Radio Shack TRS-80 Expansion Interface: Operator's Manual

Operator's Manual Catalog Numbers: 26-1140, 26-1141, 26-1142

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Part I

Introduction

Topics:

Description of the TRS-80 Expansion Interface, the parts that come with it, and what it can be used for.

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 the expansion interface can add to 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.

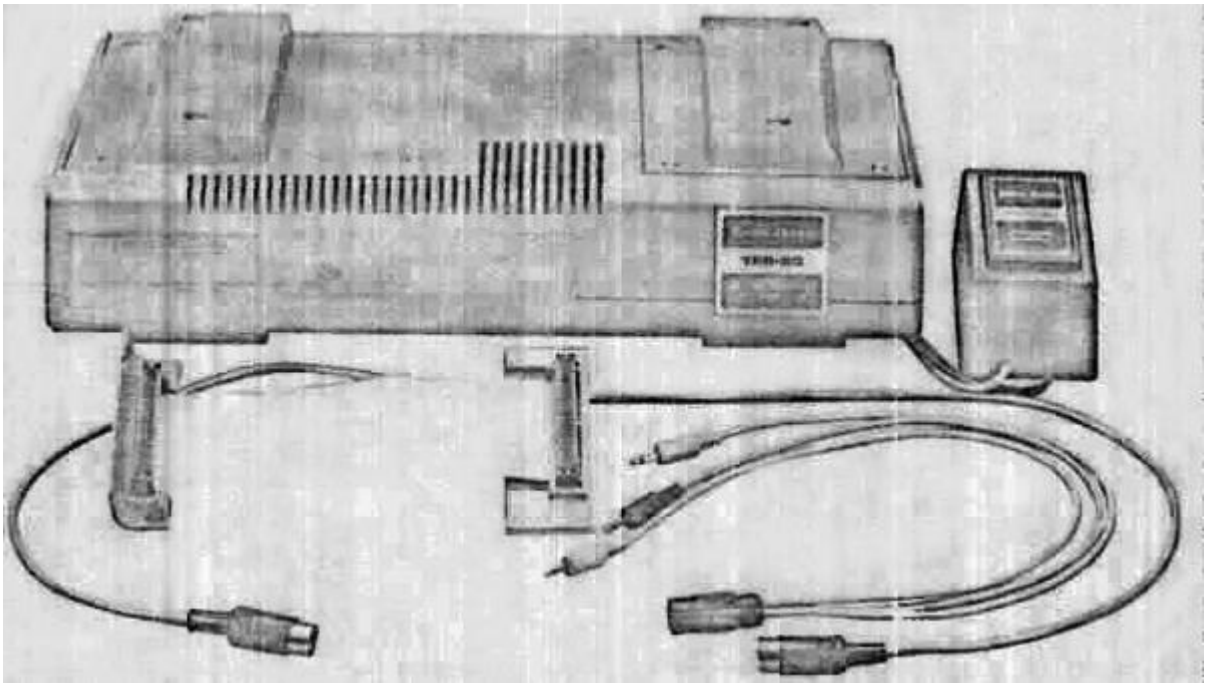

Figure 1: Expansion Interface.*

* 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 the Power Supply

Describes the process for installing and setting up the power supply for the TRS-80 expansion module.

Power Supplies and PCB Housing

Remove the Power Supply Door (top right side).

1. First connect one DC power cord (DIN connector) to the Power connector on the PCB.
2. Now install the two DC Power Supplies as illustrated.

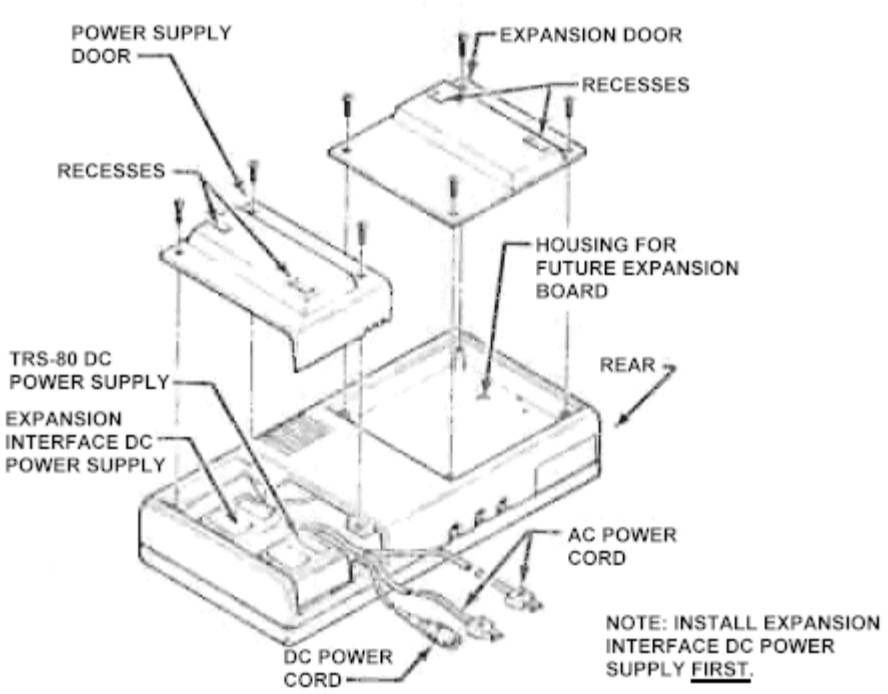

Figure 2: Power Supplies and Future Expansion PCB Locations.

3. 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.

Setting Up the Ports

Describes the process for providing access to the ports for the TRS-80 Expansion Interface

Note: 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 TRS-80 and the Expansion Interface modules.

Install expansion interface DC power supply first.

1. To gain access to the future expansion PCB Housing, remove the Expansion Door from the top left side of the module.
2. The ports, with the exception of the Expansion Interface port, are also covered by removable Doors. To remove these Doors, press on the right side of the Door and it will pivot slightly.
3. Grasp the left side of the Door and pull out (see the following figure for locations).

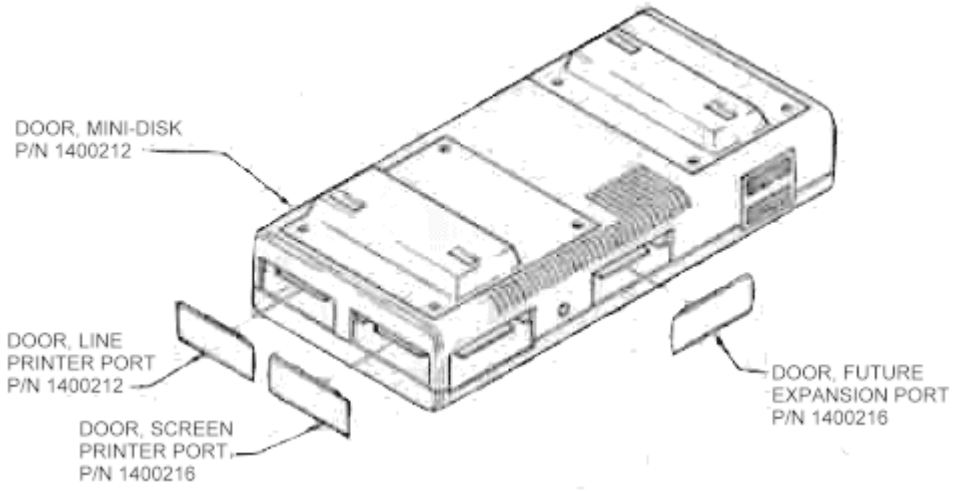

Figure 3: Expansion Interface, Front View—Doors Removed.

Electrical Connections

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

1. 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.
2. To remove the Door, raise it up and slide it to the right—then lift it up and away from the TRS-80.
3. Place the TRS-80 and Expansion Interface Hoods (14000217 and 14000214) on the Ribbon Cable Connectors as shown in Figure 4. 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.
4. Now connect the Ribbon Cable between the left front Expansion Interface port and the TRS-80 port.
5. 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.

Connecting the Cassette Recorder Cable

Describes the process for connecting the data cassette recorder cable to the TRS-80 Expansion Interface.

The interconnect cable for an expansion module is provided with that unit. See Figure 4 for Hood Assembly and Installation.

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.

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

1. 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.

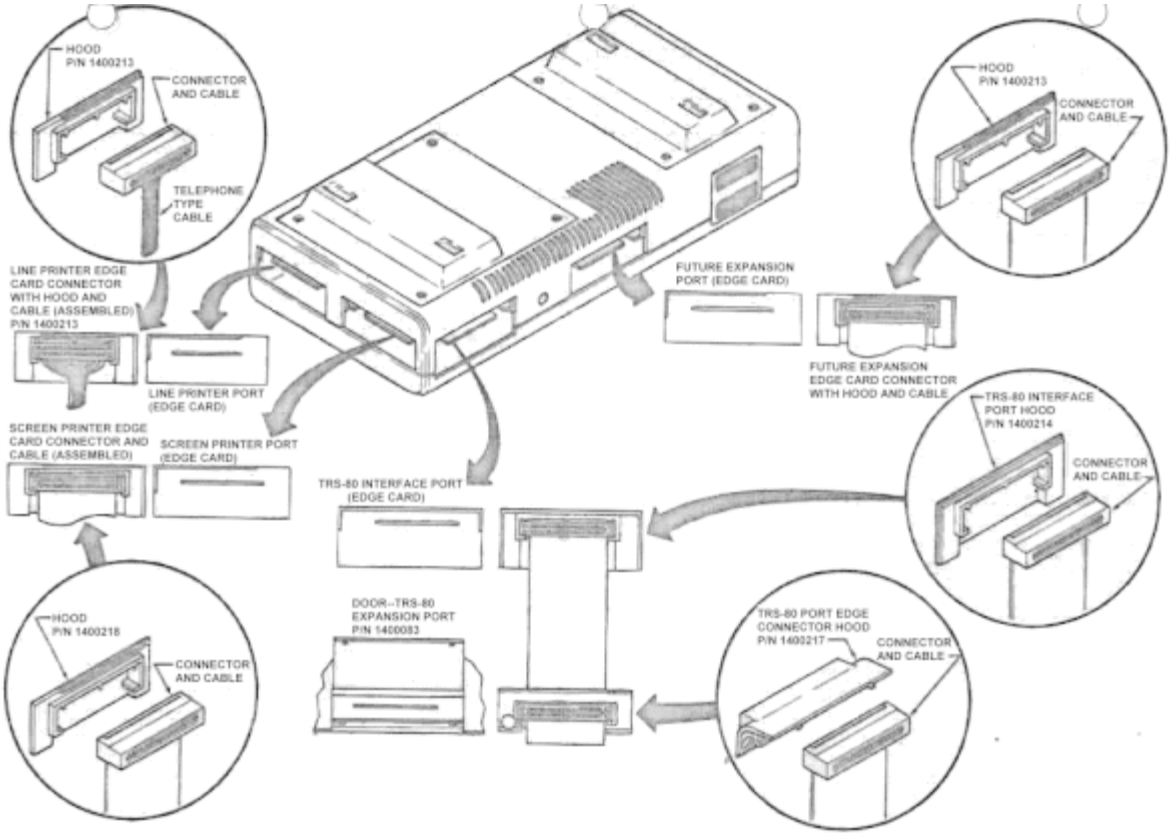

Figure 4: Front View—Interface Connections.

2. Of the three plugs on the other end of the Cable:
   a) Connect the black plug to the EAR jack on the side of the Cassette Recorder.
   b) Connect the larger gray plug to the AUX jack.
   c) Connect the smaller gray plug to the REM jack.
3. 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.
4. Connect the Video Cable from the Video Display to the VIDEO connector on the right rear of the TRS-80
5.

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

How to apply power to the TRS-80 Expansion Interface.

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

Additional information, including block diagram, interface connections, and the suggested placement for the expansion interface.

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.

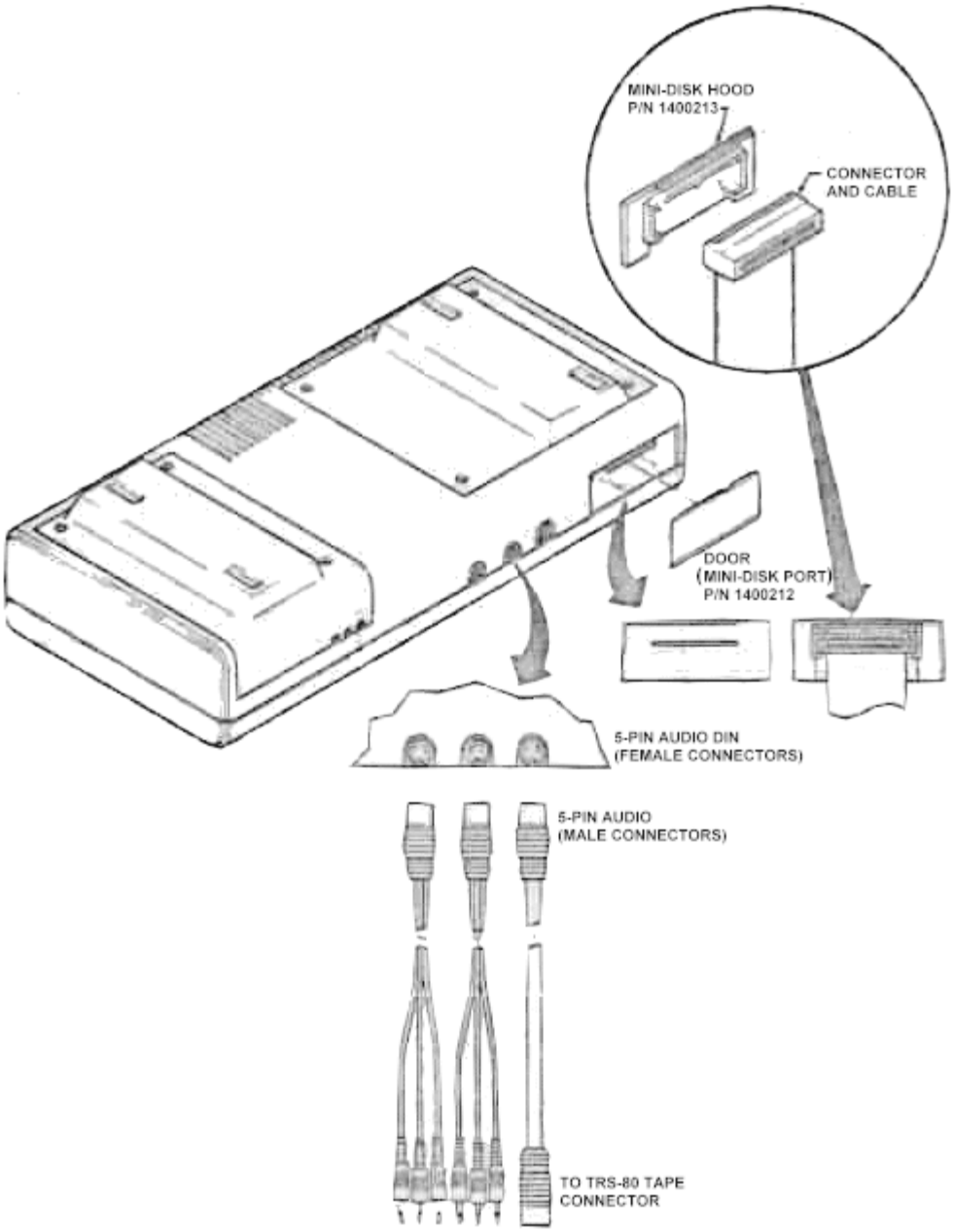

Figure 5: Rear View—Interface Connections.

Figure 6: Placement of Expansion Interface.

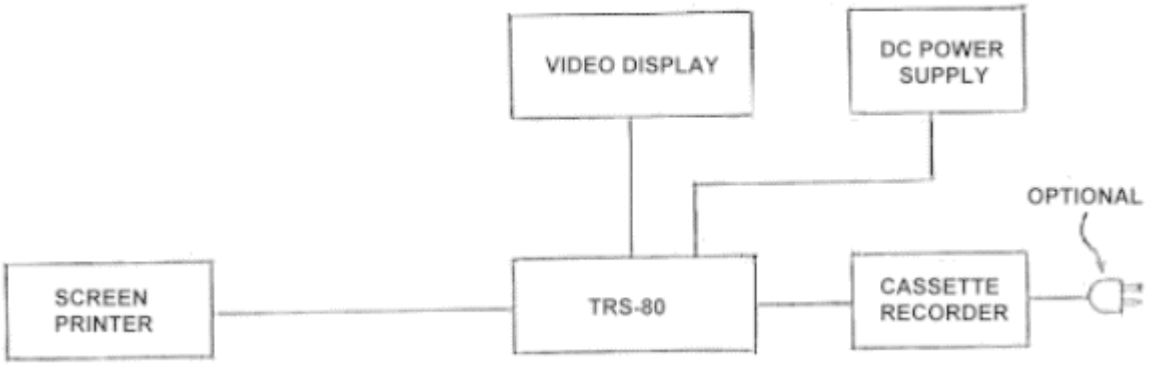

Figure 7: Electrical Connections Block Diagram: TRS-80 Microcomputer System Without Expansion Interface.

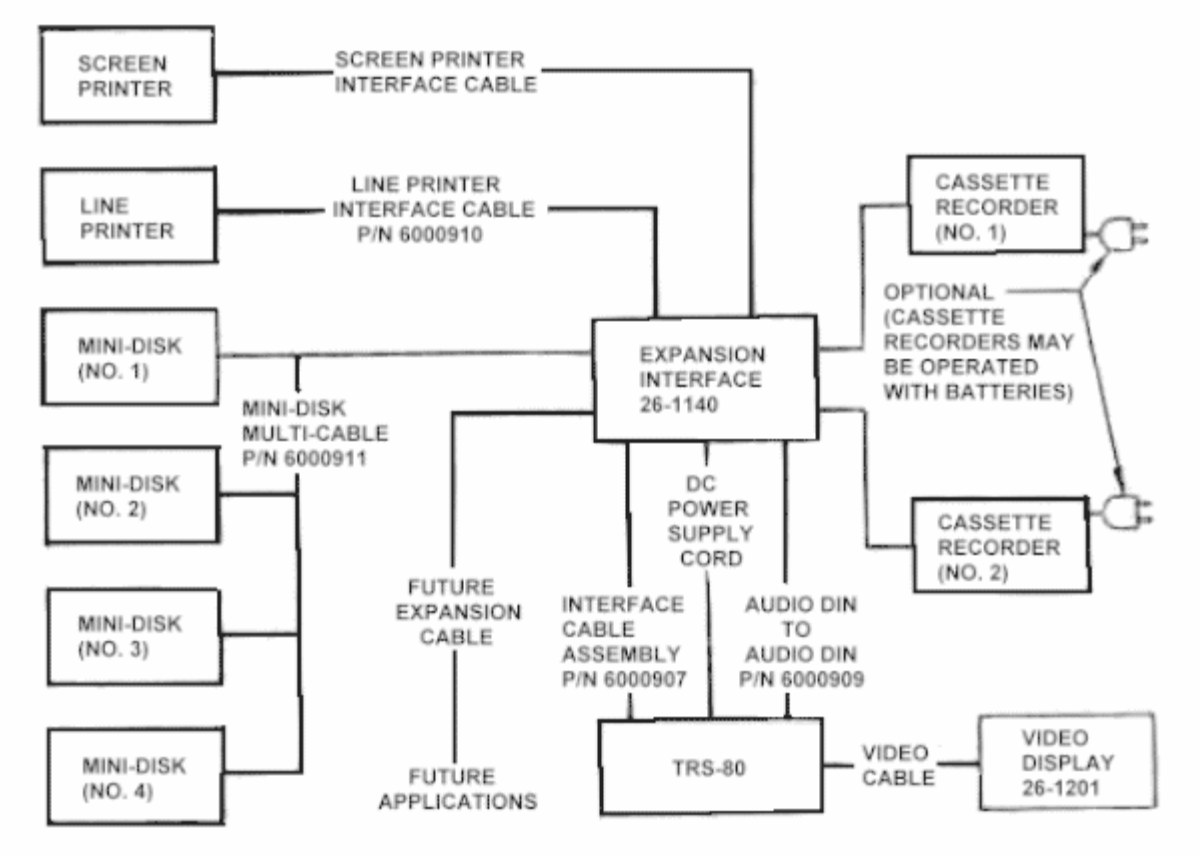

Figure 8: Electrical Connections Block DiagramTRS-80 Microcomputer System with Expansion Interface (maximum system).

Part II

Reference Material for the TRS-80 Expansion Interface

Topics:

This section provides a parts list, the types of error messages that may be encountered and how to work through them, and a sample game program.

Parts List

A description of the individual parts and part numbers comprising the TRS-80 Expansion Interface

EXPANSION INTERFACE	#
Door, Mini-Disk	1400212
Door, Line Printer	1400212
Door, Screen Printer	1400216
Door, Future Expansion Board	1400216
Hood, Mini-Disk	1400213
Hood, Line Printer	1400213
Hood, Screen Printer	1400218
Hood, Future Expansion Board	1400218
Hood, TRS-80 Microcomputer System	1400214

TRS-80 MICROCOMPUTER SYSTEM	#
Door	1400083
Hood	1400217

Error Messages

The types of error messages you may encounter when using the TRS-80 Expansion Interface along with the TRS-80 microcomputer.

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.

How to Troubleshoot Error Messages

These are steps to follow when your TRS-80 microcomputer displays an error message.

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

When an error message is displayed:

1. Try the operation several times.
2. 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.
3. Try using other diskettes.
4. Reset the computer and try the operation again.
5. Check all the power connections.
6. Check all interconnections.
7. Remove all diskettes from drives, turn off the computer, wait 15 seconds, and turn it on again.
8. If you tried all these remedies and continue to get an error message, contact a Radio Shack Service Center.

Model II Boot Errors Table

A list of the boot errors along with an explanation for each, and the recommended course of action to take.

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, or Defective diskette or Floppy disk expansion unit not on, or Defective FDC Chip/Drive.	Either try a different diskette, or turn on the floppy disk expansion unit. If that does not work, contact RSSC.
BOOT ERROR DM	DMA chip failure.	DMA chip failure.
BOOT ERROR D0	Drive not ready, or Improperly inserted diskette, or Defective diskette, or Defective drive.	Try inserting the diskette again and press . If that does not work, try a different diskette. If that does not work, 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 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.

RSSC = Radio Shack Service Center.

Random Tic-Tac-Toe

A description of the game "Random Tic-Tac-Toe" and how to play it.

Random Tic-Tac-Toe is an exciting and challenging variation of the old school-yard pastime, with the same objective of the regular game, but requiring the logic and foresight of chess.

The squares of the Tic-Tac-Toe board are randomly numbered 1 through 9, and the player and the computer take turns moving. On the first turn, it is exactly like the regular game, but on the second turn all pieces shift to the next sequential number.

That is, if the Computer opened the game by placing an O in square 5 and you responded by putting an X in square 2, then the board would be re-drawn with an O in square 6 and an X in square 3. Continuing with this example, let's say the Computer next plays to square 8 and you put your mark in square 9, then the redrawn board will have O's in squares 7 and 9 and the X's will be in squares 4 and 1 (after 9 the sequence returns to 1). The first to get three in a row wins.

When your turn comes during play, type the number of the desired square and press ENTER. When the game is over, press ENTER to play again.

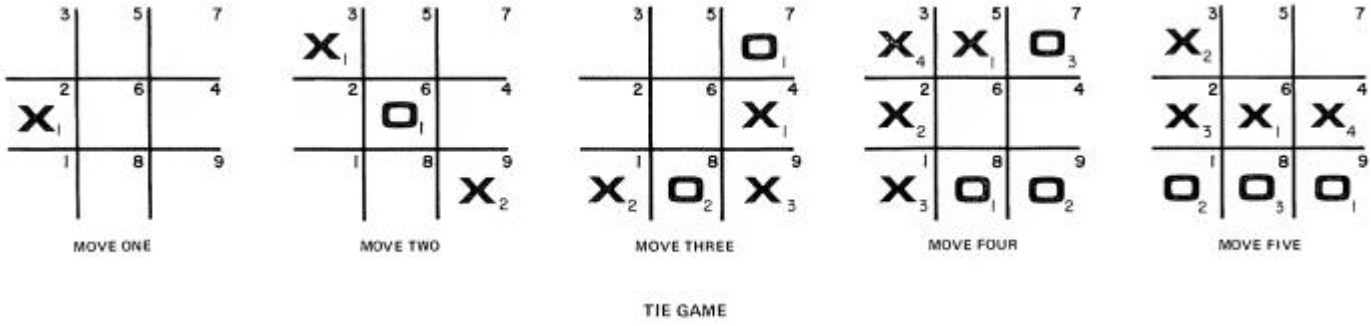

Figure 9: Sample Game of Random Tic-Tac-Toe

Random Tic-Tac-Toe Code

The program code for the Random Tic-Tac-Toe game.

```
00001 CLS.P RT463, "Radio Shack'S RANDOM TIC TAC TOE", F X=1TO1500 N X
00002 CLS.P AT471, "ENTER FIRST NAME ", IN EM J=fi l_l=0 V=6 W=0
00003 CLS.F Q=1TO20 fl<Q)=0 N Q P AT472, "I M RANDOMIZING"; P RT6, "";
90004 Q=R (SO F X=11T019 IFROO=0R(X')=iJ G 4
00005 IFX=19T 8
00006 IFFKX)=QT 4
00007 M X
00008 gos :<:<:<:< gos 10 g 95
00010 cls.x=41:t=82.f v=3t043.s (x-l, vo s (x, so s (t, v) s ct+1, v> n v
00020 V=15.Z=31.F X=12T0113.S (X, V).S (X, 2).N X.P RT272, H(ll>;
60030 F RT293, A(12>; ,P RT311, A(13>,' P RT592, A(14>; . P AT613, RC15':>;
00040 P AT631, R(16).i P AT912, fl(17>; P RT933, R(18>; P RT951, R(19'>;
00050 P AT448, "WON"; .P AT512, U; .P AT50S, "LOST".; .P RT572, V.;
00060 P RT989, "TIED ".; W; P ATO, ""; RET
80895 IFJ=1J=0 G 7000
00097 J=l
00098 P T (22), B*; " SELECT SQUARE "; P ATO, "".; IN Q.P AT0, "";
00101 IF('Q>0)*(Q<10)T 103
00102 P "INVALID PLRV"; F T=1TO1000:N T P RTO, " " P RTO, "".; .6 98
00103 IFA(GX>0T 102
00104 A(Q>=1 GOS 555 GOS 10 GOS 3333 11=1 S=4 . GOS 666 T=1.G 8888
08110 S (X-4, V-4> S (X+4, V-4> S (X-3, V-3> S (X+3, V-3> S (X-2, V-20
00120 S (X+2, V~2) S (X-l, V-l> S (X+l, V-l) S (X, V> S (X-l, V+l) S (X+1,V
+1>
00130 S (X-2, V+20 S (X+2, S'+20 S (X-3., V+3!> S (X+3, V+3) S (X-4, V+4>
00140 S <X+4, V+4>.G 680
00199 A(R>=4.P "".P AT0, "".;
00200 F T=-4T04 S (X+T, V-4.) N T.F T=-3T03 S (X-4, V+T> S (X+4, V+T) N T
```

```
00210 F T=-4T04.S (X+T, V+4,> N T.G 698
00555 F R=9T01S -1 . A(R+1)=A(R> N R A('1>=A(10:> . RET
00666 F R=1T09.IF(A(RO=M)+(R(R)=S)Q=R G 1000
80678 IFA(R)=MT 110
00680 IFA(R)=ST 199
00690 N R.RET
01000 K=20.L=7.F T=1T09 IFQ=A(T+10>X=K.V=L-G 1050
01010 K=K+42.IFK>104K=20 G 1030
01020 G 1040
81030 L=L+16
01040 N T
01056 G 670
03333 R=fl<H<llJ ) B=FKfi<12>> C=Ri'ft<13>> D=fi<ft<14>.> E=fl(H<15V>
 F=fl':fi<16';
63334 G=fKfi<'i7>> H=f=l < fi '.' IS > ; I=fKHa9>> RET
04060 Q=<fl(M.))-T IFG=-2Q=7
04001 IFQ=-1Q=8
04002 IFQ=0Q=9
04003 IFR('Q)=0H(Q)=9 G 8500
04004 IFM=17N=i:<
04005 IFM=19I1=17
04006 IFM=15M=19
04007 G 4000
07000 P T (25'. "I M IHJWIMG". P HT0, "". V=U Z=V X=S
07001 lFfl'20 '=@ft'20 ''=1 M=15 1-2 G 4000
07010 T=H+B+L IFT=XT 8000
07779 T=H+D+G 1FT=XT 8U2G
07780 T=H+E+1 IFT=XT 8060
07781 T=E:+E+H IFT=XT 8090
07782 T=C+E+G IFT=XT 8120
07783 T=C+F + I IFT=XT 8150
07784 T=D+E+F IFT=XT 8180
07785 T=G+H+I IFT=XT 8210
07786 IFV=0V=1 2=1 G 7800
07787 IFV=1Y=2 X=2 G 7010
07788 IFV=2V=2 X=8 2=2 G 7800
07789 IFV=3V=4 X=2 G 7O10
07790 IFV=4V=5 X=8 2=3 G 7800
07791 IFV=5V=6 X=2 G 7010
07792 IFV=6V=7 X=8Z=4 G 7800
07793 IFV=7V=8 X=2 G 7010
07799 GOS 8450 M=19 T=2 G 4000
07800 GOS 555 GOS 3333 G 7010
08080 IFft=0T 8490
08010 IFB=0T 8491
08020 G 8492
08030 IFfi=0T 8490
08040 IFD=0T 8493
08058 G. 8496
08060 IFfi=0T 8490
88870 IFE=0T 8494
08080 G 8498
08090 IFB=0T 8491
08100 IFE=0T 8494
08118 G 849?
08120 IFC=0T 8492
88130 IFE=0T 8494
88140 G 8496
08150 IFC=0T 8492
08160 IFF=8T 8495
08176 G 8498
08186 IFD=0T 8493
08190 IFE=0T 8494
08206 G 8495
```

```
88210 IFG=UT 8496
0822O IFH=6T 8497
08230 G 8498
084O0 H'-fKQi '=9 GOS 8458 G 8500
88450 S=0 T=9-Z
08451 GOS 555 3=3+1 IFSfTT 8451
08452 PET
88490 0=11 G 840ti
08491 0=12 i) 8400
08492 0=11 G 8400
08493 0-14 f, 8400
08494 0=15 G 8400
08495 0=16 G 8400
08496 i =- 1
08497 0=18 G 840(1
08498 0=19 b 84mm
08500 M=5 S=9 GOS 666 GOS 1-3-3 3.
08888 .'=12 Z=0
08900 IF(R+B+C=X:' + (H+D+G=X '-nfl+E+l=X ' + B+E+H=;i < + > C+E+f)=:-. <T
 2=1
68910 if!i:+f+i=;<;+'.p+e+f=:o+<:g+h+i=;<; 'Z=i
68911 X=3
08912 IF<R+e+C=XX+(H+D+G=X) + Cfl+E+I=X) + (.B+E+H=X:) + (C+E+G=:OT Z=Z+2
08913 IFcC+F+I=X» + a'+E+F=X' + fG+H+I=X)2=2+2
88914 IF2=1T 8930
08915 IF<<Z=2>+(2=4)>T 8931
08916 IFCZ=3) + (2=5:>T 10S20
08920 G 9999
08930 P RT984, Ei$; " VOU LOSE"; P RIO,""; V=V+1 IN Fit- G 3
08931 p RT984, B$; " VOU WIN"; P fiTO, ""; U=U+1 IN H* G 2
09000 1FT=1T 7O00
09001 G 98
09999 F Q=1T09 IF<fl(Q)=0)Q=9G 9000
10010 N Q
10020 P RT984, "TIE GRME ";B$; P RT0, ""; IN M H=U+1 G 3
22222 END
```