the Data Active Flag
    4E25   D2 4E2D         2245          JNC     ACHECK          ;If not set, go check the Address Active
                           2246                                  ;Flag
    4E28   0A              2247  DCHK1:  LDAX    B               ;Else, get a fresh copy of the Flags
    4E29   F6 04           2248          ORI     DFLAG           ;Set the Data Flag which indicates the Data
                           2249                                  ;Field is terminated.
    4E2B   02              2250          STAX    B               ;Store it
    4E2C   C9              2251          RET                     ;We are done.
                           2252
                           2253
    4E2D   17              2254  ACHECK: RAL                     ;Check the Address Active Flag
    4E2E   D0              2255          RNC                     ;If not set, return.
    4E2F   3A 409B         2256          LDA     LODFLG          ;Check the Load Flag
    4E32   1F              2257          RAR                     ;Put it in the Carry
    4E33   DC 4E28         2258          CC      DCHK1           ;If this is a load command and a delimiter
                           2259                                  ;other than Dot is used, it's the end.
                           2260                                  ;After setting  the DFLAG we will come back
                           2261                                  ;and set the AFLAG and no more File name or
                           2262                                  ;Extension will be accepted.
    4E36   0A              2263  ACHK1:  LDAX    B               ;Else, set the Address Flag to indicate
    4E37   F6 02           2264          ORI     AFLAG           ;termination of the Address Field.
    4E39   02              2265          STAX    B               ;Store it.
    4E3A   C9              2266          RET                     ;Leave.
                           2267
                           2268
    4E3B   01 7213         2269  DOT:    LXI     B,FLAGS         ;Point to the Flags
    4E3E   0A              2270          LDAX    B               ;Get them
    4E3F   E6 42           2271          ANI     AAFLAG          ;Save the A Active and A Flags
    4E41   FE 40           2272          CPI     AACTIV          ;Only A Active should be set
    4E43   C4 5D1E         2273          CNZ     SYNERR          ;If not equal, it's an error
    4E46   CD 4E36         2274          CALL    ACHK1           ;Go set the A flag
    4E49   C3 4D33         2275          JMP     PARSE1          ;Go look for the next character
                           2276  ;
                           2277  ;*****************************************************************
                           2278
```

```
Error Addr  Code          Seq   Source statement

                          2279  ;*****************************************************************
                          2280  ;
                          2281  ;       SPCFLW
                          2282  ;
                          2283  ;       This code merely calls the Delimiter Check and then sets the Space Flag
                          2284  ;
     4E4C   CD 4E20       2285  SPCFLW: CALL    DLMCHK          ;Go check the delimiter address/data field
                          2286                                  ;situation.
     4E4F   0A            2287  SPCF1:  LDAX    B               ;Get a fresh copy of Flags
     4E50   F6 01         2288          ORI     SPCFLG          ;Set the Space Flag
     4E52   02            2289          STAX    B               ;Store it.
     4E53   C3 4D33       2290          JMP     PARSE1          ;Go do some more parsing.
                          2291  ;
                          2292  ;*****************************************************************
                          2293
                          2294  ;*****************************************************************
                          2295  ;
                          2296  ;       SLASH
                          2297  ;
                          2298  ;       SLASH decodes the switch and does a Delimiter Check.  It also clears the
                          2299  ; Space Flag.
                          2300  ;
     4E56   CD 4E20       2301  SLASH:  CALL    DLMCHK          ;Go do a Delimiter Check
     4E59   0A            2302          LDAX    B               ;Get Flags
     4E5A   E6 FE         2303          ANI     0FEH            ;Clear the Space Flag
     4E5C   02            2304          STAX    B               ;Store it.
     4E5D   CD 4FC5       2305          CALL    GETNXT          ;Get the next character
     4E60   21 7138       2306          LXI     H,COUNT2        ;HL gets the Compare TAble pointer.
     4E63   11 7145       2307          LXI     D,ADRES2        ;DE gets the Address Table pointer.
     4E66   CD 4CFA       2308          CALL    DECODE          ;Go decode the switch.
     4E69   CD 5D1E       2309          CALL    SYNERR          ;If we return it was an illegal switch.
                          2310  ;
                          2311  ;*****************************************************************
                          2312
                          2313  ;*****************************************************************
                          2314  ;
                          2315  ;The following are routines to encode the Address Space (A.S.) or Data
                          2316  ;Length (D.L.) specified by the switch.
                          2317  ;
     4E6C   3E 01         2318  PHYS:   MVI     A,01H           ;Physical
     4E6E   C3 4E8C       2319          JMP     COMMON          ;
     4E71   3E 02         2320  VRTUAL: MVI     A,02H           ;Virtual
     4E73   C3 4E8C       2321          JMP     COMMON          ;
     4E76   3E 03         2322  GPR:    MVI     A,03H           ;GPR
     4E78   C3 4E8C       2323          JMP     COMMON          ;
     4E7B   3E 04         2324  MREG:   MVI     A,04H           ;Machine Dependent Registers
     4E7D   C3 4E8C       2325          JMP     COMMON          ;
     4E80   3E 05         2326  IREG:   MVI     A,05H           ;Interal Registers
     4E82   C3 4E8C       2327          JMP     COMMON          ;
     4E85   3E 06         2328  MICRO:  MVI     A,06H           ;8085 Ram
```

```
Error Addr  Code          Seq   Source statement

     4E87   C3 4E8C       2329            JMP     COMMON          ;
     4E8A   3E 07         2330   WCS:     MVI     A,07H           ;WCS
     4E8C   32 71B3       2331   COMMON:  STA     NEWAS           ;Store it in the New Address Space byte
     4E8F   C3 4D33       2332            JMP     PARSE1          ;Return to the parser.
                          2333   ;
                          2334   ;*****************************************************************
                          2335
                          2336   ;*****************************************************************
                          2337   ;
     4E92   3E 40         2338   BYTE:    MVI     A,040H          ;Byte
     4E94   C3 4E9E       2339            JMP     COMMN1          ;
     4E97   3E 80         2340   WORD:    MVI     A,080H          ;Word
     4E99   C3 4E9E       2341            JMP     COMMN1  ;
     4E9C   3E 30         2342   LONG:    MVI     A,030H          ;Longword
     4E9E   32 71B2       2343   COMMN1:  STA     NEWDL           ;Store it in the New Data Length byte
     4EA1   C3 4D33       2344            JMP     PARSE1          ;Go back to parsing
                          2345   ;
                          2346   ;*****************************************************************
                          2347
                          2348
                          2349
                          2350   ;*****************************************************************
                          2351   ;
     4EA4   3A 7215       2352   NEXTAD:  LDA     FLAGS2          ;Get this byte
     4EA7   A7            2353            ANA     A               ;Is the N Flag set?
     4EA8   C4 5D1E       2354            CNZ     SYNERR          ;Error if it is
     4EAB   CD 4FC5       2355            CALL    GETNXT          ;Get the next character
     4EAE   FE 3A         2356            CPI     ':'             ;Is it correct?
     4EB0   C4 5D1E       2357            CNZ     SYNERR          ;Error if not
     4EB3   21 7208       2358            LXI     H,NBUFFR        ;Point to this buffer
     4EB6   CD 6AFA       2359            CALL    ZROBUF          ;Go zero it
     4EB9   CD 4FC5       2360   NEXTA1:  CALL    GETNXT          ;Get the next one
     4EBC   FE 2F         2361            CPI     '/'             ;Look for a slash
     4EBE   CA 4EDC       2362            JZ      NEXTA2          ;Jump if it is
     4EC1   FE 0D         2363            CPI     CR              ;Check for Carriage Return
     4EC3   CA 4EDC       2364            JZ      NEXTA2          ;Jump if it is
     4EC6   FE 20         2365            CPI     ' '             ;Look for a space
     4EC8   CA 4EDC       2366            JZ      NEXTA2          ;Jump if it is
     4ECB   21 7215       2367            LXI     H,FLAGS2        ;Point to this byte
     4ECE   36 02         2368            MVI     M,2             ;Set the N Active bit
     4ED0   CD 4DF4       2369            CALL    CNVERT          ;Go convert from ASCII to Hex
     4ED3   21 7208       2370            LXI     H,NBUFFR        ;Point to this buffer
     4ED6   CD 4E0D       2371            CALL    SHIFT           ;Go shift the number in
     4ED9   C3 4EB9       2372            JMP     NEXTA1          ;Loop back
                          2373
     4EDC   21 7215       2374   NEXTA2:  LXI     H,FLAGS2        ;Point to the N Flag
     4EDF   7E            2375   NEXTA3:  MOV     A,M             ;Get the byte
     4EE0   E6 02         2376            ANI     2               ;Check the Active flag
     4EE2   CC 5D1E       2377            CZ      SYNERR          ;Error if not set
     4EE5   36 01         2378            MVI     M,1             ;Set the N Flag
```

```
Error Addr  Code          Seq   Source statement

     4EE7   2A 40CA       2379           LHLD    BUFADR          ;Get the address
     4EEA   2B            2380           DCX     H               ;Back it up
     4EEB   22 40CA       2381           SHLD    BUFADR          ;Save it
     4EEE   C3 4D33       2382           JMP     PARSE1          ;Go back
                          2383
     4EF1   3A 7216       2384   STRTAD: LDA     FLAGS3          ;Get this flags byte
     4EF4   A7            2385           ANA     A               ;Is the S Flag set?
     4EF5   C4 5D1E       2386           CNZ     SYNERR          ;Error if set
     4EF8   CD 4FC5       2387           CALL    GETNXT          ;Get the next character
     4EFB   FE 3A         2388           CPI     ':'             ;Check for correct syntax
     4EFD   C4 5D1E       2389           CNZ     SYNERR          ;Error if not
     4F00   21 4111       2390           LXI     H,SBUFFR        ;Point to this buffer
     4F03   CD 6AFA       2391           CALL    ZROBUF          ;Go zero the buffer
     4F06   CD 4FC5       2392   STRTA1: CALL    GETNXT          ;Get the next character
     4F09   FE 40         2393           CPI     ' '             ;Look for   sign
     4F0B   CA 4F2E       2394           JZ      STRTA2          ;Jump if equal
     4F0E   FE 20         2395           CPI     SPACE           ;Is it a space?
     4F10   CA 4F45       2396           JZ      STRTA3          ;Exit if it is
     4F13   FE 2F         2397           CPI     '/'             ;Else, see if it is a slash
     4F15   CA 4F45       2398           JZ      STRTA3          ;Exit if it is
     4F18   FE 0D         2399           CPI     CR              ;Else, check for Carriage Return.
     4F1A   CA 4F45       2400           JZ      STRTA3          ;Exit if it is
     4F1D   21 7216       2401           LXI     H,FLAGS3        ;Point to this flags byte
     4F20   36 02         2402           MVI     M,2             ;Set the S Active flag
     4F22   CD 4DF4       2403           CALL    CNVERT          ;Else, go change from ASCII to Hex.
     4F25   21 4111       2404           LXI     H,SBUFFR        ;Point to this buffer
     4F28   CD 4E0D       2405           CALL    SHIFT           ;Go shift in the digit.
     4F2B   C3 4F06       2406           JMP     STRTA1          ;Keep looping and looking
                          2407
     4F2E   21 7216       2408   STRTA2: LXI     H,FLAGS3        ;Point to the S Active and S flags
     4F31   7E            2409           MOV     A,M             ;Get them
     4F32   E6 02         2410           ANI     2               ;Is the active flag set
     4F34   C4 5D1E       2411           CNZ     SYNERR          ;Error if it is
     4F37   36 03         2412           MVI     M,3             ;Set both flags
     4F39   21 4111       2413           LXI     H,SBUFFR        ;Point to this dest
     4F3C   11 71BC       2414           LXI     D,EDDATA        ;Point to this source
     4F3F   CD 00F9       2415           CALL    COPY            ;Copy if over
     4F42   C3 4D33       2416           JMP     PARSE1          ;Go back up the pointer
                          2417
     4F45   21 7216       2418   STRTA3: LXI     H,FLAGS3        ;Point to this byte
     4F48   C3 4EDF       2419           JMP     NEXTA3          ;Go share some code
                          2420   ;
                          2421   ;*****************************************************************
                          2422
                          2423
                          2424   ;*****************************************************************
                          2425   ;
                          2426   ;Next come the routines to handle the address mneumonics and the +, -,
                          2427   ;*, and   symbols.
                          2428   ;
```

```
Error Addr  Code          Seq   Source statement

     4F4B   CD 4FB2       2429  PXXX:   CALL    ADRTST          ;Check the address situation
     4F4E   CD 4FC5       2430          CALL    GETNXT          ;Go get the next character and update
                          2431                                  ;the pointer.
     4F51   FE 43         2432          CPI     'C'             ;Is it a C?
     4F53   CA 4F79       2433          JZ      PRGCNT          ;If yes, go to PC
     4F56   FE 53         2434          CPI     'S'             ;Else, check for S
     4F58   C4 5D1E       2435          CNZ     SYNERR          ;If not, it is an error.
     4F5B   7E            2436          MOV     A,M             ;Get the next character.
     4F5C   FE 4C         2437          CPI     'L'             ;Is it an L?
     4F5E   C2 4F65       2438          JNZ     NOTL            ;If not, jump.
     4F61   23            2439          INX     H               ;Else, bump the pointer
     4F62   22 40CA       2440          SHLD    BUFADR          ;and update the current value.
     4F65   3E 00         2441  NOTL:   MVI     A,PSLADR        ;Get the address of the PSL
     4F67   32 71FE       2442          STA     ABUFFR          ;Write PSL address to Address Buffer
     4F6A   C3 4E7B       2443          JMP     MREG            ;Let this code set up the Address Space
                          2444
     4F6D   CD 4FB2       2445  RN:     CALL    ADRTST          ;Check the Address situation
     4F70   CD 4FC5       2446          CALL    GETNXT          ;Get the next character
     4F73   CD 4DF4       2447          CALL    CNVERT          ;Go to the ASCII to Hex conversion routine
     4F76   C3 4F8B       2448          JMP     SHARE           ;Go share some code
                          2449
     4F79   3E 0F         2450  PRGCNT: MVI     A,0FH           ;PC equals GPR F
     4F7B   C3 4F8B       2451          JMP     SHARE           ;Go share some code
                          2452
     4F7E   CD 4FB2       2453  STKFLW: CALL    ADRTST          ;Check the address situation
     4F81   CD 4FC5       2454          CALL    GETNXT          ;Get the next character and fix the pointer
     4F84   FE 50         2455          CPI     'P'             ;Is it a P?
     4F86   C4 5D1E       2456          CNZ     SYNERR          ;If not, error.
     4F89   3E 0E         2457          MVI     A,0EH           ;Else, this is the GPR address.
     4F8B   32 71FE       2458  SHARE:  STA     ABUFFR          ;Store the address in the buffer
     4F8E   C3 4E76       2459          JMP     GPR             ;Go share some code
                          2460  ;
                          2461  ;*****************************************************************
                          2462
                          2463
                          2464  ;*****************************************************************
                          2465  ;
     4F91   06 01         2466  PLUS:   MVI     B,01H           ;This is the Plus Flag
     4F93   C3 4FA2       2467          JMP     SHAREX          ;Go to the shared code.
                          2468
     4F96   06 02         2469  MINUS:  MVI     B,02H           ;This wil be used to set the Minus Flag
     4F98   C3 4FA2       2470          JMP     SHAREX          ;Go to the shared code.
                          2471
     4F9B   06 80         2472  ATSIGN: MVI     B,080H          ;This will be used to set the   Flag.
     4F9D   C3 4FA2       2473          JMP     SHAREX          ;
                          2474
     4FA0   06 04         2475  ASTRSK: MVI     B,04H           ;This will be used to set the Asterisk Flag
                          2476
     4FA2   21 7213       2477  SHAREX: LXI     H,FLAGS         ;Point to the Flags byte
     4FA5   CD 4FBA       2478          CALL    ADRTS1          ;Check the address situation
```

```
Error Addr  Code          Seq   Source statement

     4FA8   E6 BF        2479            ANI     0BFH            ;Clear the A Active bit
     4FAA   F6 01        2480            ORI     1               ;Set the Space Flag
     4FAC   77           2481            MOV     M,A             ;and store the Flags
     4FAD   23           2482            INX     H               ;Point to the FLAGS1 byte
     4FAE   70           2483            MOV     M,B             ;Store the Flags
     4FAF   C3 4D33      2484            JMP     PARSE1          ;Go back to the parser
                         2485    ;
                         2486    ;*****************************************************************
                         2487
                         2488
                         2489    ;*****************************************************************
                         2490    ;
                         2491    ;       ADRTST
                         2492    ;
                         2493    ;ADRTST checks the Space Flag and the Address Flag.  An address field must
                         2494    ;be preceded by a least one space.  Also the parser must not have already
                         2495    ;found an address field in the input string.  It is not necessary to
                         2496    ;check the A Active Flag because the Space Flag will be clear if the
                         2497    ;parser is in the middle of parsing an address field.
                         2498    ;
     4FB2   21 7213      2499    ADRTST: LXI     H,FLAGS         ;Set up the pointer
     4FB5   7E           2500            MOV     A,M             ;Get the Flags
     4FB6   1F           2501            RAR                     ;Check the Space Flag
     4FB7   D4 5D1E      2502            CNC     SYNERR          ;If not set, error
     4FBA   7E           2503    ADRTS1: MOV     A,M             ;Else, get a fresh copy of the Flags
     4FBB   E6 42        2504            ANI     AAFLAG          ;Check the A and Active Flags
     4FBD   C4 5D1E      2505            CNZ     SYNERR          ;Neither should be set
     4FC0   7E           2506            MOV     A,M             ;Get another copy
     4FC1   F6 42        2507            ORI     AAFLAG          ;Set both flags.
     4FC3   77           2508            MOV     M,A             ;Store it
     4FC4   C9           2509            RET                     ;Leave
                         2510    ;
                         2511    ;*****************************************************************
                         2512
                         2513
                         2514    ;*****************************************************************
                         2515    ;
                         2516    ;       GETNXT
                         2517    ;
                         2518    ;GETNXT loads the next character into A and updates the value of the
                         2519    ;Character String Buffer address.
                         2520    ;
     4FC5   2A 40CA      2521    GETNXT: LHLD    BUFADR          ;Load the pointer
     4FC8   7E           2522            MOV     A,M             ;Get the next character
     4FC9   23           2523            INX     H               ;Bump the pointer
     4FCA   22 40CA      2524            SHLD    BUFADR          ;Save the new value
     4FCD   C9           2525            RET                     ;Go back
                         2526    ;
                         2527    ;*****************************************************************
                         2528
```

```
Error Addr  Code          Seq   Source statement

                          2529
                          2530  ;*****************************************************************
                          2531  ;
                          2532  ;       SEMI,CRFLOW
                          2533  ;
     4FCE   CD 4FC5       2534  SEMI:   CALL    GETNXT          ;Get the next character
     4FD1   FE 0D         2535          CPI     CR              ;Look for a carriage return
     4FD3   C2 4FCE       2536          JNZ     SEMI            ;Keep trying
     4FD6   CD 4E20       2537  CRFLOW: CALL    DLMCHK          ;Do a Delimiter check
     4FD9   0A            2538          LDAX    B               ;Get Flags
     4FDA   E6 FE         2539          ANI     0FEH            ;Clear the Space flag
     4FDC   02            2540          STAX    B               ;Store it
     4FDD   C9            2541          RET                     ;Leave
                          2542  ;
                          2543  ;*****************************************************************
                          2544
                          2545  ;*****************************************************************
                          2546  ;
                          2547  ;       DDECOD
                          2548  ;
     4FDE   2A 40CA       2549  DDECOD: LHLD    BUFADR          ;Get the address of the character
     4FE1   7E            2550          MOV     A,M             ;Get the character
     4FE2   FE 49         2551          CPI     'I'             ;Is it I?
     4FE4   C2 5034       2552          JNZ     DPOSIT          ;Must be a deposit if not DIR
     4FE7   23            2553          INX     H               ;Bump the pointer
     4FE8   7E            2554          MOV     A,M             ;Get the next character
     4FE9   FE 52         2555          CPI     'R'             ;Is it an R?
     4FEB   C2 5034       2556          JNZ     DPOSIT          ;Go to Deposit if not
     4FEE   23            2557          INX     H               ;Bump the pointer
     4FEF   3A 4150       2558  DIRECT: LDA     DEFDRV          ;Get the Default Drive number
     4FF2   32 4091       2559          STA     UNIT            ;Prime the unit number
     4FF5   CD 4D23       2560          CALL    SPSTRP          ;Go to Space strip
     4FF8   FE 0D         2561          CPI     CR              ;Check for carriage return
     4FFA   CA 5026       2562          JZ      DIR1            ;Jump if it is
     4FFD   FE 44         2563          CPI     'D'             ;Look for a D
     4FFF   C4 5D1E       2564          CNZ     SYNERR          ;Error if not
     5002   23            2565          INX     H               ;Bump the pointer
     5003   7E            2566          MOV     A,M             ;Get the next character
     5004   FE 44         2567          CPI     'D'             ;Is it a D
     5006   C4 5D1E       2568          CNZ     SYNERR          ;Error if not
     5009   23            2569          INX     H               ;Bump the pointer
     500A   7E            2570          MOV     A,M             ;Get the next character
     500B   CD 4DF4       2571          CALL    CNVERT          ;Go convert it to hex
     500E   FE 02         2572          CPI     02              ;See if 0 or 1
     5010   D4 5D1E       2573          CNC     SYNERR          ;Error if not
     5013   32 4091       2574          STA     UNIT            ;Set the unit number
     5016   23            2575          INX     H               ;Bump the pointer
     5017   7E            2576          MOV     A,M             ;Get the : (we hope)
     5018   FE 3A         2577          CPI     ':'             ;Look for :
     501A   C4 5D1E       2578          CNZ     SYNERR          ;Leave if not
```

```
Error Addr  Code          Seq   Source statement

     501D   23           2579            INX     H               ;Bump the pointer again
     501E   CD 4D23       2580            CALL    SPSTRP          ;Strip the spaces
     5021   FE 0D         2581            CPI     CR              ;Look for carriage return
     5023   C4 5D1E       2582            CNZ     SYNERR          ;Leave if not
     5026   CD 46CB       2583    DIR1:   CALL    LSTPRP          ;Go to List Prep
     5029   3A 4116       2584            LDA     SUCCES          ;Check the success code
     502C   A7            2585            ANA     A               ;Is it 0?
     502D   C4 5D2D       2586            CNZ     TAPERR          ;Error if not
     5030   32 409C       2587            STA     DIRFLG          ;Zero this flag
     5033   C9            2588            RET                     ;Leave
                          2589    ;
                          2590    ;*********************************************************************
                          2591
                          2592
                          2593    ;*********************************************************************
                          2594    ;
                          2595    ;       DPOSIT
                          2596    ;
     5034   CD 4D2B       2597    DPOSIT: CALL    PARSE           ;Go parse the input string
     5037   3A 7213       2598            LDA     FLAGS           ;Get the Flags byte
     503A   E6 04         2599            ANI     DFLAG           ;Deposit always requires data
     503C   CC 5D1E       2600            CZ      SYNERR          ;If no data, error
     503F   21 71B6       2601            LXI     H,EDPACK        ;Point to the first byte of the E/D Packet
     5042   36 01         2602            MVI     M,DEPCOD        ;Put the Deposit Code there
     5044   3A 7214       2603            LDA     FLAGS1          ;Check the   Flag
     5047   17            2604            RAL                     ;See if it is set
     5048   DC 52DF       2605            CC      ATFLOW          ;Service it if it is.
     504B   11 7202       2606            LXI     D,DBUFFR        ;Pointer to the data source.
     504E   21 71BC       2607            LXI     H,EDDATA        ;Pointer to the data destination
     5051   CD 00F9       2608            CALL    COPY            ;Move four byte from source to destination
     5054   3A 7213       2609            LDA     FLAGS           ;See if there was an explicit new address
     5057   E6 40         2610            ANI     AACTIV          ;by testing the Active bit
     5059   CA 5065       2611            JZ      DPOS1           ;If no explicit address, jump
     505C   11 71FE       2612            LXI     D,ABUFFR        ;Else, point to the new address
     505F   21 71B8       2613            LXI     H,EDADDR        ;Point to the destination
     5062   CD 00F9       2614            CALL    COPY            ;Move source to destination
     5065   CD 52AE       2615    DPOS1:  CALL    DECODX          ;Go figure out the qualifiers
     5068   3A 71B5       2616    DPOS2:  LDA     ADRSPC          ;Get the Address Space byte
     506B   FE 06         2617            CPI     6               ;Check for P,V,G,M or I space
     506D   DC 508F       2618            CC      MEMDEP          ;Go to service routine if one of them
     5070   FE 06         2619            CPI     6               ;Is this a 8085 Ram deposit?
     5072   CC 50A5       2620            CZ      MICDEP          ;Go service it if it is
     5075   FE 07         2621            CPI     7               ;Is this a WCS deposit?
     5077   CC 50C3       2622            CZ      WCSDEP          ;Service it if it is
     507A   E7            2623            RST     4               ;Go look for control characters
     507B   3A 7217       2624            LDA     RFLAG           ;Get the R Flag
     507E   1F            2625            RAR                     ;Is it set?
     507F   D2 5089       2626            JNC     NPREP           ;Jump if not set
     5082   D3 3D         2627            OUT     SETLIT          ;Generate a sync pulse
     5084   D3 3C         2628            OUT     CLRLIT          ;using the Run light
```

```
Error Addr  Code          Seq   Source statement

     5086   C3 5068       2629            JMP     DPOS2           ;and loop
     5089   CD 56BE       2630   NPREP:   CALL    NTEST           ;Else, go see if the N Flag is set
     508C   C3 5065       2631            JMP     DPOS1           ;Go back and figure out the switches.
                          2632
                          2633
     508F   FE 04         2634   MEMDEP:  CPI     04H             ;Check for M space
     5091   CC 53BA       2635            CZ      MCHECK          ;Go to MCHECK if it is
     5094   CD 5373       2636            CALL    MAKMOD          ;Go build the EDMOD byte
     5097   CD 537D       2637            CALL    ITEST           ;Go see about changing the modifier byte
     509A   CD 514B       2638            CALL    SNDMSX          ;Send the Data to the Base machine
     509D   CD 53A2       2639            CALL    ICHECK          ;Go check for I space Console address
     50A0   CD 5186       2640            CALL    RCVMSX          ;Go get the message
     50A3   AF            2641            XRA     A               ;Fake out the rest of the inline compares
     50A4   C9            2642            RET                     ;Go back
                          2643
                          2644
     50A5   3A 71B9       2645   MICDEP:  LDA     EDADDR+1        ;Check 8085 I/O address
     50A8   FE FF         2646            CPI     0FFH            ;Check it
     50AA   CA 50B6       2647            JZ      DEPIO           ;Jump if I/O specified
     50AD   2A 71B8       2648            LHLD    EDADDR          ;Get the address
     50B0   3A 71BC       2649            LDA     EDDATA          ;Get the Data
     50B3   77            2650            MOV     M,A             ;Do the Deposit
     50B4   AF            2651            XRA     A               ;Fake out the rest of the inline compares
     50B5   C9            2652            RET                     ;Leave
                          2653
     50B6   3A 71B8       2654   DEPIO:   LDA     EDADDR          ;Get the low byte of the address
     50B9   32 50C0       2655            STA     IOARG1+1        ;Change I stream
     50BC   3A 71BC       2656            LDA     EDDATA          ;Get the data
     50BF   D3 84         2657   IOARG1:  OUT     UPC14           ;Dummy OUT address
     50C1   AF            2658            XRA     A               ;Fake out the rest of the inline compares
     50C2   C9            2659            RET                     ;Leave
                          2660
                          2661
     50C3   D3 20         2662   WCSDEP:  OUT     CLRCLK          ;Stop the CPU clocks
     50C5   D3 A7         2663            OUT     DISMEM          ;Turn off memory
     50C7   11 71B8       2664            LXI     D,EDADDR        ;Point to the address
     50CA   21 41AA       2665            LXI     H,SWAP          ;Point to the Swapping buffer
     50CD   22 4176       2666            SHLD    POINTR          ;Save the Address
     50D0   CD 00F9       2667            CALL    COPY            ;Copy it
     50D3   CD 49D4       2668            CALL    LDUPC1          ;Go load the UPC
     50D6   CD 4993       2669            CALL    WRTNOP          ;NOP the CSR
     50D9   21 71BC       2670            LXI     H,EDDATA        ;Point to the data
     50DC   CD 5D05       2671            CALL    WRTWCS          ;Go write it
     50DF   CD 49A7       2672            CALL    LDCSR1          ;Go restore the old CSR
     50E2   CD 49D4       2673            CALL    LDUPC1          ;Restore the old UPC
     50E5   D3 A6         2674            OUT     ENBMEM          ;Turn on memory
     50E7   3A 4196       2675            LDA     CLKFLG          ;Get the Clock Flag
     50EA   1F            2676            RAR                     ;Is it set?
     50EB   D2 50F0       2677            JNC     WCSDE1          ;If it isn't set leave the clocks off
     50EE   D3 21         2678            OUT     SETCLK          ;Otherwise, set the clock
```

```
Error Addr  Code          Seq   Source statement

     50F0   AF            2679  WCSDE1: XRA     A               ;Fake out the rest of the inline compares
     50F1   C9            2680          RET                     ;Leave
                          2681  ;
                          2682  ;*****************************************************************
                          2683
                          2684
                          2685  ;*****************************************************************
                          2686  ;
                          2687  ;       EXAMIN
                          2688  ;
     50F2   CD 4D2B       2689  EXAMIN: CALL    PARSE           ;Go parse the input string
     50F5   3A 7213       2690          LDA     FLAGS           ;Going to check for data
     50F8   E6 04         2691          ANI     DFLAG           ;Is there any?
     50FA   C4 5D1E       2692          CNZ     SYNERR          ;If set, error because there shouldn't be
     50FD   AF            2693          XRA     A               ;Generate 0
     50FE   32 71B6       2694          STA     EDPACK          ;This is the Examine Code
     5101   3A 7214       2695          LDA     FLAGS1          ;Check for   Flag
     5104   17            2696          RAL                     ;See if it is set
     5105   DC 52DF       2697          CC      ATFLOW          ;If it is, go service it
     5108   21 71BC       2698          LXI     H,EDDATA        ;Point to the Examin/Deposit Data area
     510B   CD 6AFA       2699          CALL    ZROBUF          ;Go zero it
     510E   3A 7213       2700          LDA     FLAGS           ;Check for an explicit address
     5111   E6 40         2701          ANI     AACTIV          ;Is the Address Active Flag set
     5113   CA 511F       2702          JZ      EXAMI1          ;If not, jump
     5116   11 71FE       2703          LXI     D,ABUFFR        ;Point to the Address Buffer
     5119   21 71B8       2704          LXI     H,EDADDR        ;Point to the Packet address area
     511C   CD 00F9       2705          CALL    COPY            ;Go transfer it
     511F   CD 52AE       2706  EXAMI1: CALL    DECODX          ;Go figure out the qualifiers
     5122   3A 71B5       2707  EXAMI2: LDA     ADRSPC          ;Get the Address Space byte
     5125   FE 06         2708          CPI     6               ;Check for P,V,G,M or I space
     5127   DC 51C1       2709          CC      MEMEXM          ;Go service them if ADRSPC<4
     512A   FE 06         2710          CPI     6               ;Is it 8085 Ram
     512C   CC 51E0       2711          CZ      MICEXM          ;Call if equal
     512F   FE 07         2712          CPI     7               ;Is it WCS?
     5131   CC 51FE       2713          CZ      WCSEXM          ;Call if equal
     5134   CD 523A       2714          CALL    EXTYPE          ;Print the Address and Data
     5137   3A 7217       2715          LDA     RFLAG           ;Get the R Flag
     513A   1F            2716          RAR                     ;Is it set?
     513B   D2 5145       2717          JNC     NPREP1          ;Jump if no R Flag
     513E   D3 3D         2718          OUT     SETLIT          ;Use the Run light to generate a sync pulse
     5140   D3 3C         2719          OUT     CLRLIT          ;
     5142   C3 5122       2720          JMP     EXAMI2          ;Then jump back
                          2721
     5145   CD 56BE       2722  NPREP1: CALL    NTEST           ;Go to the common NTEST subroutine
     5148   C3 511F       2723          JMP     EXAMI1          ;If we return, it is because the N Flag is set
                          2724                                  ;and the count is not 0
     514B   21 71B6       2725  SNDMSX: LXI     H,EDPACK        ;Point to the packet to be sent
     514E   06 05         2726  SNDMSG: MVI     B,05            ;Count for the number of two byte transfers
     5150   3A 4196       2727  SNDMS0: LDA     CLKFLG          ;Get the clock flag
     5153   A7            2728          ANA     A               ;Check it
```

```
Error Addr  Code          Seq   Source statement

     5154   CC 5D70       2729            CZ      CLKERR          ;Leave if off
     5157   0E 00         2730   SNDMS1:  MVI     C,0             ;Zero to C
     5159   7E            2731            MOV     A,M             ;Get the first byte
     515A   23            2732            INX     H               ;Bump the pointer
     515B   D3 CC         2733            OUT     WRITE           ;Go write it to the Base Machine
     515D   D3 AA         2734            OUT     SETATN          ;Set Console Attention
     515F   DB 82         2735   SNDMS2:  IN      CPUACK          ;Look for CPU Ack
     5161   1F            2736            RAR                     ;Is it set?
     5162   DA 516C       2737            JC      SNDMS3          ;Leave loop if set
     5165   0D            2738            DCR     C               ;Decrement the count
     5166   C2 515F       2739            JNZ     SNDMS2          ;Loop if not zero
     5169   CD 5D5E       2740            CALL    COMERR          ;Call the Communication error handler
     516C   7E            2741   SNDMS3:  MOV     A,M             ;Get the next byte
     516D   23            2742            INX     H               ;Bump the pointer
     516E   D3 CC         2743            OUT     WRITE           ;Write it to the base machine
     5170   D3 AB         2744            OUT     CLRATN          ;Clear Console Attention
     5172   0E 00         2745            MVI     C,0             ;Prime the Time out
     5174   DB 82         2746   SNDMS4:  IN      CPUACK          ;Check CPU Ack
     5176   1F            2747            RAR                     ;Is it clear?
     5177   D2 5181       2748            JNC     SNDMS5          ;Jump out if clear
     517A   0D            2749            DCR     C               ;Decrement the Time Out
     517B   C2 5174       2750            JNZ     SNDMS4          ;Loop back if not zero
     517E   CD 5D5E       2751            CALL    COMERR          ;Call Communication Error handler
     5181   05            2752   SNDMS5:  DCR     B               ;Decrement the transfer count
     5182   C2 5157       2753            JNZ     SNDMS1          ;If count not zero, do it again
     5185   C9            2754            RET                     ;Leave
                          2755
     5186   21 71C0       2756   RCVMSX:  LXI     H,RCVBUF        ;Point to storage for the Receive packet
     5189   E5            2757   RCVMSG:  PUSH    H               ;Save the address
     518A   06 05         2758            MVI     B,05H           ;Count for the number of passes through
     518C   0E 00         2759   RCVMS5:  MVI     C,0             ;Zero the Time Out count
     518E   DB 83         2760   RCVMS1:  IN      CPATTN          ;Look for CPU Attention
     5190   1F            2761            RAR                     ;Is it set
     5191   DA 519B       2762            JC      RCVMS2          ;Jump if set
     5194   0D            2763            DCR     C               ;Decrement the Time Out
     5195   C2 518E       2764            JNZ     RCVMS1          ;Loop back if not zero
     5198   CD 5D5E       2765            CALL    COMERR          ;Comm Error
     519B   DB 80         2766   RCVMS2:  IN      READ            ;Get the Data
     519D   D3 A8         2767            OUT     SETACK          ;Set Console Ack
     519F   77            2768            MOV     M,A             ;Store the Data
     51A0   23            2769            INX     H               ;Bump the pointer
     51A1   0E 00         2770            MVI     C,0             ;Zero the timeout
     51A3   DB 83         2771   RCVMS3:  IN      CPATTN          ;Check CPU Attention
     51A5   1F            2772            RAR                     ;Is it set
     51A6   D2 51B0       2773            JNC     RCVMS4          ;Jump if clear
     51A9   0D            2774            DCR     C               ;Decrement the timeout
     51AA   C2 51A3       2775            JNZ     RCVMS3          ;Loop if not zero
     51AD   CD 5D5E       2776            CALL    COMERR          ;Comm error
     51B0   DB 80         2777   RCVMS4:  IN      READ            ;Get the Data
     51B2   D3 A9         2778            OUT     CLRACK          ;Drop Console Ack
```

```
Error Addr  Code          Seq   Source statement

     51B4   77            2779          MOV     M,A             ;Store the Data
     51B5   23            2780          INX     H               ;Bump the pointer
     51B6   05            2781          DCR     B               ;Decrement the count
     51B7   C2 518C       2782          JNZ     RCVMS5          ;If not zero, do it again
     51BA   E1            2783          POP     H               ;Get the address of the first byte of storage
     51BB   7E            2784          MOV     A,M             ;Get the success code byte
     51BC   A7            2785          ANA     A               ;Is it 0?
     51BD   C8            2786          RZ                      ;Leave if it is
     51BE   CD 5D46       2787          CALL    MEMERR          ;Error if not
                          2788
                          2789
     51C1   FE 04         2790  MEMEXM: CPI     4               ;Check for M space
     51C3   CC 53BA       2791          CZ      MCHECK          ;Leave if it is
     51C6   CD 5373       2792          CALL    MAKMOD          ;Go build the EDMOD byte
     51C9   CD 537D       2793          CALL    ITEST           ;Go see if we need to alter the modifier byte
     51CC   CD 514B       2794          CALL    SNDMSX          ;Tell the CPU what we want
     51CF   CD 53A2       2795          CALL    ICHECK          ;Go see if this is I space Console address
     51D2   CD 5186       2796          CALL    RCVMSX          ;Go get the reply
     51D5   21 71BC       2797          LXI     H,EDDATA        ;Destination
     51D8   11 71C6       2798          LXI     D,RCVDAT        ;Source
     51DB   CD 00F9       2799          CALL    COPY            ;Go move the data
     51DE   AF            2800          XRA     A               ;Make sure the rest of the compares will fail
     51DF   C9            2801          RET                     ;Go back
                          2802
                          2803
     51E0   3A 71B9       2804  MICEXM: LDA     EDADDR+1        ;Get the second byte
     51E3   FE FF         2805          CPI     0FFH            ;See if the address specified is I/O
     51E5   CA 51F1       2806          JZ      EXMIO           ;Go examine the I/O area
     51E8   2A 71B8       2807          LHLD    EDADDR          ;Get the address
     51EB   7E            2808          MOV     A,M             ;Get the data
     51EC   32 71BC       2809          STA     EDDATA          ;Put it away
     51EF   AF            2810          XRA     A               ;Make sure the next inline compare fails
     51F0   C9            2811          RET                     ;Go back
                          2812
     51F1   3A 71B8       2813  EXMIO:  LDA     EDADDR          ;Get the address
     51F4   32 51F8       2814          STA     IOARG2+1        ;Modify I stream
     51F7   DB 84         2815  IOARG2: IN      UPC14           ;Dummy address
     51F9   32 71BC       2816          STA     EDDATA          ;Save the data
     51FC   AF            2817          XRA     A               ;Force miscompare for next inline compare
     51FD   C9            2818          RET                     ;Leave
                          2819
                          2820
     51FE   2A 71B8       2821  WCSEXM: LHLD    EDADDR          ;Get the Address to be examined
     5201   D3 A7         2822          OUT     DISMEM          ;Turn off memory
     5203   CD 521F       2823          CALL    WCSEX1          ;Call the subroutine part of this
     5206   D3 A6         2824          OUT     ENBMEM          ;Turn memory back on
     5208   2A 41A7       2825          LHLD    NOPBUF          ;Get the low two bytes
     520B   22 71BC       2826          SHLD    EDDATA          ;Store them
     520E   3A 41A9       2827          LDA     NOPBUF+2        ;Get the High byte
     5211   32 71BE       2828          STA     EDDATA+2        ;Save it also
```

```
Error Addr  Code          Seq   Source statement

     5214   3A 4196       2829           LDA     CLKFLG          ;Get the Clock Flag
     5217   1F            2830           RAR                     ;Is it set?
     5218   D2 521D       2831           JNC     WCSEX2          ;Leave if not set
     521B   D3 21         2832           OUT     SETCLK          ;Else set the clocks
     521D   AF            2833   WCSEX2: XRA     A               ;Fake any more inline compares
     521E   C9            2834           RET                     ;Leave
                          2835
     521F   22 41AA       2836   WCSEX1: SHLD    SWAP            ;Put the address into the Swap buffer
     5222   D3 20         2837           OUT     CLRCLK          ;Stop the CPU Clock
     5224   21 41AA       2838           LXI     H,SWAP          ;Point to the Swap buffer
     5227   CD 49D1       2839           CALL    LDUPC           ;Go load it into the UPC
     522A   CD 4993       2840           CALL    WRTNOP          ;Go write a NOP
     522D   D3 A1         2841           OUT     DISPAR          ;Turn off parity
     522F   D3 23         2842           OUT     SETSS           ;Single Step the machine to get the contents
     5231   D3 22         2843           OUT     CLRSS           ;of the WCS location specified into the CSR
     5233   CD 49A7       2844           CALL    LDCSR1          ;Put the WCS data into the NOPBUF and
                          2845                                   ;the old CSR back into the CSR
     5236   CD 49D4       2846           CALL    LDUPC1          ;Put the old UPC back.
     5239   C9            2847           RET                     ;Leave
                          2848
                          2849
                          2850
                          2851
                          2852
                          2853
     523A   21 7450       2854   EXTYPE: LXI     H,CODTAB        ;Get the base address of this table into HL
     523D   3A 71B5       2855           LDA     ADRSPC          ;Get the Address Space byte
     5240   4F            2856           MOV     C,A             ;Put it in C
     5241   06 00         2857           MVI     B,0             ;Clear B
     5243   09            2858           DAD     B               ;Add it to HL
     5244   7E            2859           MOV     A,M             ;Index into the Code TAble
     5245   32 7225       2860           STA     OUTLET          ;This is the ASCII letter of the Address Space
     5248   06 04         2861           MVI     B,04            ;Count for converting Hex to ASCII
     524A   21 71C9       2862           LXI     H,RCVDAT+3      ;Point to the high byte of the data
     524D   79            2863           MOV     A,C             ;Retrieve the Address Space
     524E   FE 02         2864           CPI     02              ;Is it virtual?
     5250   CA 5256       2865           JZ      SKP11           ;Jump if it is
     5253   21 71BF       2866           LXI     H,EDDATA+3      ;Point here if it isn't
     5256   11 7230       2867   SKP11:  LXI     D,OUTDAT        ;Point to the Output Data Buffer
     5259   CD 5DBD       2868           CALL    HEXASC          ;Call the Hex to ASCII routine
     525C   06 04         2869           MVI     B,04            ;Prime the count again
     525E   11 7227       2870           LXI     D,OUTADR        ;Point to the Output address buffer
     5261   CD 5DBD       2871           CALL    HEXASC          ;Go convert the Address from Hex to ASCII
     5264   CD 526C       2872           CALL    SUPRES          ;Go suppress leading zeros as necessary
     5267   21 7224       2873           LXI     H,OUTBUF        ;Point to the Output Buffer
     526A   F7            2874           RST     6               ;Go print the Output Buffer
     526B   C9            2875           RET                     ;Leave
                          2876
                          2877
                          2878
```

```
Error Addr  Code          Seq   Source statement

     526C   3A 71B5       2879  SUPRES: LDA     ADRSPC          ;Get the Address Space
     526F   FE 04         2880          CPI     04              ;Check for P,V or G Spaces
     5271   D2 5289       2881          JNC     NOTPVG          ;Jump if not
     5274   3A 71B4       2882          LDA     DATLEN          ;Get the Data Length
     5277   FE 40         2883          CPI     040H            ;Is it Byte?
     5279   C2 5281       2884          JNZ     NOTBYT          ;Jump if not
     527C   06 06         2885  SUPRS6: MVI     B,06            ;Let's clear the upper 6 nibbles
     527E   C3 5293       2886          JMP     MAKSPC          ;Go put spaces there
     5281   FE 80         2887  NOTBYT: CPI     080H            ;Is it word?
     5283   C0            2888          RNZ                     ;If longword, leave it alone
     5284   06 04         2889  SUPRS4: MVI     B,04            ;Count for MAKSPC
     5286   C3 5293       2890          JMP     MAKSPC          ;Go put spaces in the upper word
     5289   FE 06         2891  NOTPVG: CPI     06              ;Is it I or M?
     528B   DA 529E       2892          JC      UPCTST          ;See if we are dealing with the UPC
     528E   CA 527C       2893          JZ      SUPRS6          ;Go suppress 6 digits if it is the 8085 RAM
     5291   06 02         2894          MVI     B,02            ;Suppress 2 digits because it is the WCS
                          2895
     5293   21 7230       2896  MAKSPC: LXI     H,OUTDAT        ;Point to the data to be printed
     5296   36 20         2897  MKSPC1: MVI     M,020H          ;Send a space to the output buffer
     5298   23            2898          INX     H               ;Bump the pointer
     5299   05            2899          DCR     B               ;Decrement the count
     529A   C2 5296       2900          JNZ     MKSPC1          ;Loop if not done
     529D   C9            2901          RET                     ;Leave
                          2902
     529E   FE 04         2903  UPCTST: CPI     04              ;See if it is M space
     52A0   C0            2904          RNZ                     ;Leave if not
     52A1   21 71B8       2905          LXI     H,EDADDR        ;Point to the low byte of the address
     52A4   3E 01         2906          MVI     A,01            ;Put a 1 in A
     52A6   BE            2907          CMP     M               ;Is the low byte of the address a 1?
     52A7   C0            2908          RNZ                     ;Leave if not the same
     52A8   23            2909          INX     H               ;Bump the pointer
     52A9   BE            2910          CMP     M               ;See if the next byte is a one
     52AA   C8            2911          RZ                      ;Leave if it is
     52AB   C3 5284       2912          JMP     SUPRS4          ;Go suppress 4 characters
                          2913
                          2914
                          2915
                          2916
                          2917
                          2918  ;DECODX is used by Examine and Deposit to figure out what the
                          2919  ;switches are saying to do.  Incrementing and decrementing the address
                          2920  ;and most of the preparation of the packet for transmission to the
                          2921  ;base machine are performed by routines called from DECODX.
                          2922
     52AE   21 71B5       2923  DECODX: LXI     H,ADRSPC        ;Point the to the address space byte
     52B1   01 71B3       2924          LXI     B,NEWAS         ;Point to the New Address space
     52B4   0A            2925          LDAX    B               ;Get it
     52B5   E6 0F         2926          ANI     0FH             ;Check for new A.S.=DEFAULT
     52B7   CA 52D5       2927          JZ      DFAULT          ;If no new A.S. Qualifier, go check old
     52BA   77            2928  REENTR: MOV     M,A             ;Update the Address Space byte
```

```
Error Addr  Code          Seq   Source statement

     52BB   FE 03        2929           CPI     03H             ;Is A.S. less than or equal 03H?
     52BD   DA 52E8      2930           JC      PHYVIR          ;If less than, must be a physical or
                         2931                                   ;virtual reference.  (The console doesn't
                         2932                                   ;care which.)
     52C0   CA 5355      2933           JZ      GFLOW           ;If equal, must be a GPR reference
     52C3   FE 04        2934           CPI     04H             ;Else, check for M registers
     52C5   CA 536D      2935           JZ      MFLOW           ;If equal, go service it
     52C8   FE 05        2936           CPI     05H             ;Else, check for I registers
     52CA   CA 5367      2937           JZ      IFLOW           ;If equal, go service it
     52CD   FE 06        2938           CPI     06H             ;Else, check for 8085 RAM SPACE
     52CF   CA 5361      2939           JZ      UFLOW           ;If equal, jump
     52D2   C3 535B      2940           JMP     CFLOW           ;Else, go to the WCS Space flows.
                         2941
                         2942
                         2943
                         2944   ;DFAULT is entered when the new Qualifier equals 0.  This means there is
                         2945   ;no new Address Space.  The old Qualifier
                         2946   ;is checked and if it also equals 0 the code defaults to PHYVIR.
                         2947
     52D5   7E           2948   DFAULT: MOV     A,M             ;Get the Address Space byte
     52D6   E6 0F        2949           ANI     0FH             ;See if anything there
     52D8   CA 52E8      2950           JZ      PHYVIR          ;If no old A.S.,default to PHYVIR
     52DB   02           2951           STAX    B               ;If there is an old A.S., copy it to NEWAS
     52DC   C3 52BA      2952           JMP     REENTR          ;Now go decode it
                         2953
                         2954
                         2955   ;       This subroutine is used to handle the   address space.  This address
                         2956   ;space indicates that the last data  is to be used as the current address.
                         2957
                         2958
     52DF   21 71B8      2959   ATFLOW: LXI     H,EDADDR        ;Point to the Examine/Deposit Address buffer
     52E2   11 71BC      2960           LXI     D,EDDATA        ;Point to the Examine/Deposit Data buffer
     52E5   C3 00F9      2961           JMP     COPY            ;Go copy
                         2962
                         2963
                         2964
                         2965
     52E8   3A 7213      2966   PHYVIR: LDA     FLAGS           ;Get the Flags
     52EB   E6 02        2967           ANI     AFLAG           ;See if any Address was specified
     52ED   CC 5305      2968           CZ      UPPREP          ;If no new address specifier, assume increment
     52F0   3A 7214      2969           LDA     FLAGS1          ;Else, get the  ,*,+,- Flags
     52F3   1F           2970           RAR                     ;Is the + Flag set?
     52F4   DC 5305      2971           CC      UPPREP          ;If it is, go see about the D.L.
     52F7   1F           2972           RAR                     ;Is the - Flag set
     52F8   DC 5329      2973           CC      DNPREP          ;If it is, go see about the D.L.
     52FB   3A 71B2      2974   MERGE:  LDA     NEWDL           ;Get the New Data Length
     52FE   E6 F0        2975           ANI     0F0H            ;Is it the D.L. Default?
     5300   C8           2976           RZ                      ;Leave if new=default
     5301   32 71B4      2977           STA     DATLEN          ;Update Data Length byte if new is not default
     5304   C9           2978           RET                     ;Leave
```

```
Error Addr  Code          Seq   Source statement

                          2979
                          2980
                          2981  ;*****************************************************************
                          2982  ;
                          2983  ;       UPPREP,FOURUP,TWOUP,ONEUP
                          2984  ;
                          2985  ;       This code figures out how much to add to the address.  It then points
                          2986  ; to the correct amount and jumps to a subroutine that will add it for us.
                          2987  ; The return at the end of that subroutine will send us back to the caller
                          2988  ;
    5305   3A 71B4        2989  UPPREP: LDA     DATLEN          ;Get the old data length
    5308   E6 F0          2990          ANI     0F0H            ;Check for default
    530A   CA 5317        2991          JZ      FOURUP          ;If it was default, go add four to the address
    530D   FE 80          2992          CPI     080H            ;Else, check for Word
    530F   CA 531D        2993          JZ      TWOUP           ;If it was Word, go add two to the address
    5312   FE 40          2994          CPI     040H            ;Else, check for Byte
    5314   CA 5323        2995          JZ      ONEUP           ;If it was Byte, go add one to the address
    5317   01 718E        2996  FOURUP: LXI     B,POS4          ;Else, add four because it must be Long
    531A   C3 624E        2997          JMP     ADDADR          ;Go add the proper amount
                          2998
    531D   01 718A        2999  TWOUP:  LXI     B,POS2          ;Add two
    5320   C3 624E        3000          JMP     ADDADR          ;Go add it
                          3001
    5323   01 7186        3002  ONEUP:  LXI     B,POS1          ;Add one
    5326   C3 624E        3003          JMP     ADDADR          ;Go add it
                          3004  ;
                          3005  ;*****************************************************************
                          3006
                          3007
                          3008
                          3009  ;*****************************************************************
                          3010  ;
                          3011  ;       DNPREP,FOURDN,TWODN,ONEDN
                          3012  ;
                          3013  ;       DNPREP figures out which constant to point to and jumps as neccessary
                          3014  ; to code that loads up a pointer to the correct constant.  Then a jump is made
                          3015  ; to the ADDADR subroutine which will add the constant in and perform the return
                          3016  ; for us.
                          3017  ;
    5329   3A 71B2        3018  DNPREP: LDA     NEWDL           ;Get the new Data Length byte
    532C   E6 F0          3019          ANI     0F0H            ;Check if default
    532E   C2 5339        3020          JNZ     DNPRE1          ;Jump if not default
    5331   3A 71B4        3021          LDA     DATLEN          ;Get the old Data Length byte
    5334   E6 F0          3022          ANI     0F0H            ;Is it 0?
    5336   CA 5343        3023          JZ      FOURDN          ;If it is, prepare to subtract 4
    5339   FE 80          3024  DNPRE1: CPI     080H            ;Is it Word?
    533B   CA 5349        3025          JZ      TWODN           ;If it is, go subtract two from the address
    533E   FE 40          3026          CPI     040H            ;Else, check for Byte
    5340   CA 534F        3027          JZ      ONEDN           ;If it is, go subtract one from the address
    5343   01 71A2        3028  FOURDN: LXI     B,NEG4          ;Point to negative 4
```

```
Error Addr  Code          Seq   Source statement

     5346   C3 624E      3029           JMP     ADDADR          ;Go add it
                         3030
     5349   01 719A      3031   TWODN:  LXI     B,NEG2          ;Point to negative 2
     534C   C3 624E      3032           JMP     ADDADR          ;Go add it in.
                         3033
     534F   01 7196      3034   ONEDN:  LXI     B,NEG1          ;Point to negative 1
     5352   C3 624E      3035           JMP     ADDADR          ;Go add it
                         3036   ;
                         3037   ;*****************************************************************
                         3038
                         3039
                         3040
     5355   01 7458      3041   GFLOW:  LXI     B,GPRCON        ;Address of the four byte mask to be anded
                         3042                                   ;with the contents of the address buffer.
     5358   C3 568A      3043           JMP     COMFIN          ;
                         3044
                         3045
     535B   01 7464      3046   CFLOW:  LXI     B,WCSCON        ;Point to the WCS constant
     535E   C3 568A      3047           JMP     COMFIN          ;Go to the Common routine
                         3048
                         3049
     5361   01 7468      3050   UFLOW:  LXI     B,UCON          ;Point to the 8085 constant
     5364   C3 568A      3051           JMP     COMFIN          ;
                         3052
                         3053
     5367   01 745C      3054   IFLOW:  LXI     B,ICON          ;Point to the I constant
     536A   C3 568A      3055           JMP     COMFIN          ;Go to the Common finish
                         3056
     536D   01 7460      3057   MFLOW:  LXI     B,MCON          ;Load the pointer to the M constant
     5370   C3 568A      3058           JMP     COMFIN          ;Let Comfin do some of the work
                         3059
                         3060
     5373   21 71B4      3061   MAKMOD: LXI     H,DATLEN        ;Point to the Data Length
     5376   7E           3062           MOV     A,M             ;Get it
     5377   23           3063           INX     H               ;Point to the Address Space
     5378   B6           3064           ORA     M               ;OR it in
     5379   32 71B7      3065           STA     EDMOD           ;Put it in the Examine/Deposit Mod byte
     537C   C9           3066           RET                     ;Leave
                         3067
                         3068   ;*****************************************************************
                         3069   ;
     537D   3A 71B5      3070   ITEST:  LDA     ADRSPC          ;Get the address space
     5380   FE 05        3071           CPI     5               ;See if I space is specified
     5382   C0           3072           RNZ                     ;Leave if not I space
     5383   21 7223      3073           LXI     H,IFLAG         ;Point to the I flag
     5386   36 01        3074           MVI     M,1             ;Set to inhibit SETATN while in PM
     5388   21 71B7      3075   ITEST1: LXI     H,EDMOD         ;Point to the EDPACK modifier byte
     538B   7E           3076           MOV     A,M             ;Get it
     538C   E6 F7        3077           ANI     0F7H            ;Clear the MSB of the low nibble
     538E   77           3078           MOV     M,A             ;Send it back out
```

```
Error Addr  Code          Seq   Source statement

     538F   23           3079            INX     H               ;Bump pointer to EDADDR
     5390   7E           3080            MOV     A,M             ;Get the address
     5391   FE 18        3081            CPI     18H             ;Check for low limit of Console Domain I space
     5393   D8           3082            RC                      ;Leave if below Console I space low address
     5394   FE 24        3083            CPI     24H             ;Check for high limit
     5396   DA 539C      3084            JC      ITEST2          ;Jump if at or below high limit
     5399   FE 37        3085            CPI     37H             ;Check the one address not in the range
     539B   C0           3086            RNZ                     ;Leave with non-Console I space mod in EDMOD
     539C   2B           3087    ITEST2: DCX     H               ;Point back to EDMOD
     539D   7E           3088            MOV     A,M             ;Get the modifier byte
     539E   F6 08        3089            ORI     8H              ;Set the MSB of the low nibble
     53A0   77           3090            MOV     M,A             ;Put it back
     53A1   C9           3091            RET                     ;Leave
                         3092
                         3093
     53A2   3A 71B7      3094    ICHECK: LDA     EDMOD           ;Get the modifier byte
     53A5   E6 0F        3095            ANI     0FH             ;Save the low nibble
     53A7   FE 0D        3096            CPI     0DH             ;See if Console domain I space is specified
     53A9   C0           3097            RNZ                     ;Leave if not
     53AA   06 00        3098            MVI     B,0             ;Otherwise, set up a timeout count
     53AC   04           3099    ICHEC1: INR     B               ;Bump the time out count
     53AD   CC 5D5E      3100            CZ      COMERR          ;Time out error if = 0
     53B0   DB 83        3101            IN      CPATTN          ;Get the the CPU attention bit
     53B2   1F           3102            RAR                     ;Put it in the carry
     53B3   D2 53AC      3103            JNC     ICHEC1          ;Loop back if not set
     53B6   CD 6558      3104            CALL    CPSERV          ;Go service the CPU
     53B9   C9           3105            RET                     ;We should not return here but one level
                         3106                                    ;higher instead
                         3107    ;
                         3108    ;*********************************************************************
                         3109
                         3110
                         3111    ;*********************************************************************
                         3112    ;
     53BA   E1           3113    MCHECK: POP     H               ;Put the return address in HL temporarily
     53BB   3A 71B9      3114            LDA     EDADDR+1        ;Get the second byte of the address
     53BE   FE 01        3115            CPI     01              ;Is it a one?
     53C0   CA 549E      3116            JZ      EDLS            ;Go to the code that handles LS
     53C3   3A 71B8      3117            LDA     EDADDR          ;Get the low byte of the address
     53C6   FE 20        3118            CPI     020H            ;Look for a Q register access
     53C8   CA 54FA      3119            JZ      EDQ             ;Jump if it is
     53CB   FE 10        3120            CPI     010H            ;Check for less than 10 hex
     53CD   D2 5517      3121            JNC     EDWR            ;Should be a Working Register access
     53D0   FE 01        3122            CPI     UPCADR          ;Is it the UPC?
     53D2   CA 5481      3123            JZ      UPCCHK          ;If it is, go check for Examine or Deposit
     53D5   FE 04        3124            CPI     04              ;Check for the address to flip uword parity
     53D7   CA 543D      3125            JZ      FLIP            ;Go flip the MSB of the uword
     53DA   FE 05        3126            CPI     05              ;Look for the Enable/Disable Parity address
     53DC   CA 540E      3127            JZ      EDPAR           ;Jump if it is
     53DF   FE 06        3128            CPI     06              ;Look for CPU CSR address
```

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Error Addr  Code          Seq   Source statement

     53E1   CA 53E5       3129          JZ      EDCSR           ;Jump if it is
     53E4   E9            3130          PCHL                    ;Return if address wasn't one the 8085 handles
                          3131
     53E5   D3 20         3132  EDCSR:  OUT     CLRCLK          ;Turn off the CPU clock
     53E7   D3 A7         3133          OUT     DISMEM          ;Turn off Main Memory
     53E9   CD 4993       3134          CALL    WRTNOP          ;This will get the contents of the CSR into the
                          3135                                  ;NOPBUF
     53EC   21 41A7       3136          LXI     H,NOPBUF        ;Point to the NOP Buffer
     53EF   11 71BC       3137          LXI     D,EDDATA        ;Point to the data
     53F2   06 03         3138          MVI     B,3             ;Set up the proper count
     53F4   3A 71B6       3139          LDA     EDPACK          ;Find out if it is Examine or Deposit
     53F7   FE 00         3140          CPI     EXMCOD          ;Try the Examine Code
     53F9   C2 53FD       3141          JNZ     EDCSR1          ;Jump if Deposit
     53FC   EB            3142          XCHG                    ;If Examine, change the direction of copying
     53FD   CD 00FB       3143  EDCSR1: CALL    COPY1           ;Change the contents of the NOPBUF if Deposit
     5400   CD 49A7       3144          CALL    LDCSR1          ;Go load it in
     5403   D3 A6         3145          OUT     ENBMEM          ;Turn on Main Memory
     5405   3A 4196       3146          LDA     CLKFLG          ;Check the clock flag
     5408   A7            3147          ANA     A               ;Is it set?
     5409   C8            3148          RZ                      ;Leave if not
     540A   D3 21         3149          OUT     SETCLK          ;Otherwise, turn it on
     540C   AF            3150          XRA     A               ;Fake out the inline compares
     540D   C9            3151          RET                     ;and then leave
                          3152
     540E   3A 71B6       3153  EDPAR:  LDA     EDPACK          ;Get the packet header to check for E or D
     5411   FE 00         3154          CPI     EXMCOD          ;Which is it?
     5413   CA 5435       3155          JZ      EXMPAR          ;Go examine the parity bit
     5416   3A 71BC       3156          LDA     EDDATA          ;Get the data
     5419   A7            3157          ANA     A               ;See if it is zero
     541A   CA 542A       3158          JZ      MFLOW1          ;Jump if it is
     541D   32 4197       3159          STA     PARFLG          ;Store the parity flag
     5420   D3 A0         3160          OUT     ENBPAR          ;Turn on Halt on Parity
     5422   20            3161          RIM                     ;Read in the masks
     5423   F6 08         3162          ORI     08H             ;Set the MSE
     5425   E6 0D         3163          ANI     0DH             ;Clear the RST 6.5 mask
     5427   30            3164          SIM                     ;Write the masks
     5428   AF            3165          XRA     A               ;Fake out the inline compares
     5429   C9            3166          RET                     ;Leave
     542A   32 4197       3167  MFLOW1: STA     PARFLG          ;Store the parity flag
     542D   D3 A1         3168          OUT     DISPAR          ;Turn off halt on parity
     542F   20            3169          RIM                     ;Get the masks
     5430   F6 0A         3170          ORI     0AH             ;Set the MSE and RST 6.5 mask
     5432   30            3171          SIM                     ;Write the masks
     5433   AF            3172          XRA     A               ;Fake out the inline compares
     5434   C9            3173          RET                     ;Leave
                          3174
     5435   3A 4197       3175  EXMPAR: LDA     PARFLG          ;Get the parity flag
     5438   32 71BC       3176          STA     EDDATA          ;Store it in the right place
     543B   AF            3177          XRA     A               ;Fake out the inline compares
     543C   C9            3178          RET                     ;Leave
```

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Error Addr  Code          Seq   Source statement

                          3179
                          3180
                          3181
     543D   3A 71B6       3182  FLIP:   LDA     EDPACK          ;Check the code
     5440   FE 01         3183          CPI     DEPCOD          ;Is this a deposit?
     5442   C4 5D1E       3184          CNZ     SYNERR          ;Error if not
     5445   D3 A7         3185          OUT     DISMEM          ;Turn off memory
     5447   2A 71BC       3186          LHLD    EDDATA          ;Get the address
     544A   CD 521F       3187          CALL    WCSEX1          ;Go use this subroutine
     544D   2A 71BC       3188          LHLD    EDDATA          ;Get the UPC examine address
     5450   22 41AA       3189          SHLD    SWAP            ;Put the corrected one back
     5453   3A 41A9       3190          LDA     NOPBUF+2        ;Get the bit to be flipped
     5456   17            3191          RAL                     ;Put it in the carry
     5457   3F            3192          CMC                     ;Flip it
     5458   1F            3193          RAR                     ;Put it back
     5459   32 416C       3194          STA     TEMP1+2         ;Restore the byte
     545C   2A 41A7       3195          LHLD    NOPBUF          ;Get the low two bytes
     545F   22 416A       3196          SHLD    TEMP1           ;Store them
     5462   CD 4993       3197          CALL    WRTNOP          ;Go write a NOP again
     5465   CD 49D4       3198          CALL    LDUPC1          ;Go write the address again
     5468   21 416A       3199          LXI     H,TEMP1         ;Point to the storage area
     546B   CD 5D05       3200          CALL    WRTWCS          ;Go write the data
     546E   CD 49D4       3201          CALL    LDUPC1          ;Restore the original UPC
     5471   CD 49A7       3202          CALL    LDCSR1          ;Restore the original CSR
     5474   D3 A6         3203          OUT     ENBMEM          ;Turn memory back on
     5476   3A 4196       3204          LDA     CLKFLG          ;Get the Clock Flag
     5479   1F            3205          RAR                     ;Is it set?
     547A   D2 547F       3206          JNC     FLIP1           ;Skip setting the clock
     547D   D3 21         3207          OUT     SETCLK          ;Turn the clock on
     547F   AF            3208  FLIP1:  XRA     A               ;Fake out the inline compares
     5480   C9            3209          RET                     ;Leave
                          3210
                          3211
     5481   3A 71B6       3212  UPCCHK: LDA     EDPACK          ;Get the command
     5484   FE 00         3213          CPI     EXMCOD          ;Is this an Examine?
     5486   CA 566B       3214          JZ      UPCEXM          ;If it is, jump
     5489   D3 20         3215          OUT     CLRCLK          ;Stop the Base Machine Clock
     548B   AF            3216          XRA     A               ;Make a 0
     548C   32 4196       3217          STA     CLKFLG          ;Turn off the Clock flag
     548F   D3 A7         3218          OUT     DISMEM          ;Turn off memory
     5491   CD 4993       3219          CALL    WRTNOP          ;Write a NOP into the CSR
     5494   21 71BC       3220          LXI     H,EDDATA        ;Point to the Data for the new UPC
     5497   CD 49D1       3221          CALL    LDUPC           ;Write the new UPC
     549A   D3 A6         3222          OUT     ENBMEM          ;Turn memory back on
     549C   AF            3223          XRA     A               ;Fake out the inline compares
     549D   C9            3224          RET                     ;Leave
                          3225
     549E   CD 555B       3226  EDLS:   CALL    BEFORE          ;Go prep things
     54A1   3A 71B6       3227          LDA     EDPACK          ;Get the the packet header
     54A4   FE 00         3228          CPI     EXMCOD          ;Is this an Examine?
```

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Error Addr  Code          Seq   Source statement

     54A6   CA 54D1       3229           JZ      EXMLS          ;Go examine the LS specified
     54A9   11 71BC       3230           LXI     D,EDDATA       ;Point to the data
     54AC   CD 55CA       3231           CALL    WRTWRZ         ;Go write it to WR 0
     54AF   21 7472       3232           LXI     H,SHFBUF       ;Point to the shift buffer
     54B2   11 747D       3233           LXI     D,WRNLSN       ;Point to the LSn to WRn uword
     54B5   06 03         3234           MVI     B,03           ;Set up count for copying
     54B7   CD 00FB       3235           CALL    COPY1          ;Go copy it
     54BA   2B            3236           DCX     H              ;Decrement the pointer twice so it will
     54BB   2B            3237           DCX     H              ;point to the second byte of the shift buffer
     54BC   3A 71B8       3238           LDA     EDADDR         ;Get the LS address
     54BF   77            3239           MOV     M,A            ;Store it in the second byte
     54C0   2B            3240           DCX     H              ;Point to the low byte once again
     54C1   E5            3241           PUSH    H              ;Save the address
     54C2   0E 03         3242           MVI     C,03           ;Set up the count
     54C4   37            3243           STC                    ;Set the carry
     54C5   CD 4A00       3244           CALL    LSHIFT         ;Go shift left one bit
     54C8   D1            3245           POP     D              ;Put the address in DE
     54C9   CD 5649       3246   DEPLS1: CALL    EXECUT         ;Go do the instruction
     54CC   CD 557C       3247   DEPLS2: CALL    AFTER          ;Clean up to leave
     54CF   AF            3248           XRA     A              ;Fake out the inline compares back in Deposit
     54D0   C9            3249           RET                    ;Leave
                          3250
     54D1   21 7472       3251   EXMLS:  LXI     H,SHFBUF       ;Point to the Shift buffer
     54D4   11 747A       3252           LXI     D,LSNWRN       ;Point to the LSn to WRn uword
     54D7   06 03         3253           MVI     B,03           ;Count for copying
     54D9   CD 00FB       3254           CALL    COPY1          ;Go copy
     54DC   3A 71B8       3255           LDA     EDADDR         ;Get the address
     54DF   21 7473       3256           LXI     H,SHFBUF+1     ;Point to the second byte
     54E2   77            3257           MOV     M,A            ;Put the address here
     54E3   2B            3258           DCX     H              ;Point to the low byte once again
     54E4   E5            3259           PUSH    H              ;Save the address
     54E5   0E 03         3260           MVI     C,03           ;Number of bytes to shift accross
     54E7   37            3261           STC                    ;Set the carry
     54E8   CD 4A00       3262           CALL    LSHIFT         ;Go shift the 3 bytes
     54EB   D1            3263           POP     D              ;Put the address in DE
     54EC   CD 5649       3264   EXMLS1: CALL    EXECUT         ;Go do this instruction
     54EF   21 71BF       3265           LXI     H,EDDATA+3     ;Point to the Buffer for the data
     54F2   CD 55A4       3266           CALL    RDWRZ          ;Go read WR 0
     54F5   CD 557C       3267           CALL    AFTER          ;Clean up before leaving
     54F8   AF            3268           XRA     A              ;Fake out the inline compares back in Examine
     54F9   C9            3269           RET                    ;Leave
                          3270
     54FA   CD 555B       3271   EDQ:    CALL    BEFORE         ;Go set some things up
     54FD   3A 71B6       3272           LDA     EDPACK         ;Get the header byte of the packet
     5500   FE 00         3273           CPI     EXMCOD         ;Is this an examine?
     5502   CA 5511       3274           JZ      EXAMQ          ;Jump if it is
     5505   11 71BC       3275           LXI     D,EDDATA       ;Point to the deposit data
     5508   CD 55CA       3276           CALL    WRTWRZ         ;Go write it to WR 0
     550B   11 7489       3277           LXI     D,WRTOQ        ;Send it from WR 0 to Q
     550E   C3 54C9       3278           JMP     DEPLS1         ;Go clean things up
```

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Error Addr  Code          Seq   Source statement

                          3279
     5511   11 7486       3280  EXAMQ:  LXI     D,QTOWR         ;Point to the Q to WR 0 uword
     5514   C3 54EC       3281          JMP     EXMLS1          ;Go clean things up
                          3282
     5517   AF            3283  EDWR:   XRA     A               ;Make a zero
     5518   32 7478       3284          STA     SOURCE          ;Zero the source location
     551B   32 7479       3285          STA     DEST            ;Zero the destination location
     551E   CD 555B       3286          CALL    BEFORE          ;Go save some things
     5521   3A 71B6       3287          LDA     EDPACK          ;Get the header byte of the packet
     5524   FE 00         3288          CPI     EXMCOD          ;Is this an examine?
     5526   CA 554F       3289          JZ      EXMWR           ;Jump if it is
     5529   3A 71B8       3290          LDA     EDADDR          ;Check for WR 0 address
     552C   FE 10         3291          CPI     010H            ;This is WR 0 address
     552E   CA 5543       3292          JZ      DEPWR0          ;Go to some special code
     5531   11 71BC       3293          LXI     D,EDDATA        ;Point to the data to be deposited
     5534   CD 55CA       3294          CALL    WRTWRZ          ;Go write WR 0
     5537   3A 71B8       3295          LDA     EDADDR          ;Get the address
     553A   32 7479       3296          STA     DEST            ;Put it here
     553D   CD 5604       3297          CALL    MAKEWR          ;Go make the WR 0 to WRn uword
     5540   C3 54C9       3298          JMP     DEPLS1          ;Go clean things up
                          3299
     5543   21 746E       3300  DEPWR0: LXI     H,WRZBUF        ;Point to the WR 0 buffer
     5546   11 71BC       3301          LXI     D,EDDATA        ;Point to the deposit data
     5549   CD 00F9       3302          CALL    COPY            ;Copy it over
     554C   C3 54CC       3303          JMP     DEPLS2          ;This will write WR 0 and clean things up
                          3304
     554F   3A 71B8       3305  EXMWR:  LDA     EDADDR          ;Get the address
     5552   32 7478       3306          STA     SOURCE          ;Put it here
     5555   CD 5604       3307          CALL    MAKEWR          ;Go make the WRn to WR 0 uword
     5558   C3 54EC       3308          JMP     EXMLS1          ;Go clean things up
                          3309
     555B   D3 A7         3310  BEFORE: OUT     DISMEM          ;Turn off memory
     555D   D3 20         3311          OUT     CLRCLK          ;Stop the clock
     555F   D3 A1         3312          OUT     DISPAR          ;Turn off Halt on parity error
     5561   21 4197       3313          LXI     H,PARFLG        ;Point to the Parity Flag
     5564   7E            3314          MOV     A,M             ;Get it
     5565   36 00         3315          MVI     M,0             ;Zero the PARFLG byte
     5567   23            3316          INX     H               ;Point to a temp for it
     5568   77            3317          MOV     M,A             ;Put it here
     5569   21 41AA       3318          LXI     H,SWAP          ;Point to the swapping buffer
     556C   CD 49D1       3319          CALL    LDUPC           ;Go get the UPC
     556F   21 41A4       3320          LXI     H,CSRBUF        ;Point to the CSR buffer
     5572   CD 49A4       3321          CALL    LDCSR           ;Go get the current CSR
     5575   21 7471       3322          LXI     H,WRZBUF+3      ;Storage for WR 0
     5578   CD 55A4       3323          CALL    RDWRZ           ;Go save WR 0
     557B   C9            3324          RET                     ;Leave
                          3325
     557C   11 746E       3326  AFTER:  LXI     D,WRZBUF        ;Point to the WR 0 buffer
     557F   CD 55CA       3327          CALL    WRTWRZ          ;Go write it
     5582   21 41A4       3328          LXI     H,CSRBUF        ;Point to where the old CSR is
```

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Error Addr  Code          Seq   Source statement

     5585   CD 49A4       3329           CALL    LDCSR           ;Go put it back
     5588   21 41AA       3330           LXI     H,SWAP          ;Get the old UPC
     558B   CD 49D1       3331           CALL    LDUPC           ;Put it back
     558E   3A 4196       3332           LDA     CLKFLG          ;See if the clock was going
     5591   1F            3333           RAR                     ;If this sets the carry, it was
     5592   D2 5597       3334           JNC     AFTER1          ;Jump if not
     5595   D3 21         3335           OUT     SETCLK          ;Otherwise, turn on the clock
     5597   D3 A6         3336   AFTER1: OUT     ENBMEM          ;Turn on memory
     5599   3A 4198       3337           LDA     PARTMP          ;Check for Parity being on
     559C   32 4197       3338           STA     PARFLG          ;Put the Parity Flag back where it belongs
     559F   1F            3339           RAR                     ;Will set the carry if it was
     55A0   D0            3340           RNC                     ;Leave if not
     55A1   D3 A0         3341           OUT     ENBPAR          ;Turn on Halt on Parity
     55A3   C9            3342           RET                     ;Now leave
                          3343
                          3344
     55A4   22 746C       3345   RDWRZ:  SHLD    PNTR2           ;Save the address here
     55A7   3E 04         3346           MVI     A,04            ;Set up a count
     55A9   32 7477       3347           STA     LPCNT2          ;Save it
     55AC   CD 5633       3348   RDWRZ1: CALL    WRROT8          ;Go rotate the WR 8 times
     55AF   11 7483       3349           LXI     D,WRCRR         ;Point to the U word that moves WR to CRR
     55B2   CD 5649       3350           CALL    EXECUT          ;Go do it
     55B5   2A 746C       3351           LHLD    PNTR2           ;Get the address
     55B8   DB 80         3352           IN      READ            ;Get the byte from the READ register
     55BA   77            3353           MOV     M,A             ;Store the byte
     55BB   2B            3354           DCX     H               ;Decrement the pointer
     55BC   22 746C       3355           SHLD    PNTR2           ;Save the updated address
     55BF   3A 7477       3356           LDA     LPCNT2          ;Get the loop count
     55C2   3D            3357           DCR     A               ;Decrement it
     55C3   C8            3358           RZ                      ;Leave if zero
     55C4   32 7477       3359           STA     LPCNT2          ;Save the new value
     55C7   C3 55AC       3360           JMP     RDWRZ1          ;Loop back
                          3361
     55CA   21 7472       3362   WRTWRZ: LXI     H,SHFBUF        ;Point to the shift buffer
     55CD   CD 00F9       3363           CALL    COPY            ;Copy the data over
     55D0   3E 20         3364           MVI     A,32            ;Set up a count
     55D2   32 7476       3365           STA     LPCNT1          ;Put it here
     55D5   11 748C       3366           LXI     D,CLRWR0        ;Point to a uword to clear WR 0
     55D8   CD 5649       3367           CALL    EXECUT          ;Go do it
     55DB   11 748F       3368           LXI     D,COMWR0        ;Point to a uword to complement WR 0
     55DE   CD 5649       3369           CALL    EXECUT          ;Go do it
     55E1   11 7492       3370   WRTWR1: LXI     D,ASLWR0        ;Point to this Uword just in case
     55E4   3A 7475       3371           LDA     SHFBUF+3        ;Get the high byte
     55E7   17            3372           RAL                     ;Check the carry
     55E8   D2 55EE       3373           JNC     WRTWR2          ;Jump if not set
     55EB   11 7495       3374           LXI     D,RTLWR0        ;Point to this uword
     55EE   CD 5649       3375   WRTWR2: CALL    EXECUT          ;Go do it
     55F1   0E 04         3376           MVI     C,04            ;Set up the number of bytes to shift accross
     55F3   21 7472       3377           LXI     H,SHFBUF        ;Point to where the data is
     55F6   CD 4A00       3378           CALL    LSHIFT          ;Go shift left one
```

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Error Addr  Code          Seq   Source statement

     55F9   3A 7476       3379           LDA     LPCNT1          ;Get the loop count
     55FC   3D            3380           DCR     A               ;Decrement it
     55FD   C8            3381           RZ                      ;Leave if zero
     55FE   32 7476       3382           STA     LPCNT1          ;Save the new value if not
     5601   C3 55E1       3383           JMP     WRTWR1          ;Loop back
                          3384
     5604   21 7472       3385   MAKEWR: LXI     H,SHFBUF        ;Point to the Shift Buffer
     5607   E5            3386           PUSH    H               ;Save the address
     5608   11 7480       3387           LXI     D,WRNWRN        ;Point to the U word to be worked on
     560B   06 03         3388           MVI     B,03            ;Count for copying
     560D   CD 00FB       3389           CALL    COPY1           ;Go copy it over
     5610   3A 7478       3390           LDA     SOURCE          ;Get the source
     5613   E6 03         3391           ANI     03              ;Mask off the unused bits
     5615   17            3392           RAL                     ;Rotate it left
     5616   17            3393           RAL                     ;Twice
     5617   47            3394           MOV     B,A             ;Save it for a bit
     5618   3A 7479       3395           LDA     DEST            ;Get the dest
     561B   E6 03         3396           ANI     03              ;Mask off unused bits
     561D   B0            3397           ORA     B               ;OR in the source
     561E   2B            3398           DCX     H               ;Decrement the pointer
     561F   2B            3399           DCX     H               ;Once more to point to the middle byte
     5620   77            3400           MOV     M,A             ;Load the second byte
     5621   23            3401           INX     H               ;Fix the address
     5622   CD 5627       3402           CALL    RSHF            ;Go shift right one
     5625   D1            3403           POP     D               ;Put the address in DE
     5626   C9            3404           RET                     ;Leave
                          3405
     5627   0E 03         3406   RSHF:   MVI     C,03            ;Prime the count
     5629   AF            3407           XRA     A               ;Clear the carrys
     562A   7E            3408   RSHF1:  MOV     A,M             ;GET BYTE
     562B   1F            3409           RAR                     ;
     562C   77            3410           MOV     M,A             ;PUT IT BACK
     562D   2B            3411           DCX     H               ;Decrement the pointer
     562E   0D            3412           DCR     C               ;Decrement the count
     562F   C2 562A       3413           JNZ     RSHF1           ;Loop if not done
     5632   C9            3414           RET                     ;Leave when done
                          3415
                          3416
                          3417
     5633   3E 08         3418   WRROT8: MVI     A,08            ;Set up the count
     5635   32 7476       3419           STA     LPCNT1          ;Store it
     5638   11 7495       3420   WRRT8X: LXI     D,RTLWR0        ;Point to the Rotate Left U word
     563B   CD 5649       3421           CALL    EXECUT          ;Go do it
     563E   3A 7476       3422           LDA     LPCNT1          ;Get the count
     5641   3D            3423           DCR     A               ;Decrement it
     5642   C8            3424           RZ                      ;Leave if done
     5643   32 7476       3425           STA     LPCNT1          ;Save the count
     5646   C3 5638       3426           JMP     WRRT8X          ;Loop until done
                          3427
                          3428
```

```
Error Addr  Code          Seq   Source statement

     5649   21 41A7       3429  EXECUT: LXI     H,NOPBUF        ;Point to the NOP buffer
     564C   22 41A2       3430          SHLD    PNTR1           ;Save the address
     564F   06 03         3431          MVI     B,03            ;Set up the count
     5651   CD 00FB       3432          CALL    COPY1           ;Go copy the data
     5654   21 41A7       3433          LXI     H,NOPBUF        ;Point to the U word
     5657   7E            3434          MOV     A,M             ;Get the low byte
     5658   23            3435          INX     H               ;Point to the middle byte
     5659   AE            3436          XRA     M               ;XOR it in
     565A   23            3437          INX     H               ;Point to the high byte
     565B   AE            3438          XRA     M               ;XOR it in
     565C   E2 5663       3439          JPO     EXE1            ;Jump on odd parity
     565F   7E            3440          MOV     A,M             ;Get the high byte if parity is even
     5660   F6 80         3441          ORI     080H            ;Set the MSB
     5662   77            3442          MOV     M,A             ;Put it back
     5663   CD 49A7       3443  EXE1:   CALL    LDCSR1          ;Go load up the CSR
     5666   D3 23         3444          OUT     SETSS           ;Clock the machine
     5668   D3 22         3445          OUT     CLRSS           ;Reset the clock
     566A   C9            3446          RET                     ;Leave
                          3447
                          3448
                          3449
     566B   D3 20         3450  UPCEXM: OUT     CLRCLK          ;Stop the Base machine clock
     566D   21 4168       3451          LXI     H,TMPBUF        ;Point to a temporary storage area
     5670   CD 49D1       3452          CALL    LDUPC           ;Go get the UPC
     5673   11 4168       3453          LXI     D,TMPBUF        ;Point to the Temp Buf again
     5676   21 71BC       3454          LXI     H,EDDATA        ;Destination address for the Data
     5679   CD 00F9       3455          CALL    COPY            ;Copy the Data over
     567C   CD 49D4       3456          CALL    LDUPC1          ;Restore the UPC
     567F   3A 4196       3457          LDA     CLKFLG          ;Get the Clock Flag
     5682   1F            3458          RAR                     ;Is the Clock Running Flag set
     5683   D2 5688       3459          JNC     UPCEX1          ;Leave if it isn't
     5686   D3 21         3460          OUT     SETCLK          ;Restart the Clock if set
     5688   AF            3461  UPCEX1: XRA     A               ;Fake out any subsequent inline compares
     5689   C9            3462          RET                     ;Leave
                          3463  ;
                          3464  ;*****************************************************************
                          3465
                          3466
                          3467  ;*****************************************************************
                          3468  ;
     568A   C5            3469  COMFIN: PUSH    B               ;Save the AND address for a while
     568B   3A 7213       3470          LDA     FLAGS           ;Going to check for an address
     568E   E6 02         3471          ANI     AFLAG           ;Is there an address?
     5690   CC 5323       3472          CZ      ONEUP           ;If no address, assume increment by one
     5693   3A 7214       3473          LDA     FLAGS1          ;Check the + and - Flags.
     5696   1F            3474          RAR                     ;Check the + Flag
     5697   DC 5323       3475          CC      ONEUP           ;If set, bump the address by one
     569A   1F            3476          RAR                     ;Check the - Flag.
     569B   DC 534F       3477          CC      ONEDN           ;If set, decrement the address by one
     569E   C1            3478          POP     B               ;Get the AND address pointer back
```

```
Error Addr  Code          Seq   Source statement

     569F   CD 56A5       3479           CALL    ANDADR          ;Save only the valid address bits
     56A2   C3 52FB       3480           JMP     MERGE           ;Go to some code that will do the work
                          3481   ;
                          3482   ;*****************************************************************************
                          3483
                          3484
                          3485
                          3486
     56A5   21 71B8       3487   ANDADR: LXI     H,EDADDR        ;Point to the address
     56A8   1E 04         3488           MVI     E,04H           ;Loop count
     56AA   0A            3489   ANDAD1: LDAX    B               ;Get the Mask
     56AB   A6            3490           ANA     M               ;AND it
     56AC   77            3491           MOV     M,A             ;Store it
     56AD   03            3492           INX     B               ;Bump the Mask pointer
     56AE   23            3493           INX     H               ;Bump the Address pointer
     56AF   1D            3494           DCR     E               ;Decrement the loop count
     56B0   C8            3495           RZ                      ;Leave if done
     56B1   C3 56AA       3496           JMP     ANDAD1          ;Else, do it again
                          3497
                          3498
                          3499
     56B4   3A 7217       3500   RTEST:  LDA     RFLAG           ;Get the R Flag
     56B7   1F            3501           RAR                     ;Is it set?
     56B8   D2 56BC       3502           JNC     RTEST1          ;Jump if not set
     56BB   E7            3503           RST     4               ;Go look for Control characters
                          3504                                   ;The return at the end of GETCHR will
                          3505                                   ;send us back to the command
     56BC   E1            3506   RTEST1: POP     H               ;Fix the stack (don't want to go back to the
                          3507                                   ;command)
     56BD   C9            3508           RET                     ;Leave
                          3509
                          3510
                          3511
                          3512   ;*****************************************************************************
                          3513   ;
     56BE   01 7215       3514   NTEST:  LXI     B,FLAGS2        ;Point to this flags byte
     56C1   0A            3515           LDAX    B               ;Get it
     56C2   A7            3516           ANA     A               ;See if the N Flag is set
     56C3   CA 56BC       3517           JZ      RTEST1          ;If not, we're done
     56C6   0B            3518           DCX     B               ;Point to Flags 1
     56C7   0A            3519           LDAX    B               ;Get a copy
     56C8   E6 03         3520           ANI     03H             ;Check for the - or + Flags
     56CA   C2 56D2       3521           JNZ     NTEST1          ;If either set, skip the next part
     56CD   0B            3522           DCX     B               ;Point back at Flags
     56CE   0A            3523           LDAX    B               ;Get them
     56CF   E6 FD         3524           ANI     0FDH            ;Get rid of the A flag
     56D1   02            3525           STAX    B               ;Store it
     56D2   21 720B       3526   NTEST1: LXI     H,NBUFFR+3      ;Check for 0 count
     56D5   7E            3527           MOV     A,M             ;Get one byte of the count
     56D6   2B            3528           DCX     H               ;Decrement the pointer
```

```
Error Addr  Code          Seq   Source statement

     56D7   B6            3529          ORA     M               ;OR in the next byte
     56D8   2B            3530          DCX     H               ;Decrement the pointer
     56D9   B6            3531          ORA     M               ;Get the next byte
     56DA   2B            3532          DCX     H               ;Decrement
     56DB   B6            3533          ORA     M               ;Next byte
     56DC   A7            3534          ANA     A               ;Is it Zero?
     56DD   01 7196       3535          LXI     B,NEG1          ;Set up to subtract one from the count
     56E0   C2 6251       3536          JNZ     ADDAD1          ;Jump if not zero
     56E3   E1            3537          POP     H               ;Fix up the stack
     56E4   AF            3538          XRA     A               ;Set the Z bit to indicate no errors
     56E5   C9            3539          RET                     ;Leave
                          3540    ;
                          3541    ;*****************************************************************************
                          3542
                          3543
                          3544
                          3545
                          3546
                          3547
                          3548    ;*****************************************************************************
                          3549    ;
                          3550    ;       Init Command and Init Subroutine
                          3551    ;
     56E6   CD 56F8       3552    INIT:   CALL    INISUB          ;Call this subroutine to do the work
     56E9   21 7498       3553            LXI     H,SPPACK        ;Point to this packet
     56EC   CD 514E       3554            CALL    SNDMSG          ;Send  it
     56EF   CD 5186       3555            CALL    RCVMSX          ;Get the reply
     56F2   CD 56B4       3556            CALL    RTEST           ;See if Repeat active
     56F5   C3 56E6       3557            JMP     INIT            ;If it is, do it again.
                          3558
     56F8   D3 AF         3559    INISUB: OUT     CLRHLT          ;Clear the Halt bit to the CPU
     56FA   D3 AD         3560            OUT     CLRPFI          ;Reset the power fail interrupt
     56FC   D3 2C         3561            OUT     CLRTMR          ;Stop the Interval Timer
     56FE   20            3562            RIM                     ;Get the interrupt masks
     56FF   F6 09         3563            ORI     9H              ;Set MSE and M5.5
     5701   30            3564            SIM                     ;Write the masks out
     5702   D3 A5         3565            OUT     CLRTIM          ;Clear the timer interrupt
     5704   CD 0055       3566            CALL    TPINIT          ;Go init the drive
     5707   21 0000       3567            LXI     H,0             ;Make a word of 0
     570A   22 7070       3568            SHLD    ISR             ;Zero the ISR and IPR
     570D   22 4168       3569            SHLD    TMPBUF          ;Clear out this buffer for use further down
     5710   AF            3570            XRA     A               ;Make a 0 in Reg. A
     5711   32 7222       3571            STA     BPHALT          ;Zero this flag
     5714   32 707C       3572            STA     ICCS            ;Zero the ICCS location
     5717   32 7072       3573            STA     RCVCSR          ;Zero the RAM based terminal CSR
     571A   32 707D       3574            STA     OLDRUN          ;Zero the OLD RUN bit
     571D   32 707E       3575            STA     ITSGL           ;and the Interval Timer SGL flag
     5720   32 7099       3576            STA     IMPXFR          ;and the Implied XFR flag
     5723   32 40D7       3577            STA     SPEND           ;Clear the ^S pending flag
     5726   32 40D8       3578            STA     QPEND           ;and the ^Q pending flag
```

```
Error Addr  Code          Seq   Source statement

     5729   21 7076      3579          LXI     H,XMTCSR        ;Point to the normal Xmit CSR
     572C   22 7078      3580          SHLD    XCSADR          ;Save the address here
     572F   23           3581          INX     H               ;Point to the normal Xmit DB
     5730   22 707A      3582          SHLD    XDBADR          ;Save the address here
     5733   D3 35        3583          OUT     INITH           ;Set Unibus Init
     5735   CD 5760      3584          CALL    STAL10          ;Go stall for 10 Ms
     5738   D3 34        3585          OUT     INITL           ;Clear Unibus Init
     573A   D3 20        3586          OUT     CLRCLK          ;Stop the clock
     573C   D3 A7        3587          OUT     DISMEM          ;Turn off memory
     573E   CD 4993      3588          CALL    WRTNOP          ;Go write a NOP to the CSR
     5741   D3 A6        3589          OUT     ENBMEM          ;Turn on memory
     5743   21 4168      3590          LXI     H,TMPBUF        ;Point to this word of zeros
     5746   CD 49D1      3591          CALL    LDUPC           ;Go load it into the UPC
     5749   3E 01        3592          MVI     A,1             ;Make a one
     574B   32 7074      3593          STA     INTCSR          ;Turn on the Xmit Ready in the Intermediate CSR
     574E   32 7076      3594          STA     XMTCSR          ;Turn on the Xmit Ready in the RAM based CSR
     5751   32 4196      3595          STA     CLKFLG          ;Set the clock flag so MAKCON will turn on the
                         3596                                  ;clock when it finishes
     5754   CD 5E9E      3597          CALL    MAKCON          ;Go build the constants
     5757   21 71FB      3598          LXI     H,INITPK        ;Point to the Init Packet
     575A   CD 514E      3599          CALL    SNDMSG          ;Go send it to the CPU
     575D   C3 5186      3600          JMP     RCVMSX          ;Go get the reply
                         3601                                  ;Use the return at the end of RCVMSX
                         3602  ;
                         3603  ;*****************************************************************************
                         3604
                         3605
                         3606
                         3607  ;*****************************************************************************
                         3608  ;
                         3609  ;       Stall routine
                         3610  ;
     5760   CD 5763      3611  STAL10: CALL    STALL5          ;We'll do this twice
     5763   01 041A      3612  STALL5: LXI     B,1050          ;Load up a 5 Ms constant
     5766   0B           3613  1$:     DCX     B               ;Reduce the count
     5767   78           3614          MOV     A,B             ;Put one byte in A
     5768   B1           3615          ORA     C               ;OR in the other
     5769   C2 5766      3616          JNZ     1$              ;Loop if not done
     576C   C9           3617          RET                     ;Leave when done
                         3618  ;
                         3619  ;*****************************************************************************
                         3620
                         3621
                         3622
                         3623  ;*****************************************************************************
                         3624  ;
                         3625  ;       Boot Command
                         3626  ;
     576D   2A 40CA      3627  BOOT:   LHLD    BUFADR          ;Get the pointer into the buffer
     5770   7E           3628          MOV     A,M             ;Get the next character
```

```
Error Addr  Code          Seq   Source statement

     5771   FE 0D         3629          CPI     CR              ;Look for a Carriage Return
     5773   CA 578D       3630          JZ      1$              ;Jump if it is
     5776   FE 20         3631          CPI     ' '             ;If not, make sure we have at least one space
     5778   C4 5D1E       3632          CNZ     SYNERR          ;Error if we don't
     577B   CD 4D23       3633          CALL    SPSTRP          ;Go strip off the spaces
     577E   FE 3B         3634          CPI     ';'             ;This is one terminator
     5780   CA 578D       3635          JZ      1$              ;Jump if match
     5783   FE 21         3636          CPI     '!'             ;Check for this terminator
     5785   CA 578D       3637          JZ      1$              ;Jump if match
     5788   FE 0D         3638          CPI     CR              ;Last possible terminator
     578A   C2 5793       3639          JNZ     2$              ;Jump if no match
     578D   CD 57D5       3640    1$:   CALL    BPSUB           ;Go prep things
     5790   C3 6024       3641          JMP     CLDSTR          ;Go to the cold start flow
     5793   CD 5925       3642    2$:   CALL    LODSU1          ;Use this to figure things out
     5796   3A 7210       3643          LDA     FNCNT           ;Get the File Name count
     5799   A7            3644          ANA     A               ;Is the count 0?
     579A   C2 57AD       3645          JNZ     3$              ;Jump if it isn't
     579D   3A 7212       3646          LDA     DEVFLG          ;See if DDn: was found
     57A0   A7            3647          ANA     A               ;Is it set?
     57A1   CC 5D1E       3648          CZ      SYNERR          ;Error if not
     57A4   CD 57D5       3649          CALL    BPSUB           ;Go do the Boot Prep Subroutine
     57A7   3A 4106       3650          LDA     UNITX           ;Get this unit number
     57AA   C3 6027       3651          JMP     CLDST0          ;Go start up the machine
     57AD   FE 03         3652    3$:   CPI     3               ;Otherwise, three characters are required
     57AF   C4 5D1E       3653          CNZ     SYNERR          ;Error if not three
     57B2   3A 7211       3654          LDA     EXTCNT          ;Get the extension count
     57B5   A7            3655          ANA     A               ;Check for 0
     57B6   C4 5D1E       3656          CNZ     SYNERR          ;Error if not 0
     57B9   3A 4106       3657          LDA     UNITX           ;Get the unit number
     57BC   F6 30         3658          ORI     30H             ;Make it ASCII
     57BE   32 726A       3659          STA     FOOFIL+3        ;Put it in the string
     57C1   21 726C       3660          LXI     H,FOOFIL+5      ;Point to the indirect command file
     57C4   11 4107       3661          LXI     D,FNBUF         ;Point to the first three letters
     57C7   06 03         3662          MVI     B,3             ;Set up the count
     57C9   CD 00FB       3663          CA      COPY1           ;Go copy things over
     57CC   CD 57D5       3664          C       BPSUB           ;Go prep things
     57CF   21 7267       3665          LXI     H,FOOFIL        ;Point to the beginning of this indirect command
     57D2   C3 602F       3666          JMP     CLDST1          ;Go boot up the machine
                          3667
     57D5   AF            3668    BPSUB: XRA    A               ;Make a zero
     57D6   32 41B7       3669          STA     WARM            ;Zero this flag
     57D9   32 408A       3670          STA     COLD            ;and this one
     57DC   32 40D4       3671          STA     NOTYPE          ;Clear this out
     57DF   3C            3672          INR     A               ;Make a one
     57E0   32 40B6       3673          STA     PUBFLG          ;Set the Power Up Boot flag
     57E3   C9            3674          RET                     ;Leave
                          3675    ;
                          3676    ;*****************************************************************************
                          3677
                          3678
```

```
Error Addr  Code          Seq   Source statement

                          3679
                          3680  ;*****************************************************************************
                          3681  ;
                          3682  ;       Bootstrap Prep
                          3683  ;
    57E4    AF            3684  BSPREP: XRA     A               ;Make a 0
    57E5    32 408A       3685          STA     COLD            ;Clear this flag
    57E8    32 41B7       3686          STA     WARM            ;and this one
    57EB    3C            3687          INR     A               ;Make a 1
    57EC    32 40B6       3688          STA     PUBFLG          ;Set this to prevent going down into the ROM
    57EF    C3 6020       3689          JMP     CLDSTX          ;Go start things up
                          3690  ;
                          3691  ;*****************************************************************************
                          3692
                          3693
                          3694  ;*****************************************************************************
                          3695  ;
                          3696  ;       S Commands come here.
                          3697  ;
    57F2                  3698  S_COMMAND:
    57F2    CD 4D2B       3699          CALL    PARSE           ;Go Parse the command string
    57F5    3A 71B3       3700          LDA     NEWAS           ;Check for /C
    57F8    FE 07         3701          CPI     07              ;Is it?
    57FA    C2 5815       3702          JNZ     START1          ;Jump if not WCS start
    57FD    D3 20         3703          OUT     CLRCLK          ;Stop the CPU Clock
    57FF    D3 A7         3704          OUT     DISMEM          ;Turn off memory
    5801    CD 4993       3705          CALL    WRTNOP          ;Put a NOP in the CSR
    5804    D3 A6         3706          OUT     ENBMEM          ;Turn memory on
    5806    21 71FE       3707          LXI     H,ABUFFR        ;Point to the Address Buffer
    5809    CD 49D1       3708          CALL    LDUPC           ;Go load the address into the UPC
    580C    3E 01         3709  MICCON: MVI     A,01            ;Get a one
    580E    32 4196       3710          STA     CLKFLG          ;Set the Clock Flag
    5811    D3 21         3711          OUT     SETCLK          ;Start the CPU Clock
    5813    AF            3712          XRA     A               ;Set the Z bit to signal no errors
    5814    C9            3713          RET                     ;Leave
                          3714
    5815    FE 06         3715  START1: CPI     06              ;Check for /U
    5817    CA 583C       3716          JZ      USTART          ;Go start the Micro
    581A    CD 56F8       3717          CALL    INISUB          ;Call the Init subroutine
    581D    21 743C       3718          LXI     H,SADRS         ;Point to the address area
    5820    11 71FE       3719          LXI     D,ABUFFR        ;Point to the address storage area
    5823    3A 7214       3720          LDA     FLAGS1          ;Get the Flags1 Byte
    5826    17            3721          RAL                     ;See if the  flag is set
    5827    D2 582D       3722          JNC     START2          ;Jump if it isn't
    582A    11 71BC       3723          LXI     D,EDDATA        ;Point to the last data instead
    582D    CD 00F9       3724  START2: CALL    COPY            ;Go copy it over
    5830    21 7436       3725          LXI     H,STRPAK        ;Point to the start packet
    5833    CD 514E       3726          CALL    SNDMSG          ;Go send a Deposit PC to the CPU
    5836    CD 5186       3727          CALL    RCVMSX          ;Go get the message back
    5839    C3 584B       3728          JMP     CONT0           ;Let the Continue code start up the machine
```

```
Error Addr  Code          Seq   Source statement

                          3729
     583C   2A 71FE       3730  USTART: LHLD    ABUFFR          ;Get the low bytes of the Address Buffer
     583F   E9            3731          PCHL                    ;Go there
                          3732
                          3733  ;*****************************************************************************
                          3734  ;
                          3735  ;       CONTINUE
                          3736  ;
     5840   2A 40CA       3737  CONT:   LHLD    BUFADR          ;Get the pointer into the Line buffer
     5843   CD 4D23       3738          CALL    SPSTRP          ;Go strip off the spaces
     5846   FE 0D         3739          CPI     CR              ;Look for Carriage Return
     5848   C4 5D1E       3740          CNZ     SYNERR          ;Syntax error if not
     584B   3E 01         3741  CONT0:  MVI     A,1             ;Make a one
     584D   32 40D3       3742          STA     RUNFLG          ;Set the run flag here
     5850   3A 4196       3743          LDA     CLKFLG          ;Test the CPU Clock Flag
     5853   1F            3744          RAR                     ;Is it set?
     5854   DA 586B       3745          JC      CNTIN1          ;Jump if set
     5857   21 7222       3746          LXI     H,BPHALT        ;Point to this flag
     585A   7E            3747          MOV     A,M             ;Get it
     585B   A7            3748          ANA     A               ;Is it zero?
     585C   36 00         3749          MVI     M,0             ;Zero it
     585E   C2 58E2       3750          JNZ     CNTIN0          ;Jump if it wasn't
     5861   3A 721E       3751          LDA     STPFLG          ;Get the Step Flag
     5864   A7            3752          ANA     A               ;Is it set?
     5865   CA 58DB       3753          JZ      NOCON           ;Jump if not set
     5868   CD 580C       3754          CALL    MICCON          ;Go start up the Micro machine
     586B   3A 721E       3755  CNTIN1: LDA     STPFLG          ;Get the Single Step flag
     586E   32 71FD       3756          STA     CONMOD          ;Use it to set or clear the Modifier byte
     5871   21 71FC       3757          LXI     H,CONPAK        ;Point to the continue packet
     5874   CD 514E       3758          CALL    SNDMSG          ;Go send the packet
     5877   CD 625F       3759  CNTIN2: CALL    ENTER           ;Go to Program I/O Mode
     587A   D3 2C         3760  CONHLT: OUT     CLRTMR          ;Turn off the Interval Timer
     587C   20            3761          RIM                     ;Get the interrupt masks
     587D   F6 09         3762          ORI     9H              ;Set MSE and M5.5
     587F   30            3763          SIM                     ;Write the masks out
     5880   3E 01         3764          MVI     A,1             ;Make a one for setting a flag
     5882   32 707F       3765          STA     HMPEND          ;Set Halt Message Pending
     5885   21 71DA       3766          LXI     H,HLTBUF        ;Point to a buffer area for halt information
     5888   CD 5189       3767          CALL    RCVMSG          ;Go get a halt message from the CPU
     588B   3A 40B5       3768          LDA     PFFLAG          ;Get the Power Fail Flag
     588E   1F            3769          RAR                     ;See if it is set
     588F   DC 5E0C       3770          CC      ACFAI2          ;Call if set
     5892   21 71DB       3771          LXI     H,HLTCOD        ;Point to the Halt code
     5895   7E            3772          MOV     A,M             ;Get it
     5896   FE 02         3773          CPI     2               ;Is it a ^P Halt?
     5898   C2 58A3       3774          JNZ     CONHL2          ;Jump if not
     589B   3A 40BE       3775          LDA     LRMASK          ;Get the Local/Remote Mask
     589E   E6 40         3776          ANI     40H             ;Look for APT in control
     58A0   C2 58C1       3777          JNZ     CONHL3          ;Jump if APT in control
     58A3   11 7416       3778  CONHL2: LXI     D,HLTMSG+2      ;Point to the destination for the ASCII
```

```
Error Addr  Code          Seq   Source statement

     58A6   06 01        3779            MVI     B,1             ;Set up a count
     58A8   CD 5DBD      3780            CALL    HEXASC          ;Go convert the number over
     58AB   3E 0D        3781            MVI     A,CR            ;Get a carriage return
     58AD   DF           3782            RST     3               ;Go send it
     58AE   21 7414      3783            LXI     H,HLTMSG        ;Point to the message
     58B1   F7           3784            RST     6               ;Go send it
     58B2   21 71DF      3785            LXI     H,HALTPC+3      ;Point to the high byte of address
     58B5   11 741E      3786            LXI     D,PCADR         ;Point to the PC Address buffer
     58B8   06 04        3787            MVI     B,04            ;Set up the count
     58BA   CD 5DBD      3788            CALL    HEXASC          ;Go convert
     58BD   21 7418      3789            LXI     H,PCMSG         ;Point to the PC Message
     58C0   F7           3790            RST     6               ;Go print the message
     58C1   AF           3791    CONHL3: XRA     A               ;Make a 0
     58C2   32 707F      3792            STA     HMPEND          ;Clear out the Halt Message Pending flag
     58C5   3A 721E      3793            LDA     STPFLG          ;Get the Single Step flag
     58C8   1F           3794            RAR                     ;Put it in the carry
     58C9   D8           3795            RC                      ;Leave if set
     58CA   DB 02        3796    CONHL1: IN      HLTFLG          ;Get the Halt/Restart flag
     58CC   1F           3797            RAR                     ;Put it in the carry
     58CD   D2 4C32      3798            JNC     IDLE            ;Go to the Idle Loop if in Halt position
     58D0   3A 71DB      3799            LDA     HLTCOD          ;Get the halt code
     58D3   FE 02        3800            CPI     2               ;Check for a Control P halt
     58D5   CA 4C32      3801            JZ      IDLE            ;Go to idle loop if it is
     58D8   C3 6074      3802            JMP     WRMSTR          ;Go try to warm start the maching
                         3803
     58DB   AF           3804    NOCON:  XRA     A               ;Make a 0
     58DC   32 40D3      3805            STA     RUNFLG          ;Turn this off
     58DF   C3 580C      3806            JMP     MICCON          ;Go start up the Micro Machine
                         3807
     58E2   CD 580C      3808    CNTIN0: CALL    MICCON          ;Go start up the Micro Machine
     58E5   C3 5877      3809            JMP     CNTIN2          ;Go enter Program Mode
                         3810    ;
                         3811    ;*****************************************************************************
                         3812
                         3813
                         3814
                         3815    ;*****************************************************************************
                         3816    ;
     58E8   2A 40CA      3817    HALT:   LHLD    BUFADR          ;Get the pointer into command buffer
     58EB   CD 4D23      3818            CALL    SPSTRP          ;Go Strip off the Spaces
     58EE   FE 0D        3819            CPI     CR              ;Look for a carriage return
     58F0   C4 5D1E      3820            CNZ     SYNERR          ;Go print error message
     58F3   21 7414      3821            LXI     H,HLTMSG        ;Point to the Halt message
     58F6   F7           3822            RST     6               ;Go Print it
     58F7   21 7418      3823            LXI     H,PCMSG         ;Point to the PC of the halt
     58FA   F7           3824            RST     6               ;Go print it
     58FB   C9           3825            RET                     ;Leave
                         3826    ;
                         3827    ;*****************************************************************************
                         3828
```

```
Error Addr  Code          Seq   Source statement

                          3829
                          3830
                          3831  ;*****************************************************************************
                          3832  ;
58FC   CD 590A            3833  LOAD:   CALL    LODSUB          ;Go to the Load subroutine
58FF   CD 4500            3834  LOADZ:  CALL    LDXPRP          ;Go prepare to enter the next part of load
5902   3A 4116            3835          LDA     SUCCES          ;Check the success code
5905   A7                 3836          ANA     A               ;Is it 0?
5906   C4 5D2D            3837          CNZ     TAPERR          ;Go print the error message
5909   C9                 3838          RET                     ;Leave with the Z bit set to signal no errors
                          3839
590A   CD 5925            3840  LODSUB: CALL    LODSU1          ;Go figure things out
590D   3A 7213            3841          LDA     FLAGS           ;Get the Flags byte
5910   E6 0A              3842          ANI     0AH             ;Save the N and A Flags
5912   FE 02              3843          CPI     02H             ;Only the A Flag should be set
5914   C4 5D1E            3844          CNZ     SYNERR          ;Leave if not equal
5917   3A 7210            3845          LDA     FNCNT           ;Get the filename count
591A   A7                 3846          ANA     A               ;Check it
591B   CC 5D1E            3847          CZ      SYNERR          ;Error if no filename specified
591E   3A 71B3            3848          LDA     NEWAS           ;Get the address space
5921   32 4115            3849          STA     QUAL            ;Put it here for the load code to use
5924   C9                 3850          RET                     ;Leave
                          3851
5925   21 410E            3852  LODSU1: LXI     H,EXTBUF        ;Get the address of the Extension Buffer
5928   22 720E            3853          SHLD    EXTPTR          ;Store it in the Extension pointer
592B   21 4107            3854          LXI     H,FNBUF         ;Get the address of the File Name Buffer
592E   22 720C            3855          SHLD    FNPTR           ;Store it in the Pointer
5931   16 06              3856          MVI     D,06            ;Prime the count
5933   CD 6AFC            3857          CALL    ZBUF1           ;Zero this area
5936   21 410E            3858          LXI     H,EXTBUF        ;Point to the extension buffer
5939   CD 6AFA            3859          CALL    ZROBUF          ;Go do it
593C   21 4111            3860          LXI     H,SBUFFR        ;Point to the Load Start address buffer
593F   CD 6AFA            3861          CALL    ZROBUF          ;Go zero it
5942   32 7212            3862          STA     DEVFLG          ;Clear out the Device Flag
5945   67                 3863          MOV     H,A             ;Zero H
5946   6F                 3864          MOV     L,A             ;Zero L
5947   22 7210            3865          SHLD    FNCNT           ;Zero the Filename and Extention counts
594A   3C                 3866          INR     A               ;Make a one
594B   32 409B            3867          STA     LODFLG          ;Set the load flag
594E   3A 4150            3868          LDA     DEFDRV          ;Get the default drive number
5951   32 4106            3869          STA     UNITX           ;Put it here
5954   C3 4D2B            3870          JMP     PARSE           ;Go parse the command line
                          3871  ;
                          3872  ;*****************************************************************************
                          3873
                          3874
                          3875
                          3876  ;*****************************************************************************
                          3877  ;
5957   78                 3878  MEMLOD: MOV     A,B             ;Get the character back into A
```

```
Error Addr  Code          Seq   Source statement

     5958   21 4082       3879          LXI     H,BYTSUM        ;Point to the checksum byte
     595B   86            3880          ADD     M               ;Add it in
     595C   77            3881          MOV     M,A             ;Send it out
     595D   21 4193       3882          LXI     H,XFRBUF+1      ;Point to a buffer area
     5960   3A 40A7       3883          LDA     LODCNT          ;Get the count
     5963   1F            3884          RAR                     ;Check for odd or even byte
     5964   D2 5971       3885          JNC     MEMLD1          ;Jump if it is even
     5967   70            3886          MOV     M,B             ;Put the byte in ram
     5968   06 01         3887          MVI     B,01            ;Count for SNDMS1
     596A   2B            3888          DCX     H               ;Back up the pointer
     596B   CD 5157       3889          CALL    SNDMS1          ;Go send the data
     596E   C3 4900       3890          JMP     TURCV2          ;Go back
     5971   2B            3891  MEMLD1: DCX     H               ;Back up the pointer
     5972   70            3892          MOV     M,B             ;Send the data out
     5973   C3 4900       3893          JMP     TURCV2          ;Leave
                          3894  ;
                          3895  ;*****************************************************************************
                          3896
                          3897
                          3898
                          3899  ;*****************************************************************************
                          3900  ;
     5976   CD 4D2B       3901  MICSTP: CALL    PARSE           ;Go parse the command string
     5979   D3 20         3902          OUT     CLRCLK          ;Stop the CPU clock
     597B   AF            3903          XRA     A               ;Generate 0
     597C   32 4196       3904          STA     CLKFLG          ;Zero the Clock Flag
     597F   3C            3905          INR     A               ;Make a one
     5980   32 721F       3906          STA     MICFLG          ;Set this flag
     5983   21 7213       3907          LXI     H,FLAGS         ;Point to the Flags byte
     5986   7E            3908          MOV     A,M             ;Get it
     5987   E6 40         3909          ANI     AACTIV          ;Is there a count?
     5989   CA 599F       3910          JZ      MICST3          ;Jump if no count
     598C   CD 5A0D       3911          CALL    FIXUP           ;This is a Subroutine so Single Step can use it
     598F   D3 23         3912  MICST1: OUT     SETSS           ;Set single micro step
     5991   D3 22         3913          OUT     CLRSS           ;Clear single micro step
     5993   CD 59B6       3914          CALL    GETUPC          ;Go get and print the UPC
     5996   CD 56BE       3915          CALL    NTEST           ;This will check the count for us
     5999   C3 598F       3916          JMP     MICST1          ;Loop if count doesn't equal 0
                          3917
     599C   CD 0046       3918  MICST2: CALL    GS_VECTOR       ;Go fix up the silo pointers
     599F   D3 23         3919  MICST3: OUT     SETSS           ;Set Single Micro Step
     59A1   D3 22         3920          OUT     CLRSS           ;Then clear it
     59A3   CD 59B6       3921          CALL    GETUPC          ;Subroutine to get and print the UPC
     59A6   CD 0049       3922  MICST4: CALL    RSVEC           ;Go read from the silo
     59A9   D2 59A6       3923          JNC     MICST4          ;Loop if no character
     59AC   78            3924          MOV     A,B             ;Get the character into A
     59AD   E6 7F         3925          ANI     7FH             ;Clear the parity bit
     59AF   FE 20         3926          CPI     ' '             ;Is it a space?
     59B1   CA 599C       3927          JZ      MICST2          ;Loop here
     59B4   AF            3928          XRA     A               ;Set the Z bit to signal no errors
```

```
Error Addr  Code           Seq   Source statement

     59B5   C9            3929          RET                     ;Leave
                          3930
                          3931
                          3932
     59B6   21 41AA       3933   GETUPC: LXI     H,SWAP          ;Point to a temporary buffer area
     59B9   CD 49D1       3934           CALL    LDUPC           ;Go get the UPC
     59BC   2A 41AA       3935           LHLD    SWAP            ;Get the UPC
     59BF   2B            3936           DCX     H               ;Decrement the value
     59C0   22 4168       3937           SHLD    TMPBUF          ;Put the UPC here
     59C3   CD 49D4       3938           CALL    LDUPC1          ;Go restore the UPC
     59C6   21 4169       3939           LXI     H,TMPBUF+1      ;Prepare to convert from hex to ASCII
     59C9   11 744B       3940           LXI     D,UPCBUF        ;Dest. is the Data segment of the print buffer
     59CC   06 02         3941           MVI     B,02            ;Number of bytes to be converted
     59CE   CD 5DBD       3942           CALL    HEXASC          ;Go convert
     59D1   21 7440       3943           LXI     H,UPCOUT        ;Point to start of printout buffer
     59D4   F7            3944           RST     6               ;Go send out the line
     59D5   C9            3945           RET                     ;Leave
                          3946   ;
                          3947   ;*****************************************************************************
                          3948
                          3949
                          3950
                          3951   ;*****************************************************************************
                          3952   ;
     59D6   CD 4D2B       3953   STEP:   CALL    PARSE           ;Go parse the rest of the command
     59D9   21 721E       3954           LXI     H,STPFLG        ;Point the Step Flag byte
     59DC   36 01         3955           MVI     M,1             ;Set it
     59DE   21 7213       3956           LXI     H,FLAGS         ;See if there is a count
     59E1   7E            3957           MOV     A,M             ;Get the FLAGS byte
     59E2   E6 40         3958           ANI     AACTIV          ;The count will be in the Address buffer
     59E4   CA 59F8       3959           JZ      STEPB           ;Jump if no count
     59E7   CD 5A0D       3960           CALL    FIXUP           ;Go move the count to the N buffer
     59EA   D3 AE         3961   STEPA:  OUT     SETHLT          ;Turn on the Halt signal to the CPU
     59EC   CD 584B       3962           CALL    CONT0           ;Go continue the machine
     59EF   CD 56BE       3963           CALL    NTEST           ;Check the count
     59F2   C3 59EA       3964           JMP     STEPA           ;Loop back if we return
                          3965
     59F5   CD 0046       3966   STEPC:  CALL    GS_VECTOR               ;Go fix up the silo pointers
     59F8   D3 AE         3967   STEPB:  OUT     SETHLT          ;Turn on the Halt signal to the CPU
     59FA   CD 584B       3968           CALL    CONT0           ;Go continue the machine
     59FD   CD 0049       3969   STEPB1: CALL    RSVEC           ;Go look for characters in the silo
     5A00   D2 59FD       3970           JNC     STEPB1          ;Loop if no character
     5A03   78            3971           MOV     A,B             ;Get the character into A
     5A04   E6 7F         3972           ANI     7FH             ;Mask off the MSB
     5A06   FE 20         3973           CPI     ' '             ;Is it a Space?
     5A08   CA 59F5       3974           JZ      STEPC           ;Go step the machine
     5A0B   AF            3975           XRA     A               ;Set the Z bit to signal no errors
     5A0C   C9            3976           RET                     ;Leave if not a space
                          3977
                          3978
```

```
Error Addr  Code          Seq   Source statement

     5A0D   21 7215       3979  FIXUP:  LXI     H,FLAGS2        ;Point the Flags 2 Byte
     5A10   36 01         3980          MVI     M,1             ;Set the N Flag
     5A12   11 71FE       3981          LXI     D,ABUFFR        ;Point to the count
     5A15   21 7208       3982          LXI     H,NBUFFR        ;Point to the Destination
     5A18   C3 00F9       3983          JMP     COPY            ;Go copy
                          3984  ;
                          3985  ;*****************************************************************************
                          3986
                          3987
                          3988
                          3989  ;*****************************************************************************
                          3990  ;
     5A1B   3E 01         3991  INDRCT: MVI     A,01            ;Get a 1
     5A1D   32 7213       3992          STA     FLAGS           ;Set the space flag
     5A20   CD 590A       3993          CALL    LODSUB          ;Let the load code do some of the work
     5A23   21 4115       3994  INDRC1: LXI     H,QUAL          ;Point to the Qual byte
     5A26   7E            3995          MOV     A,M             ;Get it
     5A27   A7            3996          ANA     A               ;Should be zero
     5A28   C4 5D1E       3997          CNZ     SYNERR          ;Error if not
     5A2B   36 06         3998          MVI     M,06            ;Force U space
     5A2D   21 7600       3999          LXI     H,INDBUF        ;Point to the indirect command file buffer
     5A30   22 4111       4000          SHLD    SBUFFR          ;Save the address
     5A33   22 721C       4001          SHLD    INDADR          ;Also put it in the Address Buffer
     5A36   21 409D       4002          LXI     H,INDFLG        ;Point to the Indirect Command Flag
     5A39   36 01         4003          MVI     M,01            ;Set it
     5A3B   C3 58FF       4004          JMP     LOADZ           ;Go share some code
                          4005  ;
                          4006  ;*****************************************************************************
                          4007
                          4008
                          4009
                          4010  ;*****************************************************************************
                          4011  ;
                          4012  ;       TEST
                          4013  ;
                          4014  ;       This flow looks for T, T/M, or T/C.  For T or T/M, it sets up CRD_FLAGS
                          4015  ;       according to the following map:
                          4016  ;
                          4017  ;CRD_FLAGS-     BIT03           BIT02           BIT01           BIT00
                          4018  ;
                          4019  ;               0=Auto          0=No Micro      1=Starting      1=CRD in
                          4020  ;                 Mode            Errors          Micros          Progress
                          4021  ;               1=Menu          1=Micro
                          4022  ;                 Mode            Errors
                          4023  ;
     5A3E   21 408B       4024  TEST:   LXI     H,CODFLG        ;Point to this flag.
     5A41   7E            4025          MOV     A,M             ;Get it
     5A42   E6 01         4026          ANI     1               ;Clear bits 07-01
     5A44   77            4027          MOV     M,A             ;Store this cleaned up version
     5A45   0E 42         4028          MVI     C,'B'           ;Put an ASCII B in register C
```

```
Error Addr  Code          Seq   Source statement

     5A47   2A 40CA       4029          LHLD    BUFADR          ;Get the current pointer value
     5A4A   CD 4D23       4030          CALL    SPSTRP          ;Go strip out the spaces
                          4031                                  ;When we come back from SPSTRP, the character in
                          4032                                  ;A will be the non-space character we found in
                          4033                                  ;the buffer, and HL will point to that character
                          4034                                  ;in the buffer.
     5A4D   23            4035          INX     H               ;Point to the next character
     5A4E   FE 0D         4036          CPI     CR              ;See if the character SPSTRP found is a CR
     5A50   06 03         4037          MVI     B,3             ;In case it is, set up:  Auto Mode, No Errors,
                          4038                                  ;Starting Micros, CRD.
     5A52   CA 5A74       4039          JZ      2$              ;Go finish up and then Jump to the T_Vector
     5A55   FE 2F         4040          CPI     '/'             ;Look for a Switch
     5A57   C4 5D1E       4041          CNZ     SYNERR          ;Syntax Error if not
     5A5A   7E            4042          MOV     A,M             ;Get the character after the Slash
     5A5B   23            4043          INX     H               ;and point to the character after that.
     5A5C   FE 4D         4044          CPI     'M'             ;Look for /M
     5A5E   06 09         4045          MVI     B,9H            ;In case it is, set up:  Menu Mode, No Errors,
                          4046                                  ;Not Starting Micros, CRD.
     5A60   CA 5A6C       4047          JZ      1$              ;Jump if it is
     5A63   FE 43         4048          CPI     'C'             ;Look for /C
     5A65   06 00         4049          MVI     B,0             ;In case it is, set up for NO CRD
     5A67   C4 5D1E       4050          CNZ     SYNERR          ;Syntax Error if not T, T/M or T/C.
     5A6A   0E 41         4051          MVI     C,'A'           ;Put an ASCII A in register C
     5A6C   CD 4D23       4052   1$:    CALL    SPSTRP          ;Go read until non-space character found.
     5A6F   FE 0D         4053          CPI     CR              ;Is it a Carriage Return?
     5A71   C4 5D1E       4054          CNZ     SYNERR          ;Error if not
     5A74   3E 01         4055   2$:    MVI     A,1             ;Make a 1
     5A76   32 40BB       4056          STA     OFLAG           ;Set the Control O Flag
     5A79   78            4057          MOV     A,B             ;Get the CRD Flags Code
     5A7A   32 40FD       4058          STA     CRD_FLAGS       ;Set up these flags
     5A7D   79            4059          MOV     A,C             ;Get the correct n for ENKAn.EXE
     5A7E   32 4158       4060          STA     MICMON+4        ;Fix up the file name.
     5A81   78            4061          MOV     A,B             ;Get the CRD flags back again.
     5A82   FE 09         4062          CPI     9H              ;Look for Menu Mode.
     5A84   CA 5A98       4063          JZ      3$              ;Jump if it is.
     5A87   20            4064          RIM                     ;Get the Interrupt Masks.
     5A88   F6 0B         4065          ORI     0BH             ;Disable everything but Power Fail interrupts
     5A8A   30            4066          SIM                     ;Write the Masks
     5A8B   AF            4067          XRA     A               ;Make a 0
     5A8C   32 4196       4068          STA     CLKFLG          ;Turn off the Clock Flag
     5A8F   32 4197       4069          STA     PARFLG          ;and the Parity Flag
     5A92   32 40D5       4070          STA     WCS_LOAD_FLAGS  ;and the WCS flags
     5A95   C3 414D       4071          JMP     T_VECTOR        ;Go figure things out
     5A98   AF            4072   3$:    XRA     A               ;Make a 0
     5A99   32 408A       4073          STA     COLD            ;Zero out this flag
     5A9C   3A 40D5       4074          LDA     WCS_LOAD_FLAGS  ;Get the flags that indicate the state of the
     5A9F   1F            4075          RAR                     ;WCS and test for POWER.CMD executed.
     5AA0   D2 5F99       4076          JNC     COLD_BEGIN      ;Jump if not
     5AA3   1F            4077          RAR                     ;How about CODE0n.CMD?
     5AA4   D2 5FD2       4078          JNC     COLD_BEGIN0     ;Jump if not.
```

```
Error Addr  Code          Seq   Source statement

     5AA7   C3 5FE8       4079          JMP     COLD_BEGIN1     ;If all the Micro Code is loaded, boot up.
                         4080  ;
                         4081  ;*****************************************************************************
                         4082
                         4083
                         4084
                         4085  ;*****************************************************************************
                         4086  ;
     5AAA   E7           4087  WAICMD: RST     4               ;Go look for breakouts
     5AAB   DB 83        4088          IN      CPATTN          ;Wait for CPU attention to be asserted
     5AAD   1F           4089          RAR                     ;Is it asserted?
     5AAE   D2 5AAA      4090          JNC     WAICMD          ;Loop back if not
     5AB1   CD 5186      4091          CALL    RCVMSX          ;Go get the message
     5AB4   21 749E      4092          LXI     H,MEMADR        ;Point to the dest
     5AB7   11 71C2      4093          LXI     D,RCVADR        ;Point to the source
     5ABA   06 08        4094          MVI     B,08            ;Count for copying
     5ABC   CD 00FB      4095          CALL    COPY1           ;Go copy
     5ABF   21 71C1      4096          LXI     H,RCVMOD        ;Point to the configuration number
     5AC2   11 724C      4097          LXI     D,CODFIL+5      ;Point to where it goes
     5AC5   06 01        4098          MVI     B,1             ;Set up a count of one
     5AC7   CD 5DBD      4099          CALL    HEXASC          ;Go convert it
     5ACA   CD 5186      4100          CALL    RCVMSX          ;Go get the second packet
     5ACD   21 74B4      4101          LXI     H,MEMCOD        ;Point to this dest
     5AD0   11 71C2      4102          LXI     D,RCVADR        ;Point to this source
     5AD3   CD 00F9      4103          CALL    COPY            ;Go copy it over
     5AD6   AF           4104          XRA     A               ;Set the Z bit to signal no errors
     5AD7   C9           4105          RET                     ;Leave
                         4106  ;
                         4107  ;*****************************************************************************
                         4108
                         4109
                         4110  ;*****************************************************************************
                         4111  ;
     5AD8   3E 01        4112  XFER:   MVI     A,1             ;Set the Control Character Disable flag
     5ADA   32 40FE      4113          STA     CTLDIS          ;Do it
     5ADD   CD 0046      4114  XFER1:  CALL    GS_VECTOR       ;Go get the checksum
     5AE0   D2 5ADD      4115          JNC     XFER1           ;Loop until a character is received
     5AE3   3A 4082      4116          LDA     BYTSUM          ;Get the checksum
     5AE6   A7           4117          ANA     A               ;Check for 0
     5AE7   C4 5D4E      4118          CNZ     NACK_X_CMND     ;Error if result is not zero
     5AEA   CD 4D2B      4119          CALL    PARSE           ;Go parse the command
     5AED   21 418A      4120          LXI     H,XFRADR        ;Point to the place where the address goes
     5AF0   11 71FE      4121          LXI     D,ABUFFR        ;Point to where the address was stored
     5AF3   06 08        4122          MVI     B,8             ;Count of 8
     5AF5   CD 00FB      4123          CALL    COPY1           ;Go move it over
     5AF8   CD 623C      4124          CALL    XFRCHK          ;Check for 0 count
     5AFB   CC 5D1E      4125          CZ      SYNERR          ;Can't have 0 byte transfers
     5AFE   3A 71B3      4126          LDA     NEWAS           ;Get the Address space byte
     5B01   FE 06        4127          CPI     6               ;See if 8085 Ram space was specified
     5B03   CA 5BC2      4128          JZ      XFRRAM          ;Jump if it is
```

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Error Addr  Code          Seq   Source statement

     5B06   FE 07        4129           CPI     7               ;How about WCS?
     5B08   CA 5C27      4130           JZ      XFRWCS          ;Jump if it is
     5B0B   FE 02        4131           CPI     2               ;See if P or V
     5B0D   D4 5D1E      4132           CNC     SYNERR          ;Error if not
     5B10   21 4188      4133           LXI     H,XFRPAK        ;Point to the Transfer Packet
     5B13   CD 514E      4134           CALL    SNDMSG          ;Go send it
     5B16   CD 5CE7      4135           CALL    XFRCOM          ;Go share some code
     5B19   DA 5B7B      4136           JC      XMEMO           ;When we return, the carry will either be set
                         4137                                   ;or clear.  If set it is an X Out
     5B1C   CD 5CAC      4138   XMEMI:  CALL    GETDAT          ;Go try for some data
     5B1F   CA 5B51      4139           JZ      XMEMI2          ;If we return with the Z bit set, count=0
     5B22   D3 CC        4140           OUT     WRITE           ;Send the data out
     5B24   D3 AA        4141           OUT     SETATN          ;Raise the Console Attention signal
     5B26   0E 00        4142           MVI     C,0             ;Set up a timeout
     5B28   DB 82        4143   XMEMH:  IN      CPUACK          ;Look for the ack
     5B2A   1F           4144           RAR                     ;Rotate it into the carry
     5B2B   DA 5B35      4145           JC      XMEMH1          ;Jump if set
     5B2E   0D           4146           DCR     C               ;Reduce the count
     5B2F   C2 5B28      4147           JNZ     XMEMH           ;Loop back if not yet zero
     5B32   C3 5B48      4148           JMP     XMEMI1          ;Jump if timeout
     5B35   CD 5CAC      4149   XMEMH1: CALL    GETDAT          ;Go look for another byte
     5B38   D3 CC        4150           OUT     WRITE           ;Write it to the CPU
     5B3A   D3 AB        4151           OUT     CLRATN          ;Clear Console Attention
     5B3C   0E 00        4152           MVI     C,0             ;Set up a time out
     5B3E   DB 82        4153   XMEML:  IN      CPUACK          ;Look for CPU ack
     5B40   1F           4154           RAR                     ;Put it in the carry
     5B41   D2 5B1C      4155           JNC     XMEMI           ;Jump if it has gone away
     5B44   0D           4156           DCR     C               ;Reduce the count
     5B45   C2 5B3E      4157           JNZ     XMEML           ;Loop if not yet zero
     5B48   CD 5CAC      4158   XMEMI1: CALL    GETDAT          ;Get all the data
     5B4B   C2 5B48      4159           JNZ     XMEMI1          ;Loop until we get it all
     5B4E   CD 5D5E      4160           CALL    COMERR          ;Go report the error
                         4161
     5B51   CD 5186      4162   XMEMI2: CALL    RCVMSX          ;Go get the reply packet from the CPU
     5B54   C2 5B61      4163           JNZ     XMEMI3          ;Jump if not good
     5B57   3A 71C6      4164           LDA     RCVDAT          ;Get the checksum the microcode calculated
     5B5A   21 4082      4165           LXI     H,BYTSUM        ;Point to mine
     5B5D   BE           4166           CMP     M               ;Are they the same
     5B5E   CA 5B67      4167           JZ      GETCS           ;Jump if good
     5B61   CD 5B67      4168   XMEMI3: CALL    GETCS           ;Go get the checksum character
     5B64   CD 5D5E      4169           CALL    COMERR          ;Go send an error message
                         4170
     5B67   CD 0046      4171   GETCS:  CALL    GS_VECTOR       ;Go get the checksum character
     5B6A   D2 5B67      4172           JNC     GETCS           ;Loop until a character comes in
     5B6D   3A 4082      4173           LDA     BYTSUM          ;Get the checksum
     5B70   A7           4174           ANA     A               ;Check it for 0
     5B71   C4 5D56      4175           CNZ     NACK_X_DATA     ;Error if not
     5B74   32 40D4      4176           STA     NOTYPE          ;Clear the typeout inhibit flag
     5B77   32 40FE      4177           STA     CTLDIS          ;Allow control characters to function now
     5B7A   C9           4178           RET                     ;and go back
```

```
Error Addr  Code          Seq   Source statement

                          4179
     5B7B   21 4192       4180  XMEMO:  LXI     H,XFRBUF        ;Point to this buffer area
     5B7E   06 01         4181          MVI     B,1             ;Count for two byte transfer
     5B80   CD 518E       4182          CALL    RCVMS1          ;Go get the data from the CPU
     5B83   CA 5B94       4183          JZ      XMEMO2          ;Jump if OK
     5B86   CD 5CD9       4184  XMEMO4: CALL    SNDDAT          ;Send garbage until count=0
     5B89   C2 5B86       4185          JNZ     XMEMO4          ;Loop until 0
     5B8C   3A 4082       4186          LDA     BYTSUM          ;Get the byte checksum
     5B8F   2F            4187          CMA                     ;Complement
     5B90   DF            4188          RST     3               ;Send it
     5B91   CD 5D5E       4189          CALL    COMERR          ;Send an error message
     5B94   CD 5CD9       4190  XMEMO2: CALL    SNDDAT          ;Go send the data
     5B97   CA 5BA6       4191          JZ      XMEMO1          ;Jump if count =0
     5B9A   3A 4193       4192          LDA     XFRBUF+1        ;Get the second byte
     5B9D   32 4192       4193          STA     XFRBUF          ;Put it here
     5BA0   CD 5CD9       4194          CALL    SNDDAT          ;Go check the count and send the data
     5BA3   C2 5B7B       4195          JNZ     XMEMO           ;Loop back if not 0 count
     5BA6   CD 5186       4196  XMEMO1: CALL    RCVMSX          ;Go get the packet from the CPU
     5BA9   21 71C6       4197          LXI     H,RCVDAT        ;Point to the checksum he calculated
     5BAC   3A 4082       4198          LDA     BYTSUM          ;Get mine
     5BAF   BE            4199          CMP     M               ;Are they equal?
     5BB0   CA 5BB7       4200          JZ      XOFIN           ;IF CORRECT, THEN go finish up cleanly.
     5BB3   3D            4201          DCR     A               ;ELSE, screw up the checksum
     5BB4   32 4082       4202          STA     BYTSUM          ;to cause an error.
     5BB7   3A 4082       4203  XOFIN:  LDA     BYTSUM          ;Get the checksum
     5BBA   2F            4204          CMA                     ;Complement it
     5BBB   3C            4205          INR     A               ;Make the twos complement
     5BBC   DF            4206          RST     3               ;Go send it out
     5BBD   AF            4207          XRA     A               ;Set the Z bit to indicate no errors
     5BBE   32 40FF       4208          STA     NOCHK           ;Zero this out
     5BC1   C9            4209          RET                     ;Leave
                          4210
                          4211
     5BC2   11 71FE       4212  XFRRAM: LXI     D,ABUFFR        ;Point to where the address is
     5BC5   21 71AA       4213          LXI     H,RAMADR        ;Point to this address
     5BC8   CD 6242       4214          CALL    CMPCHK          ;Go see if it is the same
     5BCB   C2 5BDA       4215          JNZ     XFRRA1          ;Jump if not
     5BCE   21 71AE       4216          LXI     H,RAMCNT        ;Point to this count
     5BD1   11 7202       4217          LXI     D,DBUFFR        ;Point to the count specified
     5BD4   CD 6242       4218          CALL    CMPCHK          ;Go see if equal
     5BD7   CA 000B       4219          JZ      XVEC            ;Go down into the ROM
     5BDA   CD 5CE7       4220  XFRRA1: CALL    XFRCOM          ;Go share some code
     5BDD   DA 5C01       4221          JC      XRAMO           ;Jump if direction is Out
     5BE0   CD 5CAC       4222  XRAMI1: CALL    GETDAT          ;Go get a byte
     5BE3   CA 5B67       4223          JZ      GETCS           ;If count=0, get the checksum and check it
     5BE6   2A 418A       4224          LHLD    XFRADR          ;Get the address
     5BE9   7C            4225          MOV     A,H             ;Put the high byte in A
     5BEA   FE F0         4226          CPI     0F0H            ;Check for 8085 I/O address
     5BEC   CA 5BF7       4227          JZ      XRAMI3          ;Jump if it is
     5BEF   70            4228          MOV     M,B             ;Send the data out to memory
```

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Error Addr  Code          Seq   Source statement

     5BF0   23            4229  XRAMI2: INX     H               ;Bump the address
     5BF1   22 418A       4230          SHLD    XFRADR          ;Save the updated address
     5BF4   C3 5BE0       4231          JMP     XRAMI1          ;Loop back
                          4232
     5BF7   7D            4233  XRAMI3: MOV     A,L             ;Get the I/O address
     5BF8   32 5BFD       4234          STA     XRAMI4+1        ;Alter I stream
     5BFB   78            4235          MOV     A,B             ;Get the data into A
     5BFC   D3 84         4236  XRAMI4: OUT     UPC14           ;Dummy address
     5BFE   C3 5BF0       4237          JMP     XRAMI2          ;Rejoin normal XRAMI flow
                          4238
                          4239
                          4240
                          4241
     5C01   CD 623C       4242  XRAMO:  CALL    XFRCHK          ;Go check for 0 count
     5C04   CA 5BB7       4243          JZ      XOFIN           ;Go finish things up if it is
     5C07   2A 418A       4244          LHLD    XFRADR          ;Get the specified address
     5C0A   7C            4245          MOV     A,H             ;Get the high byte
     5C0B   FE F0         4246          CPI     0F0H            ;See if I/O space is specified
     5C0D   CA 5C1E       4247          JZ      XRAMO2          ;Jump if it is
     5C10   7E            4248          MOV     A,M             ;Get the data
     5C11   32 4192       4249  XRAMO1: STA     XFRBUF          ;Save the data here
     5C14   23            4250          INX     H               ;Bump the address pointer
     5C15   22 418A       4251          SHLD    XFRADR          ;Save the updated address
     5C18   CD 5CD9       4252          CALL    SNDDAT          ;Go send it to APT
     5C1B   C3 5C01       4253          JMP     XRAMO           ;Loop back
                          4254
     5C1E   7D            4255  XRAMO2: MOV     A,L             ;Get the I/O address
     5C1F   32 5C23       4256          STA     XRAMO3+1        ;Alter I stream
     5C22   DB 84         4257  XRAMO3: IN      UPC14           ;Dummy address
     5C24   C3 5C11       4258          JMP     XRAMO1          ;Jump back
                          4259
                          4260
     5C27   D3 20         4261  XFRWCS: OUT     CLRCLK          ;Turn off the CPU clock
     5C29   CD 4993       4262          CALL    WRTNOP          ;NOP the CSR
     5C2C   21 418A       4263          LXI     H,XFRADR        ;Point to the address
     5C2F   CD 49D1       4264          CALL    LDUPC           ;Go load it
     5C32   CD 5CE7       4265          CALL    XFRCOM          ;Go share some code
     5C35   DA 5C64       4266          JC      XWCSO           ;Jump if set (indicates X out)
     5C38   CD 5CAC       4267  XWCSI:  CALL    GETDAT          ;Go look for a byte
     5C3B   CA 5C5B       4268          JZ      XWCSI1          ;Will come back with Z set if count=0
     5C3E   D3 08         4269          OUT     WCSB0           ;Write byte 0
     5C40   CD 5CAC       4270          CALL    GETDAT          ;Get the next byte
     5C43   CA 5C5B       4271          JZ      XWCSI1          ;Jump if count = 0
     5C46   D3 09         4272          OUT     WCSB1           ;Write byte 1
     5C48   CD 5CAC       4273          CALL    GETDAT          ;Get the next byte
     5C4B   CA 5C5B       4274          JZ      XWCSI1          ;Jump if count = 0
     5C4E   D3 0A         4275          OUT     WCSB2           ;Write byte 2
     5C50   D3 37         4276          OUT     SETWCK          ;Set the WCS clock
     5C52   D3 36         4277          OUT     CLRWCK          ;Clear it
     5C54   D3 27         4278          OUT     SETUPK          ;Set the the UPC clock
```

```
Error Addr  Code          Seq   Source statement

     5C56   D3 26        4279            OUT     CLRUPK          ;Clear it
     5C58   C3 5C38      4280            JMP     XWCSI           ;Loop back
                         4281
     5C5B   CD 5B67      4282    XWCSI1: CALL    GETCS           ;Go get the checksum
     5C5E   CD 4993      4283            CALL    WRTNOP          ;NOP the CSR
     5C61   C3 5CA1      4284            JMP     XWCSO3          ;Go share some code
                         4285
     5C64   21 4168      4286    XWCSO:  LXI     H,TMPBUF        ;Point to this temp
     5C67   11 41A7      4287            LXI     D,NOPBUF        ;Point to the CSR we want to save
     5C6A   06 03        4288            MVI     B,3             ;Count
     5C6C   CD 00FB      4289            CALL    COPY1           ;Go move the data over
     5C6F   D3 23        4290    XWCSO1: OUT     SETSS           ;Single step the machine
     5C71   D3 22        4291            OUT     CLRSS           ;Reset the single step clock
     5C73   CD 4993      4292            CALL    WRTNOP          ;Go get the data and rewrite the NOP
     5C76   3A 41A7      4293            LDA     NOPBUF          ;Get the low byte
     5C79   32 4192      4294            STA     XFRBUF          ;Put it here
     5C7C   CD 5CD9      4295            CALL    SNDDAT          ;Go send it
     5C7F   3A 41A8      4296            LDA     NOPBUF+1        ;Get the next byte
     5C82   32 4192      4297            STA     XFRBUF          ;Put it here
     5C85   CD 5CD9      4298            CALL    SNDDAT          ;Go send it
     5C88   3A 41A9      4299            LDA     NOPBUF+2        ;Get the byte
     5C8B   32 4192      4300            STA     XFRBUF          ;Save it here
     5C8E   CD 5CD9      4301            CALL    SNDDAT          ;Go send it
     5C91   CD 623C      4302            CALL    XFRCHK          ;Go check the Transfer count
     5C94   C2 5C6F      4303            JNZ     XWCSO1          ;Loop back if not 0
     5C97   3A 4082      4304            LDA     BYTSUM          ;Get my checksum
     5C9A   DF           4305            RST     3               ;Go send it
     5C9B   21 4168      4306    XWCSO2: LXI     H,TMPBUF        ;Point to the old CSR
     5C9E   CD 49A4      4307            CALL    LDCSR           ;Go write it
     5CA1   CD 49D4      4308    XWCSO3: CALL    LDUPC1          ;Go load the old UPC
     5CA4   3A 4196      4309            LDA     CLKFLG          ;Get the clock flag
     5CA7   A7           4310            ANA     A               ;Is it set?
     5CA8   C8           4311            RZ                      ;Leave if not
     5CA9   D3 21        4312            OUT     SETCLK          ;Turn the clock back on otherwise
     5CAB   C9           4313            RET                     ;Leave
                         4314
                         4315
     5CAC   21 4191      4316    GETDAT: LXI     H,XFRCNT+3      ;Point to the high byte of the count
     5CAF   7E           4317            MOV     A,M             ;Get it
     5CB0   2B           4318            DCX     H               ;Back the pointer up
     5CB1   B6           4319            ORA     M               ;OR in the next byte
     5CB2   2B           4320            DCX     H               ;Keep backing it up
     5CB3   B6           4321            ORA     M               ;and ORing things in
     5CB4   2B           4322            DCX     H               ;Last one
     5CB5   B6           4323            ORA     M               ;Whew!
     5CB6   C8           4324            RZ                      ;Leave if 0
     5CB7   AF           4325            XRA     A               ;Clear the carry
     5CB8   01 7196      4326            LXI     B,NEG1          ;Point to a minus 1
     5CBB   0A           4327    ONE:    LDAX    B               ;Get the low byte of the constant
     5CBC   8E           4328            ADC     M               ;Add it to the address
```

```
Error Addr  Code          Seq   Source statement

     5CBD   77            4329          MOV     M,A             ;Store it
     5CBE   03            4330          INX     B               ;Bump the constant pointer
     5CBF   23            4331          INX     H               ;Bump the address pointer
     5CC0   0A            4332  TWO:    LDAX    B               ;Get the low byte of the constant
     5CC1   8E            4333          ADC     M               ;Add it to the address
     5CC2   77            4334          MOV     M,A             ;Store it
     5CC3   03            4335          INX     B               ;Bump the constant pointer
     5CC4   23            4336          INX     H               ;Bump the address pointer
     5CC5   0A            4337  THREE:  LDAX    B               ;Get the low byte of the constant
     5CC6   8E            4338          ADC     M               ;Add it to the address
     5CC7   77            4339          MOV     M,A             ;Store it
     5CC8   03            4340          INX     B               ;Bump the constant pointer
     5CC9   23            4341          INX     H               ;Bump the address pointer
     5CCA   0A            4342  FOUR:   LDAX    B               ;Get the low byte of the constant
     5CCB   8E            4343          ADC     M               ;Add it to the address
     5CCC   77            4344          MOV     M,A             ;Store it
     5CCD   03            4345          INX     B               ;Bump the constant pointer
     5CCE   23            4346          INX     H               ;Bump the address pointer
     5CCF   CD 0046       4347  GETDA1: CALL    GS_VECT?        ;Go get the next character
     5CD2   D2 5CCF       4348          JNC     GETDA1          ;Wait for a character
     5CD5   AF            4349          XRA     A               ;Make a 0
     5CD6   3C            4350          INR     A               ;Clear the Z bit
     5CD7   78            4351          MOV     A,B             ;Get the character back
     5CD8   C9            4352          RET                     ;Leave with the Z bit clear
                          4353
     5CD9   21 418E       4354  SNDDAT: LXI     H,XFRCNT        ;Point to the count again
     5CDC   01 7196       4355          LXI     B,NEG1          ;Point to a longword -1
     5CDF   CD 6251       4356          CALL    ADDAD1          ;Go bump the count
     5CE2   3A 4192       4357          LDA     XFRBUF          ;Get the byte to be sent
     5CE5   DF            4358          RST     3               ;Go send it
     5CE6   C9            4359          RET                     ;Leave
                          4360
     5CE7   21 4203       4361  XFRCOM: LXI     H,PROMPT        ;Point to the prompt
     5CEA   F7            4362          RST     6               ;Send an ACK
     5CEB   AF            4363          XRA     A               ;Make a 0
     5CEC   32 4082       4364          STA     BYTSUM          ;Zero out the checksum
     5CEF   21 4191       4365          LXI     H,XFRCNT+3      ;Point to the high byte of the count
     5CF2   46            4366          MOV     B,M             ;Get a copy into B
     5CF3   78            4367          MOV     A,B             ;Put a copy in A
     5CF4   E6 7F         4368          ANI     7FH             ;Clear the MSB
     5CF6   77            4369          MOV     M,A             ;Put it back into XFRCNT+3
     5CF7   78            4370          MOV     A,B             ;Get the unmodified copy
     5CF8   17            4371          RAL                     ;Put the MSB in the carry
     5CF9   D0            4372          RNC                     ;Leave if transfer is inward
     5CFA   AF            4373          XRA     A               ;Make a 0
     5CFB   32 40FE       4374          STA     CTLDIS          ;Clear this flag
     5CFE   3C            4375          INR     A               ;Make a 1
     5CFF   32 40FF       4376          STA     NOCHK           ;and set this one
     5D02   C9            4377          RET                     ;Leave
                          4378
```

```
Error Addr  Code           Seq   Source statement

                          4379
                          4380
                          4381  ;
                          4382  ;*********************************************************************************
                          4383
     5D03   AF            4384  CRCMD:  XRA     A               ;Set the Z bit to signal no errors
     5D04   C9            4385          RET                     ;Leave
                          4386
                          4387
                          4388  ;*********************************************************************************
                          4389  ;
                          4390  ;THE FOLLOWING ROUTINE WRITES ONE UWORD.
                          4391  ;HL POINTS TO THE FIRST BYTE TO BE WRITTEN
                          4392  ;
     5D05   7E            4393  WRTWCS: MOV     A,M             ;A gets CSR <7:0>
     5D06   D3 08         4394          OUT     WCSB0           ;Write byte 0
     5D08   23            4395          INX     H               ;INCREMENT POINTER
     5D09   7E            4396          MOV     A,M             ;A GETS CSR<15:8>
     5D0A   D3 09         4397          OUT     WCSB1           ;Write byte 1
     5D0C   23            4398          INX     H               ;INCREMENT POINTER
     5D0D   7E            4399          MOV     A,M             ;A GETS CSR<23:16>
     5D0E   D3 0A         4400          OUT     WCSB2           ;Write byte 2
     5D10   23            4401          INX     H               ;INCREMENT POINTER
     5D11   D3 37         4402          OUT     SETWCK          ;Set the clock
     5D13   D3 36         4403          OUT     CLRWCK          ;Reset it
     5D15   C9            4404          RET                     ;RETURN
                          4405  ;
                          4406  ;*********************************************************************************
                          4407
                          4408
                          4409  ;*********************************************************************************
                          4410  ;
     5D16                 4411  CF_ERROR:
     5D16   3E 02         4412          MVI     A,CFERR_CODE    ;Error code
     5D18   11 738B       4413          LXI     D,CF_TL_MSG     ;Point to this message
     5D1B   C3 5D80       4414          JMP     ERROR           ;Go service it
                          4415
     5D1E   AF            4416  SYNERR: XRA     A               ;Make a 0
     5D1F   32 4182       4417          STA     CMDVAL          ;Zero the Command Valid Flag
     5D22   32 7000       4418          STA     CHRCNT          ;Zero the character count
     5D25   3E 03         4419          MVI     A,SYN_CODE      ;Error code
     5D27   11 7352       4420          LXI     D,SYNMSG        ;Point to this error message
     5D2A   C3 5D80       4421          JMP     ERROR           ;Go print the error message
                          4422
     5D2D   AF            4423  TAPERR: XRA     A               ;Make a zero
     5D2E   32 40BB       4424          STA     OFLAG           ;Zero the O flag
     5D31   32 409C       4425          STA     DIRFLG          ;Zero this flag
     5D34   32 409B       4426          STA     LODFLG          ;and this one
     5D37   32 409D       4427          STA     INDFLG          ;and this one also
     5D3A   32 40FE       4428          STA     CTLDIS          ;Allow control characters
```

```
Error Addr  Code          Seq   Source statement

     5D3D   CD 4266       4429          CALL    MYLDER          ;Go print the error information
     5D40   3E 0D         4430          MVI     A,CR            ;Get a carriage return
     5D42   DF            4431          RST     3               ;Go send it
     5D43   C3 5DA2       4432          JMP     ERROR1          ;Go share some code
                          4433
     5D46   3E 04         4434  MEMERR: MVI     A,MEM_CODE      ;Error code
     5D48   11 7365       4435          LXI     D,MEMMSG        ;Point to the memory error message
     5D4B   C3 5D80       4436          JMP     ERROR           ;Go print it
                          4437
     5D4E                 4438  NACK_X_CMND:
     5D4E   3E 07         4439          MVI     A,NACKCMND_CODE ;Code for Command Checksum Error
     5D50   11 73A7       4440          LXI     D,X_CMND_MSG    ;Error message address
     5D53   C3 5D80       4441          JMP     ERROR           ;Go report the error
                          4442
     5D56                 4443  NACK_X_DATA:
     5D56   3E 08         4444          MVI     A,NACKDATA_CODE ;Code for Data Checksum Error
     5D58   11 73C6       4445          LXI     D,X_DATA_MSG    ;Error message address
     5D5B   C3 5D80       4446          JMP     ERROR           ;Go report the error
                          4447
     5D5E   D3 AB         4448  COMERR: OUT     CLRATN          ;Clear attention
     5D60   D3 A9         4449          OUT     CLRACK          ;Clear ack
     5D62   D3 20         4450          OUT     CLRCLK          ;Turn off the CPU clock
     5D64   AF            4451          XRA     A               ;Make a 0
     5D65   32 4196       4452          STA     CLKFLG          ;Turn off this flag
     5D68   3E 05         4453          MVI     A,COMM_CODE             ;
     5D6A   11 7378       4454          LXI     D,COMMSG        ;Point to the Communications error message
     5D6D   C3 5D80       4455          JMP     ERROR           ;Go print it
                          4456
     5D70   3E 06         4457  CLKERR: MVI     A,CLOCK_CODE    ;
     5D72   11 73E2       4458          LXI     D,CLKMSG        ;Point to the Clock Stopped message
     5D75   C3 5D80       4459          JMP     ERROR           ;Go report it
                          4460
     5D78                 4461  CRD_ERROR:
     5D78   3E 01         4462          MVI     A,CRD_CODE      ;Generate an Error Code
     5D7A   11 73FA       4463          LXI     D,CRD_ERR_MSG   ;Point to this error message.
     5D7D   C3 5D80       4464          JMP     ERROR           ;Go report it
                          4465
     5D80   32 4116       4466  ERROR:  STA     SUCCES          ;Write the error code
     5D83   E1            4467          POP     H               ;Get the error PC
     5D84   22 40B9       4468          SHLD    MYPC            ;Save it
     5D87   3A 40D4       4469          LDA     NOTYPE          ;Get the No Typeout Flag
     5D8A   A7            4470          ANA     A               ;Is it set?
     5D8B   C2 5DA2       4471          JNZ     ERROR1          ;Jump if set
     5D8E   EB            4472          XCHG                    ;Get the message address into HL
     5D8F   AF            4473          XRA     A               ;Make a 0
     5D90   32 40FE       4474          STA     CTLDIS          ;Turn off the control character disable flag
     5D93   32 40BB       4475          STA     OFLAG           ;Clear the O Flag
     5D96   32 409D       4476          STA     INDFLG          ;Clear the Indirect Command Flag
     5D99   F7            4477          RST     6               ;Go print the message
     5D9A   3A 4116       4478          LDA     SUCCES          ;Get the Success code
```

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Error Addr  Code          Seq   Source statement

     5D9D   FE 05         4479          CPI     COMM_CODE       ;Is is a comm error?
     5D9F   CC 59B6       4480          CZ      GETUPC          ;If it is, go print the UPC
     5DA2   3A 4116       4481  ERROR1: LDA     SUCCES          ;Get the Success code
     5DA5   FE 01         4482          CPI     CRD_CODE        ;Look for CRD Error Code
     5DA7   CA 4C32       4483          JZ      IDLE            ;Go immediately to the Idle Loop if it is.
     5DAA   AF            4484          XRA     A               ;Clear A
     5DAB   3C            4485          INR     A               ;Make sure the Z bit is cleared
     5DAC   2A 7219       4486          LHLD    MRKBUF          ;Get the SP value
     5DAF   F9            4487          SPHL                    ;Put it in the SP
     5DB0   C9            4488          RET                     ;Leave
                          4489  ;
                          4490  ;*****************************************************************************
                          4491
                          4492
                          4493
                          4494  ;*****************************************************************************
                          4495  ;
     5DB1   AF            4496  MARKSP: XRA     A               ;Make a zero
     5DB2   32 4116       4497          STA     SUCCES          ;Zero out this byte
     5DB5   21 0002       4498          LXI     H,2             ;Offset for adding
     5DB8   39            4499          DAD     SP              ;Get the SP value and add it to 2
     5DB9   22 7219       4500          SHLD    MRKBUF          ;Save this value
     5DBC   C9            4501          RET                     ;Leave
                          4502  ;
                          4503  ;*****************************************************************************
                          4504
                          4505
                          4506  ;*****************************************************************************
                          4507  ;
     5DBD   7E            4508  HEXASC: MOV     A,M             ;Get the digit to be converted
     5DBE   E6 F0         4509          ANI     0F0H            ;Save the high nibble
     5DC0   1F            4510          RAR                     ;Move it down to the low nibble
     5DC1   1F            4511          RAR                     ;
     5DC2   1F            4512          RAR                     ;
     5DC3   1F            4513          RAR                     ;
     5DC4   CD 5DD7       4514          CALL    CHANGE          ;This actually does the convert
     5DC7   12            4515          STAX    D               ;Store the ASCII character
     5DC8   13            4516          INX     D               ;Point the Output buffer to the next byte
     5DC9   7E            4517          MOV     A,M             ;Get the Hex digit
     5DCA   E6 0F         4518          ANI     0FH             ;Save the low nibble
     5DCC   CD 5DD7       4519          CALL    CHANGE          ;Go convert
     5DCF   12            4520          STAX    D               ;Put the ASCII character in the buffer
     5DD0   13            4521          INX     D               ;Bump the Output buffer pointer
     5DD1   2B            4522          DCX     H               ;Decrement the source pointer
     5DD2   05            4523          DCR     B               ;Decrement the count
     5DD3   C2 5DBD       4524          JNZ     HEXASC          ;If not done, loop
     5DD6   C9            4525          RET                     ;Else, return
                          4526
     5DD7   FE 0A         4527  CHANGE: CPI     0AH             ;Check the value of the Hex digit
     5DD9   DA 5DE2       4528          JC      SKIP40          ;If less than A(Hex), jump
```

```
Error Addr  Code          Seq   Source statement

     5DDC   3D            4529           DCR     A               ;This will make the lower 3 bits correct
     5DDD   E6 07         4530           ANI     07H             ;Save them
     5DDF   F6 40         4531           ORI     040H            ;This completes the conversion
     5DE1   C9            4532           RET                     ;Leave
     5DE2   F6 30         4533   SKIP40: ORI     030H            ;For values less than A(Hex), this is all
     5DE4   C9            4534           RET                     ;Leave
                          4535   ;
                          4536   ;*************************************************************************
                          4537
                          4538
                          4539
                          4540
                          4541   ;*************************************************************************
                          4542   ;
     5DE5   3A 40D3       4543   ACFAIL: LDA     RUNFLG          ;Get the runflag
     5DE8   A7            4544           ANA     A               ;Is it set?
     5DE9   CA 5DFD       4545           JZ      ACFAI0          ;Jump if not
     5DEC   3E 01         4546           MVI     A,01            ;Make a one
     5DEE   32 40B5       4547           STA     PFFLAG          ;Set the Power Fail Flag
     5DF1   D3 AC         4548           OUT     SETPFI          ;Set the Power Fail Interrupt signal
     5DF3   D3 3B         4549           OUT     SETBLK          ;Set the 100Hz clock block
     5DF5   3E 64         4550           MVI     A,LARM3         ;Get the code for Loading and Arming counter 3
     5DF7   D3 1D         4551           OUT     ITCSR           ;Send it out
     5DF9   D3 3A         4552           OUT     CLRBLK          ;Clear the 100Hz clock block
     5DFB   F1            4553           POP     PSW             ;Get the AC and the PSW back
     5DFC   C9            4554           RET                     ;Go back to program mode
                          4555
     5DFD   D3 3B         4556   ACFAI0: OUT     SETBLK          ;Set the 100Hz clock block
     5DFF   3E 64         4557           MVI     A,LARM3         ;Get the code for Loading and Arming counter 3
     5E01   D3 1D         4558           OUT     ITCSR           ;Send it out
     5E03   D3 3A         4559           OUT     CLRBLK          ;Clear the 100Hz clock block
     5E05   DB 20         4560   ACFAI1: IN      SUMREG          ;Check the 2 ms timer
     5E07   E6 40         4561           ANI     40H             ;Look for overflow
     5E09   C2 5E05       4562           JNZ     ACFAI1          ;Loop until the 2 ms done
     5E0C   D3 2C         4563   ACFAI2: OUT     CLRTMR          ;Turn off the Interval Timer
     5E0E   20            4564           RIM                     ;Get the interrupt masks
     5E0F   F6 09         4565           ORI     9H              ;Set MSE and M5.5
     5E11   30            4566           SIM                     ;Write the masks out
     5E12   D3 3B         4567           OUT     SETBLK          ;Set the 100Hz clock block
     5E14   3E C4         4568           MVI     A,0C4H          ;Disarm counter #3
     5E16   D3 1D         4569           OUT     ITCSR           ;Send it out
     5E18   3E E3         4570           MVI     A,0E3H          ;Code for setting output of counter #3 high
     5E1A   D3 1D         4571           OUT     ITCSR           ;Send it out to the chip
     5E1C   D3 3A         4572           OUT     CLRBLK          ;Unblock the 100Hz clock
     5E1E   AF            4573           XRA     A               ;Make a 0
     5E1F   32 40D3       4574           STA     RUNFLG          ;Zero the Run Flag
     5E22   32 40B5       4575           STA     PFFLAG          ;Zero this flag
     5E25   D3 AD         4576           OUT     CLRPFI          ;Turn off this signal
     5E27   D3 3C         4577           OUT     CLRLIT          ;Turn off the light
     5E29   D3 20         4578           OUT     CLRCLK          ;Turn off the CPU clock
```

```
Error Addr  Code          Seq   Source statement

     5E2B   D3 A7        4579          OUT     DISMEM          ;Turn off the CPU memory
     5E2D   CD 4151      4580          CALL    PUVEC           ;Go perform the Power Up sequence
     5E30   21 0000      4581          LXI     H,0             ;Make a word of 0
     5E33   2B           4582   ACFAI3: DCX     H               ;Start counting down
     5E34   7C           4583          MOV     A,H             ;Get the high byte
     5E35   B5           4584          ORA     L               ;OR in the low
     5E36   C2 5E33      4585          JNZ     ACFAI3          ;Jump if not 0
     5E39   3E 10        4586          MVI     A,10H           ;Code for reseting RST7.5 if set
     5E3B   30           4587          SIM                     ;Do it
     5E3C   FB           4588          EI                      ;Turn on the interrupt system
     5E3D   CD 5E9E      4589          CALL    MAKCON          ;Go build the LS constants
     5E40   DB 48        4590          IN      TTDB            ;Clear any garbage out of the Terminal DB
                         4591                                  ;and clear the RCV DONE bit as well
     5E42   21 7341      4592          LXI     H,PWRMSG        ;Point to the Power Restored Message
     5E45   F7           4593          RST     6               ;Go send it
     5E46   3A 707F      4594          LDA     HMPEND          ;Get this flag
     5E49   1F           4595          RAR                     ;Were we trying to print a halt message?
     5E4A   D8           4596          RC                      ;Return if we were
     5E4B   3E 03        4597          MVI     A,3             ;Get the Power Fail code
     5E4D   32 71DB      4598          STA     HLTCOD          ;Put it in the halt code
     5E50   3E 0D        4599          MVI     A,CR            ;Get a carriage return
     5E52   DF           4600          RST     3               ;Go send it out
     5E53   C3 58CA      4601          JMP     CONHL1          ;Now go try to start up the machine
                         4602   ;
                         4603   ;*****************************************************************************
                         4604
                         4605
                         4606
                         4607   ;*****************************************************************************
                         4608   ;
     5E56   F5           4609   PARITY: PUSH    PSW             ;Save state
     5E57   C5           4610          PUSH    B               ;
     5E58   D5           4611          PUSH    D               ;
     5E59   E5           4612          PUSH    H               ;
     5E5A   D3 20        4613          OUT     CLRCLK          ;Turn off the clock
     5E5C   AF           4614          XRA     A               ;Make a zero
     5E5D   32 4196      4615          STA     CLKFLG          ;Clear the clock running flag
     5E60   3A 40D3      4616          LDA     RUNFLG          ;Get the Run Flag
     5E63   32 7222      4617          STA     BPHALT          ;Set this flag
     5E66   D3 A7        4618          OUT     DISMEM          ;Turn off memory
     5E68   CD 4993      4619          CALL    WRTNOP          ;This will get the current CSR into the NOP
                         4620                                  ;buffer
     5E6B   3A 41A9      4621          LDA     NOPBUF+2        ;Get the MS byte
     5E6E   17           4622          RAL                     ;Now get the MSB of the CSR into the carry
     5E6F   3F           4623          CMC                     ;Flip it
     5E70   1F           4624          RAR                     ;Everything is back where it belongs
     5E71   32 41A9      4625          STA     NOPBUF+2        ;Store it away
     5E74   CD 49A7      4626          CALL    LDCSR1          ;Go restore the CSR
     5E77   D3 A6        4627          OUT     ENBMEM          ;Turn memory back on
     5E79   3E 0D        4628          MVI     A,CR            ;Put a Carriage Return in A
```

```
Error Addr  Code          Seq   Source statement

     5E7B   DF            4629          RST     3               ;Go print it
     5E7C   CD 59B6       4630          CALL    GETUPC          ;Go get and print the UPC
     5E7F   E1            4631          POP     H               ;Restore state
     5E80   D1            4632          POP     D               ;
     5E81   C1            4633          POP     B               ;
     5E82   3A 721F       4634          LDA     MICFLG          ;Check the Micro Step Flag
     5E85   1F            4635          RAR                     ;Is it set?
     5E86   D2 5E8C       4636          JNC     1$              ;Jump if not
     5E89   F1            4637          POP     PSW             ;Finish restoring state
     5E8A   FB            4638          EI                      ;Enable interrupts
     5E8B   C9            4639          RET                     ;and leave
     5E8C   AF            4640  1$:     XRA     A               ;Make a zero
     5E8D   32 40D3       4641          STA     RUNFLG          ;Zero the run flag
     5E90   D3 3C         4642          OUT     CLRLIT          ;Turn off the run light
     5E92   F1            4643          POP     PSW             ;Restore the PSW
     5E93   22 4168       4644          SHLD    TMPBUF          ;Save HL for a bit
     5E96   E1            4645          POP     H               ;Fix up the Stack
     5E97   2A 4168       4646          LHLD    TMPBUF          ;Restore HL
     5E9A   FB            4647          EI                      ;Turn on interrupts again
     5E9B   C3 4C32       4648          JMP     IDLE            ;Go to console mode
                          4649  ;
                          4650  ;*****************************************************************************
                          4651
                          4652
                          4653
                          4654  ;*****************************************************************************
                          4655  ;
     5E9E   D3 20         4656  MAKCON: OUT     CLRCLK          ;Turn off the clock
     5EA0   D3 A1         4657          OUT     DISPAR          ;Turn off parity
     5EA2   21 4197       4658          LXI     H,PARFLG        ;Point to the Parity flag
     5EA5   7E            4659          MOV     A,M             ;Get it into A
     5EA6   36 00         4660          MVI     M,0             ;Now zero it
     5EA8   23            4661          INX     H               ;Bump the pointer to a temp
     5EA9   77            4662          MOV     M,A             ;Save this copy
     5EAA   D3 A7         4663          OUT     DISMEM          ;Turn off memory
     5EAC   21 74A9       4664          LXI     H,BASCON        ;Point to a work area
     5EAF   11 7186       4665          LXI     D,POS1          ;Point to a positive one
     5EB2   CD 00F9       4666          CALL    COPY            ;Copy it over
     5EB5   21 74AD       4667          LXI     H,CONBUF        ;Point to the storage area for the constants
     5EB8   7E            4668  MAKCN1: MOV     A,M             ;Get the count for the number of loads in the
                          4669                                  ;group
     5EB9   A7            4670          ANA     A               ;Check for zero
     5EBA   CA 5F16       4671          JZ      MAKCN4          ;Jump over next part if it is
     5EBD   32 74A6       4672          STA     GRPCNT          ;Save it
     5EC0   23            4673          INX     H               ;Bump the pointer
     5EC1   7E            4674          MOV     A,M             ;Get the Base address for this group
     5EC2   32 74A7       4675          STA     BASADR          ;Save it
     5EC5   23            4676          INX     H               ;Bump the pointer again
     5EC6   7E            4677          MOV     A,M             ;Get the a count for mapping the bytes in the
                          4678                                  ;buffer into the LS load word
```

```
Error Addr  Code          Seq   Source statement

     5EC7   32 74A8       4679          STA     CONSIZ          ;Save it
     5ECA   23            4680          INX     H               ;Bump the pointer
     5ECB   E5            4681          PUSH    H               ;Save the pointer value
     5ECC   21 7472       4682  MAKCN2: LXI     H,SHFBUF        ;Point to the shift buffer
     5ECF   CD 6AFA       4683          CALL    ZROBUF          ;Go zero it
     5ED2   D1            4684          POP     D               ;Get the pointer back
     5ED3   3A 74A8       4685          LDA     CONSIZ          ;Get the number of bytes per entry
     5ED6   47            4686          MOV     B,A             ;Put it in B
     5ED7   FE 05         4687          CPI     05              ;Check for count of five
     5ED9   CA 5F39       4688          JZ      MAKCN6          ;Jump if it is
     5EDC   1A            4689  MAKCN3: LDAX    D               ;Get a byte
     5EDD   77            4690          MOV     M,A             ;Store it
     5EDE   23            4691          INX     H               ;Bump the pointer in HL
     5EDF   13            4692          INX     D               ;and the one in DE
     5EE0   05            4693          DCR     B               ;Reduce the entry count by one
     5EE1   C2 5EDC       4694          JNZ     MAKCN3          ;Loop back if not zero
     5EE4   D5            4695          PUSH    D               ;Save the current pointer value
     5EE5   CD 5F4D       4696  MAKCN8: CALL    FASTWR          ;Go write WR 0 the quick way
     5EE8   21 7472       4697          LXI     H,SHFBUF        ;Point the shift buffer
     5EEB   11 747D       4698          LXI     D,WRNLSN        ;Point to the LSn to WRn U word
     5EEE   06 03         4699          MVI     B,03            ;Set up the count
     5EF0   CD 00FB       4700          CALL    COPY1           ;Go copy them
     5EF3   2B            4701          DCX     H               ;Move the pointer back
     5EF4   2B            4702          DCX     H               ;to point to byte 2
     5EF5   3A 74A7       4703          LDA     BASADR          ;Get the address
     5EF8   77            4704          MOV     M,A             ;Put it in the second byte
     5EF9   3C            4705          INR     A               ;Bump the address
     5EFA   32 74A7       4706          STA     BASADR          ;Save the new value
     5EFD   2B            4707          DCX     H               ;Point to byte one
     5EFE   E5            4708          PUSH    H               ;Save this address
     5EFF   0E 03         4709          MVI     C,03            ;Number of bytes to shift accross
     5F01   CD 4A00       4710          CALL    LSHIFT          ;Position the U word correctly
     5F04   D1            4711          POP     D               ;Get the address back
     5F05   CD 5649       4712          CALL    EXECUT          ;Go do it
     5F08   3A 74A6       4713          LDA     GRPCNT          ;Get the count
     5F0B   3D            4714          DCR     A               ;Subtract one
     5F0C   32 74A6       4715          STA     GRPCNT          ;Save the new value
     5F0F   C2 5ECC       4716          JNZ     MAKCN2          ;Loop back if not done
     5F12   E1            4717          POP     H               ;Put the pointer in HL
     5F13   C3 5EB8       4718          JMP     MAKCN1          ;Go here if this group done
                          4719
     5F16   CD 4993       4720  MAKCN4: CALL    WRTNOP          ;Put a NOP in the CSR
     5F19   21 41AB       4721          LXI     H,SWAP+1        ;Point to high byte of Swap buffer
     5F1C   AF            4722          XRA     A               ;Make a zero
     5F1D   77            4723          MOV     M,A             ;Send it out
     5F1E   2B            4724          DCX     H               ;Drop the pointer down one
     5F1F   77            4725          MOV     M,A             ;Zero the low byte
     5F20   CD 49D1       4726          CALL    LDUPC           ;Go load it in
     5F23   D3 A6         4727          OUT     ENBMEM          ;Turn on memory again
     5F25   21 4198       4728          LXI     H,PARTMP        ;Point to the Parity Flag copy
```

```
Error Addr  Code            Seq   Source statement

     5F28   7E              4729          MOV     A,M             ;Get the copy
     5F29   2B              4730          DCX     H               ;Point to the Parity Flag byte
     5F2A   77              4731          MOV     M,A             ;Send the copy out
     5F2B   1F              4732          RAR                     ;See if we should turn parity back on
     5F2C   D2 5F31         4733          JNC     MAKCN5          ;Jump if not
     5F2F   D3 A0           4734          OUT     ENBPAR          ;Turn Parity on again
     5F31   3A 4196         4735  MAKCN5: LDA     CLKFLG          ;Get the clock flag
     5F34   1F              4736          RAR                     ;Check it
     5F35   D0              4737          RNC                     ;Done if not set
     5F36   D3 21           4738          OUT     SETCLK          ;Turn on the clock
     5F38   C9              4739          RET                     ;Leave
                            4740
     5F39   D5              4741  MAKCN6: PUSH    D               ;Save DE
     5F3A   11 74A9         4742          LXI     D,BASCON        ;Point to the constant
     5F3D   D5              4743          PUSH    D               ;Save the address
     5F3E   21 7472         4744          LXI     H,SHFBUF        ;Point to the destination
     5F41   CD 00F9         4745          CALL    COPY            ;Go copy the data over
     5F44   E1              4746          POP     H               ;Get the address back
     5F45   0E 04           4747          MVI     C,04            ;Set the count
     5F47   CD 4A00         4748          CALL    LSHIFT          ;Go shift 4 bytes left by one bit
     5F4A   C3 5EE5         4749          JMP     MAKCN8          ;Return to the main flow
                            4750
                            4751
     5F4D   CD 4993         4752  FASTWR: CALL    WRTNOP          ;NOP the CSR
     5F50   21 0016         4753          LXI     H,FASUPC        ;Load up the address of the right routine
     5F53   22 41AA         4754          SHLD    SWAP            ;Put it in the swapping buffer
     5F56   21 41AA         4755          LXI     H,SWAP          ;Point to it
     5F59   CD 49D1         4756          CALL    LDUPC           ;Go load it
     5F5C   3E 21           4757          MVI     A,33            ;Loop control count
     5F5E   32 40B4         4758          STA     TEMP            ;Put it here
     5F61   D3 23           4759          OUT     SETSS           ;Do the NOP
     5F63   D3 22           4760          OUT     CLRSS           ;
     5F65   D3 23           4761  FASWR1: OUT     SETSS           ;First tick in a three tick loop
     5F67   D3 22           4762          OUT     CLRSS           ;
     5F69   D3 AB           4763          OUT     CLRATN          ;Clear Console attention
     5F6B   21 7472         4764          LXI     H,SHFBUF        ;Point to the data
     5F6E   0E 04           4765          MVI     C,04            ;Number of bytes to shift accross
     5F70   CD 4A00         4766          CALL    LSHIFT          ;Go shift it left
     5F73   D2 5F78         4767          JNC     FASWR2          ;Jump if no carry
     5F76   D3 AA           4768          OUT     SETATN          ;Set Console Attention
     5F78   D3 23           4769  FASWR2: OUT     SETSS           ;Second tick
     5F7A   D3 22           4770          OUT     CLRSS           ;
     5F7C   D3 23           4771          OUT     SETSS           ;Third tick
     5F7E   D3 22           4772          OUT     CLRSS           ;
     5F80   3A 40B4         4773          LDA     TEMP            ;Get the count
     5F83   3D              4774          DCR     A               ;Subtract one
     5F84   32 40B4         4775          STA     TEMP            ;Save it
     5F87   C2 5F65         4776          JNZ     FASWR1          ;Loop back if not done
     5F8A   C9              4777          RET                     ;Leave
                            4778  ;
```

```
Error Addr  Code          Seq   Source statement

                          4779  ;*****************************************************************************
                          4780
                          4781
                          4782
                          4783  ;*****************************************************************************
                          4784  ;
     5F8B   3A 40B6       4785  PUBCHK: LDA     PUBFLG          ;Point to the power up boot flag
     5F8E   A7            4786          ANA     A               ;Is it zero?
     5F8F   C2 4C32       4787          JNZ     IDLE            ;Jump if not
     5F92   21 7323       4788          LXI     H,PUBMSG        ;Point to the Power Up Boot message
     5F95   F7            4789          RST     6               ;Go send it
     5F96   C3 0040       4790          JMP     INIVEC          ;Then go down into the ROM
                          4791  ;
                          4792  ;*****************************************************************************
                          4793
                          4794
                          4795  ;*****************************************************************************
                          4796  ;
     5F99                 4797  COLD_BEGIN:
     5F99   D3 A7         4798          OUT     DISMEM          ;Turn off memory
     5F9B   AF            4799          XRA     A               ;Make a 0
     5F9C   32 4196       4800          STA     CLKFLG          ;Zero this flag
     5F9F   32 408A       4801          STA     COLD            ;and this one
     5FA2   3C            4802          INR     A               ;Make a one
     5FA3   32 40B6       4803          STA     PUBFLG          ;Set the Power Up Boot in Progress Flag
     5FA6   32 4197       4804          STA     PARFLG          ;Zero this flag
     5FA9   CD 5E9E       4805          CALL    MAKCON          ;Go make the constants
     5FAC   20            4806          RIM                     ;Read in the interrupt masks
     5FAD   F6 08         4807          ORI     08H             ;Set the MSE
     5FAF   E6 0D         4808          ANI     0DH             ;Clear the Parity interrupt mask
     5FB1   30            4809          SIM                     ;Set the masks
     5FB2   FB            4810          EI                      ;Enable interrupts
     5FB3   CD 6999       4811          CALL    TMRPRP          ;Go fix up the timers
     5FB6   3A 4150       4812          LDA     DEFDRV          ;Get the Default Drive number
     5FB9   32 4091       4813          STA     UNIT            ;Set up the unit number
     5FBC   3E 01         4814          MVI     A,1             ;Make a 1
     5FBE   32 409D       4815          STA     INDFLG          ;Set this flag
     5FC1   21 7239       4816          LXI     H,PWRFIL        ;Point to this command
     5FC4   22 721C       4817          SHLD    INDADR          ;Save the pointer
     5FC7   CD 4C5E       4818          CALL    CNSOLB          ;Go process it
     5FCA   C2 4C32       4819          JNZ     IDLE            ;Stop if we return with Z bit not set
     5FCD   3E 01         4820          MVI     A,1             ;Make a 1
     5FCF   32 40D5       4821          STA     WCS_LOAD_FLAGS  ;Set the POWER.CMD done flag
                          4822
     5FD2                 4823  COLD_BEGIN0:
     5FD2   3E 01         4824          MVI     A,1             ;Make a 1
     5FD4   32 409D       4825          STA     INDFLG          ;Set this flag
     5FD7   21 7247       4826          LXI     H,CODFIL        ;Point to this command
     5FDA   22 721C       4827          SHLD    INDADR          ;Save the pointer
     5FDD   CD 4C5E       4828          CALL    CNSOLB          ;Go process it
```

```
Error Addr  Code          Seq   Source statement

     5FE0   C2 4C32       4829           JNZ     IDLE            ;Jump if Z bit clear
     5FE3   3E 03         4830           MVI     A,3             ;Make a 1
     5FE5   32 40D5       4831           STA     WCS_LOAD_FLAGS  ;Set the CODE0n.CMD done flag.
                          4832
     5FE8                 4833   COLD_BEGIN1:
     5FE8   21 40FD       4834           LXI     H,CRD_FLAGS     ;Point to the CRD flags
     5FEB   7E            4835           MOV     A,M             ;Get them
     5FEC   36 00         4836           MVI     M,0             ;Zero out the copy in Memory
     5FEE   1F            4837           RAR                     ;Check for CRD in Progress
     5FEF   D2 601A       4838           JNC     COLD_HALT_TEST  ;Jump if not.
     5FF2   1F            4839           RAR                     ;Check the Micros Completed flag
     5FF3   DC 5D78       4840           CC      CRD_ERROR       ;Go print an error message.
     5FF6   1F            4841           RAR                     ;Check for Micro Errors.
     5FF7   DA 6010       4842           JC      2$              ;Jump if errors
     5FFA   1F            4843           RAR                     ;Check for Auto or Menu Mode.
     5FFB   21 727C       4844           LXI     H,CRAFIL+3      ;Point to the Auto Mode File String.
     5FFE   D2 6004       4845           JNC     1$              ;Jump if Auto Mode
     6001   21 728E       4846           LXI     H,CRMFIL+3      ;Otherwise, point to the Menu Mode Boot file.
     6004   3A 4150       4847   1$:     LDA     DEFDRV          ;Get the Default Drive Number.
     6007   F6 30         4848           ORI     30H             ;Make it ASCII.
     6009   77            4849           MOV     M,A             ;Store it in the string.
     600A   2B            4850           DCX     H               ;Back the pointer up to the beginning of
     600B   2B            4851           DCX     H               ;the string.
     600C   2B            4852           DCX     H               ;
     600D   C3 602F       4853           JMP     CLDST1          ;Go boot things up.
     6010   AF            4854   2$:     XRA     A               ;Make a 0
     6011   32 40BB       4855           STA     OFLAG           ;Clear the Control O Flag
     6014   3E 0D         4856           MVI     A,CR            ;Put a Carriage Return in A
     6016   DF            4857           RST     3               ;Go send it out
     6017   C3 4C32       4858           JMP     IDLE            ;Don't Boot Up if the Micros had errors.
                          4859
     601A                 4860   COLD_HALT_TEST:
     601A   DB 02         4861           IN      HLTFLG          ;Check the Halt/Auto Restart Switch
     601C   1F            4862           RAR                     ;Put it in the carry
     601D   D2 4C32       4863           JNC     IDLE            ;Go to the Idle Loop if low
                          4864
     6020   21 72EB       4865   CLDSTX: LXI     H,CLDMSG        ;Point to this message
     6023   F7            4866           RST     6               ;Go print it
     6024   3A 4150       4867   CLDSTR: LDA     DEFDRV          ;Get the default drive number
     6027   F6 30         4868   CLDST0: ORI     30H             ;Make it ASCII
     6029   32 7258       4869           STA     DEFFIL+3        ;Put it into the command string
     602C   21 7255       4870           LXI     H,DEFFIL        ;Point to this command string
     602F   22 721C       4871   CLDST1: SHLD    INDADR          ;Save the addres of the indirect command file
     6032   21 408A       4872           LXI     H,COLD          ;Point to this flag
     6035   7E            4873           MOV     A,M             ;Get it
     6036   A7            4874           ANA     A               ;Is it zero?
     6037   C4 6062       4875           CNZ     CFAIL           ;Jump if not
     603A   3E 01         4876           MVI     A,1             ;Force a one into A
     603C   32 408A       4877           STA     COLD            ;Set this flag
     603F   32 41B7       4878           STA     WARM            ;and this flag also
```

```
Error Addr  Code          Seq   Source statement

     6042   32 409D      4879            STA     INDFLG          ;Set this flag
     6045   CD 56F8      4880            CALL    INISUB          ;Go init the machine
     6048   C4 6062      4881            CNZ     CFAIL           ;If error try a Power up Boot
     604B   21 71B6      4882            LXI     H,EDPACK        ;Point to this packet area
     604E   11 7498      4883            LXI     D,SPPACK        ;Point to this packet
     6051   06 0A        4884            MVI     B,10            ;Set up the count
     6053   CD 00FB      4885            CALL    COPY1           ;Go copy it over
     6056   CD 6222      4886            CALL    SNDRCV          ;Go send and receive a packet
     6059   C4 6062      4887            CNZ     CFAIL           ;If error, go check the PUB flag
     605C   CD 4C5E      4888            CALL    CNSOLB          ;Now go process the indirect command file we
                         4889                                    ;set up at CLDSTR
     605F   CD 6062      4890            CALL    CFAIL           ;If we come back here, there is an error
                         4891
     6062   E1           4892    CFAIL:  POP     H               ;Get the error PC
     6063   22 7565      4893            SHLD    CFATAL          ;Store it
     6066   21 730A      4894            LXI     H,CFMSG         ;Point to the Cold Failed message
     6069   F7           4895            RST     6               ;Go print it
     606A   3A 4116      4896            LDA     SUCCES          ;Get the success code
     606D   A7           4897            ANA     A               ;If we had a tape error, this will be non zero
     606E   CA 5F8B      4898            JZ      PUBCHK          ;Go see about doing a Power Up Boot
     6071   C3 4C32      4899            JMP     IDLE            ;Otherwise, go to the Idle Loop
                         4900    ;
                         4901    ;*****************************************************************************
                         4902
                         4903
                         4904    ;*****************************************************************************
                         4905    ;
     6074   31 4080      4906    WRMSTR: LXI     SP,STACK        ;Set up the stack pointer
     6077   21 72AD      4907            LXI     H,WRMMSG        ;Go send the Attempting Warm Restart message
     607A   F7           4908            RST     6               ;Do it
     607B   AF           4909            XRA     A               ;Make a 0
     607C   32 7564      4910            STA     WEFLAG          ;Zero out this flag
     607F   3A 41B7      4911            LDA     WARM            ;Get this flag
     6082   A7           4912            ANA     A               ;See if it is zero
     6083   C4 61E3      4913            CNZ     WFAIL           ;Jump if not
     6086   CD 56F8      4914            CALL    INISUB          ;Go init the machine
     6089   C4 61E3      4915            CNZ     WFAIL           ;If error at this point, go try cold start
     608C   21 71CC      4916            LXI     H,SCNADR        ;Point to the address part of this packet
     608F   11 71A6      4917            LXI     D,NEG200        ;Point to a negative 200 hex
     6092   CD 00F9      4918            CALL    COPY            ;Go copy it over
     6095   3E 01        4919            MVI     A,1             ;Make a one
     6097   32 40D4      4920            STA     NOTYPE          ;Suppress error typeouts
     609A   E7           4921    WRMST1: RST     4               ;Do this to allow for breakouts
     609B   21 71CC      4922            LXI     H,SCNADR        ;Point to the address part of SCNPAK
     609E   01 7192      4923            LXI     B,POS200        ;Point to a positive 200 hex
     60A1   CD 6251      4924            CALL    ADDAD1          ;Go add it in
     60A4   21 71B6      4925            LXI     H,EDPACK        ;Now we move SCNPAK to EDPACK
     60A7   11 71CA      4926            LXI     D,SCNPAK        ;Point to the source
     60AA   06 06        4927            MVI     B,6             ;Set up the count
     60AC   CD 00FB      4928            CALL    COPY1           ;Copy source to dest
```

```
Error Addr  Code          Seq   Source statement

     60AF   CD 6204       4929           CALL    SNDPRP          ;Go set up the send and receive packets
     60B2   C4 61F2       4930           CNZ     WFAIL1          ;Loop back if error
     60B5   CD 6233       4931           CALL    DATCHK          ;See if data is same as address
     60B8   C4 61F2       4932           CNZ     WFAIL1          ;Jump if not the same
     60BB   CD 6204       4933           CALL    SNDPRP          ;Go send and receive the packets
     60BE   C4 61F2       4934           CNZ     WFAIL1          ;Jump if error occurred
     60C1   CD 6233       4935           CALL    DATCHK          ;See if address is same as data
     60C4   CC 61F2       4936           CZ      WFAIL1          ;Jump if they are (shouldn't be)
     60C7   21 71E4       4937           LXI     H,RESADR        ;Point to this storage location
     60CA   11 71C6       4938           LXI     D,RCVDAT        ;and the the data to go there
     60CD   CD 00F9       4939           CALL    COPY            ;Go copy it over
     60D0   CD 6204       4940           CALL    SNDPRP          ;Go get the next longword
     60D3   C4 61F2       4941           CNZ     WFAIL1          ;Jump if error
     60D6   21 71E8       4942           LXI     H,LNGSAV        ;Point to this storage
     60D9   11 71C6       4943           LXI     D,RCVDAT        ;and this data
     60DC   CD 00F9       4944           CALL    COPY            ;Move it over
     60DF   21 71EC       4945           LXI     H,LNGSUM        ;Point to this storage area
     60E2   CD 6AFA       4946           CALL    ZROBUF          ;Go zero it out
     60E5   CD 6204       4947           CALL    SNDPRP          ;Get the next longword
     60E8   C4 61F2       4948           CNZ     WFAIL1          ;Loop back if error
     60EB   21 71F2       4949           LXI     H,WFADR         ;Point to the beginning of a storage area
     60EE   11 71C2       4950           LXI     D,RCVADR        ;Point the beginning of the address part
     60F1   06 08         4951           MVI     B,8             ;Count for copying
     60F3   CD 00FB       4952           CALL    COPY1           ;Go copy
     60F6   21 71FA       4953           LXI     H,WRMCNT        ;Point to this counter byte
     60F9   36 1F         4954           MVI     M,1FH           ;Set up the count
     60FB   21 71B8       4955           LXI     H,EDADDR        ;Point to the address part of the packet
     60FE   11 71E4       4956           LXI     D,RESADR        ;Point to the restart address
     6101   CD 00F9       4957           CALL    COPY            ;Go copy it over
     6104   CD 6204       4958   WRMST2: CALL    SNDPRP          ;Get the next longword
     6107   C4 61F2       4959           CNZ     WFAIL1          ;Jump if error
     610A   21 71EC       4960           LXI     H,LNGSUM        ;Point to the Longword checksum
     610D   01 71C6       4961           LXI     B,RCVDAT        ;Point to the data
     6110   CD 6251       4962           CALL    ADDAD1          ;Go add it in
     6113   21 71FA       4963           LXI     H,WRMCNT        ;Point to this counter
     6116   35            4964           DCR     M               ;Decrement it
     6117   C2 6104       4965           JNZ     WRMST2          ;Loop until zero
     611A   21 71EC       4966           LXI     H,LNGSUM        ;Point to the checksum
     611D   11 71E8       4967           LXI     D,LNGSAV        ;Point to the one we got from the RPB
     6120   06 04         4968           MVI     B,4             ;Set up a count of 4
     6122   1A            4969   WRMST9: LDAX    D               ;Get a byte
     6123   BE            4970           CMP     M               ;See if equal
     6124   C4 61F2       4971           CNZ     WFAIL1          ;Jump back if not
     6127   23            4972           INX     H               ;Bump the pointer
     6128   13            4973           INX     D               ;and the other pointer
     6129   05            4974           DCR     B               ;Reduce the count
     612A   C2 6122       4975           JNZ     WRMST9          ;Loop back until count equals 0
     612D   AF            4976           XRA     A               ;Make a 0
     612E   32 40D4       4977           STA     NOTYPE          ;Clear this flag
     6131   21 71F6       4978           LXI     H,WFDATA        ;Point to the low byte
```

```
Error Addr  Code          Seq   Source statement

     6134   7E            4979          MOV     A,M             ;Get it
     6135   1F            4980          RAR                     ;Put the LSB in the carry
     6136   DC 61E3       4981          CC      WFAIL           ;Jump if set
     6139   3F            4982          CMC                     ;Set it if it was clear
     613A   17            4983          RAL                     ;Rotate things back
     613B   77            4984          MOV     M,A             ;Send the low byte back
     613C   21 71B6       4985          LXI     H,EDPACK        ;Point to this area
     613F   11 71D0       4986          LXI     D,DEPPAK        ;Point to this source packet
     6142   06 06         4987          MVI     B,6             ;Set up a count
     6144   CD 00FB       4988          CALL    COPY1           ;Go copy it over
     6147   21 71BC       4989          LXI     H,EDDATA        ;Point to the data part of the packet
     614A   11 71DC       4990          LXI     D,HALTPC        ;Point to the Halt PC
     614D   CD 00F9       4991          CALL    COPY            ;Put it in the data part of the packet
     6150   CD 6222       4992          CALL    SNDRCV          ;Go send it
     6153   C4 61E3       4993          CNZ     WFAIL           ;If error, go try a cold start
     6156   21 71BC       4994          LXI     H,EDDATA        ;Point to the data part again
     6159   11 71E0       4995          LXI     D,HLTPSL        ;Point to the Halt PSL
     615C   CD 00F9       4996          CALL    COPY            ;Copy it over
     615F   01 7186       4997          LXI     B,POS1          ;Point to a 1
     6162   CD 624E       4998          CALL    ADDADR          ;Go add it
     6165   CD 6222       4999          CALL    SNDRCV          ;Go send the PSL to R11
     6168   C4 61E3       5000          CNZ     WFAIL           ;Go try a cold start if error
     616B   21 71BC       5001          LXI     H,EDDATA        ;Point to this area
     616E   CD 6AFA       5002          CALL    ZROBUF          ;Go zero it
     6171   3A 71DB       5003          LDA     HLTCOD          ;Get the halt code
     6174   32 71BC       5004          STA     EDDATA          ;Put it in the packet
     6177   01 7186       5005          LXI     B,POS1          ;Now prepare to bump the address
     617A   CD 624E       5006          CALL    ADDADR          ;Go do it
     617D   CD 6222       5007          CALL    SNDRCV          ;Go send and receive
     6180   C4 61E3       5008          CNZ     WFAIL           ;Go try a cold start if error
     6183   3E 0E         5009          MVI     A,0EH           ;Get the address of the SP
     6185   32 71B8       5010          STA     EDADDR          ;Put it into the address area of the packet
     6188   21 71BC       5011          LXI     H,EDDATA        ;Point to the data area
     618B   11 71CC       5012          LXI     D,SCNADR        ;Point to this address
     618E   CD 00F9       5013          CALL    COPY            ;Put it into the packet
     6191   21 71BC       5014          LXI     H,EDDATA        ;Point to this part of the packet again
     6194   01 7192       5015          LXI     B,POS200        ;Positive 200
     6197   CD 6251       5016          CALL    ADDAD1          ;Go add it in
     619A   CD 6222       5017          CALL    SNDRCV          ;Go send it
     619D   C4 61E3       5018          CNZ     WFAIL           ;Go try a cold start if error
     61A0   01 7186       5019          LXI     B,POS1          ;Positive 1
     61A3   CD 624E       5020          CALL    ADDADR          ;Go bump the address part of the packet
     61A6   21 71BC       5021          LXI     H,EDDATA        ;Point to the data portion
     61A9   11 71E4       5022          LXI     D,RESADR        ;Point to the restart address
     61AC   CD 00F9       5023          CALL    COPY            ;Go copy it over
     61AF   CD 6222       5024          CALL    SNDRCV          ;Go send the packet
     61B2   C4 61E3       5025          CNZ     WFAIL           ;Go try a cold start if error
     61B5   21 71B6       5026          LXI     H,EDPACK        ;Point to this packet
     61B8   11 71F0       5027          LXI     D,WFPACK        ;and this source packet
     61BB   06 0A         5028          MVI     B,10            ;Count for copying
```

```
Error Addr  Code          Seq   Source statement

     61BD   CD 00FB       5029          CALL    COPY1           ;Go move the packet over
     61C0   CD 6222       5030          CALL    SNDRCV          ;Go send and receive the deposit
     61C3   C4 61E3       5031          CNZ     WFAIL           ;Go try a cold start if error
     61C6   3E 01         5032          MVI     A,1             ;Make a one
     61C8   32 41B7       5033          STA     WARM            ;Set the Console based Warm Flag
     61CB   AF            5034          XRA     A               ;Make a 0
     61CC   32 71FD       5035          STA     CONMOD          ;Zero this Continue Modifier byte
     61CF   21 71FC       5036          LXI     H,CONPAK        ;Point to the continue packet
     61D2   CD 622B       5037          CALL    SNDRCX          ;Go send it
     61D5   C4 61E3       5038          CNZ     WFAIL           ;Go try a cold start if error
     61D8   AF            5039          XRA     A               ;Make a 0
     61D9   32 40D4       5040          STA     NOTYPE          ;Zero the No Error Typeout flag
     61DC   3C            5041          INR     A               ;Make a 1
     61DD   32 40D3       5042          STA     RUNFLG          ;Turn on the Run Flag
     61E0   C3 5877       5043          JMP     CNTIN2          ;Go share code
                          5044
     61E3   AF            5045  WFAIL:  XRA     A               ;Make a 0
     61E4   32 40D4       5046          STA     NOTYPE          ;Zero out this flag
     61E7   E1            5047          POP     H               ;Get the error PC
     61E8   22 7567       5048          SHLD    WFATAL          ;Store it here
     61EB   21 72CF       5049          LXI     H,WFMSG         ;Point to the Warm Failed message
     61EE   F7            5050          RST     6               ;Go print it
     61EF   C3 6020       5051          JMP     CLDSTX          ;Go try a cold restart
                          5052
     61F2   E1            5053  WFAIL1: POP     H               ;Get the failure PC
     61F3   3A 7564       5054          LDA     WEFLAG          ;Get this flag
     61F6   A7            5055          ANA     A               ;See if set
     61F7   C2 609A       5056          JNZ     WRMST1          ;Jump if set
     61FA   3C            5057          INR     A               ;Make a one
     61FB   32 7564       5058          STA     WEFLAG          ;Set it
     61FE   22 7569       5059          SHLD    WERROR          ;Save the error PC
     6201   C3 609A       5060          JMP     WRMST1          ;Go back to try again
                          5061
                          5062
     6204   21 74A2       5063  SNDPRP: LXI     H,MEMSIZ        ;Point to the highest memory address
     6207   11 71B8       5064          LXI     D,EDADDR        ;Point to next memory to be accessed
     620A   CD 6242       5065          CALL    CMPCHK          ;Go compare them
     620D   C2 6214       5066          JNZ     SNDPR1          ;Jump if not the same
     6210   E1            5067          POP     H               ;Error if the same, so fix stack
     6211   C3 6024       5068          JMP     CLDSTR          ;and go try a cold start
     6214   CD 6222       5069  SNDPR1: CALL    SNDRCV          ;Go send and receive packets
     6217   01 718E       5070          LXI     B,POS4          ;Point to a positive 4
     621A   CD 624E       5071          CALL    ADDADR          ;Go add 4 to EDADDR
     621D   3A 4116       5072          LDA     SUCCES          ;Get the success code
     6220   A7            5073          ANA     A               ;Set or clear the Z bit
     6221   C9            5074          RET                     ;Leave
                          5075
                          5076
     6222   CD 5DB1       5077  SNDRCV: CALL    MARKSP          ;Go mark the SP value
     6225   CD 514B       5078          CALL    SNDMSX          ;Go send it
```

```
Error Addr  Code          Seq   Source statement

     6228   C3 5186       5079            JMP     RCVMSX          ;Get the reply
                          5080
     622B   EB            5081    SNDRCX: XCHG                    ;Put the address in DE for a bit
     622C   CD 5DB1       5082            CALL    MARKSP          ;Go mark the SP value
     622F   EB            5083            XCHG                    ;Get the address back
     6230   C3 514E       5084            JMP     SNDMSG          ;Go send it
                          5085
     6233   21 71CC       5086    DATCHK: LXI     H,SCNADR        ;Point to the address part of this packet
     6236   11 71C6       5087            LXI     D,RCVDAT        ;and the data part of this one
     6239   C3 6242       5088            JMP     CMPCHK          ;Go compare them
     623C   21 418E       5089    XFRCHK: LXI     H,XFRCNT        ;Point to the Transfer count
     623F   11 7182       5090    ZROCHK: LXI     D,ZERO          ;Point to a longword zero
     6242   06 04         5091    CMPCHK: MVI     B,4             ;Set up the count in B
     6244   1A            5092    CMPCH1: LDAX    D               ;Get the low byte of the source
     6245   BE            5093            CMP     M               ;Compare it to a byte of the dest
     6246   C0            5094            RNZ                     ;Leave if not the same
     6247   23            5095            INX     H               ;Bump the dest pointer
     6248   13            5096            INX     D               ;and the source pointer
     6249   05            5097            DCR     B               ;Decrement the count
     624A   C2 6244       5098            JNZ     CMPCH1          ;Keep looping until count=0
     624D   C9            5099            RET                     ;Leave with Z bit set
                          5100
     624E   21 71B8       5101    ADDADR: LXI     H,EDADDR        ;Point to the address buffer
     6251   1E 04         5102    ADDAD1: MVI     E,04H           ;Prep the loop count
     6253   AF            5103            XRA     A               ;Clear the carry
     6254   0A            5104    1$:     LDAX    B               ;Get the low byte of the constant
     6255   8E            5105            ADC     M               ;Add it to the address
     6256   77            5106            MOV     M,A             ;Store it
     6257   03            5107            INX     B               ;Bump the constant pointer
     6258   23            5108            INX     H               ;Bump the address pointer
     6259   1D            5109            DCR     E               ;Decrement the loop count
     625A   C2 6254       5110            JNZ     1$              ;If not zero, repeat the loop
     625D   AF            5111            XRA     A               ;Clear the accumulator.
     625E   C9            5112            RET                     ;Leave.
                          5113
                          5114    ;
                          5115    ;*****************************************************************************
                          5116    ;
                          5117    ;       CONSOLE MODE ENDS HERE.
                          5118    ;
                          5119    ;*****************************************************************************
                          5120
                          5121
                          5122
                          5123
                          5124
                          5125
                          5126    ;*****************************************************************************
                          5127    ;
                          5128    ;       PROGRAM MODE BEGINS HERE.
```

```
Error Addr  Code           Seq   Source statement

                           5129  ;
                           5130  ;*********************************************************************************
                           5131  ;
                           5132  ;
                           5133  ;
                           5134  ;       IPR=
                           5135  ;
                           5136  ;07     06      05      04      03      02      01      00
                           5137  ;-----------------------------------------------------------
                           5138  ;PRI1   PRI2    PRI3    PRI4    N.U.    N.U.    N.U.    N.U.
                           5139  ;-----------------------------------------------------------
                           5140  ;
                           5141  ;
                           5142  ;       ISR=
                           5143  ;
                           5144  ;
                           5145  ;-----------------------------------------------------------
                           5146  ;TTR    TTR     TTX     TTX     TUX     TUX     TUR     TUR
                           5147  ;I.S.   I.E.    I.S.    I.E.    I.E.    I.S.    I.E.    I.S.
                           5148  ;-----------------------------------------------------------
                           5149  ;
                           5150  ;
                           5151  ;
                           5152  ;
                           5153  ;       ICCS=
                           5154  ;
                           5155  ;07     06      05      04      03      02      01      00
                           5156  ;-----------------------------------------------------------
                           5157  ;I.E    INT     ERR     N.U.    N.U.    SGL     XFR     RUN
                           5158  ;-----------------------------------------------------------
                           5159  ;
                           5160  ;
                           5161  ;
                           5162  ;
                           5163  ;       THIS IS THE BEGINNING OF THE PROGRAM I/O MODE CODE
                           5164  ;
                           5165  ;PROGRAM I/O MODE consists of a primary loop that handles the peripheral
                           5166  ;devices and periodically checks for CPU service requests, routines to
                           5167  ;service MFPR's, MTPR's and interrupt Acknowledges, and routines to handle the
                           5168  ;maintenance of the Interval Timer
                           5169  ;To keep latency reasonable there are a number of CPU service request checks.
                           5170  ;
                           5171  ;
                           5172  ;
625F   D3 3D               5173  ENTER:  OUT     SETLIT          ;Turn on the Run light
6261   AF                  5174          XRA     A               ;Make a 0
6262   32 40BB             5175          STA     OFLAG           ;Clear the Control O flag
6265   32 40CD             5176          STA     SFLAG           ;and the Control S flag
6268   32 409D             5177          STA     INDFLG          ;Clear the Indirect Command Flag
626B   32 70FC             5178          STA     PCOUNT          ;Zero the Control P Timeout
```

```
Error Addr  Code          Seq   Source statement

     626E   3C            5179          INR     A               ;Make a 1
     626F   32 7098       5180          STA     BLKFLG          ;Set the 100Hz clock blocked flag
     6272   D3 3B         5181          OUT     SETBLK          ;Now block it
     6274   3E C4         5182          MVI     A,0C4H          ;Get the code to disarm counter #3
     6276   D3 1D         5183          OUT     ITCSR           ;Send it out
     6278   3E E3         5184          MVI     A,0E3H          ;Code for setting output of counter #3 high
     627A   D3 1D         5185          OUT     ITCSR           ;Send it out to the chip
     627C   AF            5186          XRA     A               ;Make a 0
     627D   32 7098       5187          STA     BLKFLG          ;Clear the 100Hz clock blocked flag
     6280   D3 3A         5188          OUT     CLRBLK          ;Now clear the block
     6282   21 707C       5189          LXI     H,ICCS          ;Point to the ICCS
     6285   7E            5190          MOV     A,M             ;Get it
     6286   1F            5191          RAR                     ;Check the run bit
     6287   D2 6296       5192          JNC     1$              ;Jump if not set
     628A   17            5193          RAL                     ;Move things back into position
     628B   F6 20         5194          ORI     20H             ;Set the error bit
     628D   77            5195          MOV     M,A             ;Put it back
     628E   20            5196          RIM                     ;Get the interrupt masks
     628F   E6 FE         5197          ANI     0FEH            ;Clear M5.5
     6291   F6 08         5198          ORI     8H              ;Set MSE
     6293   30            5199          SIM                     ;Write the masks
     6294   D3 2D         5200          OUT     SETTMR          ;Turn on the Interval Timer
     6296   AF            5201  1$:     XRA     A               ;Make a zero again
     6297   32 40F4       5202          STA     SLOW_CLK_FLG    ;Clear out this flag.
     629A   CD 66B6       5203          CALL    IPRCHK          ;Go see about setting Console Attention
                          5204
     629D   3A 40D7       5205  CPCHK1: LDA     SPEND           ;Get the ^S Pending/Sent/Taken flags
     62A0   E6 04         5206          ANI     4               ;Save only the Taken flag
     62A2   CA 62BD       5207          JZ      CPCH0           ;Jump if not set
     62A5   3A 7E06       5208          LDA     TRNFLG          ;Get the Trans Mode flag.
     62A8   A7            5209          ANA     A               ;Are we in Protocol or Trans mode.
     62A9   C2 62BD       5210          JNZ     CPCH0           ;IF PROTOCOL MODE, THEN jump.
     62AC   3A 7076       5211          LDA     XMTCSR          ;Get the normal Xmit CSR
     62AF   A7            5212          ANA     A               ;Is the Xmit Rdy set?
     62B0   C2 62BD       5213          JNZ     CPCH0           ;Jump if it is
     62B3   21 7074       5214          LXI     H,INTCSR        ;Otherwise, point to the Intermediate CSR
     62B6   22 7078       5215          SHLD    XCSADR          ;Store the correct Address here
     62B9   23            5216          INX     H               ;Form the address of the correct DB
     62BA   22 707A       5217          SHLD    XDBADR          ;Store the address here
     62BD   21 7220       5218  CPCH0:  LXI     H,BRKFLG        ;Point to this flag
     62C0   7E            5219          MOV     A,M             ;Get it
     62C1   A7            5220          ANA     A               ;See if set
     62C2   CA 62D0       5221          JZ      CPCH1           ;Jump if clear
     62C5   23            5222          INX     H               ;Bump the pointer to the count
     62C6   35            5223          DCR     M               ;Reduce the count
     62C7   C2 62D0       5224          JNZ     CPCH1           ;Jump if not 0
     62CA   2B            5225          DCX     H               ;Point back at the flag
     62CB   35            5226          DCR     M               ;Make it 0
     62CC   3E 15         5227          MVI     A,TUPREP        ;Get the normal USART code
     62CE   D3 47         5228          OUT     TUCR            ;Fix up the USART
```

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Error Addr  Code          Seq   Source statement

     62D0   DB 83         5229  CPCH1:  IN      CPATTN          ;Check the CPU Attention bit
     62D2   1F            5230          RAR                     ;by putting it in the carry
     62D3   DC 6558       5231          CC      CPSERV          ;Go to the service flows if set
     62D6   DB 20         5232          IN      SUMREG          ;Get this register
     62D8   E6 40         5233          ANI     40H             ;Check for 2ms done
     62DA   CA 5E0C       5234          JZ      ACFAI2          ;Leave if asserted
     62DD   3A 70FC       5235          LDA     PCOUNT          ;Get the control P Timeout counter
     62E0   A7            5236          ANA     A               ;See if it is zero
     62E1   CA 62ED       5237          JZ      TTRTST          ;Jump if it is
     62E4   3C            5238          INR     A               ;Bump the count
     62E5   FE FF         5239          CPI     0FFH            ;See if we have timed out
     62E7   CC 6625       5240          CZ      PMHALT          ;Go halt the machine the hard way
     62EA   32 70FC       5241          STA     PCOUNT          ;Save the new count and fall through
                          5242
     62ED   3A 40D7       5243  TTRTST: LDA     SPEND           ;Get the ^S pending and sent flags
     62F0   1F            5244          RAR                     ;Are we trying to put ^S in the RCV DB?
     62F1   DC 6531       5245          CC      SENDS           ;Go try to do it
     62F4   DA 62FE       5246          JC      TTRTSB          ;If the call succeeded, don't check the Q flag
     62F7   3A 40D8       5247          LDA     QPEND           ;Get the ^Q pending flag
     62FA   1F            5248          RAR                     ;Is it set?
     62FB   DC 6549       5249          CC      SENDQ           ;Go try to send it if set
     62FE   DB 06         5250  TTRTSB: IN      REMOTE          ;Get the Remote/Local Switch position
     6300   1F            5251          RAR                     ;Put it in the carry
     6301   D2 64F2       5252          JNC     TTRREM          ;Jump if in Remote
     6304   3A 40D0       5253          LDA     SILFLG          ;Get the Silo Flag
     6307   1F            5254          RAR                     ;Anything in it?
     6308   DA 6319       5255          JC      TTRTSA          ;Jump if there is
     630B   3A 40D9       5256          LDA     MIPFLG          ;Get the Modem In Progress flag
     630E   A7            5257          ANA     A               ;Is it set?
     630F   C2 6319       5258          JNZ     TTRTSA          ;Jump if it is
     6312   3A 4081       5259          LDA     SWPOS           ;We must see if this flag has been set to Local
     6315   A7            5260          ANA     A               ;Check for 1=Local or 0=Remote.
     6316   C2 6328       5261          JNZ     TTRTS0          ;Skip next part if in Local.
     6319   CD 0046       5262  TTRTSA: CALL    GS_VECTOR       ;Keep the modem stuff going
     631C   D2 6375       5263          JNC     CPCHK2          ;Jump over next part if no characters found
     631F   79            5264          MOV     A,C             ;Get the SR and source flags
     6320   E6 C0         5265          ANI     0C0H            ;Look for any remote input
     6322   C2 6375       5266          JNZ     CPCHK2          ;Skip the next part if it was a remote origin
                          5267                                  ;character
     6325   C3 633D       5268          JMP     TTRTS2          ;Go share the rest of the code
     6328   DB 49         5269  TTRTS0: IN      TTSR            ;Get the Terminal USART SR
     632A   4F            5270  TTRTS1: MOV     C,A             ;Save it
     632B   E6 02         5271          ANI     02H             ;Check RCVR Done
     632D   CA 6375       5272          JZ      CPCHK2          ;Jump if Done not set.
     6330   DB 48         5273          IN      TTDB            ;Get the character
     6332   47            5274          MOV     B,A             ;save it in a temp
     6333   79            5275          MOV     A,C             ;Get the SR back
     6334   E6 38         5276          ANI     38H             ;Look for errors
     6336   CA 633D       5277          JZ      TTRTS2          ;Jump if none
     6339   3E 35         5278          MVI     A,35H           ;Constant to be used to clear error
```

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Error Addr  Code          Seq   Source statement

     633B   D3 4B         5279            OUT     TTCR            ;Send it to the USART
     633D   78            5280  TTRTS2:   MOV     A,B             ;Get the character back
     633E   E6 7F         5281            ANI     07FH            ;Mask off Parity bit
     6340   FE 10         5282            CPI     CNTRLP          ;Is it a Control P?
     6342   C2 6355       5283            JNZ     TTRTS4          ;Jump if not Control P
     6345   DB 03         5284            IN      ALLOWP          ;Check for Allow Control P
     6347   1F            5285            RAR                     ;Put it in the carry
     6348   D2 6355       5286            JNC     TTRTS4          ;Jump if not asserted
     634B   D3 AE         5287            OUT     SETHLT          ;Set the Halt bit
     634D   3E 01         5288            MVI     A,1             ;Set up a timeout count
     634F   32 70FC       5289            STA     PCOUNT          ;for control P in progress
     6352   C3 6375       5290            JMP     CPCHK2          ;Go to the next CPU Attention check
     6355   21 40D7       5291  TTRTS4:   LXI     H,SPEND         ;Point to the ^S Taken/Sent/Pending flags.
     6358   7E            5292            MOV     A,M             ;Get them.
     6359   E6 03         5293            ANI     3               ;Save ^S (Sent OR Pending).
     635B   57            5294            MOV     D,A             ;Put the result here for a moment.
     635C   23            5295            INX     H               ;Point to the ^Q Pending/Sent flag byte
     635D   7E            5296            MOV     A,M             ;Get them.
     635E   E6 02         5297            ANI     2               ;Save only ^Q Sent.
     6360   B2            5298            ORA     D               ;OR it in
     6361   C2 6375       5299            JNZ     CPCHK2          ;Don't overwrite the buffer if my ^S or ^Q are
                          5300                                    ;in it.
     6364   21 7073       5301            LXI     H,RCVDB         ;Point to the Pseudo DB
     6367   70            5302            MOV     M,B             ;Save the character
     6368   2B            5303            DCX     H               ;Back up the pointer
     6369   7E            5304            MOV     A,M             ;Get the old CSR
     636A   E6 02         5305            ANI     02H             ;Check RCVR Done in the previous CSR
     636C   79            5306            MOV     A,C             ;Get the new CSR back
     636D   CA 6372       5307            JZ      TTRTS5          ;Jump if Done isn't set
     6370   F6 10         5308            ORI     010H            ;If it was, set the O.E. in the new CSR
     6372   B6            5309  TTRTS5:   ORA     M               ;OR in the old CSR
     6373   A1            5310            ANA     C               ;AND the old+new with the new CSR
     6374   77            5311            MOV     M,A             ;Save the new CSR
                          5312
     6375   DB 83         5313  CPCHK2:   IN      CPATTN          ;Get the CPU Attention bit
     6377   1F            5314            RAR                     ;Rotate it into the Carry
     6378   DC 6558       5315            CC      CPSERV          ;Call CPU Service if set
                          5316
     637B   3A 7072       5317  RCVTTR:   LDA     RCVCSR          ;Get the Pseudo CSR
     637E   E6 02         5318            ANI     02H             ;Check the RCVR Done bit
     6380   CA 639A       5319            JZ      CPCHK3          ;Jump if not set
     6383   11 7070       5320            LXI     D,ISR           ;Point to the ISR
     6386   1A            5321            LDAX    D               ;Get the ISR
     6387   17            5322            RAL                     ;ISR bit 07 is the Terminal RCVR I.S. bit
     6388   DA 639A       5323            JC      CPCHK3          ;If set it locks out further checking
     638B   17            5324            RAL                     ;If not set, check the I.E. bit
     638C   D2 639A       5325            JNC     CPCHK3          ;Jump if the Terminal RCVR I.E. is not set
     638F   D3 AA         5326            OUT     SETATN          ;Set the interrupt flag to the CPU
     6391   1A            5327            LDAX    D               ;Get the ISR again
     6392   F6 80         5328            ORI     080H            ;Set bit 07, the Terminal RCVR I.S. bit
```

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Error Addr  Code          Seq   Source statement

     6394   12           5329            STAX    D               ;Put it back
     6395   13           5330            INX     D               ;Point to the IPR
     6396   1A           5331            LDAX    D               ;Get the IPR
     6397   F6 20        5332            ORI     020H            ;Set bit 05, PRI 3
     6399   12           5333            STAX    D               ;Put it back
                         5334
     639A   DB 83        5335  CPCHK3:   IN      CPATTN          ;Check the CPU Attention bit
     639C   1F           5336            RAR                     ;Put it in the carry
     639D   DC 6558       5337            CC      CPSERV          ;If set, go service the CPU
                         5338
     63A0   11 7070       5339  TTXTST:   LXI     D,ISR           ;Point to the Interrupt Summary Register
     63A3   1A           5340            LDAX    D               ;Get the ISR
     63A4   E6 30        5341            ANI     030H            ;Save only TTX I.S. and I.E.
     63A6   FE 10        5342            CPI     010H            ;See if only I.E. is set
     63A8   C2 63BE      5343            JNZ     CPCHK4          ;Jump if I.E. not set or I.S. set
     63AB   2A 7078      5344            LHLD    XCSADR          ;Get the correct Xmit CSR Address
     63AE   7E           5345            MOV     A,M             ;Get the CSR contents
     63AF   A7           5346            ANA     A               ;Is the Xmit Rdy set?
     63B0   CA 63BE      5347            JZ      CPCHK4          ;Jump if not
     63B3   D3 AA        5348            OUT     SETATN          ;Set Console Attention
     63B5   1A           5349            LDAX    D               ;Get the ISR
     63B6   F6 20        5350            ORI     020H            ;Set the Terminal XMIT I.S. bit
     63B8   12           5351            STAX    D               ;Save it
     63B9   13           5352            INX     D               ;Point to the Interrupt Priority Register
     63BA   1A           5353            LDAX    D               ;Get the IPR
     63BB   F6 10        5354            ORI     010H            ;Set PRI 4 in the IPR
     63BD   12           5355            STAX    D               ;Save it
                         5356
     63BE   DB 83        5357  CPCHK4:   IN      CPATTN          ;Check for CPU attention
     63C0   1F           5358            RAR                     ;Is it set?
     63C1   DC 6558       5359            CC      CPSERV          ;Go service it if it is.
                         5360
     63C4   21 7074       5361  SNDTTX:   LXI     H,INTCSR        ;Point to this CSR
     63C7   7E           5362            MOV     A,M             ;Get it
     63C8   A7           5363            ANA     A               ;Is the Xmit Rdy set?
     63C9   C2 63E0       5364            JNZ     SNDTT0          ;Jump if it is (no character waiting)
     63CC   23           5365            INX     H               ;Bump the pointer twice
     63CD   46           5366            MOV     B,M             ;And get the character on the way
     63CE   23           5367            INX     H               ;
     63CF   7E           5368            MOV     A,M             ;Get the normal Xmit CSR
     63D0   A7           5369            ANA     A               ;Is the Xmit Rdy set?
     63D1   CA 63E0       5370            JZ      SNDTT0          ;Jump if not
     63D4   35           5371            DCR     M               ;Make it zero
     63D5   22 7078       5372            SHLD    XCSADR          ;Set up this address
     63D8   23           5373            INX     H               ;Point to the normal Xmit DB
     63D9   70           5374            MOV     M,B             ;Store the character
     63DA   22 707A       5375            SHLD    XDBADR          ;Set up this address
     63DD   32 7074       5376            STA     INTCSR          ;Set the Xmit Rdy in the Intermediate CSR
     63E0   DB 06        5377  SNDTT0:   IN      REMOTE          ;Get the Switch position
     63E2   1F           5378            RAR                     ;Put the flag in the carry
```

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Error Addr  Code          Seq   Source statement

     63E3   DA 6494       5379            JC      SNDTL           ;Go send to local if not in remote
     63E6   3A 7E04       5380            LDA     TLKFLG          ;Get the Talk Flag
     63E9   1F            5381            RAR                     ;Is it set?
     63EA   DA 6441       5382            JC      PMTALK          ;Jump if set
     63ED   21 7074       5383    SNDTT1: LXI     H,INTCSR        ;Point to my Intermediate CSR
     63F0   7E            5384            MOV     A,M             ;Get it
     63F1   A7            5385            ANA     A               ;Is the Xmit Rdy set
     63F2   CA 63FD       5386            JZ      SNDTT2          ;Jump if not (0 indicates presence of chr)
     63F5   21 7076       5387            LXI     H,XMTCSR        ;Point to the Xmit CSR
     63F8   7E            5388            MOV     A,M             ;Get the Pseudo SR
     63F9   A7            5389            ANA     A               ;Test the Xmit Rdy bit
     63FA   C2 64A9       5390            JNZ     CPCHK5          ;Jump if it is set (no character waiting)
     63FD   3A 40BE       5391    SNDTT2: LDA     LRMASK          ;Get the Local/Remote Mask
     6400   E6 0F         5392            ANI     0FH             ;Save the low nibble only
     6402   FE 01         5393            CPI     1               ;See if Local only set
     6404   CA 649C       5394            JZ      SNDTL0          ;Jump if it is
     6407   FE 02         5395            CPI     2               ;See if APT enabled
     6409   CA 6468       5396            JZ      SNDTA           ;Jump if it is
     640C   FE 05         5397            CPI     5               ;See if Remote and Local.
     640E   CA 641E       5398            JZ      SNDTRL          ;Jump if it is
     6411   DB 03         5399            IN      SECURE          ;Are we in the (Remote) Secure position.
     6413   1F            5400            RAR                     ;This is also known as ALLOWP.
     6414   DA 6475       5401            JC      SNDTR           ;IF NOT, THEN jump to Send Terminal Remote.
     6417   3A 7E67       5402            LDA     OVERRIDE_LCS    ;ELSE, check for Override Local Copy in Secure.
     641A   1F            5403            RAR                     ;Is it set?
     641B   DA 6475       5404            JC      SNDTR           ;IF SET, THEN jump.
                          5405                                    ;ELSE, fall through to send to Local and Remote.
     641E   3A 7E10       5406    SNDTRL: LDA     RDCON           ;Get the RD connect status
     6421   1F            5407            RAR                     ;Are we conected?
     6422   DA 642C       5408            JC      SNTRL1          ;Jump if we are
     6425   3A 7E05       5409            LDA     DISCRD          ;Get the Discard Output bit
     6428   1F            5410            RAR                     ;Is it set?
     6429   DA 649C       5411            JC      SNDTL0          ;Jump if it is
     642C   11 7E02       5412    SNTRL1: LXI     D,REMXSR        ;Point to the Remote SR
     642F   DB 49         5413            IN      TTSR            ;Get the Local SR
     6431   47            5414            MOV     B,A             ;Save it
     6432   1A            5415            LDAX    D               ;Get the Remote SR
     6433   A0            5416            ANA     B               ;AND them together
     6434   1F            5417            RAR                     ;Put the LSB into the carry
     6435   D2 64A9       5418            JNC     CPCHK5          ;Jump if both are not set
     6438   AF            5419            XRA     A               ;Make a 0
     6439   12            5420            STAX    D               ;Zero the Xmit Ready bit
     643A   13            5421            INX     D               ;Bump the pointer ahead to the Remote DB
     643B   23            5422            INX     H               ;Point to the DB
     643C   7E            5423            MOV     A,M             ;Get the character
     643D   12            5424            STAX    D               ;Store it
     643E   C3 64A4       5425            JMP     SNDTL1          ;Go finish sending to Local
                          5426
     6441   21 7E13       5427    PMTALK: LXI     H,TALKSR        ;Point to the Talk SR
     6444   7E            5428            MOV     A,M             ;Get it
```

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Error Addr  Code          Seq   Source statement

     6445   1F            5429           RAR                ;Is the Ready bit asserted?
     6446   D2 6458       5430           JNC     PMTLK0     ;Jump if not (go try to send the character)
     6449   CD 0046       5431           CALL    GS_VECTOR  ;Go get the character
     644C   D2 64A9       5432           JNC     CPCHK5     ;Jump if no character to process
     644F   21 7E14       5433           LXI     H,TALKDB   ;Point to the Talk DB
     6452   70            5434           MOV     M,B        ;Store the character
     6453   2B            5435           DCX     H          ;Point to the Talk SR
     6454   79            5436           MOV     A,C        ;Get the source flag
     6455   E6 80         5437           ANI     80H        ;Save only the RD one and clear Xmit Rdy
     6457   77            5438           MOV     M,A        ;Store it in TALKSR
     6458   3A 7E04       5439   PMTLK0: LDA     TLKFLG     ;Get the the Talk/Talk Echo flag back
     645B   E6 02         5440           ANI     2          ;Look for Talk Echo
     645D   C2 641E       5441           JNZ     SNDTRL     ;Jump if Echo (send to both)
     6460   7E            5442           MOV     A,M        ;Get the source flag
     6461   17            5443           RAL                ;See what the source was
     6462   D2 6475       5444           JNC     SNDTR      ;If source was Local, send to remote
     6465   C3 649C       5445           JMP     SNDTL0     ;Otherwise, send to local
                          5446
                          5447
     6468   DB 41         5448   SNDTA:  IN      TRSR       ;Look for APT Xmit Ready
     646A   1F            5449           RAR                ;Is it set?
     646B   D2 64A9       5450           JNC     CPCHK5     ;Jump if not
     646E   23            5451           INX     H          ;Point to the DB
     646F   7E            5452           MOV     A,M        ;Get the character
     6470   D3 40         5453           OUT     TRDB       ;Send it out
     6472   C3 64A6       5454           JMP     SNDTL2     ;Go set the Xmit Ready in the Pseudo SR
                          5455
     6475   3A 7E10       5456   SNDTR:  LDA     RDCON      ;Get the RD connect status
     6478   1F            5457           RAR                ;Are we conected?
     6479   DA 6483       5458           JC      SNDTR1     ;Jump if we are
     647C   3A 7E05       5459           LDA     DISCRD     ;Get the Discard Output bit
     647F   1F            5460           RAR                ;Is it set?
     6480   DA 64A7       5461           JC      SNDTL3     ;Jump if it is
     6483   11 7E02       5462   SNDTR1: LXI     D,REMXSR   ;Point to the Remote Xmit SR
     6486   1A            5463           LDAX    D          ;Get it
     6487   1F            5464           RAR                ;Is Xmit Ready set?
     6488   D2 64A9       5465           JNC     CPCHK5     ;Jump if not
     648B   AF            5466           XRA     A          ;Make a zero
     648C   12            5467           STAX    D          ;Zero the Xmit Ready
     648D   13            5468           INX     D          ;Point the the DB
     648E   23            5469           INX     H          ;Point to the DB
     648F   7E            5470           MOV     A,M        ;Get the character
     6490   12            5471           STAX    D          ;Store the character
     6491   C3 64A6       5472           JMP     SNDTL2     ;Go set the Xmit Ready in the Pseudo SR
                          5473
                          5474
     6494   21 7076       5475   SNDTL:  LXI     H,XMTCSR   ;Point to the Xmit CSR
     6497   7E            5476           MOV     A,M        ;Get the CSR
     6498   1F            5477           RAR                ;Is the Xmit Ready bit set?
     6499   DA 64A9       5478           JC      CPCHK5     ;Jump if it is (means no character waiting)
```

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Error Addr  Code          Seq   Source statement

     649C   DB 49         5479  SNDTL0: IN      TTSR          ;Get the Local SR
     649E   1F            5480          RAR                   ;Check for Xmit Ready
     649F   D2 64A9       5481          JNC     CPCHK5        ;Jump if not ready
     64A2   23            5482          INX     H             ;Point to the character
     64A3   7E            5483          MOV     A,M           ;Get the character
     64A4   D3 48         5484  SNDTL1: OUT     TTDB          ;Send it to the local DB
     64A6   2B            5485  SNDTL2: DCX     H             ;Back the pointer up
     64A7   36 01         5486  SNDTL3: MVI     M,1           ;Set the Xmit Ready
                          5487
     64A9   DB 83         5488  CPCHK5: IN      CPATTN        ;Check CPU attention
     64AB   1F            5489          RAR                   ;Rotate it into the carry
     64AC   DC 6558       5490          CC      CPSERV        ;Call if set
                          5491
     64AF   11 7070       5492  TUXTST: LXI     D,ISR         ;Point to the ISR
     64B2   1A            5493          LDAX    D             ;Get the ISR
     64B3   E6 0C         5494          ANI     0CH           ;Save only the TUX I.E. and I.S. bits
     64B5   FE 08         5495          CPI     08H           ;See if I.E. set and I.S. clear
     64B7   C2 64CB       5496          JNZ     CPCHK6        ;Jump if not
     64BA   DB 45         5497          IN      TUSR          ;Get the TU-58 USART SR
     64BC   1F            5498          RAR                   ;Check the Ready bit
     64BD   D2 64CB       5499          JNC     CPCHK6        ;Jump if not set
     64C0   D3 AA         5500          OUT     SETATN        ;Set the Console Attention flag
     64C2   1A            5501          LDAX    D             ;Get the ISR
     64C3   F6 04         5502          ORI     04H           ;Set bit 02, the TU-58 XMIT ISR bit
     64C5   12            5503          STAX    D             ;Put it away
     64C6   13            5504          INX     D             ;Point to the IPR
     64C7   1A            5505          LDAX    D             ;Get the IPR
     64C8   F6 40         5506          ORI     040H          ;Set the PRI 2 Flag
     64CA   12            5507          STAX    D             ;Put it away
                          5508
     64CB   DB 83         5509  CPCHK6: IN      CPATTN        ;Check CPU attention
     64CD   1F            5510          RAR                   ;Rotate it into the carry
     64CE   DC 6558       5511          CC      CPSERV        ;Call if set
                          5512
     64D1   DB 45         5513  TURTST: IN      TUSR          ;Get the TU-58 SR
     64D3   E6 02         5514          ANI     02H           ;Check the Done bit
     64D5   CA 629D       5515          JZ      CPCHK1        ;Jump if not Done
     64D8   11 7070       5516          LXI     D,ISR         ;Point to the ISR
     64DB   1A            5517          LDAX    D             ;Get the ISR
     64DC   1F            5518          RAR                   ;Check the TUR Interrupt Status
     64DD   DA 629D       5519          JC      CPCHK1        ;Jump if already set
     64E0   1F            5520          RAR                   ;Check the I.E.
     64E1   D2 629D       5521          JNC     CPCHK1        ;Jump if not set
     64E4   D3 AA         5522          OUT     SETATN        ;Otherwise, set Console Attention
     64E6   1A            5523          LDAX    D             ;Get the ISR
     64E7   F6 01         5524          ORI     01H           ;Set the TUR ISR BIT
     64E9   12            5525          STAX    D             ;Put the ISR back
     64EA   13            5526          INX     D             ;Point to the IPR
     64EB   1A            5527          LDAX    D             ;Get the IPR
     64EC   F6 80         5528          ORI     080H          ;Set Priority 1
```

```
rror Addr  Code          Seq   Source statement

    64EE   12           5529           STAX    D               ;Put the IPR back
    64EF   C3 629D       5530           JMP     CPCHK1          ;We're done
                         5531
                         5532
    64F2   3A 7E04       5533   TTRREM: LDA     TLKFLG          ;Get the Talk Flag
    64F5   A7            5534           ANA     A               ;Is it set?
    64F6   C2 652D       5535           JNZ     CHECK_MODEM     ;Skip the next part if it is
    64F9   3A 7E05       5536           LDA     DISCRD          ;Get the Discard Remote Output bit
    64FC   21 7E10       5537           LXI     H,RDCON         ;Point to the RD Connected flag
    64FF   B6            5538           ORA     M               ;OR it in
    6500   EE 01         5539           XRI     1               ;Flip the result
    6502   23            5540           INX     H               ;Point to flag that indicates past connection
    6503   A6            5541           ANA     M               ;AND it in
    6504   47            5542           MOV     B,A             ;Store it in B for a moment.
    6505   21 40D7       5543           LXI     H,SPEND         ;See what the ^S status is.
    6508   7E            5544           MOV     A,M             ;Get the ^S Taken/Sent/Pending flags.
    6509   E6 03         5545           ANI     3               ;Save only Sent and Pending.
    650B   4F            5546           MOV     C,A             ;Put it in C.
    650C   23            5547           INX     H               ;Point at the ^Q Sent/Pending flags.
    650D   E6 02         5548           ANI     2               ;Save only the Sent (^Q in the RCVDB) flag.
    650F   B0            5549           ORA     B               ;OR everything together.
    6510   B1            5550           ORA     C               ;
    6511   C2 652D       5551           JNZ     CHECK_MODEM     ;Don't touch Silo if (-RDCON*-DISCRD*RDCON1)
                         5552                                   ;OR (^S (Sent OR Pending)) OR ^Q Sent.
    6514   21 40F4       5553   TTRRE1: LXI     H,SLOW_CLK_FLG  ;Point to this flag.
    6517   DB 06         5554           IN      SLWCLK          ;Get the Slow Clock
    6519   E6 80         5555           ANI     80H             ;Save only the MSB.
    651B   BE            5556           CMP     M               ;Are the Flag and the Clock the same?
    651C   CA 652D       5557           JZ      CHECK_MODEM     ;IF EQUAL, THEN jump (5ms hasn't elapsed).
    651F   77            5558           MOV     M,A             ;ELSE, create the new Slow Clock Flag.
    6520   CD 0046       5559           CALL    GS_VECTOR       ;Now go get the character
    6523   D2 6375       5560           JNC     CPCHK2          ;Jump if none found
    6526   79            5561           MOV     A,C             ;Get the SR
    6527   E6 3F         5562           ANI     3FH             ;Clear bits 7 and 6
    6529   4F            5563           MOV     C,A             ;Restore it
    652A   C3 633D       5564           JMP     TTRTS2          ;Go share processing code
                         5565
    652D                 5566   CHECK_MODEM:
    652D   E7            5567           RST     4               ;Keep the Modem servicing frequency up
    652E   C3 6375       5568           JMP     CPCHK2          ;Go back to the normal flow.
                         5569
                         5570
    6531   0E 13         5571   SENDS:  MVI     C,CNTRLS        ;Set up a ^S in C
    6533   CD 653E       5572           CALL    SNDCTL          ;Go try to send the control S
    6536   C0            5573           RNZ                     ;Leave if the ^S was not sent
    6537   21 40D7       5574           LXI     H,SPEND         ;Point to the ^S flags
    653A   36 02         5575           MVI     M,2             ;Set bit 1 and clear bit 0
    653C   37            5576           STC                     ;Set the carry
    653D   C9            5577           RET                     ;Leave
                         5578
```

```
Error Addr  Code          Seq   Source statement

     653E   21 7072       5579  SNDCTL: LXI     H,RCVCSR        ;Point to the Pseudo Rcv CSR
     6541   7E            5580          MOV     A,M             ;Get it
     6542   A0            5581          ANA     B               ;Is the Done bit set?
     6543   C0            5582          RNZ                     ;Leave if it is
     6544   36 02         5583          MVI     M,2             ;Set the Rcvr Done bit
     6546   23            5584          INX     H               ;Point to the DB
     6547   71            5585          MOV     M,C             ;Put the correct control character there
     6548   C9            5586          RET                     ;Leave with the Z bit set
                          5587
     6549   0E 11         5588  SENDQ:  MVI     C,CNTRLQ        ;Set up a ^Q in C
     654B   CD 653E       5589          CALL    SNDCTL          ;Go share the next part
     654E   C0            5590          RNZ                     ;Leave if we couldn't post the ^Q
     654F   21 40D7       5591          LXI     H,SPEND         ;Point to the ^S flags
     6552   36 00         5592          MVI     M,0             ;Zero them out
     6554   23            5593          INX     H               ;Point to the ^Q flags
     6555   36 02         5594          MVI     M,2             ;Set bit 1 and clear bit 0
     6557   C9            5595          RET                     ;Leave
                          5596
                          5597
                          5598
     6558   DB 80         5599  CPSERV: IN      READ            ;Get the offset from the CPU
     655A   6F            5600          MOV     L,A             ;Put it in register L
     655B   D3 A8         5601          OUT     SETACK          ;Set Console Acknowledge
     655D   1E 00         5602          MVI     E,0             ;Clear register E for timeout counting
     655F   63            5603          MOV     H,E             ;Clear register H for the DAD at CPSER2
     6560   DB 83         5604  CPSER1: IN      CPATTN          ;Wait for CPU Attention to go away
     6562   1F            5605          RAR                     ;Rotate it into the carry
     6563   D2 656D       5606          JNC     CPSER2          ;Exit loop if CPU Attention goes away
     6566   1C            5607          INR     E               ;Bump the Timeout count
     6567   CC 5D5E       5608          CZ      COMERR          ;If the count reaches 0 it is an error
     656A   C3 6560       5609          JMP     CPSER1          ;Loop on CPU Attention
     656D   11 70A2       5610  CPSER2: LXI     D,TABLE         ;Get the address of the Table
     6570   19            5611          DAD     D               ;Add it to the offset
     6571   11 7070       5612          LXI     D,ISR           ;Point to the ISR
     6574   E9            5613          PCHL                    ;Decode the command
                          5614
                          5615
     6575   13            5616  INTACK: INX     D               ;Point to the IPR
     6576   1A            5617          LDAX    D               ;Get the IPR
     6577   D3 CC         5618          OUT     WRITE           ;Put the data in the WRITE Register
     6579   D3 AB         5619          OUT     CLRATN          ;Console Attention must be cleared first
                          5620                                  ;in case this Interrupt Acknowledge
                          5621                                  ;has only one interrupt pending
     657B   D3 A9         5622          OUT     CLRACK          ;Clear Console Ack second
     657D   17            5623          RAL                     ;Check PRI 1
     657E   DA 66A5       5624          JC      PRI1            ;Go take care of Priority 1 device
     6581   17            5625          RAL                     ;Check PRI 2
     6582   DA 66AA       5626          JC      PRI2            ;Go take care of Priority 2 device
     6585   17            5627          RAL                     ;Check PRI 3
     6586   DA 66AF       5628          JC      PRI3            ;Go take care of  Priorty 3 device
```

```
Error Addr  Code          Seq   Source statement

     6589   C3 66B4       5629            JMP     PRI4            ;Go clear PRI 4
                          5630
                          5631
     658C   2A 7078       5632   TTXCSR:  LHLD    XCSADR          ;Get the address of the correct CSR
     658F   7E            5633            MOV     A,M             ;Get the correct CSR
     6590   D3 CC         5634   LAST:    OUT     WRITE           ;Write Register A to the CPU
     6592   D3 A9         5635            OUT     CLRACK          ;Clear Console Ack to tell the CPU it's there
     6594   C9            5636            RET                     ;Leave
                          5637
                          5638
     6595   3A 7072       5639   TTRCSR:  LDA     RCVCSR          ;MFPR's for the Terminal RCVR CSR actually
                          5640                                   ;access the Pseudo CSR
     6598   C3 6590       5641            JMP     LAST            ;This code will finish up the transfer
                          5642
     659B   DB 45         5643   TURCSR:  IN      TUSR            ;MFPR's for the TU-58 CSR get the USART SR
     659D   C3 6590       5644            JMP     LAST            ;Go finish the transfer
                          5645
     65A0   DB 80         5646   TTXDB:   IN      READ            ;Read the character to be sent to the Terminal
     65A2   D3 A9         5647            OUT     CLRACK          ;Signal the CPU that we got it
     65A4   2A 707A       5648            LHLD    XDBADR          ;Get the address of the correct Xmit DB
     65A7   77            5649            MOV     M,A             ;Store the character
     65A8   2B            5650            DCX     H               ;Point to the correct Xmit CSR
     65A9   36 00         5651            MVI     M,0             ;Clear the Xmit Ready
     65AB   1A            5652            LDAX    D               ;Get the ISR
     65AC   E6 DF         5653            ANI     0DFH            ;Clear bit 05, the Terminal XMIT I.S. bit
     65AE   12            5654            STAX    D               ;Put the ISR back
     65AF   C9            5655            RET                     ;We're done
                          5656
     65B0   DB 80         5657   TUXDB:   IN      READ            ;Get the character to be sent to the TU-58
     65B2   D3 44         5658            OUT     TUDB            ;Write it
     65B4   D3 A9         5659            OUT     CLRACK          ;Tell the CPU we got the character
     65B6   1A            5660            LDAX    D               ;Get the ISR
     65B7   E6 FB         5661            ANI     0FBH            ;Clear bit 02, the TU-58 XMIT I.S. bit
     65B9   12            5662            STAX    D               ;Put it in the ISR
     65BA   C9            5663            RET                     ;We're done
                          5664
     65BB   D3 A9         5665   TTXIE:   OUT     CLRACK          ;Tell the CPU that we got the command
     65BD   1A            5666            LDAX    D               ;Get the ISR
     65BE   F6 10         5667            ORI     010H            ;Set the Terminal Xmit I.E. in the ISR
     65C0   12            5668            STAX    D               ;Put the ISR back
     65C1   C9            5669            RET                     ;leave
                          5670
     65C2   D3 A9         5671   TTRIE:   OUT     CLRACK          ;Tell the CPU that we got it
     65C4   1A            5672            LDAX    D               ;Get the ISR
     65C5   F6 40         5673            ORI     040H            ;Set the Terminal Rcvr I.E.
     65C7   12            5674            STAX    D               ;Put the ISR back
     65C8   C9            5675            RET                     ;Leave
                          5676
     65C9   DB 80         5677   TUWCSR:  IN      READ            ;Get the next byte
     65CB   D3 A9         5678            OUT     CLRACK          ;Clear Console Acknowledge
```

```
Error Addr  Code          Seq   Source statement

     65CD   E6 41         5679           ANI     41H             ;Save only the I.E. and Break bits
     65CF   1F            5680           RAR                     ;Put the LSB (Break bit) in the carry
     65D0   47            5681           MOV     B,A             ;Save the rotated version, I.E. in bit 5
     65D1   D2 65E0       5682           JNC     TUWCS1          ;Jump if no Break
     65D4   21 7220       5683           LXI     H,BRKFLG        ;Point to the flag
     65D7   36 01         5684           MVI     M,1             ;Set it
     65D9   23            5685           INX     H               ;Point to the count
     65DA   36 03         5686           MVI     M,3             ;Set up a count
     65DC   3E 0D         5687           MVI     A,BREAK         ;Get the code for a break
     65DE   D3 47         5688           OUT     TUCR            ;Send it to the USART
     65E0   AF            5689   TUWCS1: XRA     A               ;Clear the carry
     65E1   78            5690           MOV     A,B             ;Get the rotated version back
     65E2   1F            5691           RAR                     ;Rotate it into bit 4
     65E3   1F            5692           RAR                     ;and now into bit 3
     65E4   47            5693           MOV     B,A             ;Save this version
     65E5   0E 08         5694           MVI     C,8             ;Set up register C for comparing and such
     65E7   1A            5695           LDAX    D               ;Get the ISR to check the old I.E.
     65E8   A1            5696           ANA     C               ;Save the old TUXIE only
     65E9   B8            5697           CMP     B               ;See if they are the same
     65EA   C8            5698           RZ                      ;Leave if they are
     65EB   78            5699           MOV     A,B             ;Put the new one in A
     65EC   B9            5700           CMP     C               ;See if the new I.E. is set or clear
     65ED   C2 6611       5701           JNZ     TUXID           ;Go clear it
     65F0   EB            5702           XCHG                    ;Put the pointer in HL instead of DE
     65F1   B6            5703           ORA     M               ;Set the I.E. in the ISR
     65F2   77            5704           MOV     M,A             ;Save the new version
     65F3   C9            5705           RET                     ;Leave
                          5706
     65F4   D3 A9         5707   TURIE:  OUT     CLRACK          ;Clear Console Acknowledge
     65F6   1A            5708           LDAX    D               ;Get the ISR
     65F7   F6 02         5709           ORI     02H             ;Set the TU-58 Rcv I.E.
     65F9   12            5710           STAX    D               ;Put the ISR back
     65FA   C9            5711           RET                     ;Leave
                          5712
     65FB   D3 AB         5713   TTXID:  OUT     CLRATN          ;Clear Console attention
     65FD   D3 A9         5714           OUT     CLRACK          ;Clear Console Ack
     65FF   1A            5715           LDAX    D               ;Get the ISR
     6600   E6 CF         5716           ANI     0CFH            ;Clear bits <05:04>
     6602   12            5717           STAX    D               ;Put the ISR back
     6603   C3 66B4       5718           JMP     PRI4            ;Go clear Priority 4
                          5719
                          5720
     6606   D3 AB         5721   TTRID:  OUT     CLRATN          ;Clear Console Attention
     6608   D3 A9         5722           OUT     CLRACK          ;Clear Console Ack
     660A   1A            5723           LDAX    D               ;Get the ISR
     660B   E6 3F         5724           ANI     03FH            ;Clear bits <07:06>
     660D   12            5725           STAX    D               ;Put the ISR back
     660E   C3 66AF       5726           JMP     PRI3            ;Go clear Priority 3
                          5727
                          5728
```

```
Error Addr  Code          Seq   Source statement

     6611   D3 AB        5729  TUXID:  OUT     CLRATN          ;Clear Console Attention
     6613   1A           5730          LDAX    D               ;Get the ISR
     6614   E6 F3        5731          ANI     0F3H            ;Clear bits <03:02>
     6616   12           5732          STAX    D               ;Put the ISR back
     6617   C3 66AA      5733          JMP     PRI2            ;Go clear Priority 2
                         5734
     661A   D3 AB        5735  TURID:  OUT     CLRATN          ;Clear the Console Attention bit
     661C   D3 A9        5736          OUT     CLRACK          ;Clear Console Ack
     661E   1A           5737          LDAX    D               ;Get the ISR
     661F   E6 FC        5738          ANI     0FCH            ;Clear bits <01:00>
     6621   12           5739          STAX    D               ;Put the ISR back
     6622   C3 66A5      5740          JMP     PRI1            ;Go clear Priority 1
                         5741
                         5742
     6625   D3 A9        5743  PMHALT: OUT     CLRACK          ;Clear Console Ack
     6627   D3 AB        5744          OUT     CLRATN          ;Turn off Console Attention
     6629   D3 AF        5745          OUT     CLRHLT          ;Clear the Halt bit
     662B   D3 3C        5746          OUT     CLRLIT          ;Turn off the Run light
     662D   AF            5747          XRA     A               ;Make a 0
     662E   32 40D3      5748          STA     RUNFLG          ;Turn off the Run Flag
     6631   E1           5749          POP     H               ;Fix up the stack
     6632   3A 40B5      5750          LDA     PFFLAG          ;Get the Power Fail flag
     6635   A7           5751          ANA     A               ;Is it set?
     6636   C0           5752          RNZ                     ;Leave if it is
     6637   3A 7076      5753          LDA     XMTCSR          ;Get the pseudo XMT CSR
     663A   A7           5754          ANA     A               ;Is Xmit Rdy set?
     663B   C2 6647      5755          JNZ     PMHAL0          ;Jump if it is (means no character in DB)
     663E   3A 7077      5756          LDA     XMTDB           ;Get the character
     6641   DF           5757          RST     3               ;Go print it
     6642   3E 01        5758          MVI     A,1             ;Make a 1
     6644   32 7076      5759          STA     XMTCSR          ;Set the Xmit Rdy
     6647   3A 7074      5760  PMHAL0: LDA     INTCSR          ;Get the INT CSR
     664A   A7           5761          ANA     A               ;Is Xmit Rdy set?
     664B   C0           5762          RNZ                     ;Leave if not (means no character in DB)
     664C   3A 7075      5763          LDA     INTDB           ;Get the character
     664F   DF           5764          RST     3               ;Go print it
     6650   3E 01        5765          MVI     A,1             ;Make a 1
     6652   32 7074      5766          STA     INTCSR          ;Set the Xmit Rdy
     6655   C9           5767          RET                     ;Leave
                         5768
                         5769
     6656   1A           5770  TTRDB:  LDAX    D               ;Get the ISR
     6657   E6 7F        5771          ANI     07FH            ;Clear Terminal Rcvr I.S.
     6659   12           5772          STAX    D               ;Store it
     665A   21 7073      5773          LXI     H,RCVDB         ;Point to the Pseudo DB
     665D   7E           5774          MOV     A,M             ;Get the Pseudo DB
     665E   D3 CC        5775          OUT     WRITE           ;Send the character to the CPU
     6660   CD 6971      5776          CALL    WAITH           ;Go wait for CPATTN to go high
     6663   2B           5777          DCX     H               ;Back up the pointer
     6664   7E           5778          MOV     A,M             ;Send the CSR next.  The CSR is sent because
```

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Error Addr  Code          Seq   Source statement

                          5779                             ;it contains the Error bits
      6665  D3 CC         5780              OUT    WRITE       ;Send it
      6667  CD 6980       5781              CALL   WAITL       ;Go wait for CPU Attention to go away
      666A  D3 A9         5782              OUT    CLRACK      ;Clear Console Ack
      666C  AF            5783              XRA    A           ;Generate 0
      666D  77            5784              MOV    M,A         ;This clears Done and the Errors
      666E  21 40D7       5785              LXI    H,SPEND     ;Point to the ^S Pending/Sent flags
      6671  7E            5786              MOV    A,M         ;Get them
      6672  E6 02         5787              ANI    2           ;See if this was a Console generated ^S we sent
      6674  CA 6679       5788              JZ     TTRDB1      ;Jump if not
      6677  36 04         5789              MVI    M,4         ;Set bit 2 to indicate the ^S was taken
      6679  21 40D8       5790     TTRDB1:  LXI    H,QPEND     ;Point to the ^Q Pending/Sent flags
      667C  7E            5791              MOV    A,M         ;Get them
      667D  FE 02         5792              CPI    2           ;See if the ^Q Sent flag is set
      667F  C0            5793              RNZ                ;Leave if not
      6680  36 00         5794              MVI    M,0         ;Clear it if it was
      6682  C9            5795              RET                ;Leave
                          5796
                          5797
      6683  1A            5798     TURDB:   LDAX   D           ;Get the ISR
      6684  E6 FE         5799              ANI    0FEH        ;Clear the TU-58 Rcvr I.S.
      6686  12            5800              STAX   D           ;Put the ISR back
      6687  DB 44         5801              IN     TUDB        ;Get the character
      6689  6F            5802              MOV    L,A         ;Save it
      668A  DB 45         5803              IN     TUSR        ;Get the SR
      668C  67            5804              MOV    H,A         ;Save it
      668D  E6 38         5805              ANI    38H         ;Check for errors
      668F  CA 6696       5806              JZ     TURDB0      ;Jump over next part if none
      6692  3E 15         5807              MVI    A,015H      ;Used to clear possible ERRORS
      6694  D3 47         5808              OUT    TUCR        ;Clear them
      6696  7D            5809     TURDB0:  MOV    A,L         ;Get the character
      6697  D3 CC         5810              OUT    WRITE       ;Send it
      6699  CD 6971       5811              CALL   WAITH       ;Go wait for CPATTN to go high
      669C  7C            5812              MOV    A,H         ;Get the error bits
      669D  D3 CC         5813              OUT    WRITE       ;Send them
      669F  CD 6980       5814              CALL   WAITL       ;Go wait for CPATTN to go away
      66A2  D3 A9         5815              OUT    CLRACK      ;Clear Console Ack
      66A4  C9            5816              RET                ;Leave
                          5817
      66A5  3E 7F         5818     PRI1:    MVI    A,07FH      ;Clear Priority 1
      66A7  C3 66B6       5819              JMP    IPRCHK      ;Check the IPR
                          5820
      66AA  3E BF         5821     PRI2:    MVI    A,0BFH      ;Clear Priority 2
      66AC  C3 66B6       5822              JMP    IPRCHK      ;Go check the remaining priorities
                          5823
      66AF  3E DF         5824     PRI3:    MVI    A,0DFH      ;Clear Priority 3
      66B1  C3 66B6       5825              JMP    IPRCHK      ;Go do it and check remaining priorities
                          5826
      66B4  3E EF         5827     PRI4:    MVI    A,0EFH      ;Set up to clear PRI 4
                          5828
```

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Error Addr  Code          Seq   Source statement

     66B6   21 7071       5829   IPRCHK: LXI     H,IPR           ;Point to the IPR
     66B9   A6            5830           ANA     M               ;'AND' in the IPR
     66BA   77            5831           MOV     M,A             ;Save the new IPR
     66BB   E6 F0         5832           ANI     0F0H            ;Are any PRI bits set?
     66BD   C8            5833           RZ                      ;If none set, return with Console Attention off
     66BE   3A 7223       5834           LDA     IFLAG           ;Get the I space operation flag
     66C1   A7            5835           ANA     A               ;Is it set?
     66C2   C0            5836           RNZ                     ;Leave if it is
     66C3   D3 AA         5837           OUT     SETATN          ;Else, set Console Attention
     66C5   C9            5838           RET                     ;and leave
                          5839
     66C6   DB 80         5840   ITWCSR: IN      READ            ;Get the new ICCS value
     66C8   D3 A9         5841           OUT     CLRACK          ;Clear Console Ack
     66CA   5F            5842           MOV     E,A             ;Save the new ICCS in a tmp
     66CB   E6 07         5843           ANI     07H             ;Make a copy with I.E., INT and ERR clear
     66CD   57            5844           MOV     D,A             ;Save it in another tmp
     66CE   21 707C       5845           LXI     H,ICCS          ;Point to the ICCS
     66D1   7E            5846           MOV     A,M             ;Get the ICCS
     66D2   F6 87         5847           ORI     087H            ;Set everything except INT and ERR
     66D4   A3            5848           ANA     E               ;Generate the new CSR
     66D5   5E            5849           MOV     E,M             ;Save the old ICCS for a bit
     66D6   77            5850           MOV     M,A             ;Install the new one
     66D7   17            5851           RAL                     ;Check for I.E.
     66D8   D2 66E6       5852           JNC     ITWCS0          ;If not set, go clear the INTERRUPT
     66DB   7E            5853           MOV     A,M             ;Get the ICCS back
     66DC   E6 60         5854           ANI     060H            ;See if either INT or ERR is set
     66DE   CA 66E6       5855           JZ      ITWCS0          ;If neither is set, go clear Interrupt
     66E1   D3 A4         5856           OUT     SETTIM          ;May or may not already be set
     66E3   C3 66E8       5857           JMP     ITWCS1          ;Skip over CLRINT
     66E6   D3 A5         5858   ITWCS0: OUT     CLRTIM          ;Clear the timer Interrupt
     66E8   7B            5859   ITWCS1: MOV     A,E             ;Get the old ICCS
     66E9   E6 01         5860           ANI     01H             ;Save only the Run bit, clear SGL and XFR
     66EB   32 707D       5861           STA     OLDRUN          ;Save the old RUN bit
     66EE   BA            5862           CMP     D               ;See if these bits in the new ICCS and the old
                          5863                                   ;are the same
     66EF   C8            5864           RZ                      ;Leave if they are
     66F0   7A            5865           MOV     A,D             ;Something is different, so get the new ICCS
     66F1   1F            5866           RAR                     ;Check the run bit
     66F2   DA 679E       5867           JC      ITRUN           ;Go start the timer, forget about SGL
     66F5   D3 2C         5868           OUT     CLRTMR          ;Stop the counters
     66F7   20            5869           RIM                     ;Get the interrupt masks
     66F8   F6 09         5870           ORI     9H              ;Set MSE and M5.5
     66FA   30            5871           SIM                     ;Write the masks out
     66FB   7A            5872           MOV     A,D             ;Get the ICCS
     66FC   E6 02         5873           ANI     02              ;Check for XFR
     66FE   CA 671F       5874           JZ      ITWCS2          ;Skip if no XFR
     6701   3A 7083       5875           LDA     NICFLG          ;Is there a new count
     6704   A7            5876           ANA     A               ;See if the NIC flag is set
     6705   C4 6823       5877           CNZ     XFRSET          ;Go do the load
     6708   AF            5878           XRA     A               ;Make a 0
```

```
Error Addr  Code          Seq   Source statement

     6709   32 7099       5879           STA     IMPXFR          ;Clear the Implied XFR flag
     670C   3C            5880           INR     A               ;Make a 1
     670D   32 7098       5881           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     6710   D3 3B         5882           OUT     SETBLK          ;Block the 100Hz  clock
     6712   3E 63         5883           MVI     A,LARM12        ;Don't do this as part of the XFRSET subroutine
     6714   D3 1D         5884           OUT     ITCSR           ;because XFRSET is also called from the timer
                          5885                                   ;handlers if new NiCR must be loaded on the fly
     6716   AF            5886           XRA     A               ;Make a 0
     6717   32 7098       5887           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     671A   D3 3A         5888           OUT     CLRBLK          ;Unblock the 100Hz clock
     671C   CD 69D7       5889           CALL    TMRPR1          ;Go reset any interrupts
     671F   3A 707C       5890   ITWCS2: LDA     ICCS            ;Get the ICCS
     6722   E6 04         5891           ANI     04              ;Is SGL set
     6724   C8            5892           RZ                      ;Leave if not
     6725   32 707E       5893           STA     ITSGL           ;Set the flag that says an interval timer single
                          5894                                   ;step has occurred
     6728   3A 7082       5895           LDA     LOADED          ;Get the flag that indicates what is in the
                          5896                                   ;9513 Alarm registers
     672B   A7            5897           ANA     A               ;If it is zero we don't need to do anything
     672C   C4 684C       5898           CNZ     NEWCNT          ;Go reload the Alarm registers if LOADED<>0
     672F   3E 01         5899           MVI     A,1             ;Make a 1
     6731   32 7098       5900           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     6734   D3 3B         5901           OUT     SETBLK          ;Block the 100Hz  clock
     6736   3E A3         5902           MVI     A,SAVE12        ;Save the current value
     6738   D3 1D         5903           OUT     ITCSR           ;Do it
     673A   3E 19         5904           MVI     A,HOLD1         ;Point to the Counter 1 Hold register
     673C   D3 1D         5905           OUT     ITCSR           ;Do it
     673E   DB 1C         5906           IN      ITDB            ;Get the low byte of Hold
     6740   3C            5907           INR     A               ;Check for value=0FFH
     6741   C2 6747       5908           JNZ     ITWCS3          ;If not zero we don't need to look at the next
     6744   DB 1C         5909           IN      ITDB            ;Get the high byte
     6746   3C            5910           INR     A               ;Bump the high byte
     6747   3E F1         5911   ITWCS3: MVI     A,STEP1         ;Step the low counter
     6749   D3 1D         5912           OUT     ITCSR           ;Do it
     674B   C2 6752       5913           JNZ     ITWCS4          ;Leave if not zero
     674E   3E F2         5914           MVI     A,STEP2         ;If zero, bump the high count
     6750   D3 1D         5915           OUT     ITCSR           ;Do it
     6752   CD 69D7       5916   ITWCS4: CALL    TMRPR1          ;Go try to reset the overflow
     6755   AF            5917           XRA     A               ;Make a 0
     6756   32 7098       5918           STA     BLKFLG          ;Clear the 100Hz blocked flag
     6759   D3 3A         5919           OUT     CLRBLK          ;Clear the 100Hz block
     675B   DB 20         5920           IN      SUMREG          ;See if we caused an overflow
     675D   17            5921           RAL                     ;
     675E   D8            5922           RC                      ;Leave if not
     675F   3A 707C       5923           LDA     ICCS            ;Get the ICCS
     6762   17            5924           RAL                     ;Check the I.E.
     6763   D2 6768       5925           JNC     ITWCS5          ;Jump if no I.E.
     6766   D3 A4         5926           OUT     SETTIM          ;Set the Timer interrrupt to the CPU
     6768   3E 01         5927   ITWCS5: MVI     A,1             ;Make a 1
     676A   32 7098       5928           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
```

```
Error Addr  Code          Seq   Source statement

     676D   D3 3B         5929            OUT     SETBLK          ;Block the 100Hz  clock
     676F   3E 63         5930            MVI     A,LARM12        ;Prepare to Load and Arm counters 1 and 2
     6771   D3 1D         5931            OUT     ITCSR           ;Do it
     6773   AF            5932            XRA     A               ;Make a 0
     6774   32 7098       5933            STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6777   D3 3A         5934            OUT     CLRBLK          ;Unblock the 100Hz clock
     6779   21 7083       5935            LXI     H,NICFLG        ;Point to this flag
     677C   7E            5936            MOV     A,M             ;Get it
     677D   A7            5937            ANA     A               ;Is the NIC flag set?
     677E   CA 6789       5938            JZ      ITWCS6          ;Jump if not
     6781   32 7099       5939            STA     IMPXFR          ;Set the "Implied XFR occurred" flag
     6784   C5            5940            PUSH    B               ;Save BC
     6785   CD 6823       5941            CALL    XFRSET          ;Go figure out what to load and load it
     6788   C1            5942            POP     B               ;and BC
     6789   21 707C       5943    ITWCS6: LXI     H,ICCS          ;Point to the ICCS
     678C   7E            5944            MOV     A,M             ;Get the ICCS
     678D   E6 40          5945            ANI     040H            ;Check for INT already set
     678F   CA 6793        5946            JZ      ITWCS7          ;Jump if not already set
     6792   1F            5947            RAR                     ;This will set bit 05 quickly
     6793   F6 40         5948    ITWCS7: ORI     040H            ;Set the INT bit
     6795   B6            5949            ORA     M               ;OR in the ICCS
     6796   77            5950            MOV     M,A             ;Store the new ICCS
     6797   3E 40         5951            MVI     A,040H          ;Set SOE and clear SOD
     6799   30            5952            SIM                     ;Drive SOD low, then high to reset Timer Int
     679A   3E C0         5953            MVI     A,0C0H          ;
     679C   30            5954            SIM                     ;
     679D   C9            5955            RET                     ;Leave
                          5956
                          5957
     679E   1F            5958    ITRUN:  RAR                     ;Check for XFR
     679F   DA 67FF       5959            JC      ITRUN1          ;Jump if XFR set
     67A2   3A 707D       5960            LDA     OLDRUN          ;Get the Old Run flag
     67A5   A7            5961            ANA     A               ;Is it set?
     67A6   C0            5962            RNZ                     ;Leave if the timer is already running
     67A7   CD 684C       5963            CALL    NEWCNT          ;Go load the correct Alarm value
     67AA   21 707E       5964            LXI     H,ITSGL         ;Find out if any single stepping has occurred
     67AD   7E            5965            MOV     A,M             ;Get the flag
     67AE   A7            5966            ANA     A               ;Test it
     67AF   36 00         5967            MVI     M,0             ;Zero it (just in case)
     67B1   CA 67F4       5968            JZ      ITRUN0          ;If zero we don't need to do anymore
                          5969
                          5970    ;Otherwise, we must find out if the value in the counters is greater than the
                          5971    ;minus 3 or minimum count version we have just loaded via NEWCNT.  If it is,
                          5972    ;we must pretend that an overflow has occurred, set interrupts if necessary,
                          5973    ;and start the counter over from zero by doing a Load and Arm on counters 1
                          5974    ;and 2.
                          5975
     67B4   3E 01         5976            MVI     A,1             ;Make a 1
     67B6   32 7098       5977            STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     67B9   D3 3B         5978            OUT     SETBLK          ;Block the 100Hz  clock
```

```
Error Addr  Code          Seq   Source statement

     67BB   3E A3        5979            MVI     A,SAVE12        ;Save the present contents of counters 1 and 2
     67BD   D3 1D        5980            OUT     ITCSR           ;
     67BF   3E 19        5981            MVI     A,HOLD1         ;Point to the internal pointer to Hold Registers
     67C1   D3 1D        5982            OUT     ITCSR           ;1 and 2
     67C3   AF           5983            XRA     A               ;Make a 0
     67C4   32 7098      5984            STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     67C7   D3 3A        5985            OUT     CLRBLK          ;Unblock the 100Hz clock
     67C9   11 709E      5986            LXI     D,ITTEMP        ;Point to this temp
     67CC   DB 1C        5987            IN      ITDB            ;Get the low byte of the count
     67CE   12           5988            STAX    D               ;Store it
     67CF   23           5989            INX     H               ;Bump the pointer
     67D0   DB 1C        5990            IN      ITDB            ;Get the next byte of the count
     67D2   12           5991            STAX    D               ;Store it
     67D3   23           5992            INX     H               ;Bump the pointer
     67D4   DB 1C        5993            IN      ITDB            ;Get the next byte of the count
     67D6   12           5994            STAX    D               ;Store it
     67D7   DB 1C        5995            IN      ITDB            ;Get the next byte of the count
     67D9   21 7097      5996            LXI     H,ALRMM3+3      ;Point to the high byte of what is in Alarms
     67DC   BE           5997            CMP     M               ;Check for Counter<Alarm
     67DD   DA 67F4      5998            JC      ITRUN0          ;Jump if Counter<Alarm
     67E0   1A           5999            LDAX    D               ;Get the next counter byte
     67E1   2B           6000            DCX     H               ;Back down the pointer to the ALRMM3 buffer
     67E2   BE           6001            CMP     M               ;Check for Counter<Alarm
     67E3   DA 67F4      6002            JC      ITRUN0          ;Jump if it is
     67E6   1B           6003            DCX     D               ;Back up the ITTEMP pointer
     67E7   2B           6004            DCX     H               ;and the ALRMM3 pointer
     67E8   1A           6005            LDAX    D               ;Get the next counter byte
     67E9   BE           6006            CMP     M               ;Check for Counter<Alarm
     67EA   D2 67F4      6007            JNC     ITRUN0          ;Jump if it is
     67ED   1B           6008            DCX     D               ;Back up the ITTEMP pointer
     67EE   2B           6009            DCX     H               ;and the ALRMM3 pointer
     67EF   1A           6010            LDAX    D               ;Get the next counter byte
     67F0   BE           6011            CMP     M               ;Check for Counter<Alarm
     67F1   D2 67F4      6012            JNC     ITRUN0          ;Jump if it is
                         6013
                         6014    ;handle the special case here
                         6015
     67F4   D3 2D        6016    ITRUN0: OUT     SETTMR          ;Start up the counter
     67F6   F3           6017    ITRUN2: DI                      ;Disable interrupts for a moment
     67F7   20           6018            RIM                     ;Get the interrupt masks
     67F8   E6 FE        6019            ANI     0FEH            ;Clear M5.5
     67FA   F6 08        6020            ORI     8H              ;Set MSE
     67FC   30           6021            SIM                     ;Write the masks
     67FD   FB           6022            EI                      ;Enable interrupts
     67FE   C9           6023            RET                     ;Leave
                         6024
                         6025
     67FF   D3 2C        6026    ITRUN1: OUT     CLRTMR          ;Turn the timer off
     6801   CD 6823      6027            CALL    XFRSET          ;Go load the Alarm registers
     6804   AF           6028            XRA     A               ;Make a 0
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Error Addr  Code          Seq   Source statement

     6805   32 7099       6029           STA     IMPXFR          ;Clear the Implied XFR flag
     6808   3C            6030           INR     A               ;Make a 1
     6809   32 7098       6031           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     680C   D3 3B         6032           OUT     SETBLK          ;Block the 100Hz  clock
     680E   3E 63         6033           MVI     A,LARM12        ;Prepare to Load and Arm counters 1 and 2
     6810   D3 1D         6034           OUT     ITCSR           ;Do it
     6812   AF            6035           XRA     A               ;Make a 0
     6813   32 7098       6036           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6816   D3 3A         6037           OUT     CLRBLK          ;Unblock the 100Hz clock
     6818   D3 2D         6038           OUT     SETTMR          ;Start the counter
     681A   3E 40         6039           MVI     A,040H          ;Set up code to drive SOD low to clear any
     681C   30            6040           SIM                     ;pending Timer interrupt.
     681D   3E C0         6041           MVI     A,0C0H          ;Code to drive SOD high
     681F   30            6042           SIM                     ;
     6820   C3 67F6       6043           JMP     ITRUN2          ;Go clear M5.5
                          6044
                          6045
     6823   21 7083       6046   XFRSET: LXI     H,NICFLG        ;Point to the "new NIC value" flag
     6826   7E            6047           MOV     A,M             ;Get it
     6827   A7            6048           ANA     A               ;Set or clear?
     6828   CA 684C       6049           JZ      NEWCNT          ;Skip the next part if no new NICR
     682B   35            6050   XFRSE0: DCR     M               ;Otherwise, clear it now
     682C   2A 7084       6051           LHLD    NICR            ;Get two bytes
     682F   22 7090       6052           SHLD    ALARM           ;Move them over
     6832   2A 7086       6053           LHLD    NICR+2          ;Two more
     6835   22 7092       6054           SHLD    ALARM+2         ;and so on
     6838   2A 7088       6055           LHLD    NICR+4          ;
     683B   22 7094       6056           SHLD    ALARM+4         ;
     683E   2A 708A       6057           LHLD    NICR+6          ;
     6841   22 7096       6058           SHLD    ALARM+6         ;
     6844   21 7080       6059           LXI     H,SMLNIC        ;Get the Small NICR flag
     6847   7E            6060           MOV     A,M             ;Put it in the AC
     6848   36 00         6061           MVI     M,0             ;Zero it out in memory
     684A   23            6062           INX     H               ;Point to the Small Alarm flag
     684B   77            6063           MOV     M,A             ;Set or clear it with the Small NICR flag
     684C   21 7082       6064   NEWCNT: LXI     H,LOADED        ;Point to the "which count is loaded" flag byte
     684F   11 7090       6065           LXI     D,ALARM         ;Point to the unaltered count
     6852   06 00         6066           MVI     B,0             ;Set up a 0 in B
     6854   3A 707C       6067           LDA     ICCS            ;Get the current version of the ICCS
     6857   1F            6068           RAR                     ;Check the Run bit
     6858   D2 6878       6069           JNC     NEWCN1          ;Jump if clear
     685B   11 7094       6070           LXI     D,ALRMM3        ;Point to the minus 3 version of the count
     685E   04            6071           INR     B               ;Make a 1 in B
     685F   3A 7081       6072           LDA     SMLALM          ;Get the Small Alarm flag
     6862   A7            6073           ANA     A               ;Is it set?
     6863   CA 6878       6074           JZ      NEWCN1          ;Jump if clear
     6866   3A 7083       6075           LDA     NICFLG          ;Since the value to go in the Alarm registers is
     6869   A7            6076           ANA     A               ;too small, we must see if there is a backup NIC
     686A   CA 6874       6077           JZ      NEWCN0          ;Jump if there isn't
     686D   3A 7080       6078           LDA     SMLNIC          ;See if the backup NIC is too small
```

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Error Addr  Code          Seq   Source statement

     6870   A7           6079            ANA     A               ;
     6871   CA 6878      6080            JZ      NEWCN1          ;Jump if it isn't
     6874   11 708C      6081  NEWCN0:   LXI     D,MINCNT        ;Point to the minimum value of the count
     6877   04           6082            INR     B               ;Make a 2 in B
     6878   70           6083  NEWCN1:   MOV     M,B             ;Store the correct flags in LOADED
     6879   EB           6084            XCHG                    ;Put the correct pointer in HL
     687A   3E 01        6085  NEWCN2:   MVI     A,1             ;Make a 1
     687C   32 7098      6086            STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     687F   D3 3B        6087            OUT     SETBLK          ;Block the 100Hz  clock
     6881   3E 07        6088            MVI     A,ALARM1        ;Point to the Alarm registers
     6883   D3 1D        6089            OUT     ITCSR           ;Do it
     6885   7E           6090            MOV     A,M             ;Get the low byte
     6886   23           6091            INX     H               ;Increment the pointer
     6887   D3 1C        6092            OUT     ITDB            ;Write it to the Alarm reg.
     6889   7E           6093            MOV     A,M             ;Get the next byte
     688A   23           6094            INX     H               ;Bump the pointer
     688B   D3 1C        6095            OUT     ITDB            ;Write it
     688D   7E           6096            MOV     A,M             ;Get the next byte
     688E   23           6097            INX     H               ;Bump the pointer
     688F   D3 1C        6098            OUT     ITDB            ;Write the byte
     6891   7E           6099            MOV     A,M             ;Get the last byte
     6892   D3 1C        6100            OUT     ITDB            ;and write it
     6894   AF           6101            XRA     A               ;Make a 0
     6895   32 7098      6102            STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6898   D3 3A        6103            OUT     CLRBLK          ;Unblock the 100Hz clock
     689A   C9           6104            RET                     ;Leave
                         6105
                         6106
                         6107
     689B   3A 707C      6108  ITRCSR:   LDA     ICCS            ;Get the ICCS
     689E   47           6109            MOV     B,A             ;Put a copy in B
     689F   1F           6110            RAR                     ;Is the run bit on?
     68A0   78           6111            MOV     A,B             ;Put the ICCS in A just in case Run=0
     68A1   D2 6590      6112            JNC     LAST            ;Go send this version of the ICCS to the CPU
     68A4   3A 7082      6113            LDA     LOADED          ;Find out what is in the Alarm registers
     68A7   FE 02        6114            CPI     2               ;If it is the Minimum count we want to indicate
                         6115                                    ;an Overrun Error
     68A9   78           6116            MOV     A,B             ;Get the ICCS into A
     68AA   C2 6590      6117            JNZ     LAST            ;Jump if not the Minimum count
     68AD   F6 60        6118            ORI     60H             ;Set the Overrun Error and INT bits
     68AF   C3 6590      6119            JMP     LAST            ;Go send the ICCS byte
                         6120
                         6121
     68B2   3A 7082      6122  ITICR:    LDA     LOADED          ;Get the Loaded Flag byte
     68B5   FE 02        6123            CPI     2               ;Look for minimum value loaded
     68B7   C2 68C1      6124            JNZ     ITICR0          ;Jump if not
     68BA   3A 707C      6125            LDA     ICCS            ;Get the ICCS
     68BD   1F           6126            RAR                     ;Is the timer running?
     68BE   DA 68FD      6127            JC      ITICR2          ;Jump if it is
     68C1   3E 01        6128  ITICR0:   MVI     A,1             ;Make a 1
```

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Error Addr  Code          Seq   Source statement

     68C3   32 7098       6129           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     68C6   D3 3B         6130           OUT     SETBLK          ;Block the 100Hz  clock
     68C8   3E A3         6131           MVI     A,SAVE12        ;Get the current value of the count
     68CA   D3 1D         6132           OUT     ITCSR           ;Now
     68CC   3E 19         6133           MVI     A,HOLD1         ;Point the pointer to the Hold registers
     68CE   D3 1D         6134   ITICR1: OUT     ITCSR           ;Now
     68D0   AF            6135           XRA     A               ;Make a 0
     68D1   32 7098       6136           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     68D4   D3 3A         6137           OUT     CLRBLK          ;Unblock the 100Hz clock
     68D6   DB 1C         6138           IN      ITDB            ;Get the low byte
     68D8   D3 CC         6139           OUT     WRITE           ;Send it
     68DA   CD 6971       6140           CALL    WAITH           ;
     68DD   DB 1C         6141           IN      ITDB            ;Get the next byte
     68DF   D3 CC         6142           OUT     WRITE           ;Send it to the CPU
     68E1   CD 6980       6143           CALL    WAITL           ;
     68E4   DB 1C         6144           IN      ITDB            ;Next byte
     68E6   D3 CC         6145           OUT     WRITE           ;Send it
     68E8   CD 6971       6146           CALL    WAITH           ;
     68EB   DB 1C         6147           IN      ITDB            ;Get the last byte
     68ED   D3 CC         6148   ITICR3: OUT     WRITE           ;Send it
     68EF   CD 6980       6149           CALL    WAITL           ;
     68F2   21 7099       6150           LXI     H,IMPXFR        ;Get this byte
     68F5   7E            6151           MOV     A,M             ;
     68F6   D3 CC         6152           OUT     WRITE           ;Send it to the CPU micro engine
     68F8   D3 A9         6153           OUT     CLRACK          ;Clear Ack
     68FA   36 00         6154           MVI     M,0             ;Zero my copy of IMPXFR
     68FC   C9            6155           RET                     ;Leave
                          6156
                          6157   ;The following section is used when the count the program was trying to use
                          6158   ;was too small to be allowed.  If the ICR is read under this circumstance it
                          6159   ;will always read 0.  If the ICCS is read it will always have the INT and
                          6160   ;OVERRUN bits on.
                          6161
                          6162
     68FD   21 7090       6163   ITICR2: LXI     H,ALARM         ;Get the unaltered count
     6900   7E            6164           MOV     A,M             ;and send it to the CPU
     6901   D3 CC         6165           OUT     WRITE           ;Send it
     6903   CD 6971       6166           CALL    WAITH           ;
     6906   23            6167           INX     H               ;Point to the next byte
     6907   7E            6168           MOV     A,M             ;Get it
     6908   DB 1C         6169           IN      ITDB            ;Get the next byte
     690A   D3 CC         6170           OUT     WRITE           ;Send it to the CPU
     690C   CD 6980       6171           CALL    WAITL           ;
     690F   23            6172           INX     H               ;Point to the next byte
     6910   7E            6173           MOV     A,M             ;Get it
     6911   D3 CC         6174           OUT     WRITE           ;Send it
     6913   CD 6971       6175           CALL    WAITH           ;
     6916   23            6176           INX     H               ;Point to the last byte
     6917   7E            6177           MOV     A,M             ;Get it
     6918   C3 68ED       6178           JMP     ITICR3          ;Go share the code that sends the last byte
```

```
Error Addr  Code          Seq   Source statement

                          6179                          ;and IMPXFR
                          6180
                          6181
     691B   21 7084       6182  ITNICR: LXI     H,NICR          ;Point to the storage
     691E   CD 6953       6183          CALL    NICSUB          ;The next part is a subroutine so TODW can
                          6184                          ;also use it
     6921   21 7088       6185          LXI     H,NICRM3        ;Point to the dest
     6924   11 7084       6186          LXI     D,NICR          ;and the source
     6927   CD 00F9       6187          CALL    COPY            ;Move it over
     692A   21 708B       6188          LXI     H,NICRM3+3      ;Point to the high byte of the minus 3 version
     692D   7E             6189          MOV     A,M             ;Get it
     692E   2B             6190          DCX     H               ;Back the pointer down
     692F   B6             6191          ORA     M               ;OR in the next byte down
     6930   2B             6192          DCX     H               ;Back the pointer down again
     6931   B6             6193          ORA     M               ;OR in the next one
     6932   2B             6194          DCX     H               ;Point to the low byte
     6933   C2 6947        6195          JNZ     ITNIC0          ;Jump if high three bytes not 0
     6936   7E             6196          MOV     A,M             ;Get the low byte
     6937   FE E8          6197          CPI     232             ;See if it is less min+2
     6939   D2 6947        6198          JNC     ITNIC0          ;Jump if not
     693C   A7             6199          ANA     A               ;Is it 0 (the largest count)
     693D   CA 6947        6200          JZ      ITNIC0          ;Jump if it is
     6940   CD 694D        6201          CALL    ITNIC1          ;Go set the NIC flag
     6943   32 7080        6202          STA     SMLNIC          ;Set the Small NICR flag
     6946   C9             6203          RET                     ;Leave
                          6204
     6947   01 719E        6205  ITNIC0: LXI     B,NEG3          ;Point to a minus 3
     694A   CD 6251        6206          CALL    ADDAD1          ;Go add it in
     694D   3E 01           6207  ITNIC1: MVI     A,01            ;Get a one into A
     694F   32 7083        6208          STA     NICFLG          ;Set the NICR Flag
     6952   C9             6209          RET                     ;All done
                          6210                          ;use it
     6953   DB 80          6211  NICSUB: IN      READ            ;Get the low byte
     6955   77             6212          MOV     M,A             ;Store it
     6956   23             6213          INX     H               ;Bump the pointer
     6957   CD 6971        6214          CALL    WAITH           ;Go wait for next byte
     695A   DB 80          6215          IN      READ            ;Get next byte
     695C   77             6216          MOV     M,A             ;Store it
     695D   23             6217          INX     H               ;Bump the pointer
     695E   CD 6980        6218          CALL    WAITL           ;Go wait
     6961   DB 80          6219          IN      READ            ;Get the next byte
     6963   77             6220          MOV     M,A             ;Store it
     6964   23             6221          INX     H               ;Bump the pointer
     6965   CD 6971        6222          CALL    WAITH           ;Wait for CPATTN to go high
     6968   DB 80          6223          IN      READ            ;Get the last byte
     696A   77             6224          MOV     M,A             ;And store it
     696B   CD 6980        6225          CALL    WAITL           ;Wait for CPATTN to go away
     696E   D3 A9          6226          OUT     CLRACK          ;Clear Console Ack
     6970   C9             6227          RET                     ;Leave
                          6228
```

```
Error Addr  Code          Seq   Source statement

                          6229
                          6230
     6971   D3 A9         6231  WAITH:  OUT     CLRACK          ;Get rid of Ack
     6973   1E 00         6232          MVI     E,0             ;Prime the count
     6975   DB 83         6233  1$:     IN      CPATTN          ;Get CPATTN
     6977   1F            6234          RAR                     ;Check to see if it is set
     6978   D8            6235          RC                      ;We're done if it is
     6979   1C            6236          INR     E               ;Bump the count
     697A   C2 6975       6237          JNZ     1$              ;Loop if not zero
     697D   CD 5D5E       6238          CALL    COMERR          ;Else timeout
                          6239
                          6240
                          6241
                          6242
     6980   D3 A8         6243  WAITL:  OUT     SETACK          ;Set Console Ack
     6982   1E 00         6244          MVI     E,0             ;Prime the count
     6984   DB 83         6245  1$:     IN      CPATTN          ;Get CPATTN
     6986   1F            6246          RAR                     ;Is it clear?
     6987   D0            6247          RNC                     ;Return if it is
     6988   1C            6248          INR     E               ;Else bump the count
     6989   C2 6984       6249          JNZ     1$              ;Loop if count doesn't equal 0
     698C   CD 5D5E       6250          CALL    COMERR          ;Else timeout
                          6251
                          6252
                          6253
                          6254
                          6255
                          6256  ;SAVREG IS ENTERED FROM THE HALT FLOWS.  IT ALLOWS FOR CONTINUE AND
                          6257  ;SI TO OCCUR
                          6258
                          6259
                          6260
                          6261
                          6262
                          6263
                          6264
     698F   D3 A0         6265  SETPAR: OUT     ENBPAR          ;Turn on Parity
     6991   C3 4C32       6266          JMP     IDLE            ;Go back to the Null Task
                          6267
     6994   D3 A1         6268  CLRPAR: OUT     DISPAR          ;Turn off parity
     6996   C3 4C32       6269          JMP     IDLE            ;Go back to Null Task
                          6270
                          6271
     6999   D3 2C         6272  TMRPRP: OUT     CLRTMR          ;Make sure the counter isn't counting
     699B   D3 A5         6273          OUT     CLRTIM          ;Clear the Timer interrupt to the CPU
     699D   21 708C       6274          LXI     H,MINCNT        ;Point to the minimum allowable count
     69A0   CD 687A       6275          CALL    NEWCN2          ;Load the alarm registers with it
     69A3   3E 01         6276          MVI     A,1             ;Make a 1
     69A5   32 7098       6277          STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     69A8   D3 3B         6278          OUT     SETBLK          ;Block the 100Hz  clock
```

```
Error Addr  Code          Seq   Source statement

     69AA   3E 17         6279           MVI     A,MASTER        ;Code to force internal pointer to MM reg
     69AC   D3 1D         6280           OUT     ITCSR           ;Send it out
     69AE   AF            6281           XRA     A               ;Make a 0
     69AF   32 7098       6282           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     69B2   D3 3A         6283           OUT     CLRBLK          ;Unblock the 100Hz clock
     69B4   DB 1C         6284           IN      ITDB            ;Get the low byte of the MM reg
     69B6   FE 0C         6285           CPI     0CH             ;See if the low byte is correct
     69B8   C2 69BF       6286           JNZ     TMRPR0          ;Jump if not
     69BB   DB 1C         6287           IN      ITDB            ;Get the high byte
     69BD   FE 0A         6288           CPI     0AH             ;See if it is correct
     69BF   C4 69DE       6289   TMRPR0: CNZ     TPSUB           ;Go init the 9513 if not
     69C2   3E 01         6290           MVI     A,1             ;%Move 1 to A
     69C4   32 7098       6291           STA     BLKFLG          ;%Set the flag to indicate that 100Hz is blocked
     69C7   D3 3B         6292           OUT     SETBLK          ;%Block the 100Hz clock
     69C9   3E C4         6293           MVI     A,0C4H          ;Disarm counter #3
     69CB   D3 1D         6294           OUT     ITCSR           ;Send it out
     69CD   3E E3         6295           MVI     A,0E3H          ;Code for setting output of counter #3 high
     69CF   D3 1D         6296           OUT     ITCSR           ;Send it out to the chip
     69D1   AF            6297           XRA     A               ;%Make A 0
     69D2   32 7098       6298           STA     BLKFLG          ;%Set the flag to indicate the 100Hz is unblocked
     69D5   D3 3A         6299           OUT     CLRBLK          ;%Unblock the 100hz clock
     69D7   3E 40         6300   TMRPR1: MVI     A,040H          ;Reset any garbage 9513 overflow interrupts
     69D9   30            6301           SIM                     ;to the 8085 by driving SOD low then high
     69DA   3E C0         6302           MVI     A,0C0H          ;
     69DC   30            6303           SIM                     ;
     69DD   C9            6304           RET                     ;Leave
                          6305
     69DE   3E 01         6306   TPSUB:  MVI     A,1             ;Make a 1
     69E0   32 7098       6307           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     69E3   D3 3B         6308           OUT     SETBLK          ;Block the 100Hz  clock
     69E5   3E 5F         6309           MVI     A,05FH          ;%This should be part of init routine
     69E7   D3 1D         6310           OUT     ITCSR           ;%This should do software retrigger
     69E9   3E 01         6311           MVI     A,CG1MOD        ;Point the internal pointer to Counter
     69EB   D3 1D         6312           OUT     ITCSR           ;Group 1, Mode register
     69ED   21 7052       6313           LXI     H,TMRFIL        ;Point to the Timer Prep File
     69F0   06 05         6314           MVI     B,5             ;Overall loop count
     69F2   0E 06         6315   TPSUB0: MVI     C,6             ;Inner loop count
     69F4   7E            6316   TPSUB1: MOV     A,M             ;Get Counter Mode low byte
     69F5   D3 1C         6317           OUT     ITDB            ;Send it out
     69F7   23            6318           INX     H               ;Bump the Pointer
     69F8   0D            6319           DCR     C               ;Reduce the inner count
     69F9   C2 69F4       6320           JNZ     TPSUB1          ;Stay in the inner loop if not 0
     69FC   05            6321           DCR     B               ;Decrement the group count
     69FD   C2 69F2       6322           JNZ     TPSUB0          ;Loop if all the groups aren't done
     6A00   3E 17         6323           MVI     A,MASTER        ;Point to the Master Mode reg
     6A02   D3 1D         6324           OUT     ITCSR           ;Do it
     6A04   21 0A0C       6325           LXI     H,MSTRCD        ;Put the code for the Master Mode reg into HL
     6A07   7D            6326           MOV     A,L             ;Get the low byte
     6A08   D3 1C         6327           OUT     ITDB            ;Send it
     6A0A   7C            6328           MOV     A,H             ;Get the High byte
```

```
Error Addr  Code          Seq   Source statement

     6A0B   D3 1C         6329           OUT     ITDB            ;Send it
     6A0D   3E 7B         6330           MVI     A,LA1245        ;Load and Arm counters 1, 2, 4 and 5
     6A0F   D3 1D         6331           OUT     ITCSR           ;1 and 2 won't count because gate is off.
     6A11   AF            6332           XRA     A               ;Make a 0
     6A12   32 7098       6333           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6A15   D3 3A         6334           OUT     CLRBLK          ;Unblock the 100Hz clock
     6A17   C9            6335           RET                     ;Leave
                          6336
                          6337   ;*****************************************************************************
                          6338   ;
     6A18   F5            6339   TMRSRV: PUSH    PSW             ;Save the AC and the PSW
     6A19   E5            6340           PUSH    H               ;Save H and L
     6A1A   20            6341           RIM                     ;Get the interrupt masks
     6A1B   F6 09         6342           ORI     9H              ;Set the MSE and M5.5
     6A1D   30            6343           SIM                     ;Write them out
     6A1E   FB            6344           EI                      ;Turn on the interrupt system again
     6A1F   3A 707C       6345           LDA     ICCS            ;Get the ICCS
     6A22   17            6346           RAL                     ;Check the I.E.
     6A23   D2 6A28       6347           JNC     TMRSR0          ;Jump if no I.E.
     6A26   D3 A4         6348           OUT     SETTIM          ;Set the Timer interrrupt to the CPU
     6A28   3E 01         6349   TMRSR0: MVI     A,1             ;Make a 1
     6A2A   32 7098       6350           STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     6A2D   D3 3B         6351           OUT     SETBLK          ;Block the 100Hz  clock
     6A2F   3E 62         6352           MVI     A,LARM2         ;Prepare to Load and Arm counter 2
     6A31   D3 1D         6353           OUT     ITCSR           ;Do it
     6A33   AF            6354           XRA     A               ;Make a 0
     6A34   32 7098       6355           STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6A37   D3 3A         6356           OUT     CLRBLK          ;Unblock the 100Hz clock
     6A39   21 7083       6357           LXI     H,NICFLG        ;Point to this flag
     6A3C   7E            6358           MOV     A,M             ;Get it
     6A3D   A7            6359           ANA     A               ;Is the NIC flag set?
     6A3E   CA 6A4B       6360           JZ      TMRSR1          ;Jump if not
     6A41   32 7099       6361           STA     IMPXFR          ;Set the "Implied XFR occurred" flag
     6A44   C5            6362           PUSH    B               ;Save BC
     6A45   D5            6363           PUSH    D               ;and DE
     6A46   CD 682B       6364           CALL    XFRSE0          ;Go figure out what to load and load it
     6A49   D1            6365           POP     D               ;Get DE back
     6A4A   C1            6366           POP     B               ;and BC
     6A4B   21 707C       6367   TMRSR1: LXI     H,ICCS          ;Point to the ICCS
     6A4E   7E            6368           MOV     A,M             ;Get the ICCS
     6A4F   E6 40         6369           ANI     040H            ;Check for INT already set
     6A51   CA 6A55       6370           JZ      TMRSR2          ;Jump if not already set
     6A54   1F            6371           RAR                     ;This will set bit 05 quickly
     6A55   F6 40         6372   TMRSR2: ORI     040H            ;Set the INT bit
     6A57   B6            6373           ORA     M               ;OR in the ICCS
     6A58   77            6374           MOV     M,A             ;Store the new ICCS
     6A59   1F            6375           RAR                     ;Is the Run bit on?
     6A5A   D2 6A6E       6376           JNC     TMRSR4          ;Jump if it is off
     6A5D   3E 40         6377           MVI     A,040H          ;Set SOE and clear SOD
     6A5F   30            6378           SIM                     ;Drive SOD low, then high to reset Timer Int
```

```
Error Addr  Code          Seq   Source statement

     6A60   3E C0         6379          MVI     A,0C0H          ;
     6A62   30           6380          SIM                     ;
     6A63   F3           6381          DI                      ;Turn off the interrupt system
     6A64   20           6382          RIM                     ;Get the interrupt masks
     6A65   E6 FE        6383          ANI     0FEH            ;Clear M5.5
     6A67   F6 08        6384          ORI     8H              ;Set MSE
     6A69   30           6385          SIM                     ;Write the masks
     6A6A   E1           6386  TMRSR3: POP     H               ;Get HL back
     6A6B   F1           6387          POP     PSW             ;Get the PSW and the AC back
     6A6C   FB           6388          EI                      ;Turn on the interrupts
     6A6D   C9           6389          RET                     ;Leave
                         6390
     6A6E   D3 2C        6391  TMRSR4: OUT     CLRTMR          ;Turn off the timer
     6A70   3E 63        6392          MVI     A,LARM12        ;Put the value in A
     6A72   D3 1D        6393          OUT     ITCSR           ;Load and arm counters 1 and 2
     6A74   3E 40        6394          MVI     A,040H          ;Set SOE and clear SOD
     6A76   30           6395          SIM                     ;Drive SOD low, then high to reset Timer Int
     6A77   3E C0        6396          MVI     A,0C0H          ;
     6A79   30           6397          SIM                     ;
     6A7A   C3 6A6A      6398          JMP     TMRSR3          ;Go clean things up
                         6399  ;
                         6400  ;*****************************************************************************
                         6401
                         6402
                         6403
     6A7D   3E 01        6404  TODR:   MVI     A,1             ;Make a 1
     6A7F   32 7098      6405          STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     6A82   D3 3B        6406          OUT     SETBLK          ;Block the 100Hz  clock
     6A84   3E B8        6407          MVI     A,SAVE45        ;Save Counters 4 and 5
     6A86   D3 1D        6408          OUT     ITCSR           ;Do it
     6A88   3E 1C        6409          MVI     A,HOLD4         ;Point at the Hold registers
     6A8A   C3 68CE      6410          JMP     ITICR1          ;This will do the rest for us
                         6411
     6A8D   21 709A      6412  TODW:   LXI     H,TODBFR        ;Put the value here at first
     6A90   CD 6953      6413          CALL    NICSUB          ;This code will get the value for us
     6A93   21 709A      6414  TODW1:  LXI     H,TODBFR        ;Point to the value to be loaded
     6A96   3E 01        6415          MVI     A,1             ;Make a 1
     6A98   32 7098      6416          STA     BLKFLG          ;Set the flag to indicate the 100Hz is blocked
     6A9B   D3 3B        6417          OUT     SETBLK          ;Block the 100Hz  clock
     6A9D   CD 6AB5      6418          CALL    TODPRP          ;go put it in
     6AA0   3E 58        6419          MVI     A,LOAD45        ;Load Counters 4 and 5
     6AA2   D3 1D        6420          OUT     ITCSR           ;Now
     6AA4   21 70FD      6421          LXI     H,ZEROS         ;Point to some zeros
     6AA7   CD 6AB5      6422          CALL    TODPRP          ;And reload the load registers
     6AAA   3E 38        6423          MVI     A,ARM45         ;Start counters 4 and 5 counting
     6AAC   D3 1D        6424          OUT     ITCSR           ;Do it
     6AAE   AF           6425          XRA     A               ;Make a 0
     6AAF   32 7098      6426          STA     BLKFLG          ;Zero the 100Hz clock blocked flag
     6AB2   D3 3A        6427          OUT     CLRBLK          ;Unblock the 100Hz clock
     6AB4   C9           6428          RET                     ;And leave
```

```
Error Addr  Code            Seq   Source statement

                            6429
                            6430  ;*****************************************************************************
                            6431  ;
                            6432  ;The TODPRP subroutine expects the calling routine to block the 100Hz clock
                            6433  ;
     6AB5   3E 0C           6434  TODPRP: MVI     A,CGFOUR        ;Force the 9513 Internal Pointer to counter 4
     6AB7   D3 1D           6435          OUT     ITCSR           ;Do it
                            6436                                  ;Calling routine must have loaded HL
     6AB9   7E              6437          MOV     A,M             ;Get the low byte
     6ABA   D3 1C           6438          OUT     ITDB            ;Send it
     6ABC   23              6439          INX     H               ;Point to the next byte
     6ABD   7E              6440          MOV     A,M             ;Get it
     6ABE   D3 1C           6441          OUT     ITDB            ;and send it
     6AC0   3E 0D           6442          MVI     A,CGFIVE        ;Point to counter five
     6AC2   D3 1D           6443          OUT     ITCSR           ;Do it
     6AC4   23              6444          INX     H               ;Point to the next byte
     6AC5   7E              6445          MOV     A,M             ;and get it
     6AC6   D3 1C           6446          OUT     ITDB            ;and send it
     6AC8   23              6447          INX     H               ;Point to the last byte
     6AC9   7E              6448          MOV     A,M             ;and get it
     6ACA   D3 1C           6449          OUT     ITDB            ;and send it
     6ACC   C9              6450          RET                     ;Leave
                            6451  ;
                            6452  ;*****************************************************************************
                            6453
                            6454
     6ACD   D3 35           6455  UBINIT: OUT     INITH           ;Set Unibus Init
     6ACF   CD 5760         6456          CALL    STAL10          ;Go stall for 10 Ms
     6AD2   D3 34           6457          OUT     INITL           ;Release Unibus Init
     6AD4   D3 A9           6458          OUT     CLRACK          ;Clear Console Ack
     6AD6   C9              6459          RET                     ;And leave
                            6460
     6AD7   D3 A9           6461  SOFDON: OUT     CLRACK          ;Turn the CPU loose
     6AD9   C9              6462          RET                     ;
                            6463
     6ADA   D3 A9           6464  PMBOOT: OUT     CLRACK          ;Turn the CPU loose
     6ADC   D3 20           6465          OUT     CLRCLK          ;Stop the CPU
     6ADE   D3 3C           6466          OUT     CLRLIT          ;Turn off the Run Light
     6AE0   AF              6467          XRA     A               ;Make a 0
     6AE1   32 40D3         6468          STA     RUNFLG          ;Turn off this flag
     6AE4   C3 6020         6469          JMP     CLDSTX          ;Go try to boot the system up
                            6470
     6AE7   D3 A9           6471  CLRCLD: OUT     CLRACK          ;Turn the CPU loose
     6AE9   AF              6472          XRA     A               ;Make a 0
     6AEA   32 408A         6473          STA     COLD            ;Reset the Cold Start in Progress flag
     6AED   32 40B6         6474          STA     PUBFLG          ;Clear the Power Up Boot Flag
     6AF0   C9              6475          RET                     ;Leave
                            6476
     6AF1   D3 A9           6477  CLRWRM: OUT     CLRACK          ;Turn the CPU loose
     6AF3   AF              6478          XRA     A               ;Make a 0
```

```
Error Addr  Code          Seq   Source statement

     6AF4   32 41B7       6479           STA     WARM            ;Reset the Warm Start in Progress flag
     6AF7   C9            6480           RET                     ;Leave
                          6481
     6AF8   C9            6482   CLRPME: RET                     ;
                          6483
     6AF9   C9            6484   SETPME: RET                     ;
                          6485
                          6486
     6AFA   16 04         6487   ZROBUF: MVI     D,04H           ;Set up the count
     6AFC   AF            6488   ZBUF1:  XRA     A               ;Generate 0
     6AFD   E5            6489   ZBUF2:  PUSH    H               ;Save the address
     6AFE   77            6490   1$:     MOV     M,A             ;Clear the location
     6AFF   23            6491           INX     H               ;Bump the address
     6B00   15            6492           DCR     D               ;Decrement the count
     6B01   C2 6AFE       6493           JNZ     1$              ;Loop if not done
     6B04   E1            6494           POP     H               ;Restore HL
     6B05   C9            6495           RET                     ;Leave
                          6496   ;
                          6497   ;*****************************************************************************
                          6498
                          6499
                          6500
                          6501
                          6502
                          6503
                          6504
                          6505
                          6506   ;*****************************************************************************
                          6507   ;*****************************************************************************
                          6508   ;*****************************************************************************
                          6509   ;
                          6510   ;       Many of the buffers and constants used by the console software
                          6511   ; (not MICMON) start here.  The vectors for the Program Mode command decode
                          6512   ; and the buffer for the Console Mode indirect command files are here as well
                          6513   ;
                          6514
                          6515
                          6516
        =7000             6517           ORG     07000H          ;
                          6518
7000    00                6519   CHRCNT: DB      0
7001    =0050             6520   CHRBUF: DS      080
                          6521
7051    00                6522   TIMCNT: DB      0
                          6523
7052    A2A9              6524   TMRFIL: DW      0A2A9H          ;
7054    0000 0000         6525           DW      0,0             ;
                          6526
7058    A0A9              6527           DW      0A0A9H          ;
705A    0000 0000         6528           DW      0,0             ;
```

```
Error Addr  Code           Seq   Source statement

                           6529
     705E   020E           6530          DW      20EH            ;
     7060   F830 0000      6531          DW      0F830H,0        ;Count for Power Fail Timeout
                           6532
     7064   0128           6533          DW      128H            ;
     7066   0000 0000      6534          DW      0,0             ;
                           6535
     706A   0028           6536          DW      28H             ;
     706C   0000 0000      6537          DW      0,0             ;
                           6538
     7070   00             6539  ISR:    DB      0               ;Interrupt Status Register
     7071   00             6540  IPR:    DB      0               ;Interrupt Priority Register
                           6541
     7072   00             6542  RCVCSR: DB      0               ;Terminal Pseudo CSR
     7073   00             6543  RCVDB:  DB      0               ;Terminal Pseudo Data Buffer
                           6544
     7074   00             6545  INTCSR: DB      0               ;
     7075   00             6546  INTDB:  DB      0               ;
     7076   00             6547  XMTCSR: DB      0               ;
     7077   00             6548  XMTDB:  DB      0               ;
                           6549
     7078   0000           6550  XCSADR: DW      0               ;
     707A   0000           6551  XDBADR: DW      0               ;
                           6552
     707C   00             6553  ICCS:   DB      0               ;This is the Interval Timer control register
     707D   00             6554  OLDRUN: DB      0               ;Old value of RUN bit
     707E   00             6555  ITSGL:  DB      0               ;Flag to indicated I.T. single stepping
                           6556                                  ;has occurred
                           6557
     707F   00             6558  HMPEND: DB      0               ;Halt Message Pending flag
                           6559
                           6560
                           6561  ;****
                           6562  ;
     7080   00             6563  SMLNIC: DB      0               ;Flag to indicate that the value in the Normal
                           6564                                  ;NICR is too small.
     7081   00             6565  SMLALM: DB      0               ;Flag to indicate that the value in the Ram
                           6566                                  ;based copy of the alarm registers is too small
                           6567  ;
                           6568  ;****
                           6569
                           6570
     7082   00             6571  LOADED: DB      0               ;Indicates what value is in the Alarm
                           6572                                  ;registers.  0=unaltered, 1=minus 3 version,
                           6573                                  ;and 2=minimum allowable count version.
                           6574
     7083   00             6575  NICFLG: DB      0               ;Flag indicating there is a value in Software
                           6576                                  ;NICR
     7084   =0004          6577  NICR:   DS      4               ;Save 4 bytes for the software NICR
     7088   =0004          6578  NICRM3: DS      4               ;Buffer for NICR count minus 3
```

E 11

```
Error Addr  Code           Seq   Source statement

     708C   00E8          6579  MINCNT: DW      232             ;Minimum allowable count
     708E   0000          6580          DW      0               ;
                          6581
     7090   =0004         6582  ALARM:  DS      4               ;
     7094   =0004         6583  ALRMM3: DS      4               ;
                          6584
     7098   00            6585  BLKFLG: DB      0               ;100Hz blocked flag
                          6586
     7099   00            6587  IMPXFR: DB      0               ;
                          6588
     709A   =0004         6589  TODBFR: DS      4
                          6590
     709E   =0004         6591  ITTEMP: DS      4               ;
                          6592
                          6593  ;*************************************************************************
                          6594  ;*************************************************************************
                          6595  ;
                          6596  ;       This is a table of addresses used by Program Mode to determine which
                          6597  ; command the CPU wants to execute.  The CPU passed the Program Mode software
                          6598  ; a command byte which is actually used as an offset into this table.
                          6599  ;
                          6600
     70A2   C3 6575       6601  TABLE:  JMP     INTACK
     70A5   C3 658C       6602          JMP     TTXCSR
     70A8   C3 6595       6603          JMP     TTRCSR
     70AB   C3 65A0       6604          JMP     TTXDB
     70AE   C3 65BB       6605          JMP     TTXIE
     70B1   C3 65C2       6606          JMP     TTRIE
     70B4   C3 65FB       6607          JMP     TTXID
     70B7   C3 6606       6608          JMP     TTRID
     70BA   C3 6625       6609          JMP     PMHALT
     70BD   C3 6656       6610          JMP     TTRDB
                          6611
     70C0   C3 659B       6612          JMP     TURCSR          ;
     70C3   C3 65B0       6613          JMP     TUXDB           ;
     70C6   C3 6683       6614          JMP     TURDB           ;
     70C9   C3 65C9       6615          JMP     TUWCSR          ;
     70CC   C9            6616          RET                     ;Dummy this out
     70CD   00            6617          NOP                     ;
     70CE   00            6618          NOP                     ;
     70CF   C3 65F4       6619          JMP     TURIE
     70D2   C3 661A       6620          JMP     TURID           ;
                          6621
     70D5   C3 689B       6622          JMP     ITRCSR          ;Read the ICCS
     70D8   C3 66C6       6623          JMP     ITWCSR          ;Write the ICCS
     70DB   C3 68B2       6624          JMP     ITICR           ;Read (only) the ICR
     70DE   C3 691B       6625          JMP     ITNICR          ;Write (only) the NICR
                          6626
     70E1   C3 6A7D       6627          JMP     TODR            ;Read the TOD register
     70E4   C3 6A8D       6628          JMP     TODW            ;Write the TOD register
```

```
Error Addr  Code           Seq   Source statement

                           6629
     70E7   C3 6ACD        6630            JMP     UBINIT          ;Go init the Unibus
                           6631
     70EA   C3 6AD7        6632            JMP     SOFDON          ;
     70ED   C3 6ADA        6633            JMP     PMBOOT          ;
     70F0   C3 6AF1        6634            JMP     CLRWRM          ;Clear the Warm Start Flag
     70F3   C3 6AE7        6635            JMP     CLRCLD          ;Clear the Cold Start flag
                           6636
     70F6   C3 6AF8        6637            JMP     CLRPME          ;
     70F9   C3 6AF9        6638            JMP     SETPME          ;
                           6639
                           6640    ;
                           6641    ;       End of the table
                           6642    ;
                           6643    ;*******************************************************************************
                           6644
     70FC   00             6645    PCOUNT: DB      0               ;
                           6646
     70FD   0000           6647    ZEROS:  DW      0
     70FF   0000           6648            DW      0
                           6649
                           6650
     7101   12             6651    COUNT1: DB      18
     7102   40 42 43       6652    CMPAR1: DB      ' BCDEHILMNRSTWX;!'
     7105   44 45 48
     7108   49 4C 4D
     710B   4E 52 53
     710E   54 57 58
     7111   3B 21
     7113   0D             6653            DB      CR
     7114   5A1B           6654    ADRES1: DW      INDRCT                  ;Indirect Command File command
     7116   576D           6655            DW      BOOT
     7118   5840           6656            DW      CONT
     711A   4FDE           6657            DW      DDECOD
     711C   50F2           6658            DW      EXAMIN
     711E   58E8           6659            DW      HALT
     7120   56E6           6660            DW      INIT
     7122   58FC           6661            DW      LOAD
     7124   5976           6662            DW      MICSTP
     7126   59D6           6663            DW      STEP
     7128   4D0E           6664            DW      REPEAT
     712A   57F2           6665            DW      S_COMMAND       ;
     712C   5A3E           6666            DW      TEST
     712E   5AAA           6667            DW      WAICMD          ;
     7130   5AD8           6668            DW      XFER
     7132   5D03           6669            DW      CRCMD           ;
     7134   5D03           6670            DW      CRCMD
     7136   5D03           6671            DW      CRCMD           ;
                           6672
                           6673
```

```
Error Addr  Code           Seq   Source statement

                           6674
     7138   0C             6675  COUNT2: DB      12                ;
     7139   42 57 4C       6676  CMPAR2: DB      'BWLPVCMGIUSN'
     713C   50 56 43
     713F   4D 47 49
     7142   55 53 4E
     7145   4E92           6677  ADRES2: DW      BYTE
     7147   4E97           6678          DW      WORD
     7149   4E9C           6679          DW      LONG
     714B   4E6C           6680          DW      PHYS
     714D   4E71           6681          DW      VRTUAL
     714F   4E8A           6682          DW      WCS
     7151   4E7B           6683          DW      MREG
     7153   4E76           6684          DW      GPR
     7155   4E80           6685          DW      IREG
     7157   4E85           6686          DW      MICRO
     7159   4EF1           6687          DW      STRTAD
     715B   4EA4           6688          DW      NEXTAD
                           6689
                           6690
                           6691  ;Any changes to the next table must take into acount the way it is used
                           6692  ;by PARSE when the command is a Load command.  The count is altered by the
                           6693  ;PARSE code and only the first part of the table is used.  This means that any
                           6694  ;changes to this table must be done with this in mind.  For example, if
                           6695  ;something is to be added that must be recognized by all commands, it would have
                           6696  ;to go in the first part of the CMPAR3 and ADRES3 areas and the count in PARSE
                           6697  ;for Load commands would have to be changed from 5 to 6
                           6698
                           6699
     715D   0C             6700  COUNT3: DB      12                ;
     715E   0D             6701  CMPAR3: DB      CR
     715F   20             6702          DB      SPACE
     7160   2F 3B 21       6703          DB      '/;!+- *SPR'
     7163   2B 2D 40
     7166   2A 53 50
     7169   52
     716A   4FD6           6704  ADRES3: DW      CRFLOW
     716C   4E4C           6705          DW      SPCFLW
     716E   4E56           6706          DW      SLASH
     7170   4FCE           6707          DW      SEMI              ;
     7172   4FCE           6708          DW      SEMI              ;
     7174   4F91           6709          DW      PLUS
     7176   4F96           6710          DW      MINUS
     7178   4F9B           6711          DW      ATSIGN
     717A   4FA0           6712          DW      ASTRSK
     717C   4F7E           6713          DW      STKFLW
     717E   4F4B           6714          DW      PXXX
     7180   4F6D           6715          DW      RN
                           6716
     7182   0000 0000      6717  ZERO:   DW      0,0               ;4 bytes of 0
```

```
Error Addr  Code          Seq   Source statement

                          6718
     7186   0001 0000     6719  POS1:   DW      01H,0           ;
                          6720
     718A   0002 0000     6721  POS2:   DW      02H,0           ;
                          6722
     718E   0004 0000     6723  POS4:   DW      04H,0           ;
                          6724
     7192   0200 0000     6725  POS200: DW      200H,0          ;
                          6726
     7196   FFFF FFFF     6727  NEG1:   DW      0FFFFH,0FFFFH   ;
                          6728
     719A   FFFE FFFF     6729  NEG2:   DW      0FFFEH,0FFFFH   ;
                          6730
     719E   FFFD FFFF     6731  NEG3:   DW      0FFFDH,0FFFFH   ;
                          6732
     71A2   FFFC FFFF     6733  NEG4:   DW      0FFFCH,0FFFFH   ;
                          6734
     71A6   FE00 FFFF     6735  NEG200: DW      0FE00H,0FFFFH   ;
                          6736
     71AA   4100 0000     6737  RAMADR: DW      4100H,0         ;
     71AE   3F00 0000     6738  RAMCNT: DW      3F00H,0         ;
                          6739
     71B2   00            6740  NEWDL:  DB      0               ;
     71B3   00            6741  NEWAS:  DB      0               ;
                          6742
     71B4   00            6743  DATLEN: DB      0               ;
     71B5   00            6744  ADRSPC: DB      0               ;
                          6745
     71B6   00            6746  EDPACK: DB      0
     71B7   00            6747  EDMOD:  DB      0
     71B8   =0004         6748  EDADDR: DS      4
     71BC   =0004         6749  EDDATA: DS      4
                          6750
     71C0   00            6751  RCVBUF: DB      0
     71C1   00            6752  RCVMOD: DB      0
     71C2   0000 0000     6753  RCVADR: DW      0,0
     71C6   0000 0000     6754  RCVDAT: DW      0,0
                          6755
                          6756
     71CA   00 00         6757  SCNPAK: DB      0,0             ;
     71CC   0000 0000     6758  SCNADR: DW      0,0             ;
                          6759
     71D0   01 03         6760  DEPPAK: DB      1,3             ;Deposit code and GPR space qualifier
     71D2   000A 0000     6761  DEPADR: DW      0AH,0           ;R11 address
     71D6   0000 0000     6762  DEPDAT: DW      0,0             ;
                          6763
     71DA   00            6764  HLTBUF: DB      0               ;
     71DB   00            6765  HLTCOD: DB      0
     71DC   0000 0000     6766  HALTPC: DW      0,0             ;
     71E0   0000 0000     6767  HLTPSL: DW      0,0             ;
```

```
Error Addr  Code          Seq   Source statement

                          6768
     71E4   0000 0000     6769   RESADR: DW      0,0             ;
                          6770
     71E8   0000 0000     6771   LNGSAV: DW      0,0             ;
                          6772
     71EC   0000 0000     6773   LNGSUM: DW      0,0             ;
                          6774
     71F0   01 00         6775   WFPACK: DB      1,0             ;
     71F2   0000 0000     6776   WFADR:  DW      0,0             ;
     71F6   0000 0000     6777   WFDATA: DW      0,0             ;
                          6778
     71FA   00            6779   WRMCNT: DB      0               ;
                          6780
     71FB   02            6781   INITPK: DB      02
                          6782
     71FC   03            6783   CONPAK: DB      03
     71FD   00            6784   CONMOD: DB      0
                          6785
     71FE   =0004         6786   ABUFFR: DS      4
     7202   =0004         6787   DBUFFR: DS      4
                          6788
                          6789
                          6790
     7206   0000          6791   NSADBF: DW      0
                          6792
     7208   =0004         6793   NBUFFR: DS      4
                          6794
     720C   0000          6795   FNPTR:  DW      0               ;Storage for Address of File Name Buffer
     720E   0000          6796   EXTPTR: DW      0               ;Storage for Address of Extension Buffer
     7210   00            6797   FNCNT:  DB      0
     7211   00            6798   EXTCNT: DB      0
     7212   00            6799   DEVFLG: DB      0
                          6800
                          6801
     7213   00            6802   FLAGS:  DB      0
     7214   00            6803   FLAGS1: DB      0
     7215   00            6804   FLAGS2: DB      0
     7216   00            6805   FLAGS3: DB      0
     7217   00            6806   RFLAG:  DB      0
                          6807
     7218   00            6808   QUAL1:  DB      0
                          6809
     7219   0000          6810   MRKBUF: DW      0               ;
                          6811
     721B   00            6812   INDCNT: DB      0               ;Storage for count
     721C   7600          6813   INDADR: DW      INDBUF          ;Storage for address into Indirect command file
                          6814
     721E   00            6815   STPFLG: DB      0               ;
                          6816
     721F   00            6817   MICFLG: DB      0               ;
```

```
Error Addr  Code           Seq   Source statement

                           6818
     7220   00             6819  BRKFLG: DB      0               ;Break in Progress Flag byte
     7221   00             6820  BRKCNT: DB      0               ;
                           6821
     7222   00             6822  BPHALT: DB      0               ;Break Point Halt Flag
                           6823
     7223   00             6824  IFLAG:  DB      0               ;
                           6825
     7224   14             6826  OUTBUF: DB      20
     7225   00             6827  OUTLET: DB      0
     7226   20             6828          DB      SPACE
     7227   =0008          6829  OUTADR: DS      8
     722F   20             6830          DB      SPACE
     7230   =0008          6831  OUTDAT: DS      8
     7238   0D             6832          DB      CR              ;
                           6833
                           6834
     7239   40 50 4F       6835  PWRFIL: DB      ' POWER',0,'.CMD'               ;
     723C   57 45 52
     723F   00 2E 43
     7242   4D 44
     7244   0D 0A 00       6836          DB      CR,LF,0                         ;
                           6837
     7247   40 43 4F       6838  CODFIL: DB      ' CODE00.CMD'                   ;
     724A   44 45 30
     724D   30 2E 43
     7250   4D 44
     7252   0D 0A 00       6839          DB      CR,LF,0                         ;
                           6840
     7255   40 44 44       6841  DEFFIL: DB      ' DD0:DEFBOO.CMD'               ;
     7258   30 3A 44
     725B   45 46 42
     725E   4F 4F 2E
     7261   43 4D 44
     7264   0D 0A 00       6842          DB      CR,LF,0                         ;
                           6843
     7267   40 44 44       6844  FOOFIL: DB      ' DD0:FOOBOO.CMD'               ;
     726A   30 3A 46
     726D   4F 4F 42
     7270   4F 4F 2E
     7273   43 4D 44
     7276   0D 0A 00       6845          DB      CR,LF,0                         ;
                           6846
     7279   40 44 44       6847  CRAFIL: DB      ' DD1:CRABOO.CMD'               ;
     727C   31 3A 43
     727F   52 41 42
     7282   4F 4F 2E
     7285   43 4D 44
     7288   0D 0A 00       6848          DB      CR,LF,0                         ;
                           6849
```

```
Error Addr  Code          Seq   Source statement

     728B   40 44 44     6850  CRMFIL: DB      ' DD1:CRMBOO.CMD'              ;
     728E   31 3A 43
     7291   52 4D 42
     7294   4F 4F 2E
     7297   43 4D 44
     729A   0D 0A 00     6851          DB      CR,LF,0                        ;
                         6852
     729D   0F 0D        6853  VERMSG: DB      15,CR                          ;
     729F   56 45 52     6854          DB      'VERSION 03.00'                ;
     72A2   53 49 4F
     72A5   4E 20 30
     72A8   33 2E 30
     72AB   30
     72AC   0D           6855          DB      CR                             ;
                         6856
     72AD   21 0D        6857  WRMMSG: DB      33,CR                          ;
     72AF   3F 33 33     6858          DB      '?33  ATTEMPTING SYSTEM RESTART'       ;
     72B2   20 20 41
     72B5   54 54 45
     72B8   4D 50 54
     72BB   49 4E 47
     72BE   20 53 59
     72C1   53 54 45
     72C4   4D 20 52
     72C7   45 53 54
     72CA   41 52 54
     72CD   0D 0A        6859          DB      CR,LF                          ;
                         6860
     72CF   1B           6861  WFMSG:  DB      27                             ;
     72D0   3F 34 30     6862          DB      '?40  SYSTEM RESTART FAILED'   ;
     72D3   20 20 53
     72D6   59 53 54
     72D9   45 4D 20
     72DC   52 45 53
     72DF   54 41 52
     72E2   54 20 46
     72E5   41 49 4C
     72E8   45 44
     72EA   0D           6863          DB      CR                             ;
                         6864
     72EB   1E 0D        6865  CLDMSG: DB      30,CR                          ;
     72ED   3F 33 34     6866          DB      '?34  ATTEMPTING SYSTEM BOOT'  ;
     72F0   20 20 41
     72F3   54 54 45
     72F6   4D 50 54
     72F9   49 4E 47
     72FC   20 53 59
     72FF   53 54 45
     7302   4D 20 42
     7305   4F 4F 54
```

```
Error Addr  Code          Seq   Source statement

     7308   0D 0A         6867            DB      CR,LF                           ;
                          6868
     730A   18            6869  CFMSG:    DB      24                              ;
     730B   3F 34 30       6870            DB      '?40  SYSTEM BOOT FAILED'       ;
     730E   20 20 53
     7311   59 53 54
     7314   45 4D 20
     7317   42 4F 4F
     731A   54 20 46
     731D   41 49 4C
     7320   45 44
     7322   0D            6871            DB      CR                              ;
                          6872
     7323   1D 0D 0A      6873  PUBMSG:   DB      29,CR,LF                        ;
     7326   50 4F 57      6874            DB      'POWER UP BOOT IN PROGRESS'     ;
     7329   45 52 20
     732C   55 50 20
     732F   42 4F 4F
     7332   54 20 49
     7335   4E 20 50
     7338   52 4F 47
     733B   52 45 53
     733E   53
     733F   0D 0A         6875            DB      CR,LF                           ;
                          6876
     7341   10 0D 0A      6877  PWRMSG:   DB      16,CR,LF                        ;
     7344   50 4F 57      6878            DB      'POWER RESTORED'                ;
     7347   45 52 20
     734A   52 45 53
     734D   54 4F 52
     7350   45 44
                          6879
     7352   12            6880  SYNMSG:   DB      18                              ;
     7353   3F 32 30      6881            DB      '?20  SYNTAX ERROR'             ;
     7356   20 20 53
     7359   59 4E 54
     735C   41 58 20
     735F   45 52 52
     7362   4F 52
     7364   0D            6882            DB      CR                              ;
                          6883
     7365   12            6884  MEMMSG:   DB      18                              ;
     7366   3F 34 30      6885            DB      '?40  MEMORY ERROR'             ;
     7369   20 20 4D
     736C   45 4D 4F
     736F   52 59 20
     7372   45 52 52
     7375   4F 52
     7377   0D            6886            DB      CR                              ;
                          6887
```

```
Error Addr  Code          Seq   Source statement

     7378   12          6888   COMMSG: DB      18                              ;
     7379   3F 32 39    6889           DB      '?29  CPU TIME-OUT'             ;
     737C   20 20 43
     737F   50 55 20
     7382   54 49 4D
     7385   45 2D 4F
     7388   55 54
     738A   0D          6890           DB      CR                              ;
                        6891
     738B               6892   CF_TL_MSG:
     738B   1B 3F 34    6893           DB      27,'?40  COMMAND FILE TOO LONG' ;
     738E   30 20 20
     7391   43 4F 4D
     7394   4D 41 4E
     7397   44 20 46
     739A   49 4C 45
     739D   20 54 4F
     73A0   4F 20 4C
     73A3   4F 4E 47
     73A6   0D          6894           DB      CR                              ;
                        6895
     73A7               6896   X_CMND_MSG:
     73A7   1E 3F 32    6897           DB      30,'?20  X COMMAND CHECKSUM ERROR'      ;
     73AA   30 20 20
     73AD   58 20 43
     73B0   4F 4D 4D
     73B3   41 4E 44
     73B6   20 43 48
     73B9   45 43 4B
     73BC   53 55 4D
     73BF   20 45 52
     73C2   52 4F 52
     73C5   0D          6898           DB      CR                              ;
                        6899
     73C6               6900   X_DATA_MSG:
     73C6   1B 3F 33    6901           DB      27,'?30  X DATA CHECKSUM ERROR' ;
     73C9   30 20 20
     73CC   58 20 44
     73CF   41 54 41
     73D2   20 43 48
     73D5   45 43 4B
     73D8   53 55 4D
     73DB   20 45 52
     73DE   52 4F 52
     73E1   0D          6902           DB      CR                              ;
                        6903
     73E2   17          6904   CLKMSG: DB      23
     73E3   3F 32 36    6905           DB      '?26  CPU CLOCK STOPPED'        ;
     73E6   20 20 43
     73E9   50 55 20
```

```
Error Addr  Code          Seq   Source statement

     73EC   43 4C 4F
     73EF   43 4B 20
     73F2   53 54 4F
     73F5   50 50 45
     73F8   44
     73F9   0D           6906          DB      CR                              ;
                         6907
     73FA               6908   CRD_ERR_MSG:
     73FA   19          6909          DB      25                              ;
     73FB   3F 34 30    6910          DB      '?40  CRD TU-58 NOT FOUND'      ;
     73FE   20 20 43
     7401   52 44 20
     7404   54 55 2D
     7407   35 38 20
     740A   4E 4F 54
     740D   20 46 4F
     7410   55 4E 44
     7413   0D          6911          DB      CR                              ;
                         6912
     7414   03          6913   HLTMSG: DB      3                               ;
     7415   3F 30 30    6914          DB      '?00'                           ;
                         6915
     7418   0E 20 20    6916   PCMSG:  DB      14,'  PC='
     741B   50 43 3D
     741E   30 30 30    6917   PCADR:  DB      '00000000'
     7421   30 30 30
     7424   30 30
     7426   0D          6918          DB      CR                              ;
                         6919
     7427   50 57 52    6920   PUPFIL: DB      'PWRUP',0,'.CPU'                ;
     742A   55 50 00
     742D   2E 43 50
     7430   55
     7431   00 00 00    6921          DB      0,0,0,0,7                       ;
     7434   00 07
                         6922
     7436   01          6923   STRPAK: DB      DEPCOD
     7437   03          6924          DB      03              ;GPR Space code
     7438   000F        6925          DW      000FH           ;Address of PC
     743A   0000        6926          DW      0000            ;
     743C   =0004       6927   SADRS:  DS      4               ;
                         6928
                         6929
     7440   0F 20 20    6930   UPCOUT: DB      15,'      UPC='
     7443   20 20 20
     7446   20 55 50
     7449   43 3D
     744B   0000 0000    6931   UPCBUF: DW      0,0
     744F   0D          6932          DB      CR
                         6933
```

```
Error Addr  Code          Seq   Source statement

                          6934
                          6935
     7450   50 50 50      6936   CODTAB: DB      'PPPGMIUC'
     7453   47 4D 49
     7456   55 43
                          6937
     7458   000F          6938   GPRCON: DW      000FH
     745A   0000          6939           DW      0000H
     745C   003F          6940   ICON:   DW      003FH
     745E   0000          6941           DW      0000H
     7460   01FF          6942   MCON:   DW      01FFH          ;
     7462   0000          6943           DW      0000H          ;
     7464   7FFF          6944   WCSCON: DW      07FFFH
     7466   0000          6945           DW      0000H
     7468   FFFF          6946   UCON:   DW      0FFFFH
     746A   0000          6947           DW      00000H
                          6948
     746C   0000          6949   PNTR2:  DW      0              ;
     746E   =0004          6950   WRZBUF: DS      4              ;
                          6951
     7472   =0004          6952   SHFBUF: DS      4              ;
                          6953
     7476   00            6954   LPCNT1: DB      0
     7477   00            6955   LPCNT2: DB      0
                          6956
     7478   00            6957   SOURCE: DB      0              ;
     7479   00            6958   DEST:   DB      0              ;
                          6959
                          6960
     747A   0A            6961   LSNWRN: DB      0AH
     747B   00            6962           DB      0
     747C   1B            6963           DB      01BH
                          6964
     747D   0A            6965   WRNLSN: DB      0AH
     747E   00            6966           DB      0
     747F   1F            6967           DB      01FH
                          6968
     7480   2A            6969   WRNWRN: DB      02AH
     7481   00            6970           DB      0
     7482   40            6971           DB      040H
                          6972
     7483   15            6973   WRCRR:  DB      015H           ;
     7484   FE            6974           DB      0FEH           ;
     7485   10            6975           DB      010H           ;
                          6976
     7486   15            6977   QTOWR:  DB      015H           ;
     7487   80            6978           DB      080H           ;
     7488   A1            6979           DB      0A1H           ;
                          6980
     7489   15            6981   WRTOQ:  DB      015H           ;
```

```
Error Addr  Code          Seq   Source statement

     748A   C0            6982            DB      0C0H            ;
     748B   AA            6983            DB      0AAH            ;
                          6984
     748C   15            6985   CLRWR0:  DB      015H            ;
     748D   80            6986            DB      080H            ;
     748E   2F            6987            DB      02FH            ;
                          6988
     748F   15            6989   COMWR0:  DB      015H            ;
     7490   C0            6990            DB      0C0H            ;
     7491   A0            6991            DB      0A0H            ;
                          6992
     7492   15            6993   ASLWR0:  DB      015H            ;
     7493   D0            6994            DB      0D0H            ;
     7494   23            6995            DB      023H            ;
                          6996
     7495   15            6997   RTLWR0:  DB      015H
     7496   C0            6998            DB      0C0H            ;
     7497   A3            6999            DB      0A3H            ;
                          7000
     7498   01 03         7001   SPPACK:  DB      DEPCOD,3        ;
     749A   000E 0000      7002   SPADRS:  DW      0EH,0           ;
     749E   =0004          7003   MEMADR:  DS      4               ;
     74A2   =0004          7004   MEMSIZ:  DS      4               ;
                          7005
                          7006
     74A6   00            7007   GRPCNT:  DB      0               ;Storage for Number of bytes per group
     74A7   00            7008   BASADR:  DB      0               ;Storage for the base address
     74A8   00            7009   CONSIZ:  DB      0               ;Storage for number of bytes per entry
                          7010
     74A9   0001 0000     7011   BASCON:  DW      1,0             ;Base constant of 00000001
                          7012
                          7013
     74AD   01            7014   CONBUF:  DB      1               ;Number of entries in group
     74AE   FF            7015            DB      0FFH            ;Address
     74AF   01            7016            DB      1               ;Bytes per entry
     74B0   00            7017            DB      0               ;Data
                          7018
     74B1   01            7019            DB      1               ;Number of entries in group
     74B2   93            7020            DB      93H             ;Base address
     74B3   04            7021            DB      4               ;Bytes per entry
     74B4   0000 0000     7022   MEMCOD:  DW      0,0             ;Four bytes for the code
                          7023
     74B8   15            7024            DB      21              ;Number of entries in group
     74B9   50            7025            DB      050H            ;Base address for this group
     74BA   01            7026            DB      1               ;Bytes to be used per entry
     74BB   00 03 05      7027            DB      0,3H,05H,06H,07H                ;Data
     74BE   06 07
     74C0   09 0B 0C      7028            DB      09H,0BH,0CH,0DH         ;Data
     74C3   0D
     74C4   0E 0F 13      7029            DB      0EH,0FH,013H,01FH       ;Data
```

```
Error Addr  Code          Seq   Source statement

      74C7  1F
      74C8  34 3B 3F      7030          DB      034H,03BH,03FH,04BH     ;Data
      74CB  4B
      74CC  66 A0 F0      7031          DB      066H,0A0H,0F0H,0FFH     ;Data
      74CF  FF
                          7032
      74D0  08            7033          DB      8               ;Number of entries in second group
      74D1  65            7034          DB      065H            ;Base address for second group
      74D2  02            7035          DB      2               ;Bytes per entry
      74D3  01FF          7036          DW      01FFH           ;Data
      74D5  0FFF          7037          DW      0FFFH           ;Data
      74D7  2001          7038          DW      02001H          ;Data
      74D9  3000          7039          DW      03000H          ;Data
      74DB  7F80          7040          DW      07F80H          ;Data
      74DD  C000          7041          DW      0C000H          ;Data
      74DF  FFE0          7042          DW      0FFE0H          ;Data
      74E1  FFFF          7043          DW      0FFFFH          ;Data
                          7044
                          7045
      74E3  0B            7046          DB      11              ;Entries in next group
      74E4  6D            7047          DB      06DH            ;Base address for this group
      74E5  04            7048          DB      4               ;Bytes per entry
      74E6  0000 001F     7049          DW      0,01FH          ;Data
      74EA  0001 0020     7050          DW      1,020H          ;Data
      74EE  7000 00F2     7051          DW      07000H,0F2H     ;Data
      74F2  0000 0300     7052          DW      0,0300H         ;Data
      74F6  0000 041F     7053          DW      0,041FH         ;Data
      74FA  0000 0700     7054          DW      0,0700H         ;Data
      74FE  FE00 3FFF     7055          DW      0FE00H,03FFFH   ;Data
      7502  0000 7F80     7056          DW      0,07F80H        ;Data
      7506  FE00 7FFF     7057          DW      0FE00H,07FFFH   ;Data
      750A  FF0E 7FFF     7058          DW      0FF0EH,07FFFH   ;Data
      750E  0001 BF80     7059          DW      1,0BF80H        ;Data
                          7060
      7512  04            7061          DB      4               ;Entries in next group
      7513  19            7062          DB      019H            ;Base address for this group
      7514  04            7063          DB      04              ;Bytes per entry
      7515  F000 FFFF     7064          DW      0F000H,0FFFFH   ;Data
      7519  FF00 FFFF     7065          DW      0FF00H,0FFFFH   ;Data
      751D  FFFC FFFF     7066          DW      0FFFCH,0FFFFH   ;Data
      7521  FFFF FFFF     7067          DW      0FFFFH,0FFFFH   ;Data
                          7068
      7525  0A            7069          DB      10              ;Entries in group
      7526  D0            7070          DB      0D0H            ;Base address
      7527  01            7071          DB      1               ;Bytes per entry
      7528  14            7072          DB      014H            ;Data
      7529  18            7073          DB      018H            ;Data
      752A  1C            7074          DB      01CH            ;Data
      752B  24            7075          DB      024H            ;Data
      752C  28            7076          DB      028H            ;Data
```

```
Error Addr  Code           Seq   Source statement

     752D   2C             7077          DB      02CH            ;Data
     752E   2D             7078          DB      02DH            ;Data
     752F   30             7079          DB      030H            ;Data
     7530   F8             7080          DB      0F8H            ;Data
     7531   FC             7081          DB      0FCH            ;Data
                           7082
     7532   08             7083          DB      8               ;Entries in group
     7533   DA             7084          DB      0DAH            ;Base address
     7534   03             7085          DB      3               ;Bytes per entry
     7535   2D20           7086          DW      02D20H          ;Data
     7537   00             7087          DB      0               ;Data
     7538   0000           7088          DW      0               ;Data
     753A   14             7089          DB      014H            ;Data
     753B   0000           7090          DW      0               ;Data
     753D   15             7091          DB      015H            ;Data
     753E   0000           7092          DW      0               ;DAta
     7540   16             7093          DB      016H            ;Data
     7541   0000           7094          DW      0               ;Data
     7543   17             7095          DB      017H            ;Data
     7544   0000           7096          DW      0               ;Data
     7546   18             7097          DB      018H            ;Data
     7547   0000           7098          DW      0               ;Data
     7549   1E             7099          DB      01EH            ;Data
     754A   0A10           7100          DW      0A10H           ;Data
     754C   04             7101          DB      4               ;Data
                           7102
     754D   04             7103          DB      4               ;Entries in group
     754E   E2             7104          DB      0E2H            ;Base address
     754F   04             7105          DB      4               ;Bytes per entry
     7550   00E0 0C00      7106          DW      0E0H,0C00H      ;Data
     7554   0000 0FFF      7107          DW      0,0FFFH         ;Data
     7558   FF00 B020      7108          DW      0FF00H,0B020H   ;Data
     755C   FF10 FFFF      7109          DW      0FF10H,0FFFFH   ;Data
                           7110
     7560   20             7111          DB      32              ;Entries in group
     7561   20             7112          DB      020H            ;Base address
     7562   05             7113          DB      05              ;Special code
                           7114
     7563   00             7115          DB      0               ;Terminating 0
                           7116
                           7117
     7564   00             7118  WEFLAG: DB      0               ;
     7565   0000           7119  CFATAL: DW      0               ;
     7567   0000           7120  WFATAL: DW      0               ;
     7569   0000           7121  WERROR: DW      0               ;
                           7122  ;
                           7123  ;*****************************************************************************
                           7124
                           7125
                           7126  ;*****************************************************************************
```

```
Error Addr  Code          Seq   Source statement

                          7127  ;
                          7128  ;The Indirect Command File buffer starts here and is 2K (2048) bytes
                          7129  ;long.  Do not use this area for anything else.
                          7130  ;
            =7600         7131          ORG     07600H          ;
                          7132
     7600   =0800         7133  INDBUF: DS      2048            ;
                          7134
                          7135
            =7E00         7136          ORG     7E00H           ;
                          7137
     7E00   00            7138  REMRSR: DB      0               ;
     7E01   00            7139  REMRDB: DB      0               ;
                          7140
     7E02   01            7141  REMXSR: DB      1               ;
     7E03   00            7142  REMXDB: DB      0               ;
                          7143
     7E04   00            7144  TLKFLG: DB      0               ;
                          7145
     7E05   00            7146  DISCRD: DB      0               ;
                          7147
     7E06   00            7148  TRNFLG: DB      0               ;
                          7149
     7E07   00            7150  MSGTBS: DB      0               ;
                          7151
     7E08   0000          7152  TIMSAV: DW      0               ;
     7E0A   0000          7153  TIMER1: DW      0               ;
     7E0C   00            7154  TIMER2: DB      0               ;
     7E0D   00            7155  TIKTOK: DB      0               ;
                          7156
     7E0E   00            7157  LOGCON: DB      0               ;
     7E0F   00            7158  LOGCNT: DB      0               ;
                          7159
     7E10   00            7160  RDCON:  DB      0               ;
     7E11   00            7161  RDCON1: DB      0               ;
                          7162
     7E12   00            7163  RDTEMP: DB      0               ;
                          7164
     7E13   01            7165  TALKSR: DB      1               ;
     7E14   00            7166  TALKDB: DB      0               ;
                          7167
            =7E67         7168          ORG     7E67H           ;
                          7169
     7E67                 7170  OVERRIDE_LCS:
     7E67   00            7171          DB      0               ;
                          7172
                          7173
                          7174  ;*****************************************************************************
                          7175  ;
                          7176  ;       REVISION HISTORY
```

```
Error Addr  Code          Seq   Source statement

                          7177  ;
                          7178  ;       This is a Most Recent to Least Recent list of changes to the Console
                          7179  ;       Ram software.  The format is:
                          7180  ;
                          7181  ;               VERSION NUMBER where the change was first implemented
                          7182  ;               DATE OF CHANGE
                          7183  ;               AUTHOR OF CHANGE
                          7184  ;               NUMBER OF CHANGE
                          7185  ;               LOCATION OF CHANGE given as a label +/- a number of lines.
                          7186  ;               DESCRIPTION OF CHANGE
                          7187
                          7188
                          7189  ;
                          7190  ;
                          7191  ;               01-JAN-1984     Vijay Lathia
                          7192  ;
                          7193  ;               #1
                          7194  ;
                          7195  ;               TMRPR0:(+1) and TMRPR0:(+8)
                          7196  ;
                          7197  ;               Code added to block and unblock 9513 before accessing it
                          7198  ;
                          7199  ;               #2
                          7200  ;
                          7201  ;               TPSUB:(+3)
                          7202  ;
                          7203  ;               Code added to deposit 05F to ITCSR to init 9513 correctly
                          7204
                          7205
                          7206  ;
                          7207  ;       91.00   15-MAR-1982     John Middleton
                          7208  ;
                          7209  ;               #1
                          7210  ;
                          7211  ;               ITWCS2:(-8) and ITRUN1:(+4)
                          7212  ;
                          7213  ;               INR M changed to INR A.
                          7214  ;
                          7215  ;               #2
                          7216  ;
                          7217  ;               TMRSR4:(+1)
                          7218  ;
                          7219  ;               Put the LARM12 value in A and then do an OUT to the ITCSR.
                          7220
                          7221
                          7222  ;       90.00   03-MAR-1982     John Middleton
                          7223  ;
                          7224  ;               #1
                          7225  ;
                          7226  ;               TTRTSA:(-1) to TTRTSA:
```

```
Error Addr  Code          Seq   Source statement

                          7227   ;
                          7228   ;               Must keep calling Get Silo until the LRMASK gets altered.
                          7229
                          7230
                          7231   ;       89.01   02-MAR-1982     John Middleton
                          7232   ;
                          7233   ;               #1
                          7234   ;
                          7235   ;               TURDB:(+7) to TURDB0:
                          7236   ;
                          7237   ;               Only clear the errors by sending a 15H to the TUCR if error
                          7238   ;               flags are actually on.
                          7239   ;
                          7240
                          7241
                          7242   ;       89.00   27-OCT-1981     John Middleton
                          7243   ;
                          7244   ;               #1
                          7245   ;
                          7246   ;               HALT:(+6) to HALT:(+7)
                          7247   ;
                          7248   ;               Print Halt PC for H(alt) command.
                          7249
                          7250
                          7251   ;       88.04   9-NOV-1981      John Middleton
                          7252   ;
                          7253   ;               #1
                          7254   ;
                          7255   ;               PMHALT:(+7)
                          7256   ;
                          7257   ;               Check for characters in XMTDB and INTDB and, if there are any,
                          7258   ;               print them before returning to Console Mode.
                          7259
                          7260
                          7261   ;       88.03   28-OCT-1981     John Middleton
                          7262   ;
                          7263   ;               #1
                          7264   ;
                          7265   ;               PARIT1:(+3)
                          7266   ;
                          7267   ;               Must restore PSW before leaving
                          7268
                          7269
                          7270   ;       88.02   26-OCT-1981     John Middleton
                          7271   ;
                          7272   ;               #1
                          7273   ;
                          7274   ;               TMRSR1:(-3)
                          7275   ;
                          7276   ;               Call XFRSE0 instead of XFRSET.  The decision made at XFRSET has
```

```
Error Addr  Code          Seq   Source statement

                          7277  ;               already been made by the TMRSRV code.  Changing the entry point
                          7278  ;               saves 10us on the worst case TMRSRV time.
                          7279
                          7280
                          7281  ;       88.01   26-OCT-1981     John Middleton
                          7282  ;
                          7283  ;               #1
                          7284  ;
                          7285  ;               TMRSR2:(+4)
                          7286  ;               TMRSR4:(+0) to TMRSR4:(+6)
                          7287  ;
                          7288  ;               Mask RST 5.5 if the check of the Timer RUN bit while in TMRSRV
                          7289  ;               reveals that the timer has been turned off.
                          7290
                          7291
                          7292  ;       88.00   25-OCT-1981     John Middleton
                          7293  ;
                          7294  ;               #1
                          7295  ;
                          7296  ;               TMRSR2:(+4)
                          7297  ;
                          7298  ;               If the check of the Timer RUN bit while in TMRSRV finds that
                          7299  ;               the timer has been turned off:
                          7300  ;
                          7301  ;               1.  Load and arm counters 1 and 2.  This should make the
                          7302  ;                   counter and alarm values unequal.
                          7303  ;               2.  Drive SOD low, then high.  This should drive the 9513
                          7304  ;                   interrupt to the 8085 low.
                          7305
                          7306
                          7307  ;       87.02     -OCT-1981     John Middleton
                          7308  ;
                          7309  ;               #1
                          7310  ;
                          7311  ;               ENTER:(+6) to ENTER:(+15)
                          7312  ;
                          7313  ;               When entering Program Mode, make sure the 2ms timer (counter #3
                          7314  ;               of the 9513) is off and the overflow has been cleared.  This
                          7315  ;               fixes the error where the "Power Restored" message was being
                          7316  ;               printed as the result of executing a Start command.
                          7317
                          7318
                          7319  ;       87.01     -OCT-1981     John Middleton
                          7320  ;
                          7321  ;               #1
                          7322  ;
                          7323  ;               ACFAI1:(+2)
                          7324  ;
                          7325  ;               Conditional Jump was wrong polarity.  Console would hang if
                          7326  ;               Standby was entered while in Console Mode.
```

```
Error Addr  Code          Seq   Source statement

                          7327  ;
                          7328  ;*****************************************************************************
                          7329
                          7330
                          7331  ;*****************************************************************************
                          7332  ;
                          7333  ;       WORK PENDING
                          7334  ;
                          7335  ;       This is stuff that has to be done at some time or another.  An *
                          7336  ;       indicates a bug.
                          7337  ;
                          7338  ;       1.  Error codes must be updated.
                          7339  ;
                          7340  ;       2.  Parity Error handler must be modified to work like the 780 and 750.
                          7341  ;
                          7342  ;       3.  Handler for [(NICR < (value in counter)) * SGL goes to RUN]
                          7343  ;           condition.
                          7344  ;
                          7345  ;*      4.  X Command bug when using Local Port.
                          7346  ;
                          7347  ;       5.  CRD implementation.  (In Version 01.02)
                          7348  ;
                          7349  ;       6.  CONSOL to MICMON to CONSOL mechanism for CRD and RD.  (In Version
                          7350  ;           01.02)
                          7351  ;
                          7352  ;       7.  Protocol Mode for RD
                          7353  ;
                          7354  ;*      8.  EVKAB/APT bug.  (Fixed in Version 90.00)
                          7355  ;
                          7356  ;       9.  Telenet implementation for RD.
                          7357  ;
                          7358  ;*****************************************************************************
                          7359
                          7360
                          7361          END

No errors detected
```

* * Symbol Table * *

A	Reserved	AACTIV	0040	AAFLAG	0042	ABUFFR	71FE	ACFAI0	5DFD
ACFAI1	5E05	ACFAI2	5E0C	ACFAI3	5E33	ACFAIL	5DE5	ACHECK	4E2D
ACHK1	4E36	ACLO	4120	ACVECT	4C25	ADDAD1	6251	ADDADR	624E
ADRES1	7114	ADRES2	7145	ADRES3	716A	ADRSPC	71B5	ADRTS1	4FBA
ADRTST	4FB2	AFLAG	0002	AFTER	557C	AFTER1	5597	ALARM	7090
ALARM1	0007	ALLOWP	0003	ALRMM3	7094	ALTCHK	4B2E	ALTFLG	4181
ALTMOD	001B	ANDAD1	56AA	ANDADR	56A5	APTFLG	0004	APTLOD	40D6
ARM12	0023	ARM45	0038	ASLWR0	7492	ASMASK	000F	ASTRSK	4FA0
ATFLAG	0080	ATFLOW	52DF	ATSIGN	4F9B	B	Reserved	BACKSL	005C
BASADR	74A7	BASCON	74A9	BASE	007B	BEFORE	555B	BEGIN	0000
BLKFLG	7098	BLKNUM	4174	BLOCK	4097	BMPPNT	471D	BOOT	576D
BOOTEN	0007	BOOTSW	0001	BPHALT	7222	BPSUB	57D5	BREAK	000D
BRKCNT	7221	BRKFLG	7220	BSPREP	57E4	BUFADR	40CA	BYTCNT	4095
BYTE	4E92	BYTE00	417A	BYTE01	417B	BYTES	416E	BYTSUM	4082
C	Reserved	CCFLAG	40CF	CFAIL	6062	CFATAL	7565	CFERR_*	0002
CFLOW	535B	CFMSG	730A	CF_ERR*	5D16	CF_TL_*	738B	CG1MOD	0001
CGFIVE	000D	CGFOUR	000C	CHANGE	5DD7	CHECK_*	652D	CHKSUM*	00DE
CHRBUF	7001	CHRCNT	7000	CHRSIL	4B80	CLDMSG	72EB	CLDST0	6027
CLDST1	602F	CLDSTR	6024	CLDSTX	6020	CLKERR	5D70	CLKFLG	4196
CLKMSG	73E2	CLLTLK	4A46	CLOCK_*	0006	CLRACK	00A9	CLRACL	0033
CLRATN	00AB	CLRBLK	003A	CLRBSY	002E	CLRCLD	6AE7	CLRCLK	0020
CLRCSK	0024	CLRCSR	0038	CLRDCL	0031	CLRHLT	00AF	CLRLIT	003C
CLRMCI	0029	CLRMCK	002B	CLRPAG	003F	CLRPAR	6994	CLRPFI	00AD
CLRPME	6AF8	CLRSS	0022	CLRTIM	00A5	CLRTMR	002C	CLRUPC	00A8
CLRUPK	0026	CLRWCK	0036	CLRWR0	748C	CLRWRM	6AF1	CMDVAL	4182
CMPADR	4162	CMPAR1	7102	CMPAR2	7139	CMPAR3	715E	CMPCH1	6244
CMPCHK	6242	CMPTB1	4183	CMPTB2	4185	CNSOLA	4C42	CNSOLB	4C5E
CNSOLX	4C7B	CNTADR	40C8	CNTIN0	58E2	CNTIN1	586B	CNTIN2	5877
CNTLR	42AC	CNTLR1	42BD	CNTLU	42CE	CNTRLC	0003	CNTRLO	000F
CNTRLP	0010	CNTRLQ	0011	CNTRLR	0012	CNTRLS	0013	CNTRLU	0015
CNTRLX	0018	CNVER1	4E0A	CNVERT	4DF4	CODFIL	7247	CODFL1	4C2E
CODFLG	408B	CODTAB	7450	COLD	408A	COLD_B*	5F99	COLD_B*	5FD2
COLD_B*	5FE8	COLD_H*	601A	COLON	003A	COMERR	5D5E	COMFIN	568A
COMMN1	4E9E	COMMON	4E8C	COMMSG	7378	COMM_C*	0005	COMWR0	748F
CONSMS	1000	CONBUF	74AD	CONHL1	58CA	CONHL2	58A3	CONHL3	58C1
CONHLT	587A	CONMOD	71FD	CONMSG	41DF	CONPAK	71FC	CONSIZ	74A8
CONSOL	41CE	CONT	5840	CONT0	584B	CONTLR	41BE	CONTLU	41BA
COPY	00F9	COPY1	00FB	COPYB0	419C	COPYB1	419D	COUNT	4187
COUNT1	7101	COUNT2	7138	COUNT3	715D	CPATTN	0083	CPCH0	62BD
CPCH1	62D0	CPCHK1	629D	CPCHK2	6375	CPCHK3	639A	CPCHK4	63BE
CPCHK5	64A9	CPCHK6	64CB	CPFLAG	40F3	CPSER1	6560	CPSER2	656D
CPSERV	6558	CPUACK	0082	CR	000D	CRAFIL	7279	CRCMD	5D03
CRD_CO*	0001	CRD_ER*	5D78	CRD_ER*	73FA	CRD_FL*	40FD	CRD_RD*	4B3C
CRD_VE*	0398	CRFLOW	4FD6	CRMFIL	728B	CSR07	0085	CSR15	0086
CSR23	0087	CSRBUF	41A4	CTLDIS	40FE	CVECTR	4C28	D	Reserved
DACTIV	0080	DARM12	0083	DATCHK	6233	DATLEN	71B4	DBUFFR	7202
DCHK1	4E28	DCLO	0002	DDECOD	4FDE	DECOD1	4CFB	DECODE	4CFA
DECODX	52AE	DEFDRV	4150	DEFFIL	7255	DELAY1	0457	DELETE	007F
DELFLG	40CE	DELMSK	00FE	DEPADR	71D2	DEPCOD	0001	DEPDAT	71D6
DEPIO	50B6	DEPLS1	54C9	DEPLS2	54CC	DEPPAK	71D0	DEPWR0	5543

* * Symbol Table * *

DEST	7479	DEVFLG	7212	DFAULT	52D5	DFLAG	0004	DIFUNI	4544
DIR1	5026	DIRADR	417C	DIRBUF	4300	DIRECT	4FEF	DIRFLG	409C
DIRSEG	42F6	DIRUNI	4195	DIRVAL	4194	DIRVEC	411A	DISCNT	40DB
DISCRD	7E05	DISMEM	00A7	DISPAR	00A1	DIV50	4857	DIVSR1	F9C0
DIVSR2	FFD8	DIVSR3	FFF0	DLMASK	00F0	DLMCHK	4E20	DNPRE1	5339
DNPREP	5329	DOT	4E3B	DOTBUF	410D	DPOS1	5065	DPOS2	5068
DPOSIT	5034	DRVFIL	41D8	DUMMY1	0052	E	Reserved	EDADDR	71B8
EDCSR	53E5	EDCSR1	53FD	EDDATA	71BC	EDLS	549E	EDMOD	71B7
EDPACK	71B6	EDPAR	540E	EDQ	54FA	EDWR	5517	ENBMEM	00A6
ENBPAR	00A0	ENDPAK	40AA	ENDSE1	4787	ENDSEG	476D	ENTER	625F
ENTYPE	4178	ERROR	5D80	ERROR1	5DA2	EXAMI1	511F	EXAMI2	5122
EXAMIN	50F2	EXAMQ	5511	EXE1	5663	EXECUT	5649	EXMCOD	0000
EXMIO	51F1	EXMLS	54D1	EXMLS1	54EC	EXMPAR	5435	EXMWR	554F
EXTBUF	410E	EXTCNT	7211	EXTFLW	4DDA	EXTPTR	720E	EXTRAS	42FC
EXTYPE	523A	FASTWR	5F4D	FASUPC	0016	FASWR1	5F65	FASWR2	5F78
FIXCP1	46B3	FIXCPU	46A6	FIXER1	466B	FIXER2	4685	FIXERR	4663
FIXUP	5A0D	FLAGS	7213	FLAGS1	7214	FLAGS2	7215	FLAGS3	7216
FLIP	543D	FLIP1	547F	FNBUF	4107	FNCNT	7210	FNDFLG	4164
FNFLOW	4D8D	FNFLW1	4DC0	FNFLW2	4DD3	FNFMSG	41EF	FNPTR	720C
FOOFIL	7267	FOUR	5CCA	FOURDN	5343	FOURUP	5317	FU_VEC*	004F
GCVECT	4129	GET512	47E0	GETCHK	4CC6	GETCS	5B67	GETDA1	5CCF
GETDAT	5CAC	GETEND	492F	GETLI0	4A58	GETLI1	4A7A	GETLI2	4AA0
GETLI3	4AAD	GETLI4	4A91	GETLI5	4ABC	GETLI6	4AD3	GETLI7	4AF5
GETLI8	4AF6	GETLIA	4A74	GETLIN	4A4D	GETNXT	4FC5	GETON1	47A8
GETON2	47AE	GETON3	47D4	GETON4	47D7	GETONE	478C	GETTWO	484A
GETUPC	59B6	GFLOW	5355	GLVECT	4123	GOSV	4103	GO_STA*	4C00
GPR	4E76	GPRCON	7458	GRPCNT	74A6	GSVECT	4145	GS_VEC*	0046
GT512A	47E5	H	Reserved	HALT	58E8	HALTPC	71DC	HEXASC	5DBD
HIGHST	42FA	HLBUFF	4088	HLTBUF	71DA	HLTCOD	71DB	HLTFLG	0002
HLTMSG	7414	HLTPSL	71E0	HMPEND	707F	HOLD1	0019	HOLD4	001C
ICCS	707C	ICHEC1	53AC	ICHECK	53A2	ICON	745C	IDLE	4C32
IFLAG	7223	IFLOW	5367	IMPXFR	7099	INCCNT	417F	INDADR	721C
INDBUF	7600	INDCNT	721B	INDFLG	409D	INDRC1	5A23	INDRCT	5A1B
INDTS1	4CA7	INDTS2	4CB6	INDTST	4C94	INISUB	56F8	INIT	56E6
INITH	0035	INITL	0034	INITPK	71FB	INIVEC	0040	INTACK	6575
INTCSR	7074	INTDB	7075	IOARG1	50BF	IOARG2	51F7	IPR	7071
IPRCHK	66B6	IREG	4E80	ISR	7070	ITCSR	001D	ITDB	001C
ITEST	537D	ITEST1	5388	ITEST2	539C	ITICR	68B2	ITICR0	68C1
ITICR1	68CE	ITICR2	68FD	ITICR3	68ED	ITNIC0	6947	ITNIC1	694D
ITNICR	691B	ITRCSR	689B	ITRUN	679E	ITRUN0	67F4	ITRUN1	67FF
ITRUN2	67F6	ITSGL	707E	ITTEMP	709E	ITWCS0	66E6	ITWCS1	66E8
ITWCS2	671F	ITWCS3	6747	ITWCS4	6752	ITWCS5	6768	ITWCS6	6789
ITWCS7	6793	ITWCSR	66C6	L	Reserved	LA1245	007B	LARM12	0063
LARM2	0062	LARM3	0064	LARM45	0078	LAST	6590	LCMASK	00DF
LDCSR	49A4	LDCSR1	49A7	LDUPC	49D1	LDUPC1	49D4	LDXPRP	4500
LENGTH	4166	LF	000A	LIMIT	41B4	LIMSP	41B5	LIST	46D9
LIST1	46DC	LIST2	4710	LIST3	4713	LIST4	472F	LIST5	4737
LIST6	4759	LIST7	46EC	LIST8	46E3	LNGSAV	71E8	LNGSUM	71EC
LOAD	58FC	LOAD1	45C3	LOAD12	0043	LOAD1X	45F9	LOAD2X	4625
LOAD3X	463A	LOAD45	0058	LOAD4X	4656	LOADA	45A1	LOADB	45B6

* * Symbol Table * *

LOADED	7082	LOADX3	454E	LOADZ	58FF	LODADR	40A3	LODCNT	40A7
LODDST	4165	LODFLG	409B	LODSU1	5925	LODSUB	590A	LODVEC	4117
LOGCNT	7E0F	LOGCON	7E0E	LONG	4E9C	LPCNT1	7476	LPCNT2	7477
LRMASK	40BE	LSHIFT	4A00	LSNWRN	747A	LSTBUF	41C2	LSTPRP	46CB
M	Reserved	MAKCN1	5EB8	MAKCN2	5ECC	MAKCN3	5EDC	MAKCN4	5F16
MAKCN5	5F31	MAKCN6	5F39	MAKCN8	5EE5	MAKCON	5E9E	MAKEWR	5604
MAKMOD	5373	MAKSPC	5293	MARKSP	5DB1	MASTER	0017	MATCH	4D07
MAXCNT	0050	MCHECK	53BA	MCON	7460	MEMADR	749E	MEMCOD	74B4
MEMDEP	508F	MEMERR	5D46	MEMEXM	51C1	MEMLD1	5971	MEMLOD	5957
MEMMSG	7365	MEMSIZ	74A2	MEM_CO*	0004	MERGE	52FB	MFLOW	536D
MFLOW1	542A	MICCON	580C	MICDEP	50A5	MICEXM	51E0	MICFLG	721F
MICMON	4154	MICPRO	4207	MICRO	4E85	MICST1	598F	MICST2	599C
MICST3	599F	MICST4	59A6	MICSTP	5976	MINCNT	708C	MINUS	4F96
MIPFLG	40D9	MISC2	0001	MKSPC1	5296	MMSTRT	4C00	MODADR	4099
MODIFR	4090	MODVEC	0013	MREG	4E7B	MRKBUF	7219	MSGADR	40B7
MSGBUF	40F0	MSGCNT	408E	MSGTBS	7E07	MSKCPY	40BF	MSTRCD	0A0C
MUL2	4823	MULSH1	46C0	MULSHF	46BE	MYCNT	4179	MYLDER	4266
MYLOAD	420C	MYPC	40B9	NACKCM*	0007	NACKDA*	0008	NACK_X*	5D4E
NACK_X*	5D56	NAMES	4302	NBUFFR	7208	NEG1	7196	NEG2	719A
NEG200	71A6	NEG3	719E	NEG4	71A2	NEWAS	71B3	NEWCN0	6874
NEWCN1	6878	NEWCN2	687A	NEWCNT	684C	NEWDL	71B2	NEXTA1	4EB9
NEXTA2	4EDC	NEXTA3	4EDF	NEXTAD	4EA4	NICFLG	7083	NICR	7084
NICRM3	7088	NICSUB	6953	NOCHK	40FF	NOCON	58DB	NOPBUF	41A7
NOTBYT	5281	NOTL	4F65	NOTPVG	5289	NOTYPE	40D4	NPREP	5089
NPREP1	5145	NSADBF	7206	NTEST	56BE	NTEST1	56D2	NXTSEG	42F8
OCOPY	40BC	OFLAG	40BB	OK5V	0005	OKV15	0007	OLDRUN	707D
ONE	5CBB	ONEDN	534F	ONEUP	5323	OPCODE	408F	OUTADR	7227
OUTBUF	7224	OUTDAT	7230	OUTLET	7225	OVERRI*	7E67	PACKS	4172
PAKCNT	40A8	PARERR	411D	PARFLG	4197	PARITY	5E56	PARMSK	007F
PARSE	4D2B	PARSE1	4D33	PARSE2	4D50	PARSE3	4D53	PARSE4	4D71
PARSE5	4D83	PARTMP	4198	PARVEC	4C22	PCADR	741E	PCMSG	7418
PCOUNT	70FC	PFFLAG	40B5	PHYS	4E6C	PHYVIR	52E8	PLUS	4F91
PMBOOT	6ADA	PMHAL0	6647	PMHALT	6625	PMTALK	6441	PMTLK0	6458
PNTR1	41A2	PNTR2	746C	POINTR	4176	POS1	7186	POS2	718A
POS200	7192	POS4	718E	PRGCNT	4F79	PRI1	66A5	PRI2	66AA
PRI3	66AF	PRI4	66B4	PRIADR	40C1	PRICNT	40C3	PROMPT	4203
PRPSUB	4CCF	PSLADR	0000	PSW	Reserved	PUBCHK	5F8B	PUBFLG	40B6
PUBMSG	7323	PUPFIL	7427	PUVEC	4151	PVECTR	4C2B	PWRFIL	7239
PWRMSG	7341	PWRVE1	004C	PWRVEC	001B	PXXX	4F4B	QPEND	40D8
QTOWR	7486	QUAL	4115	QUAL1	7218	QUO	4160	RAD50	482B
RAD50A	483A	RADCVT	4895	RAMADR	71AA	RAMCNT	71AE	RAMVAL	4080
RCVADR	71C2	RCVBUF	71C0	RCVCSR	7072	RCVDAT	71C6	RCVDB	7073
RCVDON	0002	RCVMOD	71C1	RCVMS1	518E	RCVMS2	519B	RCVMS3	51A3
RCVMS4	51B0	RCVMS5	518C	RCVMSG	5189	RCVMSX	5186	RCVTTR	637B
RDCON	7E10	RDCON1	7E11	RDTEMP	7E12	RDWRZ	55A4	RDWRZ1	55AC
READ	0080	READJ2	0004	REENTR	52BA	REMAIN	415E	REMOTE	0006
REMRDB	7E01	REMRSR	7E00	REMXDB	7E03	REMXSR	7E02	REPEAT	4D0E
RESADR	71E4	RETRY	408C	RETRYI	40CC	RET_VE*	414D	RFLAG	7217
RN	4F6D	RSHF	5627	RSHF1	562A	RSVEC	0049	RSVECT	413D
RTEST	56B4	RTEST1	56BC	RTLWR0	7495	RUBOU1	4B22	RUBOUT	4B0E

* * Symbol Table * *

RUNFLG	40D3	SADRS	743C	SAVADR	41B8	SAVCHR	40C0	SAVCNT	4199
SAVE	419E	SAVE12	00A3	SAVE45	00B8	SAVEB0	419A	SAVEB1	419B
SAVESP	0104	SAVMSK	40DA	SAVSP1	0108	SAVUPC	41AE	SBUFFR	4111
SCNADR	71CC	SCNPAK	71CA	SCVEC0	0043	SCVECT	4138	SECURE	0003
SEGNUM	417E	SEMI	4FCE	SENDQ	6549	SENDS	6531	SEQNUM	4093
SETACK	00A8	SETACL	0032	SETAPT	4288	SETATN	00AA	SETBLK	003B
SETBSY	002F	SETCLK	0021	SETCSK	0025	SETCSR	0039	SETDCL	0030
SETHLT	00AE	SETLIT	003D	SETMCI	0028	SETMCK	002A	SETPAG	003E
SETPAR	698F	SETPFI	00AC	SETPME	6AF9	SETSS	0023	SETTIM	00A4
SETTMR	002D	SETUPC	00A9	SETUPK	0027	SETVAL	4296	SETWCK	0037
SFLAG	40CD	SHARE	4F8B	SHAREX	4FA2	SHFBUF	7472	SHIFT	4E0D
SHIFT1	4E10	SIBIAS	40D1	SILFLG	40D0	SKIP40	5DE2	SKP11	5256
SKP319	48B5	SKP320	48AB	SKP321	48A6	SKP523	48B7	SLASH	4E56
SLOW_C*	40F4	SLVEC1	4133	SLVECT	412E	SLWCLK	0006	SMLALM	7081
SMLNIC	7080	SNDADR	40A0	SNDCNT	40A2	SNDCTL	653E	SNDDAT	5CD9
SNDDEL	4B04	SNDFLG	40F2	SNDMS0	5150	SNDMS1	5157	SNDMS2	515F
SNDMS3	516C	SNDMS4	5174	SNDMS5	5181	SNDMSG	514E	SNDMSX	514B
SNDPAK	40BD	SNDPR1	6214	SNDPRP	6204	SNDRCV	6222	SNDRCX	622B
SNDTA	6468	SNDTL	6494	SNDTL0	649C	SNDTL1	64A4	SNDTL2	64A6
SNDTL3	64A7	SNDTR	6475	SNDTR1	6483	SNDTRL	641E	SNDTT0	63E0
SNDTT1	63ED	SNDTT2	63FD	SNDTTX	63C4	SNTRL1	642C	SOBIAS	40D2
SOFDON	6AD7	SOURCE	7478	SP	Reserved	SPACE	0020	SPADRS	749A
SPBUFF	4086	SPCF1	4E4F	SPCFLG	0001	SPCFLW	4E4C	SPEND	40D7
SPPACK	7498	SPSTRP	4D23	SRCSIL	4BC0	STACK	4080	STAL10	5760
STALL5	5763	START	4100	START1	5815	START2	582D	STEP	59D6
STEP1	00F1	STEP2	00F2	STEPA	59EA	STEPB	59F8	STEPB1	59FD
STEPC	59F5	STKFLW	4F7E	STPFLG	721E	STRBLK	42FE	STRPAK	7436
STRTA1	4F06	STRTA2	4F2E	STRTA3	4F45	STRTAD	4EF1	SUBDIV	4875
SUBDV1	487B	SUBDV2	4888	SUCCES	4116	SUMREG	0020	SUPRES	526C
SUPRS4	5284	SUPRS6	527C	SWAP	41AA	SWITCH	4092	SWPOS	4081
SYNERR	5D1E	SYNMSG	7352	SYN_CO*	0003	S_COMM*	57F2	TAB	0009
TABLE	70A2	TALKDB	7E14	TALKSR	7E13	TALK_V*	080F	TAPERR	5D2D
TEMP	40B4	TEMP1	416A	TEST	5A3E	THREE	5CC5	TIKTOK	7E0D
TIMCNT	7051	TIMER1	7E0A	TIMER2	7E0C	TIMSAV	7E08	TLKFLG	7E04
TMPBUF	4168	TMRFIL	7052	TMRPR0	69BF	TMRPR1	69D7	TMRPRP	6999
TMRSR0	6A28	TMRSR1	6A4B	TMRSR2	6A55	TMRSR3	6A6A	TMRSR4	6A6E
TMRSRV	6A18	TMRVEC	4C2F	TOCNT	4083	TOCNT1	4085	TODBFR	709A
TODPRP	6AB5	TODR	6A7D	TODW	6A8D	TODW1	6A93	TPINI1	0058
TPINIT	0055	TPSUB	69DE	TPSUB0	69F2	TPSUB1	69F4	TRCR	0043
TRDB	0040	TRKUP1	41B2	TRKUPC	41B0	TRMODE	0042	TRNFLG	7E06
TRSR	0041	TRYCHK	4924	TTCR	004B	TTDB	0048	TTMODE	004A
TTRCSR	6595	TTRDB	6656	TTRDB1	6679	TTRID	6606	TTRIE	65C2
TTRRE1	6514	TTRREM	64F2	TTRTS0	6328	TTRTS1	632A	TTRTS2	633D
TTRTS4	6355	TTRTS5	6372	TTRTSA	6319	TTRTSB	62FE	TTRTST	62ED
TTSR	0049	TTXCSR	658C	TTXDB	65A0	TTXID	65FB	TTXIE	65BB
TTXTST	63A0	TUCR	0047	TUDB	0044	TUERR	0086	TUERR1	42A4
TUERR2	0079	TUERR3	0081	TUINIT	0004	TUMODE	0046	TUPREP	0015
TURCSR	659B	TURCV	48C0	TURCV1	48E0	TURCV2	4900	TURCV3	48C3
TURDB	6683	TURDB0	6696	TURID	661A	TURIE	65F4	TURTST	64D1
TUSR	0045	TUWCS1	65E0	TUWCSR	65C9	TUXDB	65B0	TUXID	6611

* * Symbol Table * *

TUXTST	64AF	TU_SEN*	0095	TWO	5CC0	TWODN	5349	TWOUP	531D
T_VECT*	414D	UBINIT	6ACD	UCON	7468	UFLOW	5361	UNIT	4091
UNITX	4106	UPC14	0084	UPC14A	0000	UPCADR	0001	UPCBUF	744B
UPCCHK	5481	UPCEX1	5688	UPCEXM	566B	UPCFLG	0080	UPCOUT	7440
UPCTST	529E	UPPREP	5305	USED	0080	USTART	583C	VERMSG	729D
VNORML	00A3	VRTUAL	4E71	VSHIFT	00A2	WAICMD	5AAA	WAITH	6971
WAITL	6980	WARM	41B7	WCS	4E8A	WCSB0	0008	WCSB1	0009
WCSB2	000A	WCSCON	7464	WCSDE1	50F0	WCSDEP	50C3	WCSEX1	521F
WCSEX2	521D	WCSEXM	51FE	WCSLOD	4A09	WCS_LO*	40D5	WEFLAG	7564
WERROR	7569	WFADR	71F2	WFAIL	61E3	WFAIL1	61F2	WFATAL	7567
WFDATA	71F6	WFMSG	72CF	WFPACK	71F0	WORD	4E97	WRBYT0	4A36
WRBYT1	4A3E	WRCRR	7483	WRDSUM	409E	WRITE	00CC	WRKMSK	40BD
WRMCNT	71FA	WRMMSG	72AD	WRMST1	609A	WRMST2	6104	WRMST9	6122
WRMSTR	6074	WRNLSN	747D	WRNWRN	7480	WRROT8	5633	WRRT8X	5638
WRTNOP	4993	WRTOQ	7489	WRTWCS	5D05	WRTWR1	55E1	WRTWR2	55EE
WRTWRZ	55CA	WRZBUF	746E	XADRES	40C4	XCOUNT	40C6	XCSADR	7078
XDBADR	707A	XFER	5AD8	XFER1	5ADD	XFRADR	418A	XFRBUF	4192
XFRCHK	623C	XFRCNT	418E	XFRCOM	5CE7	XFRPAK	4188	XFRRA1	5BDA
XFRRAM	5BC2	XFRSE0	682B	XFRSET	6823	XFRWCS	5C27	XMEMH	5B28
XMEMH1	5B35	XMEMI	5B1C	XMEMI1	5B48	XMEMI2	5B51	XMEMI3	5B61
XMEML	5B3E	XMEMO	5B7B	XMEMO1	5BA6	XMEMO2	5B94	XMEMO4	5B86
XMTCSR	7076	XMTDB	7077	XOFIN	5BB7	XRAMI1	5BE0	XRAMI2	5BF0
XRAMI3	5BF7	XRAMI4	5BFC	XRAMO	5C01	XRAMO1	5C11	XRAMO2	5C1E
XRAMO3	5C22	XVEC	000B	XWCSI	5C38	XWCSI1	5C5B	XWCSO	5C64
XWCSO1	5C6F	XWCSO2	5C9B	XWCSO3	5CA1	X_CMND*	73A7	X_DATA*	73C6
YBUSRD	00EC	ZBUF1	6AFC	ZBUF2	6AFD	ZERO	7182	ZEROS	70FD
ZROBUF	6AFA	ZROCHK	623F						

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
A	Reserved	503$ 508$ 688 702 704$ 709$ 717$ 719 738$ 741$ 774 776$ 799$
		830$ 831 834 859 861 936 938$ 985 999$ 1009$ 1012 1031$ 1040
		1047$ 1103$ 1105$ 1116$ 1129$ 1131 1132$ 1134 1141 1143$ 1149 1177$ 1215
		1218$ 1226 1233$ 1234 1240 1245$ 1253$ 1269$ 1287$ 1292$ 1301 1302$ 1304
		1305$ 1307 1349$ 1353$ 1366 1370$ 1374$ 1378 1407$ 1427$ 1449$ 1453$ 1457$
		1469$ 1482$ 1541 1570$ 1572 1589$ 1590$ 1591 1593$ 1601 1602 1638 1654$
		1673$ 1676 1685 1688$ 1705$ 1713$ 1718 1720$ 1726 1734$ 1739$ 1747 1748$
		1780$ 1785$ 1788 1789 1790 1791 1830 1913 1923 1936 1954 1964$ 1969$
		1970$ 1974$ 1977$ 1982 2020 2023 2039$ 2053$ 2085 2118$ 2126$ 2135$ 2138$
		2149$ 2152$ 2153 2164$ 2167$ 2168 2216 2220 2225$ 2227 2318$ 2320$ 2322$
		2324$ 2326$ 2328$ 2330$ 2338$ 2340$ 2342$ 2353 2375$ 2385 2409$ 2436$ 2441$
		2450$ 2457$ 2481 2500$ 2503$ 2506$ 2508 2522$ 2550$ 2554$ 2566$ 2570$ 2576$
		2585 2641 2650 2651 2658 2679 2693 2728 2731$ 2741$ 2768 2779 2784$
		2785 2800 2808$ 2810 2817 2833 2856 2859$ 2863$ 2906$ 2928 2948$ 3062$
		3076$ 3078 3080$ 3088$ 3090 3147 3150 3157 3165 3172 3177 3208 3216
		3223 3239 3248 3257 3268 3283 3314$ 3317 3346$ 3353 3357$ 3364$ 3380$
		3394 3400 3407 3408$ 3410 3418$ 3423$ 3434$ 3440$ 3442 3461 3491 3516
		3527$ 3534 3538 3570 3592$ 3614$ 3628$ 3644 3647 3655 3668 3672$ 3684
		3687$ 3709$ 3712 3741$ 3747$ 3748 3752 3764$ 3772$ 3781$ 3791 3804 3836
		3846 3863 3864 3866$ 3878$ 3881 3903 3905$ 3908$ 3924$ 3928 3957$ 3971$
		3975 3991$ 3995$ 3996 4025$ 4027 4042$ 4055$ 4057$ 4059$ 4061$ 4067 4072
		4104 4112$ 4117 4174 4201$ 4205$ 4207 4225$ 4233$ 4235$ 4245$ 4248$ 4255$
		4310 4317$ 4325 4329 4334 4339 4344 4349 4350$ 4351$ 4363 4367$ 4369
		4370$ 4373 4375$ 4384 4393$ 4396$ 4399$ 4412$ 4416 4419$ 4423 4430$ 4434$
		4439$ 4444$ 4451 4453$ 4457$ 4462$ 4470 4473 4484 4485$ 4496 4508$ 4517$
		4529$ 4544 4546$ 4550$ 4557$ 4568$ 4570$ 4573 4583$ 4586$ 4597$ 4599$ 4614
		4628$ 4640 4659$ 4662 4668$ 4670 4674$ 4677$ 4686 4690 4704 4705$ 4714$
		4722 4723 4725 4729$ 4731 4757$ 4774$ 4786 4799 4802$ 4814$ 4820$ 4824$
		4830$ 4835$ 4849 4854 4856$ 4873$ 4874 4876$ 4897 4909 4912 4919$ 4976
		4979$ 4984 5009$ 5032$ 5034 5039 5041$ 5045 5055 5057$ 5073 5103 5106
		5111 5174 5179$ 5182$ 5184$ 5186 5190$ 5195 5201 5209 5212 5219$ 5220
		5227$ 5236 5238$ 5257 5260 5264$ 5270 5274 5275$ 5278$ 5280$ 5288$ 5292$
		5294 5296$ 5304$ 5306$ 5311 5345$ 5346 5362$ 5363 5368$ 5369 5384$ 5385
		5388$ 5389 5414 5419 5423$ 5428$ 5436$ 5438 5442$ 5452$ 5466 5470$ 5476$
		5483$ 5534 5542 5544$ 5546 5558 5561$ 5563 5580$ 5600 5633$ 5649 5681
		5687$ 5689 5690$ 5693 5699$ 5704 5747 5751 5754 5758$ 5761 5765$ 5774$
		5778$ 5783 5784 5786$ 5791$ 5802 5804 5807$ 5809$ 5812$ 5818$ 5821$ 5824$
		5827$ 5831 5835 5842 5844 5846$ 5850 5853$ 5859$ 5865$ 5872$ 5876 5878
		5880$ 5883$ 5886 5897 5899$ 5902$ 5904$ 5907$ 5910$ 5911$ 5914$ 5917 5927$
		5930$ 5932 5936$ 5937 5944$ 5950 5951$ 5953$ 5961 5965$ 5966 5976$ 5979$
		5981$ 5983 6028 6030$ 6033$ 6035 6039$ 6041$ 6047$ 6048 6060$ 6063 6073
		6076 6079 6085$ 6088$ 6090$ 6093$ 6096$ 6099$ 6101 6109 6111$ 6116$ 6128$
		6131$ 6133$ 6135 6151$ 6164$ 6168$ 6173$ 6177$ 6189$ 6196$ 6199 6207$ 6212
		6216 6220 6224 6276$ 6279$ 6281 6290$ 6293$ 6295$ 6297 6300$ 6302$ 6306$
		6309$ 6311$ 6316$ 6323$ 6326$ 6328$ 6330$ 6332 6349$ 6352$ 6354 6358$ 6359
		6368$ 6374 6377$ 6379$ 6392$ 6394$ 6396$ 6404$ 6407$ 6409$ 6415$ 6419$ 6423$
		6425 6434$ 6437$ 6440$ 6442$ 6445$ 6448$ 6467 6472 6478 6488 6490
AACTIV	0040	177# 2105 2124 2159 2272 2610 2701 3909 3958
AAFLAG	0042	181# 2271 2504 2507
ABUFFR	71FE	2070 2103 2442$ 2458$ 2612 2703 3707 3719 3730 3981 4121 4212 6786#

Symb Value References (# = Definition, $ = Write, <BLANK> = Read)

ACFAI0	5DFD	4545	4556#										
ACFAI1	5E05	4560#	4562										
ACFAI2	5E0C	3770	4563#	5234									
ACFAI3	5E33	4582#	4585										
ACFAIL	5DE5	1843	4543#										
ACHECK	4E2D	2245	2254#										
ACHK1	4E36	2263#	2274										
ACLO	4120	480#											
ACVECT	4C25	480	1843#										
ADDAD1	6251	1078	3536	4356	4924	4962	5016	5102#	6206				
ADDADR	624E	2997	3000	3003	3029	3032	3035	4998	5006	5020	5071	5101#	
ADRES1	7114	1946	6654#										
ADRES2	7145	2307	6677#										
ADRES3	716A	2077	6704#										
ADRSPC	71B5	2616	2707	2855	2879	2923	3070	6744#					
ADRTS1	4FBA	2478	2503#										
ADRTST	4FB2	2429	2445	2453	2499#								
AFLAG	0002	179#	2264	2967	3471								
AFTER	557C	3247	3267	3326#									
AFTER1	5597	3334	3336#										
ALARM	7090	6052$	6054$	6056$	6058$	6065	6163	6582#					
ALARM1	0007	233#	6088										
ALLOWP	0003	15#	5284										
ALRMM3	7094	5996	6070	6583#									
ALTCHK	4B2E	1663	1746#										
ALTFLG	4181	560#											
ALTMOD	001B	212#	1662										
ANDAD1	56AA	3489#	3496										
ANDADR	56A5	3479	3487#										
APTFLG	0004	19#											
APTLOD	40D6	419#	777$	1834									
ARM12	0023	260#											
ARM45	0038	261#	6423										
ASLWR0	7492	3370	6993#										
ASMASK	000F	182#											
ASTRSK	4FA0	2475#	6712										
ATFLAG	0080	190#											
ATFLOW	52DF	2605	2697	2959#									
ATSIGN	4F9B	2472#	6711										
B	Reserved	503	508	694$	1019$	1025$	1077$	1122$	1135$	1168$	1171	1185$	1191$	1209$
		1223$	1224	1259$	1410	1510$	1523$	1542$	1557$	1593	1654	1950$	1960$	1969
		2006$	2013$	2081$	2093$	2094	2104	2106	2115	2117	2123	2158	2160	2173
		2175	2217$	2223$	2242$	2243	2247	2250	2263	2265	2269$	2270	2287	2289
		2302	2304	2466$	2469$	2472$	2475$	2483	2538	2540	2726$	2752$	2758$	2781$
		2857$	2858	2861$	2869$	2885$	2889$	2894$	2899$	2924$	2925	2951	2996$	2999$
		3002$	3028$	3031$	3034$	3041$	3046$	3050$	3054$	3057$	3098$	3099$	3138$	3234$
		3253$	3388$	3394$	3397	3431$	3469	3478$	3489	3492$	3514$	3515	3518$	3519
		3522$	3523	3525	3535$	3612$	3613$	3614	3662$	3779$	3787$	3878	3886	3887$
		3892	3924	3941$	3971	4037$	4045$	4049$	4057	4061	4094$	4098$	4122$	4181$
		4228	4235	4288$	4326$	4327	4330$	4332	4335$	4337	4340$	4342	4345$	4351

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
		4355$ 4366$ 4367 4370 4523$ 4610 4633$ 4686$ 4693$ 4699$ 4884$ 4923$ 4927$
		4951$ 4961$ 4968$ 4974$ 4987$ 4997$ 5005$ 5015$ 5019$ 5028$ 5070$ 5091$ 5097$
		5104 5107$ 5274$ 5280 5302 5366$ 5374 5414$ 5416 5434 5542$ 5549 5581
		5681$ 5690 5693$ 5697 5699 5940 5942$ 6066$ 6071$ 6082$ 6083 6109$ 6111
		6116 6205$ 6314$ 6321$ 6362 6366$
BACKSL	005C	171#
BASADR	74A7	4675$ 4703 4706$ 7008#
BASCON	74A9	4664 4742 7011#
BASE	007B	220#
BEFORE	555B	3226 3271 3286 3310#
BEGIN	0000	293# 1801
BLKFLG	7098	5180$ 5187$ 5881$ 5887$ 5900$ 5918$ 5928$ 5933$ 5977$ 5984$ 6031$ 6036$ 6086$
		6102$ 6129$ 6136$ 6277$ 6282$ 6291$ 6298$ 6307$ 6333$ 6350$ 6355$ 6405$ 6416$
		6426$ 6585#
BLKNUM	4174	542# 1029 1068 1071$ 1153$ 1206 1208$ 1262$
BLOCK	4097	349# 1030$ 1148$ 1296
BMPPNT	471D	1173# 1179
BOOT	576D	3627# 6655
BOOTEN	0007	27#
BOOTSW	0001	10# 1646
BPHALT	7222	3571$ 3746 4617$ 6822#
BPSUB	57D5	3640 3649 3664 3668#
BREAK	000D	223# 5687
BRKCNT	7221	6820#
BRKFLG	7220	5218 5683 6819#
BSPREP	57E4	1651 3684#
BUFADR	40CA	397# 1637$ 1684 1694$ 1736 1738$ 1921$ 1932 1941 1944$ 1952$ 2038 2129
		2144$ 2379 2381$ 2440$ 2521 2524$ 2549 3627 3737 3817 4029
BYTCNT	4095	348# 1021$ 1283$ 1474 1478
BYTE	4E92	2338# 6677
BYTE00	417A	551# 1197 1204 1319 1327$
BYTE01	417B	552# 1329$
BYTES	416E	539#
BYTSUM	4082	330# 1041$ 1065 1639$ 3879 4116 4165 4173 4186 4198 4202$ 4203 4304
		4364$
C	Reserved	1515$ 1543$ 1550$ 1574$ 2218$ 2730$ 2738$ 2745$ 2749$ 2759$ 2763$ 2770$ 2774$
		2856$ 2863 3242$ 3260$ 3376$ 3406$ 3412$ 3615 4028$ 4051$ 4059 4142$ 4146$
		4152$ 4156$ 4709$ 4747$ 4765$ 5264 5270$ 5275 5306 5310 5436 5546$ 5550
		5561 5563$ 5571$ 5585 5588$ 5694$ 5696 5700 6315$ 6319$
CCFLAG	40CF	405#
CFAIL	6062	4875 4881 4887 4890 4892#
CFATAL	7565	4893$ 7119#
CFERR_*	0002	199# 4412
CFLOW	535B	2940 3046#
CFMSG	730A	4894 6869#
CF_ERR*	5D16	1976 4411#
CF_TL_*	738B	4413 6892#
CGIMOD	0001	240# 6311
CGFIVE	000D	280# 6442
CGFOUR	000C	278# 6434

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

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CHANGE   5DD7          4514    4519    4527#
CHECK_*  652D          5535    5551    5557    5566#
CHKSUM*  00DE          310#    1401
CHRBUF   7001          1920    6520#
CHRCNT   7000          1918    4418$   6519#
CHRSIL   4B80          1812#
CLDMSG   72EB          4865    6865#
CLDST0   6027          3651    4868#
CLDST1   602F          3666    4853    4871#
CLDSTR   6024          3641    4867#   5068
CLDSTX   6020          3689    4865#   5051    6469
CLKERR   5D70          2729    4457#
CLKFLG   4196          581#    992     2675    2727    2829    3146    3204    3217$   3332    3457    3595$   3710$   3743
                       3904$   4068$   4309    4452$   4615$   4735    4800$
CLKMSG   73E2          4458    6904#
CLLTLK   4A46          1631#   1642
CLOCK_*  0006          203#    4457
CLRACK   00A9          147#    1560$   2778$   4449$   5622$   5635$   5647$   5659$   5665$   5671$   5678$   5707$   5714$
                       5722$   5736$   5743$   5782$   5815$   5841$   6153$   6226$   6231$   6458$   6461$   6464$   6471$
                       6477$
CLRACL   0033          73#
CLRATN   00AB          157#    2744$   4151$   4448$   4763$   5619$   5713$   5721$   5729$   5735$   5744$
CLRBLK   003A          84#     4552$   4559$   4572$   5188$   5888$   5919$   5934$   5985$   6037$   6103$   6137$   6283$
                       6299$   6334$   6356$   6427$
CLRBSY   002E          66#
CLRCLD   6AE7          6471#   6635
CLRCLK   0020          45#     975$    2662$   2837$   3132$   3215$   3311$   3450$   3586$   3703$   3902$   4261$   4450$
                       4578$   4613$   4656$   6465$
CLRCSK   0024          51#     1522$
CLRCSR   0038          81#     1513$
CLRDCL   0031          70#
CLRHLT   00AF          163#    1996$   3559$   5745$
CLRLIT   003C          87#     2628$   2719$   4577$   4642$   5746$   6466$
CLRMCI   0029          58#
CLRMCK   002B          61#
CLRPAG   003F          91#
CLRPAR   6994          6268#
CLRPFI   00AD          160#    3560$   4576$
CLRPME   6AF8          6482#   6637
CLRSS    0022          48#     2843$   3445$   3913$   3920$   4291$   4760$   4762$   4770$   4772$
CLRTIM   00A5          141#    3565$   5858$   6273$
CLRTMR   002C          63#     3561$   3760$   4563$   5868$   6026$   6272$   6391$
CLRUPC   00A8          153#    1547$
CLRUPK   0026          54#     1556$   1600$   4279$
CLRWCK   0036          78#     1598$   4277$   4403$
CLRWRO   748C          3366    6985#
CLRWRM   6AF1          6477#   6634
CMDVAL   4182          561#    1671    1714$   1746    4417$
CMPADR   4162          528#    1046$   1281$   1389    1394    1442$
CMPAR1   7102          6652#
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Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

CMPAR2	7139	6676#										
CMPAR3	715E	6701#										
CMPCH1	6244	5092#	5098									
CMPCHK	6242	4214	4218	5065	5088	5091#						
CMPTB1	4183	563#	1045	1280								
CMPTB2	4185	566#	1441									
CNSOLA	4C42	1909	1913#									
CNSOLB	4C5E	1910	1926#	1937	4818	4828	4888					
CNSOLX	4C7B	1922	1934	1940#	2041							
CNTADR	40C8	396#	829	860	1635$	1670	1687	1725	1750			
CNTIN0	58E2	3750	3808#									
CNTIN1	586B	3745	3755#									
CNTIN2	5877	3759#	3809	5043								
CNTLR	42AC	821#	1661									
CNTLR1	42BD	826	828#									
CNTLU	42CE	857#	1659									
CNTRLC	0003	215#										
CNTRLO	000F	214#										
CNTRLP	0010	219#	5282									
CNTRLQ	0011	218#	5588									
CNTRLR	0012	213#	1660									
CNTRLS	0013	217#	5571									
CNTRLU	0015	216#	1658									
CNTRLX	0018	221#										
CNVER1	4E0A	2196	2202#									
CNVERT	4DF4	2119	2139	2192#	2369	2403	2447	2571				
CODFIL	7247	4097	4826	6838#								
CODFL1	4C2E	778	1846#									
CODFLG	408B	337#	695	716	779$	824	1649	1784	4024			
CODTAB	7450	2854	6936#									
COLD	408A	336#	3670$	3685$	4073$	4801$	4872	4877$	6473$			
COLD_B*	5F99	1836	4076	4797#								
COLD_B*	5FD2	4078	4823#									
COLD_B*	5FE8	4079	4833#									
COLD_H*	601A	4838	4860#									
COLON	003A	175#										
COMERR	5D5E	2740	2751	2765	2776	3100	4160	4169	4189	4448#	5608	6238	6250
COMFIN	568A	3043	3047	3051	3055	3058	3469#						
COMMN1	4E9E	2339	2341	2343#									
COMMON	4E8C	2319	2321	2323	2325	2327	2329	2331#					
COMMSG	7378	4454	6888#										
COMM_C*	0005	202#	4453	4479									
COMWR0	748F	3368	6989#										
CONSMS	1000	192#											
CONBUF	74AD	4667	7014#										
CONHL1	58CA	3796#	4601										
CONHL2	58A3	3774	3778#										
CONHL3	58C1	3777	3791#										
CONHLT	587A	3760#											
CONMOD	71FD	3756$	5035$	6784#									

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

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CONMSG   41DF   624#  723
CONPAK   71FC   3757  5036  6783#
CONSIZ   74A8   4679$ 4685  7009#
CONSOL   41CE   620#  693
CONT     5840   3737# 6656
CONTO    584B   3728  3741# 3962  3968
CONTLR   41BE   612#  821
CONTLU   41BA   610#  857
COPY     00F9   311#  967   1035  1097  2415  2608  2614  2667  2705  2799  2961  3302  3363
                3455  3724  3983  4103  4666  4745  4918  4939  4944  4957  4991  4996  5013
                5023  6187
COPY1    00FB   312#  699   1260  3143  3235  3254  3389  3432  3663  4095  4123  4289  4700
                4885  4928  4952  4988  5029
COPYB0   419C   590#  1083$ 1102
COPYB1   419D   591#
COUNT    4187   569#  986$  1016  1101$ 1588
COUNT1   7101   1945  6651#
COUNT2   7138   2306  6675#
COUNT3   715D   2076  6700#
CPATTN   0083   124#  2760  2771  3101  4088  5229  5313  5335  5357  5488  5509  5604  6233
                6245
CPCH0    62BD   5207  5210  5213  5218#
CPCH1    62D0   5221  5224  5229#
CPCHK1   629D   5205# 5515  5519  5521  5530
CPCHK2   6375   5263  5266  5272  5290  5299  5313# 5560  5568
CPCHK3   639A   5319  5323  5325  5335#
CPCHK4   63BE   5343  5347  5357#
CPCHK5   64A9   5390  5418  5432  5450  5465  5478  5481  5488#
CPCHK6   64CB   5496  5499  5509#
CPFLAG   40F3   435#
CPSER1   6560   5604# 5609
CPSER2   656D   5606  5610#
CPSERV   6558   3104  5231  5315  5337  5359  5490  5511  5599#
CPUACK   0082   122#  2735  2746  4143  4153
CR       000D   208#  610   612   618   624   626   704   1701  1711  1748  1958  2363  2399
                2535  2561  2581  3629  3638  3739  3781  3819  4036  4053  4430  4599  4628
                4856  6653  6701  6832  6836  6839  6842  6845  6848  6851  6853  6855  6857
                6859  6863  6865  6867  6871  6873  6875  6877  6882  6886  6890  6894  6898
                6902  6906  6911  6918  6932
CRAFIL   7279   4844  6847#
CRCMD    5D03   4384# 6669  6670  6671
CRD_CO*  0001   198#  4462  4482
CRD_ER*  5D78   4461# 4840
CRD_ER*  73FA   4463  6908#
CRD_FL*  40FD   441#  1793  4058$ 4834
CRD_RD*  4B3C   513   1779#
CRD_VE*  0398   316#
CRFLOW   4FD6   2537# 6704
CRMFIL   728B   4846  6850#
CSR07    0085   128#
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Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

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CSR15   0086   130#
CSR23   0087   132#  1516
CSRBUF  41A4   596#  3320  3328
CTLDIS  40FE   443#  775$  4113$  4177$  4374$  4428$  4474$
CVECTR  4C28   1844#
D       Reserved  693$  698$  966$  970$  1034$  1069$  1070  1096$  1184$  1186  1190$  1207  1333$
                  1337$  1351  1671$  1672  1675  1791$  1946$  2011$  2012$  2019  2021$  2022  2071$
                  2077$  2133$  2138  2307$  2414$  2606$  2612$  2664$  2703$  2798$  2867$  2870$  2960$
                  3137$  3230$  3233$  3245$  3252$  3263$  3275$  3277$  3280$  3293$  3301$  3326$  3349$
                  3366$  3368$  3370$  3374$  3387$  3403$  3420$  3453$  3661$  3719$  3723$  3778$  3786$
                  3856$  3940$  3981$  4093$  4097$  4102$  4121$  4212$  4217$  4287$  4413$  4420$  4435$
                  4440$  4445$  4454$  4458$  4463$  4515  4516$  4520  4521$  4611  4632$  4665$  4684$
                  4689  4692$  4695  4698$  4711$  4741  4742$  4743  4883$  4917$  4926$  4938$  4943$
                  4950$  4956$  4967$  4969  4973$  4986$  4990$  4995$  5012$  5022$  5027$  5064$  5087$
                  5090$  5092  5096$  5294$  5298  5320$  5321  5327  5329  5330$  5331  5333  5339$
                  5340  5349  5351  5352$  5353  5355  5412$  5415  5420  5421$  5424  5462$  5463
                  5467  5468$  5471  5492$  5493  5501  5503  5504$  5505  5507  5516$  5517  5523
                  5525  5526$  5527  5529  5610$  5611  5612$  5616$  5617  5652  5654  5660  5662
                  5666  5668  5672  5674  5695  5708  5710  5715  5717  5723  5725  5730  5732
                  5737  5739  5770  5772  5798  5800  5844$  5862  5865  5872  5986$  5988  5991
                  5994  5999  6003$  6005  6008$  6010  6065$  6070$  6081$  6186$  6363  6365$  6487$
                  6492$
DACTIV  0080   176#  2116  2174
DARM12  0083   272#
DATCHK  6233   4931  4935  5086#
DATLEN  71B4   2882  2977$  2989  3021  3061  6743#
DBUFFR  7202   2114  2606  4217  6787#
DCHK1   4E28   2247#  2258
DCLO    0002   12#
DDECOD  4FDE   2549#  6657
DECOD1  4CFB   2007#  2015  2082
DECODE  4CFA   1947  2006#  2084  2308
DECODX  52AE   2615  2706  2923#
DEFDRV  4150   515#  781$  2558  3868  4812  4847  4867
DEFFIL  7255   4869$  4870  6841#
DELAY1  0457   193#
DELETE  007F   211#  1664
DELFLG  40CE   403#  835$  1667  1719$  1730
DELMSK  00FE   189#
DEPADR  71D2   6761#
DEPCOD  0001   185#  2602  3183  6923  7001
DEPDAT  71D6   6762#
DEPIO   50B6   2647  2654#
DEPLS1  54C9   3246#  3278  3298
DEPLS2  54CC   3247#  3303
DEPPAK  71D0   4986  6760#
DEPWR0  5543   3292  3300#
DEST    7479   3285$  3296$  3395  6958#
DEVFLG  7212   2145  3646  3862$  6799#
DFAULT  52D5   2927  2948#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
DFLAG	0004	178# 2248 2599 2691
DIFUNI	4544	942 946 949 961#
DIR1	5026	2562 2583#
DIRADR	417C	554# 952$ 1236 1267$ 1268 1271$
DIRBUF	4300	884# 951 1248 1255
DIRECT	4FEF	2558#
DIRFLG	409C	354# 1144$ 1227$ 2587$ 4425$
DIRSEG	42F6	872# 1258
DIRUNI	4195	579# 944 1295$
DIRVAL	4194	578# 940 1293$
DIRVEC	411A	478#
DISCNT	40DB	428#
DISCRD	7E05	5409 5459 5536 7146#
DISMEM	00A7	144# 976$ 2663$ 2822$ 3133$ 3185$ 3218$ 3310$ 3587$ 3704$ 4579$ 4618$ 4663$ 4798$
DISPAR	00A1	135# 1511$ 2841$ 3168$ 3312$ 4657$ 6268$
DIV50	4857	1321 1333#
DIVSR1	F9C0	226# 1333
DIVSR2	FFD8	227# 1337
DIVSR3	FFF0	228# 970
DLMASK	00F0	183#
DLMCHK	4E20	2242# 2285 2301 2537
DNPRE1	5339	3020 3024#
DNPREP	5329	2973 3018#
DOT	4E3B	2080 2269#
DOTBUF	410D	470#
DPOS1	5065	2611 2615# 2631
DPOS2	5068	2616# 2629
DPOSIT	5034	2552 2556 2597#
DRVFIL	41D8	622# 734$ 735
DUMMY1	0052	303#
E	Reserved	1789$ 2085$ 2118 2127 2155 2170 2216$ 2225 3488$ 3494$ 5102$ 5109$ 5602$ 5603 5607$ 5842$ 5848 5849$ 5859 6232$ 6236$ 6244$ 6248$
EDADDR	71B8	2613 2645 2648 2654 2664 2704 2804 2807 2813 2821 2905 2959 3114 3117 3238 3255 3290 3295 3305 3487 4955 5010$ 5064 5101 6748#
EDCSR	53E5	3129 3132#
EDCSR1	53FD	3141 3143#
EDDATA	71BC	2414 2607 2649 2656 2670 2698 2797 2809$ 2816$ 2826$ 2828$ 2866 2960 3137 3156 3176$ 3186 3188 3220 3230 3265 3275 3293 3301 3454 3723 4989 4994 5001 5004$ 5011 5014 5021 6749#
EDLS	549E	3116 3226#
EDMOD	71B7	3065$ 3075 3094 6747#
EDPACK	71B6	2601 2694$ 2725 3139 3153 3182 3212 3227 3272 3287 4882 4925 4985 5026 6746#
EDPAR	540E	3127 3153#
EDQ	54FA	3119 3271#
EDWR	5517	3121 3283#
ENBMEM	00A6	143# 991$ 2674$ 2824$ 3145$ 3203$ 3222$ 3336$ 3589$ 3706$ 4627$ 4727$
ENBPAR	00A0	134# 1529$ 3160$ 3341$ 4734$ 6265$
ENDPAK	40AA	368# 1445 1452

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
ENDSE1	4787	1216 1220 1226#
ENDSEG	476D	1157 1214#
ENTER	625F	3759 5173#
ENTYPE	4178	546# 1158$ 1163 1193
ERROR	5D80	4414 4421 4436 4441 4446 4455 4459 4464 4466#
ERROR1	5DA2	4432 4471 4481#
EXAMI1	511F	2702 2706# 2723
EXAMI2	5122	2707# 2720
EXAMIN	50F2	2689# 6658
EXAMQ	5511	3274 3280#
EXE1	5663	3439 3443#
EXECUT	5649	3246 3264 3350 3367 3369 3375 3421 3429# 4712
EXMCOD	0000	184# 3140 3154 3213 3228 3273 3288
EXMIO	51F1	2806 2813#
EXMLS	54D1	3229 3251#
EXMLS1	54EC	3264# 3281 3308
EXMPAR	5435	3155 3175#
EXMWR	554F	3289 3305#
EXTBUF	410E	471# 3852 3858
EXTCNT	7211	2163 3654 6798#
EXTFLW	4DDA	2113 2163#
EXTPTR	720E	2169 2172$ 3853$ 6796#
EXTRAS	42FC	875# 1169
EXTYPE	523A	2714 2854#
FASTWR	5F4D	4696 4752#
FASUPC	0016	230# 4753
FASWR1	5F65	4761# 4776
FASWR2	5F78	4767 4769#
FIXCP1	46B3	1118 1121#
FIXCPU	46A6	1089 1114# 1124
FIXER1	466B	1067 1090#
FIXER2	4685	1094 1099#
FIXERR	4663	1053 1059 1087#
FIXUP	5A0D	3911 3960 3979#
FLAGS	7213	1983$ 2093 2242 2269 2477 2499 2598 2609 2690 2700 2966 3470 3841 3907 3956 3992$ 6802#
FLAGS1	7214	1984$ 2603 2695 2969 3473 3720 6803#
FLAGS2	7215	1985$ 2352 2367 2374 3514 3979 6804#
FLAGS3	7216	1986$ 2384 2401 2408 2418 6805#
FLIP	543D	3125 3182#
FLIP1	547F	3206 3208#
FNBUF	4107	469# 692 740 1184 3661 3854
FNCNT	7210	2148 3643 3845 3865$ 6797#
FNDFLG	4164	531# 937$ 958 962 1199
FNFLOW	4D8D	2102 2123#
FNFLW1	4DC0	2125 2128 2131 2137 2148#
FNFLW2	4DD3	2147 2158#
FNFMSG	41EF	628# 800
FNPTR	720C	2154 2157$ 3855$ 6795#
FOOFIL	7267	3659$ 3660 3665 6844#

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
FOUR	5CCA	4342#
FOURDN	5343	3023 3028#
FOURUP	5317	2991 2996#
FU_VEC*	004F	302#
GCVECT	4129	485#
GET512	47E0	1250 1274#
GETCHK	4CC6	1953 1962 1974#
GETCS	5B67	4167 4168 4171# 4172 4223 4282
GETDA1	5CCF	4347# 4348
GETDAT	5CAC	4138 4149 4158 4222 4267 4270 4273 4316#
GETEND	492F	1054 1290 1439#
GETLI0	4A58	832 836 1633 1640# 1653 1712 1728 1741
GETLI1	4A7A	1654#
GETLI2	4AA0	1670# 1722
GETLI3	4AAD	1674 1677#
GETLI4	4A91	1657 1664#
GETLI5	4ABC	1679 1681 1683# 1749
GETLI6	4AD3	1690 1695#
GETLI7	4AF5	1700 1702 1704 1709#
GETLI8	4AF6	1697 1710#
GETLIA	4A74	1645 1648 1652#
GETLIN	4A4D	483 1635# 1919
GETNXT	4FC5	2075 2305 2355 2360 2387 2392 2430 2446 2454 2521# 2534
GETON1	47A8	1241 1245#
GETON2	47AE	1235 1248#
GETON3	47D4	1256 1267#
GETON4	47D7	1238 1268#
GETONE	478C	1154 1155 1173 1232# 1326 1328
GETTWO	484A	1196 1203 1318 1326#
GETUPC	59B6	3914 3921 3933# 4480 4630
GFLOW	5355	2933 3041#
GLVECT	4123	482#
GOSV	4103	460#
GO_STA*	4C00	784 1829#
GPR	4E76	2322# 2459 6684
GPRCON	7458	3041 6938#
GRPCNT	74A6	4672$ 4713 4715$ 7007#
GSVECT	4145	506#
GS_VEC*	0046	299# 507 1652 3918 3966 4114 4171 4347 5262 5431 5559
GT512A	47E5	1276# 1289 1291
H	Reserved	692$ 707$ 710$ 716$ 723$ 735$ 740$ 782$ 800$ 821$ 823$ 827$ 857$
		944$ 951$ 953$ 965$ 981$ 988$ 999 1002$ 1004$ 1009 1033$ 1036$ 1045$
		1065$ 1075$ 1095$ 1105 1110$ 1115$ 1116 1132 1134$ 1147$ 1166$ 1175$ 1177
		1183$ 1189$ 1199$ 1219 1221$ 1232$ 1248$ 1251$ 1255$ 1258$ 1270$ 1274$ 1278$
		1280$ 1282$ 1285$ 1296$ 1305 1307$ 1312$ 1314$ 1316$ 1346$ 1349 1353 1358$
		1379$ 1395$ 1400$ 1407 1411$ 1413$ 1417$ 1421$ 1425$ 1427 1433$ 1439$ 1441$
		1444 1445$ 1447$ 1452$ 1456$ 1460$ 1464$ 1468$ 1470$ 1473$ 1477$ 1481$ 1483$
		1486$ 1497 1498$ 1500$ 1502$ 1505$ 1573$ 1588$ 1604$ 1636$ 1693$ 1730$ 1737$
		1782$ 1784$ 1795$ 1832$ 1916$ 1918$ 1920$ 1929$ 1943$ 1945$ 1967$ 1974 1978$
		2007$ 2017$ 2023$ 2034$ 2056$ 2070$ 2076$ 2103$ 2114$ 2132$ 2134$ 2143$ 2145$

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

		2148$	2156$	2163$	2171$	2219	2222$	2306$	2358$	2367$	2370$	2374$	2380$	2390$
		2401$	2404$	2408$	2413$	2418$	2439$	2477$	2482$	2499$	2523$	2553$	2557$	2565$
		2569$	2575$	2579$	2601$	2607$	2613$	2665$	2670$	2698$	2704$	2725$	2732$	2742$
		2756$	2757	2769$	2780$	2783$	2797$	2838$	2854$	2862$	2866$	2873$	2896$	2898$
		2905$	2909$	2923$	2959$	3061$	3063$	3073$	3075$	3079$	3087$	3113$	3136$	3199$
		3220$	3232$	3236$	3237$	3240$	3241	3251$	3256$	3258$	3259	3265$	3300$	3313$
		3316$	3318$	3320$	3322$	3328$	3330$	3354$	3362$	3377$	3385$	3386	3398$	3399$
		3401$	3411$	3429$	3433$	3435$	3437$	3451$	3454$	3487$	3493$	3506$	3526$	3528$
		3530$	3532$	3537$	3553$	3567$	3579$	3581$	3590$	3598$	3660$	3665$	3707$	3718$
		3725$	3746$	3757$	3766$	3771$	3783$	3785$	3789$	3821$	3823$	3852$	3854$	3858$
		3860$	3863$	3879$	3882$	3888$	3891$	3907$	3933$	3936$	3939$	3943$	3954$	3956$
		3979$	3982$	3994$	3999$	4002$	4024$	4035$	4043$	4092$	4096$	4101$	4120$	4133$
		4165$	4180$	4197$	4213$	4216$	4225	4229$	4245	4250$	4263$	4286$	4306$	4316$
		4318$	4320$	4322$	4331$	4336$	4341$	4346$	4354$	4361$	4365$	4395$	4398$	4401$
		4467$	4498$	4522$	4581$	4582$	4583	4592$	4612	4631$	4645$	4658$	4661$	4664$
		4667$	4673$	4676$	4680$	4681	4682$	4691$	4697$	4701$	4702$	4707$	4708	4717$
		4721$	4724$	4728$	4730$	4744$	4746$	4753$	4755$	4764$	4788$	4816$	4826$	4834$
		4844$	4846$	4850$	4851$	4852$	4865$	4870$	4872$	4882$	4892$	4894$	4907$	4916$
		4922$	4925$	4937$	4942$	4945$	4949$	4953$	4955$	4960$	4963$	4966$	4972$	4978$
		4985$	4989$	4994$	5001$	5011$	5014$	5021$	5026$	5036$	5047$	5049$	5053$	5063$
		5067$	5086$	5089$	5095$	5101$	5108$	5189$	5214$	5216$	5218$	5222$	5225$	5291$
		5295$	5301$	5303$	5361$	5365$	5367$	5373$	5383$	5387$	5422$	5427$	5433$	5435$
		5451$	5469$	5475$	5482$	5485$	5537$	5540$	5543$	5547$	5553$	5574$	5579$	5584$
		5591$	5593$	5603$	5650$	5683$	5685$	5749$	5773$	5777$	5785$	5790$	5804$	5812
		5829$	5845$	5935$	5943$	5964$	5989$	5992$	5996$	6000$	6004$	6009$	6046$	6059$
		6062$	6064$	6091$	6094$	6097$	6150$	6163$	6167$	6172$	6176$	6182$	6185$	6188$
		6190$	6192$	6194$	6213$	6217$	6221$	6274$	6313$	6318$	6325$	6328	6340	6357$
		6367$	6386$	6412$	6414$	6421$	6439$	6444$	6447$	6489	6491$	6494$		
HALT	58E8	3817#	6659											
HALTPC	71DC	3785	4990	6766#										
HEXASC	5DBD	2868	2871	3780	3788	3942	4099	4508#	4524					
HIGHST	42FA	874#												
HLBUFF	4088	334#												
HLTBUF	71DA	3766	6764#											
HLTCOD	71DB	3771	3799	4598$	5003	6765#								
HLTFLG	0002	13#	3796	4861										
HLTMSG	7414	3778	3783	3821	6913#									
HLTPSL	71E0	4995	6767#											
HMPEND	707F	3765$	3792$	4594	6558#									
HOLD1	0019	246#	5904	5981	6133									
HOLD4	001C	251#	6409											
ICCS	707C	3572$	5189	5845	5890	5923	5943	6067	6108	6125	6345	6367	6553#	
ICHEC1	53AC	3099#	3103											
ICHECK	53A2	2639	2795	3094#										
ICON	745C	3054	6940#											
IDLE	4C32	1837	1844	1845	1906#	1911	3798	3801	4483	4648	4787	4819	4829	4858
		4863	4899	6266	6269									
IFLAG	7223	1995$	3073	5834	6824#									
IFLOW	5367	2937	3054#											
IMPXFR	7099	3576$	5879$	5939$	6029$	6150	6361$	6587#						

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
INCCNT  417F    558#    1172$   1174    1176$
INDADR  721C    1951    1968$   4001$   4817$   4827$   4871$   6813#
INDBUF  7600    3999    6813    7133#
INDCNT  721B    1931    1971$   6812#
INDFLG  409D    355#    1907    1956$   4002    4427$   4476$   4815$   4825$   4879$   5177$
INDRC1  5A23    3994#
INDRCT  5A1B    3991#   6654
INDTS1  4CA7    1955    1958#   1963
INDTS2  4CB6    1959    1964#
INDTST  4C94    1926    1950#
INISUB  56F8    3552    3559#   3717    4880    4914
INIT    56E6    3552#   3557    6660
INITH   0035    76#     3583$   6455$
INITL   0034    75#     3585$   6457$
INITPK  71FB    3598    6781#
INIVEC  0040    297#    4790
INTACK  6575    5616#   6601
INTCSR  7074    3593$   5214    5361    5376$   5383    5760    5766$   6545#
INTDB   7075    5763    6546#
IOARG1  50BF    2655$   2657#
IOARG2  51F7    2814$   2815#
IPR     7071    5829    6540#
IPRCHK  66B6    5203    5819    5822    5825    5829#
IREG    4E80    2326#   6685
ISR     7070    3568$   5320    5339    5492    5516    5612    6539#
ITCSR   001D    34#     4551$   4558$   4569$   4571$   5183$   5185$   5884$   5903$   5905$   5912$   5915$   5931$
                5980$   5982$   6034$   6089$   6132$   6134$   6280$   6294$   6296$   6310$   6312$   6324$   6331$
                6353$   6393$   6408$   6420$   6424$   6435$   6443$
ITDB    001C    33#     5906    5909    5987    5990    5993    5995    6092$   6095$   6098$   6100$   6138    6141
                6144    6147    6169    6284    6287    6317$   6327$   6329$   6438$   6441$   6446$   6449$
ITEST   537D    2637    2793    3070#
ITEST1  5388    3075#
ITEST2  539C    3084    3087#
ITICR   68B2    6122#   6624
ITICR0  68C1    6124    6128#
ITICR1  68CE    6134#   6410
ITICR2  68FD    6127    6163#
ITICR3  68ED    6148#   6178
ITNIC0  6947    6195    6198    6200    6205#
ITNIC1  694D    6201    6207#
ITNICR  691B    6182#   6625
ITRCSR  689B    6108#   6622
ITRUN   679E    5867    5958#
ITRUN0  67F4    5968    5998    6002    6007    6012    6016#
ITRUN1  67FF    5959    6026#
ITRUN2  67F6    6017#   6043
ITSGL   707E    3575$   5893$   5964    6555#
ITTEMP  709E    5986    6591#
ITWCS0  66E6    5852    5855    5858#
ITWCS1  66E8    5857    5859#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
ITWCS2  671F    5874    5890#
ITWCS3  6747    5908    5911#
ITWCS4  6752    5913    5916#
ITWCS5  6768    5925    5927#
ITWCS6  6789    5938    5943#
ITWCS7  6793    5946    5948#
ITWCSR  66C6    5840#   6623
L       Reserved 1000   1010    1103    1117    1129    1131$   1178    1218    1302    1304$   1428    2020$   3864$
                4233    4255    4584    5600$   5802$   5809    6326
LA1245  007B    263#    6330
LARM12  0063    265#    5883    5930    6033    6392
LARM2   0062    270#    6352
LARM3   0064    268#    4550    4557
LARM45  0078    266#
LAST    6590    5634#   5641    5644    6112    6117    6119
LCMASK  00DF    188#    1682
LDCSR   49A4    1504    1509#   3321    3329    4307
LDCSR1  49A7    990     1510#   2672    2844    3144    3202    3443    4626
LDUPC   49D1    982     989     1111    1540#   2839    3221    3319    3331    3452    3591    3708    3934    4264
                4726    4756
LDUPC1  49D4    1541#   2668    2673    2846    3198    3201    3456    3938    4308
LDXPRP  4500    477     700     932#    3834
LENGTH  4166    535#    968     1198$
LF      000A    209#    624     1703    1965    6836    6839    6842    6845    6848    6851    6859    6867    6873
                6875    6877
LIMIT   41B4    603#    1151$   1214    1239
LIMSP   41B5    604#    955$    1242
LIST    46D9    961     1147#
LIST1   46DC    1148#   1225
LIST2   4710    1165    1168#
LIST3   4713    1169#   1210
LIST4   472F    1162    1183#
LIST5   4737    1186#   1192
LIST6   4759    1188    1195    1203#
LIST7   46EC    1154#   1180
LIST8   46E3    956     1151#
LNGSAV  71E8    4942    4967    6771#
LNGSUM  71EC    4945    4960    4966    6773#
LOAD    58FC    3833#   6661
LOAD1   45C3    1005    1011    1016#
LOAD12  0043    257#
LOAD1X  45F9    1036#   1098    1112
LOAD2X  4625    1060#
LOAD3X  463A    1062    1068#
LOAD45  0058    258#    6419
LOAD4X  4656    1076    1080#
LOADA   45A1    974     987     998#    1006
LOADB   45B6    1001    1008#
LOADED  7082    5895    6064    6113    6122    6571#
LOADX3  454E    960     965#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
LOADZ   58FF    3834#  4004
LODADR  40A3    362#   965    978    1034   1075   1081$  1095   1107   1277$  1406   1412$  1443   1446$
                1487$
LODCNT  40A7    364#   1387$  1400   1413   3883
LODDST  4165    533#   1044$  1278   1402   1439
LODFLG  409B    353#   939$   1013$  1142$  1160   1990$  2073   2100   2111   2256   3867$  4426$
LODSU1  5925    3642   3840   3852#
LODSUB  590A    3833   3840#  3993
LODVEC  4117    477#
LOGCNT  7E0F    7158#
LOGCON  7E0E    7157#
LONG    4E9C    2342#  6679
LPCNT1  7476    3365$  3379   3382$  3419$  3422   3425$  6954#
LPCNT2  7477    3347$  3356   3359$  6955#
LRMASK  40BE    385#   1643   1695   3775   5391
LSHIFT  4A00    1518   1545   1552   1570#  1575   2221   3244   3262   3378   4710   4748   4766
LSNWRN  747A    3252   6961#
LSTBUF  41C2    614#   1166   1183   1312   1314   1316
LSTPRP  46CB    478    1141#  2583
M       Reserved 708$  709    717    719$   783$   830    861$   945    1066   1187   1200$  1233   1245
                1252$  1253   1269   1275$  1279$  1297$  1378$  1390   1396   1410$  1414$  1418   1422
                1434$  1440$  1453   1457   1462   1466   1469   1471   1475   1479   1482   1484   1499$
                1501$  1503$  1570   1572$  1589   1591$  1602$  1676$  1685$  1688   1691$  1727   1729$
                1731   1733$  1739   1785   1788$  1796   1964   1977   2006   2008   2035$  2036$  2039
                2053   2130   2133   2136   2146$  2149   2153$  2155$  2164   2168$  2170$  2226   2227$
                2368$  2375   2378$  2402$  2409   2412$  2436   2481$  2483$  2500   2503   2506   2508$
                2522   2550   2554   2566   2570   2576   2602$  2650$  2731   2741   2768$  2779$  2784
                2808   2859   2897$  2907   2910   2928$  2948   3062   3064   3074$  3076   3078$  3080
                3088   3090$  3239$  3257$  3314   3315$  3317$  3353$  3400$  3408   3410$  3434   3436
                3438   3440   3442$  3490   3491$  3527   3529   3531   3533   3628   3747   3749$  3772
                3880   3881$  3886$  3892$  3908   3955$  3957   3980$  3995   3998$  4003$  4025   4027$
                4042   4166   4199   4228$  4248   4317   4319   4321   4323   4328   4329$  4333   4334$
                4338   4339$  4343   4344$  4366   4369$  4393   4396   4399   4508   4517   4659   4660$
                4662$  4668   4674   4677   4690$  4704$  4723$  4725$  4729   4731$  4835   4836$  4849$
                4873   4954$  4964$  4970   4979   4984$  5093   5105   5106$  5190   5195$  5219   5223$
                5226$  5292   5296   5302$  5304   5309   5311$  5345   5362   5366   5368   5371$  5374$
                5384   5388   5423   5428   5434$  5438$  5442   5452   5470   5476   5483   5486$  5538
                5541   5544   5556   5558$  5575$  5580   5583$  5585$  5592$  5594$  5633   5649$  5651$
                5684$  5686$  5703   5704$  5774   5778   5784$  5786   5789$  5791   5794$  5830   5831$
                5846   5849   5850$  5853   5936   5944   5949   5950$  5965   5967$  5997   6001   6006
                6011   6047   6050$  6060   6061$  6063$  6083$  6090   6093   6096   6099   6151   6154$
                6164   6168   6173   6177   6189   6191   6193   6196   6212$  6216$  6220$  6224$  6316
                6358   6368   6373   6374$  6437   6440   6445   6448   6490$
MAKCN1  5EB8    4668#  4718
MAKCN2  5ECC    4682#  4716
MAKCN3  5EDC    4689#  4694
MAKCN4  5F16    4671   4720#
MAKCN5  5F31    4733   4735#
MAKCN6  5F39    4688   4741#
MAKCN8  5EE5    4696#  4749
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Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

MAKCON	5E9E	3597	4589	4656#	4805
MAKEWR	5604	3297	3307	3385#	
MAKMOD	5373	2636	2792	3061#	
MAKSPC	5293	2886	2890	2896#	
MARKSP	5DB1	1940	4496#	5077	5082
MASTER	0017	236#	6279	6323	
MATCH	4D07	2010	2017#		
MAXCNT	0050	194#	1689		
MCHECK	53BA	2635	2791	3113#	
MCON	7460	3057	6942#		
MEMADR	749E	4092	7003#		
MEMCOD	74B4	4101	7022#		
MEMDEP	508F	2618	2634#		
MEMERR	5D46	2787	4434#		
MEMEXM	51C1	2709	2790#		
MEMLD1	5971	3885	3891#		
MEMLOD	5957	1404	3878#		
MEMMSG	7365	4435	6884#		
MEMSIZ	74A2	5063	7004#		
MEM_CO*	0004	201#	4434		
MERGE	52FB	2974#	3480		
MFLOW	536D	2935	3057#		
MFLOW1	542A	3158	3167#		
MICCON	580C	3709#	3754	3806	3808
MICDEP	50A5	2620	2645#		
MICEXM	51E0	2711	2804#		
MICFLG	721F	1991$	3906$	4634	6817#
MICMON	4154	519#	698	4060$	
MICPRO	4207	633#	827		
MICRO	4E85	2328#	6686		
MICST1	598F	3912#	3916		
MICST2	599C	3918#	3927		
MICST3	599F	3910	3919#		
MICST4	59A6	3922#	3923		
MICSTP	5976	3901#	6662		
MINCNT	708C	6081	6274	6579#	
MINUS	4F96	2469#	6710		
MIPFLG	40D9	424#	1795	5256	
MISC2	0001	9#			
MKSPC1	5296	2897#	2900		
MMSTRT	4C00	284#			
MODADR	4099	351#			
MODIFR	4090	344#			
MODVEC	0013	295#			
MREG	4E7B	2324#	2443	6683	
MRKBUF	7219	4486	4500$	6810#	
MSGADR	40B7	376#	727		
MSGBUF	40F0	433#			
MSGCNT	408E	342#			
MSGTBS	7E07	7150#			

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

MSKCPY	40BF	386#												
MSTRCD	0A0C	238#	6325											
MUL2	4823	1170	1222	1301#										
MULSH1	46C0	1129#	1136											
MULSHF	46BE	1020	1026	1127#										
MYCNT	4179	548#	689$	707	720									
MYLDER	4266	706	727#	4429										
MYLOAD	420C	459	688#	1797										
MYPC	40B9	378#	4468$											
NACKCM*	0007	204#	4439											
NACKDA*	0008	205#	4444											
NACK_X*	5D4E	4118	4438#											
NACK_X*	5D56	4175	4443#											
NAMES	4302	885#												
NBUFFR	7208	2358	2370	3526	3982	6793#								
NEG1	7196	3034	3535	4326	4355	6727#								
NEG2	719A	3031	6729#											
NEG200	71A6	4917	6735#											
NEG3	719E	6205	6731#											
NEG4	71A2	3028	6733#											
NEWAS	71B3	1993$	2331$	2924	3700	3848	4126	6741#						
NEWCN0	6874	6077	6081#											
NEWCN1	6878	6069	6074	6080	6083#									
NEWCN2	687A	6085#	6275											
NEWCNT	684C	5898	5963	6049	6064#									
NEWDL	71B2	1994$	2343$	2974	3018	6740#								
NEXTA1	4EB9	2360#	2372											
NEXTA2	4EDC	2362	2364	2366	2374#									
NEXTA3	4EDF	2375#	2419											
NEXTAD	4EA4	2352#	6688											
NICFLG	7083	5875	5935	6046	6075	6208$	6357	6575#						
NICR	7084	6051	6053	6055	6057	6182	6186	6577#						
NICRM3	7088	6185	6188	6578#										
NICSUB	6953	6183	6211#	6413										
NOCHK	40FF	444#	4208$	4376$										
NOCON	58DB	3753	3804#											
NOPBUF	41A7	597#	1498	2825	2827	3136	3190	3195	3429	3433	4287	4293	4296	4299
		4621	4625$											
NOTBYT	5281	2884	2887#											
NOTL	4F65	2438	2441#											
NOTPVG	5289	2881	2891#											
NOTYPE	40D4	413#	3671$	4176$	4469	4920$	4977$	5040$	5046$					
NPREP	5089	2626	2630#											
NPREP1	5145	2717	2722#											
NSADBF	7206	6791#												
NTEST	56BE	2630	2722	3514#	3915	3963								
NTEST1	56D2	3521	3526#											
NXTSEG	42F8	873#	1217											
OCOPY	40BC	381#												
OFLAG	40BB	380#	1794$	1914$	4056$	4424$	4475$	4855$	5175$					

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

OK5V	0005	21#									
OKV15	0007	26#									
OLDRUN	707D	3574$	5861$	5960	6554#						
ONE	5CBB	4327#									
ONEDN	534F	3027	3034#	3477							
ONEUP	5323	2995	3002#	3472	3475						
OPCODE	408F	343#									
OUTADR	7227	2870	6829#								
OUTBUF	7224	2873	6826#								
OUTDAT	7230	2867	2896	6831#							
OUTLET	7225	2860$	6827#								
OVERRI*	7E67	5402	7170#								
PACKS	4172	540#	1028$	1090							
PAKCNT	40A8	366#	1027$	1091$	1114	1121$	1286$	1424	1426$	1448$	
PARERR	411D	479#									
PARFLG	4197	583#	1526	3159$	3167$	3175	3313	3338$	4069$	4658	4804$
PARITY	5E56	1842	4609#								
PARMSK	007F	222#									
PARSE	4D2B	2070#	2597	2689	3699	3870	3901	3953	4119		
PARSE1	4D33	2073#	2121	2161	2176	2275	2290	2332	2344	2382	2416 2484
PARSE2	4D50	2078	2084#								
PARSE3	4D53	2083	2085#								
PARSE4	4D71	2098	2108#								
PARSE5	4D83	2107	2118#								
PARTMP	4198	584#	3337	4728							
PARVEC	4C22	479	1842#								
PCADR	741E	3786	6917#								
PCMSG	7418	3789	3823	6916#							
PCOUNT	70FC	5178$	5235	5241$	5289$	6645#					
PFFLAG	40B5	372#	3768	4547$	4575$	5750					
PHYS	4E6C	2318#	6680								
PHYVIR	52E8	2930	2950	2966#							
PLUS	4F91	2466#	6709								
PMBOOT	6ADA	6464#	6633								
PMHAL0	6647	5755	5760#								
PMHALT	6625	5240	5743#	6609							
PMTALK	6441	5382	5427#								
PMTLK0	6458	5430	5439#								
PNTR1	41A2	594#	1509$	1514	3430$						
PNTR2	746C	3345$	3351	3355$	6949#						
POINTR	4176	544#	1540$	1544	1551	2666$					
POS1	7186	3002	4665	4997	5005	5019	6719#				
POS2	718A	2999	6721#								
POS200	7192	4923	5015	6725#							
POS4	718E	2996	5070	6723#							
PRGCNT	4F79	2433	2450#								
PRI1	66A5	5624	5740	5818#							
PRI2	66AA	5626	5733	5821#							
PRI3	66AF	5628	5726	5824#							
PRI4	66B4	5629	5718	5827#							

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
PRIADR	40C1	390#
PRICNT	40C3	391#
PROMPT	4203	631# 823 1916 1929 4361
PRPSUB	4CCF	1915 1928 1982#
PSLADR	0000	191# 2441
PSW	Reserved	4553$ 4609 4637$ 4643$ 6339 6387$
PUBCHK	5F8B	4785# 4898
PUBFLG	40B6	374# 3673$ 3688$ 4785 4803$ 6474$
PUBMSG	7323	4788 6873#
PUPFIL	7427	6920#
PUVEC	4151	517# 4580
PVECTR	4C2B	722 862 1845#
PWRFIL	7239	4816 6835#
PWRMSG	7341	4592 6877#
PWRVE1	004C	301#
PWRVEC	001B	296# 517
PXXX	4F4B	2429# 6714
QPEND	40D8	422# 3578$ 5247 5790
QTOWR	7486	3280 6977#
QUAL	4115	474# 972 1037 1043 1060 1072 1087 1092 1781$ 1989$ 3849$ 3994
QUAL1	7218	1988$ 6808#
QUO	4160	526# 998 1003$ 1335 1339 1347$ 1357 1359$
RAD50	482B	1159 1312#
RAD50A	483A	1313 1315 1317#
RADCVT	4895	1336 1340 1342 1363#
RAMADR	71AA	4213 6737#
RAMCNT	71AE	4216 6738#
RAMVAL	4080	328# 782 1792$
RCVADR	71C2	4093 4102 4950 6753#
RCVBUF	71C0	2756 6751#
RCVCSR	7072	3573$ 5317 5579 5639 6542#
RCVDAT	71C6	1064 2798 2862 4164 4197 4938 4943 4961 5087 6754#
RCVDB	7073	5301 5773 6543#
RCVDON	0002	172#
RCVMOD	71C1	4096 6752#
RCVMS1	518E	2760# 2764 4182
RCVMS2	519B	2762 2766#
RCVMS3	51A3	2771# 2775
RCVMS4	51B0	2773 2777#
RCVMS5	518C	2759# 2782
RCVMSG	5189	2757# 3767
RCVMSX	5186	1063 1119 2640 2756# 2796 3555 3600 3727 4091 4100 4162 4196 5079
RCVTTR	637B	5317#
RDCON	7E10	5406 5456 5537 7160#
RDCON1	7E11	7161#
RDTEMP	7E12	7163#
RDWRZ	55A4	3266 3323 3345#
RDWRZ1	55AC	3348# 3360
READ	0080	120# 2766 2777 3352 5599 5646 5657 5677 5840 6211 6215 6219 6223
READJ2	0004	18#

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

REENTR	52BA	2928#	2952							
REMAIN	415E	525#	969$	1008	1320$	1341	1348	1356$		
REMOTE	0006	24#	5250	5377						
REMRDB	7E01	7139#								
REMRSR	7E00	7138#								
REMXDB	7E03	7142#								
REMXSR	7E02	5412	5462	7141#						
REPEAT	4D0E	2034#	6664							
RESADR	71E4	4937	4956	5022	6769#					
RETRY	408C	339#	1032$	1274	1433					
RETRYI	40CC	399#								
RET_VE*	414D	511#								
RFLAG	7217	1987$	2034	2624	2715	3500	6806#			
RN	4F6D	2445#	6715							
RSHF	5627	3402	3406#							
RSHF1	562A	3408#	3413							
RSVEC	0049	300#	502	3922	3969					
RSVECT	413D	501#								
RTEST	56B4	3500#	3556							
RTEST1	56BC	3502	3506#	3517						
RTLWR0	7495	3374	3420	6997#						
RUBOU1	4B22	1732	1736#							
RUBOUT	4B0E	1665	1725#							
RUNFLG	40D3	411#	3742$	3805$	4543	4574$	4616	4641$	5042$	5748$	6468$
SADRS	743C	3718	6927#							
SAVADR	41B8	608#	1249$	1276						
SAVCHR	40C0	388#								
SAVCNT	4199	586#	1017$	1099						
SAVE	419E	592#								
SAVE12	00A3	254#	5902	5979	6131					
SAVE45	00B8	255#	6407							
SAVEB0	419A	588#	1082	1618$						
SAVEB1	419B	589#	1622$							
SAVESP	0104	313#	932	1145						
SAVMSK	40DA	426#								
SAVSP1	0108	314#	482	485	489	493	497	501	506	
SAVUPC	41AE	599#	984$	988						
SBUFFR	4111	472#	966	1783$	2390	2404	2413	3860	4000$	
SCNADR	71CC	4916	4922	5012	5086	6758#				
SCNPAK	71CA	4926	6757#							
SCVEC0	0043	298#								
SCVECT	4138	497#								
SECURE	0003	16#	5399							
SEGNUM	417E	556#	947	1150$	1232	1251				
SEMI	4FCE	2534#	2536	6707	6708					
SENDQ	6549	5249	5588#							
SENDS	6531	5245	5571#							
SEQNUM	4093	347#								
SETACK	00A8	146#	2767$	5601$	6243$					
SETACL	0032	72#								

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
SETAPT	4288	460 774#
SETATN	00AA	156# 2734$ 4141$ 4768$ 5326$ 5348$ 5500$ 5522$ 5837$
SETBLK	003B	85# 4549$ 4556$ 4567$ 5181$ 5882$ 5901$ 5929$ 5978$ 6032$ 6087$ 6130$ 6278$ 6292$ 6308$ 6351$ 6406$ 6417$
SETBSY	002F	67#
SETCLK	0021	46# 995$ 2678$ 2832$ 3149$ 3207$ 3335$ 3460$ 3711$ 4312$ 4738$
SETCSK	0025	52# 1521$
SETCSR	0039	82# 1520$
SETDCL	0030	69#
SETHLT	00AE	162# 3961$ 3967$ 5287$
SETLIT	003D	88# 2627$ 2718$ 5173$
SETMCI	0028	57#
SETMCK	002A	60#
SETPAG	003E	90#
SETPAR	698F	6265#
SETPFI	00AC	159# 4548$
SETPME	6AF9	6484# 6638
SETSS	0023	49# 2842$ 3444$ 3912$ 3919$ 4290$ 4759$ 4761$ 4769$ 4771$
SETTIM	00A4	140# 5856$ 5926$ 6348$
SETTMR	002D	64# 5200$ 6016$ 6038$
SETUPC	00A9	154# 1554$
SETUPK	0027	55# 1555$ 1599$ 4278$
SETVAL	4296	703 780#
SETWCK	0037	79# 1597$ 4276$ 4402$
SFLAG	40CD	401# 5176$
SHARE	4F8B	2448 2451 2458#
SHAREX	4FA2	2467 2470 2473 2477#
SHFBUF	7472	3232 3251 3256 3362 3371 3377 3385 4682 4697 4744 4764 6952#
SHIFT	4E0D	2120 2216# 2371 2405
SHIFT1	4E10	2218# 2224
SIBIAS	40D1	408#
SILFLG	40D0	407# 5253
SKIP40	5DE2	4528 4533#
SKP11	5256	2865 2867#
SKP319	48B5	1373 1376#
SKP320	48AB	1365 1372#
SKP321	48A6	1364 1370#
SKP523	48B7	1367 1369 1371 1375 1377#
SLASH	4E56	2301# 6706
SLOW_C*	40F4	436# 5202$ 5553
SLVEC1	4133	493#
SLVECT	412E	489#
SLWCLK	0006	23# 5554
SMLALM	7081	6072 6565#
SMLNIC	7080	6059 6078 6202$ 6563#
SNDADR	40A0	359#
SNDCNT	40A2	360#
SNDCTL	653E	5572 5579# 5589
SNDDAT	5CD9	4184 4190 4194 4252 4295 4298 4301 4354#
SNDDEL	4B04	1669 1718#

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

Symbol	Value	References
SNDFLG	40F2	434#
SNDMS0	5150	2727#
SNDMS1	5157	2730# 2753 3889
SNDMS2	515F	2735# 2739
SNDMS3	516C	2737 2741#
SNDMS4	5174	2746# 2750
SNDMS5	5181	2748 2752#
SNDMSG	514E	1039 1123 2726# 3554 3599 3726 3758 4134 5084
SNDMSX	514B	2638 2725# 2794 5078
SNDPAK	408D	341# 1465
SNDPR1	6214	5066 5069#
SNDPRP	6204	4929 4933 4940 4947 4958 5063#
SNDRCV	6222	4886 4992 4999 5007 5017 5024 5030 5069 5077#
SNDRCX	622B	5037 5081#
SNDTA	6468	5396 5448#
SNDTL	6494	5379 5475#
SNDTL0	649C	5394 5411 5445 5479#
SNDTL1	64A4	5425 5484#
SNDTL2	64A6	5454 5472 5485#
SNDTL3	64A7	5461 5486#
SNDTR	6475	5401 5404 5444 5456#
SNDTR1	6483	5458 5462#
SNDTRL	641E	5398 5406# 5441
SNDTT0	63E0	5364 5370 5377#
SNDTT1	63ED	5383#
SNDTT2	63FD	5386 5391#
SNDTTX	63C4	5361#
SNTRL1	642C	5408 5412#
SOBIAS	40D2	409#
SOFDON	6AD7	6461# 6632
SOURCE	7478	3284$ 3306$ 3390 6957#
SP	Reserved	954 1906$ 4499 4906$
SPACE	0020	174# 2040 2054 2395 6702 6828 6830
SPADRS	749A	7002#
SPBUFF	4086	333#
SPCF1	4E4F	2287#
SPCFLG	0001	180# 2288
SPCFLW	4E4C	2285# 6705
SPEND	40D7	421# 3577$ 5205 5243 5291 5543 5574 5591 5785
SPPACK	7498	3553 4883 7001#
SPSTRP	4D23	1942 2053# 2057 2560 2580 3633 3738 3818 4030 4052
SRCSIL	4BC0	1813#
STACK	4080	282# 1906 4906
STAL10	5760	3584 3611# 6456
STALL5	5763	3611 3612#
START	4100	459#
START1	5815	3702 3715#
START2	582D	3722 3724#
STEP	59D6	3953# 6663
STEP1	00F1	274# 5911

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

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STEP2    00F2   276#  5914
STEPA    59EA   3961#  3964
STEPB    59F8   3959  3967#
STEPB1   59FD   3969#  3970
STEPC    59F5   3966#  3974
STKFLW   4F7E   2453#  6713
STPFLG   721E   1992$  3751  3755  3793  3954  6815#
STRBLK   42FE   876#  1152  1261
STRPAK   7436   3725  6923#
STRTA1   4F06   2392#  2406
STRTA2   4F2E   2394  2408#
STRTA3   4F45   2396  2398  2400  2418#
STRTAD   4EF1   2384#  6687
SUBDIV   4875   971  1334  1338  1346#
SUBDV1   487B   1348#  1360
SUBDV2   4888   1352  1356#
SUCCES   4116   475#  701  729  737  1935  2584  3835  4466$  4478  4481  4497$  4896  5072
SUMREG   0020   36#  4560  5232  5920
SUPRES   526C   2872  2879#
SUPRS4   5284   2889#  2912
SUPRS6   527C   2885#  2893
SWAP     41AA   598#  979$  981  983  1109$  1110  2665  2836$  2838  3189$  3318  3330  3933
                3935  4721  4754$  4755
SWITCH   4092   346#
SWPOS    4081   329#  5259
SYNERR   5D1E   1948  1961  1966  2037  2042  2096  2109  2141  2151  2166  2193  2198  2200
                2273  2309  2354  2357  2377  2386  2389  2411  2435  2456  2502  2505  2564
                2568  2573  2578  2582  2600  2692  3184  3632  3648  3653  3656  3740  3820
                3844  3847  3997  4041  4050  4054  4125  4132  4416#
SYNMSG   7352   4420  6880#
SYN_CO*  0003   200#  4419
S_COMM*  57F2   3698#  6665
TAB      0009   210#
TABLE    70A2   5610  6601#
TALKDB   7E14   5433  7166#
TALKSR   7E13   5427  7165#
TALK_V*  080F   318#  1632
TAPERR   5D2D   2586  3837  4423#
TEMP     40B4   370#  1385$  1386  1666$  1677  1683$  1698  1707  1710  4758$  4773  4775$
TEMP1    416A   538#  3194$  3196$  3199
TEST     5A3E   4024#  6666
THREE    5CC5   4337#
TIKTOK   7E0D   7155#
TIMCNT   7051   6522#
TIMER1   7E0A   7153#
TIMER2   7E0C   7154#
TIMSAV   7E08   7152#
TLKFLG   7E04   1640  5380  5439  5533  7144#
TMPBUF   4168   537#  1018$  1024  1317$  1377  1380$  3451  3453  3569$  3590  3937$  3939  4286
                4306  4644$  4646
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

TMRFIL	7052	6313	6524#				
TMRPR0	69BF	6286	6289#				
TMRPR1	69D7	5889	5916	6300#			
TMRPRP	6999	4811	6272#				
TMRSR0	6A28	6347	6349#				
TMRSR1	6A4B	6360	6367#				
TMRSR2	6A55	6370	6372#				
TMRSR3	6A6A	6386#	6398				
TMRSR4	6A6E	6376	6391#				
TMRSRV	6A18	1848	6339#				
TMRVEC	4C2F	1848#					
TOCNT	4083	331#					
TOCNT1	4085	332#					
TODBFR	709A	6412	6414	6589#			
TODPRP	6AB5	6418	6422	6434#			
TODR	6A7D	6404#	6627				
TODW	6A8D	6412#	6628				
TODW1	6A93	6414#					
TPINI1	0058	305#	935	1146	1432		
TPINIT	0055	304#	3566				
TPSUB	69DE	6289	6306#				
TPSUB0	69F2	6315#	6322				
TPSUB1	69F4	6316#	6320				
TRCR	0043	97#					
TRDB	0040	93#	5453$				
TRKUP1	41B2	601#					
TRKUPC	41B0	600#	980$	1080	1108$	1585	1603	1605$
TRMODE	0042	95#					
TRNFLG	7E06	5208	7148#				
TRSR	0041	94#	5448				
TRYCHK	4924	1419	1423	1432#			
TTCR	004B	114#	5279$				
TTDB	0048	109#	4590	5273	5484$		
TTMODE	004A	111#					
TTRCSR	6595	5639#	6603				
TTRDB	6656	5770#	6610				
TTRDB1	6679	5788	5790#				
TTRID	6606	5721#	6608				
TTRIE	65C2	5671#	6606				
TTRRE1	6514	5553#					
TTRREM	64F2	5252	5533#				
TTRTS0	6328	5261	5269#				
TTRTS1	632A	5270#					
TTRTS2	633D	5268	5277	5280#	5564		
TTRTS4	6355	5283	5286	5291#			
TTRTS5	6372	5307	5309#				
TTRTSA	6319	5255	5258	5262#			
TTRTSB	62FE	5246	5250#				
TTRTST	62ED	5237	5243#				
TTSR	0049	110#	5269	5413	5479		

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

TTXCSR	658C	5632#	6602								
TTXDB	65A0	5646#	6604								
TTXID	65FB	5713#	6607								
TTXIE	65BB	5665#	6605								
TTXTST	63A0	5339#									
TUCR	0047	104#	5228$	5688$	5808$						
TUDB	0044	99#	5658$	5801							
TUERR	0086	308#	801								
TUERR1	42A4	799#	964	1247							
TUERR2	0079	306#	1436	1455	1459	1463	1467	1472	1476	1480	1485
TUERR3	0081	307#	1391	1397							
TUINIT	0004	224#									
TUMODE	0046	101#									
TUPREP	0015	225#	5227								
TURCSR	659B	5643#	6612								
TURCV	48C0	1048	1288	1385#	1450						
TURCV1	48E0	1399#	1415								
TURCV2	4900	1409	1413#	1587	1606	1619	1623	3890	3893		
TURCV3	48C3	1386#	1429								
TURDB	6683	5798#	6614								
TURDB0	6696	5806	5809#								
TURID	661A	5735#	6620								
TURIE	65F4	5707#	6619								
TURTST	64D1	5513#									
TUSR	0045	100#	5497	5513	5643	5803					
TUWCS1	65E0	5682	5689#								
TUWCSR	65C9	5677#	6615								
TUXDB	65B0	5657#	6613								
TUXID	6611	5701	5729#								
TUXTST	64AF	5492#									
TU_SEN*	0095	309#	1042	1284							
TWŌ	5CC0	4332#									
TWODN	5349	3025	3031#								
TWOUP	531D	2993	2999#								
T_VECT*	414D	512#	4071								
UBINIT	6ACD	6455#	6630								
UCON	7468	3050	6946#								
UFLOW	5361	2939	3050#								
UNIT	4091	345#	690	710	732	934$	943	1294	1461	1786$	2559$	2574$	4813$
UNITX	4106	468#	691$	780	933	2142$	3650	3657	3869$				
UPC14	0084	126#	1548	2657$	2815	4236$	4257						
UPC14A	0000	7#											
UPCADR	0001	186#	3122										
UPCBUF	744B	3940	6931#										
UPCCHK	5481	3123	3212#										
UPCEX1	5688	3459	3461#										
UPCEXM	566B	3214	3450#										
UPCFLG	0080	173#											
UPCOUT	7440	3943	6930#										
UPCTST	529E	2892	2903#										

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

UPPREP	5305	2968	2971	2989#									
USED	0080	187#											
USTART	583C	3716	3730#										
VERMSG	729D	1832	6853#										
VNORML	00A3	138#	1525$	1559$									
VRTUAL	4E71	2320#	6681										
VSHIFT	00A2	137#	1512$	1546$									
WAICMD	5AAA	4087#	4090	6667									
WAITH	6971	5776	5811	6140	6146	6166	6175	6214	6222	6231#			
WAITL	6980	5781	5814	6143	6149	6171	6218	6225	6243#				
WARM	41B7	606#	3669$	3686$	4878$	4911	5033$	6479$					
WCS	4E8A	2330#	6682										
WCSB0	0008	29#	1104$	1617$	4269$	4394$							
WCSB1	0009	30#	1106$	1621$	4272$	4397$							
WCSB2	000A	31#	1596$	4275$	4400$								
WCSCON	7464	3046	6944#										
WCSDE1	50F0	2677	2679#										
WCSDEP	50C3	2622	2662#										
WCSEX1	521F	2823	2836#	3187									
WCSEX2	521D	2831	2833#										
WCSEXM	51FE	2713	2821#										
WCSLOD	4A09	1405	1585#										
WCS_LO*	40D5	415#	1831$	4070$	4074	4821$	4831$						
WEFLAG	7564	4910$	5054	5058$	7118#								
WERROR	7569	5059$	7121#										
WFADR	71F2	4949	6776#										
WFAIL	61E3	4913	4915	4981	4993	5000	5008	5018	5025	5031	5038	5045#	
WFAIL1	61F2	4930	4932	4934	4936	4941	4948	4959	4971	5053#			
WFATAL	7567	5048$	7120#										
WFDATA	71F6	4978	6777#										
WFMSG	72CF	5049	6861#										
WFPACK	71F0	5027	6775#										
WORD	4E97	2340#	6678										
WRBYT0	4A36	1594	1617#										
WRBYT1	4A3E	1595	1621#										
WRCRR	7483	3349	6973#										
WRDSUM	409E	357#	1392$	1398$	1417	1421							
WRITE	00CC	165#	2733$	2743$	4140$	4150$	5618$	5634$	5775$	5780$	5810$	5813$	6139$	6142$
		6145$	6148$	6152$	6165$	6170$	6174$						
WRKMSK	40BD	384#											
WRMCNT	71FA	4953	4963	6779#									
WRMMSG	72AD	4907	6857#										
WRMST1	609A	4921#	5056	5060									
WRMST2	6104	4958#	4965										
WRMST9	6122	4969#	4975										
WRMSTR	6074	3802	906#										
WRNLSN	747D	3233	4698	6965#									
WRNWRN	7480	3387	6969#										
WRROT8	5633	3348	3418#										
WRRT8X	5638	3420#	3426										

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

WRTNOP	4993	977	1497#	2669	2840	3134	3197	3219	3588	3705	4262	4283	4292	4619
		4720	4752											
WRTOQ	7489	3277	6981#											
WRTWCS	5D05	2671	3200	4393#										
WRTWR1	55E1	3370#	3383											
WRTWR2	55EE	3373	3375#											
WRTWRZ	55CA	3231	3276	3294	3327	3362#								
WRZBUF	746E	3300	3322	3326	6950#									
XADRES	40C4	393#												
XCOUNT	40C6	394#												
XCSADR	7078	3580$	5215$	5344	5372$	5632	6550#							
XDBADR	707A	3582$	5217$	5375$	5648	6551#								
XFER	5AD8	4112#	6668											
XFER1	5ADD	4114#	4115											
XFRADR	418A	573#	1033	1096	4120	4224	4230$	4244	4251$	4263				
XFRBUF	4192	576#	3882	4180	4192	4193$	4249$	4294$	4297$	4300$	4357			
XFRCHK	623C	4124	4242	4302	5089#									
XFRCNT	418E	574#	1022$	1077	4316	4354	4365	5089						
XFRCOM	5CE7	4135	4220	4265	4361#									
XFRPAK	4188	571#	1036	4133										
XFRRA1	5BDA	4215	4220#											
XFRRAM	5BC2	4128	4212#											
XFRSEQ	682B	6050#	6364											
XFRSET	6823	5877	5941	6027	6046#									
XFRWCS	5C27	4130	4261#											
XMEMH	5B28	4143#	4147											
XMEMH1	5B35	4145	4149#											
XMEMI	5B1C	4138#	4155											
XMEMI1	5B48	4148	4158#	4159										
XMEMI2	5B51	4139	4162#											
XMEMI3	5B61	4163	4168#											
XMEML	5B3E	4153#	4157											
XMEMO	5B7B	4136	4180#	4195										
XMEMO1	5BA6	4191	4196#											
XMEMO2	5B94	4183	4190#											
XMEMO4	5B86	4184#	4185											
XMTCSR	7076	3579	3594$	5211	5387	5475	5753	5759$	6547#					
XMTDB	7077	5756	6548#											
XOFIN	5BB7	4200	4203#	4243										
XRAMI1	5BE0	4222#	4231											
XRAMI2	5BF0	4229#	4237											
XRAMI3	5BF7	4227	4233#											
XRAMI4	5BFC	4234$	4236#											
XRAMO	5C01	4221	4242#	4253										
XRAMO1	5C11	4249#	4258											
XRAMO2	5C1E	4247	4255#											
XRAMO3	5C22	4256$	4257#											
XVEC	000B	294#	4219											
XWCSI	5C38	4267#	4280											
XWCSI1	5C5B	4268	4271	4274	4282#									

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

XWCS0	5C64	4266	4286#							
XWCS01	5C6F	4290#	4303							
XWCS02	5C9B	4306#								
XWCS03	5CA1	4284	4308#							
X_CMND*	73A7	4440	6896#							
X_DATA*	73C6	4445	6900#							
YBUSRD	00EC	167#								
ZBUF1	6AFC	2072	3857	6488#						
ZBUF2	6AFD	6489#								
ZERO	7182	5090	6717#							
ZEROS	70FD	6421	6647#							
ZROBUF	6AFA	2359	2391	2699	3859	3861	4683	4946	5002	6487#
ZROCHK	623F	5090#								

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```
Error Addr  Code          Seq   Source statement

                            1   ;*******************************************************************************
                            2   ;
                            3   ;                ROM011 V10
                            4   ;
                            5   ;*******************************************************************************
                            6   ;
                            7   ;       REVISION HISTORY AT END OF FILE!!!!
                            8   ;
                            9   ;
            =0000           10   UPC14A  EQU     00H     ;(RO)   UPC bit <14>.  Asserted high.  <MSB>
                           11
            =0001           12   MISC2   EQU     01H     ;(RO)   Misc bit 2      <MSB>
            =0001           13   BOOTF   EQU     01H     ;(RO)   Boot Flag.  Asserted low.  <LSB>
                           14
            =0002           15   DCLO    EQU     02H     ;(RO)   DC LO Flag.  Asserted high.  <MSB>
            =0002           16   HLTFLG  EQU     02H     ;(RO)   Halt Flag.  Asserted low.  <LSB>
                           17
            =0003           18   SECURE  EQU     03H     ;(RO)   Disable flag.  Asserted low.  <LSB>
                           19
            =0004           20   READJ2  EQU     04H     ;(RO)   Bit 07 equals J2.  <MSB>
            =0004           21   APTFLG  EQU     04H     ;(RO)   APT Present Flag.  Asserted low. <LSB>
                           22
            =0005           23   OK5V    EQU     05H     ;(RO)   5 volts OK Flag.  Asserted high.  <MSB>
                           24
            =0006           25   SLWCLK  EQU     06H     ;(RO)   Slow (100 Hz) Clock.  <MSB>
            =0006           26   REMOTE  EQU     06H     ;(RO)   Remote Flag. Asserted low.  <LSB>
                           27
            =0007           28   OK15V   EQU     07H     ;(RO)   15 Volts OK Flag.  Asserted high.  <MSB>
            =0007           29   BOOTEN  EQU     07H     ;(RO)   Boot Enable Flag.  Asserted low.  <LSB>
                           30
            =0008           31   WCSREG  EQU     08H     ;(WO)   WCS Write Data Register
                           32
            =001C           33   ITDB    EQU     01CH    ;(R/W)  Timer Data Register
            =001D           34   ITCSR   EQU     01DH    ;(R/W)  Timer Status Register
                           35
            =0020           36   SUMREG  EQU     020H    ;(RO)   Ready Bit Summary Reg.
                           37
                            38   ;       All bits asserted low.
                           39
                            40   ; 07     06      05      04      03      02      01      00
                            41   ;Timer   Power   Remote  TU-58   Local   TU-58   Remote  Local
                            42   ;Int.    Fail    RCVR    RCV     RCV     XMIT    XMIT    XMIT
                            43   ;        Time    Done    Done    Done    Ready   Ready   Ready
                            44   ;        Out
                           45
            =0020           46   CLRCLK  EQU     020H    ;(WO)   Clear CPU Clock Run
            =0021           47   SETCLK  EQU     021H    ;(WO)   Set CPU Clock Run
                           48
            =0022           49   CLRSS   EQU     022H    ;(WO)   Clear Clock Single Step
            =0023           50   SETSS   EQU     023H    ;(WO)   Set Clock Single Step
```

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Error Addr  Code          Seq   Source statement

                           51
            =0024          52   CLRCSK  EQU     024H    ;(WO)   Clear CSR clock
            =0025          53   SETCSK  EQU     025H    ;(WO)   Set CSR clock
                           54
            =0026          55   CLRUPK  EQU     026H    ;(WO)   Clear the UPC clock
            =0027          56   SETUPK  EQU     027H    ;(WO)   Set the UPC clock
                           57
            =0028          58   SETMCI  EQU     028H    ;(WO)   Set Memory Control Init
            =0029          59   CLRMCI  EQU     029H    ;(WO)   Clear Memory Control Init
                           60
            =002A          61   SETMCK  EQU     02AH    ;(WO)   Set Memory Control Clock
            =002B          62   CLRMCK  EQU     02BH    ;(WO)   Clear Memory Control Clock
                           63
            =002C          64   CLRTMR  EQU     02CH    ;(WO)   Stop timer
            =002D          65   SETTMR  EQU     02DH    ;(WO)   Start timer counting
                           66
            =002E          67   CLRBSY  EQU     02EH    ;(WO)   Clear Unibus Bus Busy
            =002F          68   SETBSY  EQU     02FH    ;(WO)   Set Unibus Bus Busy
                           69
            =0030          70   SETDCL  EQU     030H    ;(WO)   Set DC LO
            =0031          71   CLRDCL  EQU     031H    ;(WO)   Clear DC LO
                           72
            =0032          73   SETACL  EQU     032H    ;(WO)   Set AC LO
            =0033          74   CLRACL  EQU     033H    ;(WO)   Clear AC LO
                           75
            =0034          76   INITL   EQU     034H    ;(WO)   Clear Unibus Init
            =0035          77   INITH   EQU     035H    ;(WO)   Set Unibus Init
                           78
            =0036          79   CLRWCK  EQU     036H    ;(WO)   Clear WCS Write Clock.
            =0037          80   SETWCK  EQU     037H    ;(WO)   Set WCS Write Clock.
                           81
            =0038          82   CLRCSR  EQU     038H    ;(WO)   Clear the CSR Serial Input.
            =0039          83   SETCSR  EQU     039H    ;(WO)   Set the CSR Serial Input.
                           84
            =003A          85   CLRBLK  EQU     03AH    ;(WO)   Clear the 100Hz Block.
            =003B          86   SETBLK  EQU     03BH    ;(WO)   Set the 100Hz Block.
                           87
            =003C          88   CLRLIT  EQU     03CH    ;(WO)   Clear the Run Light
            =003D          89   SETLIT  EQU     03DH    ;(WO)   Set the Run Light
                           90
            =003E          91   CLRRD   EQU     03EH    ;(WO)   Clear R/D light
            =003F          92   SETRD   EQU     03FH    ;(WO)   Set R/D light
                           93
            =0040          94   TRDB    EQU     040H    ;
            =0041          95   TRSR    EQU     041H    ;
            =0042          96   TRMODE  EQU     042H    ;
            =0043          97   TRCR    EQU     043H    ;
                           98
                           99
            =0044         100   TUDB    EQU     044H    ;(R/W)  TU-58 Data Buffer
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Error Addr  Code          Seq   Source statement

            =0045         101   TUSR    EQU     045H    ;(RO)   TU-58 Status Register
            =0046         102   TUMODE  EQU     046H    ;(R/W)  TU-58 Mode Registers 1 and 2.  First access
                          103                           ;gets MR1, second gets MR2.  Reading the TUCR
                          104                           ;forces the internal pointer back to MR1.
            =0047         105   TUCR    EQU     047H    ;(R/W)  TU-58 Command Register
                          106
                          107
            =0048         108   TTDB    EQU     048H    ;(R/W)  Terminal Data Buffer
            =0049         109   TTSR    EQU     049H    ;(RO)   Terminal Status Register
            =004A         110   TTMODE  EQU     04AH    ;(R/W)  Terminal Mode Register 1 and 2.  First access
                          111                           ;gets MR1, second gets MR2.  Reading the CR forces
                          112                           ;the internal pointer back to MR1
            =004B         113   TTCR    EQU     04BH    ;(R/W)  Terminal Command Register
                          114
                          115
                          116
                          117
                          118
            =0080         119   READ    EQU     080H    ;(RO)   Console Read Register
                          120
            =0082         121   CPUACK  EQU     082H    ;(RO)   Acknowledge from CPU.  <LSB>
                          122
            =0083         123   CPATTN  EQU     083H    ;(RO)   Attention from CPU.  <LSB>
                          124
            =0084         125   UPC14   EQU     084H    ;(RO)   UPC bit <14>.  <LSB>
                          126
            =0085         127   CSR07   EQU     085H    ;(RO)   CSR bit <07>.  <LSB>
                          128
            =0086         129   CSR15   EQU     086H    ;(RO)   CSR bit <15>.  <LSB>
                          130
            =0087         131   CSR23   EQU     087H    ;(RO)   CSR bit <23>.  <LSB>
                          132
            =00A0         133   ENBPAR  EQU     0A0H    ;(WO)   Enable Stall on Parity Error
            =00A1         134   DISPAR  EQU     0A1H    ;(WO)   Disable Stall on Parity Error
                          135
            =00A2         136   VSHIFT  EQU     0A2H    ;(WO)   Set the V-BUS to Shift Mode
            =00A3         137   VNORML  EQU     0A3H    ;(WO)   Set the V-BUS to Normal Mode
                          138
            =00A4         139   SETTIM  EQU     0A4H    ;(WO)   Set the Interval Timer Interrupt
            =00A5         140   CLRTIM  EQU     0A5H    ;(WO)   Clear the Interval Timer Interrupt
                          141
            =00A6         142   ENBMEM  EQU     0A6H    ;(WO)   Enable Memory References
            =00A7         143   DISMEM  EQU     0A7H    ;(WO)   Disable Memory References
                          144
            =00A8         145   SETACK  EQU     0A8H    ;(WO)   Set Console Acknowledge
            =00A9         146   CLRACK  EQU     0A9H    ;(WO)   Clear Console Acknowledge
                          147
                          148   ;NOTE:  The Console Acknowledge signal is also used as the UPC
                          149   ;Serial Input.  When used this way the sense is inverted.  To simplify
                          150   ;matters the next two equates are included.
```

```
Error Addr  Code          Seq   Source statement

                          151
            =00A8         152   CLRUPC  EQU     0A8H    ;(WO)   Clear the V-BUS Serial Input
            =00A9         153   SETUPC  EQU     0A9H    ;(WO)   Set the V-BUS Serial Input
                          154
            =00AA         155   SETATN  EQU     0AAH    ;(WO)   Set Console Attention
            =00AB         156   CLRATN  EQU     0ABH    ;(WO)   Clear Console Attention
                          157
            =00AC         158   SETPFI  EQU     0ACH    ;(WO)   Set Power Fail Interrupt
            =00AD         159   CLRPFI  EQU     0ADH    ;(WO)   Clear Power Fail Interrupt
                          160
            =00AE         161   SETHLT  EQU     0AEH    ;(WO)   Set the Console Halt bit
            =00AF         162   CLRHLT  EQU     0AFH    ;(WO)   Clear the Console Halt bit
                          163
            =00CC         164   WRITE   EQU     0CCH    ;(WO)   The Console Write Register
                          165
            =00EC         166   YBUSRD  EQU     0ECH    ;(RO)   Y-BUS Read
                          167
                          168
                          169
                          170   ;The following are some definitions
                          171
            =4080         172   STACK   EQU     4080H           ;Beginning address of Stack Pointer
            =1E62         173   DELAY   EQU     7778            ;70 msec delay for Power Fail
            =0004         174   TUINIT  EQU     4               ;TU Init value
            =000D         175   BREAK   EQU     0DH             ;Break value
            =000D         176   CR      EQU     0DH             ;
            =000A         177   LF      EQU     0AH             ;
            =000A         178   LINE_FEED       EQU     0AH             ;
            =000D         179   CAR_RET EQU     0DH             ;
            =0003         180   CNTRLC  EQU     3               ;
            =0010         181   CNTRLP  EQU     10H             ;ASCII for Control P
            =0013         182   CNTRLS  EQU     13H             ;
            =0011         183   CNTRLQ  EQU     11H             ;
            =000F         184   CNTRLO  EQU     0FH             ;
            =0002         185   RCVDON  EQU     02              ;
            =000B         186   SIMMSK  EQU     0BH             ;
            =0035         187   TTCR_CODE       EQU     35H     ;
                          188
                          189
            =4080         190   RAM_VALID       EQU     04080H          ;RAM valid flag byte
                          191
            =4081         192   SWITCH_POS      EQU     4081H           ;Address of Switch Position Flag
                          193
            =4082         194   BYTSUM  EQU     04082H          ;Address of byte sum area
                          195                                   ;area
            =4083         196   TOCNT   EQU     04083H          ;This is the address of the byte wide Time Out
            =4084         197   TOCNT1  EQU     04084H          ;This is the address of the word wide Time Out
                          198
            =4086         199   SPBUFF  EQU     04086H          ;Address of the SP Buffer
            =4088         200   HLBUFF  EQU     04088H          ;Address of HL buffer
```

```
Error Addr  Code          Seq   Source statement

                          201
            =408A         202   COLD    EQU     0408AH          ;Cold flag
            =408B         203   CODE_FLAG       EQU     0408BH  ;Code flag (0=Console, 1=Micmon).
                          204
            =408C         205   RETRY   EQU     0408CH          ;
                          206
            =408D         207   SNDPAK  EQU     0408DH          ;Address of Send Packet
            =4091         208   UNIT    EQU     04091H          ;Address of Unit Number in Send Packet
                          209
            =4099         210   MODEM_ADDRESS   EQU     4099H           ;
                          211
            =409B         212   LODFLG  EQU     409BH           ;
            =409C         213   DIRFLG  EQU     409CH           ;
            =409D         214   INDFLG  EQU     409DH           ;
                          215
            =409E         216   WORD_SUM        EQU     409EH           ;
                          217
            =40A0         218   SNDADR  EQU     40A0H           ;
            =40A2         219   SNDCNT  EQU     40A2H           ;
                          220
            =40A3         221   LODADR  EQU     40A3H           ;
            =40A7         222   LODCNT  EQU     40A7H           ;
                          223
            =40A8         224   PAKCNT  EQU     40A8H           ;
                          225
            =40AA         226   ENDPAK  EQU     40AAH           ;Address of the End Packet area
                          227
            =40B4         228   TEMP    EQU     40B4H           ;
                          229
            =40B5         230   PFFLAG  EQU     40B5H           ;
            =40B6         231   PUBFLG  EQU     40B6H           ;
                          232
            =40B7         233   MSGADR  EQU     40B7H           ;
            =40B9         234   MYPC    EQU     40B9H           ;
                          235
            =40BB         236   O_FLAG  EQU     40BBH           ;
            =40BC         237   O_FLAG_COPY     EQU     40BCH           ;
                          238
            =40BD         239   LR_MASK_WORK    EQU     40BDH           ;
            =40BE         240   LR_MASK EQU     40BEH           ;
            =40BF         241   LR_MASK_COPY    EQU     40BFH           ;
                          242
            =40C0         243   SAVE_CHARACTER  EQU     40C0H           ;
                          244
            =40C1         245   PRIADR  EQU     40C1H           ;
            =40C3         246   PRICNT  EQU     40C3H           ;
                          247
            =40C4         248   XADRES  EQU     40C4H           ;
            =40C6         249   XCOUNT  EQU     40C6H
                          250
```

```
Error Addr  Code          Seq   Source statement

            =40C8         251   CNTADR  EQU     40C8H           ;
            =40CA         252   BUFADR  EQU     40CAH           ;
                          253
            =40CC         254   RETRYI  EQU     40CCH           ;
            =40CD         255   S_FLAG  EQU     40CDH           ;
                          256
            =40CE         257   DELETE_FLAG     EQU     40CEH           ;
                          258
                          259
            =40D0         260   SILO_ACTIVE     EQU     40D0H           ;Silo Active Flag
            =40D1         261   SILO_IN_INDX    EQU     40D1H           ;(Byte) Silo Input Index
            =40D2         262   SILO_OUT_INDX   EQU     40D2H           ;(Byte) Silo Output Index
                          263
            =40D3         264   RUN_FLAG        EQU     40D3H           ;Run Flag (indicates Program Mode)
                          265
            =40D4         266   NOTYPE  EQU     40D4H           ;
                          267
            =40D5         268   WCS_LOAD_FLAGS  EQU     40D5H           ;
                          269
            =40D6         270   APTLOD  EQU     40D6H           ;
                          271
            =40D7         272   SPEND   EQU     40D7H           ;
            =40D8         273   QPEND   EQU     40D8H           ;
                          274
            =40D9         275   MIPFLG  EQU     40D9H           ;
                          276
            =40DA         277   DISCNT  EQU     40DAH           ;Disconnect Count
                          278
            =40F0         279   MSGBUF  EQU     40F0H           ;
                          280
            =40F2         281   SEND_IN_PROGRES EQU     40F2H           ;
                          282
            =40F3         283   CPFLAG  EQU     40F3H           ;
                          284
            =40F4         285   SECURE_STATUS   EQU     40F4H   ;(B)  Keyswitch Secure Position status.
                          286
            =40FE         287   CTL_CHR_DISABLE EQU     40FEH   ;(B)  Control C and P disable flag
            =40FF         288   NOCHK   EQU     40FFH           ;(B)  CR check for auto LF disable
                          289
                          290
                          291
            =4100         292   START   EQU     4100H           ;
            =4103         293   GOSV    EQU     4103H           ;
                          294
            =4116         295   SUCCES  EQU     4116H           ;This is the address of the Success Code byte
                          296
            =411D         297   PARERR  EQU     411DH           ;Address of Parity Error handler
            =4120         298   ACLO    EQU     4120H           ;Address of ACLO handler
                          299
            =414E         300   OVECTR  EQU     414EH           ;
```

```
Error Addr  Code          Seq   Source statement

                          301
            =4B80         302   CHAR_SILO       EQU     4B80H           ;64 byte character silo
            =4BC0         303   SOURCE_SILO     EQU     4BC0H           ;64 byte source flag silo
                          304
            =4C28         305   CVECTR  EQU     4C28H           ;Control C vector
            =4C2B         306   PVECTR  EQU     4C2BH           ;Control P vector
                          307
            =4C2F         308   TMRVEC  EQU     4C2FH           ;Interval Timer interrput vector
                          309
            =7000         310   CHRCNT  EQU     7000H           ;
            =7001         311   CHRBUF  EQU     7001H           ;
                          312
                          313   ;*****************************************************************
                          314   ;
            =7E00         315   REMRSR  EQU     7E00H           ;(B)
            =7E01         316   REMRDB  EQU     7E01H           ;(B)
                          317
            =7E02         318   REMXSR  EQU     7E02H           ;(B)
            =7E03         319   REMXDB  EQU     7E03H           ;(B)
                          320
            =7E04         321   TALK_FLAG       EQU     7E04H           ;(B)
                          322
            =7E05         323   DISCARD_RO      EQU     7E05H   ;(B)    Discard Remote Output flag.
                          324
            =7E06         325   TRNFLG  EQU     7E06H           ;(B)
                          326
            =7E07         327   MSG_TO_SEND     EQU     7E07H           ;(B)
                          328
            =7E08         329   TIMSAV  EQU     7E08H           ;(W)
            =7E0A         330   TIMER1  EQU     7E0AH           ;(W)
            =7E0C         331   TIMER2  EQU     7E0CH           ;(B)
            =7E0D         332   TIKTOK  EQU     7E0DH           ;(B)
                          333
            =7E0E         334   LOGCON  EQU     7E0EH           ;(B)
            =7E0F         335   LOGCNT  EQU     7E0FH           ;(B)
                          336
            =7E10         337   RDCON   EQU     7E10H           ;(B)
            =7E11         338   RDCON1  EQU     7E11H           ;(B)
                          339
            =7E12         340   RDTEMP  EQU     7E12H           ;(B)
                          341
            =7E13         342   TALKSR  EQU     7E13H           ;(B)
            =7E14         343   TALKDB  EQU     7E14H           ;(B)
                          344
                          345
            =7E16         346   ICNT    EQU     7E16H           ;(W)
            =7E18         347   IADDR   EQU     7E18H           ;(W)
                          348
            =7E1A         349   DPFLAG  EQU     7E1AH           ;(B)
            =7E1B         350   INLOCK  EQU     7E1BH           ;(B)
```

```
Error Addr  Code          Seq   Source statement

            =7E1C         351   HEADER  EQU     7E1CH           ;(B)
            =7E1D         352   MESSAG  EQU     7E1DH           ;(B)
                          353
            =7E1E         354   INFLAG  EQU     7E1EH           ;(B)
                          355
            =7E1F         356   MSG_TO_READ     EQU     7E1FH           ;(B)
                          357
            =7E20         358   SOHFLG  EQU     7E20H           ;(B)
                          359
            =7E21         360   ACTCNT  EQU     7E21H           ;(W)
            =7E23         361   ACTBUF  EQU     7E23H           ;(W)
                          362
            =7E25         363   LOCCNT  EQU     7E25H           ;(W)
                          364
            =7E27         365   OUTCNT  EQU     7E27H           ;(B)  Output Data count
            =7E28         366   OUTBUF  EQU     7E28H           ;(W)  Output Data Buffer address
                          367
            =7E2A         368   LAST_GOOD_MSG   EQU     7E2AH   ;(B)  Last Good Message received
            =7E2B         369   LAST_TYPE_SENT  EQU     7E2BH   ;(B)  Last Message Sent Type flag
                          370
            =7E2C         371   RD_LD_FLAG      EQU     7E2CH   ;(B)  RD Load Message Type in Progress.
            =7E2D         372   RD_LD_ERR       EQU     7E2DH   ;(B)  RD Load Error flag.
                          373
            =7E30         374   RCRC    EQU     7E30H           ;Receive CRC
            =7E32         375   XCRC    EQU     7E32H           ;Xmit CRC
                          376
            =7E34         377   CRCCN0  EQU     7E34H           ;(B)
            =7E35         378   CRCCN1  EQU     7E35H           ;(B)
                          379
            =7E36         380   NEEDI   EQU     7E36H           ;(B)
                          381
            =7E37         382   ASC_MSG_PTR     EQU     7E37H           ;(W)
            =7E39         383   ASC_MSG_COUNT   EQU     7E39H           ;(B)
                          384
            =7E3A         385   ENTER_TRANS     EQU     7E3AH           ;(B)
                          386
            =7E3B         387   RDSPER  EQU     7E3BH           ;(B)
                          388
            =7E40         389   IBUF_CNT_COPY   EQU     7E40H           ;(W)
            =7E42         390   IBUF_ADR_COPY   EQU     7E42H           ;(W)  Input Buffer Address Copy.
                          391
            =7E44         392   MSG15_PTR       EQU     7E44H   ;(W)  Contains address of Msg Type 15 String.
            =7E46         393   MSG15_COUNT     EQU     7E46H   ;(B)  Count for Msg Type 15 string.
                          394
            =7E47         395   CLMSG_PTR       EQU     7E47H   ;(W)  Pointer into Connection Lost Msg.
            =7E49         396   CLMSG_COUNT     EQU     7E49H   ;(B)  Count for Connection Lost Message.
                          397
            =7E4A         398   RD_LD_CPTR      EQU     7E4AH   ;(W)
            =7E4C         399   RD_LD_CCOUNT    EQU     7E4CH   ;(B)
            =7E4D         400   RD_LD_DPTR      EQU     7E4DH   ;(W)
```

```
Error Addr  Code          Seq   Source statement

            =7E4F         401   RD_LD_DCOUNT    EQU     7E4FH   ;(B)
            =7E50         402   RD_LD_EPTR      EQU     7E50H   ;(W)
            =7E52         403   RD_LD_ECOUNT    EQU     7E52H   ;(B)
            =7E53         404   RD_LD_OE        EQU     7E53H   ;(B)
            =7E54         405   RD_LD_SUCCESS   EQU     7E54H   ;(B)
            =7E55         406   RD_LD_CBUFFER   EQU     7E55H   ;(10B)
                          407
                          408
            =7E60         409   IBUF1   EQU     7E60H           ;(B)  One byte input buffer
                          410
                          411   ;*****************************************************************************
                          412   ;
            =7E61         413   CTL_PTR EQU     7E61H           ;(W)
            =7E63         414   CTL_COUNT       EQU     7E63H   ;(B)
            =7E64         415   CTL_BUFFER      EQU     7E64H   ;(4B)  The first byte is used to hold the
                          416                                   ;count of how many control bytes.  The second
                          417                                   ;the information about Talk, Talk Echo, Discard
                          418                                   ;Remote, Parallel Control and Local Copy.  The
                          419                                   ;third the status of Keyswitch Secure.  The
                          420                                   ;fourth (OVERRIDE_LCS) the Override Local Copy
                          421                                   ;in Secure.
            =7E67         422   OVERRIDE_LCS    EQU     7E67H   ;Last byte of CTL_BUFFER
                          423   ;
                          424   ;*****************************************************************************
                          425
                          426
                          427   ;*****************************************************************************
                          428   ;
=7E68                     429   HBUFFR  EQU     7E68H           ;Header Buffer 1
                          430
=7E69                     431   HCOUNT  EQU     7E69H           ;For SOH type headers (two bytes)
=7E69                     432   CTLTYP  EQU     7E69H           ;For ENQ type headers
=7E6A                     433   CTLREA  EQU     7E6AH           ;For ENQ type headers
                          434
=7E6B                     435   LMSGNM  EQU     7E6BH           ;Last Message Number
=7E6C                     436   CMSGNM  EQU     7E6CH           ;Current Message Number
=7E6D                     437   STATION EQU     7E6DH           ;
=7E6E                     438   HCRC    EQU     7E6EH           ;
                          439   ;
                          440   ;*****************************************************************************
                          441
=7E70                     442   CTL_C_INTR      EQU     7E70H   ;
                          443
=7E71                     444   LOCAL_COPY      EQU     7E71H   ;
=7E72                     445   PARALLEL_CNTRL  EQU     7E72H   ;
                          446
=7E73                     447   TALK_COPY       EQU     7E73H   ;
                          448
=7E76                     449   MSGFLG  EQU     7E76H           ;MSG TYPE to be sent
=7E77                     450   MSGTYP  EQU     7E77H           ;MSG TYPE
```

```
Error Addr  Code          Seq   Source statement

                          451
            =7E8D         452   LOBUF   EQU     7E8DH           ;(B)  Indicates which output buffer is Locked
            =7E8E         453   OUTLOC  EQU     7E8EH           ;(B)  Indicates there is a Locked Output buffer
            =7E8F         454   LBSIP   EQU     7E8FH           ;(B)  Locked Buffer Send In Progress flag
            =7E90         455   LBSENT  EQU     7E90H           ;(B)  Indicates that the locked buffer has been
                          456                                   ;sent
                          457
            =7E91         458   ACTFLG  EQU     7E91H           ;(B)  Indicates which buffer is active
                          459
            =7E94         460   HDCNT   EQU     7E94H           ;(B)
            =7E95         461   HDADR   EQU     7E95H           ;(W)
                          462
            =7E97         463   CTLFLG  EQU     7E97H           ;(B)
                          464
            =7E98         465   SOHENQ  EQU     7E98H           ;(B)
                          466
            =7E9A         467   BLDBLK  EQU     7E9AH           ;BLDBLK    = Address of Header to be sent
                          468                                   ;BLDBLK+2  = CTL flag
                          469                                   ;BLDBLK+3  = Output Buffer count
                          470                                   ;BLDBLK+4  = Output Buffer address
                          471                                   ;BLDBLK+6  = MSGTYP flag
                          472
            =7EA1         473   SOHHED  EQU     7EA1H           ;
                          474
            =7EA7         475   ENQHED  EQU     7EA7H           ;
                          476
            =7EDB         477   IBUF0   EQU     7EDBH           ;128 byte input buffer (plus 3 bytes).
            =7F5E         478   OCNT0   EQU     7F5EH           ;
            =7F5F         479   OBUF0   EQU     7F5FH           ;80 Byte Output Buffer.
            =7FAF         480   OCNT1   EQU     7FAFH           ;
            =7FB0         481   OBUF1   EQU     7FB0H           ;80 Byte Output Buffer.
                          482   ;
                          483   ;*****************************************************************
                          484
                          485
            =0000         486           ORG     0
0000        F3            487   BEGIN:  DI                      ;
0001        31 0000       488           LXI     SP,0            ;Zero the flag that determines which code is
                          489                                   ;to be loaded
0004        C3 0815       490           JMP     ST_VECTOR       ;Go see if we should do the self test
                          491
                          492
                          493
            =0008         494           ORG     08H
0008        C3 0274       495   RSTN1:  JMP     ROM_IDLE_PREP   ;Go to the ROM Idle Loop.
                          496
000B        C3 02E9       497   XVEC:   JMP     X_CMND_0        ;External entry into Rom based X command
                          498
            =0010         499           ORG     010H            ;
0010        C3 01D6       500   RSTN2:  JMP     TU_RCVR_DONE    ;Go to software interrupt #2 routine
```

```
Error Addr  Code          Seq   Source statement

                          501
     0013   C3 0215       502   MODVEC: JMP     MODEM_CHECK     ;External entry into the Modem routines
                          503
            =0018         504           ORG     018H            ;
     0018   C3 05D4       505   RSTN3:  JMP     SEND_CHARACTER  ;Go to software interrupt #3 routine
                          506
     001B   C3 04DF       507   PWRVEC: JMP     POWER_UP        ;External entry to Power Up code
                          508
            =0020         509           ORG     020H            ;
     0020   C3 0427       510   RSTN4:  JMP     GET_CHARACTER   ;Go to software interrupt routine #4
     0023   00            511           NOP                     ;Filler
     0024                 512   INIT_VECTOR:
     0024   C3 0112       513           JMP     INIT            ;Go to INIT.
     0027   00            514           NOP                     ;Filler
     0028   C3 05B9       515   RSTN5:  JMP     SEND_LI_0       ;Jump to software interrupt #5
     002B   00            516           NOP                     ;Filler
     002C   F3            517   RST55:  DI                      ;Disable further Interrupts
     002D   C3 4C2F       518           JMP     TMRVEC          ;Go to the timer routines
     0030   C3 05B7       519   RSTN6:  JMP     SEND_LINE       ;Go to software interrupt #6 routine
     0033   00            520           NOP                     ;Filler
     0034   F3            521   RST65:  DI                      ;Disable further Interrupts
     0035   C3 411D       522           JMP     PARERR          ;Go to the Parity error code
     0038   C3 06A5       523   RSTN7:  JMP     DPRINT          ;Go to the Diagnostic Print code
     003B   00            524           NOP                     ;Filler
     003C   F3            525   RST75:  DI                      ;Disable further Interrupts
     003D   C3 04CE       526           JMP     ACLCHK          ;Go to AC LO check
                          527
                          528
                          529
                          530
                          531
                          532   ;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
                          533   ;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
                          534   ;
                          535   ;The following routines must not be moved because they are called from the RAM
                          536   ;
                          537   ;       INIVEC
                          538   ;       SCVEC0
                          539   ;       GS_VECTOR
                          540   ;       RSVEC
                          541   ;       PWRVE1
                          542   ;       FU_VECTOR
                          543   ;       DUMMY2
                          544   ;       INIT_DRIVES
                          545   ;       TUERR2
                          546   ;       TUERR3
                          547   ;       TUERR
                          548   ;       TU_SEND_PACKET
                          549   ;       CHKSUM_WORD
                          550   ;       COPY
```

```
Error Addr  Code           Seq   Source statement

                           551   ;       COPY1
                           552   ;       SAVESP
                           553   ;       SAVSP1
                           554   ;
 0040   C3 0160            555   INIVEC: JMP     INIT1           ;Vector for RAM
 0043   C3 05DA            556   SCVEC0: JMP     SEND_CHA0       ;Vector in Send Character routine
 0046                      557   GS_VECTOR:
 0046   C3 03F1            558           JMP     GET_SILO        ;Go get the silo character
 0049   C3 040F            559   RSVEC:  JMP     READ_SILO       ;Go read the top character from the silo
 004C   C3 04EA            560   PWRVE1: JMP     POWER_0         ;Second entry in Power Up routine
 004F                      561   FU_VECTOR:
 004F   C3 0691            562           JMP     FIXUP           ;Go to the Modem Fixup routine.
 0052   C3 0052            563   DUMMY1: JMP     DUMMY1          ;<For future use>
                           564
 0055                      565   INIT_DRIVES:
 0055   CD 0104            566           CALL    SAVESP          ;Go zero Success and save the SP
 0058   21 40CC            567           LXI     H,RETRYI        ;Point to the Tape Init Retry count area
 005B   36 09              568           MVI     M,09            ;Set up a retry count
 005D   CD 03E0            569   1$:     CALL    BRKSUB          ;Go send a break to the TU-58
 0060   21 06B6            570           LXI     H,INITPK        ;Point to this packet
 0063   CD 00D1            571           CALL    TU_SEND_0       ;Go send it
 0066   CD 020B            572           CALL    TOPREP          ;Go Prep the Time Out counts
 0069   CD 01DB            573           CALL    TU_RCVR_0       ;Go wait for TU RCVR DONE
 006C   FE 10              574           CPI     10H             ;Look for a Continue code from the TU-58
 006E   C8                 575           RZ                      ;Leave if it is
 006F   21 40CC            576           LXI     H,RETRYI        ;Point to the Tape Init Retry count
 0072   35                 577           DCR     M               ;Subtract one
 0073   C2 005D            578           JNZ     1$              ;Loop back if still positive
 0076   CD 0079            579           CALL    TUERR2          ;Error if not
                           580   ;
                           581   ;*****************************************************************
                           582
                           583
                           584   ;*****************************************************************
                           585   ;
 0079   3E 02              586   TUERR2: MVI     A,02            ;Error code
 007B   21 06CE            587           LXI     H,DEVERR        ;Address of Device Error message
 007E   C3 0086            588           JMP     TUERR           ;Go to some common code
                           589
 0081   3E 03              590   TUERR3: MVI     A,3             ;Error code
 0083   21 06E1            591           LXI     H,REDERR                ;Address  of Read Error error message
 0086   32 4116            592   TUERR:  STA     SUCCES          ;Store the error code
 0089   22 40B7            593           SHLD    MSGADR          ;Store the Error Message address
 008C   E1                 594           POP     H               ;Get the error PC for the 8085
 008D   22 40B9            595           SHLD    MYPC            ;Save it
 0090   2A 4086            596           LHLD    SPBUFF          ;Get the SP value
 0093   F9                 597           SPHL                    ;Put it in the SP
 0094   C9                 598           RET                     ;Leave
                           599   ;
                           600   ;*****************************************************************
```

```
Error Addr  Code           Seq   Source statement

                           601
                           602   ;*********************************************************************************
                           603   ;
                           604   ;       TU_SEND_PACKET
                           605   ;
                           606   ;       This routine sends the twelve bytes located in SNDPAK to the TU-58.
                           607   ;  It calculates the checksum as it does this and then sends the checksum
                           608   ;  after it has completed sending the contents of SNDPAK.
                           609   ;
                           610   ;NOTE:  I later realized that I could have just rotated the MIP Flag into
                           611   ;the bit 3 position and not bothered testing it.  However, this routine is
                           612   ;one of the fixed routines, and saving four bytes would have shifted the
                           613   ;addresses of all the routines that come after it.  This would have forced me
                           614   ;to make changes in RAM as well and would have generated unnecessary
                           615   ;incompatabilities.  On the other hand, if TU_SEND_PACKET ever needs a
                           616   ;modification that would add bytes, 4 can be freed up by eliminating everything
                           617   ;between the first RAR and MVI  A,8 inclusive.  Replace the code there with
                           618   ;four RLCs.
                           619   ;
    0095                   620   TU_SEND_PACKET:
    0095   3A 40D9          621           LDA     MIPFLG          ;See if we are trying to connect RD.
    0098   1F              622           RAR                     ;Put the flag in the carry
    0099   3E 00           623           MVI     A,0             ;Prime A with a 0.
    009B   D2 00A0         624           JNC     1$              ;IF NOT MODEM IN PROGRESS, THEN jump.
    009E   3E 08           625           MVI     A,8             ;ELSE, make an 8 to set up Handshake Mode
    00A0   32 4092         626   1$:     STA     SNDPAK+5        ;Put it in the Switch Byte of SNDPAK
    00A3   21 408D         627           LXI     H,SNDPAK        ;Point to this packet
    00A6   3E 0C           628           MVI     A,12            ;Set up a count
    00A8   32 40A2         629           STA     SNDCNT          ;and save it
    00AB   22 40A0         630           SHLD    SNDADR          ;Save the address
    00AE   21 0000         631           LXI     H,0             ;Now let's zero the checksum work area
    00B1   22 409E         632           SHLD    WORD_SUM        ;Do it
    00B4   CD 01C8         633   2$:     CALL    TU_XMIT_READY   ;Look for Xmit Rdy
    00B7   2A 40A0         634           LHLD    SNDADR          ;Get the address of the data
    00BA   7E              635           MOV     A,M             ;Get the data
    00BB   D3 44           636           OUT     TUDB            ;Send the data out
    00BD   23              637           INX     H               ;Bump the pointer
    00BE   22 40A0         638           SHLD    SNDADR          ;Save the new address
    00C1   21 40A2         639           LXI     H,SNDCNT        ;Point to the count
    00C4   CD 00DE         640           CALL    CHKSUM_WORD     ;Go checksum the byte as part of a 16 bit word.
    00C7   21 40A2         641           LXI     H,SNDCNT        ;Point to the count
    00CA   35              642           DCR     M               ;Reduce it by one
    00CB   C2 00B4         643           JNZ     2$              ;Loop back if not zero
    00CE   21 409E         644           LXI     H,WORD_SUM      ;Point to the Checksum
    00D1                   645   TU_SEND_0:
    00D1   CD 00D4         646           CALL    1$              ;Call the next part
    00D4   E5              647   1$:     PUSH    H               ;Save the address
    00D5   CD 01C8         648           CALL    TU_XMIT_READY   ;Wait for Xmit Rdy
    00D8   E1              649           POP     H               ;Get the address back
    00D9   7E              650           MOV     A,M             ;Get the byte it's pointing to
```

```
Error Addr  Code           Seq   Source statement

     00DA   D3 44          651           OUT     TUDB            ;Send it out
     00DC   23             652           INX     H               ;Bump the address
     00DD   C9             653           RET                     ;Leave
                           654   ;
                           655   ;*****************************************************************************
                           656
                           657
                           658   ;*****************************************************************************
                           659   ;
                           660
     00DE                  661   CHKSUM_WORD:
     00DE   5F             662           MOV     E,A             ;Assume low byte for now
     00DF   47             663           MOV     B,A             ;Save a copy in B
     00E0   7E             664           MOV     A,M             ;Get the count
     00E1   1F             665           RAR                     ;Check the LSB
     00E2   DA 00EA        666           JC      1$              ;Jump if the count is odd
     00E5   16 00          667           MVI     D,0             ;and zero the high byte
     00E7   C3 00ED        668           JMP     2$              ;Go add them
     00EA   53             669   1$:     MOV     D,E             ;Put the character in the high byte
     00EB   1E 00          670           MVI     E,0             ;and zero the low byte
     00ED   2A 409E        671   2$:     LHLD    WORD_SUM        ;Get the current value of the checksum
     00F0   19             672           DAD     D               ;Double add to HL
     00F1   D2 00F5        673           JNC     3$              ;Jump if no carry
     00F4   23             674           INX     H               ;This takes care of the end around carry
     00F5   22 409E        675   3$:     SHLD    WORD_SUM        ;Store the value
     00F8   C9             676           RET                     ;and leave
                           677   ;
                           678   ;*****************************************************************************
                           679
                           680
                           681
                           682
                           683
                           684
                           685   ;*****************************************************************************
                           686   ;
     00F9   06 04          687   COPY:   MVI     B,04H           ;Set up the loop count.
     00FB                  688   COPY1:
     00FB   1A             689   1$:     LDAX    D               ;Get the source byte
     00FC   77             690           MOV     M,A             ;Write it to the destination.
     00FD   13             691           INX     D               ;Bump the source pointer.
     00FE   23             692           INX     H               ;Bump the destination pointer
     00FF   05             693           DCR     B               ;Decrement the count
     0100   C2 00FB        694           JNZ     1$              ;Loop back if not zero
     0103   C9             695           RET                     ;Else, return
                           696   ;
                           697   ;*****************************************************************************
                           698
                           699
                           700   ;*****************************************************************************
```

```
Error Addr  Code           Seq   Source statement

                           701   ;
                           702   ;       SAVESP
                           703   ;
                           704   ;       This routine is used by routines that could encounter a fatal error.
                           705   ;Because we want to abort, and because the depth on the Stack may be
                           706   ;indeterminant, the code that calls such routines calls SAVESP first.  Thus,
                           707   ;when such an error occurs, the error routines can restore the SP to the
                           708   ;correct level before returning.
                           709   ;
     0104   AF             710   SAVESP: XRA     A               ;Make a 0
     0105   32 4116        711           STA     SUCCES          ;Zero the Success code byte
     0108   EB             712   SAVSP1: XCHG                    ;Save HL in DE
     0109   21 0002        713           LXI     H,2             ;Put an offset into HL
     010C   39             714           DAD     SP              ;Add in the SP value
     010D   22 4086        715           SHLD    SPBUFF          ;Save it
     0110   EB             716           XCHG                    ;Get HL back
     0111   C9             717           RET                     ;Leave
                           718   ;
                           719   ;*****************************************************************************
                           720   ;
                           721   ;       End of fixed routines
                           722   ;
                           723   ;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
                           724   ;$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$$
                           725
                           726
                           727   ;*****************************************************************************
                           728   ;
                           729   ;       INIT
                           730   ;
                           731   ;       The first part of INIT cleans up the machine.
                           732   ;
     0112   21 4000        733   INIT:   LXI     H,4000H         ;Point to the beginning of RAM
     0115   AF             734   1$:     XRA     A               ;Make a 0
     0116   77             735           MOV     M,A             ;Zero memory
     0117   23             736           INX     H               ;Bump the pointer
     0118   7C             737           MOV     A,H             ;Get the high byte
     0119   17             738           RAL                     ;See if the MSB set
     011A   D2 0115        739           JNC     1$              ;Loop back if not
     011D   21 0000        740           LXI     H,0             ;Clear HL
     0120   39             741           DAD     SP              ;Get the Code Flag out of the SP
     0121   7D             742           MOV     A,L             ;It's in the low byte
     0122   32 408B        743           STA     CODE_FLAG       ;Initialize the Code Flag
     0125   D3 3B          744           OUT     SETBLK          ;block the 100HZ clock
     0127   3E 17          745           MVI     A,17H           ;code to force internal pointer to MM reg
     0129   D3 1D          746           OUT     ITCSR           ;send it out
     012B   DB 1C          747           IN      ITDB            ;get the low byte of the MM reg
     012D   FE 0C          748           CPI     0CH             ; low byte sould be 0C if BBU is present
     012F   C2 0139        749           JNZ     2$              ;if low byte is not correct then jump
     0132   DB 1C          750           IN      ITDB            ;else check high is also correct
```

```
Error Addr  Code          Seq   Source statement

     0134   FE 0A         751           CPI     0AH             ;this should be high byte
     0136   CA 0144       752           JZ      3$              ;if everything ok then unblock 100HZ clk
     0139   3E 17         753   2$:     MVI     A,17H           ;We need this value to force the Internal
     013B   D3 1D         754           OUT     ITCSR           ;Pointer of the 9513 to point at the MM Reg.
     013D   AF            755           XRA     A               ;Make a 0.
     013E   D3 1C         756           OUT     ITDB            ;Put 0 in the low byte of the MM.
     0140   3E 0A         757           MVI     A,0AH           ;Set up the high byte for divide by 10.
     0142   D3 1C         758           OUT     ITDB            ;Now the RD Timers will work properly.
     0144   D3 3A         759   3$:     OUT     CLRBLK          ;Unblock the 100 Hz signal.
     0146   31 4080       760   INITX:  LXI     SP,STACK        ;Set up the SP
     0149   CD 04DF       761           CALL    POWER_UP        ;Go do aPower Up.
     014C   3E 0B         762           MVI     A,SIMMSK        ;Mask the Parity and 5.5 Traps
     014E   30            763           SIM                     ;Set the mask
     014F   FB            764           EI                      ;Enable interrupts
     0150   AF            765           XRA     A               ;Make a 0
     0151   32 7E10       766           STA     RDCON           ;Zero the RD Connection flag
     0154   32 408A       767           STA     COLD            ;Zero the Cold Flag
     0157   32 40B6       768           STA     PUBFLG          ;and the Power Up Boot Flag
     015A   CD 03C7       769           CALL    CTLPRP          ;Go do some preping
     015D   CD 022E       770           CALL    MASK_GENERATOR  ;Go generate the mask for USART checking
                          771   ;
                          772   ;*****************************************************************************
                          773   ;
                          774   ;       INIT1
                          775   ;
                          776   ;       The second part of INIT tries to load the Boot Block from the TU-58
                          777   ;
     0160   31 4080       778   INIT1:  LXI     SP,STACK        ;Prep the SP
     0163   21 408D       779           LXI     H,SNDPAK        ;Point to the Send Packet area
     0166   11 06B8       780           LXI     D,BOOTPK        ;Point to the Boot Packet
     0169   06 0E         781           MVI     B,14            ;Count for copying
     016B   CD 00FB       782           CALL    COPY1           ;Go copy it.  This copy also sets up the MODEM
                          783                                   ;Vector
     016E   3A 40BE       784           LDA     LR_MASK         ;Get the Local/Remote Mask
     0171   E6 40         785           ANI     40H             ;Check for APT present
     0173   3E 00         786           MVI     A,0             ;Make a 0 in A
     0175   CA 017C       787           JZ      INIT2           ;Jump if not APT
     0178   3C            788           INR     A               ;Make a 1
     0179   32 40BB       789   INIT0:  STA     O_FLAG          ;Set the Control O flag
     017C   21 408C       790   INIT2:  LXI     H,RETRY         ;Prime the retry count
     017F   36 08         791           MVI     M,08            ;8 retries allowed
     0181   CD 0055       792   INIT3:  CALL    INIT_DRIVES     ;Go try to init the drive
     0184   3A 4116       793           LDA     SUCCES          ;Check the success code
     0187   A7            794           ANA     A               ;Is it zero?
     0188   CA 0190       795           JZ      INIT5           ;Jump if it is
     018B   2A 40B7       796           LHLD    MSGADR          ;Get the error message address
     018E   F7            797           RST     6               :Go print it
     018F   CF            798           RST     1               ;Go to ROM_IDLE_PREP.
     0190   CD 080C       799   INIT5:  CALL    RL_VECTOR       ;Go load the RAM
     0193   3A 4116       800           LDA     SUCCES          ;Get the success code
```

```
Error Addr  Code          Seq   Source statement

     0196   A7            801           ANA     A               ;Check the Success code
     0197   C2 01B8       802           JNZ     TRYTST          ;Jump if no good
     019A   3A 4100       803           LDA     START           ;Get the first instruction in RAM
     019D   FE C3         804           CPI     0C3H            ;Is it a Jump?
     019F   CA 4100       805           JZ      START           ;Go start up the RAM
     01A2   21 06F2       806           LXI     H,NOBOOT        ;Point to this error message
     01A5   F7            807   INIT4:  RST     6               ;Go print the message
     01A6   21 0700       808           LXI     H,DRVMSG        ;Point to this message
     01A9   F7            809           RST     6               ;Go print it
     01AA   3A 4091       810           LDA     UNIT            ;Get the unit number
     01AD   F6 30         811           ORI     30H             ;Make it ASCII
     01AF   DF            812           RST     3               ;Go send it
     01B0   21 4091       813           LXI     H,UNIT          ;Point to the Unit number
     01B3   35            814           DCR     M               ;If it was one, this will make it zero
     01B4   CA 017C       815           JZ      INIT2           ;Go try drive 1
     01B7   CF            816           RST     1               ;Go to ROM_IDLE_PREP.
                          817
                          818   ;*****************************************************************************
                          819   ;
     01B8   CD 03E0       820   TRYTST: CALL    BRKSUB          ;Stop any tape motion
     01BB   21 408C       821           LXI     H,RETRY         ;Get the retry count
     01BE   35            822           DCR     M               ;Decrement it
     01BF   C2 0181       823           JNZ     INIT3           ;Go try again
     01C2   2A 40B7       824           LHLD    MSGADR          ;Get the error message address
     01C5   C3 01A5       825           JMP     INIT4           ;Go print the message and check the unit number
                          826   ;
                          827   ;*****************************************************************************
                          828
                          829
                          830
                          831   ;*****************************************************************************
                          832   ;
                          833   ;       TU_XMIT_READY
                          834   ;
                          835   ;       This routine call TOPREP to zero the Time Out counters.  It then loops,
                          836   ;  waiting for TU-58 Xmit Rdy to come up.  While waiting it calls GET_CHARACTER
                          837   ;  to allow Control C and P to work and it call TOCHK to time out the TU-58
                          838   ;
     01C8                 839   TU_XMIT_READY:
     01C8   CD 020B       840           CALL    TOPREP          ;Go prep the Timeouts
     01CB   E7            841   1$:     RST     4               ;Go look for Control P or C
     01CC   DB 45         842           IN      TUSR            ;Get the TU-58 Status Register
     01CE   1F            843           RAR                     ;Is Xmit Rdy set?
     01CF   D8            844           RC                      ;Leave if it is
     01D0   CD 01F9       845           CALL    TOCHK           ;Go look for Timeout
     01D3   C3 01CB       846           JMP     1$              ;Loop back if we come back
                          847   ;
                          848   ;*****************************************************************************
                          849
                          850
```

```
Error Addr  Code            Seq   Source statement

                            851   ;*****************************************************************************
                            852   ;
                            853   ;       TU_RCVR_DONE
                            854   ;
     01D6                   855   TU_RCVR_DONE:
     01D6   CD 020B         856           CALL    TOPREP          ;Go prep the counters
     01D9   36 2C           857           MVI     M,2CH           ;Change the outer loop
     01DB                   858   TU_RCVR_0:
     01DB   E7              859           RST     4               ;Go look for "Break Out" conditions
     01DC   DB 45           860           IN      TUSR            ;Get the Status Register
     01DE   E6 02           861           ANI     2               ;Look for Rcvr Done
     01E0   CA 01F3         862           JZ      1$              ;Jump if not set
     01E3   DB 44           863           IN      TUDB            ;Get the character
     01E5   47              864           MOV     B,A             ;Save the character
     01E6   3A 4092         865           LDA     SNDPAK+5        ;See if Handshake has been invoked
     01E9   E6 08           866           ANI     8               ;See if the Handshake bit was set
     01EB   78              867           MOV     A,B             ;Put the character back in A just in case
     01EC   C8              868           RZ                      ;Leave if not in Handshake mode
     01ED   3E 10           869           MVI     A,10H           ;Get a Continue
     01EF   D3 44           870           OUT     TUDB            ;Send it out
     01F1   78              871           MOV     A,B             ;Get the character
     01F2   C9              872           RET                     ;Leave
     01F3   CD 01F9         873   1$:     CALL    TOCHK           ;Go check for a Timeout
     01F6   C3 01DB         874           JMP     TU_RCVR_0       ;Loop back
                            875   ;
                            876   ;*****************************************************************************
                            877
                            878
                            879   ;*****************************************************************************
                            880   ;
                            881   ;       TOCHK
                            882   ;
                            883   ;       This routine check the countents of two counters.  One is an 8 bit
                            884   ;  counter and the other is a 16 bit counter.  The 8 bit counter is
                            885   ;  is decremented first and checked for 0, the RNZ being executed if it
                            886   ;  isn't.  If it is, we fall through and decrement the 16 bit counter
                            887   ;  and check it for 0.  We return if it isn't.  Otherwise, we
                            888   ;  call the TUERR2 (DEVICE ERROR) routine.
                            889   ;
                            890   ;       NOTE:  TOCNT1 is checked for 0 before it is decremented.  This allows
                            891   ;  TOCNT to control the timeout if TOCNT1 is primed to zero.
                            892   ;
     01F9   21 4083         893   TOCHK:  LXI     H,TOCNT         ;Point to the inner loop count
     01FC   35              894           DCR     M               ;Decrement it
     01FD   C0              895           RNZ                     ;Leave if not zero
     01FE   2A 4084         896           LHLD    TOCNT1          ;Get the word wide count
     0201   7C              897           MOV     A,H             ;Put the high byte in the accumulator
     0202   B5              898           ORA     L               ;OR in the low byte
     0203   CC 0079         899           CZ      TUERR2          ;Go report the error if zero
     0206   2B              900           DCX     H               ;Reduce the count
```

```
Error Addr  Code          Seq   Source statement

     0207   22 4084       901           SHLD    TOCNT1          ;Save the new value
     020A   C9            902           RET                     ;Leave
                          903   ;
                          904   ;*****************************************************************
                          905
                          906
                          907   ;*****************************************************************
                          908   ;
                          909   ;       TOPREP
                          910   ;
                          911   ;       This routine zeros the 8 bit and 16 bit counters, TOCNT and TOCNT1.
                          912   ;
     020B   21 4083       913   TOPREP: LXI     H,TOCNT         ;Point to the inner loop count
     020E   AF            914           XRA     A               ;Make a zero in the Accumulator
     020F   77            915           MOV     M,A             ;Send it out
     0210   23            916           INX     H               ;Bump the pointer
     0211   77            917           MOV     M,A             ;Zero the high byte of the inner loop counter
     0212   23            918           INX     H               ;Point to the outer loop counter
     0213   77            919           MOV     M,A             ;Zero the it
     0214   C9            920           RET                     ;Leave
                          921   ;
                          922   ;*****************************************************************
                          923
                          924
                          925
                          926
                          927   ;*****************************************************************
                          928   ;
     0215                 929   MODEM_CHECK:
     0215   CD 068D       930           CALL    MODEM_ENTRY     ;Go attempt to sequence up the modem.
     0218   21 7E10       931           LXI     H,RDCON         ;Point to the RD connect flag
     021B   7E            932           MOV     A,M             ;Get it
     021C   23            933           INX     H               ;Bump the pointer to the tracking copy
     021D   BE            934           CMP     M               ;Are they the same?
     021E   CA 0225       935           JZ      1$              ;Jump if the same
     0221   A7            936           ANA     A               ;Is it now a 1?
     0222   C2 022E       937           JNZ     MASK_GENERATOR  ;Go fix the mask if it is
     0225   21 4081       938   1$:     LXI     H,SWITCH_POS    ;Point to the Switch Position flag
     0228   DB 06         939           IN      REMOTE          ;Get the Remote/Local Switch
     022A   E6 01         940           ANI     01              ;Save the LSB only
     022C   BE            941           CMP     M               ;Has anything changed?
     022D   C8            942           RZ                      ;IF NO CHANGE, leave.
                          943                                   ;ELSE, fall through to build new mask.
     022E                 944   MASK_GENERATOR:
     022E   21 40BE       945           LXI     H,LR_MASK       ;Point to the Console Mode Mask
     0231   DB 06         946           IN      REMOTE          ;Get the Remote Bit
     0233   1F            947           RAR                     ;Check for set
     0234   D2 024B       948           JNC     2$              ;Jump if in Remote
     0237   3E 01         949           MVI     A,1             ;Get a one
     0239   32 4081       950           STA     SWITCH_POS      ;Set this flag to Local
```

```
Error Addr  Code           Seq   Source statement

     023C   36 81          951   1$:     MVI     M,81H           ;Set up Console Mode mask
     023E   DB 04          952           IN      APTFLG          ;Check for APT
     0240   1F             953           RAR                     ;Is it there?
     0241   D8             954           RC                      ;Leave if not
     0242   3E 15          955           MVI     A,15H           ;Get this constant
     0244   D3 43          956           OUT     TRCR            ;Negate the Modem Control bits
     0246   AF             957           XRA     A               ;Make a 0
     0247   32 7E04        958           STA     TALK_FLAG       ;Zero the Talk Flag
     024A   C9             959           RET                     ;Leave
     024B   AF             960   2$:     XRA     A               ;Make a zero
     024C   32 4081        961           STA     SWITCH_POS      ;Zero this flag to indicate Remote position
     024F   DB 04          962           IN      APTFLG          ;Get the APT present flag
     0251   1F             963           RAR                     ;Check it
     0252   DA 025C        964           JC      3$              ;Jump if not APT
     0255   36 42          965           MVI     M,42H           ;Set it up for APT only
     0257   3E 37          966           MVI     A,37H           ;Assert the Modem Control bits
     0259   D3 43          967           OUT     TRCR            ;Do it
     025B   C9             968           RET                     ;Leave
     025C   3A 7E10        969   3$:     LDA     RDCON           ;Get this copy of the RD Connect Flag
     025F   32 7E11        970           STA     RDCON1          ;Save the updated version
     0262   A7             971           ANA     A               ;Check it
     0263   CA 023C        972           JZ      1$              ;Set up Local if not set
     0266   36 24          973           MVI     M,24H           ;Set up Fully Disabled mode.
     0268   AF             974           XRA     A               ;Make a zero
     0269   32 7E00        975           STA     REMRSR          ;Clear this done bit
     026C   3C             976           INR     A               ;Make a 1
     026D   32 7E02        977           STA     REMXSR          ;Set this Ready bit
     0270   32 7E13        978           STA     TALKSR          ;and this one
     0273   C9             979           RET                     ;Leave
                           980   ;
                           981   ;*****************************************************************************
                           982
                           983
                           984
                           985
                           986   ;*****************************************************************************
                           987   ;*****************************************************************************
                           988   ;*****************************************************************************
                           989   ;
                           990   ;       ROM_IDLE_PREP
                           991   ;
     0274                  992   ROM_IDLE_PREP:
     0274   31 4080        993           LXI     SP,STACK        ;Fix the Stack Pointer
     0277   AF             994           XRA     A               ;Make a 0
     0278   32 40FE        995           STA     CTL_CHR_DISABLE ;Turn off the Control Character Disable flag
     027B   32 40BB        996           STA     O_FLAG          ;and the Control O flag
     027E   21 0708        997           LXI     H,RPRMPT        ;Point to the Prompt
     0281   F7             998           RST     6               ;Go print it
     0282   21 7000        999           LXI     H,CHRCNT        ;Point to the Character Count location
     0285   36 50         1000           MVI     M,80            ;Set the maximum count
```

```
Error Addr  Code          Seq   Source statement

     0287   23           1001          INX     H               ;Point to the beginning of the buffer
     0288   22 40CA      1002          SHLD    BUFADR          ;Save the address
     028B   AF           1003          XRA     A               ;Make a 0
     028C   32 4082      1004          STA     BYTSUM          ;Zero out this area
                         1005  ;
                         1006  ;*****************************************************************************
                         1007
                         1008
                         1009  ;*****************************************************************************
                         1010  ;
     028F                1011  ROM_IDLE:
     028F   CD 03F1      1012          CALL    GET_SILO        ;Go look for characters
     0292   D2 028F      1013          JNC     ROM_IDLE        ;Loop if no character
     0295   3A 7E04      1014          LDA     TALK_FLAG       ;Get the Talk Flag
     0298   1F           1015          RAR                     ;Is it set?
     0299   D2 02A2      1016          JNC     1$              ;Jump if not
     029C   CD 080F      1017          CALL    TALK_VECTOR     ;Go to the Talk routine
     029F   C3 028F      1018          JMP     ROM_IDLE        ;Loop back when done
     02A2   78           1019  1$:     MOV     A,B             ;Get the character for a bit
     02A3   E6 7F        1020          ANI     7FH             ;Clear the MSB
     02A5   47           1021          MOV     B,A             ;Put it back in B
     02A6   21 7000      1022          LXI     H,CHRCNT        ;Point to the count
     02A9   7E           1023          MOV     A,M             ;Get it
     02AA   A7           1024          ANA     A               ;Is it zero?
     02AB   78           1025          MOV     A,B             ;Get the character into A
     02AC   C2 02B4      1026          JNZ     2$              ;Jump if count not 0
     02AF   FE 0D        1027          CPI     CR              ;Look for Carriage Return
     02B1   C2 028F      1028          JNZ     ROM_IDLE        ;Loop back if not
     02B4   F5           1029  2$:     PUSH    PSW             ;Save a copy of the character for later.
     02B5   35           1030          DCR     M               ;Reduce the count
     02B6   2A 40CA      1031          LHLD    BUFADR          ;Get the pointer
     02B9   70           1032          MOV     M,B             ;Store the character
     02BA   23           1033          INX     H               ;Bump the pointer
     02BB   22 40CA      1034          SHLD    BUFADR          ;Save the new address
     02BE   3A 40BE      1035          LDA     LR_MASK         ;Get the Local/Remote mask
     02C1   E6 40        1036          ANI     40H             ;See if APT there
     02C3   C2 02C8      1037          JNZ     3$              ;Jump if it is
     02C6   78           1038          MOV     A,B             ;Put the character in A
     02C7   DF           1039          RST     3               ;Go send it back
     02C8   F1           1040  3$:     POP     PSW             ;Get the character back
     02C9   FE 0D        1041          CPI     CR              ;Is it a carriage return?
     02CB   C2 028F      1042          JNZ     ROM_IDLE        ;Loop back if not
                         1043
     02CE   21 7001      1044          LXI     H,CHRBUF        ;Fix up the pointer
     02D1   7E           1045          MOV     A,M             ;Get the first character
     02D2   FE 58        1046          CPI     'X'             ;Is it an Xfer command?
     02D4   C2 0338      1047          JNZ     NOT_X_COMMAND   ;If it isn't, leave
     02D7   3E 01        1048          MVI     A,1             ;Make a one
     02D9   32 40FE      1049          STA     CTL_CHR_DISABLE ;Disable Control Character checking
     02DC   CD 03F1      1050  4$:     CALL    GET_SILO        ;Go get the checksum
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Error Addr  Code          Seq   Source statement

     02DF   D2 02DC       1051          JNC     4$              ;Loop until a character comes in
     02E2   3A 4082       1052          LDA     BYTSUM          ;Let's check it
     02E5   A7            1053          ANA     A               ;Is it OK?
     02E6   C2 033D       1054          JNZ     ROM_ERR ;Jump if Command Checksum bad.
     02E9                 1055    X_CMND_0:
     02E9   21 0708       1056          LXI     H,RPRMPT        ;Point to the ROM Prompt
     02EC   F7            1057          RST     6               ;Go send it
     02ED   AF            1058          XRA     A               ;Make a 0
     02EE   32 4082       1059          STA     BYTSUM          ;Zero the Byte Checksum
     02F1   21 4100       1060          LXI     H,4100H         ;Point to the part of RAM where we start loading
     02F4   22 40C4       1061          SHLD    XADRES          ;Save the address
     02F7   CD 03F1       1062    1$:   CALL    GET_SILO        ;Go look for the next character
     02FA   D2 02F7       1063          JNC     1$              ;Loop until one comes in
     02FD   2A 40C4       1064          LHLD    XADRES          ;Get the pointer
     0300   7C            1065          MOV     A,H             ;Get the high byte of the address
     0301   FE 7E         1066          CPI     7EH             ;Look for beginning of RD area
     0303   D2 0311       1067          JNC     3$              ;Jump if it is
     0306   FE 4B         1068          CPI     4BH             ;See if it is 4BH
     0308   C2 0310       1069          JNZ     2$              ;Jump if not
     030B   7D            1070          MOV     A,L             ;Get the low byte
     030C   17            1071          RAL                     ;See if it is 80H or greater
     030D   DA 0311       1072          JC      3$              ;Jump if it is
     0310   70            1073    2$:   MOV     M,B             ;Send it out
     0311   23            1074    3$:   INX     H               ;Bump the pointer
     0312   22 40C4       1075          SHLD    XADRES          ;Store the new value
     0315   7C            1076          MOV     A,H             ;Get the high byte
     0316   17            1077          RAL                     ;Look for 80 in the high byte
     0317   D2 02F7       1078          JNC     1$              ;Loop back if not there
     031A   CD 03F1       1079    4$:   CALL    GET_SILO        ;Go get the checksum
     031D   D2 031A       1080          JNC     4$              ;Wait for the character
     0320   3A 4082       1081          LDA     BYTSUM          ;Let's check it
     0323   A7            1082          ANA     A               ;Is it good
     0324   21 070E       1083          LXI     H,NACK_X_DATA   ;Point to the Error message just in case.
     0327   C2 0340       1084          JNZ     ROM_ERR1        ;Jump if Data Checksum bad.
     032A   3A 4103       1085          LDA     GOSV            ;Check the OP code in this byte
     032D   FE C3         1086          CPI     0C3H            ;This it should be a JMP
     032F   CA 4103       1087          JZ      GOSV            ;Use this to get to the proper place in the RAM
     0332   21 0713       1088          LXI     H,VALIDITY_ERR  ;Point to this error message.
     0335   C3 0340       1089          JMP     ROM_ERR1        ;Go print it.
                          1090    ;
                          1091    ;*************************************************************************
                          1092
                          1093
                          1094
                          1095    ;*************************************************************************
                          1096    ;
     0338                 1097    NOT_X_COMMAND:
     0338   FE 0D         1098          CPI     CR              ;Look for Carriage return
     033A   CA 0274       1099          JZ      ROM_IDLE_PREP   ;Leave with printing an error message.
     033D                 1100    ROM_ERR:
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Error Addr  Code           Seq   Source statement

      033D  21 0704        1101          LXI     H,SYNTAX          ;Point to the error message
      0340                1102  ROM_ERR1:
      0340  AF             1103          XRA     A                 ;Make a 0
      0341  32 40FE        1104          STA     CTL_CHR_DISABLE ;Turn off the disable (which may or may not
                           1105                                  ;be set).
      0344  F7             1106          RST     6                 ;Go to LPRINT
      0345  CF             1107          RST     1                 ;Go back to Limited Console
                           1108  ;
                           1109  ;*************************************************************************
                           1110
                           1111
                           1112
                           1113  ;*************************************************************************
                           1114  ;
                           1115  ;       This routine:
                           1116  ;
                           1117  ;               Tests for control characters.
                           1118  ;               Enters valid characters into the Silo (if possible).
                           1119  ;
                           1120  ;
      0346                 1121  GET_LOCAL:
      0346  3A 7E04        1122          LDA     TALK_FLAG         ;Get the Talk Flag
      0349  E6 01          1123          ANI     1                 ;Save only the low bit.
      034B                 1124  GET_LOCA0:
      034B  21 40D3        1125          LXI     H,RUN_FLAG        ;Point to the Run Flag
      034E  B6             1126          ORA     M                 ;OR them together
      034F  C2 038B        1127          JNZ     2$                ;IF (PROGRAM MODE + TALK MODE), jump.
      0352  79             1128          MOV     A,C               ;ELSE, get the correct SR back
      0353  E6 20          1129          ANI     20H               ;Look for Framing Error set
      0355  CA 0363        1130          JZ      1$                ;IF NOT FRAMING ERROR, jump.
      0358  78             1131          MOV     A,B               ;Get the character
      0359  A7             1132          ANA     A                 ;Is it zero?
      035A  C2 0363        1133          JNZ     1$                ;IF NOT ZERO, jump.
      035D  21 06CC        1134          LXI     H,BRKMSG          ;ELSE, point to the Break Message
      0360  C3 05AF        1135          JMP     CNTLP0            ;Go share the finish up code
      0363  3A 40FE        1136  1$:     LDA     CTL_CHR_DISABLE ;Get the Control Character Disable Flag
      0366  1F             1137          RAR                       ;Put it in the carry
      0367  DA 038B        1138          JC      2$                ;IF CONTROL CHARACTER DISABLED, jump.
      036A  78             1139          MOV     A,B               ;ELSE, get the character
      036B  E6 7F          1140          ANI     7FH               ;Mask off the parity bit
      036D  FE 14          1141          CPI     14H               ;Do a quick range check.  All the Control
                           1142                                    ;Characters we care about are less than 14 Hex.
      036F  D2 038B        1143          JNC     2$                ;IF Char => 14H, jump.
      0372  FE 13          1144          CPI     CNTRLS            ;ELSE, look for Control S
      0374  CA 03B9        1145          JZ      SET_S_FLAG        ;IF CONTROL S, jump.
      0377  FE 11          1146          CPI     CNTRLQ            ;ELSE, look for a Control Q
      0379  CA 03C3        1147          JZ      CLEAR_S_FLAG      ;IF CONTROL Q, jump.
      037C  FE 0F          1148          CPI     CNTRLO            ;ELSE, look for a control O
      037E  CA 051D        1149          JZ      FLIP_O_FLAG       ;IF CONTROL Q, jump.
      0381  FE 03          1150          CPI     CNTRLC            ;ELSE, check for Control C
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Error Addr  Code          Seq   Source statement

      0383  CA 054C       1151            JZ      CNTLC           ;IF CONTROL C, jump.
      0386  FE 10         1152            CPI     CNTRLP          ;ELSE, check for Control P.
      0388  CA 05AC       1153            JZ      CNTLP           ;IF CONTROL P, jump.
      038B  3A 40D0       1154    2$:     LDA     SILO_ACTIVE     ;Get the silo flag
      038E  1F            1155            RAR                     ;Put it in the carry
      038F  3A 40D1       1156            LDA     SILO_IN_INDX    ;Get the Silo Input Index
      0392  D2 039A       1157            JNC     3$              ;Jump if silo empty
      0395  21 40D2       1158            LXI     H,SILO_OUT_INDX ;Point to the Silo Output Index
      0398  BE            1159            CMP     M               ;Are they the same?
      0399  C8            1160            RZ                      ;Leave with carry clear if they are
      039A  5F            1161    3$:     MOV     E,A             ;Put the Index in E
      039B  21 4B80       1162            LXI     H,CHAR_SILO     ;Point to the Character Silo
      039E  85            1163            ADD     L               ;Add the Address Index
      039F  6F            1164            MOV     L,A             ;Put the adjusted address in L
      03A0  70            1165            MOV     M,B             ;Store the character
      03A1  F6 40         1166            ORI     40H             ;Alter the address to point into the Flag silo
      03A3  6F            1167            MOV     L,A             ;Put the altered low byte in L
      03A4  71            1168            MOV     M,C             ;Store the Source Flag and the SR
      03A5  7B            1169            MOV     A,E             ;Get the Index
      03A6  3C            1170            INR     A               ;Bump it
      03A7  E6 3F         1171            ANI     3FH             ;Force the wrap around
      03A9  32 40D1       1172            STA     SILO_IN_INDX    ;Save the updated value
      03AC  3E 01         1173            MVI     A,1             ;Make a 1
      03AE  32 40D0       1174            STA     SILO_ACTIVE     ;Set the Silo Active Flag
      03B1                1175    FINISH_LOCAL:
      03B1  79            1176            MOV     A,C             ;Get the source flag
      03B2  17            1177            RAL                     ;Is this an RD character?
      03B3  D0            1178            RNC                     ;Leave if not an RD character
      03B4  AF            1179            XRA     A               ;Make a 0
      03B5  32 7E00       1180            STA     REMRSR          ;Zero the Remote Done bit
      03B8  C9            1181            RET                     ;Leave
                          1182    ;
                          1183    ;*****************************************************************************
                          1184
                          1185
                          1186
                          1187    ;*****************************************************************************
                          1188    ;
      03B9                1189    SET_S_FLAG:
      03B9  3E 01         1190            MVI     A,1             ;Make a 1
      03BB                1191    SET_S_FL0:
      03BB  32 40CD       1192            STA     S_FLAG          ;Set the S Flag
      03BE  CD 03B1       1193            CALL    FINISH_LOCAL    ;Go clear the RD Rcv Done if set
      03C1  AF            1194            XRA     A               ;Clear the carry
      03C2  C9            1195            RET                     ;Leave
                          1196
      03C3                1197    CLEAR_S_FLAG:
      03C3  AF            1198            XRA     A               ;Make a 0
      03C4  C3 03BB       1199            JMP     SET_S_FL0       ;Go share code
                          1200    ;
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Error Addr  Code           Seq   Source statement

                           1201  ;*****************************************************************************
                           1202
                           1203
                           1204  ;*****************************************************************************
                           1205  ;
     03C7   AF             1206  CTLPRP: XRA     A                ;Make a 0
     03C8   32 7E46        1207          STA     MSG15_COUNT      ;Zap this count
     03CB   32 409D        1208          STA     INDFLG           ;Turn off this flag
     03CE   32 40FE        1209          STA     CTL_CHR_DISABLE  ;and this one also
     03D1   32 40FF        1210          STA     NOCHK            ;and this one as well
     03D4   32 40D4        1211          STA     NOTYPE           ;and another
     03D7   32 40D0        1212          STA     SILO_ACTIVE      ;one more
     03DA   32 40D2        1213          STA     SILO_OUT_INDX    ;Zero the Silo Output Index
     03DD   32 40D1        1214          STA     SILO_IN_INDX     ;and the Silo Input Index
     03E0   3E 0D          1215  BRKSUB: MVI     A,BREAK          ;Put the value of a Break into A
     03E2   D3 47          1216          OUT     TUCR             ;and send it to the Command register
     03E4   06 00          1217          MVI     B,0              ;Put a 0 in B
     03E6   05             1218  1$:     DCR     B                ;Decrement the count
     03E7   C2 03E6        1219          JNZ     1$               ;Loop if not done
     03EA   3E 15          1220          MVI     A,15H            ;Put the normal Command Register value in A
     03EC   D3 47          1221          OUT     TUCR             ;Send it to the Command Register
     03EE   DB 44          1222          IN      TUDB             ;Read the DB to clear out the garbage
     03F0   C9             1223          RET                      ;Leave
                           1224
                           1225  ;*****************************************************************************
                           1226
                           1227
                           1228  ;*****************************************************************************
                           1229  ;
     03F1                  1230  GET_SILO:
     03F1   CD 040F        1231          CALL    READ_SILO        ;Go read the silo
     03F4   D0             1232          RNC                      ;Leave if no character found
     03F5   7B             1233          MOV     A,E              ;Get the Silo Output Index.
     03F6   3C             1234          INR     A                ;Bump it
     03F7   E6 3F          1235          ANI     3FH              ;Save only the Modulo 40H count
     03F9   32 40D2        1236          STA     SILO_OUT_INDX    ;Store it
     03FC   21 40D1        1237          LXI     H,SILO_IN_INDX   ;Point to the Silo Output Index.
     03FF   BE             1238          CMP     M                ;See if the addresses are now equal
     0400   C2 0407        1239          JNZ     1$               ;IF NOT EQUAL, jump.
     0403   AF             1240          XRA     A                ;ELSE, make a 0
     0404   32 40D0        1241          STA     SILO_ACTIVE      ;and clear the Silo Active flag
     0407   78             1242  1$:     MOV     A,B              ;Put the character in A
     0408   21 4082        1243          LXI     H,BYTSUM         ;Point to the Byte Checksum area
     040B   86             1244          ADD     M                ;Add it in
     040C   77             1245          MOV     M,A              ;Store the result
     040D   37             1246          STC                      ;Set the carry
     040E   C9             1247          RET                      ;Leave
                           1248
     040F                  1249  READ_SILO:
     040F   CD 0427        1250          CALL    GET_CHARACTER    ;Go look for characters
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Error Addr  Code          Seq   Source statement

     0412   3A 40D0       1251          LDA     SILO_ACTIVE     ;Get the Silo Active Flag
     0415   1F            1252          RAR                     ;Is it set?
     0416   D0            1253          RNC                     ;Leave with carry clear if not
     0417   3A 40D2       1254          LDA     SILO_OUT_INDX   ;Get the Silo Output Index
     041A   5F            1255          MOV     E,A             ;Save a copy in E
     041B   21 4B80       1256          LXI     H,CHAR_SILO     ;Point to the Character Silo
     041E   85            1257          ADD     L               ;Add the Index
     041F   6F            1258          MOV     L,A             ;Put the low byte of the address into L
     0420   46            1259          MOV     B,M             ;Get the character
     0421   F6 40         1260          ORI     40H             ;Alter the low byte of the address
     0423   6F            1261          MOV     L,A             ;Put it in L
     0424   4E            1262          MOV     C,M             ;Get the source flag and the SR
     0425   37            1263          STC                     ;Set the carry to indicate character present
     0426   C9            1264          RET                     ;Leave
                          1265  ;
                          1266  ;*****************************************************************************
                          1267
                          1268
                          1269  ;*****************************************************************************
                          1270  ;
     0427                 1271  GET_CHARACTER:
     0427   3A 40BE       1272          LDA     LR_MASK         ;Get the Local/Remote Mask
     042A   E6 40         1273          ANI     40H             ;Look for APT in control
     042C   C2 049F       1274          JNZ     GET_APT         ;Jump if it is
     042F   CD 0215       1275          CALL    MODEM_CHECK     ;Go check out the Modem stuff
     0432   DB 03         1276          IN      SECURE          ;Look at the Secure bit of the Keyswitch.
     0434   21 40D3       1277          LXI     H,RUN_FLAG      ;Point to the Run Flag
     0437   B6            1278          ORA     M               ;OR them together
     0438   21 7E04       1279          LXI     H,TALK_FLAG     ;Point to the Talk Mode Flag
     043B   B6            1280          ORA     M               ;OR it in
     043C   1F            1281          RAR                     ;Put the result in the carry
     043D   D0            1282          RNC                     ;Leave with carry clear if DISABL*(-RUN)*(-TALK)
     043E   3A 40BE       1283          LDA     LR_MASK         ;Get the Local/Remote Mask
     0441   FE A5         1284          CPI     0A5H            ;Look for Parallel Control
     0443   C2 044E       1285          JNZ     1$              ;Jump if not
     0446   3A 7E10       1286          LDA     RDCON           ;Get the RD Connected flag
     0449   21 7E05       1287          LXI     H,DISCARD_RO    ;Point to the Discard Remote Output bit
     044C   B6            1288          ORA     M               ;OR them together
     044D   C8            1289          RZ                      ;Leave if (-RDCON*-DISCARD_RO)
     044E   DB 49         1290  1$:     IN      TTSR            ;Get the Local SR
     0450   E6 02         1291          ANI     2               ;Look for Receiver Done
     0452   21 7E00       1292          LXI     H,REMRSR        ;Point to the Remote Pseudo SR
     0455   B6            1293          ORA     M               ;OR it in
     0456   C8            1294          RZ                      ;Leave with carry clear if nothing set
     0457   DB 49         1295          IN      TTSR            ;Get the Local SR
     0459   4F            1296          MOV     C,A             ;Save a copy in C
     045A   E6 02         1297          ANI     RCVDON          ;Look for Receiver Done
     045C   CA 048A       1298          JZ      3$              ;Jump if not
     045F   DB 48         1299          IN      TTDB            ;Get the character
     0461   47            1300          MOV     B,A             ;Put it in B
```

```
Error Addr  Code          Seq   Source statement

     0462   79           1301          MOV     A,C             ;Get the SR back
     0463   E6 3F        1302          ANI     3FH             ;Clear bits 7 and 6 to indicate Local character
     0465   4F           1303          MOV     C,A             ;Put it back in C
     0466   E6 38        1304          ANI     38H             ;Look for errors
     0468   CA 046F      1305          JZ      2$              ;Jump if none
     046B   3E 35        1306          MVI     A,TTCR_CODE     ;RTS (DSRS for Europe RD), Error Reset, Xmit
                         1307                                  ;and Rcv Enable
     046D   D3 4B        1308          OUT     TTCR            ;Reset the errors
     046F   3A 7E04      1309    2$:   LDA     TALK_FLAG       ;Are we in Talk Mode?
     0472   1F           1310          RAR                     ;Check the LSB.
     0473   DA 0346      1311          JC      GET_LOCAL       ;IF TALK MODE, THEN jump.
     0476   3A 40BE      1312          LDA     LR_MASK         ;ELSE, get the Local/Remote Mask
     0479   17           1313          RAL                     ;Check for Local enabled
     047A   DA 0346      1314          JC      GET_LOCAL       ;IF LOCAL CONTROL ENABLED, THEN take care of
                         1315                                  ;things the normal way.
     047D   78           1316          MOV     A,B             ;ELSE, get the character back into A.
     047E   E6 7F        1317          ANI     7FH             ;Zap the parity bit.
     0480   FE 03        1318          CPI     CNTRLC          ;Check for a control C.
     0482   C2 048A      1319          JNZ     3$              ;IF NOT CONTROL C, THEN jump.
     0485   3E 40        1320          MVI     A,40H           ;ELSE, generate the INTR constant.
     0487   32 7E70      1321          STA     CTL_C_INTR      ;Store it here.
     048A   3A 40BE      1322    3$:   LDA     LR_MASK         ;Get the LR_MASK again
     048D   E6 20        1323          ANI     20H             ;Look for Remote enabled
     048F   C8           1324          RZ                      ;If not, leave with carry clear
     0490   21 7E00      1325          LXI     H,REMRSR        ;Point to the Remote Pseudo SR
     0493   7E           1326          MOV     A,M             ;Get it
     0494   E6 02        1327          ANI     RCVDON          ;Check for Receiver Done
     0496   C8           1328          RZ                      ;Leave with carry clear if not Done
     0497   F6 80        1329          ORI     80H             ;Set the Remote character flag
     0499   4F           1330          MOV     C,A             ;Put the copy of the SR in C
     049A   23           1331          INX     H               ;Point to the character
     049B   46           1332          MOV     B,M             ;and get it
     049C   C3 0346      1333          JMP     GET_LOCAL       ;Go share the character processing code
                         1334
     049F                1335    GET_APT:
     049F   21 4081      1336          LXI     H,SWITCH_POS    ;Point to the Switch Position flag
     04A2   DB 06        1337          IN      REMOTE          ;Get the Remote/Local Switch
     04A4   E6 01        1338          ANI     01              ;Save the LSB only
     04A6   BE           1339          CMP     M               ;Has anything changed?
     04A7   C4 022E      1340          CNZ     MASK_GENERATOR  ;Go fix up the Mask if anything has
     04AA   DB 03        1341          IN      SECURE          ;Look at the Secure bit of the Keyswitch.
     04AC   21 40D3      1342          LXI     H,RUN_FLAG      ;Point to the Run Flag
     04AF   B6           1343          ORA     M               ;OR them together
     04B0   1F           1344          RAR                     ;Put the result in the carry
     04B1   D0           1345          RNC                     ;Leave if DISABL*(-RUN)
     04B2   DB 41        1346          IN      TRSR            ;Get the Remote SR
     04B4   4F           1347          MOV     C,A             ;Put a copy of the SR in C
     04B5   E6 02        1348          ANI     RCVDON          ;Check for Receiver Done
     04B7   C8           1349          RZ                      ;Leave with carry clear if Done not set
     04B8   DB 40        1350          IN      TRDB            ;Get the character
```

```
Error Addr  Code          Seq   Source statement

     04BA   47            1351          MOV     B,A             ;Put it in B
     04BB   79            1352          MOV     A,C             ;Get the SR
     04BC   E6 3F         1353          ANI     3FH             ;Clear bits 7 and 6
     04BE   F6 40         1354          ORI     40H             ;Set bit 6 to indicate APT character
     04C0   4F            1355          MOV     C,A             ;Put it back in C
     04C1   E6 38         1356          ANI     38H             ;Check for errors
     04C3   CA 034B       1357          JZ      GET_LOCA0       ;Skip next part if no errors
     04C6   3E 37         1358          MVI     A,37H           ;Prepare to reset errors
     04C8   D3 43         1359          OUT     TRCR            ;Do it
     04CA   AF            1360          XRA     A               ;Clear the Accumulator
     04CB   C3 034B       1361          JMP     GET_LOCA0       ;Go share cleanup code
                          1362  ;
                          1363  ;*****************************************************************************
                          1364
                          1365
                          1366  ;*****************************************************************************
                          1367  ;
     04CE   D3 32         1368  ACLCHK: OUT     SETACL          ;Assert ACLO
     04D0   F5            1369          PUSH    PSW             ;Save the AC and the PSW
     04D1   3E 0D         1370          MVI     A,BREAK         ;Sending this will stop the Tape if it's moving
     04D3   D3 47         1371          OUT     TUCR            ;Send it
     04D5   3A 4080       1372          LDA     RAM_VALID       ;See if there is RAM code to jump to
     04D8   A7            1373          ANA     A               ;Is this byte 0?
     04D9   C2 4120       1374          JNZ     ACLO            ;Jump to the RAM code if not
     04DC   C3 0146       1375          JMP     INITX           ;Go start the power up sequence
                          1376  ;
                          1377  ;*****************************************************************************
                          1378
                          1379
                          1380  ;*****************************************************************************
                          1381  ;
     04DF                 1382  POWER_UP:
     04DF   D3 32         1383          OUT     SETACL          ;Assert ACLO
     04E1   01 014E       1384          LXI     B,334           ;Set up a 2 ms count
     04E4   0B            1385  1$:     DCX     B               ;Count it down
     04E5   79            1386          MOV     A,C             ;Get the low byte into A
     04E6   B0            1387          ORA     B               ;OR in the high
     04E7   C2 04E4       1388          JNZ     1$              ;Loop until done
     04EA                 1389  POWER_0:
     04EA   D3 2F         1390          OUT     SETBSY          ;Set Bus Busy
     04EC   F5            1391          PUSH    PSW             ;Do this Push and Pop to guarantee a 5 usec min
     04ED   F1            1392          POP     PSW             ;between asserting Bus Busy and DCLO
     04EE   D3 30         1393  1$:     OUT     SETDCL          ;Assert DCLO
     04F0   D3 35         1394          OUT     INITH           ;Assert INIT
     04F2   D3 31         1395          OUT     CLRDCL          ;Negate DCLO
     04F4   01 1F13       1396          LXI     B,7955          ;Set up for a 70 Msec delay
     04F7   CD 0512       1397          CALL    WAIT            ;Need this to allow 5 usec after releasing DC LO
     04FA   DA 04EE       1398          JC      1$              ;Loop back if DCL set
     04FD   D3 34         1399          OUT     INITL           ;Negate INIT
*****************************************************************************
**   04FF   C3 1807                     JMP     V12FIX            ;V12 Jump to subroutine which adds 2milsec wait
*****************************************************************************
```

```
Error Addr  Code          Seq   Source statement

     0502   D3 33         1402  V12RET: OUT     CLRACL          ;(V12 Added label) Negate ACLO
     0504   DB 02         1403  2$:     IN      DCLO            ;Monitor DCLO while waiting for ACLO to
     0506   17            1404          RAL                     ;go away.
     0507   DA 04EE       1405          JC      1$              ;Go try again if DCLO becomes asserted.
     050A   20            1406          RIM                     ;Check ACLO.
     050B   17            1407          RAL                     ;Check the SID (which is ACLO)
     050C   DA 0504       1408          JC      2$              ;Loop here waiting for ACLO to go away
     050F   D3 2E         1409          OUT     CLRBSY          ;Negate Bus Busy
     0511   C9            1410          RET                     ;Leave
                          1411
     0512   DB 02         1412  WAIT:   IN      DCLO            ;Low for DCLO asserted
     0514   17            1413          RAL                     ;Put it in the carry
     0515   D8            1414          RC                      ;Leave with carry set if DCL set
     0516   0B            1415          DCX     B               ;Decrement the count
     0517   78            1416          MOV     A,B             ;Get the high byte of the count
     0518   B1            1417          ORA     C               ;OR in the low byte
     0519   C2 0512       1418          JNZ     WAIT            ;Loop if not zero
     051C   C9            1419          RET                     ;Leave
                          1420  ;
                          1421  ;*****************************************************************************
                          1422
                          1423
                          1424  ;*****************************************************************************
                          1425  ;
                          1426
     051D                 1427  FLIP_O_FLAG:
     051D   CD 03B1       1428          CALL    FINISH_LOCAL    ;Go clear the RD Rcv Done if set
     0520   3A 40F2       1429          LDA     SEND_IN_PROGRES ;See if we were in the SEND_CHARACTER routine.
     0523   A7            1430          ANA     A               ;Is it set?
     0524   CA 0531       1431          JZ      1$              ;Jump if clear
     0527   3A 40F3       1432          LDA     CPFLAG          ;Get this flag byte
     052A   A7            1433          ANA     A               ;Is anything set?
     052B   C0            1434          RNZ                     ;Leave if we are in the middle of ^C, ^P or Brk
     052C   E1            1435          POP     H               ;Otherwise, fix up the SP
     052D   AF            1436          XRA     A               ;Make a 0
     052E   32 40F2       1437          STA     SEND_IN_PROGRES ;and clear this flag since we aren't going back
     0531   21 40BB       1438  1$:     LXI     H,O_FLAG        ;Point to the O Flag
     0534   7E            1439          MOV     A,M             ;Get it
     0535   36 00         1440          MVI     M,0             ;Zero out the O Flag
     0537   EE 01         1441          XRI     1               ;Flip it
     0539   23            1442          INX     H               ;Point to the temp storage for the copy
     053A   77            1443          MOV     M,A             ;Save it
     053B   CA 0544       1444          JZ      2$              ;Jump if O Flag is now 0
     053E   3E 5E         1445          MVI     A,'^'           ;Get the first letter to be printed
     0540   DF            1446          RST     3               ;Go to SEND_CHARACTER
     0541   3E 4F         1447          MVI     A,'O'           ;Now the O
     0543   DF            1448          RST     3               ;And go print it
     0544   3A 40BC       1449  2$:     LDA     O_FLAG_COPY     ;Get the real O Flag
     0547   32 40BB       1450          STA     O_FLAG          ;Store it
```

```
Error Addr  Code            Seq   Source statement

     054A   AF              1451          XRA     A               ;Clear the carry
     054B   C9              1452          RET                     ;Leave
                            1453  ;
                            1454  ;*****************************************************************************
                            1455
                            1456
                            1457  ;*****************************************************************************
                            1458  ;
     054C   3E 01            1459  CNTLC:  MVI     A,1             ;Make a 1
     054E   32 40F3          1460          STA     CPFLAG          ;Set this flag for later in CNTLC
     0551   21 06C6          1461          LXI     H,CONTLC        ;Point to this string
     0554   22 40F0          1462  CNTLC0: SHLD    MSGBUF          ;Save the address of the string to be printed
     0557   CD 03B1          1463          CALL    FINISH_LOCAL    ;Go clear the RD Rcv Done if set
     055A   3A 408B          1464          LDA     CODE_FLAG       ;Get the Code flag
     055D   21 4080          1465          LXI     H,RAM_VALID     ;Point to the RAM Valid flag
     0560   A6              1466          ANA     M               ;AND them together
     0561   21 4080          1467          LXI     H,STACK         ;Set up HL with this value
     0564   CA 056A          1468          JZ      1$              ;IF (CODE_FLAG * RAM_VALID)=0, THEN jump.
     0567   2A 4086          1469          LHLD    SPBUFF          ;ELSE, use this for the SP
     056A   F9                1470  1$:     SPHL                    ;Load the SP
     056B   CD 03C7          1471          CALL    CTLPRP          ;Go share some cleanup code
     056E   2A 40F0          1472          LHLD    MSGBUF          ;Get the address of the string to be printed
     0571   CD 059A          1473          CALL    FORCE           ;Go print it
     0574   21 40F3          1474          LXI     H,CPFLAG        ;Point to this flag byte
     0577   7E                1475          MOV     A,M             ;Get it
     0578   1F                1476          RAR                     ;Put the LSB in the carry. (Asserted=^C)
     0579   36 00            1477          MVI     M,0             ;Clear all flags
     057B   3A 4080          1478          LDA     RAM_VALID       ;Get the Ram Valid flag into A
     057E   D2 0595          1479          JNC     2$              ;Jump if C Flag not set
     0581   1F                1480          RAR                     ;Put the Ram Valid Flag in the carry
     0582   D2 0160          1481          JNC     INIT1           ;Jump if not set
     0585   21 409B          1482          LXI     H,LODFLG        ;Point to this flag
     0588   7E                1483          MOV     A,M             ;Get it
     0589   23                1484          INX     H               ;Point to the Dir Flag
     058A   B6                1485          ORA     M               ;OR it in
     058B   CA 4C28          1486          JZ      CVECTR          ;Jump if neither set
     058E   AF                1487          XRA     A               ;Make a zero
     058F   77                1488          MOV     M,A             ;Zero the DIR flag
     0590   2B                1489          DCX     H               ;Point to the Load Flag
     0591   77                1490          MOV     M,A             ;Zero it
     0592   C3 4C2B          1491          JMP     PVECTR          ;Go through this vector
                            1492
     0595   1F                1493  2$:     RAR                     ;Put the Ram Valid flag in the carry
     0596   DA 4C2B          1494          JC      PVECTR          ;Jump if Ram Valid
     0599   CF                1495          RST     1               ;Otherwise, stay in the ROM
                            1496  ;
                            1497  ;*****************************************************************************
                            1498
                            1499
                            1500  ;*****************************************************************************
```

```
Error Addr  Code           Seq   Source statement

                           1501  ;
                           1502
     059A   AF             1503  FORCE:  XRA     A               ;Make a 0
     059B   32 40BB         1504          STA     0_FLAG          ;Zero out this flag
     059E   32 40F2         1505          STA     SEND_IN_PROGRES ;and this
     05A1   32 40CD         1506          STA     S_FLAG          ;and this one also
     05A4   32 40CE         1507          STA     DELETE_FLAG     ;and another
     05A7   F7              1508          RST     6               ;Go print
     05A8   3E 0D           1509          MVI     A,CR            ;Set up a Carriage Return
     05AA   DF              1510          RST     3               ;Go print it
     05AB   C9              1511          RET                     ;Leave
                           1512  ;
                           1513  ;*****************************************************************************
                           1514
                           1515
                           1516  ;*****************************************************************************
                           1517  ;
     05AC   21 06C9         1518  CNTLP:  LXI     H,CONTLP        ;Point to the Control P message
     05AF   3E 02           1519  CNTLP0: MVI     A,2             ;Make a 2
     05B1   32 40F3         1520          STA     CPFLAG          ;Clear the ^C flag and set the (^P+Brk) flag
     05B4   C3 0554         1521          JMP     CNTLC0          ;Go share some code
                           1522  ;
                           1523  ;*****************************************************************************
                           1524
                           1525
                           1526  ;*****************************************************************************
                           1527  ;
     05B7                  1528  SEND_LINE:
     05B7   7E             1529          MOV     A,M             ;Get the count
     05B8   23             1530          INX     H               ;Bump the pointer
     05B9                  1531  SEND_LI_0:
     05B9   32 40C3         1532          STA     PRICNT          ;Save the count
     05BC   22 40C1         1533          SHLD    PRIADR          ;Save the address
     05BF   AF              1534          XRA     A               ;Make a 0
     05C0   32 4082         1535          STA     BYTSUM          ;and zero out the Byte Checksum area
     05C3   2A 40C1         1536  1$:     LHLD    PRIADR          ;Get the address of the line to be printed
     05C6   7E              1537          MOV     A,M             ;Get the character
     05C7   23              1538          INX     H               ;Bump the address along
     05C8   22 40C1         1539          SHLD    PRIADR          ;Save the new value
     05CB   DF              1540          RST     3               ;Go send a character
     05CC   21 40C3         1541          LXI     H,PRICNT        ;Point to the count
     05CF   35              1542          DCR     M               ;Subtract one
     05D0   C2 05C3         1543          JNZ     1$              ;Go send another if not 0
     05D3   C9              1544          RET                     ;Otherwise, leave with Z bit set
                           1545  ;
                           1546  ;*****************************************************************************
                           1547
                           1548
                           1549  ;*****************************************************************************
                           1550  ;
```

```
Error Addr  Code          Seq   Source statement

      05D4                1551  SEND_CHARACTER:
      05D4   32 40C0      1552          STA     SAVE_CHARACTER  ;Save the character
      05D7   3A 40BE      1553          LDA     LR_MASK         ;Get the Local/Remote mask
      05DA                1554  SEND_CHA0:
      05DA   32 40BF      1555          STA     LR_MASK_COPY    ;Save a copy of the Mask.
      05DD   3E 01        1556          MVI     A,1             ;Make a 1.
      05DF   32 40F2      1557          STA     SEND_IN_PROGRES ;Flag to indicate we are in SEND_CHARACTER.
      05E2   3A 40BF      1558  1$:     LDA     LR_MASK_COPY    ;Get the copy
      05E5   32 40BD      1559  2$:     STA     LR_MASK_WORK    ;Set up the working version
      05E8   E7           1560  3$:     RST     4               ;Go look for Control C or P
      05E9   3A 7E46      1561          LDA     MSG15_COUNT     ;Get the Message Type 15 count
      05EC   21 7E49      1562          LXI     H,CLMSG_COUNT   ;Point to the Connection Lost Msg Count.
      05EF   B6           1563          ORA     M               ;OR them together.
      05F0   C2 05E8      1564          JNZ     3$              ;IF MSG15_COUNT<>0 OR CLMSG_COUNT<>0,
                          1565                                  ;THEN loop back.
      05F3   3A 7E04      1566          LDA     TALK_FLAG       ;ELSE, get the Talk Flag
      05F6   1F           1567          RAR                     ;Is it set?
      05F7   D2 0600      1568          JNC     4$              ;IF NOT SET, THEN skip around next part.
      05FA   CD 080F      1569          CALL    TALK_VECTOR     ;Go to the Talk flow
      05FD   C3 05E8      1570          JMP     3$              ;Loop here
      0600   3A 40CD      1571  4$:     LDA     S_FLAG          ;Get this flag
      0603   1F           1572          RAR                     ;Is it set?
      0604   DA 05E8      1573          JC      3$              ;Loop here if it is
      0607   3A 40BB      1574          LDA     O_FLAG          ;Get the O Flag
      060A   1F           1575          RAR                     ;Is it set?
      060B   D8           1576          RC                      ;Leave if it is
      060C   21 40BD      1577          LXI     H,LR_MASK_WORK  ;Point to the working copy
      060F   7E           1578          MOV     A,M             ;Get it
      0610   E6 07        1579          ANI     7               ;Save only the XMIT bits
      0612   CA 066A      1580          JZ      10$             ;Jump if nobody left to be sent to
      0615   1F           1581          RAR                     ;Check for Local
      0616   D2 0628      1582          JNC     5$              ;Jump if not set
      0619   DB 49        1583          IN      TTSR            ;Get the Local SR
      061B   1F           1584          RAR                     ;Look for XMIT Ready
      061C   D2 0628      1585          JNC     5$              ;Jump if not set
      061F   3A 40C0      1586          LDA     SAVE_CHARACTER  ;Get the character to be sent
      0622   D3 48        1587          OUT     TTDB            ;Send it out
      0624   3E FE        1588          MVI     A,0FEH          ;Get this mask
      0626   A6           1589          ANA     M               ;Clear the Local Bit
      0627   77           1590          MOV     M,A             ;Save the new masked version
      0628   7E           1591  5$:     MOV     A,M             ;Get the Working Copy of the mask
      0629   E6 02        1592          ANI     2               ;See if APT set
      062B   CA 063F      1593          JZ      7$              ;Jump if not set
      062E   DB 41        1594          IN      TRSR            ;Get the remote SR
      0630   1F           1595          RAR                     ;Look for XMIT RDY
      0631   D2 05E8      1596          JNC     3$              ;Jump if not
      0634   3A 40C0      1597          LDA     SAVE_CHARACTER  ;Get the character to be sent
      0637   D3 40        1598          OUT     TRDB            ;Send it out
      0639   3E FD        1599          MVI     A,0FDH          ;Get ready to clear the next bit
      063B   A6           1600  6$:     ANA     M               ;Do it
```

```
Error Addr  Code          Seq   Source statement

     063C   C3 05E5       1601          JMP     2$              ;Loop back
                          1602
     063F   7E            1603   7$:    MOV     A,M             ;Get the Working Copy of the mask
     0640   E6 04         1604          ANI     4               ;See if RD set
     0642   CA 05E8       1605          JZ      3$              ;Loop back if not set
     0645   3A 7E10       1606          LDA     RDCON           ;See if we are connected
     0648   1F            1607          RAR                     ;Put the flag in the carry
     0649   DA 0653       1608          JC      8$              ;Jump if we are
     064C   3A 7E05       1609          LDA     DISCARD_RO              ;Get the Discard Remote Output bit
     064F   1F            1610          RAR                     ;Is it set?
     0650   DA 0662       1611          JC      9$              ;Jump if it is
     0653   21 7E02       1612   8$:    LXI     H,REMXSR        ;Point to the pseudo Xmit SR
     0656   7E            1613          MOV     A,M             ;Get it
     0657   1F            1614          RAR                     ;Is it set?
     0658   D2 05E8       1615          JNC     3$              ;Loop back if not
     065B   36 00         1616          MVI     M,0             ;Clear it
     065D   23            1617          INX     H               ;Point to the Pseudo DB
     065E   3A 40C0       1618          LDA     SAVE_CHARACTER  ;Get the character to be sent
     0661   77            1619          MOV     M,A             ;Store it
     0662   3E FB         1620   9$:    MVI     A,0FBH          ;Prepare to clear the Remote bit
     0664   21 40BD       1621          LXI     H,LR_MASK_WORK  ;Point to the Working Mask
     0667   C3 063B       1622          JMP     6$              ;Go share some code
                          1623
                          1624
     066A   3A 40C0       1625   10$:   LDA     SAVE_CHARACTER  ;Get the character
     066D   47            1626          MOV     B,A             ;Save a copy
     066E   21 4082       1627          LXI     H,BYTSUM        ;Point to the byte checksum area
     0671   86            1628          ADD     M               ;Add it in
     0672   77            1629          MOV     M,A             ;Put it back
     0673   3A 40FF       1630          LDA     NOCHK           ;See if we should check for CR
     0676   1F            1631          RAR                     ;Is checking inhibited?
     0677   DA 0688       1632          JC      11$             ;Leave if it is
     067A   78            1633          MOV     A,B             ;Get the copy in B
     067B   FE 0D         1634          CPI     CR              ;See if it was a Carriage Return
     067D   C2 0688       1635          JNZ     11$             ;Leave if it wasn't
     0680   3E 0A         1636          MVI     A,LF            ;Put a Line Feed in A
     0682   32 40C0       1637          STA     SAVE_CHARACTER  ;Put it in the storage area
     0685   C3 05E2       1638          JMP     1$              ;Go back and do it again
     0688   AF            1639   11$:   XRA     A               ;Make a 0
     0689   32 40F2       1640          STA     SEND_IN_PROGRES ;Zero this flag
     068C   C9            1641          RET                     ;Leave
                          1642   ;
                          1643   ;*****************************************************************************
                          1644
                          1645
                          1646
                          1647
                          1648   ;*****************************************************************************
                          1649   ;
     068D                 1650   MODEM_ENTRY:
```

```
Error Addr  Code          Seq   Source statement

     068D   2A 4099       1651          LHLD    MODEM_ADDRESS   ;Get the entry point address
     0690   E9            1652          PCHL                    ;and go there.
                          1653
     0691   CD 1004       1654  FIXUP:  CALL    FA_VECTOR       ;Point to MODEM0
     0694   DB 06         1655  MODEM0: IN      REMOTE          ;Check the switch position
     0696   1F            1656          RAR                     ;Put it in carry for checking
     0697   D8            1657          RC                      ;Leave if in Local
     0698   DB 04         1658          IN      APTFLG          ;Check for APT
     069A   1F            1659          RAR                     ;Put in carry
     069B   D0            1660          RNC                     ;Leave if APT present
     069C   3A 1000       1661          LDA     RD_PATTERN      ;Get the first byte from the next set of ROM
     069F   FE A5          1662          CPI     0A5H            ;Check for the correct pattern
     06A1   C0            1663          RNZ                     ;Leave if not
     06A2   C3 1007       1664          JMP     MOD0_VECTOR     ;Jump into next part of ROM
                          1665
                          1666  ;
                          1667  ;*****************************************************************************
                          1668
                          1669
                          1670  ;*****************************************************************************
                          1671  ;
                          1672  ;This is the Diagnostic Print routine.  The "caller" must have HL pointing
                          1673  ;to the character to be printed and the return point is assumed to be the
                          1674  ;address following this character.
                          1675  ;
     06A5                 1676  DPRINT:
     06A5   DB 49         1677  1$:     IN      TTSR            ;Check the XMIT Ready bit
     06A7   1F            1678          RAR                     ;Put it in the carry
     06A8   D2 06A5       1679          JNC     1$              ;Loop back if not ready
     06AB   7E            1680          MOV     A,M             ;Get the character to be printed
     06AC   D3 48         1681          OUT     TTDB            ;Send it to the Local Terminal
     06AE   23            1682          INX     H               ;Bump the pointer
     06AF   DB 49         1683  2$:     IN      TTSR            ;Wait for ready to come back before leaving
     06B1   1F            1684          RAR                     ;
     06B2   D2 06AF       1685          JNC     2$              ;Loop until Xmit Ready is asserted again
     06B5   E9            1686          PCHL                    ;Leave
                          1687  ;
                          1688  ;*****************************************************************************
                          1689
                          1690
                          1691  ;*****************************************************************************
                          1692  ;
     06B6   04 04         1693  INITPK: DB      TUINIT,TUINIT           ;TU-58 Init code
                          1694  ;
                          1695  ;*****************************************************************************
                          1696
                          1697
                          1698  ;*****************************************************************************
                          1699  ;
     06B8   02 0A 02      1700  BOOTPK: DB      02,0AH,02,0
```

```
Error Addr  Code           Seq   Source statement

      06BB  00
      06BC  01 00          1701           DB      1,0             ;
      06BE  0000           1702           DW      0
      06C0  0C00           1703           DW      3072            ;
      06C2  0000           1704           DW      0               ;
      06C4  0694           1705   VECTOR: DW      MODEM0          ;Address into Modem Control routines
                           1706   ;
                           1707   ;*****************************************************************************
                           1708
                           1709
                           1710   ;*****************************************************************************
                           1711   ;
      06C6  02 5E 43       1712   CONTLC: DB      2,'^C'          ;
      06C9  02 5E 50       1713   CONTLP: DB      2,'^P'          ;
      06CC  01 00          1714   BRKMSG: DB      1,0             ;
                           1715   ;
                           1716   ;*****************************************************************************
                           1717
                           1718
                           1719   ;*****************************************************************************
                           1720   ;
                           1721   ;       These are the tape error messages
                           1722   ;
      06CE  12 0D 3F       1723   DEVERR: DB      18,CR,'?27  DEVICE ERROR'       ;Init or Timeout Errors.
      06D1  32 37 20
      06D4  20 44 45
      06D7  56 49 43
      06DA  45 20 45
      06DD  52 52 4F
      06E0  52
                           1724
      06E1  10 0D 3F       1725   REDERR: DB      16,CR,'?27  READ ERROR'         ;Tape Checksum Errors.
      06E4  32 37 20
      06E7  20 52 45
      06EA  41 44 20
      06ED  45 52 52
      06F0  4F 52
                           1726
      06F2  0D 0D 3F       1727   NOBOOT: DB      13,CR,'?40  NO BOOT'                    ;
      06F5  34 30 20
      06F8  20 4E 4F
      06FB  20 42 4F
      06FE  4F 54
                           1728
      0700  03 20 44       1729   DRVMSG: DB      3,' DD'         ;
      0703  44
                           1730   ;
                           1731   ;       End of Tape Error messages
                           1732   ;
                           1733   ;*****************************************************************************
```

```
Error Addr  Code           Seq   Source statement

                           1734
                           1735
                           1736  ;*************************************************************************
                           1737  ;
                           1738  ;       Other messages
                           1739  ;
      0704                 1740  NACK_X_CMND:
      0704  03 3F 32       1741  SYNTAX: DB      3,'?20'                 ;
      0707  30
                           1742
      0708  05 0D 52       1743  RPRMPT: DB      5,CR,'ROM>'             ;
      070B  4F 4D 3E
                           1744
      070E                 1745  NACK_X_DATA:
      070E  04 0D 3F       1746          DB      4,CR,'?30'
      0711  33 30
                           1747
      0713                 1748  VALIDITY_ERR:
      0713  04 0D 3F       1749          DB      4,CR,'?40'
      0716  34 30
                           1750  ;
                           1751  ;       End of other messages
                           1752  ;
                           1753  ;*****************************************************************************

*****************************************************************************************
**    0718  D3 33              V12FIX: OUT     CLRACL          ;V12 Negate AC low
**    071A  01 014E                    LXI     B,334           ;V12 Set up 2 milsec count
**    071D  0B                     1$: DCX     B               ;V12 Count it down
**    071E  79                         MOV     A,C             ;V12 Get low byte into A
**    071F  B0                         ORA     B               ;V12 OR in high byte
**    0720  C2 071D                    JNZ     1$              ;V12 Jump if still time
**    0723  3E 10                      MVI     A,010H          ;V12 Reset RST 7.5
**    0725  30                         SIM                     ;V12 Do it
**    0726  C3 0502                    JMP     V12RET          ;V12 Return to flow
*****************************************************************************************

                           1754
                           1755
            =07FF          1756          ORG     7FFH            ;
                           1757
      07FF  00             1758  LOWSUM: DB      0               ;
                           1759
                           1760
                           1761
                           1762
                           1763  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                           1764  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                           1765  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                           1766  ;
                           1767  ;
                           1768
                           1769
            =0800          1770          ORG     800H            ;
                           1771
```

```
0800                    1772    RD_LD_VECTOR:
0800    C3 0B70         1773            JMP     RD_LD_COMMAND   ;Go to the RD LOAD Command flows
                        1774
0803                    1775    DCD_VECTOR:
0803    C3 0BE1         1776            JMP     DCD_MESSAGE     ;Go the (Diana) Control Data Message flows
                        1777
0806                    1778    TEXT_VECTOR:
0806    C3 0CE2         1779            JMP     TEXT_MESSAGE    ;Go to the Text Message flows
```

```
Error Addr  Code          Seq   Source statement

                          1780
     0809                 1781  STT_VECTOR:
     0809   C3 0B25       1782          JMP     SEND_TRANS_TEXT ;
                          1783
     080C                 1784  RL_VECTOR:
     080C   C3 0A6A       1785          JMP     RAM_LOAD        ;Go to Ram Load.
                          1786
     080F                 1787  TALK_VECTOR:
     080F   C3 0CFB       1788          JMP     TALK            ;Go to the Talk Mode flows.
                          1789
     0812                 1790  MD_VECTOR:
     0812   C3 0D88       1791          JMP     MSG_DECODE      ;Go to Message Decode
                          1792
     0815                 1793  ST_VECTOR:
     0815   C3 082A       1794          JMP     SELF_TEST       ;Go to the Self Test.
                          1795
     0818                 1796  BUILD_VECTOR:
     0818   C3 0E2E       1797          JMP     BUILD           ;Go to the Build (the Out Packet) flow.
                          1798
     081B                 1799  BP_VECTOR:
     081B   C3 0E67       1800          JMP     BUILD_PREP      ;Go to Build_Prep.
                          1801
     081E   C3 081E       1802  MRVEC8: JMP     MRVEC8          ;TEMPORARY
                          1803
     0821   C3 0821       1804  MRVEC9: JMP     MRVEC9          ;TEMPORARY
                          1805
     0824   C3 0824       1806  MRVE10: JMP     MRVE10          ;TEMPORARY
                          1807
     0827   C3 0827       1808  MRVE11: JMP     MRVE11          ;TEMPORARY
                          1809
                          1810
                          1811  ;*****************************************************************************
                          1812  ;
                          1813  ;  ROM - NEBULA SELF TESTS
                          1814  ;
                          1815  ;*****************************************************************************
                          1816
     082A                 1817  SELF_TEST:
     082A   D3 35         1818          OUT     INITH           ;Set Unibus Init
     082C   D3 2F         1819          OUT     SETBSY          ;Set Bus Busy
     082E   DB 07         1820  1$:     IN      OK15V           ;Check the + and - 15 volts
     0830   17            1821          RAL                     ;The flag is in the MSB
     0831   D2 082E       1822          JNC     1$              ;Loop until set
     0834   DB 47         1823          IN      TUCR            ;These IN's force an internal pointer
     0836   DB 4B         1824          IN      TTCR            ;in the USARTs to point to the MODE1
     0838   DB 43         1825          IN      TRCR            ;register
     083A   3E 4E         1826          MVI     A,4EH           ;1 Stop bit,8 bits wide,ASYNC,Divide by 16
     083C   D3 46         1827          OUT     TUMODE          ;Send it out to the USARTs
     083E   D3 4A         1828          OUT     TTMODE
     0840   D3 42         1829          OUT     TRMODE
```

```
Error Addr  Code          Seq   Source statement

     0842   3E 35        1830          MVI     A,TTCR_CODE     ;RTS (DSRS for Europe RD), Error Reset, Xmit
                         1831                                  ;and Rcv Enable
     0844   D3 4B        1832          OUT     TTCR            ;Set up the terminal USART
     0846   DB 04        1833          IN      READJ2          ;Check the status of J2
     0848   17           1834          RAL                     ;Put it in the carry
     0849   D2 0024      1835          JNC     INIT_VECTOR     ;Jump if low
                         1836
                         1837
                         1838  ;Since subroutines can't be used yet, the print routine is shared in the
                         1839  ;following manner:
                         1840  ;
                         1841  ;       1)  The "caller" must load HL with the address of the character
                         1842  ;           to be printed.
                         1843  ;       2)  The return point immediately follows the character.
                         1844  ;       3)  An RST 7 is used to get to the DPRINT routine.  Since the SP
                         1845  ;           gets Pushed twice, the state of the LSB is preserved.
                         1846
                         1847
     084C   21 0850      1848          LXI     H,FIRST_CHAR    ;Point to the LF
     084F   FF           1849          RST     7               ;Go print it
     0850                1850  FIRST_CHAR:
     0850   0A           1851          DB      LINE_FEED       ;Line Feed code.
     0851   21 0855      1852          LXI     H,SECOND_CHAR   ;Point to the CR
     0854   FF           1853          RST     7               ;Go print it
     0855                1854  SECOND_CHAR:
     0855   0D           1855          DB      CAR_RET         ;Carriage Return code.
     0856   21 085A      1856          LXI     H,THIRD_CHAR    ;Point to this return point
     0859   FF           1857          RST     7               ;Go to the Diagnostic print routine
     085A                1858  THIRD_CHAR:
     085A   43           1859          DB      C_LETTER        ;This is the letter to print
                         1860
                         1861
                         1862  ;*****************************************************************************
                         1863  ;*****************************************************************************
                         1864  ;
                         1865  ;
                         1866  ;       BEGINNING OF ROM CHECKSUM
                         1867  ;
     085B                1868  ROM_CHKSUM:
     085B   06 00        1869          MVI     B,0             ;Clear out this flag
     085D   D3 A8        1870          OUT     SETACK          ;Set the Scope Sync signal
     085F   D3 A9        1871          OUT     CLRACK          ;Clear it
     0861   21 0000      1872          LXI     H,0             ;Clear HL because ROM starts at 0
     0864   54           1873          MOV     D,H             ;Clear D
                         1874
                         1875  ;*****************************************************************************
                         1876  ;
                         1877  ;       This is where we sum up the first 2 kbyte segment (ROMS E53 and E54).
                         1878  ;
     0865   7A           1879  1$:     MOV     A,D             ;Get accumulated checksum value
```

```
Error Addr  Code          Seq   Source statement

     0866   86           1880          ADD     M               ;Add contents of current memory location
     0867   57           1881          MOV     D,A             ;Save result
     0868   23           1882          INX     H               ;Bump the pointer
     0869   3E 08        1883          MVI     A,8H            ;Check for the end of the first 2k
     086B   BC           1884          CMP     H               ;We only need to look at the high address byte
     086C   C2 0865      1885          JNZ     1$              ;Keep adding them up
     086F   7A           1886          MOV     A,D             ;Get the result
     0870   A7           1887          ANA     A               ;Check for 0
     0871   C2 0871      1888  2$:     JNZ     2$              ;Stay here if not
                         1889  ;
                         1890  ;*****************************************************************************
                         1891
                         1892  ;*****************************************************************************
                         1893  ;
                         1894  ;       Now we do the second 2 kbyte segment (ROMS E49 and E51).
                         1895  ;
     0874   7A           1896  3$:     MOV     A,D             ;Get accumulated checksum value
     0875   86           1897          ADD     M               ;Add contents of current memory location
     0876   57           1898          MOV     D,A             ;Save result
     0877   23           1899          INX     H               ;Bump the pointer
     0878   3E 10        1900          MVI     A,10H           ;Check for the end of the second 2k
     087A   BC           1901          CMP     H               ;We only need to look at the high address byte
     087B   C2 0874      1902          JNZ     3$              ;Keep adding them up
     087E   7A           1903          MOV     A,D             ;Get the result
     087F   A7           1904          ANA     A               ;Check for 0
     0880   C2 0880      1905  4$:     JNZ     4$              ;Stay here if not
                         1906  ;
                         1907  ;*****************************************************************************
                         1908
                         1909
                         1910  ;*****************************************************************************
                         1911  ;
                         1912  ;       Last, see if the high 2 kbyte segment is installed (ROMS E50 and E52).
                         1913  ;       If not, we skip this part.  If it is, we checksum it
                         1914  ;
     0883   7E           1915          MOV     A,M             ;Get the data at 1000H
     0884   FE A5        1916          CPI     0A5H            ;0A5H indicates last 2k is there
     0886   C2 0898      1917          JNZ     PRINT_FOURTH    ;Skip the next part if no ROM starting at 1000H
     0889   7A           1918  5$:     MOV     A,D             ;Get accumulated checksum value
     088A   86           1919          ADD     M               ;Add contents of current memory location
     088B   57           1920          MOV     D,A             ;Save result
     088C   23           1921          INX     H               ;Bump the pointer
     088D   3E 18        1922          MVI     A,18H           ;Check for the end of the third 2k
     088F   BC           1923          CMP     H               ;We only need to look at the high address byte
     0890   C2 0889      1924          JNZ     5$              ;Keep adding them up
     0893   7A           1925          MOV     A,D             ;Get the result
     0894   A7           1926          ANA     A               ;Check for 0
     0895   C2 0895      1927  6$:     JNZ     6$              ;Stay here if not
                         1928                                  ;Otherwise, fall through to next test
                         1929  ;
```

```
Error Addr  Code          Seq   Source statement

                          1930  ;*****************************************************************************
                          1931  ;
                          1932  ;       END OF ROM CHECKSUM
                          1933  ;
                          1934  ;*****************************************************************************
                          1935  ;*****************************************************************************
                          1936
                          1937
                          1938  ;*****************************************************************************
                          1939  ;
    0898                  1940  PRINT_FOURTH:
    0898   21 089C         1941          LXI     H,FOURTH_CHAR   ;Point to this character
    089B   FF             1942          RST     7               ;Go print the character
    089C                  1943  FOURTH_CHAR:
    089C   4F             1944          DB      O_LETTER        ;This is the character to be printed
    089D   21 08A1         1945          LXI     H,FIFTH_CHAR    ;Point to a null
    08A0   FF             1946          RST     7               ;Go print it
    08A1                  1947  FIFTH_CHAR:
    08A1   00             1948          DB      0               ;Null
    08A2   AF             1949          XRA     A               ;Make a 0.
    08A3   D3 4B          1950          OUT     TTCR            ;This is for the 2661 USARTS.
    08A5   D3 47          1951          OUT     TUCR
    08A7   D3 43          1952          OUT     TRCR
    08A9   3E B3          1953          MVI     A,0B3H          ;Now we can go into Local Loop Back.
    08AB   D3 4B          1954          OUT     TTCR
    08AD   D3 47          1955          OUT     TUCR
    08AF   D3 43          1956          OUT     TRCR
                          1957
                          1958  ;*****************************************************************************
                          1959  ;*****************************************************************************
                          1960  ;
                          1961  ;       BEGINNING OF LOCAL LOOPBACK USART TEST
                          1962  ;
                          1963  ;       By using a -1 in E and XORing the pattern with it, we generate
                          1964  ;       a 0 in a background of ones.  After rippling through this, we bump
                          1965  ;       the value in E to 0 and now the XOR does nothing (effectively) and
                          1966  ;       we ripple through ones with a background of zeros.  The value in E
                          1967  ;       also acts as loop control.
                          1968  ;
                          1969
                          1970  ;*****************************************************************************
                          1971  ;
                          1972  ;       Set up the patterns
                          1973
    08B1   1E FF          1974          MVI     E,0FFH          ;Put a minus one in E
    08B3   21 0102        1975          LXI     H,102H          ;H gets 1 and L gets 2
                          1976  ;
                          1977  ;*****************************************************************************
                          1978
                          1979
```

```
Error Addr  Code           Seq   Source statement

                          1980  ;*****************************************************************************
                          1981  ;
     08B6                 1982  LOCAL_LOOPBACK:
     08B6   7C            1983          MOV     A,H             ;Get the pattern
     08B7   AB            1984          XRA     E               ;XOR it against the value in E
     08B8   57            1985          MOV     D,A             ;Put this in reg D
                          1986
                          1987  ;*****************************************************************************
                          1988  ;
                          1989  ;       Test USART 1
                          1990  ;
     08B9                 1991  USART1_LL:
     08B9   D3 A8         1992          OUT     SETACK          ;Set the Scope Sync
     08BB   D3 A9         1993          OUT     CLRACK          ;Clear it
     08BD   DB 49         1994  1$:     IN      TTSR            ;Wait for XMIT RDY
     08BF   1F            1995          RAR
     08C0   D2 08BD       1996          JNC     1$
     08C3   7A            1997          MOV     A,D             ;Get the pattern
     08C4   D3 48         1998          OUT     TTDB            ;Send it out
     08C6   DB 49         1999  2$:     IN      TTSR            ;Get the SR
     08C8   A5            2000          ANA     L               ;Check for Rcvr Done
     08C9   CA 08C6       2001          JZ      2$              ;Wait for it
     08CC   DB 48         2002          IN      TTDB            ;Get the data
     08CE   BA            2003          CMP     D               ;Check it
     08CF   CA 08D4       2004          JZ      3$              ;Jump if OK
     08D2   06 01         2005          MVI     B,1             ;Set the error flag
     08D4   78            2006  3$:     MOV     A,B             ;Get the error flag
     08D5   1F            2007          RAR                     ;Is it set?
     08D6   DA 08B9       2008          JC      USART1_LL       ;Jump if it is
                          2009  ;
                          2010  ;*****************************************************************************
                          2011
                          2012
                          2013  ;*****************************************************************************
                          2014  ;
                          2015  ;       Test USART 2
                          2016  ;
     08D9                 2017  USART2_LL:
     08D9   D3 A8         2018          OUT     SETACK          ;Set the Scope Sync
     08DB   D3 A9         2019          OUT     CLRACK          ;Clear it
     08DD   DB 45         2020  1$:     IN      TUSR            ;Wait for XMIT RDY
     08DF   1F            2021          RAR
     08E0   D2 08DD       2022          JNC     1$
     08E3   7A            2023          MOV     A,D             ;Get the data to be sent
     08E4   D3 44         2024          OUT     TUDB            ;Send it
     08E6   DB 45         2025  2$:     IN      TUSR            ;Get the SR
     08E8   A5            2026          ANA     L               ;Check for Rcvr Done
     08E9   CA 08E6       2027          JZ      2$              ;Loop until it is
     08EC   DB 44         2028          IN      TUDB            ;Get the character
     08EE   BA            2029          CMP     D               ;Is it correct?
```

```
Error Addr  Code           Seq   Source statement

     08EF   CA 08F4       2030            JZ      3$              ;Jump if OK
     08F2   06 01         2031            MVI     B,1             ;Set the error flag
     08F4   78            2032    3$:     MOV     A,B             ;Get the error flag
     08F5   1F            2033            RAR                     ;Is it set?
     08F6   DA 08D9       2034            JC      USART2_LL       ;Jump if it is
                          2035    ;
                          2036    ;*****************************************************************************
                          2037
                          2038
                          2039    ;*****************************************************************************
                          2040    ;
                          2041    ;       Test USART 3
                          2042    ;
     08F9                 2043    USART3_LL:
     08F9   D3 A8         2044            OUT     SETACK          ;Set the Scope Sync
     08FB   D3 A9         2045            OUT     CLRACK          ;Clear it
     08FD   DB 41         2046    1$:     IN      TRSR            ;Get the SR for the third USART
     08FF   1F            2047            RAR                     ;Look for Xmit Rdy
     0900   D2 08FD       2048            JNC     1$              ;Loop if not Ready
     0903   7A            2049            MOV     A,D             ;Get the data to be sent
     0904   D3 40         2050            OUT     TRDB            ;Send it
     0906   DB 41         2051    2$:     IN      TRSR            ;Get the SR again
     0908   A5            2052            ANA     L               ;Check for Rcvr Done
     0909   CA 0906       2053            JZ      2$              ;Wait for it
     090C   DB 40         2054            IN      TRDB            ;Get the character
     090E   BA            2055            CMP     D               ;Check it
     090F   CA 0914       2056            JZ      3$              ;Jump if OK
     0912   06 01         2057            MVI     B,1             ;Set the error flag
     0914   78            2058    3$:     MOV     A,B             ;Get the error flag
     0915   1F            2059            RAR                     ;Is it set?
     0916   DA 08F9       2060            JC      USART3_LL       ;Jump if it is
                          2061    ;
                          2062    ;*****************************************************************************
                          2063
                          2064
                          2065    ;*****************************************************************************
                          2066    ;
                          2067    ;       Now rotate the pattern and see if we are done.  If not, jump back to
                          2068    ;
     0919   7C            2069            MOV     A,H             ;Get the pattern
     091A   07            2070            RLC                     ;Rotate left one place
     091B   67            2071            MOV     H,A             ;Make this the new pattern
     091C   D2 08B6       2072            JNC     LOCAL_LOOPBACK  ;Keep looping until the one shifts out
     091F   1C            2073            INR     E               ;Bump the value in E
     0920   CA 08B6       2074            JZ      LOCAL_LOOPBACK  ;Loop back until not 0
     0923   AF            2075            XRA     A               ;GET A 0
     0924   D3 4B         2076            OUT     TTCR            ;FOR 2661
     0926   D3 47         2077            OUT     TUCR            ;
     0928   D3 43         2078            OUT     TRCR            ;
                          2079    ;
```

```
Error Addr  Code          Seq   Source statement

                          2080  ;*****************************************************************************
                          2081
                          2082
                          2083  ;*****************************************************************************
                          2084  ;
     092A   3E 15         2085          MVI     A,15H           ;Code for Error Reset, Xmit and Rcv Enables
     092C   D3 4B         2086          OUT     TTCR            ;Send it out to the Terminal CR
                          2087                                  ;and fall through to the next test
                          2088  ;
                          2089  ;       END OF USART LOCAL LOOPBACK TEST
                          2090  ;
                          2091  ;*****************************************************************************
                          2092  ;*****************************************************************************
                          2093
                          2094
                          2095
                          2096
                          2097  ;*****************************************************************************
                          2098  ;
                          2099  ;       UBTST
                          2100  ;
                          2101  ;The second USART test is a dual addressing test.  A different value is
                          2102  ;written to each of the Command Registers and then read back.  If the value
                          2103  ;read back is incorrect, a dual addressing problem is assumed.
                          2104  ;
                          2105  ;*****************************************************************************
                          2106
                          2107
     092E   21 0932       2108  UBTST:  LXI     H,UBX           ;Point to this character
     0931   FF             2109          RST     7               ;Go print it
     0932   4E             2110  UBX:    DB      N_LETTER        ;This is the character
     0933   11 0104        2111          LXI     D,104H          ;Put a 1 in D and a 4 in E
                          2112
     0936   D3 A8         2113  UB1:    OUT     SETACK          ;Set the Scope Sync
     0938   D3 A9         2114          OUT     CLRACK          ;Clear it
     093A   7A             2115          MOV     A,D             ;Pattern=1 for USART 1
     093B   D3 4B         2116          OUT     TTCR            ;Send it to the Command Register
     093D   7B             2117          MOV     A,E             ;Pattern=4 for USART 2
     093E   D3 47         2118          OUT     TUCR            ;Send it to the CR
     0940   3C             2119          INR     A               ;Pattern=5 for USART 3
     0941   D3 43         2120          OUT     TRCR            ;Send it to the CR
     0943   DB 4B         2121          IN      TTCR            ;Get the Terminal CR back
     0945   BA             2122          CMP     D               ;Is it OK?
     0946   CA 094B       2123          JZ      UB1A            ;Jump if good
     0949   06 01         2124          MVI     B,1             ;Set the error flag
     094B   78             2125  UB1A:   MOV     A,B             ;Get the error flag
     094C   1F             2126          RAR                     ;Put it in the carry
     094D   DA 0936        2127          JC      UB1             ;Jump if set
                          2128
     0950   D3 A8         2129  UB2:    OUT     SETACK          ;Set the Scope Sync
```

```
Error Addr  Code          Seq   Source statement

     0952   D3 A9        2130          OUT     CLRACK          ;Clear it
     0954   7A           2131          MOV     A,D             ;Pattern=1 for USART 2
     0955   D3 47        2132          OUT     TUCR            ;Send it to the Command Register
     0957   7B           2133          MOV     A,E             ;Pattern=4 for USART 1
     0958   D3 4B        2134          OUT     TTCR            ;Send it to the CR
     095A   3C           2135          INR     A               ;Pattern=5 for USART 3
     095B   D3 43        2136          OUT     TRCR            ;Send it to USART3
     095D   DB 47        2137          IN      TUCR            ;Get the USART 2 CR
     095F   BA           2138          CMP     D               ;Is it OK?
     0960   CA 0965      2139          JZ      UB2A            ;Jump if OK
     0963   06 01        2140          MVI     B,1             ;Set the error flag
     0965   78           2141  UB2A:   MOV     A,B             ;Get the error flag
     0966   1F           2142          RAR                     ;Put it in the carry
     0967   DA 0950      2143          JC      UB2             ;Jump if set
                         2144
     096A   D3 A8        2145  UB3:    OUT     SETACK          ;Set the Scope Sync
     096C   D3 A9        2146          OUT     CLRACK          ;Clear it
     096E   7A           2147          MOV     A,D             ;Pattern=1 for USART 3
     096F   D3 43        2148          OUT     TRCR            ;Send it to the Command Register
     0971   7B           2149          MOV     A,E             ;Pattern=4 for USART 2
     0972   D3 47        2150          OUT     TUCR            ;Send it to the CR
     0974   3C           2151          INR     A               ;Pattern=5 for USART 1
     0975   D3 4B        2152          OUT     TTCR            ;Send it to USART 1
     0977   DB 43        2153          IN      TRCR            ;Get the USART 3 CR
     0979   BA           2154          CMP     D               ;Is it OK?
     097A   CA 097F      2155          JZ      UB3A            ;Jump if OK
     097D   06 01        2156          MVI     B,1             ;Set the error flag
     097F   78           2157  UB3A:   MOV     A,B             ;Get the error flag
     0980   1F           2158          RAR                     ;Put it in the carry
     0981   DA 096A      2159          JC      UB3             ;Jump if set
                         2160
                         2161  ;We come here if the test completes successfully.  The USARTs are fixed
                         2162  ;and we fall through to the next test.
                         2163
     0984   3E 35        2164  UA105:  MVI     A,TTCR_CODE     ;RTS (DSRS for Europe RD), Error Reset, Xmit
                         2165                                  ;and Rcv Enable
     0986   D3 4B        2166          OUT     TTCR            ;
                         2167
                         2168
                         2169  ;*************************************************************************
                         2170  ;
                         2171  ;  RIPPLE
                         2172  ;
                         2173  ;  THIS TEST WILL RIPPLE A 1 THROUGH A FIELD OF ZEROS IN THE FIRST
                         2174  ;  MEMORY LOCATION (4000) HEX
                         2175  ;
                         2176  ;*************************************************************************
                         2177
     0988   21 098C      2178  RIPPLE: LXI     H,RIPPLX        ;Point to this character to be printed
     098B   FF           2179          RST     7               ;Go print it
```

```
Error Addr  Code          Seq   Source statement

      098C  56            2180  RIPPLX: DB      V_LETTER        ;Code for letter V.
      098D  16 01         2181          MVI     D,1             ;Put the seed pattern in D
      098F  21 4000       2182          LXI     H,4000H         ;Point to the beginning of RAM
      0992  4D            2183          MOV     C,L             ;Put a 0 in C to indicate Ripple Test
      0993  72            2184  RIPPL1: MOV     M,D             ;Write pattern to memory
      0994  5E            2185          MOV     E,M             ;Read it back
      0995  78            2186          MOV     A,B             ;Get the error flag
      0996  1F            2187          RAR                     ;Is it set?
      0997  DA 0993       2188          JC      RIPPL1          ;Jump if it is
      099A  7B            2189          MOV     A,E             ;Put the data in A
      099B  BA            2190          CMP     D               ;See if it is the same
      099C  C2 0A1B       2191          JNZ     EPRINT          ;Jump if not the same
                          2192
                          2193  ;Come here to rotate the pattern and check for done.
                          2194  ;The pattern is already in A
                          2195
      099F  07            2196          RLC                     ;Rotate the pattern to the left
      09A0  57            2197          MOV     D,A             ;Save the new pattern
      09A1  D2 0993       2198          JNC     RIPPL1          ;Loop until the carry is set
                          2199                                  ;Then fall through to next test
                          2200
                          2201
                          2202  ;*****************************************************************************
                          2203  ;
                          2204  ;  MARCH
                          2205  ;
                          2206  ;  THIS ROUTINE WRITES A BACKGROUND OF ZEROS TO THE RAM AND THEN
                          2207  ;  GOES FROM THE LOWEST TO THE HIGHEST ADDRESS READING THE ZERO BACKGROUND
                          2208  ;  WRITING A 1 AND READING THE 1 BACK. THEN THE TEST GOES FROM THE
                          2209  ;  HIGHEST ADDRESS TO THE LOWEST ADDRESS READING THE 1'S BACKGROUND
                          2210  ;  WRITTING A ZERO AND READING A 0
                          2211  ;
                          2212  ;*****************************************************************************
                          2213
      09A4  21 09A8       2214  MARCH:  LXI     H,MARCHX        ;Point to character to be printed
      09A7  FF            2215          RST     7               ;Go do it
      09A8  30            2216  MARCHX: DB      HIGH_NUMBER     ;High digit of version number.
      09A9  21 4000       2217          LXI     H,4000H         ;Point to the beginning of RAM
      09AC  AF            2218  MARCH0: XRA     A               ;Make a 0
      09AD  77            2219          MOV     M,A             ;Write 0's to memory
      09AE  23            2220          INX     H               ;Bump the address pointer
      09AF  7C            2221          MOV     A,H             ;Get the high byte of the address
      09B0  17            2222          RAL                     ;See if the MSB is set
      09B1  D2 09AC       2223          JNC     MARCH0          ;Jump if not
                          2224                                  ;Otherwise, fall through and set up
      09B4  EB            2225          XCHG                    ;a count in DE (count=8000H)
      09B5  1B            2226  MARCH1: DCX     D               ;This loop will wait approximately
      09B6  7A            2227          MOV     A,D             ;40 milliseconds to give the refresh
      09B7  B3            2228          ORA     E               ;logic plenty of exercise.
      09B8  C2 09B5       2229          JNZ     MARCH1          ;Note that the count is generated by
```

```
Error Addr  Code          Seq   Source statement

                          2230                          ;using the 8000(hex) that ends up in
                          2231                          ;HL at the end of writing to memory
                          2232
     09BB   21 4000       2233          LXI     H,4000H ;Point to the start of the RAM
     09BE   0E 01         2234  MARCH2: MVI     C,1     ;Set up this Return Point code
     09C0   D3 A8         2235  MARCH3: OUT     SETACK  ;Scope Sync
     09C2   D3 A9         2236          OUT     CLRACK  ;
     09C4   5E            2237          MOV     E,M     ;Get the character
     09C5   78            2238          MOV     A,B     ;Check the Error flag
     09C6   1F            2239          RAR             ;Is it set?
     09C7   DA 09C0       2240          JC      MARCH3  ;Loop back if it is
     09CA   7B            2241          MOV     A,E     ;Get the data into A
     09CB   BA            2242          CMP     D       ;See if it is zero
     09CC   C2 0A1B       2243          JNZ     EPRINT  ;Jump if bad
     09CF   15            2244          DCR     D       ;Make -1(Hex) in D
     09D0   0C            2245          INR     C       ;Make the value in C a 2
     09D1   D3 A8         2246  MARCH4: OUT     SETACK  ;Scope Sync
     09D3   D3 A9         2247          OUT     CLRACK  ;
     09D5   72            2248          MOV     M,D     ;Send it to memory
     09D6   5E            2249          MOV     E,M     ;Read it back
     09D7   78            2250          MOV     A,B     ;Get the Error Flag
     09D8   1F            2251          RAR             ;Is it set?
     09D9   DA 09D1       2252          JC      MARCH4  ;Loop if it is
     09DC   7B            2253          MOV     A,E     ;Get the data into A
     09DD   BA            2254          CMP     D       ;See if it is OK
     09DE   C2 0A1B       2255          JNZ     EPRINT  ;Jump if bad
     09E1   14            2256          INR     D       ;Make a 0 in D again
     09E2   23            2257          INX     H       ;Bump the address pointer
     09E3   7C            2258          MOV     A,H     ;Get the high byte of the address
     09E4   17            2259          RAL             ;Check for MSB set
     09E5   D2 09BE       2260          JNC     MARCH2  ;Loop back if not set
                          2261
                          2262  ;       Now we want to get the 8000H from HL into DE without destroying
                          2263  ; HL.  This is why we don't use XCHG
                          2264
     09E8   54            2265          MOV     D,H     ;Set up Refresh wait count
     09E9   5D            2266          MOV     E,L     ;Count=8000(hex)
     09EA   1B            2267  MARCH5: DCX     D       ;Give the refresh logic 40
     09EB   7A            2268          MOV     A,D     ;milliseconds exercise
     09EC   B3            2269          ORA     E       ;Note that the 8000 in DE comes from
     09ED   C2 09EA       2270          JNZ     MARCH5  ;HL which has this value in it after writing
                          2271                          ;through memory
                          2272
                          2273  ;       The next test assumes that HL contains 8000(hex) in the
                          2274  ;beginning.
                          2275
     09F0   2B            2276  MARCH6: DCX     H       ;Bump the address pointer
     09F1   7C            2277          MOV     A,H     ;Look for the bottom address
     09F2   FE 3F         2278          CPI     3FH     ;
     09F4   CA 0A5D       2279          JZ      ST_DONE ;Jump out when done
```

```
Error Addr  Code          Seq   Source statement

     09F7   15            2280           DCR     D               ;Make a -1 in D
     09F8   0E 03         2281           MVI     C,3             ;Make the value in C a 3
     09FA   D3 A8         2282   MARCH7: OUT     SETACK          ;Scope Sync
     09FC   D3 A9         2283           OUT     CLRACK          ;
     09FE   5E            2284           MOV     E,M             ;Get what should be a -1
     09FF   78            2285           MOV     A,B             ;Check the Error Flag
     0A00   1F            2286           RAR                     ;Is it set?
     0A01   DA 09FA       2287           JC      MARCH7          ;Loop if it is
     0A04   7B            2288           MOV     A,E             ;Put the data in A
     0A05   BA            2289           CMP     D               ;Check it
     0A06   C2 0A1B       2290           JNZ     EPRINT          ;Jump if bad
     0A09   14            2291           INR     D               ;Make a 0 in D
     0A0A   0C            2292           INR     C               ;Make the value in C a 4
     0A0B   D3 A8         2293   MARCH8: OUT     SETACK          ;Scope Sync
     0A0D   D3 A9         2294           OUT     CLRACK          ;
     0A0F   72            2295           MOV     M,D             ;Send it to memory
     0A10   5E            2296           MOV     E,M             ;Read it back
     0A11   78            2297           MOV     A,B             ;Get the Error Flag into A
     0A12   1F            2298           RAR                     ;Is it set?
     0A13   DA 0A0B       2299           JC      MARCH8          ;Loop if it is
     0A16   7B            2300           MOV     A,E             ;Put the data in A
     0A17   BA            2301           CMP     D               ;Check it
     0A18   CA 09F0       2302           JZ      MARCH6          ;Jump if OK
                          2303                                   ;Otherwise, fall through
                          2304
                          2305
                          2306   ;*****************************************************************************
                          2307   ;
                          2308   ;       EPRINT
                          2309   ;
                          2310   ;       This is the Error Printout routine used by Ripple and March when an
                          2311   ;       error occurs.  D and E contain the two bytes to be printed.  D =
                          2312   ;       expected and E equals received.  B gets 10 hex.  C contains a code that
                          2313   ;       is used to allow us to return to the correct test and section.
                          2314   ;
                          2315   ;       By loading B with 10 hex we can have two 8 counts in one register and
                          2316   ;       know which one we are working with besides.  The first time we decrement
                          2317   ;       by eight, bits 0-2 will equal 0 and bit 3 will equal 1.  Bits 0-2 = 0
                          2318   ;       indicate that the contents of registers D and E must be swapped, while
                          2319   ;       bit 3 = 0 indicates the termination of the loop.  Thus we print the
                          2320   ;       contents of D, swap E into D and D into E, print the new contents of
                          2321   ;       D, swap E into D and D into E, and leave with everything back as it
                          2322   ;       was.
                          2323   ;
                          2324   ;
     0A1B   06 10         2325   EPRINT: MVI     B,10H           ;Set up a count in B for printing
     0A1D   DB 49         2326   EPRIN1: IN      TTSR            ;Get the terminal SR
     0A1F   1F            2327           RAR                     ;Check the Xmit Ready bit
     0A20   D2 0A1D       2328           JNC     EPRIN1          ;Loop until ready
     0A23   3E 20         2329           MVI     A,' '           ;Get a Space
```

```
Error Addr  Code          Seq   Source statement

      0A25  D3 48         2330            OUT     TTDB            ;Send it out
      0A27  DB 49         2331  EPRIN2:   IN      TTSR            ;Get the Status Register
      0A29  1F            2332            RAR                     ;Check for Xmit Ready
      0A2A  D2 0A27       2333            JNC     EPRIN2          ;Loop until it is
      0A2D  7A            2334            MOV     A,D             ;Get the data to be printed
      0A2E  07            2335            RLC                     ;Rotate the MSB into the carry
      0A2F  57            2336            MOV     D,A             ;Put the rotated data back
      0A30  3E 30         2337            MVI     A,'0'           ;Get ASCII 0
      0A32  D2 0A36       2338            JNC     EPRIN3          ;Jump if the MSB was 0
      0A35  3C            2339            INR     A               ;Make an ASCII 1
      0A36  D3 48         2340  EPRIN3:   OUT     TTDB            ;Send it out
      0A38  05            2341            DCR     B               ;Reduce the count in B
      0A39  78            2342            MOV     A,B             ;Get the new contents of B into A
      0A3A  E6 07         2343            ANI     07H             ;Check the low three bits for 0
      0A3C  C2 0A27       2344            JNZ     EPRIN2          ;Loop back if not
      0A3F  7A            2345            MOV     A,D             ;A gets D
      0A40  53            2346            MOV     D,E             ;D gets E
      0A41  5F            2347            MOV     E,A             ;E gets A which has the previous D
      0A42  78            2348            MOV     A,B             ;Get the value in B
      0A43  A7            2349            ANA     A               ;Check for 0
      0A44  C2 0A1D       2350            JNZ     EPRIN1          ;If not zero, go print the second value
      0A47  06 01         2351            MVI     B,1             ;Set up the error code
      0A49  79            2352            MOV     A,C             ;Get the Return Point code
      0A4A  FE 01         2353            CPI     1               ;Check for 0 or 1
      0A4C  DA 0993       2354            JC      RIPPL1          ;Jump if 0
      0A4F  CA 09C0       2355            JZ      MARCH3          ;Jump if 1
      0A52  FE 03         2356            CPI     3               ;Check for 2, 3 or more
      0A54  DA 09D1       2357            JC      MARCH4          ;Jump if 2
      0A57  CA 09FA       2358            JZ      MARCH7          ;Jump if 3
      0A5A  C3 0A0B       2359            JMP     MARCH8          ;Jump by default
                          2360
                          2361
      0A5D                2362  ST_DONE:
      0A5D  21 0A61       2363            LXI     H,1$            ;Point to the middle digit of version#
      0A60  FF            2364            RST     7               ;Go print it
      0A61  31            2365  1$:       DB      MIDDLE_NUMBER   ;Middle digit of version number.
      0A62  21 0A66       2366            LXI     H,2$            ;Point to low digit of version#
      0A65  FF            2367            RST     7               ;Go print it
      0A66  31            2368  2$:       DB      LOW_NUMBER      ;Low digit of version number.
                          2369                                    ;Now we fall through to the rest of the ROM code
      0A67  C3 0024       2370            JMP     INIT_VECTOR     ;Get back into the Low ROM.
                          2371
                          2372  ;*****************************************************************************
                          2373  ;
                          2374  ;       RAM_LOAD
                          2375  ;
      0A6A                2376  RAM_LOAD:
      0A6A  CD 0104       2377            CALL    SAVESP          ;Go zero the success code and save the SP
      0A6D  CD 0095       2378            CALL    TU_SEND_PACKET  ;Go send a packet.
      0A70  21 4100       2379            LXI     H,START         ;Point to the destination area
```

```
Error Addr  Code          Seq   Source statement

     0A73   22 40A3       2380          SHLD    LODADR          ;Save the address
     0A76   3E 18         2381          MVI     A,024           ;This is the number of 128 byte packets
     0A78   32 40A8       2382          STA     PAKCNT          ;Save the count
     0A7B   D7            2383   1$:    RST     2               ;Go get the first character
     0A7C   FE 01         2384          CPI     01              ;Is the Flag byte good?
     0A7E   C4 0081       2385          CNZ     TUERR3          ;Leave if not
     0A81   32 409E       2386          STA     WORD_SUM        ;This must be included in the checksum
     0A84   D7            2387          RST     2               ;Go get the byte count
     0A85   FE 80         2388          CPI     128             ;Is it OK?
     0A87   C4 0081       2389          CNZ     TUERR3          ;Leave if not
     0A8A   32 409F       2390          STA     WORD_SUM+1      ;Include this in the checksum
     0A8D   32 40A7       2391          STA     LODCNT          ;Save the count
     0A90   CD 0AF2       2392          CALL    TU_RCV_PACKETS  ;Go get the packet
     0A93   21 40A8       2393          LXI     H,PAKCNT        ;Point to the Packet Count
     0A96   35            2394          DCR     M               ;Subtract one
     0A97   C2 0A7B       2395          JNZ     1$              ;Loop if not done
     0A9A   21 40AA       2396          LXI     H,ENDPAK        ;Point to the destination of the End Packet
     0A9D   22 40A3       2397          SHLD    LODADR          ;Save the address
     0AA0   D7            2398          RST     2               ;Get the Flag byte of the End Packet
     0AA1   FE 02         2399          CPI     2               ;Is it OK?
     0AA3   C4 0081       2400          CNZ     TUERR3          ;Error if not
     0AA6   32 409E       2401          STA     WORD_SUM        ;Need to include this in the checksum
     0AA9   D7            2402          RST     2               ;Go get the byte count
     0AAA   FE 0A         2403          CPI     10              ;Check the byte count
     0AAC   C4 0081       2404          CNZ     TUERR3          ;Leave if incorrect
     0AAF   32 409F       2405          STA     WORD_SUM+1      ;Include in the checksum
     0AB2   32 40A7       2406          STA     LODCNT          ;Save the count
     0AB5   CD 0AF2       2407          CALL    TU_RCV_PACKETS  ;Go get the End Packet
     0AB8   21 40AA       2408          LXI     H,ENDPAK        ;Point to the End Packet again
     0ABB   7E            2409          MOV     A,M             ;Get the first byte
     0ABC   FE 40         2410          CPI     040H            ;Check the Op Code
     0ABE   C4 0081       2411          CNZ     TUERR3          ;Leave if incorrect
     0AC1   23            2412          INX     H               ;And bump the pointer again
     0AC2   7E            2413          MOV     A,M             ;and get the success code
     0AC3   17            2414          RAL                     ;Check for a negative number
     0AC4   DC 0081       2415          CC      TUERR3          ;Error if it is
     0AC7   3A 4091       2416          LDA     UNIT            ;Get the Unit number
     0ACA   23            2417          INX     H               ;Bump the pointer
     0ACB   BE            2418          CMP     M               ;Check for the correct unit number
     0ACC   C4 0081       2419          CNZ     TUERR3          ;Error if not the same
     0ACF   23            2420          INX     H               ;Point to the next byte
     0AD0   3A 4092       2421          LDA     SNDPAK+5        ;Get the Switch Byte
     0AD3   BE            2422          CMP     M               ;Is it the same?
     0AD4   C4 0081       2423          CNZ     TUERR3          ;Error if not
     0AD7   23            2424          INX     H               ;Point to the next byte
     0AD8   7E            2425          MOV     A,M             ;Get it
     0AD9   23            2426          INX     H               ;Point to the next byte
     0ADA   B6            2427          ORA     M               ;OR it in
     0ADB   23            2428          INX     H               ;One more to go
     0ADC   B6            2429          ORA     M               ;Now let's check
```

```
Error Addr  Code           Seq   Source statement

     0ADD   C4 0081       2430           CNZ     TUERR3          ;It is an error if the result isn't 0
     0AE0   23            2431           INX     H               ;Point to the high byte of the byte count
     0AE1   7E            2432           MOV     A,M             ;and put it in the Accumulator
     0AE2   FE 0C         2433           CPI     0CH             ;Check it
     0AE4   C4 0081       2434           CNZ     TUERR3          ;Leave if it isn't right
     0AE7   23            2435           INX     H               ;Point to the next byte
     0AE8   7E            2436           MOV     A,M             ;Bring it in
     0AE9   23            2437           INX     H               ;and the last byte
     0AEA   B6            2438           ORA     M               ;and OR it in
     0AEB   C4 0081       2439           CNZ     TUERR3          ;Leave if the last two bytes aren't 0
     0AEE   32 4116       2440           STA     SUCCES          ;Use the zero in A to clear out the Success Code
                          2441                                   ;byte in case the boot block was garbage and we
                          2442                                   ;messed up SUCCES
     0AF1   C9            2443           RET                     :Leave
                          2444   ;
                          2445   ;*****************************************************************************
                          2446
                          2447   ;*****************************************************************************
                          2448   ;
                          2449   ;       TU_RCV_PACKETS
                          2450   ;
     0AF2                 2451   TU_RCV_PACKETS:
     0AF2   D7            2452           RST     2               ;Go look for a character
     0AF3   21 40A7       2453           LXI     H,LODCNT        ;Point to the count
     0AF6   CD 00DE       2454           CALL    CHKSUM_WORD     ;Go to the Word Checksum routine
     0AF9   2A 40A3       2455           LHLD    LODADR          ;Get the address for the data
     0AFC   7C            2456           MOV     A,H             ;Get the high byte of the address
     0AFD   FE 4B         2457           CPI     4BH             ;Looking for 4B80H (beginning of silo)
     0AFF   C2 0B08       2458           JNZ     1$              ;Jump over next part if not
     0B02   7D            2459           MOV     A,L             ;Get the low byte of the address
     0B03   FE 80         2460           CPI     80H             ;Check it
     0B05   CA 0B0D       2461           JZ      2$              ;If we are at the silo, skip the write
     0B08   70            2462   1$:     MOV     M,B             ;Send the data out
     0B09   23            2463           INX     H               ;Bump the pointer
     0B0A   22 40A3       2464           SHLD    LODADR          ;Save the address
     0B0D   21 40A7       2465   2$:     LXI     H,LODCNT        ;Point to the byte count
     0B10   35            2466           DCR     M               ;Decrement the count
     0B11   C2 0AF2       2467           JNZ     TU_RCV_PACKETS  ;Loop if not done
     0B14   D7            2468           RST     2               ;Go get the low byte of the checksum
     0B15   21 409E       2469           LXI     H,WORD_SUM      ;Point to the low byte of the checksum
     0B18   BE            2470           CMP     M               ;Check it
     0B19   C4 0081       2471           CNZ     TUERR3          ;Error if not equal
     0B1C   D7            2472           RST     2               ;Get the high byte
     0B1D   21 409F       2473           LXI     H,WORD_SUM+1    ;Point to the high byte of the checksum
     0B20   BE            2474           CMP     M               ;Is it equal to the calculated
     0B21   C8            2475           RZ                      ;Leave if OK
     0B22   CD 0081       2476           CALL    TUERR3          ;Error if not
                          2477   ;
                          2478   ;*****************************************************************************
                          2479
```

```
Error Addr  Code          Seq   Source statement

                          2480
                          2481
                          2482
                          2483  ;*****************************************************************************
                          2484  ;
                          2485  ;
     0B25                 2486  SEND_TRANS_TEXT:
     0B25   3A 7E49       2487          LDA     CLMSG_COUNT     ;Get the Connection Lost Message count.
     0B28   A7            2488          ANA     A               ;Check it.
     0B29   C2 0B48       2489          JNZ     SEND_CON_LOST   ;IF NOT 0, THEN jump.
     0B2C   2A 7E44       2490          LHLD    MSG15_PTR       ;ELSE, we must be here because of a MSG
                          2491                                  ;Type 15, so get the pointer.
     0B2F   CD 0B57       2492          CALL    SPECIAL_SEND    ;Try to send it.
     0B32   C0            2493          RNZ                     ;Leave if we didn't send it.
     0B33   22 7E44       2494          SHLD    MSG15_PTR       ;Save the new pointer.
     0B36   21 7E46       2495          LXI     H,MSG15_COUNT   ;Point to the count
     0B39   35            2496          DCR     M               ;and decrement it.
     0B3A   C0            2497          RNZ                     ;IF NOT 0, THEN leave (not done yet).
     0B3B   3A 7E04       2498          LDA     TALK_FLAG       ;Get the Talk Flag.
     0B3E   1F            2499          RAR                     ;Are we in Talk Mode?
     0B3F   D8            2500          RC                      ;IF TALK, THEN leave.
     0B40   3A 7E10       2501          LDA     RDCON           ;ELSE, do we have a connection?
     0B43   A7            2502          ANA     A               ;Well?
     0B44   C2 1016       2503          JNZ     TSQA_VECTOR     ;IF RDCON * -TALK, THEN see about sending ^Q.
     0B47   C9            2504          RET                     ;ELSE, leave.
                          2505
     0B48                 2506  SEND_CON_LOST:
     0B48   2A 7E47       2507          LHLD    CLMSG_PTR       ;Get the pointer into the Connection Lost Msg.
     0B4B   CD 0B57       2508          CALL    SPECIAL_SEND    ;Go try to send it.
     0B4E   C0            2509          RNZ                     ;Leave if we couldn't send it.
     0B4F   22 7E47       2510          SHLD    CLMSG_PTR       ;Store the updated pointer.
     0B52   21 7E49       2511          LXI     H,CLMSG_COUNT   ;Point to the Connection Lost Count.
     0B55   35            2512          DCR     M               ;Subtract 1
     0B56   C9            2513          RET                     ;Leave.
                          2514
     0B57                 2515  SPECIAL_SEND:
     0B57   3A 40CD       2516          LDA     S_FLAG          ;Get the Control S flag
     0B5A   A7            2517          ANA     A               ;Is it set?
     0B5B   C0            2518          RNZ                     ;If set, leave.
     0B5C   3A 40BB       2519          LDA     O_FLAG          ;Get the Control O flag
     0B5F   A7            2520          ANA     A               ;Is it set?
     0B60   C2 0B6D       2521          JNZ     1$              ;Jump if set
     0B63   DB 49         2522          IN      TTSR            ;Get the Console Terminal SR
     0B65   E6 01         2523          ANI     1               ;Save only the Xmit Rdy bit.
     0B67   EE 01         2524          XRI     1               ;Check for it this way so NOT XMIT RDY will
                          2525                                  ;generate a non zero result, and XMIT RDY will
                          2526                                  ;generate a zero result.
     0B69   C0            2527          RNZ                     ;Now if we leave it will indicate that the
                          2528                                  ;character was not sent.
     0B6A   7E            2529          MOV     A,M             ;Get the data
```

```
Error Addr  Code          Seq   Source statement

     0B6B   D3 48         2530          OUT     TTDB            ;Send it out
     0B6D   23            2531  1$:     INX     H               ;Bump the pointer ahead.
     0B6E   AF            2532          XRA     A               ;Set the Z bit to indicate that we sent the
     0B6F   C9            2533          RET                     ;character and leave.
                          2534
                          2535
                          2536
                          2537  ;*****************************************************************************
                          2538  ;
     0B70                 2539  RD_LD_COMMAND:
     0B70   3A 408B       2540          LDA     CODE_FLAG       ;Get the Code flag (0=Console, 1=Micmon).
     0B73   21 40D3       2541          LXI     H,RUN_FLAG      ;Point to the Run Flag (indicates PM).
     0B76   B6            2542          ORA     M               ;OR it in.
     0B77   EE 01         2543          XRI     1               ;Flip it (both must have been 0 to generate
                          2544                                  ;a one at this point).
     0B79   21 4080       2545          LXI     H,RAM_VALID     ;Point to the 8085 RAM Valid flag.
     0B7C   A6            2546          ANA     M               ;AND it in.
     0B7D   21 40D5       2547          LXI     H,WCS_LOAD_FLAGS        ;Point to the MicroCode Valid Flag.
     0B80   A6            2548          ANA     M               ;AND them together.
     0B81   47            2549          MOV     B,A             ;Store the result in B for a moment.
     0B82   DB 03         2550          IN      SECURE          ;Get the Secure position of the switch.
     0B84   A0            2551          ANA     B               ;AND it with the rest.
     0B85   1F            2552          RAR                     ;What is the result?
     0B86   D2 0BD9       2553          JNC     RD_LOAD_ERROR   ;IF NOT(CONSOLE * WCS_LOAD_FLAGS * -(Program
                          2554                                  ;Mode) * -Secure), THEN leave.
     0B89   3A 7E40       2555          LDA     IBUF_CNT_COPY   ;ELSE, get the count.
     0B8C   D6 06         2556          SUI     6               ;Reduce it by the 1 MSG TYPE byte + 5 Address
                          2557                                  ;Field bytes.
     0B8E   CA 1001       2558          JZ      UB_VECTOR       ;IF COUNT = 0, THEN leave.
     0B91   FA 1001       2559          JM      UB_VECTOR       ;IF COUNT < 0, THEN leave.
     0B94   32 7E4F       2560          STA     RD_LD_DCOUNT    ;Save the data count here.
     0B97   AF            2561          XRA     A               ;Make a 0
     0B98   32 7E53       2562          STA     RD_LD_OE        ;Clear the Odd/Even flag.
     0B9B   3C            2563          INR     A               ;Make a 1.
     0B9C   32 7E2C       2564          STA     RD_LD_FLAG      ;Set this flag.
     0B9F   32 7E1F       2565          STA     MSG_TO_READ     ;Set the Message to Read flag.
     0BA2   3E 0A         2566          MVI     A,10            ;Set up a count of 10
     0BA4   32 7E4C       2567          STA     RD_LD_CCOUNT    ;Prime this count
     0BA7   32 7E52       2568          STA     RD_LD_ECOUNT    ;and this one also.
     0BAA   47            2569          MOV     B,A             ;Put the 10 in B.
     0BAB   11 0D7E       2570          LXI     D,RD_LD_CSTRING ;Point to the Command String as the source.
     0BAE   21 7E55       2571          LXI     H,RD_LD_CBUFFER ;and the Command Buffer as the destination.
     0BB1   22 7E4A       2572          SHLD    RD_LD_CPTR      ;Save this address here.
     0BB4   CD 00FB       2573          CALL    COPY1           ;Go copy them over.
     0BB7   2A 7E42       2574          LHLD    IBUF_ADR_COPY   ;Get this pointer.
     0BBA   EB            2575          XCHG                    ;Put it in DE.
     0BBB   13            2576          INX     D               ;Bump it ahead by two.
     0BBC   13            2577          INX     D               ;
     0BBD   21 7E5A       2578          LXI     H,RD_LD_CBUFFER+5       ;Point to this destination.
     0BC0   06 04         2579          MVI     B,4             ;Set up a count of 4.
```

```
Error Addr  Code          Seq   Source statement

      0BC2  1A            2580  1$:     LDAX    D               ;Get the source.
      0BC3  77            2581          MOV     M,A             ;Store it.
      0BC4  13            2582          INX     D               ;Bump the source pointer.
      0BC5  2B            2583          DCX     H               ;and the Destination pointer.
      0BC6  05            2584          DCR     B               ;Decrement the count.
      0BC7  C2 0BC2       2585          JNZ     1$              ;IF NOT 0, THEN loop back.
      0BCA  EB            2586          XCHG                    ;Put the address where the data starts into HL.
      0BCB  22 7E4D       2587          SHLD    RD_LD_DPTR      ;Save the address here.
      0BCE  21 7E4F       2588          LXI     H,RD_LD_DCOUNT  ;Point to the Data Count.
      0BD1  7E            2589          MOV     A,M             ;Get it.
      0BD2  32 7E5B       2590          STA     RD_LD_CBUFFER+6 ;Store it here.
      0BD5  1F            2591          RAR                     ;Is it odd or even?
      0BD6  D0            2592          RNC                     ;IF EVEN, THEN leave.
      0BD7  34            2593          INR     M               ;ELSE, make it even
      0BD8  C9            2594          RET                     ;and leave.
                          2595
                          2596
                          2597
      0BD9                2598  RD_LOAD_ERROR:
      0BD9  21 7E2D       2599          LXI     H,RD_LD_ERR     ;Point to the RD Load Error flag.
      0BDC  36 80         2600          MVI     M,80H           ;Set it.
      0BDE  C3 1001       2601          JMP     UB_VECTOR       ;Go clean things up.
                          2602  ;
                          2603  ;*****************************************************************************
                          2604
                          2605
                          2606
                          2607  ;*****************************************************************************
                          2608  ;
                          2609  ;       DCD_MESSAGE             Message Type 14
                          2610  ;
                          2611  ;       The first byte after the message type is the Switches byte.  Bits 6 and
                          2612  ;       7 indicate how the bits are to be used, and bits 0-5 indicate the bit
                          2613  ;       switches to be affected.
                          2614  ;
                          2615  ;       BITS:   7       6
                          2616  ;
                          2617  ;               0       0       Set to value
                          2618  ;               0       1       Set specified bits
                          2619  ;               1       0       Clear specified bits
                          2620  ;               1       1       No-op; ignore byte
                          2621  ;
                          2622  ;
                          2623  ;       BITS:   0               Enable Local Copy mode
                          2624  ;               1               Enable Local Control mode
                          2625  ;               2               Enable Talk Echo
                          2626  ;               3               Not used
                          2627  ;               4               Enable Talk
                          2628  ;               5               Discard Remote Output (while connection lost)
                          2629  ;
```

```
Error Addr  Code           Seq   Source statement

                           2630  ;       The second byte contains the Override Local Copy in Secure bit.
                           2631  ;
                           2632  ;
                           2633  ;
     0BE1                  2634  DCD_MESSAGE:
     0BE1   21 7E40        2635          LXI     H,IBUF_CNT_COPY ;Point at the Input Buffer count
     0BE4   35             2636          DCR     M               ;Subtract 1.
     0BE5   CA 1001        2637          JZ      UB_VECTOR       ;IF COUNT = 0, THEN leave.
     0BE8   3A 7E04        2638          LDA     TALK_FLAG       ;Get the Talk Flags
     0BEB   32 7E73        2639          STA     TALK_COPY       ;Save a copy for later in DCD_FINISH.
     0BEE   2A 7E42        2640          LHLD    IBUF_ADR_COPY   ;Get the pointer into the buffer
     0BF1   23             2641          INX     H               ;Bump it ahead.
     0BF2   46             2642          MOV     B,M             ;Get the Control Data byte.
     0BF3   22 7E42        2643          SHLD    IBUF_ADR_COPY   ;Save the updated address.
     0BF6   16 00          2644          MVI     D,0             ;Set up D with 0.
     0BF8   78             2645          MOV     A,B             ;Put a copy of first DCD byte in A to work on.
     0BF9   E6 C0          2646          ANI     0C0H            ;Save bits 6 and 7.
     0BFB   CA 0CB1        2647          JZ      DCD_STV         ;If zero, go to the Set to Value flow.
     0BFE   FE 80          2648          CPI     80H             ;How about 01 or 10?
     0C00   DA 0C94        2649          JC      DCD_SSB         ;IF 01, THEN go to the Set Specified Bits flow.
     0C03   CA 0C31        2650          JZ      DCD_CSB         ;IF 10, THEN go to Clear Specified Bits.
                           2651                                  ;ELSE, it is a nop, so fall through.
     0C06                  2652  DCD_MESS0:
     0C06   21 7E40        2653          LXI     H,IBUF_CNT_COPY ;Point to the count.
     0C09   35             2654          DCR     M               ;Check for another byte.
     0C0A   CA 1001        2655          JZ      UB_VECTOR       ;IF NO MORE BYTES, THEN leave.
     0C0D   2A 7E42        2656          LHLD    IBUF_ADR_COPY   ;Get the address.
     0C10   23             2657          INX     H               ;Bump it ahead.
     0C11   7E             2658          MOV     A,M             ;Get the byte
     0C12   FE 02          2659          CPI     2               ;See if the byte STV(0) or STV(1)
     0C14   DA 0C27        2660          JC      1$              ;IF (A=0) OR (A=1), THEN jump.
     0C17   16 00          2661          MVI     D,0             ;Clear out D.
     0C19   FE 81          2662          CPI     81H             ;Is it CSB*Override Bit?
     0C1B   CA 0C2A        2663          JZ      2$              ;IF YES, THEN jump.
     0C1E   14             2664          INR     D               ;ELSE, make a 1 in D.
     0C1F   FE 41          2665          CPI     41H             ;Is it SSB*Override Bit?
     0C21   CA 0C2A        2666          JZ      2$              ;IF YES, THEN jump.
     0C24   C3 1001        2667          JMP     UB_VECTOR       ;ELSE, nop, so leave.
     0C27   E6 01          2668  1$:     ANI     1               ;Save only the LSB.
     0C29   57             2669          MOV     D,A             ;Put it in D and fall through.
     0C2A   21 7E67        2670  2$:     LXI     H,OVERRIDE_LCS  ;SET/CLEAR (depends on contents of D).
     0C2D   72             2671          MOV     M,D             ;Do it.
     0C2E   C3 1001        2672          JMP     UB_VECTOR       ;Leave.
                           2673
     0C31                  2674  DCD_CSB:
     0C31   CD 0CD9        2675          CALL    DCD_SHARE       ;Go share some code.
     0C34   78             2676          MOV     A,B             ;Get the DCD byte.
     0C35   E6 14          2677          ANI     14H             ;See if the Talk or Talk Echo bits are set
     0C37   CA 0C4C        2678          JZ      DCD_CSB1        ;Jump if neither set
     0C3A   1E 02          2679          MVI     E,2             ;Set up a 2 in E.
```

```
Error Addr  Code          Seq   Source statement

     0C3C   FE 10         2680          CPI     10H             ;Is it only Clear Talk?
     0C3E   CA 0C46       2681          JZ      3$              ;IF CLEAR TALK * -CLEAR ECHO, THEN leave E=2
     0C41   DA 0C45       2682          JC      2$              ;IF CLEAR ECHO * -CLEAR TALK, THEN make a 1.
     0C44   1D            2683          DCR     E               ;IF CLEAR TALK * CLEAR ECHO, THEN make a 0.
     0C45   1D            2684  2$:     DCR     E               ;Make a 1.
     0C46   7B            2685  3$:     MOV     A,E             ;Get the contents of E.
     0C47   21 7E04       2686          LXI     H,TALK_FLAG     ;Point to the Talk and Talk Echo flags
     0C4A   A6            2687          ANA     M               ;AND in the mask
     0C4B                 2688  DCD_CSB0:
     0C4B   77            2689          MOV     M,A             ;Send it back out
     0C4C                 2690  DCD_CSB1:
     0C4C   21 7E71       2691          LXI     H,LOCAL_COPY    ;Point to the Local Copy bit
     0C4F   78            2692          MOV     A,B             ;Get the DCD byte again
     0C50   1F            2693          RAR                     ;See if we have (Clear/Set) Local Copy.
     0C51   D2 0C55       2694          JNC     1$              ;IF NOT (CLEAR/SET) LOCAL COPY, THEN jump.
     0C54   72            2695          MOV     M,D             ;Clear or set the flag depending on what is in
                          2696                                  ;register D.
     0C55   1F            2697  1$:     RAR                     ;How about (Clear) Parallel Control.
     0C56   D2 0C5B       2698          JNC     DCD_FINISH      ;Go build the LR_MASK based on what is in the
                          2699                                  ;Local_Copy and Parallel_Control flags.
     0C59   23            2700          INX     H               ;Point to the Parallel Control flag.
     0C5A   72            2701          MOV     M,D             ;Clear or Set it.
     0C5B                 2702  DCD_FINISH:
     0C5B   3A 7E72       2703          LDA     PARALLEL_CNTRL  ;Get this flag.
     0C5E   A7            2704          ANA     A               ;Is it set?
     0C5F   3E A5         2705          MVI     A,0A5H          ;Assume it is.
     0C61   C2 0C6E       2706          JNZ     1$              ;IF SET, THEN jump.
     0C64   3A 7E71       2707          LDA     LOCAL_COPY      ;How about Local Copy?
     0C67   A7            2708          ANA     A               ;Is it set?
     0C68   3E 25         2709          MVI     A,25H           ;Assume it is.
     0C6A   C2 0C6E       2710          JNZ     1$              ;IF SET, THEN jump.
     0C6D   3D            2711          DCR     A               ;ELSE, make a 24H in A.
     0C6E   32 40BE       2712  1$:     STA     LR_MASK         ;This is the new  LR Mask.
     0C71   3A 7E73       2713          LDA     TALK_COPY       ;Now get the Talk Flag copy.
     0C74   E6 01         2714          ANI     1               ;Save only the Talk bit here.
     0C76   47            2715          MOV     B,A             ;Put it here.
     0C77   3A 7E04       2716          LDA     TALK_FLAG       ;Get the Talk Flags
     0C7A   E6 01         2717          ANI     1               ;Save only the Talk bit.
     0C7C   B8            2718          CMP     B               ;Are they the same?
     0C7D   CA 0C06       2719          JZ      DCD_MESS0       ;IF EQUAL, THEN leave.
     0C80   A7            2720          ANA     A               ;Is it set or clear?
     0C81   C2 0C8E       2721          JNZ     2$              ;Jump if entering Talk Mode.
     0C84   3A 7E46       2722          LDA     MSG15_COUNT     ;See if we are doing a Message Type 15.
     0C87   A7            2723          ANA     A               ;If the count is 0, we aren't.
     0C88   CC 1016       2724          CZ      TSQA_VECTOR     ;IF NOT MSG TYPE 15, THEN see if we should send
                          2725                                  ;an ^Q.
     0C8B   C3 0C06       2726          JMP     DCD_MESS0       ;Go see if there is another byte of DCD stuff.
     0C8E   CD 1010       2727  2$:     CALL    TSS_VECTOR      ;Go see if we should send ^S.
     0C91   C3 0C06       2728          JMP     DCD_MESS0       ;Check for another byte.
                          2729
```

```
Error Addr  Code          Seq   Source statement

     0C94               2730   DCD_SSB:
     0C94   14          2731           INR     D               ;Make a 1 in D
     0C95   5A          2732           MOV     E,D             ;Make a 1 in E also.
     0C96   CD 0CD9     2733           CALL    DCD_SHARE       ;Go see about setting the Discard Remote flag.
     0C99   78          2734           MOV     A,B             ;Get the DCD byte back
     0C9A   E6 14       2735           ANI     14H             ;Check for Talk Echo or Talk
     0C9C   CA 0C4C     2736           JZ      DCD_CSB1        ;If neither set, don't change anything.
     0C9F   FE 10       2737           CPI     10H             ;Is it Talk?
     0CA1   CA 0CA9     2738           JZ      2$              ;If it is, jump.
     0CA4   DA 0CA8     2739           JC      1$              ;IF SET ECHO, THEN jump to make a 2.
     0CA7   1C          2740           INR     E               ;ELSE TALK * ECHO, so make a 3.
     0CA8   1C          2741   1$:     INR     E               ;
     0CA9   7B          2742   2$:     MOV     A,E             ;Get the Constant from E.
     0CAA   21 7E04     2743           LXI     H,TALK_FLAG     ;Point to the Talk Flag byte
     0CAD   B6          2744           ORA     M               ;OR in the old with the new.
     0CAE   C3 0C4B     2745           JMP     DCD_CSB0        ;Go share some code.
                        2746
                        2747
     0CB1               2748   DCD_STV:
     0CB1   78          2749           MOV     A,B             ;Get back an unmodified copy
     0CB2   E6 20       2750           ANI     20H             ;Find out if bit 5 is set or clear
     0CB4   07          2751           RLC                     ;Do this three times to get the bit into bit 0
     0CB5   07          2752           RLC                     ;
     0CB6   07          2753           RLC                     ;
     0CB7   32 7E05     2754           STA     DISCARD_RO      ;Set or clear the Discard Remote bit
     0CBA   78          2755           MOV     A,B             ;Get the DCD byte back
     0CBB   E6 14       2756           ANI     14H             ;Save only the Talk and Talk Echo flags.
     0CBD   1F          2757           RAR                     ;Put the Talk Echo flag into bit 1.
     0CBE   4F          2758           MOV     C,A             ;Store this here for a moment.
     0CBF   1F          2759           RAR                     ;We need three more rotates to get the Talk flag
     0CC0   1F          2760           RAR                     ;into bit 0.
     0CC1   1F          2761           RAR                     ;This is the third.
     0CC2   B1          2762           ORA     C               ;Build Talk in bit 0, Talk Echo in bit 1.
     0CC3   E6 03       2763           ANI     3               ;Save only the Talk and Talk Echo bits.
     0CC5   21 7E04     2764   1$:     LXI     H,TALK_FLAG     ;Point to the Talk Flag byte
     0CC8   77          2765           MOV     M,A             ;Send out the correct stuff
     0CC9   78          2766           MOV     A,B             ;Get the DCD byte again
     0CCA   E6 01       2767           ANI     1               ;Save only the Local Copy bit
     0CCC   32 7E71     2768           STA     LOCAL_COPY      ;and store it.
     0CCF   78          2769           MOV     A,B             ;Get the DCD one last time.
     0CD0   E6 02       2770           ANI     2               ;Save bit 1, the Parallel Control bit.
     0CD2   1F          2771           RAR                     ;Put it in bit 00
     0CD3   32 7E72     2772           STA     PARALLEL_CNTRL  ;and store it.
     0CD6   C3 0C5B     2773           JMP     DCD_FINISH      ;Go clean things up and leave.
                        2774
     0CD9               2775   DCD_SHARE:
     0CD9   78          2776           MOV     A,B             ;Get the DCD byte
     0CDA   E6 20       2777           ANI     20H             ;Check the Discard Remote bit
     0CDC   C8          2778           RZ                      ;IF NOT SET, THEN leave.
     0CDD   21 7E05     2779           LXI     H,DISCARD_RO    ;Point to the Discard Remote Flag byte
```

```
Error Addr  Code          Seq   Source statement

     0CE0   72            2780          MOV     M,D             ;Zero it
     0CE1   C9            2781          RET                     ;Leave.
                          2782  ;
                          2783  ;*****************************************************************************
                          2784
                          2785
                          2786  ;*****************************************************************************
                          2787  ;
                          2788  ;       TEXT_MESSAGE            Message Type 15
                          2789  ;
     0CE2                 2790  TEXT_MESSAGE:
     0CE2   3A 7E40       2791          LDA     IBUF_CNT_COPY   ;Get the Input Buffer Count Copy
     0CE5   3D            2792          DCR     A               ;Decrement the count.
     0CE6   CA 1001       2793          JZ      UB_VECTOR       ;IF COUNT=0, THEN cleanup and leave.
     0CE9   32 7E46       2794          STA     MSG15_COUNT     ;ELSE, there is something to print.
     0CEC   2A 7E42       2795          LHLD    IBUF_ADR_COPY   ;Get the address.
     0CEF   23            2796          INX     H               ;Bump it ahead.
     0CF0   22 7E44       2797          SHLD    MSG15_PTR       ;Store it here.
     0CF3   3E 01         2798          MVI     A,1             ;Make a 1.
     0CF5   32 7E1F       2799          STA     MSG_TO_READ     ;Set this flag.
     0CF8   C3 111D       2800          JMP     TESTSET_S       ;Go see about send ^S.
                          2801  ;
                          2802  ;*****************************************************************************
                          2803
                          2804
                          2805  ;*****************************************************************************
                          2806  ;
                          2807  ;       TALK
                          2808  ;
     0CFB   3A 7E13       2809  TALK:   LDA     TALKSR          ;Get the Talk SR
     0CFE   1F            2810          RAR                     ;Is the Ready bit set?
     0CFF   D2 0D0F       2811          JNC     TALK_SEND       ;Jump if not (we have a character to be sent)
     0D02   CD 0046       2812          CALL    GS_VECTOR       ;Go look for a character
     0D05   D0            2813          RNC                     ;Leave if none found
     0D06   21 7E14       2814          LXI     H,TALKDB        ;Point to this DB
     0D09   70            2815          MOV     M,B             ;Store the character there
     0D0A   2B            2816          DCX     H               ;Point to the Talk SR
     0D0B   79            2817          MOV     A,C             ;Get the source flag
     0D0C   E6 C0         2818          ANI     0C0H            ;Clear the Xmit Rdy bit
     0D0E   77            2819          MOV     M,A             ;Store this SR
     0D0F                 2820  TALK_SEND:
     0D0F   3A 7E04       2821          LDA     TALK_FLAG               ;Get the Talk Flags
     0D12   E6 02         2822          ANI     2               ;See if Talk Echo or Talk No Echo
     0D14   CA 0D2D       2823          JZ      TALK_NO_ECHO    ;Jump if Talk No Echo
     0D17   DB 49         2824          IN      TTSR            ;Get the Local SR
     0D19   21 7E02       2825          LXI     H,REMXSR        ;Point to the Pseudo Remote SR
     0D1C   A6            2826          ANA     M               ;AND them together
     0D1D   C8            2827          RZ                      ;Leave if both not set
     0D1E   36 00         2828          MVI     M,0             ;Zero the Xmit Rdy in the Remote SR
     0D20   23            2829          INX     H               ;Point to the Remote DB
```

```
Error Addr  Code          Seq   Source statement

     0D21   EB            2830          XCHG                    ;Put the address in DE
     0D22   21 7E14       2831          LXI     H,TALKDB        ;Point to the Talk DB
     0D25   7E            2832          MOV     A,M             ;Get the character
     0D26   D3 48         2833          OUT     TTDB            ;Send it to Local
     0D28                 2834    TALK_FIN0:
     0D28   12            2835          STAX    D               ;Store the character in the Remote DB
     0D29                 2836    TALK_FIN1:
     0D29   2B            2837          DCX     H               ;Point to the Talk SR
     0D2A   36 01         2838          MVI     M,1             ;Set the Xmit Rdy
     0D2C   C9            2839          RET                     ;Leave
                          2840
     0D2D                 2841    TALK_NO_ECHO:
     0D2D   21 7E13       2842          LXI     H,TALKSR        ;Point to the Talk SR
     0D30   7E            2843          MOV     A,M             ;Get it
     0D31   23            2844          INX     H               ;Now point to the Talk DB
     0D32   17            2845          RAL                     ;Where did the character come from?
     0D33   DA 0D43       2846          JC      1$              ;Jump if it was from Remote
     0D36   11 7E02       2847          LXI     D,REMXSR        ;See if the Remote port is ready
     0D39   1A            2848          LDAX    D               ;Get the SR
     0D3A   1F            2849          RAR                     ;Is it ready?
     0D3B   D0            2850          RNC                     ;Leave if not
     0D3C   AF            2851          XRA     A               ;Make a 0
     0D3D   12            2852          STAX    D               ;Zero the Xmit Rdy
     0D3E   13            2853          INX     D               ;Point to the Remote DB
     0D3F   7E            2854          MOV     A,M             ;Get the character
     0D40   C3 0D28       2855          JMP     TALK_FIN0       ;Go share the clean up
     0D43   DB 49         2856    1$:   IN      TTSR            ;Get the Local SR
     0D45   1F            2857          RAR                     ;Is it Ready?
     0D46   D0            2858          RNC                     ;Leave if not
     0D47   7E            2859          MOV     A,M             ;Get the character
     0D48   D3 48         2860          OUT     TTDB            ;Send it out
     0D4A   C3 0D29       2861          JMP     TALK_FIN1       ;Go share the cleanup
                          2862    ;
                          2863    ;
                          2864    ;*****************************************************************************
                          2865
                          2866    ;*****************************************************************************
                          2867    ;
                          2868    ;
                          2869    ;BYTE 0:
                          2870    ;BITS    07      06      05      04      03      02      01      00
                          2871    ;        NU      NU      Discard Talk    NU      Talk    Local   Local
                          2872    ;                        Remote                  Echo    Control Copy
                          2873    ;                        Output
                          2874    ;
                          2875    ;BYTE 1:
                          2876    ;BITS    07      06      05      04      03      02      01      00
                          2877    ;        NU      NU      NU      NU      NU      NU      Remote  Remote
                          2878    ;                                                       Secure
                          2879    ;
```

```
Error Addr  Code           Seq   Source statement

                           2880  ;BYTE 2:
                           2881  ;BITS   07      06      05      04      03      02      01      00
                           2882  ;       NU      NU      NU      NU      NU      NU      NU      0=2 sec Timeout
                           2883  ;                                                               1=0 Sec Timeout
                           2884  ;
    0D4D                   2885  CTL_BIT_BUILD:
    0D4D   3A 7E72         2886          LDA     PARALLEL_CNTRL  ;Get this flag.
    0D50   17              2887          RAL                     ;Shift it into bit position 1.
    0D51   21 7E71         2888          LXI     H,LOCAL_COPY    ;Point to this flag.
    0D54   B6              2889          ORA     M               ;OR it in.
    0D55   4F              2890          MOV     C,A             ;Store the result
    0D56   3A 7E04         2891          LDA     TALK_FLAG       ;Get the Talk and Talk Echo flag byte
    0D59   47              2892          MOV     B,A             ;Put a copy in B
    0D5A   E6 01           2893          ANI     1               ;Save the Talk Flag
    0D5C   CA 0D63         2894          JZ      1$              ;Jump if not in Talk Mode
    0D5F   3E 10           2895          MVI     A,10H           ;Set bit 4
    0D61   B1              2896          ORA     C               ;OR it into the first CTL byte
    0D62   4F              2897          MOV     C,A             ;Put the result back
    0D63   78              2898  1$:     MOV     A,B             ;Get the Talk byte
    0D64   E6 02           2899          ANI     2               ;Save the Talk Echo bit
    0D66   07              2900          RLC                     ;Rotate it into bit 2
    0D67   B1              2901          ORA     C               ;OR it into CTL byte 1
    0D68   4F              2902          MOV     C,A             ;Put the result back
    0D69   3A 7E05         2903          LDA     DISCARD_RO      ;Get the Discard Remote bit
    0D6C   A7              2904          ANA     A               ;Is it set?
    0D6D   79              2905          MOV     A,C             ;Get the accumulated CTL byte 1
    0D6E   CA 0D73         2906          JZ      2$              ;Jump if not
    0D71   F6 20           2907          ORI     20H             ;Set bit 5
    0D73   32 7E65         2908  2$:     STA     CTL_BUFFER+1    ;Store the second CTL byte
    0D76   DB 03           2909          IN      SECURE          ;Look at the Secure bit of the Keyswitch.
    0D78   E6 01           2910          ANI     1               ;Mask off the rest
    0D7A   32 7E66         2911          STA     CTL_BUFFER+2    ;Store it for transmission
    0D7D   C9              2912          RET                     ;
                           2913  ;
                           2914  ;
                           2915  ;       END OF CTL BIT BUILD ROUTINE
                           2916  ;
                           2917  ;*******************************************************************************
                           2918
                           2919
    0D7E                   2920  RD_LD_CSTRING:
    0D7E   04 00           2921          DB      4,0             ;
    0D80   0000 0000       2922          DW      0,0,0,0         ;
    0D84   0000 0000
                           2923
                           2924
                           2925
                           2926
                           2927  ;*******************************************************************************
                           2928  ;
```

```
Error Addr  Code          Seq   Source statement

                          2929  ;       Version number codes.
                          2930  ;
            =0043         2931  C_LETTER        EQU     'C'     ;
            =004F         2932  O_LETTER        EQU     'O'     ;
            =004E         2933  N_LETTER        EQU     'N'     ;
            =0056         2934  V_LETTER        EQU     'V'     ;
            =0030         2935  HIGH_NUMBER     EQU     '0'     ;High digit of version number
            =0031         2936  MIDDLE_NUMBER   EQU     '1'     ;Middle digit of version number
            =0031         2937  LOW_NUMBER      EQU     '1'     ;Low digit of version number
                          2938  ;
                          2939  ;*******************************************************************************
                          2940
                          2941
                          2942  ;*******************************************************************************
                          2943  ;
                          2944  ;       MSG_DECODE
                          2945  ;
                          2946  ;       This is the Message Decode routine.  The first thing we do is call the
                          2947  ;       Decode Subroutine (DECSUB).  By doing it this way the code that handles
                          2948  ;       each message type can do a RETurn at the end and get back here.
                          2949  ;
    0D88                  2950  MSG_DECODE:
    0D88  CD 100A         2951          CALL    RDD_VECTOR      ;Go to the decode subroutine
                          2952  ;
                          2953  ;       We return here after we finish decoding and executing the command.
                          2954  ;       Next we prime an SOH header and the BLDBLK.  Whether we are going to
                          2955  ;       send a Message Type 13 or 17 doesn't matter for most of this, so we
                          2956  ;       build a type 17, then check the RDSPER flag.  If it is set, Type 17 is
                          2957  ;       correct and we jump over the code that would change it.  If RDSPER is
                          2958  ;       clear, we fall through and execute the code that:
                          2959  ;
                          2960  ;       1)  Checks for data in the output buffers.
                          2961  ;       2)  Locks the correct buffer if there is something to be sent
                          2962  ;       3)  Sets up the correct count in both the Header and BLDBLK.
                          2963  ;       4)  Checks the CTL flag and builds the CTL bytes if necessary.
                          2964  ;
    0D8B  21 7EA1         2965          LXI     H,SOHHED        ;Point to the header
    0D8E  36 81           2966          MVI     M,81H           ;Set up an SOH
    0D90  22 7E9A         2967          SHLD    BLDBLK          ;Save this address
    0D93  23              2968          INX     H               ;Point to the second byte of the header
    0D94  36 02           2969          MVI     M,2             ;Set up a count of 1
    0D96  23              2970          INX     H               ;Bump the address
    0D97  36 00           2971          MVI     M,0             ;Zero the high byte of the count in the header
    0D99  23              2972          INX     H               ;Bump the pointer
    0D9A  3A 7E2A         2973          LDA     LAST_GOOD_MSG   ;Get the Last Good Message number
    0D9D  77              2974          MOV     M,A             ;Put it in the header
    0D9E  3C              2975          INR     A               ;Bump the message number
    0D9F  23              2976          INX     H               ;Bump the pointer
    0DA0  77              2977          MOV     M,A             ;Store the Current Message number
    0DA1  23              2978          INX     H               ;Point to the Station Number
```

```
Error Addr  Code          Seq   Source statement

     0DA2   3E 01         2979          MVI     A,1             ;Make a 1
     0DA4   77            2980          MOV     M,A             ;Make the Station Number 1
     0DA5   32 7E9D       2981          STA     BLDBLK+3        ;Set up a count of 1
     0DA8   21 17FE       2982          LXI     H,MSG17_MESSAGE ;Point to the Message Type 17 Reply Message.
     0DAB   22 7E9E       2983          SHLD    BLDBLK+4        ;Store the address here.
     0DAE   3E 11         2984          MVI     A,17            ;Set up Message Type 17
     0DB0   32 7EA0       2985          STA     BLDBLK+6        ;Put it here.
     0DB3   3A 7E3B       2986          LDA     RDSPER          ;Get the RD Service Protocol Error flag
     0DB6   A7            2987          ANA     A               ;See if it is set
     0DB7   C2 0E0C       2988          JNZ     4$              ;IF SET, THEN jump.
     0DBA   3A 7E8E       2989          LDA     OUTLOC          ;ELSE, get the Locked Buffer Flag
     0DBD   A7            2990          ANA     A               ;Is there one?
     0DBE   C2 0DC9       2991          JNZ     1$              ;Jump if there is
     0DC1   2A 7E21       2992          LHLD    ACTCNT          ;Get the Active Buffer Count address
     0DC4   7E            2993          MOV     A,M             ;Get the count
     0DC5   A7            2994          ANA     A               ;Is it 0?
     0DC6   C4 100D       2995          CNZ     FB0_VECTOR      ;If there is something in the active buffer, go
                          2996                                  ;lock it.
     0DC9   11 7EA2       2997  1$:     LXI     D,SOHHED+1      ;Point to the low byte of the count
     0DCC   3A 7E8E       2998          LDA     OUTLOC          ;Get the Locked Buffer Flag
     0DCF   A7            2999          ANA     A               ;Is there a Locked Buffer?
     0DD0   CA 0DDA       3000          JZ      2$              ;Jump if not:  AC = 0.
     0DD3   32 7E8F       3001          STA     LBSIP           ;Set the Locked Buffer Send In Progress flag
     0DD6   2A 7E25       3002          LHLD    LOCCNT          ;Get the address of the count
     0DD9   7E            3003          MOV     A,M             ;Get the count.
     0DDA   32 7E9D       3004  2$:     STA     BLDBLK+3        ;Store it in BLDBLK+3.  If we came here from
                          3005                                  ;three lines up, the count will be 0.
     0DDD   47            3006          MOV     B,A             ;Put the count in B.
     0DDE   04            3007          INR     B               ;Make it one bigger.
     0DDF   3A 7E97       3008          LDA     CTLFLG          ;Get the Control Flag
     0DE2   32 7EA0       3009          STA     BLDBLK+6        ;Store it here now
     0DE5   A7            3010          ANA     A               ;Check it
     0DE6   78            3011          MOV     A,B             ;Put the count in A
     0DE7   CA 0DEC       3012          JZ      3$              ;Jump if not set
     0DEA   C6 04         3013          ADI     4               ;Add three if the CTL Flag is set
     0DEC   12            3014  3$:     STAX    D               ;
     0DED   13            3015          INX     D               ;Point to the high byte of the count
     0DEE   AF            3016          XRA     A               ;Make a 0
     0DEF   12            3017          STAX    D               ;and zero the high byte of the count
     0DF0   23            3018          INX     H               ;Build the address of the Buffer that goes with
                          3019                                  ;this count
     0DF1   22 7E9E       3020          SHLD    BLDBLK+4        ;Store it in the parameter block
     0DF4   3E 0D         3021          MVI     A,13            ;Make a MSG TYPE 13
     0DF6   21 7EA0       3022          LXI     H,BLDBLK+6      ;Point to this byte
     0DF9   B6            3023          ORA     M               ;OR the message type in
     0DFA   47            3024          MOV     B,A             ;Store it temporarily.
     0DFB   3A 7E70       3025          LDA     CTL_C_INTR      ;Get this flag.
     0DFE   4F            3026          MOV     C,A             ;Put it in C.
     0DFF   3A 7E2D       3027          LDA     RD_LD_ERR       ;Get this error flag.
     0E02   B0            3028          ORA     B               ;OR things together.
```

```
Error Addr  Code          Seq   Source statement

     0E03   B1            3029           ORA     C               ;
     0E04   77            3030           MOV     M,A             ;Store the result.
     0E05   AF            3031           XRA     A               ;Make a 0
     0E06   32 7E70       3032           STA     CTL_C_INTR      ;Zap this flag now
     0E09   32 7E2D       3033           STA     RD_LD_ERR       ;and this one too.
     0E0C   AF            3034   4$:     XRA     A               ;Do this so LAST_TYPE_SENT=0 for Data Messages
     0E0D   CD 0E2E       3035           CALL    BUILD           ;Go build the output parameters
     0E10   AF            3036           XRA     A               ;Make a 0
     0E11   32 7E1D       3037           STA     MESSAG          ;Zero this flag
     0E14   32 7E1A       3038           STA     DPFLAG          ;Turn off the Data Portion Flag
     0E17   32 7E30       3039           STA     RCRC            ;Clear the Receive side CRC
     0E1A   32 7E31       3040           STA     RCRC+1          ;
     0E1D   3C            3041           INR     A               ;Make a 1
     0E1E   32 7E98       3042           STA     SOHENQ          ;Set the SOH or ENQ needed flag
     0E21   21 7E68       3043           LXI     H,HBUFFR        ;Point to the Header Buffer
     0E24   22 7E18       3044           SHLD    IADDR           ;Store the address
     0E27   21 0008       3045           LXI     H,8             ;Word count of 8
     0E2A   22 7E16       3046           SHLD    ICNT            ;Store it
     0E2D   C9            3047           RET                     ;Temp
                          3048
                          3049
                          3050   ;*****************************************************************************
                          3051   ;*****************************************************************************
                          3052   ;
     0E2E   CD 0E67       3053   BUILD:  CALL    BUILD_PREP      ;Go prep things
     0E31   2A 7E9A       3054           LHLD    BLDBLK          ;Get the address of the header to be sent
     0E34   22 7E95       3055           SHLD    HDADR           ;Save the address
     0E37   3A 7EA0       3056           LDA     BLDBLK+6        ;Get this byte
     0E3A   E6 20         3057           ANI     20H             ;Is the CTL bit set?
     0E3C   CA 0E4D       3058           JZ      1$              ;Jump if not
     0E3F   21 7E63       3059           LXI     H,CTL_COUNT     ;Point to the CTL count
     0E42   36 04         3060           MVI     M,4             ;Set up a count of 3.
     0E44   23            3061           INX     H               ;Point to the beginning of the buffer
     0E45   36 03         3062           MVI     M,3             ;Set up a count of 2.
     0E47   22 7E61       3063           SHLD    CTL_PTR         ;Set up this address
     0E4A   CD 0D4D       3064           CALL    CTL_BIT_BUILD   ;Go build the CTL bytes
     0E4D   3A 7EA0       3065   1$:     LDA     BLDBLK+6        ;Get this MSG TYPE byte
     0E50   32 7E77       3066           STA     MSGTYP          ;And store it here
     0E53   3E 01         3067           MVI     A,1             ;Make a 1
     0E55   32 7E76       3068           STA     MSGFLG          ;Set up the MSG TYPE flag
     0E58   3A 7E9D       3069           LDA     BLDBLK+3        ;Get the output buffer count
     0E5B   A7            3070           ANA     A               ;Is it zero?
     0E5C   C8            3071           RZ                      ;Leave if it is
     0E5D   32 7E27       3072           STA     OUTCNT          ;Store the count for the data here
     0E60   2A 7E9E       3073           LHLD    BLDBLK+4        ;Get the address of the locked output buffer
     0E63   22 7E28       3074           SHLD    OUTBUF          ;Store it here.
     0E66   C9            3075           RET                     ;Leave
                          3076
                          3077
                          3078   ;*****************************************************************************
```

```
Error Addr  Code           Seq   Source statement

                           3079  ;*****************************************************************************
                           3080  ;*****************************************************************************
                           3081  ;
                           3082  ;       BUILD_PREP
                           3083  ;
                           3084  ;       This routine primes flags and counts, sets up the Last Message sent Type
                           3085  ;       flag, and clears out the Xmit CRC.
                           3086  ;
                           3087  ;       REGISTERS:      A=      General use
                           3088  ;
                           3089  ;       CALLED BY:      BUILD
                           3090  ;                       SNDNAK
                           3091  ;
                           3092  ;       FLAGS AND COUNTERS:
                           3093  ;
                           3094  ;               (CLEARED)       XCRC-
                           3095  ;                               XCRC+1- The Xmit CRC bytes
                           3096  ;
                           3097  ;                               CRCCN0- Header CRC count
                           3098  ;
                           3099  ;                               CRCCN1- Message CRC count
                           3100  ;
                           3101  ;                               MSGFLG- Flag checked in SNDMSG that indicates
                           3102  ;                                       whether or not a MSG TYPE is to be sent
                           3103  ;
                           3104  ;                               CTL_COUNT-      Count for number of CTL bytes
                           3105  ;
                           3106  ;                               OUTCNT-
                           3107  ;
                           3108  ;                               RDSPER- RD Service Protocol error flag
                           3109  ;
                           3110  ;               (SET)           MSG_TO_SEND-    Indicates "Message To Send"
                           3111  ;
                           3112  ;               (WRITTEN)       HDCNT-  Header Count=6
                           3113  ;
                           3114  ;
                           3115  ;
                           3116  ;
0E67                       3117  BUILD_PREP:
0E67   32 7E2B             3118          STA     LAST_TYPE_SENT  ;Set up the LSTTYP flag
0E6A   AF                  3119          XRA     A               ;Make 0
0E6B   32 7E3B             3120          STA     RDSPER          ;Make sure this is no longer set
0E6E   32 7E32             3121          STA     XCRC            ;Zero this out
0E71   32 7E33             3122          STA     XCRC+1          ;
0E74   32 7E34             3123          STA     CRCCN0          ;clear this
0E77   32 7E35             3124          STA     CRCCN1          ;And this
0E7A   32 7E76             3125          STA     MSGFLG          ;and this
0E7D   32 7E63             3126          STA     CTL_COUNT       ;Clear this count
0E80   32 7E27             3127          STA     OUTCNT          ;and this
0E83   3C                  3128          INR     A               ;Make a 1
```

```
Error Addr  Code          Seq   Source statement

     0E84   32 7E07       3129          STA     MSG_TO_SEND     ;Set this flag
     0E87   3E 06         3130          MVI     A,6             ;Get a 6
     0E89   32 7E94       3131          STA     HDCNT           ;Set up this count
     0E8C   C9            3132          RET                     ;Leave
                          3133  ;
                          3134  ;*****************************************************************************
                          3135  ;*****************************************************************************
                          3136  ;*****************************************************************************
                          3137  ;
                          3138  ;
                          3139  ;*****************************************************************************
                          3140  ;*****************************************************************************
                          3141  ;
                          3142  ;
                          3143  ;
                          3144  ;*****************************************************************************
                          3145
                          3146
                          3147
                          3148
                          3149
          =0FFF           3150          ORG     0FFFH           ;
                          3151
     0FFF   00            3152  MIDSUM: DB      0               ;
                          3153
                          3154
                          3155
                          3156
                          3157  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                          3158  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                          3159  ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
                          3160  ;
                          3161  ;
                          3162  ;       BEGINNING OF FIXED ADDRESSES IN HIGH ROM!!!
                          3163  ;
          =1000           3164          ORG     1000H
                          3165
     1000                 3166  RD_PATTERN:
     1000   A5            3167          DB      0A5H            ;Pattern for determining if RD Roms present
                          3168
     1001                 3169  UB_VECTOR:
     1001   C3 16B5       3170          JMP     UNLOCK_BUFFER   ;Vector to get the the Unlock Input Buffer
                          3171                                  ;routine.
                          3172
     1004                 3173  FA_VECTOR:
     1004   C3 101F       3174          JMP     FIX_ADDRESS     ;
                          3175
     1007                 3176  MOD0_VECTOR:
     1007   C3 1024       3177          JMP     MOD0            ;
                          3178
```

```
Error Addr  Code        Source statement
      100A              RDD_VECTOR:
      100A  C3 1314             JMP     RD_DECODE       ;
      100D              FB0_VECTOR:
      100D  C3 15C7             JMP     FULBU0          ;
      1010              TSS_VECTOR:
      1010  C3 111D             JMP     TESTSET_S       ;
      1013              TSQ_VECTOR:
      1013  C3 1113             JMP     TESTSET_Q       ;
      1016              TSQA_VECTOR:
      1016  C3 1105             JMP     TSQA            ;
      1019              HR_VECT08:
      1019  C3 1019             JMP     HR_VECT08       ;
      101C              HR_VECT09:
      101C  C3 101C             JMP     HR_VECT09       ;
      101F              FIX_ADDRESS:
      101F  E1                  POP     H               ;Get the new address
      1020  22 4099             SHLD    MODEM_ADDRESS   ;Save the new address
      1023  C9                  RET                     ;Leave
      1024  AF          MOD0:   XRA     A               ;Make a 0
      1025  32 7E06             STA     TRNFLG          ;Establish Trans Mode
      1028  32 7E20             STA     SOHFLG          ;and get rid of the SOH found flag.
      102B  32 7E1A             STA     DPFLAG          ;Zero the Data Portion Flag
      102E  32 7E07             STA     MSG_TO_SEND     ;Kill the Message to Send flag,
      1031  32 7E1C             STA     HEADER          ;and the Header flag,
      1034  32 7E71             STA     LOCAL_COPY      ;Get rid of the Local Copy flag
      1037  32 7E72             STA     PARALLEL_CNTRL  ;and the Parallel Control flag as well.
      103A  32 7E67             STA     OVERRIDE_LCS    ;and the Override Local Copy in Secure.
      103D  CD 1682             CALL    IP_SUB          ;Go zap some more things.
      1040  21 0190             LXI     H,400           ;Set up a 2 second count
      1043  22 40DA             SHLD    DISCNT          ;for the Disconnect Count
      1046  3C                  INR     A               ;Make a 1
      1047  32 40D9             STA     MIPFLG          ;Set the Modem in Progress flag
                        ;
                        ;       END OF FIXED ADDRESSES IN HIGH ROM!!!
                        ;
                        ;!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
      104A  3E 37       MOD1:   MVI     A,37H           ;Set the Modem Control Bits
      104C  D3 43               OUT     TRCR            ;Send them to the Command Register
      104E  AF                  XRA     A               ;Make a 0
      104F  32 7E0D             STA     TIKTOK          ;Clear this flag
      1052  3E C8       MOD1A:  MVI     A,200           ;Set up a 1 second count
```

```
Error Addr  Code          Seq   Source statement

     1054   32 7E0C      3229            STA     TIMER2          ;Put it in Timer 2
     1057   CD 101F      3230            CALL    FIX_ADDRESS     ;Go fix up the entry point address
     105A   DB 06        3231    MODEM1: IN      REMOTE          ;Get the Remote Switch
     105C   1F           3232            RAR                     ;Put it in the carry
     105D   DA 11C9      3233            JC      MODEM9          ;Jump if not
     1060   DB 41        3234            IN      TRSR            ;Get the remote SR
     1062   17           3235            RAL                     ;Put DSR in the carry
     1063   D2 112B      3236            JNC     FLASH           ;Jump if not asserted
     1066   D3 3F        3237            OUT     SETRD           ;Turn on the R/D light
     1068   21 16A8      3238            LXI     H,5800          ;29 second count for Timer1
     106B   22 7E0A      3239            SHLD    TIMER1          ;Store it
     106E   3E 64        3240            MVI     A,100           ;500 millisecond count for Timer2
     1070   32 7E0C      3241            STA     TIMER2          ;Store it
     1073   CD 101F      3242            CALL    FIX_ADDRESS     ;Go save the next state address
     1076   CD 10E0      3243    MODEM2: CALL    REMDSR          ;Check the Remote Switch and the DSR signal
     1079   3A 7E0C      3244            LDA     TIMER2          ;Get timer 2
     107C   A7           3245            ANA     A               ;Is it zero?
     107D   C2 1140      3246            JNZ     TICK            ;Go check for Ticks
     1080   CD 101F      3247            CALL    FIX_ADDRESS     ;Go update the address
     1083   CD 10E0      3248    MODEM3: CALL    REMDSR          ;Go check the Remote Switch and the DSR signal
                         3249                                    ;If it returns, REMOTE*DSR is true.  DCD is in
                         3250                                    ;the carry
     1086   D2 1140      3251            JNC     TICK            ;Jump if not set
     1089   DB 41        3252            IN      TRSR            ;Get the Remote USART SR
     108B   1F           3253            RAR                     ;Put XMIT RDY in the carry
     108C   D2 1140      3254            JNC     TICK            ;Jump if not set (no CTS)
     108F   AF           3255            XRA     A               ;Make a 0
     1090   32 7E04      3256            STA     TALK_FLAG               ;Turn off Talk Mode
     1093   32 7E05      3257            STA     DISCARD_RO      ;Clear the Discard Remote bit
     1096   32 7E70      3258            STA     CTL_C_INTR      ;and the Control C interrupt flag
     1099   32 7E2D      3259            STA     RD_LD_ERR       ;and the RD Load Error flag.
     109C   3C           3260            INR     A               ;Make a 1
     109D   32 7E10      3261            STA     RDCON           ;Set the RD Connection Flag
     10A0   CD 1105      3262            CALL    TSQA            ;Go see if we should send ^Q.
     10A3   3E 08        3263    MODM3A: MVI     A,8             ;Count for LOGCNT
     10A5   32 7E0F      3264            STA     LOGCNT          ;Set it up
     10A8   3E 01        3265            MVI     A,1             ;Make a 1
     10AA   32 7E98      3266            STA     SOHENQ          ;Set the SOH or ENQ needed flag
     10AD   21 0008      3267            LXI     H,8             ;Make a word of 8
     10B0   22 7E16      3268            SHLD    ICNT            ;Store it
     10B3   21 7E68      3269            LXI     H,HBUFFR        ;Point to the Header buffer
     10B6   22 7E18      3270            SHLD    IADDR           ;Store in the the Input Address Buffer
     10B9   CD 101F      3271    MOD4:   CALL    FIX_ADDRESS     ;Go update the re-entry address
     10BC   CD 10E0      3272    MODEM4: CALL    REMDSR          ;Go check Remote and DSR
                         3273                                    ;Comes back with DCD in carry
     10BF   DA 11EA      3274            JC      RD_FLOW         ;Jump if asserted
     10C2   2A 7E0A      3275    MOD5:   LHLD    TIMER1          ;Get the contents of TIMER1
     10C5   22 7E08      3276            SHLD    TIMSAV          ;Save it
     10C8   2A 40DA      3277            LHLD    DISCNT          ;Get the correct Disconnect Count
     10CB   22 7E0A      3278            SHLD    TIMER1          ;Store it
```

```
Error Addr  Code          Seq   Source statement

     10CE   CD 101F       3279          CALL    FIX_ADDRESS     ;Point to the next part
     10D1   CD 10E0       3280  MODEM5: CALL    REMDSR          ;Go test Remote and DSR
                          3281                                  ;Comes back with DCD in carry
     10D4   D2 1140       3282          JNC     TICK            ;Go tick the timers as necessary
     10D7   2A 7E08       3283          LHLD    TIMSAV          ;Get the saved timer count value
     10DA   22 7E0A       3284          SHLD    TIMER1          ;Restore TIMER1
     10DD   C3 10B9       3285          JMP     MOD4            ;Go fix up the MODEM address
                          3286
                          3287
                          3288
                          3289  ;*****************************************************************************
                          3290  ;
     10E0   DB 06         3291  REMDSR: IN      REMOTE          ;Get the Remote Switch
     10E2   1F            3292          RAR                     ;Put it in the carry
     10E3   DA 115E       3293          JC      DROP_CONNECTION ;Jump if now in Local
     10E6   DB 41         3294          IN      TRSR            ;Get the Remote USART SR
     10E8   17            3295          RAL                     ;Put the DSR in the carry
     10E9   D2 115E       3296          JNC     DROP_CONNECTION ;Jump if not set
     10EC   17            3297          RAL                     ;Do this to get DCD into carry for the
                          3298                                  ;calling routine
     10ED   C9            3299          RET                     ;Leave
                          3300
                          3301
                          3302
     10EE                 3303  TEST_DISCARD:
     10EE   3A 7E05       3304          LDA     DISCARD_RO      ;Is the Discard Remote Output flag set?
     10F1   A7            3305          ANA     A               ;Test it
     10F2   CA 111D       3306          JZ      TESTSET_S       ;IF NOT Discard_RO, THEN jump.
     10F5   C3 1113       3307          JMP     TESTSET_Q       ;ELSE, see about sending ^Q.
                          3308
                          3309
     10F8   3A 7E04       3310  TSQB:   LDA     TALK_FLAG       ;Get the Talk Flag.
     10FB   1F            3311          RAR                     ;Are we in Talk Mode?
     10FC   D8            3312          RC                      ;IF TALK, THEN leave.
     10FD   3A 7E46       3313          LDA     MSG15_COUNT     ;Get this count
     1100   A7            3314          ANA     A               ;Are we doing a message type 15?
     1101   C0            3315          RNZ                     ;IF MSG TYP 15 ACTIVE, THEN leave.
     1102   C3 1113       3316          JMP     TESTSET_Q       ;ELSE, go see about sending an ^Q.
                          3317
     1105   3A 7E8E       3318  TSQA:   LDA     OUTLOC          ;Is there an output buffer locked.
     1108   A7            3319          ANA     A               ;Check it.
     1109   CA 1113       3320          JZ      TESTSET_Q       ;IF NOT LOCKED, THEN see about sending ^Q.
     110C   2A 7E21       3321          LHLD    ACTCNT          ;Get the Address of the Active Count.
     110F   7E            3322          MOV     A,M             ;Get the count.
     1110   FE 38         3323          CPI     38H             ;Is it >= 38H?
     1112   D0            3324          RNC                     ;IF >= 38H, THEN leave (don't send ^Q).
     1113                 3325  TESTSET_Q:
     1113   21 40D7       3326          LXI     H,SPEND         ;Point to the Control S Flags.
     1116   7E            3327          MOV     A,M             ;Get them.
     1117   A7            3328          ANA     A               ;Are any set?
```

```
Error Addr  Code          Seq   Source statement

     1118   C8           3329           RZ                      ;IF NONE SET, THEN leave.
     1119   23           3330           INX     H               ;Point to the Control Q Flags.
     111A   36 01        3331           MVI     M,1             ;Set the Control Q Pending flag.
     111C   C9           3332           RET                     ;THEN leave.
                         3333
     111D                3334   TESTSET_S:
     111D   21 40D8      3335           LXI     H,QPEND         ;Point to the Control Q Flags.
     1120   36 00        3336           MVI     M,0             ;Zap them.
     1122   2B           3337           DCX     H               ;Now point to the Control S Flags.
     1123   7E           3338           MOV     A,M             ;Get them.
     1124   A7           3339           ANA     A               ;Are any set?
     1125   C0           3340           RNZ                     ;IF ANY SET, THEN leave.
     1126   3A 40D3      3341           LDA     RUN_FLAG        ;Get the Run Flag (indicates PM).
     1129   77           3342           MOV     M,A             ;Set or clear the SPEND flag depending on the
                         3343                                   ;state of the Run Flag.
     112A   C9           3344           RET                     ;Leave.
                         3345   ;
                         3346   ;*****************************************************************************
                         3347
                         3348
     112B   CD 1148      3349   FLASH:  CALL    TICK1           ;Go tick the counters
     112E   3A 7E0C      3350           LDA     TIMER2          ;Get the count
     1131   A7           3351           ANA     A               ;Check for 0
     1132   CA 1052      3352           JZ      MOD1A           ;If at 0, go start over
     1135   FE 64        3353           CPI     100             ;See if we are half way there
     1137   D2 113D      3354           JNC     1$              ;Jump if in high half of count
     113A   D3 3E        3355           OUT     CLRRD           ;Turn off the light
     113C   C9           3356           RET                     ;Leave
     113D   D3 3F        3357   1$:     OUT     SETRD           ;Turn the light on
     113F   C9           3358           RET                     ;Leave
                         3359
                         3360
     1140   2A 7E0A      3361   TICK:   LHLD    TIMER1          ;Get the 29 second timer
     1143   7C           3362           MOV     A,H             ;Get the high byte
     1144   B5           3363           ORA     L               ;OR in the low byte
     1145   CC 115E      3364           CZ      DROP_CONNECTION ;Leave if 0
     1148   21 7E0D      3365   TICK1:  LXI     H,TIKTOK        ;Point to the Clock State Flag
     114B   DB 06        3366           IN      SLWCLK          ;Get the present clock state
     114D   E6 80        3367           ANI     80H             ;Save only the MSB
     114F   BE           3368           CMP     M               ;Are they the same?
     1150   C8           3369           RZ                      ;Leave if they are
     1151   77           3370           MOV     M,A             ;Change the flag
     1152   2A 7E0A      3371           LHLD    TIMER1          ;Get Timer 1
     1155   2B           3372           DCX     H               ;Decrement it
     1156   22 7E0A      3373           SHLD    TIMER1          ;Put it back
     1159   21 7E0C      3374           LXI     H,TIMER2        ;Point to Timer 2
     115C   35           3375           DCR     M               ;Decrement it
     115D   C9           3376           RET                     ;Leave
                         3377
                         3378
```

```
Error Addr  Code          Seq   Source statement

      115E                3379  DROP_CONNECTION:
      115E  E1            3380          POP     H               ;Fix up the stack
      115F  3A 7E10       3381          LDA     RDCON           ;Were we connected?
      1162  A7            3382          ANA     A               ;Test the flag
      1163  C2 116C       3383          JNZ     1$              ;IF CONNECTED, THEN jump.
      1166  CD 10EE       3384          CALL    TEST_DISCARD    ;ELSE, check the Discard Remote Output situation
      1169  C3 117A       3385          JMP     DROP_CON0       ;THEN go finish dropping the line.
      116C  21 16D5       3386  1$:     LXI     H,CONLOST_MSG   ;Point to this message.
      116F  7E            3387          MOV     A,M             ;Get the count which is in the first byte
      1170  32 7E49       3388          STA     CLMSG_COUNT     ;Store it.
      1173  23            3389          INX     H               ;Point to the text.
      1174  22 7E47       3390          SHLD    CLMSG_PTR       ;Store the address.
      1177  CD 111D       3391          CALL    TESTSET_S       ;Go test and (if necessary) set the S flag.
      117A                3392  DROP_CON0:
      117A  21 7E04       3393          LXI     H,TALK_FLAG     ;Point to the Talk Flag
      117D  7E            3394          MOV     A,M             ;Get it
      117E  36 00         3395          MVI     M,0             ;Zero it out
      1180  AF            3396          XRA     A               ;Make a 0
      1181  32 7E10       3397          STA     RDCON           ;Zero the Connect flag
      1184  32 7E0E       3398          STA     LOGCON          ;Zero the Logical Connection flag
      1187  D3 3E         3399          OUT     CLRRD           ;Turn off the R/D light
      1189  3E 35         3400          MVI     A,35H           ;Set up to clear DTR
      118B  D3 43         3401          OUT     TRCR            ;Do it
      118D  21 0190       3402          LXI     H,400           ;2 second count
      1190  22 7E0A       3403          SHLD    TIMER1          ;Store it
      1193  3E 2C         3404          MVI     A,44            ;220 millisecond count
      1195  32 7E0C       3405          STA     TIMER2          ;Store it
      1198  CD 101F       3406          CALL    FIX_ADDRESS     ;Save the address of the next part
      119B  3A 7E0C       3407  MODEM6: LDA     TIMER2          ;Get Timer #2
      119E  A7            3408          ANA     A               ;Check for 0
      119F  C2 1148       3409          JNZ     TICK1           ;Go check the clock
      11A2  CD 101F       3410          CALL    FIX_ADDRESS     ;Point to the next part
      11A5  DB 41         3411  MODEM7: IN      TRSR            ;Get the SR
      11A7  17            3412          RAL                     ;Check DSR
      11A8  D2 11B3       3413          JNC     1$              ;Jump if not asserted
      11AB  2A 7E0A       3414          LHLD    TIMER1          ;Get the 2 second timer
      11AE  7C            3415          MOV     A,H             ;Get the high byte
      11AF  B5            3416          ORA     L               ;OR in the low
      11B0  C2 1148       3417          JNZ     TICK1           ;If not zero, go tick the timers
      11B3  CD 101F       3418  1$:     CALL    FIX_ADDRESS     ;Go fix up the Modem Pointer.
      11B6  3A 7E49       3419  MODEM8: LDA     CLMSG_COUNT     ;Get the Connection Lost Message Count.
      11B9  21 7E46       3420          LXI     H,MSG15_COUNT   ;Point to the Message Type 15 Count.
      11BC  B6            3421          ORA     M               ;Are they both zero?
      11BD  C2 0809       3422          JNZ     STT_VECTOR      ;If not zero, go send the Transparent Text.
      11C0  CD 10EE       3423          CALL    TEST_DISCARD    ;Go test the Discard Remote Output situation.
      11C3  DB 06         3424          IN      REMOTE          ;Get the keyswitch position
      11C5  1F            3425          RAR                     ;Are we in Remote?
      11C6  D2 104A       3426          JNC     MOD1            ;IF REMOTE, THEN jump.
      11C9  AF            3427  MODEM9: XRA     A               ;Make a 0
      11CA  32 7E04       3428          STA     TALK_FLAG       ;Turn off the Talk Flag
```

```
Error Addr  Code          Seq   Source statement

     11CD   CD 1113       3429          CALL    TESTSET_Q       ;Decide about whether or not we have to
                          3430                                  ;set the Q Pending flag.
     11D0   3E 15         3431          MVI     A,15H           ;Clear RTS
     11D2   D3 43         3432          OUT     TRCR            ;Do it
     11D4   D3 3E         3433          OUT     CLRRD           ;Make sure the RD light is off
     11D6   21 40BD       3434          LXI     H,LR_MASK_WORK  ;Point to Working Mask
     11D9   7E            3435          MOV     A,M             ;Get it
     11DA   E6 DB         3436          ANI     0DBH            ;Clear the remote bits
     11DC   77            3437          MOV     M,A             ;Store the new version
     11DD   23            3438          INX     H               ;Bump the pointer twice
     11DE   23            3439          INX     H               ;
     11DF   7E            3440          MOV     A,M             ;Get the Mask Copy
     11E0   E6 DB         3441          ANI     0DBH            ;Clear the remote bits
     11E2   77            3442          MOV     M,A             ;Restore it
     11E3   AF            3443          XRA     A               ;Make a 0
     11E4   32 40D9       3444          STA     MIPFLG          ;Clear the Modem In Progress flag
     11E7   C3 004F       3445          JMP     FU_VECTOR       ;and go start from scratch
                          3446  ;
                          3447  ;*****************************************************************************
                          3448
                          3449
                          3450  ;*****************************************************************************
                          3451  ;
     11EA                 3452  RD_FLOW:
     11EA   3A 7E07       3453          LDA     MSG_TO_SEND     ;Get the Message to Send flag
     11ED   1F            3454          RAR                     ;Put it in the carry
     11EE   DC 1401       3455          CC      SNDMSG          ;Go send it
     11F1   3A 7E1F       3456          LDA     MSG_TO_READ     ;Get the Message to Read Flag
     11F4   1F            3457          RAR                     ;Put it in the carry
     11F5   DC 14BA       3458          CC      MSG_TR_DECODE   ;Go figure out what it is.
     11F8   3A 7E02       3459          LDA     REMXSR          ;Get the Remote Xmit SR
     11FB   1F            3460          RAR                     ;Is it ready
     11FC   DA 1209       3461          JC      1$              ;Jump if it is (no character waiting)
     11FF   3A 7E06       3462          LDA     TRNFLG          ;Get the Trans Mode flag
     1202   1F            3463          RAR                     ;Put it in the carry
     1203   D4 157C       3464          CNC     TRNSND          ;Go do a Trans Mode send
     1206   DC 158C       3465          CC      PROSND          ;Otherwise, do a Protocol Mode send
     1209   0E 00         3466  1$:     MVI     C,0             ;Prime this
     120B   DB 41         3467          IN      TRSR            ;Get the Remote Status Register
     120D   47            3468          MOV     B,A             ;Save a copy in B
     120E   E6 02         3469          ANI     2               ;Check for RCVR DONE
     1210   CA 1231       3470          JZ      3$              ;Jump if not
     1213   DB 40         3471          IN      TRDB            ;Get the character right away
     1215   32 7E12       3472          STA     RDTEMP          ;Save it here
     1218   78            3473          MOV     A,B             ;Get the SR back
     1219   E6 20         3474          ANI     20H             ;Check for Framing Errors
     121B   C2 124D       3475          JNZ     CONERR          ;Go check the Connection Error situation
     121E   3A 7E20       3476          LDA     SOHFLG          ;Get the SOH Flag
     1221   1F            3477          RAR                     ;Is it set?
     1222   DA 122C       3478          JC      2$              ;Skip the Trans Mode stuff if it is.
```

```
Error Addr  Code          Seq   Source statement

                          3479                          ;(Note:  We jump with the carry set so the CC
                          3480                          ;at 2$ will work.)
     1225   3A 7E06       3481          LDA     TRNFLG  ;Get the Trans Mode Flag
     1228   1F            3482          RAR             ;See if asserted (asserted low)
     1229   D4 1349       3483          CNC     TRANS_RECEIVE ;Go service it if in Trans Mode
     122C   DC 1375       3484    2$:   CC      PROTO_RECEIVE       ;Otherwise, go to Protocol Receive
     122F   0E FF         3485          MVI     C,-1    ;Set up to subtract 1 from LOGCNT
     1231   21 7E0F       3486    3$:   LXI     H,LOGCNT ;Point to the Logical Connection count
     1234   7E            3487          MOV     A,M     ;Get it
     1235   A7            3488          ANA     A       ;Is it 0?
     1236   C2 1248       3489          JNZ     4$      ;Jump if it isn't
     1239   3A 7E1C       3490          LDA     HEADER  ;Get the Header Received Flag
     123C   1F            3491          RAR             ;Is it set?
     123D   DC 125A       3492          CC      HDECOD  ;Go decode it
     1240   3A 7E1D       3493          LDA     MESSAG  ;Get the Message Received Flag
     1243   1F            3494          RAR             ;Is it set?
     1244   DC 0812       3495          CC      MD_VECTOR ;If set, go decode the message
     1247   C9            3496          RET             ;Leave
                          3497
     1248   81            3498    4$:   ADD     C       ;Otherwise, add the contents of C
     1249   77            3499          MOV     M,A     ;Store the result
     124A   C3 1140       3500          JMP     TICK    ;Go check the timers
                          3501
                          3502
     124D   3E 37         3503    CONERR: MVI   A,37H   ;Prepare to reset the error
     124F   D3 43         3504          OUT     TRCR    ;Do it
     1251   21 7E0F       3505          LXI     H,LOGCNT ;Point to the Logical Connection indicator
     1254   7E            3506          MOV     A,M     ;Get the count
     1255   A7            3507          ANA     A       ;Is it 0?
     1256   C8            3508          RZ              ;Leave if it is
     1257   36 08         3509          MVI     M,8     ;Initialize it back to 8 if not 0
     1259   C9            3510          RET             ;And leave
                          3511    ;
                          3512    ;*****************************************************************************
                          3513
                          3514
                          3515
                          3516    ;*****************************************************************************
                          3517    ;*****************************************************************************
                          3518    ;
                          3519    ;       HDECOD
                          3520    ;       ENQDEC
                          3521    ;
                          3522    ;       Header Decode routine.  When a complete header has been received, it is
                          3523    ;       subsequently decoded by this routine.  The first byte is checked for SOH
                          3524    ;       or ENQ.  If SOH, then we jump to SOH_DECODE.  If ENQ, we fall through
                          3525    ;       and figure out the type of ENQ: ACK, NACK, or REP.
                          3526    ;
                          3527    ;       REGISTERS:      A=      General use
                          3528    ;                       B=      Message type code (1=ACK, 2=NACK)
```

```
Error Addr  Code           Seq   Source statement

                           3529   ;                       C=      CTL REASON code
                           3530   ;
                           3531   ;       ENTERED FROM:   RD3
                           3532   ;
                           3533   ;       FLAGS AND COUNTERS:
                           3534   ;
                           3535   ;               (READ)          HCOUNT- (aka CTL TYPE and CTL reason)
                           3536   ;                               HBUFFR- Header type (SOH or ENQ)
                           3537   ;                               ENQHED+2-       CTL REASON from last ENQ sent
                           3538   ;                               LAST_TYPE_SENT- Last message type sent
                           3539   ;
                           3540   ;
    125A   2A 7E69         3541   HDECOD: LHLD    HCOUNT          ;Get the Count (aka CTL TYPE and CTL REASON)
    125D   EB              3542           XCHG                     ;Put it in DE
    125E   3A 7E68         3543           LDA     HBUFFR          ;Get the received Message Type
    1261   FE 81           3544           CPI     81H             ;Is it an SOH?
    1263   CA 12BF         3545           JZ      SOH_DECODE      ;Go to SOH Decode if it is
    1266   7B              3546   ENQDEC: MOV     A,E             ;Get the CTL TYPE
    1267   FE 01           3547           CPI     1               ;See if ACK
    1269   CA 1286         3548           JZ      RDACK           ;Jump if ACK
    126C   FE 02           3549           CPI     2               ;Check for NACK
    126E   CA 12B8         3550           JZ      RDNACK          ;Jump if NACK
    1271   CD 1298         3551   RDREP:  CALL    INFIX           ;Go set up the Input Buffer flags
    1274   3A 7EA9         3552           LDA     ENQHED+2        ;Get the CTL REASON from the last ENQ sent
    1277   4F              3553           MOV     C,A             ;Put it in C
    1278   3A 7E2B         3554           LDA     LAST_TYPE_SENT  ;Get my Last Message Type flag
    127B   FE 02           3555           CPI     2               ;Check for less than 2
    127D   D2 1606         3556           JNC     SNDNAK          ;Go set up to send a NACK
    1280   01 0100         3557           LXI     B,100H          ;Set up a 1 in B and a 0 in C
    1283   C3 1608         3558           JMP     SNDNA0          ;Go use part of the SNDNAK flow to set up for
                           3559                                   ;sending an ACK
                           3560
                           3561
    1286   CD 1298         3562   RDACK:  CALL    INFIX           ;Go do the Input Header stuff.
    1289   21 7E90         3563   RDACK1: LXI     H,LBSENT        ;Point to the Locked Buffer Sent flag
    128C   7E              3564           MOV     A,M             ;Get it
    128D   A7              3565           ANA     A               ;Is it set?
    128E   C8              3566           RZ                      ;Leave if not
    128F   AF              3567           XRA     A               ;Make a 0
    1290   77              3568           MOV     M,A             ;Zero it now
    1291   2B              3569           DCX     H               ;Point to the LBSIP flag
    1292   77              3570           MOV     M,A             ;and zero it
    1293   2B              3571           DCX     H               ;Point to the Locked Flag
    1294   77              3572           MOV     M,A             ;and zero it.
    1295   C3 10F8         3573           JMP     TSQB            ;Go see about sending ^Q.
                           3574
    1298   11 0006         3575   INFIX:  LXI     D,6             ;Set up a count of 6
    129B   21 7E68         3576           LXI     H,HBUFFR        ;Point to the Header Buffer.
    129E   22 7E18         3577   INFIX0: SHLD    IADDR           ;Save the address
    12A1   22 7E42         3578           SHLD    IBUF_ADR_COPY   ;Save another copy
```

```
Error Addr  Code          Seq   Source statement

     12A4   EB           3579          XCHG                    ;Get the count into HL
     12A5   22 7E40       3580          SHLD    IBUF_CNT_COPY   ;Save a copy of the count here
     12A8   23            3581          INX     H               ;Do this twice to add two
     12A9   23            3582          INX     H               ;to account for the CRC.
     12AA   22 7E16       3583          SHLD    ICNT            ;Store it here for use by PROTO_RECEIVE
     12AD   AF            3584          XRA     A               ;Make a 0
     12AE   32 7E1C       3585          STA     HEADER          ;Clear the Header flag
     12B1   32 7E30       3586          STA     RCRC            ;Clear the CRC for the receive side
     12B4   32 7E31       3587          STA     RCRC+1          ;
     12B7   C9            3588          RET                     ;Leave
                          3589
     12B8   AF            3590  RDNACK: XRA     A               ;Make a 0 for LAST_TYPE_SENT code
     12B9   CD 0818       3591          CALL    BUILD_VECTOR    ;Go clean up the SNDMSG counts, pointers, etc.
     12BC   C3 1298       3592          JMP     INFIX           ;Go build the input stuff.
                          3593  ;
                          3594  ;*****************************************************************************
                          3595  ;*****************************************************************************
                          3596
                          3597
                          3598  ;*****************************************************************************
                          3599  ;*****************************************************************************
                          3600  ;
                          3601  ;       SOH_DECODE
                          3602  ;
                          3603  ;       We come here from HDECOD if the first byte of the received header is an
                          3604  ;       SOH (81H).  This is where we check the validity of message numbers for
                          3605  ;       SOH messages, set up input buffers, clear the locks on output buffers
                          3606  ;       that have been sent, and generally prepare to receive the Data Portion
                          3607  ;       of a message.
                          3608  ;
                          3609  ;
                          3610  ;
     12BF                 3611  SOH_DECODE:
     12BF   AF            3612          XRA     A               ;Make a 0
     12C0   32 7E36       3613          STA     NEEDI           ;Zero the Need Init flag
     12C3   21 7E6B       3614          LXI     H,LMSGNM        ;Point to the Last Message Number field
     12C6   7E            3615          MOV     A,M             ;Get it
     12C7   23            3616          INX     H               ;Point to the Current Message Number field
     12C8   BE            3617          CMP     M               ;See if they are the same
     12C9   C2 1604       3618          JNZ     NACK7           ;Leave if not
     12CC   21 7E2A       3619          LXI     H,LAST_GOOD_MSG ;Point to my Last Good Data Message received
                          3620                                  ;number.
     12CF   46            3621          MOV     B,M             ;Put it in B
     12D0   04            3622          INR     B               ;Bump it by one
     12D1   B8            3623          CMP     B               ;Are they the same?
     12D2   CA 12DD       3624          JZ      1$              ;If they are, all is well so skip next part
     12D5   A7            3625          ANA     A               ;Check for 0 in LMSGNM and CMSGNM
     12D6   C2 1604       3626          JNZ     NACK7           ;Error if not
     12D9   3C            3627          INR     A               ;Make a 1
     12DA   32 7E36       3628          STA     NEEDI           ;Set the Need Init flag
```

```
Error Addr  Code          Seq   Source statement

     12DD   7A           3629  1$:     MOV     A,D             ;Get the high byte of the count
     12DE   A7           3630          ANA     A               ;Must be zero
     12DF   C2 15FF      3631          JNZ     NACK6           ;Jump if message too long
     12E2   7B           3632          MOV     A,E             ;Get the low byte of the count.
     12E3   FE 82        3633          CPI     130             ;Check for count>input buffer
     12E5   D2 15FF      3634          JNC     NACK6           ;Jump if count greater than 130
     12E8   3A 7E1B      3635          LDA     INLOCK          ;Get the Input Buffer Locked Flag
     12EB   A7           3636          ANA     A               ;Is it zero?
     12EC   CA 12FB      3637          JZ      2$              ;Jump if it is
     12EF   7B           3638          MOV     A,E             ;Get the low byte of the count.
     12F0   FE 02        3639          CPI     2               ;See if it is 0 or 1
     12F2   D2 15F5      3640          JNC     NACK4           ;Error if not
     12F5   21 7E60      3641          LXI     H,IBUF1         ;Point to the short data buffer
     12F8   C3 12FF      3642          JMP     3$              ;Jump with a 1 in A
     12FB   21 7EDB      3643  2$:     LXI     H,IBUF0         ;Point to the long Data buffer
     12FE   AF           3644          XRA     A               ;Make a 0 to indicate Buffer 0
     12FF   32 7E1E      3645  3$:     STA     INFLAG          ;Indicate which Input buffer is being used
     1302   3E 01        3646          MVI     A,1             ;Make a 1
     1304   32 7E1A      3647          STA     DPFLAG          ;Set the Data Portion Flag
     1307   32 7E06      3648          STA     TRNFLG          ;Set this to Protocol Mode
     130A   CD 129E      3649          CALL    INFIX0          ;Go build the input stuff.
     130D   AF           3650          XRA     A               ;Make a 0
     130E   32 7E20      3651          STA     SOHFLG          ;and clear the SOH Flag.
     1311   C3 1289      3652          JMP     RDACK1          ;Go share the cleanup code.
                         3653  ;
                         3654  ;*****************************************************************************
                         3655  ;*****************************************************************************
                         3656  ;
                         3657  ;
                         3658  ;*****************************************************************************
                         3659
                         3660
                         3661
                         3662
                         3663
                         3664  ;*****************************************************************************
                         3665  ;*****************************************************************************
                         3666  ;
                         3667  ;
     1314                3668  RD_DECODE:
     1314   2A 7E40      3669          LHLD    IBUF_CNT_COPY   ;Get the count
     1317   45           3670          MOV     B,L             ;Put it in B
     1318   2A 7E42      3671          LHLD    IBUF_ADR_COPY   ;Get the address of the correct buffer
     131B   7E           3672          MOV     A,M             ;Get the first byte
     131C   E6 20        3673          ANI     20H             ;Save the CTL bit
     131E   32 7E97      3674          STA     CTLFLG          ;Set or clear this flag
     1321   7E           3675          MOV     A,M             ;Get the first byte again
     1322   E6 1F        3676          ANI     1FH             ;Save only the low 5 bits
     1324   4F           3677          MOV     C,A             ;Save the MSG TYPE field in C
     1325   3A 7E36      3678          LDA     NEEDI           ;Do we want only an INIT?
```

```
Error Addr  Code          Seq   Source statement

     1328   A7           3679          ANA     A               ;Check the flag
     1329   79           3680          MOV     A,C             ;Get the MSG TYPE back into A
     132A   CA 1336      3681          JZ      1$              ;Jump if NEEDI=0
     132D   FE 01        3682          CPI     1               ;See if it is indeed an Init Protocol msg
     132F   CA 1336      3683          JZ      1$              ;IF INIT PROTOCOL, THEN jump.
     1332   E1           3684          POP     H               ;Fix up the stack because we don't want to go
                         3685                                  ;back to MSG_DECODE after we complete the NACK
                         3686                                  ;preparations, but one level higher instead.
     1333   C3 1604      3687          JMP     NACK7           ;Error if not
     1336   FE 10        3688    1$:   CPI     16              ;Make sure the number is within range
     1338   D2 1674      3689          JNC     RESERVED        ;Jump if not
     133B   3F           3690          CMC                     ;Clear the carry
     133C   17           3691          RAL                     ;Multiply by two
     133D   5F           3692          MOV     E,A             ;Put the multiplied value in E
     133E   16 00        3693          MVI     D,0             ;Clear the high byte
     1340   21 1654      3694          LXI     H,RD_COMMAND    ;Point to the RD Command Table
     1343   19           3695          DAD     D               ;Add in the multiplied value
     1344   5E           3696          MOV     E,M             ;Get the first byte out of the table
     1345   23           3697          INX     H               ;Point to the next
     1346   56           3698          MOV     D,M             ;Get it
     1347   EB           3699          XCHG                    ;Put the address in HL
     1348   E9           3700          PCHL                    ;Go there
                         3701    ;
                         3702    ;       END OF RD_DECODE ROUTINE.
                         3703    ;
                         3704    ;*****************************************************************************
                         3705    ;*****************************************************************************
                         3706
                         3707
                         3708
                         3709
                         3710    ;*****************************************************************************
                         3711    ;
                         3712    ;       TRANS_RECEIVE
                         3713    ;
                         3714    ;       Transparent Mode Receive routine.  This is the routine that picks up
                         3715    ;       characters when the RD is in Trans Mode.  However, if the SOH Flag is
                         3716    ;       set, it is assumed that we are in the process of picking up a header
                         3717    ;       and are thus preparing to switch from Transparent Mode to Protocol Mode.
                         3718    ;
                         3719    ;       If the SOHFLG is not set, we must see if the character is an SOH (81H).
                         3720    ;       If it is, we set the SOHFLG and leave
                         3721    ;
                         3722    ;
                         3723    ;       REGISTERS:      A=      General use.
                         3724    ;                       HL=     Pointer to REMRDB and REMRSR
                         3725    ;
                         3726    ;       CALLED BY:      RD
                         3727    ;
                         3728    ;       FLAGS AND COUNTERS:
```

```
Error Addr  Code          Seq   Source statement

                          3729  ;
                          3730  ;               (CLEARED)       Carry-  Inhibits call to PROTO_RECEIVE after
                          3731  ;                                       successful completion of TRANS_RECEIVE
                          3732  ;
                          3733  ;               (SET)           SOHFLG- Set if SOH detected
                          3734  ;
                          3735  ;               (READ)          SOHFLG- Indicates SOH found and header reception
                          3736  ;                                       in progress.
                          3737  ;
                          3738  ;               (WRITTEN)       REMRSR- Receiver Done is set if -(SOH+SOHFLG).
                          3739  ;                                       Overrun is set if Receiver Done already
                          3740  ;                                       set.
                          3741  ;
                          3742  ;
    1349                  3743  TRANS_RECEIVE:
    1349  3A 7E20         3744          LDA     SOHFLG          ;Get the SOH found flag
    134C  1F              3745          RAR                     ;Is it set? (NOTE:  This sets the carry for the
                          3746                                  ;PROTO_RECEIVE check
    134D  D8              3747          RC                      ;Leave if set
    134E  3A 7E12         3748          LDA     RDTEMP          ;Get the character
    1351  FE 81           3749          CPI     81H             ;Check for SOH
    1353  CA 1368         3750          JZ      SOHFND          ;Jump if it is
    1356                  3751  TRANS_RE0:
    1356  21 7E01         3752          LXI     H,REMRDB        ;Point to the Remote DB
    1359  77              3753          MOV     M,A             ;Store the character
    135A  2B              3754          DCX     H               ;Back up the pointer
    135B  7E              3755          MOV     A,M             ;Get the SR
    135C  E6 02           3756          ANI     2               ;Check it
    135E  CA 1363         3757          JZ      1$              ;Jump if Done not already set
    1361  3E 10           3758          MVI     A,10H           ;Set the overrun bit
    1363  F6 02           3759  1$:     ORI     2               ;Set the REMOTE DONE flag
    1365  77              3760          MOV     M,A             ;Store the SR
    1366  AF              3761          XRA     A               ;Clear the carry to make keep us from going
                          3762                                  ;to PROTO_RECEIVE after we leave TRANS_RECEIVE
    1367  C9              3763          RET                     ;Leave
                          3764
                          3765
                          3766  ;*****************************************************************************
                          3767  ;*****************************************************************************
                          3768  ;
                          3769  ;       SOHFND
                          3770  ;
                          3771  ;       We come here from TRANS_RECEIVE if the received character is an SOH.
                          3772  ;       We clear out the Receive CRC word and set the SOHFLG to indicate that
                          3773  ;       an SOH was detected.  Also we set the carry so PROTO_RECEIVE will be
                          3774  ;       called after we leave this flow.
                          3775  ;
                          3776  ;
                          3777  ;       REGISTERS:      A=      General use
                          3778  ;                       HL=     Holds a word of zero.
```

```
Error Addr  Code           Seq   Source statement

                           3779  ;
                           3780  ;       ENTERED FROM:   TRANS_RECEIVE
                           3781  ;
                           3782  ;       FLAGS AND COUNTERS:
                           3783  ;
                           3784  ;               (CLEARED)       RCRC-
                           3785  ;                               RCRC+1- The Receive CRC is primed.
                           3786  ;
                           3787  ;               (SET)           SOHFLG- Indicates SOH has been detected.
                           3788  ;
                           3789  ;                               Carry-  Causes PROTO_RECEIVE to be entered
                           3790  ;                                       after we leave this flow.
                           3791  ;
                           3792  ;
                           3793  ;
    1368   21 0000         3794  SOHFND: LXI     H,0             ;Make a word of 0
    136B   22 7E30         3795          SHLD    RCRC            ;Zero out the Receive CRC
    136E   3E 01           3796          MVI     A,1             ;Make a 1
    1370   32 7E20         3797          STA     SOHFLG          ;Set this flag
    1373   37              3798          STC                     ;Set the carry
    1374   C9              3799          RET                     ;Leave
                           3800  ;
                           3801  ;*****************************************************************************
                           3802  ;*****************************************************************************
                           3803  ;
                           3804  ;*****************************************************************************
                           3805
                           3806
                           3807  ;Remember to only take characters out of the buffer if the REMRSR done bit is
                           3808  ;cleared.
                           3809
                           3810  ;NOTE:  If CRC Error * Trans Mode, set up ICNT, IADDR and SOHENQ.
                           3811
                           3812
                           3813
                           3814  ;*****************************************************************************
                           3815  ;
                           3816  ;       PROTO_RECEIVE
                           3817  ;
                           3818  ;
    1375                   3819  PROTO_RECEIVE:
    1375   21 7E98         3820          LXI     H,SOHENQ        ;Get the SOH or ENQ needed flag
    1378   7E              3821          MOV     A,M             ;Get it
    1379   A7              3822          ANA     A               ;Set or clear the Z bit
    137A   3A 7E12         3823          LDA     RDTEMP          ;Get the character
    137D   CA 138A         3824          JZ      2$              ;Jump if the SOHENQ flag is clear
    1380   FE 81           3825          CPI     81H             ;Is the character an SOH?
    1382   CA 1388         3826          JZ      1$              ;If it is, go clear the SOHENQ flag
    1385   FE 05           3827          CPI     5               ;Is it an ENQ?
    1387   C0              3828          RNZ                     ;Leave if not
```

```
Error Addr  Code          Seq   Source statement

     1388   36 00         3829  1$:     MVI     M,0             ;Zero out the SOH or ENQ needed flag
     138A   CD 13D4       3830  2$:     CALL    RCVCRC          ;Go CRC it
     138D   2A 7E18       3831          LHLD    IADDR           ;Get the Address for storing the character
     1390   77            3832          MOV     M,A             ;Store it
     1391   23            3833          INX     H               ;Bump the address
     1392   22 7E18       3834          SHLD    IADDR           ;Save the updated address
     1395   2A 7E16       3835          LHLD    ICNT            ;Get the Protocol Input Count
     1398   2B            3836          DCX     H               ;Subtract one
     1399   22 7E16       3837          SHLD    ICNT            ;Save the new count
     139C   7D            3838          MOV     A,L             ;Put the low byte in A
     139D   B4            3839          ORA     H               ;OR in the high byte
     139E   C0            3840          RNZ                     ;Leave if not zero
     139F   21 7E30       3841          LXI     H,RCRC          ;Point to the CRC
     13A2   7E            3842          MOV     A,M             ;Get the low byte
     13A3   23            3843          INX     H               ;Point to the high byte
     13A4   B6            3844          ORA     M               ;OR it in
     13A5   C2 15ED       3845          JNZ     NACK1           ;Jump if not 0
     13A8   3A 7E1A       3846          LDA     DPFLAG          ;See if we are doing a Data Portion
     13AB   A7            3847          ANA     A               ;Is the DP Flag set?
     13AC   C2 13B4       3848          JNZ     3$              ;Jump if in Data Portion
     13AF   3C            3849          INR     A               ;Make a 1
     13B0   32 7E1C       3850          STA     HEADER          ;Set the Header Found flag
     13B3   C9            3851          RET                     ;Leave
     13B4   32 7E1D       3852  3$:     STA     MESSAG          ;Set the Message Found flag
     13B7   3A 7E1E       3853          LDA     INFLAG          ;Get the Input Buffer in use flag.
     13BA   A7            3854          ANA     A               ;Is it 0 (Long Buffer) or 1 (Short Buffer)?
     13BB   C2 13C2       3855          JNZ     4$              ;IF SHORT BUFFER, THEN jump.
     13BE   3C            3856          INR     A               ;ELSE, make a 1.
     13BF   32 7E1B       3857          STA     INLOCK          ;Lock the input buffer
     13C2   3A 7E36       3858  4$:     LDA     NEEDI           ;See if this is a NEED INITPROTOCOL situation.
     13C5   A7            3859          ANA     A               ;Is the flag set?
     13C6   C0            3860          RNZ                     ;IF SET, THEN leave.
     13C7   3A 7E6C       3861          LDA     CMSGNM          ;ELSE, get the Message number from the header
     13CA   32 7E2A       3862          STA     LAST_GOOD_MSG   ;Set up the Last Good Message number
     13CD   C9            3863          RET                     ;and leave
                          3864  ;
                          3865  ;*****************************************************************************
                          3866
                          3867
                          3868
                          3869  ;*****************************************************************************
                          3870  ;
                          3871  ;       XMTCRC
                          3872  ;       RCVCRC
                          3873  ;       CRCSUB
                          3874  ;
                          3875  ;
                          3876  ;       This is where the CRC for both the Transmit and Receive sides is
                          3877  ;       generated.  The only difference is in the pointer in HL.
                          3878  ;
```

```
Error Addr  Code          Seq   Source statement

                          3879  ;       REGISTERS:      A=      General use
                          3880  ;                       B=      Another general use register
                          3881  ;                       C=      Loop count
                          3882  ;                       D=      Work register holding the high byte of CRC
                          3883  ;                       E=      Work register holding the low byte of CRC
                          3884  ;                       HL=     Point to the CRC word
                          3885  ;
                          3886  ;       ENTERED FROM:   SNDMSG  (XMTCRC)
                          3887  ;                       SNDMSA  (XMTCRC)
                          3888  ;                       SNDMS3  (XMTCRC)
                          3889  ;
                          3890  ;                       PRORC1  (RCVCRC)
                          3891  ;
                          3892  ;       STATE SAVED:    The character and the PSW are saved on the stack
                          3893  ;                       and restored before we leave.
                          3894  ;
                          3895  ;
                          3896  ;
                          3897  ;###############################################################################
                          3898  ;
                          3899  ;       EXPLANATION OF FLOW:  First we set up the correct pointer in HL.
                          3900  ;  Then, both XMTCRC and RCVCRC enter the CRCSUB flow.  Here the presently
                          3901  ;  accumulated CRC is transferred into DE, the character is put in B,
                          3902  ;  and a count of 8 is loaded into C.  Also the character is saved on the stack.
                          3903  ;  Now we do the next five steps eight times.
                          3904  ;
                          3905  ;       DO EIGHT(8) TIMES:
                          3906  ;
                          3907  ;               XOR section:
                          3908  ;
                          3909  ;               1.  R(B)00      <--     R(B)00 [XOR] CRC00
                          3910  ;               2.  CRC01       <--     R(B)00 [XOR] CRC01
                          3911  ;               3.  CRC14       <--     R(B)00 [XOR] CRC14
                          3912  ;
                          3913  ;               Note:  R(B)00 in steps 2 and 3 is the R(B)00 after step 1
                          3914  ;
                          3915  ;               SHIFT section:
                          3916  ;
                          3917  ;               4.  R(B)        <--     R(B) [right shifted once with the
                          3918  ;                                       LSB going into the Carry]
                          3919  ;               5.  CRC         <--     CRC [right shifted once with the
                          3920  ;                                       MSB coming from the carry and the
                          3921  ;                                       LSB going into the Bit Bucket.]
                          3922  ;
                          3923  ;  Each time through the loop we work on the next bit in the character because
                          3924  ;  the next significant bit gets shifted into R(B) bit 00 at step 4 above.
                          3925  ;
                          3926  ;###############################################################################
                          3927  ;
                          3928  ;
```

```
Error Addr  Code          Seq   Source statement

     13CE   21 7E32       3929  XMTCRC: LXI     H,XCRC          ;Point to this CRC
     13D1   C3 13D7       3930          JMP     CRCSUB          ;Go share the actual CRC routine
                          3931
     13D4   21 7E30       3932  RCVCRC: LXI     H,RCRC          ;Point to this CRC word
                          3933  ;
                          3934  ;       Now we fall through
                          3935  ;
     13D7   F5            3936  CRCSUB: PUSH    PSW             ;Save the character
     13D8   5E            3937          MOV     E,M             ;Get the low byte
     13D9   23            3938          INX     H               ;Point to the high byte
     13DA   56            3939          MOV     D,M             ;Get it
     13DB   47            3940          MOV     B,A             ;Put the character in B
     13DC   0E 08         3941          MVI     C,8             ;Set up a count of 8 in C
                          3942
                          3943
                          3944  ;*************************************************************************
                          3945  ;
                          3946  ;       XOR section
                          3947  ;
                          3948  ;          R(B)00--->[XOR] <-------------------------------------------
                          3949  ;                                                                     |
                          3950  ;                                                [CRC WORD]           |
                          3951  ;                                                                     |
                          3952  ;            R(B)        V                 R(D)          |      R(E)    |
                          3953  ;                                                      |              |
                          3954  ;|07|06|05|04|03|02|01|00|     |15|14|13|12|11|10|09|08|07|06|05|04|03|02|01|00|
                          3955  ; ----------------------      ----------------------|----------------------
                          3956  ;                       |           ^                                 ^
                          3957  ;                       |           |                                 |
                          3958  ;                       |--------->[XOR]<---CRC14                     |
                          3959  ;                       |                                             |
                          3960  ;                       |                                             |
                          3961  ;                       ---------------------------------------------->[XOR]
                          3962  ;                                                                       ^
                          3963  ;                                                                       |
                          3964  ;                                                                     CRC01
                          3965  ;
                          3966  ;
                          3967  ;
     13DE   7B            3968  1$:     MOV     A,E             ;Get the low order CRC byte
     13DF   E6 01         3969          ANI     1               ;Isolate the LSB
     13E1   A8            3970          XRA     B               ;XOR the the result with the character
     13E2   47            3971          MOV     B,A             ;Put the result back in B
                          3972
                          3973  ;  Now that we have XORed the LSB of the current CRC value with the current
                          3974  ;  bit of the character, we can XOR the result with bits 1 and 14 of the CRC.
                          3975
     13E3   E6 01         3976          ANI     1               ;Isolate the LSB
     13E5   07            3977          RLC                     ;Rotate the result into bit 1
     13E6   AB            3978          XRA     E               ;XOR it with the low byte of the CRC
```

```
Error Addr  Code          Seq   Source statement

     13E7   5F          3979           MOV     E,A             ;Put the byte back
     13E8   78          3980           MOV     A,B             ;Get the character back
     13E9   E6 01       3981           ANI     1               ;Isolate the LSB again
     13EB   0F          3982           RRC                     ;Rotate it into bit 6 since this is bit 14
     13EC   0F          3983           RRC                     ;of the CRC word.
     13ED   AA          3984           XRA     D               ;XOR it against the high CRC byte
     13EE   57          3985           MOV     D,A             ;Put back the new version
                        3986   ;
                        3987   ;*************************************************************************
                        3988
                        3989
                        3990
                        3991   ;*************************************************************************
                        3992   ;
                        3993   ;       SHIFT section:
                        3994   ;
                        3995   ; CARRY (which equals 0)
                        3996   ; |
                        3997   ; V         R(B)                            R(D)          |         R(E)
                        3998   ;
                        3999   ;|07|06|05|04|03|02|01|00| --> |15|14|13|12|11|10|09|08|07|06|05|04|03|02|01|00|
                        4000   ; ----------------------    ----------------------|----------------------
                        4001   ;                                                 |
                        4002   ;
                        4003   ;  At this point in the loop, R(B) bit 00 contains the result of XORing the LSB
                        4004   ;  of the current CRC with the current bit we are working on in the character
                        4005   ;  being CRC'd.  Note that the orignal state of that bit has been lost.  CRC
                        4006   ;  bit 14 (R(D) bit 06) contains the XOR of bit 14 of the CRC and bit 00 of
                        4007   ;  R(B).  CRC bit 01 (R(E) bit 01) contains the XOR of bit 01 of the CRC and
                        4008   ;  bit 00 of  R(B).
                        4009   ;
                        4010   ;  Our next step is to shift everything right once.  When this is done we will
                        4011   ;  have put a 0 in R(B) bit 07, R(B) bit 00 will contain the next character bit
                        4012   ;  that we want to work on, the result of XORing the last character bit we
                        4013   ;  worked on with the LSB of the previously accumulated CRC will be shifted
                        4014   ;  from R(B) bit 00 to [CRC bit 15], and the CRC will have been shifted right
                        4015   ;  once.
                        4016   ;
                        4017   ;
                        4018
                        4019
                        4020   ;  NOTE:  This shift puts R(B)00 in the carry and the next bit we want to
                        4021   ;  work on (in the byte we are CRCing) in R(B)00.
                        4022
     13EF   78          4023           MOV     A,B             ;Get the character
     13F0   1F          4024           RAR                     ;MSB of R(B) <-- (CY=0)
                        4025                                   ;(CY) <-- LSB of R(B)
     13F1   47          4026           MOV     B,A             ;Put the result back in B
                        4027
                        4028
```

```
Error Addr  Code           Seq   Source statement

                           4029  ;  NOTE:  These next two rotates are the shift part of the [XOR and shift]
                           4030  ;  algorithim that generates a CRC.
                           4031
     13F2   7A             4032          MOV     A,D             ;Get the high byte of the CRC
     13F3   1F             4033          RAR                     ;MSB of CRC(HB) <-- (CY=LSB of R(B)
                           4034                                  ;(CY) <-- LSB of CRC(HB)
     13F4   57             4035          MOV     D,A             ;Put the result back
                           4036
     13F5   7B             4037          MOV     A,E             ;Get the low byte of the CRC
     13F6   1F             4038          RAR                     ;MSB of CRC(LB) <-- (CY=LSB of CRC(HB))
                           4039                                  ;(CY) <-- LSB of CRC(LB), but we don't care
                           4040                                  ;about this bit.  This is the proverbial Bit
                           4041                                  ;Bucket!
     13F7   5F             4042          MOV     E,A             ;Put the result back
                           4043  ;
                           4044  ;*****************************************************************************
                           4045
     13F8   0D             4046          DCR     C               ;Decrement the loop count
     13F9   C2 13DE        4047          JNZ     1$              ;Loop back if not done
     13FC   72             4048          MOV     M,D             ;Store the high byte of the CRC
     13FD   2B             4049          DCX     H               ;Back the pointer in HL
     13FE   73             4050          MOV     M,E             ;Store the low byte of the CRC
     13FF   F1             4051          POP     PSW             ;Get the character back
     1400   C9             4052          RET                     ;NOTE:  AC must equal character for the return
                           4053  ;
                           4054  ;
                           4055  ;*****************************************************************************
                           4056
                           4057
                           4058
                           4059  ;*****************************************************************************
                           4060  ;
                           4061  ;       SNDMSG
                           4062  ;
     1401   DB 41         4063  SNDMSG: IN      TRSR            ;Get the Remote SR
     1403   1F            4064          RAR                     ;Look for Xmit Ready
     1404   D0            4065          RNC                     ;Leave if not set
     1405   3A 7E94       4066          LDA     HDCNT           ;Get the Header Count
     1408   A7            4067          ANA     A               ;Is it zero?
     1409   CA 1424       4068          JZ      1$              ;Jump if zero
     140C   2A 7E95       4069          LHLD    HDADR           ;Get the correct address
     140F   7E             4070          MOV     A,M             ;Get the byte to be sent
     1410   D3 40         4071          OUT     TRDB            ;Send it
     1412   23            4072          INX     H               ;Bump the pointer
     1413   22 7E95       4073          SHLD    HDADR           ;Save the address
     1416   CD 13CE       4074          CALL    XMTCRC          ;Go CRC it
     1419   21 7E94       4075          LXI     H,HDCNT         ;Point to this count
     141C   35            4076          DCR     M               ;Subtract 1
     141D   C0             4077          RNZ                     ;Leave if not done
     141E   3E 02          4078          MVI     A,2             ;Set up this count
```

```
Error Addr  Code          Seq   Source statement

     1420   32 7E34      4079          STA     CRCCN0          ;Here
     1423   C9           4080          RET                     ;Leave
     1424   21 7E34      4081   1$:    LXI     H,CRCCN0        ;Point to this count
     1427   7E           4082          MOV     A,M             ;Get it
     1428   FE 01        4083          CPI     1               ;Check for 0, 1, or 2
     142A   DA 1441      4084          JC      3$              ;Jump if 0
     142D   3A 7E32      4085          LDA     XCRC            ;Assume count=2
     1430   C2 1436      4086          JNZ     2$              ;Jump if 2
     1433   3A 7E33      4087          LDA     XCRC+1          ;Get the high byte instead
     1436   D3 40        4088   2$:    OUT     TRDB            ;Send it out
     1438   35           4089          DCR     M               ;Subtract one
     1439   C0           4090          RNZ                     ;Leave if not 0
     143A   21 0000      4091          LXI     H,0             ;Make a word of 0
     143D   22 7E32      4092          SHLD    XCRC            ;Zero out the Xmit CRC
     1440   C9           4093          RET                     ;Leave
     1441   21 7E76      4094   3$:    LXI     H,MSGFLG        ;See if the message type flag is on
     1444   7E           4095          MOV     A,M             ;Get it
     1445   A7           4096          ANA     A               ;Is it set?
     1446   CA 1458      4097          JZ      4$              ;Jump if clear
     1449   36 00        4098          MVI     M,0             ;Zero it
     144B   23           4099          INX     H               ;Point to the byte to be sent
     144C   7E           4100          MOV     A,M             ;Get it
     144D   D3 40        4101          OUT     TRDB            ;Send it
     144F   CD 13CE      4102          CALL    XMTCRC          ;Go CRC the character
     1452   3E 02        4103          MVI     A,2             ;Make a 2
     1454   32 7E35      4104          STA     CRCCN1          ;Set the the CRC count
     1457   C9           4105          RET                     ;Leave
     1458   21 7E63      4106   4$:    LXI     H,CTL_COUNT     ;Point to the CTL count.
     145B   7E           4107          MOV     A,M             ;Get the count.
     145C   A7           4108          ANA     A               ;Is it zero?
     145D   CA 146F      4109          JZ      5$              ;Jump if it is
     1460   35           4110          DCR     M               ;Reduce the count
     1461   2A 7E61      4111          LHLD    CTL_PTR         ;Get the address
     1464   7E           4112          MOV     A,M             ;Get the character
     1465   D3 40        4113          OUT     TRDB            ;Send it out
     1467   23           4114          INX     H               ;Bump the pointer
     1468   22 7E61      4115          SHLD    CTL_PTR         ;Save the new address
     146B   CD 13CE      4116          CALL    XMTCRC          ;Go CRC it
     146E   C9           4117          RET                     ;Leave
     146F   3A 7E27      4118   5$:    LDA     OUTCNT          ;Get the Output Buffer count
     1472   A7           4119          ANA     A               ;Is it zero?
     1473   CA 1488      4120          JZ      6$              ;Jump if it is
     1476   2A 7E28      4121          LHLD    OUTBUF          ;Get the address of what we are supposed to send
     1479   7E           4122          MOV     A,M             ;Get the character
     147A   D3 40        4123          OUT     TRDB            ;Send it out
     147C   23           4124          INX     H               ;Bump the pointer
     147D   22 7E28      4125          SHLD    OUTBUF          ;Save the new address
     1480   CD 13CE      4126          CALL    XMTCRC          ;Go CRC the character
     1483   21 7E27      4127          LXI     H,OUTCNT        ;Point to the count
     1486   35           4128          DCR     M               ;Subtract 1
```

```
Error Addr  Code          Seq   Source statement

     1487   C9            4129          RET                     ;Leave
     1488   21 7E35       4130   6$:    LXI     H,CRCCN1        ;Point to this count
     148B   7E            4131          MOV     A,M             ;Get it
     148C   FE 01         4132          CPI     1               ;Look for 0, 1 or 2
     148E   DA 149E       4133          JC      8$              ;Jump if 0
     1491   3A 7E32       4134          LDA     XCRC            ;Assume count is 2
     1494   C2 149A       4135          JNZ     7$              ;Jump if the count was 2
     1497   3A 7E33       4136          LDA     XCRC+1          ;Get the high byte
     149A   D3 40         4137   7$:    OUT     TRDB            ;Send the character out
     149C   35            4138          DCR     M               ;Reduce the count
     149D   C9            4139          RET                     ;Leave
     149E   3A 7E8F       4140   8$:    LDA     LBSIP           ;Get the Locked Buffer Send In Progress flag
     14A1   32 7E90       4141          STA     LBSENT          ;Use it to set or clear the Locked Buffer Sent
                          4142                                  ;flag.
     14A4   21 0000       4143          LXI     H,0             ;Make a word of 0
     14A7   22 7E32       4144          SHLD    XCRC            ;Zero out this CRC
     14AA   AF            4145          XRA     A               ;Make a 0
     14AB   32 7E07       4146          STA     MSG_TO_SEND     ;Clear this flag
     14AE   21 7E3A       4147          LXI     H,ENTER_TRANS   ;Point to the Enter Trans Mode flag
     14B1   BE            4148          CMP     M               ;See if it is 0 (A should contain 0 from the
                          4149                                  ;XRA A three lines up)
     14B2   C8            4150          RZ                      ;Leave if it is
     14B3   77            4151          MOV     M,A             ;Zero it now
     14B4   32 7E06       4152          STA     TRNFLG          ;and set Trans Mode
     14B7   C3 10F8       4153          JMP     TSQB            ;Go see if we should send an ^Q.
                          4154   ;
                          4155   ;*****************************************************************************
                          4156
                          4157
                          4158   ;*****************************************************************************
                          4159   ;
                          4160   ;
     14BA                 4161   MSG_TR_DECODE:
     14BA   21 7E2C       4162          LXI     H,RD_LD_FLAG    ;Point to the RD Load Flag.
     14BD   BE            4163          CMP     M               ;See if it is zero.
     14BE   C2 14DF       4164          JNZ     DO_LD_COMMAND   ;IF RD_LD_FLAG <> 0, THEN process the command
     14C1   3A 7E00       4165          LDA     REMRSR          ;ELSE, get the Remote Rcv SR
     14C4   A7            4166          ANA     A               ;Is there already a character in it?
     14C5   C0            4167          RNZ                     ;IF CHARACTER PRESENT, THEN leave.
     14C6   21 7E39       4168          LXI     H,ASC_MSG_COUNT ;ELSE, is there an ASCII message to process?
     14C9   BE            4169          CMP     M               ;Compare the zero in the AC with the count.
     14CA   C2 1570       4170          JNZ     GET_ASCII       ;IF ASC_MSG_CNT <> 0, THEN go process it.
     14CD   3A 7E46       4171          LDA     MSG15_COUNT     ;ELSE, how about Transparent Text?
     14D0   A7            4172          ANA     A               ;Check it.
     14D1   C2 0809       4173          JNZ     STT_VECTOR      ;IF MSG15_CNT <> 0, THEN go process it.
     14D4   3A 40D0       4174          LDA     SILO_ACTIVE     ;ELSE, see if the silo has been emptied out
     14D7   A7            4175          ANA     A               ;Has it?
     14D8   C0            4176          RNZ                     ;Leave if it hasn't
     14D9   32 7E1F       4177          STA     MSG_TO_READ     ;ZAP the Message To Be Read flag.
     14DC   C3 16B5       4178          JMP     UNLOCK_BUFFER   ;Go unlock the input buffer.
```

```
Error Addr  Code          Seq   Source statement

                          4179
                          4180
     14DF                 4181  DO_LD_COMMAND:
     14DF   21 7E4C       4182          LXI     H,RD_LD_CCOUNT  ;Point to the RD Load Packet Command Count.
     14E2   7E            4183          MOV     A,M             ;Get it
     14E3   A7            4184          ANA     A               ;Is it zero?
     14E4   CA 14F3       4185          JZ      1$              ;IF RD_LD_CCOUNT = 0, THEN jump.
     14E7   35            4186          DCR     M               ;Subtract one.
     14E8   2A 7E4A       4187          LHLD    RD_LD_CPTR      ;Get the Command Packet Pointer.
     14EB   46            4188          MOV     B,M             ;Get the current byte
     14EC   23            4189          INX     H               ;Bump the pointer.
     14ED   22 7E4A       4190          SHLD    RD_LD_CPTR      ;Save the new address.
     14F0   C3 1504       4191          JMP     2$              ;Go send it and leave.
     14F3   21 7E4F       4192  1$:     LXI     H,RD_LD_DCOUNT  ;Point to the RD Load Data Count.
     14F6   7E            4193          MOV     A,M             ;Get it.
     14F7   A7            4194          ANA     A               ;See if it is now zero.
     14F8   CA 152D       4195          JZ      FINISH_LD_CMND  ;IF RD_LD_DCOUNT = 0, THEN go get the reply
                          4196                                  ;packet from the CPU.
     14FB   35            4197          DCR     M               ;Reduce the count.
     14FC   2A 7E4D       4198          LHLD    RD_LD_DPTR      ;Get the address of the byte to be sent.
     14FF   46            4199          MOV     B,M             ;Get the byte.
     1500   23            4200          INX     H               ;Bump the pointer.
     1501   22 7E4D       4201          SHLD    RD_LD_DPTR      ;Save the new address.
     1504   21 7E53       4202  2$:     LXI     H,RD_LD_OE      ;Point at the Odd/Even byte flag.
     1507   7E            4203          MOV     A,M             ;Get it.
     1508   2F            4204          CMA                     ;Flip the accumulator.
     1509   E6 01         4205          ANI     1               ;Save only the LSB.
     150B   77            4206          MOV     M,A             ;Store the result.
     150C   78            4207          MOV     A,B             ;Get the byte to be sent.
     150D   D3 CC         4208          OUT     WRITE           ;Put it in the WRITE register right now.
     150F   0E 00         4209          MVI     C,0             ;Zap C without affecting the Condition Codes.
     1511   CA 1519       4210          JZ      3$              ;IF RD_LD_OE = 0, THEN jump to do odd byte.
     1514   D3 AA         4211          OUT     SETATN          ;ELSE, this is the even word so Set Console
                          4212                                  ;Attention.
     1516   C3 151B       4213          JMP     4$              ;Jump over the next part.
     1519   D3 AB         4214  3$:     OUT     CLRATN          ;Clear Console Attention.
     151B   DB 82         4215  4$:     IN      CPUACK          ;Look for CPU Ack
     151D   E6 01         4216          ANI     1               ;Save only the low bit.
     151F   BE            4217          CMP     M               ;If we are sending the even byte, the odd/even
                          4218                                  ;flag will be a one and we are looking for
                          4219                                  ;CPUACK to be high.  If it is the odd byte, the
                          4220                                  ;flag will be a zero and we looking for CPUACK
                          4221                                  ;to be low.
     1520   C8            4222          RZ                      ;IF EQUAL, THEN leave.
     1521   0D            4223          DCR     C               ;ELSE, decrement the count
     1522   C2 151B       4224          JNZ     4$              ;IF THE COUNT IS NOT 0, THEN loop.
     1525                 4225  SET_LD_ERROR:
     1525   3E 01         4226          MVI     A,1             ;ELSE, if we fall through we have a Timeout.
     1527   32 7E2D       4227          STA     RD_LD_ERR       ;Set this error flag.
     152A   C3 156B       4228          JMP     FINISH_L0       ;Go clean things up and leave.
```

```
Error Addr  Code          Seq   Source statement

                          4229
                          4230
     152D                 4231  FINISH_LD_CMND:
     152D   0E 00         4232          MVI     C,0             ;Start the timeout count in C at zero.
     152F   21 7E53       4233          LXI     H,RD_LD_OE      ;Point to the Odd/Even byte flag.
     1532   7E            4234          MOV     A,M             ;Get it.
     1533   2F            4235          CMA                     ;Flip it.
     1534   E6 01         4236          ANI     1               ;Save the LSB.
     1536   77            4237          MOV     M,A             ;Store the result.
     1537   DB 83         4238  1$:     IN      CPATTN          ;See if the uEngine is signaling us.
     1539   E6 01         4239          ANI     1               ;Save only the LSB.
     153B   BE            4240          CMP     M               ;Check it out
     153C   CA 1546       4241          JZ      2$              ;IF DONE, THEN leave the loop.
     153F   0D            4242          DCR     C               ;Reduce the timeout count.
     1540   C2 1537       4243          JNZ     1$              ;IF NOT TIMED OUT, THEN loop back.
     1543   C3 1525       4244          JMP     SET_LD_ERROR    ;ELSE, go set the error flag.
     1546   1F            4245  2$:     RAR                     ;Put the CPATTN bit in the carry.
     1547   DB 80         4246          IN      READ            ;Get the byte.
     1549   47            4247          MOV     B,A             ;Put it in B for now.
     154A   DA 1552       4248          JC      3$              ;IF CPATTN = 1, THEN jump over the Clear Ack.
     154D   D3 A9         4249          OUT     CLRACK          ;ELSE IF CPATTN = 0, clear Console Ack.
     154F   C3 1554       4250          JMP     4$              ;Jump over the Set Acknowledge instruction.
     1552   D3 A8         4251  3$:     OUT     SETACK          ;Since CPATTN is high, set Console Ack.
     1554   21 7E52       4252  4$:     LXI     H,RD_LD_ECOUNT  ;Point to the End Packet count.
     1557   7E            4253          MOV     A,M             ;Get it.
     1558   35            4254          DCR     M               ;Subtract one from the count.
     1559   CA 1564       4255          JZ      5$              ;IF ECOUNT = 0, THEN jump.
     155C   FE 0A         4256          CPI     10              ;Is this the first?
     155E   C0            4257          RNZ                     ;Leave if not
     155F   78            4258          MOV     A,B             ;Get the first byte the uEngine sent.
     1560   32 7E54       4259          STA     RD_LD_SUCCESS   ;Save it here for later
     1563   C9            4260          RET                     ;and leave.
     1564   3A 7E54       4261  5$:     LDA     RD_LD_SUCCESS   ;Get the Success code byte.
     1567   A7            4262          ANA     A               ;Was the transfer successful?
     1568   C2 1525       4263          JNZ     SET_LD_ERROR    ;IF NOT SUCCESSFUL, THEN jump to set error flag.
                          4264                                  ;ELSE, fall through.
     156B                 4265  FINISH_L0:
     156B   AF            4266          XRA     A               ;Make a 0.
     156C   32 7E2C       4267          STA     RD_LD_FLAG      ;Zap this flag.
     156F   C9            4268          RET                     ;Leave.
                          4269
                          4270
                          4271
     1570                 4272  GET_ASCII:
     1570   35            4273          DCR     M               ;ELSE, subtract 1 from the count
     1571   2A 7E37       4274          LHLD    ASC_MSG_PTR     ;Get the address into the Input Buffer
     1574   7E            4275          MOV     A,M             ;Get the character
     1575   23            4276          INX     H               ;Bump the pointer ahead
     1576   22 7E37       4277          SHLD    ASC_MSG_PTR     ;and save it
     1579   C3 1356       4278          JMP     TRANS_REO       ;Go share the code to write the data to REMRDB
```

```
Error Addr  Code          Seq   Source statement

                          4279  ;
                          4280  ;*****************************************************************************
                          4281
                          4282
                          4283
     157C   21 7E02       4284  TRNSND: LXI     H,REMXSR        ;Point to the Remote Pseudo Xmit SR
     157F   DB 41         4285          IN      TRSR            ;Get the Remote SR
     1581   1F            4286          RAR                     ;See if Xmit Ready set
     1582   D0            4287          RNC                     ;Leave with carry clear if not ready
     1583   23            4288          INX     H               ;Point to the Remote pseudo DB
     1584   7E            4289          MOV     A,M             ;Get the character
     1585   D3 40         4290          OUT     TRDB            ;Send it the the USART
     1587   2B            4291          DCX     H               ;Point to the pseudo SR
     1588   36 01         4292  TRNSN1: MVI     M,1             ;Set the ready bit
     158A   AF            4293          XRA     A               ;Clear the carry to fake out the next
                          4294                                  ;conditional call
     158B   C9            4295          RET                     ;Leave
                          4296
                          4297
                          4298  ;*****************************************************************************
                          4299  ;
     158C   2A 7E21       4300  PROSND: LHLD    ACTCNT          ;Get the count address
     158F   7E             4301          MOV     A,M             ;Get it
     1590   FE 50         4302          CPI     50H             ;Check for Max
     1592   CA 15C2       4303          JZ      FULBUF          ;IF FULL, THEN jump.
     1595   34            4304          INR     M               ;ELSE, increment the count
     1596   3A 7E8E       4305          LDA     OUTLOC          ;Get the Output Buffer Locked flag.
     1599   A7            4306          ANA     A               ;Is it set?
     159A   CA 15B2       4307          JZ      2$              ;IF NOT LOCKED, THEN jump.
     159D   3A 7E04       4308          LDA     TALK_FLAG       ;ELSE, check for Talk Mode.
     15A0   1F            4309          RAR                     ;Look only at the Talk bit, not Talk Echo.
     15A1   DA 15B2       4310          JC      2$              ;IF TALK, don't try to send ^S.
     15A4   7E            4311          MOV     A,M             ;ELSE, get the count again.
     15A5   FE 38         4312          CPI     38H             ;Are we exactly 24H from the end?
     15A7   CA 15AF       4313          JZ      1$              ;IF YES, THEN  go try to send ^S.
     15AA   FE 4D         4314          CPI     4DH             ;ELSE, are we 4 or less from the end?
     15AC   DA 15B2       4315          JC      2$              ;IF NOT, THEN jump.
     15AF   CD 111D       4316  1$:     CALL    TESTSET_S       ;ELSE, COUNT (=38H or >=4DH) so try to send ^S.
     15B2   21 7E02       4317  2$:     LXI     H,REMXSR        ;Point to the Pseudo SR
     15B5   36 01         4318          MVI     M,1             ;Set the Xmit Ready
     15B7   23            4319          INX     H               ;Point to the DB
     15B8   7E            4320          MOV     A,M             ;Get the character
     15B9   2A 7E23       4321          LHLD    ACTBUF          ;Get the address of the Output Buffer
     15BC   77            4322          MOV     M,A             ;Store it
     15BD   23            4323          INX     H               ;Bump the pointer
     15BE   22 7E23       4324          SHLD    ACTBUF          ;Save the new version
     15C1   C9            4325          RET                     ;
                          4326
                          4327  ;*****************************************************************************
                          4328  ;*****************************************************************************
```

```
Error Addr  Code          Seq   Source statement

                          4329  ;
     15C2   3A 7E8E       4330  FULBUF: LDA     OUTLOC          ;Get the Locked Buffer flag
     15C5   A7            4331          ANA     A               ;Is it set?
     15C6   C0            4332          RNZ                     ;Leave if it is.
     15C7   21 7E8E       4333  FULBU0: LXI     H,OUTLOC        ;Point to the Locked Buffer flag
     15CA   34            4334          INR     M               ;Set it
     15CB   21 7E91       4335          LXI     H,ACTFLG        ;Point to the Active Buffer flag
     15CE   7E            4336          MOV     A,M             ;Get it
     15CF   32 7E8D       4337          STA     LOBUF           ;Indicate which output buffer is Locked
     15D2   EE 01         4338          XRI     1               ;Flip the Active Buffer flag
     15D4   77            4339          MOV     M,A             ;Indicate which buffer is Active
     15D5   11 7F5E       4340          LXI     D,OCNT0         ;We set up DE and HL here on the assumption that
     15D8   21 7FAF       4341          LXI     H,OCNT1         ;it was a 1
     15DB   CA 15DF       4342          JZ      1$              ;Jump if it was a 1
     15DE   EB            4343          XCHG                    ;If it wasn't, eXCHanGe them
     15DF   22 7E25       4344  1$:     SHLD    LOCCNT          ;Set up the Locked Buffer count address
                          4345                                  ;(The start of the Locked Buffer is implicitly
                          4346                                  ;the next location after the Locked Count
                          4347                                  ;address, so we don't need to save its address)
     15E2   EB            4348          XCHG                    ;Put the correct pointer in HL
     15E3   36 00         4349          MVI     M,0             ;Zero the count
     15E5   22 7E21       4350          SHLD    ACTCNT          ;Store the address of the active count
     15E8   23            4351          INX     H               ;Bump the pointer
     15E9   22 7E23       4352          SHLD    ACTBUF          ;Store the address of the active buffer
     15EC   C9            4353          RET                     ;Leave
                          4354  ;
                          4355  ;*****************************************************************************
                          4356  ;*****************************************************************************
                          4357  ;
                          4358  ;
                          4359  ;
                          4360  ;*****************************************************************************
                          4361
                          4362
                          4363
                          4364
                          4365  ;*****************************************************************************
                          4366  ;
                          4367  ;       NACK
                          4368  ;
     15ED                 4369  NACK1:
     15ED   3A 7E1A       4370  NACK2:  LDA     DPFLAG          ;Nack Reason 1 = Header CRC Error
                          4371                                  ;Nack Reason 2 = Message CRC Error
                          4372                                  ;Since the DP Flag will be 0 if we were doing a
                          4373                                  ;Header and 1 if we were doing a Data Message,
                          4374                                  ;we can use the incremented value for the Nack
                          4375                                  ;Reason
     15F0   3C            4376          INR     A               ;Bump it
     15F1   4F            4377          MOV     C,A             ;Put it in C
     15F2   C3 1606       4378          JMP     SNDNAK          ;Go share the Send Nack code
```

```
Error Addr  Code          Seq   Source statement

                          4379
     15F5   0E 04         4380  NACK4:  MVI     C,4             ;Nack Reason 4 = Input Buffer Unavailable
     15F7   C3 1606       4381          JMP     SNDNAK          ;Go share the Send Nack code
                          4382
     15FA   0E 05         4383  NACK5:  MVI     C,5             ;Nack Reason 5 = Serial Line Error
     15FC   C3 1606       4384          JMP     SNDNAK          ;Go share the Send Nack code
                          4385
     15FF   0E 06         4386  NACK6:  MVI     C,6             ;Nack Reason 6 = Message Too Long
     1601   C3 1606       4387          JMP     SNDNAK          ;
                          4388
     1604   0E 07         4389  NACK7:  MVI     C,7             ;Nack Reason 7 = Header Format Error
     1606   06 02         4390  SNDNAK: MVI     B,2             ;Set up NACK code in B
     1608   C5            4391  SNDNA0: PUSH    B               ;Save BC
     1609   78            4392          MOV     A,B             ;Put the LAST_TYPE_SENT code in A
     160A   CD 081B       4393          CALL    BP_VECTOR       ;Go prep things
     160D   C1            4394          POP     B               ;Get BC back
     160E   21 7EA7       4395          LXI     H,ENQHED        ;Point to this header
     1611   22 7E95       4396          SHLD    HDADR           ;Set up this address
     1614   36 05         4397          MVI     M,5             ;Make the sure the first byte = ENQ
     1616   23            4398          INX     H               ;Point to the second byte
     1617   70            4399          MOV     M,B             ;Send out the  CTL TYPE
     1618   23            4400          INX     H               ;Point to the third byte
     1619   71            4401          MOV     M,C             ;Send out the CTL REASON
     161A   23            4402          INX     H               ;Point to the fourth byte
     161B   3A 7E2A       4403          LDA     LAST_GOOD_MSG   ;Get the Last Good Data Message #
     161E   77            4404          MOV     M,A             ;Set up the LAST MSG #
     161F   23            4405          INX     H               ;Point to the fifth byte
     1620   36 00         4406          MVI     M,0             ;Zero the CURR MSG #
     1622   23            4407          INX     H               ;Point to the sixth byte
     1623   36 01         4408          MVI     M,1             ;Make the ADDR a 1
     1625   AF            4409          XRA     A               ;Make a 0
     1626   32 7E30       4410          STA     RCRC            ;Clear the two Receive CRC bytes
     1629   32 7E31       4411          STA     RCRC+1          ;
     162C   32 7E20       4412          STA     SOHFLG          ;Zero this flag
     162F   32 7E1C       4413          STA     HEADER          ;Clear the Header flag
     1632   32 7E1A       4414          STA     DPFLAG          ;and the Data Portion flag
     1635   32 7E1D       4415          STA     MESSAG          ;And message flag
     1638   3C            4416          INR     A               ;Make a 1
     1639   32 7E98       4417          STA     SOHENQ          ;and set this one
     163C   21 0008       4418          LXI     H,8             ;Set up this count
     163F   22 7E16       4419          SHLD    ICNT            ;
     1642   21 7E68       4420          LXI     H,HBUFFR        ;Set up this address
     1645   22 7E18       4421          SHLD    IADDR           ;
     1648   79            4422          MOV     A,C             ;See if we are doing a NACK4
     1649   FE 04         4423          CPI     4               ;Is it?
     164B   C8            4424          RZ                      ;IF NACK4, THEN leave.
     164C   3A 7E1F       4425          LDA     MSG_TO_READ     ;Get the Message to Read flag.
     164F   A7            4426          ANA     A               ;Is it set?
     1650   C0            4427          RNZ                     ;IF FLAG=1, THEN leave.
     1651   C3 16B5       4428          JMP     UNLOCK_BUFFER   ;ELSE, unlock the Input Buffer.
```

```
Error Addr  Code           Seq   Source statement

                           4429  ;
                           4430  ;*********************************************************************************
                           4431
                           4432
                           4433  ;*********************************************************************************
                           4434  ;
                           4435  ;       This is the lookup table for decoding RD commands.
                           4436  ;
     1654                  4437  RD_COMMAND:
     1654    1674          4438          DW      RESERVED          ;MSG TYPE 0 = Reserved
     1656    167C          4439          DW      INIT_PROTOCOL     ;MSG TYPE 1 = Init Protocol
     1658    16B0          4440          DW      EXIT_PROTOCOL     ;MSG TYPE 2 = Exit Protocol
     165A    1674          4441          DW      RESERVED          ;MSG TYPE 3 = Reserved
     165C    1674          4442          DW      RESERVED          ;MSG TYPE 4 = Reserved
     165E    0800          4443          DW      RD_LD_VECTOR      ;MSG TYPE 5 = LD Command
     1660    1674          4444          DW      RESERVED          ;MSG TYPE 6 = Reserved
     1662    1674          4445          DW      RESERVED          ;MSG TYPE 7 = Reserved
     1664    1674          4446          DW      RESERVED          ;MSG TYPE 8 = Reserved
     1666    1674          4447          DW      RESERVED          ;MSG TYPE 9 = Reserved
     1668    1674          4448          DW      RESERVED          ;MSG TYPE 10 = Reserved
     166A    1674          4449          DW      RESERVED          ;MSG TYPE 11 = Reserved
     166C    16B5          4450          DW      NULL_MESSAGE      ;MSG TYPE 12 = Null Message
     166E    16BE          4451          DW      ASCII_MESSAGE     ;MSG TYPE 13 = ASCII Message
     1670    0803          4452          DW      DCD_VECTOR        ;MSG TYPE 14 = Diana Control Data Message
     1672    0806          4453          DW      TEXT_VECTOR       ;MSG TYPE 15 = Transparent Text Message
                           4454  ;
                           4455  ;*********************************************************************************
                           4456
                           4457  ;*********************************************************************************
                           4458  ;
                           4459  ;       RESERVED                  Message Types 0,3,4,6,7,8,9,10,11,16 and up
                           4460  ;
     1674                  4461  RESERVED:
     1674    3E 01         4462          MVI     A,1               ;Make a 1
     1676    32 7E3B       4463          STA     RDSPER            ;Set the RD Service Protocol Error flag
     1679    C3 16B5       4464          JMP     UNLOCK_BUFFER     ;Go unlock the Input Buffer if necessary.
                           4465  ;
                           4466  ;*********************************************************************************
                           4467
                           4468
                           4469  ;*********************************************************************************
                           4470  ;
                           4471  ;       INIT_PROTOCOL             Message Type 1
                           4472  ;
     167C                  4473  INIT_PROTOCOL:
     167C    CD 1682       4474          CALL    IP_SUB            ;Go Zap some things
     167F    C3 10F8       4475          JMP     TSQB              ;Go see about sending ^Q.
     1682    AF            4476  IP_SUB: XRA     A                 ;Make a 0
     1683    32 7E36       4477          STA     NEEDI             ;Clear the Need Init Protocol Message flag
     1686    32 7E2A       4478          STA     LAST_GOOD_MSG     ;Clear the Last Good Data Message received
```

```
Error Addr  Code          Seq   Source statement

     1689   32 7E1F      4479          STA     MSG_TO_READ     ;and Message To Be Read flags
     168C   32 7E91      4480          STA     ACTFLG          ;Make buffer 0 the Active one
     168F   32 7E8F      4481          STA     LBSIP           ;Clear the Locked Buffer Send In Progress flag
     1692   32 7E90      4482          STA     LBSENT          ;and the Locked Buffer Sent flag
     1695   32 7E8E      4483          STA     OUTLOC          ;and the Locked Buffer flag
     1698   32 7E1B      4484          STA     INLOCK          ;Unlock the Input buffer
     169B   32 7E46      4485          STA     MSG15_COUNT     ;Zap this count
     169E   32 7E49      4486          STA     CLMSG_COUNT     ;and this one as well.
     16A1   32 7E2D      4487          STA     RD_LD_ERR       ;Clear this error flag.
     16A4   21 7F5E      4488          LXI     H,OCNT0         ;Point to the Output Buffer 0 Count
     16A7   77           4489          MOV     M,A             ;Zero the count
     16A8   22 7E21      4490          SHLD    ACTCNT          ;Set up this pointer
     16AB   23           4491          INX     H               ;Point to the beginning of the Buffer
     16AC   22 7E23      4492          SHLD    ACTBUF          ;and store the address here
     16AF   C9           4493          RET                     ;
                         4494  ;
                         4495  ;*****************************************************************************
                         4496
                         4497
                         4498  ;*****************************************************************************
                         4499  ;
                         4500  ;       EXIT_PROTOCOL           Message Type 2
                         4501  ;
     16B0                4502  EXIT_PROTOCOL:
     16B0   3E 01        4503          MVI     A,1             ;Make a 1
     16B2   32 7E3A      4504          STA     ENTER_TRANS     ;Set the Enter Trans Mode flag
                         4505                                  ;and fall through to see about unlocking the
                         4506                                  ;Input Buffer.
                         4507  ;
                         4508  ;
                         4509  ;
                         4510  ;
                         4511  ;       UNLOCK_BUFFER
                         4512  ;       NULL_MESSAGE            Message Type 12
                         4513  ;
     16B5                4514  UNLOCK_BUFFER:
     16B5                4515  NULL_MESSAGE:
     16B5   3A 7E1F      4516          LDA     MSG_TO_READ     ;Do we still have a message being read?
     16B8   A7           4517          ANA     A               ;Check the flag.
     16B9   C0           4518          RNZ                     ;IF MSG_TO_READ = 1, then leave.
     16BA   32 7E1B      4519          STA     INLOCK          ;ELSE, unlock the input buffer
     16BD   C9           4520          RET                     ;Leave
                         4521  ;
                         4522  ;*****************************************************************************
                         4523
                         4524
                         4525  ;*****************************************************************************
                         4526  ;
                         4527  ;       ASCII_MESSAGE           Message Type 13
                         4528  ;
```

```
Error Addr  Code          Seq   Source statement

      16BE                4529  ASCII_MESSAGE:
      16BE   3A 7E40      4530          LDA     IBUF_CNT_COPY   ;Get this count
      16C1   3D           4531          DCR     A               ;Subtract 1
      16C2   CA 16B5      4532          JZ      UNLOCK_BUFFER   ;Go clean up because we are done
      16C5   32 7E39      4533          STA     ASC_MSG_COUNT   ;Store the count here
      16C8   2A 7E42      4534          LHLD    IBUF_ADR_COPY   ;Get the address of the buffer
      16CB   23           4535          INX     H               ;Bump it ahead 1
      16CC   22 7E37      4536          SHLD    ASC_MSG_PTR     ;and save it here
      16CF                4537  ASCII_ME0:
      16CF   3E 01        4538          MVI     A,1             ;Make a 1
      16D1   32 7E1F      4539          STA     MSG_TO_READ     ;Set the Message To Read flag
      16D4   C9           4540          RET                     ;Leave
                          4541  ;
                          4542  ;*****************************************************************************
                          4543
                          4544
      16D5                4545  CONLOST_MSG:
      16D5   1E 0D 0A     4546          DB      30,CR,LF
      16D8   3F 34 30     4547          DB      '?40  (RD)  CONNECTION LOST'
      16DB   20 20 28
      16DE   52 44 29
      16E1   20 20 43
      16E4   4F 4E 4E
      16E7   45 43 54
      16EA   49 4F 4E
      16ED   20 4C 4F
      16F0   53 54
      16F2   0D 0A        4548          DB      CR,LF
                          4549
                          4550
             =17FE        4551          ORG     17FEH           ;
                          4552
      17FE                4553  MSG17_MESSAGE:
      17FE   01           4554          DB      1               ;Value of Message Type 17 Message.
                          4555
                          4556
                          4557
             =17FF        4558          ORG     17FFH           ;
                          4559
      17FF   00           4560  HISUM:  DB      0               ;
                          4561
                          4562
                          4563
                          4564  ;*****************************************************************************
                          4565  ;
                          4566  ;       REVISION HISTORY
                          4567  ;
**                        ;       12.0    07-NOV-1986     Molly Bacon and Jim Sadin
**                        ;               Fixed problem with unstable AC/DC LO with loaded UB.
**                        ;       NOTE:  Due to the unavailability of the original tools used to produce
**                        ;              this file, this fix was hand edited into the hex code of the
**                        ;              blasted roms.  Therefore, parts of this file were also hand edited and not
**                        ;              produced with an assembler.  These lines are marked with ** in the first
**                        ;              two columns.  This file does represent exactly what is in the boot roms
**                        ;              with part numbers as follows:   154F2 155F2 097F2 098F2 081F2 082F2
```

```
**                  ;
                4568  ;       11.10   30-SEPT-1982    vijay lathia(suggested by john middleton)
                4569  ;
                4570  ;       Following changes were made for future use when battrey back up
```

```
Error Addr  Code          Seq   Source statement

                          4571  ;       unit will be installed. If changes were not made then interval
                          4572  ;       timer will be initialized which should not be the case if BBU is
                          4573  ;       present
                          4574  ;
                          4575  ;       #9
                          4576  ;
                          4577  ;       INIT:(+11)
                          4578  ;
                          4579  ;
                          4580  ;
                          4581  ;       11.09   09-SEPT-1982    Vijay Lathia(Suggested by Dave Maruska)
                          4582  ;
                          4583  ;       Following changes were made to take care of usart mode changing problem
                          4584  ;
                          4585  ;       #8
                          4586  ;
                          4587  ;       FIFTH_CHAR:(+2) &  UBTST:(-3)
                          4588  ;
                          4589  ;       XRA     A
                          4590  ;       OUT     TTCR
                          4591  ;       OUT     TUCR
                          4592  ;       OUT     TRCR
                          4593  ;
                          4594  ;
                          4595  ;       09.01   29-JULY-1982    John Middleton
                          4596  ;
                          4597  ;       Almost all of the changes between version 03.00 and version 09.01 have
                          4598  ;       been RD related additions or fixes, mostly in the Protocol Mode area.
                          4599  ;       One exception is that many of the variable, constant, and routine names
                          4600  ;       have been changed to take advantage of the new assembler.
                          4601  ;
                          4602
                          4603  ;       03.00   12-MAY-1982     John Middleton
                          4604  ;
                          4605  ;       #1
                          4606  ;
                          4607  ;       MODEM:
                          4608  ;
                          4609
                          4610
                          4611  ;       02.00   04-MAY-1982     John Middleton
                          4612  ;
                          4613  ;       #1
                          4614  ;
                          4615  ;       SOHDEC:
                          4616  ;
                          4617  ;       Here I made changes to prioritize the Nack 4 and Nack 6 error detection
                          4618  ;       tests.  Also I substituted locals for explicit names.
                          4619  ;
                          4620
```

```
Error Addr  Code          Seq   Source statement

                          4621
                          4622  ;       01.00   03-MAY-1982     John Middleton
                          4623  ;
                          4624  ;       #1
                          4625  ;
                          4626  ;       Changed the Self Test printout from CONSOLE to CONVnnn, where nnn is the
                          4627  ;       version number of the ROM.
                          4628  ;
                          4629
                          4630
                          4631  ;       00.00   APRIL-1982      John Middleton
                          4632  ;
                          4633  ;       #1
                          4634  ;
                          4635  ;       Started version numbers back at 00.00
                          4636  ;
                          4637
                          4638
                          4639  ;       92.02   04-MAR-1982     John Middleton (Bug found by Vijay Lathia)
                          4640  ;
                          4641  ;       #1
                          4642  ;
                          4643  ;       UA7:(+6)
                          4644  ;
                          4645  ;       Change JNZ to JNC because the preceeding instruction was changed from
                          4646  ;       RAL to RLC.
                          4647
                          4648
                          4649  ;       85.01   30-NOV-1981     John Middleton
                          4650  ;
                          4651  ;       #1
                          4652  ;
                          4653  ;       SNDMS6:(-1)
                          4654  ;
                          4655  ;       Don't want to fall through after decrementing the count.
                          4656  ;       It would be faster than waiting for the next pass to find out
                          4657  ;       the count = 0, but the Accumulator would have to be cleared
                          4658  ;       for the ENTER_TRANS flag test to work.
                          4659
                          4660  ;       85.00   20-NOV-1981     John Middleton
                          4661  ;
                          4662  ;       #1
                          4663  ;
                          4664  ;       SNDMSA:(-3)
                          4665  ;
                          4666  ;       Forgot to CRC the Message Type byte.  Added call to XMTCRC
                          4667  ;       routine.
                          4668  ;
                          4669  ;
                          4670  ;       #2
```

```
Error Addr  Code           Seq    Source statement

                          4671    ;
                          4672    ;       MDECO2:(+5,+6)
                          4673    ;
                          4674    ;       Must clear SNDBLK+6 before putting the Control C Flag (CTLFLG)
                          4675    ;       in and later ORing in the Message Type 13 byte.
                          4676    ;
                          4677
                          4678
                          4679    ;       nn.nn           who knows       John Middleton
                          4680    ;
                          4681    ;       Fixed Power Fail Bus Busy problem.
                          4682    ;
                          4683    ;*******************************************************************************
                          4684
                          4685
                          4686            END

    No errors detected
```

* * Symbol Table * *

A	Reserved	ACLCHK	04CE	ACLO	4120	ACTBUF	7E23	ACTCNT	7E21		
ACTFLG	7E91	APTFLG	0004	APTLOD	40D6	ASCII_*	16CF	ASCII_*	16BE		
ASC_MS*	7E39	ASC_MS*	7E37	B	Reserved	BEGIN	0000	BLDBLK	7E9A		
BOOTEN	0007	BOOTF	0001	BOOTPK	06B8	BP_VEC*	081B	BREAK	000D		
BRKMSG	06CC	BRKSUB	03E0	BUFADR	40CA	BUILD	0E2E	BUILD_*	0E67		
BUILD_*	0818	BYTSUM	4082	C	Reserved	CAR_RE*	000D	CHAR_S*	4B80		
CHKSUM*	00DE	CHRBUF	7001	CHRCNT	7000	CLEAR_*	03C3	CLMSG_*	7E49		
CLMSG_*	7E47	CLRACK	00A9	CLRACL	0033	CLRATN	00AB	CLRBLK	003A		
CLRBSY	002E	CLRCLK	0020	CLRCSK	0024	CLRCSR	0038	CLRDCL	0031		
CLRHLT	00AF	CLRLIT	003C	CLRMCI	0029	CLRMCK	002B	CLRPFI	00AD		
CLRRD	003E	CLRSS	0022	CLRTIM	00A5	CLRTMR	002C	CLRUPC	00A8		
CLRUPK	0026	CLRWCK	0036	CMSGNM	7E6C	CNTADR	40C8	CNTLC	054C		
CNTLC0	0554	CNTLP	05AC	CNTLP0	05AF	CNTRLC	0003	CNTRLO	000F		
CNTRLP	0010	CNTRLQ	0011	CNTRLS	0013	CODE_F*	408B	COLD	408A		
CONERR	124D	CONLOS*	16D5	CONTLC	06C6	CONTLP	06C9	COPY	00F9		
COPY1	00FB	CPATTN	0083	CPFLAG	40F3	CPUACK	0082	CR	000D		
CRCCN0	7E34	CRCCN1	7E35	CRCSUB	13D7	CSR07	0085	CSR15	0086		
CSR23	0087	CTLFLG	7E97	CTLPRP	03C7	CTLREA	7E6A	CTLTYP	7E69		
CTL_BI*	0D4D	CTL_BU*	7E64	CTL_CH*	40FE	CTL_CO*	7E63	CTL_C_*	7E70		
CTL_PT*	7E61	CVECTR	4C28	C_LETT*	0043	D	Reserved	DCD_CS*	0C31		
DCD_CS*	0C4B	DCD_CS*	0C4C	DCD_FI*	0C5B	DCD_ME*	0C06	DCD_ME*	0BE1		
DCD_SH*	0CD9	DCD_SS*	0C94	DCD_ST*	0CB1	DCD_VE*	0803	DCLO	0002		
DELAY	1E62	DELETE*	40CE	DEVERR	06CE	DIRFLG	409C	DISCAR*	7E05		
DISCNT	40DA	DISMEM	00A7	DISPAR	00A1	DO_LD_*	14DF	DPFLAG	7E1A		
DPRINT	06A5	DROP_C*	117A	DROP_C*	115E	DRVMSG	0700	DUMMY1	0052		
E	Reserved	ENBMEM	00A6	ENBPAR	00A0	ENDPAK	40AA	ENQDEC	1266		
ENQHED	7EA7	ENTER_*	7E3A	EPRIN1	0A1D	EPRIN2	0A27	EPRIN3	0A36		
EPRINT	0A1B	EXIT_P*	16B0	FA_VEC*	1004	FB0_VE*	100D	FIFTH_*	08A1		
FINISH*	156B	FINISH*	152D	FINISH*	03B1	FIRST_*	0850	FIXUP	0691		
FIX_AD*	101F	FLASH	112B	FLIP_O*	051D	FORCE	059A	FOURTH*	089C		
FULBUO	15C7	FULBUF	15C2	FU_VEC*	004F	GET_AP*	049F	GET_AS*	1570		
GET_CH*	0427	GET_LO*	034B	GET_LO*	0346	GET_SI*	03F1	GOSV	4103		
GS_VEC*	0046	H	Reserved	HBUFFR	7E68	HCOUNT	7E69	HCRC	7E6E		
HDADR	7E95	HDCNT	7E94	HDECOD	125A	HEADER	7E1C	HIGH_N*	0030		
HISUM	17FF	HLBUFF	4088	HLTFLG	0002	HR_VEC*	1019	HR_VEC*	101C		
IADDR	7E18	IBUF0	7EDB	IBUF1	7E60	IBUF_A*	7E42	IBUF_C*	7E40		
ICNT	7E16	INDFLG	409D	INFIX	1298	INFIX0	129E	INFLAG	7E1E		
INIT	0112	INIT0	0179	INIT1	0160	INIT2	017C	INIT3	0181		
INIT4	01A5	INIT5	0190	INITH	0035	INITL	0034	INITPK	06B6		
INITX	0146	INIT_D*	0055	INIT_P*	167C	INIT_V*	0024	INIVEC	0040		
INLOCK	7E1B	IP_SUB	1682	ITCSR	001D	ITDB	001C	L	Reserved		
LAST_G*	7E2A	LAST_T*	7E2B	LBSENT	7E90	LBSIP	7E8F	LF	000A		
LINE_F*	000A	LMSGNM	7E6B	LOBUF	7E8D	LOCAL_*	7E71	LOCAL_*	08B6		
LOCCNT	7E25	LODADR	40A3	LODCNT	40A7	LODFLG	409B	LOGCNT	7E0F		
LOGCON	7E0E	LOWSUM	07FF	LOW_NU*	0031	LR_MAS*	40BE	LR_MAS*	40BF		
LR_MAS*	40BD	M	Reserved	MARCH	09A4	MARCH0	09AC	MARCH1	09B5		
MARCH2	09BE	MARCH3	09C0	MARCH4	09D1	MARCH5	09EA	MARCH6	09F0		
MARCH7	09FA	MARCH8	0A0B	MARCHX	09A8	MASK_G*	022E	MD_VEC*	0812		
MESSAG	7E1D	MIDDLE*	0031	MIDSUM	0FFF	MIPFLG	40D9	MISC2	0001		
MOD0	1024	MOD0_V*	1007	MOD1	104A	MOD1A	1052	MOD4	10B9		

* * Symbol Table * *

MOD5	10C2	MODEM0	0694	MODEM1	105A	MODEM2	1076	MODEM3	1083		
MODEM4	10BC	MODEM5	10D1	MODEM6	119B	MODEM7	11A5	MODEM8	11B6		
MODEM9	11C9	MODEM_*	4099	MODEM_*	0215	MODEM_*	068D	MODM3A	10A3		
MODVEC	0013	MRVE10	0824	MRVE11	0827	MRVEC8	081E	MRVEC9	0821		
MSG15_*	7E46	MSG15_*	7E44	MSG17_*	17FE	MSGADR	40B7	MSGBUF	40F0		
MSGFLG	7E76	MSGTYP	7E77	MSG_DE*	0D88	MSG_TO*	7E1F	MSG_TO*	7E07		
MSG_TR*	14BA	MYPC	40B9	NACK1	15ED	NACK2	15ED	NACK4	15F5		
NACK5	15FA	NACK6	15FF	NACK7	1604	NACK_X*	0704	NACK_X*	070E		
NEEDI	7E36	NOBOOT	06F2	NOCHK	40FF	NOTYPE	40D4	NOT_X_*	0338		
NULL_M*	16B5	N_LETT*	004E	OBUF0	7F5F	OBUF1	7FB0	OCNT0	7F5E		
OCNT1	7FAF	OK15V	0007	OK5V	0005	OUTBUF	7E28	OUTCNT	7E27		
OUTLOC	7E8E	OVECTR	414E	OVERRI*	7E67	O_FLAG	40BB	O_FLAG*	40BC		
O_LETT*	004F	PAKCNT	40A8	PARALL*	7E72	PARERR	411D	PFFLAG	40B5		
POWER_*	04EA	POWER_*	04DF	PRIADR	40C1	PRICNT	40C3	PRINT_*	0898		
PROSND	158C	PROTO_*	1375	PSW	Reserved	PUBFLG	40B6	PVECTR	4C2B		
PWRVE1	004C	PWRVEC	001B	QPEND	40D8	RAM_LO*	0A6A	RAM_VA*	4080		
RCRC	7E30	RCVCRC	13D4	RCVDON	0002	RDACK	1286	RDACK1	1289		
RDCON	7E10	RDCON1	7E11	RDD_VE*	100A	RDNACK	12B8	RDREP	1271		
RDSPER	7E3B	RDTEMP	7E12	RD_COM*	1654	RD_DEC*	1314	RD_FLO*	11EA		
RD_LD_*	7E55	RD_LD_*	7E4C	RD_LD_*	0B70	RD_LD_*	7E4A	RD_LD_*	0D7E		
RD_LD_*	7E4F	RD_LD_*	7E4D	RD_LD_*	7E52	RD_LD_*	7E50	RD_LD_*	7E2D		
RD_LD_*	7E2C	RD_LD_*	7E53	RD_LD_*	7E54	RD_LD_*	0800	RD_LOA*	0BD9		
RD_PAT*	1000	READ	0080	READJ2	0004	READ_S*	040F	REDERR	06E1		
REMDSR	10E0	REMOTE	0006	REMRDB	7E01	REMRSR	7E00	REMXDB	7E03		
REMXSR	7E02	RESERV*	1674	RETRY	408C	RETRYI	40CC	RIPPL1	0993		
RIPPLE	0988	RIPPLX	098C	RL_VEC*	080C	ROM_CH*	085B	ROM_ER*	033D		
ROM_ER*	0340	ROM_ID*	028F	ROM_ID*	0274	RPRMPT	0708	RST55	002C		
RST65	0034	RST75	003C	RSTN1	0008	RSTN2	0010	RSTN3	0018		
RSTN4	0020	RSTN5	0028	RSTN6	0030	RSTN7	0038	RSVEC	0049		
RUN_FL*	40D3	SAVESP	0104	SAVE_C*	40C0	SAVSP1	0108	SCVEC0	0043		
SECOND*	0855	SECURE	0003	SECURE*	40F4	SELF_T*	082A	SEND_C*	05DA		
SEND_C*	05D4	SEND_C*	0B48	SEND_I*	40F2	SEND_L*	05B7	SEND_L*	05B9		
SEND_T*	0B25	SETACK	00A8	SETACL	0032	SETATN	00AA	SETBLK	003B		
SETBSY	002F	SETCLK	0021	SETCSK	0025	SETCSR	0039	SETDCL	0030		
SETHLT	00AE	SETLIT	003D	SETMCI	0028	SETMCK	002A	SETPFI	00AC		
SETRD	003F	SETSS	0023	SETTIM	00A4	SETTMR	002D	SETUPC	00A9		
SETUPK	0027	SETWCK	0037	SET_LD*	1525	SET_S_*	03BB	SET_S_*	03B9		
SILO_A*	40D0	SILO_I*	40D1	SILO_O*	40D2	SIMMSK	000B	SLWCLK	0006		
SNDADR	40A0	SNDCNT	40A2	SNDMSG	1401	SNDNA0	1608	SNDNAK	1606		
SNDPAK	408D	SOHENQ	7E98	SOHFLG	7E20	SOHFND	1368	SOHHED	7EA1		
SOH_DE*	12BF	SOURCE*	4BC0	SP	Reserved	SPBUFF	4086	SPECIA*	0B57		
SPEND	40D7	STACK	4080	START	4100	STATIO*	7E6D	STT_VE*	0809		
ST_DON*	0A5D	ST_VEC*	0815	SUCCES	4116	SUMREG	0020	SWITCH*	4081		
SYNTAX	0704	S_FLAG	40CD	TALK	0CFB	TALKDB	7E14	TALKSR	7E13		
TALK_C*	7E73	TALK_F*	0D28	TALK_F*	0D29	TALK_F*	7E04	TALK_N*	0D2D		
TALK_S*	0D0F	TALK_V*	080F	TEMP	40B4	TESTSE*	1113	TESTSE*	111D		
TEST_D*	10EE	TEXT_M*	0CE2	TEXT_V*	0806	THIRD_*	085A	TICK	1140		
TICK1	1148	TIKTOK	7E0D	TIMER1	7E0A	TIMER2	7E0C	TIMSAV	7E08		
TMRVEC	4C2F	TOCHK	01F9	TOCNT	4083	TOCNT1	4084	TOPREP	020B		
TRANS_*	1356	TRANS_*	1349	TRCR	0043	TRDB	0040	TRMODE	0042		

* * Symbol Table * *

TRNFLG	7E06	TRNSN1	1588	TRNSND	157C	TRSR	0041	TRYTST	01B8
TSQA	1105	TSQA_V*	1016	TSQB	10F8	TSQ_VE*	1013	TSS_VE*	1010
TTCR	004B	TTCR_C*	0035	TTDB	0048	TTMODE	004A	TTSR	0049
TUCR	0047	TUDB	0044	TUERR	0086	TUERR2	0079	TUERR3	0081
TUINIT	0004	TUMODE	0046	TUSR	0045	TU_RCV*	01DB	TU_RCV*	01D6
TU_RCV*	0AF2	TU_SEN*	00D1	TU_SEN*	0095	TU_XMI*	01C8	UA105	0984
UB1	0936	UB1A	094B	UB2	0950	UB2A	0965	UB3	096A
UB3A	097F	UBTST	092E	UBX	0932	UB_VEC*	1001	UNIT	4091
UNLOCK*	16B5	UPC14	0084	UPC14A	0000	USART1*	08B9	USART2*	08D9
USART3*	08F9	VALIDI*	0713	VECTOR	06C4	VNORML	00A3	VSHIFT	00A2
V_LETT*	0056	WAIT	0512	WCSREG	0008	WCS_LO*	40D5	WORD_S*	409E
WRITE	00CC	XADRES	40C4	XCOUNT	40C6	XCRC	7E32	XMTCRC	13CE
XVEC	000B	X_CMND*	02E9	YBUSRD	00EC				

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
A       Reserved  586$  590$  623$  625$  628$  635$  650$  662   663   664$  690   710   734
                  735   737$  742$  745$  753$  755   757$  762$  765   786$  788$  794   801
                  864   867$  869$  871$  897$  914   915   917   919   932$  936   949$  955$
                  957   960   966$  971   974   976$  994   1003  1019$ 1021  1023$ 1024  1025$
                  1038$ 1045$ 1048$ 1053  1058  1065$ 1070$ 1076$ 1082  1103  1128$ 1131$ 1132
                  1139$ 1161  1164  1167  1169$ 1170$ 1173$ 1176$ 1179  1190$ 1194  1198  1206
                  1215$ 1220$ 1233$ 1234$ 1240  1242$ 1245  1255  1258  1261  1296  1300  1301$
                  1303  1306$ 1316$ 1320$ 1326$ 1330  1347  1351  1352$ 1355  1358$ 1360  1370$
                  1373  1386$ 1400$ 1416$ 1430  1433  1436  1439$ 1443  1445$ 1447$ 1451  1459$
                  1475$ 1483$ 1487  1488  1490  1503  1509$ 1519$ 1529$ 1534  1537$ 1556$ 1578$
                  1588$ 1590  1591$ 1599$ 1603$ 1613$ 1619  1620$ 1626  1629  1633$ 1636$ 1639
                  1680$ 1826$ 1830$ 1879$ 1881  1883$ 1886$ 1887  1896$ 1898  1900$ 1903$ 1904
                  1915$ 1918$ 1920  1922$ 1925$ 1926  1949  1953$ 1983$ 1985  1997$ 2006$ 2023$
                  2032$ 2049$ 2058$ 2069$ 2071  2075  2085$ 2115$ 2117$ 2119$ 2125$ 2131$ 2133$
                  2135$ 2141$ 2147$ 2149$ 2151$ 2157$ 2164$ 2186$ 2189$ 2197  2218  2219  2221$
                  2227$ 2238$ 2241$ 2250$ 2253$ 2258$ 2268$ 2277$ 2285$ 2288$ 2297$ 2300$ 2329$
                  2334$ 2336  2337$ 2339$ 2342$ 2345$ 2347  2348$ 2349  2352$ 2381$ 2409$ 2413$
                  2425$ 2432$ 2436$ 2456$ 2459$ 2488  2502  2517  2520  2529$ 2532  2549  2561
                  2563$ 2566$ 2569  2581  2589$ 2645$ 2658$ 2669  2676$ 2685$ 2689  2692$ 2704
                  2705$ 2708  2709$ 2711$ 2715  2720  2723  2734$ 2742$ 2749$ 2755$ 2758  2765
                  2766$ 2769$ 2776$ 2792$ 2798$ 2817$ 2819  2832$ 2843$ 2851  2854$ 2859$ 2890
                  2892  2895$ 2897  2898$ 2902  2904  2905$ 2974  2975$ 2977  2979$ 2980  2984$
                  2987  2990  2993$ 2994  2999  3003$ 3006  3010  3011$ 3016  3021$ 3024  3026
                  3030  3031  3034  3036  3041$ 3067$ 3070  3119  3128$ 3130$ 3205  3217$ 3224$
                  3226  3228$ 3240$ 3245  3255  3260$ 3263$ 3265$ 3305  3314  3319  3322$ 3327$
                  3328  3338$ 3339  3342  3351  3362$ 3370  3382  3387$ 3394$ 3396  3400$ 3404$
                  3408  3415$ 3427  3431$ 3435$ 3437  3440$ 3442  3443  3468  3473$ 3487$ 3488
                  3499  3503$ 3506$ 3507  3546$ 3553  3564$ 3565  3567  3568  3570  3572  3584
                  3590  3612  3615$ 3625  3627$ 3629$ 3630  3632$ 3636  3638$ 3644  3646$ 3650
                  3672$ 3675$ 3677  3679  3680$ 3692  3753  3755$ 3758$ 3760  3761  3796$ 3821$
                  3822  3832  3838$ 3842$ 3847  3849$ 3854  3856$ 3859  3940  3968$ 3971  3979
                  3980$ 3985  4023$ 4026  4032$ 4035  4037$ 4042  4067  4070$ 4078$ 4082$ 4095$
                  4096  4100$ 4103$ 4107$ 4108  4112$ 4119  4122$ 4131$ 4145  4151  4166  4172
                  4175  4183$ 4184  4193$ 4194  4203$ 4206  4207$ 4226$ 4234$ 4237  4247  4253$
                  4258$ 4262  4266  4275$ 4289$ 4293  4301$ 4306  4311$ 4320$ 4322  4331  4336$
                  4339  4376$ 4377  4392$ 4404  4409  4416$ 4422$ 4426  4462$ 4476  4489  4503$
                  4517  4531$ 4538$
ACLCHK  04CE      526   1368#
ACLO    4120      298#  1374
ACTBUF  7E23      361#  4321  4324$ 4352$ 4492$
ACTCNT  7E21      360#  2992  3321  4300  4350$ 4490$
ACTFLG  7E91      458#  4335  4480$
APTFLG  0004      21#   952   962   1658
APTLOD  40D6      270#
ASCII_* 16CF      4537#
ASCII_* 16BE      4451  4529#
ASC_MS* 7E39      383#  4168  4533$
ASC_MS* 7E37      382#  4274  4277$ 4536$
B       Reserved  663$  687$  693$  781$  864$  867   871   1019  1021$ 1025  1032  1038  1073
                  1131  1139  1165  1217$ 1218$ 1242  1259$ 1300$ 1316  1332$ 1351$ 1384$ 1385$
```

```
Symbol    Value          References  (# = Definition, $ = Write, <BLANK> = Read)

                         1387    1396$   1415$   1416    1626$   1633    1869$   2005$   2006    2031$   2032    2057$   2058
                         2124$   2125    2140$   2141    2156$   2157    2186    2238    2250    2285    2297    2325$   2341$
                         2342    2348    2351$   2462    2549$   2551    2569$   2579$   2584$   2642$   2645    2676    2692
                         2715$   2718    2734    2749    2755    2766    2769    2776    2815    2892$   2898    3006$   3007$
                         3011    3024$   3028    3468$   3473    3557$   3621$   3622$   3623    3670$   3940$   3970    3971$
                         3980    4023    4026$   4188$   4199$   4207    4247$   4258    4390$   4391    4392    4394$   4399
BEGIN     0000           487#
BLDBLK    7E9A           467#    2967$   2981$   2983$   2985$   3004$   3009$   3020$   3022    3054    3056    3065    3069
                         3073
BOOTEN    0007           29#
BOOTF     0001           13#
BOOTPK    06B8           780     1700#
BP_VEC*   081B           1799#   4393
BREAK     000D           175#    1215    1370
BRKMSG    06CC           1134    1714#
BRKSUB    03E0           569     820     1215#
BUFADR    40CA           252#    1002$   1031    1034$
BUILD     0E2E           1797    3035    3053#
BUILD_*   0E67           1800    3053    3117#
BUILD_*   0818           1796#   3591
BYTSUM    4082           194#    1004$   1052    1059$   1081    1243    1535$   1627
C         Reserved       1128    1168    1176    1262$   1296$   1301    1303$   1330$   1347$   1352    1355$   1386    1417
                         2183$   2234$   2245$   2281$   2292$   2352    2758$   2762    2817    2890$   2896    2897$   2901
                         2902$   2905    3026$   3029    3466$   3485$   3498    3553$   3677$   3680    3941$   4046$   4209$
                         4223$   4232$   4242$   4377$   4380$   4383$   4386$   4389$   4401    4422
CAR_RE*   000D           179#    1855
CHAR_S*   4B80           302#    1162    1256
CHKSUM*   00DE           640     661#    2454
CHRBUF    7001           311#    1044
CHRCNT    7000           310#    999     1022
CLEAR_*   03C3           1147    1197#
CLMSG_*   7E49           396#    1562    2487    2511    3388$   3419    4486$
CLMSG_*   7E47           395#    2507    2510$   3390$
CLRACK    00A9           146#    1871$   1993$   2019$   2045$   2114$   2130$   2146$   2236$   2247$   2283$   2294$   4249$
CLRACL    0033           74#     1402$
CLRATN    00AB           156#    4214$
CLRBLK    003A           85#     759$
CLRBSY    002E           67#     1409$
CLRCLK    0020           46#
CLRCSK    0024           52#
CLRCSR    0038           82#
CLRDCL    0031           71#     1395$
CLRHLT    00AF           162#
CLRLIT    003C           88#
CLRMCI    0029           59#
CLRMCK    002B           62#
CLRPFI    00AD           159#
CLRRD     003E           91#     3355$   3399$   3433$
CLRSS     0022           49#
CLRTIM    00A5           140#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
CLRTMR   002C   64#
CLRUPC   00A8   152#
CLRUPK   0026   55#
CLRWCK   0036   79#
CMSGNM   7E6C   436#  3861
CNTADR   40C8   251#
CNTLC    054C   1151  1459#
CNTLC0   0554   1462#  1521
CNTLP    05AC   1153  1518#
CNTLP0   05AF   1135  1519#
CNTRLC   0003   180#  1150  1318
CNTRLO   000F   184#  1148
CNTRLP   0010   181#  1152
CNTRLQ   0011   183#  1146
CNTRLS   0013   182#  1144
CODE_F*  408B   203#  743$  1464  2540
COLD     408A   202#  767$
CONERR   124D   3475  3503#
CONLOS*  16D5   3386  4545#
CONTLC   06C6   1461  1712#
CONTLP   06C9   1518  1713#
COPY     00F9   687#
COPY1    00FB   688#  782  2573
CPATTN   0083   123#  4238
CPFLAG   40F3   283#  1432  1460$  1474  1520$
CPUACK   0082   121#  4215
CR       000D   176#  1027  1041  1098  1509  1634  1723  1725  1727  1743  1746  1749  4546
                4548
CRCCN0   7E34   377#  3123$  4079$  4081
CRCCN1   7E35   378#  3124$  4104$  4130
CRCSUB   13D7   3930  3936#
CSR07    0085   127#
CSR15    0086   129#
CSR23    0087   131#
CTLFLG   7E97   463#  3008  3674$
CTLPRP   03C7   769  1206#  1471
CTLREA   7E6A   433#
CTLTYP   7E69   432#
CTL_BI*  0D4D   2885#  3064
CTL_BU*  7E64   415#  2908$  2911$
CTL_CH*  40FE   287#  995$  1049$  1104$  1136  1209$
CTL_CO*  7E63   414#  3059  3126$  4106
CTL_C_*  7E70   442#  1321$  3025  3032$  3258$
CTL_PT*  7E61   413#  3063$  4111  4115$
CVECTR   4C28   305#  1486
C_LETT*  0043   1859  2931#
D        Reserved  667$  669$  672  689  691$  780$  1873$  1879  1881$  1886  1896  1898$  1903
                1918  1920$  1925  1985$  1997  2003  2023  2029  2049  2055  2111$  2115  2122
                2131  2138  2147  2154  2181$  2184  2190  2197$  2226$  2227  2242  2244$  2248
                2254  2256$  2265$  2267$  2268  2280$  2289  2291$  2295  2301  2334  2336$  2345
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Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

		2346$	2570$	2576$	2577$	2580	2582$	2644$	2661$	2664$	2669$	2671	2695	2701
		2731$	2732	2780	2835	2847$	2848	2852	2853$	2997$	3014	3015$	3017	3575$
		3629	3693$	3695	3698$	3939$	3984	3985$	4032	4035$	4048	4340$		
DCD_CS*	0C31	2650	2674#											
DCD_CS*	0C4B	2688#	2745											
DCD_CS*	0C4C	2678	2690#	2736										
DCD_FI*	0C5B	2698	2702#	2773										
DCD_ME*	0C06	2652#	2719	2726	2728									
DCD_ME*	0BE1	1776	2634#											
DCD_SH*	0CD9	2675	2733	2775#										
DCD_SS*	0C94	2649	2730#											
DCD_ST*	0CB1	2647	2748#											
DCD_VE*	0803	1775#	4452											
DCLŌ	0002	15#	1403	1412										
DELAY	1E62	173#												
DELETE*	40CE	257#	1507$											
DEVERR	06CE	587	1723#											
DIRFLG	409C	213#												
DISCAR*	7E05	323#	1287	1609	2754$	2779	2903	3257$	3304					
DISCNT	40DA	277#	3216$	3277										
DISMEM	00A7	143#												
DISPAR	00A1	134#												
DO_LD_*	14DF	4164	4181#											
DPFLAĞ	7E1A	349#	3038$	3208$	3647$	3846	4370	4414$						
DPRINT	06A5	523	1676#											
DROP_C*	117A	3385	3392#											
DROP_C*	115E	3293	3296	3364	3379#									
DRVMSG	0700	808	1729#											
DUMMY1	0052	563#	563											
E	Reserved	662$	669	670$	1161$	1169	1233	1255$	1974$	1984	2073$	2117	2133	2149
		2185$	2189	2228	2237$	2241	2249$	2253	2266$	2269	2284$	2288	2296$	2300
		2346	2347$	2679$	2683$	2684$	2685	2732$	2740$	2741$	2742	3546	3632	3638
		3692$	3696$	3937$	3968	3978	3979$	4037	4042$	4050				
ENBMEM	00A6	142#												
ENBPAR	00A0	133#												
ENDPAK	40AA	226#	2396	2408										
ENQDEC	1266	3546#												
ENQHED	7EA7	475#	3552	4395										
ENTER_*	7E3A	385#	4147	4504$										
EPRINĪ	0A1D	2326#	2328	2350										
EPRIN2	0A27	2331#	2333	2344										
EPRIN3	0A36	2338	2340#											
EPRINT	0A1B	2191	2243	2255	2290	2325#								
EXIT_P*	16B0	4440	4502#											
FA_VĒC*	1004	1654	3173#											
FBŌ_VE*	100D	2995	3182#											
FIFTH_*	08A1	1945	1947#											
FINISH*	156B	4228	4265#											
FINISH*	152D	4195	4231#											
FINISH*	03B1	1175#	1193	1428	1463									

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
FIRST_*  0850          1848    1850#
FIXUP    0691          562     1654#
FIX_AD*  101F          3174    3200#   3230    3242    3247    3271    3279    3406    3410    3418
FLASH    112B          3236    3349#
FLIP_O*  051D          1149    1427#
FORCE    059A          1473    1503#
FOURTH*  089C          1941    1943#
FULBUO   15C7          3183    4333#
FULBUF   15C2          4303    4330#
FU_VEC*  004F          561#    3445
GET_AP*  049F          1274    1335#
GET_AS*  1570          4170    4272#
GET_CH*  0427          510     1250    1271#
GET_LO*  034B          1124#   1357    1361
GET_LO*  0346          1121#   1311    1314    1333
GET_SI*  03F1          558     1012    1050    1062    1079    1230#
GOSV     4103          293#    1085    1087
GS_VEC*  0046          557#    2812
H        Reserved      567$    570$    576$    587$    591$    594$    627$    631$    637$    639$    641$    644$    647
                       649$    652$    674$    692$    713$    733$    736$    737     740$    779$    790$    806$    808$
                       813$    821$    893$    897     900$    913$    916$    918$    931$    933$    938$    945$    997$
                       999$    1001$   1022$   1033$   1044$   1056$   1060$   1065    1074$   1076    1083$   1088$   1101$
                       1125$   1134$   1158$   1162$   1237$   1243$   1256$   1277$   1279$   1287$   1292$   1325$   1331$
                       1336$   1342$   1435$   1438$   1442$   1461$   1465$   1467$   1474$   1482$   1484$   1489$   1518$
                       1530$   1538$   1541$   1562$   1577$   1612$   1617$   1621$   1627$   1682$   1848$   1852$   1856$
                       1872$   1873    1882$   1884    1899$   1901    1921$   1923    1941$   1945$   1975$   1983    2069
                       2071$   2108$   2178$   2182$   2214$   2217$   2220$   2221    2233$   2257$   2258    2265    2276$
                       2277    2363$   2366$   2379$   2393$   2396$   2408$   2412$   2417$   2420$   2424$   2426$   2428$
                       2431$   2435$   2437$   2453$   2456    2463$   2465$   2469$   2473$   2495$   2511$   2531$   2541$
                       2545$   2547$   2571$   2578$   2583$   2588$   2599$   2635$   2641$   2653$   2657$   2670$   2686$
                       2691$   2700$   2743$   2764$   2779$   2796$   2814$   2816$   2825$   2829$   2831$   2837$   2842$
                       2844$   2888$   2965$   2968$   2970$   2972$   2976$   2978$   2982$   3018$   3022$   3043$   3045$
                       3059$   3061$   3201$   3215$   3238$   3267$   3269$   3326$   3330$   3335$   3337$   3362    3365$
                       3372$   3374$   3380$   3386$   3389$   3393$   3402$   3415    3420$   3434$   3438$   3439$   3486$
                       3505$   3563$   3569$   3571$   3576$   3581$   3582$   3614$   3616$   3619$   3641$   3643$   3684$
                       3694$   3697$   3752$   3754$   3794$   3820$   3833$   3836$   3839    3841$   3843$   3929$   3932$
                       3938$   4049$   4072$   4075$   4081$   4091$   4094$   4099$   4106$   4114$   4124$   4127$   4130$
                       4143$   4147$   4162$   4168$   4182$   4189$   4192$   4200$   4202$   4233$   4252$   4276$   4284$
                       4288$   4291$   4317$   4319$   4323$   4333$   4335$   4341$   4351$   4395$   4398$   4400$   4402$
                       4405$   4407$   4418$   4420$   4488$   4491$   4535$
HBUFFR   7E68          429#    3043    3269    3543    3576    4420
HCOUNT   7E69          431#    3541
HCRC     7E6E          438#
HDADR    7E95          461#    3055$   4069    4073$   4396$
HDCNT    7E94          460#    3131$   4066    4075
HDECOD   125A          3492    3541#
HEADER   7E1C          351#    3210$   3490    3585$   3850$   4413$
HIGH_N*  0030          2216    2935#
HISUM    17FF          4560#
HLBUFF   4088          200#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
HLTFLG   0002          16#
HR_VEC*  1019          3194#   3195
HR_VEC*  101C          3197#   3198
IADDR    7E18          347#    3044$   3270$   3577$   3831    3834$   4421$
IBUF0    7EDB          477#    3643
IBUF1    7E60          409#    3641
IBUF_A*  7E42          390#    2574    2640    2643$   2656    2795    3578$   3671    4534
IBUF_C*  7E40          389#    2555    2635    2653    2791    3580$   3669    4530
ICNT     7E16          346#    3046$   3268$   3583$   3835    3837$   4419$
INDFLG   409D          214#    1208$
INFIX    1298          3551    3562    3575#   3592
INFIX0   129E          3577#   3649
INFLAG   7E1E          354#    3645$   3853
INIT     0112          513     733#
INIT0    0179          789#
INIT1    0160          555     778#    1481
INIT2    017C          787     790#    815
INIT3    0181          792#    823
INIT4    01A5          807#    825
INIT5    0190          795     799#
INITH    0035          77#     1394$   1818$
INITL    0034          76#     1399$
INITPK   06B6          570     1693#
INITX    0146          760#    1375
INIT_D*  0055          565#    792
INIT_P*  167C          4439    4473#
INIT_V*  0024          512#    1835    2370
INIVEC   0040          555#
INLOCK   7E1B          350#    3635    3857$   4484$   4519$
IP_SUB   1682          3214    4474    4476#
ITCSR    001D          34#     746$    754$
ITDB     001C          33#     747     750     756$    758$
L        Reserved      742     898     1070    1163    1164$   1167$   1257    1258$   1261$   2000    2026    2052    2183
                       2266    2459    3363    3416    3670    3838
LAST_G*  7E2A          368#    2973    3619    3862$   4403    4478$
LAST_T*  7E2B          369#    3118$   3554
LBSENT   7E90          455#    3563    4141$   4482$
LBSIP    7E8F          454#    3001$   4140    4481$
LF       000A          177#    1636    4546    4548
LINE_F*  000A          178#    1851
LMSGNM   7E6B          435#    3614
LOBUF    7E8D          452#    4337$
LOCAL_*  7E71          444#    2691    2707    2768$   2888    3211$
LOCAL_*  08B6          1982#   2072    2074
LOCCNT   7E25          363#    3002    4344$
LODADR   40A3          221#    2380$   2397$   2455    2464$
LODCNT   40A7          222#    2391$   2406$   2453    2465
LODFLG   409B          212#    1482
LOGCNT   7E0F          335#    3264$   3486    3505
LOGCON   7E0E          334#    3398$
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
LOWSUM   07FF          1758#
LOW_NU*  0031          2368    2937#
LR_MAS*  40BE          240#    784     945     1035    1272    1283    1312    1322    1553    2712$
LR_MAS*  40BF          241#    1555$   1558
LR_MAS*  40BD          239#    1559$   1577    1621    3434
M        Reserved      568$    577$    635     642$    650     664     690$    735$    791$    814$    822$    857$    894$
                       915$    917$    919$    932     934     941     951$    965$    973$    1000$   1023    1030$   1032$
                       1045    1073$   1126    1159    1165$   1168$   1238    1244    1245$   1259    1262    1278    1280
                       1288    1293    1326    1332    1339    1343    1439    1440$   1443$   1466    1475    1477$   1483
                       1485    1488$   1490$   1529    1537    1542$   1563    1578    1589    1590$   1591    1600    1603
                       1613    1616$   1619$   1628    1629$   1680    1880    1897    1915    1919    2184$   2185    2219$
                       2237    2248$   2249    2284    2295$   2296    2394$   2409    2413    2418    2422    2425    2427
                       2429    2432    2436    2438    2462$   2466$   2470    2474    2496$   2512$   2529    2542    2546
                       2548    2581$   2589    2593$   2600$   2636$   2642    2654$   2658    2671$   2687    2689$   2695$
                       2701$   2744    2765$   2780$   2815$   2819$   2826    2828$   2832    2838$   2843    2854    2859
                       2889    2966$   2969$   2971$   2974$   2977$   2980$   2993    3003    3023    3030$   3060$   3062$
                       3322    3327    3331$   3336$   3338    3342$   3368    3370$   3375$   3387    3394    3395$   3421
                       3435    3437$   3440    3442$   3487    3499$   3506    3509$   3564    3568$   3570$   3572$   3615
                       3617    3621    3672    3675    3696    3698    3753$   3755    3760$   3821    3829$   3832$   3842
                       3844    3937    3939    4048$   4050$   4070    4076$   4082    4089$   4095    4098$   4100    4107
                       4110$   4112    4122    4128$   4131    4138$   4148    4151$   4163    4169    4183    4186$   4188
                       4193    4197$   4199    4203    4206$   4217    4234    4237$   4240    4253    4254$   4273$   4275
                       4289    4292$   4301    4304$   4311    4318$   4320    4322$   4334$   4336    4339$   4349$   4397$
                       4399$   4401$   4404$   4406$   4408$   4489$
MARCH    09A4          2214#
MARCH0   09AC          2218#   2223
MARCH1   09B5          2226#   2229
MARCH2   09BE          2234#   2260
MARCH3   09C0          2235#   2240    2355
MARCH4   09D1          2246#   2252    2357
MARCH5   09EA          2267#   2270
MARCH6   09F0          2276#   2302
MARCH7   09FA          2282#   2287    2358
MARCH8   0A0B          2293#   2299    2359
MARCHX   09A8          2214    2216#
MASK_G*  022E          770     937     944#    1340
MD_VEC*  0812          1790#   3495
MESSAG   7E1D          352#    3037$   3493    3852$   4415$
MIDDLE*  0031          2365    2936#
MIDSUM   0FFF          3152#
MIPFLG   40D9          275#    621     3218$   3444$
MISC2    0001          12#
MOD0     1024          3177    3205#
MOD0_V*  1007          1664    3176#
MOD1     104A          3224#   3426
MOD1A    1052          3228#   3352
MOD4     10B9          3271#   3285
MOD5     10C2          3275#
MODEM0   0694          1655#   1705
MODEM1   105A          3231#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
MODEM2   1076   3243#
MODEM3   1083   3248#
MODEM4   10BC   3272#
MODEM5   10D1   3280#
MODEM6   119B   3407#
MODEM7   11A5   3411#
MODEM8   11B6   3419#
MODEM9   11C9   3233    3427#
MODEM_*  4099   210#    1651    3202$
MODEM_*  0215   502     929#    1275
MODEM_*  068D   930     1650#
MODM3A   10A3   3263#
MODVEC   0013   502#
MRVE10   0824   1806#   1806
MRVE11   0827   1808#   1808
MRVEC8   081E   1802#   1802
MRVEC9   0821   1804#   1804
MSG15_*  7E46   393#    1207$   1561    2495    2722    2794$   3313    3420    4171    4485$
MSG15_*  7E44   392#    2490    2494$   2797$
MSG17_*  17FE   2982    4553#
MSGADR   40B7   233#    593$    796     824
MSGBUF   40F0   279#    1462$   1472
MSGFLG   7E76   449#    3068$   3125$   4094
MSGTYP   7E77   450#    3066$
MSG_DE*  0D88   1791    2950#
MSG_TO*  7E1F   356#    2565$   2799$   3456    4177$   4425    4479$   4516    4539$
MSG_TO*  7E07   327#    3129$   3209$   3453    4146$
MSG_TR*  14BA   3458    4161#
MYPC     40B9   234#    595$
NACK1    15ED   3845    4369#
NACK2    15ED   4370#
NACK4    15F5   3640    4380#
NACK5    15FA   4383#
NACK6    15FF   3631    3634    4386#
NACK7    1604   3618    3626    3687    4389#
NACK_X*  0704   1740#
NACK_X*  070E   1083    1745#
NEEDI    7E36   380#    3613$   3628$   3678    3858    4477$
NOBOOT   06F2   806     1727#
NOCHK    40FF   288#    1210$   1630
NOTYPE   40D4   266#    1211$
NOT_X_*  0338   1047    1097#
NULL_M*  16B5   4450    4515#
N_LETT*  004E   2110    2933#
OBUF0    7F5F   479#
OBUF1    7FB0   481#
OCNT0    7F5E   478#    4340    4488
OCNT1    7FAF   480#    4341
OK15V    0007   28#     1820
OK5V     0005   23#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

OUTBUF	7E28	366#	3074$	4121	4125$					
OUTCNT	7E27	365#	3072$	3127$	4118	4127				
OUTLOC	7E8E	453#	2989	2998	3318	4305	4330	4333	4483$	
OVECTR	414E	300#								
OVERRI*	7E67	422#	2670	3213$						
O_FLAG	40BB	236#	789$	996$	1438	1450$	1504$	1574	2519	
O_FLAG*	40BC	237#	1449							
O_LETT*	004F	1944	2932#							
PAKCNT	40A8	224#	2382$	2393						
PARALL*	7E72	445#	2703	2772$	2886	3212$				
PARERR	411D	297#	522							
PFFLAG	40B5	230#								
POWER_*	04EA	560	1389#							
POWER_*	04DF	507	761	1382#						
PRIADR	40C1	245#	1533$	1536	1539$					
PRICNT	40C3	246#	1532$	1541						
PRINT_*	0898	1917	1940#							
PROSND	158C	3465	4300#							
PROTO_*	1375	3484	3819#							
PSW	Reserved	1029	1040$	1369	1391	1392$	3936	4051$		
PUBFLG	40B6	231#	768$							
PVECTR	4C2B	306#	1491	1494						
PWRVE1	004C	560#								
PWRVEC	001B	507#								
QPEND	40D8	273#	3335							
RAM_LO*	0A6A	1785	2376#							
RAM_VA*	4080	190#	1372	1465	1478	2545				
RCRC	7E30	374#	3039$	3040$	3586$	3587$	3795$	3841	3932	4410$	4411$
RCVCRC	13D4	3830	3932#							
RCVDON	0002	185#	1297	1327	1348					
RDACK	1286	3548	3562#							
RDACK1	1289	3563#	3652							
RDCON	7E10	337#	766$	931	969	1286	1606	2501	3261$	3381	3397$
RDCON1	7E11	338#	970$							
RDD_VE*	100A	2951	3179#							
RDNACK	12B8	3550	3590#							
RDREP	1271	3551#								
RDSPER	7E3B	387#	2986	3120$	4463$					
RDTEMP	7E12	340#	3472$	3748	3823					
RD_COM*	1654	3694	4437#							
RD_DEC*	1314	3180	3668#							
RD_FLO*	11EA	3274	3452#							
RD_LD_*	7E55	406#	2571	2578	2590$					
RD_LD_*	7E4C	399#	2567$	4182						
RD_LD_*	0B70	1773	2539#							
RD_LD_*	7E4A	398#	2572$	4187	4190$					
RD_LD_*	0D7E	2570	2920#							
RD_LD_*	7E4F	401#	2560$	2588	4192					
RD_LD_*	7E4D	400#	2587$	4198	4201$					
RD_LD_*	7E52	403#	2568$	4252						

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
RD_LD_*  7E50  402#
RD_LD_*  7E2D  372#  2599  3027  3033$  3259$  4227$  4487$
RD_LD_*  7E2C  371#  2564$  4162  4267$
RD_LD_*  7E53  404#  2562$  4202  4233
RD_LD_*  7E54  405#  4259$  4261
RD_LD_*  0800  1772#  4443
RD_LOA*  0BD9  2553  2598#
RD_PAT*  1000  1661  3166#
READ     0080  119#  4246
READJ2   0004  20#  1833
READ_S*  040F  559  1231  1249#
REDERR   06E1  591  1725#
REMDSR   10E0  3243  3248  3272  3280  3291#
REMOTE   0006  26#  939  946  1337  1655  3231  3291  3424
REMRDB   7E01  316#  3752
REMRSR   7E00  315#  975$  1180$  1292  1325  4165
REMXDB   7E03  319#
REMXSR   7E02  318#  977$  1612  2825  2847  3459  4284  4317
RESERV*  1674  3689  4438  4441  4442  4444  4445  4446  4447  4448  4449  4461#
RETRY    408C  205#  790  821
RETRYI   40CC  254#  567  576
RIPPL1   0993  2184#  2188  2198  2354
RIPPLE   0988  2178#
RIPPLX   098C  2178  2180#
RL_VEC*  080C  799  1784#
ROM_CH*  085B  1868#
ROM_ER*  033D  1054  1100#
ROM_ER*  0340  1084  1089  1102#
ROM_ID*  028F  1011#  1013  1018  1028  1042
ROM_ID*  0274  495  992#  1099
RPRMPT   0708  997  1056  1743#
RST55    002C  517#
RST65    0034  521#
RST75    003C  525#
RSTN1    0008  495#
RSTN2    0010  500#
RSTN3    0018  505#
RSTN4    0020  510#
RSTN5    0028  515#
RSTN6    0030  519#
RSTN7    0038  523#
RSVEC    0049  559#
RUN_FL*  40D3  264#  1125  1277  1342  2541  3341
SAVESP   0104  566  710#  2377
SAVE_C*  40C0  243#  1552$  1586  1597  1618  1625  1637$
SAVSP1   0108  712#
SCVEC0   0043  556#
SECOND*  0855  1852  1854#
SECURE   0003  18#  1276  1341  2550  2909
SECURE*  40F4  285#
```

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

SELF_T*	082A	1794	1817#									
SEND_C*	05DA	556	1554#									
SEND_C*	05D4	505	1551#									
SEND_C*	0B48	2489	2506#									
SEND_I*	40F2	281#	1429	1437$	1505$	1557$	1640$					
SEND_L*	05B7	519	1528#									
SEND_L*	05B9	515	1531#									
SEND_T*	0B25	1782	2486#									
SETACK	00A8	145#	1870$	1992$	2018$	2044$	2113$	2129$	2145$	2235$	2246$	2282$	2293$	4251$
SETACL	0032	73#	1368$	1383$										
SETATN	00AA	155#	4211$											
SETBLK	003B	86#	744$											
SETBSY	002F	68#	1390$	1819$										
SETCLK	0021	47#												
SETCSK	0025	53#												
SETCSR	0039	83#												
SETDCL	0030	70#	1393$											
SETHLT	00AE	161#												
SETLIT	003D	89#												
SETMCI	0028	58#												
SETMCK	002A	61#												
SETPFI	00AC	158#												
SETRD	003F	92#	3237$	3357$										
SETSS	0023	50#												
SETTIM	00A4	139#												
SETTMR	002D	65#												
SETUPC	00A9	153#												
SETUPK	0027	56#												
SETWCK	0037	80#												
SET_LD*	1525	4225#	4244	4263										
SET_S_*	03BB	1191#	1199											
SET_S_*	03B9	1145	1189#											
SILO_A*	40D0	260#	1154	1174$	1212$	1241$	1251	4174						
SILO_I*	40D1	261#	1156	1172$	1214$	1237								
SILO_O*	40D2	262#	1158	1213$	1236$	1254								
SIMMSK	000B	186#	762											
SLWCLK	0006	25#	3366											
SNDADR	40A0	218#	630$	634	638$									
SNDCNT	40A2	219#	629$	639	641									
SNDMSG	1401	3455	4063#											
SNDNAO	1608	3558	4391#											
SNDNAK	1606	3556	4378	4381	4384	4387	4390#							
SNDPAK	408D	207#	626$	627	779	865	2421							
SOHENQ	7E98	465#	3042$	3266$	3820	4417$								
SOHFLG	7E20	358#	3207$	3476	3651$	3744	3797$	4412$						
SOHFND	1368	3750	3794#											
SOHHED	7EA1	473#	2965	2997										
SOH_DE*	12BF	3545	3611#											
SOURCE*	4BC0	303#												
SP	Reserved	488$	714	741	760$	778$	993$							

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

```
SPBUFF   4086          199#    596     715$    1469
SPECIA*  0B57          2492    2508    2515#
SPEND    40D7          272#    3326
STACK    4080          172#    760     778     993     1467
START    4100          292#    803     805     2379
STATIO*  7E6D          437#
STT_VE*  0809          1781#   3422    4173
ST_DON*  0A5D          2279    2362#
ST_VEC*  0815          490     1793#
SUCCES   4116          295#    592$    711$    793     800     2440$
SUMREG   0020          36#
SWITCH*  4081          192#    938     950$    961$    1336
SYNTAX   0704          1101    1741#
S_FLAG   40CD          255#    1192$   1506$   1571    2516
TALK     0CFB          1788    2809#
TALKDB   7E14          343#    2814    2831
TALKSR   7E13          342#    978$    2809    2842
TALK_C*  7E73          447#    2639$   2713
TALK_F*  0D28          2834#   2855
TALK_F*  0D29          2836#   2861
TALK_F*  7E04          321#    958$    1014    1122    1279    1309    1566    2498    2638    2686    2716    2743    2764
                       2821    2891    3256$   3310    3393    3428$   4308
TALK_N*  0D2D          2823    2841#
TALK_S*  0D0F          2811    2820#
TALK_V*  080F          1017    1569    1787#
TEMP     40B4          228#
TESTSE*  1113          3189    3307    3316    3320    3325#   3429
TESTSE*  111D          2800    3186    3306    3334#   3391    4316
TEST_D*  10EE          3303#   3384    3423
TEXT_M*  0CE2          1779    2790#
TEXT_V*  0806          1778#   4453
THIRD_*  085A          1856    1858#
TICK     1140          3246    3251    3254    3282    3361#   3500
TICK1    1148          3349    3365#   3409    3417
TIKTOK   7E0D          332#    3227$   3365
TIMER1   7E0A          330#    3239$   3275    3278$   3284$   3361    3371    3373$   3403$   3414
TIMER2   7E0C          331#    3229$   3241$   3244    3350    3374    3405$   3407
TIMSAV   7E08          329#    3276$   3283
TMRVEC   4C2F          308#    518
TOCHK    01F9          845     873     893#
TOCNT    4083          196#    893     913
TOCNT1   4084          197#    896     901$
TOPREP   020B          572     840     856     913#
TRANS_*  1356          3751#   4278
TRANS_*  1349          3483    3743#
TRCR     0043          97#     956$    967$    1359$   1825    1952$   1956$   2078$   2120$   2136$   2148$   2153    3225$
                       3401$   3432$   3504$
TRDB     0040          94#     1350    1598$   2050$   2054    3471    4071$   4088$   4101$   4113$   4123$   4137$   4290$
TRMODE   0042          96#     1829$
TRNFLG   7E06          325#    3206$   3462    3481    3648$   4152$
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Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

TRNSN1	1588	4292#												
TRNSND	157C	3464	4284#											
TRSR	0041	95#	1346	1594	2046	2051	3234	3252	3294	3411	3467	4063	4285	
TRYTST	01B8	802	820#											
TSQA	1105	3192	3262	3318#										
TSQA_V*	1016	2503	2724	3191#										
TSQB	10F8	3310#	3573	4153	4475									
TSQ_VE*	1013	3188#												
TSS_VE*	1010	2727	3185#											
TTCR	004B	113#	1308$	1824	1832$	1950$	1954$	2076$	2086$	2116$	2121	2134$	2152$	2166$
TTCR_C*	0035	187#	1306	1830	2164									
TTDB	0048	108#	1299	1587$	1681$	1998$	2002	2330$	2340$	2530$	2833$	2860$		
TTMODE	004A	110#	1828$											
TTSR	0049	109#	1290	1295	1583	1677	1683	1994	1999	2326	2331	2522	2824	2856
TUCR	0047	105#	1216$	1221$	1371$	1823	1951$	1955$	2077$	2118$	2132$	2137	2150$	
TUDB	0044	100#	636$	651$	863	870$	1222	2024$	2028					
TUERR	0086	588	592#											
TUERR2	0079	579	586#	899										
TUERR3	0081	590#	2385	2389	2400	2404	2411	2415	2419	2423	2430	2434	2439	2471
		2476												
TUINIT	0004	174#	1693	1693										
TUMODE	0046	102#	1827$											
TUSR	0045	101#	842	860	2020	2025								
TU_RCV*	01DB	573	858#	874										
TU_RCV*	01D6	500	855#											
TU_RCV*	0AF2	2392	2407	2451#	2467									
TU_SEN*	00D1	571	645#											
TU_SEN*	0095	620#	2378											
TU_XMI*	01C8	633	648	839#										
UA105	0984	2164#												
UB1	0936	2113#	2127											
UB1A	094B	2123	2125#											
UB2	0950	2129#	2143											
UB2A	0965	2139	2141#											
UB3	096A	2145#	2159											
UB3A	097F	2155	2157#											
UBTST	092E	2108#												
UBX	0932	2108	2110#											
UB_VEC*	1001	2558	2559	2601	2637	2655	2667	2672	2793	3169#				
UNIT	4091	208#	810	813	2416									
UNLOCK*	16B5	3170	4178	4428	4464	4514#	4532							
UPC14	0084	125#												
UPC14A	0000	10#												
USART1*	08B9	1991#	2008											
USART2*	08D9	2017#	2034											
USART3*	08F9	2043#	2060											
VALIDI*	0713	1088	1748#											
VECTOR	06C4	1705#												
VNORML	00A3	137#												
VSHIFT	00A2	136#												

Symbol Value References (# = Definition, $ = Write, <BLANK> = Read)

V_LETT*	0056	2180	2934#									
WAIT	0512	1397	1412#	1418								
WCSREG	0008	31#										
WCS_LO*	40D5	268#	2547									
WORD_S*	409E	216#	632$	644	671	675$	2386$	2390$	2401$	2405$	2469	2473
WRITE	00CC	164#	4208$									
XADRES	40C4	248#	1061$	1064	1075$							
XCOUNT	40C6	249#										
XCRC	7E32	375#	3121$	3122$	3929	4085	4087	4092$	4134	4136	4144$	
XMTCRC	13CE	3929#	4074	4102	4116	4126						
XVEC	000B	497#										
X_CMND*	02E9	497	1055#									
YBUSRD	00EC	166#										