

X4003

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# SYSTEM 80 MK II

# USER'S MANUAL

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# INTRODUCTION

# 1

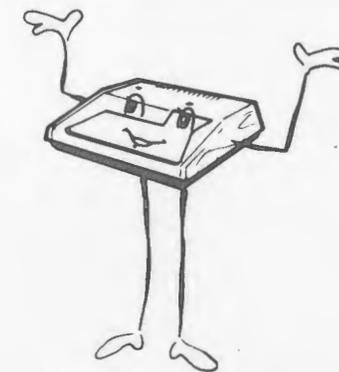
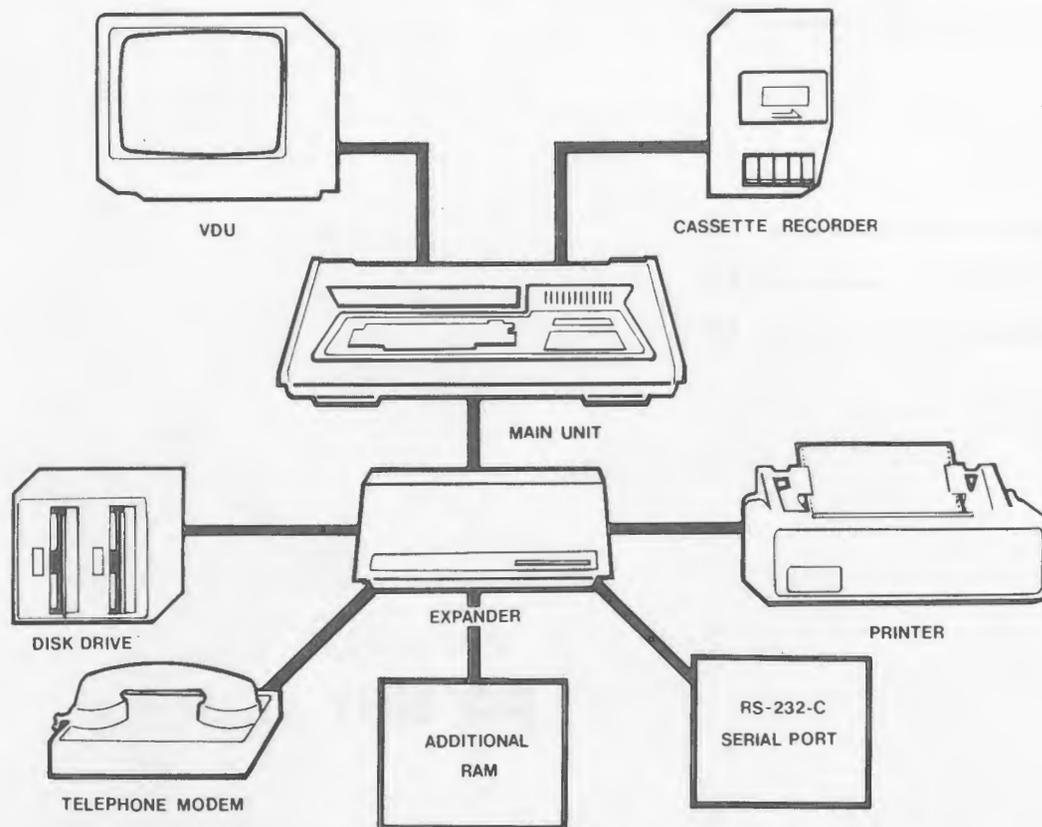
The MKII System 80 microcomputer is a new generation of the MKI System 80 and is designed for professional applications. Its design philosophy is very similar to that of many other general purpose computer systems. The main unit is composed of a Z80 CPU, 16K user memory, 13K ROM, a keyboard, a cassette interface and a video interface.

Out of the 13K ROM, 12K is the Extended BASIC Interpreter which is TRS80 Level II compatible, and 1K contains new keyboard and display routines that make the operation more handy. A dumb terminal routine and a HOST routine are built in.

The video interface can display upper and lower case characters. Display format is 64 characters/line and 16 lines/screen. The display can automatically scrolls.

The cassette interface operates at a transfer rate of 500 baud, and TRS80 compatible cassette tapes can be loaded through the interface.

The system also has great expansion capability. Through the expansion edge, it can be connected to an expander, from which, minifloppy disk drives, printer, RS-232-C interface, etc, can be linked to the system. The expander can increase the total user memory size to 48K and provide a S-100 bus option for users' specific applications.



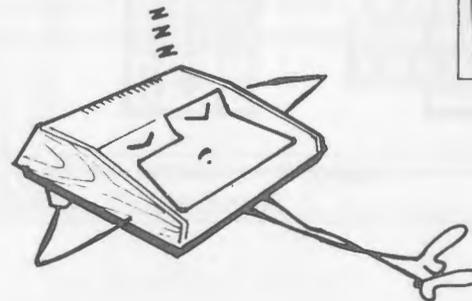
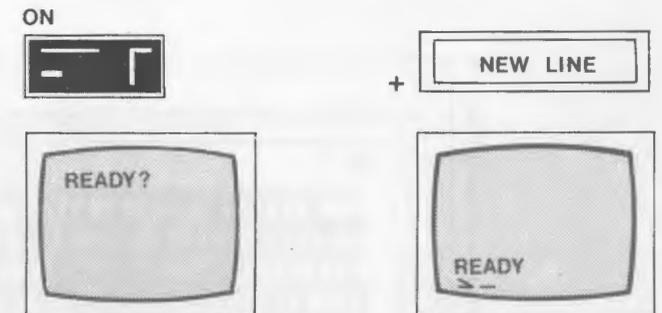
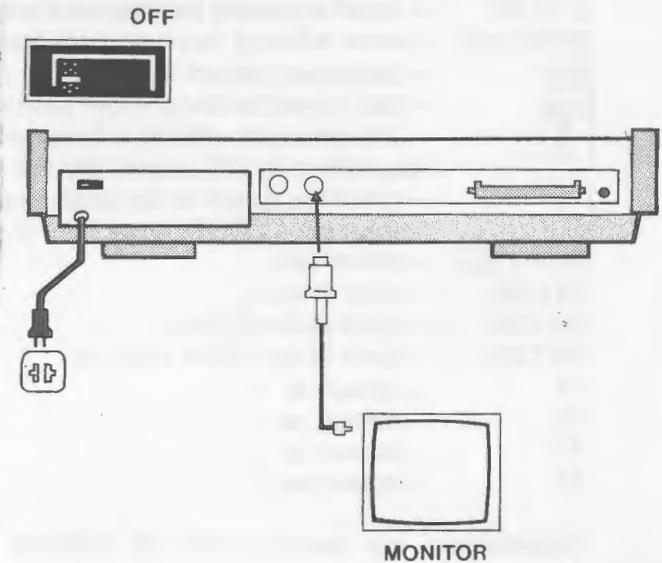
'This is my family!'

# POWER ON PREPARATION

Following is the procedure to set up the system.

- 1) Ensure the power switches of the computer and its peripherals are in the 'OFF' position.
- 2) Connect up the cables between the main unit, expander and the peripherals.
- 3) Turn on power for the peripherals first, then the computer.
- 4) If your system is not connected to an expander, a message 'READY?' will be displayed on the top left corner of the screen.
- 5) Hit the NEWLINE key, then another READY message should appear on the bottom of the display.
- 6) The computer is now in BASIC. To enable your new keyboard and display routines, type in SYSTEM **NEWLINE**
- 7) The computer prompts with ✖?.
- 8) Enter /12288 **NEWLINE** (See Remark)
- 9) The computer will immediately goes back to READY. You will see a blinking cursor.
- 10) If minifloppy disk is hooked to the system, do step 6, 7, 8 immediately after entering Disk Basic.

**REMARK:** See Section 4.4 for other entry points.



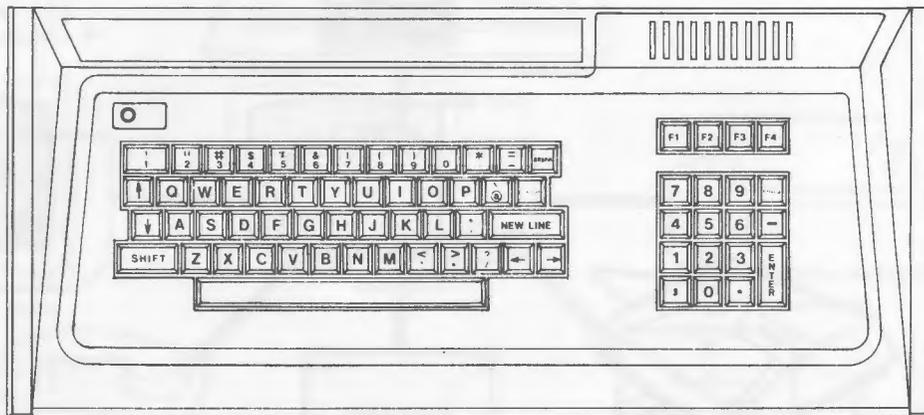
# KEYBOARD 3

The System 80 MKII Keyboard consists of 71 keys

## Special Function Keys

- BREAK** — break a running program and return to the Active command level.
- NEWLINE** — enter a line of command or data into the computer.
-  — backspace, cancel the character previously entered.
-  — tab, move the cursor eight position to the right.
-  — the computer echoes a [ sign which is an exponent sign used by the system.  
(equivalent to ESC key of the MK I system)
-  — move the cursor to the beginning of next line.  
(equivalent to CTRL key of the V.G.S.)
- SHIFT**  — delete line.
- CLEAR** — clear screen.
- ERASE** — same as the  key.
- ENTER** — same as the **NEWLINE** key.
- F1** — default as — .
- F2** — default as \ .
- F3** — default as ] .
- F4** — default as ^ .

Programmers are recommended to program the four function keys to represent preset functions for the user.



# MORE ABOUT THE KEYBOARD

# 4

The key functions mentioned in the previous section are the original functions without enabling the additional ROM routines, exactly the same as that of the MKI machine. Now, MKII adds three extra useful functions. They are the automatic key REPEAT, PRINTSCREEN and SHIFT-LOCK.

## 4.1 REPEAT KEY

After pressing a key longer than one second, the computer automatically repeats entering that character until the key is released.

## 4.2 PRINTSCREEN

Hitting SHIFT -  - P, the computer will transfer the information displayed on the screen to the printer. If no printer is hooked, the computer will skip the printing process instead of locking up itself in waiting.

## 4.3 SHIFT LOCK

The new keyboard routine has two input mode: Basic mode and Typewriter mode.

Initially, the Basic mode is set. It looks like an ordinary terminal keyboard. Every keystroke gives upper case character, but with the SHIFT key depressed, it gives lower case characters.

To switch the keyboard to the Typewriter mode, hit the SHIFT--Q keys. Then, the cursor will change from a large block to a small one which indicates that every alphabetic character input will be of lower case. In this mode, when the SHIFT key is depressed, it gives upper case characters. However, operation of the numeric keys are the same for both modes. Hitting a numeric key with the SHIFT key depressed will always give a symbol; without SHIFT, it is a number.

Switching back to Basic mode from the Typewriter mode, simply hit the SHIFT--Q keys again. The cursor will change back to a large block.

## 4.4 Disable cursor flashing

A flashing cursor can attract the operator's attention, however, somebody may feel it frustrating.

To disable the flashing cursor, hit SHIFT-BREAK. To enable it, hit SHIFT-BREAK AGAIN. If you don't want a flashing cursor at the start, you can enter 12299 instead of 12288 described in step 8 of section 2.

**NOTE:** Sometimes, you may want to neglect the new keyboard routine because of software compatibility. In such a case, 12294 should be entered in step 8 of section 2.

## LOADING AND SAVING CASSETTE PROGRAM

The computer has a cassette interface which can be connected to any audio cassette recorder. The user therefore can use cassette tapes as cheapest medium for his program storage. A cassette connector is provided, and the connection is shown in the diagram.

### 5.1 PROGRAM LOADING

Following is the procedure for program loading. In using the INPUT# command, the procedure is similar.

- a) Insert a cassette into the recorder.
- b) Unplug the remote (blue) plug.
- c) Wind or Rewind the tape until at the program's beginning.
- d) Plug in the remote plug.
- e) Enter CLOAD (refer to BASIC manual if you want to specific filename).
- f) The computer turns on the cassette and starts searching the program. Once it is found, two asterisks will appear at the top right corner of the screen, the one at the right will be flashing from time to time indicating that the program is loading.
- g) After loading finishes, the computer turns the cassette off and returns to Active Command Level.

**NOTE:** Volume of the recorder should be set to medium level. If loading is unsuccessful, try to make a small adjustment on the volume.

Loading machine code tape should use the SYSTEM command instead of CLOAD; users are advised to refer to chapter I of the BASIC manual.

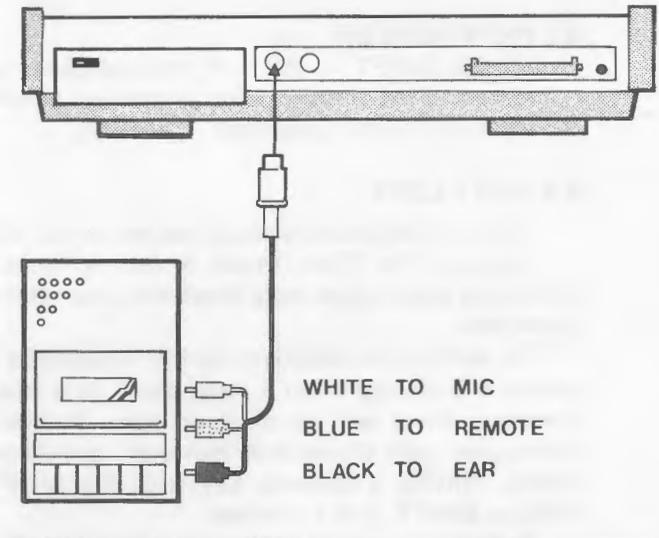
### 5.2 PROGRAM SAVING

Following is the procedure for program saving. In using the PRINT# command, the procedure is similar.

- a) Unplug the remote (blue) plug.
- b) Erase about 5 seconds of the tape.
- c) Plug in the remote plug.
- d) Enter CSAVE "F", where "F" represents the filename. The user needs not to input the cassette number since the system can only be connected to one cassette.
- e) The computer turns on the cassette and records the program onto the tape. No asterisk will appear on the screen.
- f) The computer goes back to Active Command Level after the saving has completed. Then, the cassette will be turned off.

### 5.3 PROGRAM CHECKING

The program on a tape can be compared with that stored in the memory of the computer by entering a CLOAD? command. The operating procedure is exactly the same as that of the loading. The only difference is to type in CLOAD? instead of CLOAD. A READY message will appear when a successful comparison has completed. Otherwise, the word BAD will be displayed.



'That is my heart-beat!!'

# SYSTEM RESET 6

The system must, in some cases be reset. When, for example, the machine is running in a dead loop. The Reset Switch is located at the right side of the back panel. Pressing the reset switch causes the computer to return to the 'READY' mode without changing the memory contents.

The system runs in a dead loop in the following cases:

- (1) loading a program from the cassette which contains an invalid file, or when the volume of the recorder is poorly adjusted.
- (2) executing LPRINT or LLIST instructions without hooking up a printer to the system or having not turned on the printer.
- (3) executing an inappropriate POKE instruction.

The CPU is reset everytime when the power is on. Turning the system off and on immediately is not a good practice; because it may cause improper initialization of the CPU. Therefore, the user should wait for about 15 seconds before turning on the system again.



Help!

# UTILITY- DUMB TERMINAL, HOST

Every computer user should be very familiar with what a terminal is. It is a piece of equipment for sending data to or retrieving data from the mainframe at a remote location. Nowadays, nearly all terminals use the same interface standard, that is, RS232C. The System 80 expander also has an RS232C option.

Inside the additional 1K ROM, a 'dumb terminal' routine is provided. Entering the routine, the machine will switch itself into a dumb terminal. Every keystroke by the user will be sent out in the form of ASCII code through the RS232C interface. Simultaneously, every characters received through the interface will be displayed. The keyboard functions are the same as those discussed in Section 3 and 4 except the repeat key is cancelled. User can still use the PRINTSCREEN to produce a hardcopy of the information displayed.

Another utility designed to work with Terminal routine is the Host routine. In the Host mode, resources of the Host computer, such as disk, printer, etc., will be controlled by commands through the terminal only.

## 7.1 DUMB TERMINAL

The procedure to enter the routine is:

- a) Enter SYSTEM, the computer will response with '\*?'
- b) Enter / 13037
- c) The computer will ask 'DUPLEX? (F/H): ' ; F stands for Full duplex and H for Half duplex.
- d) Enter 'F' or 'H' to select the desired mode.
- e) You are now in the terminal mode.
- f) To exit, hit the RESET switch.
- g) If a printer is connected, characters displayed will also be output to the printer.

## 7.2 HOST

The HOST routine is a communication routine utilising the RS232C interface. It allows a Host computer to hook to a remote terminal. The terminal operator can input data to or retrieve information from the computer. What the terminal is doing will also be displayed on the Host screen.

Working procedure of the Host user:

- 1) Enter the Host mode, type in SYSTEM, the computer will display ‘\*?’, then enter/12996
- 2) A message “HOST ENABLE” will send from the Host to the terminal.
- 3) The Host computer will lock its keyboard up and wait for input from the terminal.
- 4) If the Host user wants to terminate the Host mode, he should hit the  and BREAK Key simultaneously.
- 5) A message “HOST/TERMINAL DISCONNECT” will display on both the Host and the Terminal.

### Interconnection

The RS232C signal of the Host and Terminal should be connected in the following way:

<u>Host</u>		<u>Terminal</u>
RxD		TxD
TxD	to	RxD
RTS		CTS

**NOTE:** The Host entry point 12996 has no line feed on carriage return. If you are using a terminal with no auto line feed. Please enter the Host by 12999.

# APPENDIX A

## TECHNICAL SPECIFICATIONS

### (1) ELECTRICAL CHARACTERISTICS

POWER CONSUMPTION	— 25W (MAX.)
CASSETTE INPUT LEVEL	— 1 V peak to peak
COMPUTER OUTPUT RECORDING LEVEL	— 0.3 V peak to peak
REMOTE SWITCHING CAPACITY	— 0.5 A max at 6 V DC
VIDEO OUTPUT	— 2V peak to peak (Negative sync pulse)

### (2) CONNECTORS PIN ASSIGNMENTS

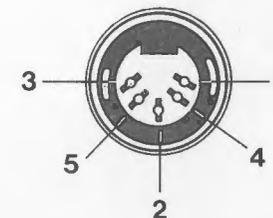
#### DIN JACK PIN CONNECTIONS FOR ADDITIONAL CASSETTE

- 1 — REMOTE
- 2 — SIGNAL GROUND
- 3 — REMOTE
- 4 — INPUT
- 5 — OUTPUT

#### DIN JACK PIN CONNECTIONS FOR VIDEO INTERFACE

- 1 — +5 V
- 4 — VIDEO OUTPUT
- 5 — GROUND

**DIN JACK** VIEWED FROM REAR SIDE OF THE SYSTEM.



**EXPANSION PIN EDGE** VIEWED FROM REAR SIDE



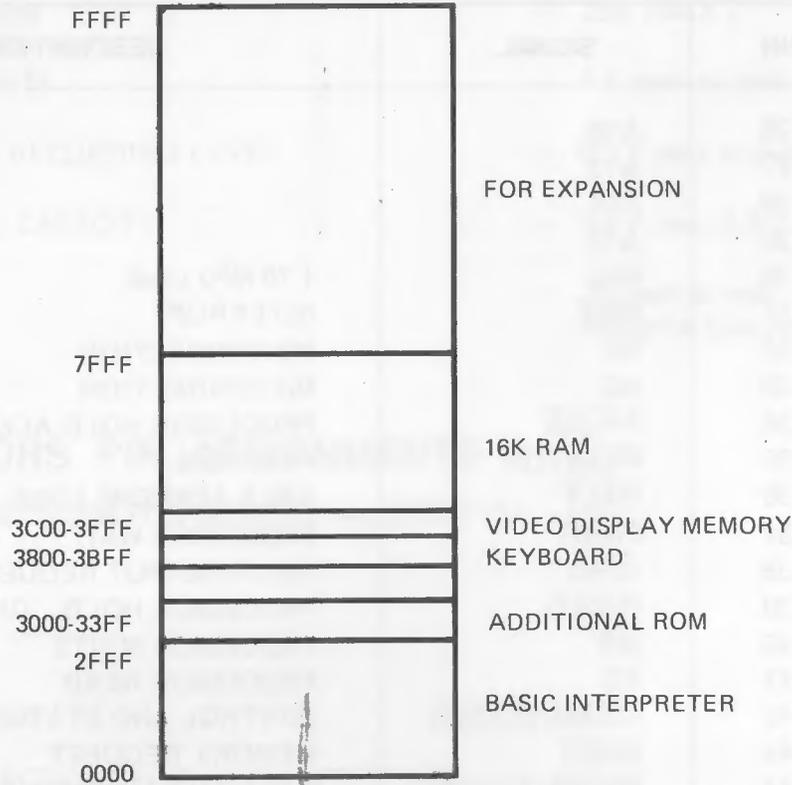
## PIN CONNECTIONS FOR EXPANSION INTERFACE

PIN	SIGNAL	DESCRIPTION	PIN	SIGNAL	DESCRIPTION
1	GND	GROUND	26	A10	
2	GND	GROUND	27	A13	
3	A7		28	A11	
4	A6		29	A12	
5	A5		30	PHI	1.79 MHz clock
6	A4		31	$\overline{\text{PINT}}$	INTERRUPT
7	A1		32	NC	NO CONNECTION
8	A3		33	NC	NO CONNECTION
9	A2		34	$\overline{\text{PHLDA}}$	PROCESSOR HOLD ACKNOWLEDGE
10	A0		35	$\overline{\text{PHANTOM}}$	PHANTOM
11	D5		36	$\overline{\text{HALT}}$	HALT ACKNOWLEDGE
12	D2		37	$\overline{\text{PWAIT}}$	PROCESSOR WAIT
13	NC		38	$\overline{\text{IORQ}}$	INPUT/OUTPUT REQUEST
14	D1		39	$\overline{\text{PHOLD}}$	PROCESSOR HOLD
15	D0		40	$\overline{\text{WR}}$	PROCESSOR WRITE
16	D3		41	$\overline{\text{RD}}$	PROCESSOR READ
17	D7		42	$\overline{\text{CCDBS/STADBS}}$	CONTROL AND STATUS BUS DISABLE
18	D6		43	$\overline{\text{MREQ}}$	MEMORY REQUEST
19	VCC	+5V SUPPLY	44	$\overline{\text{DODBS/ADDDBS}}$	DATA AND ADDRESS BUS DISABLE
20	D4		45	$\overline{\text{M1}}$	FIRST STATE OF INSTRUCTION CYCLE
21	A15		46	$\overline{\text{RESET}}$	CPU RESET
22	A8		47	$\overline{\text{RFSH}}$	DYNAMIC MEMORY REFRESH
23	A14		48	$\overline{\text{NMI}}$	NON-MASKABLE INTERRUPT
24	A9		49	GND	
25	NC	NO CONNECTION	50	GND	

# APPENDIX B

## MEMORY MAP AND I/O MAP

### MEMORY MAP



### I/O PORT ASSIGNMENT

CASSETTE INTERFACE – FF, FE  
 PRINTER INTERFACE – FD

# APPENDIX C

## ASCII TABLE

MSD LSD		0	1	2	3	4	5	6	7
		000	001	010	011	100	101	110	111
0	0000	BREAK		SP	0	@	P	\	p
1	0001		!	1	A	Q	a	q	
2	0010		..	2	B	R	b	r	
3	0011		#	3	C	S	c	s	
4	0100		S	4	D	T	d	t	
5	0101		%	5	E	U	e	u	
6	0110	BS		&	6	F	V	f	v
7	0111		.	7	G	W	g	w	
8	1000		←	(	8	H	X	h	x
9	1001		→	)	9	I	Y	i	y
A	1010		↓	*	:	J	Z	j	z
B	1011	FF CR	↑	+	;	K	[	k	{
C	1100		HOME	,	<	L	\	l	
D	1101		-	=	M	] ↑	m	}	~
E	1110		.	>	N	↑	n		
F	1111	CLS	/	?	O	-	o		



# NOTES

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# NOTES

## ASCII TABLE

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## APPENDIX B

### I/O MAP AND I/O MAP

Address	Device	Function	Notes
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### I/O PORT ASSIGNMENT

CASSETTE INTERFACE - FT, FE  
 PRINTER INTERFACE - FD

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