TANDEM

T16/6520 and T16/6524 Video Display Units OPERATING GUIDE

T16/8048-A00
82048

T16/6520 and T16/6524

VIDEO DISPLAY UNITS

OPERATING GUIDE

(PRELIMINARY)

TANDEM COMPUTERS INCORPORATED
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INTRODUCING
THE TANDEM 6520 CRT TERMINAL
DISPLAY MEMORY PARITY
MULTIPLE DISPLAY PAGES
FULL RANGE OF EDITING FUNCTIONS
SYNCHRONOUS/ASYNCHRONOUS MODES
CONVERSATIONAL & BLOCK MODES
POINT TO POINT & MULTIPOINT AT
SPEEDS UP TO 19.2 K BPS
TANDEM

T16/8048/014

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INTRODUCTION

The T16/6520 and T16/6524 Video Display Units (VDU's) enable an operator to control and interact with a program (computer job) that is running on the Tandem system.

The VDU's assist the operator by providing useful control functions (insert character, delete character, tab, back tab, etc.) and by providing a "picture" of his or her work and its context on the VDU's 2000 character/digit display.

Many VDU's can be connected to a properly configured Tandem system. This allows many operators to interact with programs running simultaneously on the Tandem system (refer to Figure 1).

HOW TO USE THIS MANUAL

The Tandem system utilizes Tandem-supplied programs or customer-supplied programs. A description of these programs will be necessary along with this discussion of VDU operation (see Appendix C for a list of manuals describing the operation of Tandem programs).

NOTE

Where indicated, the operator will be required to reference particular program documentation for specific operating instructions.

A related publication, Video Display Units Programming Manual (82047), can also be referred to by those who require detailed information concerning VDU programming, communications modes and sequences, error control, addressing, etc.

This manual includes general operating guidelines for computer interaction intended for beginning operators or data entry clerks in the section entitled "BASIC RULES OF INTERACTIVE PROGRAM OPERATION". Subsequent sections concern standard VDU operation.

Appendix A contains a glossary of technical terms which are used in this manual and may be referred to as required.

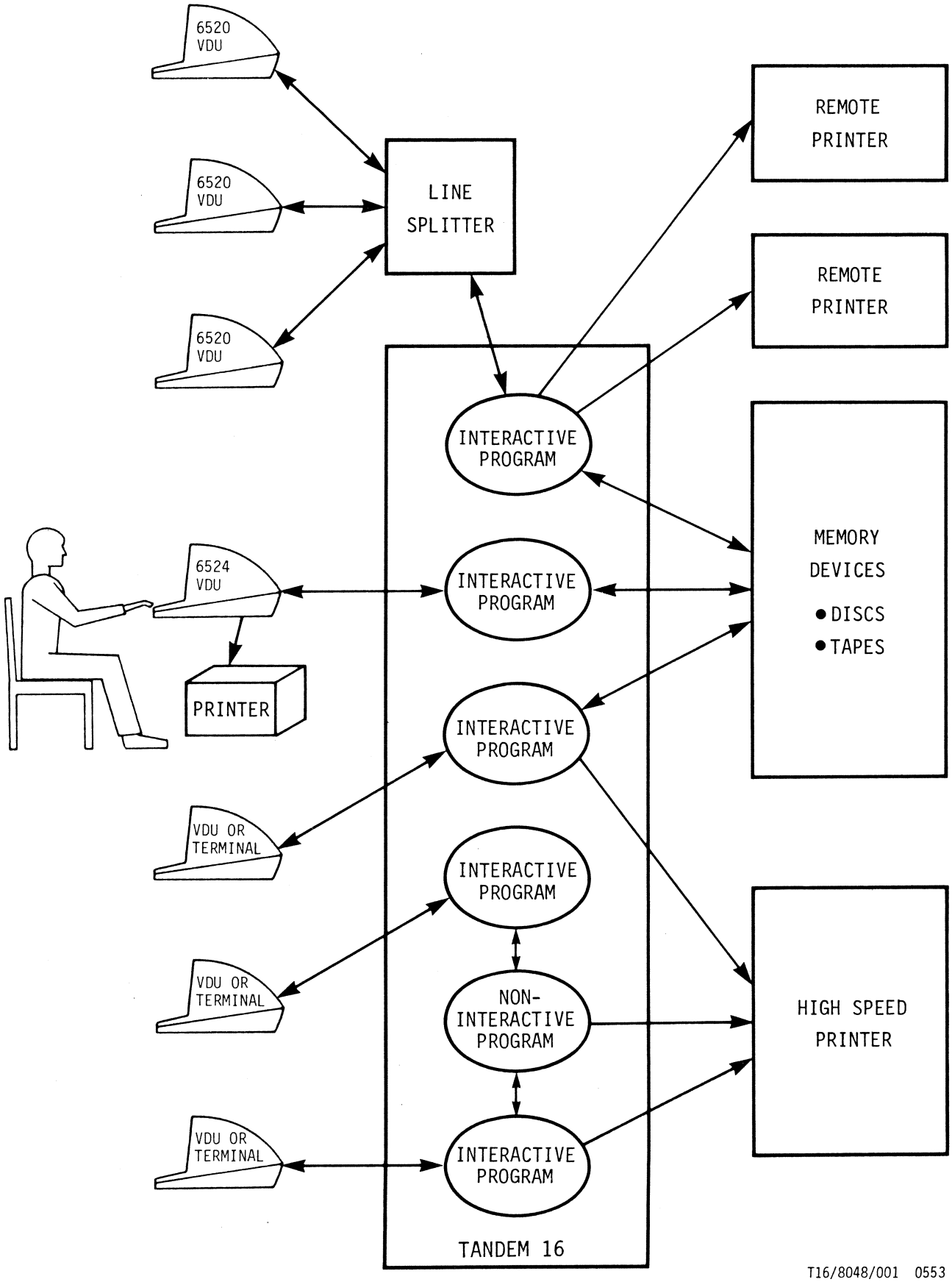

Figure 1. Relationship of Interactive Components and Operator

Section 1

OVERVIEW

The following paragraphs provide a brief overview of the operation of the Tandem system and interactive progams.

SYSTEM OPERATION

The Video Display Units (VDU's) operate in conjunction with the Tandem system to allow control of the entire system (refer to the Tandem Operating Manual listed in Appendix C).

As examples of system-level operations, the VDU's can be used to help alter system configuration, stop and start devices such as printers and discs (Figure 1), display system status, create and run jobs, etc.

INTERACTIVE PROGRAM OPERATION

Interactive programs are required in order for the VDU's to operate in conjunction with the Tandem system (Figure 1). Interactive programs provide the important link between the computer and the VDU (or operator).

Many programs are usually stored on Tandem systems. These programs are called upon as needed to perform specific tasks.

Most or all of these programs are designed to allow operators control over them through the use of a terminal or VDU. The specific operation of these programs directly influences the operation of the VDU: Although standard VDU operation is described in the following sections, it can be changed considerably by the particular program in use.

As a result, the reader is often referred to those operating manuals describing the interactive programs under use. Appendix C is a list of manuals describing programs that may be run on the Tandem system and that operate interactively with a VDU or terminal. The manuals listed in Appendix C are supplied by Tandem and only describe programs that are sold by Tandem.

Users of Tandem systems can create their own programs to suit their unique problems. The operation of these programs is not described in manuals supplied by Tandem; but since the reader will be referred into such manuals, a description of their operation should be obtained for use in conjunction with this manual.

Section 2

BASIC RULES OF INTERACTIVE PROGRAM OPERATION

This section contains brief descriptions of important aspects of interactive computer operation intended to provide operators with a general understanding of interactive programs. If the reader is familiar with this material, he or she may wish to proceed to the section entitled "Description of VDU Operating Components".

COMPUTERS ARE MACHINES

The computer is a machine. Though the computer may appear to react intelligently, it has no intelligence. It is merely performing a set of instructions, and making decisions according to what those instructions say to do.

Operators soon realize that computers perform work in a predefined manner of which they must be aware.

THE PROGRAM BEHIND THE COMPUTER

For a computer to do work, it must have been provided with a rigid set of instructions, called a "program", which it can execute and which will accomplish the desired task. A computer can do no task unless it has a particular program stored in memory for doing that task.

INTERACTIVE PROGRAMS REQUIRE ENTRIES

All computer programs require some human interaction. This interaction may only be to tell the computer which programs to run

"Interactive" programs, however, require much more operator interaction, and usually have provisions allowing the operator control over what the program will do next.

When a computer runs a normal program, its operation may be compared to a household toaster: once it is started, it does everything required automatically. However, when a computer runs an interactive program, its operation may be compared to driving an automobile: it is not enough to just start the car in motion.

With an interactive program, the computer requires information, called "entries", from the operator before it can complete a task.

RULE 1
Interactive programs always require information "entries" to be made by an operator in order to perform work.

PROVIDING THE CORRECT TYPE OF ENTRY

Entries are any information that is supplied to an interactive computer program by the operator.

Interactive programs may require "data" entries, "command" entries, or both types of entries. The program works properly only if it receives the correct type of entry in each instance.

RULE 2
Each information entry made by the operator must be of the correct type, data or command.

Data entries can be names, account numbers, inventory numbers, dates, text, or any other information which the computer has been programmed to store in memory for future reference.

Command entries are functions that control what a program will do next. The computer does not attempt to make permanent records of command entries in memory as it would data entries.

If the wrong type of entry is made, one of two things will happen:

1. If a command entry was expected by the computer and a data entry was made, an error message such as "Invalid Data" normally results and the VDU or program allows the operator another opportunity to make an appropriate entry (if the error is detected by the VDU, it will automatically erase the incorrect entry). If another opportunity is not automatically provided by the system, a program control problem may exist.

NOTE

If the operator suspects that a program control problem has arisen, no further entries should be made until the operator is certain that normal program operation has restored (the operator may wish to consult with someone qualified to make this determination).

2. If a data entry was expected by the computer and a command entry was made, the system may respond with an error message such as "Invalid Data". The system may also store the command in computer memory as if it were data. For example, let us say that "delete" is an allowed command entry, but it is entered when the computer was expecting a data entry for a man's name. In such a case, a computer memory record will have been made to include a person named "delete". This entry will then have to be erased from memory (refer to the operating manual describing the interactive program under use - it should contain specific procedures for deleting or altering existing memory records). For a more general discussion of problems of this kind, refer to "Error Handling".

HOW THE PROGRAM SIGNALS REQUESTS FOR ENTRIES

The interactive computer program signals the operator when information entries should be supplied by causing various expressions to appear on the display screen. The general computer term, "prompt", is used when referring to such expressions requesting operator entries.

RULE 3
The program signals requests for data or command entries by displaying a unique expression, which the operator can interpret as either a request for particular data entries (names, numbers, etc.) or for an allowed command entry.

Prompts can be symbols, words, questions, paragraphs, line numbers or implied line numbers. Prompts differ from program to program; The operator should refer to the operating manuals describing interactive programs under use to determine what commands are allowed, what expressions are used as data prompts, and what expressions are used as command prompts.

As an example of some of the expressions that may be used as prompts, the Tandem Edit Program uses the asterisk symbol (*) for command prompts and unique line numbers for data prompts as shown in Figure 2 (the shaded areas of the display are the computer prompts, and the unshaded areas are the entries made by the operator in response to the prompts).

Additional prompts and entries are shown in Figures 11 and 12.

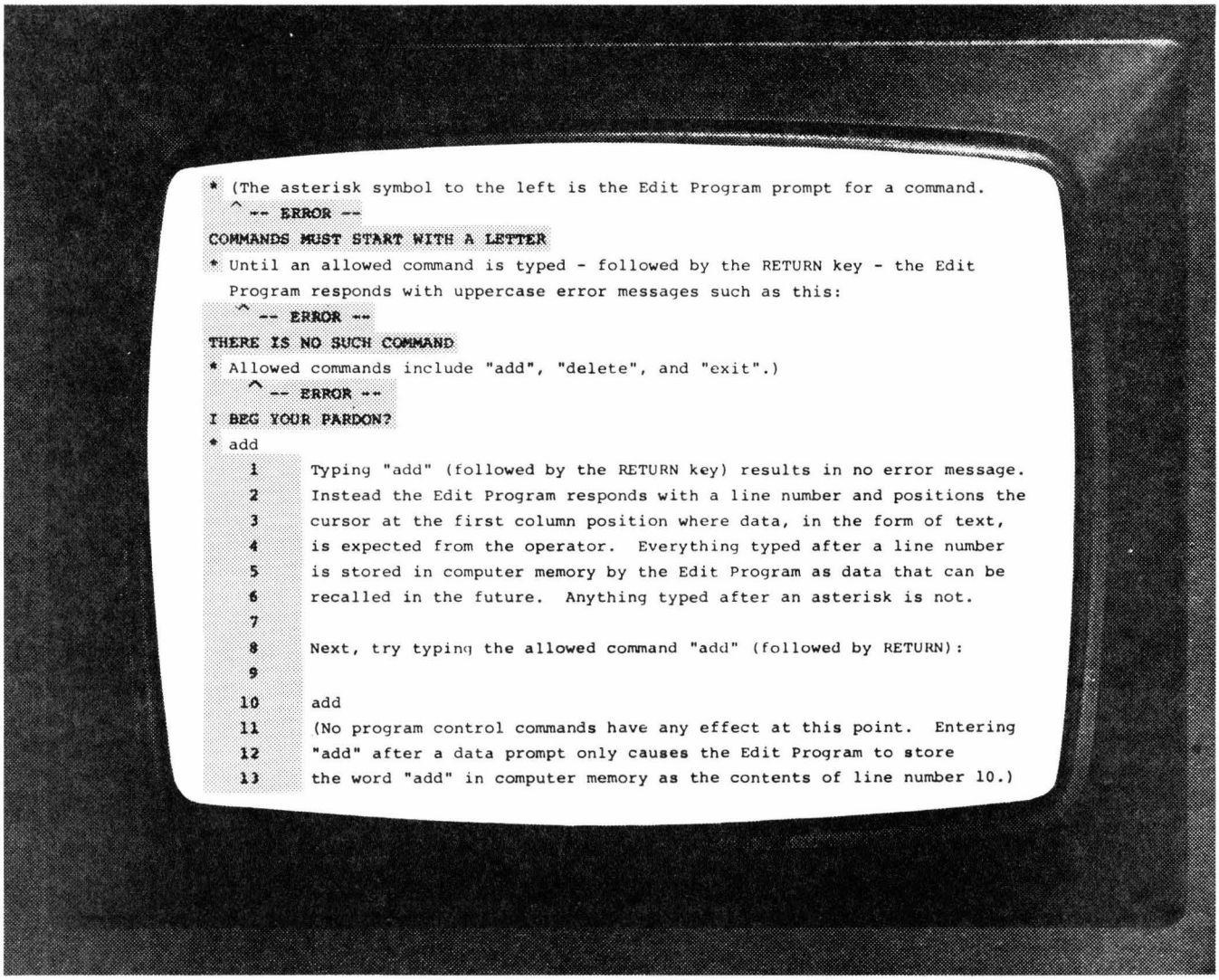

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Figure 2 Sample of Prompts and Entries for the Tandem Edit Program

HOW THE OPERATOR SIGNALS THE COMPLETION OF AN ENTRY

The interaction between the computer and the operator is possible because, at certain points in the program, the computer is instructed to request an entry from the operator and stop. It does not start again until it has received a signal from the operator that the entry or a series of entries has been completed.

> RULE 4
>
> To signal that an entry has been completed there must be a unique entry signification code that the computer will recognize not as data but as the end of the data, or an entry signification key which, when depressed, serves the same purpose.

Usually the key associated with a typewriter "carriage return" (RETURN key) or a numbered function key is used for the purpose of signaling the completion of an entry or a series of entries. The operator should refer to the operating manual describing the interactive program under use to determine what method is used to signify the completion of an entry.

(Some interactive programs may assume when an entry has been completed and automatically process or store an entry or a series of entries.)

SUMMARY

To summarize, the requirements for interactive program operation are:

1. The computer signals the operator to make a particular kind of entry. The signal used is an expression appearing on the display screen, generally referred to as a "prompt".

2. The operator, in response, types in the appropriate data or command entry.

3. Finally, the operator supplies the proper signal (entry signification code or key) to the computer indicating that the entry or series of entries has been completed (unless the interactive program itself assumes when an entry has been completed, such as when a certain number of characters have been typed).

4. The computer then processes the entry/entries (perhaps making records of them in memory) and responds with a new prompt to begin this sequence once more.

Ideally, these basic steps are repeated again and again in the same order until the desired work has been completed. However, this procedure has to be modified sooner or later because of mistakes made in entering the data.

ERROR HANDLING

Interactive programs must provide a means for handling errors.

If the error is that a command entry was made when a data entry should have been made or vice versa, refer to the previous topic, "Providing the Correct Type of Entry" for detailed instructions.

When the error is that either an incomplete entry was made (the entry signification key or code was made too soon) or that an entry was typed incorrectly, the operator should refer to the following breakdown:

1. If an entry signification code has been given for an entry that was incorrect, the entry has already been stored in computer memory in its incorrect state. In such a case the operating instructions for the interactive program under use must be referenced to reveal how data (records) already stored in computer memory may be corrected.

2. If an error is detected before the entry signification code or key is given, the operator has the opportunity of correcting it before it is stored in computer memory (refer to "Editing Function Keys" in the operating section of this manual).

Section 3

DESCRIPTION OF VDU OPERATING COMPONENTS

This section describes the components of the Video Display Unit (VDU) which are important to the operator: the display, the keyboard, and the rear-mounted controls.

REAR-MOUNTED CONTROLS

The rear-mounted controls that may be useful to the operator are the volume, brightness, and power controls as shown in Figure 3. All other rear-mounted controls are of no use to most operators.

> CAUTION
> Do not alter the settings of the BAUD RATE and the PARITY switches; the operation of the VDU may be impaired.

If the VDU malfunctions, check the following controls for the proper settings: BAUD RATE and PARITY. These switches are typically set when the VDU is first installed and should not be altered thereafter. They control the communications between the VDU and the remainder of the Tandem system. (Recording these switch settings and taping them to the back of the VDU, without obstructing air circulation vents, should help in determining whether they have been tampered with.)

Power

The power switch is used to turn the VDU on or off.

(Applying power, alone, may not allow the operator to begin work. A data entry prompt from the computer will be required before actual computer-interactive work can be started - refer to the section entitled "Customary Requirements".)

Brightness

The Brightness control (Figure 3) adjusts the intensity of the characters on the display screen. If set too high, the background against which letters appear will also start to glow; characters will be easier to read if the brightness is set less intense. (Setting this adjustment too high also tends to shorten the working life of the VDU display.)

Volume

The volume control is used to vary the loudness of the VDU "bell" tone. A "bell" symbol is not displayed on the display screen, but a unique code is associated with the bell. When the VDU receives this code, it sounds the bell tone.

The VDU also issues a short clicking sound to signal when a key has been depressed. The volume control may thus be adjusted by the operator to provide adequate audio indication of each key entry. (This feature assists an operator who is making entries from prepared copy to type in data without looking back and forth between the display and the prepared materials.)

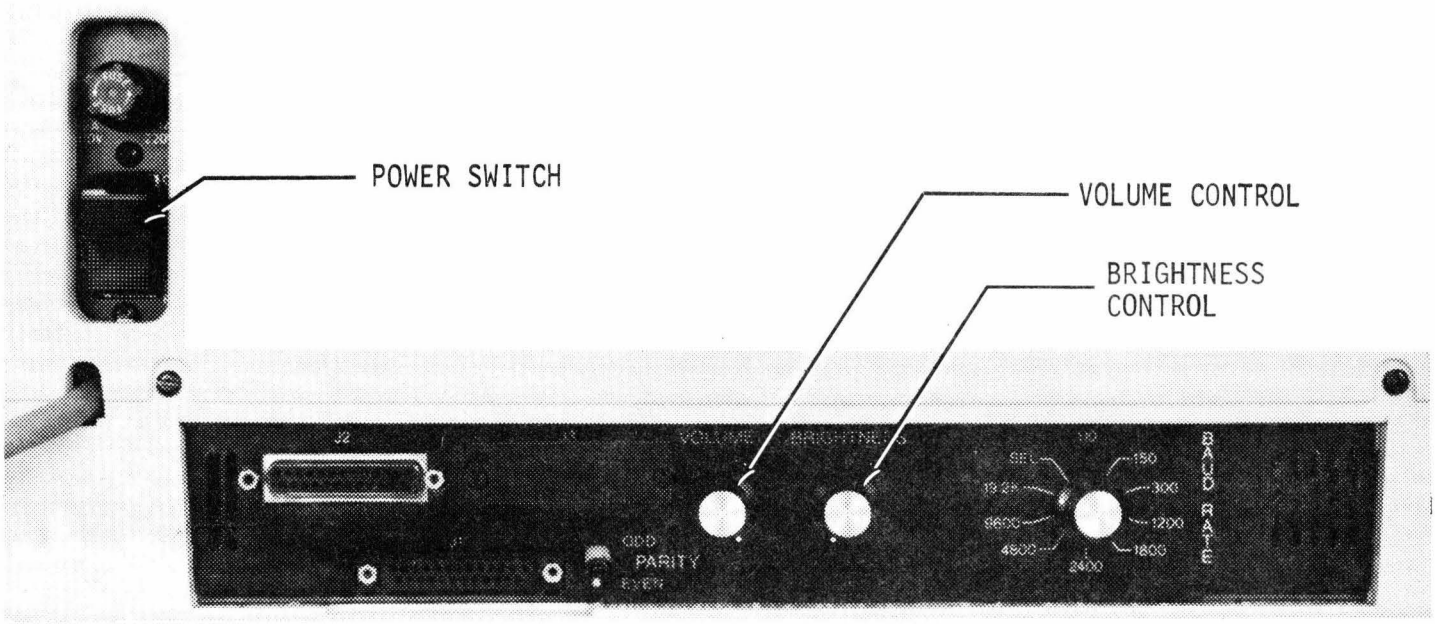

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Figure 3 Rear Mounted Operator Controls

DISPLAY SCREEN

The Display is organized as 24 rows or lines of data, each containing 80 columns. The different ways information can appear on the screen are shown in Figure 4.

Application programs requiring more than 24 lines to be displayed must resort to displaying 24 lines at a time and providing the operator a method to control which 24 lines will be displayed (the VDU can store approximately 144 lines itself, and other system components may store thousands of lines). There are two functions typically used to allow the operator to cause the display to show lines which are in memory but are not currently displayed: scrolling functions and paging functions (refer to "Display Control Functions" in the following section).

A unique display symbol, the cursor, indicates where the next character typed will appear on the display screen (Figure 4). Each time a character is typed, the cursor automatically moves to the next character position. Several cursor control keys are provided on the keyboard allowing the operator to position the cursor elsewhere on the display (refer to "Cursor Control Functions" in the following section).

When the cursor is positioned over an existing displayed character, both symbols will be visible (Figure 4). If a character entry is then made, the previous entry is erased and the new entry remains. The process of changing data already on the display will be referred to as an "editing function" throughout the remainder of this manual.

NOTE

Information and messages may appear at the bottom of the display on a special purpose twenty-fifth line. Since this line is normally under the control of the system program, the cursor cannot be positioned to enter or alter information in this line.

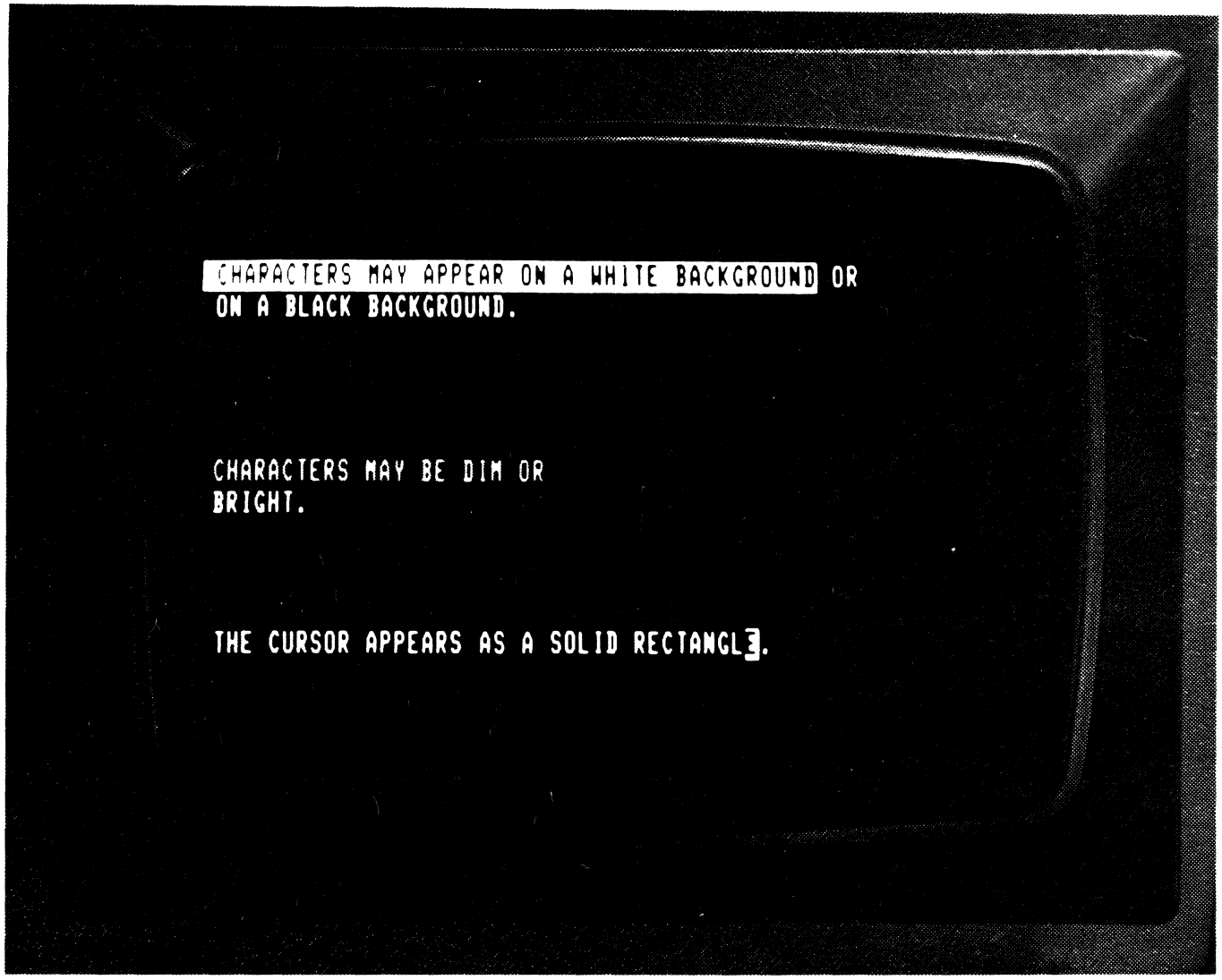

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Figure 4 VDU Display Screen

KEYBOARD

The primary function of the keyboard is to allow alphabetical and numeric entries to be made by the operator. The keyboard also has keys which provide many control functions (these are described in the following section).

The inside back cover of this manual is a foldout pictorial of the keyboard which may be left unfolded and in view while reading the remainder of this manual.

The keyboard has a standard typewriter layout and includes a numeric key pad, which has a standard adding-machine layout. It makes no difference whether numerals are entered from the numeric pad keys or from the numeric typewriter-style keys (unshifted).

Most of the keyboard keys are repeating keys which, if depressed for more than one second, cause further character entries to be made until the key is released.

The following section describes the operation of the keyboard function keys.

Section 4

VDU OPERATION

This section describes the operation of the VDU through the use of the keyboard function keys.

> NOTE
> Some functions require that the SHIFT key be depressed in conjunction with a function key. In such cases, the parenthetical expression "(shifted)" is used following the function key name to indicate this requirement.

Function keys can be divided into different categories according to their function: display control keys, cursor control keys, editing keys, and numbered function keys. These groups of keys, along with the reset key, break key, and print key, are shown on the inside back cover foldout.

The following paragraphs provide descriptions of the standard functions assigned to the function keys. However, under specific program control, the functions of these keys may be redefined to operate differently (for such changes, refer to the operating manual describing the interactive program in use).

DISPLAY CONTROL KEYS

The display control functions are active VDU functions only in Conversational Mode as summarized in Tables 1 and 2 at the end of this section. (If these or similar functions are active in Block Mode, then this is so because the interactive system program in use is implementing those functions; refer to the operating manual describing the interactive program in use for detailed operating information.)

In Conversational Mode, the display control keys alter which lines of data are currently displayed on the VDU screen. (While the VDU can only display 24 lines at once, its memory can store approximately 144 lines, and system memory can store many thousands of lines.)

After using the Conversational Mode display control functions of the VDU, one of the following methods should be employed to prevent the interactive program from writing over existing display data and causing confusion (use of the display control keys are not acknowledged by the interactive program; nor are the cursor control keys causing cursor movement up, down, or right):

1. By returning the display and cursor to their original locations (if remembered) through further use of the display and cursor control functions.

2. By erasing the display information, if any, (as long as it has already been entered, any data will already be stored in system memory), from the current cursor position (positioned as desired) to the end of memory. This erasure is accomplished by depressing the ERASE LINE/PAGE key in conjunction with the CTRL and SHIFT keys.

The latter method has the distinct advantage of enabling the operator to choose from the available display memory (approximately 144 lines) which lines will be displayed as the context for the work to be performed next.

The display function keys are labeled ROLL UP, ROLL DOWN, NEXT PAGE and PREV PAGE (refer to inside back cover foldout). These keys cause a number of lines on the screen to be replaced by the same number of different lines from VDU memory. Lines removed from the display remain stored in VDU memory (up to a total of approximately 144 lines), and can be restored to the display by activating the appropriate display control functions.

Figures 5 through 10 show the actions of each of the display control keys. The left side of the diagram shows the VDU display before a particular display control function is activated, and the right side shows the display afterward.

PREV PAGE

Previous page (Figure 5) causes all of the lines of the display to be removed while causing the previous twenty-four lines in VDU memory to be displayed.

NEXT PAGE

Next page (Figure 6) causes all of the lines of the display to be removed while causing the next twenty-four lines in VDU memory to be displayed.

ROLL UP

The ROLL UP key (Figure 7) causes only one line to be removed from the top of the screen, while one line from VDU memory is added at the bottom of the screen . The action of the roll up key is continued automatically if the key is held down for more than one second, causing lines to continue moving onto and off the screen until the key is released (or until the end of VDU memory is reached).

ROLL DOWN

The ROLL DOWN key (Figure 8) causes only one line to be removed from the bottom of the screen, while one line from VDU memory is added at the top of the screen. The action of the roll down key is continued automatically if the key is held down for more than one second, causing lines to continue moving onto and off the screen until the key is released (or until the beginning of VDU memory is reached).

HOME (Conversational Mode)

In Conversational Mode, the HOME key (Figure 9) assumes a display control function which causes the screen to display the beginning of the VDU display memory (the first 24 of approximately 144 lines). If depressed in conjunction with the SHIFT key, the HOME key (Figure 10) causes the screen to display the end of VDU display memory (the final 24 lines).

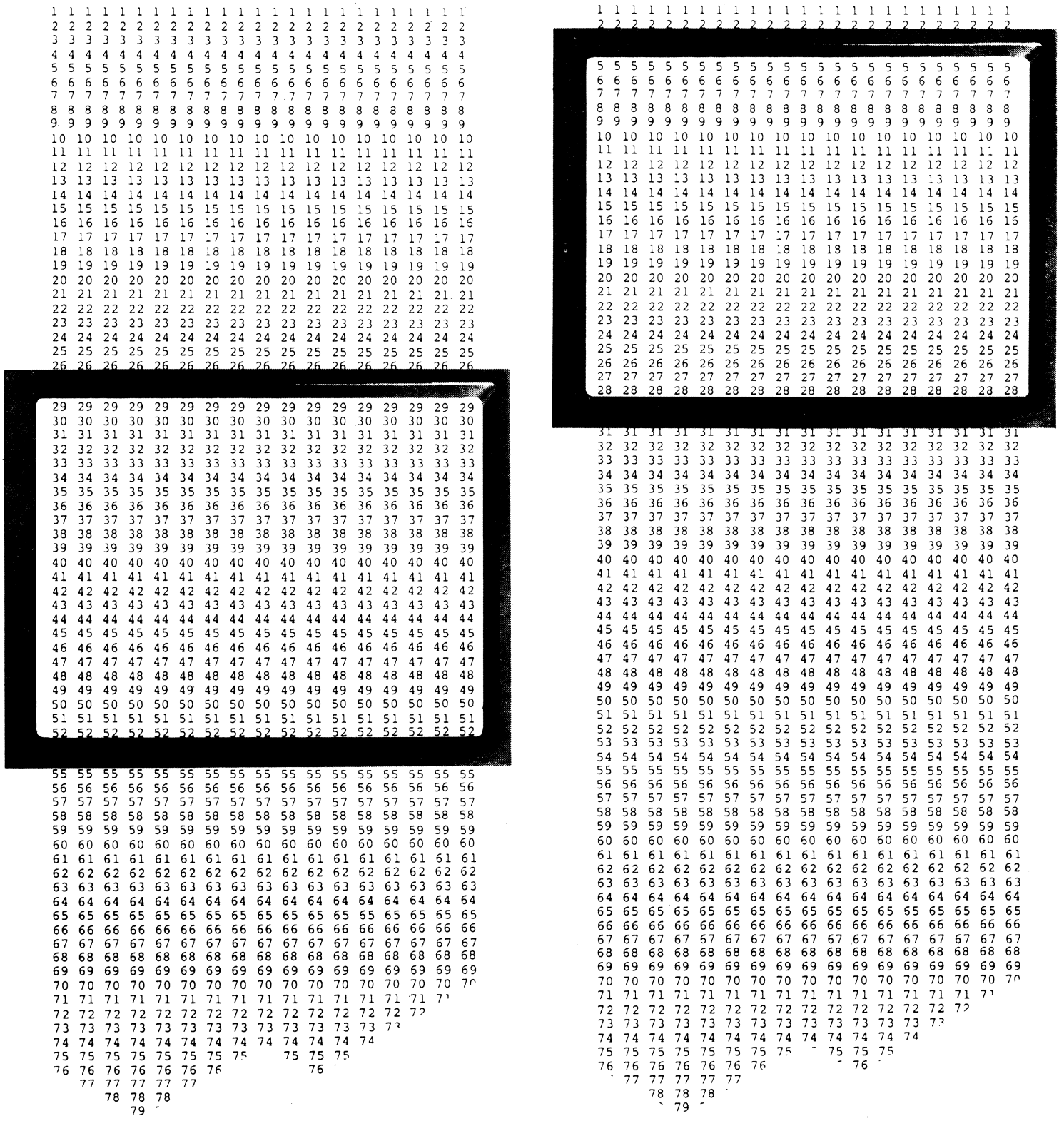

Figure 5 Action of PREV PAGE key

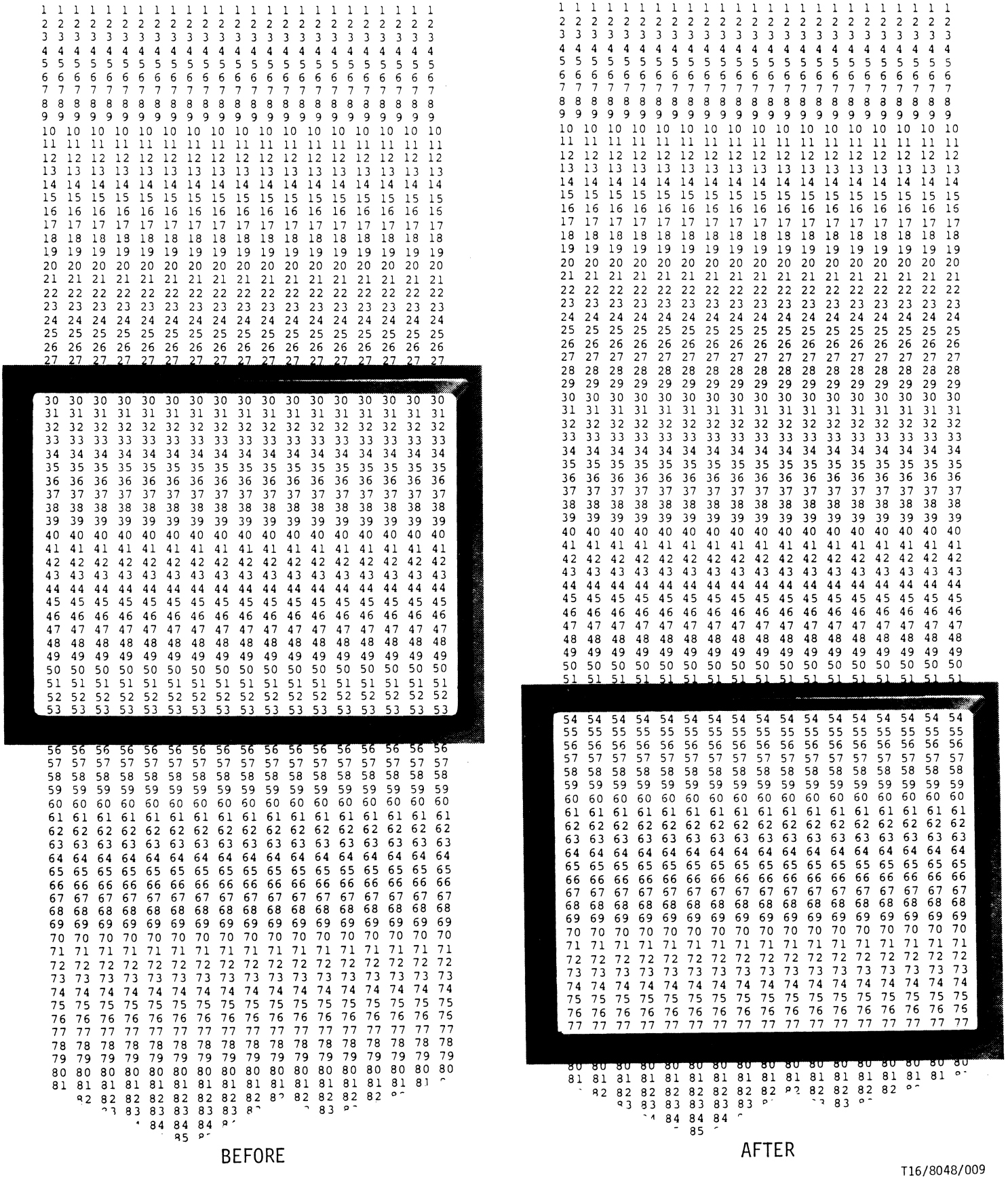

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Figure 6 Action of the NEXT PAGE key

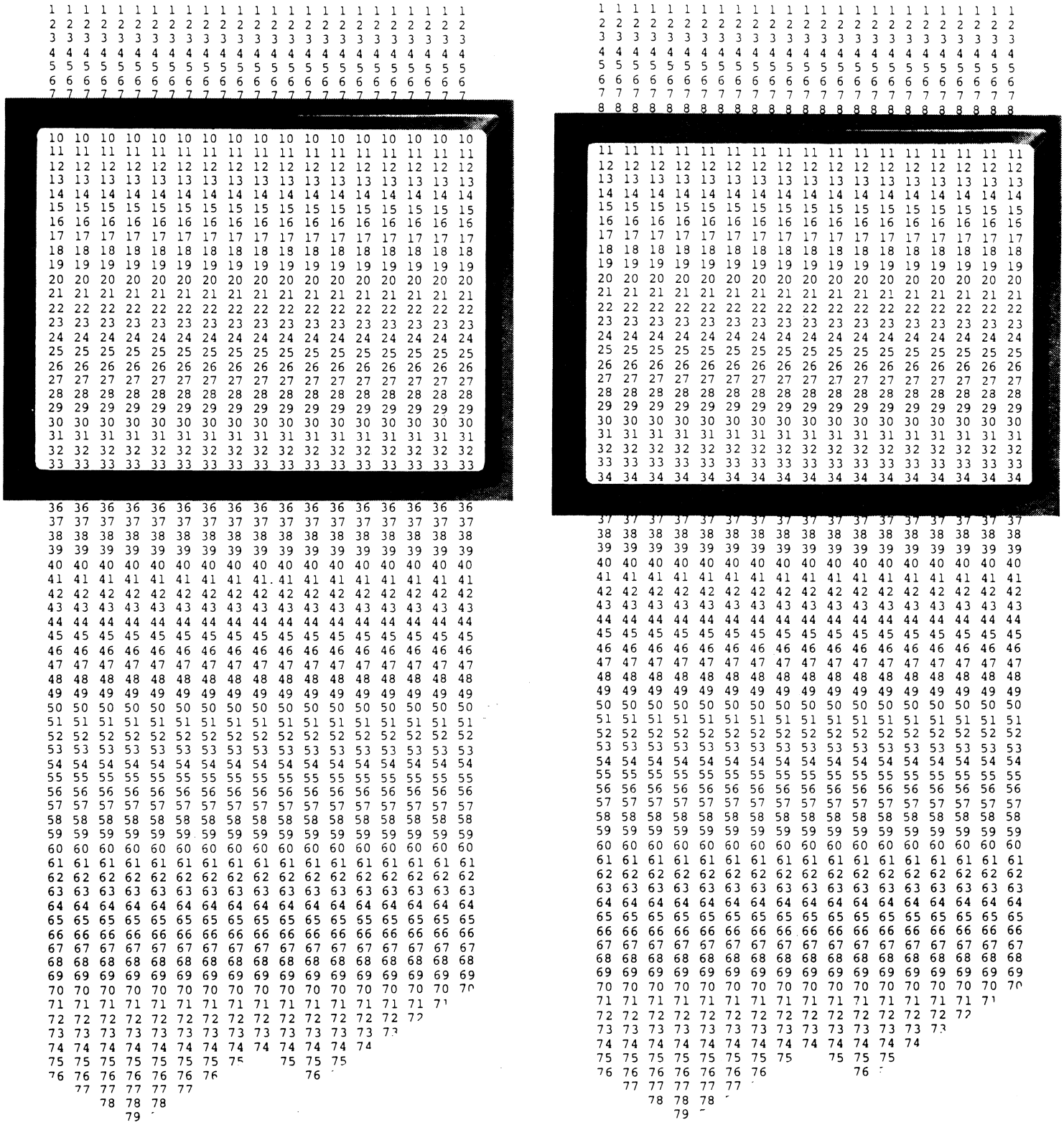

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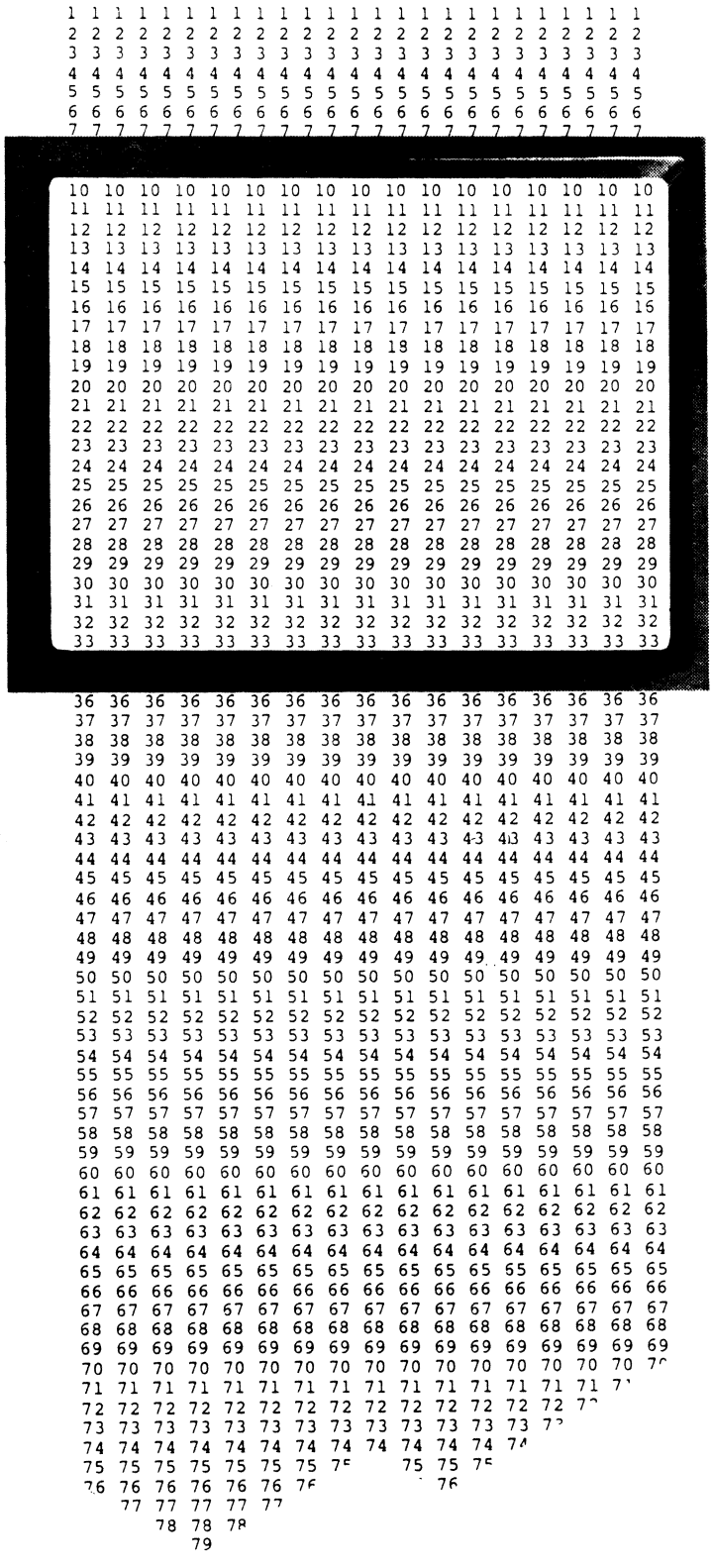
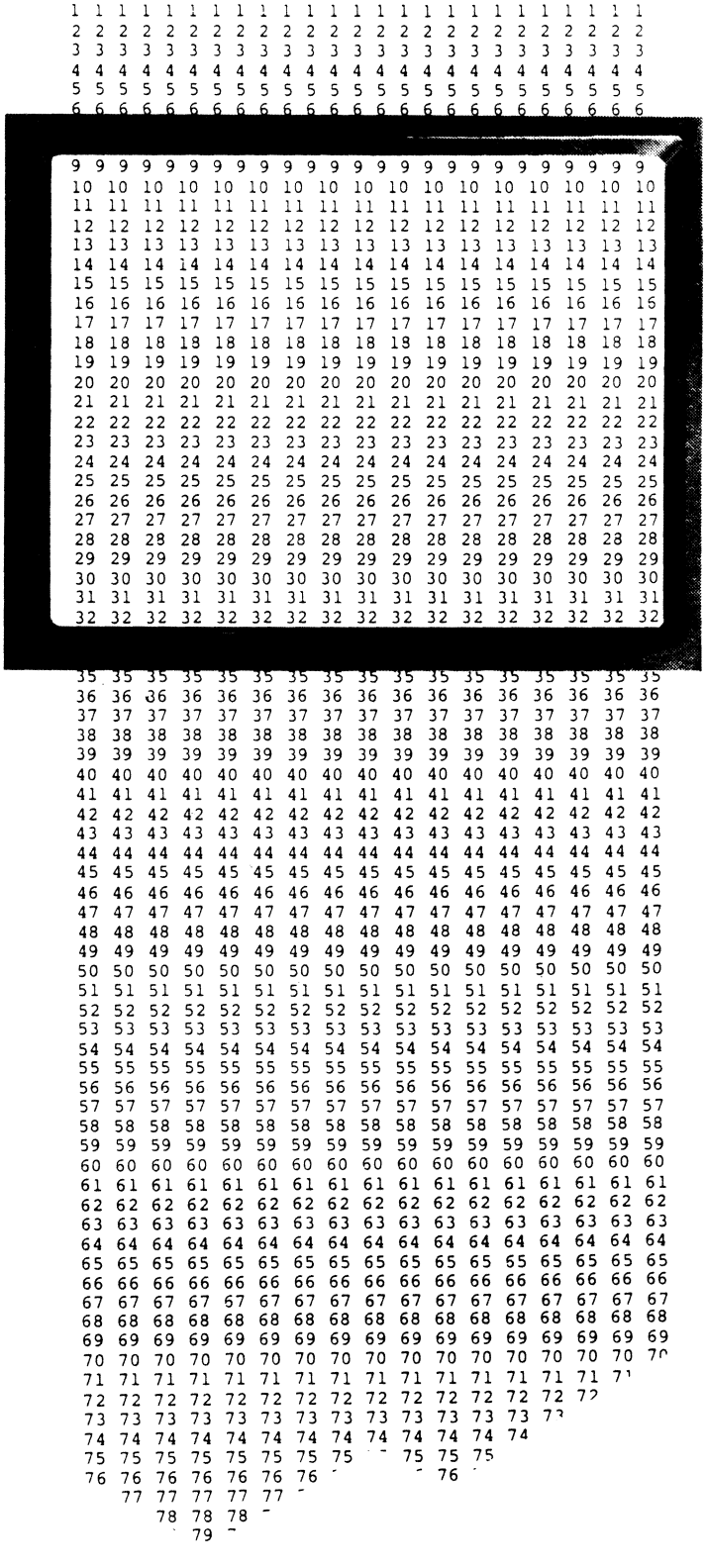
Figure 7 Action of the ROLL UP key



BEFORE



AFTER

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Figure 8 Action of the ROLL DOWN key

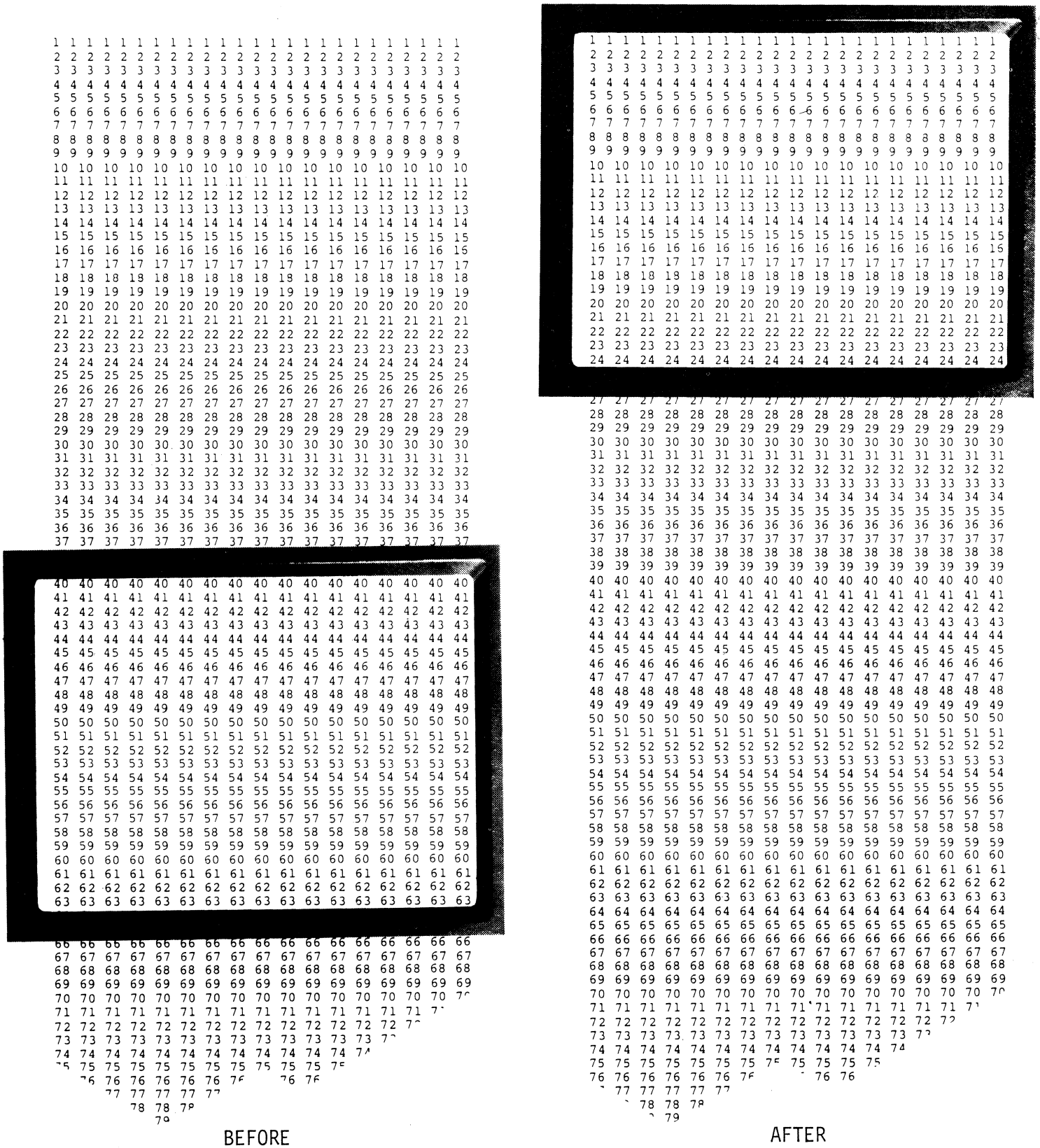

Figure 9 Action of the HOME key (unshifted; Conversational Mode only)

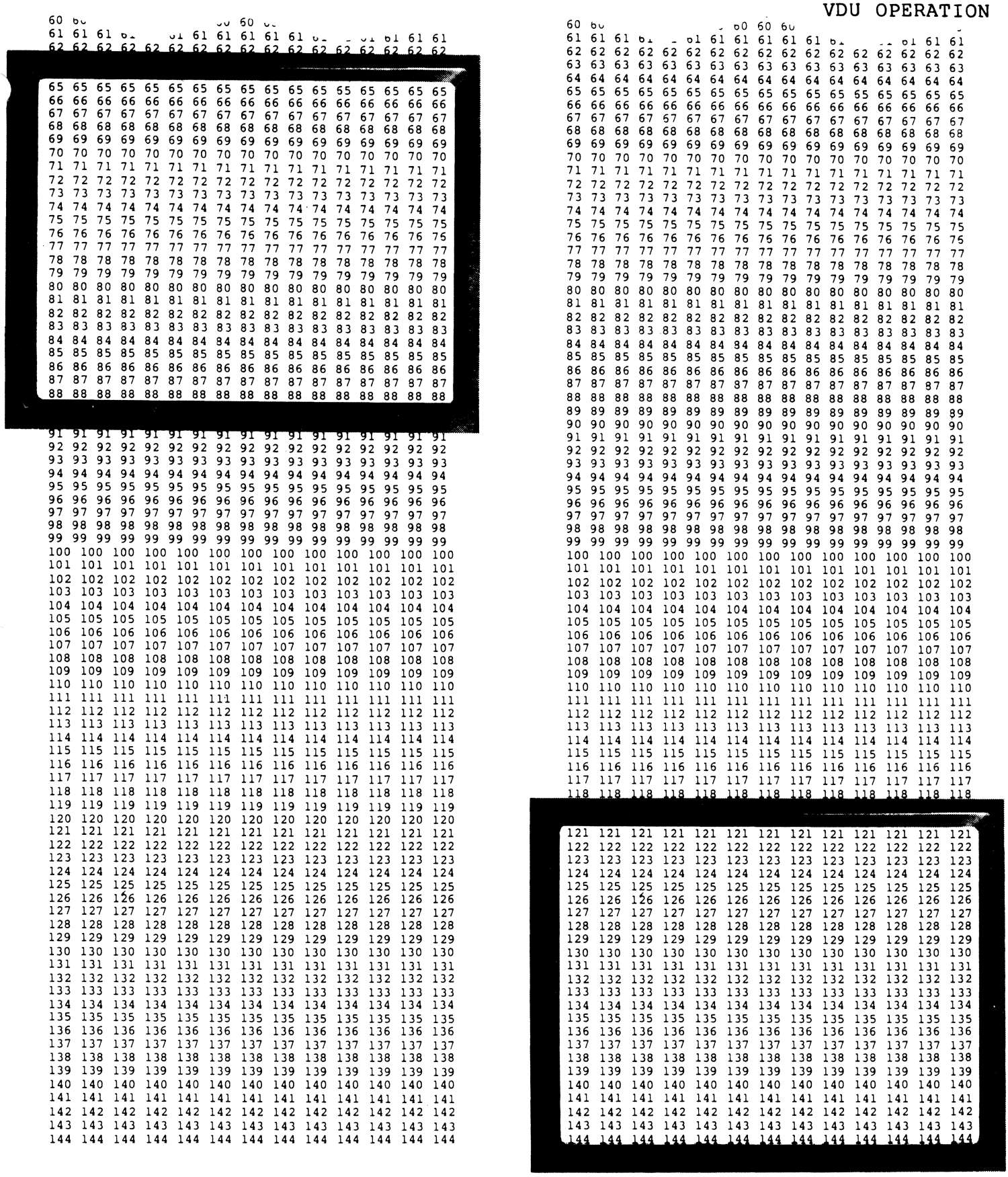

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Figure 10 Action of the HOME key (shifted; Conversational Mode only)

CURSOR CONTROL KEYS

The cursor is a unique display symbol used to indicate where the next character typed will appear on the display. The cursor appears on the display screen as a bright solid rectangle (Figure 4).

When a character key is depressed, the cursor automatically advances one character position ahead. To type a character anywhere else on the screen, the cursor must first be moved to that position by using one or more of the cursor control keys (refer to inside back cover).

The four basic cursor control keys cause cursor movement - one line or one character position at a time - either back (left), forward (right), up, or down. These keys are labeled with an arrow pointing in the appropriate direction.

If any of these keys is depressed for more than one second, the VDU repeats the desired motion automatically until the key is released. When the end of a line is reached, continued forward cursor movement causes an automatic line feed; the cursor is positioned at the beginning of the next line where it can continue forward. The backspace function is similar: When at the beginning of a line and a backspace is entered, the cursor is positioned at the last column of the previous line where movement backwards can continue.

HOME (Block Mode)

In Block Mode, depressing the HOME key positions the cursor at the first character position in the first line (upper left corner), regardless of where the cursor was previously positioned. However, depending on the program being run on the system, the cursor may also be positioned at the beginning position where the first entry is to be made (refer to the "Submodes" discussion in the VDU Programming Manual, part number 82047).

BACKSPACE

Depressing the BACKSPACE key causes the cursor to move one space to the left (if the cursor is already positioned in the first column of a line, depressing the backspace key causes the cursor to be positioned in column 80 of the previous line).

RETURN

In Conversational Mode, depressing the RETURN key causes the cursor to move to the first character position of the line. At the same time, the system program will normally respond by providing an automatic line feed, making the final cursor position the first column of the next line. (The RETURN key normally serves the entry signification function, signaling to the computer the completion of a data or command entry by the operator.)

In Block Mode, the RETURN key causes the cursor to be positioned either in the first character position of the next line (non-protected submode), or at the position corresponding to the next area on the display where the operator is allowed to enter data (protect submode). Which action depends on the particular program which is being run on the Tandem system (refer to the operating manual for the interactive program under use). Refer to the VDU Programming Manual, part number 82047, for a description of protected fields, and protect and non-protect submodes of Block Mode.

BACK TAB/TAB and CLR/TAB/SET

The cursor control keys, BACK TAB/TAB, CLR/TAB/SET, and TAB, function the same as they would on a typewriter: once a tab is set at a particular location, pressing tab (or backtab) causes the cursor to be positioned at the previously set location.

The tab functions are VDU functions requiring no computer program intervention. (The particular programs run on the computer may also have provisions for tabulation functions, using other function keys or special code sequences. If used, refer to the operating manuals describing those interactive programs for detailed information.)

In Conversational Mode, the backtab function is disabled.

NOTE
The CLR/TAB/SET key will clear all tabs if it is depressed in conjunction with the SHIFT and the CTRL keys.

EDITING FUNCTION KEYS

Editing functions refer to any keyboard operations where existing character(s) appearing on the display screen are altered or deleted.

The editing function keys are labeled as follows (refer to inside back cover): DEL LINE/INS, DEL CHAR, INS CHAR, and PAGE ERASE/LINE.

The functions of these keys vary considerably from one operating mode to another, as discussed in the subsequent topics "Conversational Mode Operation" and "Block Mode Operation".

PROGRAM FUNCTION KEYS

The function keys numbered F1 through F16 do not have any predefined functions. Instead they perform whatever functions, if any, are assigned to them by a particular program. (Refer to the operating manual describing the program in use.)

CONTROL SEQUENCE FUNCTIONS

Control sequence functions are less frequently used functions that require the CTRL key to be depressed in conjunction with other keyboard keys. Appendix C is a list of selected control sequence functions. Refer to the VDU Programming Manual, part number 82047, for a complete description of control and escape sequence functions.

PRINT KEY

The print key is useful only on T16/6524 VDU's (with outboard printer attached). This key is used to initiate printing of the data displayed on the screen.

BREAK KEY

Depressing the BREAK key causes either the current program activity to be suspended, or the current program to abend. In the latter case, the operator may not be able to regain the proper prompts to continue working (a person familiar with system operation may be consulted in such a case).

Only during specific portions of program activity is this function useful, such as to stop a listing (that was initiated using an allowed command entry) at a line that is of particular interest.

The correct function of the break key is not to abend the current program, but to suspend the current program activity.

The outcome of using the BREAK key properly is that a command prompt should appear on the screen of the type the operator normally sees. If the wrong prompt appears, the BREAK key was used incorrectly, and no other actions should be made until a person familiar with system operation has been consulted.

In Polling Block Mode, the VDU break function is disabled, but a similar function may be assigned to a numbered function key by the system program (refer to the operating manual describing the interactive program in use).

RESET KEY

Use of the RESET key should be restricted to unlocking a locked keyboard, when the locked condition persists for an abnormally long period of time.

The RESET key must be depressed twice, without intervening keystrokes, before it has any effect.

NOTE
Depressing the key more than twice in a row will invoke a special self-test feature of the VDU. This test will erase all of the VDU display memory (approximately 144 lines).

If accidentally started, the self-test can be terminated by typing any key (not SHIFT or CTRL however). Depressing the PAGE ERASE/LINE key in conjunction with the SHIFT and CTRL keys will erase the self-test display.

If an error message appears on the 25th line along with a keyboard lockup, refer to the operating manual describing the program in use for detailed explanations of the error that occurred; this may allow the operator to avoid further keyboard lockups. (However, not all keyboard lockups are the result of operator errors.)

If normal operation cannot be restored, refer the problem to a person familiar with system operation.

MODES OF OPERATION

The major VDU operating modes, Block and Conversational, are described following. To avoid confusion, the operator should read only the section which is of concern. (The operator may wish to consult with someone familiar with system operation to help determine which mode of operation is applicable.)

A summary of the characteristics of each operating mode is provided in Tables 1 and 2 and Figures 11 and 12 at the end of this section.

The important characteristics concerning a particular mode of operation are the editing functions which are available and the method by which the completion of an operator entry is signaled.

Conversational Mode Operation

In Conversational Mode, the VDU operates with a display memory of approximately 144 lines, 24 of which are displayed at any given time. The display control functions allow the operator to control which 24 lines are displayed. Refer to the preceding section entitled "Display Control Functions".

An example of Conversational Mode is shown in Figure 11 (the shaded areas of the display are the computer prompts, and the unshaded areas are the entries made by the operator in response to the prompts that appear, one at a time, after the operator signifies the completion of each previous entry).

After an operator signifies the completion of an entry (normally using the RETURN key), the entry is stored in system memory and can no longer be altered from the VDU, even though it remains displayed on the VDU screen. At this point, changing an entry requires the intervention of the host program (refer to the operating manual describing the interactive program in use).

Before the operator signals the completion of an entry, the cursor can be placed anywhere within that particular entry (using the backspace keys) to make changes on a character-by-character basis.

Table 1 at the end of this section provides a summary of the operating characteristics for Conversational Mode.

Block Mode Operation

In Block Mode, the VDU operates with only one screen of data (24 lines) at a time. Display control functions are disabled in Block Mode. However, under program control, these or similar functions may be restored, using either the standard display control keys or numbered function keys.

Block Mode operator entries and computer prompts are shown in Figure 12 at the end of this section (the shaded areas of the display are the computer prompts, all of which appear on the screen at the same time, and the unshaded areas are the entries made by the operator in response to the prompts).

In Block Mode, the operator normally signifies the completion of all entries for the displayed screen with one of the program function keys numbered F1 through F16 (refer to the operating manual describing the interactive program in use).

After an entry signification code or key has been provided, the screen information will have been stored in system memory and cannot be altered by the VDU alone. This will require the intervention of the interactive program (refer to the operating manual describing the interactive program in use).

Before an entry signfication code or key has been provided, the operator may alter any entry appearing on the display screen, using either the cursor control keys, to write over previous information, or one or more of the editing function keys described in the following paragraphs.

(Because there are two submodes of Block Mode, protect and non-protect, in which the editing function keys perform slightly different, two possible actions will be listed for most of the editing functions following. Refer to the VDU Programming Manual, part number 82047, for a complete descripiton under "Submodes". The submode, protect or non-protect, in use is determined by the particular program being run on the Tandem system - refer to the manual describing the interactive program in use.)

The following paragraphs describe the use of VDU editing functions in Block Mode (refer to inside back cover foldout for key locations). Table 2 provides a summary of the operating characteristics for Block Mode.

ERASE PAGE (BLOCK MODE)

In non-protect submode, depressing the PAGE ERASE/LINE key (shifted) erases all characters, from the current cursor position to the last line of the screen. In the protect submode, only data entries are erased within this area, while computer prompts (computer-supplied information) remain unerased.

ERASE LINE (BLOCK MODE)

In non-protect submode, depressing the PAGE ERASE/LINE key (unshifted) erases all characters, from the current cursor position to the end of the line. In protect submode, this key causes the erasure of all the characters from the current cursor position to the beginning of the next protected field (which normally is the next computer prompt).

INSERT CHARACTER (BLOCK MODE)

Depressing the INS CHAR key (unshifted) causes all characters to the right of the cursor to be shifted right one character position while a blank is inserted at the cursor position. By depressing this key repeatedly, space can be made to insert several letters or a whole new word between existing words on the display. If the line is already full, a character at the end of the line is erased each time the key is used in non-protect mode.

In protect submode, the action is the same, except that all characters following the cursor up until the beginning of the next protected field (which normally is the next computer prompt) are moved one space forward (if necessary, wrapping characters around the end of one line to the beginning of the next). Characters, if any, are lost at the subsequent postion corresponding to the beginning of the next protected field.

If the INS CHAR key is depressed in conjunction with the SHIFT key, the "insert" function becomes implied each time a normal alphabetical or numeric entry is made: each time a character is entered the cursor is incremented one space to the right and at the same time a blank is inserted at the new cursor position to allow the operator to continue automatic insertions without first inserting blanks. This manner of character entry is discontinued when the INS CHAR key (unshifted) is depressed once more.

DELETE CHARACTER (BLOCK MODE)

In non-protect submode, depressing the DEL CHAR key (unshifted) causes all characters to the right of the cursor to be shifted left one character position while the character (if any) at the current cursor position is deleted.

In protect submode, the action is the same, except that all characters following the cursor up until the beginning of the next protected field (which normally is the next computer prompt) are moved left one position (if necessary, wrapping characters back around the beginning of one line to the end of the previous line).

DELETE LINE (BLOCK MODE)

In non-protect submode, depressing the DEL LINE/INS key (shifted) causes the line in which the cursor is positioned to be deleted (all lines below move up one to avoid having a gap where the deleted line once existed).

The delete line function is only active in the non-protect submode of Block Mode. In the protect submode this key may be assigned a different function under program control (refer to the operating manual describing the interactive program in use).

INSERT LINE (BLOCK MODE)

In non-protect submode, depressing the DEL LINE/INS key (unshifted) causes a blank line to be inserted at the current cursor position (all lines below the line where the cursor is positioned, including the line where the cursor is positioned are moved down one line to make room for the new line).

NOTE

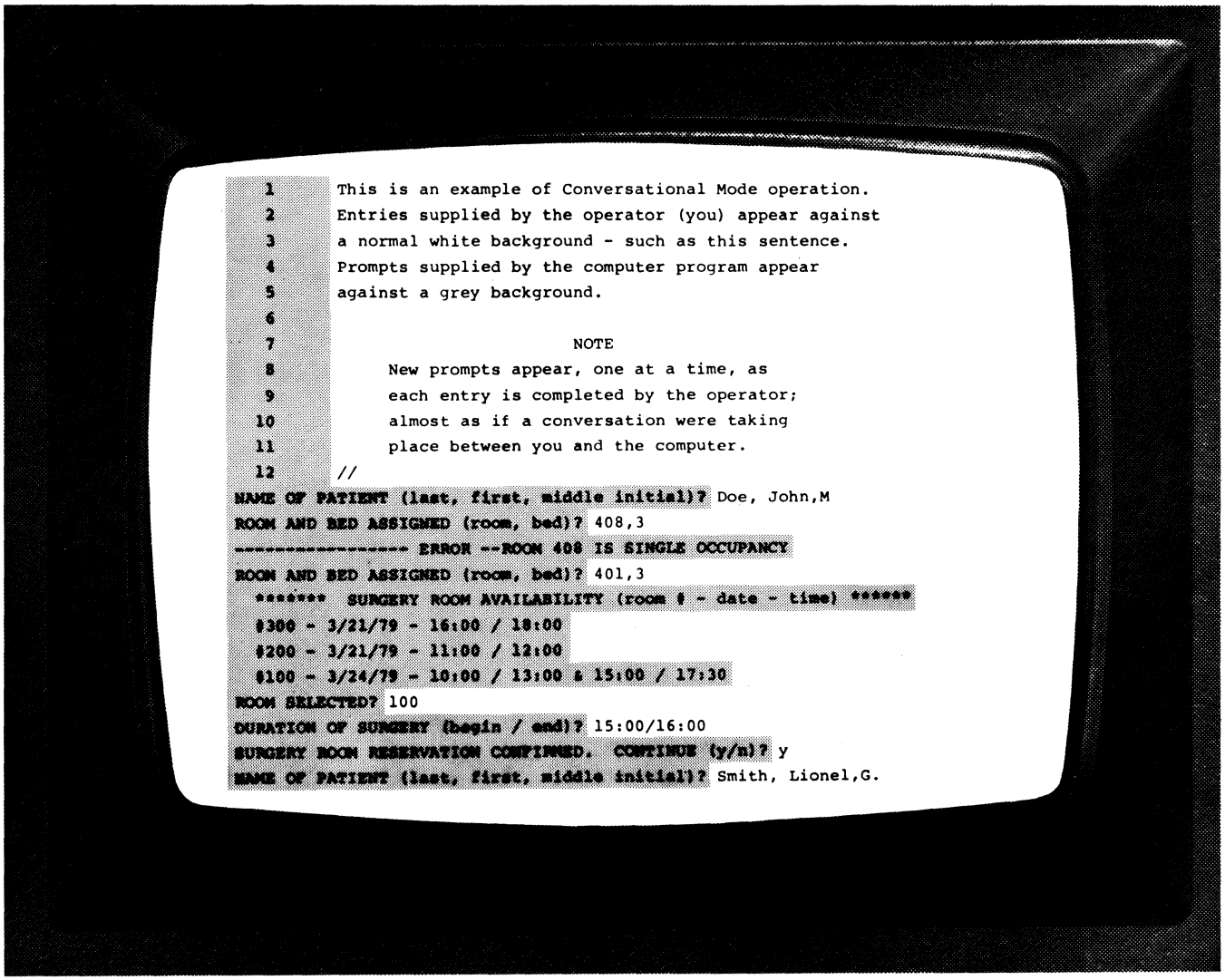
The last line on the screen (twenty-fourth line) is erased whenever this function is activated. If there is text in this line, it will be lost.

The insert line function is only active in the non-protect submode of Block Mode. In the protect submode this key may be assigned a different function under program control (refer to the operating manual describing the interactive program in use).

Table 1 Conversational Mode Characteristics

CHARACTERISTIC	CONVERSATIONAL MODE CONSIDERATIONS
Display Control Functions	Roll Up, Roll Down, Previous Page, Next Page, Home
Cursor Control Functions	← , Backspace, Tab, Return
Editing Functions	None (except manually repositioning cursor so that existing information can be retyped)
Error Indications	Appear on the line immediately following an entry or on the 25th line.
Prompts	Appear one at a time (depending on a given program prompts may be symbols, words, line numbers, etc.)
Range of Entry Signification	Variable, starting from the character position following a prompt. May be limited to a pre-specified length by a given program. (VDU editing functions are allowed within an entry following a prompt if the entry has not already been followed with a RETURN key code.)
Entry Signification Method	RETURN Key. (Or any other key assigned by a given program to provide the carriage return code.)
Disabled Keys	DEL CHAR, INS CHAR, DEL LINE/INS, BACK TAB, ERASE LINE/PAGE * ↑ , ↓ , →

*These three cursor control functions are likely to be a source of confusion if used, since they are not recognized as part of an entry by the system program, but they do alter the display of the entry so that the display can become erroneous and misleading. In a similar manner, the use of the Display Control Functions may be a source of confusion unless used as described in the preceding section entitled "Display Control Functions".



T16/8048/011

Figure 11 Conversational Mode Operation

Table 2 Block Mode Characteristics

CHARACTERISTIC	BLOCK MODE CONSIDERATIONS
Display Control Functions	None (unless provided by the application program - refer to the operating manual describing the interactive program in use)
*Cursor Control Functions	↑, ↓, →, ←, Home, Backspace, Return Tab, Back Tab
Editing Functions	Erase Line/Page, Delete Character, Insert Character, (Delete Line and Insert Line available in protect submode only)
Error Indications	Appear on 25th line only.
Prompts	Appear all at once on any or all of the 24 lines of the display screen.
Range of Entry Signification	One screen (24 lines). VDU editing functions are active for any line on the screen at any time until the "completion of screen entries" signification is given by the operator.
Entry Signification Method	Dependent on a given program. (Normally this purpose is served by one of the program function keys numbered F1 through F16.)
Disabled Keys	**ROLL UP, ROLL DOWN, NEXT PAGE, PREV PAGE, ESC **BREAK (disabled in Polling Block Mode only) **DEL LINE/INS (disabled in protect submode)

* The action of the Cursor Control Keys is modified slightly in the protect submode of Block Mode. In the protect submode, whenever an attempt is made to move the cursor into a "off-limits" area, the cursor automatically skips over the (protected) area and rests in the first unprotected character position it encounters from left to right and top to bottom.

** Under program control, these keys may be reassigned either new functions or functions similar to their original function.

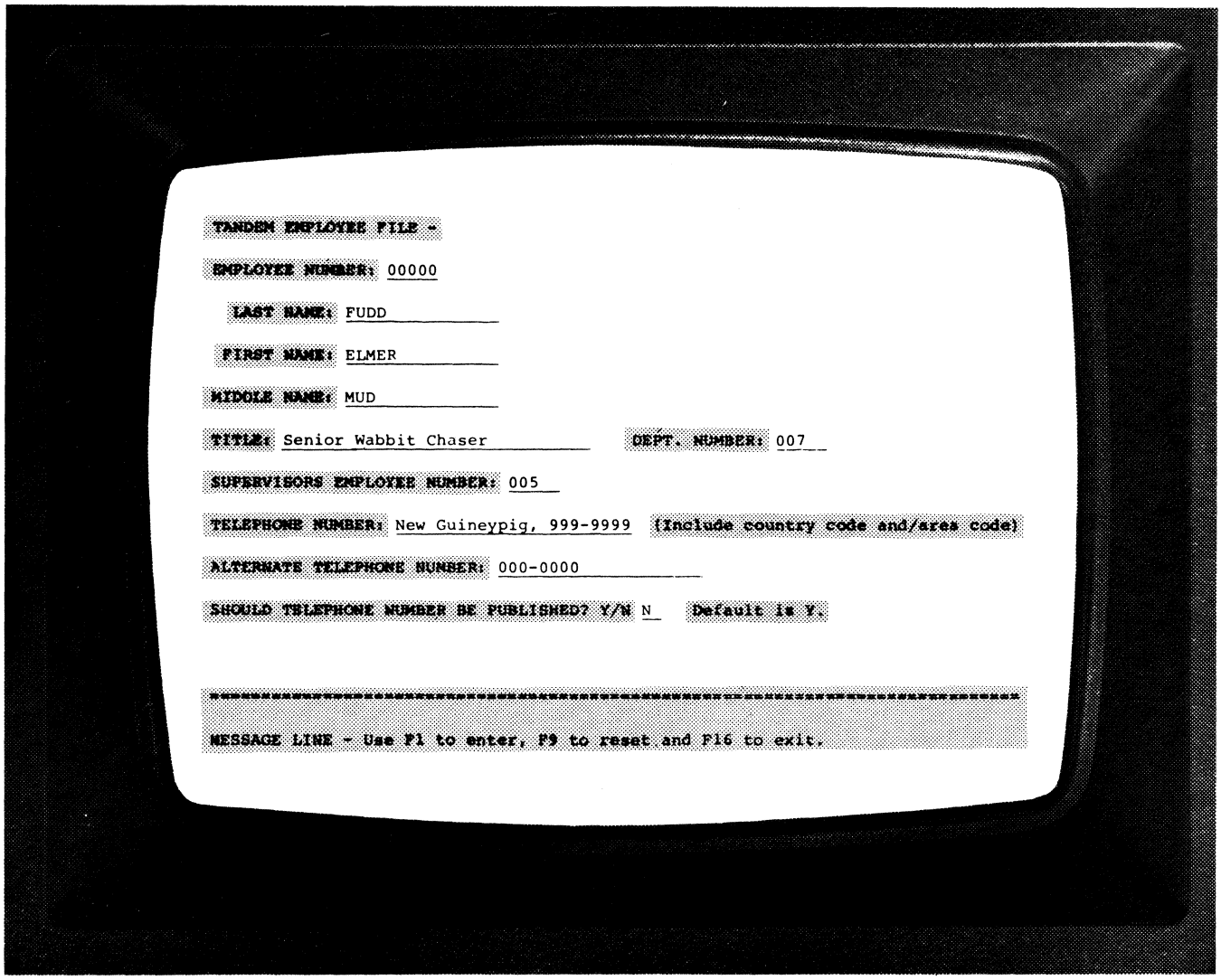


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Figure 12 Block Mode Operation

Section 5

CUSTOMARY REQUIREMENTS

Operators may be allowed or required to perform some or all of the activities described in the following topics. Disregard those that are not applicable. (Supervisors should advise operators of the particular procedures which must be performed.)

POWER, VOLUME, AND BRIGHTNESS CHECKS

The operator may have to check and adjust the power, volume and brightness controls mounted on the back side of the VDU (Figure 3) at the start of each work session (refer to instructions for adjustment in the section entitled "Rear-Mounted Controls").

IDENTIFICATION/LOGON REQUIREMENTS

In some instances, the operator will have to provide an identification message before work can begin using the Tandem system.

The Tandem Command Interpreter program, for instance, requires an identification message including the command "logon", a group name, a user name, and a user password (refer to Tandem "Operating Manual" listed in Appendix C, in the sections entitled "LOGON Command" and "Introduction"). Until this sequence (followed by the RETURN key) is received, the Command Interpreter will not process any other entries made by the operator.

Likewise, the Command Interpreter expects a logoff command (the command "logoff" followed by the RETURN key) when the operator is finished working so that unauthorized persons will be prohibited from using the system.

Refer to the operating manual describing the interactive program(s) under use, or consult with a person familiar with system operation.

> CAUTION
> Problems may occur if control characters (characters entered while the CTRL key is depressed) are used as part of the password in the identification message. Refer to the VDU Programming Manual, 82047, under the topic "Control Codes and Escape Sequences".

Command Interpreter Logon Prerequisites

The Tandem Command Interpreter program is an interactive program which functions in conjunction with a VDU.

When power is switched on, a Command Interpreter prompt (:) should appear each time the RETURN key is depressed. Once a Command Interpreter prompt is obtained, the operator may enter the logon command as previously described.

PROGRAM SELECTION COMMANDS

A program selection command is required in most instances where a logon sequence is required. After using a particular program, a program exit command is also required. Refer to the operating manual describing the driver program in use (for example the Tandem Command Interpreter Program), or consult with a person familiar with system operation.

The Tandem Command Interpreter Program allows the operator to select from available programs by entering the name of the desired program along with either an explicit or implicit run statement (refer to Tandem "Operating Manual" listed in Appendix C, in the section entitled "[RUN [D]] Command").

CLEANING INSTRUCTIONS

The VDU display screen should be cleaned as required with an appropriate glass cleaner. The cabinet may be cleaned with a slightly damp cloth or commercially available mild detergent.

CAUTION

Ensure that the power is off while cleaning. Prevent any liquids from entering the VDU housing; otherwise damage may result.

CARE

Do not restrict airflow from the underside of the cabinet by placing the VDU on mats made of thick or cushioned fabrics.

Avoid leaving drinks where they may spill onto the keyboard and damage the keyboard switches.

Exercise care to keep cigarette ashes away from the keyboard where clogging of the keyboard switches can occur.

Appendix A

GLOSSARY OF TERMS

Block Mode - used to refer to a mode of VDU operation where a block of lines is treated as one unit (24 lines).

command - an allowed control instruction supplied by the operator in response to a command prompt.

Command Interpreter - a Tandem computer program allowing an operator to coordinate, run and control other programs from a VDU or terminal.

command prompt - an expression or a symbol used by the computer program to signal a request for an allowed command entry from the operator.

computer - a device capable of executing a set of instructions written to perform a specific data processing task, using data either stored in memory or supplied by an operator.

Conversational Mode - refers to a mode of VDU operation where entries of varying lengths may be made, one at a time, each of which must be followed by an entry signification code or key before they are acted upon by the program.

cursor - a unique symbol appearing on the display to indicate where the next character will be entered on the display screen or to indicate where a function key will begin to take effect on the display data.

cursor control function - a keyboard function used to control the position of the cursor on the display screen.

data - that information, almost always stored in computer memory, which the program acts upon.

data processing - the work performed by the computer.

data prompt - an expression or a symbol used by the computer program to signal a request for data to be supplied by the operator.

display control function - keyboard function used to alter which lines of data will be displayed on the screen.

editing function - keyboard function used to alter or delete data which was previously entered.

editing facilities - the editing function provisions associated with a particular device or computer program.

Appendix A: GLOSSARY OF TERMS

entry - any data or commands supplied to the computer by the operator in response to either a command or data prompt.

entry length - the allowed length of entry that may be made by the operator at one time into the computer for a given application program and a given mode of VDU operation.

entry signification - process by which the completion of an entry or series of entries is signaled to the computer by the operator.

entry signification code - a unique character or sequence of characters which is interpreted by the computer as the end of an entry or series of entries.

entry signification key - a unique keyboard key which is used to signal the end of an entry or a series of entries to the computer.

entry type - either command entry or data entry: a command entry is any information supplied in response to a command prompt and a data entry is any information supplied in response to a data prompt.

error report - an indication made to an operator that an entry was somehow incorrect (wrong entry type, a disallowed command, or disallowed data) as determined by the particular computer program being run.

field - a contiguous set of character positions, varying in length, but assigned particular data or display attributes (refer to the VDU Programming Manual, part number 82047, for a description of data and display attributes)

function key - keyboard key used to initiate a particular operation such as delete line, set tab, etc.

line - a row of contiguous character positions on the display screen occupying the display area from extreme left to extreme right.

logoff - a special command terminating an interactive work session with the computer by a specific operator.

logon - a special command allowing a specific operator to begin interactive work with the computer system.

memory - the data storage component of the computer.

non-protect submode, VDU - a submode of Block Mode operation which does not include "protected" display information (refer to "protect submode, VDU").

operating mode, VDU - one of the following VDU modes of operation: Conversational, Block (protect or non-protect submode).

paging - a display control function involving the exchange of the 24 lines currently displayed with either the next 24 lines or previous 24 lines.

password - a code word that is usually required as part of a logon command in order to secure computer systems against unauthorized users.

polling mode, VDU - state of VDU operation which allows several VDU's to share a common communication line to the computer (not to be confused with "operational mode, VDU")

print function key - VDU keyboard key which activates printing by an external printer connected to the option connector of a model T16/6524 VDU.

program - set of instructions which can be executed by a computer to perform a specific data processing task.

program, interactive - program which requires that entries be supplied by an operator in order to run.

program, "Tandem-supplied" - same as "program", but one that is produced by Tandem for use by Tandem customers.

program exit command - any command which is used to stop a program that is already running.

program selection command - any command used to initiate the running of specific programs.

program selection - the process by which an operator selects, one program at a time, to run a program from among the many programs available.

programmer - person who writes computer programs.

prompt - an expression or a symbol supplied by the computer program to signal a request for a particular "entry" from the operator.

protect submode, VDU - a submode of Block Mode operation, where data prompts supplied by the computer and displayed on the screen cannot be altered or erased by the operator.

protected field - a contiguous set of character positions, varying in length, but assigned a "protect" attribute that makes the field an "off limits" area for the operator (the keyboard keys cannot alter or delete characters in "protected fields"). Refer to the VDU Programming Manual, part number 82047, for a complete description of data and display attributes.

record - a unit of data stored in memory, usually with a pre-specified length, and usually containing related information such as a name, salary and badge number.

Appendix A: GLOSSARY OF TERMS

record length - the length of a record or group of records stored in computer memory.

run - term used to refer to the execution of a program by a computer.

tab function key - keyboard key allowing the operator to perform tabulation functions, the same as with a typewriter.

unprotected field - a contiguous set of character positions, varying in length, but for which no "protect" attribute has been assigned (keyboard keys can be used by the operator to alter or delete characters in "unprotected fields")

VDU - Video Display Unit

Appendix B

LIST OF CONTROL SEQUENCE FUNCTIONS

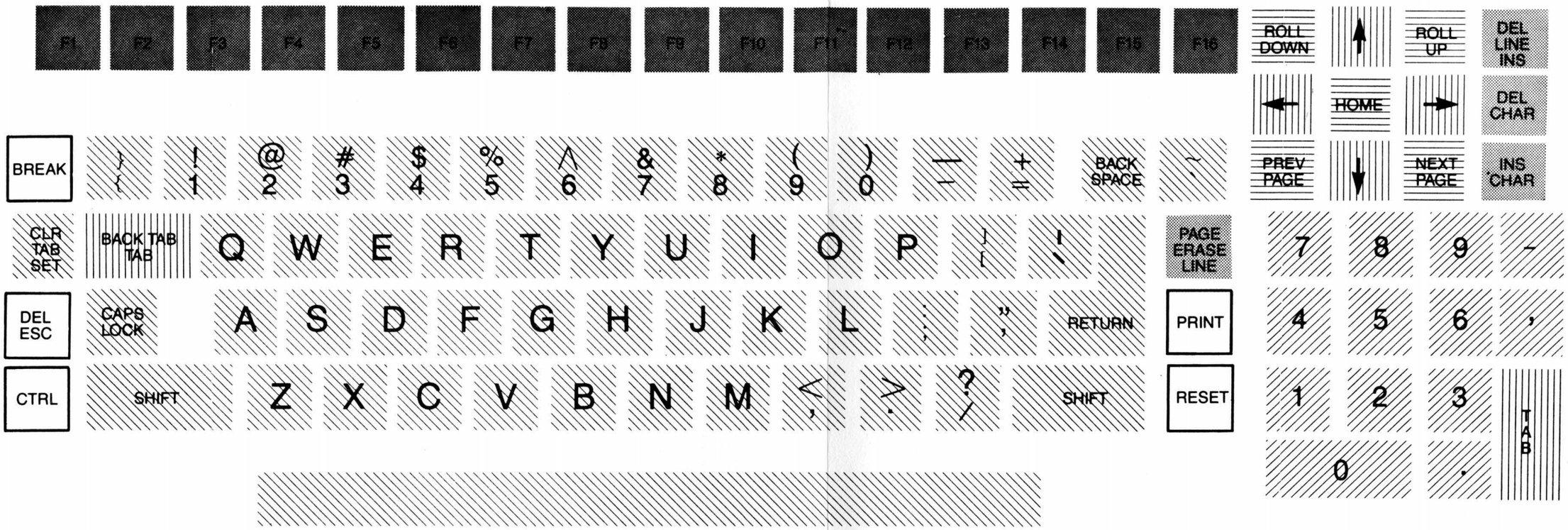
* CONTROL SEQUENCE	FUNCTION
CTRL TAB CLR	Clear all tabs
CTRL BREAK (shifted)	Modem disconnect
CTRL NEXT PAGE (shifted)	Turn on mode status in 25th line
CTRL PREV PAGE (shifted)	Turn off mode status in 25th line

*To enter a control sequence properly, the CTRL key (and SHIFT key if required) must be depressed in conjunction with other function keys as specified.

Appendix C

LIST OF TANDEM PUBLICATIONS DESCRIBING PROGRAM OPERATION

PROGRAM OPERATING MANUALS	PART NO.
COBOL	82007
SORT	82008
ENSCRIBE	82017
Operating Manual	82019
-covers the following programs:	
COMINT (Command Interpreter)	
EDIT	
FUP (File Utility Program)	
BACKUP	
RESTORE	
PUP (Peripheral Utility Program)	
UPDATE	
VS (Virtual Screen Editor)	
and various utility programs	
ENTRY (Screen Formatter)	82020
TGAL (Text Formatter)	82026
FORTRAN	82030
EXCHANGE (Remote Job Entry)	82032
EXTEND	82033
SPOOLER	82035
EXPAND (Network)	82038
ENFORM	82040



LEGEND

- Numeric Pad Keys
- Standard Typewriter Keys
- Editing Function Keys
- Special Purpose Keys
- Cursor Control Keys
- Display Control Keys*
- Program Function Keys

*THE DISPLAY CONTROL KEYS ARE TREATED AS EXTRA PROGRAM FUNCTION KEYS IN BLOCK MODE.

KEYBOARD

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