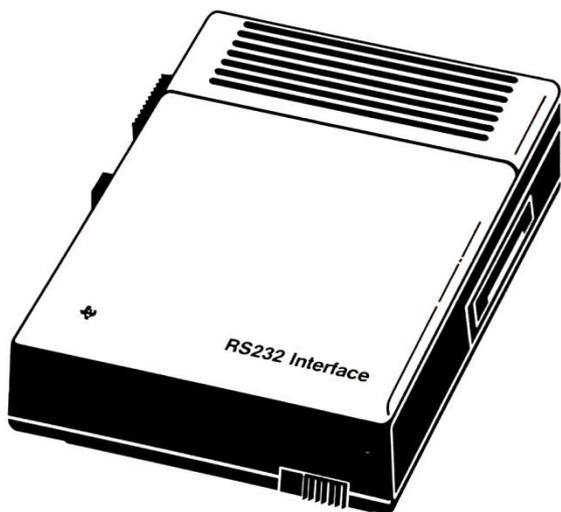


**Texas Instruments**  
**Home Computer**  
**Accessory**

**RS232 Interface**  
Model PHP1700



***Retrocomputing***



---

## **Quick Reference Guide**

### SOFTWARE SWITCH OPTION ENTRIES

<b>Option</b>	<b>Enter As</b>
BAUDRATE=110, 300,600,1200,2400, 4800,or 9600	.BA=300 (or desired rate)
DATABITS=7 or 8	.DA=7 (or 8)
PARITY=ODD, EVEN, or NONE	.PA=O (or E or N)
TWO STOP BITS	.TW
CHECK PARITY	.CH
ECHO OFF	.EC
CRLF OFF	.CR
LF OFF	.LF

### SOFTWARE SWITCH OPTION DEFAULT VALUES

<b>Option</b>	<b>Open/List</b>	<b>Old/ Save</b>
BAUD RATE	Baud rate = 300	Baud rate = 300
DATA BITS	Data bits = 7	Option not allowed
PARITY	Parity=odd	Option not allowed
STOP BITS	1 stop bit	1 stop bit
NULLS	No nulls	Option not allowed
CHECK PARITY	No parity check	Option not allowed
ECHO OFF	Echo off	Option not allowed
CRLF OFF	Carriage return supplied	Option not allowed
LF OFF	Linefeed supplied	Option not allowed

Examples: OPEN #1:"RS232.BA = 1200"  
SAVE "RS232/2.BA = 600.TW"

---

---

# RS232 Interface

Model PHP1700



Enables you to connect a wide variety of compatible accessory devices (peripherals) to your Home Computer.

## IMPORTANT

Record the serial number from the bottom of the unit and purchase date in the space below. The serial number is identified by the words "SER. NO." on the bottom case. Always reference this information in any correspondence.

**PHP1700** . . . . .

**ModelNo.**

**SerialNo.**

**Purchase Date**

---

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## INTRODUCTION

The Texas Instruments RS232 Interface is a communications adapter that enables you to connect a wide range of accessory devices to your TI-99/4 Home Computer. With the RS232 Interface attached to your Home Computer you can list programs on a printer, send and receive data from a terminal, exchange TI BASIC programs directly between TI Home Computers, and much more. By adding the Telephone Coupler (Modem) and certain Solid State Software™ Command Modules, your Home Computer can communicate with other computers and terminals over ordinary telephone lines. You can access an office computer or time-sharing network from your own home, using your TI Home Computer as a remote terminal to send and receive data. And you can write TI BASIC Language programs which use EIA RS232C compatible devices, including printers, plotters, video display terminals, and other computers.

This manual shows you how to connect and test the RS232 Interface. Then common examples of how to use the unit are given, followed by details of using TI BASIC with the RS232 Interface. The last section has additional, more advanced application examples.

---

## SET-UP INSTRUCTIONS

Setting up the TI RS232 Interface is a simple process. First, you need to connect it to the Home Computer, and then you need to test its operation. The steps involved in both procedures are included in this section. Information about connecting accessory devices is also included. Please read this material completely before proceeding.

*Note:* No more than three accessories can be attached in series to the port on the right side of the computer console. If a Solid State Speech™ Synthesizer is attached to the computer, it must be connected to the console first. Other accessories, including the RS232, are connected in any order after the speech unit.

### **CAUTION**

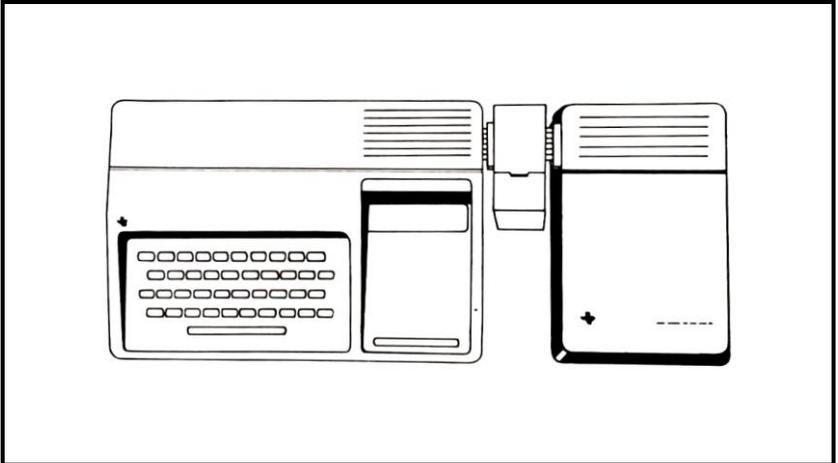
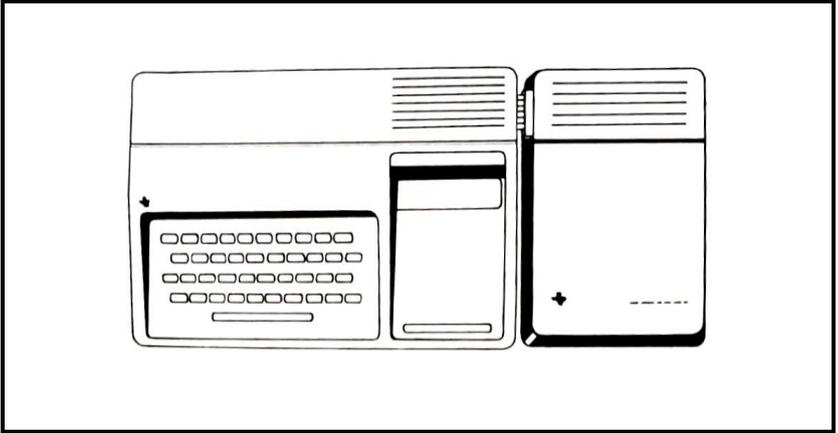
The electronic components of the RS232 Interface can be damaged by static electricity discharges. To avoid damage, do not touch the connector contacts or expose them to static electricity.

Once you've unpacked the unit, you're ready to connect the RS232 Interface to the Home Computer. (Save the packing material for storing or transporting the unit.)

### *Connecting the Unit*

1. First, turn off the computer console and all attached devices.
2. The console connector on the RS232 Interface projects from the left side of the unit. Place the unit so that its connector is to the right of, and parallel to, the computer console (or Speech Synthesizer if it's attached).
3. A small sliding door protects the accessory connector on the right side of your computer (or Speech Synthesizer). Carefully slide this door upward so that the connector is visible.

- 
4. Make sure the console and the RS232 Interface are parallel, with the connectors aligned. Then hold the console firmly with your left hand, and gently push the RS232 Interface connector onto the console (or Speech Synthesizer) connector.



5. Plug the RS232 Interface cord into a 115-volt outlet.

---

### **CAUTION**

Always disconnect the RS232 Interface before moving the computer console. The connectors between the console and the RS232 Interface are not designed to support the weight of the accessories. To prevent damage, always disconnect all devices before moving any part of your Home Computer system. For long distance moves, repack the accessories in their original packing material.

#### *Testing the RS232 Interface*

The procedure for checking the RS232 connection involves these simple steps:

1. Turn on the monitor, console and RS232 Interface. The master title screen appears.
2. Press any key on the console to make the master selection list appear, and the select TI BASIC.
3. Type the following command:  
    OPEN #1:"RS232"  
and press ENTER. The contents of the screen will scroll up two lines.
4. If an error code appears on the screen, the RS232 Interface may not be connected properly. Turn off both units, and carefully disconnect the RS232 unit. Reconnect the RS232, and repeat the test step above. If you still have difficulty, see "In Case of Difficulty" on page 18.
5. If no error message appears, the computer has accepted the OPEN command, indicating that the unit is properly connected.
6. Now type CLOSE #1 and press ENTER. The contents of the screen will scroll up two lines. Your RS232 Interface is ready for use.

---

### *Connecting Accessory Devices*

Once the RS232 Interface is properly connected to the Home Computer, other devices can be attached by cable to one or both of the connectors (called ports) on the back of the unit.

*Appendix B* contains reference information about these cables. Many devices which use the Electronic Industries Association (EIA) RS232C standard may be attached to the ports.

### **COMMON APPLICATIONS**

One common application of your RS232 Interface involves communicating with another TI Home Computer. Two examples are shown here. The first shows how messages can be exchanged between TI Home Computers, and the second illustrates how a TI BASIC program can be transferred from one TI Home Computer to another. The examples assume that both computers have RS232 Interface units connected by a cable. However, the same procedure will work using telephone lines when each unit has a Telephone Coupler (Modem) attached.

---

## *Communication Between Home Computers*

In this example, two TI Home Computers are used to send and receive messages through a cable (wired as shown on page 22 for Home Computers and Modems) attached to port 1 of each RS232 Interface. Below are the program listings: one for User A and one for User B.

User A enters the first program into computer A: User B enters the second program into computer B. Then User B should RUN his program before User A. Once both programs are RUNning, User A sends the first message. When a message is entered on User A's computer, it is transmitted via the RS232 Interface and displayed on User B's screen. Then User B can enter a message to be sent to User A. Messages are sent by typing the words and then pressing ENTER. This process of alternately sending a messages from A to B to A ... can continue until the programs are stopped by pressing **SHIFT C**.

```
100 REM-USER A
200 OPEN #1:"RS232.EC.LF",INTERNAL
300 INPUT A$
400 PRINT #1:A$
500 INPUT #1:B$
600 PRINT B$
700 GOTO 300
800 END
```

```
100 REM-USER B
200 OPEN #1:"RS232.EC.LF",INTERNAL
300 INPUT #1:A$
400 PRINT A$
500 INPUT B$
600 PRINT #1:B$
700 GOTO 300
800 END
```

---

## *Exchanging Programs with SAVE and OLD Commands*

This example shows how to transfer a TI BASIC program from one TI Home Computer to another. Once the program transfer is complete, the receiving computer can use the program just as if it had been entered there. This procedure is useful for exchanging programs without having to reenter the program statements from the keyboard.

Programs are exchanged by the following procedure:

1. If transmission is over the telephone, call the other user; then place your phone on the modem. See the modem manual for specific instructions.
2. The sender types: `SAVE "RS232"` (or `"RS232/2"` if Port 2 is used) and presses **ENTER**.
3. The receiver types: `OLD "RS232"` (or `"RS232/2"` if Port 2 is used) and presses **ENTER**.
4. The number 255 then appears at the top center of each screen. Once the link is established, this value is replaced by the remaining number of 256-character records to be exchanged. This value decreases as each record is transferred. When it reaches zero, the complete program has been transmitted.
5. If the number 255 remains on the screen longer than 10 seconds, the person at the receiving end must press **SHIFT C** and reenter the `OLD` command.

These are just two examples of ways to use the RS232 Interface. In addition to TI BASIC programs, certain *Solid State Software*<sup>™</sup> Command Modules also use the RS232 Interface. For example, a Terminal Emulator module allows you to use the interface unit and Telephone Coupler to access time-sharing computer services. Check with your local dealer for information about these modules and other accessories and services available for use with the RS232 Interface.

---

## USING TI BASIC

Once you've attached a peripheral to the RS232 Interface, its operation can be controlled by using TI BASIC commands and statements to input and output data.

- OPEN, CLOSE, INPUT, PRINT - Statements used to send and receive data between your Home Computer and other computers or accessories.
- OLD, SAVE - Commands used to send programs from one Home Computer to another.
- LIST - Command used to print or display a copy of a program.

When communicating with the RS232 Interface, TI BASIC recognizes three device or file names. RS232 and RS232/1 are equivalent and reference the port nearest the console. RS232/2 references the second port. Whenever an OPEN statement or a LIST, OLD, or SAVE command references one of the above names, all output or input is directed to or entered from the RS232 Interface.

### *Software Switch Options*

Computer accessories often require switches to give instructions to the computer. These switches are sometimes a physical part of the product and are set by hand. However, in the RS232 Interface, these switches are programmed into an integrated circuit contained in the unit. Since these switches are part of the unit's "software" they are called *software switch options*.

There are nine particular operations of the RS232 Interface controlled with software switch options. The first four describe the characteristics of the computer or accessory you want to communicate with.

- 1) BAUD RATE - the rate (in bits per second) at which data will be transferred.
- 2) DATA BITS - the number of bits of data in each character transferred.

- 
- 3) **PARITY** - a method of checking data transmission for errors.
  - 4) **STOP BITS** - the number of bits sent at the end of each character.

The other five software switch options make adjustments in the operations performed by your TI Home Computer.

- 5) **NULLS** - an option that adds six null characters to be transmitted after each carriage return to allow for printer carriage mechanism timing.
- 6) **CHECK PARITY** - an option which verifies the data of each character received.
- 7) **ECHO OFF** - an option to suppress retransmission of each character received back to the sender's device.
- 8) **CARRIAGE RETURN** and **LINE FEED OFF** - an option to suppress automatic addition of a carriage return and linefeed to each variable length **DISPLAY** type record.
- 9) **LINE FEED OFF** - an option to suppress automatic addition of a linefeed to each variable length **DISPLAY** type record. A carriage return is still automatically added.

These nine software switch options allow you to match your TI Home Computer to the operating characteristics of the accessory attached to the interface unit. You do this by listing the switch options desired when you are entering the **TI BASIC** command or statement needed.

The software switch options must be designated in the **OPEN** statement and the **LIST**, **OLD**, and **SAVE** commands. Since **CLOSE**, **INPUT**, and **PRINT** statements operate with previously **OPENed** files, switch options are not necessary.

To make things as easy as possible for you, the **RS232** Interface assumes certain switch settings. These assumed settings are called default values. You only have to specify those settings you need to change from the default values.

---

The software switch options and their default values are shown here.

### SOFTWARE SWITCH OPTION DEFAULT VALUES

<b>Option</b>	<b>Open/ List</b>	<b>Old/Save</b>
BAUD RATE	Baud rate = 300	Baud rate = 300
DATA BITS	Data bits =7	Option not allowed
PARITY	Parity = odd	Option not allowed
STOP BITS	1 stop bit	1 stop bit
NULLS	No nulls	Option not allowed
CHECK PARITY	No parity check	Option not allowed
ECHO OFF	Echo off	Option not allowed
CRLF OFF	Carriage return supplied	Option not allowed
LF OFF	Linefeed supplied	Option not allowed

If you want to specify different values, the following software switch options can be entered. In a file name the switch options follow RS232, RS232/1, or RS232/2. Each switch option that you specify must be preceded by a period and can be listed in any order. Two letters identify an option to the computer, as shown in the following list.

### SOFTWARE SWITCH OPTION ENTRIES

<b>Option</b>	<b>Enter As</b>
BAUD RATE = 110, 300,600, 1200,2400, 4800, or 9600	.BA=300 (or desired rate)
DATA BITS =7 or 8	.DA=7 (or 8)
PARITY = ODD, EVEN, or NONE	.PA=O (or E or N)
TWO STOP BITS	.TW
NULLS	.NU
CHECK PARITY	.CH
ECHO OFF	.EC
CRLF OFF	.CR
LF OFF	.LF

---

The first three options assign values to a switch and must include an equals sign (=). The remaining six switches are of the "on-off" variety and, as shown, are entered with a decimal point and then the two-letter designation. All switches are listed for quick reference on the inside of the front cover of this manual.

### *Statements and Commands*

Now you're ready to learn how to use TI BASIC file processing statements with the RS232 Interface. Remember to refer to the BASIC section of the *User's Reference Guide* for an explanation of each statement or command. The modifications needed for using devices connected to the RS232 Interface are discussed in this section.

### *The OPEN Statement*

The OPEN statement prepares a TI BASIC program to use data files with accessory devices. When used with the RS232 Interface, it links the attached peripheral to a file number and sets the software switch options to control the interface operations.

The format for the OPEN statement with the RS232 Interface is:

*OPEN #file-number: "file-name[.software switch options]"[,file-attributes]*

File-number is a numeric expression that evaluates to an integer between 1 and 255.

File-name is a string expression containing one of the three names used with the RS232 Interface: RS232, RS232/1, or RS232/2. The file-name is optionally followed by a list of software switch options. For those options not listed, the computer assumes the default values in the OPEN Statements listed on page 10.

---

*File-attributes* are string expressions, separated by commas, which specify the length and format of records, the file organization, and how the file is accessed. The possible entries and default values for the RS232 Interface are:

<b>Entry</b>	<b>RS232 Interface Default</b>
<i>file-organization</i> : SEQUENTIAL only (RELATIVE files cannot be used)	SEQUENTIAL
<i>file-type</i> : DISPLAY or INTERNAL	DISPLAY
<i>open-mode</i> : INPUT, OUTPUT, UPDATE, or APPEND	UPDATE
<i>record-type</i> : FIXED or VARIABLE [record length]	VARIABLE 80

*Examples:* 100 OPEN #1:"RS232"  
200 OPEN #2:"RS232/1.BA = 9600.EC.CH"  
300 OPEN #3:"RS232/2.TW.BA=110",FIXED 32

In line 100 all default values are assumed on port 1. In line 200 file #2 on port 1 has a baud rate of 9600, the echo feature is turned off, and parity checking will occur. The device opened in line 300 is attached to port 2, two stop bits are transmitted, the baud rate is 110, and the record type is set to FIXED 32 characters in length.

### *The CLOSE Statement*

Any device attached to the RS232 Interface which is OPENed must be CLOSED so that all pending input from or output to the device will be processed. Use the format: *CLOSE #file-number*

### *The INPUT Statement*

When you use the INPUT statement with a device connected to the RS232 Interface, data can be transmitted from the device and assigned to the variables listed in the statement. The format for this form of the INPUT statement is:

*INPUT #file-number[:variable-list]*

---

To use the INPUT statement with a device attached to the RS232 Interface, the device must be OPENed in an INPUT or UPDATE mode.

The number of characters returned by the INPUT statement depends on the record type specified in the OPEN statement. For FLXED length or INTERNAL data type records, data is accepted from the device until (1) the number of characters equals the record length specified in the OPEN statement or (2) a **SHIFT C** is pressed on the main console, which stops the program. For VARIABLE length records, input is accepted from the RS232 Interface until (1) a carriage return (or **ENTER** is pressed), (2) the maximum record length specified in the OPEN statement is reached, or (3) **SHIFT C** is typed on the main console, stopping the program.

An added feature of the RS232 Interface is its editing capability. Before pressing the carriage return or **ENTER** key, the person sending data from a terminal can delete characters and recheck the data before transmission. To use the editing feature, follow this procedure:

1. Be sure the OPEN statement for this device specifies DISPLAY type data.
2. Be sure the echo and edit capability is functioning (do not specify ECHO OFF in the corresponding OPEN statement).
3. Press the terminal's DELETE key (decimal code 127). This causes the previously transmitted character to be removed from the RS232 Interface buffer so that it is not sent to the computer. The deleted character will be echoed back to the sending terminal.
4. To see what remains in the RS232 buffer after several deletions, press the terminal's CONTROL R function key (decimal code 18). This sends a carriage return, linefeed, and the buffer contents back to the sending terminal, so that the user can see what is ready to be entered.

If the .ECHO OFF software switch option or INTERNAL data is specified in the OPEN statement, the editing features are ignored. INPUTing DELETE or SHIFT R in this case results in the corresponding code being stored in the RS232 Interface buffer.

---

### *The PRINT Statement*

To send data from the Home Computer to an accessory device via the RS232 Interface, the PRINT statement is used in this format:

PRINT #file-number[:print-list]

The device must be OPENed in OUTPUT or UPDATE mode.

When data is transmitted to a device through the RS232 Interface, a carriage return and linefeed code are sent after each record unless:

- INTERNAL type data or FIXED length records were specified in the corresponding OPEN statement.
- CRLF OFF or .LF OFF was specified in the OPEN statement.

Two Home Computers can PRINT and INPUT to each other through their respective RS232 Interfaces. While one computer PRINTs data out, the other can receive the data with an INPUT statement. Since data entered on the console of a Home Computer is immediately displayed, the receiving RS232 Interface should not echo data back. List the ECHO OFF option and .LINEFEED OFF option in the OPEN statement when two Home Computers PRINT and INPUT to each other. The first example in the "COMMON APPLICATIONS" section on page 6 illustrates how two Home Computers can communicate with each other.

### *The LIST Command*

Program lines can be displayed on an accessory device through the RS232 Interface by using the LIST command in the following format:

LIST "file-name[.software switch options]"[:line-list]

Here again the file-name must be RS232, RS232/1, or RS232/2. The software switch options and their default values are listed on page 10.

Examples: LIST "RS232"  
LIST "RS232/1.BA=600.DA=8.PA=E"  
LIST "RS232/2.BA= 1200": 100-200

---

The first example assumes all the default values through port 1. The second also uses port 1 but changes the baud rate to 600, the data bits to 8 and the parity to even. The third example uses port 2 and a baud rate of 1200. The first two examples list all program lines in memory; the third lists the lines between 100 and 200 inclusive.

### *SAVE and OLD Commands*

Programs can be exchanged between TI Home Computers when they are connected by modems over the telephone network or if their respective RS232 Interfaces are directly cabled together. The SAVE and OLD commands are used in the following formats:

SAVE "*file-name[.software switch options]*"  
OLD "*file-name[.software switch options]*"

The file-name must be RS232, RS232/1, or RS232/2. The only software switch options allowed are baud rate (.BA) and number of stop bits (.TW). The number of data bits is always 8 when exchanging programs. The default values are shown on page 10. Corresponding SAVE and OLD commands must specify the same baud rate and number of stop bits.

Example: SAVE "RS232/2.BA=600.TW"  
          OLD "RS232.BA=600.TW"

See the COMMON APPLICATIONS section for the procedure required to exchange programs.

The following table indicates the speed at which one record is exchanged between computers. The transfer time is expressed in seconds next to the baud rate you are using.

### TRANSFER TIMES FOR A 256-BYTE RECORD

<b>Baud</b>	<b>Seconds</b>
110	23.5
300	8.6
600	4.3
1200	2.5
4800	.5
9600	.3

---

## ADVANCED EXAMPLES

### *Example 1: Printing a Report*

This program prints a table listing all numbers from 1 to 10 and the squares and cubes of these numbers.

```
100 OPEN #1:"RS232"  
200 PRINT #1: ' 'X X^2   X^3"  
300 FOR I= 1 TO 10  
400 PRINT #1:I,I^2,I^3  
500 NEXT I  
600 CLOSE #1  
700 END
```

Line 100 OPENSs the attached device using the default software switch options. Line 200 prints a heading. Lines 300-500 loop through the whole numbers from 1 to 10 inclusive and print the table. Line 600 disassociates the specified file from the RS232 Interface.

### *Example 2: Two-way Communication Between Computer and Terminal*

This program can be used by a Home Computer with a video display terminal connected to port #1 of the RS232 Interface.

```
100 CALL CLEAR  
200 OPEN #1: ' 'RS232/1.BA=9600" ' , VARIABLE 112  
300 INPUT "TYPE MESSAGE: ":X$  
400 PRINT #1: "MESSAGE FROM HOME COMPUTER:  
":X$: :  
500 PRINT #1: : "TYPE MESSAGE: ";  
600 INPUT #1: X$  
700 PRINT: : "MESSAGE FROM TERMINAL: ":X$: :  
800 GOTO 300
```

The terminal is OPENed in line 200, specifying a baud rate of a 9600. The other software switch options have the default values. VARIABLE-length records are specified because a message will vary in length. The maximum number of characters accepted by an INPUT statement is 112, so this is the value specified as the

---

maximum record length. If you are using a mechanical terminal, add the .NULLS on (.NU) software switch option. This gives the carriage return time to move back to the first column.

The program first accepts a message from the Home Computer and transmits it to the terminal (lines 300, 400). In lines 500-700, the terminal user is prompted to enter a message which is displayed on the Home Computer screen. Line 800 lets this exchange of messages continue until **SHIFT C** is pressed to stop the program.

*Example 3: Specifying Different Software Switches on the Same Port*

This program demonstrates how you can simultaneously use a single device in more than one way. Initially, the program OPENS a terminal as files 1, 2, and 3 on port 1. Line 100 specifies that output to file #1 return and linefeed after each record. Line 110 indicates that data from file #2 will have variable length ASCII text and will not be echoed back to the terminal. Line 130 shows that data will be printed on file #3 and the cursor will stay on the same line after it is printed.

```
100 OPEN #1:"RS232"  
110 OPEN #2:"RS232.EC"  
120 OPEN #3:"RS232.CR"  
130 PRINT #3:"ENTER THE WORD: PASSWORD"  
140 INPUT #2:A$  
150 IF A" ="PASSWORD" THEN 180  
160 PRINT #1: "TRY AGAIN"  
170 GOTO 130  
180 PRINT #1:" PASSWORD IS OK"  
190 GOTO 130
```

---

## SERVICE INFORMATION

### *In Case Of Difficulty*

If the RS232 Interface or attached devices do not appear to be working properly, check the following:

1. *Power* - Make sure the RS232 Interface is plugged in and the power switch is on (red dot visible).
2. *Connector separation* - Check for proper alignment of console and RS232 Interface (they should be parallel). Intermittent performance may be the result of poor alignment.
3. *Cable* - Data Communication Equipment (DCE\*) devices, such as modems and other home computers, require the connections shown on page 22. Data Terminal Equipment (DTE\*) devices, such as terminals and printers, require a different cable, also shown on page 22. Be sure the correct cable is being used. Check for loose or broken leads. Be sure cables are plugged into control ports.
4. *Proper software switch options selection* - Even when all hardware is operating properly, the RS232 Interface can appear to malfunction if improper software switch options have been selected. Check the requirements of the terminal or modem attached to the RS232 Interface and be sure they correspond to the options selected in the OPEN statement and the LIST, OLD, or SAVE commands. A 300 Baud printer will not operate if the RS232 Interface is OPENed at 1200 Baud. When communicating between Home Computers, omitting the ECHO OFF or .LINEFEED OFF options in an OPEN statement may cause unpredictable results.
5. *Other modems and terminals* - If a device has a test or local mode, use it to verify that the device is working properly when disconnected from the RS232 Interface.

\*Per the EIA RS232C Standard

---

If the RS232 Interface or attached devices still do not appear to be working properly, first turn all power off. Next, disconnect the RS232 Interface from the main console and the cables to attached devices. Then follow these steps:

1. *See if the Home Computer, by itself, is working properly.* Turn on the Home Computer. Press any key and the Main Index appears. Now select TI BASIC. Type: OPEN #1:"RS232" and press ENTER. The error message, "I/O ERROR", and error code, 00, should be displayed, indicating that the device named could not be OPENed. This is the expected result if the RS232 Interface is not connected to the console.
2. *Check that the RS232 Interface is working properly.* Refer to the Set-Up Instructions and reconnect the RS232 Interface. Type: OPEN #1:"RS232" and press ENTER. Contents of the screen should scroll up two lines, indicating that the device named has been OPENed.
3. If any device when reattached to the RS232 Interface, still does not work, then the device or its cable may be faulty.
4. If none of the above procedures corrects the difficulty, consult "If You Have Questions or Need Assistance" or see the "Service Information" portion of the *User's Reference Guide*.

### *Exchange Centers*

If your RS232 Interface requires service, instead of returning the unit to a service facility for repair or replacement, you may elect to exchange the unit for a factory-reconditioned RS232 Interface of the same model (or equivalent model specified by TI) by going in person to one of the exchange centers which have been established across the United States. A handling fee will be charged by the exchange center for in-warranty exchanges of the RS232 Interface. Out-of-warranty exchanges will be charged at the rates in effect at the time of the exchange. Please refer to the enclosed Exchange Service listing or call the Consumer Relations Department for exchange fee information and the location of the nearest exchange center.

---

*If You Have Questions or Need Assistance*

If you have questions concerning RS232 Interface repair, or peripheral, accessory, or software purchase, please call our Consumer Relations Department at 800-858-4565 (toll free within the contiguous United States except Texas) or 800-692-4279 within Texas. The operators at these numbers cannot provide programming assistance.

For technical questions such as programming, specific printer applications, etc., you can call 806-741-2663. Please note that this is not a toll-free number, and collect calls cannot be accepted.

As an alternative, you can write to:

Consumer Relations Department  
Texas Instruments Incorporated  
P.O. Box 53  
Lubbock, Texas 79408

Because of the number of suggestions which come to Texas Instruments from many sources containing both new and old ideas, Texas Instruments will consider such suggestions only if they are freely given to Texas Instruments. It is the policy of Texas Instruments to refuse to receive any suggestions in confidence. Therefore, if you wish to share your suggestions with Texas Instruments, or if you wish us to review any BASIC language program which you have developed, please include the following statement in your letter:

"All of the information forwarded here with is presented to Texas Instruments on a nonconfidential, nonobligatory basis; no relationship, confidential or otherwise, expressed or implied, is established with Texas Instruments by this presentation. Texas Instruments may use, copyright, distribute, publish, reproduce, or dispose of the information in any way without compensation to me."

---

## Appendix A

### ERROR CODES

Listed below are the error codes related to the operation of TI BASIC programs that use the RS232 Interface.

#### OPEN:

CODE 00 - Device named in the statement or command cannot be OPENed.

CODE 02 - The software switch option entry is in error. Incorrect first two characters of an option, invalid BAUD rate, or incorrect number of data bits. RELATIVE record type specified in OPEN statement.

CODE 06 - A hardware error occurred and device cannot be opened.

#### INPUT:

CODE 24 - INTERNAL data type record is too large to be read into the buffer space allocated.

CODE 26 - Some type of hardware error occurred. Also caused by stopping the reception of a pending or in progress operation with a **SHIFT C** on the console keyboard.

#### PRINT:

CODE 36 - See INPUT CODE 26.

#### OLD:

CODE 50 - See CODE 00.

CODE 52 - Attempting to use .EC, .CR, .LF, .NU, or .DA switch with OLD statement. Also see CODE 02.

CODE 54 - The program is too large to be loaded.

CODE 56 - See CODE 26.

#### SAVE:

CODE 62 - Attempting to use .EC, .CR, .LF, .NU, or -DA switch with SAVE statement. Also see CODE 02.

CODE 66 - See CODE 26.

#### MISC ERROR CODES:

CODE 43,73,83,93 - Executing a command which is illegal.

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## Appendix B

### CABLE DIAGRAMS

Cables used to connect other computers, modems, or terminals to the RS232 Interface must use EIA RS232C 25-pin male connectors. The pins are connected as follows:

<i>PIN #</i>	<i>FUNCTION</i>	<i>OUTPUT/INPUT</i>
2	Serial data in	Input
3	Serial data out	Output
5	Clear to send	Output
6	Data set ready	Output
7	Signal ground	Ground
8	Data carrier detect	Output
20	Data terminal ready	Input

Pins listed above are required in either one or both of the cables diagrammed below. All unlisted pins need not be wired. It does not matter which end of the cable you plug into the RS232 Interface or the device. Be sure both ends are wired as follows:

#### Required Pin Wiring for Home Computers and Modems

<i>RS232</i>	<i>Computer/Modem</i>
2	3
3	2
6	20
7	7
20	6

#### Required Pin Wiring for Terminals

<i>RS232</i>	<i>Terminals</i>
2	2
3	3
5*	5
6*	6
7	7
8*	8
20	20

\*Not required for proper operation of the RS232 Interface but may be required for proper operation of accessory devices.

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## GLOSSARY

<b>Baud</b>	The transmission rate of data over a communication line. 300 Baud indicates 300 bits of information are being transmitted every second.
<b>Bit</b>	The fundamental unit of binary information symbolized by 0 (off) and 1 (on).
<b>Byte</b>	A string of binary digits or bits treated as a unit, often representing one data character.
<b>Echo</b>	The immediate retransmission of data just received back to the sender.
<b>Default</b>	The operating mode assumed when a software switch option is not entered.
<b>Parity</b>	A means for insuring that the data received matches the data transmitted. This data checking method is used to verify that the total number of data bits per character is always even or always odd, thus enabling parity checks to be made to test for accurate data.
<b>RS232C</b>	A serial communication interface standardized by the Electronic Industries Association (EIA).

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## **THREE-MONTH LIMITED WARRANTY FOR THERMAL PRINTER**

THIS TEXAS INSTRUMENTS SOLID STATE THERMAL PRINTER WARRANTY EXTENDS ONLY TO THE ORIGINAL CONSUMER PURCHASER OF THE THERMAL PRINTER.

### **WARRANTY DURATION**

This Texas Instruments Thermal Printer is warranted for a period of three (3) months from the date of the original purchase by the consumer.

### **WARRANTY COVERAGE**

This Texas Instruments Thermal Printer is warranted against defective materials and construction. **THIS WARRANTY IS VOID IF THE THERMAL PRINTER HAS BEEN DAMAGED BY ACCIDENT, UNREASONABLE USE, NEGLIGENCE, IMPROPER SERVICE OR OTHER CAUSES NOT ARISING OUT OF DEFECTS IN MATERIALS OR CONSTRUCTION.**

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### **LEGAL REMEDIES**

This warranty gives you specific legal rights, and you may also have other rights that vary from state to state.

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## **WARRANTY PERFORMANCE**

During the above three-month warranty period, your Thermal Printer will be repaired or replaced with a new or reconditioned unit of the same or equivalent model (at TI's option) when the unit is returned either in person or by prepaid shipment to a Texas Instruments Service Facility listed below.

The repaired or replacement unit will be warranted for three months from date of repair or replacement. Other than the cost of postage or shipping the unit to Texas Instruments, no charge will be made for the repair or replacement of in-warranty units.

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Consumers in California and Oregon may contact the following Texas Instruments offices for additional assistance or information.

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(213) 973-1803

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