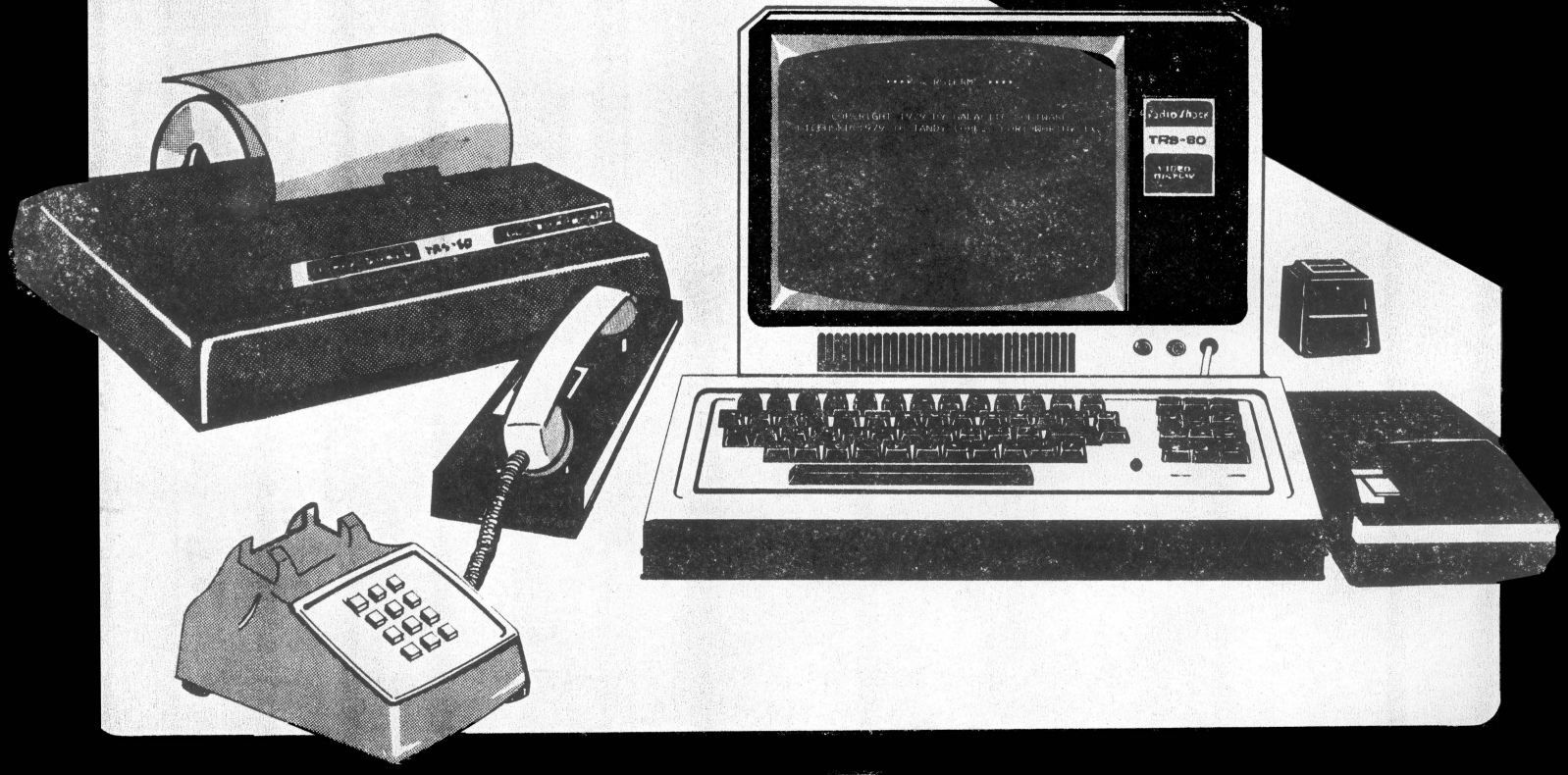
RSTERM

Catalog Number 26-1147

Radio Shack

TRS-80™ MICRO COMPUTER SYSTEM

SOFTWARE



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To Our Customers . . .

RSTERM, a machine language program, allows your computer to become a long-distance "terminal" to another computer. As a terminal, you can send information or instructions to a host computer – making use of the host computer's programs, data files, and processing power – and have the host computer send back information which will appear on your video screen or printer. The host computer may be another TRS-80 running the HOST program in Radio Shack's Communications Package (catalog number 26-1146) or any other outside computer with a complementary host program.

With RSTERM, any information sent or received may be printed on your line printer, in addition to your video screen. If connected to another TRS-80 running Radio Shack's HOST program, RSTERM will provide your TRS-80 with "automatic cursor positioning". This means the information printed on your screen will be in the same display position as it is on the host computer's screen.

RSTERM enables your TRS-80 to talk to the outside world via your RS-232-C board (catalog number 26-1145). The RS-232-C board converts the "parallel" information in your TRS-80 to "serial" information which can be sent to other computers. The RS-232-C board can also receive serial information from other computers and convert it to parallel for use by your TRS-80.

Equipment You will Need . . .

To operate the RSTERM program, you will need:

A TRS-80 Level II computer with at least 16K RAM
An Expansion Interface with Radio Shack's RS-232-C board installed

If you will be communicating over the telephone lines, you will also need a telephone interface such as Radio Shack's Telephone Interface II (catalog number 26-1171).

Any Radio Shack line printer may be used if you would like the capability of producing hard-copy printouts. (A printer is not required to run the RSTERM program).

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How to Make a Disk Copy of RSTERM (if desired)

If you have a disk system, you will probably want a disk copy of the RSTERM program. You can make a disk copy by using TAPEDISK, a utility program included with TRSDOS.

Under DOS READY, type:

TAPEDISK **ENTER**

When TAPEDISK is loaded, the ? prompt will be displayed. Place the tape copy of RSTERM in your cassette recorder, and prepare the recorder to be played. Type:

C **ENTER**

When RSTERM is completely loaded into memory, the ? prompt will reappear on the screen. Type:

F RSTERM/CMD:Ø 7DØØ 7F22 7DØØ **ENTER**

RSTERM/CMD will be dumped to the disk in drive 0. (You may have it dumped to a different drive, of course, by changing to :0 to :1 or :2 or :3.) Hexadecimal 7DØØ is the program's starting address and entry point; 7F22 is its ending address.

When the program has been dumped to your disk, the ? prompt will again appear. Type:

E **ENTER**

to return to TRSDOS.

Running RSTERM

To run RSTERM, follow these procedures:

1. Set the switches on your RS-232-C board

On your RS-232-C board, inside your Expansion Interface, there are eight tiny switches (see **Figure 1**).

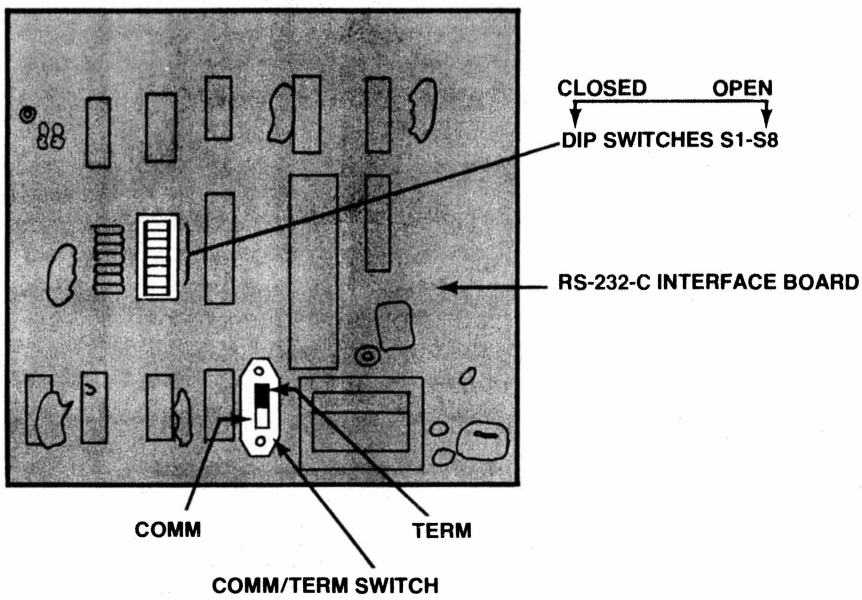


Figure 1. DIP switches and COMM/TERM switch on the RS-232-C board. The DIP switches are numbered consecutively; switch 1 is the closest one to the front of the board and switch 8 is the farthest.

These "DIP switches" determine how your program will code and decode the data sent and received. These switches must be set to match the RS-232-C requirements of the computer you are communicating with **before** loading and running the RSTERM program. If you do not know the exact requirements of your host computer, we suggest you try the settings below.

Switch 8 – CLOSED
Switch 7 – CLOSED
Switch 6 – OPEN
Switch 5 – CLOSED
Switch 4 – OPEN
Switch 3 – OPEN
Switch 2 – OPEN
Switch 1 – may be set either way

(To set the switch to the CLOSED position, press the left side; for the OPEN position, press the right side.)

This will set your RS-232-C board to 300 baud rate, 8 bit word length, one stop bit, and parity disabled. If your host computer requires different RS-232-C settings, refer to **figure 2** for guidance on how to set the DIP switches.

Below the DIP switches is a larger **COMM/TERM** switch. Set this switch to the TERM position, which is the farthest position from the front of the board.

For details on the RS-232-C Board, refer to your RS-232-C manual.

BAUD RATE	S6	S7	S8
110	Closed	Closed	Closed
150	Closed	Closed	Open
300	Open	Closed	Closed
600	Open	Closed	Open
1200	Closed	Open	Closed
2400	Closed	Open	Open
4800	Open	Open	Closed
9600	Open	Open	Open

PARITY ENABLE	S4	STOP BITS	S5
Parity Enable	Closed	One Stop Bit	Closed
Parity Disable	Open	Two Stop Bits	Open

WORD LENGTH (Excluding parity bit)	S2	S3
5 Bit Word	Closed	Closed
6 Bit Word	Closed	Open
7 Bit Word	Open	Closed
8 Bit Word	Open	Open

PARITY SELECT	S1
Odd Parity	Closed
Even Parity	Open

Figure 2. DIP switch settings of RS-232-C board.

2. Connect and set telephone interface

If you are communicating over the telephone, you need a telephone interface. **Figure 3** shows how to connect the RS-232-C cable to the card edge opening at the front center of your Expansion Interface.

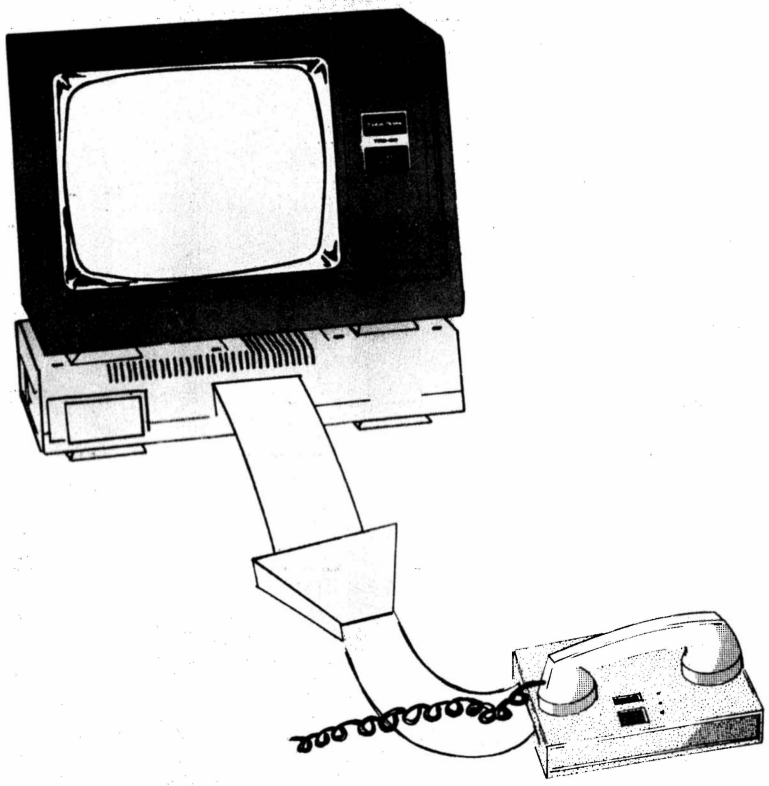
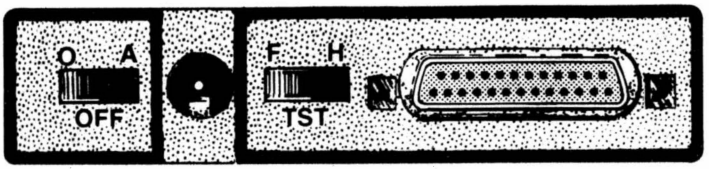


Figure 3. Connection of the telephone interface to the Expansion Interface.

Notice the two switches on your telephone interface. The left switch has O and A (originate and answer) positions. Since you are the terminal, you normally would be expected to set this switch to the O position.

The right switch sets the telephone interface to F (full duplex) or H (half duplex). Set your telephone interface to F.



3. Power up your system

If you will be loading RSTERM from disk, power up your system into TRSDOS in the normal way.

If you will be loading it from tape, turn on the Expansion Interface first, then the line printer (if used) and the video display. Last of all, hold down **BREAK** while turning your keyboard on. You should get the Level II BASIC "MEMORY SIZE?" prompt on your display.

After pressing **ENTER** you will get the normal RADIO SHACK LEVEL II BASIC heading on your display.

4. To Load the RSTERM Program:

If you have a disk copy of RSTERM, load it under DOS READY by typing:

RSTERM **ENTER**

If you have a tape copy and are loading it in Level II BASIC, you should have BASIC's prompt on your screen:

```
READY
>
```

Type:

SYSTEM **ENTER**

Your system will display:

```
*?
```

Place the tape in your cassette recorder, rewind it, and press the PLAY button.

Type:

R **ENTER**

When the RSTERM program has been loaded into memory, the computer will respond with:

```
*?
```

If you do not get this prompt, try loading RSTERM again with a different volume setting.

Once RSTERM has been loaded, you may execute it. Type:

/ **ENTER**

You will get the RSTERM title lines on your display. These are cleared as soon as you press any key. If you are connected to a host computer, the key that you press will be sent to the host.

5. Make the telephone connection.

Now that RSTERM is loaded, you may establish communication with another computer. Simply telephone the host computer. When you hear the high carrier tone, place the telephone handset on the telephone interface cradle. The mouthpiece of the telephone should be placed on the connecter end of the telephone interface.

Using RSTERM

Whatever you type on your keyboard will be input into the host computer system, as if your keyboard were physically connected to the host computer. Your screen will display both the keys you are typing, and the data the host computer is sending you. Characters below 128 ASCII may be sent or received by the program. Graphics characters are not supported. (They are ignored). See "Control Codes" later on for more information.

If your host computer is a TRS-80 running Radio Shack's HOST program, start by typing a CONTROL Q. To do this, press the SHIFT ↑ and Q keys at the same time. This will tell the host you are a "known" terminal and the host will then send you full, automatic cursor positioning information. This means that the printing on your video display will be at the same screen location as the host.

To exit from the program, press the RESET button. If you have a disk system, pressing the SHIFT and G keys will return you to DOS READY.

Printer Support

You may use any Radio Shack line printer with this program. Simply turn the printer on when you want it to print. The printer will print anything that is being printed on your video display.

Since the printing is handled through a buffer, the printer may sometimes be behind what appears on your screen. This is normal; the printer will catch up as soon as possible.

Any time you want to quit printing, "disable" the line printer. The best way to do this is by using the on-line/off-line switch, if you have one, to turn it off-line. Although disconnecting it or turning the power off will also work, this sometimes causes the computer to "hang-up" due to electrical transients entering the signal lines.

"Enable" the printer (turn it on-line) when you want to resume printing. By disabling and enabling your printer, you may select what you want your line printer to print. Disabling, enabling, or the absence of a printer does not affect the operation of the screen and keyboard in any way.

Control Codes

Your host computer may ask you to send it a control code as a way of telling it to perform a certain function. You may use the table in **Figure 4** to determine which keys to press to create a certain control code.

CONTROL CODES				
ASCII HEX	ASCII MNEMONIC	CONTROL CHARACTER	NOTES	TRS-80 KEYS PRESSED
Ø1	SOH Start of heading	–	non-disk TRS-80 only	SHIFT ↓ A
1B	ESC Escape	ESC	Break on most systems	SHIFT ↓ B
Ø3	ETX End of Text	CTRL-C	Break on the TRS-80	BREAK or SHIFT ↓ C
Ø4	EOT End of transmission	CTRL-D		SHIFT ↓ D
7F	DEL Delete			SHIFT ↓ E
1C	FS File separator		Homes Cursor on Terminal	SHIFT ↓ F
			Exit to DOS READY on disk system	SHIFT ↓ G
ØC	FF Form feed	CTRL-L	Top of form (on some printers)	SHIFT ↓ L
ØE	SO Shift Out	CTRL-N	Turns cursor on	SHIFT ↓ N
ØF	SI Shift In	CTRL-O	Turns cursor off	SHIFT ↓ O
11	DC1 Device Control 1	CTRL-Q	Sets host to TRS-80 Mode	SHIFT ↓ Q

Figure 4. This table identifies how to generate certain control codes on the TRS-80.

The first three columns in the table list three ways the host computer might identify the specific code you are to send it: its ASCII (American National Standard Code for Information Interchange) hexadecimal code; its ASCII mnemonic code and meaning; or the control character commonly used to generate this code. The fourth column notes how these codes are programmed to be displayed by the TRS-80 or by other systems. The fifth column identifies the key you should press on your TRS-80 to generate that code.

As an example of how this table would be used, your host computer might ask you to send the hexadecimal code "1C" to signal when you have completed typing in the information for one data file. To send this code, you would press the SHIFT ↓ F keys at the same time.

The special codes, for controls B-G, are derived from a table in the program and may be changed easily, but only by an experienced machine language programmer! The addresses for the codes are shown in the following chart:

CONTROL CODE ADDRESS CHART

CODE	ADDRESS
B	7EB0H
C	7EB1H
D	7EB2H
E	7EB3H
F	7EB4H
G	Vectored to three byte command at 7E37H (as programmed, this is a return, "C9")

Details on making changes to this type of table may be found in your RS-232-C Interface manual, in the discussion on the terminal program that comes with the interface (pages 21 and 22).

In Case of Problems . . .

Usually, transmission problems can be solved by making sure:

- Your cable is connected securely to your telephone interface and your Expansion Interface. Try gently moving the cable to secure the connection at the Expansion Interface.
- Your RS-232-C board's switches are set properly to match the host computer's requirements.
- Your telephone connection is good.
- Your telephone interface switches are set properly.
- Your RS-232-C board is installed properly. You can try the self-test described in the RS-232-C manual. See pages 6 - 8 in the RS-232-C manual.