

Expansion Interface Expansion Pack, Error Messages and Sample Game Code

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Radio Shack TRS-80 EXPANSION INTERFACE

Radio Shack TRS-80 Operator's Manual

SEE CAUTION INSIDE COVER

Catalog Numbers 26-1140, 26-1141, 26-1142

CUSTOM MANUFACTURED IN U.S.A. FOR RADIO SHACK TC A DIVISION OF TANDY CORPORATION

Welcome to the World of Personal Computing

Why you should not be scared of the new world of personal computing!

We've been living in the Computer Age for more than twenty years. But most people still think of computers as million dollar electronic monsters.

You've seen the made-for-the-movies computer. Rows of flashing lights, whirring sounds, bespectacled men in white lab coats seated at mysterious control panels. Feed some punched cards, paper tapes, tax returns and financial statements in one end...and out pop more punched cards, more paper tapes, bills and credit statements.

This "Please don't fold, spindle or mutilate" reputation of the computer is about to be demolished (finally!) by the remarkable advances in miniaturization which gave us the pocket calculator and digital watch. The **microcomputer** has arrived, and computers are going to become as common as telephones and television sets.

Think of the impact on the way we conduct business, educate students and keep track of our personal finances! Now the power of the computer to the appliance repair shop, the accountant, the neighborhood classroom, the corner grocer, even the individual.

The microcomputer is ushering in a fantastic new phase of the Computer Age. *Welcome to the World of Personal Computing!*

The NEW TRS-80 Expansion Interface

Information on what the TRS-80 Expansion Interface can do for you! Includes basic specification information.

A vital part of Radio Shack's modular design, this single interface enables you to upgrade your system as your needs increase. It contains sockets for additional 16K or 32K RAM and a disk controller for up to for mini-disks. Software-selectable dual cassettes can be used. It attaches to (and continues) the TRS-80 bus, and features a Centronics parallel port, real time clock, and a card slot for an RS-232C interface—or whatever! Usually requires Level-II BASIC.

Introduction

An overview of the features and functions of the TRS-80 expansion module.

The TRS-80 Expansion Interface consists of the Case, a DC Power Supply, a Ribbon Cable, a Cassette Recorder Jumper Cable and an additional Cassette Recorder Cable for Cassette Recorder number 2. Notice that the DC Power Supply is not installed in the Case upon receipt. It must be installed using the procedures under the heading "SETTING UP".

The Case houses the Expansion Interface Printed Circuit Board (PCB), two DC Power Supplies and provides a housing area for an additional expansion PCB. The Expansion Interface utilizes a real-time clock and contains sockets for the addition of up to 32K of RAM in 16K increments.

One DC Power Supply provides power to the PCB. The other one supplies power to the TRS-80. The Power Supplies are interchangeable.

The ribbon cable has 40-pin connectors on both ends and is used to connect the Expansion Interface to the TRS-80. You received hoods for these connectors which are covered later in this manual.

The Cassette Recorder Jumper Cable has 5-pin audio DIN connectors on both ends. It connects between the Expansion Interface Tape input/output (I/O) and the TAPE connector on the right rear of the TRS-80 Microcomputer.

The Cassette Recorder Cable is provided to connect the Expansion Interface to Cassette Recorder number 2.

Capabilities and Advantages

A brief overview of the additional features that adding the expansion interface can do for your TRS-80.

The Interface allows you to add the following Radio Shack modules to your system:

1. Screen Printer (26-1151)
2. Line Printer (26-1150)
3. Mini-Disk System (26-1160/26-1161)
4. Cassette Recorder number 2 (14-841)

The Screen Printer and Line Printer allow you to obtain hard copy (printed) information generated by your TRS-80.

The TRS-80 Mini-Disk System is a small version of the floppy disk. It provides vast storage space and much quicker access time than tape. The number 1 disk contains about 80,000 bytes of free space for files. Each additional disk has 89,600 bytes of file space. The Disk System has its own set of commands that allow manipulation of files and expanded abilities in file use. The TRS-80 Mini-Disk System uses sequential or random access. The disks will allow use of several additional LEVEL II commands.



Note: Because of the presence of a Disk Controller in the Expansion Interface, the computer will try to input the additional commands.

When the Expansion Interface is connected to the computer, it assumes that a Mini-Disk is connected. To use the Expansion Interface without a Mini-Disk, press the BREAK key on the TRS-80 keyboard. This will override the Mini-Disk mode and allow normal LEVEL II operation.

The use of two cassettes allows a much more efficient and convenient manner of updating data stored on tape. For example, if you have payroll data stored on tape, the information can be read, one item at a time, from Cassette Recorder number 1, then changed or added to and written out on Cassette Recorder number 2. The example cited is a very simple application; however, very powerful routines can be constructed to allow input and output of data using two tapes simultaneously.



Note: This unit is designed to be used with Level II only. Do not use with level I.

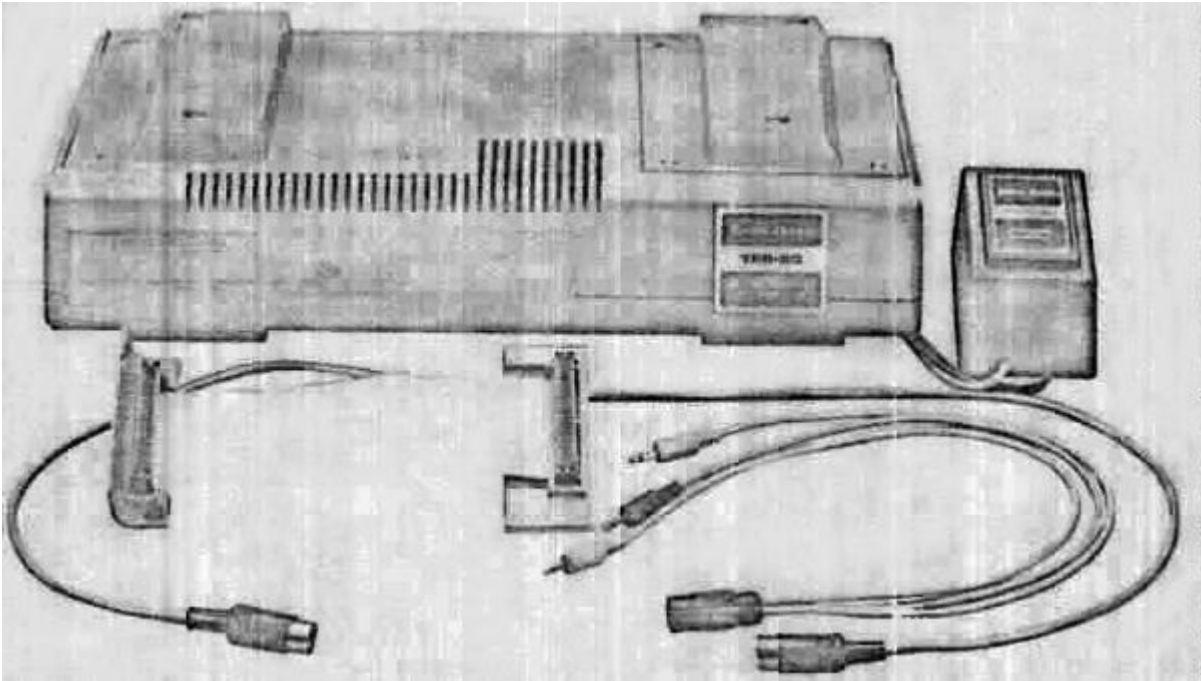


FIGURE 1. Expansion Interface *

* Catalog Number	Description	RAM
26-1140	TRS-80 Expansion Interface	0K
26-1141	TRS-80 Expansion Interface	16K
26-1142	TRS-80 Expansion Interface	32K

Setting Up

How to properly set up the power for the TRS-80 Expansion Interface.

Power Supplies and PCB Housing

Remove the Power Supply Door (top right side). First connect one DC power cord (DIN connector) to the Power connector on the PCB. Now install the two DC Power Supplies as illustrated. Route the remaining cords out the rear of the case. Be sure the power cords are seated in the door cutouts before replacing the Door.

To gain access to the future expansion PCB Housing, remove the Expansion Door from the top left side of the module.

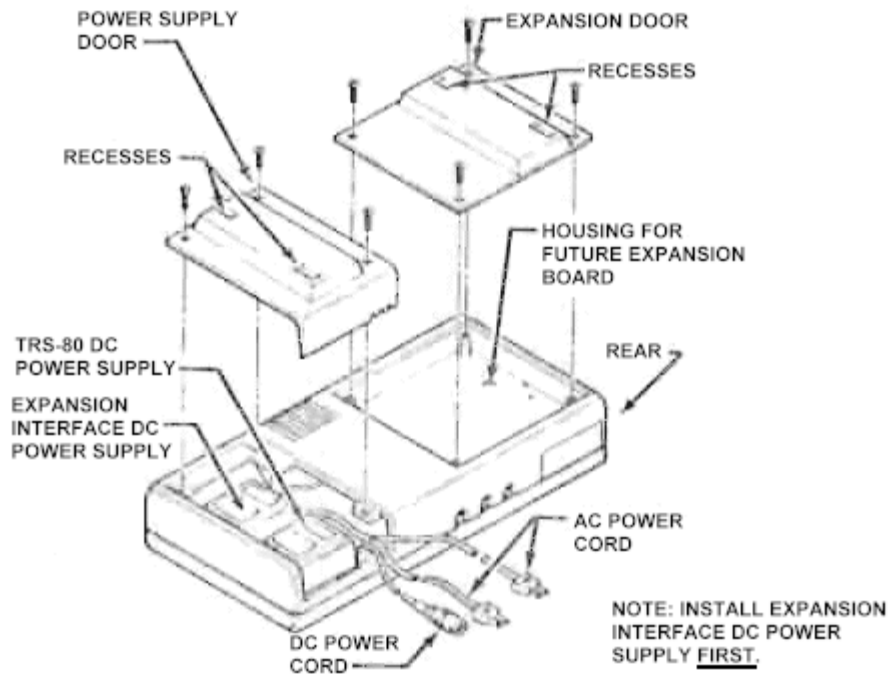


FIGURE 2. Power

Supplies and Future Expansion PCB Locations.

INSTALL EXPANSION INTERFACE DC POWER SUPPLY FIRST.

The term "port" as used in this manual refers to the openings into which the Cable connectors are inserted to provide an interconnection between the

and the
modules.

The ports, with the exception of the port, are also covered by removable Doors. To remove these Doors, press on the right side of the Door and it will pivot slightly. Grasp the left side of the Door and pull out (see the following figure for locations).

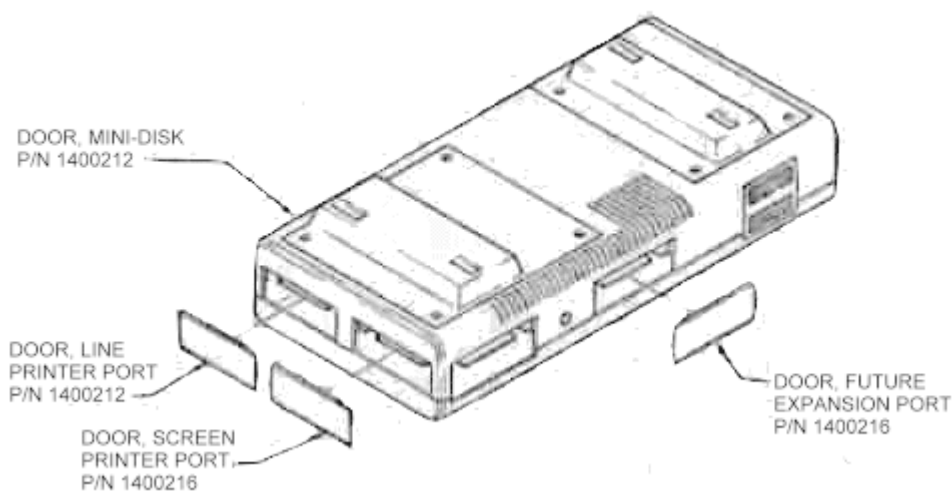


FIGURE 3.

Expansion Interface, Front View—Doors Removed.

Electrical Connections

How to set up the electrical connections for peripheral devices attaching to the TRS-80 computer.

Turn the TRS-80 so that it faces away from you. Locate the port Door (1400083); it's at the right end of the rear panel. To remove the Door, raise it up and slide it to the right—then lift it up and away from the TRS-80.

Place the TRS-80 and TRS-80 Hoods (14000217 and 14000214) on the Ribbon Cable Connectors as shown in the following figure. The Hoods replace the Door on the TRS-80 and fill the opening on the Expansion Interface. These Hoods are designed so that it is not possible to insert the connectors upside down. They function as keyways for the connectors. Now connect the Ribbon Cable between the left front Expansion Interface port and the TRS-80 port.

Connect the DC Power Cord (DIN connector) to the POWER connector on the right rear of the TRS-80 and connect both AC Power Cords to standard 120 VAC outlets.

The interconnect cable for an expansion module is provided with that unit. See the following figure for Hood Assembly and Installation.

Connect the Cassette Recorder Cable (DIN plug on one end and three plugs on the other) to the Tape I/O connector that is located on the rear of the Expansion Interface nearest the Power Cord exits.

Of the three plugs on the other end of the Cable:

1. Connect the black plug to the EAR jack on the side of the Cassette Recorder.
2. Connect the larger gray plug to the AUX jack.
3. Connect the smaller gray plug to the REM jack.



Note: A Dummy Plug is provided with your Cassette Recorder. Plug it in to the MIC jack. This Plug disconnects the built-in microphone so it won't pick up sounds while you are loading tapes.

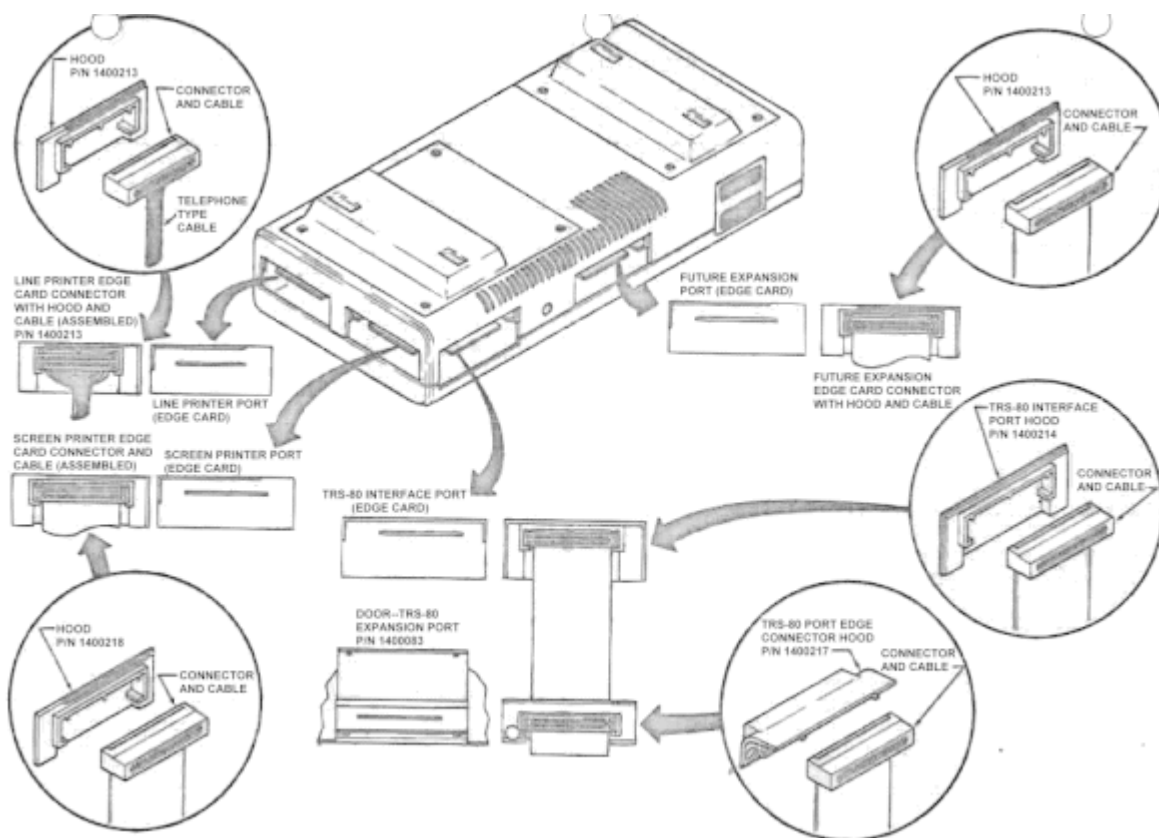


FIGURE 4. Front View—Interface Connections.

Connect the Cassette Recorder Jumper Cable to the center DIN connector on the rear of the Expansion Interface . Connect the other end to the TAPE connector on the right rear of the TRS-80.

Connect the Video Cable from the Video Display to the VIDEO connector on the right rear of the TRS-80.



Note: Your Cassette Recorders may be powered by batteries or from a 120 VAC source. Thus, AC power cords are optional.

The TRS-80 Expansion Interface has been designed to support the Video Display module. Set the feet of the Video Display in the recesses in the Power Supply and PCB Housing Doors.

Operation

What you need to know about power states for the TRS-80 expansion module.



Note: The Power switch is recessed into the front of the Expansion Interface to prevent accidental loss of power. Activate the switch with the eraser-end of a pencil or small tool of similar size.

Apply power to the Expansion Interface. Notice that when power is off, the end surface of the switch is white and when power is on, it changes to orange.

Conclusion

Thanks for buying the TRS-80 expansion module and goodbye!

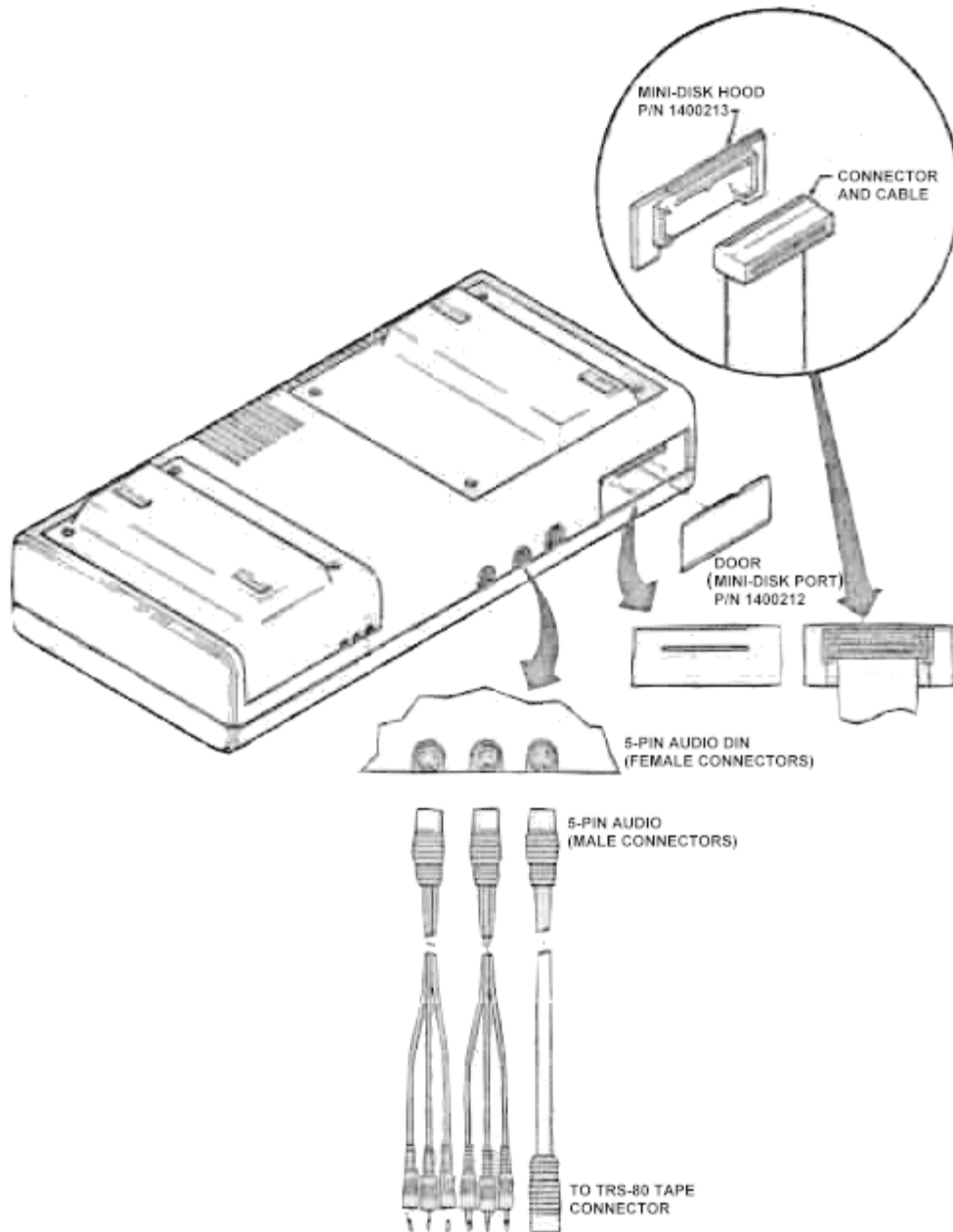
Possibly, you will not need all of the expansion modules that are available but, we have supplied you with Hoods for cable connectors for a complete expansion system. Use the Hoods as illustrated to prevent accidental mismatch between the edge connectors on the PCB and the cable connectors.

In the event that you lose a Door or Hood and want to replace it, we have given you a Parts List. You may refer to the Parts List and exploded diagrams to determine its Part Number. You can order replacement parts through your local Radio Shack store.

You must have a LEVEL II BASIC TRS-80 Microcomputer to utilize the TRS-80 Expansion Interface, the Line Printer and the Mini-Disk modules. If you have a LEVEL I BASIC machine, it must be modified to accept LEVEL II programs. The Screen Printer is the only expansion module that may be connected directly to the TRS-80 Microcomputer and that will operate with LEVEL I machines.

We are continually improving and updating our TRS-80 Microcomputer System. You will be kept informed through our Newsletters (you are on the mailing list), addenda and revisions to the Manual.

For the complete Electrical Connections Block Diagram, see the concluding figure below describing the maximum possible set of peripheral devices that can be connected via the expansion interface.



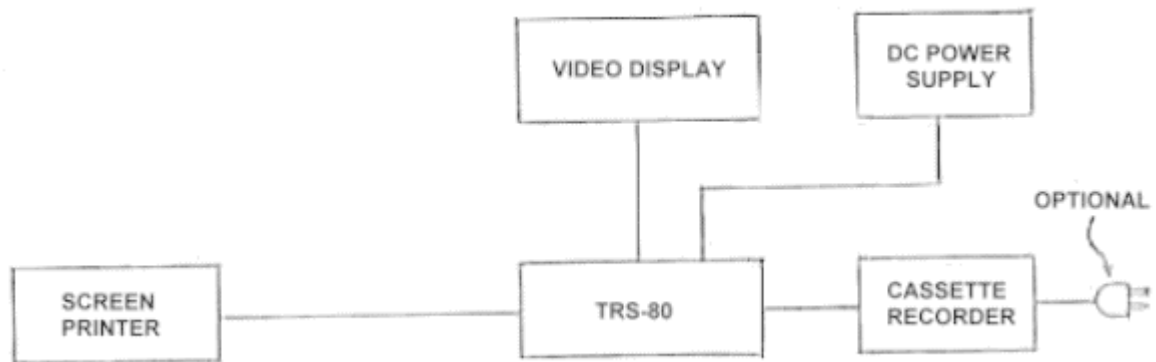
View—Interface Connections.

FIGURE 5. Rear



Expansion Interface

FIGURE 6. Placement of



TRS-80 Microcomputer System Without Expansion Interface

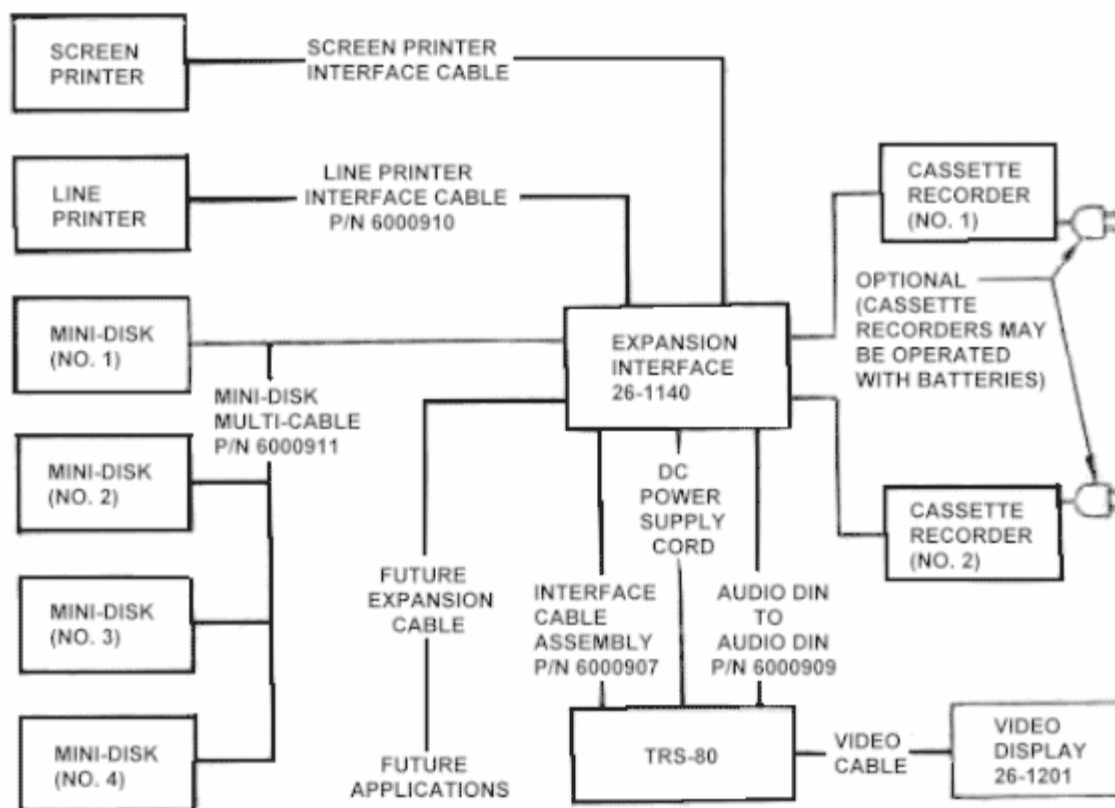


FIGURE 7. Electrical Connections Block Diagram. TRS-80 Microcomputer System with Expansion Interface

Error Messages

The types of error messages you may encounter when using your TRS-80 computer.

There are three kinds of error messages you might get while using your computer:

- Boot errors, such as **BOOT ERROR DC**. See the Boot Errors Table for more information.
- Operating system errors, such as **ERROR 24** or **FILE NOT FOUND**. To get a brief description of a numbered error, type **ERROR** followed by the error number displayed. For example, type:

ERROR 31 (ENTER)

and your screen shows:

PROGRAM NOT FOUND

For more information see the System Errors Table.

- Application program errors: see your application program manual.

When an error message is displayed:

- Try the operation several times.
- Look up boot errors and operating system errors in the following tables and take the recommended actions. See your application program manual for explanations of application program errors.
- Try using other diskettes.
- Reset the computer and try the operation again.
- Check all the power connections.
- Check all interconnections.

- Remove all diskettes from drives, turn off the computer, wait 15 seconds, and turn it on again.
- If you tried all these remedies and continue to get an error message, contact a Radio Shack Service Center.



Note: If more than one thing is wrong, the computer might wait until you correct the first error before displaying the second error message.

Model II Boot Errors Table

List of the possible error messages you may encounter when using the TRS-80 upon boot-up.

Error	Message	Explanation/Action
BOOT ERROR CK	Checksum error – possibly a defective ROM.	Contact RSSC.
BOOT ERROR CT	Defective CTC chip.	Contact RSSC.
BOOT ERROR DC	Floppy disk controller error. 1. Defective diskette. 2. Floppy disk expansion unit not on. 3. Defective FDC Chip or Drive.	1. Try a different diskette. 2. Turn on the floppy disk expansion unit. 3. Contact RSSC.
BOOT ERROR DM	DMA chip failure.	DMA chip failure.
BOOT ERROR D0	Drive not ready. 1. Improperly inserted diskette. 2. Defective diskette. 3. Defective drive.	1. Insert the diskette again and press . 2. Try a different diskette. 3. Contact RSSC.
BOOT ERROR HA	Controller error. Aborted command: Problem during boot-up of hard disk.	Re-initialize the hard disk or contact RSSC.
BOOT ERROR HC	CRC error. Invalid data in data field.	Re-initialize the hard disk or contact RSSC.
BOOT ERROR HD	Controller error. Busy not reset.	1. Re-initialize the hard disk. 2. Power down, wait 10 seconds, and power up. If the error occurs again, contact RSSC.
BOOT ERROR HI	CRC error. Invalid data in ID field.	Re-initialize the hard disk.
BOOT ERROR HM	Data address mark not found.	Re-initialize the hard disk.
BOOT ERROR HN	ID not found. No Boot Track.	Re-initialize the hard disk.
BOOT ERROR H0	Track 0 error on hard disk. 1. Didn't find Track 0 before time-out. 2. Secondary hard disk drives not turned on.	1. Press RESET. 2. Turn on your secondary hard disk drives.
BOOT ERROR HT	Time-out while waiting for Ready. 1. Hard disk drive not powered up.	1. Follow correct procedure: Turn on the hard disk first.

Error	Message	Explanation/Action
	2. Hard disk drive isn't turned on and ready within 10 seconds after the computer. 3. Hard disk drive is disconnected.	2. Press RESET. 3. Connect the hard disk drive or operate under floppy disk control.
BOOT ERROR LD	Lost data during read – FDC (floppy disk controller) or drive fault.	Try another TRSDOS-II diskette or contact RSSC.
BOOT ERROR MF	Memory failure in address range X'1000'-X'7FFF'.	Contact RSSC.
BOOT ERROR MH	Memory failure in address range X'8000'-X'FFFF'.	Contact RSSC.
BOOT ERROR ML	Memory failure in address range X'0000'-X'0FFF'.	Contact RSSC.
BOOT ERROR PI	Defective PIO Chip.	Turn on the expansion bay if it is off. If the error occurs again, contact RSSC.
BOOT ERROR RS	The diskette in Drive 0 is not Radio Shack operating system format.	Insert a TRSDOS-II formatted diskette into Drive 0 and press RESET.
BOOT ERROR SC	CRC Error. Invalid data on diskette or defective diskette.	Try a different diskette.
BOOT ERROR TK	Record not found bootstrap track. Improperly formatted or defective diskette.	Re-format your diskette or try a different diskette.
BOOT ERROR Z8	Defective CPU.	Contact RSSC.
NOT A SYSTEM DISK	Diskette in Drive 0 isn't a TRSDOS-II operating system diskette.	Insert a TRSDOS-II operating system diskette into Drive 0.

TRSDOS-II System Errors Table

List of the possible TRSDOS-II error messages you may encounter when using the TRS-80.

Code	Message	Explanation/Action
0	No Error Found.	No error occurred.
1	Bad Function Code On SVC Call Or No Function Exists.	Check the function code number used on the SVC call.
2	Character Not Available.	No record or character was available when you you called the SVC.
3	Parameter Error On Call.	Parameter is incorrect or a required parameter is missing.
4	CRC Error During Disk I/O.	Try the operation again, using a different diskette. If the problem occurs often, contact RSSC.

Code	Message	Explanation/Action
5	Disk Sector Not Found.	Try a different diskette.
6	Attempt To Open A File Which Has Not Been Closed.	Close the file before re-opening.
7	Illegal Disk Change. Disk Drive Not Ready.	TRSDOS-II detected an illegal disk swap.
8	Disk Drive Not Ready.	Drive door is open or the diskette is not in the drive. On Thinline drives, check the DRIVE command settings.
9	Invalid Data Provided By Caller.	Data stream to be processed has illegal characters.
10	Maximum Of 16 Files May Be Open At Once.	Too many files are open at once.
11	File Already In Directory.	Filename already exists as a directory entry. Kill the existing file, choose another filename, or specify a drive number.
12	No Drive Available For An Open.	No on-line drive <ul style="list-style-type: none"> • is write enabled • has enough space to create a new file, or • has a system directory.
13	Write Attempt To A Read Only File.	File was opened for read only, not for read/write.
14	Write Fault On Disk I/O.	Error occurred during a write operation. Try a different diskette. If the problem continues, contact RSSC.
15	Disk Is Write Protected.	Write enable the disk.
16	DCB Is Modified And Is Unusable.	DCB (used in machine-language programming) has been modified since the last disk access (while the file was open).
17	Directory Read Error.	Error occurred during an attempt to read the directory. Use a different diskette.
18	Directory Write Error.	Error occurred during an attempt to write to the directory. Use a different diskette.
19	Improper File Name (Filespec).	Filespec you gave does not meet TRSDOS-II standard file specifications.
20	Unknown Error Code	
21	Unknown Error Code	
22	Unknown Error Code	

Code	Message	Explanation/Action
23	Unknown Error Code	
24	File Not Found.	Filename you gave was not found on the available disks or the file is the incorrect type for the desired operation.
25	File Access Denied Due To Password Protection.	You gave an incorrect password. See the ATTRIB command.
26	Directory Space Full.	Number of filenames has reached the amount set when you formatted the disk.
27	Disk Space Full.	No space is available on the disk.
28	Attempt To Read Past EOF.	Specified record number is past the EOF.
29	Read Attempt Outside Of File Limits.	Use valid record numbers.
30	No More Extents Available (16 Maximum).	Use the COPY command to copy the files and reduce fragmentation. See also SAVE/RESTORE and MOVE.
31	Program Not Found.	Specified program is not found on the available disks.
32	Unknown Drive Number (Filespec).	Specified drive number is not valid.
33	Disk Space Allocation Cannot Be Made Due To Fragmentation Of Space.	Use the COPY command to copy the files and reduce fragmentation.
34	Attempt To Use A NON Program File As A Program.	File specified for execution is not a program file or the load address given is illegal. Make sure you have a system diskette in Drive 0.
35	Memory Fault During Program Load.	Program is loaded incorrectly, possibly because of faulty memory or a "bad" load address.
36	Parameter For Open Is Incorrect.	Check the OPEN statements or the DCB for errors.
37	Open Attempt For A File Already Open.	File specified for open is already open.
38	I/O Attempt To An Unopen File.	Open the file before access.
39	Illegal I/O Attempt.	<ul style="list-style-type: none"> • I command not given after a diskette swap. • Can be caused by an I/O attempt to a differently formatted disk. Format the disk under the current version of TRSDOS-II or use FCOPY.

Code	Message	Explanation/Action
40	Seek Error.	<ul style="list-style-type: none"> Data cannot be read from the disk – faulty disk. When re-initializing a hard disk, you must also reformat the secondary drives.
41	Data Lost During Disk I/O (Hardware Fault).	Contact RSSC.
42	Printer Not Ready.	Check the connections, power, ribbon, on-line status, and so on.
43	Printer Out Of Paper.	Check the printer's paper supply.
44	Printer Fault (May Be Turned Off).	Check the connections, power, ribbon, on-line status, and so on.
45	Printer Not Available.	Check the connections, power, ribbon, on-line status, and so on.
46	Not Applicable To VLR Type Files.	Operation performed is not valid for VLR files.
47	Required Command Parameter Not Found.	Required parameter or argument is missing from the command.
48	Incorrect Command Parameter.	Option or argument given in the command is incorrect.
49	Hardware Fault During Disk I/O.	Contact RSSC.
50	Invalid Space Descriptor.	The space descriptor that tells TRSDOS-II which extent to read next is invalid. Try a different diskette.
51-255	Unknown error code	

These codes are also returned to machine code routines that call a SVC (System Service Call) of TRSDOS-II. Register A usually has a return code after any function call. The Z flag is set when no error occurs. Exceptions are certain computational routines, which use Registers A and F to pass back data and status information.

Tic-Tac-Toe Code

Enter this BASIC code into your TRS-80 in order to play a game of tic-tac-toe.

```

10 ' COPYRIGHT 1978 THOMAS D. PRICE, JR.
30 RANDOM
  : CLS
  : PRINT
  : PRINT
  : PRINT CHR$(23); TAB(8) "TIC-TAC-TOE"
  : PRINT TAB(8) STRING$(11, CHR$(131))
  : PRINT
40 PRINT "HERE'S YOUR CHANCE TO PLAY"
  : PRINT "TIC-TAC-TOE AGAINST THE TRS-80."
```



```

: PRINT "THE COMPUTER PLAYS A VERY TOUGH"
: PRINT "GAME AND WILL BE DIFFICULT TO"
: PRINT "DEFEAT. IT CAN BE DONE, BUT NOT"
: PRINT "EASILY AND NOT EVERY TIME!"
: PRINT
50 PRINT "JUST TAP THE SPACE BAR WHEN"
: PRINT "YOU'RE READY TO START."
60 c$ = INKEY$
: IF c$ <> " " THEN 60
130 q$ = "N"
: CLS
: PRINT CHR$(23);
: PRINT@ 20, "TIC-TAC-TOE"
140 FOR i = 1 TO 9
: a(i) = 1
: NEXT i
150 PRINT@ 212, 1;
: PRINT@ 222, 2;
: PRINT@ 232, 3;
: PRINT@ 404, 8;
: PRINT@ 414, 9;
: PRINT@ 424, 4;
: PRINT@ 596, 7;
: PRINT@ 606, 6;
: PRINT@ 616, 5;
160 FOR y = 6 TO 34
: SET(52, y)
: SET(72, y)
: NEXT
: FOR x = 33 TO 89
: SET(x, 15)
: SET(x, 25)
: NEXT
180 PRINT@ 832, "WOULD YOU LIKE TO GO FIRST?"
190 r$ = INKEY$
: IF r$ = "Y" THEN GOSUB 720
: GOTO 210 ELSE IF r$ = "N" THEN GOSUB 720
: GOTO 200 ELSE 190
200 m = RND(5) * 2 - 1
: GOSUB 680
210 GOSUB 610
220 m = 9
: IF a(9) = 1 THEN 240
230 m = RND(4) * 2 - 1
: IF a(m) < 1 THEN 230
240 GOSUB 680
250 GOSUB 610
255 IF q$ <> "N" THEN 130
260 GOSUB 320
265 IF q$ <> "N" THEN 130
270 GOTO 250
280 GOSUB 720
: PRINT "THE GAME IS A DRAW !!"
290 PRINT "WOULD YOU LIKE TO TRY AGAIN?"
300 q$ = INKEY$
: IF q$ = "Y" THEN RETURN ELSE IF q$ = "N" THEN 310 ELSE 300
310 CLS
: PRINT CHR$(23)
: PRINT@ 460, "GOODBYE FOR NOW"
: PRINT
: PRINT
315 END
320 c = 1
330 READ h, j, k

```

```

: IF h = 0 THEN 390
340 m = k
: IF (a(h) = 0) * (a(j) = 0) * (a(k) = 1) THEN 380
350 m = h
: IF (a(h) = 1) * (a(j) = 0) * (a(k) = 0) THEN 380
360 m = j
: IF (a(h) = 0) * (a(j) = 1) * (a(k) = 0) THEN 380
370 c = c + 1
: GOTO 330
380 RESTORE
: GOSUB 690
: PRINT "GOTCHA!! I WIN!!"
: GOTO 810
390 RESTORE
400 READ h, j, k
: IF h = 0 THEN 480
410 m = k
: IF (a(h) = -1) * (a(j) = -1) * (a(k) = 1) THEN 450
420 m = h
: IF (a(h) = 1) * (a(j) = -1) * (a(k) = -1) THEN 450
430 m = j
: IF (a(h) = -1) * (a(j) = 1) * (a(k) = -1) THEN 450
440 GOTO 400
450 RESTORE
: GOSUB 680
: FOR i = 1 TO 9
: IF a(i) = 1 THEN 470
460 NEXT i
: GOTO 280
470 RETURN
480 RESTORE
490 FOR i = 1 TO 7 STEP 2
: IF a(i) < 1 THEN 510
500 NEXT i
: z = 7
: IF (a(2) = -1) * (a(4) = -1) THEN 504
501 z = 1
: IF (a(4) = -1) * (a(6) = -1) THEN 504
502 z = 3
: IF (a(6) = -1) * (a(8) = -1) THEN 504
503 z = 5
504 m = RND(4) * 2 - 1
: IF m = z THEN 504
505 GOSUB 680
: RETURN
510 READ h, j, k
: IF h = 0 THEN 590
520 IF (a(h) = -1) + (a(j) = -1) + (a(k) = -1) THEN 510
530 IF (a(h) = 1) * (a(j) = 1) * (a(k) = 1) THEN 510
535 IF a(9) = -1 THEN 550
540 t = RND(2)
: ON t GOTO 550, 560
550 m = h
: IF a(m) = 1 GOTO 580
560 m = k
: IF a(m) = 1 GOTO 580
570 m = j
580 RESTORE
: GOSUB 680
: RETURN
590 RESTORE
600 GOTO 280
610 PRINT "WHAT IS YOUR MOVE?";
615 m$ = INKEY$

```

```

: IF m$ = "" THEN 615 ELSE IF (ASC(m$) > 48) AND (ASC(m$) < 58) THEN m =
VAL(m$)
: GOTO 620 ELSE 615
620 PRINT m
: FOR t = 1 TO 200
: NEXT
: IF a(m) = 1 THEN 640
630 GOSUB 720
: PRINT "SORRY! "; m; "HAS BEEN USED!"
: FOR t = 1 TO 2500
: NEXT
: GOSUB 720
: GOTO 610
640 a(m) = -1
: GOSUB 730
650 w = y
: v = y + 4
: FOR z = x TO x + 8 STEP 4
: IF z = x SET(z, w)
: SET(z, v)
: w = w + 1
: v = v - 1 ELSE SET(z - 1, w)
: SET(z - 1, v)
: w = w + 1
: v = v - 1
: SET(z, w)
: SET(z, v)
: w = w + 1
: v = v - 1
660 NEXT
670 GOSUB 720
: GOSUB 740
: RETURN
680 PRINT "HERE IS MY MOVE"
: a(m) = 0
690 GOSUB 730
695 FOR d = 1 TO 200
: NEXT d
700 FOR z = y TO y + 4
: SET(x, z)
: SET(x + 8, z)
: NEXT z
710 FOR z = x TO x + 8
: SET(z, y)
: SET(z, y + 4)
: NEXT z
715 FOR d = 1 TO 200
: NEXT d
720 PRINT@ 832, CHR$(31);
: PRINT@ 832, ;
: RETURN
730 ON m GOTO 731, 732, 733, 734, 735, 736, 737, 738, 739
731 x = 37
: y = 8
: RETURN
732 x = 57
: y = 8
: RETURN
733 x = 77
: y = 8
: RETURN
734 x = 77
: y = 18
: RETURN

```

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735 x = 77
    : y = 28
    : RETURN
736 x = 57
    : y = 28
    : RETURN
737 x = 37
    : y = 28
    : RETURN
738 x = 37
    : y = 18
    : RETURN
739 x = 57
    : y = 18
    : RETURN
740 c = 1
750 READ h, j, k
    : IF h = 0 THEN 790
760 IF (a(h) = -1) * (a(j) = -1) * (a(k) = -1) THEN 800
780 c = c + 1
    : GOTO 750
790 RESTORE
    : RETURN
800 RESTORE
    : GOSUB 820
    : PRINT "VERY GOOD !! YOU WIN !!"
    : GOTO 290
810 GOSUB 820
    : GOTO 290
820 ON c GOTO 821, 822, 823, 824, 825, 826, 827, 828
821 FOR x = 32 TO 92
    : SET(x, 10)
    : NEXT
    : RETURN
822 FOR y = 5 TO 35
    : SET(81, y)
    : NEXT
    : RETURN
823 FOR x = 32 TO 92
    : SET(x, 30)
    : NEXT
    : RETURN
824 FOR y = 5 TO 35
    : SET(41, y)
    : NEXT
    : RETURN
825 FOR y = 5 TO 35
    : SET(61, y)
    : NEXT y
    : RETURN
826 FOR x = 32 TO 92
    : SET(x, 20)
    : NEXT
    : RETURN
827 y = 5
    : FOR x = 32 TO 92 STEP 4
    : SET(x, y)
    : SET(x + 1, y + 1)
    : y = y + 2
    : NEXT
    : RETURN
828 y = 35
    : FOR x = 32 TO 92 STEP 4
    : SET(x, y)

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: SET (x + 1, y - 1)
: y = y - 2
: NEXT
: RETURN
829 DATA 1,2,3,3,4,5,5,6,7,7,8,1,2,9,6,8,9,4,1,9,5,3,9,7,0,0,0

```

Glossary

A list of some of the computer-related terms you may run across while operating the TRS-80 computer.

Alphanumeric:	Information presented in both alphabetic and numeric form, for instance a mailing list. The numbers 0-9 and the letters A-Z or any combination.
ASCII:	A simple code system that converts symbols and numbers into numbers the computer can understand. For instance, when you type a on the keyboard of your computer, the binary number 01100001 is sent to computer's central processing unit (CPU). The CPU then displays the letter a on the screen.
Baud:	A unit of information transfer. In microcomputers, a baud is one bit per second.
Cartridge:	A 2x3x3/4-inch plastic box that contains ROM software such as BASIC.
Cassette:	A small plastic cartridge that has magnetic tape inside. It has two reels. The tape on one reel is wound onto the other reel. Computer programs can be stored on a standard audio cassette.
Cassette drive:	A standard tape recorder used to save (record) or load (retrieve) computer information.
Cathode Ray Tube (CRT):	The picture tube of a television set or monitor. It is used to display computer output.
Daisy wheel printer:	A printing machine whose print head has a number (usually 96) of radial arms or petals. Each petal has a type character on the end. Daisy wheel type is equal to or better than most typewriter type.
Digital computer:	A computer that uses a series of electronic offs and ons to represent information. These offs and ons are converted to (or from) binary numbers. The TRS-80 is a digital computer.
Disk:	A piece of flat rotating circular mylar that is coated with magnetic material. It is used to store computer information.
Diskette:	A flexible disk that is 5 1/4 inches in diameter (about the size of a 45 RPM record). It is the most common mass storage device.
Documentation:	All of the available information about a particular computer, computer program or set of programs; it would

	include instructions on how to turn on the computer, how to load programs, and so on. For computer programs, the documentation should include such information as what type of computer the program runs on, how much memory is needed and how to operate the program. The TRS-80 comes with an owner's manual.
Electronic mail:	Personal or other messages generated on computer and transmitted to another computer at a different location. The computers are connected by phone lines.
Function key:	A key that tells the computer to perform a special function. These functions are defined by the programmer.
Jack:	A plug socket on a computer.
Load:	The process of entering data or programs from an external device, such as a disk drive, into the computer. For instance, if you load a program into the computer it is available for use.
Mass storage:	The files of computer data that are stored on media other than the computer's memory. For example, diskettes and cassettes are mass storage devices.
Microprocessor:	A central processing unit contained on a single silicon chip.
Modem:	A modulating and demodulating device that enables computers to communicate over telephone lines.
Monitor:	A television or cathode ray tube used to display computer information. In common usage, a monitor usually refers to a special device used exclusively for computer output. It can display a line 80 characters long and has at least 24 lines of text.
Mylar:	A type of plastic used in the manufacture of floppy disks.
Peripheral:	Any device that connects to a computer. Printers, joysticks and modems are peripherals.
Read Only Memory:	A random access memory device that contains permanently stored information. The contents of this memory are set during manufacture. A game cartridge is a Read Only Memory.
Silicon:	A nonmetallic chemical element resembling carbon. It is used in the manufacture of transistors, solar cells, etc.
Software:	The programs and data used to control a computer. Software is available in many forms. You can type the program in yourself or you can have it transmitted to you over the telephone. You can also get it on cassette, diskette, or cartridge.
User's manual:	A book or notebook that describes how to use a particular piece of equipment or software.
Video display:	The screen of your monitor or TV.
Window:	A portion of the CRT display devoted to a specific purpose.

Limited Warranty

A description of the limited warranty for the TRS-80 expansion module.

Radio Shack warrants for a period of 90 days from the date of delivery to customer that the computer hardware described herein shall be free from defects in material and workmanship under normal use and service. This warranty shall be void if the computer case or cabinet is opened or if the unit is altered or modified. During this period, if a defect should occur, the product must be returned to a Radio Shack store or dealer for repair. Customer's sole and exclusive remedy in the event of defect is expressly limited to the correction of the defect by adjustment, repair or replacement at Radio Shack's election and sole expense, except there shall be no obligation to replace or repair items which by their nature are expendable. No representations or other affirmation of fact, including but not limited to statements regarding capacity, suitability for use, or performance of the equipment, shall be or be deemed to be a warranty or representation by Radio Shack, for any purpose, nor give rise to any liability or obligation of Radio Shack whatsoever.

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