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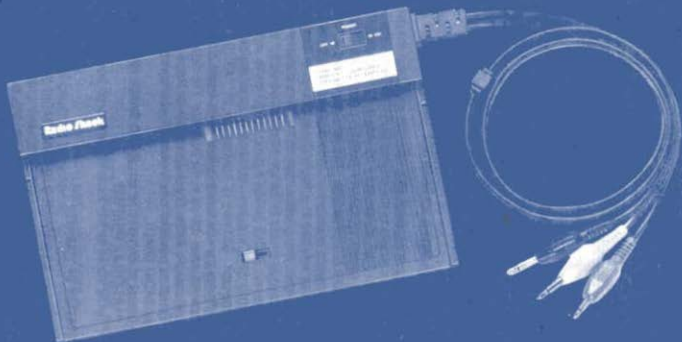
# TRS-80<sup>®</sup>

## PC-4 CASSETTE INTERFACE

### OWNER'S MANUAL

CATALOG NO. 26-3651

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CUSTOM MANUFACTURED FOR RADIO SHACK. A DIVISION OF TANDY CORPORATION

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#### VI. STATE LAW RIGHTS

The warranties granted herein give the **original** CUSTOMER specific legal rights, and the **original** CUSTOMER may have other rights which vary from state to state

Thank you very much for purchasing the tape recorder interface. This interface is an exclusive adapter for connecting any ordinary tape recorder to the Radio Shack PC-4 pocket computer.

If the cassette interface is connected incorrectly, neither the computer or the cassette recorder will be damaged; however, programs or data may not be saved or loaded. More importantly, valuable data may be erased.

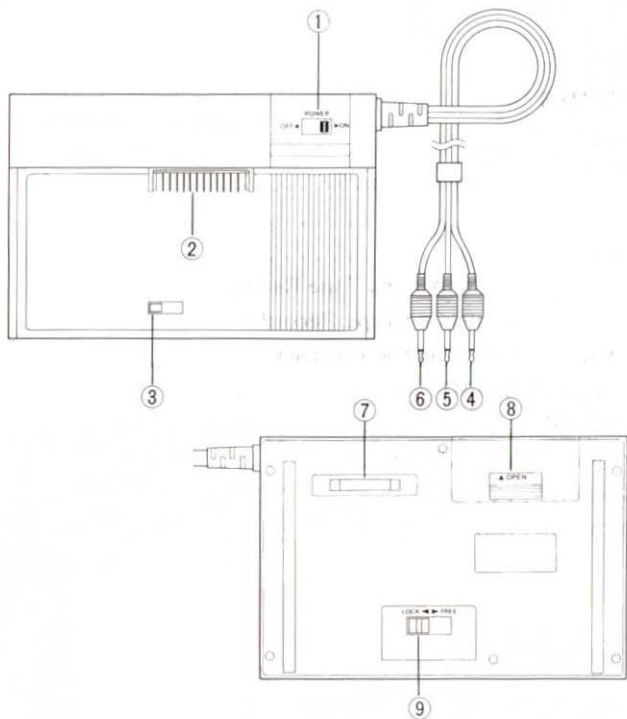
In order to avoid this, please become thoroughly familiar with the operating procedures outlined in this manual.

Also refer to the computer operation manual.

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# Description



① Power switch  
(If the power switch is turned on, the remote will operate.)

② Connector for Computer

③ Guide for fitting Computer

④ Black plug

⑤ White plug

⑥ Gray plug

⑦ For fitting a connector cap

⑧ Battery lid

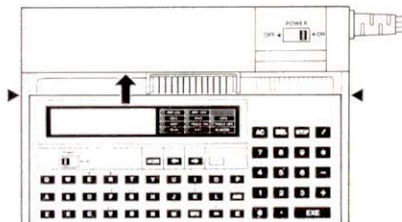
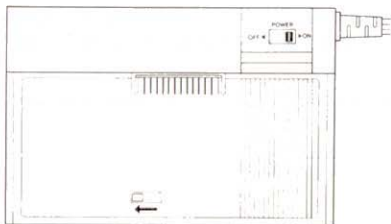
⑨ Computer lock/release control  
**LOCK:** Locks the Computer in place

**FREE:** Allows the Computer to be removed

# How to Connect to the Computer

## (Precautions)

- Prior to connecting, insure that the power switches of the computer and the cassette interface are off.
  - Be careful not to bend the cassette interface connector pins.
- (1) Turn the computer's power switch off.
  - (2) Turn the computer lock/release control of the cassette interface to the FREE position.
  - (3) Align the top of the computer with the "► ◀" marks.
  - (4) Line up the connectors of the cassette interface and of the computer and slide the computer in the direction of the arrow.
  - (5) Turn the lock/release control to the LOCK position.



## Power Source

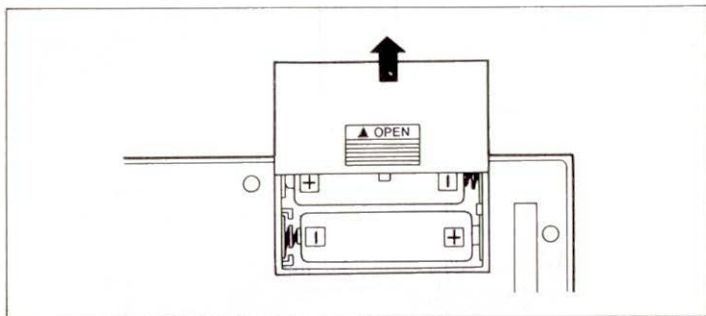
This adapter uses two AA size manganese dry batteries (Cat. No. 23-582 or equiv.) for portable operation. When the batteries run out, the portable operation function will not work properly. In such case, replace the batteries with new ones.

### ■ Installing/Replacing the Batteries

- 1) Remove the battery lid at the rear of the adapter, by pushing the knurled area in the direction indicated by the arrow.
- 2) Remove batteries, and replace them with new batteries. Observe polarity when putting in new batteries.

**CAUTION:** Installing the batteries with reverse polarity may cause them to burst and result in serious damage to the unit.

- 3) Replace the lid by pushing it in the opposite direction of the arrow. You will hear a click when the lid is back in its locked position.



- Note:**
- \*When replacing the batteries, replace them all.
  - \*Replace the batteries every two years even if the portable operation function still works properly.
  - \*Do not throw used batteries in a fire. They may explode.



## Functions

- 1) Saves a program on a tape (SAVE).
- 2) Loads a program on a tape into the computer (LOAD).
- 3) Transfers the contents of the data memories into the tape (PUT).
- 4) Transfers data from a tape into the data memories of the computer (GET).
- 5) Transfers all the programs in the computer into the tape at once (SAVE A).
- 6) Transfers all the programs on a tape into the computer (LOAD A).

## Requirements for Connecting Tape Recorder

### ■ The cassette interface can be connected to:

Tape recorders that use cassette or microcassette tapes.

### ■ Requirements for the tape recorder:

Our portable cassette recorder Miniset-9 (Cat. No. 14-812) is a perfect mate. However, if you are going to use other tape recorder, take note of following.

- 1) The input terminal of the tape recorder (the MICROPHONE terminal or equivalent) must be (1) 10 kohm or greater in input impedance, and (2) 3 mV or higher in minimum input level.
- 2) The output terminal of the tape recorder (the EARPHONE, MONITOR terminal or equivalent) must be (1) 10 ohms or less in output impedance, and (2) 2.5 V or greater in output level.
- 3) The remote control terminal of the tape recorder (or equivalent) must have a specification of 24 Vdc, 1 A or less.
- 4) Total distortion must be 15% or less.

Most cassette tape recorders currently on the market (radio cassette recorders, etc.) satisfy these requirements. If your tape recorder differs slightly, it may still work with the cassette interface. Note that mismatching will not damage either the adapter or the tape recorder.

**Note:** \*Use plug adapters (available at Radio Shack store) if necessary.

\*The requirement for the remote control terminal is important. Make sure that it is met. If not, the remote control function of the cassette interface may be damaged.

## Precautions in Connecting Tape Recorder

**For proper operation, check the following:**

- The jacks of the tape recorder must be free from rust and damage.
- The magnetic head must be clean and not excessively worn.
- We recommend our 26-301 cassette tape made specially for computer purpose, but magnetic tapes available on the market may also be used. The frequency response should be fairly good.
- The magnetic tape must be free from scratches and creases. Avoid using the first and last 30 seconds of the tape.
- Connect the computer securely to the cassette interface, and do not remove it in the middle of operation. Before removing the computer, turn off its power switch.
- Use the same tape recorder for recording and playback. Although this is rare, if you do not use the same tape recorder, you may not be able to transfer data.
- Take good care of recorded tapes. Tapes that are not stored properly may not reproduce data.
- When connecting a computer to the cassette interface, turn off all power switch, and then connect the computer securely.
- If the connector pins are touched by hand, they may become bent or dirty and prevent proper connection. Also, static electricity from the human body may damage the internal circuitry, so avoid touching the connector pins. When not in use, cover with the two connector caps.

## Setting up for Recording and Playback

### ■ Connections

- Connect the white plug of the cassette interface to the MICROPHONE jack of the tape recorder. If you are using a stereo tape recorder, connect it to the right channel.
- Connect the black plug of the cassette interface to the EARPHONE, MONITOR, or EXTERNAL SPEAKER jack. In case of a stereo tape recorder, use the same channel as used for recording.
- Connect the gray plug to the remote control jack of the tape recorder.
- Normally, the system (cassette interface and tape recorder) works properly with all three plugs connected to the cassette interface. However, some tape recorders may develop noise when the white and black plugs are connected at the same time. If so, connect only the white plug when recording (computer to tape), and only the black plug when playing back (tape to computer).

### ■ Recording level adjustment

- If your tape recorder has an automatic level control, turn it on.
- If not, adjust the level control manually as follows:  
Record test data, and, while doing so, adjust the level control so that the VU meter reads zero.

**Note:** If the level meter deflection is extremely wide, do not use that particular tape recorder.

### ■ Output level adjustment

- Set the volume control higher than you would usually when listening to music. The position of the volume control should be between the middle and maximum points. (Usually the maximum point works best.)
- In the case of a stereo tape recorder, turn the balance control to the extreme position of the channel you are using (i.e. the channel the black plug is connected to).

- If your tape recorder has a microphone-mixing feature, turn the SOURCE level control to maximum, and the MICROPHONE level control to minimum.

### ■ Miscellaneous adjustment

- Set the TONE, BASS, and TREBLE controls to a medium level.
- Set the tape selector in accordance with the type of tape.

## Program SAVE/LOAD

### ■ Saving Programs

To save a program on a tape, operate the computer as follows:

**SAVE ["file name"]** (Items within the brackets can be omitted.)

When P0 is specified as the program area, P0 program will be saved, and if P3 is specified, P3 program will be saved, and so forth. File name is a character or numeral string enclosed within quotation marks (" "); and the string must be eight elements or less in length.

**Example:** "A", "35", "PRG-1", "PC-4"

This SAVE command saves only the program in a specific program area. If you want to save all the programs (P0 through P9) at once, use the SAVE A command (see P. 18).

#### Procedure

- 1) Turn on the power.
- 2) Advance or rewind the tape to the position you want to start recording, and note the reading of the tape counter.
- 3) Start the tape recorder in the RECORD mode.
- 4) Operate the computer as follows:

**SAVE ["file name"]** **[EXE]**

- 5) The tape recorder automatically stops when the saving process is completed. (If your tape recorder does not have remote control capability, stop the tape recorder manually.)

**Note:** The SAVE command can be input only manually; it cannot be included in a program to perform the operation automatically.

## ■ Loading Programs

To load a program from a tape into the computer, operate as follows:

### **LOAD ["file name"]**

(Items within the brackets can be omitted.)

When P1 is specified as the program area, the program will be loaded into program area "P1". As in the SAVE command, "file name" can be omitted; in this case the first program found on the tape will be loaded. This command can be used only manually, and cannot be included in programs.

### **Procedure — Manual operation**

- 1) Turn on the power.
- 2) Using the tape counter find the tape location two or three counts ahead of the file you want to load.
- 3) (Only for systems with remote control capability) Start the tape recorder in the PLAYBACK mode.
- 4) Operate the computer as follows:

### **LOAD ["file name"]**

- 5) (Only for systems without remote control capability) Start the tape recorder in the PLAYBACK mode.
- 6) The tape recorder stops automatically when the loading process is completed. (If your system does not have remote control capability, stop the tape recorder manually.)

### **Readout on the display**

While loading:

P F : P R G - 1

program file

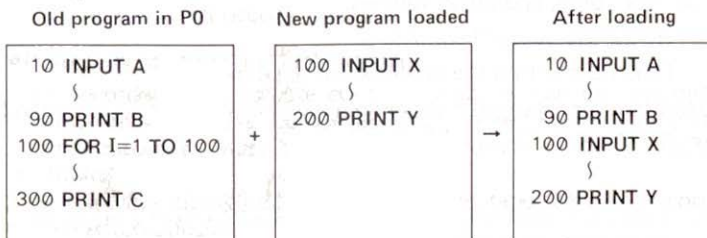
file name

When loaded (in case of "RUN" mode):

R E A D Y P n

**Note:** The loading process can be carried out even when the program area is not cleared of the old program.  
However, the old program will be erased starting with the first line number of the new program to be loaded.

### (Example)



## Data PUT/GET

- Recording data on a tape is done by the PUT command.

To "put" data, operate as follows:

**PUT ["file name"] variable**

(The item within the brackets can be omitted.)

The variable in the command can range from \$, A, B, . . . up to Z or Z(n). If you want to put (record), for instance, A through Z, enter "A, Z" for "variable".

### (Example)

To "put" \$, A, B, C, D:    PUT ["file name"] \$, A, D  
 A through Z;    PUT ["file name"] A, Z  
 A through Z and Z(1) through Z(50):  
 PUT ["file name"] A, Z(50)



When you want to "put", for instance, A through Z, do not enter "Z, A" instead of "A, Z"; this will cause an error.

(Example) PUT H, A → Error

## ■ Retrieving data from a tape is done by the GET command.

To "get" data, operate as follows:

**GET ["file name"] variable**

(The item within the brackets can be omitted.)

Variable is expressed in the same manner as in the PUT command – for example, "\$, A", "\$, A, Z".

## ■ The PUT and GET commands can be programmed, or executed manually.

### ● Procedure for Manual Operation

#### < Putting data >

- 1) Turn on the power.
- 2) Advance or rewind the tape to the point where you want to start recording, and note the reading of the tape counter.
- 3) Start the tape recorder in the RECORD mode.
- 4) Operate the computer as follows:

**PUT ["file name"] variable [EXE]**

- 5) When the "putting" process is completed, the tape recorder stops automatically. (If your tape recorder does not have remote control capability, stop the tape recorder manually.)

#### < Getting data >

- 1) Turn on the power.
- 2) Using the tape counter, find the tape location two or three counts ahead of the file you want to "get".
- 3) (Only for systems with remote control capability) Start the tape recorder in the PLAYBACK mode.
- 4) Operate the computer as follows:



## GET ["file name"] variable

- 5) (Only for systems without remote control capability) Start the tape recorder in the PLAYBACK mode.
- 6) When all the data are retrieved, the tape recorder stops automatically. (If your system does not have remote control capability, stop the tape recorder manually.)

**Note:** If you try to GET more data than you PUT previously, an error will occur.

### ● Procedure for Programed Operation

Tape recorders with remote control capability can be operated automatically by the computer. But those without remote control capability must be operated carefully in order to adjust for timing.

The following procedure assumes that the tape recorder is controlled automatically.

(Example)

Program to PUT

```
      :  
      :  
490 PUT "D" A, Z  
500 END
```

Program to GET

```
10 GET "D" A, Z  
      :  
      :
```

### < Putting data >

- 1) Turn on the power.
- 2) Advance or rewind the tape to the point where you want to start recording, and note the reading of the tape counter.
- 3) Start the tape recorder in the RECORD mode.
- 4) Run the program in which you have written a PUT command.
- 5) When the program advances to the PUT command, the tape recorder starts recording. When the PUT operation finishes, the tape recorder stops automatically.

### < Getting data >

- 1) Turn on the power.
- 2) Using the tape counter, find the tape location two or three counts ahead of the file you want to "get".
- 3) Start the tape recorder in the PLAYBACK mode.
- 4) Run the program in which you have written a GET command.

- 5) When the program advances to the GET command, the tape recorder starts playing back. When the GET operation finishes, the tape recorder stops automatically.

**Readout on the display while retrieving data:**



As in the SAVE and LOAD commands for programs, file name can be omitted in the PUT and GET commands.

## All programs SAVE/LOAD

The SAVE (or LOAD) command previously discussed saves (or loads) only one program in a specific program area. If your program consists of two or more program areas, it is convenient to be able to save or load all the programs at one time.

**The format of the commands are:**

SAVE A "file name"  
LOAD A "file name" (File name can be omitted.)

### ■ Procedure to "SAVE A"

- 1) Turn on the power.
- 2) Advance or rewind the tape to the point where you want to start recording, and note the reading of the tape counter.
- 3) Start the tape recorder in the RECORD mode.
- 4) Operate the computer as follows:

**SAVE A "file name" [EXE]**

- 5) When all the programs and data are saved, the tape recorder stops automatically. (If your tape recorder does not have remote control capability, stop the tape recorder manually.)

## ■ Procedure to "LOAD A"

- 1) Turn on the power.
- 2) Using the tape counter, find the tape location two or three counts ahead of the file you want to "load all".
- 3) (Only for systems with remote control capability) Start the tape recorder in the PLAYBACK mode.
- 4) Operate the computer as follows:

### LOAD A "file name" EXE

- 5) (Only for systems without remote control capability) Start the tape recorder in the PLAYBACK mode.
- 6) When all the pertinent programs and data are loaded, the tape recorder stops automatically. (If your tape recorder does not have remote control capability, stop it manually.)

The SAVE A and LOAD A commands can be used only manually (interactively), and cannot be included in programs.

**Read out on the display while loading all programs:**

AF : ZZ

All program file

file name

**Note:** When the LOAD A command is executed, all the programs in the computer are cleared and the new programs will be loaded.

## File Check

The VER (verify) command checks whether the programs and data have been saved correctly. The format of the command is:

**VER "file name"** (File name can be omitted.)

### Procedure

- 1) Turn on the power.
- 2) Using the tape counter, find the tape location two or three counts ahead of the file you want to check.
- 3) (Only for systems with remote control capability) Start the tape recorder in the PLAYBACK mode.
- 4) Operate the computer as follows:

**VER "file name" [EXE]**

- 5) (Only for systems without remote control capability) Start the tape recorder in the PLAYBACK mode.
- 6) The tape recorder stops automatically when the checking process is completed. (If your tape recorder does not have remote control capability, stop it manually.)

**Note:** If an error message appears, or the display does not go further than "--" to show the file number, the verifying process is not working properly. Make sure all the conditions for the loading process are met (output level of the tape recorder, connection of plugs, etc.), then go through the checking procedure once again. If this does not improve the situation, go through the saving procedure again.

This checking process does not verify all the data by comparing the computer and the tape step by step, but only checks the parity of the data on the tape to make sure the data follow the prescribed format. Differences in programs or data contents between the computer and the tape do not necessarily result in an error.

## Specifications

**Model:** Cassette interface (Cassette recorder adapter for Radio Shack PC-4.)

**Output terminal:** White mini-plug, output impedance: approx. 40 kohms, output level: 3 – 50 mV

**Input terminal:** Black mini-plug, input impedance: approx. 20 kohms, input level: 2.5 – 50 V

**Remote control terminal:** Gray mini-plug, 24V, 1 A or less

**Data recording format:** Kansas City standards (300 BPS)

**Power source:** (For remote control) Two AA size manganese dry batteries

**Power consumption:** 0.3 W

**Battery life (for continuous operation):**  
approx. 10 hours

**Ambient temperature range:** 0°C – 40°C (32°F – 104°F)

**Dimensions:** 31.5mmH x 173mmW x 114mmD  
(1-1/4"H x 6-7/8"W x 4-1/2"D)

**Weight (including batteries):** 244 g (8.6 oz)

## **GUIDELINES LAID DOWN BY FCC RULES FOR USE OF THE UNIT IN THE U.S.A. (not applicable to other areas).**

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- .... reorient the receiving antenna.
- .... relocate the computer with respect to the receiver
- .... move the computer away from the receiver
- .... plug the computer into a different outlet so that computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful: "How to Identify and Resolve Radio-TV Interference Problems". This booklet is available from the US Government Printing Office, Washington, D.C., 20402, Stock No. 004-000-00345-4.



## SERVICE POLICY

Radio Shack's nationwide network of service facilities provides quick, convenient, and reliable repair services for all of its computer products, in most instances. Warranty service will be performed in accordance with Radio Shack's Limited Warranty. Non-warranty service will be provided at reasonable parts and labor costs.

Because of the sensitivity of computer equipment, and the problems which can result from improper servicing, the following limitations also apply to the services offered by Radio Shack:

1. If any of the warranty seals on any Radio Shack computer products are broken, Radio Shack reserves the right to refuse to service the equipment or to void any remaining warranty on the equipment.
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### **RADIO SHACK, A DIVISION OF TANDY CORPORATION**

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