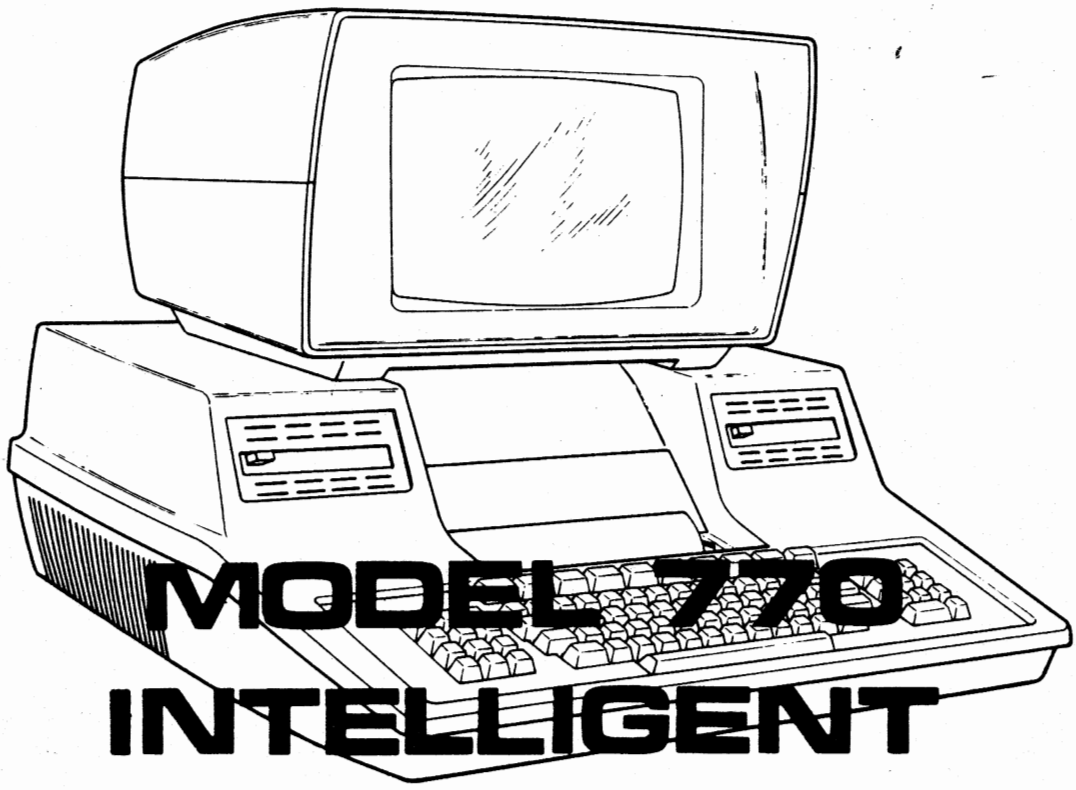
Operating Instructions

for



MODEL 770 INTELLIGENT DATA TERMINAL

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TEXAS INSTRUMENTS
INCORPORATED

INTRODUCTION

You are about to learn how to operate the Texas Instruments Model 770 Intelligent Data Terminal. Even if you have no previous experience in data processing or data terminal operation, you should find the Model 770 easy to learn and simple to operate.

Operating the Model 770 is, in fact, very similar to operating a standard electric typewriter. Differences between the two are not the actions that you — the operator — will take, but what the 770 does in response to your actions. For instance, when you type on the keyboard of the 770, the key strokes are converted to electronic signals that in addition to being displayed on the screen or printed for you to see locally, may also be recorded on magnetic tape cartridges for later recall and use, as well as transmitted over communication lines to be received and printed or viewed by other operators or even computers.

But that is not all — the 770 also has the ability to tell you when to enter (or type) information, what information to enter, and once you have completed the entry, whether or not there are any errors in the information that you have entered. That is how the 770 got the name "Intelligent Data Terminal"!

ABOUT THIS MANUAL

As you continue your familiarization with the Model 770, you will primarily be interested in Sections I, II, and III of this manual: Familiarization with the 770, Operating the 770, and Care and Cleaning. If other equipment is to be used with the 770, then Appendix E — Attaching External Equipment — should be studied.

Appendix D — Installation is included primarily as reference material for those people who unpack and complete initial installation of the equipment. Additional reference information is also provided in the remaining Appendix sections.

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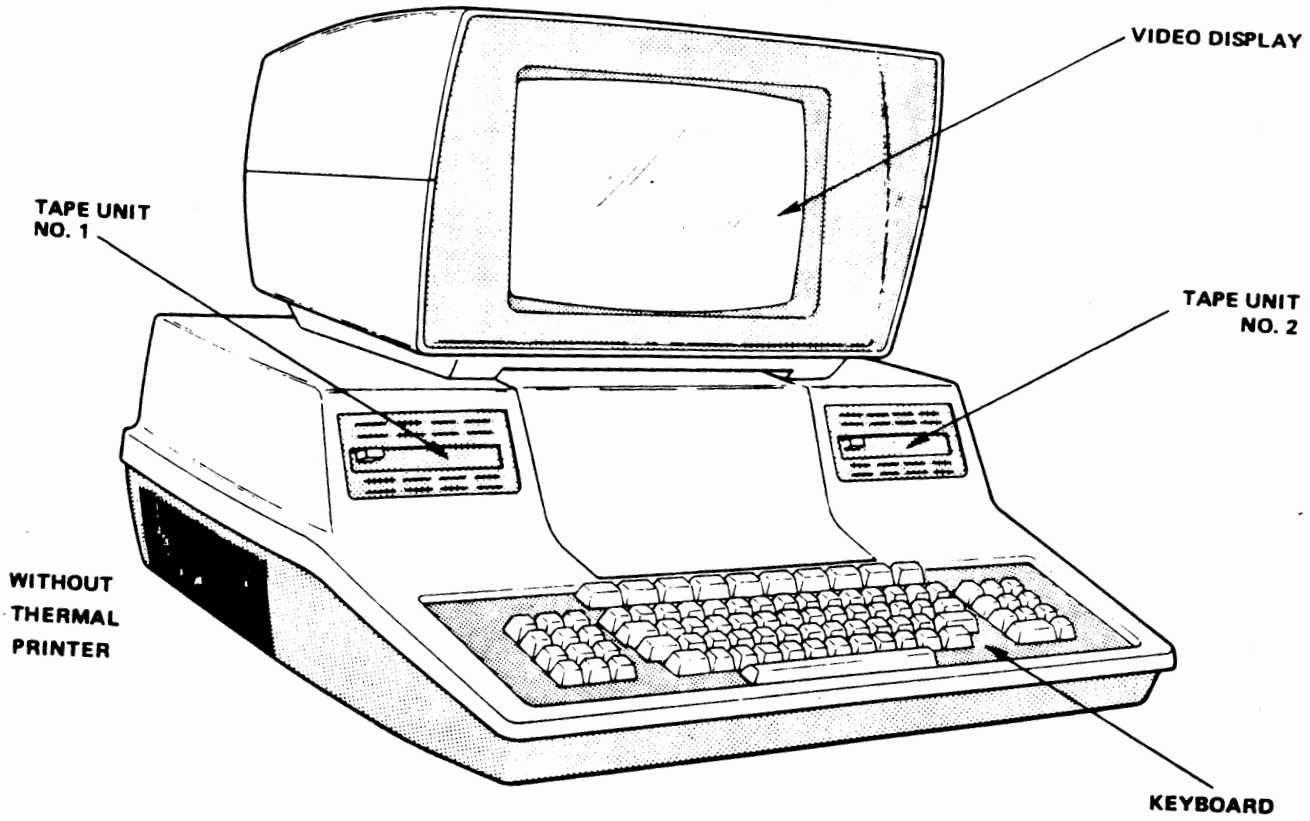


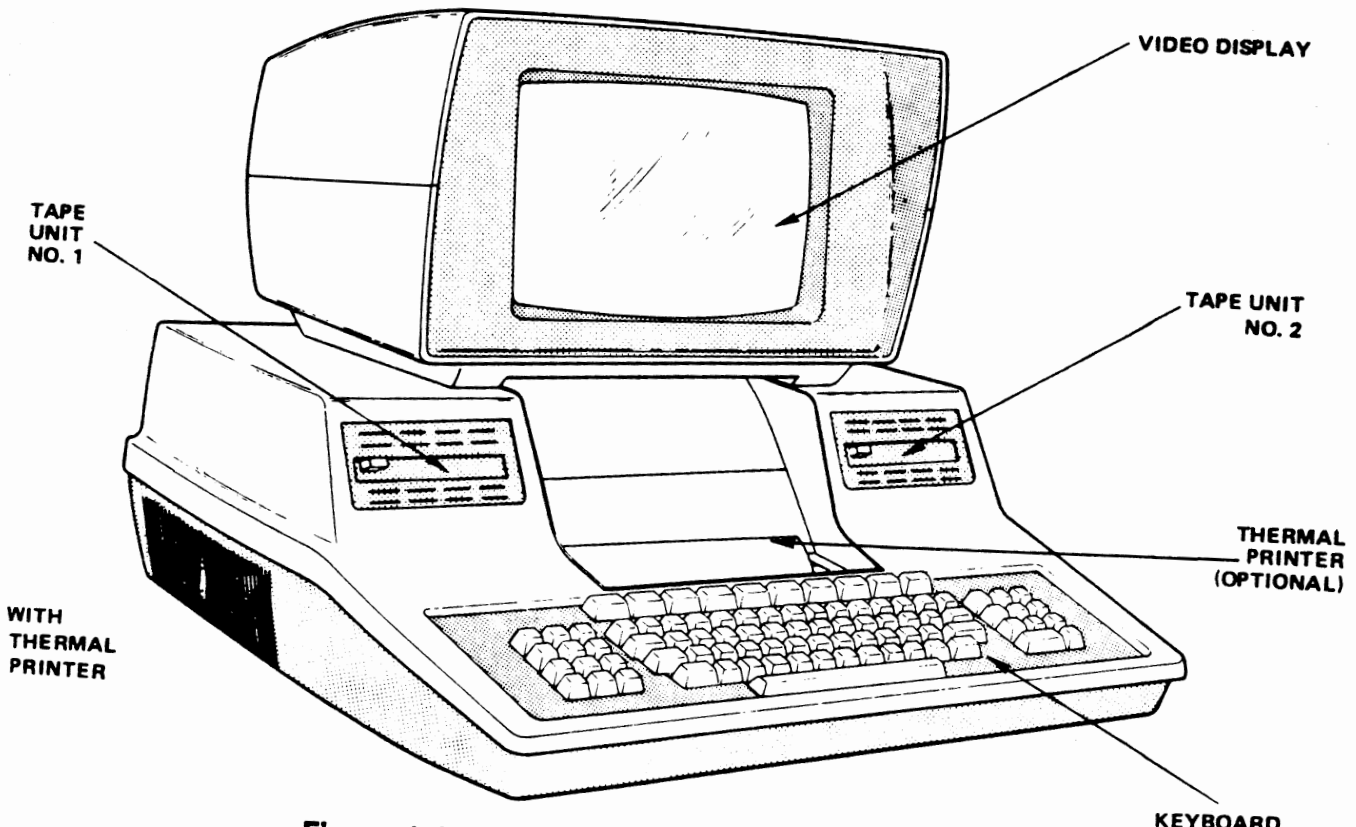


Figure 1-1. Model 770 Intelligent Terminals

SECTION I
FAMILIARIZATION WITH THE 770

Introducing the 770

The Model 770 terminal that you will be operating looks like one of the two terminals depicted in Figure 1-1. You will want to be familiar with the major parts of the terminal. Here is an introduction.

Either type terminal, as you can see, includes the following major parts:

- Keyboard — The keyboard is very similar to the keyboard of a standard typewriter. You will type on it in essentially the same way you would type on a typewriter keyboard.

- Video Display — When you type on the keyboard of the 770, the characters you type will normally appear before you on the screen of the video display. Also, messages for you to read and instructions for you will appear here.

- Two Tape Units — These two units are used in conjunction with Data Cartridges to save information that may be needed for use at a later time. The operation is very similar to recording sound on a tape recorder and playing it back later. You, as an operator, will primarily be concerned with the installation and removal of the data cartridges used with the tape units. You may want to note for later reference that:

  Tape Unit No. 1 is on the left side as you face the video display, and is sometimes referenced as CTG1.

  Tape Unit No. 2 is on the right side as you face the video display and is sometimes referenced as CTG2.

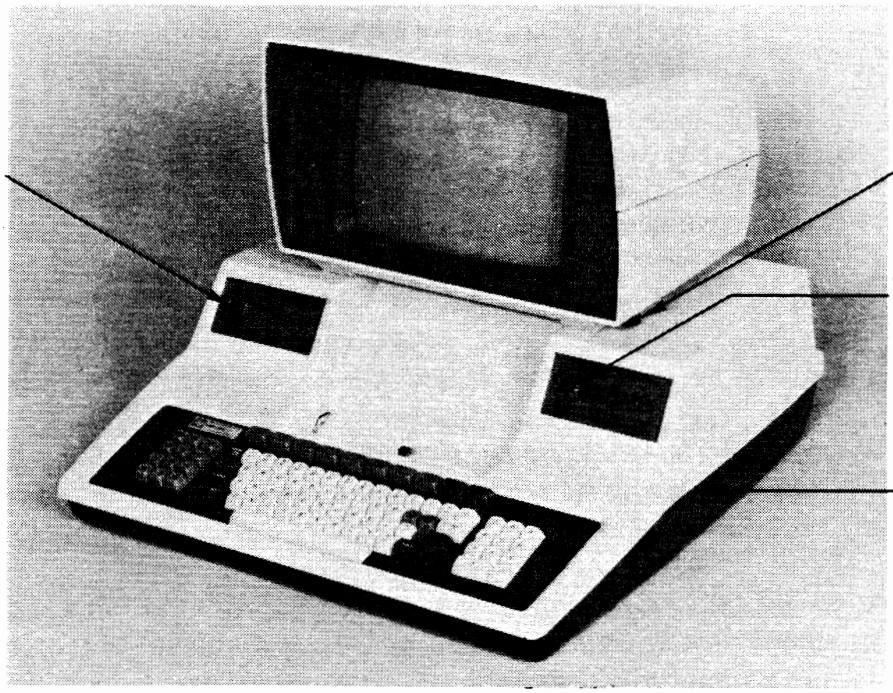
Some 770's are equipped with an additional part:

- Thermal Printer — The printer is normally used to obtain a permanent record of the information displayed on the video display screen.

Now that you have been introduced to the major parts of the 770, let's take a little more in-depth look at the terminal.

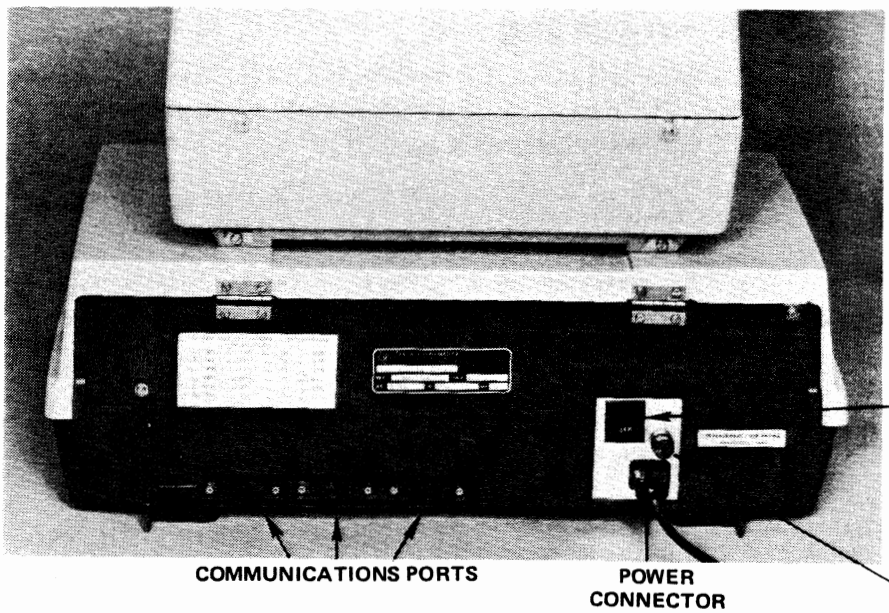
Locating the Controls

The main controls for the terminal are shown in Figures 1-2 and 1-3.



BRIGHTNESS CONTROL	ADJUSTS THE BRIGHTNESS OF THE VIDEO DISPLAY.
TAPE CARTRIDGE EJECT BUTTON	RELEASES THE TAPE CARTRIDGE FROM THE TRANSPORT TO ALLOW REMOVAL BY HAND.
THERMAL PRINTER CONTRAST ADJUSTMENT	ADJUSTS CONTRAST OF THE THERMAL PRINTER.

Figure 1-2. Terminal Front View



POWER SWITCH	TURNS TERMINAL ON AND OFF.
AC LINE FUSE	PROTECTS TERMINAL FROM DAMAGE CAUSED BY DRAWING EXCESSIVE CURRENT.
COMMUNICATION PORTS	TERMINAL CONNECTION POINT FOR PERIPHERAL DEVICES.
POWER CONNECTOR	CONNECTION POINT FOR POWER CORD.

Figure 1-3. Terminal Rear View

Attaching the Power Cord

Locate the three-prong recessed Power Connector at the rear of the terminal as shown in Figure 1-3. Now, plug the three-socket female connector of the power cord into the three-prong recessed Power Connector of the terminal, and plug the three-prong male connector of the power cord into a 115 volt ac wall outlet.

Switching Power On and Off

As shown in the Figure 1-3, the power switch is at the rear of the terminal and is accessible to your left hand when you are facing the video display. If the 770 is plugged into the ac power line, you can turn the power on by depressing the top half of the power switch (marked ON). Once the power has been switched on, you can turn the power off by depressing the lower half of the power switch (marked OFF).

Adjusting Brightness of the Video Display

Turn the power on as previously described. About thirty seconds after the power has been turned on, a message should become visible in the lower left hand corner of the video display. Another message will appear in the lower right hand corner of the video display. Do not be concerned with what the messages say at this time — they will be discussed in detail later.

Locate the Brightness Control knob (Figure 1-2) just below and to the right of the video display. Rotate the knob as far as it will go first in one direction and then in the other direction noting the change this produces in the contrast between the characters in the message and the screen itself. Note that at one extreme, the entire background of the screen is illuminated and at the other extreme the characters in the message are no longer visible (nothing is illuminated). The Brightness Control should now be adjusted so that the characters in the message are illuminated, but the background is not. There is considerable range in this adjustment; therefore, you should pick the brightness setting that is most pleasing to you. (Remember to avoid the extremes at either end of the range.)

Using the Data Cartridges

The two tape units in the 770 use a data cartridge like the one shown in Figure 1-4. You received a cartridge labeled OPERATOR TRAINING packaged with these Operating Instructions. You may use the OPERATOR TRAINING tape, or — if you wish — any similiar data cartridge from Texas Instruments, to complete the following activities.

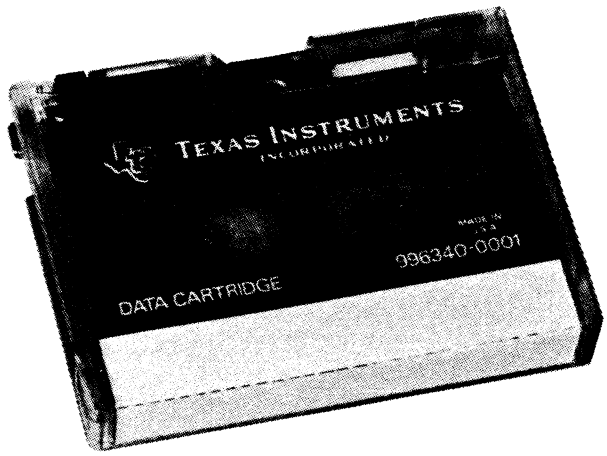


Figure 1-4. Data Cartridge

Take the data cartridge in your hand and slide it into tape unit No. 1 as illustrated in Figure 1-5. Press cartridge as shown in Figure 1-6 until it is firmly seated.

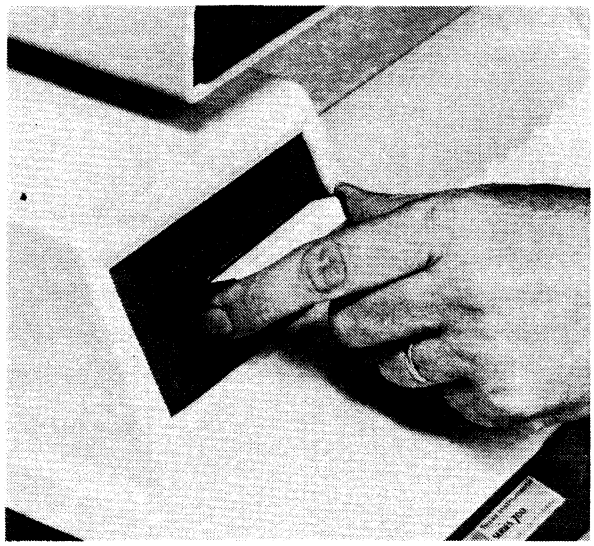


Figure 1-5. Cartridge Insertion

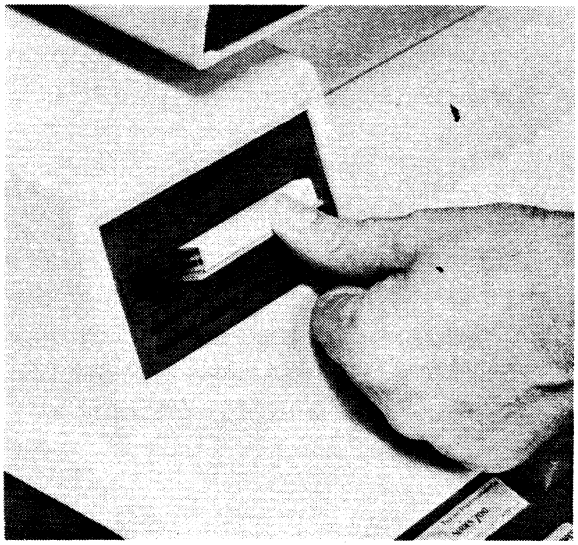


Figure 1-6. Cartridge Seating

The data cartridge is released by pressing the cartridge eject button adjacent to the data cartridge as shown in Figure 1-7.

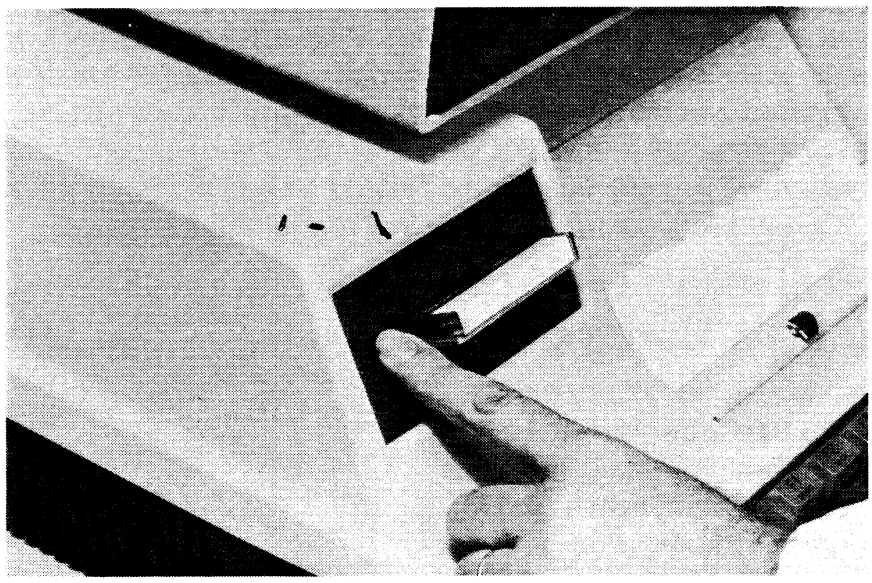


Figure 1-7. Cartridge Removal

Now repeat the operation with tape unit No. 2

These data cartridges, Figure 1-8, provide the storage facility for the terminal. Data entered into the 770 can be written on a cartridge for storage and later recalled into the terminal when required.

A movable tab on the cartridge is used to protect the data on a tape from inadvertently being destroyed. This tab, marked RECORD, is positioned as shown to either protect or not protect the data already on the tape. In some cases, the tab may be completely removed in order to permanently protect the stored data.

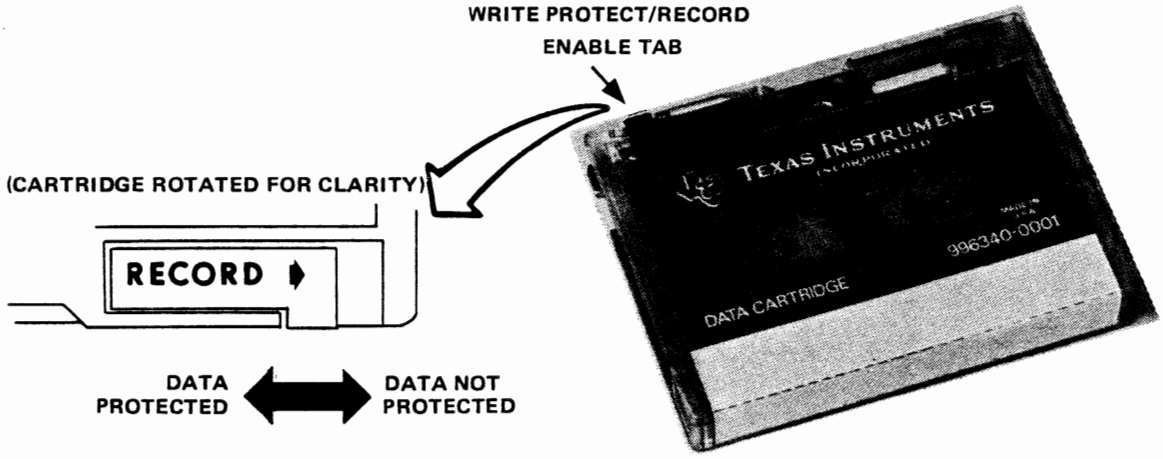


Figure 1-8. Cartridge Write Protect Tab

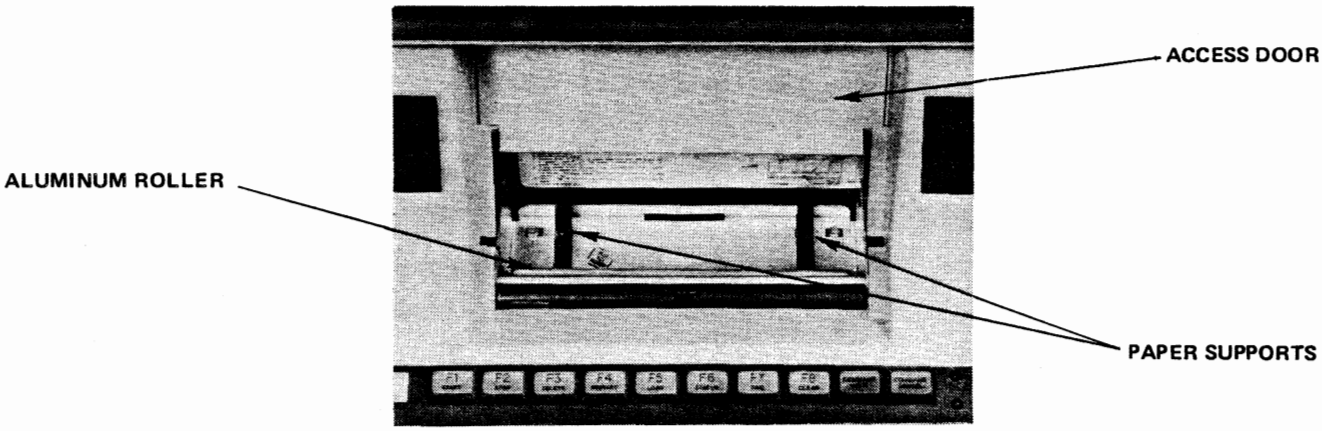
Loading Paper

If the terminal is equipped with the optional thermal printer, refer to the following figures and load it with paper (if required) as follows:

CAUTION

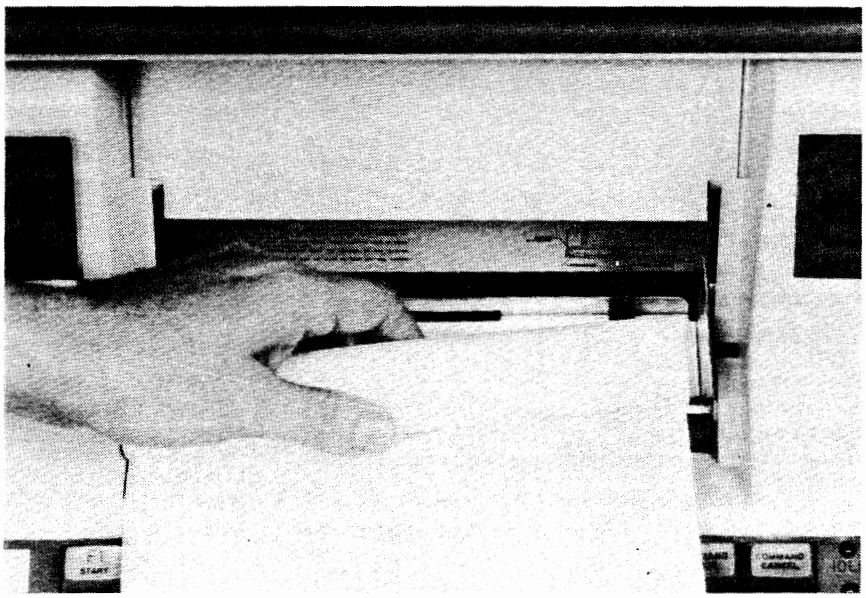
The warranty and/or service contract on the thermal printhead is subject to nullification if the thermal paper used does not meet TI Specification 972603-0001.

1. Slide the printer access door up to provide access to the paper loading area.



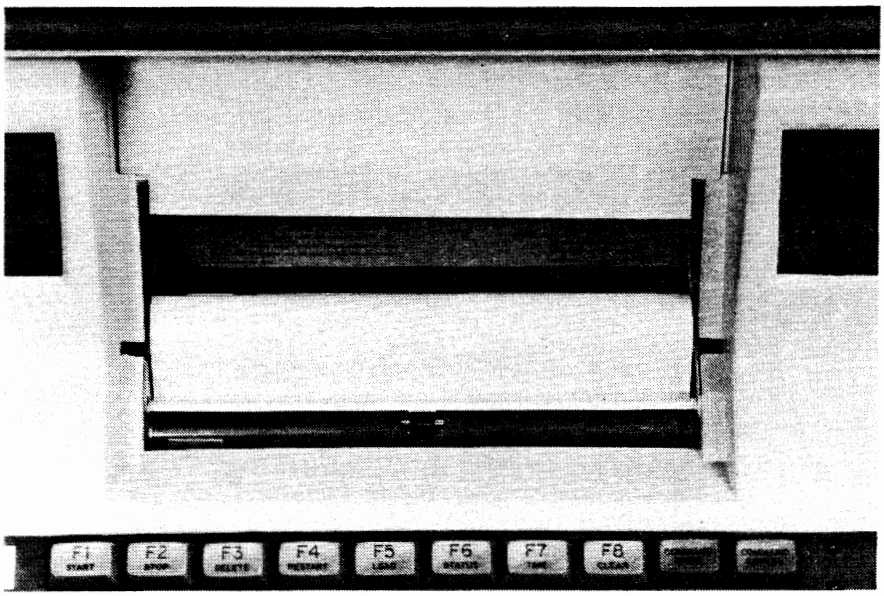
2. Remove the empty paper roll, if present. If the paper supply is almost exhausted, tear the paper where it enters the paper chute and remove the paper roll. Verify that the terminal power switch is ON and press the PAPER ADV key (third key from left, second row on keyboard) to remove the remaining paper from the printer.

3. Grasp a new roll of paper so that the paper feeds off the bottom of the roll toward the front of the terminal and place the roll on the paper supports.



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

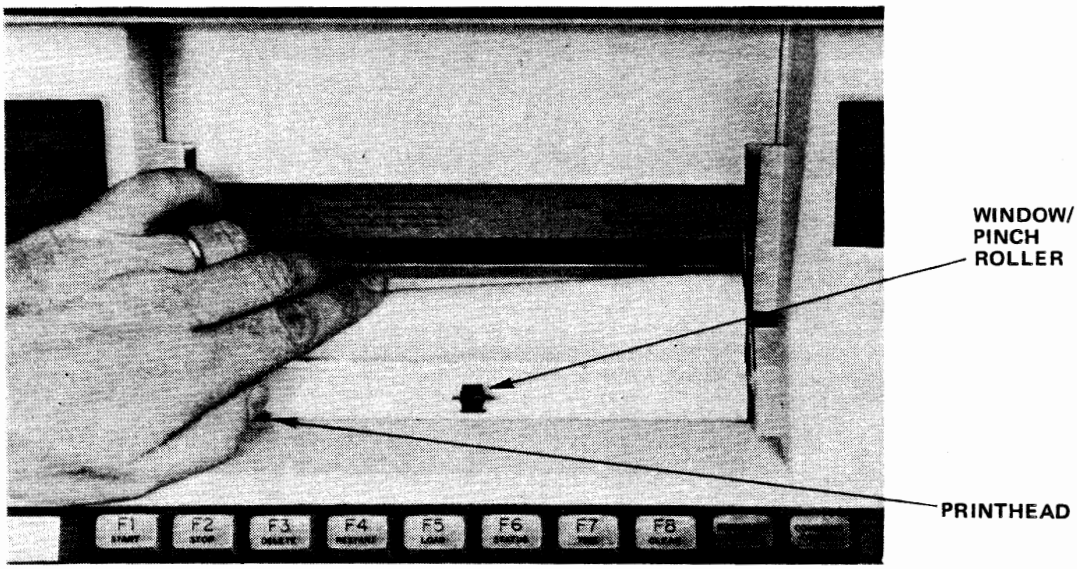
5. Feed the paper over the aluminum roller and down the paper chute until it can be seen behind the window.



NOTE

The paper will not slide under the printhead because the printhead is pressed against the platen.

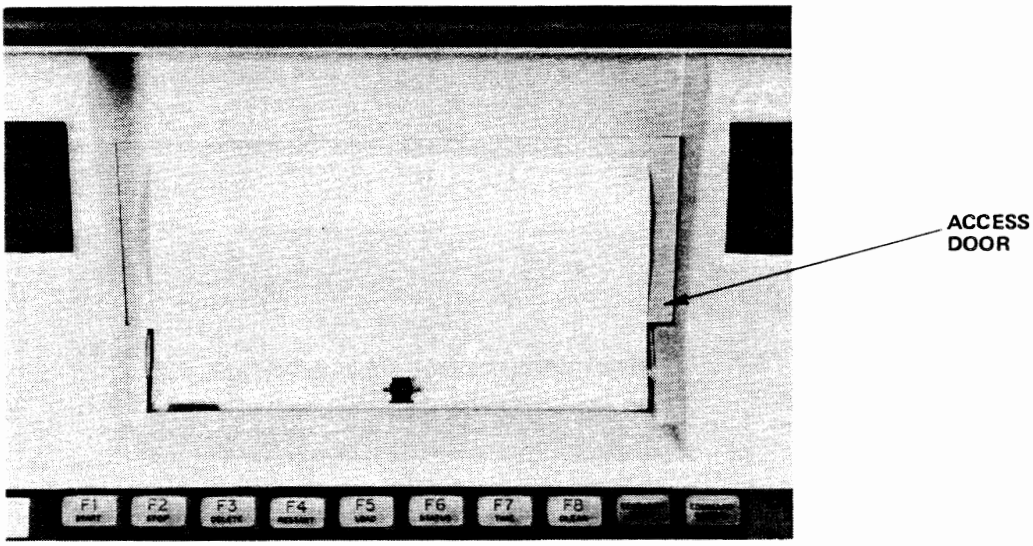
6. Press and hold the PAPER ADV key while simultaneously pushing the paper gently down the paper chute. The paper will feed under the printhead and then under the window/pinch roller.



7. Hold the paper out of the way and slide the printer access door down until it almost touches the platen.

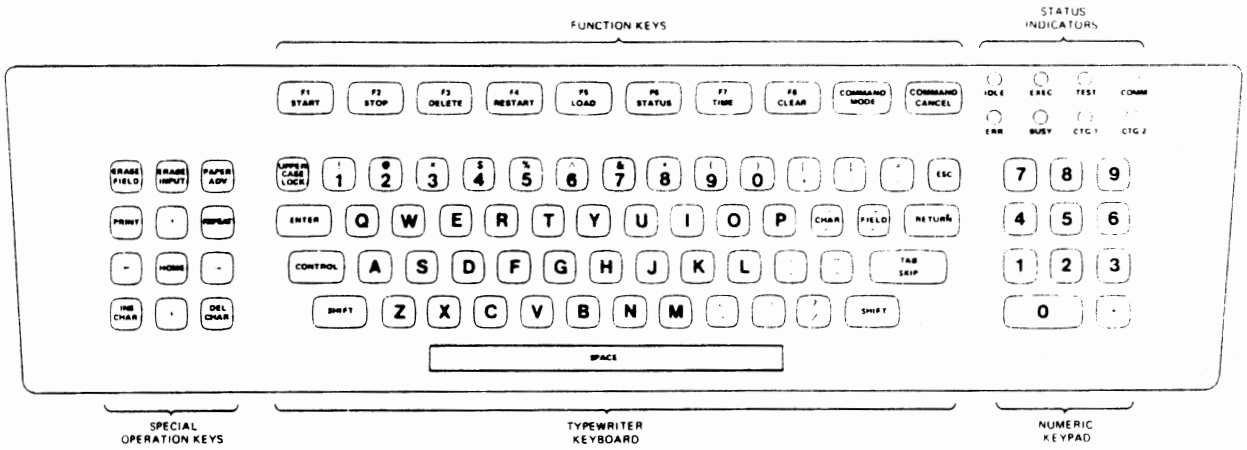
8. Tear off excess paper by pulling forward over the tearoff edge of the window.

9. When the printer is being used, the printed output is fed under the video display and to the back of the terminal.



Locating the Keyboard and Indicators

The keyboard provides the means by which you will enter data into the terminal. While studying, you may type on the keyboard, however, even if power is ON the characters typed will not necessarily be displayed on the screen. How to display typed characters on the screen will be explained when actual operation of the terminal is explained in detail in Section II. If you wish to use the actual keyboard in conjunction with this section, there is no need to have power ON.



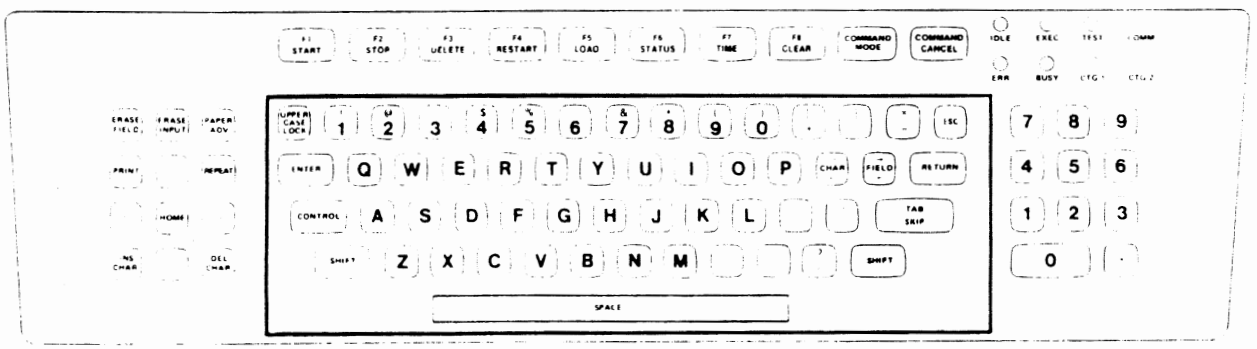
As you can see, the keyboard resembles a conventional typewriter keyboard with some additional special keys and indicators. As shown in the figure, the keyboard is divided into five separate sections. These sections are:

- Typewriter Keyboard
- Numeric Keypad
- Function Keys
- Special Operation Keys
- Status Indicators

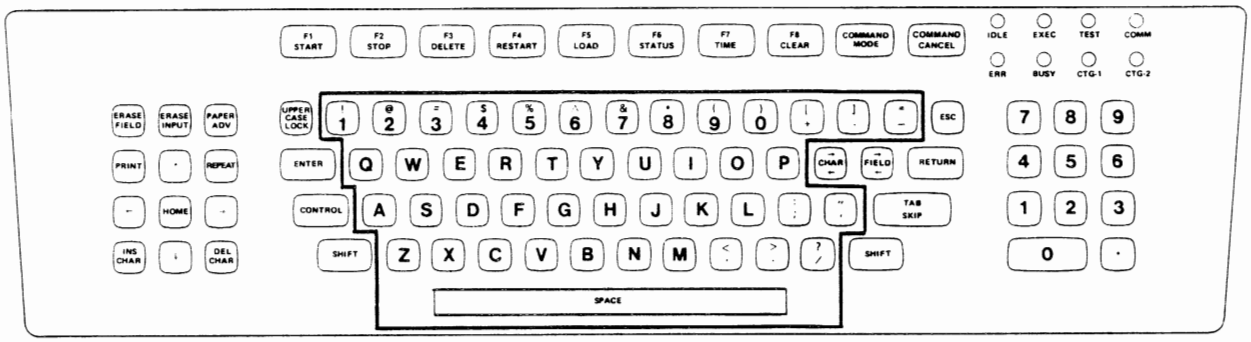
Let's look at each section in a little more detail.

Typewriter Keyboard

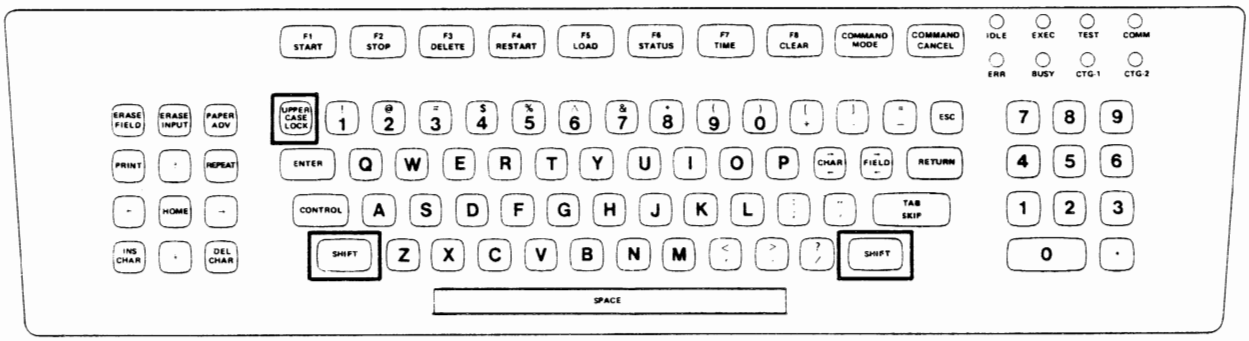
Most of your interaction with the 770 will be via the typewriter keyboard. Note the similarity to a standard typewriter highlighted here.



As you can see, the alphabet, numeric, symbol, and punctuation keys are arranged like a standard typewriter.



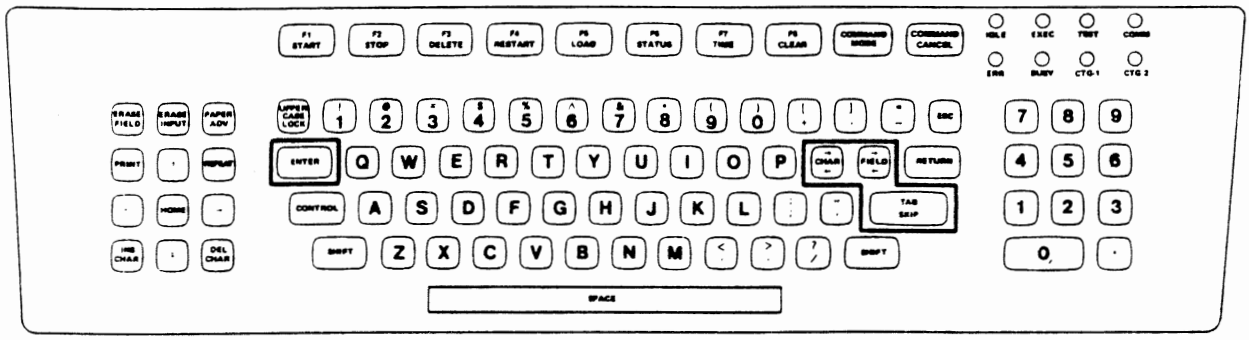
SHIFT and UPPER CASE LOCK Keys



You will use the SHIFT key(s) in the same manner on the 770 that you would on a typewriter. If you press one of the alphabet keys (A through Z) while holding a SHIFT key depressed, you will generate upper case characters (i.e., capital letters). Taking the same action without holding the SHIFT key depressed will give you lower case characters. If you press one of the "two-function" keys (those with two labels on them) while holding the SHIFT key depressed, you will generate the character or function appearing on the upper half of the key top; otherwise (i.e., unshifted), you will generate the character or function identified on the lower half of the keytop.

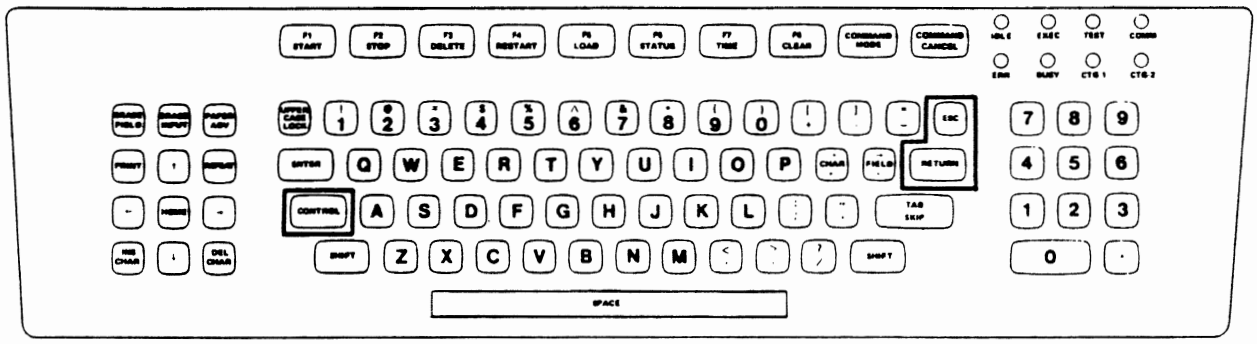
The UPPER CASE LOCK key is a special locking key. If you have this key locked in the down position, you will always generate upper case (capital) letters when typing on the alphabet keys. You cannot generate lower case letters when the UPPER CASE LOCK key is locked in the down position. Only the letters "A" through "Z" are affected by the UPPER CASE LOCK key.

ENTER, CHAR, FIELD, and TAB SKIP Keys



These keys are important special control keys used in data entry. The CHAR and FIELD keys are used to correct entry errors and the TAB SKIP and ENTER keys are used to signify the end of an entry or set of entries. You will be instructed in the exact use of these keys in Section II.

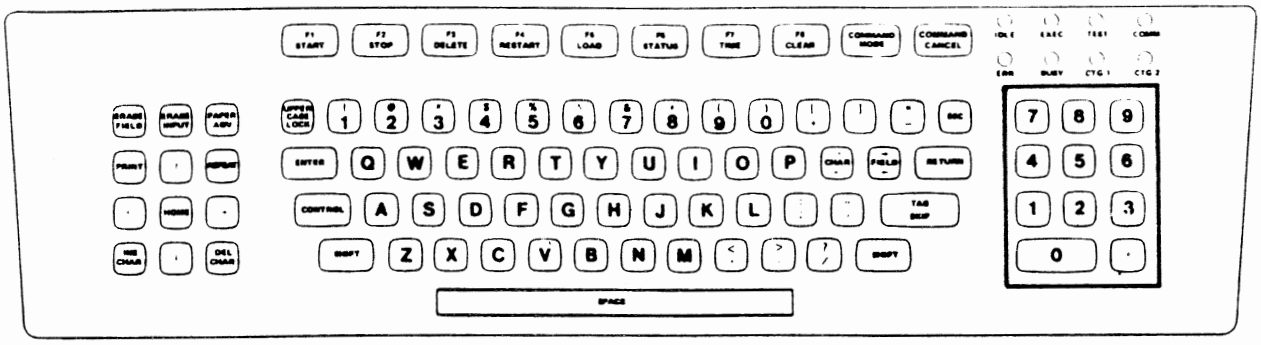
CONTROL, ESC, and RETURN Keys



As an operator, you will normally not be concerned with using the CONTROL, ESC and RETURN keys. They are used only for rare applications that need special control characters to be generated.

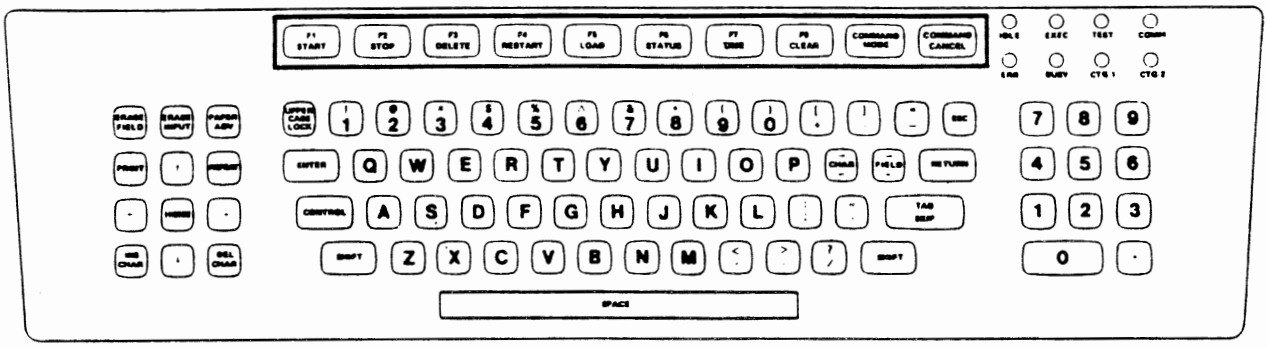
Further information on the use of these keys is contained in Appendix G and Appendix H.

Numeric Keypad



The numeric keypad is provided for your convenience when entering numerical data.

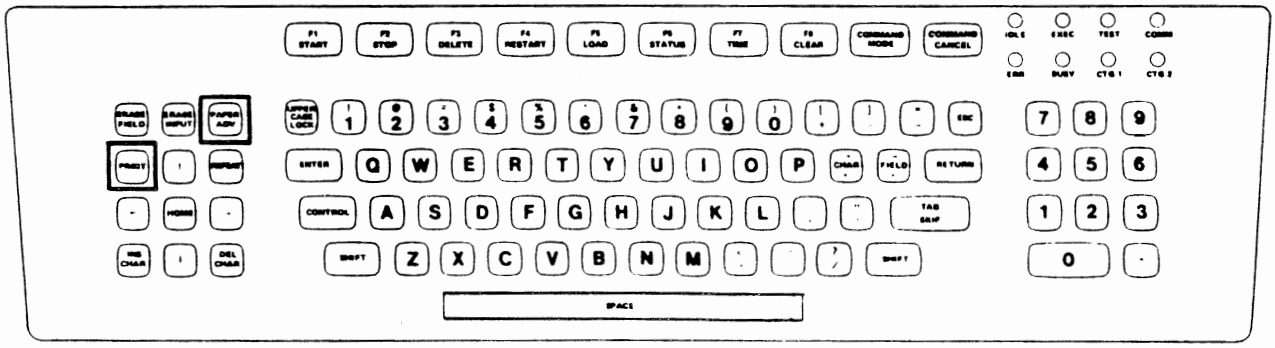
Function Keys



The function keys perform special operations. The key assignments and usage will be explained in Section II.

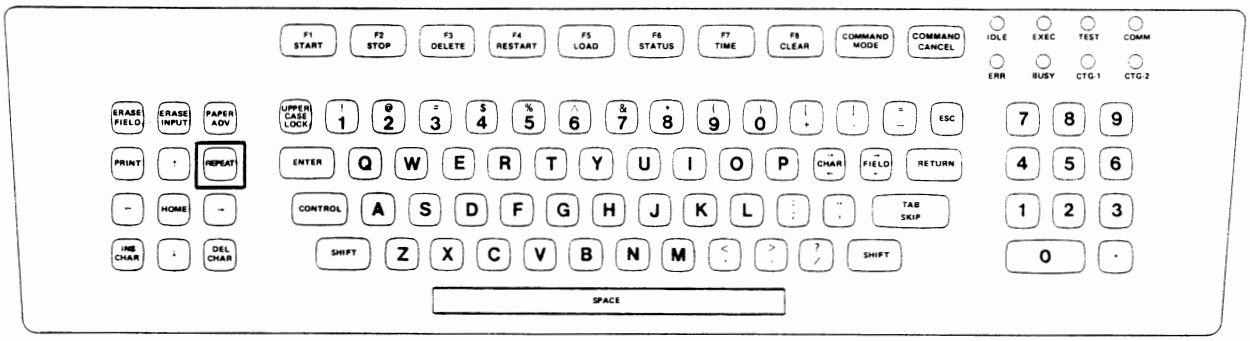
Special Operation Keys

Printer Control Keys



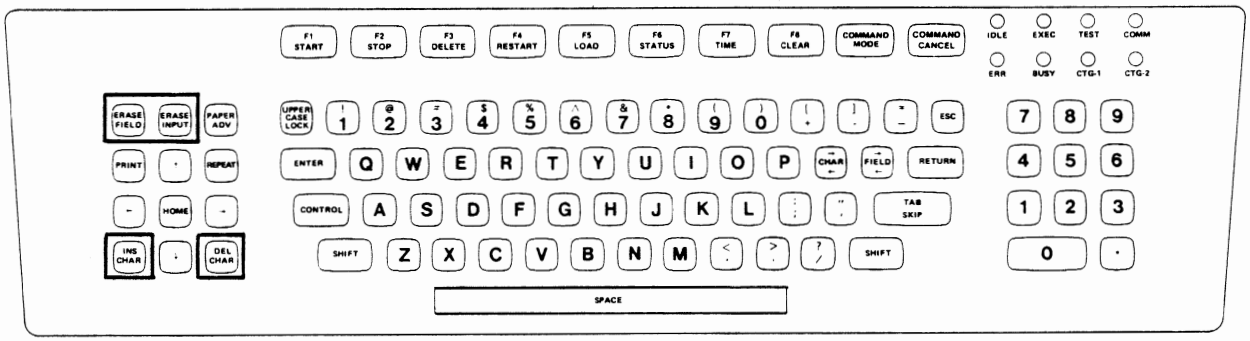
When the terminal is equipped with the optional thermal printer, you can use the PRINT key to cause the data displayed on the screen to be printed on the printer and the PAPER ADV key to line feed the printer.

REPEAT Key



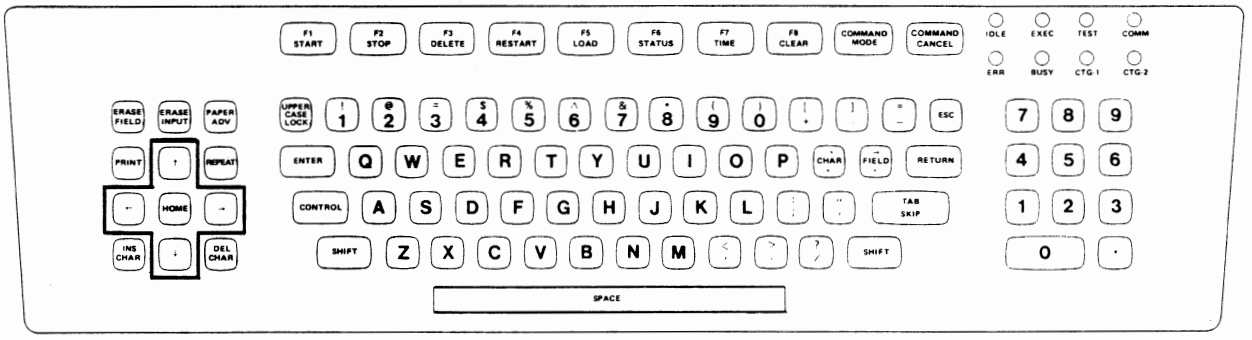
If you press and hold the REPEAT key while momentarily depressing another key, the character or action denoted for the second key will be repeated approximately five times every second until the REPEAT key is released or another character key is depressed.

ERASE FIELD, ERASE INPUT, INS CHAR, and DEL CHAR Keys



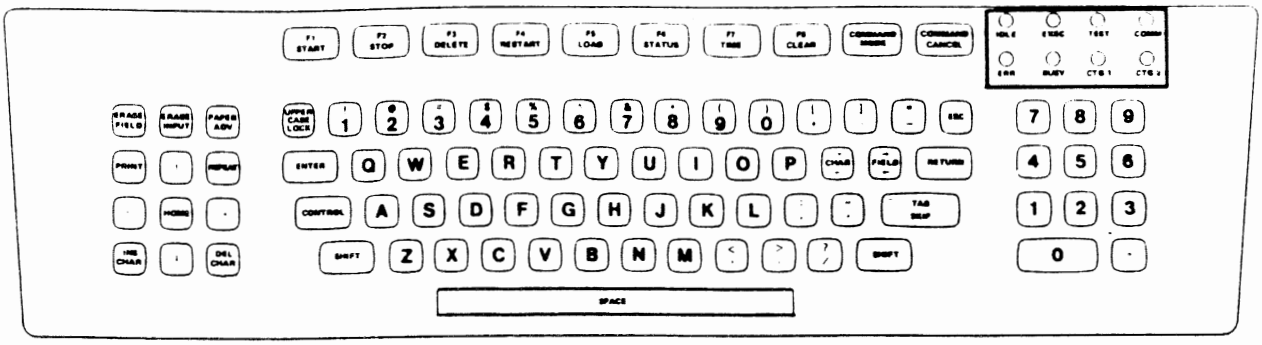
These keys can be used for correcting input errors. Their use is explained in Section II.

Cursor Control Keys



This set of keys is used primarily in program development rather than data entry. You will normally not be required to use them. They are used to control input position on the video display.

Indicators



These indicators provide you with a visible indication when various functions are happening in the terminal.

IDLE	Indicates that no operation is being performed by the 770 at this time.
EXEC	Indicates that an operation is being performed by the 770.
TEST	Indicates that self test is running.
COMM	Indicates that the terminal is communicating with another device.
ERR	Indicates that an error has occurred during self test, or an invalid character has been entered.
BUSY	Not currently used.
CTG-1	Indicates that the left tape unit is causing tape motion.
CTG-2	Indicates that the right tape unit is causing tape motion.

SECTION II
OPERATING THE 770

Learning What The 770 Can Do For You — An Introduction

The purpose of this section is to assist you in learning to operate the 770, a terminal designed with you and your workload in mind. You will discover and learn to use all the features that will help you do your work faster, more efficiently, and with fewer errors. In fact, there are so many features available to you that you may need to use only a portion of them to accomplish most of your tasks.

After completing this training session, you will be experienced and confident in the following subject areas:

- the keyboard and special keys of the 770
- how to enter data
- error checking by the 770
- how to recognize the error
- how to correct the error
- how to use the tape cartridges
- how to control what the terminal does

If you think about it,all of these items are related either to choosing which job to do, or to getting that job done. So, the information in this section is organized around those two activities. In the first part you will learn about the features of the terminal that are related to data entry and error correction. The second part introduces you to the Terminal Command Mode and how to use it to select the particular job you want the 770 to help you do.

In addition to reading this text, you will be learning by doing. There is a series of exercises on the cartridge which came with this manual. You will be using these exercises, this text, and the terminal to develop the skills to make the 770 work for you. Don't worry, the exercises begin with the basics and work gradually into the areas that may be new to you. One more thing, before you go any further in this section, be sure you have read and understood Section I, "Familiarization with the 770".

Getting The Job Done — Data Entry And Error Correction

What's It All About? An Overview

This part of Operating the 770 deals with the task of entering data correctly. In order to do that, you must be familiar with the keyboard, including any special keys related to data entry. Also, it is important to be able to recognize an error, to understand what type of error it is, and to know the most efficient way to correct it. The paragraphs and exercises that follow treat these topics from two standpoints — first, entering data in a field, and second, entering data in a form (a series of fields on one screen). Now, let's get started with some hands-on experience on the 770.

How To Begin

As mentioned earlier, you will be going back and forth between the explanations in this text and the exercises on the terminal. The exercises are stored on the Operator Training tape which came with this manual. So the first thing you must do is prepare the terminal so that you can use the exercises.

Read the following Start-Up Procedure from beginning to end. When you have finished reading it, go back and execute each step in the exact order in which it is given, even if you have already done some of the things earlier.

Start-Up Procedure

Note: The detailed instructions to perform these steps were covered in Section I: "Familiarization with the 770". Refer back to that section if necessary.

1. Plug in the terminal if it is not plugged in. (See "Attaching the Power Cord".)

2. Insert the Operator Training tape into tape unit number 1. (See "Using the Data Cartridges".)

3. Turn the power switch off. (See "Switching Power On and Off".)

4. Turn the power switch on. The IDLE indicator will come on and the internal thermal printer, if there is one, will space up one line. (See "Locating the Keyboard and Indicators".)

5. The message READY — SET TIME will appear in the lower left hand corner of the video screen. Adjust the brightness of the video display so that you can easily read the message. Do not attempt to set the time as this will be covered later on. (See "Adjusting Brightness of the Video Display".)

6. Thirty seconds after power is switched on, the terminal will begin to read the first exercises from the cartridge. During this time the CTG-1 indicator will be lit, and for a brief period you will see a PWRUP READY message displayed in the middle of the last row of the screen.

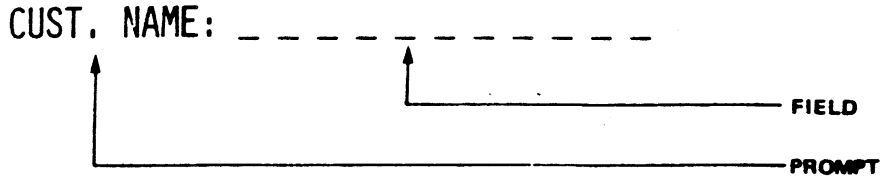
7. Wait a few seconds for the first screen image to appear. Follow any instructions that are displayed. When you have finished, return to this text at the following paragraph, "How to Enter Data in a Field".

How To Enter Data In A Field

In order to enter data into a field correctly, there are several things you need to know: definition of a FIELD, function of the CURSOR, use of the SKIP key, character-level error checking, field-level error checking, as well as several other features of the 770 that are designed to assist you on a field basis.

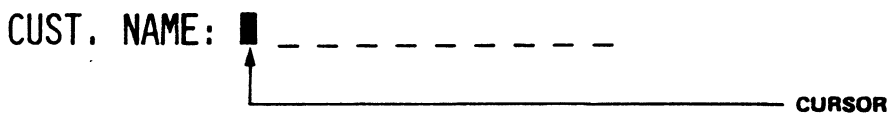
The Field

What is a FIELD? In general terms, it is a character or group of characters that can be considered as one data item. For you, a field is, in addition, recognizable on the screen because it is represented by a series of underscores. A field is also an area on the screen into which you are to enter data. One example of a field could be a customer's name, and it, along with a prompt, might appear on the 770 display like this:



The Cursor

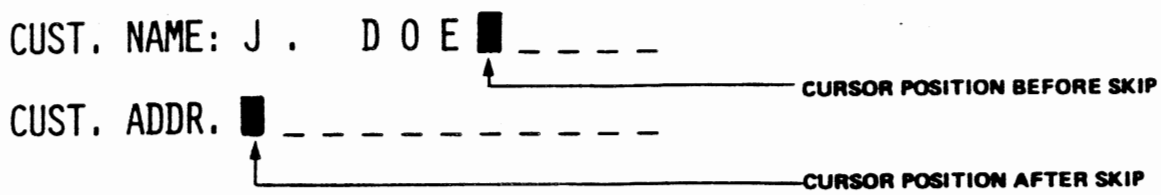
At a given time there may be any number of fields on the screen, and it is important that you know the order in which you should fill them in. There will be a CURSOR character on the screen. That marks the position of the next character to be entered. The CURSOR appears as a solid rectangle that fills the space of one character on the screen. For example, if the next field to be entered (filled-in) were CUST. NAME, the CURSOR would be displayed at the first character position of that field.



When you enter a character, that character replaces the cursor, and the cursor moves to the next character position in that field. This process continues until you fill the field (i.e., enter as many characters as there are underscores), or until you complete your entry, whichever occurs first.

The Skip Key

When you have completed your entry and you want to proceed to the next field, you do so by pressing the SKIP key. This causes the cursor to leave the current field and go to the first position of the next field. The 770 takes as your field entry all characters to the left of the cursor at the time the SKIP key is pressed. This is an important point to remember because the characters at and to the right of the cursor are erased when you press SKIP. Instances where this might occur and the methods of handling them are described in a later section.



You should be aware that the "next field" will be the field which should logically follow the current field. This may not always be the field that appears on the display next to the field you just left. Thus, you should always pay close attention to the cursor position until you become familiar with the data being entered.

Error Checking

The 770 can help you enter your data correctly by doing a wide range of error checking for you. Almost all of the error-detecting capabilities will be explained to you. This is done so that you will be able to operate the 770 efficiently regardless of what combination of error checking features your company decides to use.

While doing the exercises on the terminal, you will always be aware of what types of error-checking are being done. There will be prompts on the screen or instructions in this text to inform you. Likewise, in your daily use of the terminal, you will be aware of the entry requirements of each field via prompts on the screen or instructions from your supervisor.

Within fields, error-checking can be done on each character (per keystroke), or on each completed field (after you press the SKIP key), or both.

Character-Level Error Checking

Everytime you press a key, the 770 can verify the character you just entered. The broad categories for validation are as follows:

Category	Valid Response	Examples of Fields Where Used
alphabetic	A-Z, a-z, SPACE	state: Texas
digits	0-9	zip code: 77001
mixed	A-Z, a-z, SPACE, 0-9	telephone number: CH7 0174
numeric	0-9, +, -, ., SPACE	cost: 3.40
printable	ALL	general text: $!#ABCD

In addition, a special set of characters may be defined as valid, such as Y and N for yes and no responses.

If you make an error of this type, the 770 gives you an audible warning signal (beep), and lights up the error indicator on the keyboard.

To correct the error, simply press the CHAR key, follow it with a valid character for that field and continue with your entry. The CHAR key moves the CURSOR to the previous character position within that same field. Note that when the CURSOR is positioned over a character, that character is displayed within the cursor in reverse video.

Remember, if you enter characters in a field, then move the cursor back to some point within the field, and then press skip, all characters at and to the right of the cursor will be erased. This situation might occur when you have to move the cursor back several character positions to change a single erroneous character, for example, in the case of a misspelled name.

You will learn how to move the cursor out of a field without disturbing the existing entry in a later exercise.

Exercise 1:
Now it is time to practice on the terminal. Exercise 1 should be visible on the screen. The purpose of this exercise is to acquaint you with the keyboard, the SKIP key, the CHAR for error correction, and the six types of error checking the 770 can perform on each keystroke you make.

There are six parts to this exercise. Each part can be identified by the upper case prompt that precedes it.

ALPHA:
This field demonstrates for you an alphabetic check. There is a lower case reminder under the field to remind you that the valid characters are space and upper and lower case A through Z. Example: John Doe.

DIGITS:
In these three fields each keystroke will be checked to see if it is a digit. The only valid characters for these fields are the digits 0 through 9. Example: 1977.

MIXED:
This field will allow both alphabetic characters and digits. Thus the valid entries are upper and lower case A through Z, space, and 0 through 9. Example: 1737 Maryland Avenue.

NUMERIC:
These three fields accept numeric data. That means that the valid entries are 0 through 9, minus, plus, decimal point and space. Example: -39.2.

PRINTABLE:
Any character on the keyboard that can be printed is valid in these two fields. Example: What is a TI 770?

OTHER:
These fields validate each character against a special set of valid entries. The first field accepts either a *Y* or an *N*; the second field, *A* through *C*; the third field, *0* through *9*; the fourth field *M, S,* or *D*.

It is a good idea to experiment with the upper case lock during this exercise. All the exercises are set so that either an upper or a lower case entry is acceptable. As a general rule, however, you will find it most convenient to operate with the upper case lock on.

Do not forget that you must press the SKIP key after each entry in order to go on to the next field. Also, it is not necessary to completely fill each field.

Try this exercise several times. Practice giving correct entries, and then try many incorrect entries so you can become familiar with the warning beep, the error indicator, the cursor position, the skip key and the CHAR ← key.

When you are sure that you understand and can use with ease all of the above features, return to this text and continue reading at the paragraph entitled "Field-Level Error Checking". Now stop reading and do Exercise 1.

Field-Level Error Checking
There is another set of checks that can be done on your entry. These checks occur after you press the SKIP key, signifying that you have completed your entry in that field.

minimum number of characters — if any characters are entered in the field, you must enter at least this number of characters

fixed number of characters — if any characters are entered in the field, you must enter one of several valid numbers of characters

required — you must make an entry in the field

exclusive range — the number you enter must *not* fall within the specified range

inclusive range — the number you enter *must* fall within the specified range

rekey — you must key your entry a second time for comparison

table look-up — your entry is compared against a list of valid entries

If you make a field-level error, the 770 gives you an audible warning signal (beep), but *does not* light up the error indicator on the keyboard.

To correct a field error, you simply press the FIELD key, followed by a valid entry for that field. The FIELD key clears the error and returns the cursor to the beginning of the field so that you can enter the correct data in place of the data in error. Another key, the ERASE FIELD key, is available to correct field level errors; however, since it is part of the control cluster on the far left of the keyboard, it requires that you move your hands from the home position. ERASE FIELD not only returns the cursor to the beginning of the field, but it also erases what you had input previously.

Editing may be required if you discover an error before you press the SKIP key. In that case, you may use CHAR, CHAR, FIELD, and ERASE FIELD to make changes. Typically, you would use these keys in the following manner:

CHAR	• used to position the cursor in order to make character changes in data already entered
CHAR	• used to position cursor for character changes, especially when used in conjunction with FIELD • used to position cursor to end of field after making character changes • this is a shifted key
FIELD	• used to position cursor at beginning of field for re-entry of data entered in error
ERASE FIELD	• used to erase entire entry and position cursor at beginning of field

Remember, no matter which of these keys you use to make your changes, make sure the cursor is positioned past the last valid character in your entry before you press SKIP. The other editing keys on the keyboard will be discussed later.

Exercise 2:
Exercise 2 should be on the screen. Its purpose is to familiarize you with

1) field-level error checking
2) detecting a field error
3) correcting a field error
4) editing a field entry.

Do the exercise several times, both correctly and incorrectly. Make sure that you practice using FIELD, ERASE FIELD for corrections, and CHAR, CHAR, FIELD, ERASE FIELD for editing. Also notice that the error indicator does not light up when there is a field-level error.

There are six parts to this exercise. They are as follows:

MINIMUM LENGTH:
If you make an entry in the first field, you must enter a minimum of four characters. The minimum for the second field is six characters.

common entry for that field. This allows you to accept the value displayed by pressing the FIELD key, or to enter a different value in the same way you would if no initial value had been displayed.

Repeat Key
This key can also save you keystrokes. Instead of pressing the same key several times, press the REPEAT key and hold it while you press the key you want duplicated. The character or action for that key will be repeated five times every second until you release the repeat key or depress another key. This key is located on the control cluster to the left of home position.

Autoskip
Some fields may function as AUTOSKIP fields. This means that when the field is full, the cursor automatically skips to the next field, saving you from having to press the SKIP key.

Video (HI/LO/OFF):
There are three possible intensities for the video display. Characters may be displayed in the brightest intensity (HI) for highlighting, in the lower intensity (LO) to blend into the background, or with the video off for security purposes.

Substitution
When there is a field that requires a rather long entry and one that is fairly predictable, you may see substitution employed. In this case, you can enter an abbreviated form of the entry, and the complete entry will be substituted for you in the field. An example of this would be entering your initials in the operator identification field. The 770 would respond by entering your complete name in the field.

Arithmetic
If addition, subtraction, multiplication or division needs to be done on some of the data that you enter, the 770 may be pre-set to do that for you. For instance, if you are entering quantity and price for an item, the 770 can do the multiplication and enter the total cost in another field for you.

Justification
Quite often data that does not completely fill a field needs to be justified within the field. The 770 can move your entry to the right, to the left, or to the right and fill the empty position to the left of the data with zeroes. In addition, it can insert decimal points for you.

Scaling
Sometimes a certain number of zeroes need to be added to the right of whatever number you enter. This is called scaling and, if it is used, it will happen automatically when you press the SKIP key.

Be aware that an error condition called OVERFLOW may occur with scaling and justification. It is signalled by filling the entire field with asterisks. It simply means that the combination of your entry plus the number of zeroes to be added by scaling equalled a number larger than the size of the field. To correct this condition, merely press FIELD and enter a fewer number of characters.

Of the features introduced above, only the REPEAT key can be controlled by you via the keyboard. All of the others must be pre-set by the person within your company who is responsible for defining how your task will operate on the 770. If these features are used, you will see the results when you press the SKIP key, terminating your input for the field involved.

Exercise 3:
This exercise gives you an opportunity to try out each of the time-saving features introduced in the preceding paragraphs. At first it may be necessary to refer back to this text to refresh your memory on exactly how each features works, but with a little practice you should have very little trouble, if any, going through the exercise without the aid of this text. When you reach that point, you should stop doing the exercise and resume reading at the paragraph entitled "How to Enter Data in a Form".

There are eight parts to this exercise. Each of these parts corresponds to a paragraph heading in the section you just read. Be sure to refer back to each of those paragraphs the first time you do each part of this exercise.

INITIAL VALUE:
There are three fields, each with an initial value. Field one is THESE VALUES; field two, CAN BE USED; field three, OR REPLACED.

REPEAT KEY:
These three fields will give you a chance to experiment with and get the feel of the repeat key.

AUTOSKIP:
When you fill these fields, you will see the cursor automatically skip to the next field. If they are not filled, you must use the SKIP key.

VIDEO:
These three fields are set to display your entry in the three intensities for comparison.

SUBSTITUTION:
If you enter one of the values indicated (770, 7, TI, or 0) in this field, a substitution will be made after you press the SKIP key. Any other entry will not result in a substitution.

ARITHMETIC:
In the first and second field you may enter digits. The two numbers will be added together, and the answer will be placed in the third field. The same pattern applies to fields four, five, and six, but the operation is multiplication.

JUSTIFICATION:
The entries you make in these four fields will be justified. A numeric check is done on each character. It is best to enter a smaller number of characters than there is room for in the field. In this way, the justification will be dramatically demonstrated. In the first field the 770 will insert a decimal point, leaving two places to the right of the decimal. Field two will be left justified; field three, right justified and zero filled; field four, right justified.

SCALING:
This feature adds zeroes to the right of your entry. Numeric checks are done on the characters you enter. Your entry for field one will be multiplied by 10. Field two will be multiplied by 100.

During the scaling and justification parts of this exercise, you may notice that the field will be filled with asterisks after you press the SKIP key. This means that the entry you made plus the characters added by the 770 added up to a number larger than the length of the field. Rather than truncating the number without your realizing it, the 770 fills the field with asterisks. Treat this as a field error and correct your entry with the FIELD key. If you fail to correct the error, the 770 will not allow you to repeat the exercise or to proceed.

Now begin the exercise on the terminal. When you have finished the exercise, resume reading at this point in the text.

How to Enter Data in a Form

What is a form? A FORM is a term used to talk about all of the fields on a screen. These fields are usually related in some way so that, when all the fields are filled in, they form a complete unit of work. Actually, the exercises you have been doing could be considered forms. Another example of a form is an order entry form. All of the exercises and new information presented in this section on entering data in a form are centered around how fields interact with each other, and how you can move around from field to field within a form to edit data and correct it.

Using What You Already Know

Before you learn all the new features related to fields within a form, it is important for you to become accustomed to seeing the fields arranged in a meaningful sequence, and to the feel of interacting with the terminal and the form to produce the results you want. The next exercise is designed to give you that sort of feeling and familiarity.

Exercise 4:
This exercise represents a typical form — entries in a customer address file. You should repeat this exercise until you can do it almost automatically, since many times you may be entering data from documents in front of you and you will rarely consult the screen. In the beginning, try out each field with valid and invalid entries to verify that the checks specified are indeed being done. Also observe any additional time-saving features on each field. Then begin to make valid entries as consistently as possible in an effort to build up speed and confidence.

The checks for each field are as follows:

Prompt	Field Size	Error Checks	Other Features
NAME LAST	21	PRINTABLE	REQUIRED
FIRST	12	PRINTABLE	REQUIRED
MIDDLE	12	PRINTABLE	
ADDR STREET	37	PRINTABLE	REQUIRED
APT. OR SUITE	12	PRINTABLE	
CITY	21	"A-Z","."," - "," ","a-z"	INITIAL VALUE, REQUIRED
STATE	2	ALPHA	INITIAL VALUE, REQUIRED
ZIP	5	DIGIT	
TEL ( )	3	DIGIT	MINIMUM (3), INITIAL VALUE
	3	MIXED	MINIMUM (3)
	4	DIGIT	MINIMUM (4)
EXT	6	MIXED	
DATE	2	DIGIT	REQUIRED, RANGE (1-12), ZERO FILL
	2	DIGIT	REQUIRED, RANGE (1-31), ZERO FILL
	2	DIGIT	REQUIRED, RANGE (77-99)

Now begin exercise 4 on the terminal. When you have finished the exercise, return to this text and resume reading at the paragraph entitled "Learning More".

Learning More

Yes, there are even more ways in which a 770 can assist you in getting the job done. You will find that these features are more advanced and in some respects more specialized. Once again, as in the "Other Features to Assist You" section, some of these features can be controlled by you via the keyboard, while others you will simply observe happening since they will have been pre-set by the person at your company who designed the forms you will be using.

Other Things the 770 Can Do with a Form

These features are ones that may be pre-set for the form you are using. They make the form behave in a different way than what you have seen up to this point. Once again, you will find that these features are real time-savers.

Conditional Branching

For the most part, conditional branching is not used and the order in which you fill in the fields in a given form will not vary. If conditional branching is being done, the cursor may advance to different fields depending on what your entry in the current field is. An example would be the following: if you were to respond *single* or *divorced* to the prompt, *marital status*, the cursor might skip over the field that requested the spouse's name.

Crossfield

Crossfield means that the attributes (error checks and other features) for the current field are determined by the contents of another field. Therefore, a particular field may not have the

same attributes all the time. For instance, if the last character in a part number were *c*, indicating that the item comes in various colors, the color field would be a required entry in the form. For all other part numbers the color field would *not* be a required entry or might be skipped over entirely.

Passed Data
The 770 can be pre-set to pass data from field to field and from form to form. This can be a real time-saver for you with such items as "today's date", which you would like to be able to enter once at the beginning of the day and have it automatically entered for each form during the day.

Moving Around Within the Field
This discussion deals with keys used to move around within a given field. Some information you already have is summarized. These keys only allow you to move within a field. You are not allowed to move the cursor to the left beyond the first character position of the field, and you cannot move it to the right more than one character position past the right-most character entered in the field (you would normally have the cursor in this position when you press the SKIP key).

CHAR ← : This key moves the cursor one position to the left.

CHAR → : This key is a shifted key. It moves the cursor one position to the right.

Moving Around Within the Form
With the exception of the TAB key, you have already been introduced to the keys discussed here. Nevertheless, when these keys are used with movement within the form in mind rather than straight forward data entry or editing, there are some additional characteristics of these keys that must be taken into consideration.

TAB
This is a shift of the SKIP key. It allows you to jump from field to field regardless of whether or not a valid entry is present in that field. The cursor stops at the first character position of *only* those fields that have been pre-set as tab stops. When you TAB out of a field containing an entry, that entry will not be erased or changed.

FIELD ←:
In addition to editing fields and correcting errors (field-level and character-level), the FIELD ← key allows you to move around the form. If you press it prior to entering a character in the current field, the cursor moves to the beginning character position of the previous field. This allows you to move from field to field in reverse order, whether or not a valid entry is present in the fields passed over. If, however, you have entered a character in the field and have not yet closed it with the SKIP key, the cursor moves only to the beginning of the current field.

FIELD →:
This is a shifted key. It allows you to jump from field to field in a forward direction provided all required fields that are passed over have valid entries in them. This key is also pressed in order to accept initial values. The cursor stops at the beginning character position of the next

field. The $\overrightarrow{\text{FIELD}}$ key also allows you to leave a field without erasing characters at and to the right of the cursor position.

Please note that the SKIP key is *not suitable* for movement from field to field. Since a field entry is considered to be the characters to the left of the cursor when the SKIP key is pressed, using this key for field movement has the effect of erasing any entry, or initial value, already entered in the field. In addition, it prohibits you from moving past a required field.

Editing the Field

In addition to the keys used to position the cursor to a field or within a field, there are three editing keys that operate within a field. All of these keys reside on the cursor control pad.

INS CHAR :

Insert character moves all the characters within a field, beginning at the cursor position to the right one position. This leaves a space at the cursor position and you may press the key you wish to insert. This key can only affect data within the bounds of a field.

DEL CHAR :

Delete character deletes the character at the cursor position and moves all characters to the right of that deleted character left one position to close the gap. This key can only operate on characters within the bounds of a field.

ERASE FIELD :

This key erases the entry in the current field and leaves the cursor at the first position of that field.

Editing the Form

There is one key that has an editing effect on the entire form. It also resides in the control cluster on the left.

ERASE INPUT :

This key erases all entries in all fields, resets the initial values for the fields that have them, and positions the cursor at the first position of the first field. It is used to restart a form from the beginning.

Terminating the Form

Up until now any initiation, termination or changing of forms has been done automatically for you. There are two keys that allow you to do this manually.

ENTER:

The ENTER key signals that you have completed your entries in all of the fields. The 770, in turn, will reverify all your entries, and if they are correct, will accept them and redisplay the basic form with its initial values so that you may begin another entry sequence. If there are

any errors detected during this reverification, there will be a beep and the cursor will be positioned at the end of the field found in error. The 770 can be pre-set to perform the ENTER function for you when you skip out of a particular field. This was done in the previous exercises.

F8:
The function key F8 is located in the top row of keys. Pressing this key is one way of terminating the form. You would press this key only if there were no more entries to be made that day, and you did not want the form to be active.

Exercise 5
This exercise will give you an opportunity to use the features introduced under "Learning More". Be sure to experiment with each new key so that you will be clear on exactly what will happen should you press it. This form is not set to do an automatic ENTER for you, so each time you complete the form, press ENTER to get a fresh copy of the form to begin again. Also experiment with pressing enter with some required fields still empty to see what an error condition looks like with the ENTER key.

This exercise has three parts. Each one corresponds to a paragraph heading in the section "Other Things the 770 Can Do with a Form". Refer to these paragraphs as you do each part of the exercise for the first time.

PASSED DATA
Enter digits in the top four fields. As you skip out of the field, the number you entered will appear in the field below it. If you enter all zeroes, your entry will be left justified, ignoring leading zeroes.

CONDITIONAL BRANCHING:
There are three fields. If you respond *N* to the MARRIED question, the 770 will skip the SPOUSE'S NAME field.

CROSSFIELD:
The only valid entries for these fields are the words in parentheses following the field. If you respond GRASS for field one, then you must enter GREEN for field two. The same applies for SKY and BLUE.

When you have completely finished with Exercise 5 and *have no further need* of the form, press F8 and you will observe that the form will have terminated and that you can no longer make entries even though the screen does not go blank.

Stop reading and do Exercise 5. When you have completed the exercise return to this text at the paragraph entitled, "What It Was All About — Summary".

What Was It All About — Summary

In this section on *Getting the Job Done* you have been introduced to fields and the collection of fields called a form. You have also learned what special features are available to help you, what types of error checking may be done for you, and how you can detect and recover from an error.

Remember the special features and error checking capabilities that have been introduced to you here. After working with the terminal and the forms specific to your work, you may begin to notice ways in which some of these 770 features could make your work faster and easier. Be sure to mention any ideas for improvement of your forms to your supervisor. Both you and your company could reap benefits from your suggestions.

Before proceeding to the next section, you may want to repeat some of the exercises given thus far. If so, simply turn the power off and then on. After 30 seconds, the exercises will start over from the beginning.

Choosing a Job for the 770 — Terminal Command Mode and Error Correction

What is the Terminal Command Mode? — An Overview

In the previous section called "Getting the Job Done", you witnessed the 770 doing many things in the area of job selection; however, they were all done automatically. The terminal was pre-set so that when the power switch was turned on and off a certain series of exercises would begin. Then, each exercise, or form, terminated automatically and another one began in its place until you reached the final form, which terminated but remained on the screen. This process of selecting a job, starting it, and stopping it can be done automatically, or, you can do it selectively by using the Terminal Command Mode. With this tool you can choose what job the 770 will do and when it will do it.

In order to use the Terminal Command Mode (TCM), you must understand three things: 1) what a program is, 2) what a file is, and 3) how to use the function keys. This section will discuss the two new concepts of program and file. Then you will learn about each function key and how to use it. The material on function keys is a combination of text and exercises.

Understanding Files and Programs

What is a Program?

A program is a set of instructions that determines how the terminal will behave and what it will do. Remember the exercises from the previous section? Those exercises were forms, and a form is one type of program. With each exercise, or form, the 770 behaved in a different manner to accomplish a different task. Each form was a separate program, or a separate set of instructions for the terminal. You may also recall several references to "pre-set" conditions for the terminal. Those "pre-set" conditions are actually instructions that, along with many others, go together to form a program that determines how the terminal will act.

You need not concern yourself with how to write a program for the 770. The programs you will use on the 770 will have already been written by someone who is familiar with your work and with the features of the 770. What remains for you to do is to select from the available programs the one you need, and to command the 770 to start and stop the program.

You select the program you need by name. Each separate set of instructions is given a name. This name is referred to as a *program name*. It is a word that is a maximum of six characters in length, that begins with an alphabetic character, and that can contain both letters and numbers. Some examples of program names would be the program names associated with the exercises you did earlier. The names of the programs for exercises 2-4 are EX2, EX3, EX4.

Where Are Programs Stored?

Programs can be stored two places: in the 770 memory, and in files on a cartridge. In fact, you could compare the 770 to yourself and the cartridge to any instruction book, such as a cookbook, a home repairs manual, or an owners manual for a new car. The 770 has a memory, as you do, to temporarily hold one or more sets of instructions for use in the near future. The cartridge, like an instruction manual, has many programs (sets of instructions), organized in files (chapters).

When you have a job to do, you go through the following steps:

1) locate the instruction manual
2) open the book to the correct chapter
3) read the set of instructions from the book
4) memorize the instructions
5) execute the instructions.

The process is basically the same for the 770. Through the commands of the Terminal Command Mode, you tell the 770 which program to execute and where to find that set of instructions. Then the 770 proceeds to:

1) locate the cartridge unit
2) position the cartridge to the correct file
3) read the set of instructions from the tape
4) load (into memory) the instructions
5) execute the instructions.

You can see from the above analogy that programs are stored in files on a tape cartridge for long-term storage. They are stored in the 770 memory when you want to execute them.

What Is a File?

Up to this point files have been mentioned only briefly. A comparison was made between a chapter in a book and a file on a cartridge, meaning that files are a way of subdividing and categorizing all the information recorded on a tape. The purpose of doing this is to make the information easier to locate and use.

The files have names, just like programs do, and the same rules apply:

- maximum of six characters
- first character is alphabetic
- other five characters are letters or numbers

There are two types of information in a file: 1) programs, 2) data.

Programs

If programs are stored in the file, there can be more than one program per file. For example, you could have a file with only one program unit:

FILE NAME:	FILE1
CONTENTS:	PROG1

And, you could have a file with several programs:

FILE NAME:	FILE2
CONTENTS:	PROG1
	PROG2
	PROG3
	PROG4

Also note that "PROG1" in "FILE2" is not necessarily the same program as "PROG1" in "FILE1".

Here is another variation you might encounter. The program and the file could have the same name.

FILE NAME:	PAYROL
CONTENTS:	PAYROL

Data

Most of the programs you will execute will be forms, and most forms are designed as a mechanism to collect data. When a form is executing, and you reach the point where you are satisfied with your responses, there is usually a response to signal that you have finished this entry and are ready to go on to the next one. You press the key, your entries disappear, and the empty form with its initial values appears on the screen. What happened to the data that you entered? More than likely, it was recorded in a data file on a cartridge. So you can see that data is just another type of information that can be recorded on a tape.

In summary, here are the facts you need to remember about files: 1) files are a way to organize information recorded on a cartridge; 2) files have names; 3) there are two types of files — data and program; 4) more than one program can be stored in a program file; 5) both data and program files can be on the same cartridge; and 6) one cartridge can have a maximum of 20 files.

You may be wondering at this point how you know what files are on which cartridges. You should consult with your supervisor about the tapes you use daily at your company. They will probably contain a combination of program files and data files.

How to Use the Terminal Command Mode

Now that you know what a file is and what a program is only one thing remains — how to use the function keys. It is through these keys that you access the command mode.

The Function Keys

There is a total of ten function keys, and they are located in a row at the top of the keyboard:

Key	Command Mode Function
F1/START	Start a Program
F2/STOP	Stop a Program
F3/DELETE	Delete a Program
F4/RESTART	Restart a Program
F5/LOAD	Load a Program
F6/STATUS	Program Status
F7/TIME	Set Time and Date
F8/CLEAR	System Clear
COMMAND MODE	Enter Command Mode
COMMAND CANCEL	Cancel Command Mode

You will notice that the first eight function keys have two labels on them (Ex: F8/CLEAR). That is because they operate in two different modes. When they are under program control, they are referred to as F1 through F8. An example of this was the final exercise (#5) in the previous section where you were instructed to press F8 to terminate the form. These eight keys can be pre-set (programmed) to represent different functions in each program. When you are using the Terminal Command Mode, these same eight keys have particular commands associated with them: start, stop, delete, restart, load, status, time, clear.

Entering Terminal Command Mode

When you turn the power on, the 770 is in program mode and will stay there unless you take some action to enter command mode. To enter Terminal Command Mode, press the COMMAND MODE key. The 770 will respond with the message OP: on line 24 of the display. At this point you may press the appropriate key for whichever function it is you wish to perform. When you press one of the keys, a two character mnemonic will appear which represents the function you have chosen (Ex: start = SR, stop = SP, delete = DL, restart = RS, load = LD, status = ST, time = TM, clear = CL). This mnemonic will be followed by a series of prompts that guide you in entering the information the 770 needs to perform the task. For instance, if you wish to set the date and time, the sequence of events would be as follows:

Your Action	770 Display on Line 24
Press COMMAND MODE Key	OP: *
Press TIME Key	OP: TM * _ / _ _ / _ _ _ _ : _ _
Enter Month + SKIP	OP: TM 12/* _ / _ _ _ _ : _ _
Enter Day + SKIP	OP: TM 12/31/* _ _ _ : _ _
Enter Year + SKIP	OP: TM 12/31/77 * _ : _ _
Enter Hour + SKIP	OP: TM 12/31/77 23:* _
Enter Minute + SKIP	OP: TM 12/31/77 23:31*

*Indicates Cursor Position

When you press the SKIP key following the minute entry, the 770 accepts the time and date you entered, leaves the command mode, and clears line 24.

Responding to the Prompts

Terminal Command Mode prompts are similar in many ways to those you saw in exercises 1—5, so much of that experience will apply to giving responses in the command mode. There is, however, one main difference. You can only make editing changes in the field where the cursor is positioned. In other words, you are not able to move around from field to field for editing.

Correcting Errors

When you are in the command mode, the 770 does some character level and field level error checking on your responses. In addition, there are two other types of error checking that are done. The three levels of errors can be distinguished by the time at which they are detected and the type of error indicator you get.

1. Entry Errors: This type of error is generally due to keystroke errors and is detected by character and field level error checking at the time you make your entry. An example of this type of error would be to enter a letter where a number was required in setting the date and time. The error will be indicated in the same way character and field errors are signalled in a form (beep and error indicator on). The error correction keys are also the same (CHAR, FIELD).

2. Content Errors: With this type of error your entry passed all of the initial error tests, but the content of your entry is requesting the 770 to perform a function that it cannot do. An example of a content error would be to request that a program which is not in the 770 memory be deleted from memory. The 770 would detect that it cannot perform that function and would sound the beeper and display a message on line 24 that reads ERROR! To recover from this type of error, just press COMMAND MODE to re-enter command mode, and retry your command.

3. System Errors: These errors occur when your entry passes the initial error tests and appears to be a valid request; however, when the 770 attempts to perform the function, it is unable to do so. An example of a system error would be the following situation. You correctly enter the command requesting the 770 to load a program (read it from cartridge into the 770 memory). There are no content errors that can

be detected from your entry (i.e., there is no other program active in memory with the same name) so the 770 tries to perform the requested function. When it tries to read the cartridge, it finds that there is no cartridge in the tape unit. This type of error is indicated by a message on line 24 that says SYSTEM ERROR 0817. A list of error codes and their meanings may be found in Appendix B. If you do not have that list of the system errors handy, you should consult with your supervisor to find out what error condition corresponds to the error code. If the error is one you can correct, such as the one mentioned in this example, error recovery is simply a matter of pressing COMMAND MODE and re-entering your command.

To summarize, there are three types of errors: entry errors that occur while you are entering your command, content errors that the 770 detects before it attempts to perform the function requested, and system errors that are detected while the 770 is attempting to perform the function. Entry errors are indicated by the error indicator and beeper and are corrected with the CHAR→ and ←FIELD keys. Content errors are indicated by a message on line 24 (ERROR!) and are corrected by pressing the COMMAND MODE key and starting over. System errors are indicated by a message on line 24 (SYSTEM ERROR XXXX), and are corrected by pressing the COMMAND MODE key and starting over. XXXX represents the system error code as listed in Appendix B.

There is one other key that is used in the Terminal Command Mode. It is the COMMAND CANCEL key. This key is used to exit the command mode and return to the program mode. Actually, the command mode terminates automatically when a function is completed or a content or system error is detected. Therefore you would only use this key to terminate the command mode when you are in the middle of entering a command. For example, you begin to enter the time and date command and realize that you don't know the date. You want to terminate the command and do it later. In this case you would press COMMAND CANCEL and the 770 would return to program mode without attempting to perform the requested function.

Exercise 6:
Now it's time to begin putting this information to good use. This is the first of seven exercises that will introduce the Terminal Command Mode to you. These exercises differ from the previous exercises in that there will not be a special form on the screen to direct you in your inputs. The exercises will consist of instructions from this text and your interaction with the 770 in Terminal Command Mode.

Your task in Exercise 6 is to set the time and date by using the command mode. Remember, in order to use the command mode, you must go through the following steps: 1) enter command mode, 2) select a command, 3) respond to the prompts. The detailed description of each step required to set the time and date is given in the discussion on Entering Terminal Command Mode. Refer to that procedure when you do this exercise.

This exercise is designed to give you some experience in using the COMMAND MODE, COMMAND CANCEL, and function keys, as well as the error correction keys (CHAR→ and ←FIELD).

While you are doing this exercise, you will notice that Exercise 5 is still on the screen. Ignore this for the time being and concentrate on line 24, the bottom line of the video screen, where all Terminal Command Mode messages appear.

When you have gained some confidence, begin to experiment with the error correction keys. Make sure that you cover the following points:

1. Create and correct an entry error.
2. Notice the error indicators.
3. Use the COMMAND CANCEL key.

Set the time more than once and then terminate this exercise session by correctly setting the date and time.

Stop reading at this point and do Exercise 6 as it is described above. When you have completed the exercise, return to this text and start reading at the paragraph entitled "What You Can Do in the Terminal Command Mode".

What You Can Do in the Terminal Command Mode

You have already been introduced to the eight function keys and the commands associated with them. This section gives you a detailed description of each command as well as an exercise designed to familiarize you with its use. Each of the eight commands will be treated here even though they will not be presented in the same order you see them on the keyboard.

F7/TIME — Set Time and Date

The 770 has a clock which it can use to keep the time and date. Every time the power is turned off and then on again, the clock is set to all zeroes. The TIME command allows you to set the clock to the correct time and date. The prompts and fields are as follows:

```
OP: TM __/__/__        __:__
OP: TM 01/01/77        00:01
```

Field*	Length	Entry
1	2	Month in Digits
2	2	Day in Digits
3	2	Year in Digits
4	2	Hours in Digits (0-23)
5	2	Minutes in Digits

*Fields in this and following examples are numbered from left to right.

There is no exercise given here for the TIME command since you already have experience using it from Exercise 6.

F1/START — Start a Program

This key has a dual function. It *loads* a program (reads it from the cartridge into the 770 memory), and it *activates* the program (the 770 starts executing the set of instructions). In order for the 770 to perform these two functions, it must know 1) the program name, 2) which tape unit you placed the cartridge in, and 3) the name of the file where the program is stored. The prompts and fields are as follows:

```
OP: SR  PROG: ______    CTG: _  FILE: ______
OP: SR  PROG: CLOCKD    CTG: 1  FILE: OPRTNG
```

Field	Length	Entry
1	6	Program Name
2	1	Tape Unit Number (1 or 2)
3	6	File Name/Press TAB to Accept Initial Value (Same as Program Name)

Exercise 7:

In Exercise 6 you set the time and date. Now you will START a program which reads the 770 clock and displays it on the screen. You will be able to detect that the program is active/executing because you will see the time display change continually. The program name is CLOCKD. It is recorded on the cartridge which came with this manual. That cartridge is probably still in tape unit 1. The program is stored in a file named OPRTNG.

If a program is executing, another program by the same name cannot be LOADED or STARTED. At this point you do not know the necessary commands to stop a program and delete it from memory, so you will only be able to successfully complete this exercise once. Nevertheless, it would be informative for you to see the content errors and system errors that occur when you try to START a program that is already executing or START a program that doesn't exist on the cartridge you placed in the tape unit.

Remember that each time the 770 accepts a command, it terminates command mode, so you must reactivate it each time you want to give it a command. You do this by pressing the COMMAND MODE key.

When doing Exercises 7 through 13, be sure to refer to the examples given in the paragraphs preceding each exercise. These examples correspond very closely to what you will be doing in the exercise.

The sequence of your actions and the 770 responses are as follows:

Your Action	770 Display on Line 24
Press COMMAND MODE	OP:
Press F1/START	OP: SR PROG: ______
Enter CLOCKD + SKIP	OP: SR PROG: CLOCKD CTG: _
Enter 1 + SKIP	OP: SR PROG: CLOCKD CTG: 1 FILE: CLOCKD
Enter OPRTNG	OP: SR PROG: CLOCKD CTG: 1 FILE: OPRTNG
Press SKIP	None

Note that when you enter the cartridge number, the 770 automatically displays the program name, CLOCKD, in the FILE: field. It does this because in many cases, the program name and file name are the same. If this is the case, you can accept the file name displayed by pressing the TAB or FIELD key. Remember not to use the SKIP key in this case because the file name will be erased.

In this exercise, the program name and file name are different, and you enter the correct file name by typing OPRTNG, then SKIP.

As soon as you enter the file name, the 770 will search the tape for the program you requested, load that program into memory, and start execution of the program.

Stop reading at this point and START the clock program (CLOCKD). When you have completed the exercise, return to this text and begin reading at the paragraph entitled "F2/STOP — Stop a Program".

F2/STOP — Stop a Program

If a program is executing and you do not want it to execute, you can stop it with the STOP command. The result of this command is that the program becomes inactive, but remains stored in memory. In other words, although the 770 stops executing the instructions, it can still remember them for future use. The prompts and fields are as follows:

```
OP: SP  PROG: _ _ _ _ _ _
OP: SP  PROG: CLOCKD
```

Field	Length	Entry
1	6	Program Name

Exercise 8:

At this point the clock program (CLOCKD) should be running. Your task in this exercise is to STOP that program. It will be easy to see the results of the STOP command because the time display will stop changing each second. Since the restart procedure for a program has not been explained, you can only observe the results of the command once.

Your actions and the 770 responses will be:

Your Action	770 Display on Line 24
Press COMMAND MODE	OP:
Press F2/STOP	OP: SP PROG: _ _ _ _ _ _
Enter CLOCKD	OP: SP PROG: CLOCKD
Press SKIP	None

Stop reading and try the STOP command with the program CLOCKD. When you have completed this exercise, return to the text at the next paragraph titled "RESTART — Restart a Program". Stop reading and try the STOP command with the program CLOCKD.

F4/RESTART — Restart a Program

The RESTART command is used to activate a program. It makes the 770 begin executing the set of instructions you name. The program must already be loaded in the 770 memory. You would use this command to restart a program which has stopped or been stopped, or to execute a program which has been loaded into memory but not activated. The prompts and fields are as follows:

```
OP: RS  PROG: ______
OP: RS  PROG: CLOCKD
```

Field	Length	Entry
1	6	Program Name

Exercise 9:

The CLOCKD program is in memory and has been stopped. You can now use the RESTART command to activate it again. You will notice that it is executing when you see the time display changing. Now you should use a combination of the STOP and RESTART commands several times in succession until you become familiar with them. Also, just for fun, review the TIME command. You can use it while CLOCKD is executing or stopped, and the next time you see CLOCKD display the time and date, your change will be reflected there.

Stop reading and do the exercise. When you are finished, resume reading in this text at the paragraph entitled "F5/LOAD — Load a Program".

When you are finished, resume reading in this text at the paragraph entitled "LOAD — Load a Program". Stop reading and do the exercise.

F5/LOAD — Load a Program

The LOAD command requests that a program be read from cartridge into the 770 memory. The program will remain inactive in the 770 memory until a RESTART command is given, requesting that the program be executed. As you can see, the START command is a combination of the two commands LOAD and RESTART. In order to load the program, the 770 must be given almost the same information that was needed for a START. The exact prompts and fields are as follows:

```
OP: LD  PROG: ______   CTG: _  FILE: ______
OP: LD  PROG: PATTRN   CTG: 1  FILE: OPRTNG
```

Field	Length	Entry
1	6	Program Name
2	1	Tape Unit
3	6	File Name/Press TAB to Accept Initial Value (Same as Program Name)

When the 770 has completed loading the program, there will be a ready message which includes the program name displayed on line 24, the bottom line.

Exercise 10:
For the LOAD exercise you will use a program named PATTRN. It is on the cartridge that came with this manual and is recorded in the file named OPRTNG. Both programs, PATTRN and CLOCKD, use the screen, but since they use different parts of the screen, there is no conflict and you can allow CLOCKD to continue to execute.

In this exercise you should accomplish the following:

1. LOAD the program PATTRN.
2. RESTART the program PATTRN.
3. Practice RESTARTing and STOPping both programs (CLOCKD and PATTRN).

You may experiment with the STOP and RESTART commands with two programs in memory at the same time. The sequence of your entries is the same as that used to start a program

Be sure that when you finish the exercises, the CLOCKD program is loaded but not executing and the PATTRN program is loaded and executing.

Stop reading and do Exercise 10. When you have finished the exercise, return to the text and start reading the paragraph entitled "F6/STATUS — Program Status".

F6/STATUS — Program Status
If the 770 terminal is running when you sit down at it, it is possible that someone has already loaded the program you need into memory. You use the STATUS command to find out what programs are in memory and whether or not they are executing.

To find out which programs are loaded in the 770 memory, you press the STATUS command key, but instead of responding to the PROG: prompt, you make no entry in the field and simply hit the SKIP key. The 770 then displays the names of the programs that are in memory. The prompts and the fields are as follows:

```
OP: ST   PROG: _ _ _ _ _ _
OP: ST   PROG: _ _ _ _ _ _CLOCKD   PATTRN   EX5
```

Field	Length	Entry
1	6	SKIP

The STATUS command can also be used to find out if a program is active (executing) or inactive (loaded but not executing). To do this you give the program name as a response to the prompt. The 770 will then respond with some status information on that program. Most of the information given is of interest only to a programmer. The field you should look for is the one labeled ST for status. If the value given is 0004, that means that the program is inactive

(loaded but not executing). Any other value in that field means that the program is active (executing). The prompts and fields are as follows:

```
                OP: ST  PROG: ______
(INACTIVE)      OP: ST  PROG: CLOCKD    ST 0004  LD 1900  WP 1926  PC DEF2
(ACTIVE)        OP: ST  PROG: PATTRN    ST 0000  LD 1C00  WP 1C26  PC CC6C
```

Field	Length	Entry
1	6	Program Name

Exercise 11:
In this exercise you should try both features of the STATUS command. First, use the command to find out if any programs are in memory. If you have followed the instructions in Exercise 10, there should be three programs: EX5, CLOCKD, PATTRN. Next, you should get the detailed status information on each one of the programs to determine whether or not they are executing. EX5 and CLOCKD should be inactive, and PATTRN should be active. After you have completed these two parts of the exercises, you may want to experiment with the STOP and RESTART commands in combination with the STATUS command.

Stop reading and do Exercise 11. After completing the exercise, resume reading at the next paragraph, which is entitled "F3/DELETE — Delete a Program".

F3/DELETE — Delete a Program
The 770 memory is used for temporary storage. When the time comes that you want to erase a program from that memory, you use the DELETE command. It causes the 770 to "forget" the program. The only requirement is that the program must be inactive. So, if you wish to DELETE a program that is executing, you must first STOP it. The prompts and fields are as follows:

```
OP: DL  PROG: ______
OP: DL  PROG: CLOCKD
```

FIELD	LENGTH	ENTRY
1	6	PROGRAM NAME

Exercise 12:
At this point three programs should be in memory, EX5, CLOCKD and PATTRN. The first two are inactive and the third is active. Your assignment is to use the DELETE command on the programs. It should be successful for EX5 and CLOCKD, since they are not executing, and unsuccessful for PATTRN, which is executing. In addition to noting the error message you will receive for attempting to delete an active program, you may want to use the STATUS command to verify the results of the two DELETE commands that were accepted.

You will notice that deleting a program does not clear the screen, just as stopping a program does not.

Now that you know the STOP and DELETE commands, you can go back and practice the START and LOAD commands if you would like some additional experience with them.

Stop reading and do Exercise 12. When you finish, return to this text and start reading at the next paragraph entitled "F8/CLEAR — System Clear".

F8/CLEAR — System Clear

This last command has the effect of turning power off and then on again. Although the power is not turned off, the system is completely cleared — the memory is "erased", and the time and date are set to zeroes. Your supervisor can advise you on the proper and timely use of this key.

In addition to clearing the system, this command resembles a power cycle in another important way. If you will recall when you first started these exercises, you turned the power off and on. Shortly thereafter the first program began to load and execute. This happened because of a special POWER FAILURE recovery feature of the 770. If the power fails, the 770 waits for 30 seconds after power has been turned back on. If during that time no one has entered the Terminal Command Mode, the 770 begins to look on tape unit 1 for a file named PWRUP with a program in it by the same name. If there is one, the 770 loads and executes the program. If there isn't a file and program by that name, a system error message will appear on line 24.

The prompts and fields are as follows:

```
OP: CL  OK? _
OP: CL  OK? Y
```

Field	Length	Entry
1	1	Y = YES OTHER = NO

If you do respond *Y* to the *OK?* prompt, a system clear is performed. When it is complete, a ready message appears on line 24,along with a reminder to set the time. This is the same message you see when you turn the power on.

READY — SET TIME

Exercise 13:

This exercise consists of simply clearing the system. You may want to try it twice, once with the cartridge in tape unit 1 and once with the cartridge not in place or in tape unit 2.

Stop reading and complete Exercise 13. Then return to this text and start reading at the paragraph entitled "Reviewing What You Have Learned".

Reviewing What You Have Learned

Congratulations!

You are now fully prepared to operate the 770. As you have probably discovered, it is a terminal designed to work for you. The more familiar you become with its features, the more possibilities you will discover for saving time and increasing speed and accuracy. With this in mind, you should consider reviewing the exercises one by one with an eye towards making the 770 your own machine and personal help-mate.

The exercises may be repeated in exactly the same order as they were presented in this text, or you may single out several exercises that are of special interest to you. Each of the first five exercises is a separate program which starts the succeeding exercise from tape unit 1 when the current exercise terminates. Exercises 6–13 all deal with the Terminal Command Mode, and, as such, can be done using any of the programs on the tape. Listed below are the program names:

FILE NAME:	OPRTNG
PROGRAM NAMES:	PWRUP
	HELLO
	EX1
	EX2
	EX3
	EX4
	EX5
	CLOCKD
	PATTRN

SECTION III
CARE AND CLEANING

Cleaning the Video Display Screen

The Video Display Screen will accumulate dust over a period of time. It may be cleaned with a cloth dampened with any good glass cleaner.

Cleaning the Tape Unit Head

The read/write heads in the tape units should be cleaned at least once a week. Clean the heads as follows:

CAUTION

Do not touch the heads with anything but a cotton swab.

1. Moisten a swab with denatured alcohol.

2. Hold the tape unit door open with your finger as shown in Figure 3-1 and clean the head with a back-and-forth motion of the swab. The head is the shiny surface, inside, at the back of the unit.

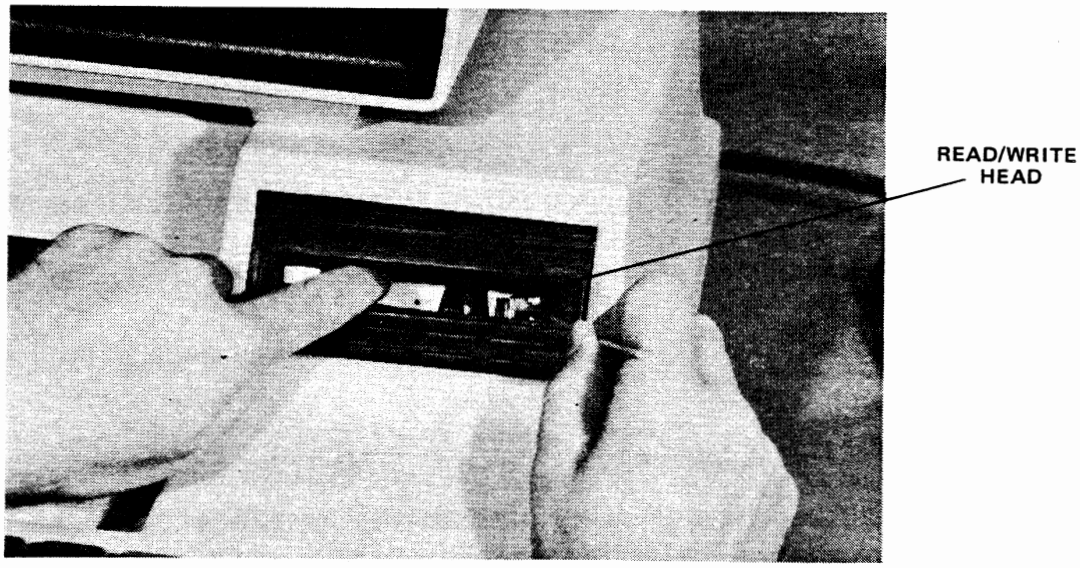


Figure 3-1. Tape Unit Head Cleaning

3. Take a dry swab and wipe the head clean with a back-and-forth motion.

4. Clean the other unit in an identical manner.

Cleaning the Outside Surfaces

If necessary, you can clean the outside covers of the base unit and the video display module with a damp cloth and any non-abrasive, household-type detergent.

Cleaning the Thermal Printhead

The thermal printhead (if the terminal is equipped with a printer) should be cleaned each time a new roll of paper is loaded into the terminal. Clean the printhead more often if the printed image begins to fade because of residue accumulating on the printhead. Proceed as follows:

1. Remove the thermal paper.

2. Feed a sheet of good quality bond paper into the paper chute until it can be seen at the window.

3. Verify that terminal power is ON and press the PAPER ADV key until the bond paper is under the printhead.

4. On the portion of the bond paper not yet in the paper chute, wet a 2-inch wide strip with denatured alcohol. (Denatured alcohol is available from Texas Instruments in pint containers as part number 230007-0000.) Now press the PAPER ADV key until the wetted area is under the printhead.

5. Start program THERML of file THERML (the Thermal Printer program) located on the OPERATOR TRAINING tape provided by Texas Instruments. The program will provide further instructions. The procedure for loading a program is covered in Section II. The tape must be in tape unit number 1.

NOTE

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

6. When the printing operation is complete, remove the bond paper from the printer.

7. Load a fresh roll or reload the existing roll of thermal paper as outlined in Section I.

Adjusting Print Contrast on the Thermal Printer

You will probably never have to adjust the printing contrast since it is pre-set at the factory for optimum clarity. However, if you want a darker or lighter image, here is how to make the adjustment.

1. Locate the adjustment hole provided on the right side of the terminal. You will use a small screw driver as shown in Figure 3-2.

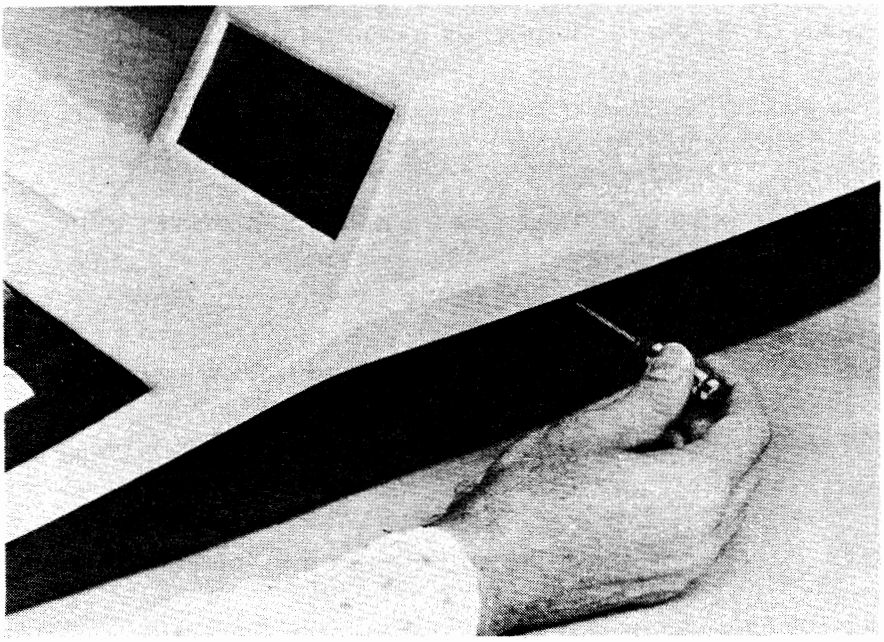


Figure 3-2. Print Contrast Adjustment

2. Start program THERML of file THERML contained on the OPERATOR TRAINING tape provided by Texas Instruments. You will be given further directions by the program. The procedure for loading and starting a program is covered in Section II. The tape must be in tape unit 1.

The following rules apply and are given here for your general reference:

- For darker print, rotate the screwdriver adjustment clockwise.

NOTE

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

- For lighter print, rotate the screwdriver adjustment counter-clockwise.

APPENDIX A
TERMINAL COMMAND MODE — REFERENCE

In addition to controlling terminal operations via executing programs, the 770 may also be controlled by a set of keyboard commands executed by the resident operating system.

This "COMMAND MODE" is initiated by depressing the COMMAND MODE key followed by the appropriate function key. The available commands are:

F1 — "START" — Load and execute the selected program.

F2 — "STOP" — Stop execution of the selected program.

F3 — "DELETE" — Delete the selected program from memory.

F4 — "RESTART" — Begin execution of the selected program already resident in memory.

F5 — "LOAD" — Load the selected program into memory.

F6 — "STATUS" — List the programs resident in memory.

F7 — "TIME" — Set the system clock.

F8 — "CLEAR" — Clear system memory.

In addition a Self Test of the 770 can be made by entering COMMAND MODE followed by a "T", "S" and "SKIP" followed by "Y" and "SKIP". (Note: "TS" clears system memory.) "TS" mode is terminated by entering COMMAND MODE.

A command mode request can be cancelled by entering COMMAND CANCEL.

APPENDIX B
TERMINAL COMMAND MODE — SYSTEM ERROR MESSAGES

When you are addressing the terminal through the Terminal Command Mode, it is possible that the 770 may not be able to successfully complete the command directed. In such instances the 770 will inform you by displaying the message ERROR! or SYSTEM ERROR XXXX.

When ERROR! is displayed you have made an invalid entry. To correct the mistake, reinitiate the Terminal Command Mode and supply the proper information.

If SYSTEM ERROR XXXX is displayed, the 770 has tried to complete the command but has detected an error in the execution. XXXX represents a code which the 770 displays to indicate which error has been detected. The following is a list of the error codes, their definitions, and suggested corrective action.

Terminal Command Mode Error Messages

Error XXXX	Definition	Recommended Action
0700	CHECKSUM ERROR — 770 has detected that the program you are trying to START or LOAD has an error in it.	Try Again — If same error, replace tape with another.
0817	CARTRIDGE NOT IN PLACE — The tape unit you requested has detected that it does not have a properly loaded cartridge.	Install the cartridge properly and retry.
0827	CARTRIDGE REMOVED DURING OPERATION — The tape unit specified was performing a cartridge operation and the cartridge was removed.	Install the cartridge and retry.
0853	FILE NOT FOUND — The 770 could not find the file you requested.	Ensure that you have the correct file name and cartridge, then retry.
0857	READ/WRITE ERROR — The tape unit did not successfully complete the READ or WRITE operation attempted.	Clean tape unit — try again. If same error, replace tape with another.
0883	PROGRAM NOT FOUND — The file you specified was found, but the program was not in the file.	Ensure that you have the correct program file and cartridge, then retry. If same error, replace tape with another.

Terminal Command Mode Error Messages (Concluded)

Error XXXX	Definition	Recommended Action
08B7, 08C7	CARTRIDGE FORMAT ERROR — Tried to use a tape that was not properly initialized.	Replace tape with the correct one.
0900	NOT ENOUGH MEMORY — Tried to START or LOAD a program that required more memory space than was available.	Ensure that all unnecessary programs have been deleted, or that all required programs have been loaded in the specified sequence, then retry.
0A00	NOT A VALID PROGRAM — You have attempted to START or LOAD something that was not a program — probably a data file.	Ensure that you attempt to START or LOAD only programs.

APPENDIX C
SPECIFICATIONS

The specifications for the 770 terminal are listed in table C-1. Dimensions are given in figure C-1.

TABLE C-1. TERMINAL SPECIFICATIONS

Characteristic	Specification
VIDEO DISPLAY	
Display Size	12-inch diagonal
Display Resolution	240 lines, non-interlaced
Display Intensities	Normal and low
Display Controls	1, brightness
Character Capacity	24 lines of 80 characters or 1920 characters
Character Font	Upper case — 5 dots by 7 dots Lower case — 5 dots by 5 dots Cursor — 7 dots by 10 dots
TAPE CARTRIDGE UNITS	
Quantity	2
Tape Length	Minimum — 140 feet
Recording Type	800 BPI-phase encoded
Tracks	2 (electrically selected)
Recording Capacity	Variable length block 100K bytes per track (256 character block)
Read/Record Speed	20 inches per second
Search/Rewind Speed	60 inches per second
Controls	Eject button (1 each)
MEMORY SIZE	
ROM	24K bytes
RAM	8K bytes — expandable to 24K bytes
KEYBOARD	
Main Keyboard	55 keys — typewriter arrangement
Numeric Keys	Numbers 0 through 9 and decimal point
Cursor and Control Keys	12 keys — 5 cursor control INS CHAR PAPER ADV DEL CHAR ERASE INPUT REPEAT ERASE FIELD PRINT
Special Function Keys	10 keys — F1 through F8 COMMAND MODE COMMAND CANCEL
Indicators	8 light-emitting diodes IDLE ERR EXEC BUSY TEST CTG-1 COMM CTG-2

TABLE C-1. TERMINAL SPECIFICATIONS (Continued)

Characteristic	Specification
COMMUNICATIONS	
Internal	Asynchronous — Type 202 Modem — 1200 baud Synchronous — Type 201 Modem — 2400 baud Auto Call Unit — Pulse and touch tone or control only for external ACU
External	Will interface to most asynchronous and synchronous modems and auto call units
THERMAL PRINTER	
Print Rate	30 characters per second
Lines per inch	6
Characters per line	80
Paper Specification	Texas Instruments Specification No. 972603-0001 — 100 foot roll
POWER	
Voltage	115/230 +13%, -15% 100/200 ±10%
Frequency	47 to 63 hertz
Current	2 amperes (approx.)
ENVIRONMENTAL (exclusive of thermal paper and magnetic tape)	
Temperature	Non-operating -30°C to +70°C Operating +10°C to +35°C
Humidity (without condensation)	Non-Operating 10% to 95% Operating 20% to 80%
Altitude	Non-Operating to 50,000 feet Operating to 12,000 feet
PHYSICAL	
Weight	Approximately 65 pounds
Dimensions	See Figure C-1

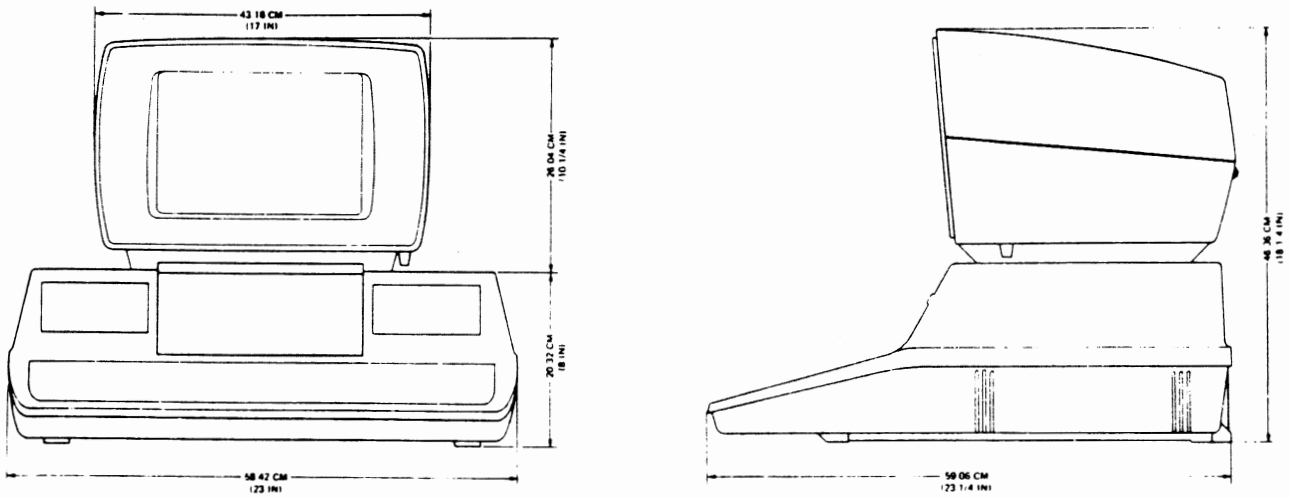


Figure C-1. Terminal Dimensions

APPENDIX D
INSTALLATION

Space Requirements

As shown in the outline dimension drawing, Figure C-1, the 770 is approximately 23 inches wide by 23¼ inches deep by 18¼ inches high. In conjunction with this obvious minimum space requirement, an additional 8 to 12 inches should be provided to either side and above the terminal to provide for adequate cooling ventilation and 2 to 4 inches at the back of the terminal for cable clearance. Additional space for operator usage should be provided as needed.

NOTE

Adjacent terminals should not be placed closer than 16 inches apart side by side or 12 inches apart back to back.

Terminal Assembly

Assemble the terminal as follows:

1. Open the base unit container and remove the packing material from around the base unit.

CAUTION

The base unit weighs approximately 40 pounds. Do not attempt to lift it without help.

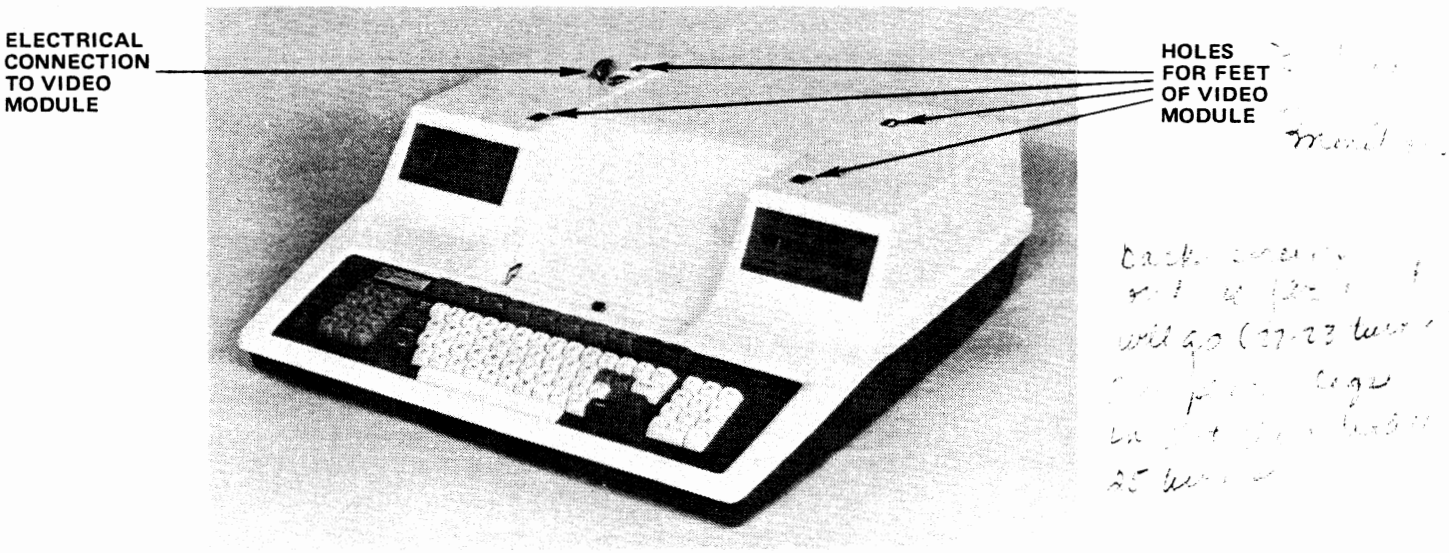


Figure D-1. Terminal Base Unit

2. Lift the base unit from the container and place it on a table.

3. Observe the holes for the video module feet and the electrical connection for the video module as shown in Figure D-1.

4. Open the video module container and remove the packing material from around the video module.

NOTE
The video module weighs approximately 25 pounds.

5. Remove the video module from the container and place it on a table.

6. Lift the left side of the video module and observe that there is a small connector located in an opening just forward of the left rear foot. This connector receives the cable from the base unit.

7. Place the video module on the base unit, inserting the feet into the holes in the base unit.

8. Slide the base unit forward to engage the front feet of the video module with the base unit.

NOTE
Lift the back of the video module as required to ensure that the front feet engage the base unit cover.

9. Lift the back of the video module high enough to allow connection of the cable from the base unit to the connector in the video module. Make the connection and lower the back of the video module pushing the cable back into the base unit as required.

10. At the back of the video module, observe a screw head at each rear foot position. These screws draw the rear feet of the video module into contact with the base unit cover. Turn each screw clockwise until it is snug.

Initial Power Application

When power is applied to the terminal, the operating system automatically initializes the terminal and a system message will be displayed on line 24 of the display. Proceed as follows:

1. On the back of the terminal, ensure that the power switch is set to OFF.

2. Plug the power cord securely into the receptacle provided in the rear of the terminal. Then connect the power cord to the commercial power source.

3. On the back of the terminal, set the power switch to ON.

4. On the video display, READY — SET TIME will appear at the bottom of the screen (line 24) and on the keyboard, the IDLE indicator will be lit.

Self Test

The following test can be used to verify that the memory and screen portions of the terminal are operating properly. This test can be executed anytime there is some question about terminal operation.

NOTE

Self test destroys any data that is presently in memory.

Proceed as follows:

1. Press the COMMAND MODE key. Line 24 will display OP:

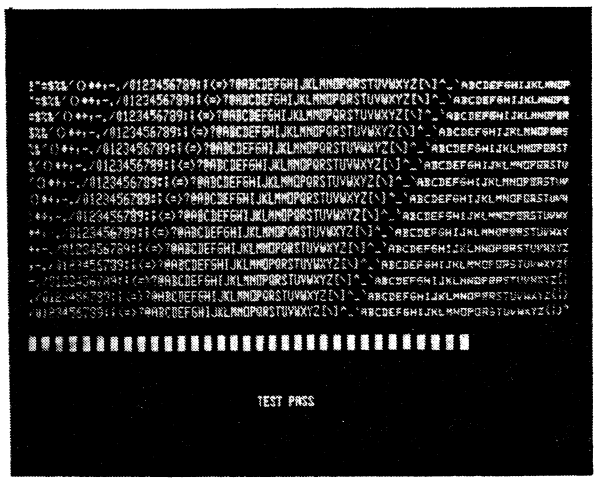
2. Press the T key and then the S key followed by the SKIP key. Line 24 will display OP: TS OK? _

3. Answer yes by pressing the Y key; answer no by pressing the N key. Any other key input sets error and is cleared by pressing FIELD. After Y or N, press SKIP key.

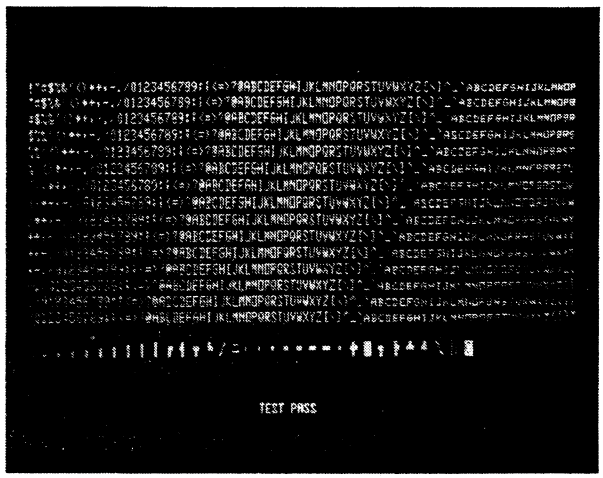
4. The self test program begins executing as soon as the SKIP key is pressed. The visible indications that self test is executing are:

   - All eight indicators on the keyboard light for a short period of time to provide a test of these indicators. After this short test, the TEST indicator will remain lit.

   - The display shown in Figure D-2 will appear on the screen. The results of the test are shown in the display. If the terminal is not operating properly, a failure is indicated by the ERROR indicator on the keyboard.



WITHOUT GRAPHICS OPTION



WITH GRAPHICS OPTION

Figure D-2. Self Test Patterns

5. Self test can be repeated as many times as desired by pressing the REPEAT key.

6. To terminate self test and return to normal terminal operation, press the COMMAND MODE key. Line 24 will display READY — SET TIME.

Thermal Printer Test

If the terminal is equipped with the optional thermal printer, the following test should be performed.

1. Load the thermal paper as indicated in Section I of this manual.

2. Start the thermal printer test program. The program is named THERML and is located in a file named THERML on the OPERATOR TRAINING tape supplied by Texas Instruments. The procedure for loading and starting a program may be found in Section II of this manual. The program will provide necessary instructions. The tape must be in tape unit 1.

APPENDIX E
ATTACHING EXTERNAL EQUIPMENT

Many applications require the use of external equipment attached to the 770. These devices, when needed, are attached via cable to the connector ports of the 770. These ports are labeled J6, J7, and J8 and are located in the lower rear area of the terminal as shown in Figure E-1.

In the area of the back faceplate directly above the connector ports is a sticker labeled 770 INTELLIGENT TERMINAL CONFIGURATION. X's placed in appropriate positions on the sticker indicate which options are associated with that particular 770. Some of the options are for use with external devices. When these external options are indicated, a cable or cables are provided for making the appropriate connections. The end of the cable that is to be attached to the 770 will be labeled with a designator P6, P7, or P8 or possibly a combination such as P6/P7. The other end of the cable is to be attached to the external equipment and is labeled appropriately.

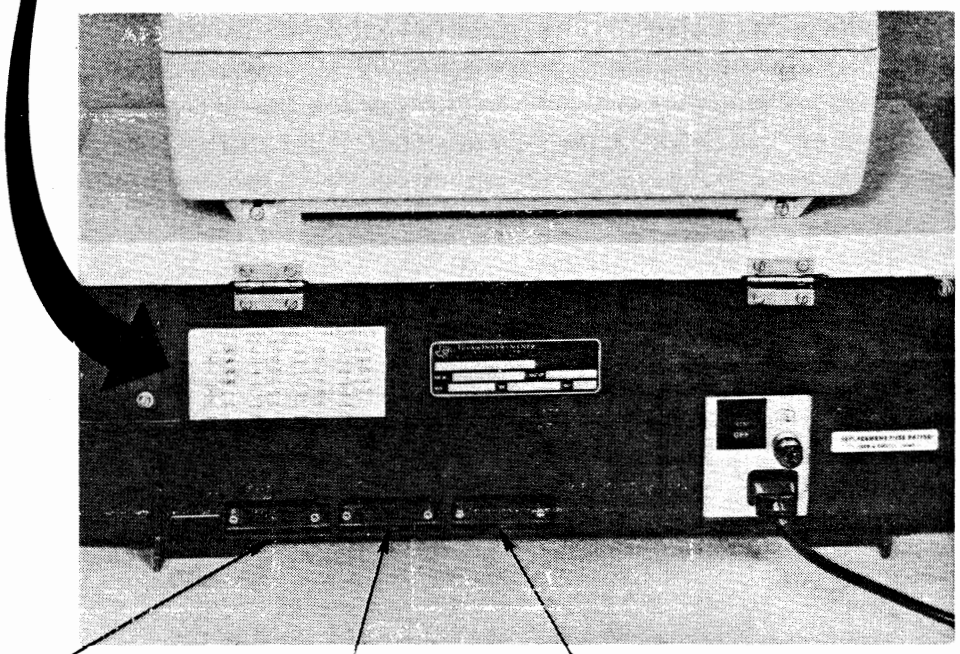
Configuration drawings are provided to show the possible cable connections. Also included is a cross reference between the external options listed on the 770 TERMINAL CONFIGURATION label and the appropriate CONFIG number. The configuration number drawings include the cable names and part numbers required. Table E-1 is a cross reference between the options indicated on the configuration label and a configuration number which is used as a reference in Figure E-2 to determine the cable connections.

Table E-1. Option to Configuration Cross Reference

Option	Configuration Number	Option	Configuration Number
E3N	1	I1A	10
E3A	2	I1D	11
E2N	3	0AC	13
E2A	4	S3N	7
E1N	5	S2N	8
E1A	6	S1N	9
I2N	10	MC0	12
I2A	10	MC1	12
I2D	11	MC2	12
I1N	10	OSC	13

770 INTELLIGENT TERMINAL CONFIGURATION
P/N 993001

____ 70S	_X_ E3N	____ I2N	____ S3N
_X_ 70P	____ E3A	____ I2A	____ S2N
____ 100	____ E2N	____ I2D	____ S1N
____ M08	____ E2A	____ I1N	____ MC0
_X_ M16	____ E1N	____ I1A	____ MC1
_X_ GPH	____ E1A	____ I1D	____ MC2
____	____	____ OAC	____ OSC



J6 – EIA Access to Primary Communications Port
J7 – EIA Access to Auxiliary Communications Port
J8 – Access to Internal Modem or ACU Interface to Primary Communication Port

Figure E-1. Terminal Communications Ports

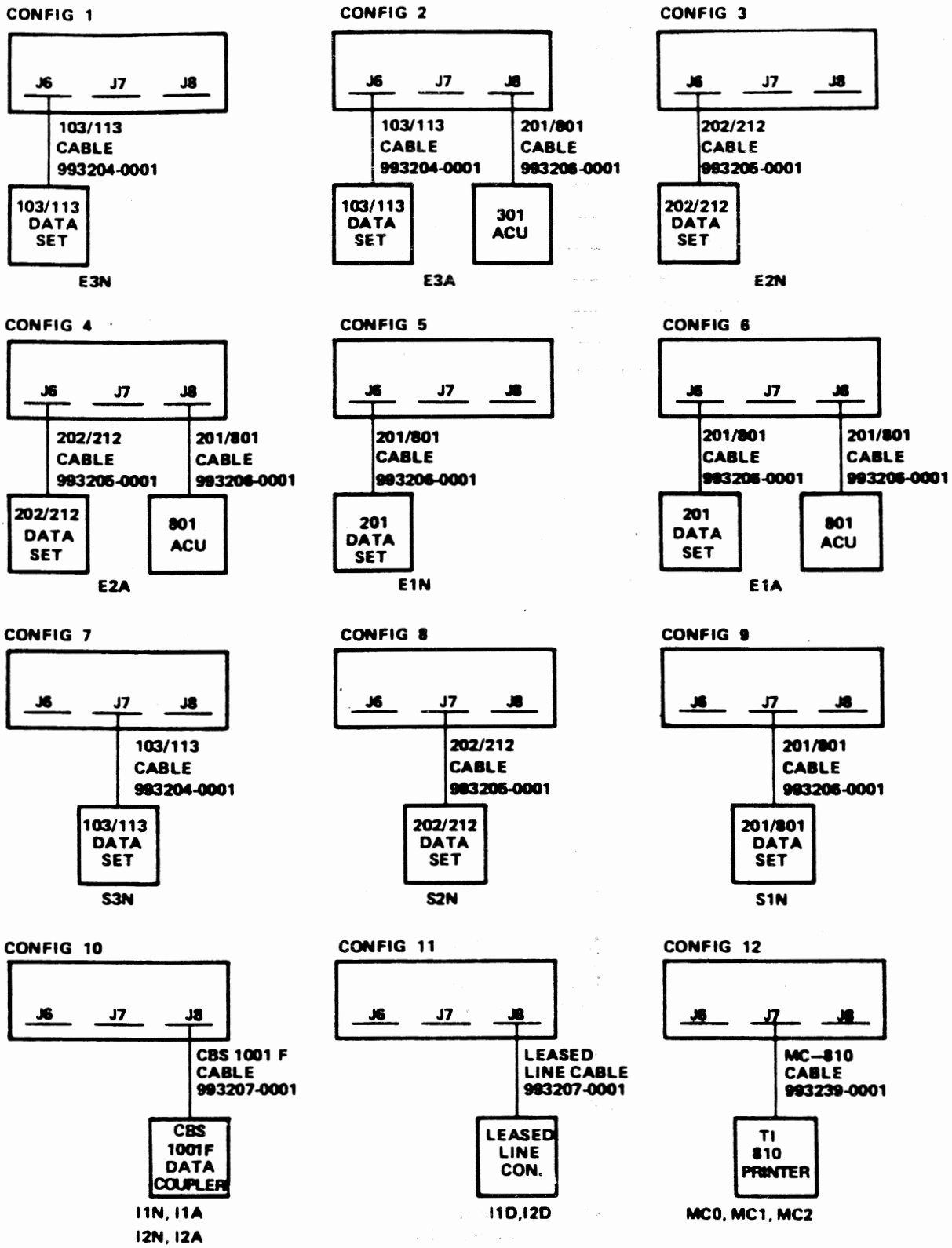


Figure E-2. Configuration Cable Connections (sheet 1 of 2)

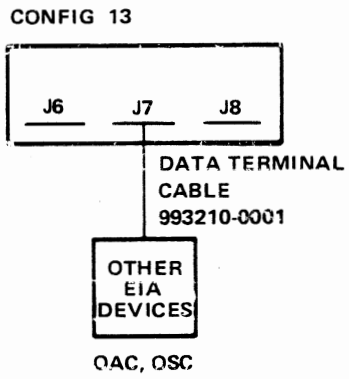


Figure E-2. Configuration Cable Connections (sheet 2 of 2)

APPENDIX F
CABLE PIN ASSIGNMENTS

The following tables provide pin assignment information for the standard cables available for the terminal. Where wiring is not one-to-one, a schematic of the cable is given.

Table F-1. 103/113 Data Set Cable P/N 993204-0001

770 Pin P6 — P7 (Male)	Modem Pin 103/113 (Male)	RS232-C Circuit	Function
1	1	AA	Protective Ground
2	2	BA	Transmitter Data
3	3	BB	Receiver Data
4	4	CA	Request to Send
5	5	CB	Clear to Send
6	6	CC	Data Set Ready
7	7	AB	Signal Ground
8	8	CF	Received Line Signal Detector (DCD)
20	20	CD	Data Terminal Ready
22	22	CE	Ring Indicator

Table F-2. 202/212 Data Set Cable P/N 993205-0001

770 Pin P6 — P7 (Male)	Modem Pin 202/212 (Male)	RS232-C Circuit	Function
1	1	AA	Protective Ground
2	2	BA	Transmitter Data
3	3	BB	Receiver Data
4	4	CA	Request to Send
5	5	CB	Clear to Send
6	6	CC	Data Set Ready
7	7	AB	Signal Ground
8	8	CF	Received Line Signal Detector (DCD)
11	11	SA	Secondary Request to Send (RCT)
12	12	SB	Secondary Received Line Signal Detector (RCR)
20	20	CD	Data Terminal Ready
22	22	CE	Ring Indicator

Table F-3. 201/801 Data Set Cable P/N 993206-0001

770 Pin P6-P7-P8 (Male)	Data Set Pin 201/801 (Male)	Circuit		Function	
		201	801	201	801
1	1	AA	FGD	Protective Ground	Frame Ground
2	2	BA	DPR	Transmit Data	Digit Present
3	3	BB	ACR	Receive Data	Abandon Call and Retry
4	4	CA	CRQ	Request to Send	Call Request
5	5	CB	PND	Clear to Send	Present Next Digit
6	6	CC	PWI	Data Set Ready	Power Indication
7	7	AB	SGD	Signal Ground	Signal Ground
8	8	CF	—	Data Carrier Detect	Not Used
13	13	—	DSS	Not Used	Data Set Status
14	14	NS	NB1	New Synchronization	BCD Digit 1
15	15	DB	NB2	Transmitter Signal Element Timing	BCD Digit 2
16	16	—	NB4	Not Used	BCD Digit 4
17	17	DD	NB8	Receiver Signal Element Timing	BCD Digit 8
20	20	CD	—	Data Terminal Ready	Not Used
22	22	CE	DLO	Ring Indicator	Data Line Occupied

Table F-4. CBS1001F Coupler (DAA) Cable P/N 993207-0001

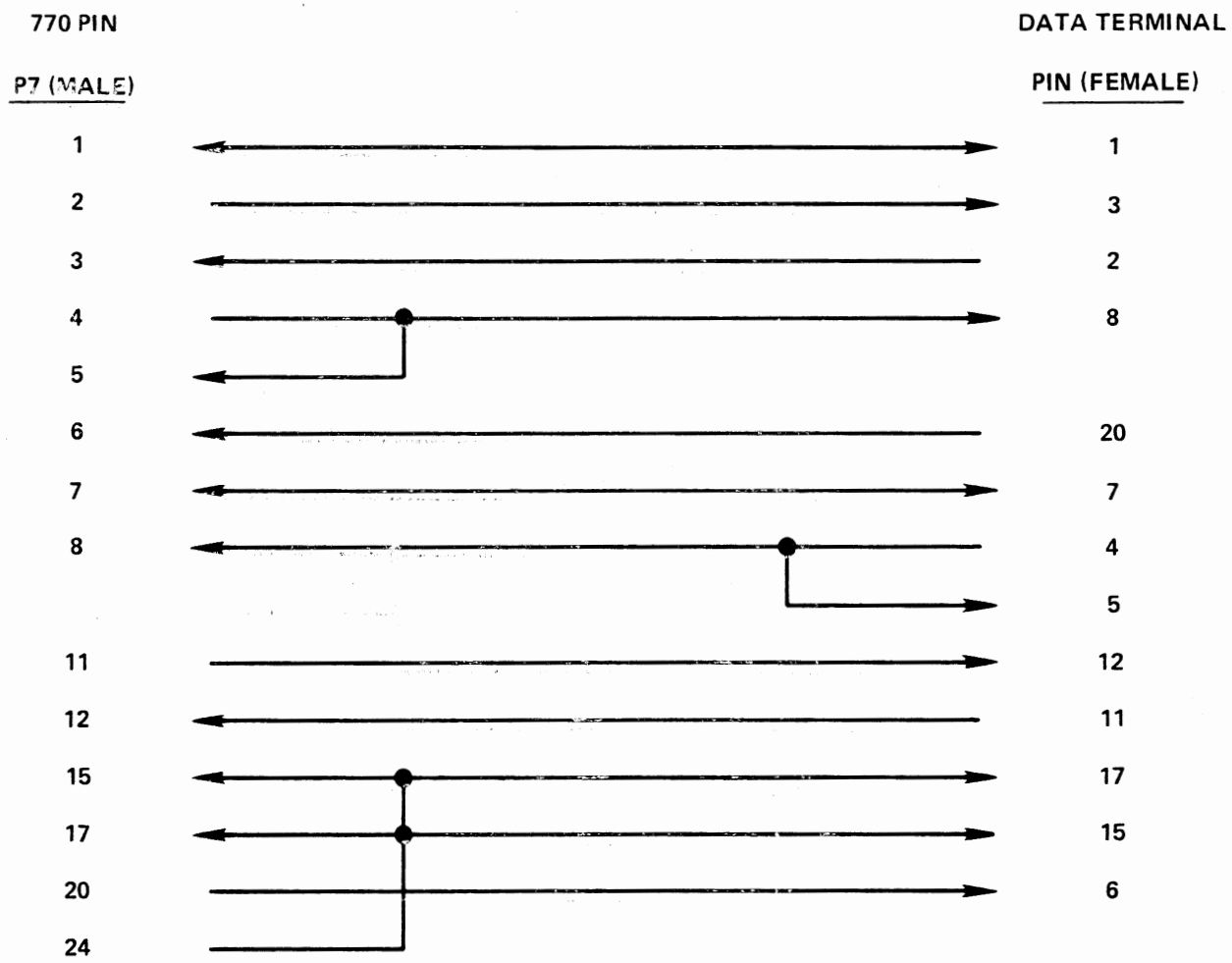
770 Pin P8 (Male)	Coupler Pin (Paddle Board)	Function
7	SG	Signal Ground
9	+V	For Test Only
10	-V	For Test Only
11	DT	Data Tip
12	DR	Data Ring
18	OH	Off Hook
19	DA	Data Access
21	CCT	Coupler Cut Through
23	RI	Ring Indicate
24	SH	Switch Hook

Table F-5. Leased-Line Cable P/N 993208-0001

770 Pin P8 (Male)	Cable Marker	Wire Color (Spade Lugs)	Function
7	RCVR Pair	Tinned Copper	Drain (Signal Ground)
9		Black	T (Tip)
10		Red	R (Ring)
7	XMTR Pair*	Tinned Copper	Drain (Signal Ground)
11		Black	DT (Data Tip)
12		Red	DR (Data Ring)
25		White	AXORA1 (Hook Switch)

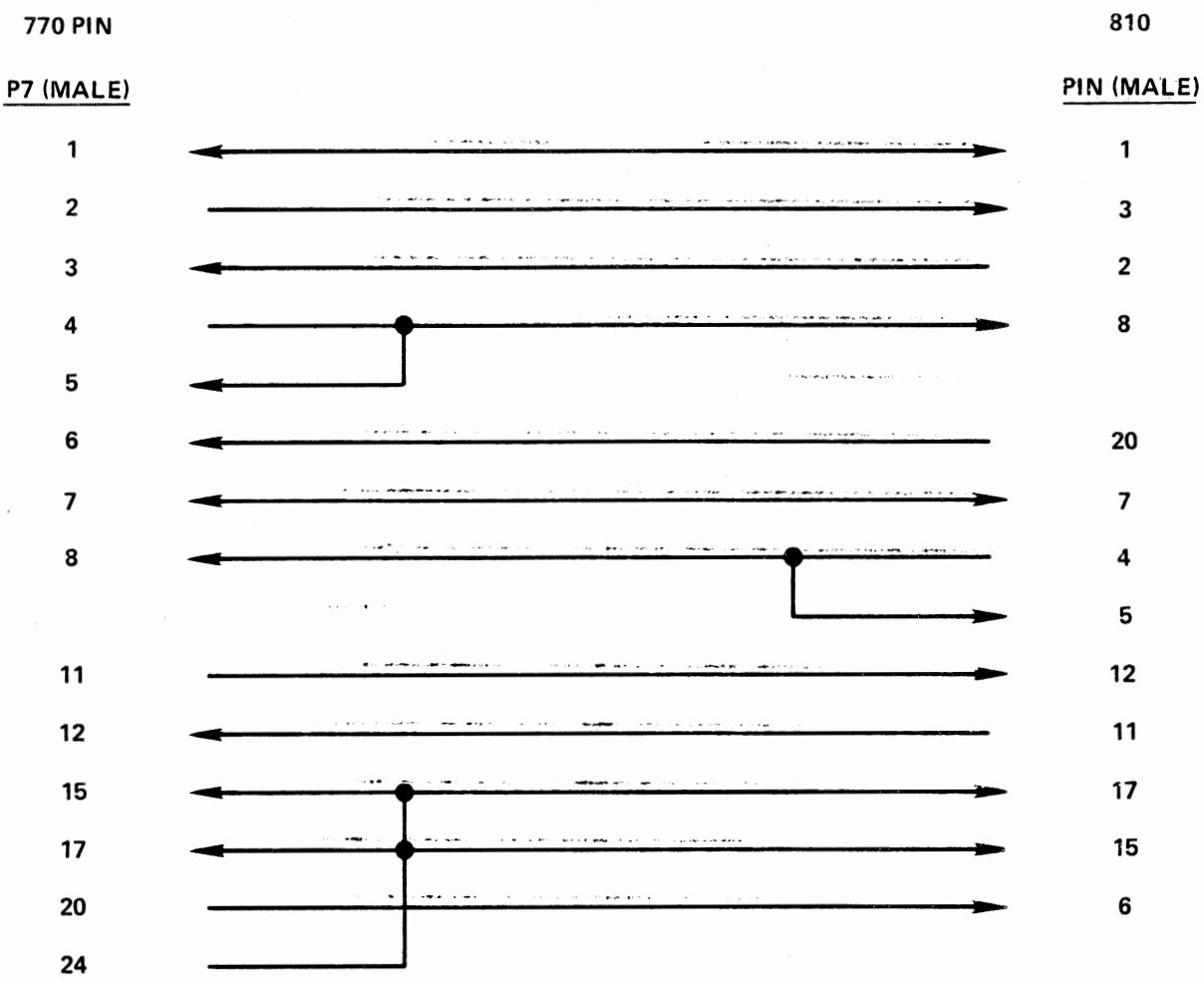
*The XMTR pair is used for a two wire leased line.

Table F-6. Data Terminal Cable P/N 993210-0001



REFERENCE: (EITHER END) PIN	RS232C CIRCUIT	FUNCTION
1	AA	PROTECTIVE GROUND
2	BA	TRANSMITTER DATA
3	BB	RECEIVER DATA
4	CA	REQUEST TO SEND
5	CB	CLEAR TO SEND
6	CC	DATA SET READY
7	AB	SIGNAL GROUND
8	CF	DATA CARRIER DETECT
11	SCA	REVERSE CHANNEL TRANSMIT
12	SCF	REVERSE CHANNEL RECEIVE
15	DB	TRANSMISSION SIGNAL ELEMENT TIMING
17	DD	RECEIVE SIGNAL ELEMENT TIMING
20	CD	DATA TERMINAL READY
24	AUXLIO	AUXILIARY INPUT/OUTPUT CONTROL

Table F-7. MC 810 Cable P/N 993230-0001



REFERENCE: (EITHER END)	PIN	CIRCUIT	FUNCTION
	1	AA	PROTECTIVE GROUND
	2	BA	TRANSMITTER DATA
	3	BB	RECEIVER DATA
	4	CA	REQUEST TO SEND
	5	CB	CLEAR TO SEND
	6	CC	DATA SET READY
	7	AB	SIGNAL GROUND
	8	CF	DATA CARRIER DETECT
	11	SCA	REVERSE CHANNEL TRANSMIT
	12	SCF	REVERSE CHANNEL RECEIVE
	15	DB	TRANSMISSION SIGNAL ELEMENT TIMING
	17	DD	RECEIVE SIGNAL ELEMENT TIMING
	20	CD	DATA TERMINAL READY
	24	AUXLIO	AUXILIARY INPUT/OUTPUT CONTROL

APPENDIX G
KEYBOARD GRAPHICS AND CONTROL CHARACTERS

Some applications require the generation of special control codes or graphics characters. The control codes generated by the 770 keyboard are the set defined by the ASCII Standard. If the graphics option is installed, then control characters will be displayed as graphic equivalents on the screen.

NOTE

When the graphics option is installed, control characters are generated, but graphics characters are displayed.

Control characters are generated by holding the control key depressed while pressing the key associated with the appropriate character. Figures G-1 and G-2 show the relationship between the keyboard keys and related control and graphics characters.

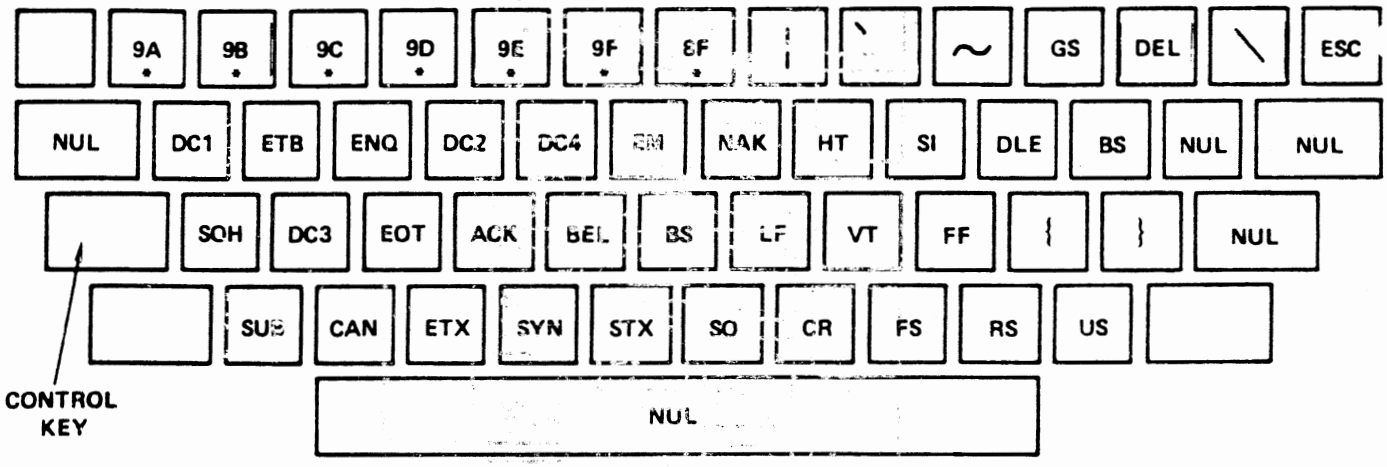


Figure G-1. Control Characters

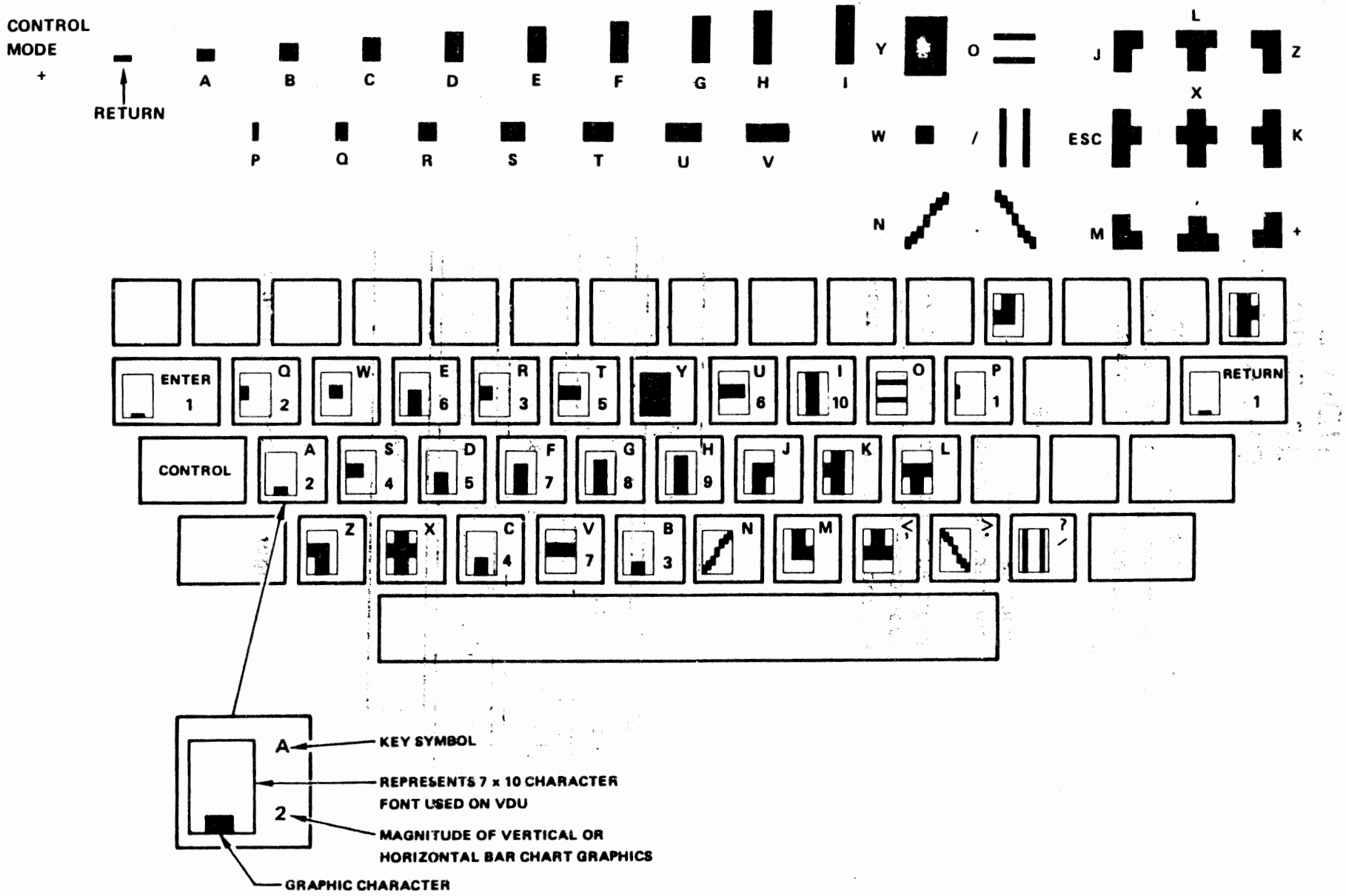


Figure G-2. Graphic Characters

APPENDIX H
KEYBOARD CROSS REFERENCE — UNLABELED CHARACTER GENERATION

The following table gives a cross reference showing how to operate the characters that are available on the 770, but not listed on the key tops. All are generated by holding the CONTROL key depressed and then pressing the character key specified.

Unlisted Character	Generated By Control + Char Key	Unlisted Character	Generated By Control + Char Key
ACK	F	HT	T
BEL	G	LF	J
BS	H	NAK	U
CAN	X	NUL	RETURN
CR*	M	RS	. (Period)
DC1	Q	SI	O
DC2	R	SO	N
DC3	S	SOH	A
DC4	T	STX	B
DEL	- (Minus)	SUB	Z
DLE	P	SYN	V
EM	Y	US	/ (Slash)
ENQ	E	VT	K
EOT	D	\	_ (Underscore)
ESC**	ESC	'	9
ETB	W	!	8
ETX	C	~	0
FF	L	{	; (Semicolon)
FS	, (Comma)	}	' (Single Quote)
GS	+ (Plus)		

*NOTE 1: The CR code can be generated by depressing the RETURN key without CONTROL.
**NOTE 2: The ESC code can be generated by depressing the ESC key with or without control.

USER'S RESPONSE SHEET

Manual Title: Operating Instructions for Model 770
Intelligent Data Terminal (993023-9701)

Manual Date: 1 January 1979 **Date of This Letter:** _____

User's Name: _____ **Telephone:** _____

Company: _____ **Office/Department:** _____

Street Address: _____

City/State/Zip Code: _____

Please list any discrepancy found in this manual by page, paragraph, figure, or table number in the following space. If there are any other suggestions that you wish to make, feel free to include them. Thank you.

Location in Manual	Comment/Suggestion

CUT ALONG LINE

NO POSTAGE NECESSARY IF MAILED IN U.S.A.
FOLD ON TWO LINES (LOCATED ON REVERSE SIDE), TAPE AND MAIL

FOLD

NO POSTAGE
NECESSARY
IF MAILED
IN THE
UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 7284 DALLAS, TX

POSTAGE WILL BE PAID BY ADDRESSEE

TEXAS INSTRUMENTS INCORPORATED
DIGITAL SYSTEMS GROUP

ATTN: TECHNICAL PUBLICATIONS
P.O. Box 2909 M/S 2146
Austin, Texas 78769

FOLD