SPERRY UNIVAC

Universal Terminal System 400

System Description

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Concepts of the Universal Terminal System 400

The SPERRY UNIVAC Universal Terminal System 400 is an intelligent, programmable tool used to prepare and send information to a host data processing system and to obtain information from the host system. In fulfilling the basic input/output role, this display terminal system also offers an array of sophisticated extras, making it one of the most versatile and effective data communications devices ever designed.

The Universal Terminal System (UTS) 400 hardware consists of master, controller, and slave terminals, which may be combined in various configurations. A master terminal is shown in Figure 1, and a slave terminal is shown with the master in Figure 2.

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Figure 1. Master Terminal of Universal Terminal System 400

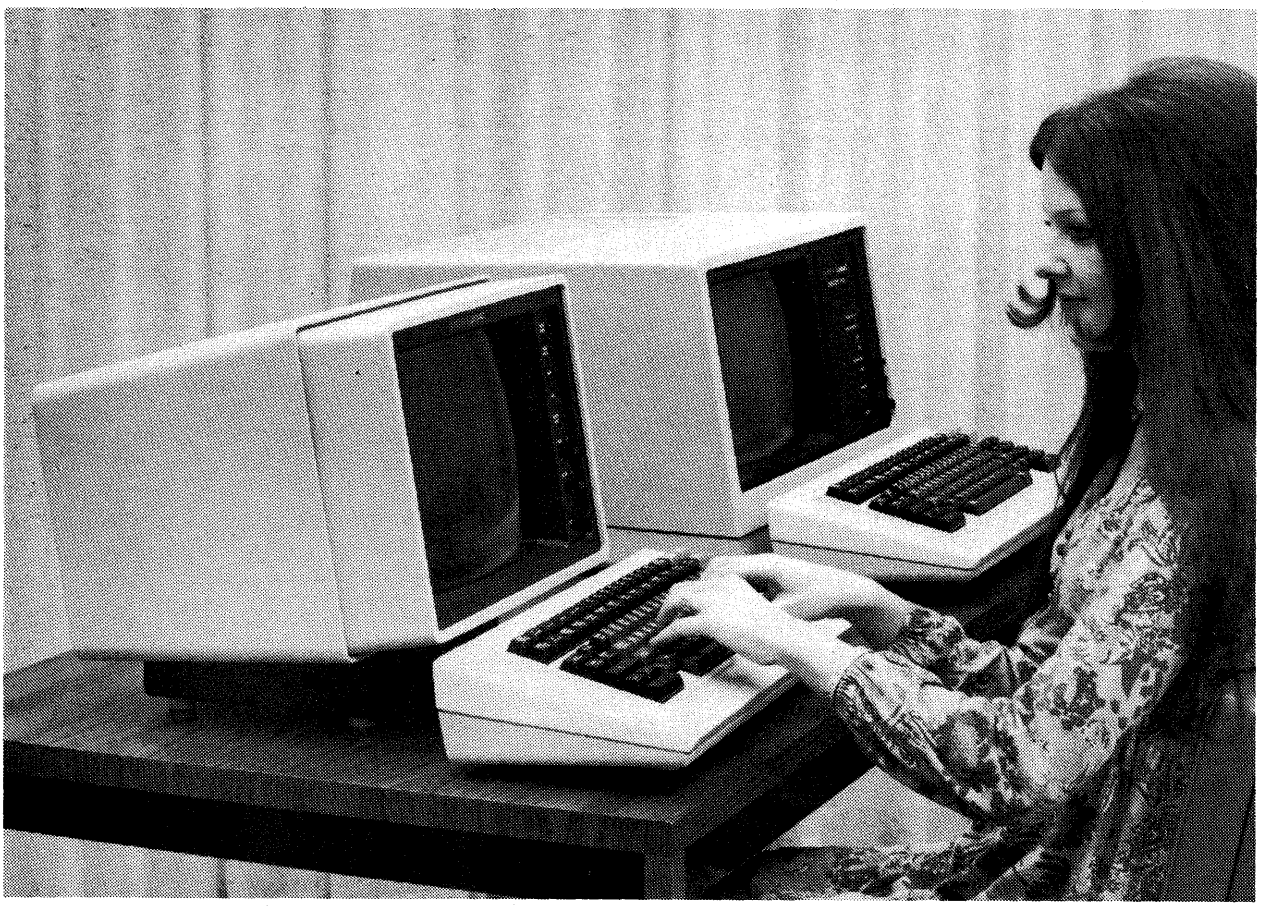

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Figure 2. UTS 400 Slave Station with Master Terminal

Economy, efficiency, versatility, expandability — these values have been considered in every phase of the UTS 400 design and have been implemented in the following basic concepts:

- Efficiency in data transmission, with techniques such as transmitting a full screen of data in a single message
- Cost savings in equipment, through the master/slave arrangement
- Building-block adaptability, which permits you to start with minimum equipment (a terminal only) and gradually expand capability without invalidating existing functions in any way
- Microprocessor technology, which uses firmware* for basic capabilities and programmability for sophistication of applications
- Keyboard-initiated program-attention capability, which provides the mechanics for the special functions defined by you in your applications software

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**This term and others peculiar to data communications are defined in the glossary at the back of the book.*

- User programmability, which allows the programmable attributes of the UTS 400 to be utilized in a host-generated program for execution by the UTS 400
- Extensive peripheral capability, augmented by
  - — both keyboard and processor control of peripherals
  - — buffered peripheral transfers
  - — peripheral sharing
- Maximum operator power, through use of machine functions such as display and format control characters and many keyboard provisions contributing to fast, flexible data preparation
- Compatibility with other terminal systems, allowing the UTS 400 to communicate on the same line as UNISCOPE 100 and 200 Display Terminals and DCT 1000 Data Communications Terminals
- Performance-tested communications protocol, using the line procedures proven so effective with the UNISCOPE Display Terminals
- Built-in data integrity and maintainability provisions

Economy — Many economies can be realized through full use of the UTS 400. You can save greatly on communications line costs through the many ways this terminal system compresses transmitted data and through the efficient receiving, holding, and outputting provisions.

You can save on equipment investment with each slave cluster that you operate because of the many sharing provisions, such as sharing a printer or a tape cassette unit on the shared peripheral interface, or sharing the communications line interface. For example, six slaves in a controller/slave cluster require only one interface to the communications line instead of six. These six clustered slaves require only one or two printers, no more than necessary to take the full-time workload of six busy UTS 400 operators.

Operator Control — You gain operator proficiency with little or no formal training, almost as soon as your UTS 400 terminal system is installed. The simple-to-operate keyboard is essentially a typist's home ground. The extra keys surrounding the alphanumeric data keys supply editing and data manipulation flexibility almost guaranteed to transform a typist into a supertypist. But data manipulation is just the beginning of your operator's power. From the keyboard, an operator can condition the UTS 400 so that routine information may be entered in any desired form arrangement, so that selected elements of data will be highlighted, so that the wrong type of data will automatically be rejected, and so that only changed or variable data is transmitted. These and other operator-controlled terminal capabilities are covered in more detail in later sections of this book.

Processor Control — The power of your host processor is also enhanced with the UTS 400. By giving the host processor control over the peripheral devices of your terminal system, enabling the host to transfer data from or to the devices, and allowing the host to select the devices to be used, the UTS 400 greatly increases host processor capability. The host processor can even operate peripheral devices at the same time your operator is entering data on the UTS 400 screen. And of course, all the unique capabilities of the terminal system are available for host processor use.

Configuration Flexibility — UTS 400 stations may be configured in whatever manner contributes most to your particular operation. Figure 3 illustrates a network involving several configuration methods. Notice the mix of connection methods all terminating at one interface point, and all compatible. Other configuration possibilities are illustrated in the "Configurations" section of this book.

User Programmability — By implementing user programmability, you can modify or augment UTS 400 operations and expand the capabilities of this microprogrammed terminal even more. This provision gives you programmability in conjunction with the microprogrammed personality, allowing you to tailor certain aspects of the terminal system to your unique functional requirements. Yet the new terminal-system personality is functionally compatible with the terminal systems that are not user programmed.

Reliability/Maintainability and Data Integrity — System reliability and data integrity are assured in the UTS 400 by several built-in functions: parity generation and checking, an automatic power-on confidence test, error logging, and line monitoring. The power-on confidence test can be initiated during equipment use either locally or by the host processor. These same functions also provide for easy and effective maintainability.

Complete Terminal Facility — Only with an efficient input/output method can the full potential of a data processing system be utilized. And that's the primary purpose of the SPERRY UNIVAC Universal Terminal System 400 — to function as the most effective I/O device that can be interfaced to your host system. In doing so, this terminal system gives you all the capabilites you could want or use at any remote location: hard-copy printers, peripheral data storage, online interactive data transfers, offline data handling potential, programmability for user-selected functions, host processor-initiated retrieval of data in peripheral storage, and very real economies in total data processing operations.

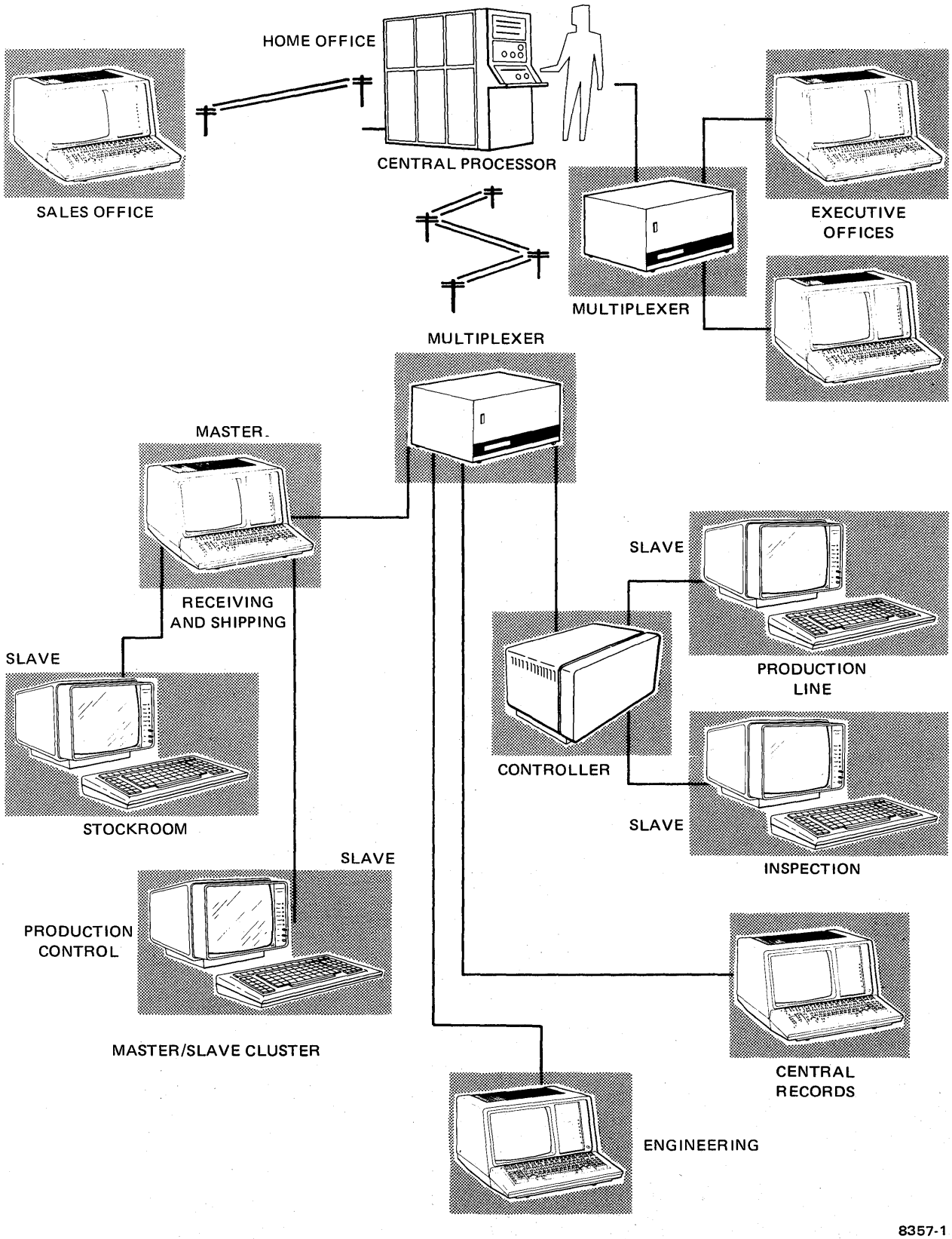

Figure 3. Network Using Several Methods of UTS 400 Station Connection

The Universal Terminal System 400

The SPERRY UNIVAC Universal Terminal System 400 is a general-purpose, microprocessor-based, programmable, remote display terminal system used for interactive data communications with a host processor.

The terminal system is available in two different configurations: as a master display terminal with zero, one, or two slaves, and as a controller with a minimum of one and up to a maximum of six slaves. The slaves are keyboard/display stations only. Each slave cluster shares a microprocessor, working storage, and other circuitry, including interfaces for communications and peripherals. These shared components are installed either in the master or in the separate controller.

Also offered with the UTS 400 are a wide assortment of peripheral devices, including a magnetic tape subsystem, a diskette subsystem, a variety of printers, and a magnetic stripe reader. The interface requirements for attaching these peripherals in various combinations are described in the "Peripheral Devices" section. The SPERRY UNIVAC Terminal Multiplexer and the SPERRY UNIVAC modem products can also be used with the UTS 400.

The UTS 400 with several of the peripheral devices in a typical master station setup is shown in Figure 4.

Integral to UTS 400 performance are many of the functions that have been use-tested in the SPERRY UNIVAC UNISCOPE 100 and 200 Display Terminals. In addition, many other capabilities are included in this versatile UTS 400 terminal system. The following list highlights some of these additional capabilities:

- Operator and host control of field control character
- Host and operator use of backward tabulation
- Host and operator use of line duplication
- Insert line in display
- Delete line in display
- Line feed character generation
- Form feed character generation
- Print transparent command generation
- Print form command generation
- Host and local use of transmit-changed-data command

- Send cursor address
- Peripheral interface device control (host and operator)
- Peripheral interface buffering
- Automatic retry of peripheral operations (both host and locally initiated)
- Automatic answer/hangup
- More program attention keys
- Keyboard locking for added security
- Host and local initiation of confidence test
- Host use of the error log

The capabilities of the UTS 400 can be broadened even more with user programmability. With this capability, the host processor downline loads the terminal random-access memory with the desired program. The "User Programmability" section tells you more about this provision.

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Figure 4. UTS 400 Controller With Slave Station and Several of the Peripheral Devices

MAJOR ATTRIBUTES OF THE UTS 400

Accessing Data

The UTS 400 is a visual display terminal system. This method of man-machine interaction is the most useful input/output method available in today's data processing technology, giving rapid, immediate access to the entire file capability of host processors.

The screen display on the UTS 400 is large, bright, and easy to read. For a look at your data, just scan through your file, using the display. Then, after you've had a look at each screenful, simply dispose of the image. You don't have to spend time and money generating a stack of paper: no stuffed file cabinets, no piles of paper that you can't quite decide to throw away, no overflowing wastebaskets. And when you do need a printed copy of data to take with you or to write on, a peripheral printer will give it to you — a screen at a time, part of a screen, or a whole file — whatever you designate.

A typical screen presentation is shown in Figure 5.

Both the UTS 400 master and controller contain a display-refreshing buffer for each display screen in the master/slave or controller/slave cluster. The buffer makes possible the continuous display of a message completely independent of the communications line, after the initial output from the processor. This capability for independent operation also gives you great flexibility in arranging station configurations.

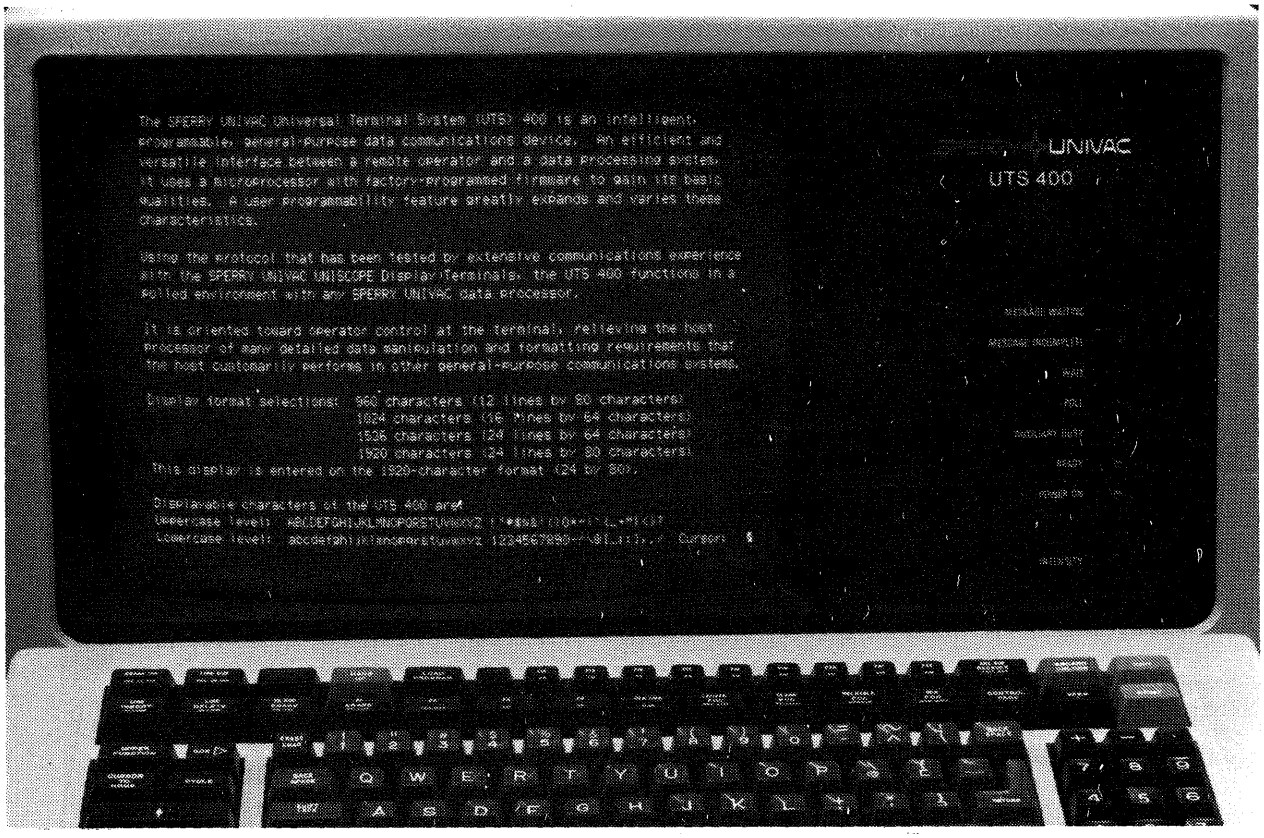

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Figure 5. Typical UTS 400 Screen Presentation

Maneuvering Data

Editing the data on the screen is simplicity itself with such operator-available attributes as a nondestructive cursor, horizontal and vertical wraparound, field control characters, tab setting capability, backward tabulation, line duplication, line insertion and deletion, character insertion and deletion, and replacement of characters by overwriting.

Control From the Screen

Your operator controls various operations by means of a control page, a technique that allows use of the screen and keyboard for control purposes without destroying information on the screen.

Peripheral Buffering

The random-access memory in the UTS 400 master or controller can function as a data buffer pool for the cluster, thus expanding the peripheral data transfer capabilities of each cluster.

Communicating

The UTS 400 can transmit over telephone lines either synchronously at a speed of up to 9600 bits per second or asynchronously at a speed of up to 2400 bits per second. All UTS 400 transmission is in ASCII code, the industry standard.

The communications control procedures — format protocol for the communications process — are complete and comprehensive. Anticipating every communications problem, these procedures provide simple, straightforward solutions.

DESIGN PHILOSOPHY

In every design phase of the UTS 400, the paramount values of such a system — economy, efficiency, versatility, and expandability — have been the first consideration. These values are clearly evident in all aspects of the terminal system.

Efficient Use of Line Time

The UTS 400 has been designed to be an integral part of a host processor communications system. A major consideration in designing an integrated system is telephone line cost, which may account for as much as one-third of the total cost of the system. To keep line costs down, you keep the number of telephone lines to a minimum.

The simplest way to meet this condition is to connect large numbers of highly efficient terminals on a single line — terminals that require only a fraction of total line time for any transmission. The UTS 400 satisfies all criteria for these efficient terminals.

The terminal system is designed to condense each transmission by sending only significant spaces; nonsignificant spaces are automatically stripped out (suppressed).

Another line-time saver that can be implemented by the user is the technique of designating only certain portions of a display for transmission, such as unprotected data or data flagged as changed from its previous condition in the display.

Multiplexed and slave clusters increase transaction productivity on each line by providing full-capacity traffic potential. Still other design provisions that reduce line-time usage without reducing machine capability are mentioned throughout this book.

Human Factors

Underlying the design of the UTS 400 is the broad premise that operator effectiveness is the key to efficient data communications. Extensive human factors evaluations, coupled with accumulated experience on similar and related data communications terminals, were called upon to develop the optimum design for this type of man-machine interface. As a result, the UTS 400 is designed for easy, straightforward operation, eliminating completely any need for awkward head or body positions. The operator's field of view of the display is well within normal eyespan; the keyboard is designed for comfortable touchtyping.

All the control keys required to operate the terminal and to initiate data transfers are located on the keyboard, within easy reaching distance of the hands when placed in normal typing position. Power and display adjustment controls and operating indicators are located on the front of the terminal.

Because the keyboard is similar to that of a typewriter, little additional training is required to operate the terminal system and to use its many extra capabilities.

The visual display consists of green characters on a dark background. The entire display is flicker free. The sharp, bright characters closely resemble conventional printed material. Each character appears of equal thickness and with equal brightness over the entire screen. The result is excellent legibility and clarity of presentation at all times.

Character brightness can be adjusted to the preferred level by the operator. And the nonglare screen further adds to viewing comfort.

Terminal Adaptability

Because the UTS 400 is intended for use in widely varying conditions, versatility and expandability have been major design goals. Almost any application can be satisfied, starting with a minimum of hardware. The terminal system can be expanded in simple steps as needed to meet growth requirements and new applications.

The available selections, illustrated in Figure 6, have been planned to satisfy any and all of your terminal system requirements.

Screen Formats

As shown in Figure 6, the UTS 400 has a selection of display capacities: 960, 1024, 1536, or 1920 characters, depending on screen format. The formats available are 12 lines by 80 columns, 16 by 64, 24 by 64, and 24 by 80. The complete ASCII set of 96 characters, including uppercase and lowercase alphabetics, can be displayed. Also available are character sets for eight languages.

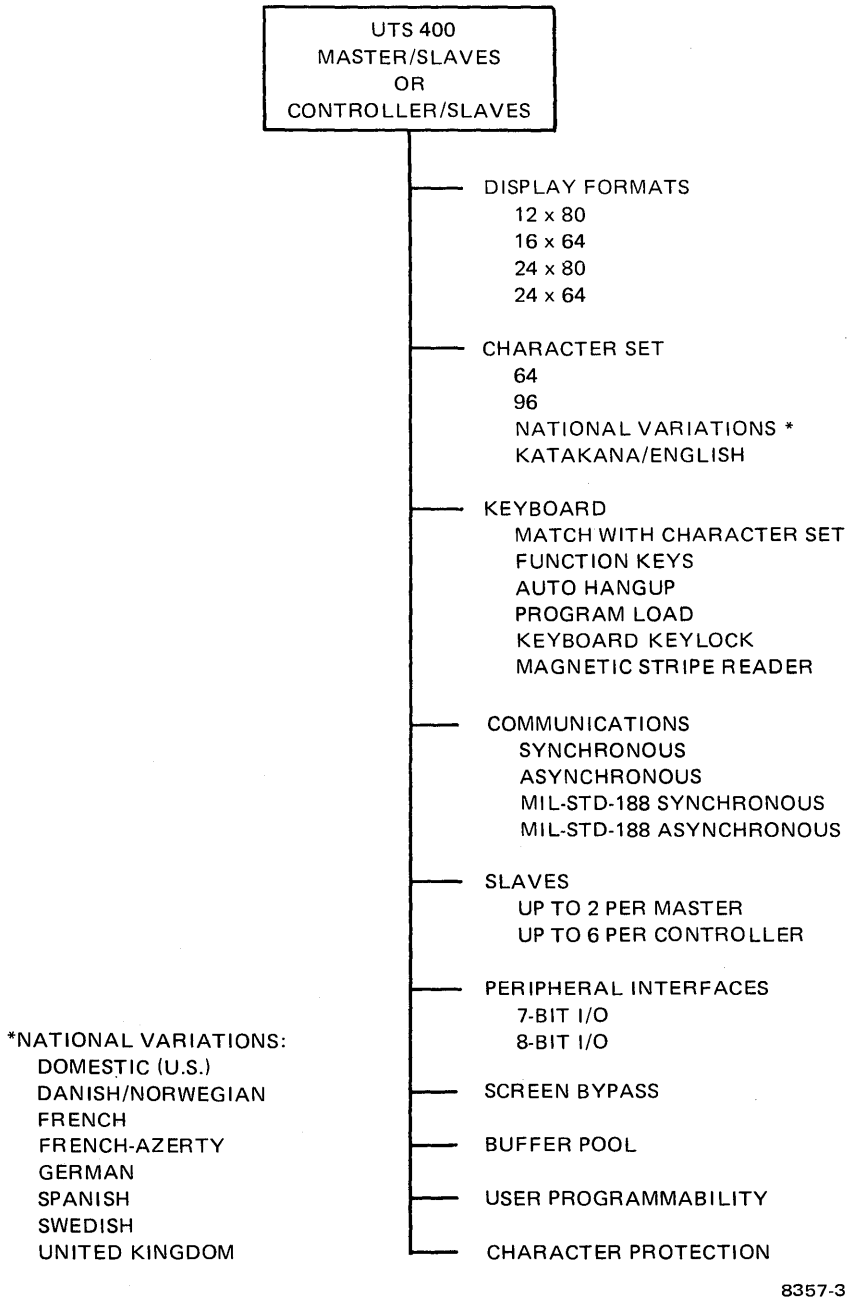

Figure 6. UTS 400 Selections

Keyboard Types

The keyboard, which should be selected to match the character set, may be either 64 character, 96 character, or Katakana/English. The same range of keyboard selections applies to each foreign language available. A keyboard option includes the 22 special function keys for use with those terminals requiring additional functions. The keyboard shown in Figure 7 includes the full set of function keys.

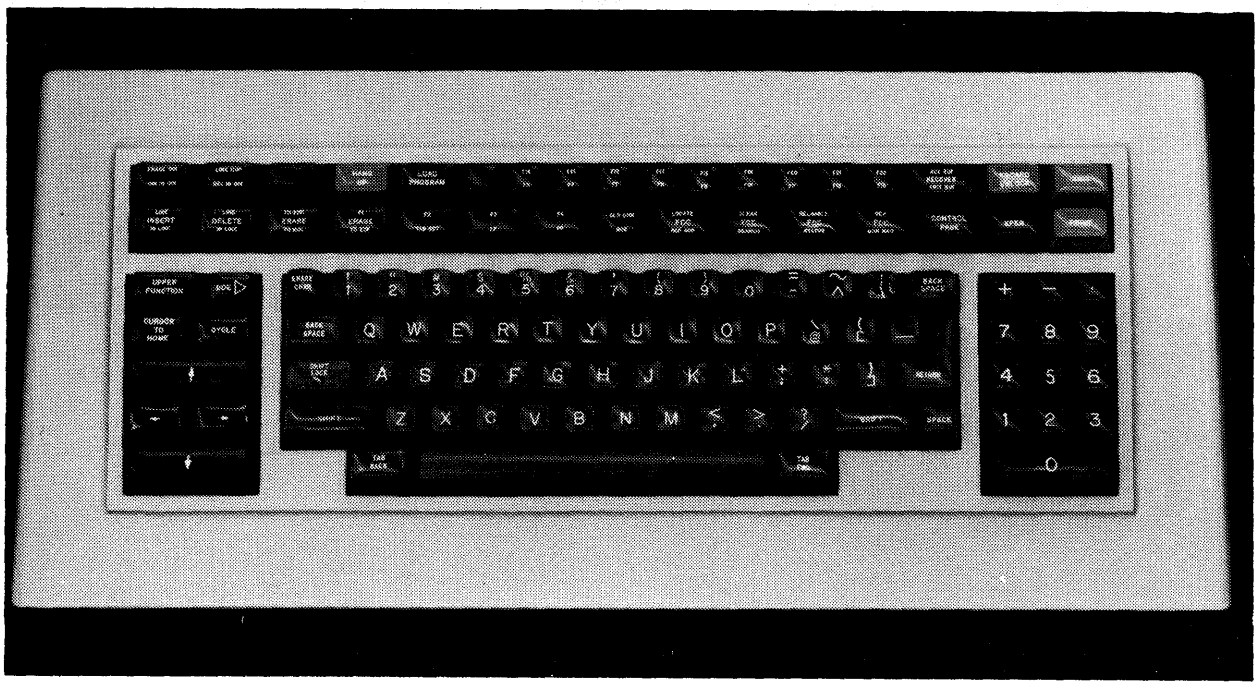

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Figure 7. Keyboard With Full Set of Function Keys

The keyboard includes alphanumeric keys, a numeric pad, editing and cursor control keys, program attention keys, and shift keys. The *hang up* key, used with the disconnect feature, permits your operator to disconnect the modems on a switched telephone network. Keycap selection is made for the language corresponding to the character generator being used. The Katakana/English keyboard is a separate choice with no keycap selection required.

ADDITIONAL CAPABILITIES

Field Control Mode

Field control, one of the most potentially useful of all UTS 400 functions, gives the operator complete control over data formatting. This function is similar in concept to protected format, but with many more capabilities. For example, fields may be formed that will accept only numbers or only letters or that will right-justify all entries. The display intensity of the entries in a field may be controlled to aid in visual identification of the data, or the entire data entry in the field may be made to blink. The same field control character used to define the parameters of the field can also

be used as tab stops, thus saving spaces in the display for additional data. (The regular tab stop requires one space in the screen display.) Following is a complete list of the field control character (FCC) capabilities:

- Designates one of the following display characteristics:
  - Normal intensity (high)
  - Low intensity
  - Off (characters in the field not displayed)
  - Blink (data in the field blinks on and off at normal intensity)
- Specifies one of the following types of data entry:
  - Any input allowed
  - Alphanumeric entry only
  - Numeric entry only
  - Protected (no data entry allowed)
  - Right justification, any entry
  - Right justification, alphanumeric entry only
  - Right justification, numeric entry only
- Specifies its use as a tab stop
- Indicates that a field has or has not been changed by an operator

And remember, the operator has complete control — both for generating and for modifying the field control character. Or the host processor may be given this same control.

The protected data capability, for example, can be used by the host processor to create "forms" for routine data entry — words and phrases used as guides for entering the variable data. These forms are displayed for your operator's convenience but are suppressed when the display is transmitted. Your operator just "fills in the blanks" and transmits the newly entered data. Obviously, this protected data capability will save you transmission time, one of the big advantages of the UTS 400. Only variable (unprotected) information is transmitted. This provision is similar to the suppression of nonsignificant spaces but works on the protected characters instead. The protected format function will also save your operator a lot of time when entering variable information.

While supplying all this versatility in formatting, the field control character still does not interfere with the screen display in any way. The character occupies a memory location but not a screen location. As many as 15 such characters can be used in each line of your display.

If you are using the UTS 400 in the environment of UNISCOPE 100 and 200 terminals, your operator can still take full offline advantage of the field control characters, even though the

applications program does not recognize the character. A special operator-accessible switch enables the UTS 400 to convert protected-field FCCs to protected format codes for transmission and, conversely, to convert protected format codes received from the line to protected-field FCCs. With this conversion aid, the UTS 400 operator can be given some FCC capabilities without requiring application software changes. One application can use FCCs, and at the flip of a switch the UTS 400 can support an application coded for UNISCOPE 100 and 200 terminals.

If your UTS 400 is equipped with the character protection feature, the UTS 400 can be operated in the character protection mode through control page definitions. In this case, the full FCC capabilities described previously are supported, and no switch setting is required.

Control Page

A dedicated, displayable storage location in UTS 400 memory contains an array of control and status indication terms called the control page. This 2-line display is used by your operator in conjunction with several of the interface function keys to control the transfer of data to and from peripheral devices and to control the type of transmission made from the UTS 400.

The operator calls the display with the *control page* key. When the control page is called to the screen, any data present on the first two display lines is shifted to temporary storage. The data is returned to the display when the control page is removed from the screen.

The control page format is:

```
(**PRINT*)STA    (**XFER**)PRNT(  )XFER(  )XMIT(  )MM
(  /  /  )ADR    (  /  /  )SEARCH(                )****
```

The appropriate functional information is entered in the fields within parentheses following or below each term. The spaces following **STA** and **ADR** are used to display the appropriate status or address of a peripheral device in response to an operator command. The control page method of controlling peripheral devices allows two input devices, two output devices, and two device functions to be defined at the same time.

The function of each control page field is:

(PRINT*)**
(fr/to/fu)

This is a 2-line field. The top line is protected from operator entry; the second line is used by the operator to define the function to be performed when the *print* key is pressed. The entries in the **fr** (from) and **to** subfields designate the input and output devices for the operation defined in the **fu** (function) subfield. The type of print operation is designated in the **PRNT( )** field.

(XFER**)**
(fr/to/fu)

This is a 2-line field. The top line is protected from operator entry; the second line is used by the operator to define the function to be performed when the *transfer* key is pressed. The entries in the **fr** and **to** subfields designate the input and output devices for the operation defined in the **fu** subfield. The type of transfer operation is designated in the **XFER( )** field.

The allowable entries in the **fr** and **to** subfields of the **(**PRINT*)** and **(**XFER**)** fields are:

Pn Designates a printer on a 7-bit interface. The **n** represents a numerical designation from 1 through 8.

Cn Designates a tape cassette transport on the 7-bit interface. The **n** represents a numerical designation from 1 through 6.

Dn Designates a diskette drive on the 8-bit interface. The **n** represents a numerical designation from 1 through 6.

Tn Designates a printer on the 8-bit interface. The **n** represents a numerical designation from 1 through 8.

There is no default condition for the **fr** and **to** subfields.

The allowable entries in the **fu** subfield of the (**PRINT*) and (**XFER**) fields are:

CO Designates the copy function. This operation takes place as an input to the screen from the device specified in the **fr** subfield, followed by an output from the screen to the device specified in the **to** subfield. The process continues until the input device reaches the address previously entered by the operator in the **SEARCH( )** field.

ED Designates the edit function. The operation is performed in the same manner as the copy operation, except the operator first has the opportunity to manipulate each screen of data and then must initiate the **to** function by pressing the *print* or *transfer* key, as applicable. The input is also manually initiated by pressing one of these two keys, as applicable.

HO Designates the home function. The device specified in the **fr** subfield will return to the beginning position when the *print* or *transfer* key is pressed: the diskette will search to home; the tape cassette system will rewind.

AT Designates the autotransmit function. The initial input to the screen is caused by pressing the *transfer* key. The data will be read from the peripheral device defined in the **fr** subfield. At the end of this input, the autotransmit function will condition the terminal for transmission of data. The transmit variation specified in the **XMIT( )** field will apply. The host processor may then initiate successive transfer operations from the designated peripheral, with autotransmit conditioning the terminal for each transmission.

RD Designates the read function. The input device designated in the **fr** subfield will read and input one screen of data each time the operator presses the *print* or *transfer* key, as applicable.

PR Designates the disk preparation function. The diskette in the selected diskette drive will be cleared and formatted when the operator presses the *print* or *transfer* key, as applicable.

A blank in the **fu** subfield is the default condition, which causes the system to output one screen of data to the device specified in the **to** subfield each time the *print* or *transfer* key is pressed.

STA The 6-character field following this term is used by the system to display the device and its status when the *status* key is pressed. The operator specifies the device at the initiation of this operation by placing the cursor over the second character of the 2-character device designator listed in the **fr** or **to** subfield.

ADR The 6-character field following this term is used by the system to display the storage address of the device specified when the *report address* key is pressed. The operator specifies the device at the initiation of this operation by placing the cursor over the second character of the 2-character device designator listed in the **fr** or **to** subfield.

PRNT( ) This 4-character field is used by the operator to specify the type of print function to be performed when the *print* key is pressed. The allowable entries are **PRNT, FORM,** and **XPAR**. When either **PRNT** or **FORM** is specified, data on the screen between the SOE or home position and the cursor location is printed, with space suppression at the end of lines. **PRNT** causes all data to be printed except field control characters (FCCs). **FORM** causes all characters except FCCs to be printed, with spaces replacing protected characters. **XPAR** specifies a print transparent operation, in which all carriage-return codes are suppressed, no FCCs are included, and no spaces are suppressed.

XFER( ) This 4-character field is used by the operator to specify the type of data transfer to be performed when the *transfer* key is pressed. Data on the screen between the SOE or home position and the cursor location is transferred, with end-of-line space suppression. The allowable entries are **ALL, VAR,** and **CHAN. ALL** causes all data to be transferred, including FCCs. **VAR** causes transfer of all data not protected; FCCs are included for each field transferred. **CHAN** causes transfer of only the data and FCC from each field in which an actual change has been made.

XMIT( ) This 4-character field is used by the operator to specify the type of online transmission to be performed when the *transmit* key is pressed. Data on the screen between the SOE or home position and the cursor location is transmitted, with end-of-line space suppression. The allowable entries are **ALL, VAR,** and **CHAN. ALL** causes all data to be transmitted, including FCCs. **VAR** causes transmission of all data not protected; FCCs are included for each field transmitted. **CHAN** causes transmission of only the data and FCC from each field in which an actual change has been made.

MM When the character protection feature is installed, this field is used to define whether a specific UTS 400 master station or slave station will operate in character protection mode.

SEARCH( )****
This 23-character field is used by the operator to define search instructions for devices designated in the **fr** subfield of the **(**PRINT*)** or **(**XFER**)** field or to define the address termination of the **CO** function. The search function is initiated by pressing the *search* key.

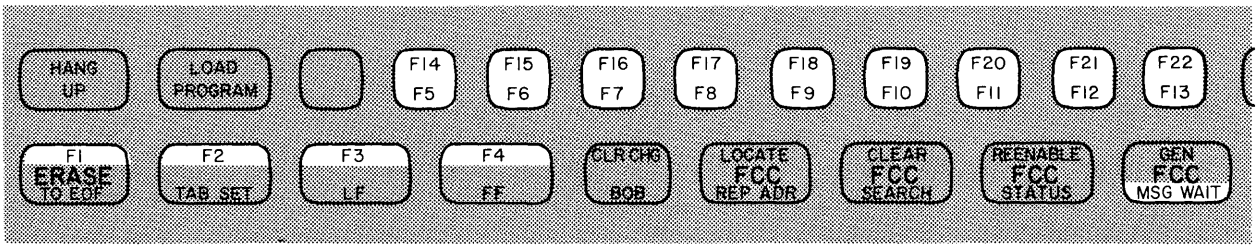
In use, the control page will specify the function each time the appropriate key *(transmit, transfer, print, backward one block, report address, search, status)* is pressed, once the function has been defined. When a different function is desired for that key, the appropriate control page field must be redefined.

Program Attention Keys

These keys are handy, economical message generators that can be used to initiate special sequences or functions as designated in your host program. Each key generates a single-character message, properly placed in the UTS 400 message format (terminal address, the 1-character message, and the end-of-message indication). In the programmable terminal systems, these keys may be shared by the host and the UTS 400 as determined by the user programs.

The processor (host or UTS 400) interprets the single-character message as a command to perform the programmed function or sequence. In other words, the message of a program attention key activates a complete program subroutine, causing the host processor or the UTS 400 processor to perform that subroutine when the message is received. An example of a UTS 400 function that could be activated with such a subroutine is rolling the display slowly upward while the operator reads it. (Display rolling is described in more detail below.)

The basic keyboard has four of these program attention keys, labeled *F1, F2, F3,* and *F4.* Additional keys, as shown in the following figure, are available as a keyboard feature, providing up to 22 program attention messages. The *message waiting* key also functions in the same manner as these special function keys and can be used to request a message generated or forwarded by the host processor.



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Line Insert and Line Delete

Under host processor or operator control, a blank line can be created or deleted anywhere in the display. When a line is inserted, the data previously in that line location, and in all subsequent lines, is shifted downward one line position. Any data in the bottom line of the screen is removed from the display and from storage. When a line is deleted, all data below the line then shifts upward one line position, creating a blank line at the bottom of the screen.

Display Rolling

By host processor control, the display on the screen can be rolled upward or downward at whatever rate you choose, from a discernible line-at-a-time rate to a rapid roll. The effect is achieved by processor-controlled line-insert and line-delete functions. The rate of roll depends on the frequency of the insert or delete function in a sequential operation. Special function keys can be designated by the host program to initiate this function, to regulate the roll rate, and to end the function.

Line Duplication

The host processor or operator can direct the UTS 400 to duplicate any line already on the screen. This capability makes it possible to set up forms or repetitious material by a simple command or operation rather than by repeating the same information over and over again.

Active/Reference Screen Areas

By use of the protected format function of the field control character, part of the screen can be designated as reference (protected) and part of it as active (receiving operator-entered variable data). With the appropriate transmit function specified, only the information in the active areas will be transmitted.

Active areas can also be isolated by use of the hardware provision of the UTS 400 called "partial screen transmission." The UTS 400 can can transmit data from any selected part of the screen without including the rest of the display.

With the active/reference area capability, portions of the screen can be used for active message interchange without disturbing the remainder of the data display. This capability allows your operator to have multiple messages on the screen at one time, and the host processor and the operator can then exchange display segments instead of sending the entire contents of the display with each transmission.

Active/reference screen areas can be arranged in almost any way you find convenient. The active area of the screen is designated by the operator or by the host processor and can be any area on the screen that is not designated as protected format.

Tabulating

Tabulation may be accomplished in the familiar manner, by pressing a tab set key, or by using the field control character to define tab positions. The field control character does not occupy a position in the display, but the conventional tab character does. The tabbing response is the same with either type of tab stop; that is, when the tab key is pressed, the cursor moves to the right and stops at the first unprotected character after the first tab stop. If no tab stop is encountered, the cursor goes to the home position.

Backward Tabulating

The UTS 400 can tab backward as well as forward. The same tab stop provisions apply to this capability, and the same tabbing response occurs except the cursor moves to the first tab stop position to the left of its position when the tab key is pressed. If no tab stop is encountered, the cursor goes to the home position. If a tab stop is immediately left of the cursor, that tab stop will be skipped.

Screen Bypass

The screen bypass permits the host processor to operate the peripheral devices of a terminal without interfering with the operator's direct use of the terminal. The screen bypass is a data storage area that functions as a nondisplayable terminal, representing one of the terminal assignments possible in a terminal cluster arrangement. Either the host or the master terminal may be used to set the control page for the screen bypass. Thereafter, the host processor can access the selected peripheral by addressing it directly.

Buffer Pool

To give your operator more active-use time of the terminal when entering data for transfer to a peripheral device, a buffering system is available as an option in the UTS 400 terminal system. With this buffer present, the terminal can place the contents of display storage into the buffer and then be immediately available for further keyboard, screen, and communications line activity. Indeed, all functions of the terminal will be operable during the buffer pool transfer activity except the peripheral device control keys; they will be inoperative.

All terminals in a slave cluster share the common buffer pool for data transfers to peripheral devices. As a terminal requires buffer space, the amount needed for a single operation is assigned to that terminal. The size of the buffer is determined by the size of the data block to be transferred. Only one such assignment is made at any one time for that terminal.

As soon as the data transfer is complete, the assigned buffer space reverts to the common pool. However, if a nonrecoverable error occurs in the data transfer, the buffer assignment will remain committed to that terminal, but the terminal will be dropped from the user queue. At this time, the operator will be alerted to the error by the *audible alarm* and by the *auxiliary busy* indicator, which will change from a steady indication to a blinking indication. The status of the device will be shown in the appropriate field of the control page.

When a nonrecoverable error occurs, the operator has two options for manual recovery: call the buffer contents back to the screen or totally abort the transaction, releasing the buffer back to the pool. No other peripheral device transactions will be permitted from this terminal until one of these two steps has been taken; the peripheral device control keys will continue to be inoperative.

Character Protection

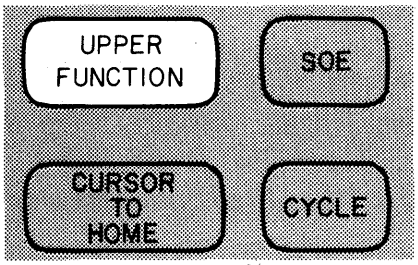
The character protection feature provides the same character protection capability as that provided in the UNISCOPE 100/200 terminals. This feature allows you to have as many protected or unprotected fields per line as you desire. The character protection feature also suppresses spaces within UNISCOPE terminal protected fields on transmission. Use of this feature does not preclude the use of field control characters (FCCs) for character protection. In addition, while some terminals in a cluster are operating in character protection mode, other terminals in the same cluster can be operated in the normal mode.

Automatic Answer/Hangup

For use with a dialed modem, an optional feature is available that enables the UTS 400 to answer a host processor-originated call automatically. This feature also provides the terminal system with the capability of hanging up automatically in response to a processor command or of initiating the disconnection command itself.

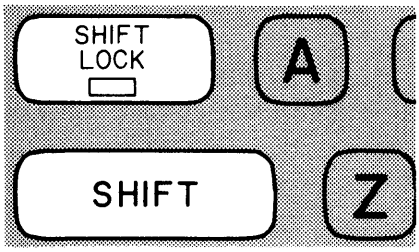
Function Control Keys

The UTS 400 keyboard contains several function control keys used to implement the added capabilities of this terminal, as described in the following paragraphs. (If a key has two functions, the top function is enabled in conjunction with the *upper function* key.)

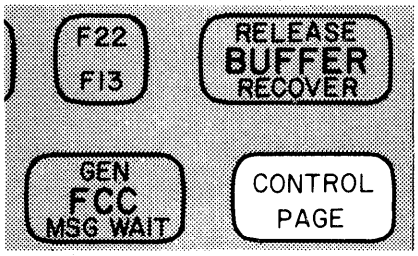


44541

These keys are used to change the active level of the applicable section of the keyboard. The *upper function* key acts on the various function-control and editing keys. The *shift* and *shift lock* keys act on the alphanumeric (data) section. (The Katakana/English keyboard has four data-section shift states to accommodate the uppercase and lowercase requirements of both Katakana and English.)

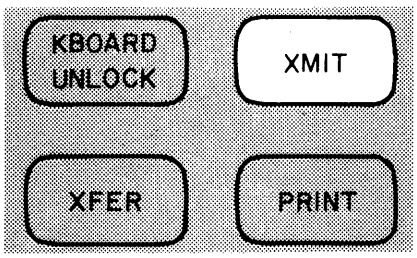


44542



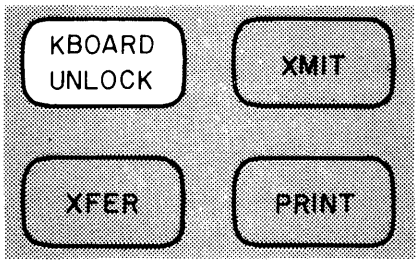
44543

The *control page* key is used to bring the control page display to the screen and to return the control page to storage when the operator has made the entry for which the control page was called. No shift level control is required; the key is simply pressed twice, once to call the control page from storage and once to return it to storage.



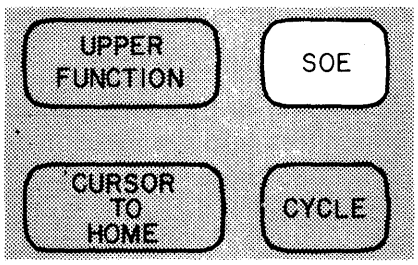
44544

When the *transmit* key is pressed, the type of transmission specified in the control page will occur on the next traffic poll to that terminal. The types of transmission that may be specified in the control page are all, variable, and changed. "All" refers to everything on the display. "Variable" refers to all unprotected data. "Changed" refers to those fields in which some data change has occurred. The field control character must be set to indicate changed data.



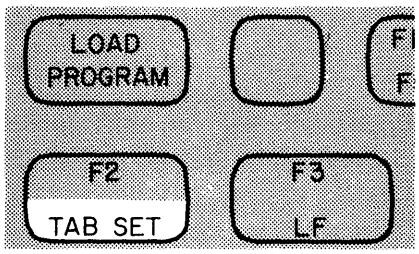
44545

The *keyboard unlock* key unlocks the keyboard and turns out the *wait* indicator.



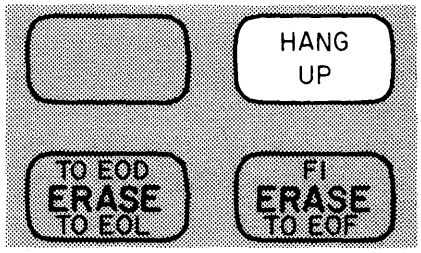
44546

The *SOE* key generates a start-of-entry code (▷) at the cursor position.



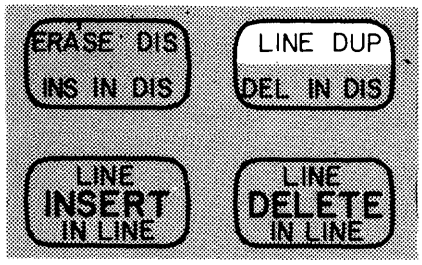
44547

The *tab set* key generates a tab stop at the cursor location. The tab stop code will occupy that position in display storage, and when the tabulation function is used, the cursor will be located in the first screen location to the right of the tab stop.



44548

When a condition occurs necessitating an operator-initiated disconnection on a dialed line connection, pressing the *hang up* key causes the modem at each end of the line to break the connection.

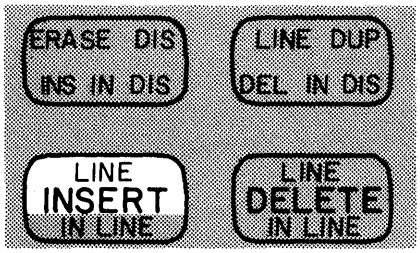


44549

The *line duplication* key causes the contents of the line on which the cursor is located to be duplicated on the line directly below. (The location of the cursor within the line is not significant; the entire line will be duplicated regardless.) The cursor is repositioned to the corresponding location on the duplicated line. When the key is pressed repeatedly, the same line is duplicated again and again, once for each pressing. This action will continue to the bottom of the screen, but line duplication will not occur if the key is pressed when the cursor is on the last line.

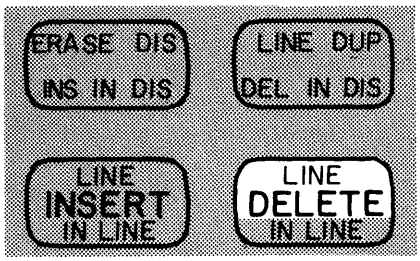
Selective clearing can also be accomplished by clearing the desired portion of the line before pressing the *line duplication* key.

Rapid setup of field control characters, tab stops, and repetitive text for tabular or columnar treatments is easily accomplished with the line duplication function. Other uses will suggest themselves to the operator as unique work requirements are imposed.



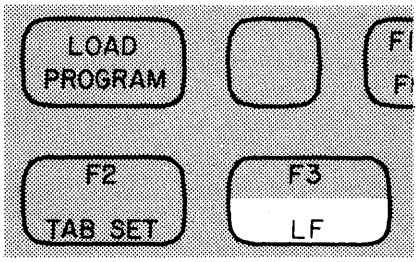
44550

The *insert line* key causes a blank line to be inserted at the cursor location, causing all lines already on the screen from the cursor location to the bottom to move down one line. The line at the bottom of the screen when the key is pressed will be lost from storage.



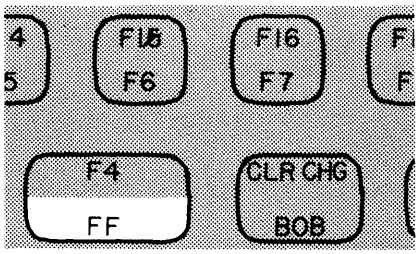
44551

The *delete line* key deletes the line on which the cursor is positioned. All lines below the deleted line will shift up one line, and a blank line will result at the bottom of the screen.



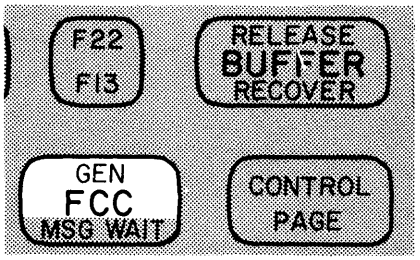
44552

When the *line feed* key is pressed, the nondisplayable line feed (LF) character is generated at the cursor position. The cursor advances to the next position just as it would with the entry of a data character.



44553

When the *form feed* key is pressed, the nondisplayable form feed (FF) character is generated at the cursor position. The cursor advances to the next position just as it would with the entry of a data character.

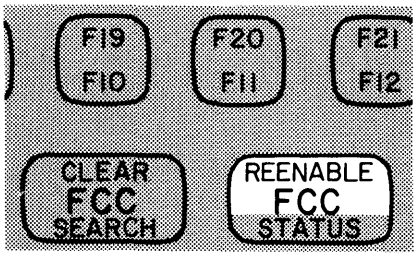


44554

When the *field control character generate* key is pressed, the next five sequential keyboard inputs are interpreted as code elements or the generation of a field control character. The cursor is placed at the first position of the desired field, and then each of four characters is sequentially keyed from that point to define the appropriate function of the FCC. The FCC generation sequence is concluded by pressing the *FCC reenable* key. The FCC generation codes and sequence are shown in Table 1. Note that when the *FCC generate* key has been pressed, all FCCs are disabled until the *FCC reenable* key is pressed.

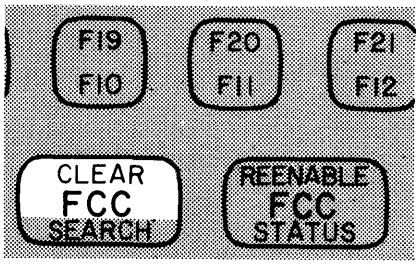
Table 1. Field Control Character Generation

Entry Sequence	FCC Function	Entry	Meaning of Entry
1	Intensity	N (or space) L B O	Normal intensity (high) Low intensity Blink Off
2	Tab stop	T S (or space)	Tab (FCC acts as tab stop) FCC is skipped in tab operation
3	Field restrictions	P A N U (or space)	Protected field (no entry allowed) Alphabetic entries only Numeric entries only Any entry allowed
4	Justification	R Space	Right justification (of all data entered) Left justification (of all data entered)
5	Activation of FCC	REENABLE FCC	FCC is placed in storage.



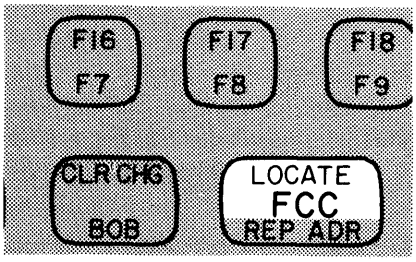
44555

The *field control character reenable* key is pressed, following generation of a field control character, to put the various functions of the newly generated FCC into effect. If this key is not pressed following the FCC generation sequence, the UTS 400 will not act upon the FCC just generated (or any other FCC).



44556

When the *field control character clear* key is pressed, the first field control character to the left of the cursor is cleared. The cursor may be located anywhere within the field defined by the field control character being cleared. If the field that was defined by the cleared FCC is not redefined, the field will become part of the first field to the left of the cleared FCC.

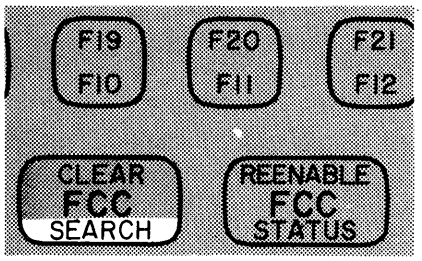


44557

When the *field control character locate* key is pressed, the cursor immediately moves to the first character position of the next field defined by a field control character. (This position is the effective position of the field control character.) Then, if the FCC is to be changed, the cursor is properly positioned for the FCC generation sequence. Normal keyboard inputs, however, will be treated as defined by the FCC for that field. This locate function will work as described even if the FCC is not set to act as a tab stop.

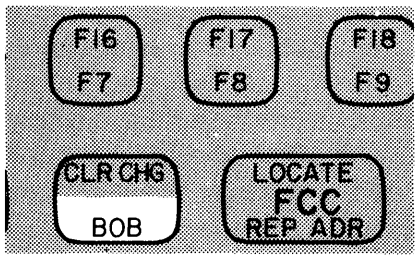
Peripheral Device Keys

Certain of the function control keys are used in conjunction with control page commands to select and control peripheral device operations or to transfer data to or from these devices. The operator uses these keys rather than the equivalent control on the device itself.



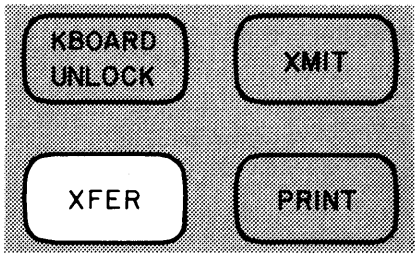
44558

The *search* key places the tape cassette system or the diskette device in the search mode, interpreting as the search instruction a character sequence that has been placed in the control page prior to the pressing of this key.



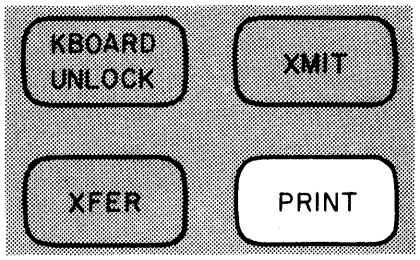
44559

The *backward one block* key, when pressed, causes the tape cassette system or diskette device (as designated in the control page) to reposition the selected file backward one data block.



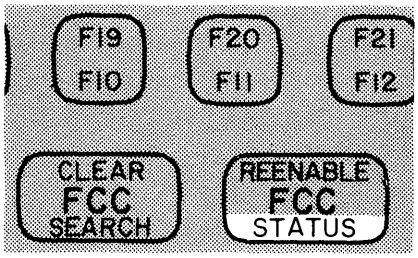
44560

The *transfer* key initiates a data transfer to or from a peripheral storage device. The device and the type of transfer (all, variable, or changed) are defined in the control page. When "all" is specified, protected and unprotected data and all FCCs are transferred. "Variable" transfer to a peripheral device involves all variable (not protected) fields and associated FCCs. Only changed fields and associated FCCs are transferred when "changed" is specified.



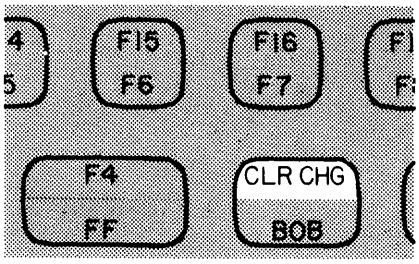
44561

The *print* key initiates a data transfer to a peripheral printer device, according to the limitations defined in the control page. No FCCs are transferred in any type of print operation. When "all" is specified in the control page, the entire message is transferred. The "form" command causes a selected data transfer in which all protected characters are replaced with spaces. The "transparent" command suppresses (that is, strips out or eliminates) the cursor return code. The result is that the cursor return at the end of each display line is not seen by the peripheral device, and the data transferred is treated as one continuous line of data. (This type of transfer is useful for formatting when used with the *line feed* and *form feed* keys. Otherwise, whatever automatic carriage-return provisions the peripheral device may have will provide for any carriage returns during the transfer.)



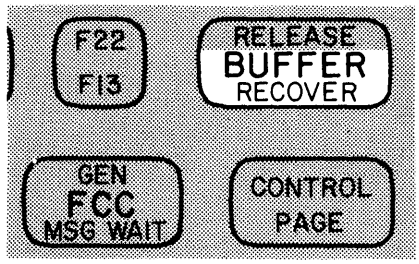
44562

When pressed, the *status* key causes the status of the peripheral device defined by cursor location in the control page to be displayed in the STA field of that page.



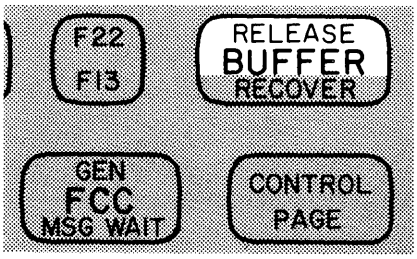
44563

When the *clear changed* key is pressed, the changed-field designators in the field control characters will be cleared without altering the data in the field. One keystroke clears the entire display regardless of cursor position. (These designators are set into the FCC by the UTS 400 whenever a change is made within the field of that FCC.)



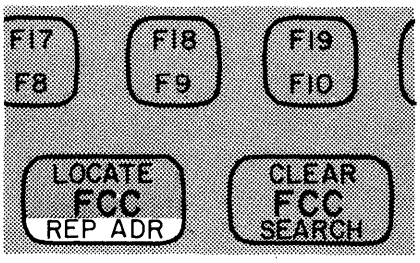
44564

The *recover buffer* key is pressed when the operator plans to manually retry a data transfer that encountered a nonrecoverable error in automatic retry. The buffered information will be recalled to the screen. This key functions only on those terminals with the buffer pool feature.



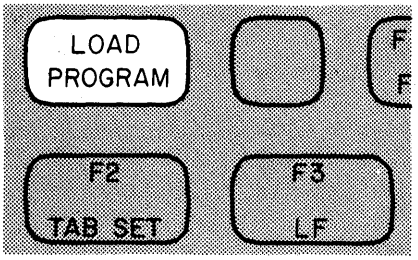
44565

If a nonrecoverable error occurs during a peripheral device data transfer and the operator chooses to close out the transaction without further recovery attempts, the *release buffer* key is pressed. That part of the buffer pool allocated to this terminal for the peripheral device transaction will then be freed for general use. This key functions only on those terminals with the buffer pool feature.



44566

When pressed, the *report address* key causes the current address of the peripheral storage device defined by cursor location in the control page to be displayed in the ADR field of that page.

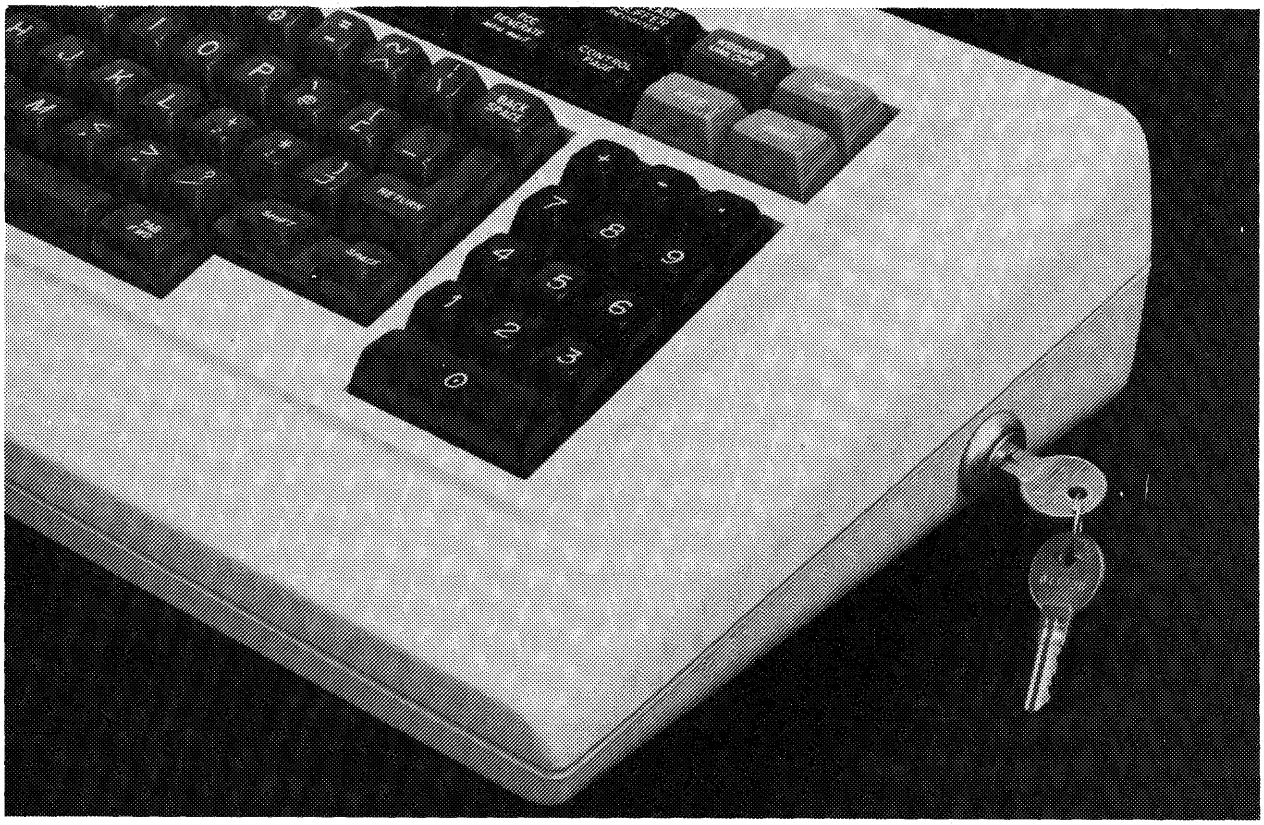


44567

The *load program* key, when pressed, enables loading of a program into the UTS 400. This key functions only on user programmable terminals.

Keyboard Keylock

An optional keylock is available for UTS 400 keyboards. When the keylock is in the "lock" position, all keyboard keys are electronically locked and none of the corresponding functions can be initiated from the keyboard. Locking the keyboard does not inhibit other UTS 400 functions that do not require operator intervention from the keyboard. The UTS 400 keylock is shown in Figure 8; the key is in the "unlock" position.



8357-9

Figure 8. Keyboard Keylock Feature

PARITY GENERATION AND CHECKING

The UTS 400 generates and checks both character and block parity. If a parity error occurs on data, the operation is retried, but the automatic retry does not provide any unique indication either to the host processor or to the operator. However, if the error continues after several retry attempts, the host and the operator will be alerted. (An example of such a nonrecoverable error would be a peripheral device out of paper.)

If a parity error occurs on an instruction, the *ready* indicator goes out and the microprocessor is stopped.

The UTS 400 can also detect a parity error in the refresh memory. If an error occurs during the refresh function, the system will alert the operator by displaying a character in reverse video (a dark character on a light background) at the proper screen location.

Parity generation and checking are performed on 8-bit peripheral interface transfers, but not on those for the 7-bit interface.

MAINTENANCE

The UTS 400 has several built-in functions to assist in maintenance of the equipment and to assure you of proper operation of the terminal system.

Error Logging

A log of errors related to the communications line, peripherals, and internal operation is maintained in the UTS 400. This error log is callable (and clearable) by the host processor for network statistics. It is also available to Sperry Univac customer engineers for remote station maintenance analysis.

Power-On Confidence Test

The power-on confidence test is conducted by the UTS 400 master or controller whenever power is turned on. The test can also be manually initiated by a local control or initiated by the host processor. This test verifies the presence and proper functioning of the various modules in the terminals. When the test has been completed successfully, the *ready* indicator lights on each station in the cluster. If the test is not completed satisfactorily, the error conditions will be displayed on the screen of the master or of the slave designated as primary.

Message Monitoring

The monitor function permits monitoring of message traffic on the communications line. This function is used by Sperry Univac customer engineers in troubleshooting communications problems.

Configurations

TERMINAL SYSTEMS

The UTS 400 can be a master with no slaves, operating independently of all others, or it can be a master/slave or controller/slave cluster with all keyboard/display units sharing the microprocessor, the read-only memory, the communications interface, and the peripheral interfaces.

You can use the UTS 400 in point-to-point or multidrop configurations, as shown in Figure 9. At remote locations, the UTS 400 may be configured in any of the following arrangements:

- A master, with or without peripheral devices
- A master with zero, one, or two slaves, all units sharing all peripheral devices connected to the master
- A controller with up to six slaves, all units sharing all peripheral devices connected to the controller
- A terminal multiplexer with up to 17 UTS 400 systems in any mix of master only, master/slave cluster, and controller/slave cluster.

Cascading of terminal multiplexers is not allowed with the UTS 400 (see page 54).

DATA COMMUNICATIONS SYSTEMS

Communications system configurations can be as varied as the applications for which they are intended. By using the SPERRY UNIVAC Terminal Multiplexer, you can connect as many as 16 masters or slave clusters to a single modem, considerably reducing overall system costs. Extensive networks may be configured by using terminals and multiplexers in various combinations at many communications line interface points.

A typical communications system configuration with a SPERRY UNIVAC host processor is shown in Figure 10.

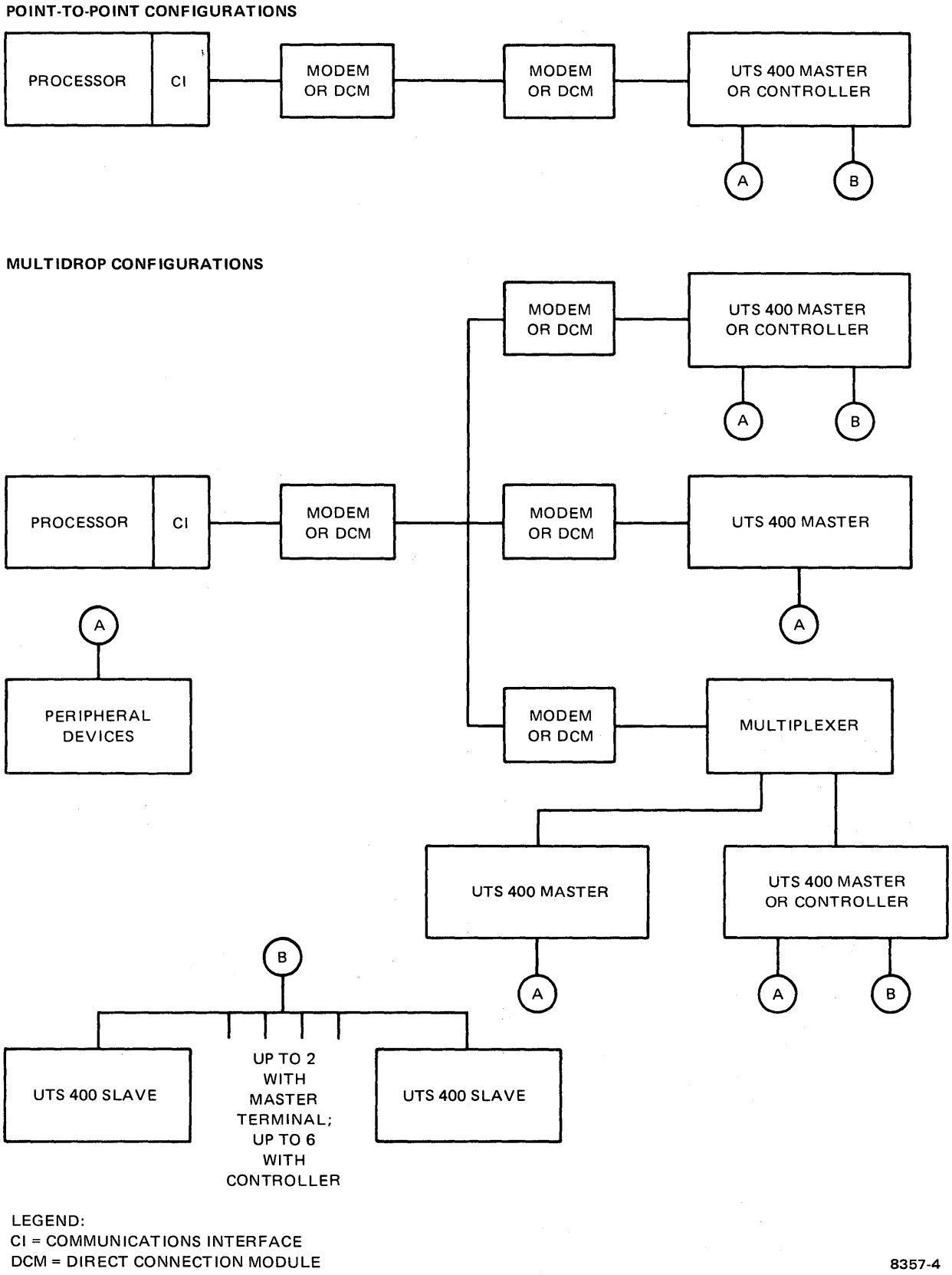
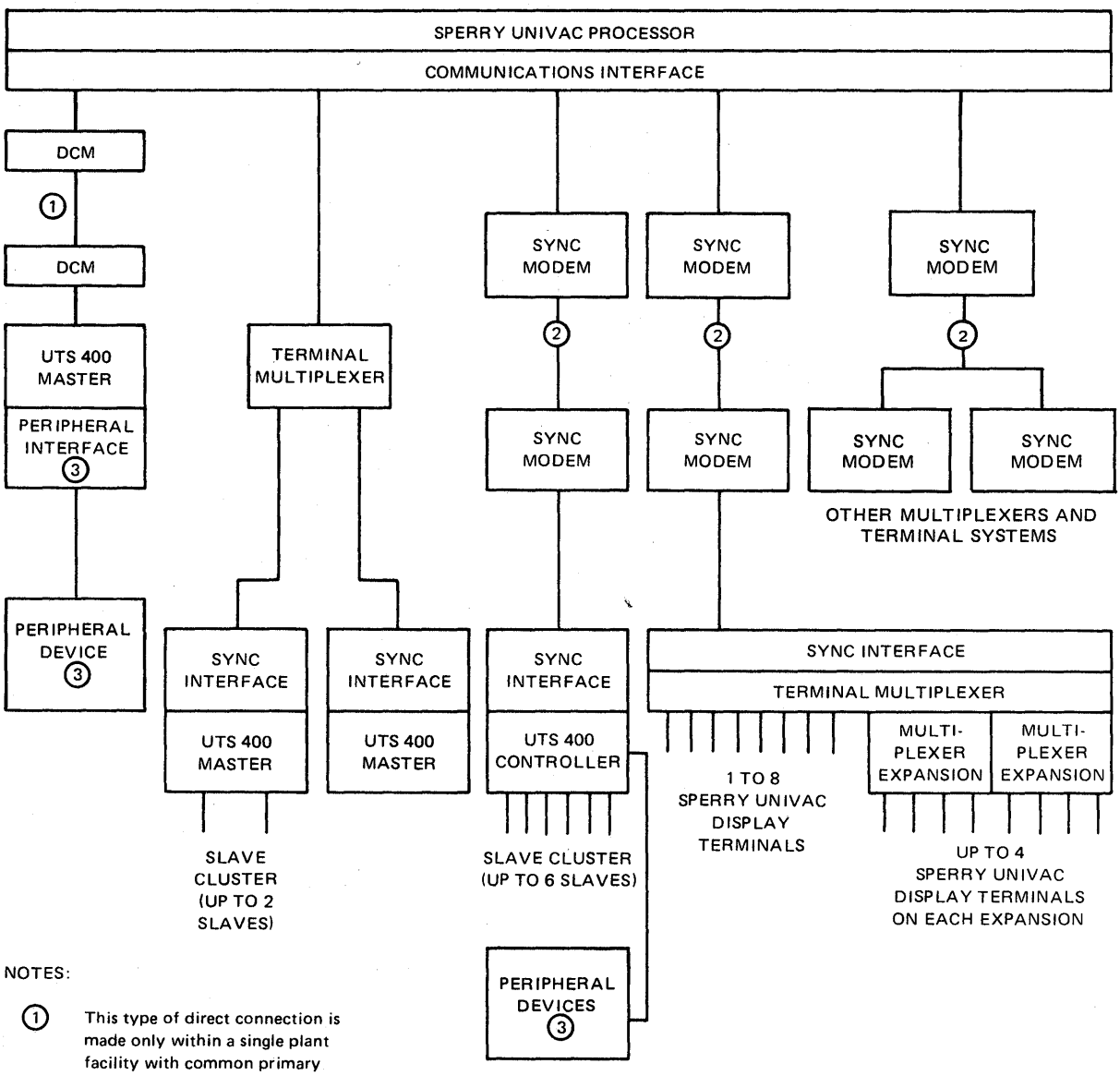


Figure 9. UTS 400 Terminal System Configurations



NOTES:

1. This type of direct connection is made only within a single plant facility with common primary power throughout.
2. Switched or private lines. Asynchronous interfaces also are available.
3. Any UTS 400 master or controller can have a peripheral interface and one or more peripheral devices. Slaves will share these devices.

8357-5

Figure 10. Typical Communications System Configuration Using UTS 400 Terminals and UNISCOPE Display Terminals

CABLING

Standard cable lengths are available for connecting the UTS 400 to modems and multiplexers. Additional cabling can be assembled up to 5000 feet long for connecting a master or controller to a multiplexer. Cables for connecting slaves to masters or controllers are available up to 2000 feet long for each slave.

The keyboard of the UTS 400 can be moved away from the terminal system cabinet and connected by a cable up to 10 feet long.

A 4-foot cable connects the magnetic stripe reader (described in the "Peripheral Devices" section) to the keyboard of the UTS 400. Other peripheral devices are connected in a chaining arrangement with total cable length (combined for all devices) up to 200 feet for each peripheral interface. (Refer to the "Peripheral Devices" section for more information on peripheral-device connection.)

Modem cables may be up to 50 feet long from UTS 400 to modem or multiplexer.

Functional Description

LINE CONNECTIONS

The UTS 400 terminal system can be operated over the public telephone network, on leased common-carrier voice-grade lines, or directly over a private communications line. These terminals can be connected to the communications line singly or in multiplexed and slave clusters — or a combination of these methods can be used on a single line. Slave clusters of the UTS 400 in the basic modular level and in the first step from the basic level can also be mixed on the same communications line with UNISCOPE terminals.

If multiple masters or slave clusters are connected to a communications line at a single interface point, the multiplexer provides the electrical interface to the line and determines priority when more than one of the terminal systems tries to respond to a processor poll.

Two of the communications-line connection methods are shown in Figure 11. Figure 3 shows a variation of either method using multiplexers.

TRANSMISSION CHARACTERISTICS

Transmission between the host processor communications equipment and the terminal system is bit-serial. The data transmission code is standard 7-level ASCII plus character parity. The UTS 400 can transmit either synchronously or asynchronously at speeds up to 9600 bits per second, synchronous, and 2400 bits per second, asynchronous.

Each master or controller operates in half-duplex mode; however, the UTS 400 is so designed that a full-duplex communications line can be put to very efficient use if shared by several masters and controllers. Since each master or controller contains its own storage and control logic, the host processor can poll to condition one UTS 400 while receiving a data transmission from another connected to the full-duplex communications line.

DATA TRANSMISSION

Message Format

UTS 400 terminal systems operate in a polling environment: all transmissions between the processor and the UTS 400 are initiated by the processor. Communications line protocol requires that terminal system and device addressing be used in every transmission and that messages between the terminal system and the host processor be acknowledged by the recipient. In the UTS 400, line protocol and message formatting functions are automatic — the operator is concerned only with message content.

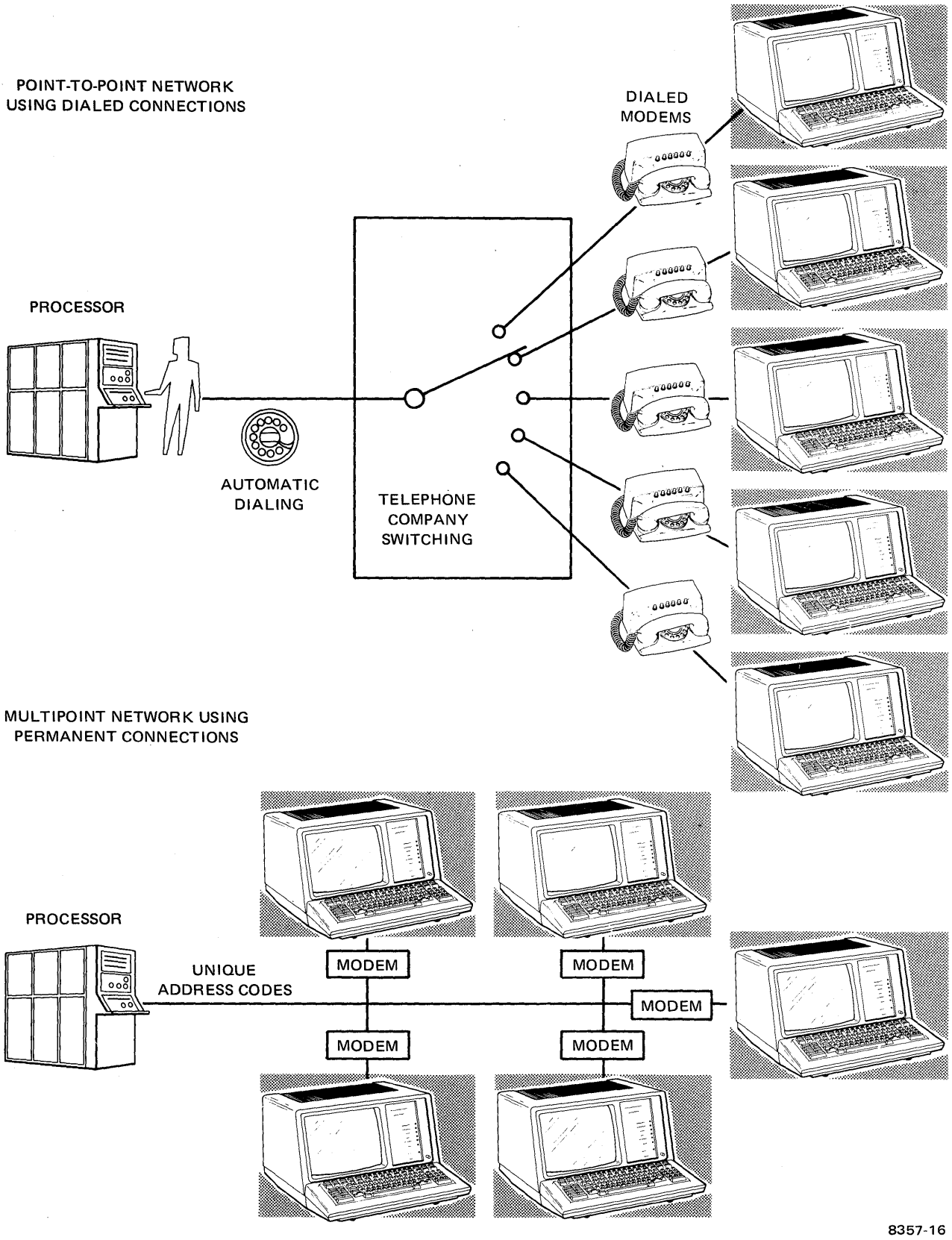


Figure 11. Typical Network Connection Methods for UTS 400

Messages to the Processor

A message to be transmitted from a UTS 400 to a host processor is composed by the operator, who positions the cursor and enters the desired data from the keyboard. The operator then presses the *transmit* key. When the host processor next polls the UTS 400 for traffic, that message is transmitted to the host processor. Waiting time is a function of the host activity, poll rate, and line propagation time; normally there is only a momentary delay.

Messages to Peripheral Devices

Messages transferred from the UTS 400 terminal system to a peripheral device can be initiated manually by the operator. After composing the message, the operator presses the *print* or *transfer* key and, if the device is properly conditioned to accept the transfer, the message is immediately transferred; or if the UTS 400 is equipped with a buffer pool, the message is immediately placed in this buffer, and the screen is freed for the next operator entry. The transfer to the peripheral device will then take place from the buffer.

The host processor can also transfer data, by way of a UTS 400 screen, to a peripheral device. If the terminal system is equipped with the screen bypass feature, the host processor can output to the selected peripheral device without involving the UTS 400 screen, thus permitting the operator to be using the screen simultaneously for some other activity, such as composing a message.

Messages From the Processor

If a terminal system receives an unsolicited host processor message while the operator is composing a message, the terminal alerts the operator but the message being composed is not interrupted. After the operator's message has been sent, the operator presses the *message waiting* key to request the host processor message.

By programming, the host processor can override any operator action and cause an urgent message to be displayed immediately, regardless of whether a message is being composed at the UTS 400.

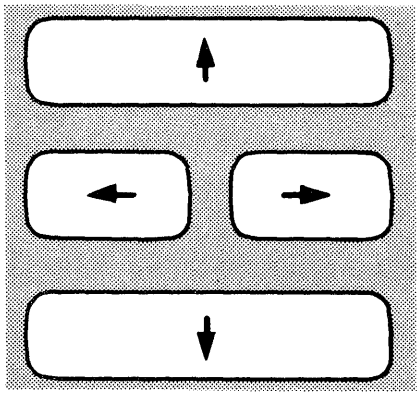
DATA ENTRY AND MESSAGE EDITING

Cursor and Cursor Control Keys

For data entry, the cursor is an indispensable provision of the UTS 400 terminal system. The operator uses it in preparing data for transmission to the processor, the UTS 400 uses it to identify the end position of data to be transmitted to the processor or transferred to a peripheral device, and peripheral devices use it for positioning data in display storage.

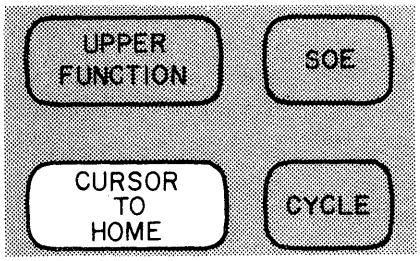
The cursor is a unique character that is displayed on the screen at all times except, briefly, during transmission to the host processor or data transfer to a peripheral device. It appears as a bright rectangle with a dark diagonal bar (▨). The cursor advances one position each time a data key is pressed, its current position indicating the location where the next data character will be entered. If the next data character is to be entered somewhere other than the next sequential position, the cursor is moved to the desired position with one or more of the cursor control keys.

The familiar cursor control keys are the space bar and the backspace key; when pressed, they move the cursor one space at a time. Less familiar are the other cursor control keys: four *scan* keys that move the cursor forward, backward, up, or down; the *cursor to home* key; the *tab forward* key; and the *tab backward* key.



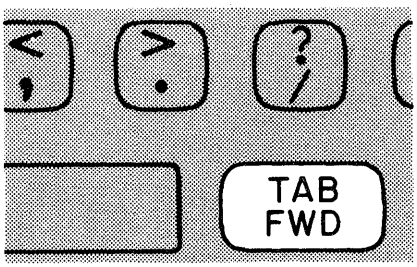
44571

Any one of the *scan* keys, when momentarily pressed, moves the cursor one space at a time; if the key is held down, the cursor moves in that direction repeatedly until the key is released.



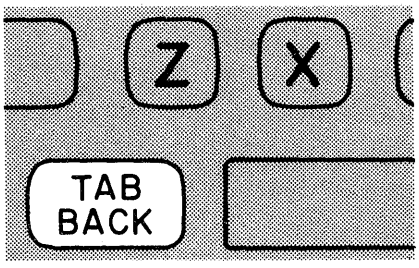
44572

The *cursor to home* key, when pressed, immediately moves the cursor from its present location to the home position (first position at the upper left corner of the screen).



44573

The *tab forward* key moves the cursor immediately to the next tab stop to the right and the *tab backward* key moves the cursor immediately to the next tab stop to the left. If there are no tab stops to the right of the cursor (including all following lines to the last position on the screen) or to the left of the cursor (including all preceding lines to the home position on the screen), the cursor moves to the home position when the appropriate tab key is pressed.



44574

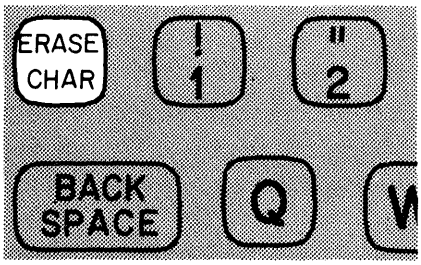
The cursor is nondestructive; that is, it does not destroy or change the information in the display storage. When the cursor is positioned over a displayable character, the character and cursor blink alternately. (The cursor also blinks when placed over any nondisplayable character except the space.) This blinking helps the operator keep track of the cursor when it is positioned over a character.

Using this highly mobile, highly visible screen-position indicator, your operator can manipulate data with great speed and accuracy — and with ease.

Editing Keys

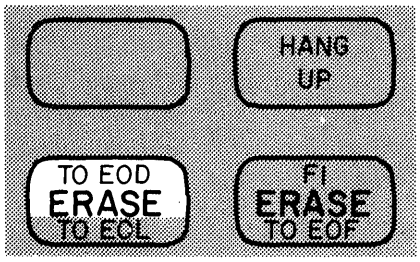
The editing capabilities of the UTS 400 terminal system allow the operator to edit any message completely before transmitting it to the processor, or to modify data received from the processor. (Processor-supplied data is not changed at the processor when the display is edited; the changed data must be returned to the processor with instructions to change the file data as indicated in the edited transmission.) Using the various editing keys, your operator can erase data on the display and enter new data in the erased area, or insert or delete data without changing the rest of the display.

Five keys provide specialized character erasing functions:



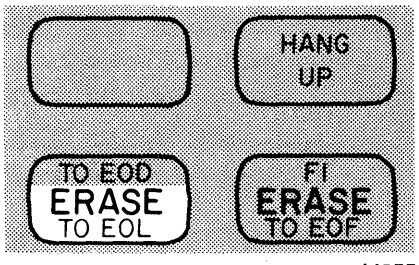
44575

The *erase character* key, when pressed, erases the character in the cursor position and enters a space in that position of the display. The cursor moves one position to the right.



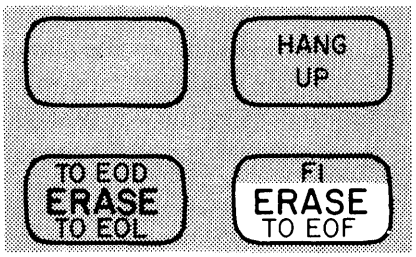
44576

The *erase to end of display* key deletes all unprotected data characters from the cursor position to the end of the screen.



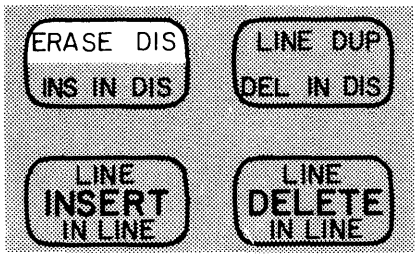
44577

The *erase to end of line* key deletes all unprotected data characters from the cursor position to the end of the line or the end of a field, whichever occurs first.



44578

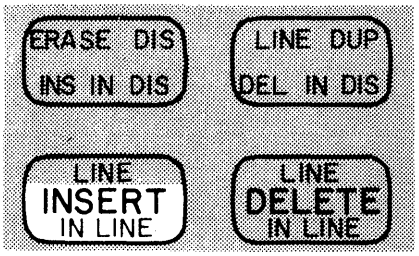
The *erase to end of field* key deletes all data characters from the field in which the cursor is located. The field may be as small as a single character or as large as the entire screen, or any size between these two extremes.



44579

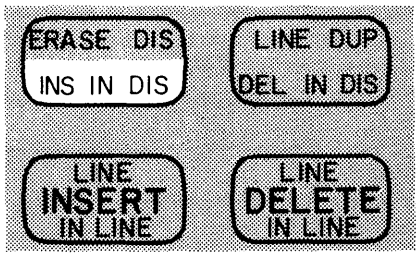
The *erase display* key deletes all data, both protected and unprotected, and all FCCs from the cursor position to the end of the display.

Four keys are used to move data forward and backward by inserting spaces or by deleting characters and spaces in the lines of the display. When specific fields have been defined by protected-format or field-control characters, these keys apply only to the field in which the cursor is located rather than the entire display. (In a field that extends onto the next line, the in-line function will affect only that portion of the field on the line where the cursor is located.)



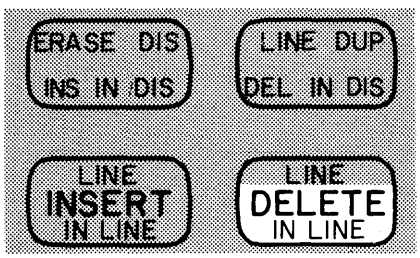
44580

The *insert in line* key, when pressed, causes all characters in the line to the right of and including the cursor position to shift one space right and a space to be inserted under the cursor. Any character in the last position of the line is discarded.



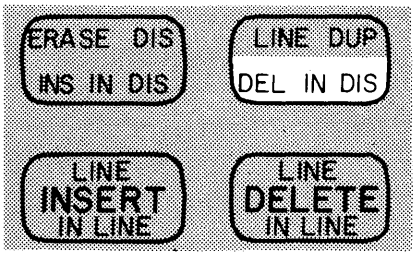
44581

The *insert in display* key inserts a space at the cursor location, causing the entire display to the right of the cursor to move to the right one character location. The character ending each line to the right of and below the cursor position moves to the first position of the following line, and any character in the last position on the screen is discarded.



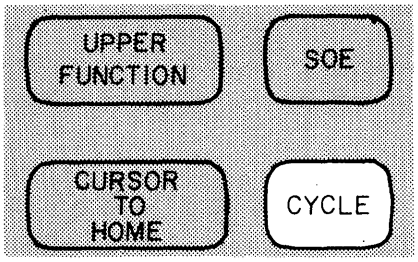
44582

The *delete in line* key causes all characters in the line to the right of the cursor to move left one character location. The character beginning each line below the cursor position moves to the last position on the previous line. A space is inserted at the last position on the screen.



44583

The *delete in display* key deletes the character at the cursor position, causing the entire display to the right of the cursor to move left one character location. The character beginning each line below the cursor position moves to the last position on the previous line. A space is inserted at the last position on the screen.



44584

The *cycle* key, when pressed, causes the next data character chosen by the operator to be repeated as long as the cycle key is pressed. The *space, backspace,* and *character erase* keys also respond to the *cycle* key.

CONTROLS AND INDICATORS

UTS 400 controls and indicators used in basic operation of the terminal system are listed in Table 2. Those marked with an asterisk (*) are located on the slave unit, and those marked with a dagger (†) are located on the controller. All of the controls and indicators listed are located on the master.

Table 2. Controls and Indicators of UTS 400 (Part 1 of 2)

Designation	Control or Indicator	Function
POWER*†	Control	Applies or removes primary power.
	Indicator	Lights when power is applied to the UTS 400.
WAIT*	Indicator	Lights when a text message is being transmitted to or from the UTS 400. At the same time, indicates that the keyboard is locked (functionally disabled). Also lights during a peripheral interface data transfer.
INTENSITY*	Control	Adjusts brightness of the screen display.
MESSAGE WAITING*	Indicator	Lights when the processor has a conditional unsolicited message for display. Stays on until the MSG WAIT key or a special function key is pressed and the processor-message-waiting request or function-key message is sent.

Table 2. Controls and Indicators of UTS 400 (Part 2 of 2)

Designation	Control or Indicator	Function
MESSAGE INCOMPLETE*	Indicator	Lights during the time a text message is being received by the UTS 400. Goes out when all checks for the message have been satisfied.
Audible alarm*	Indicator	Sounds once when the cursor moves into the eighth character position from the right on any line in the display. Sounds once when the cursor first moves into the last line (in any character position) and again when it reaches the eighth character position from the end of the last line of the display. Sounds intermittently during the time that the MESSAGE WAITING indicator is lit. The alarm is turned off when the MESSAGE WAITING indicator is turned off. Sounds when the peripheral interface is busy and unable to accept further data. Sounds when an error is made in manually entering a field control character. Sounds when the peripheral interface automatic recovery fails.
TEST†	Control	Initiates a test involving a diagnostic program internal to the UTS 400. The test leaves the terminal system in a predetermined condition.
MONITOR†	Control	Causes the information on the communications line to be displayed on the screen.
READY*†	Indicator	Lights if the unit is functioning properly.
POLL*†	Indicator	Blinks when the unit is being polled.
FCC/PROTECT†	Control	Allows the selection of protected or FCC field definition on communications transactions when character protection feature is not installed (with character protection feature installed, switch must always be set to FCC position).
AUXILIARY BUSY*	Indicator	Lights when the peripheral interface is busy and unable to accept further data.
SHIFT LOCK*	Indicator	Lights when the keyboard is in the uppercase condition. This indicator is located in the SHIFT LOCK key. (On Katakana/English keyboards, the KANA SHIFT key also has a shift indicator.)

User Programmability

PROGRAMMABILITY ATTRIBUTES

You add a new dimension to the UTS 400 with user programmability. Now you can tailor certain aspects of the terminal system operation to your own special requirements, without diminishing in any way the basic functions previously described. Rather, user programmability allows you to build upon the many fixed functions and generate terminal capabilities meeting your particular needs.

This provision is unique among intelligent terminals. In some, a programmable capability is used to provide the overall "personality" — the intelligence — of the terminal. But the basic personality of the UTS 400 resides in firmware; the purpose of user programmability is to increase the terminal capabilities.

The firmware functions, housed in read-only memory (ROM), are always available in the UTS 400. Firmware does not need to be loaded before the terminal system will function, nor is it destroyed in the event of power failure. Further, it does not compete for random-access memory (RAM) locations which could be occupied by the user program. Thus, the full amount of storage, up to 24,000 bytes, can be devoted to your programmable functions. The two approaches to intelligent terminals are compared in Figure 12.

Enhanced Firmware Functions

User programmability, then, complements the firmware by building on its functional base. The firmware provides the communications protocol, enables dialog with the host processor, provides for transactions between the UTS 400 and its peripherals, and supplies an operation corresponding to each keyboard input.

User programs cannot change the communications protocol; they can use the firmware-controlled protocol as a conduit to send data to and receive data from the host. A similar relationship exists with respect to the peripherals. Since the user programs need not be concerned with such details of terminal operation, your programming becomes simpler and easier.

Peripheral and Communications Line Efficiencies

User programmability also permits increased utilization of your peripherals. Both data and programs can be output and retrieved by the terminal. Your operator will be concerned with the data and the operation to be performed; the firmware, activated by your program request, will actually handle the transfer.

A similar capability exists with the communications line. Firmware handles the protocol and properly structures all messages. Your operator prepares the data. Data may be portrayed on the screen in one format and varied when sent to peripherals or to the host processor. For example, a program could have selected portions of the content of a screen printed.

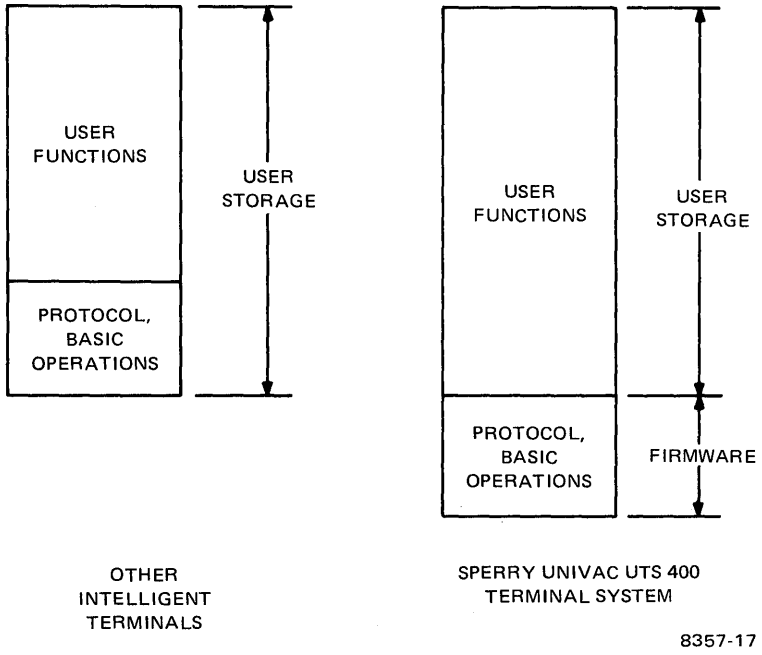


Figure 12. Comparison of UTS 400 Basic Intelligence and Programmability With Other Intelligent Terminal Approaches

HOST/UTS 400/PERIPHERAL RELATIONSHIPS

Although the user programs are executed by the UTS 400, they are generated on a host processor and conveyed to the terminal by way of a communications line. (This procedure is called downline loading.) User programs cannot be generated at the UTS 400. The purpose of the UTS 400 is to generate, format, and manipulate data in a communications environment. User programmability does not transform the UTS 400 into a freestanding processing system (such as would be used by small businesses for payroll or accounts receivable work). But programmability does give you increased ability to better accomplish your terminal system application.

Because programs are not generated at the terminal, there is no requirement for terminal peripherals dedicated to generating, loading, or storing user programs. However, if your application warrants storage peripherals, or if you desire local retrieval, the UTS 400 can be so configured. In that case, the host-generated programs can be downline loaded and directed to the peripherals, from which they can be retrieved and executed as needed.

Your program will be run in the UTS 400 master or controller. Only one program can be in effect for a given cluster at any given time. If you require one set of capabilities at one station and a different set at another station of the same master/slave cluster or controller/slave cluster, these different operations must be combined into one program.

EXAMPLES OF USER PROGRAM TASKS

The following list gives you some idea of the types of user programs that can be executed by the UTS 400:

- Data validation (such as restricting entries, range checking, comparison checking)
- Data formatting/reformatting (such as changing the order of information, or excluding information)
- Data creation
- Data editing
- Data storage
- Arithmetic operations
- Security checks (such as the use of passwords or of code sequences)
- Highlighting invalid entries (or items requiring operator attention)
- Prompt sequences (for operator guidance)
- Text compression on transfer
- Local report generation

You can program the UTS 400 to intercept keyboard-entered characters and cause a specific key (or keys) to initiate a special editing function, such as clearing a designated column of data on the screen, clearing selected fields while leaving others unchanged, loading constants into selected fields, or duplicating the contents of a particular field into one or several different areas of the screen. (Execution time for user programs will depend on the complexity of the operations and the amount of data involved in the operations. In general, the time to perform operations of the types just mentioned should be of the same order of magnitude as the time required to do firmware-supplied edit functions, such as inserting or deleting characters in the display.)

In the preceding example, the UTS 400 was programmed to perform a totally unique function which replaced that produced by a given key. As another possibility, you could program the UTS 400 to perform a unique operation and then pass a keystroke code to the firmware for normal handling. For example, the UTS 400 could be programmed to accept a backward tab keystroke as a command to insert a constant into the current field, thus relieving the operator of that task. A forward tab code could then be given to the firmware by the program to cause a normal forward tab to the next field. (In this example, the time to perform the tab operation would be increased by the time required to load the constant.)

Programs can be used to validate entries and to assure that the entries meet certain criteria. If the criteria are not met (for instance, if a number in a "date" field does not lie between 01 and 31), the program can notify the operator by some method such as repositioning the cursor, sounding the audible alarm, or blinking the field. If the entry meets the criteria, the cursor can be advanced, or some other operation can be initiated.

Arithmetic operations can also be performed, such as summing columns of information, adding the contents of multiple fields and placing the results in yet another field, and accumulating information on each screen as well as on multiple screens.

A program can be set up to place prompting messages of various types on the screen. Prompts could be used to give directions for filling in a particular screen format or for running a seldom-used application, for example, and could be called to the screen by a certain sequence of keystrokes.

SOFTWARE PACKAGES

Programs for the programmable UTS 400 may be generated by either of two SPERRY UNIVAC software packages, the UTS 400 COBOL compiler or the MAC80* assembler. Programs created by either software package can be stored in the host processor and called to the terminal system in any one of three ways: by a terminal operator, by a program running in the UTS 400, or by an application program running in the host. In each case, the host will take the request, obtain the desired program, and downline load it to the terminal system.

COBOL Compiler

The UTS 400 COBOL compiler conforms to the American National Standard X3.23-1974, providing the following level 1 COBOL functional processing modules as defined in the COBOL standard:

- Nucleus
- Sequential access
- Segmentation
- Table handling
- Library

In addition to these modules, the UTS 400 COBOL compiler includes part of the level 1 debugging module. Extensions are also provided to accommodate special features of the UTS 400. These extensions include syntax for interactive data entry and program control, screen management and data formatting, and compressing.

COBOL programs are compiled on a SPERRY UNIVAC Series 1100 or Series 90 host system.

COBOL File Management — One of the most significant extensions of UTS 400 COBOL is the file management system. With this extension, file organization may be either sequential or random and either formatted or unformatted. Also, multiple files are supported.

Sequential access provides the same results as a file that is organized sequentially (such as a tape file). Random access allows the programmer to control the sequence of access. For random access, any desired recorded area is accessed at will, both for reading and writing. All semblance of sequence can be ignored — or the random method can be turned off and a strictly sequential method can be used.

**Trademark of Intel Corporation*

The UTS 400 COBOL file management system, not defined or required by American National Standard COBOL specifications, provides the following functions as enhancements for multiuser facilities in a UTS 400 shared environment:

- Multifile support — the ability to have multiple files on a storage device
- Formatted files — the ability to label files in a multifile format
- Unformatted files — nonlabeled files
- File definition utility — preconditions a multifile diskette and allows assignment of file parameters for each of the files placed on diskette

Peripheral Assignment — Peripherals may either be shared or given exclusive use by a specific station in a multiuser environment. Alternately, files can be changed from one device to another similar device, and a shared file can be changed to exclusive use.

Additional Memory — An additional 8K bytes of user memory will be permitted when COBOL is used, bringing the total to 32K bytes and thus making available more memory for user application programs.

The UTS 400 COBOL compiler is an option for the UTS 400. It is available as a licensed program product on host systems.

Detailed information on UTS 400 COBOL is provided in the UTS 400 COBOL programmer reference, UP-8481 (current version).

MAC80 Assembler

The MAC80 assembler language, a basic programming tool for the UTS 400, provides a way for the microcoder to write application programs and to interface to the firmware of the UTS 400. The MAC80 assembler is included as part of the basic UTS 400. SMS 400, a screen management system, provides a set of control routines which interface with the UTS 400 firmware to support MAC80 programs. This screen management system greatly simplifies the programming task by providing standard routines to perform common functions such as initializing and displaying screen formats, validating input fields, and controlling input/output functions. A variety of other utility routines are also provided for use with the MAC80 assembler.

MAC80 programs are assembled on a SPERRY UNIVAC Series 1100 or Series 90 host system.

Detailed information on MAC80 is given in the UTS 400 MAC80 assembler programmer reference, UP-8482 (current version), and information on the utilities is given in the UTS 400 utility library programmer reference, UP-8483 (current version).

Additional Software

An IBM* 3741 compatibility subroutine is available which will convert the data code and format of a UTS 400 diskette to IBM 3741 data code and format. It will also perform the reverse conversion.

Trademark of International Business Machines Corporation.

An edit processor provides an easy and efficient way to create and update line-oriented data files. Lines can be inserted, replaced, deleted, or changed in any sequence, forward or backward. This stand-alone utility provides the capacity to create and update large files of data without connection to a host.

DISTRIBUTED DATA PROCESSING

With the UTS 400 COBOL software package, the UTS 400 becomes a sophisticated, low-cost entry into distributed data processing, capable of sharing the processing load and thus relieving the load on the host processor while reducing the frequency and duration of communications line connections. Primary applications that fit readily into the UTS 400 distributed data processing role include:

- Source data entry online to host
- Offline source data collection
- Local data retrieval and listing
- Offline program development

In light of these capabilities, it is easy to see the extent to which this terminal system can bring your data processing facility into the distributed processing environment. This capability will even further enhance the efficiencies in quality of data, operator performance, and communications that the basic UTS 400 operations provide.

Peripheral Devices

The capabilities of the SPERRY UNIVAC Universal Terminal System 400 are greatly enhanced when you add one or more of the associated SPERRY UNIVAC peripheral devices, which include the following:

- Model 610 Tape Cassette System
- 8406 Diskette Subsystem
- Communications Output Printer
- Model 800 Terminal Printer
- 0786 Printer Subsystem
- 0791 Correspondence Quality Printer Subsystem
- Magnetic Stripe Reader

GENERAL PERIPHERAL REQUIREMENTS

A peripheral interface is required to connect all peripheral devices except the magnetic stripe reader to the UTS 400. Input data from the magnetic stripe reader is routed to a master station or slave station via the keyboard.

Two peripheral interfaces are available for the UTS 400, a 7-bit interface for 7-bit data transfers and an 8-bit interface for 8-bit data transfers. The 7-bit interface has eight input/output (I/O) ports, and the 8-bit interface has four I/O ports. Each port handles a single peripheral device, and both interfaces can be installed at the same time. The 7-bit interface accommodates the tape cassette system, the communications output printer, the 800 terminal printer, and the 0786 printer. The 8-bit interface accommodates the diskette subsystem and all printers except the communications output printer. The tape cassette system and the communications output printer cannot be operated on the 8-bit interface.

You can see the data transfer relationships of these devices in Figure 13.

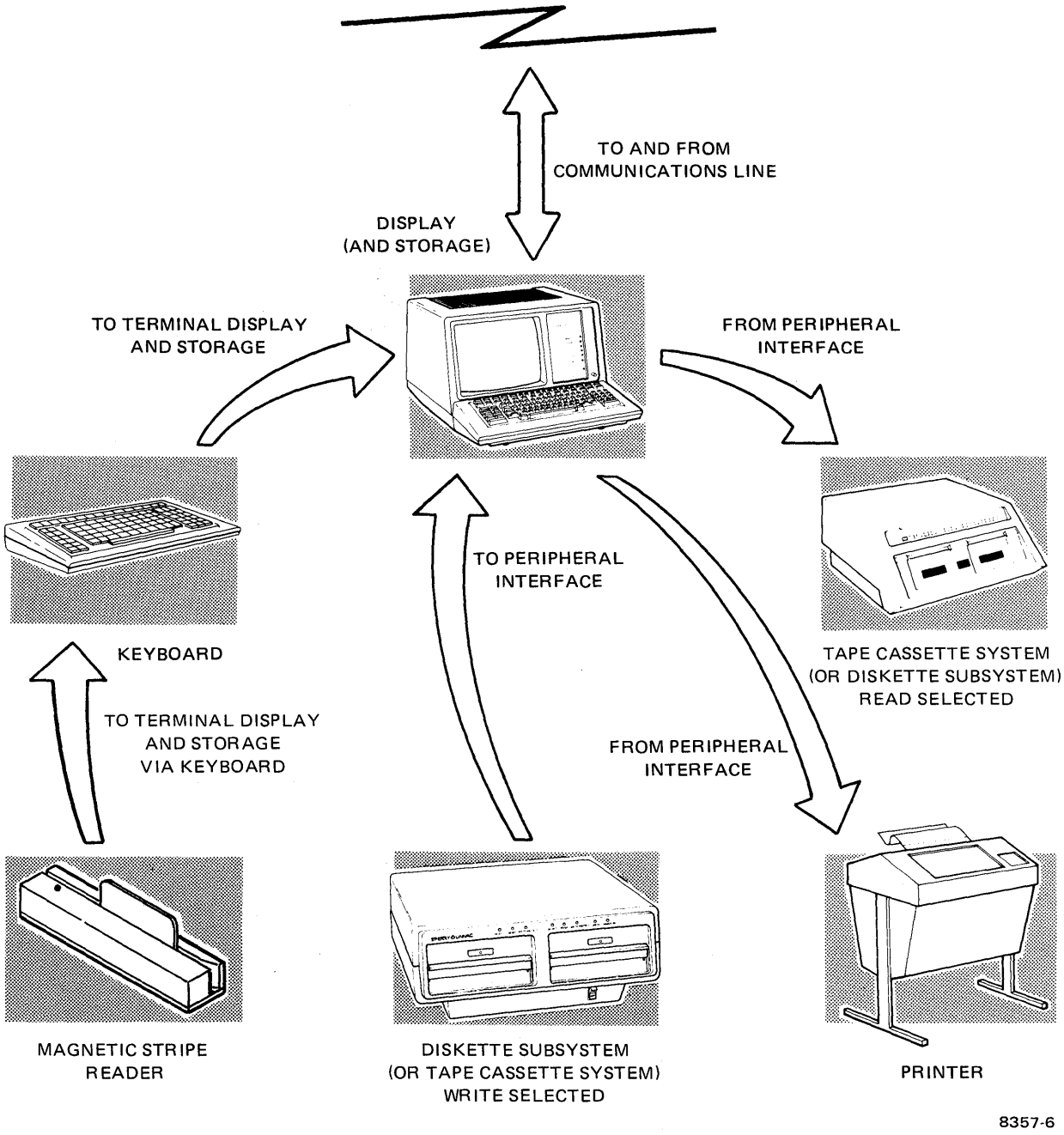


Figure 13. Data Transfer Relationships of the UTS 400 and Peripheral Devices

Device Addressing

For online activity, each device input or output function requires a device address code (DID), except for the magnetic stripe reader. The DID is a unique code sent by the processor to activate the particular input or output function. The UTS 400 has 12 device address codes available for use with the peripheral devices. The number of address codes required for each peripheral are —

Tape cassette system	4 DIDs, one for each transport write function and one for each transport read function
Diskette subsystem	2 DIDs per diskette drive, one for read functions and one for write functions
Any printer	1 DID
Magnetic stripe reader	DID not required

A master or controller may be equipped with various combinations of peripheral devices within the device addressing limits. For example, a UTS 400 master station equipped with only a 7-bit interface could be equipped with as many as three tape cassette subsystems. The configuration would use only 3 of 8 ports, but all 12 device address codes. If only two tape cassette systems were used, as many as four communications output printers and 800 terminal printers could also be used in any combination. When the 8-bit interface is added, the combinations possible on the 7-bit interface are not affected, except to decrease the number of available device addresses.

The following are two examples of possible peripheral combinations for the UTS 400.

Example 1

7-bit interface: One tape cassette system (4 DIDs)
One 800 terminal printer (1 DID)

8-bit interface: One diskette subsystem with two drives (4 DIDs)
One diskette subsystem with one drive (2 DIDs)
One 0791 printer subsystem (1 DID)

In example 1, only 5 of 12 available ports are used, but all 12 DIDs are used.

Example 2

7-bit interface: One communications output printer (1 DID)
One 0786 printer subsystem (1 DID)

8-bit interface: Two diskette subsystems with two drives each (8 DIDs)
Two 0791 printer subsystems (2 DIDs)

In example 2, only 6 of 12 available ports are used, but all 12 DIDs are used (all 4 ports on the 8-bit interface are used).

Line Length

You can use a total of 200 feet of cable to connect peripheral devices to either peripheral interface of the master or controller. If you are connecting only one device, the entire 200 feet may be used — or any portion of the total length, as your needs dictate. If more than one device is to be connected, the cable length must be divided between these devices so that total cable length does not exceed 200 feet.

Multiple peripheral devices are connected in a "daisy-chain" fashion; the first device is connected to the peripheral interface, the next device is connected to the first device, the third device is connected to the second device, and so on.

MODEL 610 TAPE CASSETTE SYSTEM

The SPERRY UNIVAC Model 610 Tape Cassette System provides offline storage on magnetic tape cassettes for your UTS 400. This desk-top tape cassette system writes data onto tape, storing up to 1,440,000 characters with a single loading of the dual cassette transports. Or the cassette system reads from tape to the display, quickly locating any screenful of data that you want.

The tape cassette system enhances your terminal system by giving you offline file accessibility and extensive offline file-building capability — that is, you can have copies of your file stored on tape cassettes at your UTS 400 location and you can build new files directly onto tape cassettes.

Large "batch-like" transmissions, either to or from the terminal, can be made at low-traffic periods, combining operation of the UTS 400 and tape cassette system to gain more efficient use of your UTS 400 facility and of your personnel. This type of data transfer can even be controlled entirely by the host processor without an operator in attendance. Include one or more of the printer peripherals with the tape cassette system and your UTS 400 terminal system becomes a versatile, complete data-handling communications station (Figure 14).

The tape cassette system requires four address codes, one for each transport write function and one for each transport read function. Therefore, up to three tape cassette systems can be connected to the 7-bit peripheral interface of one UTS 400 master or controller, if no other device is attached to that interface.

8406 DISKETTE SUBSYSTEM

The SPERRY UNIVAC 8406 Diskette Subsystem provides offline random-access storage on flexible disks for your UTS 400. The desk-top device writes data onto the disk or reads data from the disk upon command from either the UTS 400 or the host processor. Each flexible disk has a recording surface that will store 256,000 bytes. The basic diskette subsystem has one disk drive; a second disk drive is optionally available.

With the diskette subsystem, the UTS 400 gains vast offline file accessibility and extensive offline file-building capability. You can store partial or complete files as called from the host processor, or you can maintain working files of current interest, preparing them for later transmission to the host processor. You will also be able to develop numerous other uses for this versatile storage device.

8357-18

Figure 14. UTS 400 Master With Tape Cassette System and Model 800 Terminal Printer

The diskette subsystem requires two address codes for each disk drive, one for the read function and one for the write function. It is connected to the UTS 400 by means of a separate 8-bit interface, allowing the full range of other peripheral devices to be included on the 7-bit interface within the limits of the available device addresses. If no other peripherals are included in the configuration, a maximum of four devices can be attached to the 8-bit interface.

The diskette device can be seen in a use situation in Figure 15.

MODEL 800 TERMINAL PRINTER

The SPERRY UNIVAC Model 800 Terminal Printer, using a nonimpact printing method, produces a single copy of data displayed on the UTS 400 screen at rates up to 300 characters per second. Printing in the 80-column business format, this desk-top output device reproduces in clear, easily readable images the full uppercase/lowercase ASCII character set in a 7-by-9 dot matrix. You can see an 800 terminal printer in Figure 14 as one of two devices in a UTS 400 station.

The 800 terminal printer can be connected to the UTS 400 7-bit or 8-bit peripheral interface. This device requires one address code.

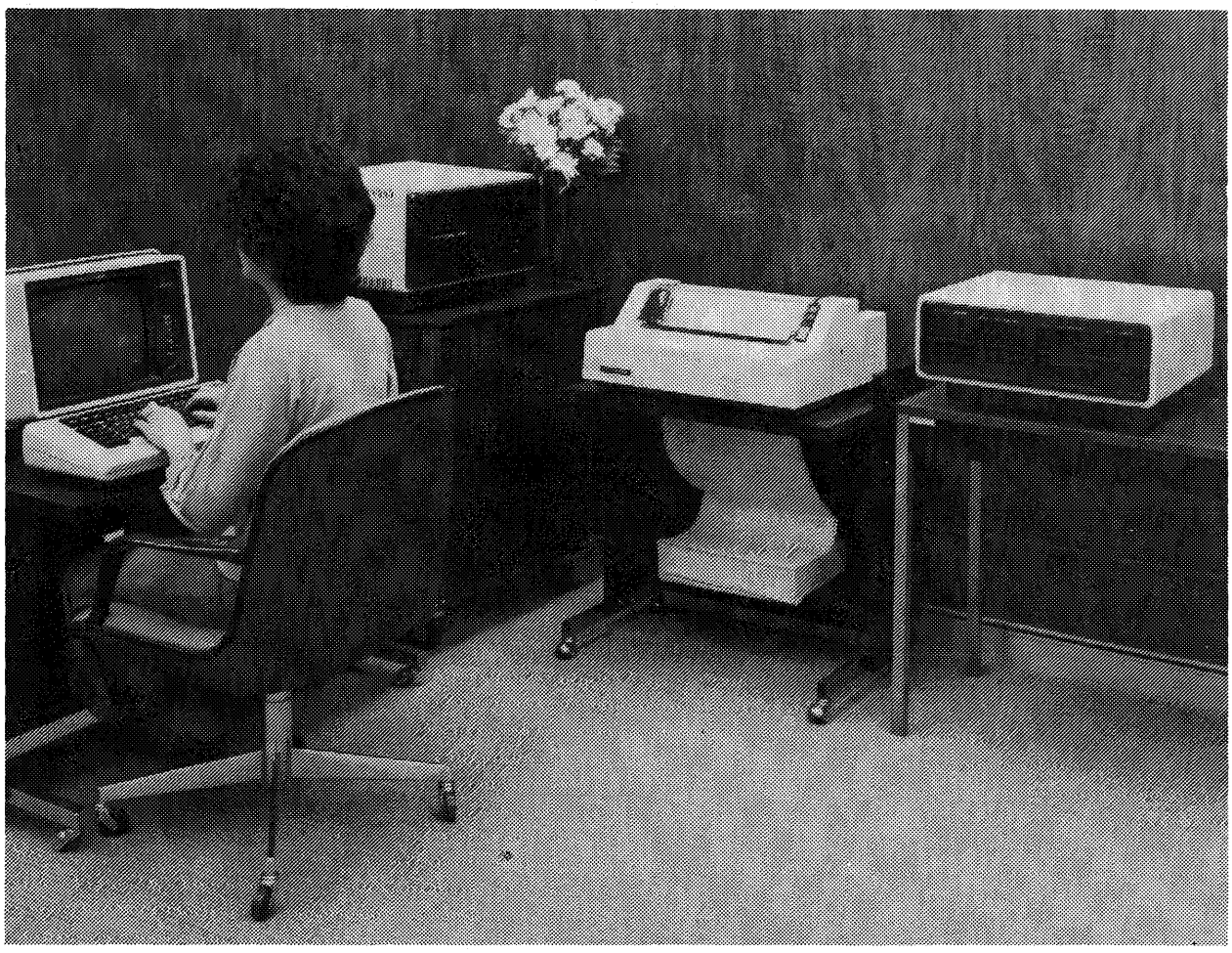
COMMUNICATIONS OUTPUT PRINTER

The freestanding SPERRY UNIVAC Communications Output Printer, using an impact method, prints data at rates up to 30 characters per second. It can print multiple copies (up to six) on sprocketed continuous forms, which may be of variable sizes (as narrow as 3-5/8 inches or as wide as 14-7/8 inches or any width between, and as short as 1 line and up to 999 lines long or any length in between). The printer accepts the full ASCII character set, converting lowercase to uppercase and printing in uppercase only.

The communications output printer accepts data by way of the UTS 400 7-bit peripheral interface and requires one address code.

0786 PRINTER SUBSYSTEM

The SPERRY UNIVAC 0786 Printer Subsystem prints at rates up to 200 characters per second, using a 7-by-7 dot matrix impact method. Used either as a desk-top device or on its own stand, this printer produces clear, legible characters on single or multipart forms (up to six copies) from 1.6 to 15.3 inches wide and 3 to 17 inches long. Various character sets are selectable with the 0786 and



8357-19

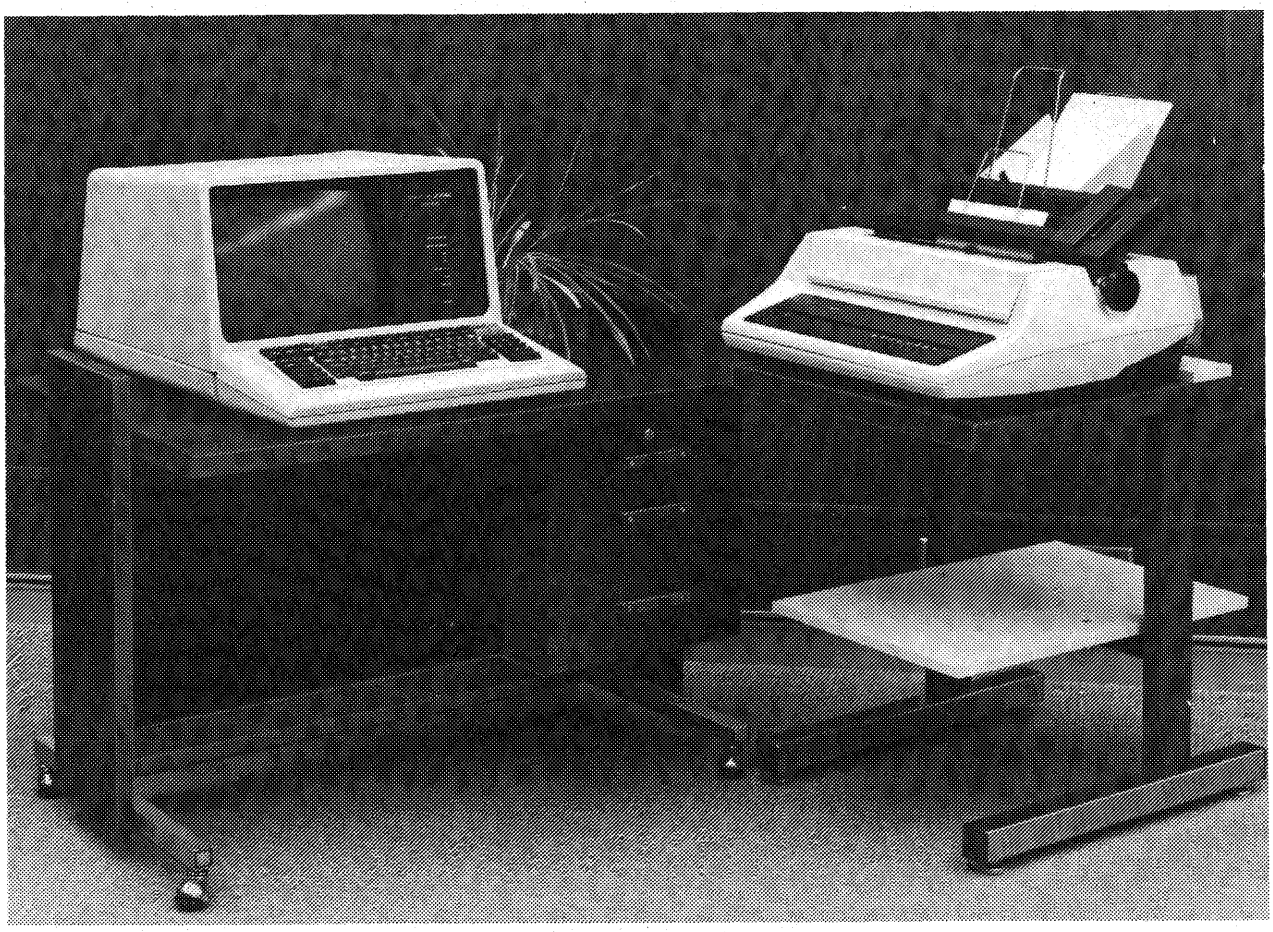
Figure 15. UTS 400 Controller With Slave Station, 0786 Printer Subsystem, and 8406 Diskette Subsystem

are field replaceable. These include the 64- and 96-character ASCII sets as well as 96-character sets for several different language applications and a 128-character English/Katakana set for Japan.

The 0786 printer, which requires one address code, accepts data through the UTS 400 7-bit or 8-bit peripheral interface. However, if it is using the 128-character set, the printer must be attached to the 8-bit interface. Figure 15 shows the 0786 printer in use in a typical UTS 400 installation.

0791 CORRESPONDENCE QUALITY PRINTER SUBSYSTEM

The SPERRY UNIVAC 0791 Correspondence Quality Printer Subsystem (Figure 16) offers typewriter-quality printing on a wide variety of media including cut forms, business letterheads, or continuously fed, sprocketed, multipart forms. The 0791 printer is a desk-top unit that uses an impact printing system. Operator-interchangeable daisy print wheels allow selection of a variety of character sizes and styles, including 64- and 96-character ASCII sets, as well as 96-character sets for several different language applications and OCR applications.



8357-10

Figure 16. UTS 400 Master and 0791 Printer Subsystem

Printing occurs at up to 45 characters per second, with a maximum of 158 characters per line at 12 characters per inch or 132 characters per line at 10 characters per inch. Print line density can be either six or eight lines per inch. Characters per inch, lines per inch, and margin settings are normally controlled by the application program and are not generally determined by an operator.

Two models of the 0791 printer are available, a top-feed model and a dual-feed model. The dual-feed model has the top-feed capability as well as a mechanism that allows feeding through the bottom of the unit. The bottom-feed mechanism accommodates multipart forms or other paper stock too heavy for top feeding. Cut-form feeding is accomplished by a separate feeding mechanism that is available as an option for either model of the printer.

The 0791 printer, which requires one address code, accepts data through the UTS 400 8-bit peripheral interface.

MAGNETIC STRIPE READER

The SPERRY UNIVAC Magnetic Stripe Reader (Figure 17) is a read-only device used to enter prerecorded data read from the magnetic stripe on bank cards or similar media. Data is read from the card and accepted by the UTS 400 when the card is pushed through the read station of the magnetic stripe reader, which connects to the keyboard of either a master station or slave station. All data received by the UTS 400 from the magnetic stripe reader is treated the same as input data from the keyboard and is displayed by the UTS 400 in uppercase. The data transfer occurs one character at a time at 20-millisecond intervals.

8357-20

Figure 17. Magnetic Stripe Reader

There are numerous applications for the magnetic stripe reader. Any industry with a need for some type of security requirement such as badge reading, operator identification, or privileged access to terminal use or selected files will find the magnetic stripe reader a particularly useful device.

The magnetic stripe reader will accept information stored on the magnetic stripe of a bank card or similar media when the data format is consistent with the format used by the American Banking Association (40 characters of numeric data) or the International Air Transport Association (79 characters of alphanumeric data).

Since the magnetic stripe reader connects to the keyboard of a UTS 400 master station or slave station, rather than to one of the UTS 400 peripheral interfaces, it does not require a device address code. In addition, input from a magnetic stripe reader to the UTS 400 cannot be activated by a host processor, since operator intervention is required to generate the input data. If the keyboard is equipped with the keylock feature, input from the magnetic stripe reader is prohibited when the keyboard is locked.

One magnetic stripe reader can be connected to the keyboard of any UTS 400 master station or slave station. Therefore, in a master/slave cluster, up to three magnetic stripe readers can be in use. In a controller/slave cluster, up to six magnetic stripe readers can be in use.

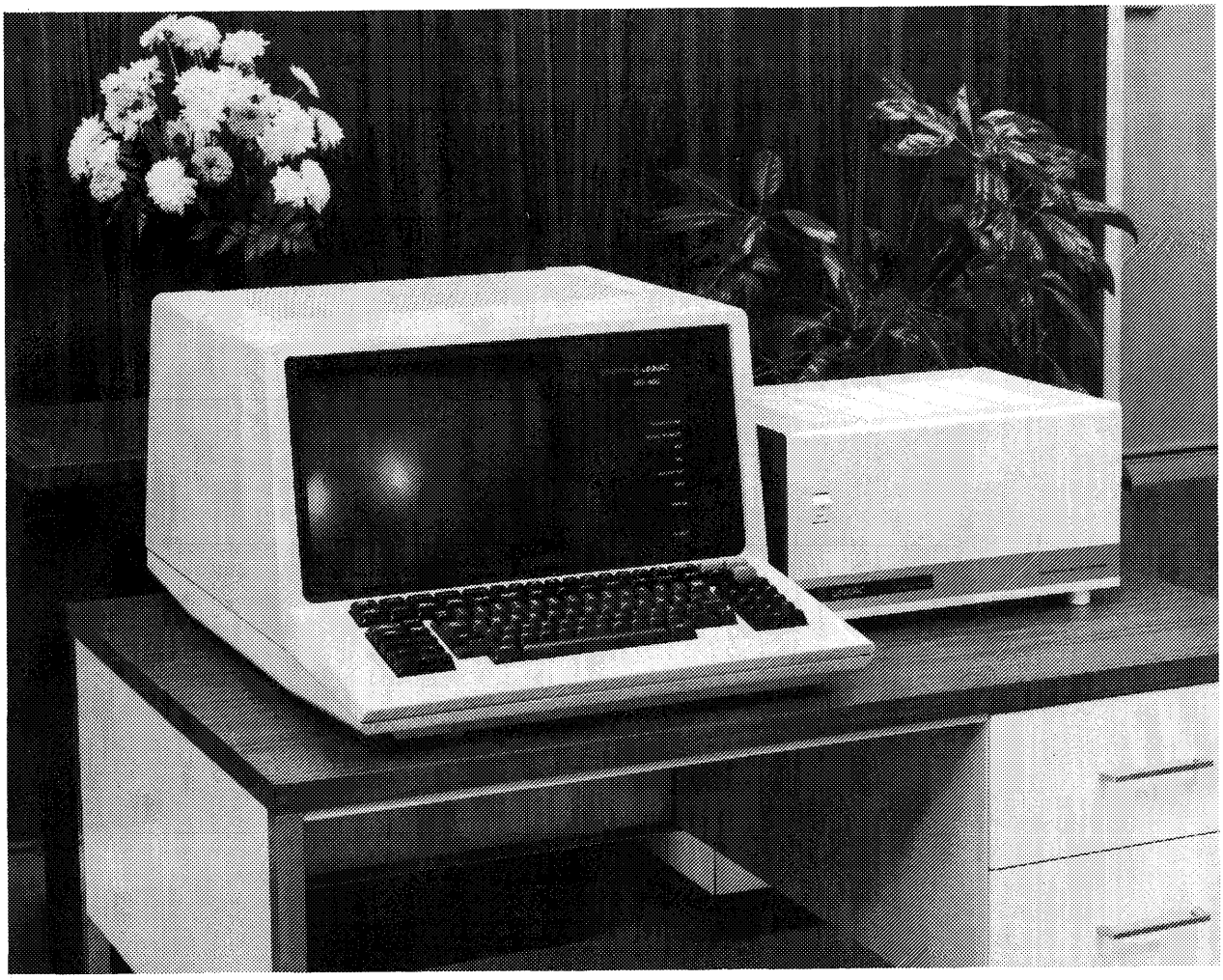
TERMINAL MULTIPLEXER

With the SPERRY UNIVAC Terminal Multiplexer, multiple UTS 400 masters, master/slave clusters, and controller/slave clusters can be connected into a data communications system at one system interface point. Housed in a small, freestanding cabinet, it includes control logic, interface logic, line drivers and receivers, and a power supply. As an option, it may contain either a SPERRY UNIVAC U-201 Synchronous Modem or a U-202 Asynchronous Modem. The multiplexer is shown with the UTS 400 master in Figure 18.

The multiplexer provides system connection for up to 16 UTS 400 terminal systems (masters with or without slaves, controllers with slaves). The UTS 400 can be used on the same terminal multiplexer with both UNISCOPE 100 and 200 terminals. However, if cascading is used on a multiplexer servicing UNISCOPE 100 and 200 terminals, the UTS 400 can be connected only to the primary multiplexer; connection to the cascaded multiplexer is not allowed.

The multiplexer permits synchronous or asynchronous full-duplex communications through common-carrier modems, or full-duplex synchronous operation directly with a central processor equipped with suitable communications terminal adapters.

The primary purpose of the multiplexer is to select, one at a time, those terminal systems and cascaded multiplexers (with attached terminals) that have information to send to the processor and provide line access to the selected UTS 400. The terminal system with the highest priority condition is selected first. To save time and number of transmissions, the multiplexer also combines with the current message certain communications protocol responses from a previously selected UTS 400. The multiplexer does not detect or recognize characters; this function is performed by the UTS 400.



8357-21

Figure 18. UTS 400 Master and Terminal Multiplexer

Terminal System Applications

The UTS 400 is designed to accommodate a wide range of applications requiring direct operator interaction with a central data processing system. Whether your application involves a narrowly specified function or covers the broadest spectrum of functions, the UTS 400 will satisfy your needs.

Applications for the UTS 400 fall into one or more of the following general categories:

- Data entry
- Data accessing
- Control and monitoring
- Conversational interaction
- Offline operation

DATA ENTRY

UTS 400 units are ideally suited for data entry operations. These operations are basically one way — the data flow is mainly from UTS 400 to host processor. Primarily, you use the terminal system in this category to fill in forms, or to send instructional commands or other data to the host processor for retention or for use in other locations.

The editing capability and display storage of the UTS 400 are indispensible in data entry applications. With these capabilities you can enter data and work it over until it is exactly the way you want it before you transmit it. This saves time both in use of the transmission line and in use of the host processor. And with the FCCs, you can set up an automatic check for erroneous entries (by limiting entries to alphabetic or numeric), thus catching many errors at their source.

If you want to use protected forms as guides for data entry, the software can provide as many of these forms as your operation requires. By using simple code commands, your operator can call the forms to the UTS 400 as they are needed.

DATA ACCESSING

When the UTS 400 is used for data accessing, it is basically extracting from the host processor information that has previously been stored, although not necessarily by that station. The data flow for this function is primarily from host processor to UTS 400. The input activity of the UTS 400 is generally limited to specifying the desired data and acknowledging receipt of a transmission from the host processor. This function does not usually give you the capability to change the files, only to look at what is in the files.

By using this limited function, you realize great economy because you can view a relatively large amount of information and expend only a minimum of time — both transmission and operation time — to specify each input segment. The special function keys are quite useful in such applications. With appropriate software, these keys can be used to issue commands to the host with a minimum of time required for data entry and transmission. Also, software can be designed to provide many detailed services that respond to these and other types of minimum UTS 400 commands, making access to and display of data in complex files an almost automatic process. This is particularly the case if your UTS 400 capability includes downline program loading by the host processor.

CONTROL AND MONITORING

In control-station or output-display-monitoring applications, the UTS 400 performs as a receive-only display with a limited input requirement. Transmission is essentially one way only, from the host to the terminal system, when the application is strictly for monitoring; it is both ways when control is also a function of the application.

Basically, this is the same type of operation as data accessing, but even less message interchange is necessary. The data displayed on the UTS 400 is the output from whatever sensing, monitoring, or control elements are used in the system. When a change occurs in the sensing element, the host changes the display. At this point the operator may use the terminal to request the status of various aspects of the operation or to initiate input commands that will correct the condition.

CONVERSATIONAL INTERACTION

The versatility of the UTS 400 is most evident in conversational applications, when terminal operator and host processor are interacting on a real-time basis. Such interaction makes full use of the UTS 400 two-way communications capability and also makes efficient use of the storage capacity and high-speed capabilities of the host processor.

In effect, this type of application combines both the data entry and data accessing applications previously described, but it goes a large step farther by incorporating real-time responses into each input or output transaction and thus creating a constantly changing data base. Applications for the UTS 400 in the conversational category are both numerous and complex, depending only on the extent and sophistication of your software support and your host processor system.

OFFLINE OPERATION

The offline capability of the UTS 400 is outstanding. Powerful data handling capability is available at the command of your operator by means of field control characters and the many editing key functions. Additional power is realized with the vast storage possibilities of the peripheral storage devices. Thus, the UTS 400 becomes a complete data preparation and data manipulation center.

Offline, your operator can create unique formats, enter data, build complete files of such material, and file the results in the peripheral storage. Then, when you choose to submit the accumulated data files to the host processor, the UTS 400 can be placed online and the files transferred from the peripheral storage at the most advantageous time (when the communications rate or traffic is low, for example).

Also, lengthy files from the host processor may be received in a continuous transmission sequence at whatever time is the most convenient or economical for you. Your operator can work over these files offline, whenever such activity is appropriate or convenient, and the modified results can then be submitted to the host.

If your UTS 400 is equipped for programming by the host, you can keep such a program in peripheral storage and reload it as required to give the microprocessor in your terminal system additional program power — and give your operator many additional data preparation possibilities.

Specifications

FUNCTIONAL CHARACTERISTICS

Display format selections	960 characters (12 lines by 80 characters) 1024 characters (16 lines by 64 characters) 1536 characters (24 lines by 64 characters) 1920 characters (24 lines by 80 characters)
View area	10 inches wide by 7 inches high
Character generation	9 by 7 dot matrix, refresh rate of 60 or 50 times per second
Character generator	Basic 64, expandable to 96
Transmission code	7-level ASCII plus parity
Transmission mode	Half-duplex
Transmission facilities	Voice grade (telephone switched network or private line)
Transmission type	Synchronous Asynchronous
Transmission rates	Synchronous up to 9600 bits per second Asynchronous at 300, 600, 1200, 1800, or 2400 bits per second
Communications interfaces	EIA RS-232-C/CCITT V.24 MIL-STD-188
Data sets	SPERRY UNIVAC U-201 Synchronous Modem or equivalent SPERRY UNIVAC U-202 Asynchronous Modem or equivalent
Data integrity provisions	Communications character and message block parity with automatic retransmission Automatic retry with peripheral transfers Internal parity

Selective calling	Host processor can select terminal system or peripheral device or both; processor can initiate data transfer from the terminal system
Keyboards	Uppercase and numeric Uppercase/lowercase and numeric
Language selections	Domestic (U.S.) Danish/Norwegian French German Spanish Swedish United Kingdom Katakana/English
Protected format	Protection of specified data fields as defined by field control characters or UNISCOPE terminal character-protection characteristics
Special function keys	Keys that generate unique characters for use as requests or indicators, extending operational and systems control

PHYSICAL CHARACTERISTICS

	Master	Slave	Controller
Width	20 inches (50.8 cm)	17 inches (43.2 cm)	16 inches (40.6 cm)
Height	13 inches (33.0 cm)	14 inches (35.6 cm)	13 inches (33.0 cm)
Depth	28 inches (71.1 cm)	16 inches (40.6 cm)	14 inches (35.6 cm)
Weight	65 pounds (29.5 kg)	35 pounds (15.9 kg)	35 pounds (15.9 kg)

POWER REQUIREMENTS

Nominal voltage	100, 120, 220, or 240 volts
Nominal frequency	50 or 60 Hz
Phases and lines	Single phase, 3 wire
Nominal load	0.200 kilowatt
Btu per hour	600

PERIPHERAL/AUXILIARY DEVICES

SPERRY UNIVAC Model 610 Tape Cassette System

Read/write speed	6 inches per second (4800 bits per second)
Dual cassette capability	1,440,000 characters
Width	16 inches (40.6 cm)
Height	8 inches (20.3 cm)
Depth	20 inches (50.8 cm)
Weight	34 pounds (15.4 kg)
Nominal primary power	100, 120, 200, or 220 volts at 60 or 50 Hz

SPERRY UNIVAC 8406 Diskette Subsystem

Storage	256 kilobytes per disk drive (one or two drives per subsystem)
Transfer rate	31 kilobytes per second
Width	20.25 inches (51.5 cm)
Height	9 inches (22.9 cm)
Depth	16.75 inches (42.5 cm)
Weight (with single diskette drive)	46 pounds (20.9 kg)
Nominal primary power	100 or 120 volts at 60 Hz 200 or 220 volts at 50 Hz

SPERRY UNIVAC Model 800 Terminal Printer

Print speed	200 characters per second
Character set	96 characters, uppercase and lowercase
Width	18.5 inches (47.0 cm)
Height	7 inches (17.8 cm)
Depth	16.5 inches (41.9 cm)
Weight	34 pounds (15.4 kg)
Nominal primary power	100 or 120 volts at 60 Hz 100, 220, or 240 volts at 50 Hz

SPERRY UNIVAC Communications Output Printer

Print speed	30 characters per second
Character set	63 printable characters, uppercase
Width	38 inches (96.5 cm)
Height	36 inches (91.4 cm)
Depth	31 inches (78.7 cm), including paper rack
Weight	100 pounds (45.3 kg)
Nominal primary power	120 volts at 60 Hz 220 volts at 50 Hz

SPERRY UNIVAC 0786 Printer Subsystem

Print speed	200 characters per second
Character set	96 characters, uppercase and lowercase
Width	22.6 inches (57.5 cm)
Height	9.6 inches (24.5 cm)
Depth	19 inches (48.5 cm)
Weight	55 pounds (25.0 kg)
Nominal primary power	100 or 120 volts at 60 Hz 100, 220, or 240 volts at 50 Hz

SPERRY UNIVAC 0791 Correspondence Quality Printer Subsystem

Print speed	45 characters per second
Character set	96 printable characters, uppercase and lowercase
Width	26 inches (66.0 cm)
Height	10 inches (25.0 cm)
Depth	24 inches (61.0 cm)
Weight	35 pounds (15.9 kg)
Nominal primary power	100 or 120 volts at 50 or 60 Hz 220 or 240 volts at 50 Hz

SPERRY UNIVAC Magnetic Stripe Reader

Read rate	One character at a time at 20-millisecond intervals
Width	1.64 inches (4.2 cm)
Height	1.37 inches (3.5 cm)
Length	7.75 inches (19.7 cm)
Weight	1 pound (0.45 kg)
Power requirement	None (power is supplied from UTS 400)

SPERRY UNIVAC Terminal Multiplexer

Terminal system capacity	Interfaces up to eight masters and/or controllers with expansion features to interface eight more; accepts one level of cascading
Internal modems	SPERRY UNIVAC U-201 Synchronous Modem SPERRY UNIVAC U-202 Asynchronous Modem
Width	16 inches (40.6 cm)
Height	12 inches (30.5 cm)
Depth	8.5 inches (21.6 cm)
Weight	30 pounds (13.6 kg)
Nominal primary power	120 volts at 60 Hz 220 volts at 50 Hz

NOTE:

All specifications subject to change without notice.

Glossary

The terms in this glossary are defined as they apply to data communications, particularly to the UTS 400 terminal system, its peripherals, and its communications protocol.

Accessing	Entering mass storage files from a terminal system for purposes of reference, change, or any other file function for which the terminal is equipped.
Addressing	A communications protocol method of identifying one communications line interface point and a specific terminal system at that location. Also, the same method used in identifying a specific peripheral device associated with the addressed terminal system.
ASCII	Acronym for American Standard Code for Information Interchange.
Asynchronous	Literally "not synchronous." Refers to a method of timing or pacing a data transmission by starting each character with a start element and following it with one or two stop elements.
Buffer	A place or function for the temporary holding of data. Also, a device (or software routine) used to compensate for a difference in rate of data flow, or in timing of events, when data is being transmitted from one device to another.
Cascading	The technique of expanding the number of terminal systems at one communications interface point by connecting a terminal multiplexer to the terminal port of the primary multiplexer and then connecting single terminals to the cascaded multiplexer.
Communications control procedures	The means used to control the orderly communication of information between data communications terminals and a data communications link (that is, a processor or another terminal).
CRT	Acronym for cathode ray tube, the element used as a display screen in a display terminal.
DCM	Acronym for SPERRY UNIVAC Direct Connection Module (a modem replacement).

Deselection	The sequence by which peripheral devices are removed from active participation on an interface, thus precluding their involvement in data transfer.
Display	The visual presentation of information either being prepared for entry into the processor storage or retrieved from processor storage.
FCC	Acronym for field control character, a feature of the UTS 400 that provides control of display formatting.
Firmware	A program permanently resident in a processor read-only memory and providing basic machine instructions through the use of microprogramming techniques.
Full-duplex	Refers to a mode of transmission in which communication takes place in two directions simultaneously, each direction independent of the other.
Half-duplex	Refers to a mode of transmission in which communications takes place in one direction at a time.
Handler	A software package written for a special purpose; in data communications, it generally controls input and output between the processor and the terminal systems or other communications devices.
Host or host processor	Refers to the data processing system controlling the communications environment in which the UTS 400 is working.
I/O	Acronym for input and output.
Interactive	Refers to the process of communication between two stations in which each station responds alternately to procedural formalities. (Also called "conversational.")
List	To print or otherwise produce a permanent representation of data.
Modem	A contraction of modulator-demodulator. A device that modulates and demodulates signals transmitted over communications facilities.
Multidrop	Refers to a communications method using two or more data communications terminals on a communications line at a single interface point.
Multipoint	Refers to a communications method where two or more data communications stations interface the same communications line, each at a separate interface point.
Offline	Refers to terminal system activity performed without access to a host processor or communications line.
Online	Refers to terminal system activity performed between two or more stations linked together on a communications line or joined in a direct communications link.

Parity	An element added to the basic message or character for the purpose of checking correctness of the data transmission.
Peripheral device	A device that operates from a terminal system and need not be under continuous control of the host processor but may depend on the terminal system for overall control.
Peripheral interface	The special interface in a UTS 400 master or controller designed for the peripheral devices associated with this terminal system.
Point-to-point	Refers to a communications method providing an exclusive communications link between two stations. One of these stations may be the host processor.
Polling	A technique for inviting a data communications terminal system to transmit status or messages at a given time.
Processor	A device or group of devices, with the supporting software, capable of executing a systematic sequence of operations upon data.
Protocol	*See* "Communications control procedures."
Real time	A description applied to a computation or other data processing sequence that occurs during the actual time the related process is occurring so that the results are available for modifying or guiding the process.
Selection	The sequence by which a particular peripheral device attached to an interface is designated as the source or destination of data.
Software	The programs and routines used in the operation of data processing systems, such as assemblers, compilers, and handlers.
Storage	A device into which data can be entered, in which it can be held, and from which it can be retrieved at a later time. Loosely, any device that can store data.
Synchronous	Refers to a method of timing or pacing of data transmission by synchronizing the transmitting equipment and the receiving equipment with a series of synchronizing characters.
Timesharing	The use of a processor for two or more purposes or operations during the same overall time interval, accomplished by interleaving portions of each function throughout the processing time. In data communications, this term is popularly applied to processing services sold to independent subscribers who access the host processor by means of data communications terminal systems.
Transfer	The conveying of data between a terminal system and one of its peripheral devices across a peripheral interface.
Transmission	The conveying of data and procedural messages between a processor and a remote terminal system across a communications line.