



WANG

2200

**Binary Synchronous Communications 1 (BSC 1)
User Guide**
for 2200VP, LVP, MVP, and SVP

2200

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for 2200VP, LVP, MVP, and SVP

1st Edition — March, 1982
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700-7123

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PREFACE

This manual describes the Binary Synchronous Communications 1 (BSC 1) emulation software. The BSC 1 software provides a 2200 Series system with the capability to emulate four IBM binary synchronous protocols: 2780, 3780, 3741, and multileaving HASP. The software also provides the 2200-to-2200 protocol and the 2200 WPS mode. The 2200-to-2200 protocol is for synchronous communications between 2200 Series systems. The 2200 WPS mode is for synchronous document transfer between a 2200 Series system with 2200 Word Processing software and another Wang word processing system with synchronous communications capabilities.

Chapter 1 is an overview of the BSC 1 software. Chapter 2 provides instructions for configuring the software to achieve compatibility with the communications protocol in use at a remote site. Chapters 3 and 4 provide operating instructions for the emulation software.

Appendix A outlines the Wang TC file format. Appendix B provides information concerning modem selection, and Appendix C discusses the information necessary for establishing a communications connection. Appendix D summarizes the BSC 1 emulator configuration process. An outline of the operation of a BSC 1 emulation is provided in Appendix E. Appendix F discusses code translation. Appendix G provides instructions for implementing software-controlled Printer Vertical Format Control.

This manual should be used in conjunction with the following manuals.

Wang BASIC-2 Language Reference Manual (700-4080)

Wang BASIC-2 Disk Reference Manual (700-4081)

Model 2228B/2228C/Option 62B Synchronous/Asynchronous
Communications Controller User Manual (700-4670)

TC Support Utilities 1 User Manual (700-4086)

Integrated Support System (ISS) User Manual, Release 3.2 (700-4254)

Integrated Support System (ISS) User Manual, Release 5 (700-5010)

2200 Word Processing Software Operator's Guide (700-6937)

Refer to the current Wang Corporate Publications Literature Catalog (700-5294) for information on ordering these manuals.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions. It emphasizes that proper record-keeping is essential for the integrity of the financial system and for the ability to detect and prevent fraud. The text notes that without reliable records, it would be difficult to track the flow of funds and identify any irregularities.

2. The second part of the document outlines the specific procedures for recording transactions. It details the steps involved in entering data into the system, including the use of standardized codes and the requirement for double-checking entries. The text also mentions the importance of regular audits to ensure that the records are up-to-date and accurate.

3. The third part of the document discusses the role of technology in modern record-keeping. It highlights the benefits of using computerized systems, such as increased efficiency and the ability to store large amounts of data securely. However, it also notes the need for robust security measures to protect sensitive information from unauthorized access or theft.

4. The fourth part of the document addresses the challenges of maintaining records over a long period. It discusses the issue of data storage and the need for regular backups to prevent data loss. The text also mentions the importance of having a clear policy for the retention and disposal of records to ensure compliance with legal requirements. Finally, it emphasizes the need for ongoing training and education for staff to keep them up-to-date on the latest record-keeping practices.

5. The fifth and final part of the document provides a summary of the key points discussed. It reiterates the importance of accurate record-keeping and the need for a systematic approach to managing financial data. The text concludes by stating that a well-maintained record-keeping system is a critical component of any organization's financial management strategy.

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CHAPTER 1 GENERAL INFORMATION

1.1 SOFTWARE OVERVIEW

The Wang Binary Synchronous 1 (BSC 1) software provides six binary synchronous communications protocols.

- IBM 2780 protocol
- IBM 3780 protocol
- IBM 3741 protocol
- HASP Multileaving protocol
- 2200-to-2200 protocol
- 2200-WPS mode

The 2780, 3780, and 3741 protocols have become industry standards for data communications equipment designed to handle batched data transmission. These protocols ensure reliable and efficient data communications with computer systems in many service bureaus and major corporations. The HASP Multileaving protocol interleaves multiple batch jobs to accommodate differences in the data handling rates of various input and output devices, thereby improving data throughput capability.

The Wang 2200-to-2200 protocol combines standard BSC procedures with specialized techniques to facilitate data transfer between two Wang 2200 Series systems. Two 2200VP, SVP, LVP, or MVP systems can use 2200-to-2200 protocol if both systems are equipped with the BSC 1 software (Release 5 or later).

The 2200 WPS mode is a modified BSC protocol developed to facilitate document transfer between 2200 Series systems and other Wang systems that support word processing. Wang 2200 systems with Word Processing software and the BSC 1 software can communicate with other Wang systems that have synchronous communications capabilities.

The BSC 1 software is available on a single-sided single-density diskette for 2200VP, LVP, or MVP systems (Package 195-2057-3); or on a double-sided dual-density diskette for 2200SVP systems (Package 195-2057-5).

The BSC 1 software is designed to accommodate a wide variety of the devices that can communicate using a binary synchronous protocol. The BSC 1 software allows the user to specify the type of communications connection needed for an application, and to save this information (referred to as a configuration) in a disk data file for later use or modification. Since configurations can be created and saved prior to transmission, an operator need

only know which configuration is to be used for each communications connection and what data is to be sent using that configuration. The operator loads and runs the correct configuration, supplies the input data or data files to be sent, and chooses the appropriate transmission and reception functions. If necessary, the operator can modify a configuration before establishing a connection (for example, to direct data to a different reception device). The configuration process is accomplished using step-by-step screen prompts, and the configuration is summarized for examination before any communications functions are activated.

The following configuration functions are contained in the Start and Parameter Selection modules.

- Create a communications configuration. A configuration is a set of parameters (options) chosen to match communications requirements, including the device types and addresses for transmission and reception, the modem type (synchronous or modem eliminator), the connecting line (dial-up or leased), and various protocol-dependent option categories.
- Save or run any newly specified configuration.
- Load any previously saved configuration.
- Delete or modify any previously saved configuration.

1.2 SYSTEM AND PERIPHERAL REQUIREMENTS

The BSC 1 software operates on Wang systems equipped with a 2200VP, SVP, LVP, or MVP central processor, a Wang Synchronous/Asynchronous Communications Controller, and a suitable modem. Consult Table 1-1 to determine the appropriate communications controller for the 2200 Series processor in use.

Table 1-1. Communications Controllers
for 2200 Series Processors

Processor	Communications Controller
2200MVP, LVP, VP	Model 2228B or 2228C
2200SVP	Option 28B or 28C

Usually, a synchronous modem (not supplied with the controller) is used as an interface between the communications controller and either a leased or dial-up telephone line. For some applications, the Wang 2228N Null Modem and direct cables to a site within the same building may be appropriate. Modem considerations are detailed in Appendix B.

If the 2200-to-2200 protocol is to be used to communicate with another 2200 Series processor, each processor must be equipped with Release 5 (or later) of the BSC 1 software, a Wang Synchronous/Asynchronous Communications Controller, and a suitable modem.

If the 2200 WPS mode is to be used, the 2200 system must have 2200 Word Processing software, BSC 1 software, a Wang Synchronous/Asynchronous Communications Controller, and a synchronous modem. The remote Wang system must have both word processing and synchronous communications capabilities.

The BSC 1 software supports data transmission from a card reader, disk, or diskette. The software routes received data to a printer, disk, diskette, or minidiskette. These capabilities, however, vary according to the emulation chosen. A printer should be available for on-line printing, or for off-line printing of files received to disk. To transmit data from disk or receive data to disk storage, at least one disk drive must be available. To transmit data solely from a card reader or the keyboard, without disk storage of received data, only one disk drive unit is necessary.

NOTE

The BSC 1 software diskette can be removed from the diskette drive after a BSC 1 configuration is loaded, because all the program modules necessary for operation are loaded into system memory. If only one diskette drive is available, removing the BSC 1 diskette would free a diskette drive for disk transmit and receive functions.

Tables 1-2 and 1-3 detail the memory requirements for the BSC 1 software emulations. The tables present the transmission and reception device combinations that can be selected during the configuration process. The 2780, 3780, and 3741 emulations offer two disk access methods: Search and On Error. Generally, a configuration using the On Error disk access method can operate in a partition or processor memory smaller than that required for a configuration using the Search disk access method. Section 2.4 has information on the differences between Search disk operations and On Error disk operations.

Table 1-2. HASP Emulation Memory Requirements

Transmission Device	Reception Device	2200VP or SVP Processor Memory	2200MVP or LVP Partition Memory
Card Reader	Printer	16K	15K
Card Reader	Printer and Disk	24K	21K
Disk	Printer	20K	16K
Disk	Printer and Disk	24K	21K

Table 1-3. 2780, 3780, and 3741 Emulation Memory Requirements

Transmission Device	Reception Device	Disk Access Method	2200VP or SVP Processor Memory	2200MVP or LVP Partition Memory
Card Reader	Printer	None	16K	11K
	Disk	On Error	16K	11K
	Disk	Search	16K	14K
	Printer and Disk	On Error	16K	11K
	Printer and Disk	Search	16K	16K
Disk	Printer	On Error	16K	11K
	Printer	Search	16K	13K
	Disk	On Error	16K	11K
	Disk	Search	16K	15K
	Printer and Disk	On Error	16K	11K
	Printer and Disk	Search	20K	17K

The 2200-to-2200 protocol provides transmission from disk and reception to disk, using the Search disk access method. Operation of a 2200-to-2200 protocol configuration requires a processor memory of at least 16K (for 2200VP and SVP) or a partition memory of at least 16K (for 2200MVP and LVP).

The 2200 WPS mode provides transmission from disk and reception to disk, using the Search disk access method. Operation of a 2200 WPS mode configuration requires a processor memory of at least 16K (for 2200VP and SVP) or a partition memory of at least 14K (for 2200MVP and LVP).

1.3 TC FILE FORMATTING REQUIREMENTS

The BSC 1 software provides the capability to transmit files from disk and receive files to disk. However, the BSC 1 software is designed to perform disk operations using files that conform to the Wang TC file format. BASIC-2 program files must be converted to TC file format to be transmitted. Data files for use with the 2780, 3780, 3741, and HASP emulators must be created using the TC file format, or converted to TC file format.

The only exceptions to the requirement for TC-formatted files occur when the 2200-to-2200 protocol and the 2200 WPS mode are used. The 2200-to-2200 protocol is essentially a 2780 protocol that utilizes Transparent mode operations, with modifications to support Wang file formats; program and data files

can be sent from one 2200 system to another without reformatting if the 2200-to-2200 protocol is used. The 2200 WPS mode utilizes the TC/WP file format, and the 2200 Word Processing software provides conversion utilities to implement this file format (refer to Section 3.5).

The conversion of 2200 program files to TC file format and the creation of TC-formatted data files can be accomplished using the Wang TC Support Utilities 1 software. Three of the TC Support Utilities are concerned with the creation and conversion of TC files. These utilities provide a convenient means to create TC-formatted data files or convert program files to TC file format. The three utilities function as follows.

- The DATA ENTRY 1 utility can be used to create a new disk data file in TC file format. DATA ENTRY 1 also provides the capability to edit, delete, rearrange, or list records in an existing TC-formatted file.
- The DE-ATOMIZE utility can be used to convert a BASIC-2 program to a TC-formatted disk data file. The utility copies the program file, and de-atomizes the BASIC-2 commands (converting space-conserving 1-byte text atoms to character-by-character text). This process is necessary because BASIC-2 commands in text atom form would not be transmitted correctly. The DE-ATOMIZE utility then saves the de-atomized program in a TC-formatted file (the original program file remains intact).
- The ATOMIZE utility can be used to convert a BASIC-2 program stored in a TC-formatted file to standard program file format. The utility copies the TC-formatted file, and atomizes the BASIC-2 commands (converting character-by-character data to 1-byte text atoms). This process is necessary because BASIC-2 commands in TC format would not be executed correctly. The ATOMIZE utility then saves the atomized program text in a program file (the original TC-formatted file remains intact).

Programs to convert user data files to TC-formatted files (and to convert TC-formatted files to user data files) must be written by the user. The TC Support Utilities package contains three subroutines that can be used, for example, as part of a user-programmed file conversion utility to convert existing data files to TC-formatted files. The three subroutines function as follows.

- The OPEN subroutine accepts a file name, performs a file-opening procedure, and returns an indication of the success or failure of the file-opening procedure. OPEN can open an existing TC-formatted file for input (read data from), or create and open a new TC-formatted file for output (write data to).
- The READ subroutine copies a record from a TC-formatted file into a subroutine variable and sets another variable equal to the record's length in bytes (necessary for TC file format operations). READ can be used by a user-written routine to extract records from a TC-formatted file.

- The WRITE subroutine writes a record to a TC-formatted file. The record must be formatted in TC file format by the user. A user-written routine can be programmed to recover data from user data files, convert that data to TC file format, and use the WRITE subroutine to write that data to a TC-formatted file. If a last-record condition is detected from the user-written subroutine call, the WRITE subroutine writes an End of File (EOF) indicator and closes the TC file.

For information about these utilities and subroutines, consult the 2200 TC Support Utilities 1 User Manual (700-4086) and addendum. Specifications for the Wang TC file format can be found in Appendix A of the BSC 1 manual and the TC Support Utilities manual.

1.4 SOFTWARE BACKUP

Prepare a backup copy of the software diskette before operating the software for the first time. Label any copies as duplicates, and use the duplicates for all operations. Reserve the master software diskette received from Wang Laboratories for use as backup software, to ensure that an undamaged copy of the software is always available.

To copy the BSC 1 software onto an empty formatted diskette, use the MOVE statement described in the Wang BASIC-2 Disk Reference Manual (700-4081). The MOVE statement can be used to copy files from one platter to a platter mounted in the same disk unit, or to another disk unit on the same 2200 Series system.

The Wang Integrated Support System (ISS) contains a COPY/VERIFY utility that can be used in BASIC-2 systems to copy files from one disk platter to another in the same disk unit or in a separate unit. ISS is an optional package that may be ordered for any 2200 Series system.

To copy the BSC 1 software from diskette to a disk drive, use the BASIC-2 MOVE statement or the ISS COPY/VERIFY utility. However, the BSC 1 software contains a "START" program that is used to load the software. Because two programs with identical names cannot be saved on the same disk, the BSC 1 "START" program cannot be saved on a disk containing another "START" program. Therefore, save the BSC 1 software on a disk without a "START" program, if possible. If the BSC 1 software must be saved on a disk containing a "START" program, one of the "START" programs will have to be renamed. If the BSC 1 "START" program is renamed, the program name must be entered during Step 4 of the software loading procedure (refer to Section 1.5). For example, if the program was renamed "STARTBSC", Step 4 of the loading procedure would be changed to the following: Press LOAD, then press RUN, then enter "STARTBSC".

1.5 LOADING THE BSC 1 SOFTWARE

To load the BSC 1 software, mount the BSC 1 diskette in an available diskette drive on the 2200 system and perform the following steps.

1. Press RESET.
2. Enter SELECT DISK xyz (substitute the device address for xyz).
3. Press RETURN.
4. Press LOAD, then press RUN.
5. Press RETURN.

The BSC 1 software main menu then appears.

1.6 THE BSC 1 MAIN MENU

When the BSC 1 Start module is loaded and execution begins, the CRT is cleared and the BSC 1 main menu appears. This menu initially displays only the option CREATE A NEW CONFIGURATION, as shown in Figure 1-1. The standard format of the BSC 1 main menu is presented in Figure 1-2.

```
WANG 2200 TELECOMMUNICATIONS EMULATORS BSC Rel. 6.00.01
TO OPERATE -- Press S.F. KEY or DIGIT corresponding to name, or
position # via RETURN or BACKSPACE and key RUN, DELETE or RECALL

# '1 CREATE A NEW CONFIGURATION
```

Figure 1-1. Initial Format of the BSC 1 Main Menu

After the BSC 1 software has been used to create and save one or more configurations, the BSC 1 main menu displays the available configurations, as shown in Figure 1-2.

```
WANG 2200 TELECOMMUNICATIONS EMULATORS BSC Rel. 6.00.01
TO OPERATE -- Press S.F. KEY or DIGIT corresponding to name, or
position # via RETURN or BACKSPACE and key RUN, DELETE or RECALL

# '1 CREATE A NEW CONFIGURATION
# '2 Load (first user-defined configuration)
# '3 Load (second user-defined configuration)
.
.
.
# 'n Load (last user-defined configuration)
```

Figure 1-2. General Format of the BSC 1 Main Menu

The first line of the BSC 1 main menu identifies the software and shows the release number. The release number indicates the current version of the BSC 1 software. The release number (given in the format x.y.z) denotes major and minor changes in the software. The "x" identifies the release number; the "y" and the "z" identify particular revisions. Revisions often represent changes transparent to a user, and require no changes in the documentation.

Each available configuration is identified by a number representing a Special Function (SF) key, the word "Load," and a description. The configuration description is supplied by the user when the configuration is originally created and saved. A sample of a BSC 1 main menu with several user-defined configuration descriptions is presented in Figure 1-3.

```
WANG 2200 TELECOMMUNICATIONS EMULATORS BSC Rel. 6.00.01
TO OPERATE -- Press S.F. KEY or DIGIT corresponding to name, or
position # via RETURN or BACKSPACE and key RUN, DELETE or RECALL

# '1 CREATE A NEW CONFIGURATION
# '2 Load 2780 leased-line, to disk in ASCII
# '3 Load HASP #2 (data-transfer to main office)
# '4 Load 3741 for card send to Akron office
# '5 Load Fran's test emulator
```

Figure 1-3. Sample BSC 1 Main Menu

A configuration description might describe the emulation connection, as the description adjacent to '2 does in Figure 1-3. A combination of a descriptive name, the connection protocol, and the primary remote site name or location (as in Descriptions '3 and '4 in Figure 1-3) is a useful convention for naming configurations. The configuration name itself need not be unique, because each configuration name is associated with a unique SF key in the BSC 1 main menu. The process of naming and saving configurations is detailed in Section 2.5.

NOTE

```
SF'0 is active from the BSC 1 main menu, the Emulator
Selection menu, and during the configuration process.
Pressing SF'0 aborts the current operation and invokes the
BSC 1 main menu.
```

CHAPTER 2
CREATING A COMMUNICATIONS CONFIGURATION

2.1 CREATING A NEW CONFIGURATION

To generate a new configuration that implements a particular BSC protocol and matches the characteristics used by a terminal or host computer, begin by mounting the BSC 1 software diskette. Next, load the software using the steps outlined in Section 1.5. After the BSC 1 main menu appears, press SF'1 to activate CREATE A NEW CONFIGURATION. The screen clears and the Emulator Selection menu appears.

2.2 SELECTING AN EMULATION

The Emulator Selection menu for the BSC 1 software lists all the available protocols, as shown in Figure 2-1.

```
WHAT EMULATION?
TO OPERATE -- Press S.F. KEY or DIGIT corresponding to name,
or position # via RETURN, SPACE or BACKSPACE and key RUN

# '1 for Multileaving Hasp
  '2 for IBM 2780
  '3 for IBM 3780
  '4 for IBM 3741
  '5 for Wang 2200 to 2200
  '6 for 2200-WPS Mode
```

Figure 2-1. The Emulator Selection Menu

Each protocol contained in the BSC 1 software is assigned an SF key number. To select the desired protocol, press the SF key that is listed in the Emulator Selection menu to the left of the protocol. There are two alternative methods for choosing an emulation: the digit key method and the flag ("#") method.

To use the digit key method, press the digit key whose number is the same as the SF key number assigned to the desired emulation.

To use the flag ("#") method, perform the following steps.

1. Use RETURN, BACKSPACE, or the Space Bar to position the "#" next to the desired emulation.
2. Press RUN.

After an emulator is selected, the screen clears and a Parameter Selection menu appears.

2.3 SPECIFYING VALID PARAMETERS FOR A NEW CONFIGURATION

A Wang 2200VP, SVP, LVP, or MVP system equipped with the BSC 1 software and a Wang Synchronous/Asynchronous Communications Controller can communicate with either another Wang system or a non-Wang system with appropriate synchronous communications capabilities. The systems can be remotely connected using leased or switched telephone lines and a pair of synchronous modems. Local connection using EIA (Electronic Industries Association) RS-232-C/CCITT (Consultative Committee for International Telegraph and Telephone) V.24-compatible cables and the Wang 2228N Null Modem is also possible (refer to Appendix B).

Because the means of implementing data communications between systems differ, the BSC 1 software can accommodate a reasonable variety of the equipment and communications line combinations that are possible. Parameter values can be specified to suit the modem, line speed, and the line type (dial-up or leased), since some differences in the BSC emulator are necessary to support these options. The software can also accommodate the preferred record blocking method (single record or multi-record); the disk access method (if a disk or diskette drive is the device chosen for data transmission or reception); the terminal ID for 2780, 3780, and 3741 emulation; and the desired output code for data received in transparent mode from the remote site.

The BSC 1 software contains Parameter Selection menus specific to each of the available protocols. These menus present the valid parameter options for each protocol (in a multiple-choice format), along with a set of default selections. These menus guide the user through the customizing procedure associated with creating a configuration for communications with one or more remote sites.

The parameters to be selected vary in number and type, depending upon which protocol is chosen by the operator prior to the appearance of a Parameter Selection menu. For several protocols, the Parameter Selection menu appears in two parts. Figures 2-2 and 2-3 show Parts 1 and 2 of the Parameter Selection menu for the 2780 protocol. Even though a reader may wish to create a communications configuration for a protocol other than 2780, the menus in Figures 2-2 and 2-3 should be studied carefully. The parameter selection procedure is fundamentally the same for all BSC 1 protocols; only the specific parameters vary.

The screen display shown in Figure 2-2 appears after an emulator is selected from the Emulator Selection menu.

2 7 8 0 P a r a m e t e r s	
<u>PARAMETER</u>	<u>CURRENT SELECTION</u>
# MODEM TYPE	Synchronous 2000-4800
MODEM OPERATES	Dial-up line
RECORD BLOCKING	Multi-record
RECEIVE TRANSPARENCY?	To disk in ASCII
MULTIPOINT?	No
LINE CODE	EBCDIC
OPTIONS FOR -- MODEM TYPE	ACTIVE KEYS --
1 Synchronous 2000-4800	--DIGITS--
2 2400 BPS (null modem)	--RETURN--
3 4800 BPS (null modem)	--BACKSPACE--
4 Synchronous (Drop DTR)	--RECALL--
	--RUN--

Figure 2-2. Parameter Selection Menu, Part 1 (2780 Protocol)

The top line in Figure 2-2 indicates the protocol for the parameters being selected. The Parameter Selection menus for 2780, 3780, and 3741 emulations have two parts; the second part is used to specify the devices for transmission and reception, as illustrated in Figure 2-3. The format of the menu and the selection process do not differ from Part 1 to Part 2; only the names of the parameters and the valid options are different.

I n p u t / O u t p u t S e l e c t i o n	
<u>PARAMETER</u>	<u>CURRENT SELECTION</u>
# SEND FROM	Disk
RECEIVE TO	All streams to printer
DISK ACCESS METHOD	via Search
T.C. BOARD ADDRESS	1C
OPTIONS FOR -- SEND FROM	ACTIVE KEYS--
1 Disk	--DIGITS--
2 Card Reader	--RETURN--
	--BACKSPACE--
	--RECALL--
	--RUN--

Figure 2-3. Parameter Selection Menu, Part 2 (2780 Protocol)

There are four information categories in the Parameter Selection menu. PARAMETER contains a set of parameter options that need to be specified for the protocol. OPTIONS FOR lists a parameter and the choices available for that parameter. CURRENT SELECTION contains the option currently chosen for each parameter. Initially, a default selection is displayed under CURRENT SELECTION. ACTIVE KEYS lists the keys that can be used for parameter selection.

Under PARAMETER, a "#" appears to the left of the parameter list. The "#" serves as a flag; it allows a value to be selected for a parameter. When the "#" is moved to another position within the parameter list (by use of RETURN, BACKSPACE, or the Space Bar), the parameter name flagged by the "#" and the available options for this parameter appear under OPTIONS FOR.

Each item under OPTIONS FOR is represented by a number and a brief description. To change the current selection for the flagged parameter, press the digit key corresponding to the desired option. The new selection then replaces the previous selection under CURRENT SELECTION. In Figure 2-2, the flagged parameter is MODEM TYPE; therefore, the OPTIONS FOR selections correspond to this parameter. If 2 is pressed, the current selection for MODEM TYPE changes to "2400 BPS (null modem)". If the "#" is moved to a different parameter, that parameter name appears adjacent to OPTIONS FOR, and a different set of options appears under OPTIONS FOR. After an option is chosen, the "#" automatically cycles to the next PARAMETER category.

For example, if a 2780 emulation configuration is needed for communications via a null modem at a line speed of 4800 bps, Option 3 should be chosen for MODEM TYPE. After Option 3 is chosen, the Parameter Selection menu would appear as in Figure 2-4. Note that the options under OPTIONS FOR have changed to reflect the flagged parameter MODEM OPERATES.

2 7 8 0 P a r a m e t e r s	
<u>PARAMETER</u>	<u>CURRENT SELECTION</u>
MODEM TYPE	4800 BPS (null modem)
# MODEM OPERATES	Dial-up line
RECORD BLOCKING	Multi-record
RECEIVE TRANSPARENCY?	To disk in ASCII
MULTIPOINT?	No
LINE CODE	EBCDIC
OPTIONS FOR -- MODEM OPERATES	ACTIVE KEYS --
1 Dial-up line	--DIGITS--
2 Leased line	--RETURN--
	--BACKSPACE--
	--RECALL--

Figure 2-4. Parameter Selection Example (2780 Protocol)

ACTIVE KEYS lists the keys that are active during parameter selection. The RUN key is active only while the first parameter is flagged. When a different parameter is flagged, the RUN key is deleted from the ACTIVE KEYS list. (Note that while RUN is displayed as an active key in Figures 2-2 and 2-3, RUN is no longer displayed as an active key in Figure 2-4, because the "#" is no longer adjacent to the first parameter.)

Until RUN is pressed when active, the software retains the user's responses. The responses can be changed during parameter selection any number of times before RUN is pressed. After RUN is pressed, the software stores the responses as part of the modified or newly created configuration and proceeds to the next step in the configuration process. The active keys are used as follows.

- DIGITS -- Press a DIGIT key to change the selected option for the flagged parameter. The description corresponding to the keyed digit then appears in the CURRENT SELECTIONS category.
- RETURN -- Press RETURN to move the "#" down in the PARAMETER category. (With successive keystrokes, the flag reaches the last parameter and cycles to the top before moving downward again.)
- BACKSPACE -- Press BACKSPACE to move the "#" upward in the list.
- RECALL -- Press RECALL (SF'15) to reset each parameter selection to its initial setting (the setting before modification was attempted, not the emulator default setting). This procedure may be especially useful during the recall/modify procedure described in Section 2.7.
- RUN -- Press RUN to indicate acceptance of the currently displayed selections and activate either the next part of the Parameter Selection menu (if there is another part) or the Save/Run menu (refer to Section 2.5).

Tables 2-1 through 2-6 present the complete set of parameters for the BSC 1 software emulations. Note that not all of the parameters listed for an emulator necessarily appear on the screen during the parameter selection process. Some of the parameter options appear only as a result of a user response to another parameter. For example, when the user is creating a configuration for 2780 emulation, the parameter for Disk Access Method does not appear unless a parameter option enabling disk send or receive operations is chosen.

Table 2-1. HASP Multileaving Parameters and Options

Parameter	Options	Remarks
Input Device	1 Disk 2 Card Reader	Choose the source device from which data will be transmitted.
Transparent Send?	1 Translate to EBCDIC before send 2 Send w/o translation	Choose Option 1 to translate data to EBCDIC code prior to transmission. Choose Option 2 to send data without translation.
Print Streams To*	1 Printer 2 Disk (spooled)	Option 1 routes received data streams to the printer; Option 2 routes print streams to disk in TC file format (refer to Appendix A). Spooled print files contain a vertical format control byte preceding the text data; these files may be printed off-line using the Wang TC Support utilities.
Punch Streams To**	1 None 2 Disk in ASCII 3 Disk w/o Translation	With Option 1, punch data streams are inactive. Option 2 translates punch streams to ASCII prior to storage on disk in TC-formatted files. Option 3 selects disk storage without translation from EBCDIC to ASCII.
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.
<p>* If emulator partition size must be 16K or less, select Option 1 for the Print Streams To parameter and Option 1 for the Punch Streams To parameter. (Do not select parameters activating disk send or receive operations.)</p> <p>** Parameter appears only if the selection for Print Streams To is Option 1 (Printer).</p>		

Table 2-2. 2780 Parameters and Options

Parameter*	Options	Remarks
Modem Type	1 Synchronous 2000-4800 2 2400 BPS (null modem) 3 4800 BPS (null modem) 4 Synchronous (Drop DTR)	For communications via a synchronous modem, select Option 1 or 4. With Option 4, the emulator drops Data Terminal Ready after 3 minutes of line inactivity. Select Option 2 or 3 for connection via a null modem (the Wang communications controller provides the clocking signal).
Modem Operates	1 Dial-up line 2 Leased line	Select Option 1 for use with a dial-up line; otherwise, select Option 2.
Record Blocking	1 Multi-record 2 Single record	The 2200 record blocking option must match the record blocking option at the remote site; otherwise, the sent or received blocks may be rejected.
Receive Transparency	1 To disk in ASCII 2 To disk without translation	Select Option 1 to route transparent data to disk in ASCII; select Option 2 for disk storage in EBCDIC code. Transparent data routed to a printer is printed in hexadecimal code.
Multipoint	1 No 2 Yes	Select Option 1 for point-to-point emulator operations, or Option 2 for multipoint emulator operations.
Terminal ID	(Supply ID)	Supply a 1-letter Terminal ID (A-Z or a-z). This parameter appears if Option 2 is chosen for the Multipoint parameter.
Line Code**	1 EBCDIC 2 ASCII	Select Option 1 to translate data to EBCDIC before transmission, or Option 2 to transmit data in ASCII (without translation).
<p>* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.</p> <p>** This parameter appears only if Option 1 is chosen for the Multipoint parameter.</p>		

Table 2-2. 2780 Parameters and Options (continued)

Parameter*	Options	Remarks
Send From	1 Disk 2 Card Reader	Choose the source device from which data will be transmitted.
Receive To	1 All streams to printer 2 Printer and disk 3 All streams to disk	2780 data streams are either print or punch streams. Option 1 routes all received streams to the printer. Option 2 routes received print streams to the printer and stores received punch streams on disk in TC file format (refer to Appendix A). Option 3 routes all received streams to disk for storage in TC-formatted files. TC format files saved on disk can be printed off-line using the Wang TC Support utilities.
Disk Access Method**	1 via Search 2 via On Error	Choose Option 1 unless the emulator must run in a partition smaller than 16K. Refer to Section 2.4 for more information.
Save Print Files	1 with line control 2 without line control	Option 1 includes line control codes in print files routed to disk. Option 2 routes print files to disk without including line control codes (this parameter appears only if Option 3 is chosen for the Receive To parameter).
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.
<p>* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.</p> <p>** This parameter appears only if the Send From selection is Option 1 (Disk), or the Receive To selection is Option 2 (Printer and disk) or Option 3 (All streams to disk).</p>		

Table 2-3. 3780 Parameters and Options

Parameter*	Options	Remarks
Modem Type	1 Synchronous 2000-4800 2 2400 BPS (null modem) 3 4800 BPS (null modem) 4 Synchronous (Drop DTR)	For communications via a synchronous modem, select Option 1 or 4. With Option 4, the emulator drops Data Terminal Ready after 3 minutes of line inactivity. Select Option 2 or 3 for connection via a null modem (the Wang communications controller provides the clocking signal).
Modem Operates	1 Dial-up line 2 Leased line	Select Option 1 for use with a dial-up line; otherwise, select Option 2.
Record Blocking	1 Multi-record 2 Single record	The 2200 record blocking option must match the record blocking option at the remote site; otherwise, sent or received blocks may be rejected.
Receive Transparency	1 To disk in ASCII 2 To disk without translation	Select Option 1 to route transparent data to disk in ASCII; select Option 2 for disk storage in EBCDIC code. Transparent data routed to a printer is printed in hexadecimal code.
Received Data	1 Space Compressed 2 Horizontal Tabs	Select Option 1 if the host system supports 3780 space compression. Select Option 2 to use horizontal tabbing for space compression.
Transmitted Data**	1 Compressed 2 As Is	Select Option 1 for space compression of transmitted data. Option 2 permits transmission of repetitious blanks.
Multipoint	1 No 2 Yes	Select Option 1 for point-to-point emulator operations, or Option 2 for multipoint emulator operations.
Terminal ID	(Supply ID)	Supply a 1-letter Terminal ID (A-Z). This parameter appears only if Option 2 is chosen for the Multipoint parameter.
<p>* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.</p> <p>** This parameter appears only if the Received Data selection is Option 1 (Space Compressed).</p>		

Table 2-3. 3780 Parameters and Options (continued)

Parameter*	Options	Remarks
Send From	1 Disk 2 Card Reader	Choose the source device from which data will be transmitted.
Receive To	1 All streams to printer 2 Printer and disk 3 All streams to disk	Unlike 2780 protocol data streams, 3780 data streams are only <u>print</u> streams. Data streams can be routed to the printer with Option 1 or to disk with Option 3. Option 2 routes the streams to printer and to disk. TC format files saved on disk can be printed off-line using the Wang TC Support utilities.
Disk Access Method**	1 via Search 2 via On Error	Option 1 is recommended unless the emulator must run in a partition smaller than 16K. Refer to Section 2.4 for more information.
Save Print Files	1 with line control 2 without line control	Option 1 includes line control codes in print files routed to disk. Option 2 routes print files to disk without including line control codes (this parameter appears only if Option 3 is chosen for the Receive To parameter).
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.
<p>* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.</p> <p>** This parameter appears only if the Send From selection is Option 1 (Disk), or the Receive To selection is Option 2 (Printer and disk) or Option 3 (All streams to disk).</p>		

Table 2-4. 3741 Parameters and Options

Parameter*	Options	Remarks
Modem Type	1 Synchronous 2000-4800 2 2400 BPS (null modem) 3 4800 BPS (null modem) 4 Synchronous (Drop DTR)	For communications via a synchronous modem, select Option 1 or 4. With Option 4, the emulator drops Data Terminal Ready after 3 minutes of line inactivity. Select Option 2 or 3 for connection via a null modem (the Wang communications controller provides the clocking signal).
Modem Operates	1 Dial-up line 2 Leased line	Select Option 1 for use with a dial-up line; otherwise, select Option 2.
Record Blocking	1 Multi-record 2 Single record	The 2200 record blocking option must match the record blocking option at the remote site; otherwise, sent or received blocks may be rejected.
Terminal ID	1 No 2 Yes	3741 protocol optionally supports an imbedded Terminal ID code (1 to 4 characters) at the start of a message. Select Option 2 to activate the Terminal ID feature; otherwise, select Option 1.
1 to 4 Character ID**	Supply the ID (1 to 4 alphanumeric characters)	Do <u>not</u> use this ID as an address on a multipoint line.
<p>* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.</p> <p>** This parameter appears only if the Terminal ID selection is Option 1 (Yes).</p>		

Table 2-4. 3741 Parameters and Options (continued)

Parameter*	Options	Remarks
Send From	1 Disk 2 Card Reader	Choose the source device from which data will be transmitted.
Receive To	1 All streams to printer 2 Printer and disk 3 All streams to disk	3741 data streams are either print or punch streams. Option 1 routes all received streams to the printer. Option 2 routes received print streams to the printer and stores received punch streams on disk in TC file format (refer to Appendix A). Option 3 routes all received streams to disk for storage in TC-formatted files. TC format files saved on disk can be printed off-line using the Wang TC Support utilities.
Disk Access Method**	1 via Search 2 via On Error	Choose Option 1 unless the emulator must run in a partition smaller than 16K. Refer to Section 2.4 for more information.
Save Print Files	1 with line control 2 without line control	Option 1 includes line control codes in print files routed to disk. Option 2 routes print files to disk without including line control codes (this parameter appears only if Option 3 is chosen for the Receive To parameter).
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.

* Parameters appear in a 2-part menu; Part 2 begins with the Send From parameter.

** This parameter appears only if the Send From selection is Option 1 (Disk), or the Receive To selection is Option 2 (Printer and disk) or Option 3 (All streams to disk).

Table 2-5. 2200-to-2200 Parameters and Options

Parameter	Options	Remarks
Modem Type	1 Synchronous 2000-4800 2 2400 BPS (null modem) 3 4800 BPS (null modem) 4 Synchronous (Drop DTR)	For communications via a synchronous modem, select Option 1 or 4. With Option 4, the emulator drops Data Terminal Ready after 3 minutes of line inactivity. Select Option 2 or 3 for connection via a null modem (the Wang communications controller provides the clocking signal).
Modem Operates	1 Dial-up line 2 Leased line	Select Option 1 for use with a dial-up line; otherwise, select Option 2.
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.
Remote 2200 Uses	1 28B or C (Release 6) 2 28B or C (Release 5) 3 28D	Select the controller type used by the remote 2200. Options 1 and 2 select 2228B, 2228C, Option 28B or Option 28C. Option 2 selects 2228D or Option 28D. Choose Option 2 if the remote 2200 uses BSC 1 Release 5 software.

Table 2-6. 2200 WPS Parameters and Options

Parameter	Options	Remarks
Modem Type	1 Synchronous 2000-4800 2 2400 BPS (null modem) 3 4800 BPS (null modem) 4 Synchronous (Drop DTR)	For communications via a synchronous modem, select Option 1 or 4. With Option 4, the emulator drops Data Terminal Ready after 3 minutes of line inactivity. Select Option 2 or 3 for connection via a null modem (the Wang communications controller provides the clocking signal).
Modem Operates	1 Dial-up line 2 Leased line	Select Option 1 for use with a dial-up line; otherwise, select Option 2.
TC Board Address	1 1C 2 1D 3 1E 4 1F	Select the device address of the 2200 TC controller being used.

2.4 DISK ACCESS METHODS

There are two disk access methods for the 2780, 3780, and 3741 emulations: Search and On Error. Either option can be chosen during the configuration process. The methods differ in the amount of memory required for operation and in the way that they access a disk for sending and receiving files.

The Search method enables the software to search the disk catalog to validate user-supplied file names. If an invalid or nonexistent file name is entered during a file send operation, a software prompt indicates that the file is not cataloged or that the given file name is invalid. The software then requests a new send file name. If an invalid or existing file name is entered during the process of creating and opening a receive file, a software prompt indicates that the file exists (as the disk will not accommodate duplicate file names) or that the file name given is invalid. The software then requests a new receive file name. Also, when receiving files using the Search method, the system temporarily allocates all the remaining platter space; unused space is freed when a file is closed.

If the On Error method is used, a configuration will run in a smaller partition than a configuration using the Search method (refer to Section 1.2 and Table 1-3); however, with the On Error method, disk handling capabilities are more limited. When the On Error method is used, the software does not validate send or receive file names. The software captures and flags erroneous file name entries via the ON ERROR statement during file send or receive operation. If a nonexistent file name is entered during a file send operation, or an invalid file name is entered during a receive operation, the operation terminates with a STOP statement, signaling that a disk access error occurred. If this happens, the emulator has to be reactivated and the interrupted operations may have to be performed again. Also, when receiving files, the system allocates equal space to each file (the number of sectors is operator-specified in response to a screen prompt; unused space is not freed). The software does not automatically open consecutive receive files if a received file overflows the allotted file space.

For more information about the Search and On Error disk access methods, refer to Sections 3.6 and 3.7.

2.5 SAVING A NEW CONFIGURATION

The BSC 1 software provides the capability to save up to 14 configurations in a file on the BSC 1 software diskette. To begin the process of saving a new configuration, press RUN to accept the currently displayed selections in a Parameter Selection menu. A second Parameter Selection menu appears if the emulation chosen uses two menus for configuration; otherwise, the Save/Run menu appears (refer to Figure 2-5).


```

SAVE IT OR RUN?      -- Key SF '0 to exit
TO OPERATE -- Press S.F. KEY or DIGIT corresponding to option,
or position # via RETURN, SPACE or BACKSPACE and key RUN.

# '1 FOR RUN CREATED VERSION
  '2 FOR SAVE CREATED VERSION

```

Figure 2-5. The Save/Run Menu

SF'0 can be used to abort the CREATE A CONFIGURATION activity from the Save/Run menu. If SF'0 is pressed, the newly created configuration is not saved, and the BSC 1 main menu is displayed.

To run a newly created configuration immediately, but only once, from the Save/Run menu, press SF'1 or Digit Key 1. The configuration is run, but it is not stored on the BSC 1 software disk and cannot be retrieved for later use. To save a newly created configuration for subsequent use, press either SF'2 or Digit Key 2 from the Save/Run menu. The configuration can be deleted or modified later if, during testing or operation, the configuration does not appear to be suitable for its intended application.

After SF'2 or Digit Key 2 is pressed, the Configuration Description display appears as shown in Figure 2-6.

```

                SAVE THE PARAMETERS YOU HAVE GENERATED

EXISTING CALLS--
' 2 FOR (first user-defined configuration)
' 3 FOR (second user-defined configuration)
.
.
' n FOR (last user-defined configuration)

THESE PARAMETERS--
Emulator type    --- (system-supplied emulator name)
Input capability --- (system-supplied transmission module description)
Output capability --- (system-supplied reception module description)

KEY 1-40 BYTE....!....1....!....2....!....3....!....4
DESCRIPTION? _____

```

Figure 2-6. The Configuration Description Display

There are two information categories in the Configuration Description display. EXISTING CALLS shows the user-supplied descriptions for any previously configured emulator stored on the platter. THESE PARAMETERS shows the following parameters for the newly configured emulator: emulator type, transmission capability, and reception capability. The last two lines of the display allow a configuration description to be entered for the new configuration.

In Figure 2-6, note that the configuration description may be 1 to 40 characters in length. As a description is entered, each character is displayed beneath the 40-byte scale. This scale has 10-byte divisions marked by the digits 1 through 4; the 5-byte subdivisions are marked by exclamation points. Figure 2-7 presents a sample Configuration Description display.

```

SAVE THE PARAMETERS YOU HAVE GENERATED

EXISTING CALLS--
' 2 FOR 2780 leased-line, to disk in ASCII
' 3 FOR HASP #2 (data-transfer to main office)
' 4 FOR 3741 for card send to Akron office
' 5 FOR Kelly's test emulator

THESE PARAMETERS--
Emulator type      --- 2200-to-2200
Input capability   --- disk-send
Output capability  --- disk-receive

KEY 1-40 BYTE.....!.....1.....!.....2.....!.....3.....!.....4
DESCRIPTION? 2200-to-2200 disk send/receive

```

Figure 2-7. Sample Configuration Description Display

Although unique descriptions are advisable if several communications configurations are saved, duplicate descriptions are acceptable because a unique SF key is automatically assigned to each configuration. After entering a description for the new configuration, press RETURN. The new configuration is then saved on the BSC 1 software platter, and the BSC 1 main menu reappears. The user-supplied description and the SF key number for the saved configuration are added automatically to the BSC 1 main menu.

The new configuration can now be loaded into memory using the instructions displayed with the BSC 1 main menu. These instructions are discussed further in the next section.

2.6 LOADING A CONFIGURATION

A saved communications configuration is loaded from the BSC 1 main menu. If the configuration has just been saved by entry of a configuration description, the BSC 1 main menu appears automatically after the operator presses RETURN to save the configuration. The configuration can then be loaded. If a configuration has been saved previously, it can be loaded from the BSC 1 main menu after the BSC 1 software is loaded.

If the "#" is in its default position (i.e., next to CREATE A NEW CONFIGURATION) when the BSC 1 main menu appears, there are two ways to load a communications configuration with a single keystroke.

- Press the SF key whose number corresponds to the number of the desired user-described configuration.
- Press the digit key that matches the SF key number of the configuration. (Note that this method can only be used to load configurations numbered 2-9, because only single-digit entries are accepted. This means, for example, that trying to press 1 and 3 to load configuration '13 would instead select CREATE A NEW CONFIGURATION.)

A third way to load a configuration requires more than one keystroke. Press RETURN or the Space Bar to move the "#" down (or BACKSPACE to move the "#" up) in the BSC 1 main menu until the "#" is next to the desired configuration; then press RUN.

2.7 DELETING OR MODIFYING A CONFIGURATION

The BSC 1 software provides a means for deleting or modifying previously saved configurations. To delete a configuration that is no longer needed, perform the following steps from the BSC 1 main menu.

1. Position the "#" next to the configuration description to be deleted (using the RETURN, BACKSPACE, or Space Bar keys).
2. Press DELETE (SF'9).

CAUTION

SF'9 can be used to load Configuration '9 only if the "#" is next to '1 CREATE A NEW CONFIGURATION. If the "#" has been moved from the position next to '1 to a position next to another configuration description, an attempt to use SF'9 to load Configuration '9 instead activates the DELETE function. The configuration adjacent to the "#" is then deleted.

The configuration is deleted from the BSC 1 software platter, and the configuration description is removed from the BSC 1 main menu.

NOTE

To delete all configurations from the BSC 1 main menu, press the RESET key, then press SF'31, RUN, and RETURN. The BSC 1 main menu then appears on the screen without any user-specified configurations, as in Figure 1-1.

The modification process retrieves a previously saved configuration for modification. The modified configuration can then be run or saved. The previously saved configuration remains intact; it can be deleted when the modified configuration is tested and verified, or it can be retained on the BSC 1 platter if needed.

To modify a configuration (i.e., to change any of the currently selected parameters or the configuration description for a particular emulation program), perform the following steps from the BSC 1 main menu.

1. Press RECALL (SF'15).
2. Choose one of the following.
 - a. Position the "#" next to the description of the configuration to be modified, and press RUN.
 - b. Press the digit or SF key whose number matches the SF key number for the description of the configuration to be modified.
4. When the Parameter Selection menu for the described configuration appears, change one or more current selections, if desired.
5. When the current selections are satisfactory, move the "#" adjacent to the first parameter (so that RUN is an active key) and press RUN.
6. If another part of the Parameter Selection menu appears, repeat Steps 4 and 5.
7. When the Save/Run menu appears, save or run the modified configuration using the procedure described in Section 2.5. (Remember that if the configuration is run from this menu, it is not saved, and must be generated again to be run again.)

If the modified configuration is saved, a unique SF key is assigned to the modified configuration, and this configuration is added to the BSC 1 main menu. The original configuration is still available for use, or it may be deleted.

NOTE

Because SF'15 is active from the BSC 1 main menu to enable the RECALL feature, this SF key cannot be used to activate a configuration. If enough configurations are saved so that a configuration is assigned SF'15, there is only one way to activate that configuration: use RETURN, BACKSPACE, or the Space Bar to move the "#" adjacent to the configuration description, and then press RUN.

CHAPTER 3
OPERATING A 2780, 3780, 3741, 2200-TO-2200, OR 2200 WPS EMULATION PROGRAM

3.1 INITIAL OPERATOR ACTION

To operate the BSC 1 software, follow the instructions for loading the BSC 1 software (refer to Section 1.5). If no configurations have been previously saved, refer to Chapter 2 for instructions on how to create and save a communications configuration. A saved communications configuration is loaded from the BSC 1 main menu, which appears each time the BSC 1 software is loaded.

During the configuration loading sequence, the screen momentarily clears, and the display shown in Figure 3-1 appears. This display summarizes the parameters for the configuration and shows the configuration name. When the loading sequence is completed, the screen displays the appropriate operator's screen.

<u>PARAMETER</u>	<u>CURRENT SELECTION</u>
MODEM TYPE	(as specified)
MODEM OPERATES	(as specified)
RECORD BLOCKING	(as specified)
RECEIVE TRANSPARENCY	(as specified)
MULTIPOINT	(as specified)

* LOADING SYSTEM	WANG 2200 TELECOMMUNICATIONS *
*	(configuration name) *
* INPUT =	(software transmission module name and description) *
* OUTPUT=	(software reception module name and description) *

Microcode revision =	(emulation) (microcode release number) (release date)
(System type)	

Figure 3-1. BSC 1 Emulator Loading Sequence Display

After the operator's screen appears, but before a connection with a remote site is established, ensure that all necessary peripheral devices are readied. Because data reception is activated by a data transmission from the remote end of a communications link, the designated reception device for a BSC 1 emulator should be ready before the remote end begins to transmit data. For this reason, the BSC 1 emulator automatically checks the ready status of designated reception devices. If a device is not ready, a message is displayed on the screen when the system first enters the Control mode.

Be sure that the reception device is ready before establishing a connection with a host system or a terminal, unless no data is to be received. To ready a reception device, press SF'1 to activate the Attention mode, then respond to the device-related prompts (refer to Section 3.6). After the Attention mode prompt/response sequence is completed, the system automatically returns to the Control mode.

Depending upon the communications application, a connection can now be established with a remote site. Appendix C presents additional information on establishing a connection.

Once a connection is established, the operation of a BSC 1 emulator can differ depending upon the peripherals selected and the communications functions performed. For example, the sequence of operations for a session requiring only transmission functions differs from that for a session involving both transmission and reception functions. For this reason, this chapter gives step-by-step procedures for each of the individual communications functions, instead of a general sequence of operations. Appendix E presents a general summary of the operations sequence for BSC 1 communications.

3.2 OPERATIONAL MODES

Any person attempting to operate a 2780, 3780, 3741, 2200-to-2200, or 2200 WPS emulation should first understand the operational modes available with the BSC 1 software. Each of these emulations provides 2-way communication utilizing the following five modes of operation: Control, Bid, Send, Receive, and Attention. Refer to Table 3-1 for descriptions of these operational modes. During program execution, a particular mode may be entered many times or not at all, depending upon the local transmission and reception requirements and the number of data transfers originating from the remote end of the communications link.

Only one operational mode is in effect at any time. For example, after a communications configuration is loaded into memory, the system automatically enters the Control mode and displays the word CONTROL on the operator's screen under the mode label. The mode label appears at the far right of the operator's screen.

Table 3-1. Operational Modes

Mode	Description
Control	Automatically occurs when emulator execution begins. The system monitors the communications line and the keyboard. When the operator or the remote end initiates action, the system can enter another mode. The system remains in Control mode indefinitely if no actions are initiated.
Bid	Occurs from Control mode when SF'2 (SEND) or SF'3 (SEND TRSP) is pressed to initiate data transmission (refer to Section 3.7). Bid mode also occurs from Control mode when RETURN is pressed during keyboard message entry to transmit an entered message. The system then enters Bid mode and requests host permission to transmit. Bid mode continues until the host grants permission (the system then enters Send mode) or the BID request is aborted. Refer to Table 3-2 for information on BID abort.
Send	Occurs from a successful Bid mode. The system transmits in EBCDIC code (for C/R or SF'2) or uses BSC control characters to activate transparent transmission (SF'3) until one of the following occurs. <ul style="list-style-type: none"> ● All data is sent. ● The local operator or remote end aborts transmission. ● Transmission difficulties arise (such as a line disconnect). The system then returns to Control mode.
Receive	Occurs only if the remote end initiates transmission. The BSC 1 software routes received data to the designated device(s) until one of the following occurs. <ul style="list-style-type: none"> ● An end-of-transmission code is received. ● The local operator or remote end aborts transmission. ● Transmission difficulties arise (such as a line disconnect). The system then returns to Control mode. (Receive mode continues if an insufficient paper condition interrupts printer reception.)
Attention	Occurs from Control mode when SF'1 is pressed. Attention mode is activated for one of three reasons. <ul style="list-style-type: none"> ● To open a disk file for reception ● To erase a file opened by the system ● To adjust paper in the printer Refer to Table 3-3 for information on Attention mode prompts.

Once in the Control mode, the system waits indefinitely if no action occurs at either the local or the remote end of the communications link. When an action, such as an operator response, causes the system to enter another mode, the new mode name is displayed. During each mode of operation, the currently active keyboard controls are displayed on the second line of the screen. For example, during the Control mode the first and second lines appear as in Figure 3-2.

```

ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0=CONTROL '1=ATTN '2=SEND '3=SEND TRSP '30=Bkgnd C/R=KYBD

TRANSMISSION COMPLETED

PRINTER NOT READY

--MODEM SIGNALS--   BLOCKS   BLOCKS
DIR DSR RTS CTS CAR   SENT     RECD     --MODE--
*  *                *         21      215     CONTROL
  
```

Figure 3-2. Sample Operator Screen

When the mode changes, the active keys (listed on Line 2) also change. Table 3-2 lists the active keys for Control, Bid, Send, and Receive modes; Table 3-3 lists the active keys for Attention mode.

Note that a configuration can be loaded without establishing a connection; therefore, a user can examine most emulator operations and become familiar with the software before attempting on-line operation. If difficulty arises during program execution, check the screen to determine the current operational mode; then refer to the applicable tables in this chapter for information about the operation of that mode. If the difficulty persists, contact a Wang Customer Engineering representative or Wang Corporate Systems Support representative.

Table 3-2. Active Keys for Control, Bid, Send, and Receive Modes

Mode	Active Keys	Action
CONTROL	SF'0=CONTROL	Removes any currently displayed status and error messages. The BLOCKS SENT and BLOCKS RECD values are retained until Send or Receive mode is activated.
	SF'1=ATTN	Activates the Attention mode, which allows reception devices to be readied, or printer paper adjustments to be made (refer to Section 3.6).
	SF'2=SEND	Initiates transmission in EBCDIC code. The software requests source-device information (refer to Sections 3.7 and 3.8). The system then enters Bid mode.
	SF'3=SEND TRSP	Initiates transparent transmission (using BSC line control characters that permit transmission in any code); otherwise, same as SF'2.
	C/R=KYBD	Carriage return (C/R) is activated by pressing RETURN. C/R allows single-record entry from the keyboard (refer to Section 3.9).
BID	SF'0=ABORT	Terminates a Bid attempt. To recover from an aborted Bid attempt, press SF'31 to activate the Reset and Disconnect function; then press RUN and RETURN. To resume operations, dial the connection again.
SEND	SF'0=ABORT	Terminates transmission. The system sends the last data block currently in memory, signals the remote end that transmission is aborted, and returns to the operator's screen in Control mode.
RECEIVE	SF'0=ABORT	Terminates reception. The system signals the remote end that an Abort request has been made and follows the remote system Abort procedure. Press SF'0 to return to Control mode. (Host Abort procedures vary -- one may clear the transmission, and another may attempt a partial transmission; therefore, a "cancel job request" or other host-acceptable keyboard message may be required in addition to the Abort signal.)

Table 3-3. Active Keys for Attention Mode

Device	Active Keys	Action
Disk (Search method)	SF'0=CONTROL SF'1=OPEN FILE SF'2=ERASE FILE	Reactivates the Control mode. Closes any currently open receive file and opens a new file for disk receive (refer to Section 3.6). Erases either a currently open receive file (thereby freeing unused disk space), or a user-specified cataloged file (disk space is freed only if the file occupies the last currently used disk sectors). Refer to Section 3.6.
Disk (On Error method)	SF'0=CONTROL	Reactivates Control mode; only SF'0 is active. Refer to Section 3.8 for On Error method disk receive prompts.
Printer	SF'0=CONTROL SF'12=PRT FMT TAPE SF'13=FORM FEED SF'14=VERT. TAB SF'15=LINE FEED	Reactivates the Control mode. A user can specify a software-controlled vertical tape format for printer output. Refer to Appendix G. Executes a printer form feed; the system then returns to Control mode. Executes a printer vertical tab; the system then returns to Control mode. Executes a printer line feed; the system then returns to the Control mode.
Disk and printer		The keys related to the disk access method (Search or On Error) are active initially. After the disk-related operations have been completed, the keys related to printer operation are active.

3.3 DISPLAYS, PROMPTS, AND STATUS MESSAGES

The BSC 1 emulators use screen prompts, status messages, and error messages to request responses or provide information during emulator operation. The particular locations where specific types of information appear on the screen are shown in Figure 3-3. (Line Numbers 1 through 13 in the figure are used to simplify discussion of the screen layout; they do not appear on the screen.) Screen labels that remain unchanged for all operational modes are shown as uppercase words in Figure 3-3 (Lines 1, 11, and 12); Lines 3 and 10 are always blank.

```
Line:
1  ACTIVE KEYBOARD CONTROLS
2  (List of active keys for operating mode.)
3
4  (Send status messages. Receive-device prompts. Input scale.)
5  (Send-device prompts. System action during reception. Input line.)
6  (Send-file-name error messages.)
7  (Receive-device ready/not-ready status messages.)
8  (Automatic receive-file-opening error messages.)
9  (Reception abort messages.)
10
11  --MODEM SIGNALS--   BLOCKS   BLOCKS
12  DTR DSR RTS CTS CAR   SENT     RECD     --MODE--
13  *  *  *  *  *       xxxxx    yyyy    mmmmmmmmm
```

Figure 3-3. Operator Screen, General Format

Some displayed information is device-independent and other information is device-dependent. Some information is common to all operational modes, and other information is related only to specific modes. For example, as indicated in Section 3.2, the active SF keys for an operational mode are listed on Line 2 while that mode is in effect. Five SF keys are active during the Control mode; only one SF key is active during the Send, Bid, or Receive mode. The number of SF keys that are active during the Attention mode depends upon the reception device(s) designated for the configuration. Figure 3-2 provides an example of the active keyboard controls during Control mode.

Transmission and reception status messages are displayed on Lines 4 and 9 in the screen layout (refer to Table 3-4). Line 4 also displays a 63-byte scale during keyboard send operations.

Table 3-4. Transmission/Reception Status Messages

Location	Message*	Meaning
Line 4	SEND	The system is either sending or waiting to send data automatically translated into EBCDIC code.
	SEND TRANSPARENT	The system is either sending or waiting to send transparent data (no translation is made).
	TRANSMISSION COMPLETED	The system has completed a send (SF'2) or a send transparent (SF'3) operation.
	TRANSMISSION ABORTED	Transmission has been aborted in response to action by the local or remote operator.
Line 9	RECEPTION ABORTED	Transmission from a remote system has been aborted in response to action by the local or remote operator.
<p>* Since message retention eliminates the necessity for constant operator monitoring, existing messages on Lines 4 and 9 are not cleared when the system returns to the Control mode after transmission or after reception is either completed or aborted. To remove such messages, press SF'0 while the system is in Control mode.</p>		

Line 5 in Figure 3-3 displays prompts related to the input device after SF'2 or SF'3 is pressed to initiate transmission. These prompts and the acceptable responses are discussed in Section 3.6. Line 5 is also used to display keyboard-entered messages during keyboard send operations (refer to Section 3.9).

Line 7 displays receive-device ready/not-ready status messages. These messages are always related to the designated reception device for the executing configuration. For example, if the receive device is a printer that is not ready, the message PRINTER NOT READY appears on Line 7; no message appears if a ready condition exists. Figure 3-2 shows a receive-device status message on Line 7, indicating that the system printer has not been readied for reception.

Lines 12 and 13 present information for five modem signals: DTR (Data Terminal Ready), DSR (Data Set Ready), RTS (Request To Send), CTS (Clear To Send), and CAR (Carrier). An asterisk appearing on Line 13 below a modem signal name on Line 12 represents an active status for that modem signal. To indicate the rapidly changing status of the RTS, CTS, and CAR modem signals during transmission and reception, the asterisks blink on and off. Figure 3-2 provides an example of this display with DTR, DSR, and CAR active. The significance of the modem categories is summarized in Table 3-5.

Table 3-5. Modem Signal Status

Signal	Definition	Status
DTR	Data Terminal Ready	An asterisk indicates that the communications controller is operational (microcode has been loaded by the emulation program).
DSR	Data Set Ready	An asterisk indicates that the modem has been placed in the data position. Although DSR must be present for data transmission or reception to occur, its presence does not always ensure a viable communications link. With some modems, DSR may be activated while the local modem is in the data position and the remote end either has not yet completed the link or has disconnected an established link.
RTS	Request To Send	An asterisk indicates that a Request To Send signal is being sent from the communications controller to the modem.
CTS	Clear To Send	An asterisk indicates that the modem is signaling the controller that the modem is ready to send data.
CAR	Carrier	An asterisk indicates that carrier (the sine wave that carries the transmitted or received signal) is present.

In Line 13 of Figure 3-3, xxxx and yyyy represent the number of blocks sent and the number received, respectively. Initially these values are blank on the display. A value is displayed in the xxxx position when the system enters the Send mode for the first time and actually transmits data. This category is initially set to 0000, and is increased by 1 as each block is transmitted. After the transmission is completed, the xxxx value indicates the total number of blocks sent, and remains fixed (refer to Figure 3-2). This value is not altered by system entry into the Control, Receive, Attention, or Bid mode. When the system again enters the Send mode, the xxxx value is reset to 0000.

Similarly, during receive operations no value is displayed in the yyyy position on Line 13 of the screen until the system enters the Receive mode in response to a data transmission from the remote end of the communications link. When reception begins, yyyy is set to 0000 and increased by 1 after each block is received. After reception is completed, the yyyy value indicates the total number of blocks received; this value remains fixed until the next entry into Receive mode, which resets the value to 0000 (refer to Figure 3-2).

At the far right of Line 13 in Figure 3-3, the current operational mode is represented by mmmmmmmmm. In Figure 3-2, for example, the current mode is CONTROL.

3.4 SPECIAL CONSIDERATIONS FOR 2200-TO-2200 OPERATION

Because the 2200-to-2200 protocol is intended for use with 2200 Series products on both ends of the communications link, the operation of this software differs slightly from that of the other BSC 1 emulators. The 2200-to-2200 protocol utilizes the Search disk access method (On Error disk access is not available). Also, the 2200-to-2200 protocol does not support printer operations; only disk operations are used for transmission and reception (console messages are received to the screen only).

The 2200-to-2200 protocol is essentially a 2780 protocol that utilizes transparent mode operations, with modifications to support Wang file formats; therefore, files sent and received need not be formatted in Wang TC file format. The 2200-to-2200 protocol supports the transfer of both data and program files without conversion.

3.5 SPECIAL CONSIDERATIONS FOR 2200 WPS MODE OPERATION

The 2200 WPS mode can be used by Wang 2200 systems with 2200 Word Processing software to communicate with Wang 2200 Word Processing, OIS, WP, and VS/IIS (Integrated Information Systems) systems if each system is equipped with synchronous communications capabilities. There are, however, several prerequisites for the 2200 WPS mode to be used for document transfer. For any documents received to the 2200 system to be usable, that system must be equipped with 2200 Word Processing software and at least one 2236DW Integrated Terminal. The 2200 Word Processing software is also required if a 2200 system is to format documents for transmission using 2200 WPS mode.

The primary reason for these software and equipment requirements is the need to perform file format conversion to allow standard Wang word processing files to be processed by the BSC 1 software. Word processing files resident on a 2200 system must be converted to 2200 TC/WP file format in order to be accurately transmitted. Word processing files received by a 2200 system must be converted from 2200 TC/WP file format to WP format in order to be processed by the 2200 Word Processing software. The 2200 Word Processing software includes two utilities to perform these conversions.

1. The Convert WP Document to TC Data File utility allows an operator to convert a WP document to 2200 TC/WP file format. A copy of the document is written in 2200 TC/WP file format to a 2200 TC/WP file with an operator-specified file name (the original WP document is unaffected by the conversion).
2. The Convert TC Data File to WP Document utility converts a 2200 TC/WP file to 2200 WP document file format. A copy of the TC/WP file is written in WP document format to a document with an operator-specified name (the original TC/WP file is unaffected by the conversion).

Operating instructions for these two utilities are contained in the 2200 Word Processing Software Operator's Guide (700-6937).

NOTE

These utilities must be used off-line, either before transmission or after reception. They cannot be used during the operation of the BSC 1 software.

The 2200 WPS mode utilizes the Search method of disk access (On Error disk access is not available). Also, the 2200 WPS mode does not support printer operations -- transmission and reception are to disk only (console messages are received to CRT only).

3.6 DISK FILE RECEIVE OPERATIONS

When Attention mode is activated from Control mode by the pressing of SF'1, the file opening and closing options allow up to 99 received files to be uniquely named. The operation of the Attention mode for file receive operations differs according to the disk access method chosen during the configuration process (refer to Section 2.4). The two disk access methods that can be chosen during the configuration process are Search and On Error. These disk access methods handle invalid responses to Attention routine prompts in different ways. The Search method searches for and validates operator-entered file names, and provides recovery if invalid responses are entered. The On Error method provides only BASIC-2 ERROR statement termination if invalid responses are entered. This method prevents, to some extent, the occurrence of non-recoverable BASIC-2 error codes, and therefore avoids the need to reload the emulator on most miscues. The On Error method should be used only when the emulator must run in an 11K partition or when no disk access is required.

Opening a Receive File Using the Search Disk Access Method

To create and open a file for data reception to disk when using the Search disk access method, perform the following steps.

1. Press SF'1 to activate Attention mode from Control mode.
2. The following display then appears on Lines 1 and 2 of the operator screen. If the configuration includes printer receive capabilities, additional printer-related options also appear on Line 2.

```
ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = CONTROL '1=OPEN RCV FILE '2=ERASE FILE
```

From this display, press SF'1 to open a receive file. The software erases any previously opened BSC 1 receive file.

3. The prompt ENTER RECEIVE DISK ADDRESS appears on the screen. Enter the device address of the disk chosen for receive files and press RETURN.
4. If an invalid disk address is entered, the software repeats the prompt in Step 3 until a valid address is entered. The software verifies that the disk is mounted and accessible, and then displays both the number of available sectors on the chosen disk and a prompt requesting a receive file name. For example, if Disk B20 is specified and 43,847 sectors are available in the B20 catalog area, the following display appears.

```
ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = CONTROL
43847 Sectors available on disk B20

ENTER 1- TO 6-CHARACTER FILE NAME
```

5. Enter a file name of six or fewer characters, and press RETURN. (The software uses this name to create a receive file.)

The message SEARCHING CATALOGUE appears momentarily. If the entered name is already cataloged on the disk, the software cannot create a receive file with that name, and a different file name must be chosen; the message ROOT xxxxxx CATALOGUED appears (xxxxxx is replaced by the file name), and the prompt ENTER 1- TO 6-CHARACTER FILE NAME is again displayed. If this occurs, repeat Step 5.

If the entered name is acceptable, the system returns to Control mode automatically, and the message RECEIVE FILE xxxxxx01 OPENED appears, indicating that the first file is now open. The temporarily allotted file size of the opened receive file equals all the remaining platter space (the disk is not available to other users for the creation of new files).

The system appends two digits (e.g., 01, 02, 03) to the file name when the file is opened. The 2-digit sequence appended to the operator-supplied name accommodates multiple file reception, because the sequence is increased each time a new file is opened by the software. Thus, if the root file name "DATA" is entered, the first file received is named "DATA 01", and the next file received is named "DATA 02".

Opening a Receive File Using the On Error Disk Access Method

To open a file for data reception to disk when using the On Error disk access method, perform the following steps.

1. Press SF'1 to activate Attention mode from Control mode.
2. The following display then appears.

```
ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = CONTROL

ENTER RECEIVE DISK ADDRESS  1=310  2=B10  3=320  4=B20  5=350?
```

Respond by entering the number corresponding to the appropriate device address and pressing RETURN.

3. The prompt ENTER 1- TO 6-CHARACTER FILE NAME? then appears. Enter a file name of six or fewer characters, and press RETURN.
4. The prompt ENTER NUMBER OF SECTORS TO OPEN RECEIVE FILES then appears. The On Error method requires that the number of sectors of disk space for each receive file be pre-assigned. Enter the desired number of sectors and press RETURN.

After a response to this prompt is entered, the system appends the digits 01 to the operator-supplied file name before checking the receive disk catalog. If the file name is cataloged on the receive disk, the message STOP NAME ALREADY CATALOGUED appears. The software terminates the receive file opening operation without opening a file. If this occurs, press SF'0 to resume emulator operations and then initiate the receive file opening sequence again, if appropriate.

If the file name entered is not cataloged on the receive disk, the software opens a file for reception, and displays the message RECEIVE FILE xxxxxx01 OPENED. The file created by this process is allotted a number of sectors equal to the operator-supplied value. The system then returns to Control mode.

The Erase File Function

The Erase File function is active only in configurations using the Search disk access method. Two types of files can be erased using the Erase File function: the last file opened by Attention mode (erasing the file frees unused disk space reserved by the emulator) and any cataloged file (space is freed only if the file occupies the last currently used disk sectors). To activate the Erase File function, perform the following steps.

1. Press SF'1 to activate Attention mode from Control mode.
2. Press SF'2. If a disk receive file is currently open, the Erase File function erases that file, and automatically reactivates Control mode.

3. If no disk receive file is currently open, the Erase File function allows any cataloged file to be erased. The prompt ENTER RECEIVE DISK ADDRESS appears. Enter a valid disk address. The prompt ERASE FILE _____ then appears. Enter the name of any file cataloged on the disk specified in the ENTER RECEIVE DISK ADDRESS prompt, and press RETURN.
4. The messages SEARCHING FOR FILE and FILE xxxxxxxx ERASED (with the appropriate name substituted for xxxxxxxx) appear, and the system returns to Control mode.

The Erase File function should be used to erase unused open receive files after receive operations are completed. The software automatically opens consecutive receive files when the Search disk access method is used: after each received file has been closed by the software, the software automatically opens a new receive file. Therefore, after receive operations have been completed, an additional, empty receive file will have been opened. This file should be closed and erased to conserve disk space and to free the disk for file creation operations by other users.

3.7 DISK FILE SEND OPERATIONS

Disk file Send mode is activated from Control mode by pressing SF'2 (for normal send) or SF'3 (for transparent send). Send mode operations differ according to the disk access method chosen during the configuration process. The two disk access methods that can be chosen during the configuration process are Search and On Error. These disk access methods involve different ways of handling invalid responses to disk file send routine prompts. The Search disk access method searches for and validates operator-entered file names, and provides recovery if invalid responses are entered. The On Error disk access method provides only program termination using the BASIC-2 ERROR statement if invalid responses are entered. This method prevents, to some extent, the occurrence of non-recoverable BASIC-2 error codes, and therefore avoids the need to reload the emulator on most miscues. It should be used only when it is imperative that the emulator run in an 11K partition.

Sending a File Using the Search Disk Access Method

To queue a TC-formatted file for data transmission from disk when using the Search disk access method, perform the following steps.

1. Press SF'2 or SF'3 from Control mode. Pressing SF'2 initiates transmission in EBCDIC. Pressing SF'3 initiates transmission in BSC Transparent mode.
2. The following display then appears.

```

ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = ABORT

SEND
ENTER SEND DISK ADDRESS _____

```

If SF'3 is pressed, Line 4 reads SEND TRANSPARENT.

3. Enter a valid disk address and press RETURN. The following message appears (the actual disk address entered in response to the previous prompt appears where yyy is shown; initially, x is 1).

```
SEND (file name)    from disk yyy
ENTER FILE NAME  x ?
```

4. Enter the name of the file to be transmitted. The system then searches the catalog to determine the validity of the name. If the file name is not valid, the message REENTER appears below the prompt; continue operations by entering a valid file name. If the file name is valid, the software increases the x value by 1 and then requests the name of the next file to be transmitted by repeating the ENTER FILE NAME prompt. The process continues until either RETURN is pressed without a file name being entered, or the x value reaches 10.
5. The prompt SEND FILES SEPARATELY OR COMBINED AS ONE (1=SEPARATE) then appears if more than one file is named for transmission. There are two possible choices.
 - a. Press 1 and RETURN if the files are to be sent as separate files within a single transmission.
 - b. Press RETURN if the files are to be combined and sent as a single file. If this option is chosen, the transmission appears to the remote end as though the multiple files originated as a single file or stream of cards.

After the prompt and response sequence is completed, the system enters the Bid mode, waiting for host acknowledgment. From a successful Bid mode, the system automatically enters the Send mode and transmits the specified files before returning to the Control mode. The software remains in Bid mode indefinitely if no further communications activity occurs.

Sending a File Using the On Error Disk Access Method

To queue a TC-formatted file for data transmission from disk using the On Error disk access method, perform the following steps.

1. Press SF'2 or SF'3 from Control mode. Pressing SF'2 initiates transmission in EBCDIC. Pressing SF'3 initiates transmission in BSC Transparent mode.
2. The following display then appears.

```
ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = ABORT

SEND
ENTER SEND DISK ADDRESS    1=310  2=B10  3=320  4=B20  5=350?
```

If SF'3 is pressed, Line 4 will read SEND TRANSPARENT.

3. Enter the number corresponding to the appropriate disk address and press RETURN.
4. The following message appears.

```
SEND
ENTER FILE NAME  x ?
```

Initially, x is 1. Supply the name of the file to be transmitted. The system then searches the catalog to determine the validity of the name. If the file name is not valid, the message STOP NAME NOT CATALOGUED appears. If this occurs, press SF'0 to return to Control mode, press SF'2 or SF'3, and begin the file send sequence again; all file names must be reentered.

If the file name is valid, the software increases the x value by 1 and then requests the name of the next file to be transmitted by repeating ENTER FILE NAME. The process continues until either RETURN is pressed without a file name being entered, or the x value reaches 5.

5. The prompt SEND FILES SEPARATELY OR COMBINED AS ONE 1=SEPARATE then appears if more than one file is named for transmission. There are two possible choices.
 - a. Press 1 and RETURN if the files are to be sent separately within a single transmission.
 - b. Press RETURN if the files are to be combined and sent as a single file. If the option to combine the files is chosen, the transmission appears to the remote end as though the multiple files originated as a single file or stream of cards.

After the prompt and response sequence is completed, the system enters the Bid mode, waiting for host acknowledgment. From a successful Bid mode, the system automatically enters the Send mode and transmits the specified files before returning to the Control mode. The software remains in Bid mode indefinitely if no further communications activity (such as host acknowledgment) occurs.

3.8 CARD SEND OPERATIONS

If a 2780, 3780, or 3741 emulator is configured to support a card reader as an input device, Card Send can be selected from Control mode. When SF'2 or SF'3 is pressed during Control mode, the following display appears.

```
ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0 = ABORT
```

```
SEND
END OF FILE AT HOPPER EMPTY 1=YES?
```

If SF'3 is pressed, Line 4 reads SEND TRANSPARENT.

To begin card send operations, perform the following steps.

1. Press 1 and RETURN to answer yes, or RETURN only to answer no. A yes answer indicates that only one group of cards is to be sent; a no answer implies that more than one group of cards is to be sent. This prompt appears initially and after each Hopper Empty condition relayed to the software by the card reader, unless the Hopper Empty condition occurs following a yes answer to the prompt. If a Hopper Empty condition is relayed to the software and this prompt is answered yes, the software returns to Control mode.
2. After a yes or no response is entered, the prompt READY CARD READER. KEY RETURN TO CONTINUE? appears. This prompt allows the card reader to be readied to begin (or continue) transmission. After the card reader is readied, press RETURN to begin (or continue) the transmission sequence.

3.9 KEYBOARD SEND OPERATIONS

The 2780, 3780, 3741, 2200-to-2200, and 2200 WPS Mode emulators provide the capability to transmit messages entered at the 2200 terminal. This capability is useful for sending sign-on messages or status request messages to a host system. Keyboard entry capabilities are available during Control mode, and are denoted in Line 2 of the Control mode display as C/R (carriage return), as shown below.

```
ACTIVE KEYBOARD CONTROLS
'0 = CONTROL  '1 = ATTN  '2 = SEND  '3 = SEND TRSP  C/R = KYBD
```

To send a message from the keyboard, perform the following steps.

1. Press RETURN to activate the C/R routine. C/R allows single-record entry from the keyboard. A position-scale (63 characters long) is displayed on Line 4 of the screen, and each entered character appears beneath this scale; the BACKSPACE and Line Erase keys are active for editing the message.
2. After the text is complete and correct, press RETURN to signify end-of-message and start transmission.

To return to Control mode without sending a message, press SF'0.

NOTE

The characters /*\$ appear in the first three positions on the scale; they can be used as part of a sign-on message. If these characters are not desired as part of a message, press the BACKSPACE key three times to place the cursor at the beginning of the 63-character scale, and overwrite the characters /*\$ with message text. If no text is entered and RETURN is pressed, the software enters Bid mode and attempts to send /*\$ as a message. If the characters /*\$ are erased and RETURN is pressed, no message is sent, and the software returns to Control mode.

3.10 ERROR MESSAGES AND RECOVERY TECHNIQUES

Various error messages can occur during BSC 1 emulator operations. Most messages appear during On Error disk access operations as the result of an incorrect response to a prompt. Error recovery is not difficult in most cases, but some of the interrupted operations will need to be repeated. This section discusses only those messages most likely to occur during normal operations.

Invalid File Names (Transmission)

As indicated in Section 3.7, an error message may occur when the system is processing operator-supplied names of disk files to be transmitted. If the Search disk access method is being used, an invalid file name produces the message REENTER. With the Search method, recovery requires only that a new, unique file name be entered.

If the On Error disk access method is being used, an invalid file name produces the message STOP NAME NOT CATALOGUED. To reactivate emulator operations, perform the following steps.

1. Press SF'0 to return to Control mode.
2. Press SF'2 or SF'3 to reinitiate the desired transmission operation.
3. Enter valid responses to the input device prompts.
4. Reenter each of the valid file names entered previously.

Invalid File Names (Reception)

As indicated in Section 3.6, an error message can occur during the Attention mode when the system is processing the operator-supplied file name for receive-to-disk files. If the Search method is in effect, the system searches the catalog index to ensure that the file name is valid (has not been previously cataloged). The software appends a 2-digit sequence code to the operator-supplied characters; thus, the software has the capability to open as many as 99 sequentially named files. An invalid file name produces the message xxxxxx CATALOGUED RE-ENTER. Recovery for the Search method requires only that a new, unique file name be entered.

If the On Error disk access method is being used, an invalid file name produces the message STOP NAME ALREADY CATALOGUED. To reactivate emulator operations, perform the following steps.

1. Press SF'0 to return to Control mode.
2. Press SF'1 to reinitiate the Attention mode.
3. Enter valid responses to the reception device prompts.

Insufficient Disk Space (Reception)

Other error messages can occur during or after Attention mode operations, when the system attempts to open a file but cannot do so because of disk space limitations. For example, the message INSUFFICIENT SPACE ON RECEIVE DISK can occur at the time the first file is being opened if the Search method is in effect. If the On Error method is in effect, the message STOP INSUFFICIENT SPACE ON RECEIVE DISK can occur. Such a message can also occur during multiple file reception when one file is closed and the next file is being opened. To resume emulator operations, perform the following steps.

1. Press SF'0 to return to Control mode.
2. If a diskette is being used for reception, remove the filled diskette and mount another indexed diskette in the same drive.
3. As an alternative, use the Attention mode prompts to select a platter that has sufficient space.
4. Supply a new file name for reception of additional files from the remote end.
 - a. If the Search method is in effect, press SF'1 to enter Attention mode, and then enter a new file name.
 - b. If the On Error method is in effect, press SF'0 to return to Control mode; then press SF'1 to enter Attention mode, and enter a new file name.

Insufficient File Space (Reception)

In Receive mode, the error message ERR D81 occurs if the file being received to disk overflows its allotted space, whether the Search or On Error method is in effect. Remember that the Search method opens each receive file by temporarily allotting all the remaining platter space; any unused space is freed when the file is closed. Therefore, an ERR D81 message probably indicates that the receive disk is nearly full and that there was not enough disk storage space to store the most recently received file. On the other hand, the On Error method opens each receive file by allotting the exact number of sectors specified by the operator and does not free unused space when closing the file. Therefore, the message TEXT OVERFLOW means that an ERR D81 condition has occurred, indicating either that the receive disk is nearly full or that the allotted file space was not sufficient to store the most recently received file.

The system remains in the Receive mode if reception to disk is interrupted by an ERR D81 message. Although repeated pressing of SF'0 can return the system to Control mode, such a procedure is not a recommended recovery technique. Instead, perform the following steps.

1. Press CLEAR, and then press RETURN.
2. Reload the BSC 1 software (refer to Section 1.5).
3. Reload the emulation configuration (refer to Section 2.6).
4. Contact the remote end of the line to request retransmission of all files, and provide ample space on the receiving disk platter.

System Errors

If the message SYSTEM ERROR! occurs during the loading or executing of a configuration, clear the system and reload the program. To avoid one source of such an error, do not press the HALT/STEP key, followed by SF'0, when the system is in the Send mode. Also, do not press RESET at any time during program execution. If repeated attempts to operate a program produce a system error, call a Wang Customer Engineering representative.

3.11 BACKGROUND OPERATION (2200MVP OR 2200LVP PROCESSOR)

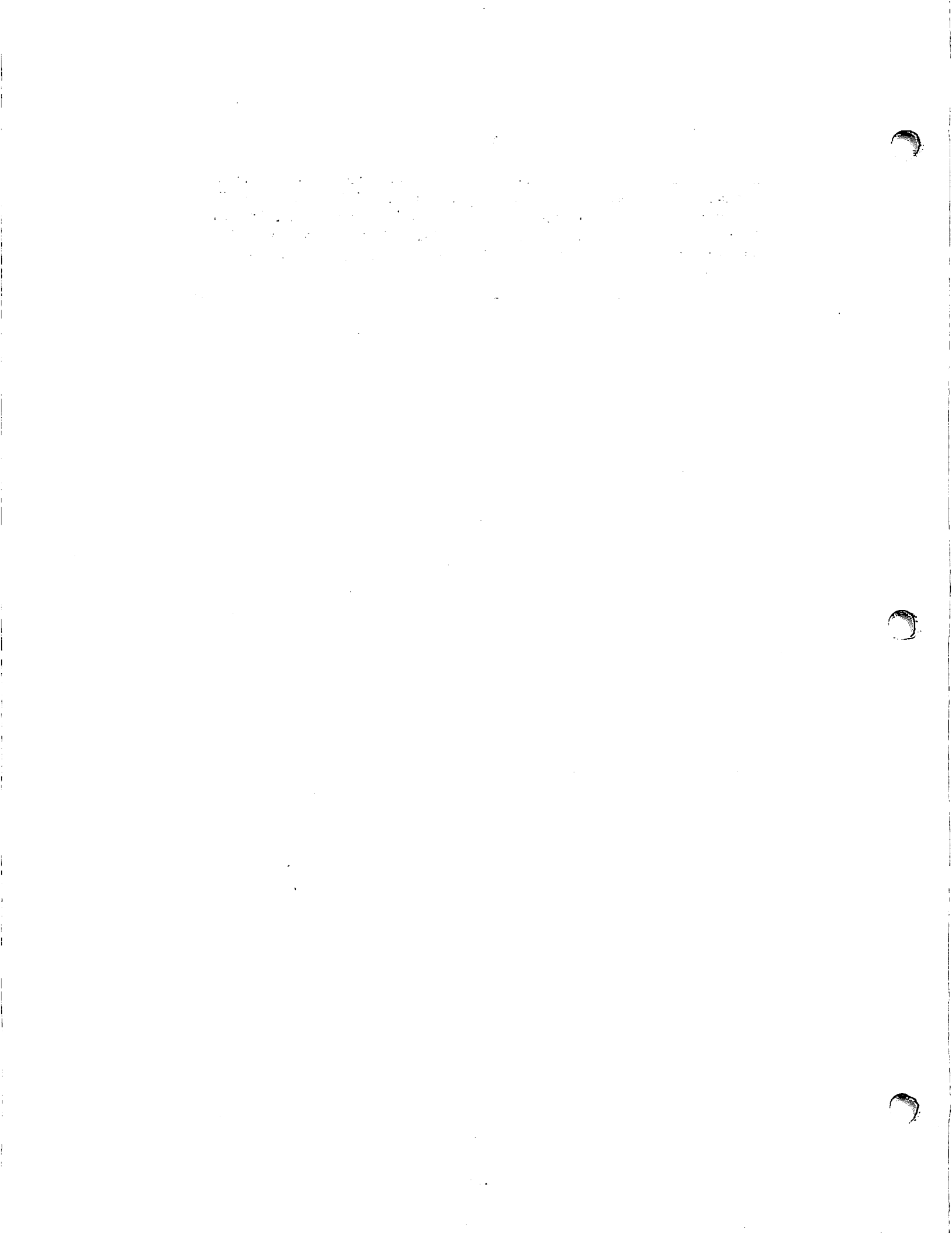
During the running of a 2780, 3780, 3741, 2200-to-2200, or 2200 WPS emulator on a 2200MVP or LVP system, communications functions that can be accomplished without operator intervention can be executed in a background partition. Pressing SF'30 releases the terminal to an available partition. Normal emulator operations continue in the original partition, utilizing any I/O devices previously selected by the operator. Transmission and reception functions can be initialized prior to entry into background mode, with actual transmission or reception taking place in background. To return the emulator to foreground operation, the \$RELEASE TERMINAL command must be used to return the partition running the emulator to operator control. The emulator then detects the terminal status change and resumes normal foreground operations.

If, for example, an operator is running a 3780 configuration and wishes to have emulator operations performed in a background partition, the operator should press SF'30. The 3780 emulator operations continue in background, and the operator's terminal is attached to the next available partition. If no partition is available, the emulator does not release the terminal.

When communications functions are to be executed in background mode, any devices selected to receive data should be enabled to allow receive operations to take place without operator intervention. If receive devices are not enabled to allow reception without operator intervention, reception is suspended.

NOTE

Because the BSC 1 software uses different sets of \$GIO statements for emulation operations on 2200MVP and 2200VP processors, the emulators cannot run on an MVP running in VP mode. The software Loading module begins normal MVP operations, causing \$GIO failures on the system operating in VP mode.




```
HASP WORK STATION EMULATOR   ACTIVE S.F. KEYS  
'0=Control '1=ATTN '2=Send '3=Console '4=Signon          '6=Print  
  
STATUS -          File -          STREAM          - DEVICE  
aaaaaaaaa   nameBccc  Rcv Disk          eeee          fffffff  
                         Rcv Print          215  
  
mmmmmmmmmm  filename  Snd pppp          qqqq          rrrrrr  
  
ssssssssssssssssssssssss  
  
tttttttttttttttttttttttttttttttttttttttttttttttt
```

Figure 4-2. HASP Emulator Display General Format

The display in Figure 4-2 occurs during normal HASP interaction. Print data streams are directed either to disk storage or to the printer at Device Address 215, depending on the options chosen during the configuration process. If disk receive operations are selected during configuration, punch data streams received from the host system are written to an opened receive disk file. Incoming messages from the host system activate the Console Output mode (refer to Section 4.3). Table 4-1 provides a key to the general format presented in Figure 4-2.

NOTE

If the loaded configuration includes disk receive capabilities (if parameters were chosen to direct either print or punch streams to disk during configuration generation), two prompts relative to disk receive functions automatically appear during the emulator loading sequence, after the HASP emulator display appears on the screen. Section 4.6 has information on these prompts and the operator responses they require.

Table 4-1. Key to HASP Emulator Display General Format

Code	Meaning
aaaaaaaa	Receive disk status
nameBccc	Receive disk file name -- file name/alphabetic volume designator/file number (001-999)
eeee	Receive disk device address
fffffff	Receive file status information
mmmmmmmmmm	Send device status
filename	Current send file name
pppp	Send device type
qqqq	Send device address
rrrrrrrrrr	2200 error messages and status information

A sample HASP emulator display is shown in Figure 4-3, with typical messages and entries filled in. Not all display categories shown in the HASP emulator display are used during all emulator functions. In Figure 4-3, for example, the receive disk status message is "Not Open," indicating that no receive disk file is open at this point in the operation. In fact, no address has yet been chosen for a receive disk. Note that a receive print operation has been suspended by the HASP operator. Also, a file named D-FILE is being sent from Disk 320 to a host system.

HASP WORK STATION EMULATOR ACTIVE S.F. KEYS			
'0=Control	'1=ATTN	'2=Send	'3=Console
		'4=Signon	'6=Print
STATUS -	File -	STREAM	- DEVICE
Not Open		Rcv Disk	None
Suspended		Rcv Print	215
Sending	D-FILE	Send Disk	320

Figure 4-3. Sample HASP Emulator Display

The HASP workstation emulation utilizes five modes of operation: Control, Attention, Send, Console, and Sign-On. During program execution, a particular mode can be entered many times or not at all, depending upon the local transmission and reception requirements and the number of data transfers originating from the remote end of the communications link. Several modes also have subordinate functions that can be accessed after the mode is entered.

When the HASP emulator display initially appears, the emulator is in Control mode. Once in Control mode, the system waits indefinitely if no action occurs at either the local or remote end of the communications link. When an action, such as a response to a prompt, causes the system to enter another mode, the second line of the screen displays either the currently active keyboard controls for that mode or any prompt that requires a response. During the Control mode, for example, the first and second lines appear as follows.

HASP WORK STATION EMULATOR ACTIVE S.F. KEYS '0=Control '1=ATTN '2=Send '3=Console '4=Signon '5=EOF '6=Print
--

All the other modes can be accessed from the Control mode display. Control mode also provides two subordinate functions: Print and EOF. The modes and functions accessed from Control mode are detailed in Table 4-2. Note that '6=Print does not appear in this display if the emulator is configured to direct all streams to disk; also, '5=EOF appears in this display only if the emulator is configured for card send.

Table 4-2. Active SF Keys, HASP Control Mode

Key	Function	Description
'0	Control	Clears the screen and returns to the emulator display.
'1	ATTN	Calls the Attention routine for off-line disk receive processing (to open disk files and assign receive file names). If SF'1 is pressed, the Attention mode display appears. If disk receive is not selected during configuration, SF'1 is inactive. Attention prompts are discussed in Section 4.6.
'2	Send	Activates request for card or disk send, whichever was selected for the configuration currently running.
'3	Console	Activates the Console Entry routine for the entry of a console message or sign-off message.

Table 4-2. Active SF Keys, HASP Control Mode (continued)

Key	Function	Description
'4	Signon	Activates the Console Entry routine for the entry of a sign-on message. Sign-on can be performed only from the keyboard; it cannot be accomplished from a disk or card reader.
'5	EOF	Pressing SF'5 sets the End of File (EOF) indicator either on or off. If the indicator is set on and an end of file condition occurs, EOF is displayed starting in Position 1 of the Send Device line to prompt the operator to service the card reader. If the indicator is set off, EOF is not displayed on the Send Device line. (SF'5 is active only if card reader was selected for a send device.)
'6	Print	Activates the system printer for printing received print stream files. (SF'6 is active unless the emulator is configured to route all streams to disk storage.)

4.3 THE CONSOLE OUTPUT MESSAGES DISPLAY

The Console Output Messages display appears whenever the host system sends console output messages to the HASP emulation workstation. The Console Output Messages display consists of a scrolled display of console messages received from the host. Messages are listed with the most recent message last. To return to Control mode from the Console Output Messages display, press either SF'0 or RETURN. To enter Console mode from the Console Output Messages display, press SF'3.

4.4 CONSOLE ENTRY AND SIGN-ON PROMPTS

The Console Entry display is activated by pressing SF'3. The Console Entry display enables console messages (such as sign-off messages) to be entered from the keyboard. If Console Entry mode is activated from Control mode, the screen is cleared and the Console Entry display appears. If Console Entry mode is activated from the Console Output Messages display, any console output messages are retained (scrolled upward) and the Console Entry display appears (refer to Figure 4-4).

<pre> CONSOLE ENTRY '0 ABORT!.....1.....!.....2.....!.....3.....!.....4.....!.....5.....!.....6.....!.....7.....!.....8 </pre>

Figure 4-4. Console Entry Display

The Sign-On display (refer to Figure 4-5) allows the entry of a sign-on message from the keyboard. It is activated by pressing SF'4.

```
SIGNON ENTRY      'O ABORT
.....1.....!.....2.....!.....3.....!.....4.....!.....5.....!.....6.....!.....7.....!.....8
```

Figure 4-5. Sign-On Display

To send a console entry or a sign-on message from the keyboard, enter a message of 1 to 80 characters and press RETURN. Table 4-3 describes the keys that are active for cursor control during Console Entry or Sign-On mode.

Table 4-3. Active Keys, Console Entry or Sign-On Entry Mode

SF Key	Function
'0	Restores the HASP emulator display to Control mode. No message is sent.
'6	Moves the cursor to Position 80.
'7	Moves the cursor to Position 1.
'8	Erases any message text between the current cursor position and Position 80.
'9	Deletes one character.
'10	Inserts one space.
'11	Moves the cursor five positions to the right (but not beyond Position 80).
'12	Moves the cursor one position to the right (but not beyond Position 80).
'13	Moves the cursor one position to the left (but not beyond Position 1).
'14	Moves the cursor five positions to the left (but not beyond Position 1).
ERASE	Erases any message text between Position 1 and the current cursor position.
RETURN	Sends a console message. Press RETURN after the message has been entered and is complete. If no data has been entered, pressing RETURN clears the Console Entry line on the HASP emulator display, and no message is sent.

4.5 DISK SEND OPERATIONS

Disk send is initiated by pressing SF'2 from Control mode. If disk was not specified as the transmission device during the parameter selection procedure, disk send cannot be activated. Pressing SF'0 during any step of the process aborts a disk send operation and returns the HASP emulator to Control mode.

When disk send is activated, the screen clears and a series of Disk Send prompts appears. These prompts are summarized in Table 4-4.

Table 4-4. Summary of HASP Disk Send Prompts

Prompt	Response
Send 1 = Normal 2 = Transparent	Press 1 or 2 and RETURN.
ENTER DISK ADDRESS 1 = 310 2 = B10 3 = 320 4 = B20 5 = 330 6 = B30 7 = 350	Press the appropriate key (1-7), then press RETURN.
ENTER FILE NAME	Enter a valid file name and press RETURN. This prompt is repeated for up to nine files to be sent from disk. If no more files are to be transmitted, press only RETURN.
LAST FILE NAMED = name	The response to the previous ENTER FILE NAME prompt is displayed.
RE-ENTER = name	If the file name entered previously is invalid, this prompt appears.
SEND FILES SEPARATELY OR COMBINED AS ONE (1 = SEPARATE)?	This prompt appears if more than one send file is selected. Press RETURN to send all files as a single file. Press 1 and RETURN to send files separately.

The software allows up to nine files from the same disk to be specified for disk send. Separate transmissions must be made to send files from more than one disk; repeat the disk send procedure for the files from each disk. SF'0 is also active to abort the Send mode from each of these prompts. The following prompt appears initially.

Send From Disk '0 ABORT 1=Normal 2=Transparent

This prompt offers a choice between Normal mode (data translated to EBCDIC before disk send) or Transparent mode (data transmitted without translation, using EBCDIC control codes). Press either 1 or 2, and then press RETURN. The following prompt then appears.

```
Send From Disk '0 ABORT
1=310 2=B10 3=320 4=B20
5=330 6=B30 7=350
```

Enter the single digit corresponding to the disk address for the send operation; then press RETURN. Once a valid disk address is chosen, a prompt appears showing the disk address chosen for disk send and requesting the entry of a send file name. If, for example, B20 is chosen as the disk address for disk send operations, the prompt appears as follows.

```
B20 '0 ABORT
ENTER FILE NAME 01
```

Enter the name of the file to be sent and press RETURN. The software does not accept an invalid file name (a file name not cataloged on the selected disk); instead, a REENTER prompt is displayed, requesting the entry of a valid file name. For example, assume that the file name DAAT (a miscue for DATA) is entered. The software searches the specified disk catalog (in this case, B20) to find the file DAAT. If DAAT is not a valid file name, the following prompt appears to indicate that the file name is invalid and request that a valid file name be entered.

```
REENTER= DAAT '0 ABORT
ENTER FILE NAME 01
```

If a valid file name is entered (in this case, the correct file name, DATA), the following prompt appears and a second file name can now be entered.

```
LAST FILE NAMED=DATA '0 ABORT
ENTER FILE NAME 02
```

The software accepts up to nine files for disk send operations, and the prompt and search process is repeated for each file name. This process is terminated when RETURN is pressed instead of a file name being entered in response to the prompt ENTER FILE NAME. The software then displays the following prompt.

```
LAST FILE NAMED=DATA '0 ABORT
SEND FILES SEPARATELY OR COMBINED AS ONE (1=SEPARATE)
```

If RETURN is pressed, the software sends all of the specified files combined as one file. Pressing 1 in response to this prompt causes the software to send each file separately. After a valid response to this prompt is entered, the software returns to Control mode and attempts to begin transmission.

4.6 DISK RECEIVE OPERATIONS

The HASP emulator disk receive functions are designed to sequentially fill the catalog area of the specified disk surface. If large volumes of data are expected, an alternate disk address can be assigned to accommodate disk files that overflow the primary disk. The software activates the alternate disk to receive overflow files if the primary disk catalog area becomes filled. If the free disk space of both disks is filled by received data files, no data files will be lost. The software alternately attempts to access the primary and overflow disks, displaying prompts to indicate the Disk Full condition, until free disk space is available. This feature is particularly useful if a large number of files are to be received to diskette, because filled diskettes can be replaced with unfilled indexed diskettes to continue reception operations. To accommodate multiple disk access, the following file naming convention is used.

xxxxyzzz = File name

Where:

xxxx = An operator-supplied file name

y = An alphabetic volume designator (in alphabetic sequence beginning with "A")

zzz = A file number (in numeric sequence 001--999)

The sequence number is automatically increased for each new file received. If more than 999 files are received to a disk surface, the volume designator is changed, and the file number is reset to 001. The volume designator is also automatically changed upon first access to the alternate disk address for overflow files.

If a received file overflows a disk surface, a partial file is written to one surface and the remainder of the file is written to the alternate surface. These two partial files are assigned the same sequence number, but the volume designator for each differs, because the volume designator changes when the emulator accesses the alternate disk surface.

Disk receive operations are initiated by pressing SF'1 to activate Attention mode from the Control mode. Attention mode allows a receive file to be opened and created for data reception.

NOTE

To ensure disk file integrity, the software does not open a previously written data file or a program file for disk receive operations.

Unless the HASP emulation configuration specified no disk access (i.e., Printer was selected for the Print Streams To parameter, and None was selected for the Punch Streams To parameter), the two following disk address prompts appear in succession immediately after the emulator loading sequence.

```
Disk Overflow surface?
1=310 2=B10 3=320 4=B20 5=330 6=B30 7=350
Disk=?_

Open Receive Disk File
1=310 2=B10 3=320 4=B20 5=330 6=B30 7=350
Disk=?_
```

In response to each of these prompts, choose a valid disk address by pressing the appropriate digit key and RETURN (e.g., press 3 and RETURN to choose disk address 320). The software does not accept an invalid disk address. Pressing RETURN without entering a digit is interpreted by the software as a decision not to assign an overflow disk surface or not to open a disk receive file at the present time. If no disk overflow surface is chosen, the disk overflow option is disabled during HASP emulator operation. For the option to be reactivated, the emulator must be restarted (by pressing HALT, RETURN, RUN, and RETURN in sequence). The Open Receive Disk File prompt, however, is accessible from the Attention mode throughout HASP emulator operation. If no receive disk file is opened at this time, a receive disk file can be opened later in the HASP session by activating Attention mode (pressing SF'1 from Control mode) and pressing SF'1.

If no sectors are available on the overflow disk or receive disk chosen, the prompt ABOVE DISK FULL - SELECT ANOTHER indicates that another disk must be chosen for receive operations.

The next prompt displays the specified disk address and the number of sectors available on the disk. For example, if Disk B10 is chosen for disk receive operations, and the disk has 192 available sectors, the prompt appears in the following form.

```
B10 192 SECTORS AVAILABLE
ENTER 1- TO 4-CHARACTER FILE NAME?
```

To create a receive file for disk receive operations, enter a file name 1 to 4 characters long, and press RETURN. The software searches the specified disk catalog to ensure that this file name has not been previously cataloged. Because the software reads only the first four characters of a file name, it does not allow a file named DATA to be opened if the specified disk contains a file or program name using DATA as its first four characters (e.g., DATAFIL).

After a receive file name is specified, the message SEARCHING CATALOG appears, indicating that the software is searching the disk file catalog to validate the receive file name. If the software finds a data or program file name having the same first four characters as the receive file name, no receive file is opened; instead, the software displays the file name and the message CATALOGUED. REENTER. Respond by entering a different 4-character

receive file name. If, for example, an attempt is made to open a new file on Disk B10 (which in this case has 192 unused sectors) and DATA is chosen for a 4-character receive file name, the Attention mode display appears as in Figure 4-6.

```

HASP Attention Mode (Communications temporarily suspended)
Receive Disk Sectors File Status
Primary = B10 192 DATAA001 Open
Overflow = None

'0=CONTROL '1=Open RCV file '2=ERASE File
  
```

Figure 4-6. Sample Attention Mode Display

Pressing SF'0 returns the emulator to Control mode; the emulator is then ready to receive data files to disk. Pressing SF'2 activates the HASP Erase File function, which closes and erases an empty receive file opened by the software.

4.7 CARD SEND OPERATIONS

The HASP emulator card send capabilities can be utilized if Card Reader is chosen as the input device during the configuration process. Card send can be selected from the HASP emulator display by pressing SF'2 from Control mode; the following prompt appears.

```

Initiate Card Send
'0=Abort '1 = Normal '2=Transparent '3=Binary
  
```

Choose the card send option appropriate for the application being run. Table 4-5 details the card send options.

Table 4-5. HASP Card Send Options

SF Key	Send Device Message	Card Send Mode
'1	SEND NORMAL CARDS	The cards are sent in EBCDIC in non-transparent mode.
'2	SEND TRSP CARDS	The cards are sent in EBCDIC in transparent mode. If a card containing the characters /\$ in Columns 1-2 is encountered, the remaining cards are sent in binary mode.
'3	SEND BINARY CARDS	Data is read from the card reader in binary mode (i.e., 2 bytes per card position) and is sent in transparent mode.

The Send Device message on the HASP emulator display differs according to the card send option chosen. For example, if '2 is chosen, the HASP emulator display appears as in Figure 4-7.

HASP WORK STATION EMULATOR		ACTIVE S.F. KEYS	
'0=Control	'1=ATTN	'2=Abort	'3=Console
'4=SIGNON	'5=EOF	'6=Print	
STATUS -	File -	STREAM	- DEVICE
Not Open		Rcv Disk	None
Suspended		Rcv Print	215
EOF		Send CARD	629 SEND TRSP CARDS

Figure 4-7. HASP Emulator Display for Card Send

Once transmission has begun, either SF'2 or SF'5 can be used to control card reader operations.

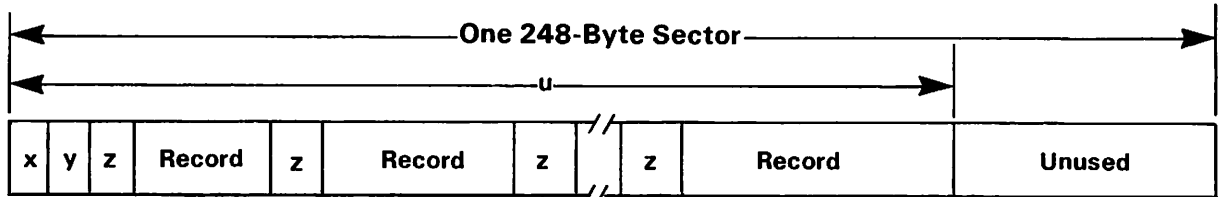
1. SF'2 aborts transmission (in the HASP emulator display, SF'2 changes from "SEND" to "Abort" -- refer to Figure 4-7).
2. SF'5 sets the EOF indicator on or off. If the EOF indicator is set on, EOF is displayed in Position 1 of the send device line. If the EOF indicator is set off, no EOF indicator is displayed on the send device line.

The EOF indicator is used when card data is being sent. If the indicator is set off when the card hopper empties, the HASP emulator waits for more cards before completing transmission. If the indicator is on when the hopper empties, an End of Text (ETX) signal is transmitted, thereby completing the card transmission sequence. Use SF'5 to set the EOF indicator on if only one card deck is to be sent or after the last card deck is loaded for card send.

APPENDIX A
 TC FILE FORMAT

The Wang 2200 Telecommunications (TC) file format for disk data files is defined as follows.

1. Records are packed into a 1-dimensional array having four 62-byte elements (e.g., DIM A\$(4)62). The array is saved into a single sector by using the DATA SAVE DC or DATA SAVE DA statement.
2. When TC records are being packed into the array, element boundaries are ignored; the array is treated as if it were simply 248 contiguous bytes of storage.
3. Within the 248 bytes of storage in a sector, three types of control bytes are used (represented by x, y, and z in the following diagram).



x = A 1-byte hexadecimal code indicating whether or not the sector is the last sector in the file; if x = HEX(F0), then x is the last sector. If x = HEX(00), then x is not the last sector.

y = A 1-byte hexadecimal value denoting the number of bytes used for data storage in the array, plus 1. For example, in the diagram, if u is the total number of bytes used in the array, then y is the hexadecimal equivalent of u + 1.

z = A 1-byte hexadecimal value preceding each record. This value denotes the record length in bytes. For example, if an individual record contains 39 bytes, z equals HEX(27), since the hexadecimal number 27 is equal to the decimal number 39.

In the diagram, "record" represents one complete record with trailing spaces truncated (except in the first record). Individual records do not overlap from one 248-byte array to the next (i.e., if a record is larger than the number of bytes remaining in the array, that record is written into the next sector, rather than being split between two sectors).

In the DATA ENTRY 1 utility, the commands SAVE and SAVE N do not truncate trailing spaces in the first record of a file. Thus the first record is always 80 or 128 bytes long. The DATA ENTRY 1 utility is included in the 2200 TC Support Utilities 1 software. For more information, consult the 2200 TC Support Utilities 1 User Manual (700-4086) and its addendum (700-4086.01).

APPENDIX B MODEM CONSIDERATIONS

A modem facilitates data communications by connecting computer equipment to a public telephone system or to private leased lines. Most computer equipment operates using digital signals, while most public telephone facilities provide analog signal communications lines. Therefore, a device is needed to convert a computer's digital signals into analog signals compatible with telephone lines. A modem modulates digital signals (converts them into analog signals) to enable them to be sent over analog telephone lines. For data reception, a modem demodulates analog signals (converts them into digital signals). Modems are therefore needed at both ends of a communications link. The modems at both ends of the link must be compatible with each other, to ensure that the modulation and demodulation functions performed are equivalent. The data handling speed and the methods of modulation and demodulation must be equivalent for both of the modems. The modems used should, therefore, be pairs of an identical model, or different models certified by their manufacturers to be compatible with each other.

The BSC 1 software requires that modems used for data communications be EIA RS-232-C/V.24-compatible, and capable of synchronous operations at line speeds from 2000 to 4800 bits per second (bps). Modems such as the Wang WA3451 and the Bell 212A can also be used with the BSC 1 software, even though their line speed (1200 bps synchronous) falls outside of the 2000 to 4800 bps range. These modems maintain a constant carrier signal for switched line connection, whereas the BSC 1 software normally associates a constant carrier signal with a leased line connection. If Wang WA3451 or Bell 212A modems are to be used with the BSC 1 software, the Modem Operates parameter must be set as Leased Line to accommodate this difference. Determine the type and model of modem at the remote site before installing a modem locally to further ensure modem compatibility.

For local connection of 2200 Series systems, or other Wang equipment to a 2200 system for BSC 1 operation, it might be feasible to use a Wang 2228N Null Modem rather than a pair of modems. The 2228N Null Modem can be used for local connections using RS-232-C/V.24-compatible cables, over distances of less than 50.0 feet (15.2 meters). The 2228N Null Modem allows one of the systems to supply the clocking signal and crosses the transmit and receive connections of the RS-232-C/V.24-compatible cables. The transmit pins from each system's RS-232-C/V.24-compatible cable are connected to the receive pins of the other system's cable, enabling digital signals transmitted from one system to be received by the other without modulation or demodulation. The null modem thus eliminates the need for a pair of modems and a telephone connection when the BSC 1 software is being used locally for data transfer.

For 2200-to-2200 protocol operations, the null modem is connected by means of the RS-232-C/V.24-compatible cable provided with each communications controller. One RS-232-C/V.24-compatible cable attaches from one of the Asynchronous/Synchronous Communications Controllers to the 2228N Null Modem. A second RS-232-C/V.24-compatible cable links the null modem to the other Asynchronous/Synchronous Communications Controller.

When a null modem is used for local connection of a Wang OIS, WPS, or VS system to a 2200 Series system, ensure that a protocol emulator that is equivalent to one of the BSC 1 emulators is operative on the other Wang system. When a null modem is used for local connection of a non-Wang system to a 2200 Series system, ensure that the other system accepts direct connection and supports one of the protocols emulated by the BSC 1 software.

For BSC 1 operation with a null modem connecting 2200 systems, prepare an appropriate BSC 1 emulation configuration for each 2200 system. Compatible parameter selections should be chosen for the configurations. For example, data rates should be equivalent, the chosen record blocking options and the option selected for the Receive Transparency parameter (if applicable) should be the same, and the choice for the Modem Operation parameter (dial-up or leased line) should match.

The HASP Multileaving emulation cannot be operated if a null modem is used for direct connection of two systems, unless one of the systems has the BSC 1 software and the other system has a user-programmed HASP host simulator.

APPENDIX C
ESTABLISHING A COMMUNICATIONS CONNECTION

This manual does not include an exact procedure for establishing a communications connection, because some details vary with the type of communications equipment used. However, several aspects of the connection process should be considered here. Obtain the following information about the connection capabilities of both the local 2200 Series system and the system at the remote site.

1. Are the local and remote modems compatible? As indicated in Appendix B, modems used at both ends of a communications link must be compatible. Therefore, if BSC 1 software is used to link a 2200 system to a remote system for the first time, it is necessary to determine the compatibility of the local and remote modems.
2. If a dial-up connection is being used, what telephone number should be called for data transfer, and what is the appropriate dialing procedure for calling this number? (In large data centers, different telephone numbers access different remote lines. One remote line may be set up for 2780 protocol communications at a line speed of 2400 bps; another remote line may be set up for 2780 protocol at a line speed of 4800 bps; other remote lines may accept various synchronous and asynchronous communications protocols. Thus, some of the data center's telephone numbers may not be appropriate for the communications link desired. Determine the data center telephone number that is appropriate for the line discipline and line speeds to be used with the BSC 1 software and the 2200 Series system.)
3. What telephone number at the remote system's facility can be called for information concerning the intended communications link or concerning problems encountered during operation of the communications link?
4. What is the normal sequence of operations to be followed after a communications connection is established?
 - a. Should the 2200 Series system transmit first? If so, is a particular sign-on message required?
 - b. Does the remote system normally transmit first? If so, is a particular message used, and is a particular response required?

5. What character set is used by the remote facility? (As indicated in Section 3.7, the BSC 1 software provides the capability to transmit data in EBCDIC or ASCII code, or in transparent mode. Determine which of these codes is appropriate for each application.)
6. Have successful communications occurred previously? Is a currently existing configuration adequate for this particular communications link, or must a new configuration be created to suit this communications connection?

Once successful communications with a particular facility have been established, construct a step-by-step outline of the procedure to be used for subsequent sessions, including telephone numbers for the connection(s), and the names and telephone numbers of support personnel who can be contacted for assistance. This communications procedure should then be posted near the 2200 terminal used for BSC 1 communications.

APPENDIX D
BSC 1 CONFIGURATION PROCEDURES SUMMARY

This appendix outlines the procedures used to create emulator configurations for the BSC 1 software. This summary should be useful as a reference both for first-time users and users more familiar with the software. It can also be used as a guideline by those writing BSC 1 configuration summaries to suit particular applications or 2200 operating systems.

The following procedures constitute an outline of the configuration process. References are provided to the sections of this manual that discuss each step in greater detail.

Creating a Configuration

To create a configuration for BSC 1 software operation, perform the following steps.

1. Insert the BSC 1 software diskette into a system diskette drive and use the LOAD RUN command to begin operation. (Refer to Section 1.5.)
2. Select CREATE A NEW CONFIGURATION from the BSC 1 main menu. (Refer to Sections 1.6 and 2.1.)
3. Select the desired emulation from the Emulator Selection menu. (Refer to Section 2.1.)
4. Specify valid parameters for the chosen emulation. (Refer to Section 2.3.)
5. Save or run the configuration from the Save/Run menu. (Refer to Section 2.5.)

Modifying a Configuration

To modify a BSC 1 software configuration, perform the following steps.

1. Insert the BSC 1 software diskette into a system diskette drive and use the LOAD RUN command to begin operation. (Refer to Section 1.5.)

2. Press RECALL (SF'15).
3. Select the configuration to be modified. (Refer to Section 2.7.)
4. Modify any or all parameter choices for the selected emulation. (Refer to Section 2.3.)
5. Save or run the configuration from the Save/Run menu. (Refer to Section 2.5.)

NOTE

A configuration that is modified is added to the BSC 1 main menu; the original configuration is not automatically deleted.

Deleting a Configuration

To delete a BSC 1 software configuration, perform the following steps.

1. Insert the BSC 1 software diskette into a system diskette drive and use the LOAD RUN command to begin operation. (Refer to Section 1.5.)
2. Position the "#" next to the configuration description to be deleted (using the RETURN, BACKSPACE, or Space Bar keys).
3. Press DELETE (SF'9).

Deleting All Configurations

To delete all currently saved BSC 1 software configurations, perform the following steps.

1. Insert the BSC 1 software diskette into a system diskette drive and use the LOAD RUN command to begin operation. (Refer to Section 1.5.)
2. Press RESET.
3. Press SF'31.
4. Press RUN and RETURN. All configurations are deleted.

APPENDIX E
BSC 1 OPERATION PROCEDURES SUMMARY

The following steps outline the procedure used to operate the BSC 1 software. They should prove useful for first-time users, users more familiar with the software, and those writing BSC 1 operation summaries to suit particular applications or 2200 operating systems.

1. Insert the BSC 1 software diskette into a system diskette drive and use the LOAD RUN command to begin operation. (Refer to Section 1.5.)
2. Load the desired configuration from the BSC 1 main menu. (Refer to Sections 1.6, 2.6, and 3.2.)
3. Ready all necessary input and output devices. (Refer to Section 3.2.)
4. Establish a communications connection with the remote site. (Refer to Section 3.2 and Appendix C.)
5. Perform any necessary sign-on or initiation functions required by the particular application.
6. Perform the desired communications functions. Chapter 3 has instructions on the various communications functions provided with the 2780, 3780, 3741, 2200-to-2200, and 2200 WPS protocols. Chapter 4 has instructions on the various communications functions provided with the HASP emulation.
7. When all communications functions are completed, fulfill any sign-off or other host requirements (including disconnecting the communications line, if appropriate). Terminate the session by pressing HALT, then RETURN, then RESET.

1. The first part of the document discusses the importance of maintaining accurate records of all transactions and activities. It emphasizes the need for transparency and accountability in financial reporting.

2. The second part of the document outlines the various methods used to collect and analyze data. It includes a detailed description of the sampling process and the statistical techniques employed to ensure the reliability of the results.

3. The third part of the document presents the findings of the study. It shows that there is a significant correlation between the variables being studied, and that the results are consistent across different groups and time periods.

4. The fourth part of the document discusses the implications of the findings. It suggests that the results have important implications for policy-making and practice, and that further research is needed to explore the underlying causes of the observed trends.

5. The fifth part of the document concludes the study and provides a summary of the key points. It reiterates the importance of accurate record-keeping and the need for ongoing monitoring and evaluation of the system.

6. The sixth part of the document provides a list of references and sources used in the study. It includes a mix of academic journals, books, and government reports, all of which are cited in the text to support the findings and conclusions.

7. The seventh part of the document contains a list of appendices and supplementary materials. These include detailed data tables, charts, and graphs that provide a more in-depth look at the study's results and methodology.

8. The eighth part of the document is a final section that discusses the limitations of the study and offers suggestions for future research. It acknowledges that while the study provides valuable insights, there are still many questions that need to be answered, and that further work is needed to fully understand the complex nature of the phenomena being studied.

APPENDIX F
CODE TRANSLATION

The BSC 1 software accommodates two specific 8-bit transmission code sets.

1. EBCDIC (Extended Binary Coded Decimal Interchange Code), with 256 assignment positions.
2. USASCII (United States of America Standard Code for Information Interchange), with 128 assignment positions. (Also referred to as the ASCII code set.)

The BSC 1 code translation tables are contained in the emulator microcode modules. Wang Laboratories, Inc. does not support user access to the microcode translation tables. Tables F-1 and F-2 illustrate the EBCDIC and ASCII character sets, with hex code assignments for each character.

ASCII-to-EBCDIC Code Translation

Before transmission in the non-transparent mode, data is converted from ASCII to EBCDIC as follows.

1. The following characters are converted to NUL (HEX 00) to avoid possible interference with data link control characters: RS (IRS), US (IUS), ETB, ETX, ENQ, SYN, DLE.
2. All other ASCII control characters have EBCDIC counterparts and are converted to the equivalent EBCDIC code: ACK, SOH, STX, EOT, NAK, NUL, SUB, ESC, DEL, BEL, EM, FS (IFS), GS (IGS), SP, BS, HT, CR, LF, VT, FF, SO, SI, DC1, DC2, DC3, DC4.
3. ASCII graphic characters having EBCDIC counterparts are converted to the equivalent EBCDIC code.
 - a. Alphanumeric characters: A through Z, a through z, 0 through 9
 - b. Punctuation symbols: . ? : ; , " ' _
 - c. Common special graphics: # \$ % & * / @ + - = () _
 - d. Other special graphics: <> {} \ (grave accent) ~ (tilde)
| (split vertical line)

4. ASCII graphic characters having no EBCDIC equivalents are converted as follows.

<u>ASCII graphic</u>	<u>EBCDIC character</u>
(up arrow)	¬ (logical NOT symbol)
[(left bracket)	ø (cent sign)
] (right bracket)	(logical OR symbol)

EBCDIC-to-ASCII Code Translation

After reception in the standard mode (non-transparent), data is converted from EBCDIC to ASCII as follows.

1. EBCDIC control characters having no ASCII counterparts are converted to NUL (HEX 00): PF, LC, RLF, SMM, RES, NL, IL, CC, DS, SOS, RS, BYP, SM, FS, PN, UC.
2. EBCDIC characters having no control or graphic assignments are converted to NUL (HEX 00).
3. EBCDIC control and graphic characters having ASCII counterparts are converted to the equivalent ASCII code. (See the characters listed under 2 and 3 in the ASCII-to-EBCDIC translation list.) The characters RS(IRS), US(IUS), ETB, ETX, ENQ, SYN, and DLE are not legal data characters and do not occur in received data.
4. EBCDIC graphic characters having no ASCII counterparts are converted as follows.

<u>EBCDIC character</u>	<u>ASCII graphic</u>
¬ (logical NOT symbol)	(up arrow)
ø (cent sign)	[(left bracket)
(logical OR symbol)] (right bracket)

NOTE

Wang 2200 Series terminals and printers use the ASCII code set. Some peripherals may not display all EBCDIC or ASCII graphic characters. Furthermore, substitute graphic characters may be displayed. For details, refer to the manual that accompanies the particular peripheral.

Table F-1. ASCII Code

	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
0_	NUL	SOH	STX	ETX	EOT	ENQ	ACK	BEL	BS	HT	LF	VT	FF	CR	SO	SI
1_	DLE	DC1	DC2	DC3	DC4	NAK	SYN	ETB	CAN	EM	SUB	ESC	FS	GS	RS	US
2_	sp	!	"	#	\$	%	&	'	()	*	+	,	-	.	/
3_	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
4_	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
5_	P	Q	R	S	T	U	V	W	X	Y	Z	[\]		_
6_	.	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
7_	p	q	r	s	t	u	v	w	x	y	z	{		}	~	DEL

NOTE

The notation "sp" is used in Table F-1 to represent the space character (HEX 20).

ASCII Control and Function Characters

- | | | | |
|-----|-------------------------------------|-----|-------------------------|
| ACK | Acknowledgment (positive) | GS | Group Separator |
| BEL | Bell (audible signal) | HT | Horizontal Tab |
| BS | Backspace | LF | Line Feed |
| CAN | Cancel | NAK | Negative Acknowledgment |
| CR | Carriage Return | NUL | Null |
| DC1 | Device Control 1 (X-ON) | RS | Record Separator |
| DC2 | Device Control 2 (PN for Punch On) | SI | Shift In |
| DC3 | Device Control 3 (X-OFF) | SO | Shift Out |
| DC4 | Device Control 4 (PF for Punch Off) | SOH | Start of Header |
| DEL | Delete | STX | Start of Text |
| DLE | Data Link Escape | SUB | Substitute |
| EM | End of Medium | SYN | Synchronous Idle |
| ENQ | Enquiry | US | Unit Separator |
| EOT | End of Transmission | VT | Vertical Tab |
| ESC | Escape | | |
| ETB | End of Transmission Block | | |
| ETX | End of Text | | |
| FF | Form Feed | | |
| FS | Field or File Separator | | |

Table F-2. EBCDIC Code

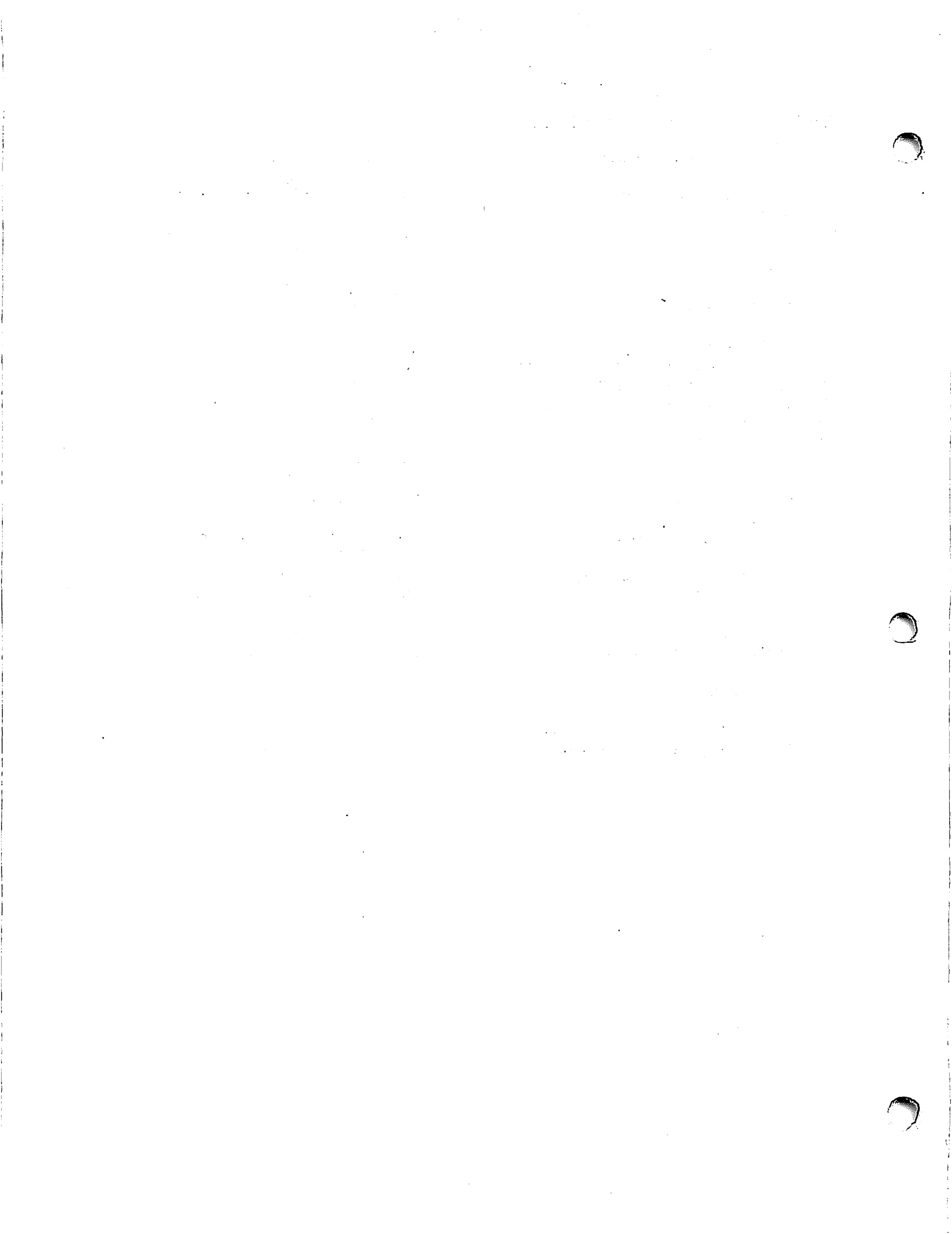
	_0	_1	_2	_3	_4	_5	_6	_7	_8	_9	_A	_B	_C	_D	_E	_F
0_	NUL	SOH	STX	ETX	PF	HT	LC	DEL		RLF	SMM	VT	FF	CR	SO	SI
1_	DLE	DC1	DC2	DC3	RES	NL	BS	IL	CAN	EM	CC		IFS	IGS	IRS	IUS
2_	DS	SOS	FS		BYP	LF	ETB	ESC			SM			ENQ	ACK	DEL
3_			SYN		PN	RS	UC	EOT					DC4	NAK		SUB
4_	sp										¢	.	<	(+	
5_	&										!	\$	*)	;	-
6_	-	/										,	%	_	>	?
7_										.	:	#	@	'	=	"
8_		a	b	c	d	e	f	g	h	i						
9_		j	k	l	m	n	o	p	q	r						
A_		~	s	t	u	v	w	x	y	z						
B_																
C_	{	A	B	C	D	E	F	G	H	I						
D_	}	J	K	L	M	N	O	P	Q	R						
E_	\		S	T	U	V	W	X	Y	Z						
F_	0	1	2	3	4	5	6	7	8	9						

NOTE

The notation "sp" is used in Table F-2 to represent the space character (HEX 40).

EBCDIC Control and Function Characters

ACK	Acknowledgment (positive)	IL	Idle
BEL	Bell (audible signal)	IRS	Interchange Record Separator
BS	Backspace	IUS	Information Unit Separator
BYP	Bypass	LC	Lowercase Shift
CAN	Cancel	LF	Line Feed
CC	Cursor Control	NAK	Negative Acknowledgment
CR	Carriage Return	NL	New Line
DC1	Device Control 1 (X-ON)	NUL	Null
DC2	Device Control 2 (PN for Punch On)	PF	Punch Off
DC3	Device Control 3 (X-OFF)	PN	Punch On
DC4	Device Control 4 (PF for Punch Off)	RES	Restore
DEL	Delete	RS	Record Separator
DLE	Data Link Escape	SI	Shift In
DS	Digit Select	SM	Set Mode
EM	End of Medium	SMM	Start Manual Message
ENQ	Enquiry	SO	Shift Out
EOT	End of Transmission	SOH	Start of Header
ESC	Escape	SOS	Start of Significance
ETB	End of Transmission Block	STX	Start of Text
ETX	End of Text	SUB	Substitute
FF	Form Feed	SYN	Synchronous Idle
FS	Field or File Separator	UC	Unit Shift
HT	Horizontal Tab	VT	Vertical Tab
IFS	Interchange Field Separator		
IGS	Interchange Group Separator		



APPENDIX G
SOFTWARE PRINTER VERTICAL FORMAT CONTROL

The BSC 1 software provides several user-selectable printer vertical tape formats for the 2780, 3780, and 3741 emulations. The variable formats can be used, for example, to format received data for on-line printing on special forms. These formats can be selected for use or modified on-line (if necessary) during emulator operation. The formats can also be permanently modified off-line if necessary.

NOTE

The software-controlled printer vertical tape formats are enabled only with Wang printers that use vertical format control tapes. The BSC 1 software printer vertical format option should be disregarded if such a printer is not in use.

The printer vertical tape format option can be accessed from the Attention mode display if SF'12 is pressed. If the configuration being used specifies reception to printer and disk, Lines 1 and 2 of the Attention mode display appear as follows.

ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0=CONTROL '1=OPEN RCV FILE '2=ERASE FILE '12=PRT FMT TAPE

If the configuration being used specifies reception to printer only, Lines 1 and 2 of the Attention mode display appear as follows.

ACTIVE KEYBOARD CONTROLS---2200 MVP BATCH EMULATOR
'0=CONTROL '12=PRT FMT TAPE '13=FF '14=VT '15=LF

NOTE

The printer vertical format tape option is disabled if, during configuration, Option 2 (Printer and Disk) was chosen for the Receive To parameter, and Option 2 (via On Error) was chosen for the Disk Access Method parameter.

Press SF'12 to access the printer vertical format tape option. The display in Figure G-1 then appears.

```

ACTIVE KEYBOARD CONTROLS----2200 MVP BATCH EMULATOR

0= Default printer tape    2= User format tape 2
1= User format tape 1     3= User format tape 3

See lines 6272, 6274, and 6276 for tape formats.
Refer to user manual for instructions.
Key 0, 1, 2, or 3 for printer format tape.

---MODEM SIGNALS---    BLOCKS    BLOCKS
DTR DSR RTS CTS CAR    SENT      RECD      --MODE--
*                               ATTENTION

```

Figure G-1. Vertical Printer Format Display

If 0 is pressed, the software does not control the printer vertical tape format. (Vertical format is controlled by the vertical format tape in the printer.) If 1, 2, or 3 is pressed, however, the emulator imposes one of the three software-controlled vertical formats, overriding the printer's vertical format tape. After a valid response is entered, the emulator returns to Control mode.

The printer control tape formats are contained in Program Lines 6272, 6274, and 6276. These lines, which indicate the options for software vertical printer format control, appear as follows in a BSC 1 program listing if the LISTD command is used.

```

-6272 STR(X9$( ),1)="    A          B    C    D    E    F M"
      : RETURN

-6274 STR(X9$( ),1)="    A          B          C    D    E    F    M"
      : RETURN

-6276 STR(X9$( ),1)="    A    B          C    D          E    F    M"
      : RETURN

```

NOTE

Line 6272 shows the format settings for Option 1. Line 6274 shows the format settings for Option 2. Line 6276 shows the format settings for Option 3. No format setting is shown for Option 0.

In these program lines, the placement of the format control letters (A through F, and M) represents the vertical line positions of a vertical format tape. If Option 0 is chosen for the software-controlled vertical format tape, any printer control commands that occur during data reception initiate vertical formatting controlled by the printer's vertical format tape. However, if Option 1 is chosen, any printer control commands that occur during data reception initiate vertical formatting according to the stops set in Line 6272. If the Option 1 format is used, any control code initiating a "skip to C" causes the printer to skip to the line represented by the C setting in the Option 1 format. Table G-1 presents the printer line skips produced by Options 1, 2, and 3. (Option 0 enables the printer's vertical format tape.)

Table G-1. Vertical Printer Control Line Skips

Format	Printer Format Symbol						
	A	B	C	D	E	F	M
1	Line 5	Line 22	Line 27	Line 31	Line 35	Line 38	Line 40
2	Line 4	Line 12	Line 22	Line 27	Line 30	Line 34	Line 40
3	Line 2	Line 7	Line 17	Line 23	Line 30	Line 35	Line 40

The vertical printer tape formats can be modified to accommodate user printer format requirements (for applications such as forms-filling). The formats can be modified temporarily during emulator operations, or permanently in an off-line operation.

NOTE

Modifications to the BSC 1 software should not be performed on the BSC 1 master software diskette received from Wang Laboratories, Inc. Instead, any modifications should be performed on a backup copy. Wang Laboratories, Inc. does not support user modifications to the master software diskette. Refer to Section 1.4 for information on making backup copies of the master software diskette.

It may be necessary to examine the software printer tape formats during operation, or to modify one or more of these printer tape formats temporarily during emulator operation. In order to perform either of these activities, use the following sequence of commands to display Program Lines 6272, 6274, and 6276.

1. Press HALT
2. Press RETURN
3. Enter LISTD 6272,6276
4. Press RETURN

These lines can now be modified by using standard BASIC-2 editing procedures. (For information on the BASIC-2 Edit mode, consult the Wang BASIC-2 Language Reference Manual, 700-4080). The positions of the printer format symbols (A through F and M) in the program lines can be changed to indicate the desired vertical printer format line skips. Note that any changes made on-line in this manner are in effect only as long as the emulator is in operation.

To return to emulator operation, press RUN, then press RETURN. The emulator returns to the Control mode display.

To permanently modify any of the printer control formats, load the appropriate BSC 1 program module (as in Step 4, following), modify the program lines, and save the modified program back onto the duplicate software diskette. There are two program modules that allow access to the printer format options.

1. "CIOVDPSS" -- This module is accessed if Option 2 (Printer and disk) was selected as the Receive To parameter during the configuration process.
2. "CIO*110" -- This module is accessed if Option 1 (All Streams To Printer) was selected as the Receive To parameter during the configuration process.

The following steps should be followed for program module modification.

1. Place a duplicate BSC 1 software diskette in an available diskette drive on the 2200 system. (Do not use the master software diskette received from Wang Laboratories, Inc. Refer to Section 1.4 for instructions on preparing a duplicate BSC 1 diskette.)
2. Enter CLEAR and RETURN to clear partition memory.
3. Use the SELECT statement to select the diskette drive containing the BSC 1 diskette.
4. Load the appropriate BSC 1 program module.
 - a. To modify the program module that controls printer and disk receive, enter LOAD T "CIOVDPSS" and press RETURN.
 - b. To modify the program module that controls printer receive only, enter LOAD T "CIO*110" and press RETURN.
5. Enter LISTD 6262,6276 and press RETURN
6. Modify any or all of the lines (6272, 6274, and 6276), using standard BASIC-2 editing procedures.

7. Save the modified program module.

- a. To modify the program module that controls printer and disk receive, enter SCRATCH T "CIOVDPSS": SAVE T("CIOVDPSS" and press RETURN.
- b. To modify the program module that controls printer receive only, enter SCRATCH T "CIO*110": SAVE T("CIO*110" and press RETURN.

The modified program module replaces the original program module. The modifications made are selectable any time the appropriate emulation is run.

CAUTION

Load only the program module to be modified into the 2200 partition during this procedure. The BSC 1 software makes extensive use of program overlays; if another module is overlaid onto the module being modified, the modified program module may not fit back into the disk space allotted to it on the BSC 1 software diskette, and a disk error may occur. If this happens, the original module has been scratched prior to the SAVE command, and the BSC 1 diskette is no longer fully operational. For this reason, permanent modifications should only be performed off-line on a duplicate copy of the BSC 1 software (refer to Section 1.4 for instructions), and Step 2 of the modification procedure (clearing partition memory) must be performed.

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