

Modem I

Catalog Number 26-1172

Radio Shack

TRS-80

**MICRO
COMPUTER
SYSTEM**

HARDWARE



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Introduction

The Modem I is a self-contained, FSK (Frequency Shift Keying) telephone interface. It enables your computer to communicate with other computers via ordinary telephone lines. The Modem I is compatible with all TRS-80 models (except Level I versions of the Model I and Model III) and with other RS-232-C standard devices.

Its special features include:

- Sends/receives at 0-300 baud for compatibility with most time-shared computer systems.
- Selectable originate/answer mode for operation in "remote" or "host" terminal applications.
- Full duplex operation allows simultaneous communication between modems.
- Direct (non-acoustic) connection to phone lines helps ensure a low error rate.
- NORMAL/CASSETTE switch lets you use RS-232-C equipped computers and TRS-80 Model I Level II computers which do *not* have an RS-232-C interface. Select NORM for RS-232-C use; CASS for use with the cassette interface of Model I Level II Computers. Cassette use requires optional/extra "Cassette-Comm" software (Radio Shack Cat. No. 26-1139) and a cassette cable (26-3009).
- Bell 103 compatible.

Note: When using the Cassette Comm software, communications will not be in a true full duplex mode. For further details, see the Cassette Comm instruction manual.

Important Note

Before connecting your Modem I to the phone lines, you must notify your local telephone company of the:

Manufacturer: Radio Shack

Model: Modem I, #26-1172

USOC Number: RJ11C

FCC Number: AAO99R-69525-DM-N

Ringer Equivalence Number (REN): 0.0B

This information also appears on the bottom of the Modem.

The Modem I must not be connected to:

- ☒ Coin-operated phones
- ☒ Party-line phones
- ☒ Multiple-line phones

Installation

Modem/Telephone Connection

Figure 1 shows the connection of a Modem I to telephone lines using the new modular connectors. If your telephone has this type of connection, attach your Modem I as shown.

If your telephone has the older style four-prong connection (see **Figure 2**), you will need an adapter which allows the Modem I to be used in parallel with your telephone. Radio Shack sells this type of adapter, Cat. No. 279-360.

If your telephone is wired directly to the wall as in **Figure 3**, you must contact the telephone company and have them install modular connections. Be aware however, that you will be charged for this service.

After connecting the telephone, make sure that the MODE switch on the Modem is OFF. Your telephone should be operating normally now.

AC Connection

Connect the AC adapter to the AC jack on the Modem's rear panel and to an electrical wall outlet.

Note: Use only the supplied, UL-listed adapter. The use of any other adapter could damage the Modem.

Modem/Computer Connection via RS-232-C Interface

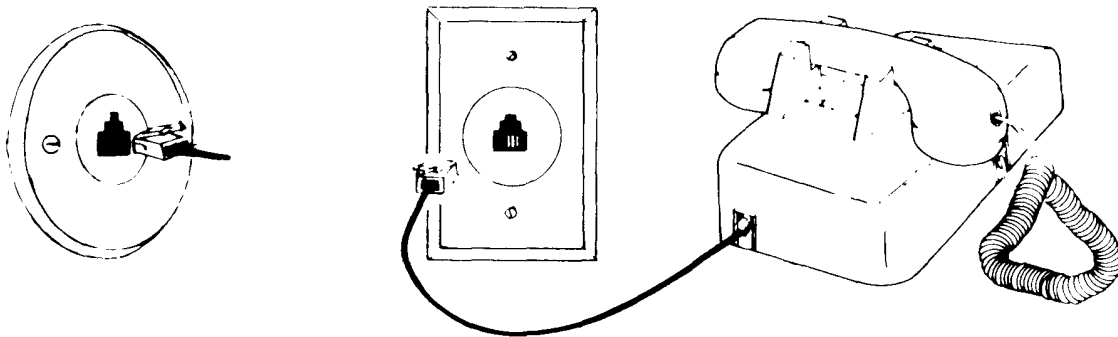
For most applications, you will use an RS-232-C equipped computer. **Table 1** summarizes the cable and connection requirements for RS-232-C equipped TRS-80's. Using the table, select the appropriate connector for your computer. Connect the computer's RS-232-C interface to the specified connection point on the Modem.

| TRS-80 Model | Cable | Connection Point | |
|-------------------|-----------|-------------------------|---------------------|
| | | TRS-80 | Modem I |
| Model I, Level II | 26-1145 * | Card-Edge on Exp/Int | DB-25 "RS232C" |
| Model II | 26-4403 | DB-25 "CHANNEL A/B" | DB-25 "RS232C" |
| Model III | 26-1408 | DB-25 Serial I/O | DB-25 "RS232C" |
| Color Computer | 26-3020 | DIN Serial I/O | DIN "RS232/CASS" |

*This is the RS-232-C interface board. The cable is included.

Table 1. RS-232-C Cable Identification and Connection

If your telephone hook-up looks like this:



Connect like this:

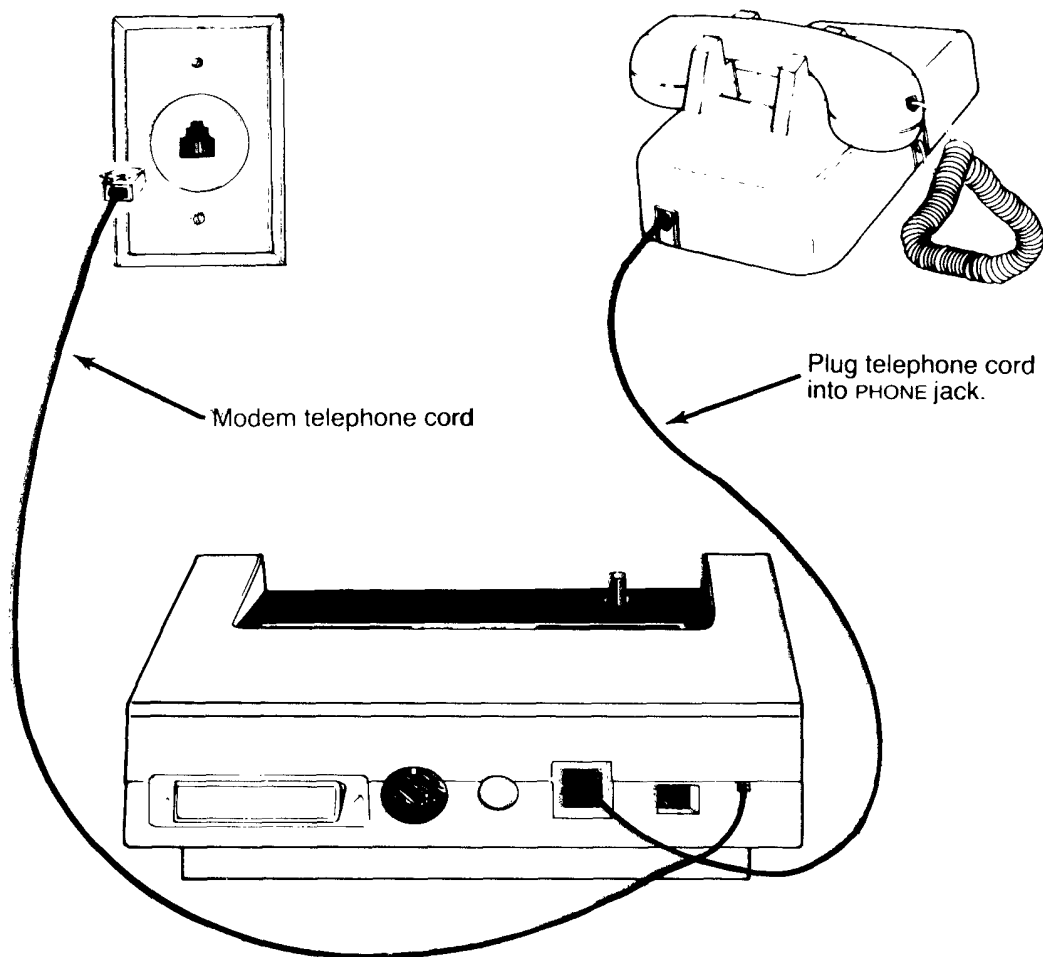


Figure 1. Connection to Modular Phone Jacks.

Modem/Computer Connection via Cassette Interface

Note: When using the Cassette Comm software, communications will not be in a true full duplex mode. For further details, see the Cassette Comm instruction manual.

If you have a Model I Level II computer which is *not* equipped with an RS-232-C interface board, you may use the cassette interface of your computer for serial communications with the Modem. To do this, you will need to buy the "Cassette-Comm" software and the appropriate cable (Cat. Nos. 26-1139 and 26-3009, respectively).

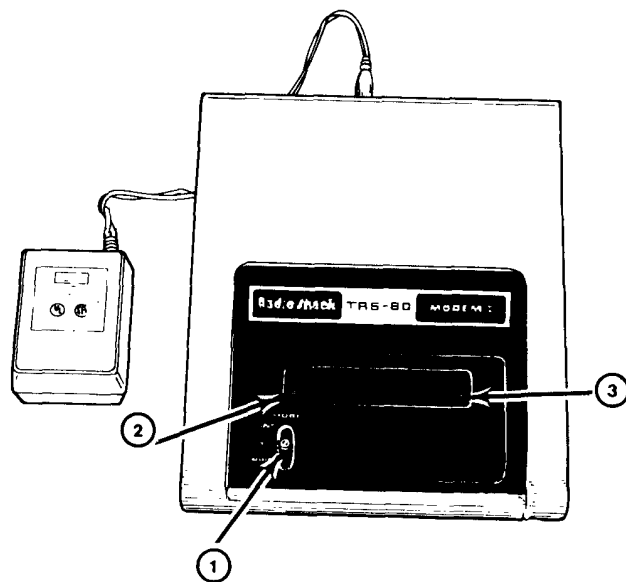
Connect the cable to the TAPE connector on your computer and to the RS-232/CASS connector on the Modem.

Note: The Model III cassette circuitry cannot be used for serial communications with the Modem.

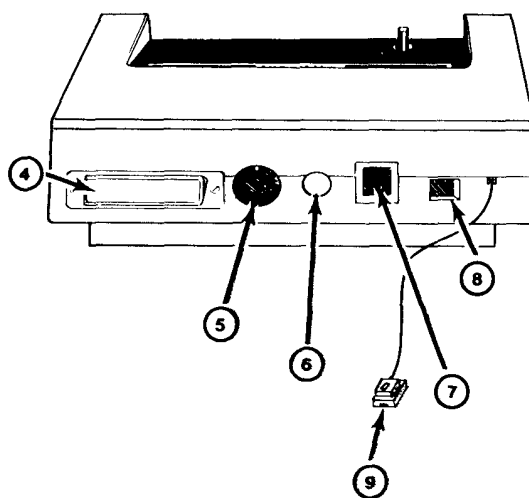
Controls and Connectors

Refer to **Figure 4**.

- ① **MODE Switch** Selects either ORIGINATE or ANSWER mode. **Note:** With the Modem connected, your phones are available for conversational use only when the MODE switch is OFF. So be sure to select MODE OFF when you are not using the Modem.
- ② **On Power Light** Remains lit while the Modem is "on."
- ③ **CD.(Carrier Detect) Light** Lights and remains lit while a "carrier tone" is being received via phone lines from another modem.
- ④ **RS-232C** Standard DB-25 jack for connection to RS-232-C interface of Models I, II and III.
- ⑤ **RS-232/CASS** This four-pin DIN jack allows connection to the RS-232-C interface of the TRS-80 Color Computer, or to the Model I Level II cassette interface.
- ⑥ **POWER** AC adapter plug goes here.
- ⑦ **PHONE** Modular-type jack for telephone line cord.
- ⑧ **NORMAL/CASSETTE Switch** For use with RS-232-C equipped computers, use NORM position. For use with cassette interface of Model I Level II computer, use CASS position.
- ⑨ **TO WALL** This modular-type plug connects to the telephone wall jack in place of the telephone cord.



Top View



Rear View

Figure 4. Identification of Controls and Connectors.

General Operation

The Modem I accepts digital data from your computer and generates tones which can be sent over the telephone lines to another Modem. The Modem I can also receive tones from the telephone line and change them back to digital data. (The Frequency Shift Keying method is used. For details, see Specifications.)

Baud Rate

The speed at which the Modem receives and transmits these tones is called the baud rate. The Modem I can send and receive at baud rates from 0-300. 300 baud is standard for most time-shared systems, but some may use 110, 150, or other rates. Before using the Modem, be sure your computer and the host computer are set to the same baud rate (0-300).

Originate vs. Answer

The Modem I can operate in either originate or answer mode. Electrically, the MODE switch determines which set of receive and transmit tones the Modem will respond to. For communications to take place, one modem must be in the originate mode and the other in the answer mode.

Normally, when you dial a "host" computer, your Modem should be in the originate mode. When you receive a call from a "remote" computer, your Modem should be in the answer mode. See **Figure 5**.

RS-232 Communications

For communication between computers and computer-related equipment, the most widely used standard is the RS-232-C. This allows use of cables of up to 50 feet in length between the Modem and the computer. The Modem has two RS-232-C connectors: a standard DB-25 connector (labeled RS-232C) which is used with the majority of computers, and the four-pin DIN connector (labeled RS-232), for use with the TRS-80 Color Computer.

Cassette Communications

The Modem I contains special circuitry for communications with the cassette interface of Model I Level II computers. To use this method, you'll need the "Cassette-Comm" software and a special cable (see Installation).

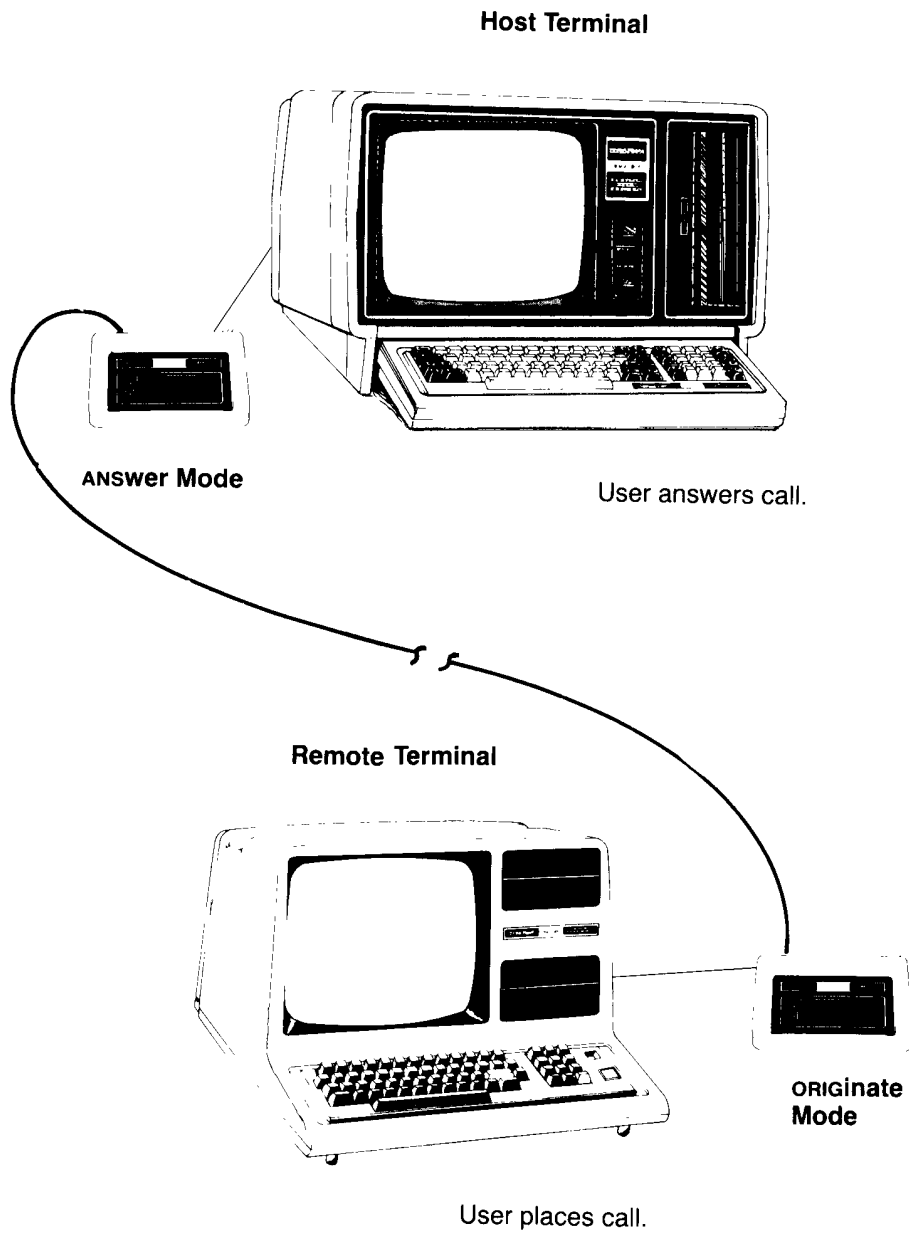


Figure 5. Originate/Answer Mode Difference.

Operating Procedures

First find out the communications conventions of the computer or other device with which you are going to communicate. In particular, find out the:

- ☐ Baud Rate
- ☐ Word Length
- ☐ Parity
- ☐ Number of Stop Bits
- ☐ Who will use originate mode, who will use answer mode

Set up your computer accordingly, and set the Modem's MODE switch accordingly.

A. Originate Mode

1. With the **MODE** switch **OFF**, dial the number of the "host" computer.
2. When you **hear** the carrier tone, flip the **MODE** switch to **ORIGINATE** and hang up the phone.
3. When the Carrier Detect (CD) light comes on, you may start communicating. When communications are finished, be sure to sign off. (The sign-off will depend on the "host" computer, however, **BYE** or **GOODBYE** is commonly used.)
4. After signing off, wait until the Carrier Detect light (CD) goes off, then flip the **MODE** switch to **OFF**.

B. Answer Mode

1. Wait for the "remote" computer operator to call you.
2. Upon receiving the call, flip the **MODE** switch to **ANSWER** and hang up the phone.
3. When the Carrier Detect (CD) light comes on, begin data communications.
4. When finished with the data transfer, set the **MODE** switch to **OFF**.

When Something Goes Wrong

If you have trouble (garbled data, intermittent errors, etc.), check for the following:

1. The phone connection should be clean and noise-free.
2. There should be no one talking on the telephone line.
3. The phone and all extension phones should be on-the-hook.
4. The baud rate of the terminal should be less than or equal to 300.

Troubleshooting Chart

| Symptom | Problem/Solution |
|--------------------------|--|
| Carrier Detect light off | AC Adapter is not plugged in; plug in. |
| | Telephone connections; check connections and refer to the Installation section. |
| | MODE switch is not in proper position; refer to the General Operation section. |
| | Modem at other end is not compatible; modem should be a Bell 103 or equivalent. |
| Garbled Display | Phone not hung up; hang up phone. |
| | Communications protocol may be set incorrectly (baud rate, word length, parity, stop bits); check and change if necessary. |

Specifications

| | |
|-----------------------------|---|
| Receive Frequencies | A. Answer Mark 1270 Hz; Space 1070 Hz B. Originate Mark 2225 Hz; Space 2025 Hz |
| Transmit Frequencies | A. Answer Mark 2225 Hz; Space 2025 Hz B. Originate Mark 1270 Hz; Space 1070 Hz |
| Transmit Power | - 10 dBm, \pm 1 dB |

| | |
|--------------------------------|--|
| Receive Sensitivity | - 45 dBm |
| Baud Rate | 300 |
| Operating Temperature | 55°F-85°F (12.8°C-29.4°C) |
| Electrical Requirements | 15 VAC at 300ma supplied by UL listed AC adapter |
| Size | 6.5" x 7.5" x 2" (16.5 x 19.1 x 5.1 cm) |

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