SPACE BYTE™ 8085 CPU

PRODUCT SUPPORT DOCUMENTATION

The SPACE BYTE CORP.

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ENGINEERING ERRATA

NONE

* * *

NOTE:

NEVER ATTEMPT TO INSERT OR REMOVE A CARD FROM THE MOTHERBOARD WITH THE POWER TURNED ON.

* * *

SPACE BYTE 8085 CPU

Introduction and Design Philosophy

The design and marketing philosophy behind the development of the SPACE BYTE 8085 CPU was to create a single board computer containing all of the necessary I/O to support a disk based small business computer system. Additionally, the CPU card, with the optional SPACE BYTE [illegible] grammer attached will function as the [illegible] development system- utilizing the CPU card [illegible] dedicated controller.

The ICOM FD3700, or frugal flo[illegible] controller was chosen to interface direct[illegible]YTE 8085 CPU for the following reasons:

1) Simplicity of interface- connection directly to the CPU card, eliminating the need for the S-100 interface card (all software for disk I/O handling contained in the on board 3K system monitor.
2) Full size, 8" IBM compatable 256K diskette.
3) Full software support- both FDOS III relocatable assembler and operating system and DEBBI (Disk Extended Basic) are available from ICOM assembled for the SPACE BYTE 8085 CPU hardware configuration. Absolutley no patching is necessary.
4) ICOM products are well supported at the retail and OEM levels.

With this philosophy in mind, the SPACE BYTE 8085 CPU was further developed to allow more versatility. This ofcourse being the inclusion of the necessary routines to support the Tarbell cassette medium and Polymorphic Video Interface, enableing the use of the Electric Pencil, by Michael Shrayer for complete word processor capability. A variety of jumper schemes allow such options as relocatable system PROM address (0000, C000, or E000), use of the INTEL 2716 EPROM, for up to 6K of onboard application firmware and pin 4 & 5 clear to send function for serial ports and M-WRITE generation, through the bus.

Careful review of the following information will assure complete utilization of the SPACE BYTE 8085 CPU.

SPACE BYTE 8085 JUMPER OPTIONS

The SPACE BYTE 8085 CPU card is designed to be useful in many applications. 18 option jumper positions have been included to make the job of configuring the card for your application easier. The card is shipped with 8 of these jumpers etched in place, representing the most common S-100 bus application. The card should work in your system with little or no changes necessary.

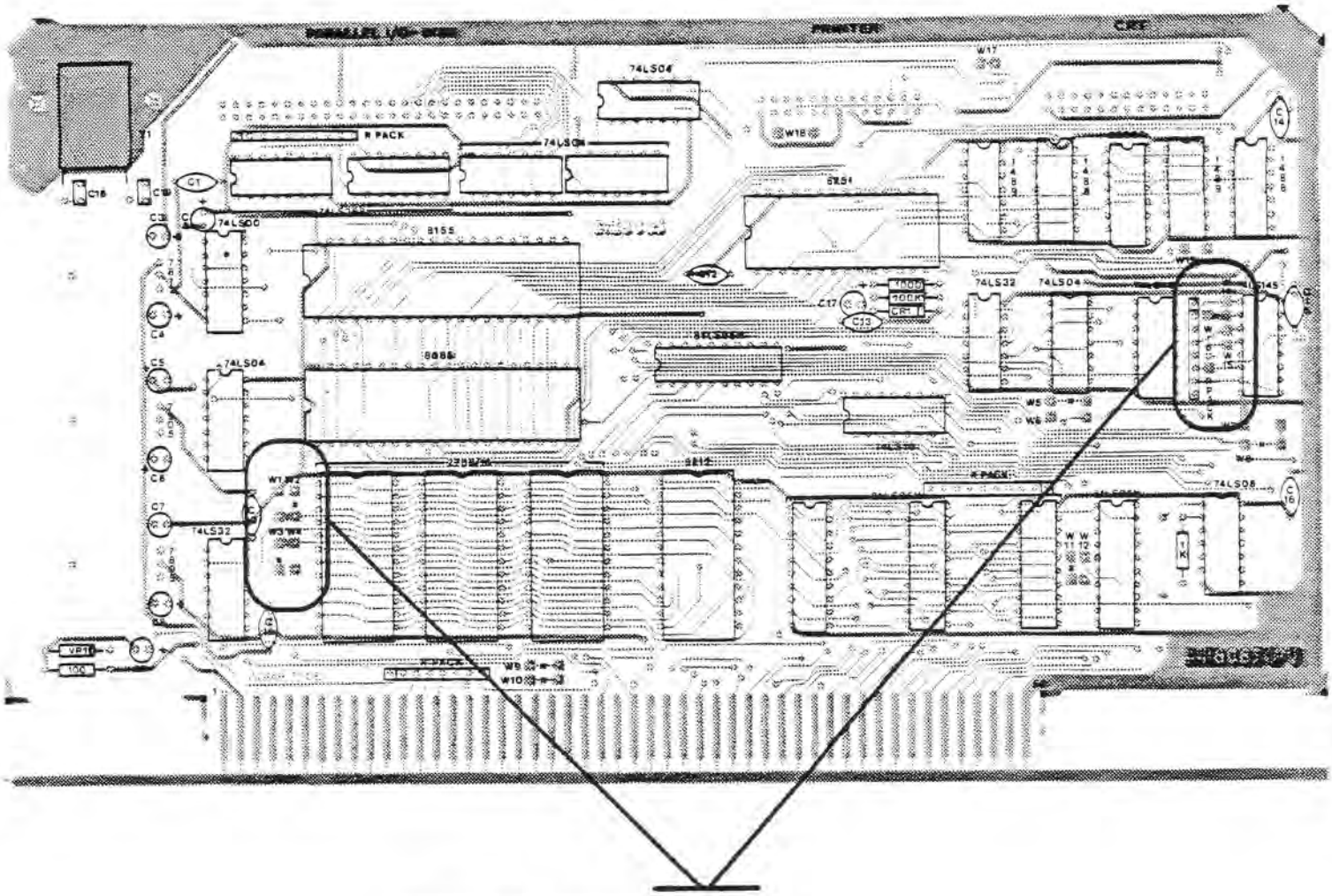
The diagrams in the following pages explain the functions of each jumper. Keep in mind that changing jumpers may require a firmware change. For example, if a PROM starting address of E000 is desired, the 3K SPACE BYTE PROM Monitor will not function because it has been assembled for operation at a starting address of C000. All links to the SPACE BYTE version of ICOM Software requires that the PROM monitor start at address C000.

The card can be strapped for starting addresses of E000 and 0000, but the user is then responsible for providing the necessary software for the applications. The jumpers that can be added or deleted without requiring a software change are:

W-10
W-9
W-11
W-12
W-18
W-19

As shipped from SPACE BYTE CORPORATION, the 8085 CPU card has a starting address of C000. When the hardware system reset switch is depressed, the CPU card jumps automatically to this address. The port addressing and memory map for all three configurations possible are shown below.

0000 START	C000 START	E000 START	FUNCTION
0000-0BFF	C000-CBFF	E000-EBFF	3K SPACE BYTE PROM MONITOR
0000-17FF	C000-D7FF	E000-F7FF	PROM MEMORY AREA USING 2K 2716 DEVICES
1800-18FF	D800-D8FF	F800-F8FF	256 BYTE SCRATCH RAM (in the 8155)
0	C0	E0	USART DATA PORT I/O
1	C1	E1	USART STATUS CONTROL PORT I/O
18	D8	F8	8155 CONTROL STATUS PORT
19	D9	F9	8155 PORT A (8-BITS)
1A	DA	FA	8155 PORT B (8-BITS)
1B	DB	FB	8155 PORT C (6-BITS)
1C	DC	FC	8155 TIMER PORT (LO-ORDER)
1D	DD	FD	8155 TIMER PORT (HI-ORDER)
C	CC	EC	8-BIT UNLATCHED INPUT PORT
NA	6E	NA	MAG TAPE CONTROL PORT
NA	6F	NA	MAG TAPE DATA PORT
NA	F8	NA	VIDEO CARD KEYBOARD PORT
NA	F800-FFF	NA	VIDEO CARD RAM MEMORY (DISPLAY MEMORY)



PROM STRAPPING OPTIONS

W1

This jumper is not installed. W1 conflicts with W2 and only one can be installed. W1 connects +5VDC to pin 21 of all 3 PROM sockets. This is needed when using the INTEL 2716 PROM device.

W2

This jumper is installed. W2 conflicts with W1 and only one can be installed. W2 connects -5VDC to pin 21 of all 3 PROM sockets. This is needed when using 2708 PROM devices in the card.

W3

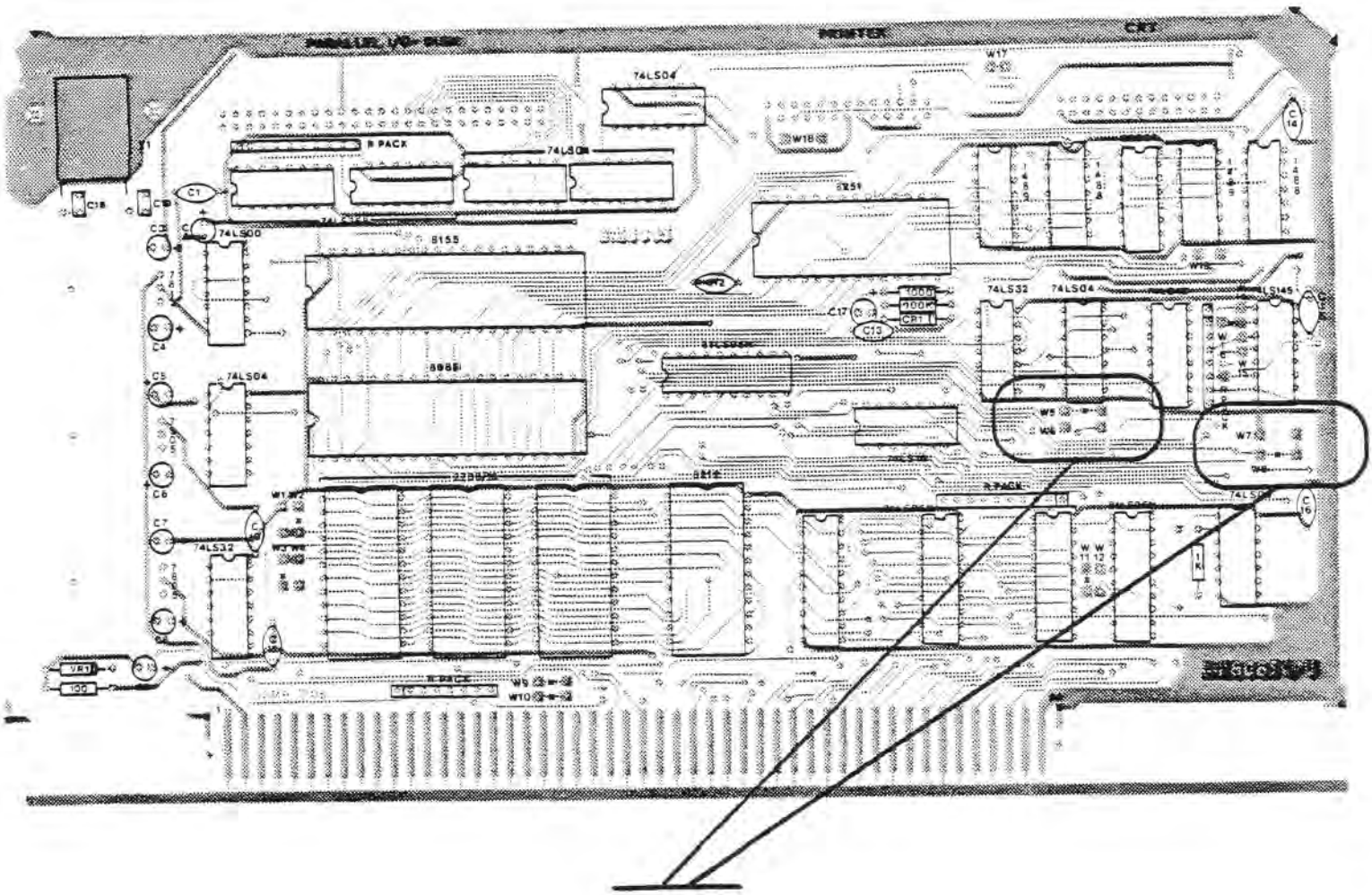
This jumper is installed. W3 conflicts with W4 and only one can be installed. W3 connects +12VDC to pin 19 of all 3 PROM sockets. This is needed when using 2708 PROM devices in the card.

W4

This jumper is not installed. W4 conflicts with W3 and only one can be installed. W4 connects A10 to pin 19 of all 3 PROM sockets. This is needed when using INTEL 2716 PROM devices on the card.

W14, W15, W16

These three jumpers are not installed. W14 has a horizontal jumper etched, connecting to the top of W16. This connection is required when using 2708 PROM devices. If 2716 PROM devices are to be used, cut this etch, and install three vertically possitioned jumpers in W-14, W-15, and W-16. When these jumpers are installed the PROM address space is 6K. Refer to the memory map for absolute address ranges.



W5

This jumper is installed. W5 conflicts with W6 and only one can be installed. W5 sets the starting address of the card to C000, providing that W7 is not installed. The type of PROM device installed does not modify this function.

W6

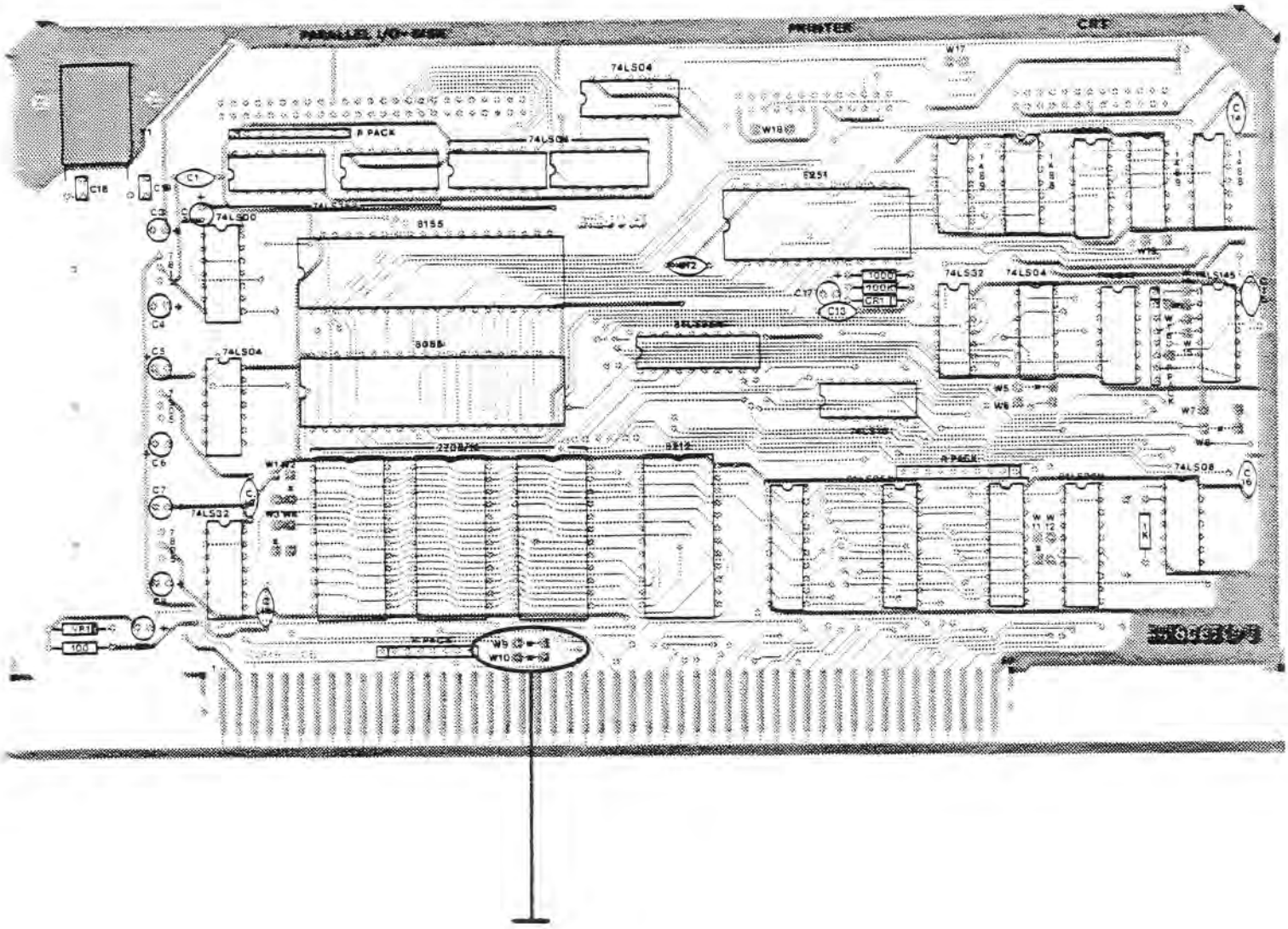
This jumper is not installed. W6 conflicts with W5 and only one can be installed. W6 sets the starting address of the card to E000, providing that W7 is not installed. The type of PROM device installed does not modify this function.

W7

This jumper is not installed. W7 conflicts with W8 and only one can be installed. W7 sets the starting address of the card to 0000, and limits the addressing range to 8K total. If 6K bytes of PROM is installed, only the scratch RAM and 1K of additional off-board RAM can be controlled. This RAM must be addressed at 1C00-1FFF. This is the typical case for single card dedicated controller applications.

W8

This jumper is installed. W8 conflicts with W7 and only one can be installed. W8 places board starting address under the control of W5 and W6. This jumper should only be removed if the 8085 CPU is to be used in single board controller applications.



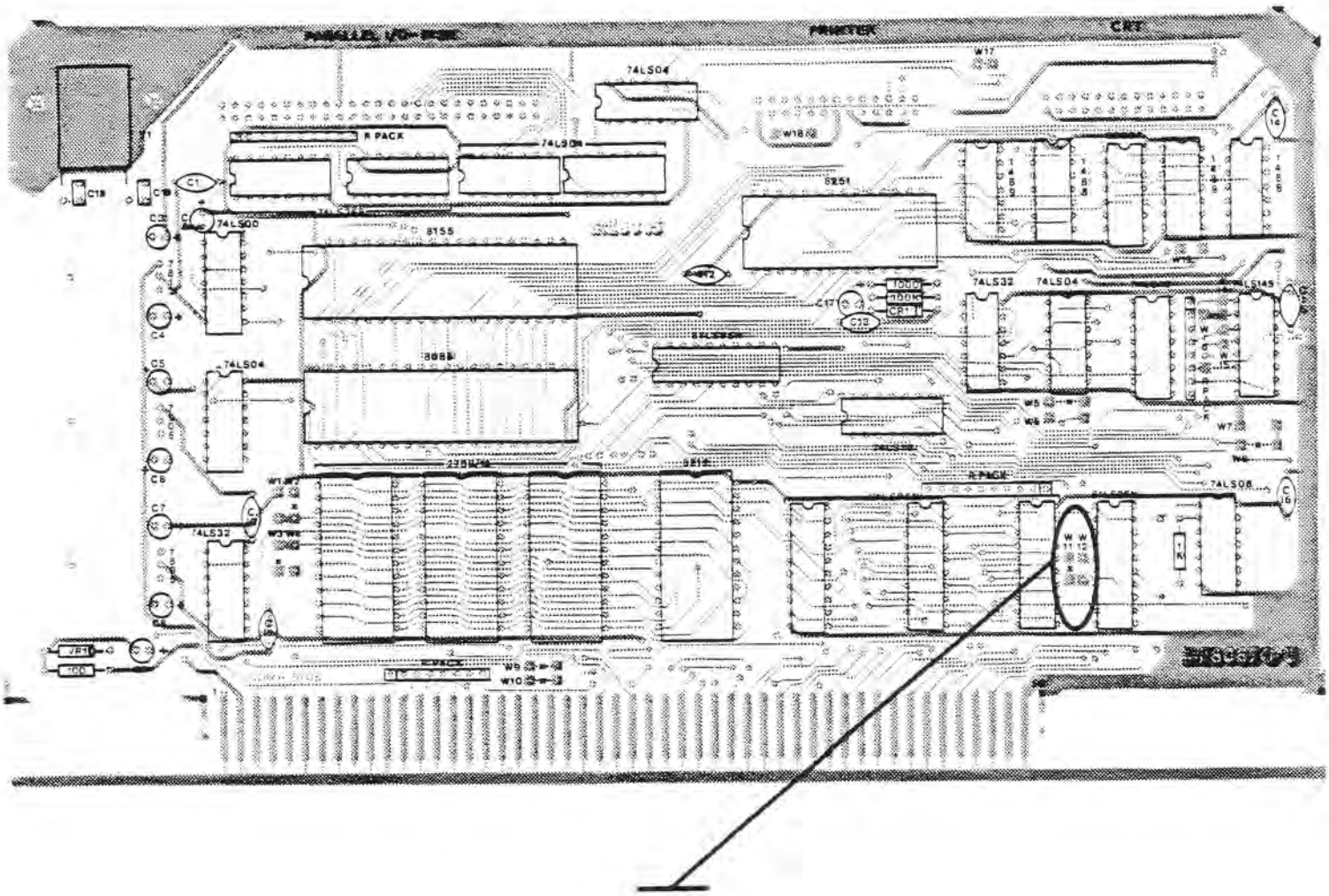
S-100 BUS OPTIONS

W9

This jumper is installed. This jumper connects the jump-start bistable output to pin 67 of the bus. This pin is low (0) when the system reset switch is depressed, and remains low until the 8155 chip is initialized. Initialization of the 8155 resets the jump-start latch. To properly perform this function, the port C of the 8155 must be initialized to an output port first, even though it will then be changed to an input port. Any further excursions of the port C pin will not change the reset condition of the latch.

W10

This jumper is installed. This jumper connects to pin 68 of the bus, and provides the M-write function. If this function is provided by another board in the system, remove W10 from the CPU card.



W11

This jumper is installed. W11 conflicts with W12 and only one can be installed. W11 causes the SMEMR pin on the bus to be controlled by the PDBIN signal. This function is required in some systems.

W12

This jumper is not installed. W12 conflicts with W11 and only one can be installed. W12 provides the SMEMR status function from the decoder status output of the 8085 CPU chip.

SERIAL I/O STRAP OPTIONS

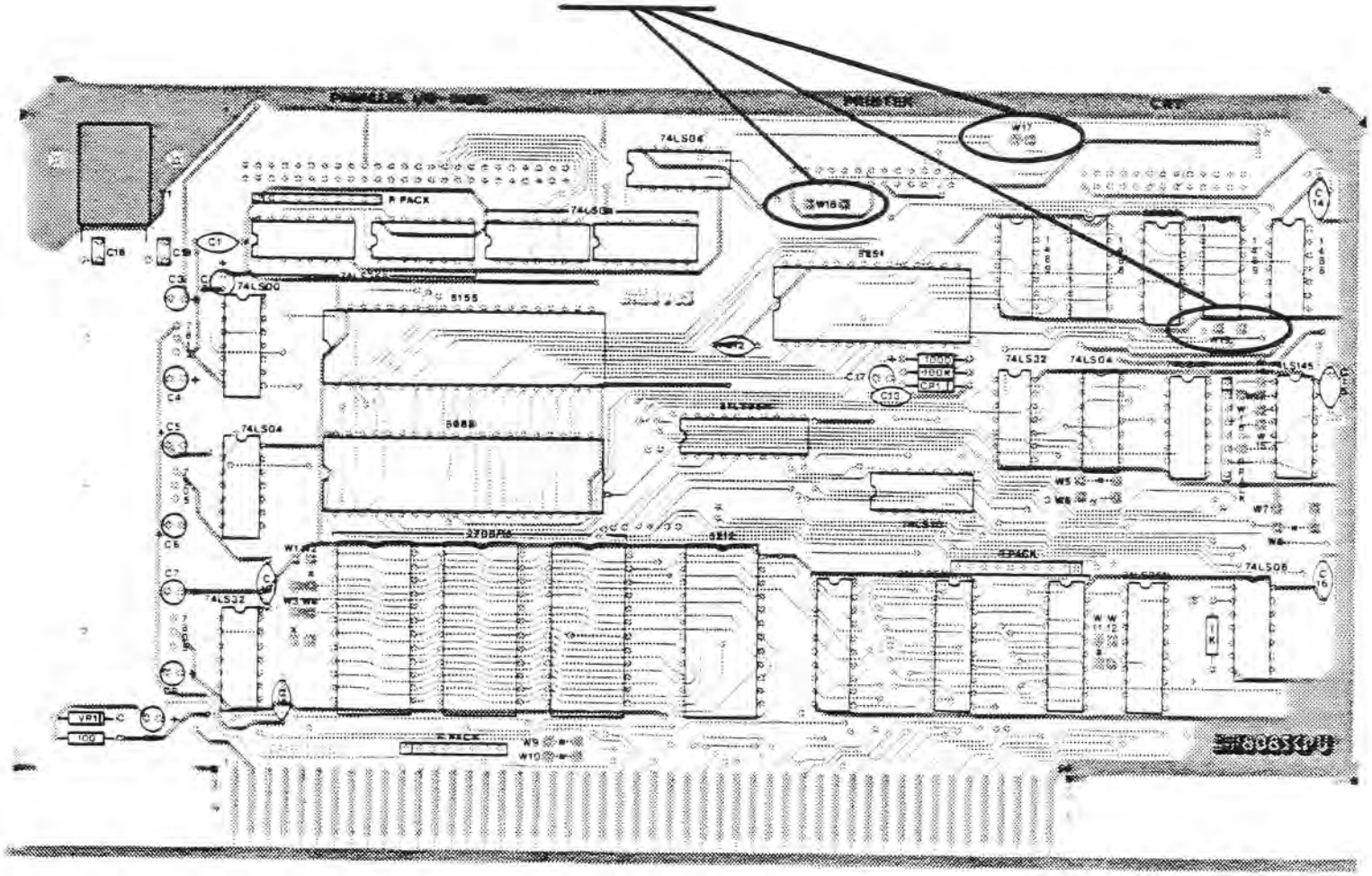
W17 This jumper is installed. The SID pin of the CPU chip is buffered by an EIA RS232C receiver, and parallels the CRT keyboard EIA RS232C input. This is necessary to allow the SPACE BYTE 8085 PROM monitor to automatically determine the correct CRT speed. The jumper may be removed for single board controller applications, thus providing one additional input, and one additional output pin to the system.

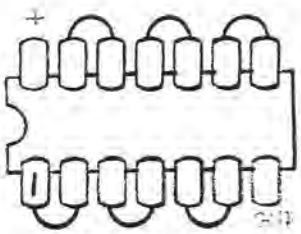
W18

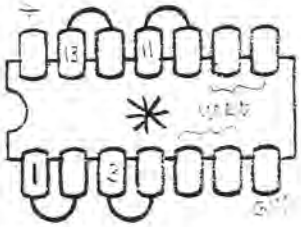
This jumper is not installed. This jumper turns on the CTS function for the printer port. Install this jumper if the printer does not provide the function.

W19

This number is not installed. This jumper connects the RTS and CTS functions together on the CPU card. This jumper may be required if your CRT does not provide compatable handshaking. These functions appear on pins 4 and 5 of the EIA data connector. This jumper must be installed when using the ADM-3 or SOROC IQ 120.



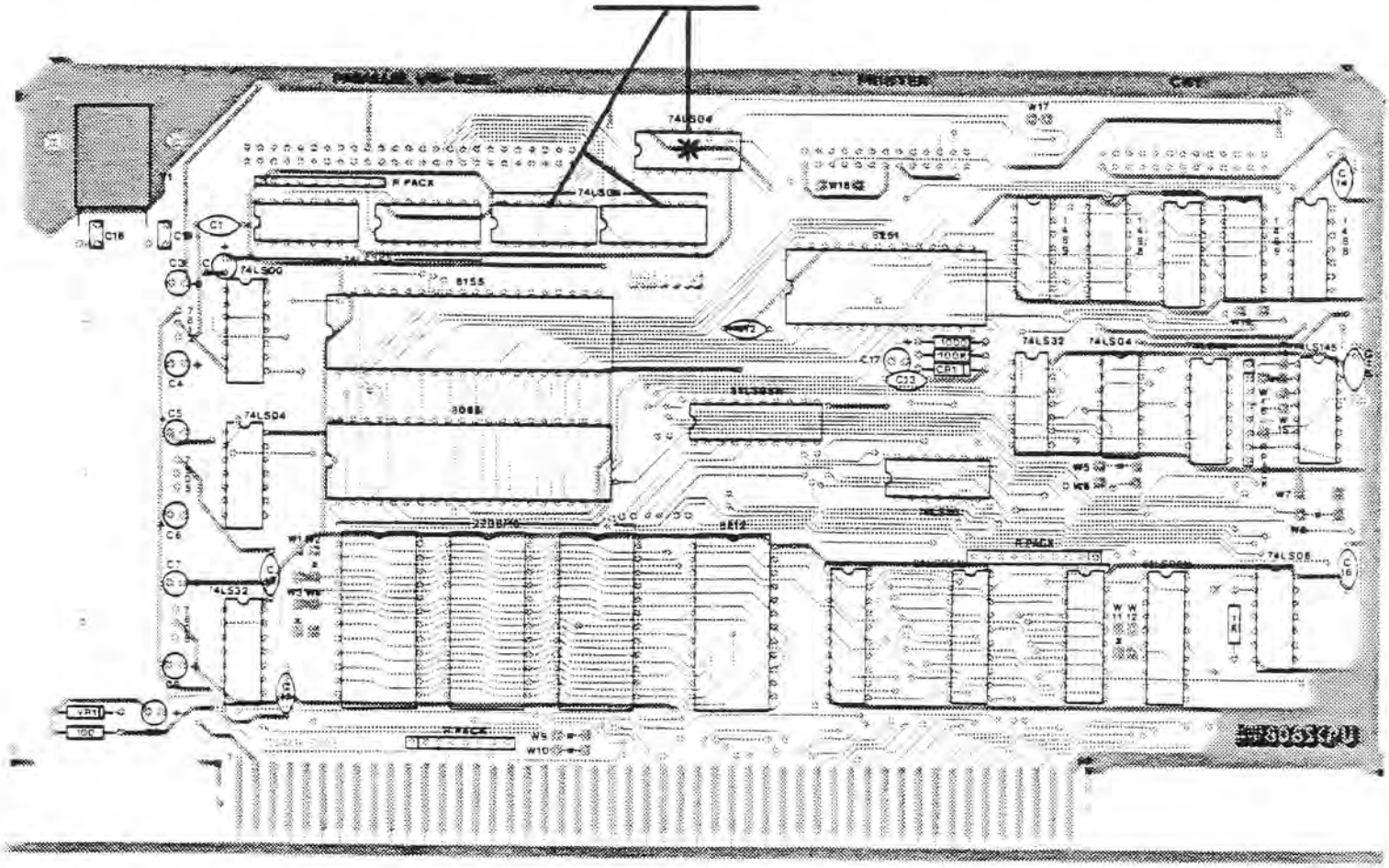




PARALLEL BUFFERED OUTPUTS

16 lines of buffered I/O are provided and configured for the ICOM Disk system. This buffering may be removed, and jumper plugs inserted, or other buffer chip types may be used instead of the 74LS04 chips that are provided. Other chips that would increase drive capability are the 7404, 74S04, and open collector versions, 7406, 7407. As shipped the 8085 CPU card will directly interface to the ICOM Disk system, using the FC-360 disk controller supplied by ICOM.

When removing all buffer chips and substituting direct jumpers, the ports may be used as input as well as outputs. Please note that the chip marked with the star must be left installed, with pins 1 and 3, and pins 13 and 11 out of the socket, and jumpers made to the back of the card as shown. This is because there are two inverter stages in the chip used for USART control and may not be removed.



INSTALLATION INSTRUCTIONS
POLYMORPHIC VIDEO DRIVER CARD

The PROM Monitor Software included with your SPACE BYTE 8085 CPU card will support a video card as the console device.

There are several modifications necessary to the card before it will operate with the 8085 CPU. The primary change involves the divider chain formed by IC1 and IC2, that divides the clock reference to a frequency of 15,750 Hertz needed for faster scan generation.

The 8085 CPU supports pin 24 of the edge connector (phase 2 clock) but the frequency present at this pin is 3.072 MHz instead of the more common 2.0 MHz found in 8080 systems. Modification of the divider chain is necessary to provide the frequency closest to 15,750 Hertz at its output. The frequency produced is not exactly 15,750 Hertz so some small adjustment in the horizontal hold control on the video monitor may be necessary.

The 8085 CPU card does not support pin 49 of the edge connector. This is normally phase 2 inverted.

Details of steps necessary to modify the video card

1) Add a wire jumper between edge connector pins 24 and 49.
2) Remove any wires or etched jumpers from the 3 holes marked JMP1 (near IC1 and IC2).
3) Cut etch connecting pins 4 and 7 of IC2.
4) Add a wire connecting together pins 3, 4, and 5 of IC2.
5) Remove etch from pins of IC1, isolating pins 1, 3, 4, 5 and 7 from each other and from any other pins.
6) Add a wire connecting together pins 5 and 6 of IC1.
7) Set the board address switch for F800H.

Install the video card in the mainframe and connect it to the keyboard and video monitor.

NOTE: No RAM need be installed for this test.

Turn on the system and depress 'A' on the keyboard. The display will most likely have a tear in the horizontal. Adjust the horizontal hold control of the display monitor until a stable display is present.

Depress R(CR) on the keyboard. This will cause a complete line of characters to be displayed. Adjust the two potentiometers on the video card for line length and starting character possition, until the line is centered on the display monitor. Using the 'D' command, display 0 to 100H. This will fill the screen with characters, and point up the need for any other adjustments to the monitor.

Operate the system according to the SPACE BYTE PROM Monitor operating instructions.

OPERATING INSTRUCTIONS

SPACE BYTE 8085 PROM MONITOR

The SPACE BYTE 8085 CPU is delivered complete with an extended monitor programmed into 3 TMS2708JL EPROMS. This monitor program executes at address C000H and extends to address CBFFH. The monitor supports the I/O devices and contains a software debugging capability that allows assembly language programs to be executed to software breakpoints that return control to the monitor.

In addition, the following support software has been included to simplify the initial use of the CPU.

1. Serial EIA CRT I/O routines.
2. Serial EIA Printer I/O routines.
3. ICOM Disk I/O routines.
4. Tarbell tape read and write to cassette.
5. SPACE BYTE 2708/2716 EPROM Programmer controls.
6. Polymorphic video driver routines.

The SPACE BYTE 8085 CPU fully supports the CRT, Serial Printer, and the disk interface, however, the Tarbell and Polymorphic software require additional hardware at the system level. Cable assemblies complete the connection to the rear panel of the system where 25 pin female data sockets provide easy connection to standard CRT and printer units.

The monitor software supports the indicated devices, and because all related RAM requirements are met by the on-card scratch RAM located at address D800H, the main RAM memory is usable from location 000H thru BFFFH, allowing for 48K RAM systems.

MONITOR COMMANDS

Monitor commands consist of a single alpha character typed on the console device keyboard, followed by parameters describing the complete job to be accomplished.

To provide minimum problems in getting this product to "run" in your existing system, the monitor provides for auto-device-speed selection. The software will determine automatically, upon restart, if a Polymorphic Video Driver card is installed in the mainframe, and/or if a CRT device is connected to the serial EIA port provided on the 8085 CPU card. Additionally, the CPU automatically sets the baud rate on the CPU to match that of the CRT.

The user simply strikes the letter "A" on the keyboard and the system then automatically assigns that device as the programmers console.

... < F 5+12V
(U19)
Pin 6

← U23 pin 11 Low

U25 { 11 Hi / 6 Low } works (DEC in CRT)

← U23 pin 11 Hi

U25 { 11 Low / 6 Hi } doesn't (DEC in PR)

no Car. Det.

U25 { 6 Hi / 11 Hi } works (modem) ← (#6 goes Low when Carrier Detect ?) ← RTS @ CD

For CRT, U25 pin 6 Low
Line 4 must be Hi (+9 to +12V)
(from DEC)
(U25 11 is Hi when U25 13 floating ← PR pin 4)

⇓ U23 Pin 11 is Low

U23 Pin 11 (U14 Pin 17) (CTS) must be low for Xmssn.

~~Modem works if U14 Pin 17 Hi~~

DEC → CRT
12 L | 4 H
11 L | 5 L

DEC → PR
12 H | 4 L
11 H | 5 H

```
 1 0000                         TITLE   'SPACE BYTE 8085 PROM MONITOR 11-14-77'
 2 0000
 3 0000                 ;       THE SPACE BYTE CORPORATION
 4 0000                 ;       1720 PONTIUS AVE.
 5 0000                 ;       SUITE 201
 6 0000                 ;       LOS ANGELES CA. 90025
 7 0000                 ;       (213) 468-8080
 8 0000
 9 0000                 ;EQUATES LIST
10 0000
11 0000   00D8   PORTI  EQU 330Q  0D8H    ;8155 STATUS/CONTROL REG.
12 0000   00D9   PORTA  EQU 331   0D9H    ;8155 'A' 8-BIT PORT
13 0000   00DA   PORTB  EQU 332   0DAH    ;8155 'B' 8-BIT PORT
14 0000   00DB   PORTC  EQU 333   0DBH    ;8155 'C' 8-BIT PORT
15 0000   00CC   PORTD  EQU 314   0CCH    ;DISK DATA INPUT PORT
16 0000   00DC   TIMLO  EQU 334   0DCH    ;8155 TIMER PORT (LO BYTE)
17 0000   00DD   TIMHI  EQU 335   0DDH    ;8155 TIMER PORT (HI BYTE)
18 0000   00C0   SDATA  EQU 300   0C0H    ;USART (8251) DATA PORT
19 0000   00C1   SSTAT  EQU 301   0C1H    ;USART STATUS/CONTROL
20 0000   0001   TXRDY  EQU       1       ;USART TX BUFFER EMPTY.
21 0000   0002   RXRDY  EQU       2       ;USART RX BUFFER FULL.
22 0000   006E   CASC   EQU       6EH     ;MAG TAPE CONTROL PORT.
23 0000   006F   CASD   EQU       6FH     ;MAG TAPE DATA PORT.
24 0000   4000   MODE   EQU       4000H   ;OFFSET FOR CONSTANTS
25 0000   4014   S9600  EQU       MODE+20 ;9600 X 16
26 0000   4028   S4800  EQU       MODE+40 ;4800 X 16
27 0000   4050   S2400  EQU       MODE+80 ;2400 X 16
28 0000   406B   S1800  EQU       MODE+107        ;1800 X 16
29 0000   40A0   S1200  EQU       MODE+160        ;1200 X 16
30 0000   4230   S0300  EQU       MODE+640        ;300 X 16
31 0000   4500   S0150  EQU       MODE+1280       ;150 X 16
32 0000   46D1   S0110  EQU       MODE+1745       ;110 X 16
33 0000   F800   PAGE   EQU       0F800H
34 0000   00F8   PSTAD  EQU       0F8H
35 0000   0024   READP  EQU       24H     ;PROM PROGRAMMER READ CODE.
36 0000   0010   PPULS  EQU       10H     ;PROGRAMMER 24V PULSE BIT
37 0000   000E   WRTP   EQU       0EH     ;PROGRAMMER WRITE CODE
38 0000   0001   STB    EQU       1       ;PROGRAMMER DATA STROBE
39 0000                ;
40 0000                RIM     MACRO
41 0000                        DB      20H
42 0000                        ENDM
43 0000                ;
44 0000                SIM     MACRO
45 0000                        DB      30H
46 0000                        ENDM
47 0000
48 0000
49 0000                ;SCRATCHPAD RAM REGISTER ASSIGNMENTS
50 0000
51 0000   D800                 ORG     0D800H
52 D800
53 D800   D8FF  [      STACK   EQU     $+255
54 D800           NULOC:  DS      1       ;CONSTANT FOR NULLS IN CRLF
55 D801          /HIBYTE: DS      2       ;TOP OF MEMORY STORED HERE.
```

SPACE BYTE 3085 PROM MONITOR 11-14-77

```
 56 D803            PSTAT:  DS      1       ;PRINTER SELECT STATUS
 57 D804            BAUDP:  DS      2       ;SPEED SELECTED FOR PRINTER
 58 D806            ERBYT:  DS      1       ;ERROR DURING LOAD
 59 D807            CSTAT:  DS      1       ;CONSOLE DEVICE STATUS
 60 D808            PASS:   DS      1
 61 D809            OFILE:  DS      1       ;OUTPUT FILE
 62 D80A            OUNIT:  DS      1       ;OUTPUT DRIVE NUMBER
 63 D80B            IUNIT:  DS      1       ;INPUT DRIVE NUMBER
 64 D80C            ISIZE:  DS      2       ;INPUT FILE SIZE IN HEX SECTORS
 65 D80E            ITRK:   DS      1       ;INPUT FILE TRACK NUMBER
 66 D80F            ISCTR:  DS      1       ;INPUT FILE SECTOR NUMBER
 67 D810            ICNTR:  DS      1       ;INPUT FILE CHARACTER COUNT
 68 D811            OSIZE:  DS      2       ;OUTPUT FILE SIZE IN HEX SECTORS
 69 D813            OTRK:   DS      1       ;OUTPUT FILE TRACK NUMBER
 70 D814            OSCTR:  DS      1       ;OUTPUT FILE SECTOR NUMBER
 71 D815            OCNTR:  DS      1       ;OUTPUT FILE CHARACTER COUNT
 72 D816            TITRK:  DS      1       ;INPUT FILE TRACK NUMBER (RESTORE)
 73 D817            TISZE:  DS      2       ;INPUT FILE SIZE (RESTORE)
 74 D819            BAUDC:  DS      2       ;SPEED SELECTED FOR CRT
 75 D81B            ALOC:   DS      1       ;ACCUMULATOR STORAGE
 76 D81C            BLOC:   DS      1       ;REG. B STORAGE
 77 D81D            CLOC:   DS      1       ;REG. C STORAGE
 78 D81E            DLOC:   DS      1       ;REG. D STORAGE
 79 D81F            ELOC:   DS      1       ;REG. E STORAGE
 80 D820            FLOC:   DS      1       ;FLAG REGISTER STORAGE
 81 D821            ILOC:   DS      1       ;INTERRUPT STORAGE
 82 D822            HLOC:   DS      1       ;REG. H-L STORAGE
 83 D823            LLOC:   DS      1       ;REG. L STORAGE
 84 D824   D822       MLOC    EQU     HLOC
 85 D824            PLOC:   DS      2       ;PROGRAM COUNTER STORAGE
 86 D826            SLOC:   DS      2       ;STACK POINTER STORAGE
 87 D828            TLOC:   DS      12      ;TRAP INFORMATION STORAGE
 88 D834            EXIT:   DS      2       ;USER ADDDRESS STORE
 89 D836            CURS:   DS      2
 90 D838            IFL:    DS      1
 91 D839            VFL:    DS      1
 92 D83A            UNO:    DS      1
 93 D83B            SPD:    DS      1
 94 D83C            TEMP:   DS      2       ;TEMPORARY STORAGE.
 95 D83E
 96 D83E
 97 D83E   C000             ORG     0C000H
 98 C000
 99 C000 C357C0     START:  JMP     INIT    ;JUMP AROUND VECTOR TABLE.
100 C003            ;
101 C003            ;SUBROUTINE VECTOR TABLE
102 C003            ;
103 C003 C387C3     INCV:   JMP     INC     ;CONSOLE INPUT
104 C006 C3CAC9     READV:  JMP     CASIN   ;MAG TAPE INPUT
105 C009 C3B1C2     OUTCV:  JMP     OUTC    ;CONSOLE OUTPUT
106 C00C C365CA     TWRTV:  JMP     CASOT   ;MAG TAPE OUTPUT
107 C00F C3D4C9     RIV:    JMP     RI      ;READ A BYTE FROM DISK
108 C012 C370CA     WRTV:   JMP     WRT     ;WRITE A BYTE TO DISK
109 C015 C39305     OUTPV:  JMP     OUTP    ;PRINTER OUTPUT
110 C018 C3E1C3     MEMSZ:  JMP     MEMTP   ;COMPUTE MEMORY SIZE
```

SPACE-BYTE

Initializat'n

11111000
1 = 0

317
76543210
11001111

a='CF, out D8 . init parallel ⇒ {317 ⇒ Ports A, B, C are outputs; Start timer; disable port A, B intrpt's; ALT2 ⇒ C is output port}
(317, 330)

don't need { a='00, out 'F8 .=370 . data (VIDPLØ) }

a='FA, out C1 . mode

a='25, out C1 . command

INIT1 in 'F9 .=371

i-a'377, jz INITB

a&'001, jnz INITB

in 'F8 .=370

i-a"A, jz INITD

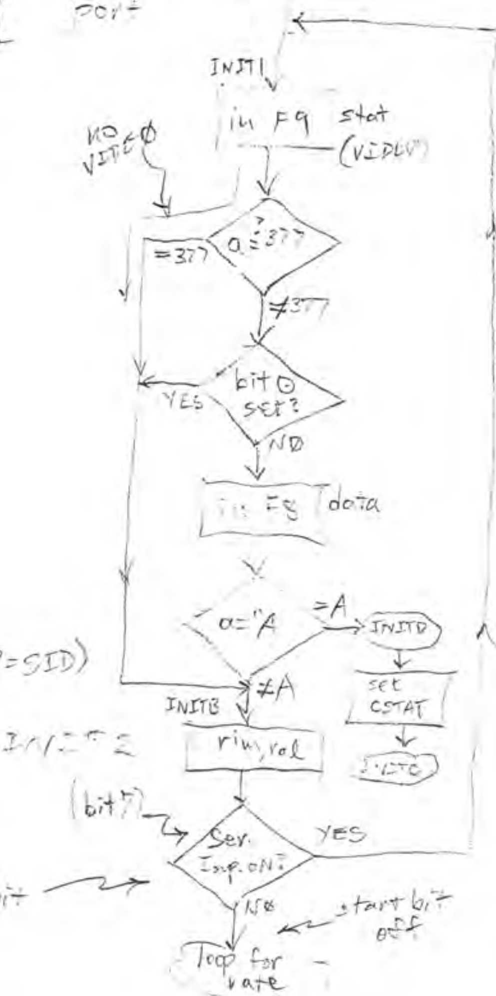
INITB rim, ral, jc INIT1

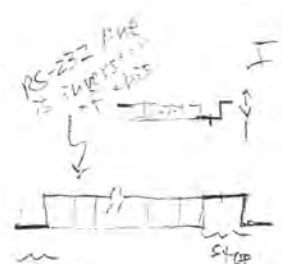
hl='00 00, pshhl

INIT2 rim . read interrupt mask (bit 7=SID)

pophl, hl+1, pshhl, ral, jnc INIT2

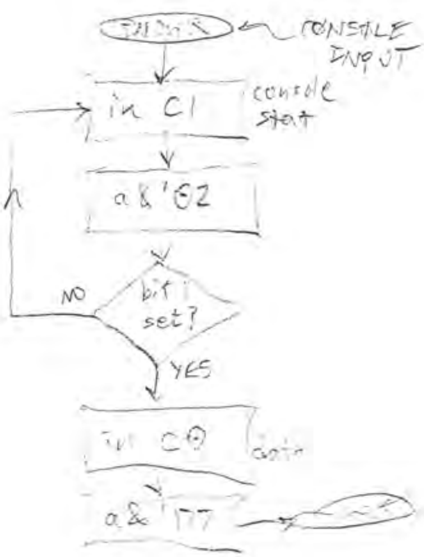
pophl





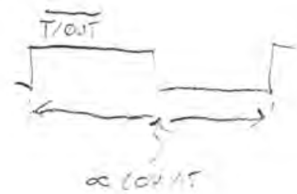
Parallel: 8155

Port	Functn
330	set(write) mode
334	set timer (lsb)
335	" " (msb) + mode



VIDPLØ: F9, F8 (370, 1)

CONSOLE: C1, C0 (300, 1)



Must have jmp @ C000

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
 111 C01B C30DC9    RESTV:  JMP     RESET   ;RESET ERRORS AND HOME HEAD.
 112 C01E C3BC0A    XUSV:   JMP     XUS     ;TRANSMIT UNIT SECTOR BYTE
 113 C021 C3CB0A    XXUSV:  JMP     XXUS    ;
 114 C024 C3D30A    SEEKV:  JMP     SEEK+1  ;JMP TO SEEK TRACK
 115 C027 C3DF0A    FLAGV:  JMP     RFLAG   ;RESET DISK ERROR FLAGS
 116 C02A C3E10A    LOOPV:  JMP     LOOP    ;COMMAND AND LOOP WHILE BUSY
 117 C02D C33309    RSTRV:  JMP     RESTR   ;RESTORE INPUT FILE POINTERS
 118 C030 C3150B    PASSV:  JMP     IPASS   ;INTERPASS FUNCTIONS
 119 C033 C399C2    CRLFV:  JMP     CRLFP
 120 C036           ;
 121 C036 CD4CC9    ASSEM:  CALL    LOADER
 122 C039 CD3309            CALL    RESTR
 123 C03C C33DD8            JMP     0D83DH
 124 C03F           ;
 125 C03F CD4CC9    EDITOR: CALL    LOADER
 126 C042 CD3309            CALL    RESTR
 127 C045 C34000            JMP     40H
 128 C048           ;
 129 C048 31FFD8    UPDAT:  LXI     SP,STACK
 130 C04B CD17C9            CALL    BOOT1
 131 C04E C34300            JMP     43H
 132 C051           ;
 133 C051 CD4CC9    PROG:   CALL    LOADER
 134 C054 C32EC1            JMP     MAIN
 135 C057           ;
 136 C057           ;INIT...INITIALIZE HARDWARE AND SOFTWARE REGISTERS.
 137 C057           ;
 138 C057 31FFD8    INIT:   LXI     SP,STACK        ;SET MONITOR STACK
 139 C05A 97                SUB     A               ;CLEAR A
 140 C05B 3200D8            STA     NULOC           ;SET NULLS TO 0.
 141 C05E 3203D8            STA     PSTAT   ;SELECT CRT = LIST DEVICE
 142 C061 3238D8            STA     IFL     ;SET VIDEO TO NEED RESET
 143 C064 3ECF              MVI     A,0CFH
 144 C066 D3D8              OUT     PORTI   ;INIT VIDEO BOARD
 145 C068 CDF2C7            CALL    VIDEO
 146 C06B           ;
 147 C06B           ;USART PORTS (8251)
 148 C06B           ;
 149 C06B 3EFA              MVI     A,0FAH  ;SET USART FOR 7 BITS
 150 C06D D3C1              OUT     SSTAT   ;EVEN PARITY, 2 STOP BITS.
 151 C06F 3E25              MVI     A,25H
 152 C071 D3C1              OUT     SSTAT
 153 C073           ;
 154 C073           ;INIT PARALLEL PORTS
 155 C073           ;
 156 C073 211440            LXI     H,09600 ;SET PRINTER SPEED
 157 C076 2204D8            SHLD    BAUDP   ;TO 9600 BPS.
 158 C079 DBF9      INIT1:  IN      0F9H    ;KEYBOARD PORT STATUS
 159 C07B FEFF              CPI     -1      ;FF = NO BOARD INSTALLED
 160 C07D CA8CC0            JZ      INITB   ;GOTO CRT AND LOOK
 161 C080 E601              ANI     1       ;VIDEO BOARD INSTALLED
 162 C082 C28CC0            JNZ     INITB   ;NO KEY DEPRESSED
 163 C085 DBF8              IN      0F8H    ;KEYBOARD PORT DATA
 164 C087 FE41              CPI     'A'     ;WAS AN A DEPRESSED?
 165 C089 CA11C1            JZ      INITD   ;YES...
```

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```
 166 C08C                +INITB:  RIM             ;WAIT
     C08C 20             +        DB      20H
     C08D
 167 C08D 17                      RAL             ;FOR START
 168 C08E DA79C0                  JC      INIT1   ;BIT
 169 C091 210000                  LXI     H,0
 170 C094 E5                      PUSH    H
 171 C095                +INIT2:  RIM             ;THIS
     C095 20             +        DB      20H
     C096
 172 C096 E1                      POP     H       ;LOOP TAKES
 173 C097 23                      INX     H       ;14.9739
 174 C098 E5                      PUSH    H       ;MICROSECONDS
 175 C099 17                      RAL             ;TO
 176 C09A D295C0                  JNC     INIT2   ;COMPLETE
 177 C09D E1                      POP     H
 178 C09E                ;
 179 C09E                ;NUMBER IN H-L RELATES TO WIDTH OF START PULSE
 180 C09E                ;
 181 C09E AF                      XRA     A       ;CLEAR A
 182 C09F 3207D8                  STA     CSTAT   ;SET CRT = CONSOLE
 183 C0A2 7C                      MOV     A,H
 184 C0A3 A7                      ANA     A
 185 C0A4 CABDC0                  JZ      INIT3
 186 C0A7 FE01                    CPI     1
 187 C0A9 C2B2C0                  JNZ     INIT9
 188 C0AC 210045                  LXI     H,30150 ;H-L = 445
 189 C0AF C3CAC0                  JMP     INIT4
 190 C0B2 FE02           INIT9:   CPI     2
 191 C0B4 C279C0                  JNZ     INIT1   ;GOOFUP!
 192 C0B7 21D146                  LXI     H,30110 ;H-L = 607
 193 C0BA C3CAC0                  JMP     INIT4
 194 C0BD 7D             INIT3:   MOV     A,L
 195 C0BE A7                      ANA     A
 196 C0BF FA06C1                  JM      INITA
 197 C0C2 FE0A                    CPI     10
 198 C0C4 D2DAC0                  JNC     INIT5
 199 C0C7 211440                  LXI     H,39600 ;H-L = 7
 200 C0CA 2219D8         INIT4:   SHLD    BAUDC   ;SAVE IN SCRATCHRAM
 201 C0CD 7D                      MOV     A,L
 202 C0CE D3DC                    OUT     TIMLO
 203 C0D0 7C                      MOV     A,H
 204 C0D1 D3DD                    OUT     TIMHI
 205 C0D3 3ECF                    MVI     A,0CFH
 206 C0D5 D3D8                    OUT     PORTI
 207 C0D7 C319C1                  JMP     INIT0
 208 C0DA FE14           INIT5:   CPI     20
 209 C0DC D2E5C0                  JNC     INIT6
 210 C0DF 212840                  LXI     H,34800 ;H-L = 14
 211 C0E2 C3CAC0                  JMP     INIT4
 212 C0E5 FE21           INIT6:   CPI     33
 213 C0E7 D2F0C0                  JNC     INIT7
 214 C0EA 215040                  LXI     H,32400 ;H-L = 29
 215 C0ED C3CAC0                  JMP     INIT4
 216 C0F0 FE2B           INIT7:   CPI     43
```

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```
C0F2 D2FBC0          JNC     INIT8
C0F5 21E840          LXI     H,61800 ;H-L = 37 = 153 100
C0F8 C3CAC0          JMP     INIT4
C0FB FE46    INIT8:  CPI     70 =106
C0FD D279C0          JNC     INIT1   ;GOOFUP!
C100 211A40          LXI     H,61200 ;H-L = 55 =110 100
C103 C3CAC0          JMP     INIT4
C106 FEFF    INIT9:  CPI     255 = 377
C108 D279C0          JNC     INIT1   ;GOOFUP!
C10B 211842          LXI     H,60300 ;H-L = 223 = 200 102 8=C
C10E C3CAC0          JMP     INIT4
C111                 ;
C111 3EFF    INITD:  MVI     A,-1    = 377
C113 3207D8          STA     CSTAT   ;SET VIDEO = CONSOLE =007 330
C116 C31CC1          JMP     INITC
C119                 ;
C119                 ;INIT STORAGE REGISTER CONTENTS
C119                 ;
C119 CD87C3  INIT0:  CALL    INC     ;CLEAN OUT RX REG.
C11C 211BD8  INITC:  LXI     H,ALOC
C11F 061A            MVI     B,26
C121 97              SUB     A       ;CLEAR A
C122 77      LOOP2:  MOV     M,A
C123 23              INX     H       ;INCREMENT MEMORY POINTER
C124 05              DCR     B
C125 C222C1          JNZ     LOOP2
C128                 ;
C128                 ;COMPUTE SIZE OF RAM MEMORY
C128                 ;
C128 210000          LXI     H,0
C12B CDB0C3          CALL    HILOC
C12E                 ;
C12E                 ;MAIN COMMAND LOOP
C12E                 ;
C12E CD4AC5  MAIN:   CALL    CRLF    ;CRLF TO CRT
C131 0E3E            MVI     C,'>'   ;PROMPT SYMBOL
C133 CDB102          CALL    OUTC    ;TO CRT
C136 CDB0C1          CALL    ECHO    ;GET KB CHAR AND DISPLAY IT
C139 0E02            MVI     C,2     ;SET FOR 2 NUMBERS
C13B FE03            CPI     3
C13D CA1CC1          JZ      INITC   ;RESET MONITOR
C140 FE41            CPI     'A'
C142 CA03C6          JZ      ASSIGN  ;ASSIGN DEVICES
C145 FE42            CPI     'B'
C147 CAEBC8          JZ      BBOOT   ;LOAD DISK EXEC.
C14A FE43            CPI     'C'
C14C CAC7C2          JZ      PROM    ;COMPARE PROM TO RAM
C14F FE44            CPI     'D'
C151 CC5DC5          CZ      DUMP    ;DISPLAY MEMORY
C154 FE45            CPI     'E'
C156 CA56CB          JZ      TAPEL   ;LOAD AND EXECUTE FILE FROM MAG TAPE

C159 FE46            CPI     'F'
C15B CC28C5          CZ      FILL    ;FILL MEMORY W/CONSTANT
C15E FE47            CPI     'G'
C160 CAEDC6          JZ      GO      ;GO...TO RAM LOCATION XXXX
```

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```
 272 C163 FE48              CPI     'H'
 273 C165 CCE9C3            CZ      HEXAS   ;HEXIDECIMAL ARITHMETIC
 274 C168 FE49              CPI     'I'
 275 C16A CADEC5            JZ      INSPECT ;LOOK AT AND CHANGE MEMORY
 276 C16D FE4A              CPI     'J'
 277 C16F CA0000            JZ      0       ;JUMP TO RAM LOCATION 0000
 278 C172 FE4C              CPI     'L'
 279 C174 CA56CB            JZ      TAPEL   ;LOAD FILE FROM MAG TAPE
 280 C177 FE4D              CPI     'M'
 281 C179 CC3AC5            CZ      MOVEB   ;MOVE A BLOCK OF MEMORY
 282 C17C FE4E              CPI     'N'
 283 C17E CCA2C1            CZ      NULL    ;ASSIGN DELAY TO CRLF
 284 C181 FE50              CPI     'P'
 285 C183 CA1BC3            JZ      PPROG   ;PROGRAM A PROM
 286 C186 FE52              CPI     'R'
 287 C188 CA40C6            JZ      R       ;EXAMINE AND CHANGE CPU REGISTERS
 288 C18B FE53              CPI     'S'
 289 C18D CCA8C4            CZ      SPEED   ;SET PRINTER SPEED
 290 C190 FE54              CPI     'T'
 291 C192 CAC7C2            JZ      PROM    ;TRANSFER PROM TO RAM
 292 C195 FE56              CPI     'V'     ;VERIFY MAG TAPE FILE
 293 C197 CA56CB            JZ      TAPEL   ;WITH AREA OF RAM.
 294 C19A FE57              CPI     'W'
 295 C19C CCD2CB            CZ      WTAPE   ;WRITE FILE TO MAG TAPE
 296 C19F C32EC1            JMP     MAIN
 297 C1A2                   ;
 298 C1A2                   ;NULL (N)  SET DELAY FOR CARRIAGE RETURN
 299 C1A2                   ;SENT TO CONSOLE DEVICE.
 300 C1A2                   ;
 301 C1A2 CDB0C1    NULL:  CALL    ECHO    ;GET KB CHAR AND DISPLAY IT.
 302 C1A5 D630              SUI     '0'
 303 C1A7 FE0A              CPI     10
 304 C1A9 D222C4            JNC     ERROR
 305 C1AC 3200D8            STA     NULOC   ;STORE IN SCRATCHRAM
 306 C1AF C9                RET
 307 C1B0                   ;
 308 C1B0                   ;ECHO..GET A CHARACTER FROM THE CRT KEYBOARD
 309 C1B0                   ;THEN SEND IT TO THE SCREEN.  CHAR RETURNED IN A
 310 C1B0                   ;
 311 C1B0 C5        ECHO:  PUSH    B       ;SAVE B-C
 312 C1B1 CD87C3            CALL    INC     ;GET KB CHAR.
 313 C1B4 CD57C4            CALL    LOCON   ;CONVERT LC TO UC
 314 C1B7 4F                MOV     C,A     ;PUT IN REG. C
 315 C1B8 CDB1C2            CALL    OUTC    ;SEND IT TO SCREEN.
 316 C1BB C1                POP     B       ;RESTORE B-C
 317 C1BC C9                RET             ;RETURN.
 318 C1BD                   ;
 319 C1BD                   ;MESSAGE AND CONSTANT STORAGE AREA.
 320 C1BD                   ;
 321 C1BD 53504143  MS001:  DB      'SPACE BYTE 8085 MONITOR'
     C1C1 45204259
     C1C5 54452038
     C1C9 30383520
     C1CD 4D4F4E49
     C1D1 544F52
```

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```
 322 C1D4 20562D31          DB      ' V-1.0  TOP OF RAM AT '
     C1D8 2E302020
     C1DC 544F5020
     C1E0 4F462052
     C1E4 414D2041
     C1E8 5420
 323 C1EA   002D    SZ001   EQU     $-MS001
 324 C1EA 0A0D0000  CRLFD:  DB      10,13,0,0
 325 C1EE 00000000          DB      0,0,0,0
 326 C1F2 000000            DB      0,0,0
 327 C1F5 43484543  MS002:  DB      'CHECKSUM ERROR'
     C1F9 4B53554D
     C1FD 20455252
     C201 4F52
 328 C203   000E    SZ002   EQU     $-MS002
 329 C203 46494C45  MS003:  DB      'FILE SIZE ERROR'
     C207 2053495A
     C20B 45204552
     C20F 524F52
 330 C212   000F    SZ003   EQU     $-MS003
 331 C212 4449534B  MS004:  DB      'DISK FULL'
     C216 2046554C
     C21A 4C
 332 C21B   0009    SZ004   EQU     $-MS004
 333 C21B 4449534B  MS005:  DB      'DISK NOT READY'
     C21F 204E4F54
     C223 20524541
     C227 4459
 334 C229   000E    SZ005   EQU     $-MS005
 335 C229 4B455942  MS006:  DB      'KEYBOARD ERROR!'
     C22D 4F415244
     C231 20455252
     C235 4F522107
 336 C239   0010    SZ006   EQU     $-MS006
 337 C239 435254    MS007:  DB      'CRT'
 338 C23C   0003    SZ007   EQU     $-MS007
 339 C23C 5052494E  MS008:  DB      'PRINTER'
     C240 544552
 340 C243   0007    SZ008   EQU     $-MS008
 341 C243 204C4953  MS009:  DB      ' LIST DEVICE = '
     C247 54204445
     C24B 56494345
     C24F 203D20
 342 C252   000F    SZ009   EQU     $-MS009
 343 C252 204D454D  MS010:  DB      ' MEMORY WRITE ERRORS'
     C256 4F525920
     C25A 57524954
     C25E 45204552
     C262 524F5253
 344 C266   0014    SZ010   EQU     $-MS010
 345 C266 54415045  MS011:  DB      'TAPE VERIFIED'
     C26A 20564552
     C26E 49464945
     C272 44
 346 C273   000D    SZ011   EQU     $-MS011
```

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```
 347 C273 4E4F20     MS014:  DB      'NO '
 348 C276 4449534B   MS013:  DB      'DISK'
 349 C27A    0004    SZ013   EQU     $-MS013
 350 C27A    0007    SZ014   EQU     $-MS014
 351 C27A 4E4F204D   MS015:  DB      'NO MAG TAPE'
     C27E 41472054
     C282 415045
 352 C285    000B    SZ015   EQU     $-MS015
 353 C285 444F4553   MS016:  DB      'DOES NOT COMPARE'
     C289 204E4F54
     C28D 20434F4D
     C291 50415245
 354 C295    0010    SZ016   EQU     $-MS016
 355 C295 444F4E45   MS017:  DB      'DONE'
 356 C299    0004    SZ017   EQU     $-MS017
 357 C299            ;
 358 C299            ;CRLFP SEND CRLF TO LISTING DEVICE
 359 C299            ;
 360 C299 C5         CRLFP:  PUSH    B       ;SAVE REGISTERS
 361 C29A 0607               MVI     B,7
 362 C29C 0E0D               MVI     C,13
 363 C29E CD93C5             CALL    OUTP    ;SEND IT TO PRINTER
 364 C2A1 0E0A               MVI     C,10
 365 C2A3 CD93C5             CALL    OUTP
 366 C2A6 0E00               MVI     C,0     ;SEND FILL CHARACTERS
 367 C2A8 CD93C5     CRL1:   CALL    OUTP
 368 C2AB 05                 DCR     B
 369 C2AC C2A8C2             JNZ     CRL1
 370 C2AF C1                 POP     B
 371 C2B0 C9                 RET
 372 C2B1            ;
 373 C2B1            ;OUTC   SENDS ONE CHARACTER TO CRT
 374 C2B1            ;
 375 C2B1 3A07D8     OUTC:   LDA     CSTAT   ;SEE WHO IS CONSOLE
 376 C2B4 A7                 ANA     A
 377 C2B5 CABCC2             JZ      OUTC1
 378 C2B8 79                 MOV     A,C
 379 C2B9 C3F2C7             JMP     VIDEO
 380 C2BC DBC1       OUTC1:  IN      SSTAT   ;GET STATUS OF USART
 381 C2BE E601               ANI     TXRDY   ;CHECK TX BUFFER FULL?
 382 C2C0 CAB1C2             JZ      OUTC    ;FULL, LOOP AND WAIT.
 383 C2C3 79                 MOV     A,C     ;GET CHAR FROM REG. C
 384 C2C4 D3C0               OUT     SDATA   ;PUT INTO USART
 385 C2C6 C9                 RET             ;RETURN
 386 C2C7            ;
 387 C2C7 3206D8     PROM:   STA     ERBYT   ;SAVE CONTROL CHAR
 388 C2CA CD12C4             CALL    STRING
 389 C2CD D1                 POP     D       ;HI LIMIT ADDRESS
 390 C2CE E1                 POP     H       ;LO STARTING ADDRESS
 391 C2CF 010000             LXI     B,0     ;PROM ADDRESS
 392 C2D2 CDE3C2     PROM1:  CALL    RPROM
 393 C2D5 CD08C4             CALL    LIMIT   ;ARE WE DONE?
 394 C2D8 D2D2C2             JNC     PROM1   ;NO
 395 C2DB 2195C2             LXI     H,MS017 ;YES, DISPLAY
 396 C2DE 1E04               MVI     E,SZ017 ;"DONE.."
```

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```
 397 C2E0 C327C4            JMP     CHK1
 398 C2E3             ;
 399 C2E3 3E24        RPROM: MVI     A,READP
 400 C2E5 D3DB               OUT     PORTC
 401 C2E7 79                 MOV     A,C       ;LO-ORDER PROM ADDRESS
 402 C2E8 2F                 CMA               ;COMPLEMENT
 403 C2E9 D3DA               OUT     PORTB     ;APPLY TO PROM.
 404 C2EB 78                 MOV     A,B       ;HI-ORDER PROM ADDRESS
 405 C2EC 2F                 CMA               ;COMPLIMENT
 406 C2ED D3D9               OUT     PORTA     ;APPLY TO PROM
 407 C2EF 03                 INX     B         ;INCREMENT PROM ADDRESS
 408 C2F0 DBCC               IN      PORTD     ;READ BYTE FROM PROM
 409 C2F2 323CD8             STA     TEMP      ;STORE TEMP
 410 C2F5 97                 SUB     A
 411 C2F6 D3D9               OUT     PORTA
 412 C2F8 D3DB               OUT     PORTC
 413 C2FA 3A06D8             LDA     ERBYT     ;GET CONTROL CHAR
 414 C2FD FE43               CPI     'C'       ;COMPARE?
 415 C2FF CA0DC3             JZ      PROM2     ;YES
 416 C302 FE54               CPI     'T'       ;TRANSFER?
 417 C304 C222C4             JNZ     ERROR     ;MUST BE ONE OR THE OTHER
 418 C307             ;
 419 C307             ;TRANSFER PROM CONTENT TO RAM
 420 C307             ;
 421 C307 3A3CD8             LDA     TEMP
 422 C30A 2F                 CMA
 423 C30B 77                 MOV     M,A
 424 C30C C9                 RET
 425 C30D             ;
 426 C30D             ;COMPARE PROM CONTENT TO RAM
 427 C30D             ;
 428 C30D 3A3CD8      PROM2: LDA     TEMP
 429 C310 2F                 CMA
 430 C311 BE                 CMP     M
 431 C312 C8                 RZ
 432 C313             ;
 433 C313             ;ERROR IF NO MATCH
 434 C313             ;
 435 C313 2135C2             LXI     H,MS016 ;DISPLAY
 436 C316 1E10               MVI     E,SZ016 ;"DOES NOT COMPARE"
 437 C318 C327C4             JMP     CHK1
 438 C31B             ;
 439 C31B CD12C4      PPROG: CALL    STRING
 440 C31E D1                 POP     D
 441 C31F E1                 POP     H
 442 C320 223CD8             SHLD    TEMP
 443 C323 3E64               MVI     A,100
 444 C325 3206D8             STA     ERBYT
 445 C328 3E0E               MVI     A,WRTP
 446 C32A D3DB               OUT     PORTC
 447 C32C 2A3CD8      PROG1: LHLD    TEMP
 448 C32F 010000             LXI     B,0
 449 C332 CD52C3      PROG2: CALL    PROGA
 450 C335 CD08C4             CALL    LIMIT
 451 C338 D232C3             JNC     PROG2
```

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```
 452 C33B 3A06D8            LDA     ERBYT
 453 C33E 3D                DCR     A
 454 C33F 3206D8            STA     ERBYT
 455 C342 C22CC3            JNZ     PROG1
 456 C345 97                SUB     A
 457 C346 D3D9              OUT     PORTA
 458 C348 D3DB              OUT     PORTC
 459 C34A 21950Z            LXI     H,MS017
 460 C34D 1E04              MVI     E,SZ017
 461 C34F C327C4            JMP     CHK1
 462 C352           ;
 463 C352 7E        PROGA:  MOV     A,M
 464 C353 2F                CMA
 465 C354 D3DA              OUT     PORTB
 466 C356 DBDB              IN      PORTC
 467 C358 F601              ORI     STB
 468 C35A D3DB              OUT     PORTC
 469 C35C E6FE              ANI     255-STB
 470 C35E D3DB              OUT     PORTC
 471 C360 79                MOV     A,C
 472 C361 2F                CMA
 473 C362 D3DA              OUT     PORTB
 474 C364 78                MOV     A,B
 475 C365 2F                CMA
 476 C366 D3D9              OUT     PORTA
 477 C368 03                INX     B
 478 C369 DBDB              IN      PORTC
 479 C36B F610              ORI     PPULS
 480 C36D D3DB              OUT     PORTC
 481 C36F CD76C3            CALL    DLAY
 482 C372 E6EF              ANI     255-PPULS
 483 C374 D3DB              OUT     PORTC
 484 C376           ;
 485 C376 F5        DLAY:   PUSH    PSW
 486 C377 C5                PUSH    B
 487 C378 D5                PUSH    D
 488 C379 E5                PUSH    H
 489 C37A 3E50              MVI     A,80
 490 C37C E1        DLOOP:  POP     H
 491 C37D E5                PUSH    H
 492 C37E 3D                DCR     A
 493 C37F C27CC3            JNZ     DLOOP
 494 C382 E1                POP     H
 495 C383 D1                POP     D
 496 C384 C1                POP     B
 497 C385 F1                POP     PSW
 498 C386 C9                RET
 499 C387           ;
 500 C387           ;INC   RECEIVES OFE CHARACTER FROM CRT
 501 C387           ;CHARACTER RETURNED IN A  W/FLAGS SET.
 502 C387           ;
 503 C387 3A07D8    INC:    LDA     CSTAT   ;SEE WHO IS CONSOLE
 504 C38A A7                ANA     A
 505 C38B CA9AC3            JZ      INC1
 506 C38E DBF9      INC2:   IN      0F9H    ;CHECK KEYBOARD STATUS
```

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```
 507 C390 E601          ANI     1
 508 C392 C28EC3        JNZ     INC2    ;LOOP AND WAIT
 509 C395 DBF8          IN      0F8H    ;GET CHAR.
 510 C397 E67F          ANI     7FH     ;MASK TO 7 BITS
 511 C399 C9            RET
 512 C39A DBC1  ;INC1:  IN      SSTAT   ;GET STATUS OF USART
 513 C39C E602          ANI     RXRDY   ;CHECK RX CHAR. PRESENT?
 514 C39E CA87C3        JZ      INC1    ;NOT HERE YET, WAIT.
 515 C3A1 DBC0          IN      SDATA   ;GET CHAR FROM USART
 516 C3A3 E67F          ANI     127     ;MASK TO 7 BITS/SET FLAGS
 517 C3A5 C9            RET             ;RETURN.
 518 C3A6               ;
 519 C3A6               ;MSOUT  MESSAGE OUTPUT ROUTINE
 520 C3A6               ;START OF STRING IS IN H-L
 521 C3A6               ;STRING LENGTH IS IN REG. E
 522 C3A6               ;
 523 C3A6 4E            MSOUT:  MOV     C,M     ;GET STRING CHAR.
 524 C3A7 CDB1C2        CALL    OUTC    ;SEND TO CRT.
 525 C3AA 23            INX     H       ;INCREMENT MSG POINTER
 526 C3AB 1D            DCR     E       ;DECREMENT CHAR. COUNT
 527 C3AC C2A6C3        JNZ     MSOUT   ;LOOP, IF NOT DONE.
 528 C3AF C9            RET             ;RETURN.
 529 C3B0               ;
 530 C3B0               ;CALCULATE TOP OF RAM MEMORY
 531 C3B0               ;START LOCATION IS IN H-L
 532 C3B0               ;
 533 C3B0 7E            HILOC:  MOV     A,M     ;GET DATA FROM RAM
 534 C3B1 2F            CMA             ;COMPLEMENT DATA
 535 C3B2 77            MOV     M,A     ;WRITE IT BACK TO SAME LOC.
 536 C3B3 BE            CMP     M       ;MAKE SURE IT GOT THERE.
 537 C3B4 C2BDC3        JNZ     EXIT1   ;NOT READ/WRITE MEMORY
 538 C3B7 2F            CMA             ;COMPLEMENT AND
 539 C3B8 77            MOV     M,A     ;RESTORE ORIGINAL CONTENTS.
 540 C3B9 24            INR     H       ;INCREMENT H (HI-ORDER)
 541 C3BA C3B0C3        JMP     HILOC   ;KEEP GOING.
 542 C3BD               ;
 543 C3BD 7C            EXIT1:  MOV     A,H     ;TEST FOR NO
 544 C3BE A7            ANA     A       ;RAM AT ALL.
 545 C3BF CAC3C3        JZ      EXIT2
 546 C3C2 2B            DCX     H       ;SUBTRACT 1 FROM 16 BITS
 547 C3C3 2201D8        EXIT2:  SHLD    HIBYTE  ;STORE IN SCRATCHRAM
 548 C3C6 E5            PUSH    H
 549 C3C7 CD4AC5        CALL    CRLF    ;CRLF TO CRT
 550 C3CA 21BDC1        LXI     H,MS001 ;MONITOR GREETING MESSAGE.
 551 C3CD 1E2D          MVI     E,SZ001 ;SIZE TO REG. E
 552 C3CF CDA6C3        CALL    MSOUT   ;DISPLAY MESSAGE
 553 C3D2 E1            POP     H       ;RESTORE H-L
 554 C3D3 7C            MOV     A,H     ;SET USER STACK
 555 C3D4 3236D8        STA     SLOC
 556 C3D7 7D            MOV     A,L
 557 C3D8 3237D8        STA     SLOC+1
 558 C3DB CD6FC4        CALL    DISAD   ;DISPLAY HI MEMORY VALUE
 559 C3DE C34AC5        JMP     CRLF    ;RETURN THRU CRLF.
 560 C3E1               ;
 561 C3E1               ;MEMTP  READ TOP OF RAM MEMORY ADDRESS
```

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```
 562 C3E1             ;
 563 C3E1 3A02D8      MEMTP:  LDA     HIBYTE+1
 564 C3E4 47                  MOV     B,A     ;PUT HI ADDR BYTE IN REG. B
 565 C3E5 3A01D8              LDA     HIBYTE  ;LO ADDR BYTE IN REG. A
 566 C3E8 C9                  RET
 567 C3E9             ;
 568 C3E9             ;HEXAS  HEXIDECIMAL ARITHMETIC
 569 C3E9             ;TYPE TWO NUMBERS AND THE SUM AND
 570 C3E9             ;DIFFERENCE ARE DISPLAYED ON THE
 571 C3E9             ;CONSOLE DEVICE.
 572 C3E9             ;
 573 C3E9 CD12C4      HEXAS:  CALL    STRING  ;GET TWO NUMBERS
 574 C3EC CD4AC5              CALL    CRLF
 575 C3EF D1                  POP     D       ;NUMBER TWO
 576 C3F0 E1                  POP     H       ;NUMBER ONE
 577 C3F1 E5                  PUSH    H       ;SAVE NUMBER ONE
 578 C3F2 19                  DAD     D       ;ADD THE TWO
 579 C3F3 CD6FC4              CALL    DISAD   ;DISPLAY THE SUM
 580 C3F6 0E20                MVI     C,' '   ;SEND A SPACE
 581 C3F8 CDB1C2              CALL    OUTC    ;TO CRT
 582 C3FB E1                  POP     H       ;GET NUMBER TWO
 583 C3FC 7D                  MOV     A,L     ;SUBTRACT #1
 584 C3FD 93                  SUB     E       ;FROM #2
 585 C3FE 6F                  MOV     L,A
 586 C3FF 7C                  MOV     A,H
 587 C400 9A                  SBB     D
 588 C401 67                  MOV     H,A
 589 C402 CD6FC4              CALL    DISAD   ;DISPLAY DIFFERENCE
 590 C405 C34AC5              JMP     CRLF
 591 C408             ;
 592 C408             ;LIMIT   TEST TO SEE IF D-E EQUAL TO H-L
 593 C408             ;
 594 C408 23          LIMIT:  INX     H       ;INCREMENT H-L
 595 C409 7C                  MOV     A,H     ;GET HI BYTE
 596 C40A B5                  ORA     L       ;OR WITH LO BYTE
 597 C40B 37                  STC             ;SET CARRY FOR SUBTRACT
 598 C40C C8                  RZ              ;H-L = 0
 599 C40D 7B                  MOV     A,E     ;SUBTRACT
 600 C40E 95                  SUB     L       ;H-L FROM D-E
 601 C40F 7A                  MOV     A,D     ;AND LOOK FOR CARRY
 602 C410 9C                  SBB     H       ;TO BE RESET IF
 603 C411 C9                  RET             ;H-L > D-E
 604 C412             ;
 605 C412             ;STRING   GET A COMMAND FROM THE KEYBOARD
 606 C412             ;AND STORE THE 16 BIT NUMBERS ON THE STACK.
 607 C412             ;
 608 C412 CD33C4      STRING: CALL    GET16   ;GET 16 BIT NUMBER IN H-L
 609 C415 E3                  XTHL            ;EXCHANGE WITH TOP OF
 610 C416 E5                  PUSH    H       ;STACK AND REPLACE RETURN ADDR.
 611 C417 0D                  DCR     C       ;DECREMENT GROUP COUNT
 612 C418 D21FC4              JNC     STRN0
 613 C41B C222C4              JNZ     ERROR   ;NOT ENOUGH NUMBERS!!
 614 C41E C9                  RET             ;ALL CORRECT
 615 C41F C212C4      STRN0:  JNZ     STRING  ;GET ANOTHER GROUP
 616 C422             ;
```

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```
 617 C422                ;DISPLAY KEYIN ERROR ROUTINE
 618 C422                ;
 619 C422 2129C2    ERROR:  LXI     H,MS006 ;DISPLAY "KEYBOARD ERROR"
 620 C425 1E10              MVI     E,SZ006
 621 C427 CD4AC5    CHK1:   CALL    CRLF
 622 C42A CDA6C3            CALL    MSOUT
 623 C42D 31FFD8            LXI     SP,STACK
 624 C430 C32EC1            JMP     MAIN
 625 C433                ;
 626 C433                ;GET16   ONE TO FOUR ASCII CHARACTERS
 627 C433                ;RECEIVED FROM THE KEYBOARD ARE CONVERTED
 628 C433                ;TO 16 BIT NUMBERS IN H-L
 629 C433                ;
 630 C433 CD60C4    GET16:  CALL    DELIM   ;GET CHAR AND TEST FOR
 631 C436 CA22C4            JZ      ERROR   ;FOR TERMINATOR.
 632 C439 210000    GET0:   LXI     H,0     ;PRESET H-L = 0
 633 C43C 47        GET1:   MOV     B,A
 634 C43D CDAFC9            CALL    NBL     ;CONVERT TO 4-BITS
 635 C440 DA4FC4            JC      GET2    ;NOT NUMBER, TEST FOR END.
 636 C443 29                DAD     H       ;SHIFT NUMBER IN
 637 C444 29                DAD     H       ;H-L 4 POSITIONS TO
 638 C445 29                DAD     H       ;THE LEFT.  MAKE ROOM
 639 C446 29                DAD     H       ;FOR THIS NUMBER.
 640 C447 B5                ORA     L       ;PUT THESE 4 BITS
 641 C448 6F                MOV     L,A     ;IN AS LSB.
 642 C449 CDB0C1            CALL    ECHO    ;GET NEXT ASCII CHAR.
 643 C44C C33CC4            JMP     GET1    ;LOOP
 644 C44F 78        GET2:   MOV     A,B     ;GET BACK CHAR.
 645 C450 CD63C4            CALL    DEL1    ;TEST FOR TERMINATOR
 646 C453 C222C4            JNZ     ERROR
 647 C456 C9                RET
 648 C457                ;
 649 C457                ;LCCON   LOWER CASE TO UPPER CASE CONVERTER
 650 C457                ;
 651 C457 FE61      LCCON:  CPI     61H
 652 C459 F8                RM
 653 C45A FE7B              CPI     7BH
 654 C45C F0                RP
 655 C45D E6DF              ANI     0DFH
 656 C45F C9                RET
 657 C460                ;
 658 C460                ;DELIM  GET CHAR$ ECHO IT, AND TEST FOR DELIMITER
 659 C460                ;
 660 C460 CDB0C1    DELIM:  CALL    ECHO    ;GET CHAR/DISPLAY IT
 661 C463 FE20      DEL1:   CPI     ' '
 662 C465 C8                RZ
 663 C466 FE2C              CPI     ','
 664 C468 C8                RZ
 665 C469 FE0D              CPI     13
 666 C46B 37                STC
 667 C46C C8                RZ
 668 C46D 3F                CMC
 669 C46E C9                RET
 670 C46F                ;
 671 C46F                ;DISAD   DISPLAY MEMORY ADDRESS.  THE 16-BIT
```

```
 672 C46F                ;NUMBER IN H-L IS DISPLAYED AS 4 ASCII CHARS.
 673 C46F                ;
 674 C46F 7C             DISAD:  MOV     A,H     ;DISPLAY HI BYTE
 675 C470 CD77C4                 CALL    DIS8
 676 C473 7D                     MOV     A,L     ;DISPLAY LO BYTE
 677 C474 C377C4                 JMP     DIS8
 678 C477                ;
 679 C477                ;DIS8   DISPLAY 8 BIT VALUE IN A AS
 680 C477                ;TWO ASCII CHARACTERS.
 681 C477                ;
 682 C477 F5             DIS8:   PUSH    PSW
 683 C478 0F                     RRC             ;GET HI NIBBLE
 684 C479 0F                     RRC
 685 C47A 0F                     RRC
 686 C47B 0F                     RRC
 687 C47C CD99C4                 CALL    HTOA    ;CONVERT HEX TO ASCII
 688 C47F CDB1C2                 CALL    OUTC    ;SEND TO PRINTER
 689 C482 F1                     POP     PSW     ;GET BYTE FOR LO NIBBLE
 690 C483 CD99C4                 CALL    HTOA
 691 C486 C3B1C2                 JMP     OUTC
 692 C489                ;
 693 C489                ;LIST   LIST OF VALID ASCII CHARACTERS
 694 C489                ;USED IN HEXIDECIMAL NUMBER NOTATION.
 695 C489                ;
 696 C489 30313233       LIST:   DB      '0123456789ABCDEF'
     C48D 34353637
     C491 38394142
     C495 43444546
 697 C499                ;
 698 C499                ;HTOA  HEX TO ASCII CONVERTER
 699 C499                ;ASCII CHAR IS RETURNED IN REG. C
 700 C499                ;
 701 C499 E5             HTOA:   PUSH    H
 702 C49A D5                     PUSH    D
 703 C49B 2189C4                 LXI     H,LIST
 704 C49E E60F                   ANI     15
 705 C4A0 5F                     MOV     E,A
 706 C4A1 1600                   MVI     D,0
 707 C4A3 19                     DAD     D
 708 C4A4 4E                     MOV     C,M
 709 C4A5 D1                     POP     D
 710 C4A6 E1                     POP     H
 711 C4A7 C9                     RET
 712 C4A8                ;
 713 C4A8                ;SPEED  SET BAUD RATE FOR THE PRINTER
 714 C4A8                ;
 715 C4A8 CD33C4         SPEED:  CALL    GET16   ;GET A NUMBER
 716 C4AB CD4AC5                 CALL    CRLF    ;CRLF TO CRT
 717 C4AE 7C                     MOV     A,H     ;GET HI ORDER 2 NUMBERS
 718 C4AF 1F                     RAR
 719 C4B0 1F                     RAR             ;SHIFT FOR TEST
 720 C4B1 1F                     RAR
 721 C4B2 1F                     RAR
 722 C4B3 E60F                   ANI     15      ;MASK FOR 4 BITS
 723 C4B5 CAF7C4                 JZ      SP2     ;FIRST DIGIT IS A 0.
```

```
 724 C4B8 FE09              CPI     9       ;NO, IS IT 9
 725 C4BA C2C3C4            JNZ     SP3     ;NO!
 726 C4BD 211440            LXI     H,S9600 ;YES, SET SPEED
 727 C4C0 C31CC5            JMP     SP4     ;TO 9600 BPS.
 728 C4C3 FE04      SP3:    CPI     4       ;IS IT 4
 729 C4C5 C2CEC4            JNZ     SP5     ;NO!
 730 C4C8 212840            LXI     H,S4800 ;YES, SET SPEED
 731 C4CB C31CC5            JMP     SP4     ;TO 4800 BPS.
 732 C4CE FE02      SP5:    CPI     2       ;IS IT A 2?
 733 C4D0 C2D9C4            JNZ     SP6     ;NO!
 734 C4D3 215040            LXI     H,S2400 ;YES, SET SPEED
 735 C4D6 C31CC5            JMP     SP4     ;TO 4800 BPS
 736 C4D9 FE01      SP6:    CPI     1       ;IS IT 1?
 737 C4DB C222C4            JNZ     ERROR   ;KEY ENTRY ERROR.
 738 C4DE 7C                MOV     A,H     ;YES IS A 1
 739 C4DF E60F              ANI     15      ;GET NEXT DIGIT
 740 C4E1 FE08              CPI     8       ;IS SECOND NUMBER 8?
 741 C4E3 C2ECC4            JNZ     SP11    ;NO, THEN SHOULD BE 2
 742 C4E6 216B40            LXI     H,S1800 ;YES, SET SPEED
 743 C4E9 C31CC5            JMP     SP4     ;TO 1800 BPS.
 744 C4EC FE02      SP11:   CPI     2       ;IS IT 2?
 745 C4EE C222C4            JNZ     ERROR   ;KEY ENTRY ERROR
 746 C4F1 21A040            LXI     H,S1200 ;YES, SET SPEED
 747 C4F4 C31CC5            JMP     SP4     ;TO 1200 BPS
 748 C4F7 7C        SP2:    MOV     A,H     ;GET 1ST 2 NUMBERS
 749 C4F8 FE03              CPI     3       ;IS 2ND # A 3?
 750 C4FA C203C5            JNZ     SP9     ;NO!
 751 C4FD 218042            LXI     H,S0300 ;YES, SET SPEED
 752 C500 C31CC5            JMP     SP4     ;TO 300 BPS
 753 C503 FE01      SP9:    CPI     1       ;IS 2ND # A 1?
 754 C505 C222C4            JNZ     ERROR   ;KEY ENTRY ERROR
 755 C508 7D        SP7:    MOV     A,L     ;GET LO-ORDER NUMBERS
 756 C509 FE50              CPI     50H     ;IS 3RD NUMBER 5
 757 C50B C214C5            JNZ     SP10    ;NO!
 758 C50E 210045            LXI     H,S0150 ;YES, SET SPEED
 759 C511 C31CC5            JMP     SP4     ;TO 150 BPS
 760 C514 FE10      SP10:   CPI     10H     ;IS 3RD NUMBER 1?
 761 C516 C222C4            JNZ     ERROR   ;NO, KEY ENTRY ERROR
 762 C519 21D146            LXI     H,S0110 ;YES, SET SPEED
 763 C51C 2204D8    SP4:    SHLD    BAUDP   ;TO 110 BAUD
 764 C51F C9                RET
 765 C520           ;
 766 C520           ;PRNAD  PRINT MEMORY ADDRESS.  THE
 767 C520           ;16 BIT NUMBER IN H-L IS PRINTED AS 4
 768 C520           ;ASCII CHARACTERS.
 769 C520           ;
 770 C520 7C        PRNAD:  MOV     A,H
 771 C521 CD81C5            CALL    BYTEP
 772 C524 7D                MOV     A,L
 773 C525 C381C5            JMP     BYTEP
 774 C528           ;
 775 C528           ;FILL  FILL MEMORY WITH A CONSTANT
 776 C528           ;USER SPECIFIES LO-ADDR/HI-ADDR/CONSTANT.
 777 C528           ;
 779 C528 0C        FILL:   INR     C       ;LOOK FOR 3 NUMBERS
```

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```
 779 C529 CD12C4            CALL    STRING  ;GET 3 NUMBERS
 780 C52C CD4AC5            CALL    CRLF
 781 C52F C1                POP     B       ;CONSTANT IS REG C.
 782 C530 D1                POP     D       ;HI MEMORY ADDR.
 783 C531 E1                POP     H       ;LO MEMORY ADDR.
 784 C532 71        FILL1:  MOV     M,C     ;WRITE TO MEMORY
 785 C533 CD08C4            CALL    LIMIT   ;SEE IF WERE DONE.
 786 C536 D232C5            JNC     FILL1   ;NO, CONTINUE
 787 C539 C9                RET
 788 C53A           ;
 789 C53A           ;MOVEB  MOVE A BLOCK OF MEMORY
 790 C53A           ;
 791 C53A 0C        MOVEB:  INR     C       ;GET THREE NUMBERS
 792 C53B CD12C4            CALL    STRING
 793 C53E C1                POP     B       ;NEW ORG
 794 C53F D1                POP     D       ;OLD TOP ADDR.
 795 C540 E1                POP     H       ;OLD ORG
 796 C541 7E        MOVE1:  MOV     A,M     ;GET BYTE FROM OLD
 797 C542 02                STAX    B       ;WRITE TO NEW
 798 C543 03                INX     B       ;INCREMENT NEW
 799 C544 CD08C4            CALL    LIMIT   ;INCREMENT OLD
 800 C547 D241C5            JNC     MOVE1   ;AND LOOP IF NOT DONE.
 801 C54A           ;
 802 C54A           ;CRLF SENDS CARRIAGE RETURN LINE FEED TO CONSOLE DEVICE.
 803 C54A           ;
 804 C54A E5        CRLF:   PUSH    H       ;SAVE CURRENT
 805 C54B D5                PUSH    D       ;CPU REGISTER
 806 C54C F5                PUSH    PSW     ;CONTENTS.
 807 C54D 21EAC1            LXI     H,CRLFD ;POINT TO CRLF DATA BLOCK
 808 C550 3A00D8            LDA     NULOC   ;GET NUMBER OF NULLS TO ADD
 809 C553 C602              ADI     2       ;ADD 2 FOR CRLF
 810 C555 5F                MOV     E,A     ;PUT LENGTH IN REG. E
 811 C556 CDA6C3            CALL    MSOUT   ;SEND THE MESSAGE
 812 C559 F1                POP     PSW     ;RESTORE
 813 C55A D1                POP     D       ;CPU REGISTER CONTENTS
 814 C55B E1                POP     H       ;AND
 815 C55C C9                RET             ;RETURN TO CALLER
 816 C55D           ;
 817 C55D           ;DUMP   THIS ROUTINE DISPLAYS MEMORY
 818 C55D           ;CONTENTS ON THE LISTING DEVICE.
 819 C55D           ;
 820 C55D CD12C4    DUMP:   CALL    STRING  ;GET 2 NUMBERS
 821 C560 D1                POP     D       ;HI ADDR.
 822 C561 E1                POP     H       ;LO ADDR.
 823 C562 CD99C2    DUMP1:  CALL    CRLFP   ;CRLF TO LISTING DEVICE
 824 C565 CD20C5            CALL    PRNAD   ;DISPLAY ADDR.
 825 C568 0E20      DUMP2:  MVI     C,' '   ;SEND SPACE
 826 C56A CD93C5            CALL    OUTP    ;TO LIST DEVICE
 827 C56D 7E                MOV     A,M     ;GET MEMORY BYTE
 828 C56E CD81C5            CALL    BYTEP   ;SEND TO PRINTER
 829 C571 CD08C4            CALL    LIMIT   ;SEE IF WERE DONE
 830 C574 DA99C2            JC      CRLFP   ;DONE
 831 C577 00                NOP             ;DO SOME MORE.
 832 C578 7D                MOV     A,L
 833 C579 E60F              ANI     15
```

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```
 834 C57B C2680C5            JNZ     DUMP2
 835 C57E C3620C5            JMP     DUMP1
 836 C581                ;
 837 C581                ;BYTEP   PRINT A BYTE OF MEMORY
 838 C581                ;ON THE LISTING DEVICE AS TWO
 839 C581                ;ASCII CHARACTERS
 840 C581                ;
 841 C581 F5             BYTEP:  PUSH    PSW     ;SAVE A COPY
 842 C582 0F                     RRC             ;SHIFT
 843 C583 0F                     RRC             ;FOR
 844 C584 0F                     RRC             ;HI
 845 C585 0F                     RRC             ;ORDER
 846 C586 CD99C4                 CALL    HTOA    ;CONVERT TO ASCII
 847 C589 CD93C5                 CALL    OUTP    ;SEND TO PRINTER
 848 C58C F1                     POP     PSW     ;GET ORIGINAL
 849 C58D CD99C4                 CALL    HTOA    ;CONVERT TO ASCII
 850 C590 C393C5                 JMP     OUTP    ;SEND TO PRINTER
 851 C593                ;
 852 C593                ;OUTP   SENDS ONE CHAR TO LISTING DEVICE
 853 C593                ;CHARACTER IS EXPECTED IN REG. C
 854 C593                ;
 855 C593 3A03D8         OUTP:   LDA     PSTAT   ;CHECK PRINTER
 856 C596 A7                     ANA     A       ;STATUS
 857 C597 CAB1C2                 JZ      OUTC    ;SEND DATA TO CRT
 858 C59A                ;
 859 C59A                ;WAIT FOR USART TXR TO EMPTY
 860 C59A                ;
 861 C59A C5                     PUSH    B
 862 C59B E5                     PUSH    H
 863 C59C 060A           OUTP2:  MVI     B,10
 864 C59E DBC1           OUTP1:  IN      SSTAT   ;GET USART STATUS
 865 C5A0 E604                   ANI     4       ;TX EMPTY?
 866 C5A2 CA9CC5                 JZ      OUTP2   ;NO
 867 C5A5 05                     DCR     B       ;YES, MAYBE
 868 C5A6 C29EC5                 JNZ     OUTP1   ;CHECK 9 MORE TIMES
 869 C5A9                ;
 870 C5A9                ;SWITCH THE OUTPUT CONNECTIONS TO PRINTER
 871 C5A9                ;
 872 C5A9 3E27                   MVI     A,27H
 873 C5AB D3C1                   OUT     SSTAT
 874 C5AD                ;
 875 C5AD                ;SWITCH THE SPEED TO MATCH THAT
 876 C5AD                ;OF THE PRINTER IN USE
 877 C5AD                ;
 878 C5AD 2A04D8                 LHLD    BAUDP
 879 C5B0 7D                     MOV     A,L
 880 C5B1 D3DC                   OUT     TIMLO
 881 C5B3 7C                     MOV     A,H
 882 C5B4 D3DD                   OUT     TIMHI
 883 C5B6 3ECF                   MVI     A,0CFH
 884 C5B8 D3D8                   OUT     PORTI
 885 C5BA                ;
 886 C5BA                ;SEND CHARACTER
 887 C5BA                ;
 888 C5BA 79                     MOV     A,C
```

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```
 889 C5BB D3C0          OUT     SDATA
 890 C5BD               ;
 891 C5BD               ;RESTORE EVERYTHING THE WAY IT WAS
 892 C5BD               ;
 893 C5BD 060A          OUTP3:  MVI     B,10
 894 C5BF DBC1          OUTP4:  IN      SSTAT
 895 C5C1 E604                  ANI     4
 896 C5C3 CABDC5                JZ      OUTP3
 897 C5C6 05                    DCR     B
 898 C5C7 C2BFC5                JNZ     OUTP4
 899 C5CA               ;
 900 C5CA 3E25                  MVI     A,25H
 901 C5CC D3C1                  OUT     SSTAT
 902 C5CE               ;
 903 C5CE 2A19D8                LHLD    BAUDC
 904 C5D1 7D                    MOV     A,L
 905 C5D2 D3DC                  OUT     TIMLO
 906 C5D4 7C                    MOV     A,H
 907 C5D5 D3DD                  OUT     TIMHI
 908 C5D7 3ECF                  MVI     A,0CFH
 909 C5D9 D3D8                  OUT     PORTI
 910 C5DB E1                    POP     H
 911 C5DC C1                    POP     B
 912 C5DD               ;
 913 C5DD C9                    RET
 914 C5DE               ;
 915 C5DE               ;INSPECT  INSPECT THE CONTENTS OF MEMORY
 916 C5DE               ;ONE LOCATION AT A TIME.  CHANGE CONTENTS
 917 C5DE               ;IF NECESSARY.
 918 C5DE               ;
 919 C5DE CD33C4        INSPECT:        CALL    SET16   ;GET AN ADDR.
 920 C5E1 DA2EC1                JC      MAIN    ;CR ENTERED
 921 C5E4 7E            INSP1:  MOV     A,M     ;GET CONTENTS OF MEMLOC
 922 C5E5 CD77C4                CALL    DIS8    ;DISPLAY CONTENTS
 923 C5E8 0E2D                  MVI     C,'-'   ;DISPLAY A DASH
 924 C5EA CDB1C2                CALL    OUTC
 925 C5ED CD60C4                CALL    DELIM   ;GET A CHAR
 926 C5F0 DA2EC1                JC      MAIN    ;CR ENTERED
 927 C5F3 CAFFC5                JZ      INSP2   ;SPACE ENTERED DISPLAY NEXT
 928 C5F6 EB                    XCHG            ;GET TWO ASCII CHARACTERS
 929 C5F7 CD39C4                CALL    GET0    ;CONVERT TO BINARY AND
 930 C5FA EB                    XCHG
 931 C5FB 73                    MOV     M,E     ;STORE IN MEMORY
 932 C5FC DA2EC1                JC      MAIN    ;RETURN ON CR
 933 C5FF 23            INSP2:  INX     H       ;INCREMENT MEMORY POINTER
 934 C600 C3E4C5                JMP     INSP1   ;DO ANOTHER
 935 C603               ;
 936 C603               ;ASSIGN LISTING DEVICE
 937 C603               ;
 938 C603 2143C2        ASSIGN: LXI     H,MS009 ;DISPLAY
 939 C606 1E0F                  MVI     E,SZ009 ;"LIST DEVICE = "
 940 C608 CDA6C3                CALL    MSOUT
 941 C60B CD87C3                CALL    INC     ;GET A CHAR AND DISP IT.
 942 C60E FE43                  CPI     'C'     ;LIST = CRT?
 943 C610 CA25C6                JZ      AS1     ;YES!
```

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```
 944 C613 FE0D              CPI     13      ;RETURN?
 945 C615 CA29C6            JZ      ADISP   ;DISPLAY STATUS
 946 C618 FE50              CPI     'P'     ;LIST = PRINTER?
 947 C61A C222C4            JNZ     ERROR   ;MUST BE CRT OR PRINTER
 948 C61D 3EFF              MVI     A,-1    ;SET STATUS = PRINTER
 949 C61F 3203D8            STA     PSTAT
 950 C622 C329C6            JMP     ADISP
 951 C625 97        AS1:    SUB     A       ;SET STATUS = CRT
 952 C626 3203D8            STA     PSTAT
 953 C629 3A03D8    ADISP:  LDA     PSTAT
 954 C62C A7                ANA     A
 955 C62D CA38C6            JZ      ADIS1
 956 C630 213CC2            LXI     H,MS008
 957 C633 1E07              MVI     E,SZ008
 958 C635 C32AC4            JMP     CHK1+3
 959 C638 2139C2    ADIS1:  LXI     H,MS007
 960 C63B 1E03              MVI     E,SZ007
 961 C63D C32AC4            JMP     CHK1+3
 962 C640           ;
 963 C640           ;R  EXAMINE AND MODIFY CPU REGISTERS
 964 C640           ;
 965 C640 21BCC6    R:      LXI     H,RTBL  ;POINT TO MATCH TABLE
 966 C643 CD60C4            CALL    DELIM   ;GET A CHAR.
 967 C646 DA8EC6            JC      R5      ;CR ENTERED
 968 C649 0E0C              MVI     C,SZR   ;TABLE SIZE
 969 C64B BE        R0:     CMP     M       ;COMPARE ENTRY TO TABLE
 970 C64C CA5AC6            JZ      R1      ;MATCH FOUND
 971 C64F 23                INX     H       ;NO MATCH, SKIP
 972 C650 23                INX     H       ;TO NEXT TABLE
 973 C651 23                INX     H       ;ENTRY.
 974 C652 23                INX     H
 975 C653 0D                DCR     C
 976 C654 C24BC6            JNZ     R0
 977 C657 C322C4            JMP     ERROR
 978 C65A 0E20      R1:     MVI     C,' '   ;SEND A SPACE
 979 C65C CDB1C2            CALL    OUTC    ;TO THE CRT.
 980 C65F CDAAC6    R2:     CALL    DREG    ;DISPLAY REG. CONTENTS
 981 C662 0E2D              MVI     C,'-'   ;SEND A DASH
 982 C664 CDB1C2            CALL    OUTC    ;TO THE CRT.
 983 C667 CD60C4            CALL    DELIM   ;GET A CHAR
 984 C66A DA2EC1            JC      MAIN    ;CR ENTERED
 985 C66D CA80C6            JZ      R4      ;SPACE ENTERED
 986 C670 E5                PUSH    H
 987 C671 C5                PUSH    B
 988 C672 CD39C4            CALL    GET0    ;GET NEW VALUE
 989 C675 7D                MOV     A,L
 990 C676 12                STAX    D
 991 C677 F1                POP     PSW
 992 C678 B7                ORA     A
 993 C679 FA7FC6            JM      R3
 994 C67C 1B                DCX     D
 995 C67D 7C                MOV     A,H
 996 C67E 12                STAX    D
 997 C67F E1        R3:     POP     H
 998 C680 AF        R4:     XRA     A
```

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```
 999 C681 B6                ORA     M
1000 C682 FA2EC1            JM      MAIN
1001 C685 78                MOV     A,B
1002 C686 FE0D              CPI     13
1003 C688 CA2EC1            JZ      MAIN
1004 C68B C35FC6            JMP     R2
1005 C68E CD4AC5    R5:     CALL    CRLF
1006 C691 0E20      R6:     MVI     C,' '
1007 C693 CDB1C2            CALL    OUTC
1008 C696 AF                XRA     A
1009 C697 B6                ORA     M
1010 C698 FA2EC1            JM      MAIN
1011 C69B 4E                MOV     C,M
1012 C69C CDB1C2            CALL    OUTC
1013 C69F 0E3D              MVI     C,'='
1014 C6A1 CDB1C2            CALL    OUTC
1015 C6A4 CDAAC6            CALL    DREG
1016 C6A7 C391C6            JMP     R6
1017 C6AA           ;
1018 C6AA           ;DREG  DISPLAY REGISTER CONTENTS
1019 C6AA           ;
1020 C6AA 23        DREG:   INX     H
1021 C6AB 5E                MOV     E,M
1022 C6AC 23                INX     H
1023 C6AD 56                MOV     D,M
1024 C6AE 23                INX     H
1025 C6AF 46                MOV     B,M     ;SIZE 1 OR 2
1026 C6B0 23                INX     H       ;POINT TO NEXT
1027 C6B1 1A                LDAX    D
1028 C6B2 CD77C4            CALL    DIS8    ;DISPLAY BYTE
1029 C6B5 05                DCR     B
1030 C6B6 F8                RM
1031 C6B7 13                INX     D
1032 C6B8 1A                LDAX    D
1033 C6B9 C377C4            JMP     DIS8
1034 C6BC           ;
1035 C6BC           ;RTBL  REGISTER IDENTIFIER TABLE
1036 C6BC           ;
1037 C6BC 41        RTBL:   DB      'A'
1038 C6BD 1BD8              DW      ALOC
1039 C6BF 00                DB      0
1040 C6C0 42                DB      'B'
1041 C6C1 1CD8              DW      BLOC
1042 C6C3 00                DB      0
1043 C6C4 43                DB      'C'
1044 C6C5 1DD8              DW      CLOC
1045 C6C7 00                DB      0
1046 C6C8 44                DB      'D'
1047 C6C9 1ED8              DW      DLOC
1048 C6CB 00                DB      0
1049 C6CC 45                DB      'E'
1050 C6CD 1FD8              DW      ELOC
1051 C6CF 00                DB      0
1052 C6D0 46                DB      'F'
1053 C6D1 20D8              DW      FLOC
```

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```
1054 C6D3 00                    DB      0
1055 C6D4 49                    DB      'I'
1056 C6D5 21D8                  DW      ILOC
1057 C6D7 00                    DB      0
1058 C6D8 48                    DB      'H'
1059 C6D9 22D8                  DW      HLOC
1060 C6DB 00                    DB      0
1061 C6DC 4C                    DB      'L'
1062 C6DD 23D8                  DW      LLOC
1063 C6DF 00                    DB      0
1064 C6E0 4D                    DB      'M'
1065 C6E1 22D8                  DW      HLOC
1066 C6E3 01                    DB      1
1067 C6E4 50                    DB      'P'
1068 C6E5 24D8                  DW      PLOC
1069 C6E7 01                    DB      1
1070 C6E8 53                    DB      'S'
1071 C6E9 26D8                  DW      SLOC
1072 C6EB 01                    DB      1
1073 C6EC FF                    DB      -1
1074 C6ED   000C        SZR     EQU     ($-RTBL)/4
1075 C6ED               ;
1076 C6ED               ;
1077 C6ED               ;GO  EXECUTE USER PROGRAM
1078 C6ED               ;
1079 C6ED CD60C4        GO:     CALL    DELIM
1080 C6F0 CA37C7                JZ      GO2
1081 C6F3 CD39C4                CALL    GET0
1082 C6F6 2234D8                SHLD    EXIT
1083 C6F9 CA37C7                JZ      GO2
1084 C6FC 2126D8        GO1:    LXI     H,SLOC
1085 C6FF 56                    MOV     D,M
1086 C700 23                    INX     H
1087 C701 5E                    MOV     E,M
1088 C702 D5                    PUSH    D       ;PUT SP ON STACK
1089 C703 3A1BD8                LDA     ALOC
1090 C706 67                    MOV     H,A
1091 C707 3A20D8                LDA     FLOC
1092 C70A 6F                    MOV     L,A
1093 C70B E5                    PUSH    H       ;PUT A + FLAGS ON STACK
1094 C70C 3A21D8                LDA     ILOC
1095 C70F 67                    MOV     H,A
1096 C710 E5                    PUSH    H       ;PUT INT. MASK ON STACK
1097 C711 211CD8                LXI     H,BLOC
1098 C714 56                    MOV     D,M
1099 C715 23                    INX     H
1100 C716 5E                    MOV     E,M
1101 C717 23                    INX     H
1102 C718 D5                    PUSH    D       ;PUT B-C ON STACK
1103 C719 56                    MOV     D,M
1104 C71A 23                    INX     H
1105 C71B 5E                    MOV     E,M
1106 C71C D5                    PUSH    D       ;PUT D-E ON STACK
1107 C71D 23                    INX     H
1108 C71E 23                    INX     H
```

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```
1109 C71F 23              INX     H
1110 C720 56              MOV     D,M
1111 C721 23              INX     H
1112 C722 5E              MOV     E,M
1113 C723           ;
1114 C723           ;RESTORE CPU REGISTERS WITH USER DATA.
1115 C723           ;
1116 C723 EB              XCHG            ;H-L SET
1117 C724 D1              POP     D       ;D-E SET
1118 C725 C1              POP     B       ;B-C SET
1119 C726 F1              POP     PSW
1120 C727         +       SIM
     C727 30      +       DB      30H     <---
     C728
1121 C728 F1              POP     PSW     ;A + FLAGS SET
1122 C729 2232D8          SHLD    TLOC+10 ;STORE H-L TEMP
1123 C72C E3              XTHL            ;SP IN H
1124 C72D F9              SPHL            ;SP LOADED
1125 C72E 2A34D8          LHLD    EXIT    ;GET JUMP ADDR.
1126 C731 E5              PUSH    H       ;PUT ON NEW STACK
1127 C732 2A32D8          LHLD    TLOC+10 ;SET H-L
1128 C735 FB              EI
1129 C736 C9              RET             ;EXECUTE USER CODE.
1130 C737           ;
1131 C737           ;GO2  SET BREAKPOINT
1132 C737           ;
1133 C737 DAFCC6    GO2:    JC      GO1     ;NO BREAKPOINT TO SET.
1134 C73A 0E2D              MVI     C,'-'   ;SENT PROMPT
1135 C73C CDB1C2            CALL    OUTC    ;FOR BREAKPOINT
1136 C73F CD33C4            CALL    GET16   ;GET BREAKPOINT ADDR.
1137 C742 2228D8            SHLD    TLOC    ;STORE FIRST BREAKPOINT ADDR.
1138 C745 7E                MOV     A,M     ;GET CODE FROM PROG.
1139 C746 322AD8            STA     TLOC+2  ;SAVE
1140 C749 36C7              MVI     M,0C7H  ;SET BREAKPOINT #1
1141 C74B DA64C7            JC      GO3
1142 C74E 0E2D              MVI     C,'-'
1143 C750 CDB1C2            CALL    OUTC
1144 C753 CD33C4            CALL    GET16   ;GET ANOTHER ADDR
1145 C756 222BD8            SHLD    TLOC+3
1146 C759 7E                MOV     A,M     ;GET CODE FROM PROG
1147 C75A 322DD8            STA     TLOC+5  ;SAVE
1148 C75D 36C7              MVI     M,0C7H  ;SET BREAKPOINT #2
1149 C75F 3EFF              MVI     A,-1
1150 C761 3231D8            STA     TLOC+9
1151 C764 210000    GO3:    LXI     H,0
1152 C767 112ED8            LXI     D,TLOC+6
1153 C76A 7E                MOV     A,M
1154 C76B 12                STAX    D
1155 C76C 13                INX     D
1156 C76D 23                INX     H
1157 C76E 7E                MOV     A,M
1158 C76F 12                STAX    D
1159 C770 23                INX     H
1160 C771 13                INX     D
1161 C772 7E                MOV     A,M
```

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```
1162 C773 12                    STAX    D
1163 C774 210000                LXI     H,0
1164 C777 36C3                  MVI     M,0C3H
1165 C779 2182C7                LXI     H,BREAK
1166 C77C 220100                SHLD    1
1167 C77F C3FCC6                JMP     GO1     ;RESTORE REGS, AND JUMP.
1168 C782               ;
1169 C782               ;BREAK  RETURN WHEN A BREAKPOINT IS HIT
1170 C782               ;
1171 C782 F3            BREAK:  DI              ;DISABLE THE INTERRUPT
1172 C783 E3                    XTHL
1173 C784 2B                    DCX     H
1174 C785 2234D8                SHLD    EXIT    ;SAVE THE NEXT USER ADDR
1175 C788 23                    INX     H
1176 C789 E3                    XTHL
1177 C78A E5                    PUSH    H
1178 C78B D5                    PUSH    D
1179 C78C C5                    PUSH    B
1180 C78D F5                    PUSH    PSW
1181 C78E               +       RIM
     C78E 20            +       DB      20H
     C78F
1182 C78F               ;
1183 C78F               ;STORE REGISTERS IN SAVE AREA IN SCRATCHRAM
1184 C78F               ;
1185 C78F 2121D8                LXI     H,ILOC
1186 C792 77                    MOV     M,A
1187 C793 211BD8                LXI     H,ALOC
1188 C796 C1                    POP     B
1189 C797 70                    MOV     M,B
1190 C798 2120D8                LXI     H,FLOC
1191 C79B 71                    MOV     M,C
1192 C79C 211CD8                LXI     H,BLOC
1193 C79F C1                    POP     B
1194 C7A0 70                    MOV     M,B
1195 C7A1 23                    INX     H
1196 C7A2 71                    MOV     M,C
1197 C7A3 23                    INX     H
1198 C7A4 C1                    POP     B
1199 C7A5 70                    MOV     M,B
1200 C7A6 23                    INX     H
1201 C7A7 71                    MOV     M,C
1202 C7A8 C1                    POP     B
1203 C7A9 2123D8                LXI     H,LLOC
1204 C7AC 71                    MOV     M,C
1205 C7AD 2B                    DCX     H
1206 C7AE 70                    MOV     M,B
1207 C7AF C1                    POP     B
1208 C7B0 2124D8                LXI     H,PLOC
1209 C7B3 70                    MOV     M,B
1210 C7B4 23                    INX     H
1211 C7B5 71                    MOV     M,C
1212 C7B6 23                    INX     H
1213 C7B7 EB                    XCHG
1214 C7B8 210000                LXI     H,0
```

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```
1215 C7BB 39                DAD     SP
1216 C7BC EB                XCHG
1217 C7BD 72                MOV     M,D
1218 C7BE 23                INX     H
1219 C7BF 73                MOV     M,E
1220 C7C0 31FFD8            LXI     SP,STACK
1221 C7C3           ;
1222 C7C3           ;EVERYTHING NOW STORED RESTORE
1223 C7C3           ;BREAKPOINT DATA
1224 C7C3           ;
1225 C7C3 2A28D8            LHLD    TLOC
1226 C7C6 3A2AD8            LDA     TLOC+2
1227 C7C9 77                MOV     M,A
1228 C7CA 3A31D8            LDA     TLOC+9
1229 C7CD A7                ANA     A
1230 C7CE CAD8C7            JZ      B1
1231 C7D1 2A2BD8            LHLD    TLOC+3
1232 C7D4 3A2DD8            LDA     TLOC+5
1233 C7D7 77                MOV     M,A
1234 C7D8 97        B1:     SUB     A
1235 C7D9 3231D8            STA     TLOC+9
1236 C7DC 112ED8            LXI     D,TLOC+6
1237 C7DF 210000            LXI     H,0
1238 C7E2 1A                LDAX    D
1239 C7E3 77                MOV     M,A
1240 C7E4 13                INX     D
1241 C7E5 23                INX     H
1242 C7E6 1A                LDAX    D
1243 C7E7 77                MOV     M,A
1244 C7E8 13                INX     D
1245 C7E9 23                INX     H
1246 C7EA 1A                LDAX    D
1247 C7EB 77                MOV     M,A
1248 C7EC           ;
1249 C7EC           ;EXIT THRU R TO MAIN.
1250 C7EC           ;
1251 C7EC 21BCC6            LXI     H,RTBL
1252 C7EF C38EC6            JMP     RS
1253 C7F2           ;
1254 C7F2           ;POP PSW AND ENTER HERE
1255 C7F2           ;
1256 C7F2 F5        VIDEO:  PUSH    PSW
1257 C7F3 C5                PUSH    B
1258 C7F4 D5                PUSH    D
1259 C7F5 E5                PUSH    H
1260 C7F6 47                MOV     B,A
1261 C7F7 3A38D8    VID1:   LDA     IFL
1262 C7FA FE49              CPI     'I'     ;FLAG INITED?
1263 C7FC CA11C8            JZ      CONT    ;YES, DISPLAY CHAR
1264 C7FF AF        INI:    XRA     A       ;CLEAR A
1265 C800 D3F8              OUT     0F8H    ;ZERO SCROLL
1266 C802 2138D8            LXI     H,IFL
1267 C805 3649              MVI     M,'I'   ;SET IFL
1268 C807 2C                INR     L
1269 C808 3680              MVI     M,80H
```

```
1270 C80A 2C                    INR     L
1271 C80B 2C                    INR     L
1272 C80C 3600                  MVI     M,0
1273 C80E C3B0C8                JMP     CLEAR
1274 C811               ;
1275 C811 2A36D8        CONT:   LHLD    CURS
1276 C814 3A3AD8                LDA     UND
1277 C817 77                    MOV     M,A
1278 C818 78                    MOV     A,B
1279 C819 B7                    ORA     A
1280 C81A CA8FC8                JZ      DELAY
1281 C81D FE13                  CPI     13H     ;CNTRL S 'SPEED'
1282 C81F CAE0C8                JZ      SDL
1283 C822 FE15                  CPI     21      ;CNTRL U 'CURSUR UP
1284 C824 CA96C8                JZ      UP
1285 C827 FE12                  CPI     18      ;CNTRL R 'CURSUR FORWARD'
1286 C829 CA5DC8                JZ      FOW
1287 C82C FE0C                  CPI     12      ;CNTRL L 'BACKSPACE'
1288 C82E CADCC8                JZ      BACK
1289 C831 FE0E                  CPI     14      ;CNTRL N 'GRAPHICS ON'
1290 C833 CAA8C8                JZ      GRON
1291 C836 FE0F                  CPI     15      ;CNTRL O 'GRAPHICS OFF'
1292 C838 CAA3C8                JZ      GROFF
1293 C83B FE04                  CPI     4       ;CNTRL D 'CLEAR SCREEN'
1294 C83D CAFFC7                JZ      INI
1295 C840 FE0A                  CPI     10      ;CNTRL J 'LINE FEED'
1296 C842 CAD3C8                JZ      LF
1297 C845 FE0D                  CPI     13      ;CNTRL M 'RETURN'
1298 C847 CAC2C8                JZ      CR
1299 C84A FE08                  CPI     8       ;CNTRL H 'HOME CURSUR'
1300 C84C CABCC8                JZ      HOME
1301 C84F FE5F                  CPI     95      ;SHIFT O 'BACKSPACE'
1302 C851 CADAC8                JZ      BS
1303 C854 E67F                  ANI     7FH
1304 C856 47                    MOV     B,A
1305 C857 3A39D8                LDA     VFL
1306 C85A B0                    ORA     B
1307 C85B 47                    MOV     B,A
1308 C85C 70                    MOV     M,B
1309 C85D 23            FOW:    INX     H
1310 C85E 7C            DONE:   MOV     A,H
1311 C85F FEFC                  CPI     PSTAD+4
1312 C861 C280C8                JNZ     FINI
1313 C864 2100F8                LXI     H,PAGE
1314 C867 1140F8                LXI     D,PAGE+64
1315 C86A 1A            SCROL:  LDAX    D
1316 C86B 77                    MOV     M,A
1317 C86C 13                    INX     D
1318 C86D 23                    INX     H
1319 C86E 7A                    MOV     A,D
1320 C86F FEFC                  CPI     PSTAD+4
1321 C871 C26AC8                JNZ     SCROL
1322 C874 36A0          LDL:    MVI     M,0A0H
1323 C876 23                    INX     H
1324 C877 7C                    MOV     A,H
```

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```
1325 C878 FEFC              CPI     PSTAD+4
1326 C87A C274C8            JNZ     LDL
1327 C87D 21C0FB            LXI     H,PAGE+960
1328 C880 7E        FINI:   MOV     A,M
1329 C881 323AD8            STA     UND
1330 C884 36FF              MVI     M,-1
1331 C886 00                NOP
1332 C887 2236D8            SHLD    CURS
1333 C88A E1                POP     H
1334 C88B D1                POP     D
1335 C88C C1                POP     B
1336 C88D F1                POP     PSW
1337 C88E C9                RET
1338 C88F 3C        DELAY:  INR     A
1339 C890 C28FC8            JNZ     DELAY
1340 C893 C380C8            JMP     FINI
1341 C896 11C0FF    UP:     LXI     D,-64
1342 C899 19                DAD     D
1343 C89A 7C        FIX:    MOV     A,H
1344 C89B E603              ANI     3
1345 C89D F6F8              ORI     PSTAD
1346 C89F 67                MOV     H,A
1347 C8A0 C380C8            JMP     FINI
1348 C8A3 3E80      GROFF:  MVI     A,80H
1349 C8A5 C3AAC8            JMP     VSET
1350 C8A8 3E00      GRON:   MVI     A,0
1351 C8AA 3239D8    VSET:   STA     VFL
1352 C8AD C380C8            JMP     FINI
1353 C8B0 2100F8    CLEAR:  LXI     H,PAGE
1354 C8B3 36A0      CLEA1:  MVI     M,0A0H
1355 C8B5 23                INX     H
1356 C8B6 7C                MOV     A,H
1357 C8B7 FEFC              CPI     PSTAD+4
1358 C8B9 C2B3C8            JNZ     CLEA1
1359 C8BC 2100F8    HOME:   LXI     H,PAGE
1360 C8BF C380C8            JMP     FINI
1361 C8C2 7D        CR:     MOV     A,L
1362 C8C3 E6C0              ANI     0C0H
1363 C8C5 6F                MOV     L,A
1364 C8C6 3A3BD8            LDA     SPD
1365 C8C9 57                MOV     D,A
1366 C8CA 7A        DLY:    MOV     A,D
1367 C8CB A7                ANA     A
1368 C8CC 1B                DCX     D
1369 C8CD C2CAC8            JNZ     DLY
1370 C8D0 C380C8            JMP     FINI
1371 C8D3 114000    LF:     LXI     D,64
1372 C8D6 19                DAD     D
1373 C8D7 C35EC8            JMP     DONE
1374 C8DA 36A0      BS:     MVI     M,0A0H
1375 C8DC 2B        BACK:   DCX     H
1376 C8DD C39AC8            JMP     FIX
1377 C8E0 3A3BD8    SDL:    LDA     SPD
1378 C8E3 C614              ADI     20
1379 C8E5 323BD8            STA     SPD
```

```
1380 C8E8 C380C8            JMP     FINI
1381 C8EB             ;
1382 C8EB             ;DISK BOOTSTRAP SECTION
1383 C8EB             ;
1384 C8EB CDB0C1      BBOOT:  CALL    ECHO
1385 C8EE FE0D                CPI     13
1386 C8F0 C222C4              JNZ     ERROR
1387 C8F3 CD4AC5              CALL    CRLF
1388 C8F6             ;
1389 C8F6 DBCC        BOOT:   IN      PORTD = 3CH
1390 C8F8 A7                  ANA     A
1391 C8F9 C204C9              JNZ     BOOTT
1392 C8FC 2173C2              LXI     H,MS014
1393 C8FF 1E07                MVI     E,SZ014
1394 C901 C327C4              JMP     CHK1
1395 C904             ;
1396 C904 31FFD8      BOOTT:  LXI     SP,STACK
1397 C907 CD17C9              CALL    BOOT1
1398 C90A C34000              JMP     40H
1399 C90D             ;
1400 C90D 3E81        RESET:  MVI     A,81H
1401 C90F CDE1CA              CALL    LOOP
1402 C912 3E0D                MVI     A,13
1403 C914 C3E1CA              JMP     LOOP
1404 C917             ;
1405 C917 CD0DC9      BOOT1:  CALL    RESET
1406 C91A 210000              LXI     H,0     ;SET OFFSET = 0
1407 C91D E5                  PUSH    H
1408 C91E 21F401              LXI     H,500   ;SIZE OF DISK EXECUTIVE
1409 C921 220CD8              SHLD    ISIZE   ;STORE IN INPUT FILE SIZE REG.
1410 C924 210ED8              LXI     H,ITRK  ;POINT TO INPUT FILE TRACK REG.
1411 C927 3601                MVI     M,1     ;STORE TRACK 1
1412 C929 23                  INX     H
1413 C92A 3600                MVI     M,0     ;STORE SECTOR 0
1414 C92C 23                  INX     H
1415 C92D 3600                MVI     M,0     ;STORE INPUT COUNT = 0
1416 C92F CD4CC9              CALL    LOADER  ;LOAD THE DISK EXECUTIVE
1417 C932 C9                  RET
1418 C933             ;
1419 C933 2A17D8      RESTR:  LHLD    TISZE   ;GET ORIGINAL SIZE OF FILE
1420 C936 220CD8              SHLD    ISIZE   ;COPY TO WORKING SIZE REGISTER
1421 C939 3A16D8              LDA     TITRK   ;GET ORIGINAL TRACK NUMBER
1422 C93C 320ED8              STA     ITRK    ;COPY TO WORKING TRACK REGISTER
1423 C93F 3A0BD8              LDA     IUNIT
1424 C942 0F                  RRC
1425 C943 0F                  RRC
1426 C944 320FD8              STA     ISCTR
1427 C947 97                  SUB     A
1428 C948 3210D8              STA     ICNTR
1429 C94B C9                  RET
1430 C94C             ;
1431 C94C             ;LOAD ROUTINE TO READ A HEX OBJECT FILE FROM DISK
1432 C94C             ;AND STORE IN MAIN RAM MEMORY.
1433 C94C             ;
1434 C94C E1          LOADER: POP     H       ;GET OFFSET AND SWAP
```

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```
1435 C94D E3                    XTHL            ;WITH RETURN
1436 C94E E5                    PUSH    H
1437 C94F E1            LOAD:   POP     H
1438 C950 E5                    PUSH    H
1439 C951 CDC1C9                CALL    RIX
1440 C954 063A                  MVI     B,':'
1441 C956 90                    SUB     B       ;LOOK FOR DATA LINE.
1442 C957 C24FC9                JNZ     LOAD
1443 C95A 57                    MOV     D,A     ;STORE IN D
1444 C95B CD90C9                CALL    BYTE
1445 C95E CA81C9                JZ      LOAD2
1446 C961 5F                    MOV     E,A
1447 C962 CD90C9                CALL    BYTE
1448 C965 F5                    PUSH    PSW
1449 C966 CD90C9                CALL    BYTE
1450 C969 C1                    POP     B
1451 C96A 4F                    MOV     C,A
1452 C96B 09                    DAD     B
1453 C96C CD90C9                CALL    BYTE
1454 C96F CD90C9        LOAD1:  CALL    BYTE
1455 C972 77                    MOV     M,A
1456 C973 23                    INX     H
1457 C974 1D                    DCR     E
1458 C975 C26FC9                JNZ     LOAD1
1459 C978 CD90C9                CALL    BYTE
1460 C97B C2A7C9                JNZ     LODER
1461 C97E C34FC9                JMP     LOAD
1462 C981 CD90C9        LOAD2:  CALL    BYTE
1463 C984 67                    MOV     H,A
1464 C985 CD90C9                CALL    BYTE
1465 C988 6F                    MOV     L,A
1466 C989 B4                    ORA     H
1467 C98A CA8EC9                JZ      LOAD3
1468 C98D E9                    PCHL
1469 C98E E1            LOAD3:  POP     H
1470 C98F C9                    RET
1471 C990               ;
1472 C990 CDC1C9        BYTE:   CALL    RIX
1473 C993 CDAFC9                CALL    NBL
1474 C996 07                    RLC
1475 C997 07                    RLC
1476 C998 07                    RLC
1477 C999 07                    RLC
1478 C99A 4F                    MOV     C,A
1479 C99B CDC1C9                CALL    RIX
1480 C99E CDAFC9                CALL    NBL
1481 C9A1 B1                    ORA     C
1482 C9A2 4F                    MOV     C,A
1483 C9A3 82                    ADD     D
1484 C9A4 57                    MOV     D,A
1485 C9A5 79                    MOV     A,C
1486 C9A6 C9                    RET
1487 C9A7               ;
1488 C9A7               ;LODER  IF LOAD ERROR OCCURS
1489 C9A7               ;
```

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```
1490 C9A7 21F5C1    LODER:  LXI     H,MS002 ;ERROR MESSAGE
1491 C9AA 1E0E              MVI     E,SZ002 ;SIZE TO E
1492 C9AC C327C4            JMP     CHK1
1493 C9AF           ;
1494 C9AF           ;SUBR TO CONVERT AN ASCII CHARACTER
1495 C9AF           ;TO A 4-BIT BINARY VALUE
1496 C9AF           ;
1497 C9AF D630      NBL:    SUI     '0'
1498 C9B1 D8                RC
1499 C9B2 C6E9              ADI     0E9H
1500 C9B4 D8                RC
1501 C9B5 C606              ADI     6
1502 C9B7 F2BDC9            JP      N10
1503 C9BA C607              ADI     7
1504 C9BC D8                RC
1505 C9BD C60A      N10:    ADI     10
1506 C9BF B7                ORA     A
1507 C9C0 C9                RET
1508 C9C1           ;
1509 C9C1           ;SUBROUTINE TO READ A ASCII CHAR FROM DISK
1510 C9C1           ;CHARACTER RETURNED IN A.
1511 C9C1           ;
1512 C9C1 CDD4C9    RIX:    CALL    RI
1513 C9C4 DA2EC1            JC      MAIN
1514 C9C7 E67F              ANI     127
1515 C9C9 C9                RET
1516 C9CA           ;
1517 C9CA           ;CASIN  READ A BYTE FROM MAG TAPE
1518 C9CA           ;
1519 C9CA DB6E      CASIN:  IN      CASC    ;GET MAG TAPE STATUS
1520 C9CC E610              ANI     16      ;CHECK B4
1521 C9CE C2CAC9            JNZ     CASIN   ;WAIT TIL LO
1522 C9D1 DB6F              IN      CASD    ;GET BYTE
1523 C9D3 C9                RET             ;RETURN TO CALLER
1524 C9D4           ;
1525 C9D4           ;RI READ AN 8 BIT BYTE FROM DISKETTE
1526 C9D4           ;
1527 C9D4 C5        RI:     PUSH    B
1528 C9D5 E5                PUSH    H
1529 C9D6 2110D8            LXI     H,ICNTR ;GET INPUT FILE COUNT
1530 C9D9 7E                MOV     A,M
1531 C9DA A7                ANA     A       ;SET FLAGS
1532 C9DB C2E3CA            JNZ     RI10    ;IF NOT 0 THEN BRANCH
1533 C9DE 210FD8    RI5:    LXI     H,ISCTR ;COUNT IS 0, INCREMENT SECTOR
1534 C9E1 CD53CA            CALL    INCDA
1535 C9E4 2A0CD8            LHLD    ISIZE   ;GET INPUT SIZE
1536 C9E7 2B                DCX     H       ;DECREMENT BY ONE
1537 C9E8 220CD8            SHLD    ISIZE   ;SECTOR
1538 C9EB 7D                MOV     A,L     ;CHECK IF OVER MAX
1539 C9EC A7                ANA     A
1540 C9ED C202CA            JNZ     RI3     ;NOT TO MAX YET!
1541 C9F0 7C                MOV     A,H
1542 C9F1 A7                ANA     A       ;TEST HI BYTE
1543 C9F2 C202CA            JNZ     RI3
1544 C9F5           ;
```

```
1545 C9F5                ;WE RAN OVER INDICATED SIZE WITHOUT
1546 C9F5                ;FINDING END OF FILE CHARACTER.  EXIT
1547 C9F5                ;WITH CARRY SET INDICATING ERROR.
1548 C9F5                ;
1549 C9F5 23                     INX     H
1550 C9F6 220CD8                 SHLD    ISIZE
1551 C9F9 2110D8                 LXI     H,ICNTR
1552 C9FC 3600                   MVI     M,0
1553 C9FE 37                     STC
1554 C9FF E1             RI2:    POP     H
1555 CA00 C1                     POP     B
1556 CA01 C9                     RET
1557 CA02 210FD8         RI3:    LXI     H,ISCTR
1558 CA05 CDBCCA                 CALL    XUS
1559 CA08 CD08CB                 CALL    CHK
1560 CA0B 23                     INX     H
1561 CA0C 3680                   MVI     M,128
1562 CA0E 0E05                   MVI     C,5
1563 CA10 2110D8                 LXI     H,ITRK
1564 CA13 CDD2CA                 CALL    SEEK
1565 CA16 3E03           RI6:    MVI     A,3
1566 CA18 CDE1CA                 CALL    LOOP
1567 CA1B DBCC                   IN      PORTD
1568 CA1D E680                   ANI     80H
1569 CA1F CA28CA                 JZ      RI4
1570 CA22 CDDFCA                 CALL    RFLAG
1571 CA25 C3DEC9                 JMP     RI5
1572 CA28 DBCC           RI4:    IN      PORTD
1573 CA2A E608                   ANI     8
1574 CA2C CA3ECA                 JZ      RI10
1575 CA2F CDDFCA                 CALL    RFLAG
1576 CA32 0D                     DCR     C
1577 CA33 C216CA                 JNZ     RI6
1578 CA36 2103C2                 LXI     H,MS003
1579 CA39 1E0F                   MVI     E,SZ003
1580 CA3B C327C4                 JMP     CHK1
1581 CA3E                ;
1582 CA3E 3E40           RI10:   MVI     A,40H
1583 CA40 D3D9                   OUT     PORTA
1584 CA42 DBCC                   IN      PORTD
1585 CA44 4F                     MOV     C,A
1586 CA45 3E41                   MVI     A,41H
1587 CA47 CDE1CA                 CALL    LOOP
1588 CA4A 2110D8                 LXI     H,ICNTR
1589 CA4D 35                     DCR     M
1590 CA4E 79                     MOV     A,C
1591 CA4F B7                     ORA     A
1592 CA50 C3FFC9                 JMP     RI2
1593 CA53                ;
1594 CA53                ;ROUTINE TO INCREMENT DISK ADDRESS
1595 CA53                ;
1596 CA53 34             INCDA:  INR     M
1597 CA54 7E                     MOV     A,M
1598 CA55 E61F                   ANI     1FH
1599 CA57 FE1B                   CPI     27
```

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```
 724 C4B8 FE09              CPI     9       ;NO, IS IT 9
 725 C4BA C2C3C4            JNZ     SP3     ;NO!
 726 C4BD 211440            LXI     H,S9600 ;YES, SET SPEED
 727 C4C0 C31CC5            JMP     SP4     ;TO 9600 BPS.
 728 C4C3 FE04      SP3:    CPI     4       ;IS IT 4
 729 C4C5 C2CEC4            JNZ     SP5     ;NO!
 730 C4C8 212840            LXI     H,S4800 ;YES, SET SPEED
 731 C4CB C31CC5            JMP     SP4     ;TO 4800 BPS.
 732 C4CE FE02      SP5:    CPI     2       ;IS IT A 2?
 733 C4D0 C2D9C4            JNZ     SP6     ;NO!
 734 C4D3 215040            LXI     H,S2400 ;YES, SET SPEED
 735 C4D6 C31CC5            JMP     SP4     ;TO 4800 BPS
 736 C4D9 FE01      SP6:    CPI     1       ;IS IT 1?
 737 C4DB C222C4            JNZ     ERROR   ;KEY ENTRY ERROR.
 738 C4DE 7C                MOV     A,H     ;YES IS A 1
 739 C4DF E60F              ANI     15      ;GET NEXT DIGIT
 740 C4E1 FE08              CPI     8       ;IS SECOND NUMBER 8?
 741 C4E3 C2ECC4            JNZ     SP11    ;NO, THEN SHOULD BE 2
 742 C4E6 216B40            LXI     H,S1800 ;YES, SET SPEED
 743 C4E9 C31CC5            JMP     SP4     ;TO 1800 BPS.
 744 C4EC FE02      SP11:   CPI     2       ;IS IT 2?
 745 C4EE C222C4            JNZ     ERROR   ;KEY ENTRY ERROR
 746 C4F1 21A040            LXI     H,S1200 ;YES, SET SPEED
 747 C4F4 C31CC5            JMP     SP4     ;TO 1200 BPS
 748 C4F7 7C        SP2:    MOV     A,H     ;GET 1ST 2 NUMBERS
 749 C4F8 FE03              CPI     3       ;IS 2ND # A 3?
 750 C4FA C203C5            JNZ     SP9     ;NO!
 751 C4FD 218042            LXI     H,S0300 ;YES, SET SPEED
 752 C500 C31CC5            JMP     SP4     ;TO 300 BPS
 753 C503 FE01      SP9:    CPI     1       ;IS 2ND # A 1?
 754 C505 C222C4            JNZ     ERROR   ;KEY ENTRY ERROR
 755 C508 7D        SP7:    MOV     A,L     ;GET LO-ORDER NUMBERS
 756 C509 FE50              CPI     50H     ;IS 3RD NUMBER 5
 757 C50B C214C5            JNZ     SP10    ;NO!
 758 C50E 210045            LXI     H,S0150 ;YES, SET SPEED
 759 C511 C31CC5            JMP     SP4     ;TO 150 BPS
 760 C514 FE10      SP10:   CPI     10H     ;IS 3RD NUMBER 1?
 761 C516 C222C4            JNZ     ERROR   ;NO, KEY ENTRY ERROR
 762 C519 21D146            LXI     H,S0110 ;YES, SET SPEED
 763 C51C 2204D8    SP4:    SHLD    BAUDP   ;TO 110 BAUD
 764 C51F C9                RET
 765 C520                   ;
 766 C520                   ;PRNAD  PRINT MEMORY ADDRESS.  THE
 767 C520                   ;16 BIT NUMBER IN H-L IS PRINTED AS 4
 768 C520                   ;ASCII CHARACTERS.
 769 C520                   ;
 770 C520 7C        PRNAD:  MOV     A,H
 771 C521 CD81C5            CALL    BYTEP
 772 C524 7D                MOV     A,L
 773 C525 C381C5            JMP     BYTEP
 774 C528                   ;
 775 C528                   ;FILL  FILL MEMORY WITH A CONSTANT
 776 C528                   ;USER SPECIFIES LO-ADDR/HI-ADDR/CONSTANT.
 777 C528                   ;
 778 C528 0C        FILL:   INR     C       ;LOOK FOR 3 NUMBERS
```

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```
 779 C529 CD12C4            CALL    STRING  ;GET 3 NUMBERS
 780 C52C CD4AC5            CALL    CRLF
 781 C52F C1                POP     B       ;CONSTANT IS REG C.
 782 C530 D1                POP     D       ;HI MEMORY ADDR.
 783 C531 E1                POP     H       ;LO MEMORY ADDR.
 784 C532 71        FILL1:  MOV     M,C     ;WRITE TO MEMORY
 785 C533 CD08C4            CALL    LIMIT   ;SEE IF WERE DONE.
 786 C536 D232C5            JNC     FILL1   ;NO, CONTINUE
 787 C539 C9                RET
 788 C53A           ;
 789 C53A           ;MOVEB  MOVE A BLOCK OF MEMORY
 790 C53A           ;
 791 C53A 0C        MOVEB:  INR     C       ;GET THREE NUMBERS
 792 C53B CD12C4            CALL    STRING
 793 C53E C1                POP     B       ;NEW ORG
 794 C53F D1                POP     D       ;OLD TOP ADDR.
 795 C540 E1                POP     H       ;OLD ORG
 796 C541 7E        MOVE1:  MOV     A,M     ;GET BYTE FROM OLD
 797 C542 02                STAX    B       ;WRITE TO NEW
 798 C543 03                INX     B       ;INCREMENT NEW
 799 C544 CD08C4            CALL    LIMIT   ;INCREMENT OLD
 800 C547 D241C5            JNC     MOVE1   ;AND LOOP IF NOT DONE.
 801 C54A           ;
 802 C54A           ;CRLF SENDS CARRIAGE RETURN LINE FEED TO CONSOLE DEVICE.
 803 C54A           ;
 804 C54A E5        CRLF:   PUSH    H       ;SAVE CURRENT
 805 C54B D5                PUSH    D       ;CPU REGISTER
 806 C54C F5                PUSH    PSW     ;CONTENTS.
 807 C54D 21EAC1            LXI     H,CRLFD ;POINT TO CRLF DATA BLOCK
 808 C550 3A00D8            LDA     NULOC   ;GET NUMBER OF NULLS TO ADD
 809 C553 C602              ADI     2       ;ADD 2 FOR CRLF
 810 C555 5F                MOV     E,A     ;PUT LENGTH IN REG. E
 811 C556 CDA6C3            CALL    MSOUT   ;SEND THE MESSAGE
 812 C559 F1                POP     PSW     ;RESTORE
 813 C55A D1                POP     D       ;CPU REGISTER CONTENTS
 814 C55B E1                POP     H       ;AND
 815 C55C C9                RET             ;RETURN TO CALLER
 816 C55D           ;
 817 C55D           ;DUMP   THIS ROUTINE DISPLAYS MEMORY
 818 C55D           ;CONTENTS ON THE LISTING DEVICE.
 819 C55D           ;
 820 C55D CD12C4    DUMP:   CALL    STRING  ;GET 2 NUMBERS
 821 C560 D1                POP     D       ;HI ADDR.
 822 C561 E1                POP     H       ;LO ADDR.
 823 C562 CD99C2    DUMP1:  CALL    CRLFP   ;CRLF TO LISTING DEVICE
 824 C565 CD20C5            CALL    PRNAD   ;DISPLAY ADDR.
 825 C568 0E20      DUMP2:  MVI     C,' '   ;SEND SPACE
 826 C56A CD93C5            CALL    OUTP    ;TO LIST DEVICE
 827 C56D 7E                MOV     A,M     ;GET MEMORY BYTE
 828 C56E CD81C5            CALL    BYTEP   ;SEND TO PRINTER
 829 C571 CD08C4            CALL    LIMIT   ;SEE IF WERE DONE
 830 C574 DA99C2            JC      CRLFP   ;DONE
 831 C577 00                NOP             ;DO SOME MORE.
 832 C578 7D                MOV     A,L
 833 C579 E60F              ANI     15
```

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```
 834 C57B C2E8C5            JNZ     DUMP2
 835 C57E C3E2C5            JMP     DUMP1
 836 C581                ;
 837 C581                ;BYTEP   PRINT A BYTE OF MEMORY
 838 C581                ;ON THE LISTING DEVICE AS TWO
 839 C581                ;ASCII CHARACTERS
 840 C581                ;
 841 C581 F5             BYTEP:  PUSH    PSW     ;SAVE A COPY
 842 C582 0F                     RRC             ;SHIFT
 843 C583 0F                     RRC             ;FOR
 844 C584 0F                     RRC             ;HI
 845 C585 0F                     RRC             ;ORDER
 846 C586 CD99C4                 CALL    HTOA    ;CONVERT TO ASCII
 847 C589 CD93C5                 CALL    OUTP    ;SEND TO PRINTER
 848 C58C F1                     POP     PSW     ;GET ORIGINAL
 849 C58D CD99C4                 CALL    HTOA    ;CONVERT TO ASCII
 850 C590 C393C5                 JMP     OUTP    ;SEND TO PRINTER
 851 C593                ;
 852 C593                ;OUTP   SENDS ONE CHAR TO LISTING DEVICE
 853 C593                ;CHARACTER IS EXPECTED IN REG. C
 854 C593                ;
 855 C593 3A03D8         OUTP:   LDA     PSTAT   ;CHECK PRINTER
 856 C596 A7                     ANA     A       ;STATUS
 857 C597 CAB1C2                 JZ      OUTC    ;SEND DATA TO CRT
 858 C59A                ;
 859 C59A                ;WAIT FOR USART TXR TO EMPTY
 860 C59A                ;
 861 C59A C5                     PUSH    B
 862 C59B E5                     PUSH    H
 863 C59C 060A           OUTP2:  MVI     B,10
 864 C59E DBC1           OUTP1:  IN      SSTAT   ;GET USART STATUS
 865 C5A0 E604                   ANI     4       ;TX EMPTY?
 866 C5A2 CA9CC5                 JZ      OUTP2   ;NO
 867 C5A5 05                     DCR     B       ;YES, MAYBE
 868 C5A6 C29EC5                 JNZ     OUTP1   ;CHECK 9 MORE TIMES
 869 C5A9                ;
 870 C5A9                ;SWITCH THE OUTPUT CONNECTIONS TO PRINTER
 871 C5A9                ;
 872 C5A9 3E27                   MVI     A,27H
 873 C5AB D3C1                   OUT     SSTAT
 874 C5AD                ;
 875 C5AD                ;SWITCH THE SPEED TO MATCH THAT
 876 C5AD                ;OF THE PRINTER IN USE
 877 C5AD                ;
 878 C5AD 2A04D8                 LHLD    BAUDP
 879 C5B0 7D                     MOV     A,L
 880 C5B1 D3DC                   OUT     TIMLO
 881 C5B3 7C                     MOV     A,H
 882 C5B4 D3DD                   OUT     TIMHI
 883 C5B6 3ECF                   MVI     A,0CFH
 884 C5B8 D3D8                   OUT     PORTI
 885 C5BA                ;
 886 C5BA                ;SEND CHARACTER
 887 C5BA                ;
 888 C5BA 79                     MOV     A,C
```

```
 889 C5BB D3C0           OUT     SDATA
 890 C5BD                ;
 891 C5BD                ;RESTORE EVERYTHING THE WAY IT WAS
 892 C5BD                ;
 893 C5BD 060A           OUTP3:  MVI     B,10
 894 C5BF DBC1           OUTP4:  IN      SSTAT
 895 C5C1 E604                   ANI     4
 896 C5C3 CABDC5                 JZ      OUTP3
 897 C5C6 05                     DCR     B
 898 C5C7 C2BFC5                 JNZ     OUTP4
 899 C5CA                ;
 900 C5CA 3E25                   MVI     A,25H
 901 C5CC D3C1                   OUT     SSTAT
 902 C5CE                ;
 903 C5CE 2A19D8                 LHLD    BAUDC
 904 C5D1 7D                     MOV     A,L
 905 C5D2 D3DC                   OUT     TIMLO
 906 C5D4 7C                     MOV     A,H
 907 C5D5 D3DD                   OUT     TIMHI
 908 C5D7 3ECF                   MVI     A,0CFH
 909 C5D9 D3D8                   OUT     PORTI
 910 C5DB E1                     POP     H
 911 C5DC C1                     POP     B
 912 C5DD                ;
 913 C5DD C9                     RET
 914 C5DE                ;
 915 C5DE                ;INSPECT  INSPECT THE CONTENTS OF MEMORY
 916 C5DE                ;ONE LOCATION AT A TIME.  CHANGE CONTENTS
 917 C5DE                ;IF NECESSARY.
 918 C5DE                ;
 919 C5DE CD33C4         INSPECT:        CALL    GET16   ;GET AN ADDR.
 920 C5E1 DA2EC1                 JC      MAIN    ;CR ENTERED
 921 C5E4 7E             INSP1:  MOV     A,M     ;GET CONTENTS OF MEMLOC
 922 C5E5 CD77C4                 CALL    DIS8    ;DISPLAY CONTENTS
 923 C5E8 0E2D                   MVI     C,'-'   ;DISPLAY A DASH
 924 C5EA CDB1C2                 CALL    OUTC
 925 C5ED CD60C4                 CALL    DELIM   ;GET A CHAR
 926 C5F0 DA2EC1                 JC      MAIN    ;CR ENTERED
 927 C5F3 CAFFC5                 JZ      INSP2   ;SPACE ENTERED DISPLAY NEXT
 928 C5F6 EB                     XCHG            ;GET TWO ASCII CHARACTERS
 929 C5F7 CD39C4                 CALL    GET0    ;CONVERT TO BINARY AND
 930 C5FA EB                     XCHG
 931 C5FB 73                     MOV     M,E     ;STORE IN MEMORY
 932 C5FC DA2EC1                 JC      MAIN    ;RETURN ON CR
 933 C5FF 23             INSP2:  INX     H       ;INCREMENT MEMORY POINTER
 934 C600 C3E4C5                 JMP     INSP1   ;DO ANOTHER
 935 C603                ;
 936 C603                ;ASSIGN LISTING DEVICE
 937 C603                ;
 938 C603 2143C2         ASSIGN: LXI     H,MS009 ;DISPLAY
 939 C606 1E0F                   MVI     E,SZ009 ;"LIST DEVICE = "
 940 C608 CDA6C3                 CALL    MSOUT
 941 C60B CD97C3                 CALL    INC     ;GET A CHAR AND DISP IT.
 942 C60E FE43                   CPI     'C'     ;LIST = CRT?
 943 C610 CA25C6                 JZ      AS1     ;YES!
```

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```
 944 C613 FE0D              CPI     13      ;RETURN?
 945 C615 CA29C6            JZ      ADISP   ;DISPLAY STATUS
 946 C618 FE50              CPI     'P'     ;LIST = PRINTER?
 947 C61A C222C4            JNZ     ERROR   ;MUST BE CRT OR PRINTER
 948 C61D 3EFF              MVI     A,-1    ;SET STATUS = PRINTER
 949 C61F 3203D8            STA     PSTAT
 950 C622 C329C6            JMP     ADISP
 951 C625 97        AS1:    SUB     A       ;SET STATUS = CRT
 952 C626 3203D8            STA     PSTAT
 953 C629 3A03D8    ADISP:  LDA     PSTAT
 954 C62C A7                ANA     A
 955 C62D CA38C6            JZ      ADIS1
 956 C630 213CC2            LXI     H,MS008
 957 C633 1E07              MVI     E,SZ008
 958 C635 C32AC4            JMP     CHK1+3
 959 C638 2139C2    ADIS1:  LXI     H,MS007
 960 C63B 1E03              MVI     E,SZ007
 961 C63D C32AC4            JMP     CHK1+3
 962 C640           ;
 963 C640           ;R  EXAMINE AND MODIFY CPU REGISTERS
 964 C640           ;
 965 C640 21BCC6    R:      LXI     H,RTBL  ;POINT TO MATCH TABLE
 966 C643 CD60C4            CALL    DELIM   ;GET A CHAR.
 967 C646 DA8EC6            JC      R5      ;CR ENTERED
 968 C649 0E0C              MVI     C,SZR   ;TABLE SIZE
 969 C64B BE        R0:     CMP     M       ;COMPARE ENTRY TO TABLE
 970 C64C CA5AC6            JZ      R1      ;MATCH FOUND
 971 C64F 23                INX     H       ;NO MATCH, SKIP
 972 C650 23                INX     H       ;TO NEXT TABLE
 973 C651 23                INX     H       ;ENTRY.
 974 C652 23                INX     H
 975 C653 0D                DCR     C
 976 C654 C24BC6            JNZ     R0
 977 C657 C322C4            JMP     ERROR
 978 C65A 0E20      R1:     MVI     C,' '   ;SEND A SPACE
 979 C65C CDB1C2            CALL    OUTC    ;TO THE CRT.
 980 C65F CDAAC6    R2:     CALL    DREG    ;DISPLAY REG. CONTENTS
 981 C662 0E2D              MVI     C,'-'   ;SEND A DASH
 982 C664 CDB1C2            CALL    OUTC    ;TO THE CRT.
 983 C667 CD60C4            CALL    DELIM   ;GET A CHAR
 984 C66A DA2EC1            JC      MAIN    ;CR ENTERED
 985 C66D CA80C6            JZ      R4      ;SPACE ENTERED
 986 C670 E5                PUSH    H
 987 C671 C5                PUSH    B
 988 C672 CD39C4            CALL    GET0    ;GET NEW VALUE
 989 C675 7D                MOV     A,L
 990 C676 12                STAX    D
 991 C677 F1                POP     PSW
 992 C678 B7                ORA     A
 993 C679 FA7FC6            JM      R3
 994 C67C 1B                DCX     D
 995 C67D 7C                MOV     A,H
 996 C67E 12                STAX    D
 997 C67F E1        R3:     POP     H
 998 C680 AF        R4:     XRA     A
```

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```
 999 C681 B6                ORA     M
1000 C682 FA2EC1            JM      MAIN
1001 C685 78                MOV     A,B
1002 C686 FE0D              CPI     13
1003 C688 CA2EC1            JZ      MAIN
1004 C68B C35FC6            JMP     R2
1005 C68E CD4AC5    R5:     CALL    CRLF
1006 C691 0E20      R6:     MVI     C,' '
1007 C693 CDB1C2            CALL    OUTC
1008 C696 AF                XRA     A
1009 C697 B6                ORA     M
1010 C698 FA2EC1            JM      MAIN
1011 C69B 4E                MOV     C,M
1012 C69C CDB1C2            CALL    OUTC
1013 C69F 0E3D              MVI     C,'='
1014 C6A1 CDB1C2            CALL    OUTC
1015 C6A4 CDAAC6            CALL    DREG
1016 C6A7 C391C6            JMP     R6
1017 C6AA           ;
1018 C6AA           ;DREG  DISPLAY REGISTER CONTENTS
1019 C6AA           ;
1020 C6AA 23        DREG:   INX     H
1021 C6AB 5E                MOV     E,M
1022 C6AC 23                INX     H
1023 C6AD 56                MOV     D,M
1024 C6AE 23                INX     H
1025 C6AF 46                MOV     B,M     ;SIZE 1 OR 2
1026 C6B0 23                INX     H       ;POINT TO NEXT
1027 C6B1 1A                LDAX    D
1028 C6B2 CD77C4            CALL    DIS8    ;DISPLAY BYTE
1029 C6B5 05                DCR     B
1030 C6B6 F8                RM
1031 C6B7 13                INX     D
1032 C6B8 1A                LDAX    D
1033 C6B9 C377C4            JMP     DIS8
1034 C6BC           ;
1035 C6BC           ;RTBL  REGISTER IDENTIFIER TABLE
1036 C6BC           ;
1037 C6BC 41        RTBL:   DB      'A'
1038 C6BD 1BD8              DW      ALOC
1039 C6BF 00                DB      0
1040 C6C0 42                DB      'B'
1041 C6C1 1CD8              DW      BLOC
1042 C6C3 00                DB      0
1043 C6C4 43                DB      'C'
1044 C6C5 1DD8              DW      CLOC
1045 C6C7 00                DB      0
1046 C6C8 44                DB      'D'
1047 C6C9 1ED8              DW      DLOC
1048 C6CB 00                DB      0
1049 C6CC 45                DB      'E'
1050 C6CD 1FD8              DW      ELOC
1051 C6CF 00                DB      0
1052 C6D0 46                DB      'F'
1053 C6D1 20D8              DW      FLOC
```

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```
1054 C6D3 00                    DB      0
1055 C6D4 49                    DB      'I'
1056 C6D5 21D8                  DW      ILOC
1057 C6D7 00                    DB      0
1058 C6D8 48                    DB      'H'
1059 C6D9 22D8                  DW      HLOC
1060 C6DB 00                    DB      0
1061 C6DC 4C                    DB      'L'
1062 C6DD 23D8                  DW      LLOC
1063 C6DF 00                    DB      0
1064 C6E0 4D                    DB      'M'
1065 C6E1 22D8                  DW      HLOC
1066 C6E3 01                    DB      1
1067 C6E4 50                    DB      'P'
1068 C6E5 24D8                  DW      PLOC
1069 C6E7 01                    DB      1
1070 C6E8 53                    DB      'S'
1071 C6E9 26D8                  DW      SLOC
1072 C6EB 01                    DB      1
1073 C6EC FF                    DB      -1
1074 C6ED   000C        SZR     EQU     ($-RTBL)/4
1075 C6ED               ;
1076 C6ED               ;
1077 C6ED               ;GO  EXECUTE USER PROGRAM
1078 C6ED               ;
1079 C6ED CD60C4        GO:     CALL    DELIM
1080 C6F0 CA37C7                JZ      GO2
1081 C6F3 CD39C4                CALL    GET0
1082 C6F6 2234D8                SHLD    EXIT
1083 C6F9 CA37C7                JZ      GO2
1084 C6FC 2126D8        GO1:    LXI     H,SLOC
1085 C6FF 56                    MOV     D,M
1086 C700 23                    INX     H
1087 C701 5E                    MOV     E,M
1088 C702 D5                    PUSH    D       ;PUT SP ON STACK
1089 C703 3A1BD8                LDA     ALOC
1090 C706 67                    MOV     H,A
1091 C707 3A20D8                LDA     FLOC
1092 C70A 6F                    MOV     L,A
1093 C70B E5                    PUSH    H       ;PUT A + FLAGS ON STACK
1094 C70C 3A21D8                LDA     ILOC
1095 C70F 67                    MOV     H,A
1096 C710 E5                    PUSH    H       ;PUT INT. MASK ON STACK
1097 C711 211CD8                LXI     H,BLOC
1098 C714 56                    MOV     D,M
1099 C715 23                    INX     H
1100 C716 5E                    MOV     E,M
1101 C717 23                    INX     H
1102 C718 D5                    PUSH    D       ;PUT B-C ON STACK
1103 C719 56                    MOV     D,M
1104 C71A 23                    INX     H
1105 C71B 5E                    MOV     E,M
1106 C71C D5                    PUSH    D       ;PUT D-E ON STACK
1107 C71D 23                    INX     H
1108 C71E 23                    INX     H
```

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```
1109 C71F 23                INX     H
1110 C720 56                MOV     D,M
1111 C721 23                INX     H
1112 C722 5E                MOV     E,M
1113 C723             ;
1114 C723             ;RESTORE CPU REGISTERS WITH USER DATA.
1115 C723             ;
1116 C723 EB                XCHG                ;H-L SET
1117 C724 D1                POP     D           ;D-E SET
1118 C725 C1                POP     B           ;B-C SET
1119 C726 F1                POP     PSW
1120 C727             +     SIM
     C727 30          +     DB      30H
     C728
1121 C728 F1                POP     PSW         ;A + FLAGS SET
1122 C729 2232D8            SHLD    TLOC+10     ;STORE H-L TEMP
1123 C72C E3                XTHL                ;SP IN H
1124 C72D F9                SPHL                ;SP LOADED
1125 C72E 2A34D8            LHLD    EXIT        ;GET JUMP ADDR.
1126 C731 E5                PUSH    H           ;PUT ON NEW STACK
1127 C732 2A32D8            LHLD    TLOC+10     ;SET H-L
1128 C735 FB                EI
1129 C736 C9                RET                 ;EXECUTE USER CODE.
1130 C737             ;
1131 C737             ;G02  SET BREAKPOINT
1132 C737             ;
1133 C737 DAFCC6      G02:  JC      G01         ;NO BREAKPOINT TO SET.
1134 C73A 0E2D              MVI     C,'-'       ;SENT PROMPT
1135 C73C CDB1C2            CALL    OUTC        ;FOR BREAKPOINT
1136 C73F CD33C4            CALL    GET16       ;GET BREAKPOINT ADDR.
1137 C742 2228D8            SHLD    TLOC        ;STORE FIRST BREAKPOINT ADDR.
1138 C745 7E                MOV     A,M         ;GET CODE FROM PROG.
1139 C746 322AD8            STA     TLOC+2      ;SAVE
1140 C749 36C7              MVI     M,0C7H      ;SET BREAKPOINT #1
1141 C74B DA64C7            JC      G03
1142 C74E 0E2D              MVI     C,'-'
1143 C750 CDB1C2            CALL    OUTC
1144 C753 CD33C4            CALL    GET16       ;GET ANOTHER ADDR
1145 C756 222BD8            SHLD    TLOC+3
1146 C759 7E                MOV     A,M         ;GET CODE FROM PROG
1147 C75A 322DD8            STA     TLOC+5      ;SAVE
1148 C75D 36C7              MVI     M,0C7H      ;SET BREAKPOINT #2
1149 C75F 3EFF              MVI     A,-1
1150 C761 3231D8            STA     TLOC+9
1151 C764 210000      G03:  LXI     H,0
1152 C767 112ED8            LXI     D,TLOC+6
1153 C76A 7E                MOV     A,M
1154 C76B 12                STAX    D
1155 C76C 13                INX     D
1156 C76D 23                INX     H
1157 C76E 7E                MOV     A,M
1158 C76F 12                STAX    D
1159 C770 23                INX     H
1160 C771 13                INX     D
1161 C772 7E                MOV     A,M
```

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```
1162 C773 12                    STAX    D
1163 C774 210000                LXI     H,0
1164 C777 3603                  MVI     M,0C3H
1165 C779 2182C7                LXI     H,BREAK
1166 C77C 220100                SHLD    1
1167 C77F C3FCC6                JMP     GO1     ;RESTORE REGS, AND JUMP.
1168 C782               ;
1169 C782               ;BREAK  RETURN WHEN A BREAKPOINT IS HIT
1170 C782               ;
1171 C782 F3            BREAK:  DI              ;DISABLE THE INTERRUPT
1172 C783 E3                    XTHL
1173 C784 2B                    DCX     H
1174 C785 2234D8                SHLD    EXIT    ;SAVE THE NEXT USER ADDR
1175 C788 23                    INX     H
1176 C789 E3                    XTHL
1177 C78A E5                    PUSH    H
1178 C78B D5                    PUSH    D
1179 C78C C5                    PUSH    B
1180 C78D F5                    PUSH    PSW
1181 C78E               +       RIM
     C78E 20            +       DB      20H
     C78F
1182 C78F               ;
1183 C78F               ;STORE REGISTERS IN SAVE AREA IN SCRATCHRAM
1184 C78F               ;
1185 C78F 2121D8                LXI     H,ILOC
1186 C792 77                    MOV     M,A
1187 C793 211BD8                LXI     H,ALOC
1188 C796 C1                    POP     B
1189 C797 70                    MOV     M,B
1190 C798 2120D8                LXI     H,FLOC
1191 C79B 71                    MOV     M,C
1192 C79C 211CD8                LXI     H,BLOC
1193 C79F C1                    POP     B
1194 C7A0 70                    MOV     M,B
1195 C7A1 23                    INX     H
1196 C7A2 71                    MOV     M,C
1197 C7A3 23                    INX     H
1198 C7A4 C1                    POP     B
1199 C7A5 70                    MOV     M,B
1200 C7A6 23                    INX     H
1201 C7A7 71                    MOV     M,C
1202 C7A8 C1                    POP     B
1203 C7A9 2123D8                LXI     H,LLOC
1204 C7AC 71                    MOV     M,C
1205 C7AD 2B                    DCX     H
1206 C7AE 70                    MOV     M,B
1207 C7AF C1                    POP     B
1208 C7B0 2124D8                LXI     H,PLOC
1209 C7B3 70                    MOV     M,B
1210 C7B4 23                    INX     H
1211 C7B5 71                    MOV     M,C
1212 C7B6 23                    INX     H
1213 C7B7 EB                    XCHG
1214 C7B8 210000                LXI     H,0
```

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```
1215 C7BB 39                DAD     SP
1216 C7BC EB                XCHG
1217 C7BD 72                MOV     M,D
1218 C7BE 23                INX     H
1219 C7BF 73                MOV     M,E
1220 C7C0 31FFD8            LXI     SP,STACK
1221 C7C3           ;
1222 C7C3           ;EVERYTHING NOW STORED RESTORE
1223 C7C3           ;BREAKPOINT DATA
1224 C7C3           ;
1225 C7C3 2A28D8            LHLD    TLOC
1226 C7C6 3A2AD8            LDA     TLOC+2
1227 C7C9 77                MOV     M,A
1228 C7CA 3A31D8            LDA     TLOC+9
1229 C7CD A7                ANA     A
1230 C7CE CAD8C7            JZ      B1
1231 C7D1 2A2BD8            LHLD    TLOC+3
1232 C7D4 3A2DD8            LDA     TLOC+5
1233 C7D7 77                MOV     M,A
1234 C7D8 97        B1:     SUB     A
1235 C7D9 3231D8            STA     TLOC+9
1236 C7DC 112ED8            LXI     D,TLOC+6
1237 C7DF 210000            LXI     H,0
1238 C7E2 1A                LDAX    D
1239 C7E3 77                MOV     M,A
1240 C7E4 13                INX     D
1241 C7E5 23                INX     H
1242 C7E6 1A                LDAX    D
1243 C7E7 77                MOV     M,A
1244 C7E8 13                INX     D
1245 C7E9 23                INX     H
1246 C7EA 1A                LDAX    D
1247 C7EB 77                MOV     M,A
1248 C7EC           ;
1249 C7EC           ;EXIT THRU R TO MAIN.
1250 C7EC           ;
1251 C7EC 21BCC6            LXI     H,RTBL
1252 C7EF C38EC6            JMP     R5
1253 C7F2           ;
1254 C7F2           ;POP PSW AND ENTER HERE
1255 C7F2           ;
1256 C7F2 F5        VIDEO:  PUSH    PSW
1257 C7F3 C5                PUSH    B
1258 C7F4 D5                PUSH    D
1259 C7F5 E5                PUSH    H
1260 C7F6 47                MOV     B,A
1261 C7F7 3A38D8    VID1:   LDA     IFL
1262 C7FA FE49              CPI     'I'     ;FLAG INITED?
1263 C7FC CA11C8            JZ      CONT    ;YES, DISPLAY CHAR
1264 C7FF AF        INI:    XRA     A       ;CLEAR A
1265 C800 D3F8              OUT     0F8H    ;ZERO SCROLL
1266 C802 2138D8            LXI     H,IFL
1267 C805 3649              MVI     M,'I'   ;SET IFL
1268 C807 2C                INR     L
1269 C808 3630              MVI     M,30H
```

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```
1270 C80A 2C                INR     L
1271 C80B 2C                INR     L
1272 C80C 3600              MVI     M,0
1273 C80E C3B0C8            JMP     CLEAR
1274 C811           ;
1275 C811 2A36D8    CONT:   LHLD    CURS
1276 C814 3A3AD8            LDA     UND
1277 C817 77                MOV     M,A
1278 C818 78                MOV     A,B
1279 C819 B7                ORA     A
1280 C81A CA8FC8            JZ      DELAY
1281 C81D FE13              CPI     13H     ;CNTRL S 'SPEED'
1282 C81F CAE0C8            JZ      SDL
1283 C822 FE15              CPI     21      ;CNTRL U 'CURSUR UP
1284 C824 CA96C8            JZ      UP
1285 C827 FE12              CPI     18      ;CNTRL R 'CURSUR FORWARD'
1286 C829 CA5DC8            JZ      FOW
1287 C82C FE0C              CPI     12      ;CNTRL L 'BACKSPACE'
1288 C82E CADCC8            JZ      BACK
1289 C831 FE0E              CPI     14      ;CNTRL N 'GRAPHICS ON'
1290 C833 CAA8C8            JZ      GRON
1291 C836 FE0F              CPI     15      ;CNTRL O 'GRAPHICS OFF'
1292 C838 CAA3C8            JZ      GROFF
1293 C83B FE04              CPI     4       ;CNTRL D 'CLEAR SCREEN'
1294 C83D CAFFC7            JZ      INI
1295 C840 FE0A              CPI     10      ;CNTRL J 'LINE FEED'
1296 C842 CAD3C8            JZ      LF
1297 C845 FE0D              CPI     13      ;CNTRL M 'RETURN'
1298 C847 CAC2C8            JZ      CR
1299 C84A FE08              CPI     8       ;CNTRL H 'HOME CURSUR'
1300 C84C CABCC8            JZ      HOME
1301 C84F FE5F              CPI     95      ;SHIFT O 'BACKSPACE'
1302 C851 CADAC8            JZ      BS
1303 C854 E67F              ANI     7FH
1304 C856 47                MOV     B,A
1305 C857 3A39D8            LDA     VFL
1306 C85A B0                ORA     B
1307 C85B 47                MOV     B,A
1308 C85C 70                MOV     M,B
1309 C85D 23        FOW:    INX     H
1310 C85E 7C        DONE:   MOV     A,H
1311 C85F FEFC              CPI     PSTAD+4
1312 C861 C280C8            JNZ     FINI
1313 C864 2100F8            LXI     H,PAGE
1314 C867 1140F8            LXI     D,PAGE+64
1315 C86A 1A        SCROL:  LDAX    D
1316 C86B 77                MOV     M,A
1317 C86C 13                INX     D
1318 C86D 23                INX     H
1319 C86E 7A                MOV     A,D
1320 C86F FEFC              CPI     PSTAD+4
1321 C871 C26AC8            JNZ     SCROL
1322 C874 36A0      LDL:    MVI     M,0A0H
1323 C876 23                INX     H
1324 C877 7C                MOV     A,H
```

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```
1325 C878 FEFC              CPI     PSTAD+4
1326 C87A C274C8            JNZ     LDL
1327 C87D 21C0FB            LXI     H,PAGE+960
1328 C880 7E        FINI:   MOV     A,M
1329 C881 323AD8            STA     UND
1330 C884 36FF              MVI     M,-1
1331 C886 00                NOP
1332 C887 2236D8            SHLD    CURS
1333 C88A E1                POP     H
1334 C88B D1                POP     D
1335 C88C C1                POP     B
1336 C88D F1                POP     PSW
1337 C88E C9                RET
1338 C88F 3C        DELAY:  INR     A
1339 C890 C28FC8            JNZ     DELAY
1340 C893 C380C8            JMP     FINI
1341 C896 11C0FF    UP:     LXI     D,-64
1342 C899 19                DAD     D
1343 C89A 7C        FIX:    MOV     A,H
1344 C89B E603              ANI     3
1345 C89D F6F8              ORI     PSTAD
1346 C89F 67                MOV     H,A
1347 C8A0 C380C8            JMP     FINI
1348 C8A3 3E80      GROFF:  MVI     A,80H
1349 C8A5 C3AAC8            JMP     VSET
1350 C8A8 3E00      GRON:   MVI     A,0
1351 C8AA 3239D8    VSET:   STA     VFL
1352 C8AD C380C8            JMP     FINI
1353 C8B0 2100F8    CLEAR:  LXI     H,PAGE
1354 C8B3 36A0      CLEA1:  MVI     M,0A0H
1355 C8B5 23                INX     H
1356 C8B6 7C                MOV     A,H
1357 C8B7 FEFC              CPI     PSTAD+4
1358 C8B9 C2B3C8            JNZ     CLEA1
1359 C8BC 2100F8    HOME:   LXI     H,PAGE
1360 C8BF C380C8            JMP     FINI
1361 C8C2 7D        CR:     MOV     A,L
1362 C8C3 E6C0              ANI     0C0H
1363 C8C5 6F                MOV     L,A
1364 C8C6 3A3BD8            LDA     SPD
1365 C8C9 57                MOV     D,A
1366 C8CA 7A        DLY:    MOV     A,D
1367 C8CB A7                ANA     A
1368 C8CC 1B                DCX     D
1369 C8CD C2CAC8            JNZ     DLY
1370 C8D0 C380C8            JMP     FINI
1371 C8D3 114000    LF:     LXI     D,64
1372 C8D6 19                DAD     D
1373 C8D7 C35EC8            JMP     DONE
1374 C8DA 36A0      BS:     MVI     M,0A0H
1375 C8DC 2B        BACK:   DCX     H
1376 C8DD C39AC8            JMP     FIX
1377 C8E0 3A3BD8    SDL:    LDA     SPD
1378 C8E3 C614              ADI     20
1379 C8E5 323BD8            STA     SPD
```

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```
1380 C8E8 C380C8            JMP     FINI
1381 C8EB               ;
1382 C8EB               ;DISK BOOTSTRAP SECTION
1383 C8EB               ;
1384 C8EB CDB0C1        BBOOT:  CALL    ECHO
1385 C8EE FE0D                  CPI     13
1386 C8F0 C222C4                JNZ     ERROR
1387 C8F3 CD4AC5                CALL    CRLF
1388 C8F6               ;
1389 C8F6 DBCC          BOOT:   IN      PORTD + 3H
1390 C8F8 A7                    ANA     A
1391 C8F9 C204C9                JNZ     BOOTT
1392 C8FC 2173C2                LXI     H,MS014
1393 C8FF 1E07                  MVI     E,SZ014
1394 C901 C327C4                JMP     CHK1
1395 C904               ;
1396 C904 31FFD8        BOOTT:  LXI     SP,STACK
1397 C907 CD17C9                CALL    BOOT1
1398 C90A C34000                JMP     40H
1399 C90D               ;
1400 C90D 3E81          RESET:  MVI     A,81H
1401 C90F CDE1CA                CALL    LOOP
1402 C912 3E0D                  MVI     A,13
1403 C914 C3E1CA                JMP     LOOP
1404 C917               ;
1405 C917 CD0DC9        BOOT1:  CALL    RESET
1406 C91A 210000                LXI     H,0     ;SET OFFSET = 0
1407 C91D E5                    PUSH    H
1408 C91E 21F401                LXI     H,500   ;SIZE OF DISK EXECUTIVE
1409 C921 220CD8                SHLD    ISIZE   ;STORE IN INPUT FILE SIZE REG.
1410 C924 210ED8                LXI     H,ITRK  ;POINT TO INPUT FILE TRACK REG.
1411 C927 3601                  MVI     M,1     ;STORE TRACK 1
1412 C929 23                    INX     H
1413 C92A 3600                  MVI     M,0     ;STORE SECTOR 0
1414 C92C 23                    INX     H
1415 C92D 3600                  MVI     M,0     ;STORE INPUT COUNT = 0
1416 C92F CD4CC9                CALL    LOADER  ;LOAD THE DISK EXECUTIVE
1417 C932 C9                    RET
1418 C933               ;
1419 C933 2A17D8        RESTR:  LHLD    TISZE   ;GET ORIGINAL SIZE OF FILE
1420 C936 220CD8                SHLD    ISIZE   ;COPY TO WORKING SIZE REGISTER
1421 C939 3A16D8                LDA     TITRK   ;GET ORIGINAL TRACK NUMBER
1422 C93C 320ED8                STA     ITRK    ;COPY TO WORKING TRACK REGISTER
1423 C93F 3A0BD8                LDA     IUNIT
1424 C942 0F                    RRC
1425 C943 0F                    RRC
1426 C944 320FD8                STA     ISCTR
1427 C947 97                    SUB     A
1428 C948 3210D8                STA     ICNTR
1429 C94B C9                    RET
1430 C94C               ;
1431 C94C               ;LOAD ROUTINE TO READ A HEX OBJECT FILE FROM DISK
1432 C94C               ;AND STORE IN MAIN RAM MEMORY.
1433 C94C               ;
1434 C94C E1            LOADER: POP     H       ;GET OFFSET AND SWAP
```

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```
1485 C94D E3                    XTHL            ;WITH RETURN
1486 C94E E5                    PUSH    H
1487 C94F E1            LOAD:   POP     H
1488 C950 E5                    PUSH    H
1489 C951 CDC1C9                CALL    RIX
1440 C954 063A                  MVI     B,':'
1441 C956 90                    SUB     B       ;LOOK FOR DATA LINE.
1442 C957 C34FC9                JNZ     LOAD
1443 C95A 57                    MOV     D,A     ;STORE IN D
1444 C95B CD90C9                CALL    BYTE
1445 C95E CA81C9                JZ      LOAD2
1446 C961 5F                    MOV     E,A
1447 C962 CD90C9                CALL    BYTE
1448 C965 F5                    PUSH    PSW
1449 C966 CD90C9                CALL    BYTE
1450 C969 C1                    POP     B
1451 C96A 4F                    MOV     C,A
1452 C96B 09                    DAD     B
1453 C96C CD90C9                CALL    BYTE
1454 C96F CD90C9        LOAD1:  CALL    BYTE
1455 C972 77                    MOV     M,A
1456 C973 23                    INX     H
1457 C974 1D                    DCR     E
1458 C975 C26FC9                JNZ     LOAD1
1459 C978 CD90C9                CALL    BYTE
1460 C97B C2A7C9                JNZ     LODER
1461 C97E C34FC9                JMP     LOAD
1462 C981 CD90C9        LOAD2:  CALL    BYTE
1463 C984 67                    MOV     H,A
1464 C985 CD90C9                CALL    BYTE
1465 C988 6F                    MOV     L,A
1466 C989 B4                    ORA     H
1467 C98A CA8EC9                JZ      LOAD3
1468 C98D E9                    PCHL
1469 C98E E1            LOAD3:  POP     H
1470 C98F C9                    RET
1471 C990               ;
1472 C990 CDC1C9        BYTE:   CALL    RIX
1473 C993 CDAFC9                CALL    NBL
1474 C996 07                    RLC
1475 C997 07                    RLC
1476 C998 07                    RLC
1477 C999 07                    RLC
1478 C99A 4F                    MOV     C,A
1479 C99B CDC1C9                CALL    RIX
1480 C99E CDAFC9                CALL    NBL
1481 C9A1 B1                    ORA     C
1482 C9A2 4F                    MOV     C,A
1483 C9A3 82                    ADD     D
1484 C9A4 57                    MOV     D,A
1485 C9A5 79                    MOV     A,C
1486 C9A6 C9                    RET
1487 C9A7               ;
1488 C9A7               ;LODER  IF LOAD ERROR OCCURS
1489 C9A7               ;
```

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```
1490 C9A7 21F5C1    LODER:  LXI     H,MS002 ;ERROR MESSAGE
1491 C9AA 1E0E              MVI     E,SZ002 ;SIZE TO E
1492 C9AC C327C4            JMP     CHK1
1493 C9AF           ;
1494 C9AF           ;SUBR TO CONVERT AN ASCII CHARACTER
1495 C9AF           ;TO A 4-BIT BINARY VALUE
1496 C9AF           ;
1497 C9AF D630      NBL:    SUI     '0'
1498 C9B1 D8                RC
1499 C9B2 C6E9              ADI     0E9H
1500 C9B4 D8                RC
1501 C9B5 C606              ADI     6
1502 C9B7 F2BDC9            JP      N10
1503 C9BA C607              ADI     7
1504 C9BC D8                RC
1505 C9BD C60A      N10:    ADI     10
1506 C9BF B7                ORA     A
1507 C9C0 C9                RET
1508 C9C1           ;
1509 C9C1           ;SUBROUTINE TO READ A ASCII CHAR FROM DISK
1510 C9C1           ;CHARACTER RETURNED IN A.
1511 C9C1           ;
1512 C9C1 CDD4C9    RIX:    CALL    RI
1513 C9C4 DA2EC1            JC      MAIN
1514 C9C7 E67F              ANI     127
1515 C9C9 C9                RET
1516 C9CA           ;
1517 C9CA           ;CASIN  READ A BYTE FROM MAG TAPE
1518 C9CA           ;
1519 C9CA DB6E      CASIN:  IN      CASC    ;GET MAG TAPE STATUS
1520 C9CC E610              ANI     16      ;CHECK B4
1521 C9CE C2CAC9            JNZ     CASIN   ;WAIT TIL LO
1522 C9D1 DB6F              IN      CASD    ;GET BYTE
1523 C9D3 C9                RET             ;RETURN TO CALLER
1524 C9D4           ;
1525 C9D4           ;RI READ AN 8 BIT BYTE FROM DISKETTE
1526 C9D4           ;
1527 C9D4 C5        RI:     PUSH    B
1528 C9D5 E5                PUSH    H
1529 C9D6 2110D8            LXI     H,ICNTR ;GET INPUT FILE COUNT
1530 C9D9 7E                MOV     A,M
1531 C9DA A7                ANA     A       ;SET FLAGS
1532 C9DB C23ECA            JNZ     RI10    ;IF NOT 0 THEN BRANCH
1533 C9DE 210FD8    RI5:    LXI     H,ISCTR ;COUNT IS 0, INCREMENT SECTOR
1534 C9E1 CD53CA            CALL    INCDA
1535 C9E4 2A0CD8            LHLD    ISIZE   ;GET INPUT SIZE
1536 C9E7 2B                DCX     H       ;DECREMENT BY ONE
1537 C9E8 220CD8            SHLD    ISIZE   ;SECTOR
1538 C9EB 7D                MOV     A,L     ;CHECK IF OVER MAX
1539 C9EC A7                ANA     A
1540 C9ED C202CA            JNZ     RI3     ;NOT TO MAX YET!
1541 C9F0 7C                MOV     A,H
1542 C9F1 A7                ANA     A       ;TEST HI BYTE
1543 C9F2 C202CA            JNZ     RI3
1544 C9F5           ;
```

```
1545 C9F5             ;WE RAN OVER INDICATED SIZE WITHOUT
1546 C9F5             ;FINDING END OF FILE CHARACTER.  EXIT
1547 C9F5             ;WITH CARRY SET INDICATING ERROR.
1548 C9F5             ;
1549 C9F5 23                 INX     H
1550 C9F6 220CD8             SHLD    ISIZE
1551 C9F9 2110D8             LXI     H,ICNTR
1552 C9FC 3600               MVI     M,0
1553 C9FE 37                 STC
1554 C9FF E1          RI2:   POP     H
1555 CA00 C1                 POP     B
1556 CA01 C9                 RET
1557 CA02 210FD8      RI3:   LXI     H,ISCTR
1558 CA05 CDBCCA             CALL    XUS
1559 CA08 CD08CB             CALL    CHK
1560 CA0B 23                 INX     H
1561 CA0C 3680               MVI     M,128
1562 CA0E 0E05               MVI     C,5
1563 CA10 210ED8             LXI     H,ITRK
1564 CA13 CDD2CA             CALL    SEEK
1565 CA16 3E03        RI6:   MVI     A,3
1566 CA18 CDE1CA             CALL    LOOP
1567 CA1B DBCC               IN      PORTD
1568 CA1D E680               ANI     80H
1569 CA1F CA28CA             JZ      RI4
1570 CA22 CDDFCA             CALL    RFLAG
1571 CA25 C3DEC9             JMP     RI5
1572 CA28 DBCC        RI4:   IN      PORTD
1573 CA2A E608               ANI     8
1574 CA2C CA3ECA             JZ      RI10
1575 CA2F CDDFCA             CALL    RFLAG
1576 CA32 0D                 DCR     C
1577 CA33 C216CA             JNZ     RI6
1578 CA36 2103C2             LXI     H,MS003
1579 CA39 1E0F               MVI     E,SZ003
1580 CA3B C327C4             JMP     CHK1
1581 CA3E             ;
1582 CA3E 3E40        RI10:  MVI     A,40H
1583 CA40 D3D9               OUT     PORTA
1584 CA42 DBCC               IN      PORTD
1585 CA44 4F                 MOV     C,A
1586 CA45 3E41               MVI     A,41H
1587 CA47 CDE1CA             CALL    LOOP
1588 CA4A 2110D8             LXI     H,ICNTR
1589 CA4D 35                 DCR     M
1590 CA4E 79                 MOV     A,C
1591 CA4F B7                 ORA     A
1592 CA50 C3FFC9             JMP     RI2
1593 CA53             ;
1594 CA53             ;ROUTINE TO INCREMENT DISK ADDRESS
1595 CA53             ;
1596 CA53 34          INCDA: INR     M
1597 CA54 7E                 MOV     A,M
1598 CA55 E61F               ANI     1FH
1599 CA57 FE1B               CPI     27
```

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
1600 CA59 CA5ECA            JZ      INCDB
1601 CA5C 2D                DCR     L
1602 CA5D C9                RET
1603 CA5E 7E        INCDB:  MOV     A,M
1604 CA5F E6C1              ANI     0C1H
1605 CA61 77                MOV     M,A
1606 CA62 2D                DCR     L
1607 CA63 34                INR     M
1608 CA64 C9                RET
1609 CA65           ;
1610 CA65           ;SUBROUTINE TO WRITE A BYTE TO CASSETTE TAPE
1611 CA65           ;
1612 CA65 DB6E      CASOT:  IN      CASC    ;GET CASSETTE STATUS
1613 CA67 E620              ANI     20H     ;LOOK AT B6
1614 CA69 C265CA            JNZ     CASOT   ;WAIT TIL LO
1615 CA6C 79                MOV     A,C     ;GET CHAR
1616 CA6D D36F              OUT     CASD    ;SEND TO CASSETTE
1617 CA6F C9                RET
1618 CA70           ;
1619 CA70           ;
1620 CA70           ;SUBROUTINE TO WRITE A BYTE TO DISK
1621 CA70           ;
1622 CA70 79        WRT:    MOV     A,C
1623 CA71 E5                PUSH    H
1624 CA72 D3DA              OUT     PORTB
1625 CA74 3E31              MVI     A,31H
1626 CA76 CDE1CA            CALL    LOOP
1627 CA79 2115D8            LXI     H,DCNTR
1628 CA7C 34                INR     M
1629 CA7D 7E                MOV     A,M
1630 CA7E FE80              CPI     128
1631 CA80 C2BACA            JNZ     WRT4
1632 CA83 3600              MVI     M,0
1633 CA85 2114D8    WRT1:   LXI     H,DSCTR
1634 CA88 CDBCCA            CALL    XUS
1635 CA8B CD08CB            CALL    CHK
1636 CA8E 0E05              MVI     C,5
1637 CA90 2B                DCX     H
1638 CA91 CDD2CA            CALL    SEEK
1639 CA94 3E05      WRT2:   MVI     A,5
1640 CA96 CDE1CA            CALL    LOOP
1641 CA99 3E07              MVI     A,7
1642 CA9B CDE1CA            CALL    LOOP
1643 CA9E DBCC              IN      PORTD
1644 CAA0 E608              ANI     8
1645 CAA2 CAB7CA            JZ      WRT3
1646 CAA5 CDDFCA            CALL    RFLAG
1647 CAA8 0D                DCR     C
1648 CAA9 C294CA            JNZ     WRT2
1649 CAAC 3E0F              MVI     A,15
1650 CAAE CDE1CA            CALL    LOOP
1651 CAB1 CDEDCA            CALL    WRTN
1652 CAB4 C385CA            JMP     WRT1
1653 CAB7 CDEDCA    WRT3:   CALL    WRTN
1654 CABA E1        WRT4:   POP     H
```

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
1655 CABB C9                RET
1656 CABC                   ;
1657 CABC                   ;SUBROUTINE TO TRANSMIT UNIT SECTOR BYTE
1658 CABC                   ;
1659 CABC 7E        XUS:    MOV     A,M
1660 CABD E61F              ANI     1FH
1661 CABF E5                PUSH    H
1662 CAC0 213BCB            LXI     H,TBL-1
1663 CAC3 85                ADD     L
1664 CAC4 6F                MOV     L,A
1665 CAC5 4E                MOV     C,M
1666 CAC6 E1                POP     H
1667 CAC7 7E                MOV     A,M
1668 CAC8 E6C0              ANI     0C0H
1669 CACA B1                ORA     C
1670 CACB D3DA      XXUS:   OUT     PORTB
1671 CACD 3E21              MVI     A,21H
1672 CACF C3E1CA            JMP     LOOP
1673 CAD2                   ;
1674 CAD2                   ;SUBROUTINE TO SEEK TRACK
1675 CAD2                   ;TRACK NUMBER IS IN A
1676 CAD2                   ;
1677 CAD2 7E        SEEK:   MOV     A,M
1678 CAD3 D3DA              OUT     PORTB
1679 CAD5 3E11              MVI     A,11H
1680 CAD7 CDE1CA            CALL    LOOP
1681 CADA 3E09              MVI     A,9
1682 CADC C3E1CA            JMP     LOOP
1683 CADF                   ;
1684 CADF                   ;SUBROUTINE TO RESET DISK FLAGS
1685 CADF                   ;
1686 CADF 3E0B      RFLAG:  MVI     A,11
1687 CAE1                   ;
1688 CAE1                   ;SUBROUTINE TO ISSUE COMMAND..
1689 CAE1                   ;THEN LOOP ON BUSY UNTIL DONE.
1690 CAE1                   ;
1691 CAE1 D3D9      LOOP:   OUT     PORTA
1692 CAE3 97                SUB     A
1693 CAE4 D3D9              OUT     PORTA
1694 CAE6 DBCC      LOOP1:  IN      PORTD
1695 CAE8 1F                RAR
1696 CAE9 DAE6CA            JC      LOOP1
1697 CAEC C9                RET
1698 CAED                   ;
1699 CAED                   ;SUBR TO INC DISK ADDR AND
1700 CAED                   ;CHECK OUTPUT FILE SIZE.
1701 CAED                   ;
1702 CAED 2114D8    WRTN:   LXI     H,OSCTR
1703 CAF0 CD53CA            CALL    INCDA
1704 CAF3 2A11D8    WRTN2:  LHLD    OSIZE
1705 CAF6 2B                DCX     H
1706 CAF7 2211D8            SHLD    OSIZE
1707 CAFA 7D                MOV     A,L
1708 CAFB A7                ANA     A
1709 CAFC C0                RNZ
```

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
1710 CAFD 7C                MOV     A,H
1711 CAFE A7                ANA     A
1712 CAFF C0                RNZ
1713 CB00 2112C2            LXI     H,MS004
1714 CB03 1E09              MVI     E,SZ004
1715 CB05 C327C4            JMP     CHK1
1716 CB08                   ;
1717 CB08                   ;SUBROUTINE TO CHECK IF DISKETTE IS PRESENT
1718 CB08                   ;
1719 CB08 DBCC      CHK:    IN      PORTD
1720 CB0A E620              ANI     20H
1721 CB0C C8                RZ
1722 CB0D 211BC2            LXI     H,MS005
1723 CB10 1E0E              MVI     E,SZ005
1724 CB12 C327C4            JMP     CHK1
1725 CB15                   ;
1726 CB15                   ;INTERPASS FUNCTIONS
1727 CB15                   ;
1728 CB15 3A08D8    IPASS:  LDA     PASS
1729 CB18 1F                RAR
1730 CB19 D228CB            JNC     PASS2
1731 CB1C 3A08D8            LDA     PASS
1732 CB1F 3D                DCR     A
1733 CB20 3208D8            STA     PASS
1734 CB23 3E01              MVI     A,1
1735 CB25 C339CB            JMP     PASS3
1736 CB28 A7        PASS2:  ANA     A
1737 CB29 CA48C0            JZ      UPDAT
1738 CB2C CD33C9            CALL    RESTR
1739 CB2F 3A08D8            LDA     PASS
1740 CB32 1F                RAR
1741 CB33 F5                PUSH    PSW
1742 CB34 97                SUB     A
1743 CB35 3208D8            STA     PASS
1744 CB38 F1                POP     PSW
1745 CB39 C630      PASS3:  ADI     30H
1746 CB3B C9                RET
1747 CB3C                   ;
1748 CB3C                   ;LOGICAL/PHYSICAL SECTOR TABLE
1749 CB3C                   ;
1750 CB3C 010A1302  TBL:    DB      1,10,19,2
1751 CB40 0B140300          DB      11,20,3,12
1752 CB44 15040D16          DB      21,4,13,22
1753 CB48 050E1706          DB      5,14,23,6
1754 CB4C 0F180710          DB      15,24,7,16
1755 CB50 1908111A          DB      25,8,17,26
1756 CB54 0912              DB      9,18
1757 CB56                   ;
1758 CB56                   ;TAPEL  ROUTINE TO READ TARBELL TAPE
1759 CB56                   ;RECORD INTO RAM, OR COMPARE TAPE TO RAM.
1760 CB56                   ;
1761 CB56 F5        TAPEL:  PUSH    PSW     ;SAVE THE CONTROL CHAR
1762 CB57 DB6E              IN      CASC    ;SEE IF CASSETTE
1763 CB59 FEFF              CPI     -1      ;IS INSTALLED.
1764 CB5B CAF8CB            JZ      WT2     ;IT IS NOT!
```

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
1765 CB5E 3E10              MVI     A,10H   ;RESET
1766 CB60 D36E              OUT     CASC    ;CASSETTE INTERFACE
1767 CB62 97                SUB     A       ;CLEAR
1768 CB63 3206D8            STA     ERBYT   ;WRITE ERROR REG.
1769 CB66 CD12C4            CALL    STRING  ;GET SA AND EA
1770 CB69 D1                POP     D       ;ENDING ADDRESS
1771 CB6A E1                POP     H       ;STARTING ADDRESS
1772 CB6B F1                POP     PSW     ;SWAP STARTING CHAR
1773 CB6C E5                PUSH    H       ;WITH STARTING ADDR.
1774 CB6D F5                PUSH    PSW     ;ON STACK.
1775 CB6E 0600              MVI     B,0     ;SET CHECKSUM = 0
1776 CB70 CDCAC9    TAP1:   CALL    CASIN   ;GET A CHAR FROM TAPE
1777 CB73 4F                MOV     C,A     ;SAVE IN REG. C
1778 CB74 F1                POP     PSW     ;LOOK AT CONTROL CHAR.
1779 CB75 F5                PUSH    PSW
1780 CB76 FE56              CPI     'V'     ;VERIFY ONLY?
1781 CB78 CA7CCB            JZ      TAP2    ;YES!
1782 CB7B 71                MOV     M,C
1783 CB7C 79        TAP2:   MOV     A,C
1784 CB7D 80                ADD     B       ;UPDATE
1785 CB7E 47                MOV     B,A     ;CHECKSUM
1786 CB7F 79                MOV     A,C     ;CHECK IF BYTE
1787 CB80 BE                CMP     M       ;WRITTEN PROPERLY
1788 CB81 C4CBCB            CNZ     TAP4    ;KEEP TRACK OF ERRORS
1789 CB84 CD08C4            CALL    LIMIT   ;SEE IF WERE DONE.
1790 CB87 D270CB            JNC     TAP1    ;GET MORE INPUT
1791 CB8A CDCAC9            CALL    CASIN   ;GET CHECKSUM
1792 CB8D B8                CMP     B       ;COMPARE TO CALCULATED VALUE
1793 CB8E CA99CB            JZ      TAP3    ;GOOD LOAD
1794 CB91 21F5C1            LXI     H,MS002
1795 CB94 1E0E              MVI     E,SZ002
1796 CB96 C327C4            JMP     CHK1
1797 CB99 3A06D8    TAP3:   LDA     ERBYT
1798 CB9C A7                ANA     A
1799 CB9D CAB1CB            JZ      TAP6
1800 CBA0 CD4AC5            CALL    CRLF
1801 CBA3 3A06D8            LDA     ERBYT
1802 CBA6 CD77C4            CALL    DIS8
1803 CBA9 2152C2            LXI     H,MS010
1804 CBAC 1E14              MVI     E,SZ010
1805 CBAE C32AC4            JMP     CHK1+3
1806 CBB1 F1        TAP6:   POP     PSW     ;GET CONTROL CHAR
1807 CBB2 FE56              CPI     'V'
1808 CBB4 CAC3CB            JZ      TAP5
1809 CBB7 FE4C              CPI     'L'
1810 CBB9 CA2EC1            JZ      MAIN
1811 CBBC FE45              CPI     'E'
1812 CBBE C2CBCB            JNZ     TAP4
1813 CBC1 E1                POP     H
1814 CBC2 E9                PCHL
1815 CBC3 2166C2    TAP5:   LXI     H,MS011
1816 CBC6 1E0D              MVI     E,SZ011
1817 CBC8 C327C4            JMP     CHK1
1818 CBCB E5        TAP4:   PUSH    H
1819 CBCC 2106D8            LXI     H,ERBYT
```

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```
1820 CBCF 34                INR     M
1821 CBD0 E1                POP     H
1822 CBD1 C9                RET
1823 CBD2           ;
1824 CBD2           ;WTAPE  WRITE A MAG TAPE BINARY FILE
1825 CBD2           ;
1826 CBD2 DB6E      WTAPE:  IN      CASD    ;CHECK TO SEE IF
1827 CBD4 FEFF              CPI     -1      ;MAG TAPE IS INSTALLED
1828 CBD6 CAF8CB            JZ      WT2     ;ITS NOT!
1829 CBD9 CD12C4            CALL    STRING  ;GET START AND END ADDR.
1830 CBDC D1                POP     D       ;HI ADDR
1831 CBDD E1                POP     H       ;START ADDR.
1832 CBDE 0600              MVI     B,0     ;ZERO CHECKSUM
1833 CBE0 CD65CA            CALL    CASOT   ;SCRATCH CHAR
1834 CBE3 0EE6              MVI     C,0E6H  ;SEND
1835 CBE5 CD65CA            CALL    CASOT   ;SYNC CHAR
1836 CBE8 4E        WT1:    MOV     C,M     ;GET BYTE FROM MEMORY
1837 CBE9 CD65CA            CALL    CASOT   ;WRITE TO TAPE
1838 CBEC 80                ADD     B       ;UPDATE
1839 CBED 47                MOV     B,A     ;CHECKSUM
1840 CBEE CD08C4            CALL    LIMIT   ;CHECK IF DONE
1841 CBF1 D2E8CB            JNC     WT1     ;LOOP IF NOT
1842 CBF4 48                MOV     C,B     ;SEND
1843 CBF5 C365CA            JMP     CASOT   ;CHECKSUM TO TAPE
1844 CBF8           ;
1845 CBF8 217AC2    WT2:    LXI     H,MS015
1846 CBFB 1E0B              MVI     E,SZ015
1847 CBFD C327C4            JMP     CHK1
1848 CC00           ;
1849 CC00   0000            END

TOTAL ERRORS=00
```

SPACE BYTE 8085 PROM MONITOR 11-14-77

```
ADIS1 L C638    ADISP L C629    ALOC  L D81B    AS1   L C625
ASSEM L C036    ASSIG L C603    B1    L C7D8    BACK  L C8DC
BAUDC L D819    BAUDP L D804    BBOOT L C8EB    BLOC  L D81C
BOOT  L C8F6    BOOT1 L C917    BOOTT L C904    BREAK L C782
BS    L C8DA    BYTE  L C990    BYTEP L C581    CASC  E 006E
CASD  E 006F    CASIN L C9CA    CASOT L CA65    CHK   L CB08
CHK1  L C427    CLEA1 L C8B3    CLEAR L C8B0    CLOC  L D81D
CONT  L C811    CR    L C8C2    CRL1  L C2A8    CRLF  L C54A
CRLFD L C1EA    CRLFP L C299    CRLFV L C033    CSTAT L D807
CURS  L D836    DEL1  L C463    DELAY L C88F    DELIM L C460
DIS8  L C477    DISAD L C46F    DLAY  L C376    DLOC  L D81E
DLOOP L C37C    DLY   L C8CA    DONE  L C85E    DREG  L C6AA
DUMP  L C55D    DUMP1 L C562    DUMP2 L C568    ECHO  L C1B0
EDITO L C03F    ELOC  L D81F    ERBYT L D806    ERROR L C422
EXIT  L D834    EXIT1 L C3BD    EXIT2 L C3C3    FILL  L C528
FILL1 L C532    FINI  L C880    FIX   L C89A    FLAGV L C027
FLOC  L D820    FOW   L C85D    GET0  L C439    GET1  L C43C
GET16 L C433    GET2  L C44F    GO    L C6ED    GO1   L C6FC
GO2   L C737    GO3   L C764    GROFF L C8A3    GRON  L C8A8
HEXAS L C3E9    HIBYT L D801    HILOC L C3B0    HLOC  L D822
HOME  L C8BC    HTOA  L C499    ICNTR L D810    IFL   L D838
ILOC  L D821    INC   L C387    INC1  L C39A    INC2  L C38E
INCDA L CA53    INCDB L CA5E    INCV  L C003    INI   L C7FF
INIT  L C057    INIT0 L C119    INIT1 L C079    INIT2 L C095
INIT3 L C0BD    INIT4 L C0CA    INIT5 L C0DA    INIT6 L C0E5
INIT7 L C0F0    INIT8 L C0FB    INIT9 L C0B2    INITA L C106
INITB L C08C    INITC L C11C    INITD L C111    INSP1 L C5E4
INSP2 L C5FF    INSPE L C5DE    IPASS L CB15    ISCTR L D80F
ISIZE L D80C    ITRK  L D80E    IUNIT L D80B    LCCON L C457
LDL   L C874    LF    L C8D3    LIMIT L C408    LIST  L C489
LLOC  L D823    LOAD  L C94F    LOAD1 L C96F    LOAD2 L C981
LOAD3 L C98E    LOADE L C94C    LODER L C9A7    LOOP  L CAE1
LOOP1 L CAE6    LOOP2 L C122    LOOPV L C02A    MAIN  L C12E
MEMSZ L C018    MEMTP L C3E1    MLOC  E D822    MODE  E 4000
MOVE1 L C541    MOVEB L C53A    MS001 L C1BD    MS002 L C1F5
MS003 L C203    MS004 L C212    MS005 L C21B    MS006 L C229
MS007 L C239    MS008 L C23C    MS009 L C243    MS010 L C252
MS011 L C266    MS013 L C276    MS014 L C273    MS015 L C27A
MS016 L C285    MS017 L C295    MSOUT L C3A6    N10   L C9BD
NBL   L C9AF    NULL  L C1A2    NULOC L D800    OCNTR L D815
OFILE L D809    OSCTR L D814    OSIZE L D811    OTRK  L D813
OUNIT L D80A    OUTC  L C2B1    OUTC1 L C2BC    OUTCV L C009
OUTP  L C593    OUTP1 L C59E    OUTP2 L C59C    OUTP3 L C5BD
OUTP4 L C5BF    OUTPV L C015    PAGE  E F800    PASS  L D808
PASS2 L CB28    PASS3 L CB39    PASSV L C030    PLOC  L D824
PORTA E 00D9    PORTB E 00DA    PORTC E 00DB    PORTD E 00CC
PORTI E 00D8    PPROG L C31B    PPULS E 0010    PRNAD L C520
PROG  L C051    PROG1 L C32C    PROG2 L C332    PROGA L C352
PROM  L C2C7    PROM1 L C2D2    PROM2 L C30D    PSTAD E 00F8
PSTAT L D803    R     L C640    R0    L C64B    R1    L C65A
R2    L C65F    R3    L C67F    R4    L C680    R5    L C68E
R6    L C691    READP E 0024    READV L C006    RESET L C90D
RESTR L C933    RESTV L C01B    RFLAG L CADF    RI    L C9D4
RI10  L CA3E    RI2   L C9FF    RI3   L CA02    RI4   L CA28
RI5   L C9DE    RI6   L CA16    RIM   M 7C40    RIV   L C00F
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SPACE BYTE
WARRANTY DISCLOSURE

The specific warranty period for the SPACE BYTE 8085 CPU is 90 days from the date of purchase verified by receipt of buyers registration form at SPACE BYTE, Los Angeles, California. During that period the device will be repaired free of charge if material, component or manufacturing defects become apparent. However your dealer should be consulted prior to contacting SPACE BYTE. Most actual device replacements can be handled quickly by the dealer from who you purchased your unit.

This warranty is void if the SPACE BYTE has been subjected to catastrophic electrical or mechanical abuse. In this case the unit will be repaired for a nominal fee to cover actual device replacement and a labor charge. This charge will be authorized in writing prior to commencement of repairs.

NOTICE: The Space Byte Corporation hereby assumes no liability for loss of data, system damage or personal injury resulting from the use of said product.

The SPACE BYTE Corporation
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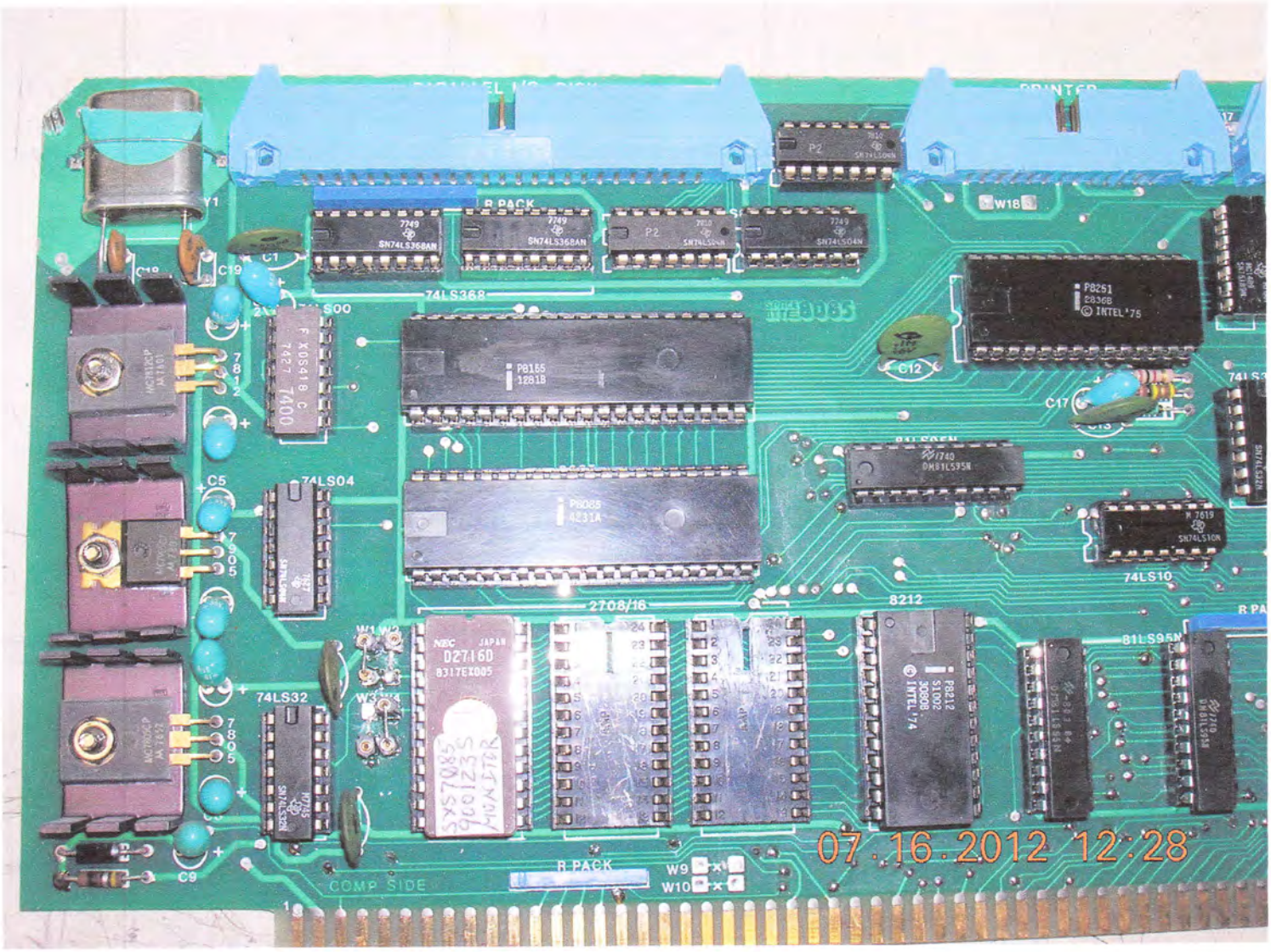

W2, W3 Cut

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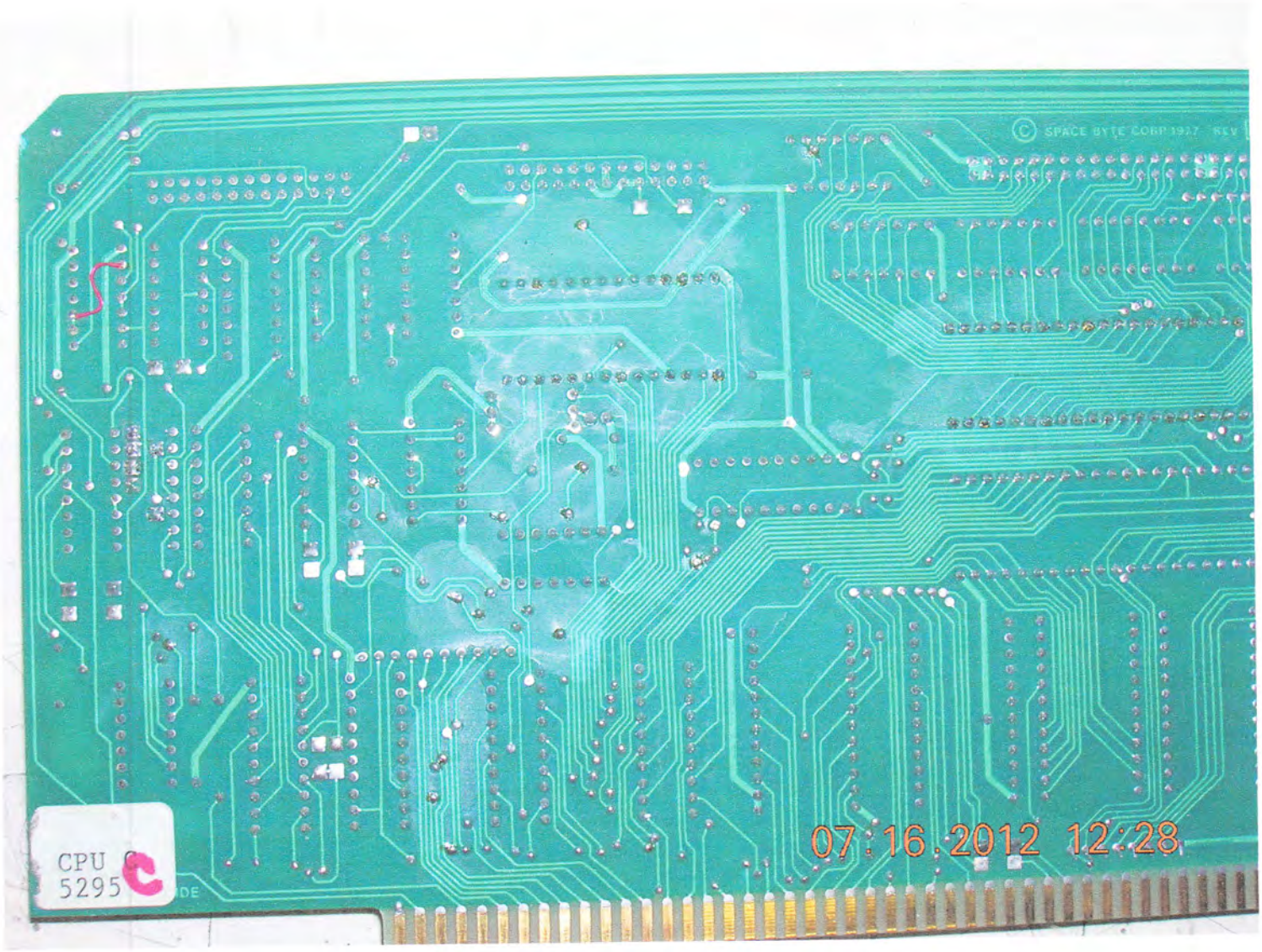

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