

**MIO-100**  
**MULTI-I/O CARD**  
**USER'S MANUAL**

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MULTI-I/O CARD  
USER'S MANUAL**

## Checklist

Your MIO-100 carton contains the following:

- MIO-100 multi-I/O card (board)
- MFPLUS Diskette - containing  
SETCLOCK, GETCLOCK,  
RAMDISK and PSPPOOL.
- MIO-100 User's Manual
- Primary Serial Port interface cable
- Secondary Serial Port interface cable  
(if Secondary Serial Port is included)
- Joystick interface cable
- Flat cable to connect your MIO-100 to  
diskette drive
- Bracket for the Secondary Serial Port  
interface connector and the Joystick  
interface connector

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Congratulations on your choice of the MIO-100 Multi-I/O Card for your IBM PC, PC-XT and compatibles. The MIO-100 Multi-I/O Card offers a variety of powerful data I/O functions including: up to two RS-232C serial interface ports; for use with modems, serial printers, remote display terminals or as an asynchronous communication port to another computer or peripheral operating under separate asynchronous communications software control; a parallel printer port, a real-time clock-calendar with removable battery backup, a game adapter port and a 5 1/4" diskette drive adapter. All this in a cost-effective, high performance configuration designed to give you years of reliable operation.

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SECTION I  
-HARDWARE-

## CHAPTER 1 INTRODUCTION

The MIO-100 is a flexible and powerful Multi-I/O enhancement product for the IBM Personal Computer (PC) family. It provides powerful data I/O expansion capabilities for the IBM PC PC-XT, PC portable, and compatibles. Standard features include a real-time Clock-Calendar with battery backup, one RS-232C asynchronous serial communication port, a parallel printer port, a game adapter port and a 5 1/4" diskette drive adapter. An optional secondary RS-232C serial port is also available.

### 1.1 Standard Features

1. One RS-232C serial interface to be used with Modems, serial printers, remote display terminals, or other serial devices, or for asynchronous communications software control.
2. A parallel printer port to be used for connecting a parallel printer to the PC.
3. A Real-Time Clock-Calendar with battery backup so that you don't have to re-enter the time and date every time you start your system. The battery power is only used when your system is turned off.
4. A game adapter port which can be used with an IBM compatible joystick.

5. A 5 1/4" diskette drive adapter which can be connected to IBM 5 1/4" diskette drive.

6. The MFPLUS utility diskette containing clock software which supports the clock-calendar. RAMDISK and PSPPOOL software is also provided. This software is described in section II of your MIO-100 manual.

### 1.2 Options

A secondary RS-232C serial port with a flat cable.

### 1.3 Software

Refer now to section II in order to backup and transfer provided files to your system disk. This must be done before proceeding.

### 1.4 Board Layout and Description

The following is a Board Layout and brief description of relevant locations on your MIO-100: (figure 1)

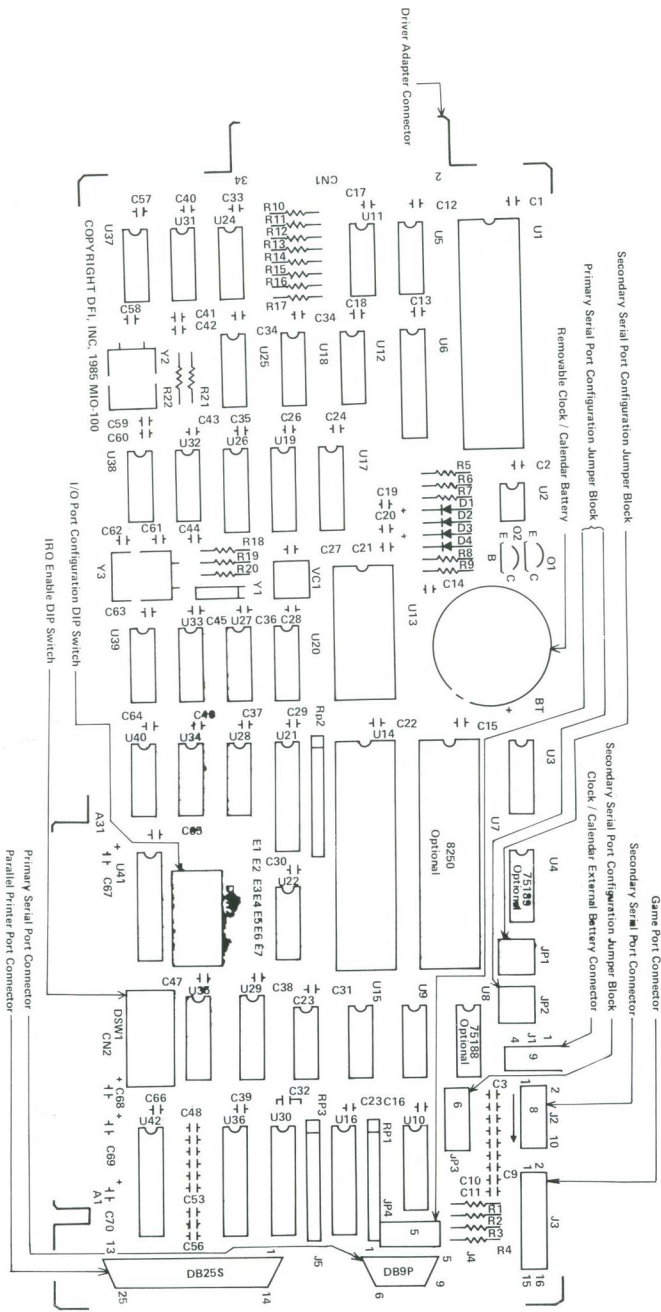


Figure 1. MIO-100 BOARD LAYOUT AMDA BRIEF DESCRIPTION

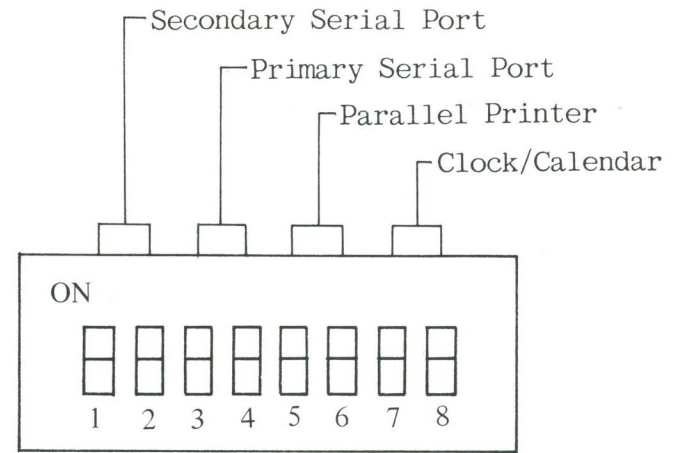


Figure 2. Interrupt Selection Switch

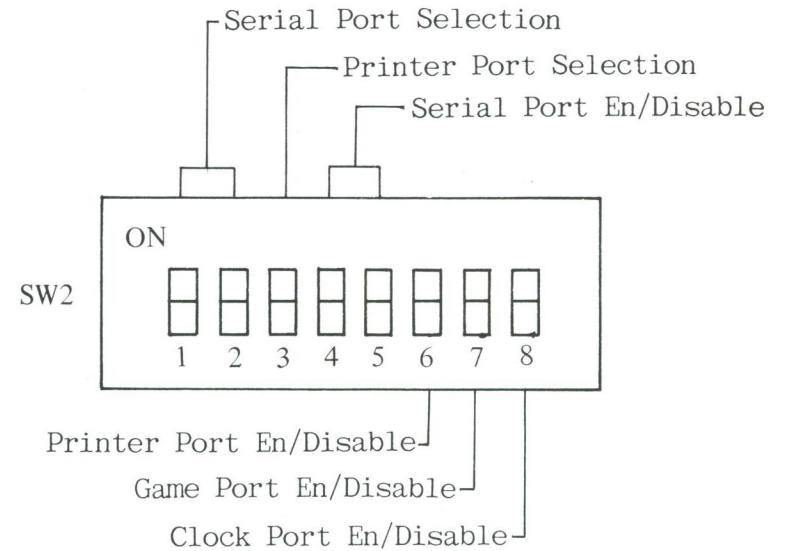


Figure 3. I/O Port Configuration Switch

## CHAPTER 2 THE CLOCK-CALENDAR

The Clock Calendar includes the following features:

1. 24-hour clock, maintained in a Microprocessor Real Time Clock chip (MM58167A) on the MIO-100 board.
2. Four-year calendar (no leap year).
3. Battery backup power supply (battery life approximately five years).
4. User-replacable Lithium battery.
5. Full PC-DOS Compatibility.

Two clock utility programs; GETCLOCK.COM and SETCLOCK.COM, are supplied on your MFPLUS diskette. GETCLOCK is used for answering the TIME and DATE prompts which the DOS operating system issues each time you boot the system. SETCLOCK updates the real-time clock.

### 2.1 Configuration of the Clock-Calendar

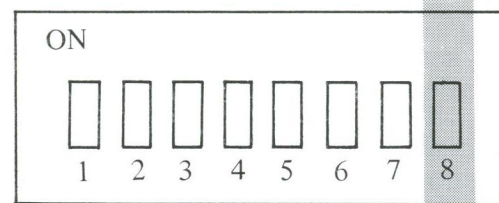
The Clock-Calendar I/O port address is defined as follows:

PORT CONFIGURATION	I/O PORTS
-----	-----
CLOCK	2C0-2DF HEX

### 2.1.1 Clock-Calendar Enable/Disable

DIP Switch Bank 2 (SW2) is utilized to enable and disable your MIO-100 Clock-Calendar. Switch 8 on SW2 is toggled as follows:

Status	S8
-----	---
Enable	ON (default)
Disable	OFF



SW2

### 2.2 The GETCLOCK Utility

Setting your PC TIME and DATE:

GETCLOCK is a utility program which reads and displays the current time and date from your MIO-100 at each power-up or reboot of the system. GETCLOCK eliminates the need to manually enter the correct time and date through your keyboard whenever your PC is turned on or rebooted.



## 2.3 The SETCLOCK Utility

Setting your MIO-100 TIME and DATE:

You need to execute the SETCLOCK Utility whenever you want to correct the time or date of your MIO-100 board's internal microprocessor clock. The DOS TIME and DATE commands only update the system's time and date parameters; they will not update the time and date values stored in the MIO-100 clock chip until you execute the following procedure:

### STEP 1

Boot the system with a diskette that leaves the screen at the A> prompt.

### STEP 2

From the DOS prompt A>, enter the following instruction:

```
SETCLOCK <enter>
```

A current date and time message will be displayed.

If your Clock-Calendar has not been used before or you have just replaced your Lithium battery, then the current date and time will be the system's date and time, and this information will be recorded into your Clock-Calendar.

To RESET and update your Clock-Calendar use the following commands:

### STEP 3

Enter the DOS command DATE. The current date will be printed on the screen, and you will be given a chance to enter a new date. Press <enter> if no change is necessary or type a new date in the form mm/dd/yy <enter> or mm-dd-yy <enter>. Your DOS will determine, from the information you provide, the proper date and display it each time you boot your DOS program in the future.

### STEP 4

Enter the DOS command TIME. The current date will be indicated on your screen, and you will be given a chance to enter a new time. Press <enter> if no change is necessary or type a new time in the form hh:mm:ss <enter>. For maximum accuracy, type in a time that is 10 to 15 seconds ahead of the actual time but do not press the <enter> key; observe a digital clock or watch, and press <enter> when the seconds reading on the clock synchronizes with the value that you typed in.

### STEP 5

Reboot the system (Ctrl-Alt-Del) to install the new TIME and DATE values.

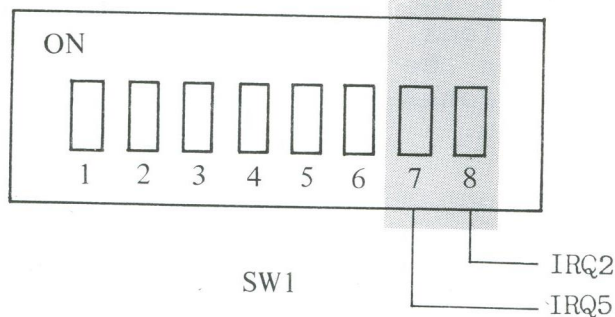
## 2.4 Clock-Calendar Interrupt Generation

The Clock-Calendar feature of your DIO-200 normally does not need or support interrupts. By writing your own software, however, it is possible to program the MIO-100 to generate timed interrupts on either the IRQ2 or the IRQ5 interrupt lines. To implement this feature, you will need to do the following:

### 1. Setting Clock Interrupts

DIP Switch Bank 1 (SW1) is utilized to Enable clock interrupts. To select either interrupt lines (IRQ2 or IRQ5) toggle switches 7 and 8 on SW1 as follows:

LINE	S7	S8
---	---	---
IRQ2	OFF	ON (Default)
IRQ5	ON	OFF



Note: If you wish to write your own software to handle clock interrupts you should obtain further information about the National Semiconductor MM58167AN clock chip from your dealer or from National Semiconductor directly. Your IBM PC manual can also provide useful information for this purpose.

### 2.5 Preparing your Working DOS Diskettes

After installing your MIO-100 you must prepare your working DOS diskettes to automatically initialize the time and date each time you boot the system. This sub-section lists the process used to invoke your Clock-Calendar.

#### STEP 1

Copy the two clock programs, GETCLOCK.COM and SETCLOCK.COM to your working DOS diskette. These programs are on the diskette supplied with your MIO-100.

#### STEP 2

If your working DOS diskette already has an AUTOEXEC.BAT file, then you need to alter this file to include the GETCLOCK command. To see the current contents of your AUTOEXEC file, insert the working DOS diskette in drive A: and from the A> prompt, type the following command line:

TYPE AUTOEXEC.BAT <enter>

The contents of your AUTOEXEC file will be listed on your CRT screen. You now need to create a new AUTOEXEC file in which the command GETCLOCK proceeds these other command(s). The following sequence will do this for you:

COPY CON:AUTOEXEC.BAT <enter>  
GETCLOCK <enter>

.  
.  
.

Function Key F6 <enter>

If your working DOS diskette has no AUTOEXEC file, then you should use the above sequence to create one. The only command in the file will be GETCLOCK.

### STEP 3

If necessary, use the SETCLOCK Utility to give the TIME and DATE variables their initial values.

## 2.6 Technical Information

I/O Address	Function
-----	-----
2C0	counter-1/10000 of seconds
2C1	counter-1/100 and 1/10 seconds
2C2	counter-seconds
2C3	counter-minutes
2C4	counter-hours
2C5	counter-days of the week
2C6	counter-days of the month
2C7	counter-month
2C8	RAM-upper nibble only
2C9	RAM-last month storage
2CA	RAM-year storage (-80)
2CB	RAM-reserved
2CC	RAM-not used
2CD	RAM-not used
2CE	RAM-not used
2CF	RAM-not used
2D0	interrupt status register
2D1	interrupt control register
2D2	counter reset
2D3	RAM reset
2D4	status bit
2D5	GO command
2D6	standby interrupt
2DF	test mode

### 2.6.1 Counter and RAM reset format

Data	Function
----	-----
01	1/10000 of seconds
02	1/100 and 1/10 of seconds
04	seconds
08	minutes
10	hours
20	days of the week
40	days of the month
80	months

### 2.7 Using an External Battery with your MIO-100

You can attach your MIO-100 Clock-Calendar to an external battery by connecting the 4 pin connector (J1), to the external battery cable on your system. The external battery must be DC 3V.

**Note:** Some systems may not have an external battery available. Please check your system manual or call your dealer to determine if your system includes this provision.

## CHAPTER 3 PARALLEL PRINTER PORT

The MIO-100 has a standard feature for interfacing your PC to a parallel printer such as the IBM/Epson MX-80. This port is completely compatible with the IBM PC and uses the same female DB25 connector as an IBM port.

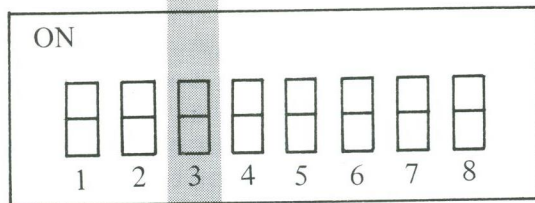
### 3.1 I/O Port Assignment and Pinouts

The parallel port on the MIO-100 uses the following system I/O ports:

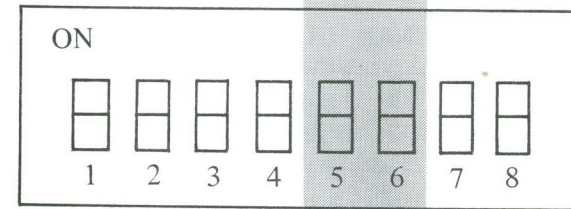
Port Configuration	I/O Ports
-----	-----
LPTA	378-37A Hex
LPTB	278-27A Hex

DIP Switch Bank 2 (SW2) is utilized to select either LPTA or LPTB. Toggle switch 3 on SW2 as follows:

Port Configuration	S3
-----	---
LPTA	OFF (default)
LPTB	ON



SW2



### 3.2 Parallel Port-System Consideration

The IBM PC allows installation of up to three parallel ports. These ports are called; LPT1, LPT2, and LPT3. The printer port on the Monochrome/Printer Adaptor which is addressed at 3BC (HEX) will be LPT1 when it is installed, LPTA on your MIO-100 will be LPT2, and LPTB on your MIO-100 will be LPT3. If your system uses a Color/Graphic Adaptor, and a Monochrome/Printer Adaptor is not installed, then LPTA on your MIO-100 will be LPT1, and LPTB on your MIO-100 will be LPT2.

### 3.3 Parallel Port-Interrupt Enable

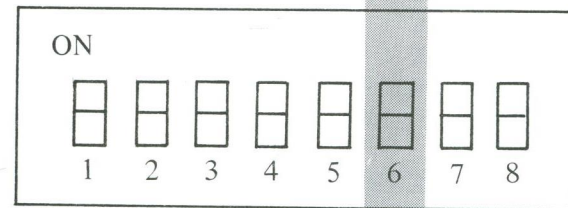
DIP Switch Bank 1 (SW1) is utilized to enable either IRQ5 or IRQ7 as an interrupt. Toggle switches 5 and 6 on SW1 as follows:

Line	Status	S5	S6
IRQ5	Enable	OFF	ON
IRQ7	Enable	ON	OFF (default)

### 3.4 Parallel Port Enable/Disable

DIP Switch Bank 2 (SW2) is utilized to Enable/Disable your parallel port. Toggle switch 6 on SW2 as follows:

Status	S6
Enable	ON (default)
Disable	OFF



SW2

### 3.5 Parallel Printer Port Pinout

#### PARALLEL PORT SIGNAL LINE CONFIGURATION

Line Name	J5 Pin DB25S	IBM Matrix Printer
-STROBE	1	1
D0	2	2
D1	3	3
D2	4	4
D3	5	5
D4	6	6
D5	7	7
D6	8	8
D7	9	9
-ACK	10	10
BUSY	11	11
PE	12	12
SLCT	13	13
-AUTOFD	14	14
-ERROR	15	32
-INIT	16	31
-SLCT IN	17	36
GROUND	(18-25)	(16,19-30,33)

### CHAPTER 4 SERIAL PORT

Your MIO-100 has one serial port for asynchronous communications. (a second RS-232C serial port is optional.) This port can be used to connect your PC to a serial printer, modem, or other device which uses a RS-232C interface. The MIO-100 interface is a DTE/DCE type with a male DB9P on J4 (primary serial port) and a male DB25P connector via extension cable connect to J2 (secondary serial port).

#### 4.1 Configuring your Serial Port

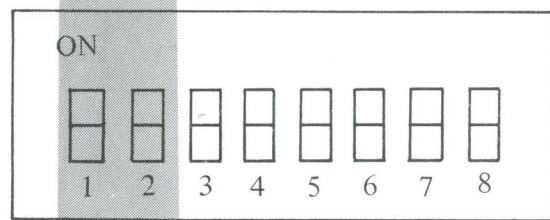
##### 4.1.1 Selecting the Serial I/O Port

The serial port on your MIO-100 uses the following system I/O ports:

Port Configuration	I/O Ports
COM 1	3F8-3FF HEX
COM 2	2F8-2FF HEX
COM 3	2E8-2EF HEX
COM 4	2E0-2E7 HEX

DIP Switch Bank 2 (SW2) is utilized to select the primary and secondary serial I/O port address. Toggle switches 1 and 2 on SW2 as follows:

Primary Serial Port	Secondary Serial Port	S1	S2
COM 1	COM 2	ON	ON (default)
COM 2	COM 3	OFF	ON
COM 3	COM 4	ON	OFF



SW2

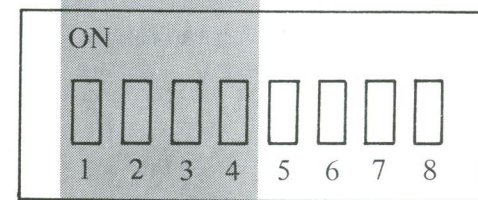
**\*NOTE\***

Switches 1 and 2 on SW2 cannot both be OFF simultaneously. If they are both OFF it will cause a conflict with other devices using I/O address ports, such as 2B0-2BF, 2D0-2DF, 3B0-3BF or 3C0-3CF.

**4.1.2 Setting the Interrupt Request Line.**

DIP Switch Bank 1 (SW1) is utilized to select IRQ3 and IRQ4 as an interrupt. Toggle switch 1, 2, 3 and 4 on SW1 as follows:

Primary Serial Port	Secondary Serial Port	S1	S2	S3	S4
IRQ3	----	---	---	ON	OFF
IRQ4 (default)	----	---	---	OFF	ON
---- (default)	IRQ3	ON	OFF	---	---
----	IRQ4	OFF	ON	---	---



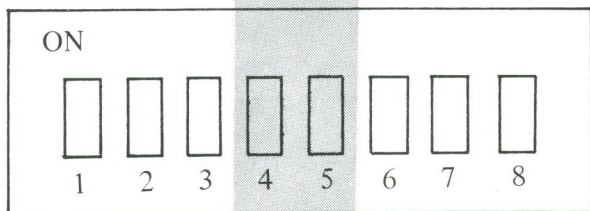
SW1



**4.1.3 Serial Port Enable/Disable**

DIP Switch Bank 2 (SW2) is utilized to enable both your primary and your secondary serial ports. Toggle switches 4 and 5 on SW2 to enable/disable your serial ports as follows:

Port	Status	S4	S5
Primary	Enable	ON	-- (default)
Secondary	Enable	--	ON (default)
Primary	Disable	OFF	--
Secondary	Disable	--	OFF



SW2

#### 4.2 Configuring the RS-232C Interface Line

Your MIO-100 Multi-I/O card adheres to RS-232C engineering standards, all inputs to the serial port with the exception of Ring Indicator, Pin 9 must be connected to a signal, even if the device the port is connected to is not using one or more of the interface lines at connector J4, J2. The serial port interface configuration block JP3, JP2 are provided to allow some signal line inputs such as CTS, DSR, DCD to the "forced true" state. JP4 and JP1 are provided to allow these ports to be set in the DTE or DCE configuration. These configuration jumpers are shown as follows:

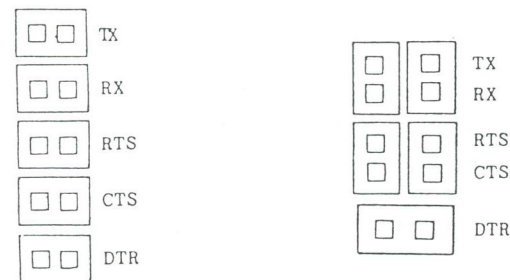
##### A. Primary serial port

JP2 Normal Setting JP2 Forced True Setting



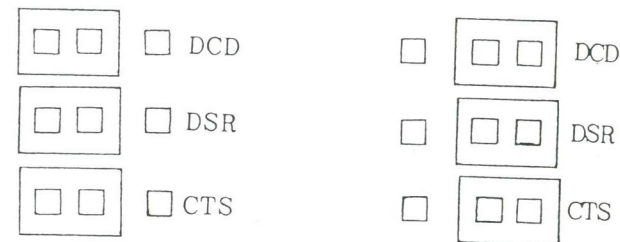
JP4 DTE Setting

JP4 DCE Setting



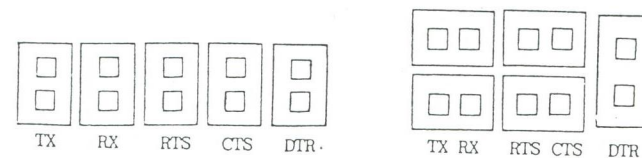
##### B. Secondary Serial Port:

JP1 Normal Setting JP1 Forced True Setting



JP3 DTE Setting

JP3 DCE Setting





### 4.3 Serial I/O Port Pinouts.

- A. Primary serial port J4 Secondary serial port J2

RS-232C Name	J2, J4 Pin No.	Signal Name
CF	1	DCD (Data Carrier Detect)
BB	2	RX (Receive Data)
BA	3	TX (Transmit Data)
CD	4	DTR (Data Terminal Ready)
AB	5	GND (Signal Ground)
CC	6	DSR (Data Set Ready)
CA	7	RTS (Request To Send)
CB	8	CTS (Clear To Send)
CE	9	RI (Ring Indicator)

### 4.4 Connecting your Serial Port to a Device With DB25S Connector.

- A. Your MIO-100 Serial Port has a DB9P 9 PIN connector at J4. This connector must connect to a 9 pin female (DB9S) connector. Most devices use a DB25S connector rather than a DB9S connector. There are no functional differences between them. Most of the pins on DB25 are not used. If you should use a DB25 connector, purchase an adapter cable from your dealer that has a DB9S on one end and a DB25P on the other end. The model number is AC9S25P.

- B. The secondary serial port connector on your MIO-100 is a 10 pin connector (J2), 9 pins are used. An interface cable is supplied with your MIO-100. This ribbon-type cable is approximately 30 cm long and has a rectangular connector on one end and a male DB25P connector on the other end. The rectangular connector plugs into J2 on your MIO-100, the DB25P connector attaches to the female DB25S connector on the cable from your remote serial cable. Note that one edge of the 30 cm flat ribbon cable has a red or blue line on it. This line indicates which end of the rectangular connector is to be installed to pin 1 of J2. The rectangular connector plugs into J2 with the colored line at the left side of J2 (toward the front of PC), with the cable exiting toward the back of your MIO-100.

The following is the wiring diagram for the DB9S to DB25P adaptor cable.

Signal Name	DB9S Connector	DB25P Connector
DCD (Data Carrier Detect)	1	8
RX (Receive Data)	2	3
TX (Transmit Data)	3	2
DTR (Data Terminal Ready)	4	20
GND (Signal Ground)	5	7
DSR (Data Set Ready)	6	6
RTS (Request To Send)	7	4
CTS (Clear To Send)	8	5
RI (Ring Indicator)	9	22

#### 4.5 Installing the Secondary Serial Port

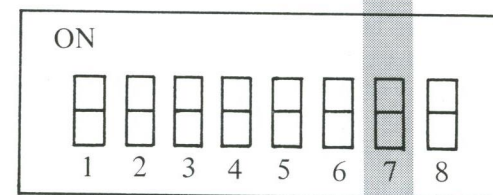
For MIO-100 insert IC 8250 into U7, SN75189 into U4 and SN75188 into U8 to activate the secondary serial port.

NOTE: Contact your dealer for the optional secondary serial port kit.

## CHAPTER 5 GAME ADAPTER PORT

One Game Adapter Port is included on the MIO-100. The I/O port address is defined as 200-207. A game adapter cable is required. Any IBM compatible joy stick may be used. DIP Switch Bank 2 (SW2) is utilized to enable or disable your game port. Toggle switch 7 on SW2 shown as follows:

Status	S7
-----	-----
Enable	ON (default)
Disable	OFF



SW2

#### 5.1 Game Port Pinout

Line Name	J3 Pin	MIO-100 Adapter Cable Output DB-15S
-----	-----	-----
+5VDC	1	1
Button 4	2	2

Position 0	3	3
Ground	4	4
Position 1	6	6
Button 5	7	7
+5VDC	8	8
+5VDC	9	9
Button 6	10	10
Position 2	11	11
Ground	12	12
Position 3	13	13
Button 7	14	14
+5VDC	15	15

## 5.2 Installing the Game Port Cable

The game port cable is optional on your MIO-100. Contact your dealer for this cable. This cable is approximately 30 cm long and has a rectangular connector at one end and a female DB15S connector at the other end. The DB15S connector can mount on the additional bracket supplied with your MIO-100. The rectangular connector plugs into J3 on your MIO-100 with the red or blue line on one side of the ribbon cable set at Pin 1. The IBM-compatible joy-stick DB15P male connector connects to the DB15S connector.

## 6.1 Introduction

The MIO-100 5 1/4 inch diskette drive adapter is fully compatible with the IBM 5 1/4 inch diskette drive adapter. The MIO-100 attaches to one or two diskette drives through a daisy-chained flat cable that connects to one end of the drive adapter.

MIO-100 is designed for double-density, MFM-Coded diskette drives, uses a NECuPD765 compatible controller and a WD9216 data separator for clock and data recovery. In addition, the adapter supports write compensation and write protect features. It is buffered on the I/O bus and uses the system board's direct memory access (DMA) for record data transfer. An interrupt level is also used to indicate when an operation is complete and a status condition requires processor attention.

In general, the 5 1/4" diskette drive adapter presents a high-level command interface to software I/O drivers. A functional block diagram is on Figure 4.

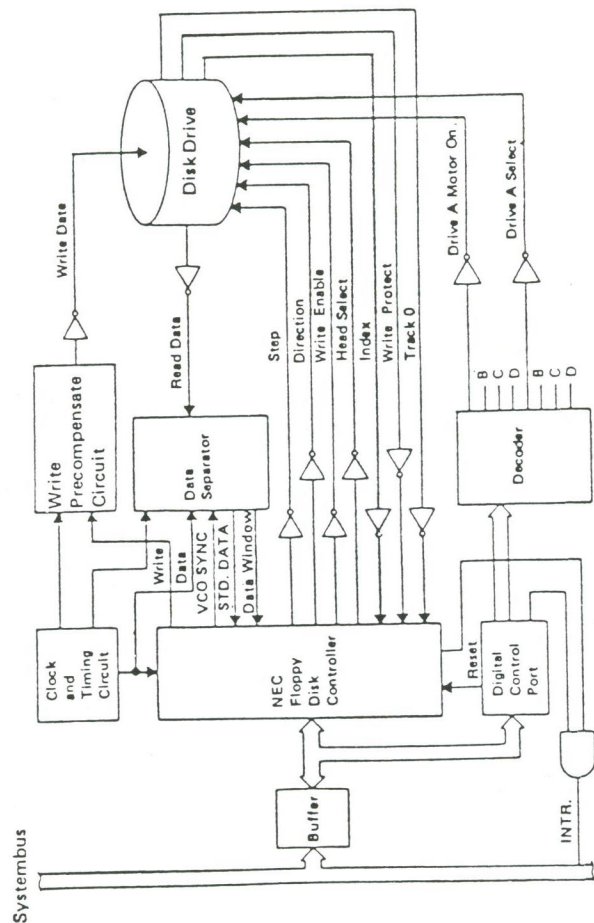


Figure 4. 5 1/4 Inch Diskette Drive Adapter Block Diagram

## 6.2 Functional Description

From a programming point of view, this attachment consists of an 8-bit digital-output register in parallel with an NECuPD765 or equivalent floppy disk controller (FDC).

### 6.2.1 Digital-Output Register

The digital-output register (DOR) I/O Address Hex 3F2, is an output-only register used to control drive motors, drive selection, and feature enable. All bits are cleared by the I/O interface reset line. The bits have the following functions:

Bit 0 and 1 These bits are decoded by the hardware to select one drive if its motor is on:

Bit	1	0	Drive
	0	0	A
	0	1	B

Bit 2 The FDC is held reset when this bit is clear. It must be set by the program to enable the FDC.

Bit 3 This bit allows the FDC interrupt and DMA requests to be gated onto the I/O interface. If this bit is cleared, the interrupt and DMA request I/O interface drivers are disabled.

Bit 4 and 5 These bits control, respectively, the motors of drives A and B. If a bit is clear, the associated motor is off, and the drive cannot be selected.

### 6.2.2 Floppy Disk Controller

The floppy disk controller (FDC) contains two registers that may be accessed by the main system processor: a status register and a data register. The 8-bit main status register contains the status information of the FDC and may be accessed at any time. The 8-bit data register (actually consisting of several registers in a stack with only one register presented to the data bus at a time) stores data, commands, parameters, and provides floppy disk drive (FDD) status information. Data bytes are read from or written to the data register in order to program or obtain results after a particular

command. The main status register may only be read and is used to facilitate the transfer of data between the processor and FDC.

The FDC is capable of performing 15 different commands. Each command is initiated by a multi-byte transfer from the processor, and the result after execution of the command may also be a multi-byte transfer back to the processor. Because of this multi-byte interchange of information between the FDC and the processor, it is convenient to consider each command as consisting of three phases:

#### Command Phase

The FDC receives all information required from the processor to perform a particular operation.

#### Execution Phase

The FDC performs the operation it was instructed to do.

#### Result Phase

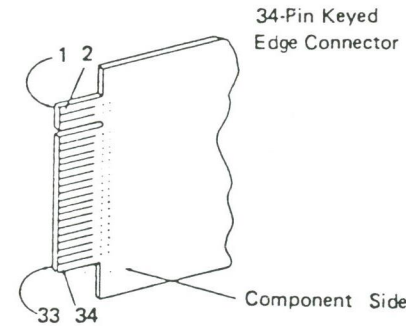
After completion of the operation, status and other housekeeping information is made available to the processor. (detailed information refer to the factory for supplied Data Sheet).

### 6.3 Programming Summary

Register	I/O Address
FDC Data Register	3F5 (Hex)
FDC Main Status Register	3F4 (Hex)
Digital Output Register	3F2 (Hex)

Bit	Drive	I/O Address
0	Drive	00: DR #A
1	Select	01: DR #B
2	Not FDC Reset	
3	Enable INT & DMA Requests	
4	Drive A Motor Enable	
5	Drive B Motor Enable	

All bits cleared with channel reset.



Note: Lands 1-33 (odd numbers) are on the back of the board. Lands 2-34 (even numbers) are on the front, or component side.

	At Standard TTL Levels	Land Number	
	Ground-Odd Numbers	1-33	
	Unused	2,4,6	
	Index	8	
	Motor Enable A	10	→
	Drive Select B	12	←
	Drive Select A	14	←
	Motor Enable B	16	←
Diskette	Direction (Stepper Motor)	18	←
Drives	Step Pulse	20	←
	Write Data	22	←
	Write Enable	24	←
	Track 0	26	←
	Write Protect	28	→
	Read Data	30	→
	Select Head 1	32	→
	Unused	34	←

Fig. 5 Connector Specifications

SECTION II  
-SOFTWARE-

CHAPTER 7 INTRODUCTION

7.1 About this section

This section describes the use and operation of the MFPLUS Utility programs. These programs will work satisfactorily on most expansion cards that are available for the IBM PC-1, PC-2 PC-XT, PC portable and compatibles, and should be executed under all current releases of PC-DOS.

The MFPLUS Utility diskette supports six utility programs as follows:

RAMDISK.COM

-- A program which simulates floppy disk drives with your PC system RAM. It helps you access data or execute programs much faster than a floppy disk.

RAMHELP.COM

-- This utility lists the RAMDISK operations menu. It also gives you a brief listing of all options, types, and their meanings. When you are unsure of how to enter a command, execute this utility to return to the operations menu.

DISKCONF.COM

-- A program which displays the current RAMDISK status message.

## PSPOOL.COM

-- A program which enables printing a list of data files on the printer while you are performing other tasks on your PC system. Your print output data is queued in a predefined area of memory and will be printed using PC system interrupt.

## PSPLHELP.COM

-- This utility list the PSPOOL operations menu. It also gives you a brief listing of all options, types, and their meanings. When you are unsure how to enter a command, execute this utility to return to the operations menu.

## PSPLCONF.COM

-- A program which displays the current PSPOOL status message.

## 7.2 Backing up your MFPLUS Utility Programs

The MFPLUS Utility diskette is a single-side, 8 sector non-system diskette. It can be used with PC-DOS 1.1 and DOS 2.0. The following steps are used to back up the MFPLUS Utility programs.

### STEP 1

Write-Protect your original MFPLUS Utility diskette. Put a tab on the original diskette. This will prevent

accidental erasure during the copying process.

### STEP 2

Boot your PC system

### STEP 3

Copy the utility program to your new diskette.

<i> If you have only one floppy drive, type:

COPY B:\*. \* A: <enter>

The system will prompt you to change source and destination diskettes to programs.

<ii> If you have two or more floppy drives, place the MFPLUS diskette in drive B: and type

COPY B:\*. \* A: <enter>

The system will copy all of the programs in B: into A:

### STEP 4

The MFPLUS Utility programs will be copied to your diskette.

NOTE: The MFPLUS Utility diskette should be kept in a safe place and should not be used during system operation.





Figure: 6

## 8.1 Introduction

The RAMDISK Utility program allows you to assign RAM space for use as up to four RAMDISKS. These RAMDISKS will enhance the processing speed of your PC. A RAMDISK performs the same I/O functions as a floppy disk drive, however, by using RAM for I/O operations. Tremendous time savings can be obtained. You can run any DOS command on it and save data into it. However, RAMDISK can only be loaded by using an EXEC loader each time you turn on your PC.

Your RAMDISK includes the following features:

- \* Simulation of up to four disk drives.
- \* User definition of memory space and RAMDISK size.
- \* Supports single and double side drives, eight or nine sectors per track, up to 360K in size.

## 8.2 Preparing RAMDISK On Your Personal Computer

Before you install the RAMDISK on your Personal Computer, set the PC for RAMDISK operation.

Normally, you will do this only once, after you have set up your PC. The following procedure is all you need to complete to use your RAMDISK capabilities.

<i> Set DIP switch 1 on your PC motherboard to conform with each floppy drive and each RAM disk being utilized. Remember that each RAM disk will be counted as a physical drive by your system board. Thus if you are using two floppy drives and two RAM disks DIP switch 1 must be set for 4 drives.

NOTE: Consult your PC user's manual for proper DIP switch settings for your system.

Refer to Figure 6 for setting DIP switch 1 on your main board. You may set the DIP switch for more disk drives than are actually installed. It's perfectly acceptable for you to leave the switches set for a total of three or four drives, so that you can assign any of four drive names (A:, B:, C:, and D:) to your RAMDISKS at any time.

#### <ii> Memory Setting

Refer to your PC technical Reference Manual for memory settings. Set the switch to the maximum memory size currently available in you system. This

allows you full use of all available memory space.

### 8.3 Getting Started

To start the RAMDISK, you must copy three utility programs into your DOS diskette, the utilities are:

RAMDISK.COM  
RAMHELP.COM  
DISKCONF.COM

Insert your DOS diskette in drive A. Next, type the command you wish to execute.

#### 8.3.1 The RAMDISK Help Command

The RAMDISK Help Command is one of the RAMDISK Utility programs. It provides an operations menu to be used with your RAMDISK. To execute the RAMHELP command

TYPE:

RAMHELP

Your screen will display:

\*\*RAMDISK HELP INFORMATION\*\*

Command Format:

RAMDISK X:[/1][/2][/M=xxx][/U=xxx][/8][/9]

/1 -- Side specification. Creates a single sided RAMDISK.

/2 -- Side specification. Creates a double sided RAMDISK.

/M=xxx -- RAMDISK size specification.

/U=xxx -- Reserves memory space size for user applications programs.

/8 -- Creates an 8 sector per track formatted RAMDISK.

/9 -- Creates an 9 sector per track formatted RAMDISK.

X: -- Drive specification.

[ ] -- Indicates an optional term. The [ ] is not part of the input.

### 8.3.2 The RAMDISK Parameters Specification

Because RAMDISK is a program, just like a DOS command, it must be initialized each time you turn on your PC. This section describes in detail the various commands and options you can use and the format in which they must be entered.

To install the RAMDISK, type the command using the following format:

RAMDISK X: [/M=xxx][/U=xxx][/1][/2][/8][/9]

The word RAMDISK invokes the RAMDISK program's command handler routines. The remainder of the command syntax specifies the various options. They are described below:

X: It creates a RAMDISK in memory. X may be A, B, C, and D.

/1 or /2 Side specification, creates a single-sided drive with /1 option, the default drive size is 160K for DOS 1.1, 180K for DOS 2.0 creates a double-sided drive with /2 option, the default drive size is 320K for DOS 1.1, 360K for DOS 2.0, default side specification is /2.

/8 or /9 Specifies eight sectors per track or nine sectors per track, under DOS 2.0

/M=xxx This option reserves xxxK bytes of memory for RAMDISK use. If this option is omitted, as much memory as possible will be allocated to RAMDISK based on the option /1 or /2 chosen.

`/U=xxx` This option reserves a minimum of `xxxK` bytes of memory for the user application programs, and its work space. If this option is omitted, the RAMDISK will reserve a minimum default program space of `64K` memory space.

#### 8.4 Examples Using RAMDISK

The following examples are provided to help clarify the use of the RAMDISK command.

`RAMDISK B: <enter>`

Allocates a minimum `64K` bytes of application memory space. It also create a double side drive as B:

`RAMDISK C: /2/U=128/M=128 <enter>`

Allocates a minimum `128K` bytes of application memory space, and creates a double side drive with memory space of `128K`.

Now, we will take you step by step through the process of creating and using a RAMDISK.

##### STEP 1

Create a RAMDISK by entering a command as follows :

`RAMISK D: <enter>`

Your screen will display the following message.

```
RAMDISK Version 2.00
RAMDISK D: total space xxxxxxbytes
A>
```

##### STEP 2

Copy all of the files from drive A: to drive D:

```
TYPE:
COPY A: *.* D: <enter>
```

##### STEP 3

Set drive to D:

```
TYPE:
D: <enter>
```

##### STEP 4

Execute the program at drive D:

```
Program - Name <enter>
```

#### 8.5 Executing DISKCONF

DISKCONF Command is one of the RAMDISK Utility programs. It allows you to check the current RAMDISK configuration, after

you type in the command DISKCONF, the screen will display the configuration of current RAMDISKS.

TYPE:  
DISKCONF <enter>

Your screen will display:

**\*\*RAMDISK CONFIGURATION INFORMATION\*\***

RAMDISK X : 1 side 8 sectors, total  
xxxxxx bytes.

RAMDISK X: 2 sides 9 sectors, total  
xxxxxx bytes.

. .  
. .  
. .

### 8.6 RAMDISK Error Messages

RAMDISK may give you an error message under certain conditions. These messages are described below:

#### A. INVALID RAMDISK SPECIFIED!

-- This indicates that either the system board switches have not been set for the correct number of drives or you have used an invalid drive letter in your RAMDISK command.

#### B. NO AVAILABLE MEMORY SPACE!

-- This indicates that there is no available memory space to allocate a RAMDISK.

#### C. xxxxxx Bytes Short

-- This is a message indicating the number of insufficient memory space that you specified for memory allocation.

#### D. RAMDISK CAN NOT BE REPLACED!

-- It attempts to specify an installed RAMDISK name.

#### E. INVALID PARAMETERS SPECIFIED !

-- It indicates an invalid parameter specified.

## 9.1 Introduction

The PSpOOL Utility program is a print spooler which provides queued print-out data to a parallel or serial printer during concurrent processing of other programs. Files to be printed will be output to the PSpOOL queue, the PSpOOL program will handle output to the printer at printer speed.

PSpOOL has the following features:

- \* Provides queued output of print data to either a parallel or serial printer.
- \* Allows you to define the size of the spooler queue.
- \* Allows stop/restart, and line-per page controls.

## 9.2 Preparing PSpOOL on Your Personal Computer

Refer to your PC technical reference manual for memory settings to set the switch to the maximum memory size of your system. This allows you full use of your memory space. Prior to entering your PSpOOL command, you must enter the DOS MODE command to disable the redirection of printer LPT#: This can be done by typing in:

MODE LPT1: <enter>

If you assign the print data to your serial printer, you must do the following:

1. Refer to the DOS MODE command which initializes the Asynchronous Communications Adapter by using option 3.
2. Use the PSpOOL command to redirect LPT1: to a serial printer.

## 9.3 Getting Started

To start PSpOOL, you must copy three utility programs into your DOS diskette, the utilities are:

PSpOOL.COM  
PSPLHELP.COM  
PSPLCONF.COM

Insert the DOS diskette into drive A, and type the command you wish to execute.

### 9.3.1 The PSpOOL HELP Command

The PSpOOL HELP Command is one of the PSpOOL Utility programs. It provides you an operations menu, after you type the following command:

PSPLHELP <enter>

Your screen will display:

\*\*PSPOOL HELP INFORMATION\*\*

Command Format:

PSPOOL LPTn:[=COMn:][ /U=xxx ][ /M=xxx ]  
[ /L=xx ][ /S ][ /C ][ /R ][ /I ][ /ON= ][ /OFF ]

- LPTn: -- Selects parallel printer.
- =COMn: -- Redirects parallel printer output to a serial port.
- /U=xxx -- Reserves memory space size for user application programs.
- /M=xxx -- PSPOOL queue size specification.
- /L=xx -- Sets the number of lines per page.
- /S -- Stops output of print data.
- /C -- Continues output of print data.
- /R -- Continues output of print data at the beginning of the current page.
- /I -- Initializes the PSPOOL queue, all print data will be purged.

/ON= -- Turns on serial printer port handshake line protocol options.

/OFF -- Turns off serial printer port handshake line protocol options.

[ ] -- Indicates an optional term. The [ ] is not part of the input.

### 9.3.2 PSPOOL Parameters Specification

Because PSPOOL is a program, just like a DOS command, it must be initialized each time you turn on your PC. This section describes in detail the various commands and options you can use and the format in which they must be entered. The PC normally sends all printer output to LPT1 unless the user takes steps to redirect the output to a different port. When either a serial or parallel port is assigned for printer output with PSPOOL, the port cannot be used by any other program for any purpose until the port is redirected by the PSPOOL command once again.

To install PSPOOL, use the following command format.

PSPOOL LPTn: [=COMn:][ /U=xxx ][ /M=xxx ]  
[ /L ][ /S ][ /C ][ /R ][ /I ][ /ON=OPTION ]  
[ /OFF=OPTION ]

The word PSPPOOL invokes the PSPPOOL program's command handler routines. The remainder of the command syntax specifies the various options. They are described below.

LPTn: selects one of the three possible parallel ports.

=COMn: Redirects parallel printer output to a serial port. LPTn now responds as LPTn+1. Note that you must initialize the Asynchronous Communication

Adapter by using DOS command MODE before you select this option.

/U=xxx This option reserves a minimum of xxxK bytes of memory for the user application programs, and its work space. If this option is omitted, PSPPOOL will reserve a minimum default program space of 64K memory space.

/M=xxx This option reserves a minimum of xxxK bytes of memory for PSPPOOL queue. If this option is omitted, The default queue size is 64K. If =xxx is omitted as much memory as possible will be allocated to PSPPOOL queue.

/L Sets the number of lines per page. Default is 66.

/S Stops output of print data. No data will be lost, and data output can be restarted by using /C option.

/C Continue output of print data.

/R Continue output of print data at the beginning of the current page.

/I Immediately purge all data from PSPPOOL queue, the queue is empty.

/ON= Turn on serial printer port handshake line protocol options.

/OFF= Turns off serial printer port handshake line protocol options.

The handshake line protocol options are XON, DCD, DSR, CTS. default ON=CTS, DSR, OFF=XON, DCD.

#### 9.4 Examples Using PSPPOOL

The following examples are provided to help clarify the use of the PSPPOOL command.

```
PSPPOOL LPT1: <enter>
```

spooler printer output to LPT1.



PSPPOOL LPT1:/U=192/M <enter>

spooler printer output to LPT1, reserves a minimum of 192K for the application program. Use as much memory space as possible for spooler queue.

PSPPOOL LPT1:=COM1:/ON=CTS <enter>

Redirects to serial printer 1, with CTS handshake line protocol control.

Now, we will take you step by step through the process of creating and using PSPPOOL.

#### STEP 1

Prepare DOS for PSPPOOL by using MODE command

A> MODE LPT1: <enter>

#### STEP 2

Create PSPPOOL by entering a command as follows:

A> PSPPOOL LPT1: <enter>

PSPPOOL Version 2.00  
PSPPOOL total queue space xxxxxx bytes  
A>

#### STEP 3

To use the spooler you can give a print screen command ( shift-prtsc ), or give a print out file XYZ. LST to LPT1: by entering the following command :

A>COPY A: XYZ.LST LPT1: (enter)

At this point, you can proceed with running whatever program you want while PSPPOOL is printing out your specified data files.

#### 9.5 Executing PSPLCONF

Once PSPPOOL has been activated, the status can be checked at any time by entering the PSPLCONF command. The current printer configuration and spooler queue will be displayed.

The PSPPOOL directed printer port configuration can be changed when the spool queue is empty.

#### 9.6 PSPPOOL Error Messages

PSPPOOL may give you an error message under certain conditions. The messages are described below:

A. PRINTER NOT AVAILABLE

-- No such printer port in the system or printer not on line.

B. INVALID PARAMETER SPECIFIED

-- This indicates an invalid parameter specified.

C. CANNOT BE REDIRECTED

-- Redirect parameter specified error.

D. NO AVAILABLE MEMORY SPACE

-- This indicate that there is no available memory space for printer queue.

