

SYSTEM DESCRIPTION
and
COMMUNICATIONS DESIGN
for

Burroughs
INPUT AND DISPLAY
SYSTEM



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THE BURROUGHS INPUT AND DISPLAY SYSTEM

INTRODUCTION

The Burroughs Input and Display System is designed for general purpose use with Burroughs Data Processors. Using the latest state-of-the-arts technology; including stroke formed characters, and monolithic integrated circuits, the Burroughs Input and Display System is a high quality and high performance system.

The Burroughs Input and Display System provides the ability to compose, edit and input data to a computer and to access and display computer stored or generated data conveniently and faster than by more conventional means. From the keyboard, data can be composed, displayed on the screen for editing or correction, and transmitted to the computer. Also from the keyboard, an inquiry can be entered quickly and easily into the computer which processes the inquiry and returns the desired information. This data, displayed on the screen then can be analyzed, updated if desired, and returned to the computer for additional processing.

The design and development of these commercial-use oriented Input and Display Systems are based on Burroughs Corporation's solid background and experience in display systems in Defense and Space fields such as BUIC, NORAD and ATC.

The Burroughs Input and Display Systems provide new avenues to explore for applications having the following requirements:

- Remote Key punching - provides the ability to compose or alter input data in punched card format, check the information for accuracy and send the information instantly to the computer for immediate updating or subsequent processing. This operation greatly reduces the time and costs associated with the manual preparation of expensive forms, key-punching, verifying and conversion of punched cards to enter information into the computer.
- Remote problem solving - where the operator instructs the computer to obtain a program from random access storage, process the data submitted and send a calculated answer back to the operator.
- Inquiry - where computer stored data is required by users to serve their customers better. Example - Account balance, Inventory on hand, credit rating.
- Information Display - where a large volume of data can be displayed by executive management for study or comparison purposes.

These are only a few of the many applicational areas for this exciting new product. Study of information in the following pages will emphasize the versatility, flexibility and speed of this system as a remote input device for computer systems.

Three different Input and Display Control models are available, they are:

- Control I (a self-contained logic control) is available for those users who require only one Monitor/Keyboard per location. This model has the advantage of a low price.
- Control II (a shared logic control) is available for those users who require multiple Monitor/Keyboards at one location. This model permits multiple monitor/keyboards at one location by sharing the logic of a control and/or by connecting additional controls to a Multiplexor. Control II allows a lower price per Monitor/Keyboard.
- Control IIA (a shared logic control) is a very low cost control used in conjunction with a Control II and a Multiplexor to facilitate additional Monitor/Keyboards at one location. Control IIA, like the Control II model, allows an even lower price per Monitor/Keyboard.

Through the use of either a direct cable connection or the use of data sets, a wide variety of communication facilities is provided when using the Burroughs Input and Display System.

Flexibility in network design is provided to the user by the following sub-units:

- Remote Communications Adapter (C/A). The C/A allows the Input and Display subsystem to be connected to a data set or a Direct Cable (twisted pair of wires only).
- Simplex Unit (SU). The SU permits the connection of a single control on a multi-point communications circuit.
- Multiplexor Unit (MU). The MU provides for the connection of multiple controls in one location to a communications circuit. The MU allows a single data set to serve multiple input and display controls. Up to four controls can be accommodated by the MU.
- Multiplexor Extension (EXT). The EXT permits up to four additional controls to be added to the MU. A maximum of three EXT's can be added to the MU, thus allowing a maximum of 16 controls with up to 64 Input and Display Monitor/Keyboards to share a single data set.

BURROUGHS INPUT AND DISPLAY SYSTEM

The Burroughs Input and Display System uses a keyboard for operator entered data, a monitor (screen) which uses a cathode ray tube (CRT) and a character generator to generate the displayed characters. Up to 64 BCL characters plus three special symbols and a non-destructive cursor can be displayed. The memory allows up to 1020 characters to be stored in the control.

The data content of the Input and Display memory is entered or altered by either the keyboard, the incoming messages, or both. The content of memory is displayed on one or more monitors using a "stroke" character generator.

All or part of memory may be transmitted to the central processor upon request by either the keyboard operator, or through a processor originated command.

Two basic models, one using a single monitor/keyboard, the other permitting multiple monitor/keyboards, are released at this time. The basic characteristics are shown in the following table.

Basic Configuration	Control I	Control II or IIA
Model Number	9351-1	9351-2 or -3
Is the control logic shareable?	No	Yes
How many monitors may share?	1	1 - 4
Maximum characters of memory per monitor:		
1 Monitor	1,020	1,020
2 Monitors	N/A	508*
3 - 4 Monitors	N/A	252*
Screen size:		
Characters per line	80	80
No. of lines	25	25

*The difference between memory per monitor and total memory is due to monitor control requirements.

The memory of a Control II or IIA can be divided into two or four equal segments of sizes shown in the above table.

The relationship of memory to displayed data is explained in section entitled "Memory Organization."

The control, monitor and keyboard can be combined to form an attractive free-standing console with the keyboard at standard typewriter height as shown in Figure 1, or the separate components can be installed as shown in Figure 2.

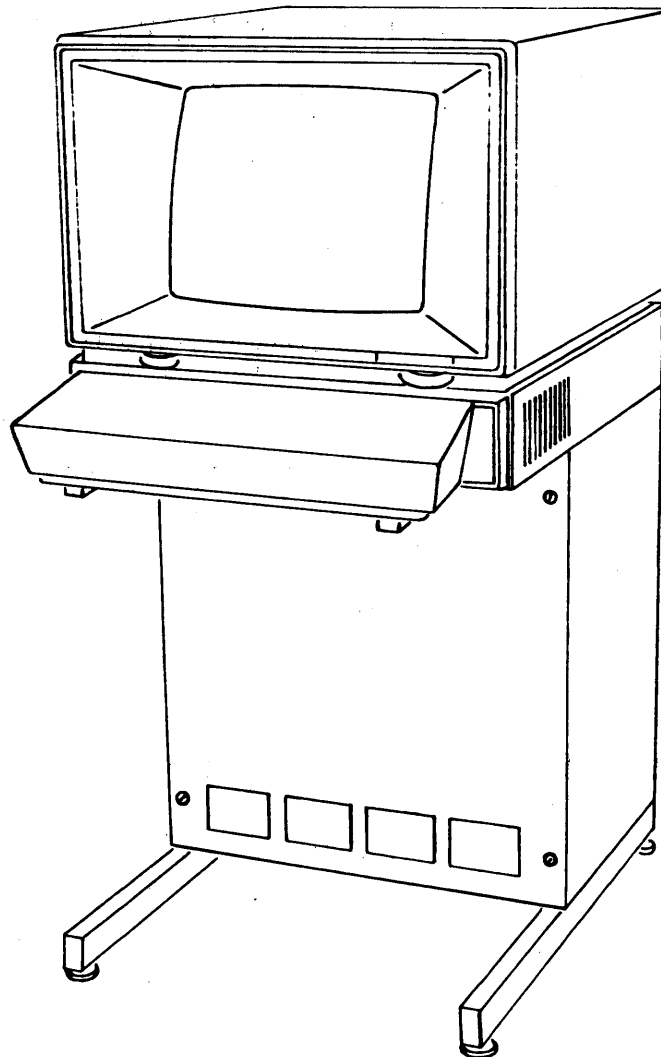


Figure 1

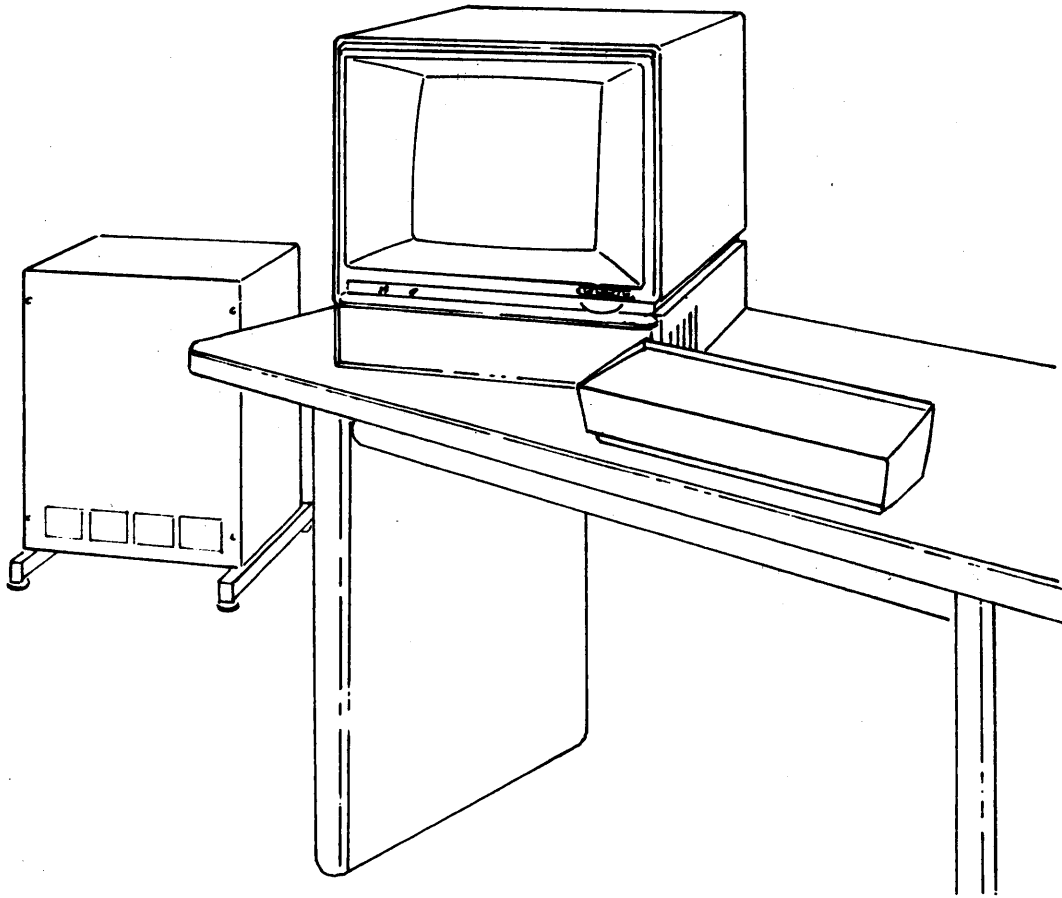
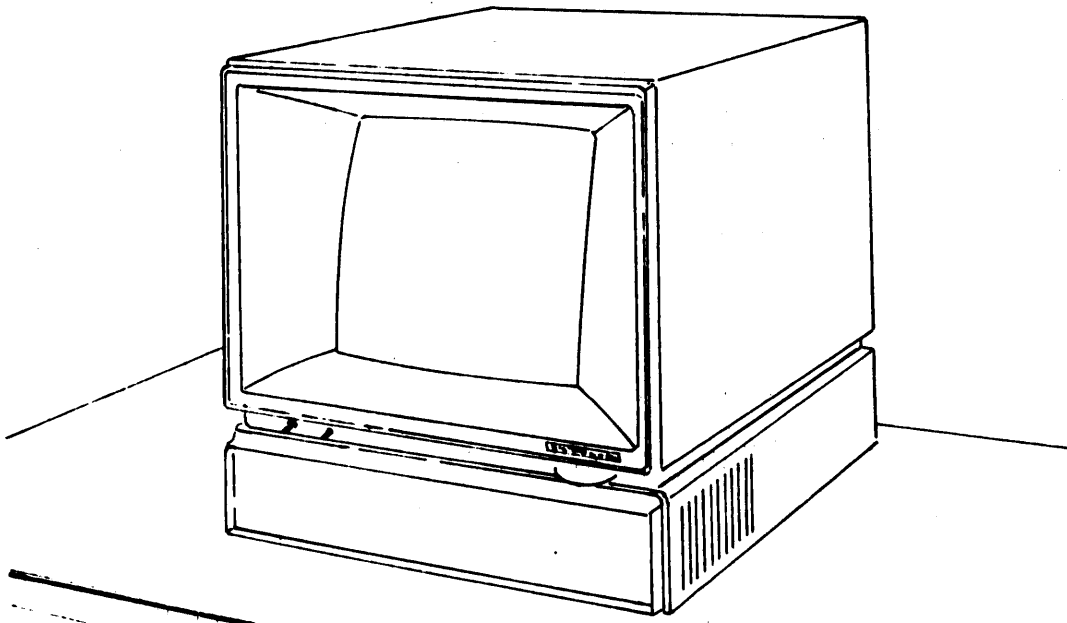


Figure 2

THE MONITOR



The monitor houses the screen. The screen is a high-resolution, rectangular cathode ray tube (CRT). The screen is mounted in a tilted

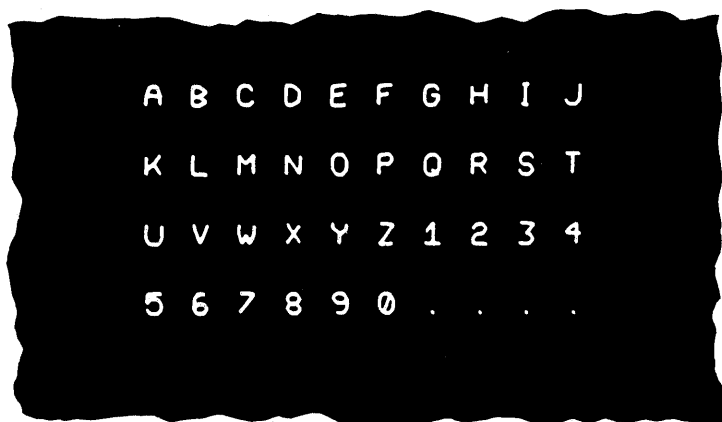
position to permit easy viewing from either a seated or a standing position. A non-glare polarized safety glass placed in front of the CRT reduces glare from both ambient and reflected light sources. Images appear as white characters on a dark background and are displayed continually. The "refresh" rate is 60 frames per second. The messages appear sharp, legible, "non-floating", "flicker-free", and with a contrast that is comfortable to the eye. The viewing area is 12 inches horizontally by 9 inches vertically. All displayed data, including characters appearing near the screen edges, are without distortion. The display area is made up of 25 lines of 80 character positions each for a total of 2,000 character positions. The brightness control is a single-function rotary type control located conveniently to permit easy operator adjustment. A separate power on-off switch allows the monitor to be turned on or off without affecting the brightness control.

CHARACTER FORMATION

All character images are formed by using up to 12 straight line strokes. The stroke formed character is superior to the dot matrix character provided in many competitive models. The letter "G" is shown as it would appear on the screen. (Not to Scale)



Below is a reproduction of an unretouched photograph of the alphanumeric character set displayed on the screen in actual size.



DISPLAY FORMAT

Data can be arranged on the screen much as a typist arranges copy on a typewritten page.

Wide flexibility in formatting messages is provided through use of the tabulator, new line key, space bar and other cursor control keys just as the typist formats a page by using the typewriter tab key, carriage return key, space bar, etc. Characters may be placed at any character position on the screen.

When messages are received from the computer, information appears on the screen in the format directed by the control characters in the data stream from the computer.

A sample message is shown below.

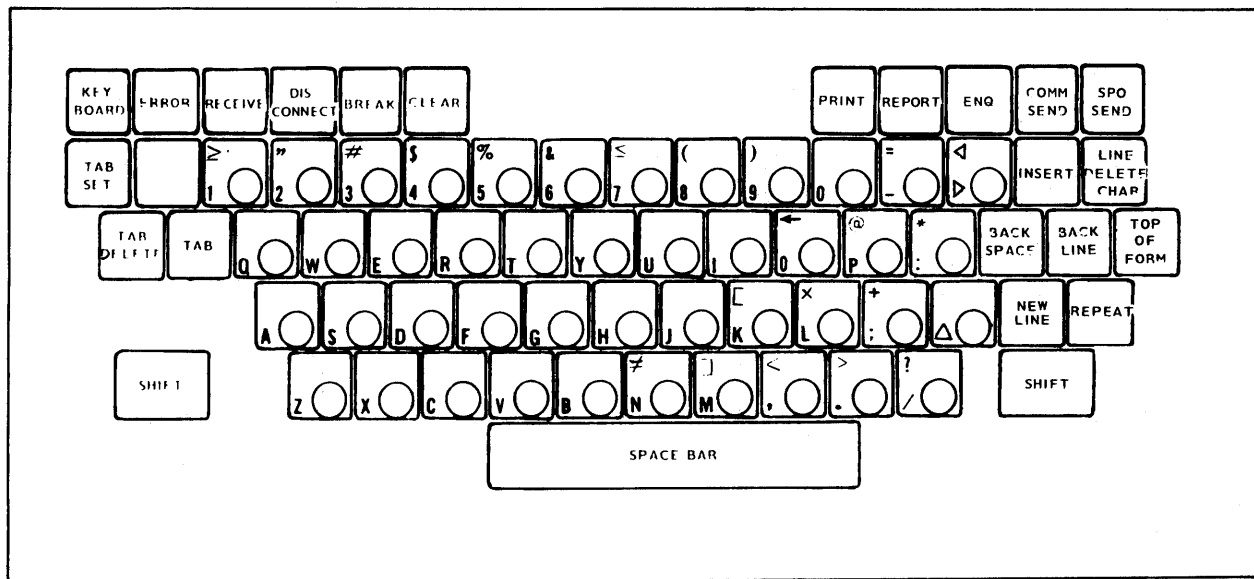
DESCRIPTION	PART NO.	INVENTORY STATUS	ENTER ORDER
BLANKETS, WOOL, STYLE 8X		AVAILABLE	
BLACK	8X914	858	
BLUE	8X915	223	12
BROWN	8X916	613	
GREEN	8X917	288	24
GREY	8X918	0	
ORANGE	8X919	4	
PINK	8X920	50	
RED	8X921	226	
WHITE	8X922	138	12
SHIP ORDER TO ABEL DEPT. STORE, ANYTOWN, USA			△

THE KEYBOARD

The keyboard contains alphanumeric (graphic), format effector (cursor movement), and control keys necessary to operate the display. Designed to comply with the touch and geometry of a conventional office typewriter, the key action is "feather-light" but positive. The typing speed attainable is greater than the typing speed of most operators. Mounted in a slope-top case, the keyboard may be placed on a table top, in a counter cut-out, or mounted on the control module with the monitor. The operation of the keyboard is virtually noiseless. The keyboard is interlocked so that no more than one key is operative at a time.

A Monitor and Control can be installed without a Keyboard. Only one keyboard may be associated with each Monitor.

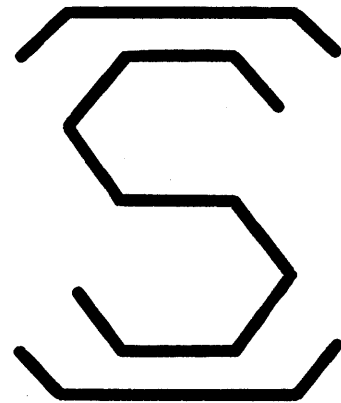
Keys may be depressed at any time. However, only when the Input and Display is in the Keyboard Phase (See Operation Section) is the keyboard active.



Keyboard functions are explained in detail in the appendix.

CURSOR

The cursor is a visible marker which indicates clearly on the screen where the next operation may take place. The cursor appears on the screen as a pair of horizontal brackets (as shown with the letter "S") located above and below a character position so that the character at that position is always completely visible. (Non-destructive cursor.)



Note: Cursor indicators may normally be either Destructive or Non-Destructive. A Destructive Cursor, when moved to a display position containing a character, erases the character. A Non-Destructive Cursor, when moved to a display position already containing a character, does not erase that character.

The Burroughs Input and Display contains a Non-Destructive Cursor. Normal movement of the cursor does not alter any displayed data. Some of the cursor movement keys also have erase capability when used in conjunction with the Shift key. This provides controlled destructive cursor capability.

The cursor movement keys and their functions are:

SPACE BAR - The Space Bar inserts the space character in the position of the cursor if that position is unassigned and moves the cursor forward one position. If the position in which the cursor is located contains a character, the space bar moves the cursor forward one position.

With the Shift key depressed, the space bar also causes the SPACE character to replace the character at the cursor position before the cursor is moved.

- BACK SPACE - The Back Space key moves the cursor backward one position unless the cursor is in the first position of the line in which case the cursor is positioned to the first position of the line above.
- NEW LINE - The New Line key moves the cursor to the beginning of the next line down.
- BACK LINE - The Back Line key moves the cursor to the beginning of the same line it is positioned on when it is not positioned at the beginning of a line. When it is positioned at the beginning of a line; the cursor is moved to the beginning of the next line above.
- TOP OF FORM - The Top Of Form key moves the cursor to the beginning of the top line.

With the SHIFT key depressed, the TOP OF FORM key also clears the screen.
- TAB - The Tab key moves the cursor to the next tab stop. If there is no tab stop to the right of the cursor, the cursor will move to the first tab stop on the next line.
- GRAPHIC KEYS - The prime function of a graphic key is to cause the character depicted by the keytop designation to replace the character at the position of the cursor. The cursor moves forward one position.

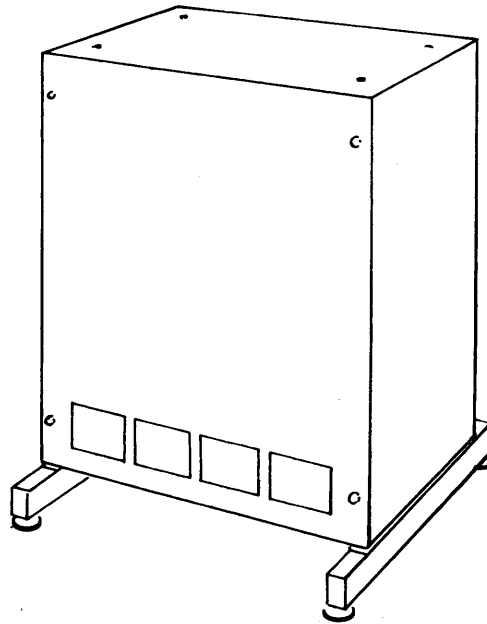
The position of the cursor may also be changed by control characters in the incoming data stream from the computer.

THE HORIZONTAL TABULATOR

The Input and Display has, as a standard feature, ten fixed tabulator stops located one at every eighth character position starting at position 1 on the 80-character line. The tabulator stops may be used by either the computer or the operator to accomplish tabulation in a manner similar to that of a standard office typewriter.

A Variable Tab Position is available as an optional feature and is explained in the Optional Features section.

THE CONTROL



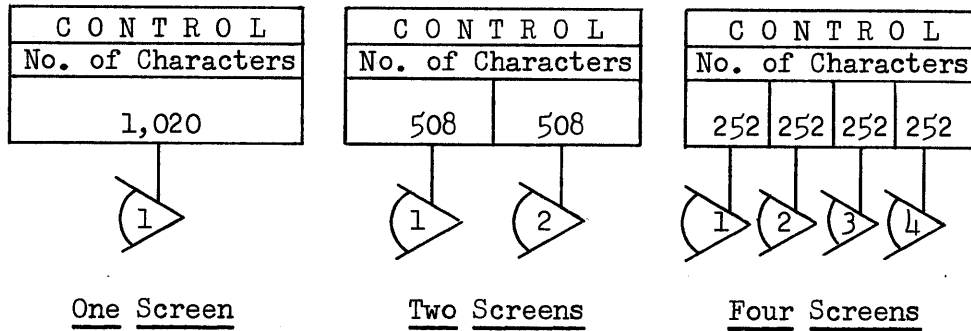
The Control contains the core memory, character generator, logic circuits, and power supply. Two types of control, one allowing a single monitor/keyboard and the other allowing more than one monitor/keyboard, are available:

- Control I
- Control II or IIA

Control I has a memory size of 1,020 characters which cannot be shared.

Control II or IIA has 1,020 characters of memory which may be shared by one to four monitors.

There are three memory arrangements available with Control II or IIA:



Note: Each Monitor/Keyboard can use only its assigned area of memory.

MEMORY ORGANIZATION

There are two methods of using memory in displays. The two methods of memory organization are referred to as spatial and non-spatial. Spatial memory organization means that every character position on the screen has a corresponding character position in memory. (Using the spatial organization, all blanks use a character position in memory.)

Non-Spatial memory organization means that only characters displayed including SPACE (plus control characters) have a corresponding character position in memory. Blanks representing the unused area between fields of information on the screen therefore do not have a memory position assigned.

The Burroughs Input and Display System uses the non-spatial memory organization, uncommon to most display systems on the market. Non-spatial memory has many advantages over spatial memory.

Advantages

When comparing Input and Display systems, it is important to compare the number of character positions available for displaying information, the amount of memory available and the flexibility in the use of the memory. The Burroughs Input and Display screen provides 2,000 character positions where data can be displayed anywhere on the screen regardless of memory size associated with each Display Monitor. This is possible because of the non-spatial relationship of memory to the character positions on the screen. Burroughs users will enjoy the many advantages of the feature.

The following example illustrates an advantage of non-spatial memory organization. Shown below is a sample message display which assumes a 40-character line, double spaced.

PART NO.	QUANTITY	AMOUNT
12769 NF	439	1,921.62
17413 LE	25	413.60
11336 WN	1,439	9,657.42

Below is a representation of memory contents for the above message when using a spatial memory organization that requires a one-for-one relationship between memory content and displayed data. The letter "x" is used to indicate the location of a space or blank in memory which produces a space or blank on the screen. Most competitive displays use the spatial memory organization.

PARTxNO. xxxxxxxxQUANTITYxxxxxxxAMOUNTxx
xx
12769xNFxxxxxxxxxxxxx439xxxxxxxx1,921.62
xx
17413xLExxxxxxxxxxxxx25xxxxxxxx413.60
xx
11336xWNxxxxxxxxxxxx1,439xxxxxxxx9,657.42
xx
xx
xx
xx

280 memory positions are used.

Following is a representation of the contents of memory for the same message with non-spatial memory organization. The symbol "x" is used as in the previous illustration. The symbol "*" indicates a memory position occupied by a TAB control code, and "NL", requiring two memory positions, indicates memory positions occupied by a "NEW LINE" control code.

PARTxNO.*QUANTITY*AMOUNTNLNL12769xNF*xxx	
xx439*1,921.62NLNL17413xLE*xxxxxx25*xx41	
3.60NLNL11336xWN*xxx1,439*9,657.42NL	
S A V I N G	
MEMORY AREA NOT USED	

116 memory positions are used.

Comparison of the preceding examples will reveal a saving of 164 memory positions using the non-spatial arrangement. Many times a Burroughs 252 or 508 non-spatial memory Input and Display System provides results equal to or exceeding a 480 or 960 spatial memory display system. A non-spatial memory will display normally a message equally as large and display it over a greater area for easier reading compared to a spatial memory display.

Other advantages are:

- A reduction in Input and Display memory requirements
- A reduction in the size of messages to be transmitted
- Facility to display a message or messages over a larger screen area for easier reading.

INPUT AND DISPLAY SYSTEM OPERATION

The Input and Display System is used to compose, send, or receive information and is simple and easy to operate. The operator composes the message using the graphic keys and keyboard control keys. The message is stored in memory and is also displayed on the screen so that it may be edited before it is sent. When ready for transmission the message (inquiry) is sent to the computer. The computer receives the message or inquiry, processes it and returns the reply to the Input and Display memory which in turn displays it on the screen. Six communication lights are provided to assist the display operator. The lights and/or illuminated switches are placed conveniently for operator use. The indicators show clearly the operating phase that is being performed. Each Input and Display station has five mutually exclusive operating phases which are explained in detail in the following paragraphs:

- Keyboard
- Send
- Wait
- Receive
- Error

Keyboard Phase: The keyboard phase is used when the operator is composing or changing displayed data. The keyboard phase may be entered by:

- Operator depression of the "Clear" Switch
- Operator depression of the "Keyboard" Reset Switch
- Receipt of a character code sequence in the message data stream from the computer.

In the Keyboard Phase, the KEYBOARD INDICATOR/SWITCH is illuminated to indicate that the keyboard is available for use by the operator.

The keyboard phase is terminated when entering the send or receive phase.

Send Phase: The Send Phase is entered when the Input and Display System is transmitting to the computer. Either the operator or the computer may request the transmission. The SEND/PRINT Indicator is illuminated during the Send Phase.

The information sent to the computer may be the entire displayed message or only a portion of the displayed data. Two operator selectable send modes

are standard:

- Selective Send - Transmission begins with the character located at the position of the cursor and all data in memory is sent (in sequence) until a group separator (Δ) is reached.
- Frame Send - The cursor is positioned automatically at the beginning of the top line and all data in memory is transmitted.

The operator normally either completes his composition by writing GS (Δ), then positions the cursor to the beginning of the message before evoking Selective Send or he evokes Frame Send.

The Send Phase is terminated by completion of transmission of the data stream.

Wait Phase: The Wait Phase suspends the system until further instructions arrive. Upon completion of the Send Phase, the Input and Display normally goes into the Wait Phase which is indicated by illumination of the RECEIVE/WAIT Indicator.

The Wait Phase is terminated by the receipt of data from the computer.

The operator may interrupt the Wait Phase by depressing the Keyboard Push-button. This is not a normal operation.

Receive Phase: The Receive Phase allows transmission of data from the computer to the Input and Display System. Only the computer can initiate the Receive Phase. The RECEIVE/WAIT Indicator is illuminated during the Receive Phase.

Receipt of a message has precedence over, and will interrupt, all other operations.

In the Receive Phase, the Input and Display is under computer control.

Termination of the Receive Phase normally occurs with the receipt of the control character codes which appear in the message stream and which direct the Input and Display System to the next operational phase.

If a message received contains an error, the Error Condition is entered immediately following receipt of the end of message character codes.

Error Condition: The Error Condition is used to alert the operator to the fact that either an error in transmission of a received message has occurred or that the computer is requesting operator participation in the acknowledgement of the received message.

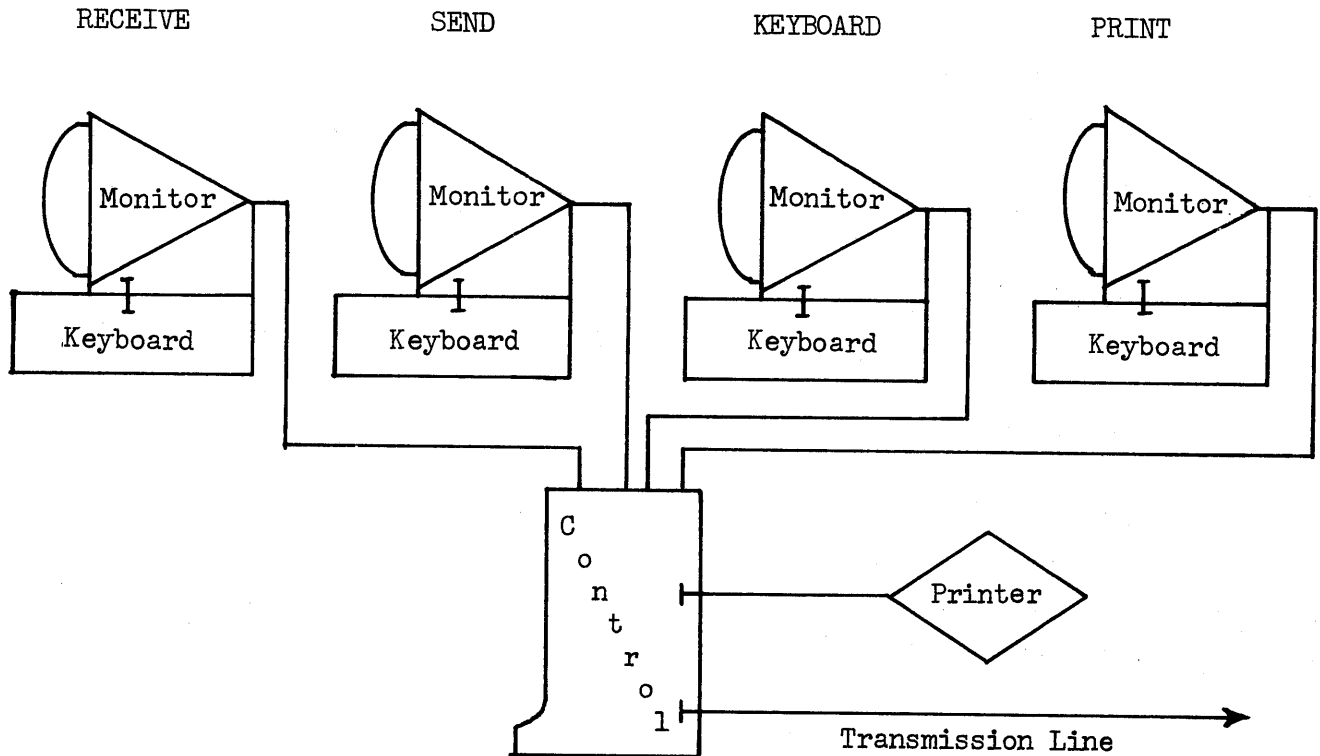
The ERROR Indicator/Switch is illuminated during the Error Condition.

The operator may terminate the Error Condition by:

- depression of the Error Indicator/Switch

- depression of the Error Indicator/Switch and the Report key (which initiates a response to the computer).

Phase Inter-Relationship: Each Input and Display Monitor/Keyboard connected to a Control II (or IIA) can operate independently of other Monitor/Keyboards. Illustrated below is a Control II (or IIA) to which are connected four Monitor/Keyboards and one Printer.



- Transmission occurs only between that portion of memory associated with a monitor/keyboard and the computer.
- Transmission can occur in only one direction at a time.
- Composition may occur simultaneously on all monitor/keyboards attached to one Control.
- The memory associated with only one monitor/keyboard connected to the same communications line may send information at a given time.
- The memory associated with multiple monitor/keyboards can receive group addressed messages.
- A message from only one monitor may be printing at one time on the Printer attached at a Control.

INPUT AND DISPLAY LINE ADAPTERS

Input and Display line adapters are available to accommodate either a direct connection (Twisted Pair of Wires or Multi-wire) or a data set (300/1200/2400 bits per second) to permit a wide variety of communication lines and transmission speeds.

The following table indicates the various combinations of data sets and types of service available:

TRANSMISSION SPEEDS (Bits Per Second)	TYPE OF TRANSMISSION	COMPUTER LINE ADAPTER		TYPE OF DATA SET	TYPE OF SERVICE	REVERSE CHANNEL AVAILABLE ?
		B 300 B 5500 B 6500	B 2500 B 3500			
150 or 300	Asynchronous	989-2	NA	103A or 103B or 103F or equivalent	DDD, WATS or Schedule 3A or Schedule 4	No
1200 or 1800	Asynchronous	989-3	X659-2	202C or 202D or equivalent	DDD, WATS or Schedule 4 or Schedule 4B	Yes
2000 or 2400	Synchronous	NA	X659-3	201A or 201B or equivalent	DDD, WATS or Schedule 4 or Schedule 4C	Yes, 201B only
2400	Direct Connect	NA	X659-1	None Required	Multi-wire Cable	NA
not yet determined	Direct Connect	989-1	NA	None Required	Twisted Pair Wire	NA

In addition, the Automatic Calling Unit (ACU) - a dialing service supplied by the communication common carrier which permits the computer automatically to dial calls over the dialed network - may be used.

REMOTE COMMUNICATIONS ADAPTER

The Remote Communications Adapter provides compatability with Bell System data sets 103A, 103B, 103F, 202C, 202D, 201A and 201B, or equivalent modems.

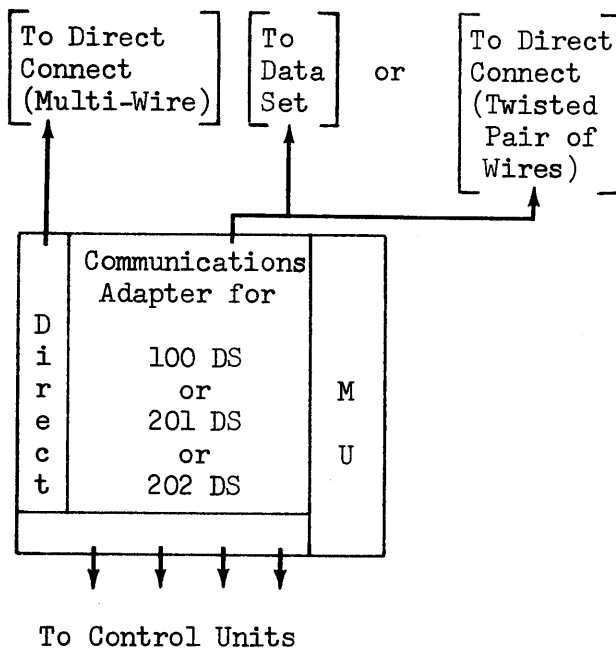
The Remote Communications Adapter is required to connect a Control to a Direct Connect (Twisted Pair of Wires) Line Adapter. In this case, no data set is required. A Remote Communications Adapter is always used in conjunction with a remote data set.

SIMPLEXOR UNIT - SU

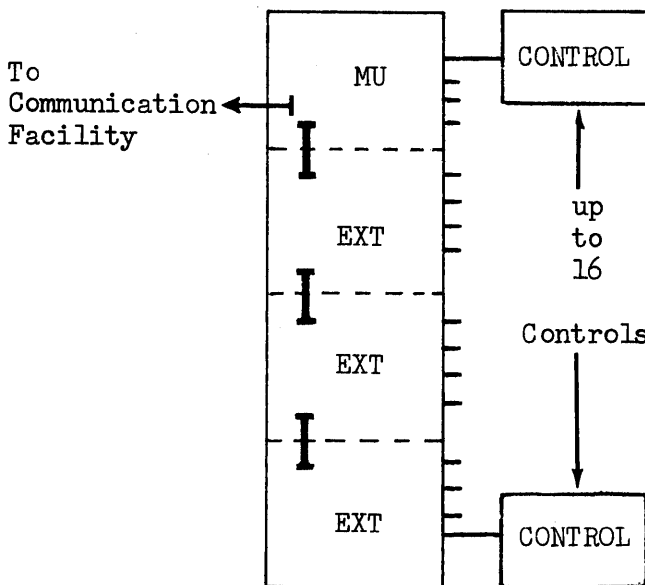
A Simplexor Unit (SU) is required where a single Control is connected to a drop point of a multi-point communications circuit.

The Remote Communications Adapter is housed in the Control.

MULTIPLEXOR UNIT - MU



The Multiplexor Unit (MU), a general purpose communications concentrator, is available to those installations requiring up to four Controls at a location. The MU is designed for use with the Control II (or IIIA).



To accommodate additional controls on an MU, a Multiplexor Extension is available. Each Extension can accommodate up to four additional Controls. A maximum of three Multiplexor Extensions (field installable) may be added to an MU. With three Extensions, an MU can accommodate up to 16 Controls which may serve up to 64 Monitor/Keyboards.

Up to 95 MU's or SU's are addressable on one communications circuit. The number of drop points is limited normally by the common carrier.

A message received by an MU or SU appears as follows:

S	A	I	A	S	A		E	B		
O	D	N	D	T	D	←	TEXT	→	T	C
H	1	S	2	X	3				X	C

where:

SOH = Start of Header

AD1 = Address 1 - Address of the MU/SU

INS = Instruction

AD2 = Address 2 - Address of the Control being serviced by the MU/SU

STX = Start of Text

AD3 = Address 3 - The first character of text which indicates the address of the Monitor being serviced by the Control.

TEXT

ETX = End of Text

BCC = Block Check Character

COMMUNICATION AND TRANSMISSION ABILITIES

Information is transmitted between the controlling computer and the display system. To meet the varying requirements of customers, the transmission may be accomplished by using a direct cable or by using a wide range of data sets which use a variety of communication lines. A chart showing the transmission facilities utilized is included in the Input and Display Line Adapter section.

Multi-wire cable (or twisted pair wires) up to 1,000 feet in length allows a direct connection of the Input and Display to the computer.

Messages are sent and received one character at a time bit serial. Data transmission rates of from 150 to 2,400 bits per second are achieved depending on which data set and transmission facility are used. The seven-bit ASCII plus parity interchange code is used to communicate between the computer and the display. Both character parity and longitudinal message parity are used to verify correct transmission of data except for the Data Set (300 bits/second) Line Adapter and Input and Display Direct Connect (twisted pair of wires) Line Adapter.

There are many communication options available to assist in developing the desired communications network. Several of the choices which influence the communication facilities selected are:

- The number of Monitor/Keyboards at the location.
- The message size.
- The number and frequency of transmitted messages.
- The response time required.
- The distance from the computer to the Input and Display.

A configurator is included in the Appendix to illustrate the many ways that the communication facilities may be combined with the Burroughs Input and Display System.

Where the requirement is for a single Control, with one or multiple Monitor/Keyboards at a location, the following arrangements can be used:

- A direct connect (multi-wire or twisted pair of wires)
- A transmission line to a location
- A transmission circuit to multiple locations

Where the requirement is for multiple monitor/keyboards and multiple Control units at one location, the following arrangements may be used:

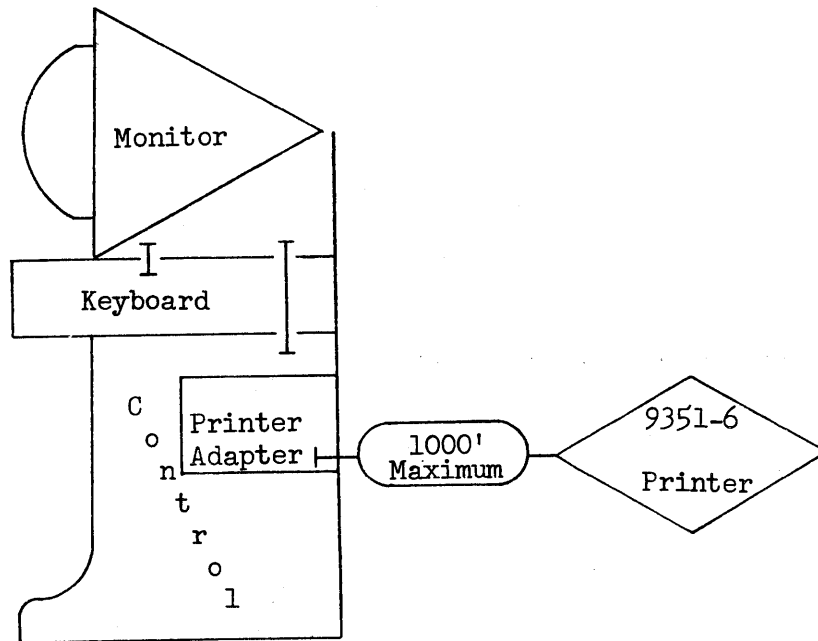
- A direct connection.
- A transmission circuit with a Multiplexor.
- A transmission line to multiple locations, each having a MU.

OPTIONAL FEATURES

The Burroughs Input and Display System is designed with standard features necessary to meet the requirements of the majority of applications. Low cost optional features are available to Burroughs users having special application requirements. An explanation of the optional features follows:

INPUT AND DISPLAY PRINTER ADAPTER

The ability to print Input and Display messages in hard-copy is provided via the optional Printer Adapter which allows the connection of one Model 9351-6 Input and Display Printer (Teletype Model 33RO (Receive Only) to the Control.



The memory content associated with a given Monitor/Keyboard may be printed upon depression of the PRINT key or by a computer message.

The Send indicator is on during the print operation. If the Input and Display Printer is "busy" when printing is requested, the print operation will be performed when the printer becomes idle.

The Input and Display Printer can accommodate a maximum of 72 characters per line as compared with 80 characters per line on the screen. The length of the print line must be taken into consideration when a hard copy of the displayed information is desired.

INSERT/DELETE - Character/Line

Insert Functions

The Insert Function provides an additional editing capability whereby characters and lines may be inserted into existing screen data. The existing data,

starting at the insertion position, is moved to the right and/or down to make room for the insertion.

Depression of the Insert key initiates the insert operation - no operation is performed. The key depressed immediately after the Insert key determines the type of insert operation to be performed; that is:

- A character or space key causes a character or space to be inserted at the position of the cursor. All characters, starting with the character at the cursor position, are moved one position to the right before the new character is inserted. If the cursor is positioned at the last character position of the line, or if the character positions to the end of the line are filled, the last character on the line is moved to the first character position of the next line.

Before

```
INSERT CHARACTER-  
TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-ABCDEFGHI  
JKLMNOPQRSTUVWXYZ0123456789-+()"[];'z$,./=z
```

After

```
INSERT CHARACTER-  
TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-ABCDEFGH  
JKLMNOPQRSTUVWXYZ0123456789-+()"[];'z$,./=z
```

- The New Line key causes the characters from the cursor position to be moved to the next line and all succeeding lines to move down one line.

Before

```
INSERT LINE-  
TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-  
ALPHABETIC; ABCDEFGHIJKLMNOPQRSTUVWXYZ  
SPECIAL;    -+()"[];'z$,./=z
```

After

```
INSERT LINE-  
TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-  
ALPHABETIC; ABCDEFGHIJKLMNOPQRSTUVWXYZ  
NUMERIC;    0123456789  
SPECIAL;    -+()"[];'z$,./=z
```

- The depression of any other control key causes the insert operation to be cancelled.

Delete Function

The Delete function provides additional keyboard editing capabilities whereby characters and lines (entire or partial) may be removed from existing screen data. The Delete key causes:

- Character deletion when used without the Shift key.
- Line deletion when used with the Shift key.

Character Delete: With the Shift key not depressed, the Delete key erases the character under the cursor. All other characters on the line move one space to the left to close the gap created by the deletion. Control characters are not affected by Delete key depression.

Before Character Delete

DELETE CHARACTER-

TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-ABCDEF G
HIJKLMNOPQRSTUVWXYZ0123456789-+()"[];'z\$,./=z.....

After Character Delete

DELETE CHARACTER-

TYPICAL CHARACTERS WHICH MAY BE DISPLAYED-ABCDEFGHI
JKLMNOPQRSTUVWXYZ0123456789-+()"[];'z\$,./=z.....

Line Delete: With the Shift Key depressed, the Delete key causes:

- erasure of all characters on the line from the position of the cursor to the end of the line.
- insertion of a new line code at the position of the cursor.

Before Full Line Delete

```
ALPHABETIC; ABCDEFGHIJKLMNOPQRSTUVWXYZ.....  
NUMERIC; 0123456789.....  
NUMERIC; 0123456789.....  
SPECIAL; -+() "[ ] ; ' z $ , . / = z.....  
1
```

After Full Line Delete

```
ALPHABETIC; ABCDEFGHIJKLMNOPQRSTUVWXYZ.....  
NUMERIC; 0123456789.....  
SPECIAL; -+() "[ ] ; ' z $ , . / = z.....  
1  
2
```

Before Partial Line Delete

```
1  
2  
3 PARTIAL LINE DELETE- 1234567890@ABCDEFGHIJKLMNO  
4
```

After Partial Line Delete

```
1  
2  
3 PARTIAL LINE DELETE- 1234567890  
4  
5
```

If the cursor is positioned over a New Line (NL) character (in memory), the New Line character will be erased and information from the line below will fill the line starting at the position of the cursor. Any excess characters will remain on their line, left justified.

The Insert/Delete feature is a valuable option which can save the operator much time when composition or editing is a major use of the Input and Display System.

CONTROLLED FORMAT

DESCRIPTION	PART NO.	INVENTORY STATUS	ENTER ORDER
BLANKETS, WOOL, STYLE 8X		AVAILABLE	
BLACK	8X914	858	
BLUE	8X915	223	12
BROWN	8X916	613	
GREEN	8X917	288	24
GREY	8X918	0	
ORANGE	8X919	4	
PINK	8X920	50	
RED	8X921	226	
WHITE	8X922	138	12
SHIP ORDER TO ABEL DEPT. STORE, ANYTOWN, USA			Ⓐ

The Controlled Format option provides the ability to display an outline for requested data and reserve fixed areas for the reply. With the Controlled Format option, two advantageous features are available:

- The Controlled Format option prevents data formatted by the computer to the Input and Display from being altered. The cursor is restricted to only that area reserved for entering data from the keyboard.
- The Controlled Format option permits the transmission of only the operator entered data to the computer.

The data formatted by the computer contains fixed format fields for entering data. The fixed fields will aid the operator in entering data and result in greater accuracy in formatting of data. It is not necessary to re-send the formatted data to the display for each transaction or entry since the data formatted is not disturbed during the Send Phase.

A switch is provided on the Control to allow Keyboard access to the complete screen, thereby allowing creation or alteration of computer formatted data from the keyboard.

When the Controlled Format option is being used, the following features are inoperative: Insert/Delete, Character/Line; Variable Tab Position; and Fixed Tab.

VARIABLE TAB POSITION

The Variable Tab Position option allows a single tab stop to be positioned at any one of the 80 horizontal character positions on the screen.

The Variable Tab Position is repositioned by the operator by moving the cursor to the desired position on the screen and depressing the TAB SET key. It also may be positioned by a message from the computer. The Variable Tab Position may be used for tabulation from the keyboard and from control characters in a computer message.

With the Shift key depressed, the Tab key causes the cursor to move to the Variable Tab Position whether on the same or the next line depending upon whether the cursor was positioned to the left or the right of the tab stop.

PROGRAMMATIC CURSOR POSITIONING

The Programmatic Cursor Positioning option is provided to permit positioning of the cursor by the computer to a specific character position on the screen. The computer message defines:

- the screen line - line 1 through 25 respectively.
- a horizontal screen position - positions 1 through 80 respectively.

This positioning of the cursor by the computer eliminates the need for the operator to position the cursor manually to the starting position after receipt of a message.

B 5500 CONSOLE MODIFICATION SWITCH

The Burroughs Input and Display can be used as a remote console for the B 2500 - B 3500, B 5500 or B 6500 systems. The operation of the display as a console is similar to the model B 493 typewriter.

Control I with Keyboard and Monitor are used for the Console facility. Only one Input and Display can be connected to the line adapter. All line adapters, except the Data Set (2400 bits per second) Line Adapter, may be used in the Console mode of operation.

The optional Console Modification switch is required for the B 5500 only. This switch modifies the character set to comply with the character set used by the B 5500 Master Control Program.

APPENDIX

KEYBOARD FUNCTIONS

Key	Function			
	Shift Key Not Depressed	Shift Key Depressed		
> " # I 2 3	(1) Character depicted by lower key designation replaces character at position of cursor.	(1) Character depicted by upper key top designation replaces character at position of cursor.		
\$ % & 4 5 6				
< () 7 8 9				
= < < - > O	(2) Moves cursor forward one position.			
@ * [P : K				
X + ≠ L ; N				
] < > M , .				
? /				
Ø Q W				
E R T	(1) Character depicted by key top designation replaces character at position of cursor.			
Y U I				
A S D				
F G H			(2) Moves cursor forward one position.	
J Δ Z				
X C V				
B				
SPACE BAR	(1) Inserts space character at position of cursor if position does not already contain a character (screen position is unassigned.)	(1) SP character replaces character at position of cursor.		
	(2) Moves cursor forward one position.			
BACK- SPACE	If the cursor is not in the first position of line, moves the cursor backward (left) one position. If the cursor is in the first position of a line, moves the cursor to the first position of the previous line.			

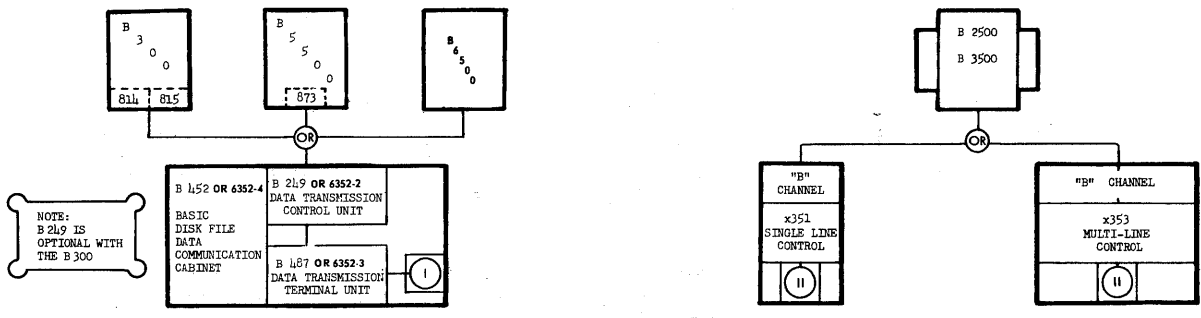
KEYBOARD FUNCTIONS - Continued

Key	Function	
	Shift Key Not Depressed	Shift Key Depressed
TAB	Moves the cursor forward to the next tab stop.	
TAB SET	Places a TAB character (stop) at the position of the cursor	
TAB DELETE	Deletes TAB character (stop) if cursor is at TAB character location.	
NEW LINE	Moves the cursor to the beginning of the next line.	
BACK LINE	If the cursor is NOT positioned on beginning of line, moves cursor to beginning of same line. If cursor is positioned on beginning of line, moves cursor to beginning of the previous line.	
TOP OF FORM	(1) Moves cursor to the beginning of top line	
	(2) Clears screen	
REPEAT	Causes the last Function to be repeated at the rate of 10 actions per second	
REPORT	(1) Turns KEYBOARD light OFF and SEND light ON. (2) If ERROR light is ON, Negative Report message sequence is transmitted. (3) If ERROR light is OFF, Positive Report message sequence is transmitted.	
SEND	(1) KEYBOARD light goes OFF and SEND light goes ON.	
	(2) Selective Send to the communication interface is evoked.	(2) Frame Send to the communication interface is evoked.
PRINT	(1) KEYBOARD light goes OFF and SEND light goes ON.	
	(2) Selective Send to the display printer adapter is evoked.	(2) Frame Send to the display printer adapter is evoked.
ENQ	Sends a message advising the computer that servicing is desired now. (Normally as a result of display inactivity, the computer will stop polling, and begin polling again only when an "Enquire" message is sent.)	

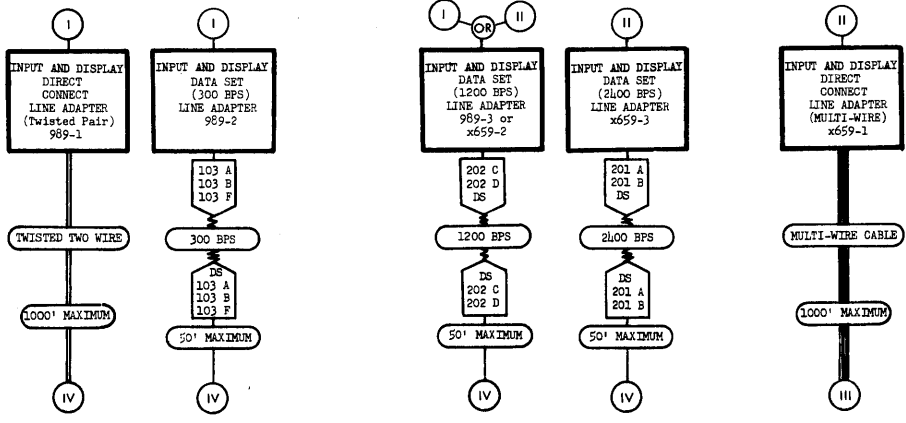
POWER ON/CLEAR Indicator Switch is illuminated when the ON/OFF switch is in the "ON" position. Depression of the indicator/switch when illuminated, causes all data to be removed from memory and screen. (Note: The On/Off and the Indicator/Switch are two separate switches.)

ON LINE/DISCONNECT Indicator/Switch is illuminated when the display is connected to a communication line with the data set "On" and "Ready", or when connected via a direct cable. When connected via a switched network, depression of the Indicator/Switch causes a line disconnect and turns off the light.

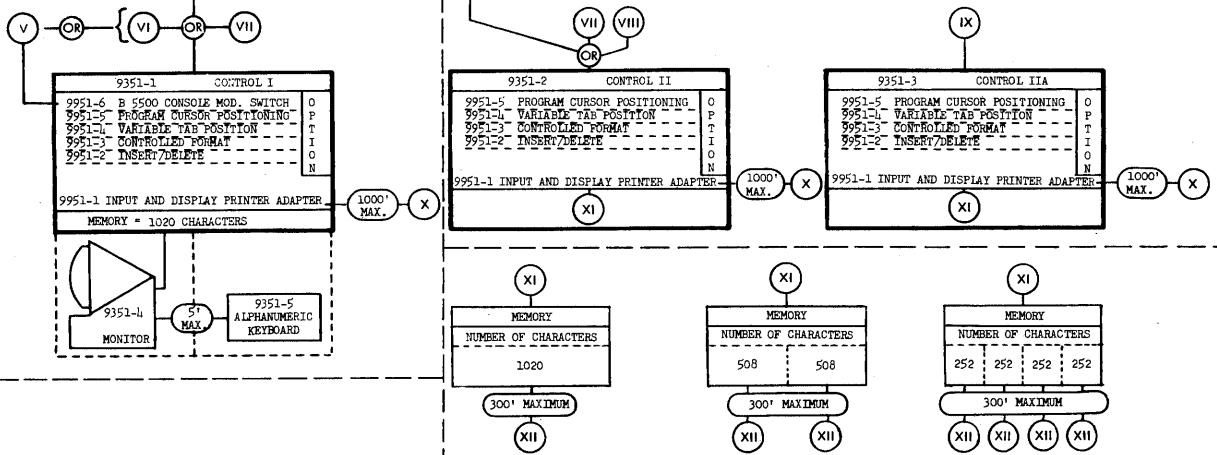
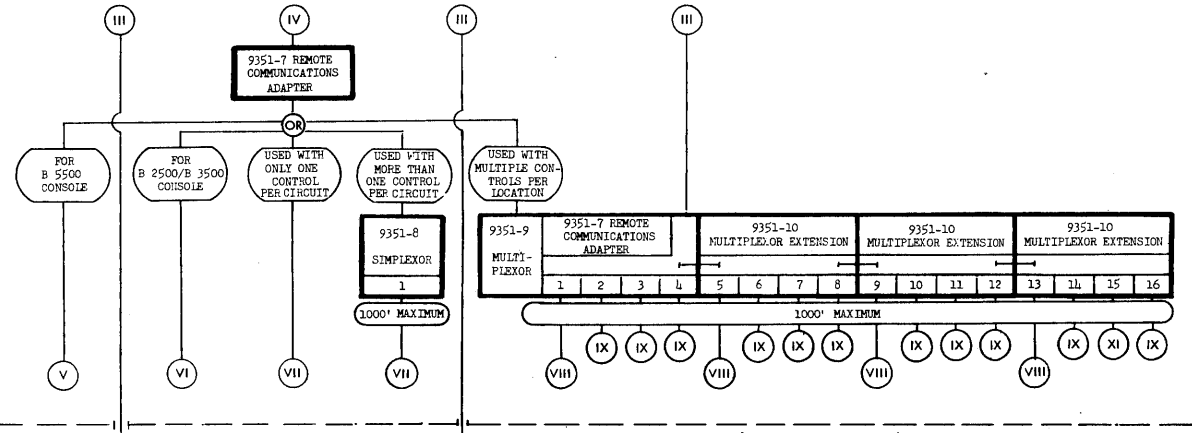
BREAK Key. Depression of this key causes termination of transmission of a message from the computer without causing a line disconnect. The operator can depress this key to stop the receipt of an unwanted message.



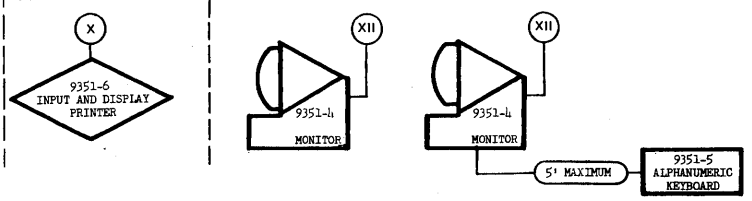
NOTE: B 249 IS OPTIONAL WITH THE B 300



NOTE: DATA SETS AT DISTANT SITE MAY BE CONNECTED TO THE CENTRAL SITE DATA SET USING A MULTI-POINT NETWORK.



Burroughs
INPUT AND DISPLAY
SYSTEM
CONFIGURATOR



INPUT AND DISPLAY - Physical Characteristics

Power:

105 to 125 volts A.C., 50/60 cps., 400 watts

Weight:

Monitor Unit - 70 pounds

Keyboard Unit - 5 pounds

Control Unit - 85 pounds (including power supplies)

Dimensions:

	Height	Width	Depth
Monitor	18"	19 1/4"	22"
Keyboard	3 1/2"	18"	5 1/4"
Control	22"	19 1/4"	14"

Cooling:

Quiet, low speed fans in Monitor and Control Unit.

Temperature:

+59°F to +100°F (15°C to 37.7°C)

MONITOR - Display Characteristics

Cathode Ray Tube (CRT)

Deflection Technique:	Electromagnetic
Overall Tube Size:	17" Rectangular
Phosphor Type:	P4 Aluminized
Viewable Tube Area:	9" high by 12" wide
Brightness:	50 Foot-lamberts (min.)

Deflection Circuitry

Writing Rate:	100,000"/sec. (max.)
Flyback Time:	40 microseconds
Character to Character Positioning Time:	2.7 microseconds
Small Signal Response:	1 MC
Refresh Rate	50 or 60 cps. synchronized to the power line

Characters

Repertoire:	63 graphic characters, blank, cursor group separator (Δ) record separator (\langle) and unit separator (\triangleright)
Method of Generation:	Stroke type
Max. strokes per character:	12
Drawing Time:	0.9 microsec./stroke
Character Size (nominal):	.150" high by .115" wide
Character Spacing:	7 characters/in.
Line Spacing:	3.33 lines/in.
Stroke Brightness Compensation:	Two levels-compensated with residual variation of 1.66:1