Chapter 4:

SYSINIT FUNCTIONS

During the initial Valdocs loading, or bootstrap, the SYSINIT program loads three modules which become part of the Valdocs system and, if appropriate, perform a graphic character download to the FX printer. Two of these modules are located in common RAM above the E000 Hex boundary, and the third is located on the SYSTEM bank of RAM at 7000 Hex. A brief description of the three modules follows.

INTERRUPT VECTOR TABLE - IVT

The Interrupt Vector Table (IVT) is a 64-byte table located at FF20 Hex in common RAM, containing sixteen 4-byte entries, one for each of the interrupt locations. Note that the QX-10 makes direct use of interrupt level 7, resulting in 15 usable interrupts.

COMMON MEMORY - COMMEM

The COMmon MEMory (COMMEM) module is a 256-byte area used to access programs located on memory bank one below the E000 Hex boundary. Memory above E000 Hex is common to all banks; there are four separate sections of memory below E000 Hex. The process of accessing a different section is known as bank switching, and the program that performs this action *must* be located in the common memory (above E000 Hex).

BANK ONE - BNK1

The BaNK one (BNK1) module is located at 7000 Hex on memory bank one (actual location and size change with Valdocs' continuing development). The module contains the major portion of the programs that provide Interrupt Service Subroutine (ISS) support and Back Door Subroutine (BDS) support. A separate Interrupt Service Subroutine exists for each of the interrupt levels that are used; likewise, there are separate Back Door Subroutines for each of the major support functions.

The following SYSINIT document describes *only* those functions that are intended to be used by the application programmer: many of the other SYSINIT functions are intended for use internal to the SPOOLER--a part of SYSINIT--or will change during Valdocs' development.

Application programmers should document their use of the following Back Door Subroutine (BDS) function calls so that they can adapt their programs to future changes.

BACK DOOR SUBROUTINE - BDS FUNCTION CALLS

BDS03 Function 3 provides support for the B side of the 7201 MPSCC, otherwise known as the "serial port," and is intended for use by an application program such as MAIL, which desires to use the serial port to access a modem.

BDS11 Function 11 allows an application program to send a screen dump to an Epson dot matrix printer. At the present time, the screen dump can only be sent to the printer if background spooling is inactive.

BDS13 Function 13 provides miscellaneous features: get disk date/id, print help message, turn on/off time display, and check for spooling activity.

BDS functions are accessed through TPM. The complete SYSINIT back door subroutine package comes under TPM function 40. Three function numbers must be kept in mind: a 40 (28 hex) in the C register to tell TPM to access SYSINIT; the BDS number in the B register to tell TPM which of the BDS functions you wish to use; and a possible subfunction number in one of the other registers. Depending upon the function desired, other information may be required in the remaining registers. A call to TPM is then made at address 5 (0005 Hex). Data may be returned in the various registers.

BDS03 SERIAL PORT

MAIL uses this function to access the serial port. It provides a means to turn the receive interrupts on or off, send and receive characters, read the modem status, and manipulate the modem control lines. Subfunction numbers are placed in the D register, and characters or data are placed in the E register.

The following is an assembly language example:

```
        ;
        ; Transmit the character pointed to by HL.
        ;
        SEND:
                MOV     E,M     ;get the character
                MVI     D,2     ;subfunction = transmit
                LXI     B,(3<8)+40 ;3 (BDS03) in the B reg
                                   ;40 in the C reg.
                CALL    0005H   ;call TPM
                INX     H       ;next char, HL preserved.
                RET
        ;
```

Subfunction   Description

0 Drain line and turn off receive interrupts.

1 Get a character from the receive buffer and return it in the A register.

2 Transmit the character which is supplied in the E register.

3 Get the serial port status and return it in the A register. The status bits are described:

```
7654:3210
|||| |||\-> 1 = Received data available.
|||| ||\--> 1 = Transmit buffer not full.
|||| |\---> 1 = All data sent.
|||| \----> 1 = Modem DCD line is true.
|||\------> 1 = Modem CTS line is true.
||\-------> 1 = Modem DSR line is true.
|\--------> 1 = Receive buffer overflowed.
\---------> 1 = Break or framing error occurred.
```

4 Turn the receive interrupts on if the E register contains a non-zero and turn them off if the E register contains a zero.

5 Turn the DTR modem control line on (+ voltage) if the E register contains a non-zero and turn it off (- voltage) if the E register contains a zero.

6 Turn the RTS modem control line on (+ voltage) if the E register contains a non-zero and turn it off (- voltage) if the E register contains a zero.

7 Send a break (continuous space or + voltage) if the E register contains a non-zero and stop sending a break (normal mark or - voltage) if the E register contains a zero.

BDS11 SCREEN DUMP

Application programs may use this function to performadump of the QX-10 screen to an Epson dot matrix printer. Subfunction numbers are placed in the H register.

An assembly language example appears below:

```
;
; Dump the screen to an Epson Printer.
;
DUMP:
        MVI     H,0       ;subfunction = dump
        LXI     B,(11<8)+40;11 (BDS11) in the B reg
                            ;40 in the C reg.
        CALL    0005H     ;call TPM
        RET
;
```

Subfunction Description

0 Dump the screen to an Epson dot matrix printer. The function will return a zero in the A register if the dump completed successfully, a +1 (01 Hex) if spooling was active, and a -1 (0FF Hex) if an error occurred in the value of the sub-function number. (At this time, only subfunction 0 is available.)

BDS13 MISC

Miscellaneous features, such as get disk date/id, print help message, turn off/on time display, and check for spooling activity are provided by this function. Subfunction numbers are placed in the H register, and other data may be required in the other registers.

Subfunction Description

0 Get disk date/id. DE points to a 16-byte area where the disk date/id will be stored. If A is returned non-zero,a disk error occurred and the contents of A is the disk error code. If no date/id is stored on the disk, the 16-byte area will be filled with "??/??/????:??:??".

```
; Get disk date/id.
;
        LXI     B,(13<8)+40 ; B = 13 BDS13
                            ; C = 40
        MVI     H,0       ;subfunction 0
        LXI     D,DATE    ;storage area
        CALL    0005H     ;call TPM
```

BDS13 Misc: (cont.)

Subfunction   Description

```
0     DATE:    .BLKB   16        ;storage area
      ;
```

1 Help message printer. DE points to a key word string that ends in a null. The help message file is always HELP.TXT and is located on the A: disk.

```
      ; Display a particular help message.
      ;
               LXI     B,(13<8)+40 ; B = 13, C = 40
               MVI     H,1       ;subfunction 1
               LXI     D,MSG1    ;desired message
               CALL    0005H     ;call TPM
               .
      MSG1:    .ASCIZ  'WHAT-TO-DO-NOW'
```

2 Turn off/on time display. The off/on code is supplied in the L reg. (zero = off, non-zero = on)

```
      ; Shut down time display.
      ;
               LXI     B,(13<8)+40 ; B = 13, C = 40
               LXI     H,(2<8)+0   ; H = 2,  L = 0
               CALL    0005H     ;call TPM
```

3 Check for spooling activity, zero is returned in the A register if spooling is active, non-zero if spooling is not active. If SYSINIT is not loaded, TPM will return a -1 in the A register.

```
      ; Check for spooling activity.
      ;
               LXI     B,(13<8)+40 ; D = 13, C = 40
               MVI     H,3       ;subfunction 3
               CALL    0005H     ;call TPM
               STA     SPLLR     ;save status
               .
      SPLLR:   .BLKB   1         ;spooling activity
```