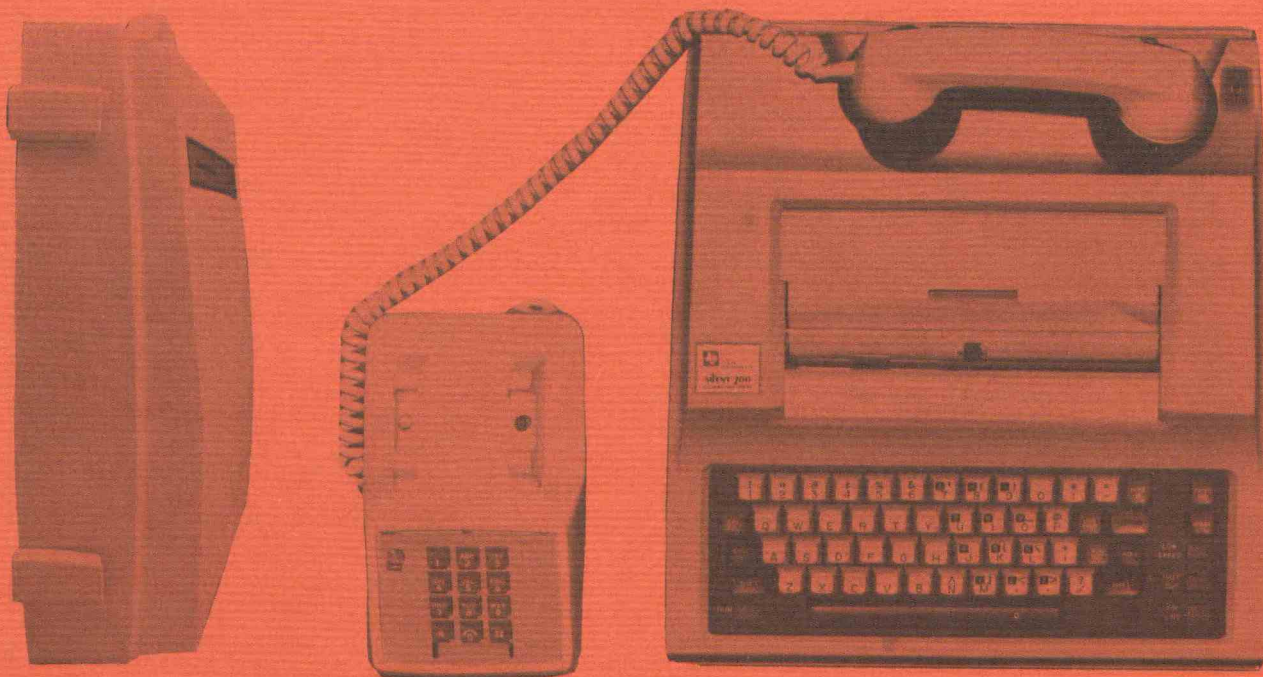


SILENT 700[®]

electronic data terminals

Model 745 Portable Data Terminal Operating Instructions



MANUAL NO. 984024-9701, REV. A

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| DATE | ECN | LEVEL | DESCRIPTION |
|---------|--------|-------|---|
| 11-1-76 | 416932 | C | Add full-ASCII Keyboard and update for standard, limited-ASCII, rocker switch keyboard. |

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INTRODUCTION

You are about to learn how to operate the Texas Instruments Silent 700® Model 745 Portable Data Terminal . . . the lightest-weight portable now available. Even if you have no previous data processing or data terminal experience, you should find the Model 745 simple to operate and easy to transport.

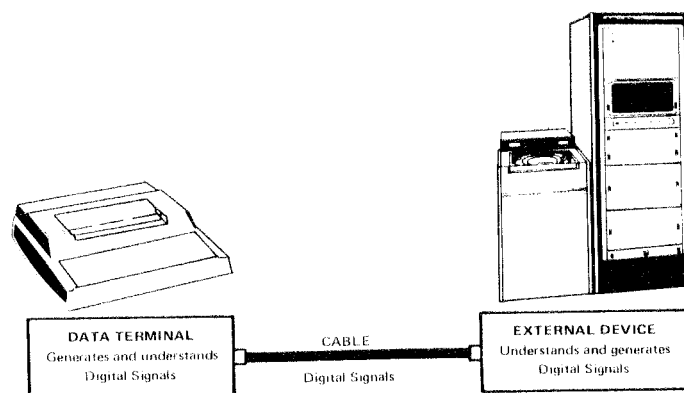
What is a data terminal? How does it differ from a standard typewriter?

In its broadest sense a *data terminal* is any device, inserted in a communications network, which can transmit data, or receive data, or both. Most department store cash registers are *data terminals*; teletypewriters are *data terminals*. The Model 745 is a *portable* teletypewriter, further defined as a *Keyboard Send-Receive* (KSR) data terminal, which has the ability to send and receive data. (By the way, *data* is a very general term meaning *information*; for example, numbers, alphabetic letters, symbols, words, and sentences.)

The difference between a KSR data terminal and a standard typewriter is the ability of a data terminal to generate codes through the keyboard. The codes can be transmitted to, and printed by, its own printer and/or transmitted to, and understood by, another device (data terminal, computer, data logger, CRT, etc.). The KSR also understands and prints codes received from another device.

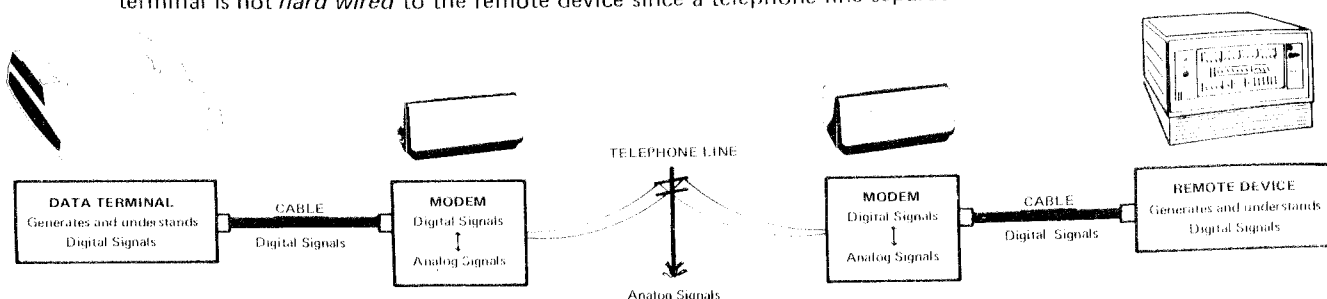
The code system used by the Model 745 is the ASCII Code System and Character Set, commonly called ASCII (pronounced "as-key"). The ASCII Code System consists of different combinations of *ones* and *zeros* (corresponding to numbers, alphabetic letters, and symbols) which are communicated as *digital signals* (□□□□). Generally, a *one* is an *on* signal and a *zero* is an *off* signal. For example, if you look on page A-1, you will notice that a "U" is represented by a 1010101 (b_1 through b_7). When you depress the *U* key, the terminal generates an *on off on off on off on*. (Think of a light switch being flipped on and off.)

How are these digital signals passed from one device to another? If the distance is not too great (50 feet usually is the limit), only cables are necessary and the terminal is said to be *hard wired* to the other device. For example, when a data terminal is used as a computer console, it is usually *hard wired* to the computer.

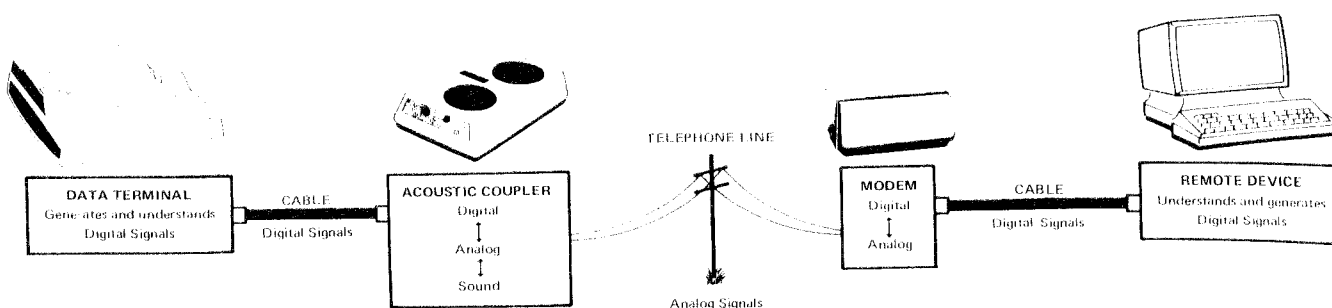


For longer distances telephone lines often are necessary, and the digital signals (*ones* and *zeros*) must be converted to *analog signals* (~~~~~). The device used to convert digital signals (compatible with data processing equipment) to analog signals (compatible with transmission facilities), and analog to digital, is called a *modem* or *data set*. A modem can be built-into, or be external to a data terminal, computer, data logger, CRT, etc.; a modem is required on each end of the telephone line. (By the


way, if the modem is external to the terminal, the terminal is *hard wired* to the modem, and the modem will be *hard wired* to the telephone line since they are in close proximity; but the data terminal is not *hard wired* to the remote device since a telephone line separates them.)



Still another way to transmit and receive data over telephone lines is available: that is, through the use of a telephone handset. However, if a handset is used, the digital signals must first be converted to sound; then the sound is converted to analog signals before the data is transmitted over the telephone line. The device used for this purpose is called an *acoustic coupler*. All acoustic couplers contain a modem. An acoustic coupler also can be external or internal (built-in) to a data terminal.



The Model 745 is capable of operating in several communications configurations, each of which is described in this manual. However, the most common use of the Model 745 is as a portable terminal, using its built-in acoustic coupler as the means of communication.

While you are learning to operate the Model 745, you may notice another difference between it and a standard typewriter . . . the Model 745's silent printing. In fact, like most typewriters, most data terminals use impact printing techniques. The quiet, nonimpact printing of the Model 745 is achieved by a miniature five by seven dot matrix  of 35 tiny heating elements mounted on a solid-state printhead, which creates characters on heat-sensitive paper.

ABOUT THIS MANUAL . . .

All operators should read the GENERAL OPERATING GUIDELINES and the first three sections to become familiar with the basic operations of the Model 745. Many of the operations described in these sections are repeated in subsequent sections, but in less detail. If you will be operating the Model 745 with the optional Auxiliary EIA Interface Cable Kit, determine the particular configuration you will use, then read the appropriate operating instructions in Section IV. If you will be responsible for installing the Model 745 using the optional Auxiliary EIA Interface Cable Kit, read the appropriate installation instructions in Section V. Finally, if you want to know more about the controls and keyboard, read Section VI.

NOTE

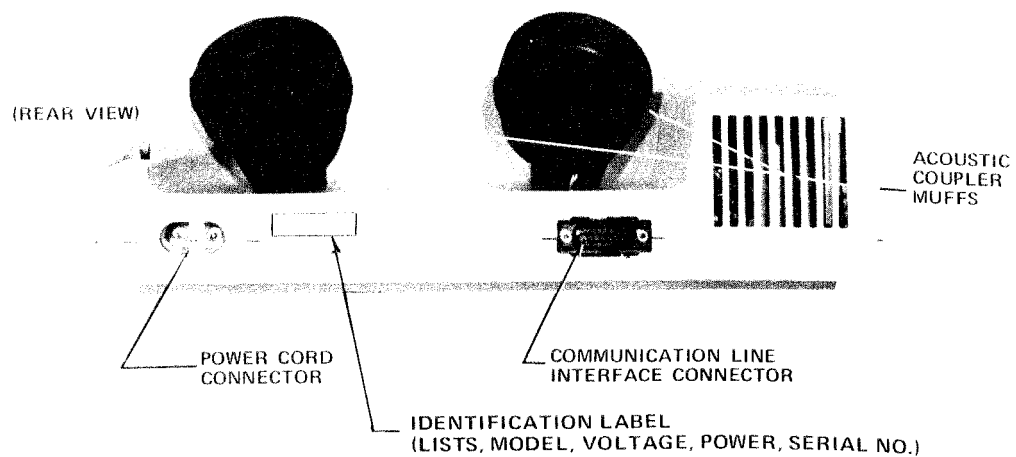
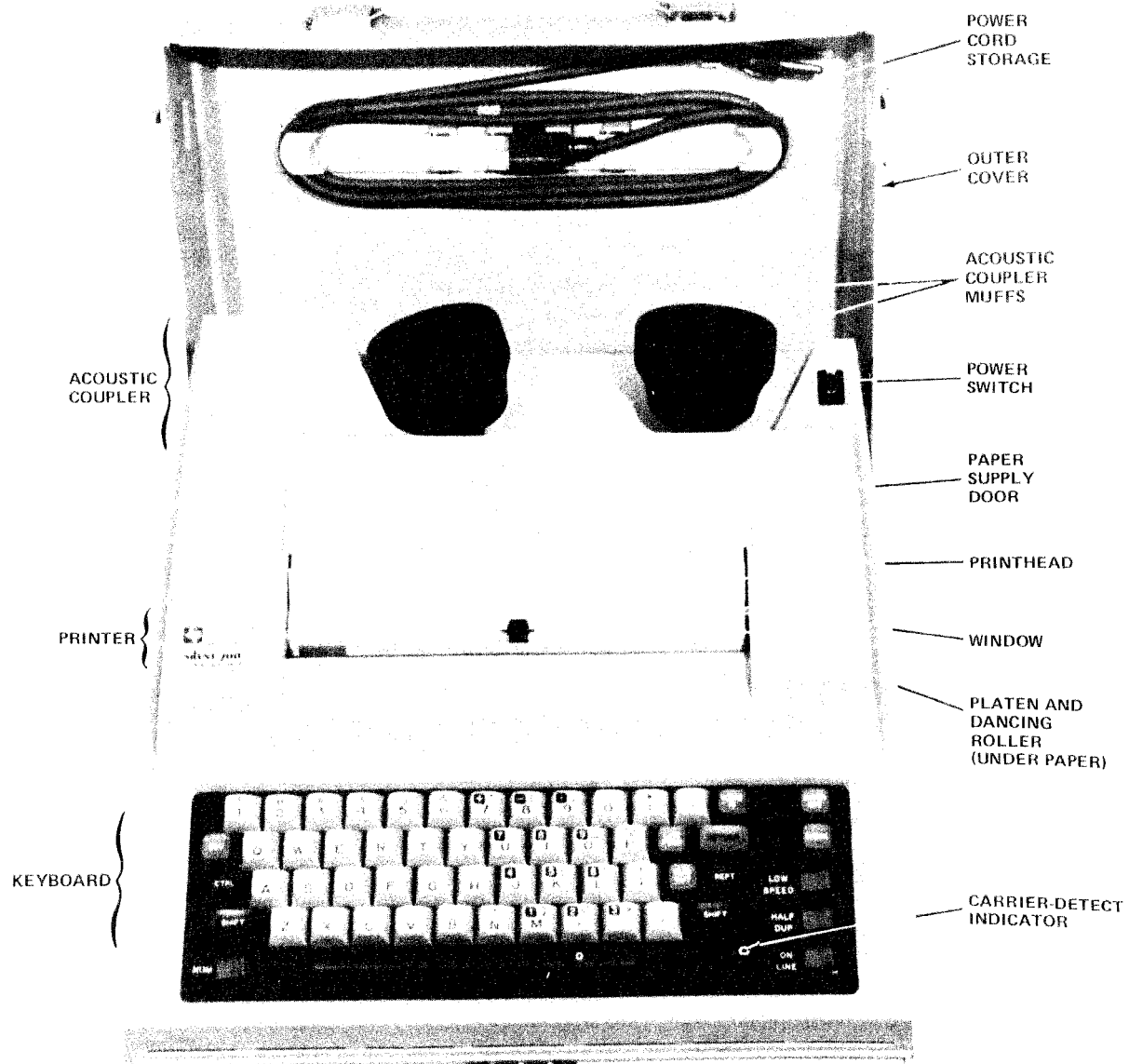
If you don't know the meaning of a technical term, you may find its definition in Appendix C.

GENERAL OPERATING GUIDELINES

1. *External device* denotes: a minicomputer, data logger, CRT, computer, plotter, or any other device which communicates with the local Model 745 over a cable (hard wired). *External modem* denotes: a modem which is hard wired to the local Model 745. *Local equipment* denotes: the Model 745, or the Model 745 with an external modem and/or an external device.
2. *Remote device* denotes: a minicomputer, data terminal, CRT, computer, data logger, plotter or any other device which communicates with the local Model 745 over telephone lines. *Remote modem*: a modem which is hard wired to the remote device. *Remote equipment* denotes: the remote device, remote modem, and any other associated data equipment.
3. *Communication line* (or *line*) denotes the cable or telephone line over which data is transmitted to, and received from, the Model 745.
4. *Depress* means: momentarily push down the designated key and then release it. *Press* means: push down a switch until it locks. *Press and hold* means: push down and hold the key until some stated action is completed.
5. Depress the PAPER ADV key to return the printhead to the left margin and advance the paper. Use this key when you do *not* wish to generate a code to be transmitted to the communication line.
6. Depress both LINE FEED and RETURN keys at the end of a typed line when you *do* wish to generate the respective codes to be transmitted to the communication line.

NOTE

Some Model 745 Data Terminal keyboards are equipped with alternate-action keys for the LOW SPEED, HALF DUP, and ON LINE functions instead of rocker switches. Press down the desired key once to gain the labeled mode; press again to release the key.



SECTION I

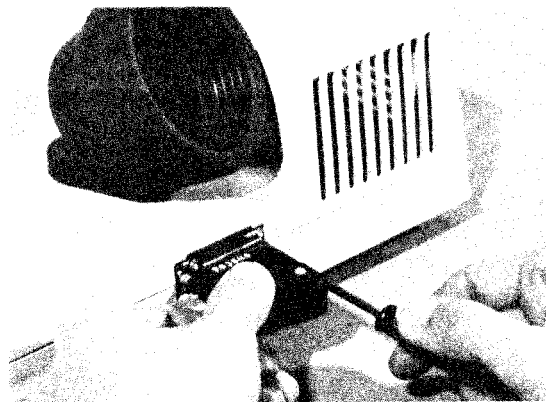
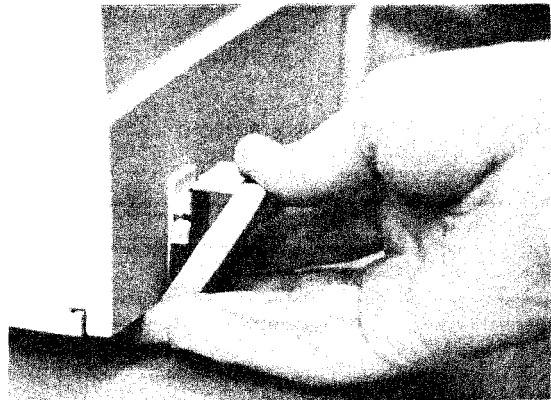
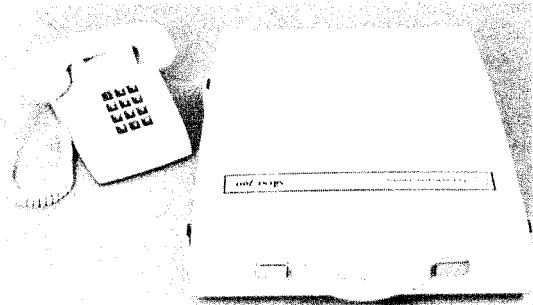
BECOMING FAMILIAR WITH THE MODEL 745

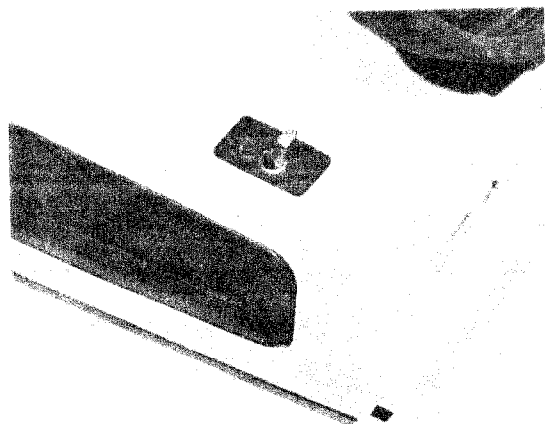
SETTING UP THE TERMINAL

1. Place the Model 745 Portable (with the Silent 700® label facing up) on a table or stand. If the terminal is to be used with any external equipment (modem and/or device), be sure that the equipment is nearby; if not, be sure that a telephone is nearby.
2. Unlatch the outer cover by pushing down on the top part of each latch until the bottom part of the latch unhooks from the groove in the terminal base; then swing the bottom part of the latch away from the terminal base, while pressing down on the top part of the latch.
3. Lift the outer cover straight up and off.
4. If the terminal is to be operated in its standard configuration (i.e., without any external equipment), but was originally ordered with the optional Auxiliary EIA Interface Cable Kit, plug the Jumper Connector (included in the Kit) into the Communications Line Interface Connector at the rear of the terminal. If the terminal was not originally ordered with the Kit, skip to step 6.

—OR—

5. If the terminal is to be operated with any external equipment, ensure that the terminal is installed according to the desired configuration (described in Section V).

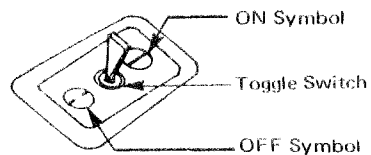




6. Remove the ac power cord from inside the outer cover. Plug the three-socket female connector of the cord into the rear of the terminal, and plug the three-prong male connector into a 115-volt ac wall outlet.

SWITCHING THE TERMINAL ON AND OFF

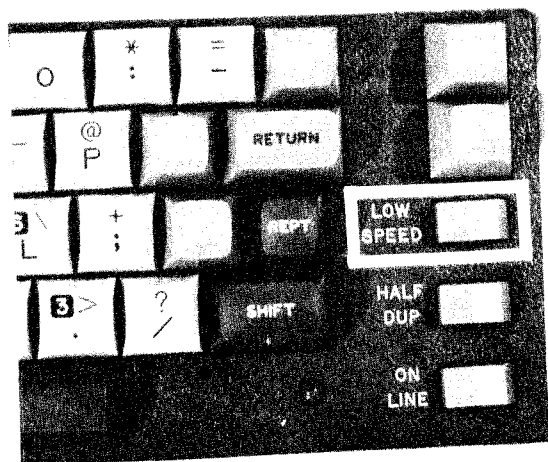
1. Check that the power cord is plugged into the terminal and wall outlet.
2. To switch the terminal ON, flip the power switch, located on the top right rear corner of the terminal, toward the *rear* of the terminal.
3. To switch the terminal OFF, flip the power switch toward the *front* of the terminal.



SETTING THE PRINTING SPEED

Determine whether you will be transmitting and receiving data at 10 or 30 characters-per-second, then set the terminal printing speed to the same rate as follows:

1. Press the left side of the LOW SPEED switch (to the LOW SPEED position) to set the printing speed to 10 characters-per-second.
2. Press the right side of the LOW SPEED switch to set the printing speed to 30 characters-per-second.



SETTING THE TERMINAL TO HALF-AND FULL-DUPLEX

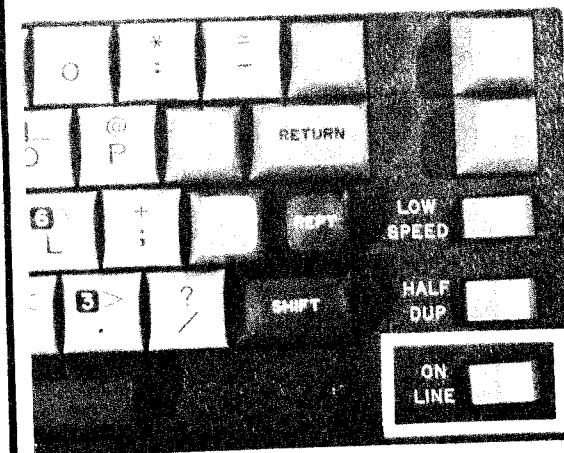
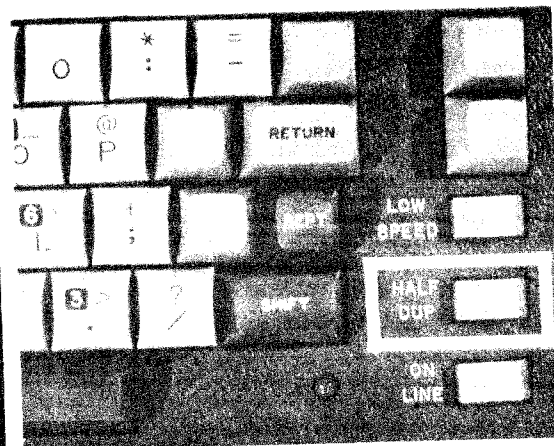
As generally defined in the computer industry, *half duplex* describes the mode in which a device is capable of transmitting and receiving data, but *not* simultaneously; *full duplex* describes the mode in which a device transmits and receives data simultaneously. Typically, when a data terminal is set to the *full duplex* mode, data typed on the keyboard is transmitted, but not printed by its printer (or other output device). Since the Model 745 is capable of transmitting and receiving data simultaneously, *full duplex* is defined as *full duplex operation with no local printout of transmitted data*, and *half duplex* is defined as *half duplex operation with local printout of any transmitted data*. Therefore, when the terminal is in the *half duplex* mode, any data received from the line while transmitting will be ignored and not printed. Determine whether or not you want local printout of transmitted data, then set the HALF DUP key accordingly.

1. To set the terminal to the half-duplex mode, press the left side of the HALF DUP switch (to the HALF DUP position).
2. To set the terminal to the full-duplex mode, press the right side of the HALF DUP switch.

SETTING THE TERMINAL TO ON-LINE AND LOCAL

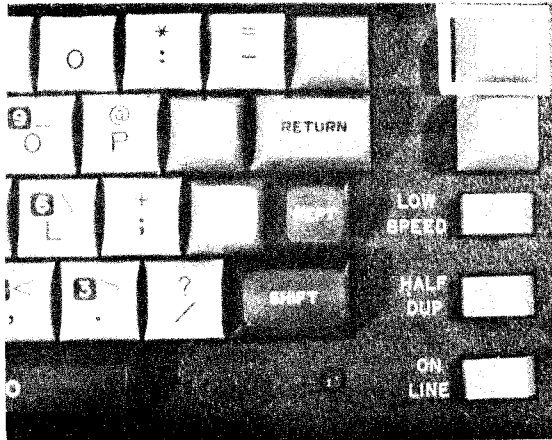
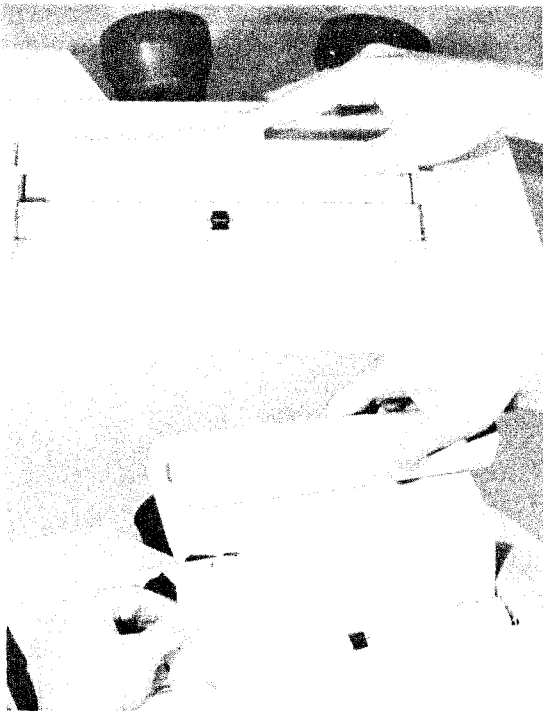
Whether you use the Model 745 in a hard wired configuration or over a telephone line, it must be internally connected to the communication line so that it can communicate with the external or remote device. Otherwise, it only communicates with itself and merely is an electronic typewriter. When the terminal is connected to the line, it is said to be *on-line*; if it is not, it is said to be in the *local* mode.

1. To connect the terminal to the communication line (*on-line*), press the left side of the ON LINE switch (to the ON LINE position).
2. To disconnect the terminal from the communication line (*local*), press the right side of the ON LINE switch.



LOADING PAPER

1. Switch the terminal power ON.
2. Lift the paper door.
3. If a useable amount of paper remains on the paper supply roll, grasp the used roll and lift it from the paper compartment. Tear the paper halfway between the roll and the dancing roller, then remove the roll. If no paper remains on the paper supply core, simply lift out the empty core.
4. Press and hold the PAPER ADV key until any remaining paper is ejected from the paper chute.
5. Grasp the new paper roll so that the loose end of the paper is toward you with the end pointing up.



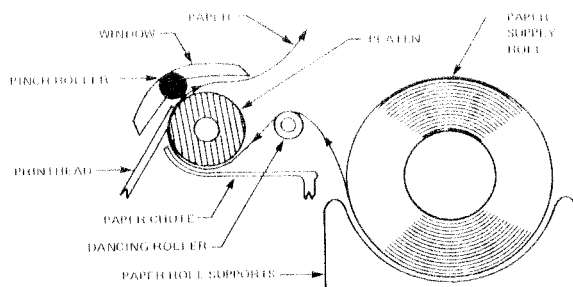
IMPORTANT NOTE

The warranty and/or service contract on the thermal printhead is subject to nullification if the thermal printing paper used in the Silent 700 Data Terminal does not meet TI Specification 972603-0001.

6. Place the paper roll on the paper roll supports, checking that the roll can rotate freely.

7. Grasp both corners of the loose end of the paper and gently pull up about 6 inches.

8. Feed the paper over the dancing roller and down through the paper chute until it appears behind the window. The paper will not slide behind the printhead because the printhead is pressed against the platen.



(SIDE VIEW)

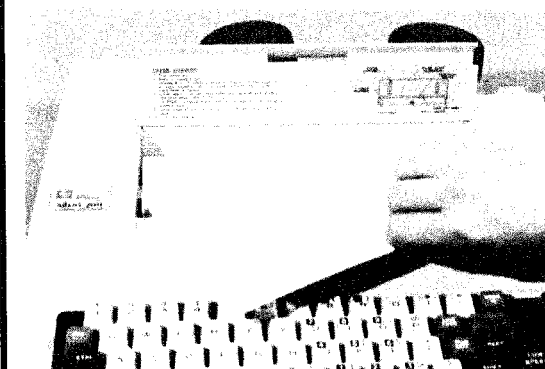
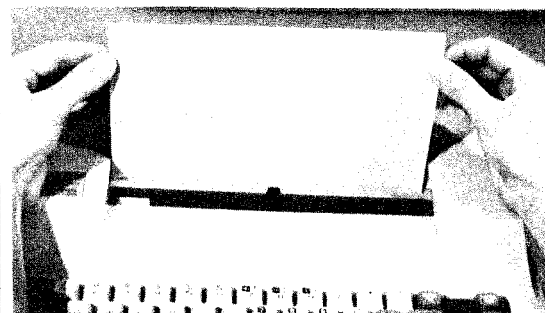
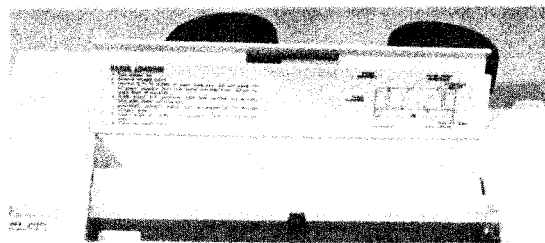
9. Press and hold the PAPER ADV key until the paper feeds behind the printhead, then under the window.

NOTE

If the paper does not feed freely, gently push the paper down the paper chute and simultaneously press and hold the PAPER ADV key.

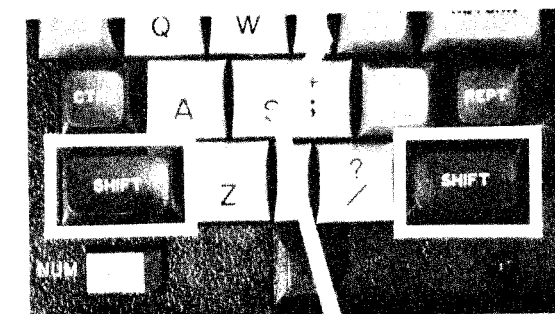
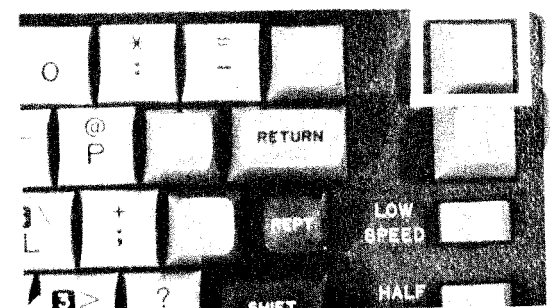
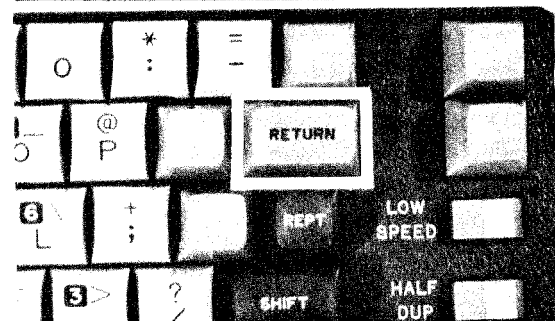
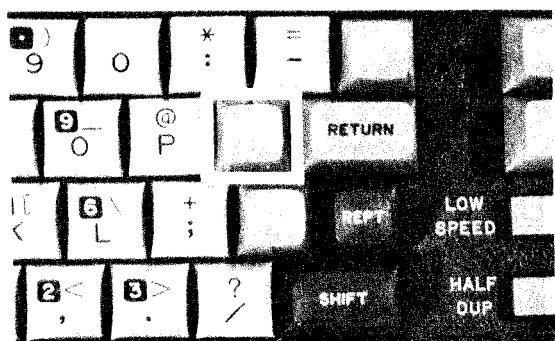
10. Tear off the excess paper by pulling it forward and down over the tear-off edge of the window.

11. Close the paper door and switch terminal power OFF, then ON.



TYPING ON THE KEYBOARD

Briefly study the keyboard and note the similarities and differences from the keyboard to which you may be accustomed. For example, you must depress both the LINE FEED and RETURN keys on the Model 745 keyboard to accomplish the same action as a RETURN key on a standard typewriter. The NUM switch, unavailable on standard typewriter keyboards, permits you to use the "shadow box" numeric keypad on the Model 745 for fast entry of numbers. Finally, the CTRL key, when pressed and held in conjunction with one of the other keys, generates *control characters* which may initiate actions locally and/or remotely.



1. Depress the LINE FEED key to advance the printhead vertically one line; the printhead will not return to the left hand margin.
2. Depress the RETURN key to return the printhead to the left margin.
3. Press and hold the PAPER ADV key to return the printhead to the left margin, then continuously line feed as long as the key is pressed. Since the PAPER ADV key does not generate a code, use it when you want to perform line feed and carriage return actions locally and not transmit their corresponding codes to the line.
4. Press and hold the SHIFT key while simultaneously depressing one of the keys marked with two or more characters, to print the upper character on the key (except the "shadow box" numbers).

5. Press the left side of the NUM switch to print/generate the "shadow box" numbers. Note that the "0" (zero) is on the space bar.

6. Press and hold the CTRL key while simultaneously depressing one of the alphabetic keys or the - , . / keys to generate the ASCII control characters (see page A-1).

NOTE

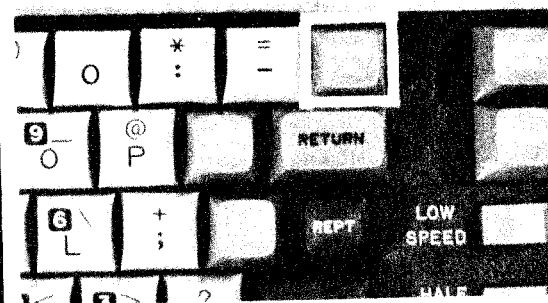
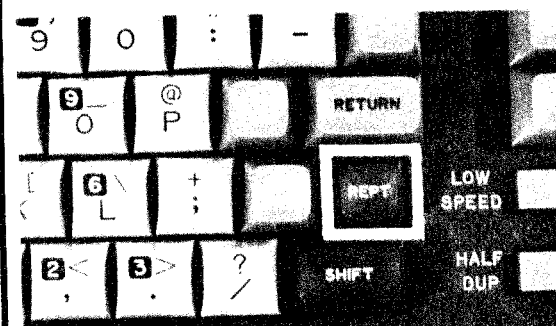
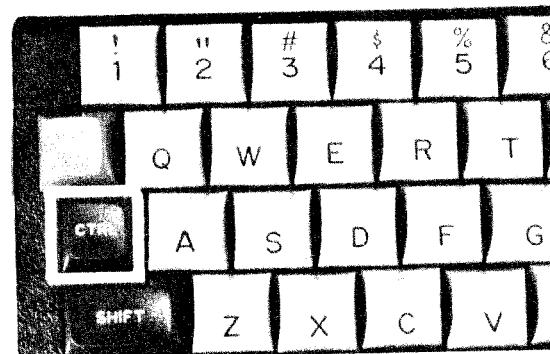
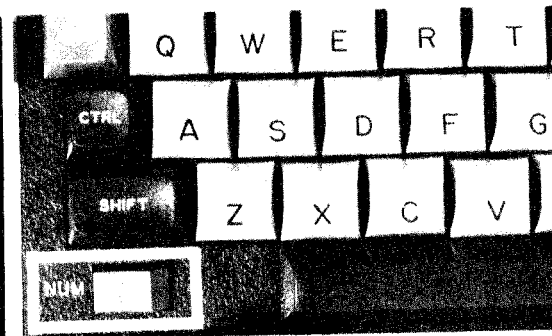
For practice, depress the G, H, J, and M keys in conjunction with the CTRL key to see what actions are performed. These four control characters are the only ones that initiate some action by the Model 745's printer when generated by the keyboard or received from the line. However, other control characters, when transmitted to an external or remote device, may initiate some action in that device.

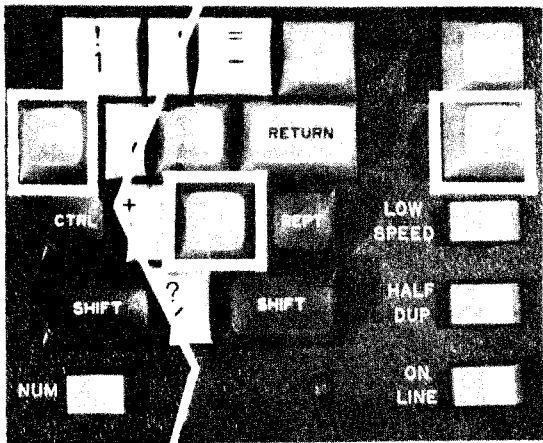
7. Press and hold the REPT key while momentarily depressing another key to repeat a character.

8. Depress the HERE IS key to transmit the contents of the answer-back memory (if this option is installed in your Model 745).

NOTE

To protect proprietary data and/or to prevent entry of erroneous data, many systems are designed to check each data terminal attempting to establish communications to determine if the terminal is authorized to communicate. One method of making such a check is to install an answer-back memory, which can contain up to 21 pre-defined ASCII characters into each authorized terminal. When a particular terminal attempts to establish communications, the remote equipment can check the contents of the answer-back memory to verify that the terminal is authorized to communicate with the system.





9. Depress the ESC, RUBOUT, and BREAK keys when your system requires their corresponding codes.

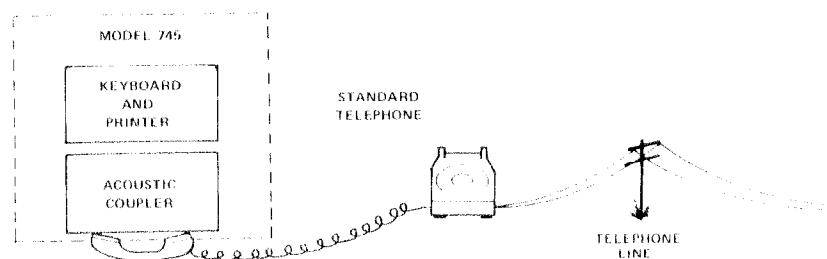
NOTE

In some systems the codes generated by these keys have special meaning. Check their significance to your system.

SECTION II

OPERATING THE MODEL 745 IN ITS STANDARD CONFIGURATION

This section describes operation of the Model 745 in its standard configuration. Using only the built-in acoustic coupler (and no external modem and/or external device) on the Model 745 gives you the most freedom. All that is required for its operation is a standard telephone and an electrical outlet.



TERMINAL SETUP

1. Set the Model 745 on a table close to a standard telephone and a 115 Vac power receptacle.
2. Remove the outer cover.
3. Remove the power cord from inside the outer cover and plug the female connector into the rear of the terminal and the male connector into an electrical outlet.
4. Switch the terminal power ON.
5. Set the printing speed to 10 or 30 characters-per-second according to your system's requirements.
6. Set the operating mode to half- or full-duplex according to your system's requirements.
7. Open the paper door and check that the terminal is properly loaded with a sufficient supply of TI *Silent 700*[®] printing paper.

OPERATION

8. Press the right side of the ON LINE switch to place the Model 745 in the *local* mode (off-line).



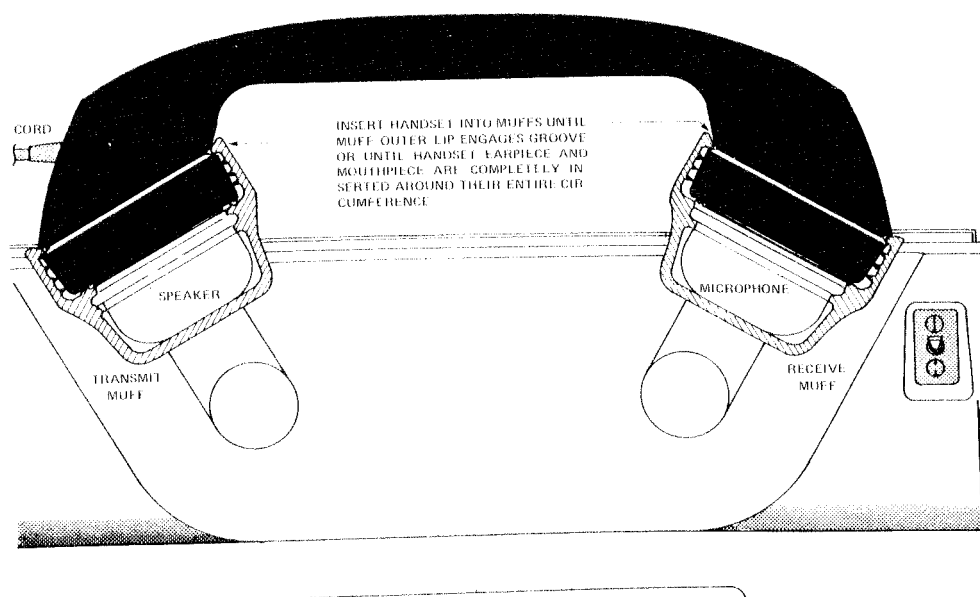
9. Pick up the telephone handset and dial the appropriate number; an audible high frequency signal (data tone) can be heard after the call is answered.



10. As soon as you hear the data tone, firmly insert the telephone handset into the acoustic coupler muffs so that the cord is to the left side of the data terminal. The Model 745 acoustic coupler will, in turn, transmit a data tone to the remote modem or acoustic coupler.

NOTE

It is very important to insert the handset into the muffs so that the outer lip of each muff mates with the grooves in the handset; or until the removable caps on the handset are completely surrounded by the inside circumference of the muffs.



11. Immediately press the ON LINE switch to connect the terminal to the remote device. When the connection is complete, the small green lamp (called the *carrier detect* indicator) located on the keyboard, will illuminate.

NOTE

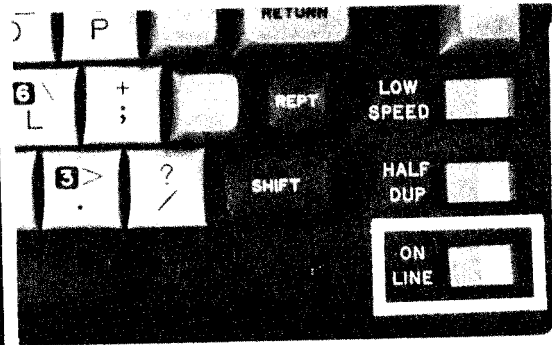
If the carrier detect lamp goes out, communication has been lost and you must return to step 8.

12. Begin communications according to your system's procedures.

NOTE

After prolonged operation the carbon particles in the telephone handset may settle, causing data errors. If this occurs, rap the handset several times in the palm of your hand.

13. If required, depress the HERE IS key to transmit the contents of the answer-back memory (if your Model 745 is equipped with this option).
14. When you are finished, terminate communications according to your system's procedures, set the terminal to the off-line mode, remove the telephone handset from the acoustic coupler muffs, and replace the handset in its cradle.



SECTION III

CLEANING AND ADJUSTING THE TERMINAL

CLEANING THE PRINTHEAD

The printhead should be cleaned each time a new roll of thermal paper is loaded into the terminal. Clean more often if the printed image begins to fade because of residue accumulating on the printhead.

1. Remove all thermal paper from the paper chute (refer to page 8).
2. Using denatured alcohol, wet a 2-inch wide strip across a sheet of good quality bond paper. Insert the sheet down the paper chute in the same manner as described for the thermal paper on page 9.

NOTE

Denatured alcohol is available from TI in pint containers (TI Part No. 230007-0000).

3. Print five lines on the bond paper across the 2-inch strip wetted with alcohol. Use the REPT key to accelerate the process. Then advance the paper to a dry area and print two more lines.

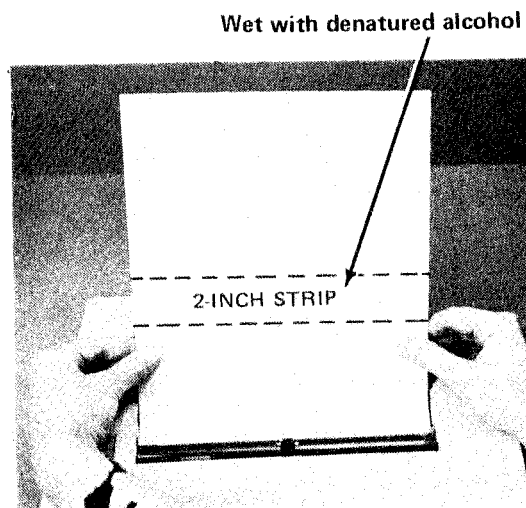
NOTE

The printhead will not print a visible image on the bond paper.

4. Press and hold the PAPER ADV key until the bond paper is ejected from the paper chute.

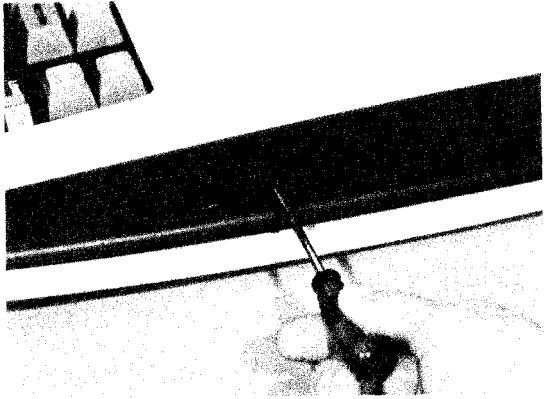
CLEANING THE CASE

Use a soft, damp cloth or sponge and any nonabrasive household-type detergent to clean the exterior surfaces of the Model 745 case. Take care not to spill liquids on any electrical components: short-circuits could result.



ADJUSTING THE PRINT CONTRAST

You will probably never have to adjust the printing contrast since it is preset at the factory for optimum clarity. But if the contrast has been changed and you want a darker or lighter image, here's how to adjust.



1. For *darker* print insert a small standard screwdriver into the hole marked CONTRAST located on the right side of the terminal; then rotate the screwdriver clockwise (toward *D*), while printing characters from the keyboard, until the printed image is dark enough.

NOTE

If the print blurs, you've rotated the screwdriver too far. If so, adjust it to a lighter print.

2. For *lighter* print rotate the screwdriver counterclockwise (toward *L*), while printing characters from the keyboard, until the printed image is light enough.

SECTION IV

OPERATING THE TERMINAL USING THE OPTIONAL AUXILIARY EIA INTERFACE CABLE KIT

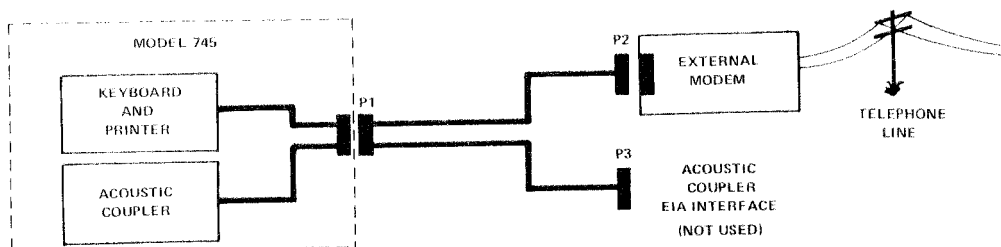
This section describes operation of the Model 745 in the variety of configurations made possible using the optional Auxiliary EIA Interface Cable Kit (TI Part No. 983856).

Basically, there are three parts of the Model 745: keyboard, printer and acoustic coupler. In the terminal's standard configuration (Section III) the keyboard and printer are connected to the acoustic coupler. Since no external equipment is needed, the standard configuration permits the most freedom of operation.

When the optional Auxiliary EIA Interface Cable Kit is ordered with the Model 745, the keyboard and printer are disconnected from the acoustic coupler. This permits the keyboard and printer to be connected to an external modem or other external device; and the acoustic coupler can be connected to an external device. When plugged into the Communication Line Interface Connector at the rear of the terminal, the Auxiliary EIA Interface Cable (included in the Kit) provides the necessary connections to most external equipment. When the Model 745 is to be used in its standard configuration, the Jumper Connector (also included in the Kit) must be plugged into the Communication Line Interface to reconnect the Model 745 keyboard and printer to the built-in acoustic coupler.

OPERATING THE TERMINAL WITH AN EXTERNAL MODEM

Occasionally you may want to use an external modem rather than the built-in acoustic coupler for communication with the remote equipment on the other end of the telephone line. If so, determine if the modem will *originate* or *answer* the data call. If the external modem will answer the call, perform only steps 1 through 7; communication will be established automatically. If the terminal will originate the call, find out if you will be operating with or without a Data Access Arrangement (DAA), then perform the appropriate steps below.



Terminal Setup

1. If the terminal is not connected to the external modem, ensure that it is installed as described in Section V, page 28.
2. Switch the terminal power ON.
3. Open the paper door and check that the terminal is properly loaded with a sufficient supply of TI Silent 700 printing paper.
4. Set the printing speed (LOW SPEED switch) to 10 or 30 characters-per-second according to your system's requirements.
5. Set the operating mode to half- or full-duplex (HALF DUPLEX switch) according to your system's requirements.
6. Set the terminal to the *on-line* mode (ON LINE switch).
7. Set all the controls on the external modem according to your system's requirements.

Operation With a DAA

The DAA installed by the telephone company may operate in one of two ways, depending on how the white DATA key on the telephone cradle is wired. If you hear a dial tone when you pick up the handset from the cradle, proceed as follows . . .

8. Pick up the telephone handset and dial the appropriate number; an answer tone can be heard when the call is answered.
9. Lift up the white DATA key on the telephone cradle when the answer tone begins.
10. Place the handset on the table and proceed to step 14 below.

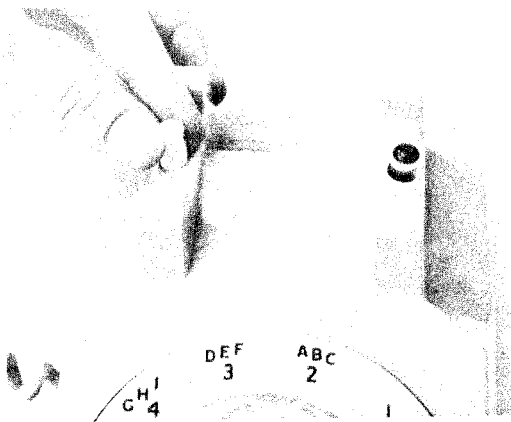
CAUTION

Do not hang up the handset or you will terminate the connection.

-OR-

. . . if you *do not* hear a dial tone when you pick up the handset, proceed as follows . . .

11. Lift up the white DATA key on the telephone cradle and wait for a dial tone.

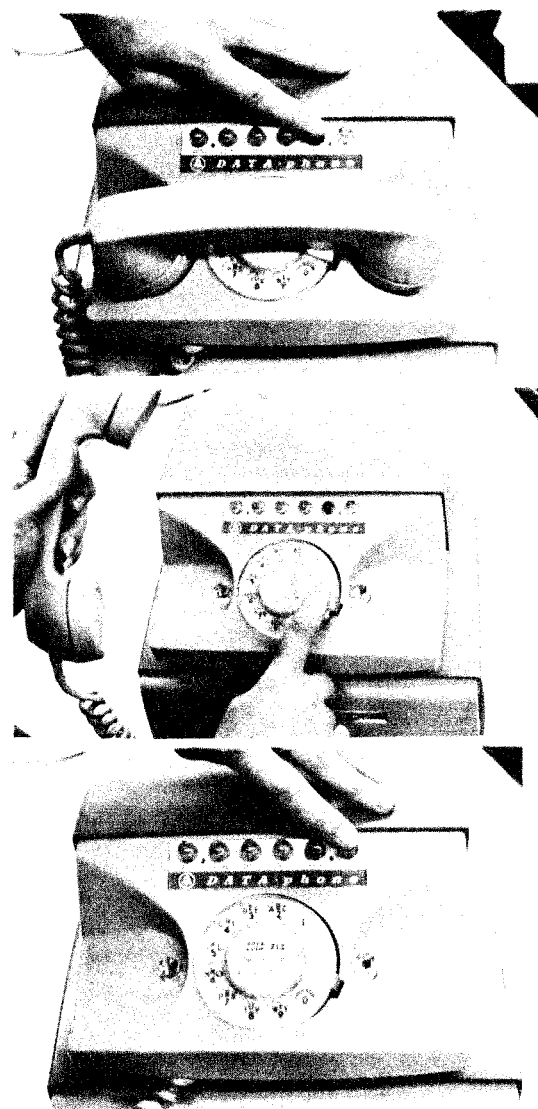


12. Dial the appropriate number; an answer tone will be heard when the call is answered.
13. Replace the handset on the telephone cradle.
14. When the connection is complete (the *carrier detect* lamp will illuminate), begin communications according to your system's procedures.
15. If your system requires, press the keyboard HERE IS key to transmit the contents of the answer-back memory.

—OR—

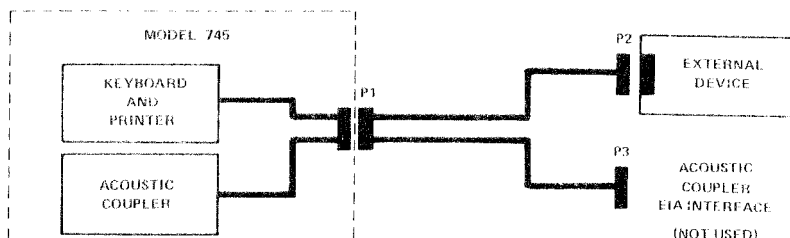
Operation Without a DAA

16. Press the TALK button on the data set.
17. Pick up the telephone handset and dial the appropriate number; a data tone can be heard after the call is answered.
18. Press the DATA button on the data set (modem) when the data tone begins.
19. Hang up the handset.
20. Begin communications according to your system's procedures.
21. If your system requires, press the keyboard HERE IS key to transmit the contents of the answer-back memory.
22. When you are finished, terminate communications according to your system's procedures, pick up the handset, press the TALK button, then hang up the handset.



OPERATING THE TERMINAL WITH AN EXTERNAL DEVICE – CONFIGURATION I

In some applications you may want to use the Model 745 keyboard and printer, but not the acoustic coupler because there is no need to transmit or receive data over the telephone line. A typical example is the use of the Model 745 as a means of input and output to a minicomputer.



Terminal Setup

1. If the terminal is not connected to the external device, ensure that it is installed as described on page 28.
2. Switch the terminal power ON.
3. Open the paper door and check that the terminal is properly loaded with a sufficient supply of TI Silent 700 printing paper.
4. Set the printing speed (LOW SPEED switch) to 10 or 30 characters-per-second according to your system's requirements.
5. Set the operating mode to half- or full-duplex (HALF DUPlex switch) according to your system's requirements.
6. Set the terminal to *on-line*.
7. Set all necessary controls on the external device.

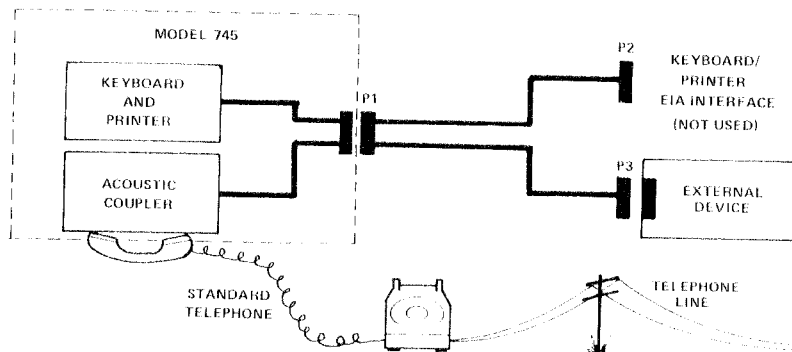
Operation

8. Begin communications according to your system's procedures.

OPERATING THE TERMINAL WITH AN EXTERNAL DEVICE – CONFIGURATION II

In some applications you may have an external device which has its own keyboard and printer (or other means of output; e.g., a video screen), but no way to communicate over the telephone lines. In such a

case, you may want to "borrow" the Model 745's acoustic coupler on a temporary basis. For example, a video terminal normally may be hard wired to a computer, but occasionally needs to be put *on line* to a remote device over the telephone line



Terminal Setup

1. If the terminal is not connected to the external device, ensure that it is installed as described on page 29.
2. Switch the terminal power ON.
3. Set all necessary controls on the external device.

Operation

4. Press the right side of the ON LINE switch to place the Model 745 in the *local* mode (off line).
5. Pick up the telephone handset and dial the appropriate number; an audible high frequency signal (data tone) can be heard after the call is answered.
6. As soon as you hear the data tone, place the telephone handset into the Model 745 acoustic coupler muffs so that the cord is to the left side of the data terminal. The acoustic coupler will, in turn, transmit a data tone to the remote modem or acoustic coupler. (See the NOTE on page 14 to assure satisfactory insertion of the handset into the muffs).
7. Begin communications according to your system's procedures.

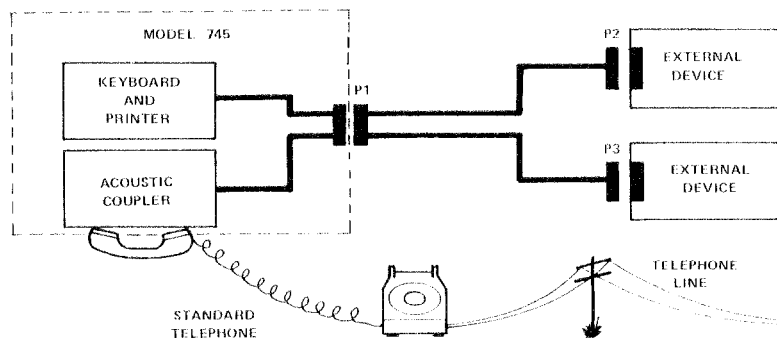
NOTE

After prolonged operation the carbon particles in the telephone handset may settle, causing data errors. If this occurs, rap the handset several times in the palm of your hand.

8. When you are finished, terminate communications according to your system's procedures, then remove the telephone handset from the acoustic coupler muffs and replace the handset in its cradle.

OPERATING THE TERMINAL WITH AN EXTERNAL DEVICE – CONFIGURATION III

At times you may want to use the Model 745 with an external device, such as a tape cassette recorder, data logger, CRT, plotter, or minicomputer, using all three functions of the terminal. For example, with a cassette recorder connected to the Model 745, you can type data on the keyboard, store it on cassette tape, then transmit the data via the acoustic coupler to a remote computer either simultaneously or at a later time. Or, data can be received from a remote computer via the acoustic coupler, stored on cassette tape, then printed either simultaneously or at a later time. Typically, if an external device has storage capability, when data is received from the input device (keyboard), it will be transmitted at a later time; and when the data is received from the line, it will be printed at a later time. When an external device does not have storage capability, all operations must occur simultaneously.



Terminal Setup

1. If the terminal is not connected to the external device, ensure that it is installed as described on page 29.
2. Switch the terminal power ON.
3. Open the paper door and check that the terminal is properly loaded with a sufficient supply of TI Silent 700 printing paper.
4. Set the printing speed (LOW SPEED switch) to 10 or 30 characters-per-second according to your system's requirements.
5. Set the operating mode to half- or full-duplex (HALF DUPLEX switch) according to your system's requirements.
6. Set all necessary controls on the external device.

Operation

Operation of the Model 745 differs slightly, depending on whether you want data transmitted to the line via the acoustic coupler at the same time or at a later time than you type it on the keyboard; and whether you want data printed via the printer at the same time or at a later time than it is received from the line via the acoustic coupler.

To Transmit Data to the Line at the Same Time You Type it on the Keyboard:

7. Set up the external device to receive data from the Model 745 keyboard and transmit data to the line via the Model 745 acoustic coupler.
8. Set the terminal to *on-line*.
9. Complete communications as described in steps 23 through 28 below.
10. Type the data on the terminal's keyboard; the data will be transmitted to the external device, then to the line.

To Print Data on the Printer at the Same Time it is Received From the Line:

11. Set up the external device to receive data from the line via the Model 745 acoustic coupler and to transmit data to the Model 745 printer.
12. Set the terminal to *on-line*.
13. Complete communications as described in steps 23 through 28 below; the data will be received by the external device and then printed by the Model 745.

To Transmit Data to the Line at a Later Time Than You Type it on the Keyboard:

14. Set up the external device to receive data from the terminal's keyboard.
15. Set the terminal to *on-line*.
16. Type the data on the terminal's keyboard; the data will be transmitted to the external device and stored.
17. When you are ready to transmit the data to the remote equipment, set up the external device to transmit data to the line via the terminal's acoustic coupler.

18. Complete communications as described in steps 23 through 28 below; the data will be transmitted to the line when transmission is initiated by the external device.

To Print Data on the Printer at a Later Time than it is Received from the Line:

19. Set up the external device to receive data from the line via the terminal's acoustic coupler.
20. Complete communications as described in steps 23 through 28 below; the data will be stored by the external device when received from the line.
21. When you are ready to print the data, set up the external device to transmit to the terminal's printer.
22. Set the terminal to *on-line*; the data will be printed by the Model 745 when transmission is initiated.

To Complete Communications

23. Set the external device to *local*.
24. Pick up the telephone handset and dial the appropriate number; an audible high frequency signal (data tone) can be heard after the call is answered.
25. As soon as you hear the data tone, place the telephone handset into the Model 745 acoustic coupler muffs so that the cord is to the left side of the data terminal. The acoustic coupler will in turn transmit a data tone to the remote modem or acoustic coupler.
26. Immediately set the external device to ON LINE to connect it to the remote device.
27. Begin communication according to your system's procedures.

NOTE

After prolonged operation the carbon particles in the telephone handset may settle, causing data errors. If this occurs, rap the handset several times in the palm of your hand.

28. When you are finished, terminate communications according to your system's procedures, set the external device to local, then remove the telephone handset from the acoustic coupler muffs and replace the handset in its cradle.

SECTION V

INSTALLATION

When the Model 745 is ordered in its standard configuration, its acoustic coupler is connected to its keyboard and printer, and the terminal can only operate as described on pages 13 and 14.

If the optional Auxiliary EIA Interface Cable Kit is ordered with the Model 745, the terminal is factory set for applications in which the acoustic coupler is to be used separately from the keyboard and printer. However, the terminal is still capable of operation in its standard configuration. The Auxiliary Cable Kit includes:

- Auxiliary EIA Interface Cable (TI Part No. 983847)
- Jumper Connector (TI Part No. 983846)

When the Auxiliary EIA Interface Cable is installed, the Model 745 is capable of operating in the configurations described on pages 19 through 26. When the Jumper Connector is installed, the Model 745 operates in its standard configuration.

The Auxiliary EIA Cable has EIA Specification RS-232-C connectors; pin assignments are listed in Table 5-1.

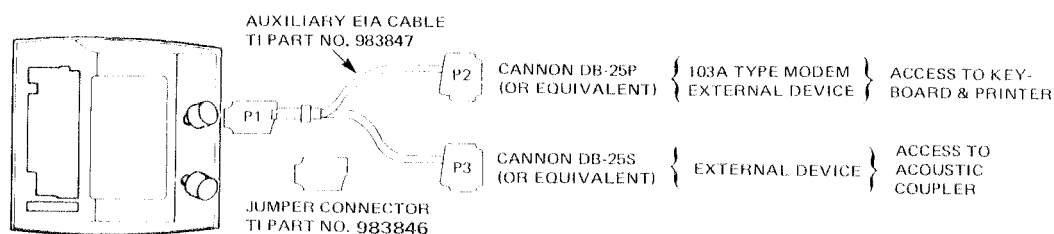
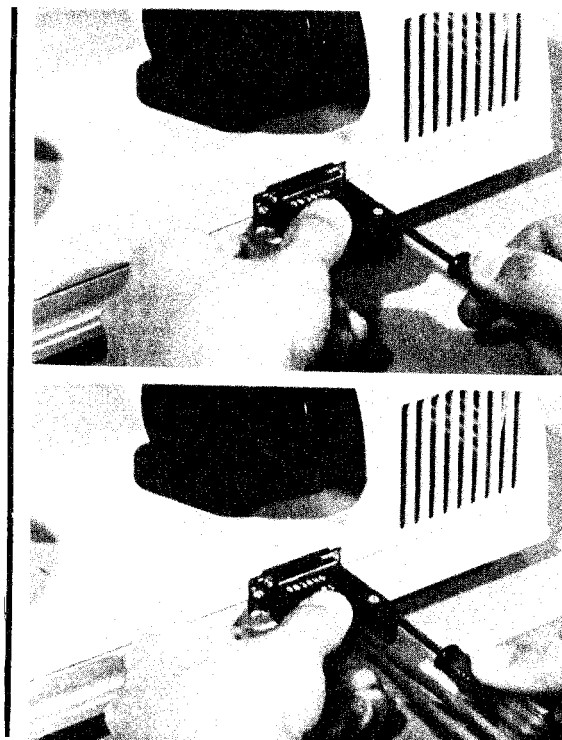
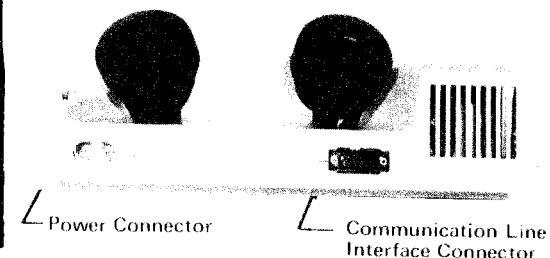


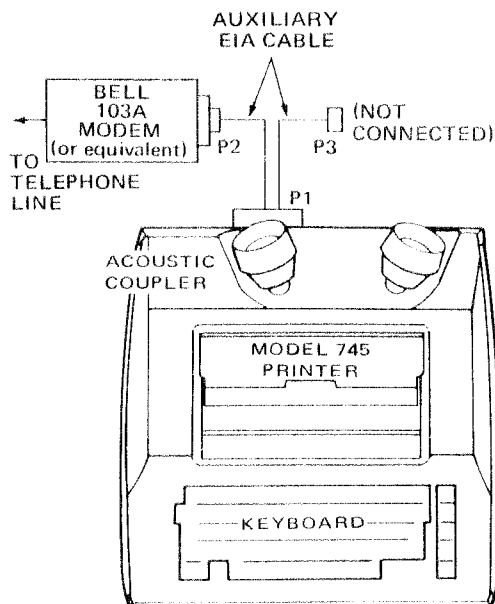
Table 5-1. Auxiliary EIA Interface Cable Pin Assignments.

| Terminal Connector (P1) | Cable Termination (P2 and P3) | Function |
|-------------------------|-------------------------------|------------------------------------|
| P1-9 | P2-1 | Protective Ground |
| P1-13 | P2-2 | Transmit Data ¹ |
| P1-12 | P2-3 | Receive Data ¹ |
| P1-10 | P2-4 | +12 Volts to RTS ^{1,4} |
| P1-1 | P2-7 | Signal Ground ¹ |
| P1-11 | P2-8 | Data Carrier Detect ^{1,5} |
| P1-15 | P2-20 | Data Terminal Ready ^{1,4} |
| P1-8 | P3-3 | Receive Data ² |
| P1-3 | P3-2 | Transmit Data ² |
| P1-1 | P3-7 | Signal Ground ² |
| P1-2 | P3-8 | Carrier Detect ² |
| P1-9 | P3-1 | Protective Ground |
| P1-6 | P3-5 | Clear to Send ^{3,4} |
| P1-7 | P3-6 | Data Set Ready ^{2,4} |

NOTES

1. Relative to the keyboard and printer (P2).
2. Relative to the acoustic coupler internal to the terminal and on another connector (P3).
3. DTR is on ($> +3V$) when terminal is on-line.
4. EIA on ($> +3V$) when power is ON.
5. Held to EIA ON by external equipment: required for data reception.

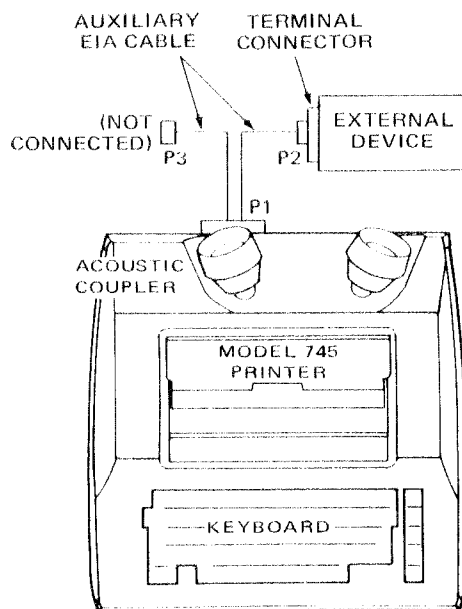




INSTALLING THE TERMINAL WITH AN EXTERNAL MODEM

Coupling to the line is accomplished through the external modem using the Auxiliary EIA Interface Cable. The Model 745 acoustic coupler is not used.

1. Set the Model 745 on a table close to the external modem and remove the outer cover.
2. If the terminal has been operated in its standard configuration, it may be necessary to unplug the Jumper Connector from the Communication Line Interface Connector at the rear of the Model 745.
3. Plug EIA cable connector P1 into the Communication Line Interface Connector.
4. Plug EIA cable connector P2 into the external modem.
5. Check that the modem is connected to the telephone line (or DAA).
6. Plug the female connector to the ac power cord into the Power Connector at the rear of the terminal; plug the three prong male connector into an ac wall outlet.



INSTALLING THE TERMINAL WITH AN EXTERNAL DEVICE — CONFIGURATION I

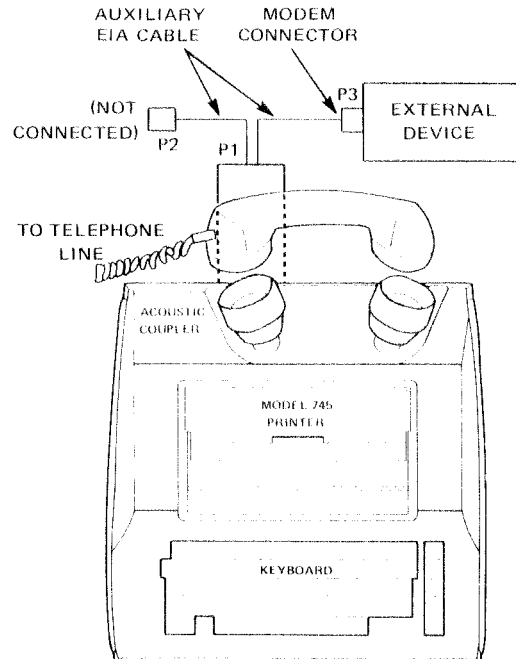
No coupling to the telephone line is required; therefore the acoustic coupler is not used. The Auxiliary EIA Interface Cable connects the Model 745 keyboard and printer to the external device.

1. Set the terminal on a table close to the external device and remove the outer cover.
2. If the terminal has been operated in its standard configuration, it may be necessary to unplug the Jumper Connector from the Communication Line Interface Connector at the rear of the Model 745.
3. Plug EIA cable connector P1 into the Communication Line Interface Connector.
4. Plug EIA cable connector P2 into the external device terminal connector.
5. Plug the female connector of the ac power cord into the Power Connector at the rear of the Model 745; plug the three-prong male connector into an ac wall outlet.

INSTALLING THE TERMINAL WITH AN EXTERNAL DEVICE – CONFIGURATION II

Coupling to the telephone line is accomplished through the Model 745 built-in acoustic coupler. The Auxiliary EIA Interface Cable connects the acoustic coupler to the external device.

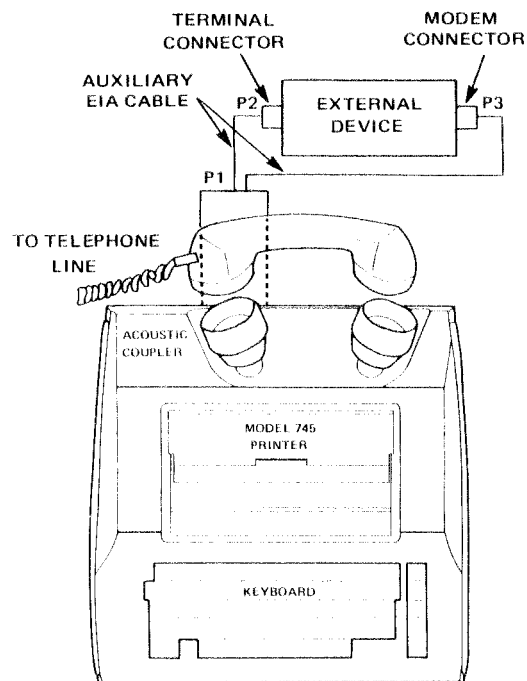
1. Set the Model 745 on a table close to the external device and a telephone; remove the outer cover.
2. If the terminal has been operated in its standard configuration, it may be necessary to unplug the Jumper Connector from the Communication Line Interface Connector at the rear of the Model 745.
3. Plug EIA cable connector P1 into the Communication Line Interface Connector.
4. Plug EIA cable connector P3 into the external device modem connector.
5. Plug the female connector of the ac power cord into the Power Connector at the rear of the Model 745; plug the three-prong male connector into an ac wall outlet.



INSTALLING THE TERMINAL WITH AN EXTERNAL DEVICE – CONFIGURATION III

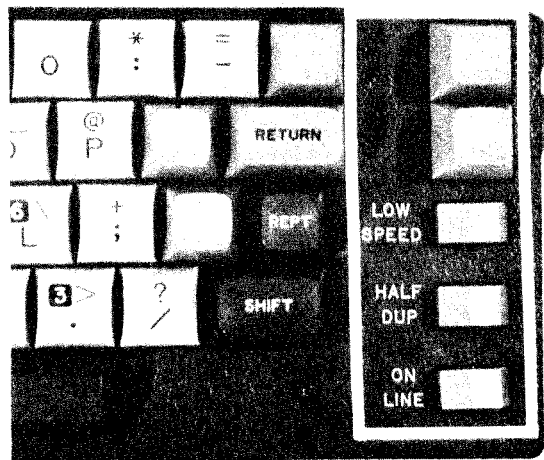
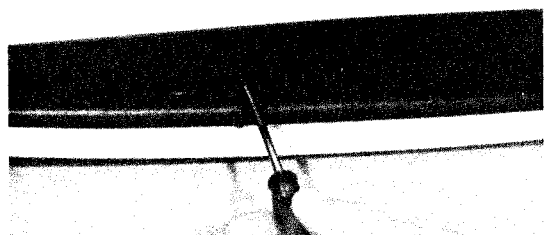
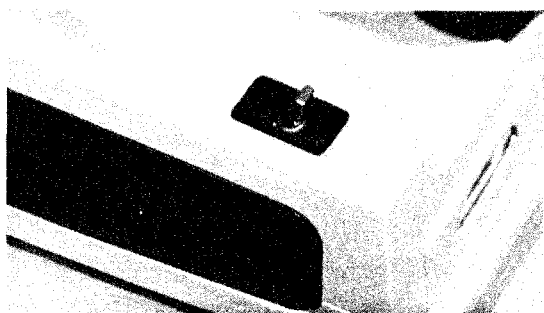
Coupling to the telephone line is accomplished through the Model 745 built-in acoustic coupler. The Auxiliary EIA Interface Cable connects the Model 745 keyboard, printer, and acoustic coupler to the external device.

1. Set the terminal on a table close to the external device and remove the outer cover.
2. If the terminal has been operated in its standard configuration, it may be necessary to unplug the Jumper Connector from the Communication Line Interface Connector at the rear of the Model 745.
3. Plug EIA cable connector P1 into the Communication Line Interface Connector.
4. Plug EIA cable connector P2 into the external device terminal connector.
5. Plug EIA cable connector P3 into the external device modem connector.
6. Plug the female connector of the ac power cord into the Power Connector at the rear of the Model 745; plug the three-prong male connector into an ac wall outlet.



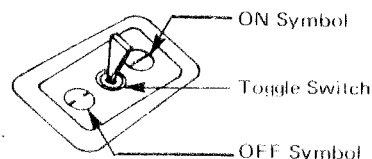
SECTION VI

LEARNING MORE ABOUT THE CONTROLS & KEYBOARD



CONTROLS

- a. Power switch. Located at the top right rear corner of the Model 745, this toggle switch either disconnects the ac power line from all circuits in the data terminal (forward position) or connects the ac power line to the terminal (rear position).



- b. TRANSMIT LEVEL control. The transmit level is factory-calibrated for optimum performance with most U. S. telephone systems. However, because of the conditions of some handsets and since line losses occur in some areas, it may be necessary to increase or decrease the transmit level to compensate for unusual conditions. Adjust the transmit level for optimum performance by inserting a small screwdriver into the hole marked TRANSMIT LEVEL; rotate clockwise to improve log-on or counterclockwise to reduce data errors.

- c. CONTRAST control. Located on the right side of the terminal, this potentiometer darkens or lightens the printed characters. To increase (darken) print contrast rotate the control clockwise (toward the "D") with a screwdriver; to decrease (lighten), rotate counterclockwise (toward the "L").

The following controls (keys) are located in a row on the right side of the keyboard:

- d. PAPER ADV key. Pressing and holding this key returns the printhead to the left margin, and continuously feeds paper until the key is released. No code is generated.
- e. BREAK key. Depressing this key transmits a continuous *space* over the communication line as long as the key is depressed (if the terminal is set to *on-line*). Generally, the BREAK key is used in full-duplex communications networks to interrupt transmission from the remote equipment.
- f. LOW SPEED switch. Pressing this rocker switch to the left sets the data transmission and reception speeds to 10 characters-per-second; pressing to the right sets the transmission and reception speeds to 30 characters-per-second.

- g. HALF DUP rocker switch. Pressing this switch to the left sets the operating mode to half-duplex; pressing to the right sets the operating mode to full-duplex.

NOTE

Set to *full-duplex* to prohibit local printout of transmitted data; set to *half-duplex* to enable local printout of transmitted data.

- h. ON LINE rocker switch. Pressing this switch to the left connects the terminal to the communication line (*on-line* mode); pressing to the right disconnects the terminal from the communication line (*local* mode).

STANDARD KEYBOARD

The Model 745 standard keyboard is shown in Figure 6-1. The Model 745 generates the ASCII code and character set described in Appendix A.

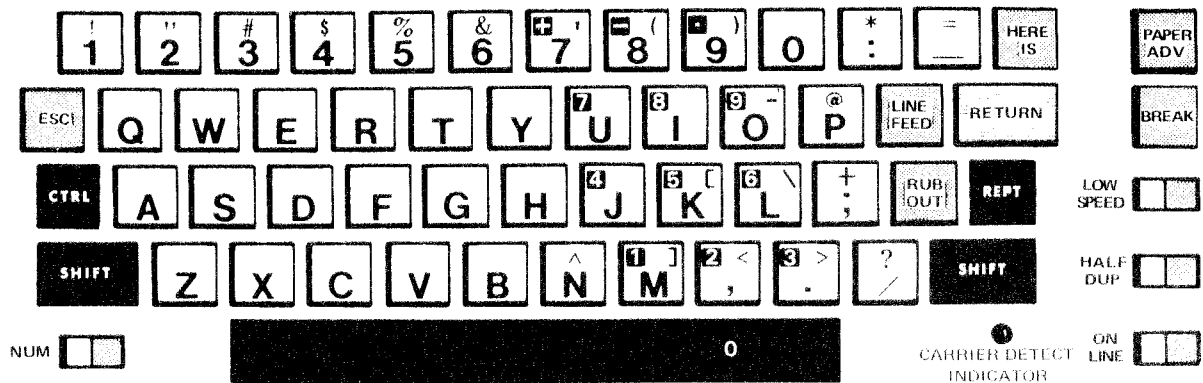
Special Purpose Controls

- a. HERE IS key. Depressing this key transmits the contents of the optional Answer-Back Memory (if installed) to the communications line.
- b. LINE FEED key. Depressing this key advances the paper one line. The printhead does not move.
- c. RETURN key. Depressing this key returns the printhead to the left margin. The paper is not advanced.

NOTE

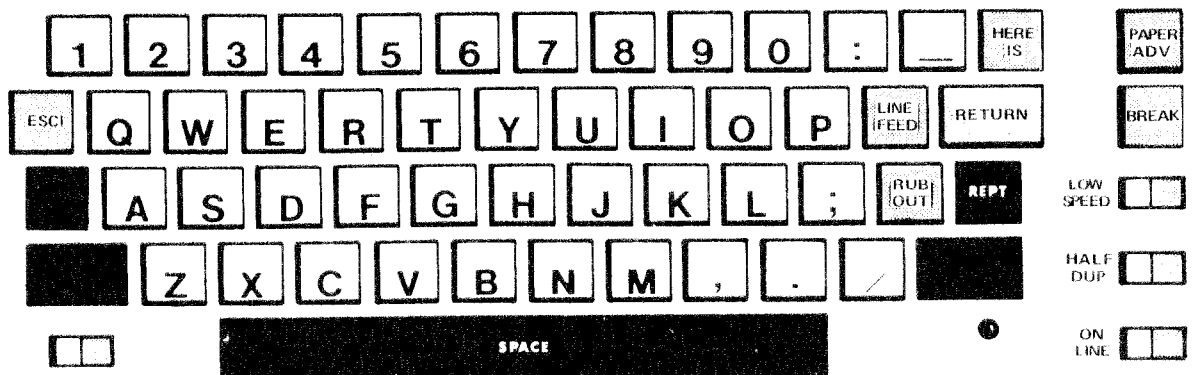
Both LINE FEED and RETURN must be depressed to obtain the equivalent to a standard typewriter carriage return.

- d. REPT key. Pressing and holding this key while momentarily depressing another character key repeats that character until either the REPT key is released or another character key is depressed.
- e. SHIFT key. Releasing this key permits generation of the characters shown in Figure 6-2; pressing and holding this key permits generation of the characters shown in Figure 6-3.
- f. CTRL key. Pressing and holding this key permits generation of the characters shown in Figure 6-4.
- g. NUM rocker switch. Pressing this switch to the left permits generation of the characters shown in Figure 6-5.



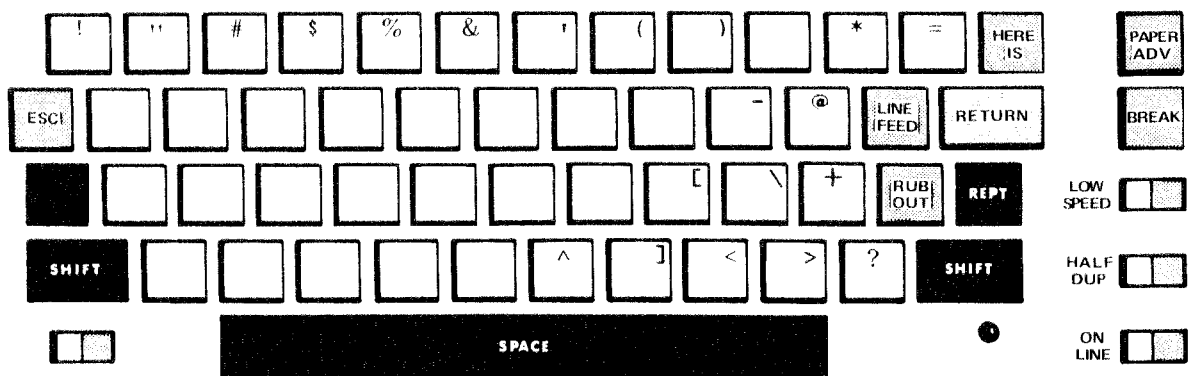
A0001196

Figure 6-1. Model 745 Standard Keyboard Layout and Symbolization.



A0001197

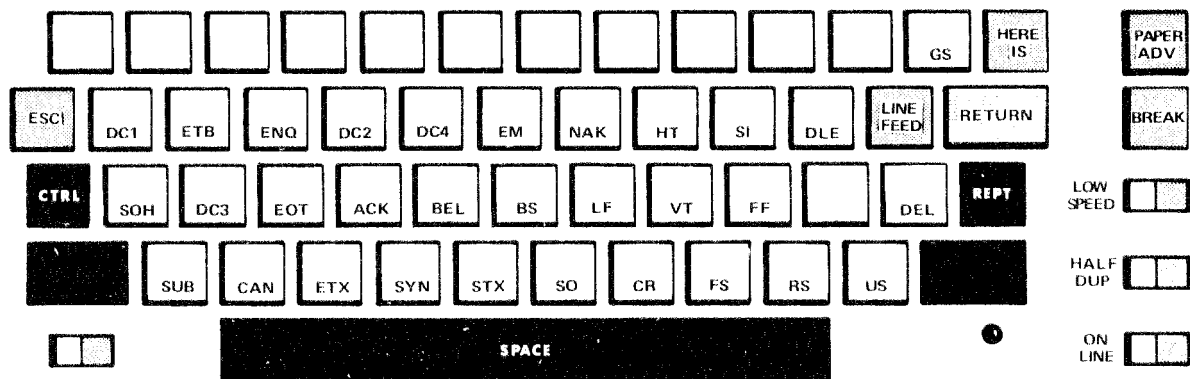
Figure 6-2. Codes Generated with no Mode Keys Activated (Standard Keyboard).



A0001198

NOTES: ☐ A blank key indicates that a NUL code is transmitted.

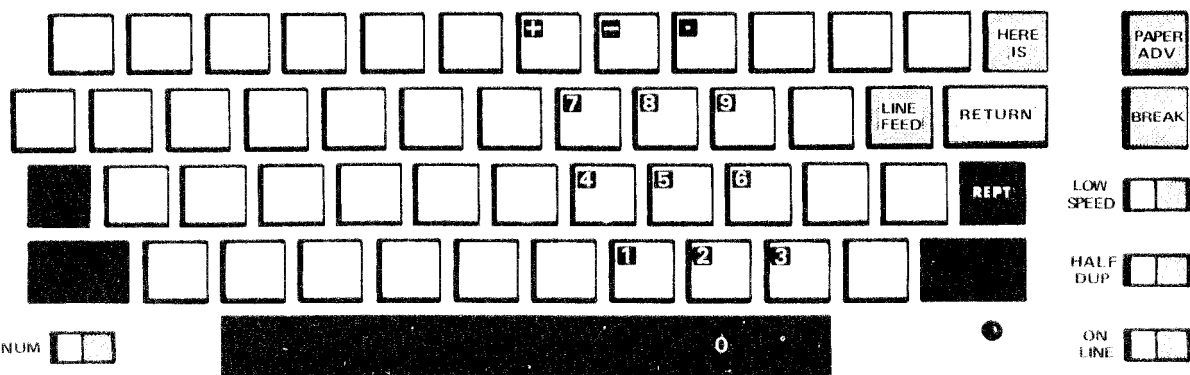
Figure 6-3. Codes Generated with the SHIFT Key Pressed and Held (Standard Keyboard).



A0001199

NOTES: ☐ A blank key indicates that a NUL code is transmitted.
The CTRL (Control) key overrides the SHIFT key.

Figure 6-4. Codes Generated with the CTRL Key Pressed and Held (Standard Keyboard).



A0001200

NOTES: ☐ A blank key indicates that a NUL code is transmitted.
The NUM (Numbers) switch overrides the SHIFT and CTRL keys.

Figure 6-5. Codes Generated with the NUM Switch Set (Standard Keyboard).

Indicators

- Carrier detect indicator. When illuminated, this green lamp indicates the presence of the receive-data carrier frequency.
- Bell indicator. An audible sound is emitted when the BEL code is received from the keyboard or communication line.

FULL ASCII KEYBOARD

The optional full-ASCII keyboard is shown in Figure 6-6. This keyboard features the capability to transmit/receive and print both uppercase and lowercase alphabet characters, using the SHIFT key as on a standard typewriter. A special UPPER CASE rocker switch is provided on the full-ASCII keyboard to permit generating/printing uppercase-only characters. All *special purpose controls* and *indicators* on the full-ASCII keyboard function the same as on the standard keyboard (see pages 31,32, & 33 for a description). Figures 6-7 through 6-9 show the characters and codes generated by the full-ASCII keyboard in the unshifted, shifted, and control modes, respectively.

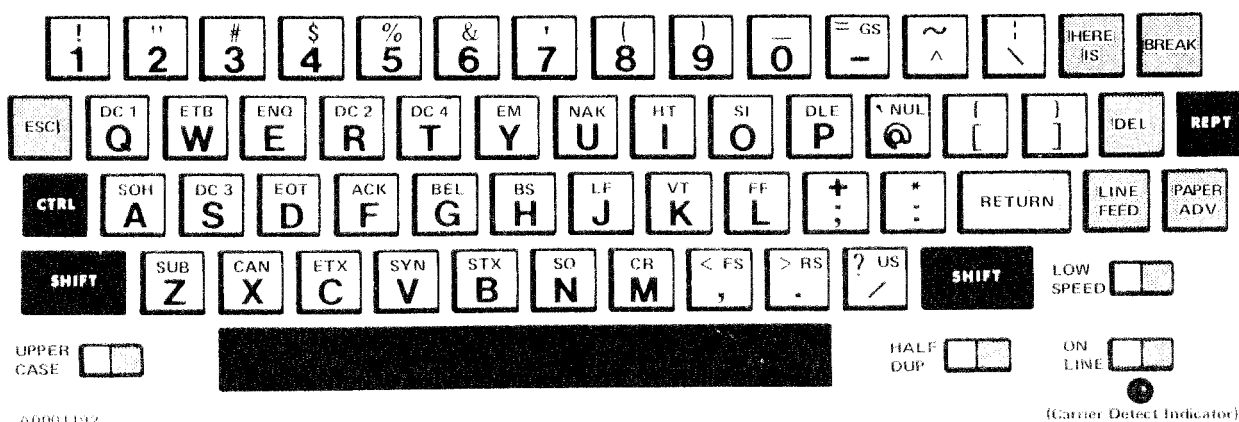
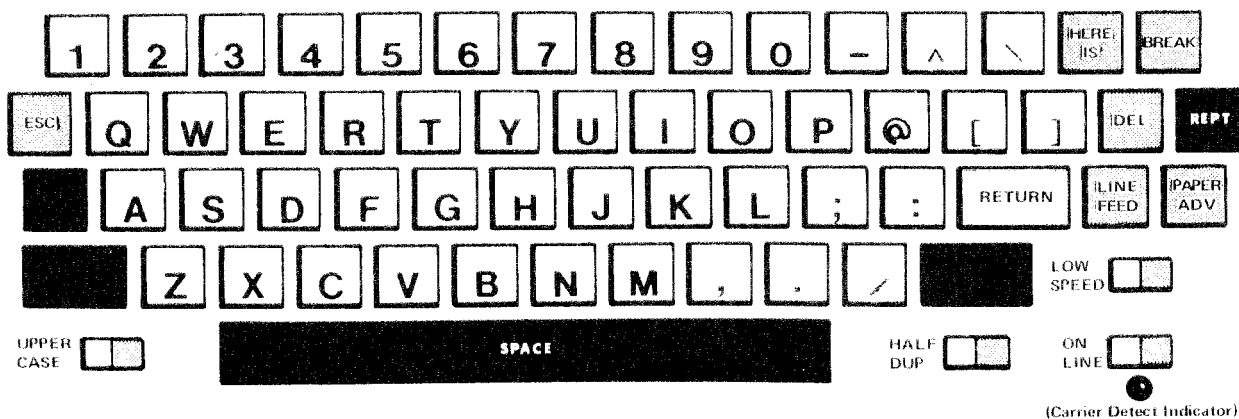


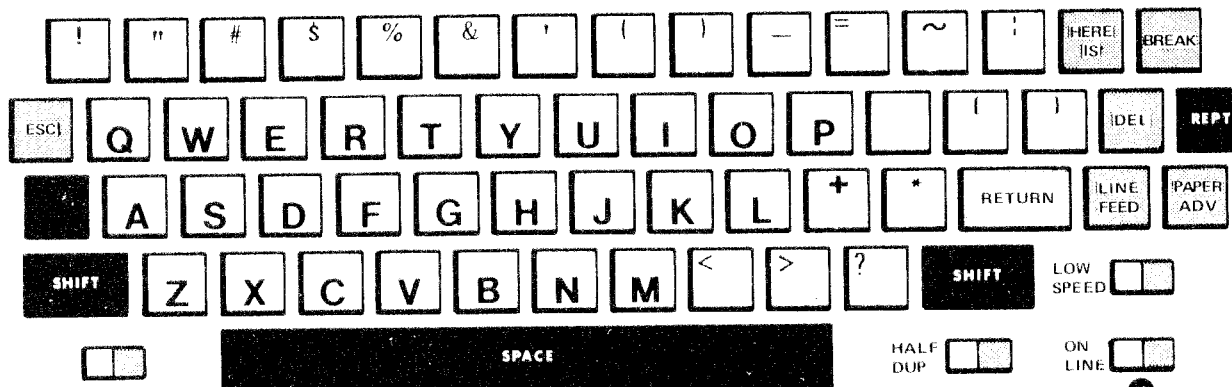
Figure 6-6. Model 745 Optional Full-ASCII Keyboard Layout and Symbolization.



A0001193

NOTE: If UPPER CASE is not selected, A to Z are printed in lowercase.
If UPPER CASE is selected, A to Z are printed in uppercase.

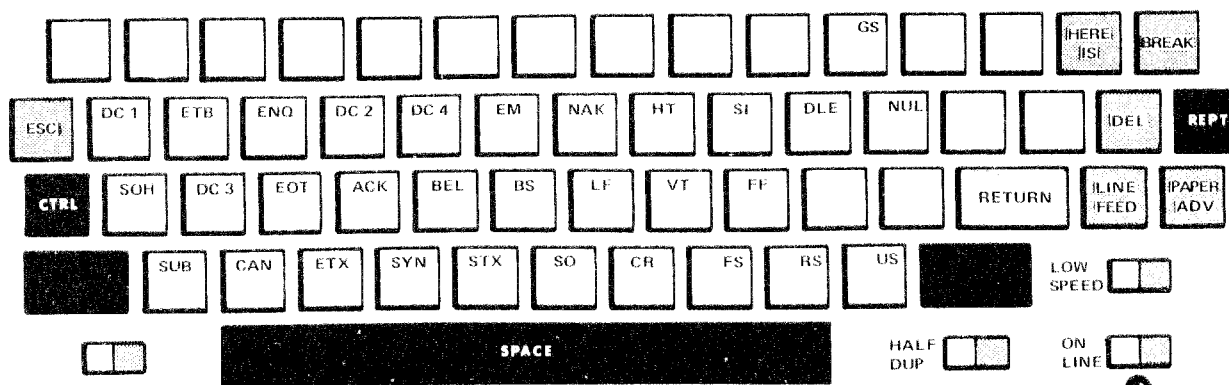
Figure 6-7. Codes Generated with no Mode Keys Activated (Full-ASCII Keyboard).



A0001194

NOTE: The SHIFT key overrides the UPPER CASE switch

Figure 6-8. Codes Generated with the SHIFT Key Pressed and Held (Full-ASCII Keyboard)

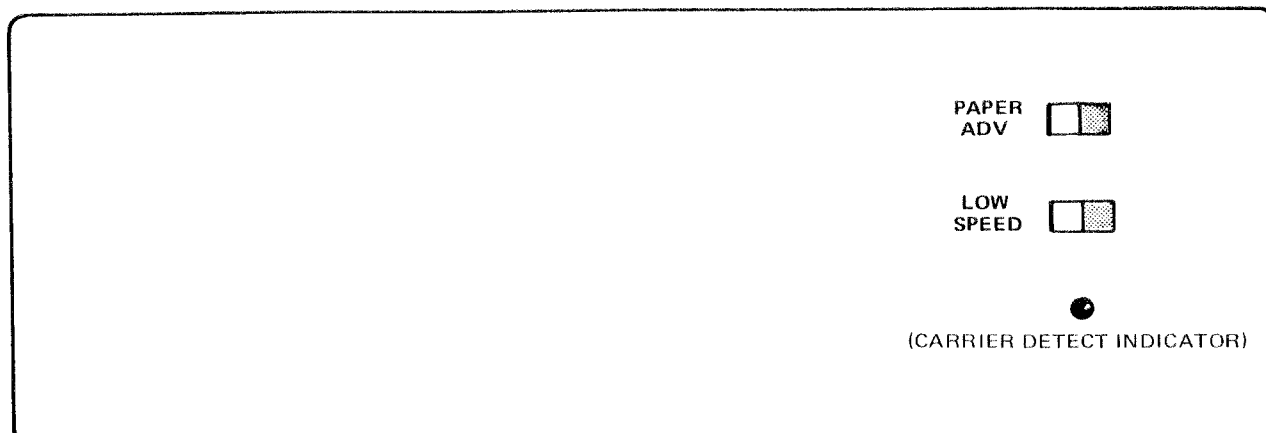


A0001195

NOTES: A blank key indicates that a NUL code is transmitted.

The CTRL (Control) key overrides the SHIFT key and UPPER CASE switch.

Figure 6-9. Codes Generated with the CTRL Key Pressed and Held (Full-ASCII Keyboard).




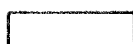
A0001272

Figure 6-10. Optional Receive - Only Control Panel (Replaces the Keyboard).

APPENDIX A

ASCII CODE SYSTEM AND CHARACTER SET

| b_7 b_6 b_5 | b_4 b_3 b_2 b_1 | $b_7 \rightarrow 0$ $b_6 \rightarrow 0$ $b_5 \rightarrow 0$ | 0 0 1 | 0 1 0 | 0 1 1 | 1 0 0 | 1 0 1 | 1 1 0 | 1 1 1 |
|-------------------------|-------------------------|---|-------------|-------------|-------------|-------------|-------------|-------------|---|
| 0 0 0 0 | | | NUL | DLE | SP | 0 | @ | P |  |
| 0 0 0 1 | | | SOH | DC1 | ! | 1 | A | Q | a |
| 0 0 1 0 | | | STX | DC2 | " | 2 | B | R | b |
| 0 0 1 1 | | | ETX | DC3 | # | 3 | C | S | c |
| 0 1 0 0 | | | EOT | DC4 | \$ | 4 | D | T | d |
| 0 1 0 1 | | | ENQ | NAK | % | 5 | E | U | e |
| 0 1 1 0 | | | ACK | SYN | & | 6 | F | V | f |
| 0 1 1 1 | | | BEL | ETB | / | 7 | G | W | g |
| 1 0 0 0 | | | BS | CAN | (| 8 | H | X | h |
| 1 0 0 1 | | | HT | EM |) | 9 | I | Y | i |
| 1 0 1 0 | | | LF | SUB | * | : | J | Z | j |
| 1 0 1 1 | | | VT | ESC | ; | ; | K | [| k |
| 1 1 0 0 | | | FF | FS | , | < | L | \ | l |
| 1 1 0 1 | | | CR | GS | - | = | M |] | m |
| 1 1 1 0 | | | SO | RS | . | > | N | ^ | n |
| 1 1 1 1 | | | SI | US | / | ? | O | _ | o |
| | | | | | | | | | DEL |



Printable characters



Printer control characters



Codes generated and transmitted by the terminal, but no action is taken locally



On standard (limited-ASCII) keyboard only: translated to uppercase equivalents when received by the terminal



On standard (limited-ASCII) keyboard only: printed when received but not generated

ASCII CONTROL CHARACTERS

(From American Standards Institute Publication X3.4-1968)

| | | | |
|------|------------------------------|-----|-----------------------|
| ACK | acknowledge | ETX | end of text |
| BEL | bell | FF | form feed |
| BS | backspace | FS | file separator |
| CAN | cancel | GS | group separator |
| CR | carriage return | HT | horizontal tabulation |
| DC1 | device control 1 | LF | line feed |
| DC2 | device control 2 | NAK | negative acknowledge |
| DC3 | device control 3 | NUL | null |
| DC4 | device control 4 (stop) | RS | record separator |
| *DEL | delete (also called RUB OUT) | SI | shift in |
| DLE | data link escape | SO | shift out |
| EM | end of medium | SOH | start of heading |
| ENQ | enquiry | STX | start of text |
| EOT | end of transmission | SUB | substitute |
| ESC | escape | SYN | synchronous idle |
| ETB | end of transmission block | US | unit separator |
| | | VT | vertical tabulation |

*not strictly a control character

A0001113

APPENDIX B

EQUIPMENT SPECIFICATIONS

1. KEYBOARD

| | |
|-------------------|--|
| Code | ASCII (American Standard Code for Information Interchange) |
| Character Set | |
| Standard Keyboard | 97 codes generated 64 printable characters 33 control characters |
| Optional Keyboard | 128 codes generated 95 printable characters 33 control characters |
| Numeric Keypad | (Standard Keyboard only) Embedded, 13-key calculator style, numeric cluster |

2. PRINTER

| | |
|-------------------|--|
| Method | Nonimpact, thermal-paper printing; five by seven, 35-element matrix, electronically heated |
| Paper | TI Thermographic Printing Paper, TI Part No. 972603 (white); 8-1/2 inches x 100 feet; last 10 feet color-coded |
| Platen | Friction-feed |
| Character Set | |
| Standard Keyboard | 69 printable characters (lowercase characters are translated to uppercase equivalents upon reception) |
| Optional Keyboard | 95 printable characters |
| Character Size | 0.105 inches x 0.080 inches, maximum |
| Line Length: | 8 inches 10 characters per inch 80 characters per line |
| Line Spacing | 6 lines per inch |
| Printing Rate | Switch-selectable, 10 or 30 characters-per-second |

| | |
|-------------------------------|--|
| Visibility | At least 50 previous lines of print, including current line and last character printed |
| Carriage Return/ Line Feed | Automatic at column 81; no code is transmitted |
| Carriage Return Time | 195 milliseconds; no filler characters required after carriage return |
| Line Feed Time | 33 milliseconds (one character-time) |

3. OPERATOR CONTROLS

| | |
|----------------|---|
| SPEED | 10/30 characters-per-second |
| DUplex | HALF/full |
| Transmit Level | Low to high |
| Contrast | Light to dark |
| PAPER ADVance | 30 lines per second while key pressed and held |
| NUM | (Standard Keyboard only) Enables numeric keypad |
| Status | ON LINE/Local |
| UPPER CASE | (Optional Keyboard only) Enables uppercase characters |

4. INDICATORS

| | |
|---------|------------------------------|
| Carrier | Carrier detect lamp |
| Bell | 250-millisecond audible tone |

5. DATA TRANSMISSION

| | |
|--------|---|
| Method | Asynchronous; serial-by-bit, serial-by-character |
| Code | ASCII; 11 bits per character including parity, start, and two stop bits at 10 characters-per- |

second speed, 10 bits per character with one stop bit at 30 characters-per-second speed

Carrier Detect
Turn-on delay
Turn-off delay

7 seconds, typical
200 milliseconds, typical

Mode Switch-selectable: half or full duplex

Parity Odd, even, or mark parity (factory adjustable only)

Buffer Character buffering on received data, permitting true 30 characters-per-second operation

7. PHYSICAL

Size Width: 15.4 inches
Depth: 16.0 inches
Height: 4.6 inches

Weight 13.5 pounds (including paper)

8. POWER REQUIREMENTS

Voltage 90 through 132 volts RMS

Frequency 47 through 63 Hz

Power 75 watts maximum

6. COMMUNICATIONS INTERFACE

Acoustic Coupler

Compatibility Bell System 103A (or equivalent) data set

Mode Originate

Modulation Frequency shift keying (FSK)

Transmit 1270 Hz — Mark (one)
Frequencies 1070 Hz — Space (zero)

Receive 2225 Hz — Mark (one)
Frequencies 2025 Hz — Space (zero)

Receiver -30 dBm with full duplex and
Sensitivity 300 baud operation

Transmitter Adjustable between -20 and -5
Output Level dBm

Auxiliary EIA Compatible with EIA Specification RS-232-C

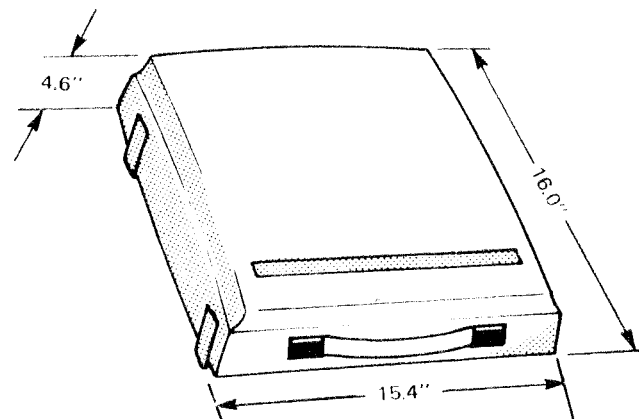
9. ENVIRONMENT

Temperature Operating: 10°C to 40°C
Storage: -30°C to 70°C (not including paper)
-30°C to 40°C (including paper)

Humidity Operating: 10% to 90% (no condensation)
Storage: 10% to 95% (no condensation)

Shock 20 G for 11 milliseconds

Vibration 1.5 G, 5 to 500 Hz



APPENDIX C

DEFINITIONS

ASCII -- an eight-level (7 bits + parity) code from the American Standard Code for Information Interchange.

analog -- the representation of numerical quantities by means of physical *variables*; e.g., translation, rotation, voltage, or resistance. (Contrast with *digital*.)

baud -- a unit of data transmission speed equal to the number of code elements (bits) per second.

bit -- an abbreviation for binary digit; the smallest unit of information in a binary system of notation.

character -- one symbol of a set of elementary symbols, such as a letter of the alphabet; a character is made up of a group of 7 bits (ASCII code).

code -- a system of symbols (bits) for representing data (characters). The Model 745 utilizes the ASCII code.

data -- a general term for any type of information.

data set -- a device which performs modulation/demodulation and control functions to enable data transmission/reception over telephone lines between two data devices.

digital -- the representation of numerical quantities by means of *discrete integer numbers*. It is possible to express in digital form all information stored, transferred, or processed by dual-state condition; e.g., on-off, open-closed, and true-false.

duplex -- describes two operations, such as transmitting and receiving; full duplex means simultaneous transmission and reception; half duplex means transmission or reception, but not both at the same time.

line, communications -- describes cables, telephone lines, etc. over which data is transmitted to, and received from, the terminal. Also referred to as the "line".

local -- see *off-line*.

modem -- acronym for data set (*modulator/demodulator*)

off-line (local) -- describes equipment or devices which are not connected to the communications line.

on-line -- describes equipment or devices which are connected to the communications line.

signal -- The event, phenomenon, or electrical quantity, that conveys information from one point to another.

CUT ALONG LINE

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FOLD ON TWO LINES (LOCATED ON REVERSE SIDE), STAPLE AND MAIL

Sales and Service Offices of Texas Instruments are located throughout the United States and in major countries overseas. Contact the Digital Systems Division, Texas Instruments Incorporated, P.O. Box 1444, Houston, Texas 77001, or call (713) 494-5115, for the location of the office nearest to you.



Texas Instruments reserves the right to make changes at any time to improve design and supply the best product possible.

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INCORPORATED

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P.O. BOX 1444 HOUSTON, TEXAS 77001

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M/S 770

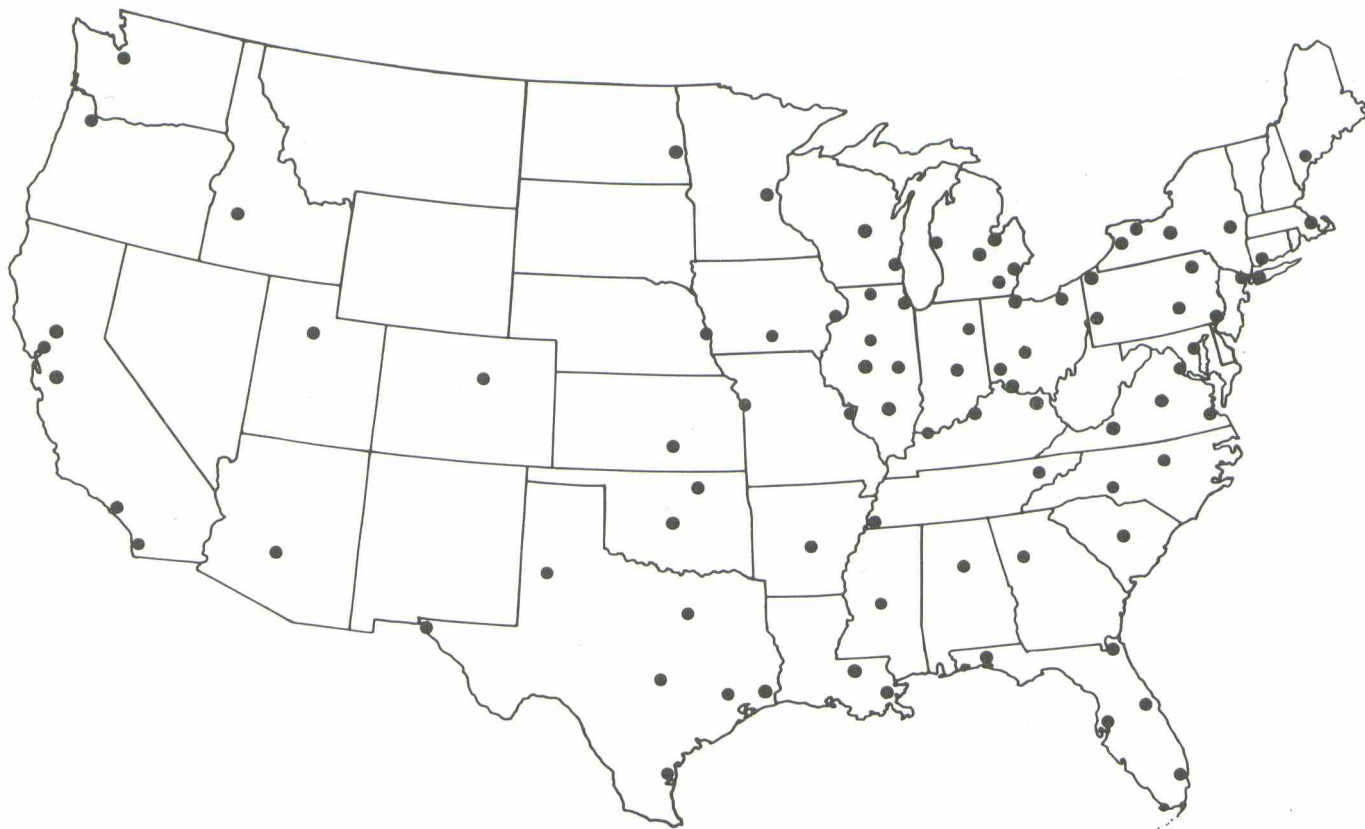
FOLD

Digital Systems Division Field Service

Texas Instruments Digital Systems Division maintains a responsive, nationwide service organization dedicated to customer satisfaction. Expertly trained personnel, modern facilities, and the resources of a large corporation are available to

provide the products of the Digital Systems Division with the same exacting attention after the sale as during manufacture. Nationwide service personnel and computerized dispatching coordinate every effort to meet the needs of TI customers.

Field Service Locations



Service locations indicated on this map are subject to change without notice.

TEXAS INSTRUMENTS.

Field Information System

Customer satisfaction is the primary goal of Texas Instruments Incorporated. To meet this goal the Field Information System was developed and implemented. The Field Information System is a nationwide, computerized network which facilitates the entry, dispatch, and completion of all customer service requests.

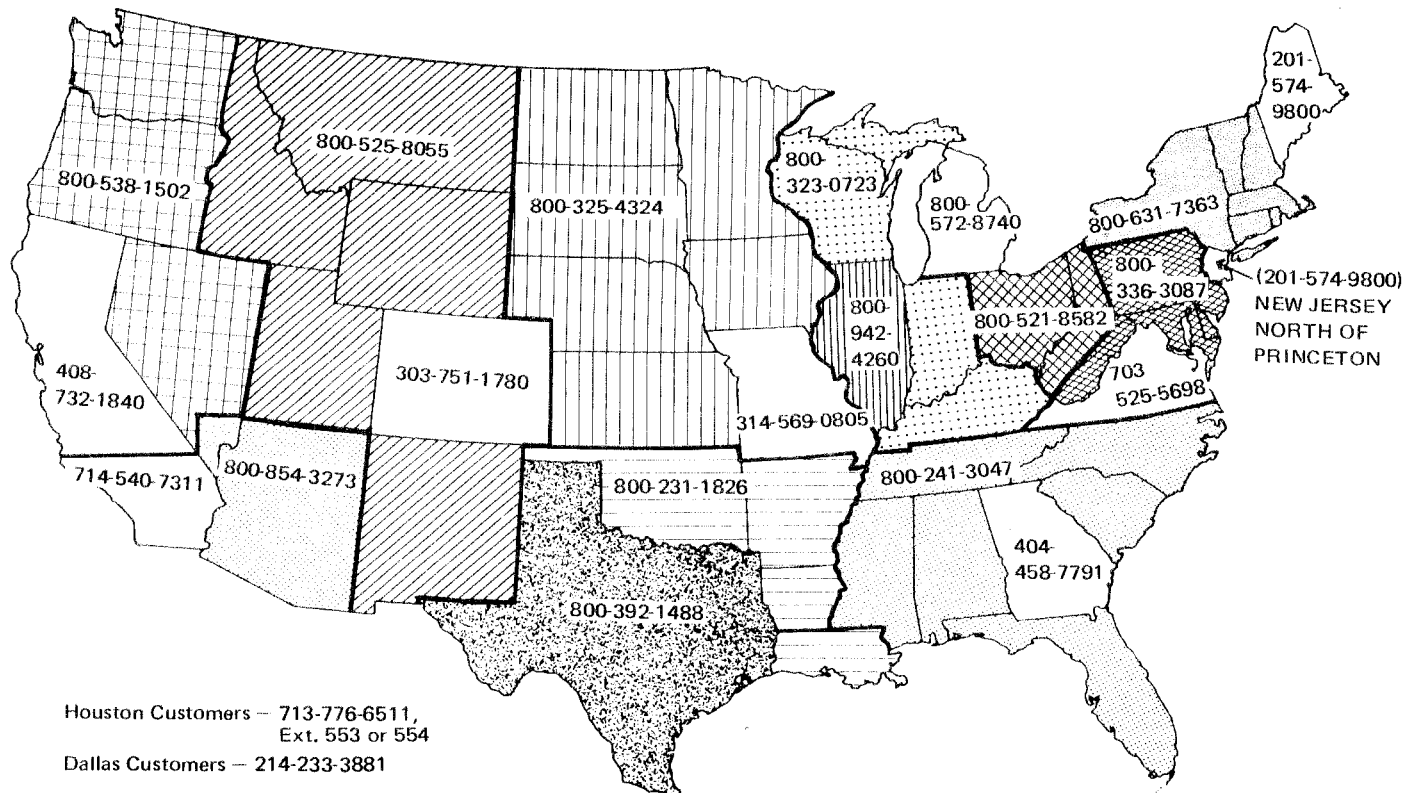
To initiate any service request, a customer should use the Centralized Dispatch telephone number assigned to the area in which he is located (see map below). The customer provides the dispatcher with: customer name, the address of the product needing service, telephone number, the name of a contact, the model and serial number of the product, the problem, and a purchase order number (if it is purchased equipment and not covered by warranty or a maintenance agreement). The dispatcher enters this information into the Field Information System. If the service request is for equipment located in another geographical

area, the Field Information System automatically transfers the request to the TI Service Office nearest the equipment needing service.

The dispatcher at the location nearest the equipment will assign the service request to a Customer Engineer for action. When the Customer Engineer completes the service request, all pertinent data is entered into the system and a real-time service status is maintained.

The Field Information System enables Texas Instruments to provide fast, efficient service to every customer, whether their operations are concentrated in one geographical area or nationwide. If the customer is not satisfied with the service provided by the Field Information System, the nearest District or Regional Manager, as designated on the last page of this brochure should be notified.

Centralized Dispatch Telephone Numbers for Requesting Service



Equipment Maintenance Service

Two types of equipment maintenance service are provided nationwide by Texas Instruments: *Maintenance Agreement Service* (Basic, Extended, and Full) and *On-Call Service*. A Maintenance Agreement provides the customer with priority maintenance over On-Call Service during periods of peak service needs. Maintenance Agreement Service quotes can be obtained from any TI Sales representative.

To maintain acceptable service and response time, *Extended* and *Full* coverage are offered only when Texas Instruments can ensure the availability of adequate personnel.

Spare parts inventory is maintained at Branch, District, and Regional offices for both Maintenance Agreement Service and On-Call Service, with Maintenance Agreement Service having parts usage priority.

Maintenance Agreement Service covers all routine maintenance except those customer responsibilities such as cleaning tape transport heads, printheads and other first line items, as specified in the equipment manuals.

Customer care is equally important to ensure trouble free operation and optimum performance levels.

MAINTENANCE AGREEMENTS

The *Basic Coverage* for Maintenance Agreement Service is shown in each products price list. Prices for *Extended Coverage* and *Full Coverage* are listed below. Agreements for resident engineers will be quoted on request. Service calls resulting from failures or problems not the fault of TI

equipment will be separately invoiced at TI Standard Service Rates. Availability of On-Call Service outside the Service Agreement period will be provided on a best effort basis. Rates are subject to change without notice.

| MAINTENANCE AGREEMENT COVERAGE | DESCRIPTION | PRICE |
|--|---|---|
| Basic Coverage | Service on your equipment for 8 hours during the period from 8:00 a.m. to 5:00 p.m., Monday through Friday, excluding holidays. | As listed on the Standard Price List for each product. |
| Extended Coverage** | Service on your equipment for 16 consecutive hours during the period from 8:00 a.m. to midnight each day, Monday through Friday, and during the period from 8:00 a.m. to 5:00 p.m. on Saturday, excluding holidays. | 1.5 times the monthly charge for Basic Coverage. |
| Full Coverage** | Service on your equipment 24 hours-per day, 7 days-per-week. | 2.0 times the monthly charge for Basic Coverage. |
| Transportation (Computers, Computer Systems, and <i>Silent 700</i> ® Data Terminals) | The transportation rate applies to all travel by automobile and commercial surface and air carriers. This rate includes charges for travel time in transit as well as travel expenses. | Monthly price per Zone* for computers and computer systems, beyond Zone* Zero (0), is 5% of the total Basic Monthly Maintenance price. For <i>Silent 700</i> Data Terminals, a price adder of \$20.00 per month is charged for each terminal beyond 100 miles of a TI service location. |

* Zones are established as 25 mile intervals from the nearest TI Service location. The zones are numbered in order beginning from zero (0).

** Contact your local TI sales representative for coverage available in your area.

ON-CALL SERVICE

For customers who prefer service on an On-Call basis (i.e., service performed outside the hours of an agreement and service for customers not covered by a Service Agreement, TI Customer Engineers are available at TI's then current

Standard Service Rates for labor, travel, material, and subsistence as described below. Rates are subject to change without notice. On-Call Service outside local TI office hours will be provided on a best effort basis.

| ON-CALL SERVICE COVERAGE | DESCRIPTION | STANDARD SERVICE RATES |
|--------------------------|--|--|
| Standard Shop Rate | Labor rate during normal shop hours if the customer delivers equipment requiring service to a TI service center.* | \$25 per man-hour or part thereof. |
| Standard Field Rate | Up to 8 hours work between the normal working hours of 8:00 a.m. and 5:00 p.m., local time, Monday through Friday. | \$40 per man-hour or part thereof. |
| Overtime Field Rate | Work exceeding 8 hours during normal working hours, before 8:00 a.m. and after 5:00 p.m., Monday through Friday and any time on Saturday. | \$50 per man-hour or part thereof. Emergency call out is subject to a 4-hour minimum charge. |
| Sunday and Holiday Rate | Work performed on Sundays or holidays (New Year's Day, Good Friday, Memorial Day, Independence Day, Labor Day, Thanksgiving Day, Friday after Thanksgiving Day, Christmas Day, TI Floating Holiday). | \$60 per man-hour or part thereof. Emergency call out is subject to a 4-hour minimum charge. |
| Living Expenses | | Charged at actual cost. |
| Transportation Fees | The transportation rate applies to all travel by automobile and commercial surface and air carriers. | Charged at 15 cents per mile each way and at the appropriate hourly rate. Commercial travel may be charged at actual cost. |

* TI Service Centers have the facilities to provide in-shop repair. Their locations are denoted by an asterisk (*) on the last page of this brochure, under Field Sales and Service Offices.

Field Sales and Service Offices

The Field Sales and Service offices listed below should be contacted for all customer needs other than service requests.

Service requests should be telephoned through the Centralized Dispatching numbers listed in this brochure.

This list is subject to change without notice. Difficulty in reaching any of the following offices should be reported to Field Sales and Service Administration (713) 494-5115, extension 3261.

- ALABAMA**
Sales
Texas Instruments Incorporated
601 Bel Air Blvd.
Suite 102
Mobile, Alabama 36606
(205) 471-1435
- ARIZONA**
Sales and Service
*Texas Instruments Incorporated
4820 North Black Canyon Highway
Suite 202
Phoenix, Arizona 85017
(602) 249-1313
- CALIFORNIA**
Sales
Texas Instruments Incorporated
3186 J Airway
Costa Mesa, California 92626
(714) 540-7311
- 4 Texas Instruments Incorporated
831 S. Douglas Street
El Segundo, California 90245
(213) 973-2571
- Texas Instruments Incorporated
140 Sansome Street
San Francisco, California 94104
(415) 392-0229
- 3-4 Texas Instruments Incorporated
776 Palomar Avenue
P.O. Box 9064
Sunnyvale, California 94086
(408) 732-1840
- Service**
1-2 *Texas Instruments Incorporated
3186 J Airway
Costa Mesa, California 92626
(714) 540-7311
- Texas Instruments Incorporated
7827 Convey Court
Suite 412
San Diego, California 92111
(714) 540-7311
- Texas Instruments Incorporated
140 Sansome Street
San Francisco, California 94104
(408) 732-1840
- 2 *Texas Instruments Incorporated
776 Palomar Avenue
P.O. Box 9064
Sunnyvale, California 94086
(408) 732-1840
- COLORADO**
Sales and Service
2-4 *Texas Instruments Incorporated
9725 East Hampden Avenue
Suite 301
Denver, Colorado 80231
(303) 751-1780
- CONNECTICUT**
Sales and Service
Texas Instruments Incorporated
2405 Whitney Avenue
Hamden, Connecticut 06518
(203) 281-0074
- FLORIDA**
Sales and Service
*Texas Instruments Incorporated
4600 West Commercial Boulevard
Fort Lauderdale, Florida 33319
(305) 733-3300
- 4 *Texas Instruments Incorporated
2221 Lee Road
Suite 108
Winter Park, Florida 32789
(305) 644-3535
- GEORGIA**
Sales and Service
1-2 *Texas Instruments Incorporated
3300 Northeast Expressway
Suite 6A
Atlanta, Georgia 30341
(404) 458-7791
- ILLINOIS**
Sales
3-4 Texas Instruments Incorporated
4333 Trans World Road
Suite 328
Schiller Park, Illinois 60176
(312) 671-0300
- Service**
1-2 *Texas Instruments Incorporated
4333 Trans World Rd.
Suite 328
Schiller Park, Illinois 60176
(312) 671-1540
- INDIANA**
Sales and Service
Texas Instruments Incorporated
2346 S. Lynhurst Drive
Suite 101
Indianapolis, Indiana 46241
(317) 248-8555
- KENTUCKY**
Service
Texas Instruments Incorporated
1941 Bishop Lane
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(502) 456-6463
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4 *Texas Instruments Incorporated
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2-4 *Texas Instruments Incorporated
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Sales and Service
Texas Instruments Incorporated
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Minneapolis, Minnesota 55435
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- MISSOURI**
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Texas Instruments Incorporated
8080 Ward Parkway
Kansas City, Missouri 64114
(816) 523-2500
- Texas Instruments Incorporated
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St. Louis, Missouri 63141
(314) 569-0801
- Service**
2 *Texas Instruments Incorporated
2368 Schuetz
St. Louis, Missouri 63141
(314) 569-0805
- NEW JERSEY**
Sales and Service
1-2-3-4 *Texas Instruments Incorporated
1245 Westfield Avenue
Clark, New Jersey 07066
(201) 574-9800
- NEW YORK**
Sales
Texas Instruments Incorporated
1270 Ave. of Americas
Suite 420
New York, New York 10020
(212) 246-6165
- Texas Instruments Incorporated
1210 Jefferson Road
Rochester, New York 14623
(716) 461-1800
- Service**
Texas Instruments Incorporated
1270 Avenue of the Americas
Suite 420
New York, New York 10020
(212) 246-6258
- Texas Instruments Incorporated
144 Metro Park
Rochester, New York 14623
(716) 461-1800
- NORTH CAROLINA**
Sales and Service
Texas Instruments Incorporated
1 Woodlawn Green, Suite 160
Charlotte, North Carolina 28210
(704) 527-0903
- OHIO**
Sales
Texas Instruments Incorporated
28790 Chagrin Blvd., Suite 120
Cleveland, Ohio 44122
(216) 464-2990
- 4 Texas Instruments Incorporated
4140 Linden Avenue
Dayton, Ohio 45432
(513) 253-6128
- Service**
Texas Instruments Incorporated
28790 Chagrin Blvd., Suite 120
Cleveland, Ohio 44122
(216) 464-1981
- Texas Instruments Incorporated
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- PENNSYLVANIA**
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(412) 771-8550
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275 Commerce Drive
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(215) 628-3434
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Ft. Washington, Pennsylvania 19034
(215) 628-2787
- TENNESSEE**
Sales
Texas Instruments Incorporated
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Memphis, Tennessee 38132
(901) 392-2410
- TEXAS**
Sales
4 Texas Instruments Incorporated
P. O. Box 5621
M/S 917
Dallas, Texas 75222
(214) 238-5318
- 3-4 Texas Instruments Incorporated
P. O. Box 1444
M/S 769
Houston, Texas 77001
(713) 776-6511
- Texas Instruments Incorporated
1938 North East Loop 410, Suite 191
San Antonio, Texas 78217
(512) 828-9101
- Service**
2 *Texas Instruments Incorporated
13536 North Central Expressway
P. O. Box 5012
M/S 917
Dallas, Texas 75222
(214) 238-3881
- Texas Instruments Incorporated
P. O. Box 1444, M/S 748
Houston, Texas 77001
(713) 776-6511
- 2 *Texas Instruments Incorporated
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Houston, Texas 77036
(713) 776-6511
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4 Texas Instruments Incorporated
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Suite 1111 A.M. Bldg.
Arlington, Virginia 22209
(703) 527-2800
- Service**
2 *Texas Instruments Incorporated
1500 Wilson Boulevard
Suite 1111 A.M. Building
Arlington, Virginia 22209
(703) 525-5698
- WASHINGTON**
Sales
Texas Instruments Incorporated
700 112th Street Northeast
Suite 10
Bellevue, Washington 98004
(206) 455-1711
- Service**
*Texas Instruments Incorporated
700 112th North East
Suite 10
Bellevue, Washington 98004
(206) 455-1711
- WISCONSIN**
Sales and Service
Texas Instruments Incorporated
8112 West Bluemound
Milwaukee (Wauwatosa)
Wisconsin 53213
(414) 475-1690
- *TI Service Centers**
1 Service Regional Office
2 Service District Office
3 Sales Regional Office
4 Sales District Office

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