MICRO INNOVATIONS
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Multipurpose Interface Board 2 (MIB2)

Installation and Operating Instructions

Congratulations on the purchase of an MIB2 Multipurpose Interface Board for your Coleco ADAM computer! The MIB2 adds two RS-232 ports, a parallel printer port, and a memory expansion board port (for Orphanware and E & T memory expander boards) to your computer.

This document contains all the information you'll need to get your MIB2 up and running. It's as simple as plugging it in and booting the supplied software. The detailed instructions contained herein will take you through the installation and checkout process.

We know you're anxious to get started. But first please read all the way through the instructions so you'll be somewhat familiar with the process before you actually start the installation.

A WORD OF WARNING ABOUT STATIC ELECTRICITY!

Before you get started, just a word of warning about static electricity. The integrated circuit chips used on the MIB2 can be destroyed by static charges. If you notice that you get shocks when you touch metal appliances after walking around the room, then you should take precautions to prevent static discharges when handling it. There are a couple of common precautions you can take if you suspect static electricity is a problem in your installation environment.

One precaution you can take is to discharge yourself each time before you touch the MIB2. You can do this by performing your installation near an appliance that you can touch to discharge the static electricity just prior to handling it. Another way is to connect a wire to a water pipe or the metal frame of a grounded appliance (like a refrigerator). AC power outlets in modern homes and businesses also can be a ground source (you can pick up the ground from the screw that holds the cover plate onto the receptacle). Wrap the other end of this wire around your wrist or a finger. Make sure you are using the frame of a grounded appliance.

By the way, the MIB2 chips are not particularly sensitive to static electricity, but like all normal 74LS series integrated circuits, they can be destroyed if hit with a big enough discharge.

UNPACKING

The MIB2 comes packed in a small box. Inside the box, you'll find 4 or more items, counting this document -

(1) your invoice,
(2) the installation and operating instructions,
(3) the MIB2 circuit board with AC power cube
(4) the distribution software diskette or tape,
(5 - 7) zero to three ribbon cables, depending upon how many cables you ordered with the MIB2

Please make sure that you have all of the above-listed components before going any further. If anything is missing, please give the dealer you purchased the MIB2 from a call so he (or she) can ship you any missing parts. Assuming that everything is accounted for, let's proceed to installation.

INSTALLATION

As mentioned earlier, the MIB2 has two RS232 ports, a parallel printer port and a memory expander board port on it. Which cables you'll install will depend on how many interface cables you purchased with the MIB2. The following steps will take you through the installation process for all of the MIB2 cables. If you did not purchase a particular cable, please disregard the installation instructions for that cable.

Let's start with the parallel printer calble. Locate the cable marked "PRINTER". This cable has a 26 pin socket connector on one end and a 36 pin Centronics connector on the other. The socket connector plugs in to MIB2 connector J2. Use the MIB2 layout drawing included as Figure 1 to locate the position of J2. Please note that the socket connector is keyed, so that it plugs in to J2 in only one orientation. The socket connector is also labelled. When the MIB2 is placed with it's gold edge card connector down (as shown in figure 1 below), the label will be closest to the top edge of the board when the connector is installed correctly. The label should say "PTR (TOP)" on it. Gently push the socket connector onto J2. For now, leave the other end unconnected. If you have too many pieces of equipment connected at first, you may have difficulty making the cables reach as you're installing the MIB2 into your computer.

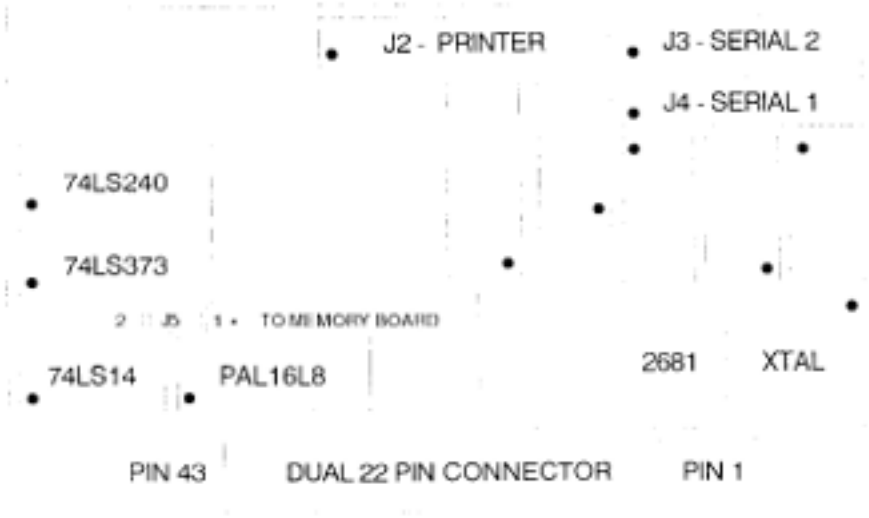

FIGURE 1 - MIB2 LAYOUT (viewed from the COMPONENT side)

Now for the Serial ports. Note that the two serial cables are labelled differently. This is because they are made differently. The way each cable exits it's socket connector is different. Serial port number two's cable has the cable coming out the connector near the top of the computer while number one's has it coming out towards the bottom of the computer. This is to keep interference between the two socket connectors at a minimum - they are close together when both installed.

Locate the cable marked "SERIAL 1". Notice that it has a 20 pin socket connector on one end and a DB-25 male connector on the other. Align the 20 pin socket connector with the pins on J4 and push it onto J4. The label, which says "SER1 (TOP)", goes toward the top edge of the board. Now locate and connect the serial port 2 cable. It is marked "SER2 (TOP)". Plug it in to connector J3. As before, leave the other ends of both cables unconnected for now.

Okay! We're ready to plug the MIB2 into the computer. Pick up the MIB2 with its dangling cables and take it to the computer. Assuming you are looking at the computer from its front, the board goes into the center expansion slot with the components towards the **left**. Some of the other ADAM add-on boards have the components on the right when they are installed. Make sure that the MIB2 has its components facing the left side of the machine. This means that the cables will exit the computer to the left side unless you wrap them back over the top of the board. Please note that if you plug in the MIB2 backwards, you will most likely destroy all of the integrated circuits on it. **Make sure that you have the MIB2 oriented so that the components are facing towards the left side of the computer (when viewed from the front) before you install it!**

If you already have a board in the center slot, it will have to be removed. If you do have a board in the center slot, it is most likely a parallel printer interface or memory addressor board. The parallel printer port on the MIB2 will replace all of the functions of the board you have to remove, so don't worry that you'll lose your printer port or memory expansion board

addressing capability. You can take the removed board to your next user's group meeting and sell it to someone who doesn't have an MIB2!

If you have a memory expander board installed in slot #3 (the right slot), you'll have one or two wires running from it to the board you're removing. The MIB2 provides the same signal (and its return wire - a ground connection) to your memory expander board, so detach the wire(s) at the printer board end.

Locate connector J5 on the back of the MIB2 (see figure 1 to locate it - Please note that figure 1 shows the layout from the component side of the board - you'll need to locate J5 on the solder, or reverse side of the board). Connector J5 consists of two pins - pin 1 is for the bank switch signal to the memory board and pin 2 is for a ground line. If you experience erratic operation of your memory board, you'll have to use both pins and twisted wire between the boards. Twisted wire will reduce the amount noise that the signal wire will pick up. If you're using a single wire from the memory expander board, connect it to J5 pin 1. The most common color codes for the wires are for the signal wire to be red and the ground wire black.

Connect the memory board wire (if needed) to the MIB2 and insert it into the center expansion slot (remember, the cable connectors face the left side of the computer). Adjust the cables so they exit the computer on the left side. Make sure that the MIB2 sits straight up in the center slot (the cables can pull it towards the left so adjust their tension so that the board sits up straight in the slot). The top cover can be put back in place but won't close all the way unless you cut a narrow slot along the left side of the cover for the cables to exit.

POWERING UP

Turn on your Adam with no disks or tapes in your drives. Smartwriter should come up and sign on. If it does, skip the next paragraph.

If Smartwriter does not start up and sign on, turn off the power and remove the MIB2. Try it again with the MIB2 removed. If Smartwriter comes up fine without the MIB2 installed, it is likely that your MIB2 is defective. We know that it worked when it left the factory so it must have been damaged in transit or during installation. Static electricity is one possibility. Give your dealer a call and have a replacement sent.

BOOTING UP

Insert the distribution diskette or tape into the appropriate disk or tape drive. Pull the computer reset switch. TDOS 4.5 will boot up and sign on. You can see what programs are we provide on the distribution disk or tape by typing "DIR" and hitting the return key. The exact collection of files on the distribution media may vary but should include at least the following:

40MIB???.COM	40 column TDOS Install program
80MIB???.COM	80 column TDOS Install program
CLONE??.COM	The utility program used to copy an IMG file from a TDOS media to an EOS media
DRIVES??.COM	Utility to identify all disk and tape drives attached to your Adam
IOBYTE??.COM	Utility to set the TDOS IOBYTE
BASPATCH.IMG	Utility to patch the MIB2 parallel port driver into EOS and boot SmartBasic
PARPATCH.BAS	Utility to patch the MIB2 parallel port driver into EOS
IMP_MIB2.COM	The IMP communication program patched for the MIB2
MEX_MIB2.COM	The MEX communication program patched for the MIB2
UNCR.COM	File un-Crunch utility to expand compressed MIB2 documentation files to normal text
MEX.HZP	Crunched MEX help file
IMP.DZC	Crunched IMP documentation file

The question marks in each file name will be replaced by the version number of the program.

Other MIB2 files are available from the Micro Innovations Bulletin Board System. Call (703) 264-3908 between 6:30 PM and 6:30 AM Monday through Thursday and 24 hours on weekends and holidays to download these files. They include additional TDOS utilities and the ZMP communication program.

INSTALLING AN OPERATING SYSTEM

The MIB2 distribution tape or disk comes with the TDOS operating sytem installed. To boot it, you need only to hit the RESET switch with the distribution media installed. If you wish to reconfigure your system, you must select the version you want to install (the 40 column for the ADAM screen or the 80 column for an external terminal) and execute the appropriate TDOS

install program by typing its file name (without the extension) - 40MIB??? or 80MIB???. The install program will prompt you for information about your system, configure TDOS for you, and then install it on your boot diskette or tape. Hitting the reset switch will then cause TDOS to be booted.

INSTALLING TDOS

Assuming you want to reconfigure TDOS, you'll need to choose between the 40 column and 80 column TDOS versions. Unless you have an external terminal or an 80 column add-on unit, you'll want the 40 column version. Execute the appropriate version by typing its name and hit the return key. For example, if the names of the TDOS install programs provided on the distribution media are 40MIB456.COM and 80MIB456.COM, then type its full name, 40MIB456 or 80MIB456, followed by the return key to execute the one you want.

When the TDOS install program signs on, the TDOS release number will be shown on the top line. The first screen asks for you to specify which ADAM disk or tape drive to write the operating system to. It checks immediately after your selection to see if the device exists on your system. If it doesn't, it gives you an error message and lets you try again. You can get out of the installation program at any prompt by typing a CONTROL-C (that is holding down the CONTROL key and hitting the "C" key).

The following screen tells you what your TDOS drive assignments are. TDOS assigns the drive letters in order to all storage devices it finds when it is installed. It always assigns the drive letters starting with the fastest drives first (you may choose to have your RAM-disk first or last, however). For example, if you have a single Disk drive and two tape drives (no memory expander), the disk drive will be drive A and the tape drives will be B and C.

The next screens ask you to specify the size of the floppy disk drives - one screen for each drive. The choices are:

1 - 145K Standard Coleco single-sided 40 track format
2 - 254K Medium sized double-sided 40 track format
3 - 304K Full-sized double-sided 40 track format
4 - 356K IBM-sized double-sided 40 track format
5 - 702K Quad density 80 track format
6 - 714K Quad density 80 track format

Formats 1 through 4 are used for 5 1/4" floppy diskettes and formats 5 and 6 for 3.5" diskettes. The exact selection of formats available for your system will depend on the equipment you have. Not all of the alternatives are valid - for example, you can't have a 714K format on a 5 1/4" floppy disk drive. Some formats may require a special EPROM in your Adam floppy drive for it to be functional. All formats except the 356K and the 714K formats are compatible with existing ADAM formats.

The DSKSZ??? program (which is available on the Micro Innovations BBS) will let you temporarily change your Adam floppy disk drive definitions so that you can keep your permanent format different than one you might use only for information interchange. To permanently change to a different format, you must re-install TDOS.

After selecting floppy diskette formats, the next two screens ask if you'd like to change the parameters on the MIB2 serial ports. Serial Port 1 is wired for direct connection of an external modem and is set up for a default of 2400 baud, no parity, 8 data bits, and one stop bit. You can exit the screen without changing any of the parameters (by hitting a "0"), or you can choose to change any of the parameters if you desire (a "1" to change baud rate, a "2" to change parity, a "3" to change number of data bits, or a "4" to change number of stop bits). The default settings are normal for a 2400 baud external modem. After exiting the screen, you are asked the same questions about Serial Port 2, which is wired for direct connection of an external CRT terminal or a serial interface printer. Its defaults are 19200 baud, no parity, 8 data bits, and 1 stop bit - normally the highest speed an external terminal can run.

You are next asked if you would like to change the IOBYTE assignments. CP/M and TDOS use the IOBYTE to know which physical devices to use for each of their four logical devices. The five logical devices are CON: (the system console output), KEY: (the system console keyboard input), RDR: (the reader), PUN: (the punch), and LST: (the system printer).

The reader and punch device names are left over from the days when a paper tape reader or a paper tape punch were common microcomputer peripheral devices. Each of the logical devices can be assigned to any of it's four physical devices, and the physical devices to be selected from can be different from

logical device to logical device. The valid assignments for logical devices are shown in the table below:

Logical Device	Permitted Physical Device Assignments			
CON:	CRT:	SR1:	SR2:	UC1:
KEY:	KYB:	SR1:	SR2:	UK1:
RDR:		SR1:	SR2:	
PUN:		SR1:	SR2:	
LST:	LPT:	SR1:	SR2:	PAR:

Definitions for the physical devices are as follows:

For Logical device CON:, the system console -

CRT: ADAM 40 column display
SR1: MIB2 Serial Port #1 Out
SR2: MIB2 Serial Port #2 Out
UC1: 80 column terminal output

NOTE - on the 80 column version of TDOS. physical device CRT: is the ADAM Serial Port

For logical device KEY:, the keyboard-

KYB: ADAM Keyboard
SR1: MIB2 Serial Port #1 input
SR2: MIB2 Serial Port #2 input
UC1: 80 column terminal input

For logical device RDR:, the reader -

SR1: MIB2 Serial Port #1 input
SR2: MIB2 Serial Port #2 input

For logical device PUN:, the punch -

SR1: MIB2 Serial Port #1 output
SR2: MIB2 Serial Port #2 output

For logical device LST:, the printer -

LPT: The ADAM printer
SR1: MIB2 Serial Port #1 output
SR2: MIB2 Serial Port #2 output
UL1: MIB2 Parallel Printer Port

Note that it is possible during the installation process to define where you want your printer output to go and what device you want to use for the system console. The reader and punch logical devices are not used by many programs. About the only one we know of is the PIP (Peripheral Interchange Program) program supplied with CP/M. You can use PIP to copy files in and out the assigned physical devices (for example - between computers) but no error checking protocol is used. You will be much better off to use one of the modem programs. We provide two on the distribution media (more are available on the MI BBS), already patched for the MIB2 serial ports. All of the modem programs are designed to talk directly to the physical devices and purposely bypass the reader and punch logical devices.

The defaut IOBYTE assignments are:

CON: CRT: (the ADAM display)
KEY: KYB: (the ADAM keyboard)
RDR: SR1: (MIB2 serial port #1 in)
PUN: SR1: (MIB2 serial port #1 out)
LST: UL1: (the MIB2 parallel printer port)

NOTE - The default system console (CON:) for the 80 column version is the ADAM Serial Port)

After you've selected your IOBYTE assignments or chosen not to change them, the installation program asks if you'd like to change the function key definitions. This is a rather long and technical operation so if you're even marginally satisfied with the function key translations, avoid this part of the process. By the way, the default function key definitions match normal Wordstar definitions.

The next screen asks if you would like to change the SMART key strings. These are the character strings that are sent to the operating system whenever you hit a SMART key. The default settings are:

I COPY
II REN (to rename a file)
III DEL (to delete a file)
IV LIST (to print a file)
V TYPE (to display a file on the console)
VI DIR (to display a directory listing on the console)

The last screen asks you to insert a tape or disk for the boot block to be written on. After you hit the return key, the installation program writes the operating system to the diskette or tape. TDOS installation is now complete.

NOTE: The 80 column version asks three additional questions before it prompts you to insert a tape or disk. It asks you if you are using an ADAM keyboard for the console, if you want the SMART key definitions displayed on line 25 of your 80 column display (the display must have a command set compatible with the Heathkit H-19 or Zenith Z-19 terminal. which is what the ADAM uses) and whether or not ADAM Serial Port 2 is configured for an EVE 80 column display.

INSTALLING EOS PATCHES

Two patch programs (PARPATCH.IMG and BASPATCH.IMG) are provided with the MIB2 to allow its parallel printer port to operate with EOS. To utilize either of them, you must copy them to tape or disk using the CLONE??.COM program. The CLONE program is executed by typing:

"CLONE PROGNAME.IMG X:"

and hitting the return key. The X: portion of the command line is the letter of the floppy or tape drive you are copying to.

NOTE: TDOS assigns the drive letters in order to all storage devices it finds when it is installed. It always assigns the drive letters starting with the fastest drives first (you may choose to have your RAM-disk first or last, however). If you have a single Disk drive and two tape drives (no memory expander), the disk drive will be drive A and the tape drives will be B and C.

Let's run through an example of "clone"ing with the BASPATCH.IMG program. The program is supplied on the MIB2 Distribution Diskette and therefore resides on a TDOS media. To be able to use it, we must clone it to an EOS media (disk or tape). You must clone to a newly formatted EOS media. We'll assume that you have one disk drive. Therefore, you'll have to clone it to a tape. Knowing that you have at least one tape drive, we'll assume that you have your newly formatted tape in tape drive #1 (the leftmost unit). Since Disk #1 is drive A, and you don't have a second disk drive, Tape #1 will be drive B. The command you'll enter to clone the program is:

CLONE21 BASPATCH.IMG B: <Return>

To utilize the BASPATCH program, you must copy SmartBasic onto the EOS media that BASPATCH was cloned to (using a file copy program, such as AJM Software's File Manager), and pull the RESET switch. The BASPATCH program will boot and patch EOS for the parallel printer port on the MIB2. It will then load and execute SmartBasic. You can now print onto a dot matrix printer attached to the MIB2 parallel printer port.

The process is the same to clone the PARPATCH program.

IN CASE OF TROUBLE

We at Micro Innovations have attempted to provide a solid product at the lowest price possible. We have tested each and every MIB2 unit delivered. It is possible, however, for problems to crop up. If you purchased your unit from a dealer, please contact him for your first level assistance. Ih he cannot assist you to resolve your problems, feel free to give us a call. If you purchased your unit from us, please contact us directly. Micro Innovations' technical assistance is available from 6-:30 - 9:30 PM, Monday through Friday. Call (703) 620-1372 or write to Micro Innovations, 12503 King's Lake Drive, Reston, VA 22091.

REPAIR/UPGRADE POLICY

It is our philosophy that all Micro Innovations products should be exhibit the turnkey philosophy. That is, we believe that any skill level buyer should be able to install and use one. It is in keeping with that philosophy that we discourage buyers from attempting to repair or upgrade their units. If you will return your unit to Micro Innovations or one of our approved dealers, we will repair or upgrade it at mimimal cost.

WARANTEE

All Micro Innovations products are waranteed for 90 days from date of shipment. This should give plenty of time for infant mortalities to appear in new units, given average use. All warantee work must be accomplished by an approved dealer or by Micro Innovations. If, in the opinion of Micro Innovations or its approved dealer, the failure of a unit returned for warantee service is deemed to have been caused by neglect or abuse, a reasonable fee shall be charged for repair of the unit.

APPENDIX A - MIB2 SERIAL PORT INFORMATION

This section describes the register addresses and pin assignments for the MIB2's RS232 Serial Ports, connectors J3 and J4. Both of the serial ports are provided by a single integrated circuit, a Signetics 2681, which the manufacturer calls a DUART (DUal Asynchronous Receiver/Transmitter). The driver and receiver chips used are common LM1488 and LM1489 ICs. All of the other currently available serial port products utilize the Signetics 2651, which is a single serial port IC. The register addresses and bit assignments within the registers are different between the 2651 and the 2681. Therefore, software written for the 2651 will not function with the 2681 without patching. We provide already-patched versions of the ZMP, IMP, and MEX communications programs so that the user will not have to patch those programs. In addition, Alan Neely has developed an EOS communications program (called ACHAT) for the Powermate and MIB2 products. The latest version can be downloaded from the Micro Innovations BBS.

However, for those users who wish to utilize some other communications package or would like to talk directly to the ports from programs they have written, the I/O address information is given below. All addresses are in hexadecimal. Bit assignments within registers are in accordance with the 1983 Signetics MOS Microprocessor Data Manual.

```
;
;SIGNETICS 2681 DUART I/O PORT EQUATES
;NOTE: Port A is Serial Port 2, Port B is Serial Port 1
;

S2681   EQU   10H          ;S2681 DUART BASE ADDRESS
MRA     EQU   S2681        ;MODE REGISTERS 1A AND 2A
SRA     EQU   S2681+1      ;STATUS REGISTER A
CSRA    EQU   S2681+1      ;CLOCK SELECT REGISTER A
CRA     EQU   S2681+2      ;COMMAND REGISTER A
RHRA    EQU   S2681+3      ;RX HOLDING REGISTER A (RX DATA)
THRA    EQU   S2681+3      ;TX HOLDING REGISTER A (TX DATA)
IPCR    EQU   S2681+4      ;INPUT PORT CHANGE REGISTER
ACR     EQU   S2681+4      ;AUXILIARY CONTROL REGISTER
ISR     EQU   S2681+5      ;INTERRUPT STATUS REGISTER
IMR     EQU   S2681+5      ;INTERRUPT MASK REGISTER
CTU     EQU   S2681+6      ;COUNTER/TIMER UPPER
CTUR    EQU   S2681+6      ;COUNTER/TIMER UPPER REGISTER
CTL     EQU   S2681+7      ;COUNTER/TIMER LOWER
CTLR    EQU   S2681+7      ;COUNTER/TIMER LOWER REGISTER
MRB     EQU   S2681+8      ;MODE REGISTERS 1B AND 2B
SRB     EQU   S2681+9      ;STATUS REGISTER B
CSRB    EQU   S2681+9      ;CLOCK SELECT REGISTER B
CRB     EQU   S2681+10     ;COMMAND REGISTER B
RHRB    EQU   S2681+11     ;RX HOLDING REGISTER B (RX DATA)
THRB    EQU   S2681+11     ;TX HOLDING REGISTER B (TX DATA)
IP      EQU   S2681+13     ;INPUT PORT
OPCR    EQU   S2681+13     ;OUTPUT PORT CONFIGURATION REGISTER
STARTC  EQU   S2681+14     ;START COUNTER COMMAND PORT (READ)
SOPB    EQU   S2681+14     ;SET OUTPUT PORT BITS COMMAND PORT
STOPC   EQU   S2681+15     ;STOP COUNTER COMMAND PORT (READ)
ROPB    EQU   S2681+15     ;RESET OUTPUT PORT BITS CMD PORT
```

An example of driver code for the serial ports is given below:

```
;
;   CONSOLE I/O ROUTINES FOR POWERMATE I/F BOARD SERIAL PORT 2
;
CONSTAT: IN      A,(SRA)        ;GET STATUS REGISTER A CONTENTS
         BIT     0,A            ;SEE IF RXRDY (BIT 0 = 1)
         RET     Z              ;RETURN IF ZERO (NO CHARACTER)
         XOR     A              ;CHARACTER AVAILABLE, FLAG BY
         DEC     A              ;       SETTING A REG TO -1 (0FFH)
         RET

CONIN:   IN      A,(SRA)        ;GET STATUS REGISTER A CONTENTS
         BIT     0,A            ;SEE IF RXRDY (BIT 0 = 1)
         JR      Z,CONIN1       ;NO CHAR, TRY AGAIN
         IN      A,(RHRA)       ;CHAR READY, GO GET IT
         AND     7FH            ;MASK OUT PARITY BIT
         RET

CONOUT:  IN      A,(SRA)        ;GET STATUS REGISTER A CONTENTS
         BIT     3,A            ;SEE IF TXEMP (BIT 3 = 1)
         JR      Z,CONOT1       ;NO, WAIT UNTIL CHARACTER(S) SENT
         LD      A,C            ;YES, GET CHARACTER INTO A
         OUT (THRA),A           ;SEND IT
         RET

;
;   PUNCH OUTPUT DRIVER ROUTINE FOR SERIAL PORT 1
;
PUNOUT:  IN      A,(SRB)        ;GET STATUS REGISTER B CONTENTS
         BIT     3,A            ;SEE IF TXEMP (BIT 3 = 1)
         JR      Z,PUNOT1       ;NO, WAIT UNTIL CHARACTER(S) SENT
         LD      A,C            ;YES, GET CHARACTER INTO A
         OUT     (THRB),A       ;SEND IT
         RET

;
;   READER INPUT DRIVER ROUTINE FOR SERIAL PORT 1
;
RDRIN:   IN      A,(SRB)        ;GET STATUS REGISTER B CONTENTS
         BIT     0,A            ;SEE IF RXRDY (BIT 0 = 1)
         JR      Z,RDRIN        ;NO CHAR, GO TRY AGAIN
         IN      A,(RHRB)       ;CHAR READY, GET IT
         AND     7FH            ;MASK OUT PARITY BIT
         RET
```

```
;
;    INITIALIZE ROUTINE AND VALUES FOR SERIAL I/O PORTS
;
INIT:   LD      HL,INITBL       ;POINT AT START OF INIT TABLE
IN1:    LD      C,(HL)          ;PUT BYTE INTO C
        LD      A,C             ;GET INTO A FOR TEST
        INC     A               ;SEE IF -1 (0FFH)
        INC     HL              ;POINT AT NEXT BYTE
        RET     Z               ;FINISHED IF BYTE WAS A (-1)
        LD      B,(HL)          ;NOT FINISHED, BYTE WAS PORT NUMBER
                                ;       GET BYTE COUNT BYTE INTO B FOR OTIR
        INC     HL              ;POINT AT FIRST BYTE TO OUTPUT
        OTIR                    ;OUTPUT UNTIL BYTE COUNT EXHAUSTED
        JR      IN1             ;AND GO DO IT AGAIN

INITBL: DB      MRA             ;MODE REGISTERS 1A & 2A ADDRESS
        DB      02              ;TWO BYTES TO SEND
        DB      13H             ;TO MR1A - NO PARITY, 8 BITS/CHAR
        DB      07H             ;TO MR2A - NO RTS/CTS CONT, 1 STOP BIT

        DB      MRB             ;MODE REGISTERS 1B & 2B ADDRESS
        DB      02              ;TWO BYTES TO SEND
        DB      13H             ;TO MR1B - NO PARITY, 8 BITS/CHAR
        DB      07H             ;TO MR2B - NO RTS/CTS CONT, 1 STOP BIT

        DB      CSRA            ;CLOCK SELECT REGISTER A ADDRESS
        DB      01H             ;ONE BYTE TO SEND
        DB      0CCH            ;TX/RX DATA RATE = 9600 BAUD

        DB      CSRB            ;CLOCK SELECT REGISTER B ADDRESS
        DB      01H             ;ONE BYTE TO SEND
        DB      0CCH            ;TX/RX DATA RATE = 9600 BAUD

        DB      CRA             ;COMMAND REGISTER A
        DB      01H             ;ONE BYTE TO SEND
        DB      05H             ;ENABLE TXA & RXA

        DB      CRB             ;COMMAND REGISTER B
        DB      01H             ;ONE BYTE TO SEND
        DB      05H             ;ENABLE TXB & RXB

        DB      ACR             ;AUXILIARY CONTROL REGISTER
        DB      01              ;ONE BYTE TO SEND
        DB      0F0H            ;BRG SET 2, TIMER INPUT XTAL/16

        DB      SOPB            ;SET OUTPUT PORT BITS COMMAND ADDRESS
        DB      01              ;ONE BYTE TO SEND
        DB      0FFH            ;SET ALL OUTPUT BITS

        DB      -1              ;END OF INITIALIZE TABLE
```

Handshaking Lines

The handshaking lines use the S2681's general purpose input and output ports and are assigned as follows:

Serial Port 2 (wired for direct connection of a terminal or a serial printer) -

Signal Line Name	Bit Number	Interface Board Pin	RS232 Pin
Data Terminal Ready	Output Bit 2	J3 Pin 11	6
Request to Send	Output Bit 0	J3 Pin 9	5
Carrier Detect	Output Bit 4	J3 Pin 15	8
Data Set Ready	Input Bit 2	J3 Pin 14	20
Clear to Send	Input Bit 0	J3 Pin 7	4

Serial Port 1 (wired for direct connection of a modem) -

Signal Line Name	Bit Number	Interface Board Pin	RS232 Pin
Data Terminal Ready	Output Bit 3	J4 Pin 14	20
Request to Send	Output Bit 1	J4 Pin 7	4
Carrier Detect	Input Bit 5	J4 Pin 15	8
Data Set Ready	Input Bit 3	J4 Pin 11	6
Clear to Send	Input Bit 1	J4 Pin 9	5

APPENDIX B

Parallel Printer Port Signals
for
Powermate Interface Board and
Multipurpose Interface Board 2

Interface Board Signal Name	Interface Board Pin No.	Centronics Connector Pin No.	Centronics Printer Signal Name
\Strobe	1	1	\Data Strobe
Signal Ground	2	19	Strobe Return
D1	3	2	Data bit 1
Signal Ground	4	20	Data 1 Return
D2	5	3	Data bit 2
Signal Ground	6	21	Data 2 Return
D3	7	4	Data bit 3
Signal Ground	8	22	Data 3 Return
D4	9	5	Data bit 4
Signal Ground	10	23	Data 4 Return
D5	11	6	Data bit 5
Signal Ground	12	24	Data 5 return
D6	13	7	Data bit 6
Signal Ground	14	25	Data 6 Return
D7	15	8	Data bit 7
Signal Ground	16	26	Data 7 Return
D8	17	9	Data bit 8
Signal Ground	18	27	Data 8 Return
No Connection	19	10	\Acknowledge
Signal Ground	20	28	\Ack Return
Printer Busy	21	11	Busy
Signal Ground	22	29	Busy Return
PE	23	12	Paper Out
Signal Ground	24	30	\Reset Return
SLCT	25	13	Select
No Connection	26	31	\Reset