SPUR PRODUCTS CORPORATION

SB/2K EXPRESS–CENTRONICS

REFERENCE MANUAL	PART #
SB/2K EXPRESS CENTRONICS TO XEROX	A12774-C1X
SB/2K EXPRESS CENTRONICS TO XEROX	A12774-C2X
SB/2K EXPRESS CENTRONICS TO IBM 3211	A12774-CIA
SB/2K EXPRESS CENTRONICS TO IBM 3800	A12774-C1B
SB/2K EXPRESS WANG TO XEROX	A12774-W0X
SB/2K EXPRESS HP400 TO XEROX	A12774-F1X
SB/2K EXPRESS NCR TOWER TO XEROX	A12774-R1X

REVISED 6/18/98

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Anhang 2 zur Anlage 1 zur AmtsblVfg 243/1991

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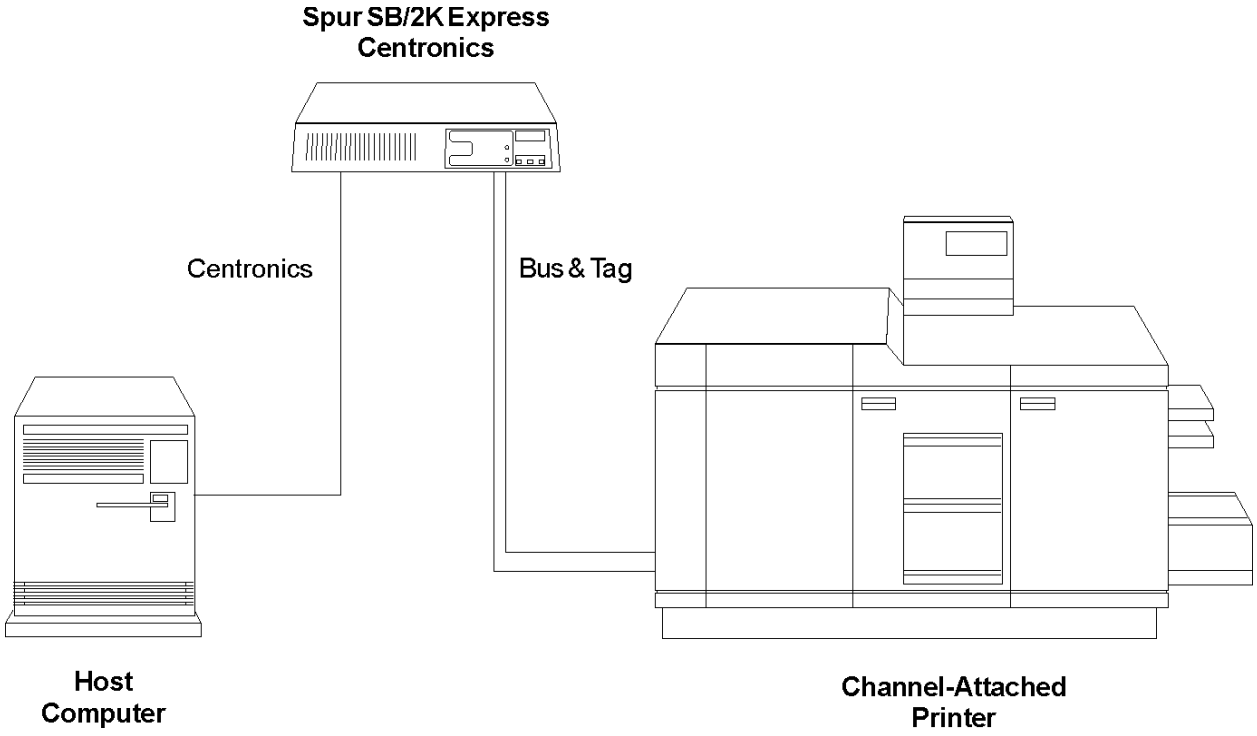
CONTENTS

CHAPTER 1—INTRODUCTION

FUNCTIONAL DESCRIPTION

The Spur SB/2K Express Centronics system allows a host computer that supports a parallel centronics interface to drive a high-speed channel-attached printer, such as a Xerox-centralized printer, an IBM 3211-compatible printer, or an IBM 3800-compatible printer.



The SB/2K Express Centronics family consists of seven similar, yet separate products. They are:

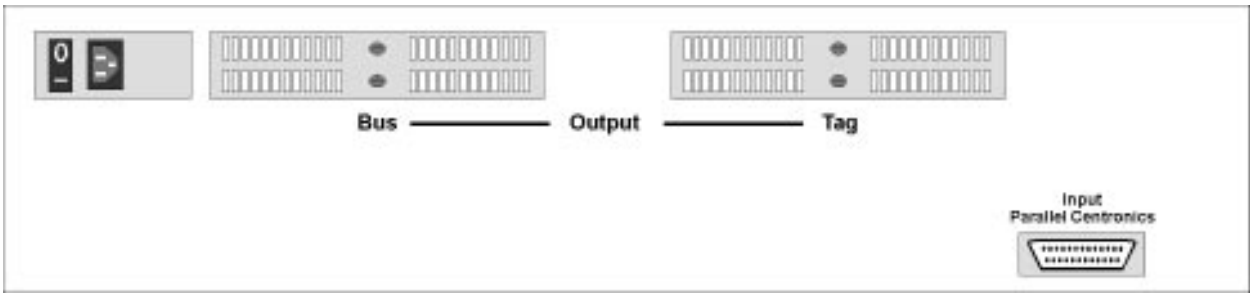
- SB/2K Express Centronics to Xerox (P/N TOPA12768-C1X)
- SB/2K Express Centronics to Xerox (P/N TOPA12768-C2X)
- SB/2K Express Centronics to IBM 3211 (P/N TOPA12768-C1A)
- SB/2K Express Centronics to IBM 3800 (P/N TOPA12768-C1B)
- SB/2K Express Wang to Xerox (P/N TOPA12768-W0X)
- SB/2K Express HP400 to Xerox (P/N TOPA12768-F1X)
- SB/2K Express NCR Tower to Xerox (P/N TOPA12768-R1X)

This manual provides information about all of them. In general, the chapters present information that is common between the products and the appendixes provide product-specific information.

INTERFACES

The SB/2K Express Centronics provides the following connections:

- Parallel Centronics input port
- Bus and Tag output ports



INPUT POWER RANGE

The SB/2K Express Centronics supports an input power range of 110 to 230 VAC.

MANUAL OVERVIEW

This manual provides the information you need to place a Spur SB/2K Express Centronics system into operation, including hardware installation, cabling, and software configuration. It is organized as follows:

Chapter	Description
Chapter 1—Introduction	Describes the functions and capabilities of the SB/2K Express Centronics, describes product requirements, lists the items supplied with the unit, and provides an overview to installing the unit.
Chapter 2—Hardware Installation and Configuration	Describes how you install the SB/2K Express Centronics' hardware.
Chapter 3—Using SB/2K Express Centronics with Xerox and IBM 3211 Systems	Describes the different operating modes for the SB/2K Express Centronics when working in Xerox or IBM 3211-compatible environments.
Chapter 4—Using SB/2K Express Centronics with IBM 3800 Systems	Describes the different operating modes for the SB/2K Express Centronics when working in IBM 3800-compatible environments.

Chapter	Description
Chapter 5—Troubleshooting	Describes ways to identify the cause of operating problems and suggests actions to resolve them.
Appendix A—Printer Configuration	Describes printer-specific installation and configuration issues.
Appendix B—ASCII-to-EBCDIC Translation Tables	Provides the SB/2K Express Centronics internal ASCII-to-EBCDIC translation for each product type.
Appendix C—Cabling Issues	Describes cabling considerations and options you should be aware of when installing an SB/2K Express Centronics.
Appendix D—SB/2K Express Centronics DIP Switch Settings	Describes DIP switch settings (on an internal board) which control the SB/2K Express Centronics' operation modes.

CHAPTER 2—HARDWARE INSTALLATION AND CONFIGURATION

The instructions in this chapter enable you to install the SB/2K Express Centronics and prepare it for print operations. In addition, steps to configure the Xerox printer for use with the SB/2K Express Centronics are provided.

OVERVIEW OF THE SB/2K EXPRESS CENTRONICS HARDWARE INSTALLATION

The hardware installation of the SB/2K Express Centronics consists of the following steps:

- Select an appropriate location for the SB/2K Express Centronics.
- Unpack the hardware, check the contents against the packing list, and inspect for damage during shipping.
- Place the SB/2K Express Centronics on an appropriate flat surface (minimum dimensions of 18” × 21”).
- Configure the host computer.
- Configure the printer.
- Connect the power cord to rear of the unit, then to an AC power outlet.
- Connect the parallel cable from the host computer to the SB/2K Express Centronics.
- Connect the Bus and Tag cables from the SB/2K Express Centronics to the printer.
- Connect the terminators to the printer.
- Print from the host computer.

PREPARING FOR THE INSTALLATION

Before you begin the installation, make sure that the site you have chosen meets the following requirements:

- Adequate space
- Environment
- Power source
- Cabling

SPACE REQUIREMENTS

A 18" × 21" flat, stable surface, such as a shelf or desktop, must be available. You can locate the SB/2K Express Centronics in a variety of environments, including an office or computer room, provided the environmental requirements are met: 40 to 105ºF (5 to 40º C); 5 to 90 percent humidity, noncondensing.

To reduce the possibility of dust entering the SB/2K Express Centronics and to allow easy inspection of the its front panel lights, make sure that the SB/2K Express Centronics is located at an optimum distance, preferably not less than 18 inches (45 cm) from the floor.

ENVIRONMENT REQUIREMENTS

Make sure that the location you choose for the SB/2K Express Centronics meets the environmental criteria listed above. Do not choose a location where the SB/2K Express Centronics will be exposed to direct sunlight or subjected to vibration.

POWER SOURCE REQUIREMENTS

A grounded AC power outlet must be located within 6 feet of the SB/2K Express Centronics. You may use a UL-approved, 3-prong extension cord, if necessary, provided it has sufficient current and voltage. The SB/2K Express Centronics automatically adapts for operation at 110 or 230 VAC.

NOTE: Do not plug the SB/2K Express Centronics into the printer's internal accessory power outlet.

CABLING REQUIREMENTS

Hardware installation of the SB/2K Express Centronics requires the following cables:

Cable Type	Description
Power supply cord	Required for connecting the SB/2K Express Centronics to power source. A 110V power supply cord is provided with the SB/2K Express Centronics. For 230V usage, refer to Appendix C for cord specifications.
Parallel printer cable	Required for connecting the SB/2K Express Centronics to the host computer.
IBM serpentine ("Bus & Tag") cable assemblies (#5353920)	Required for connecting the SB/2K Express Centronics to the high-speed printer.
IBM terminator ("Bus & Tag") assemblies (#5440649 & 5440650)	Required for proper operation.

HOST CONFIGURATION

Configure the host computer to send variable-length ASCII text to its printer port.

PRINTER CONFIGURATION

Since the SB/2K Express Centronics supports three different types of printers, configuration and setup will depend on requirements unique to each printer. Please refer to *Appendix A, Printer Configuration,* and configure your printer according to the setup information that is appropriate for your system.

Verify that your printer functions properly by having manufacturer-authorized personnel perform the printer's internal diagnostics.

HARDWARE INSTALLATION

UNPACK AND INSPECT THE SB/2K EXPRESS CENTRONICS

Carefully unpack the SB/2K Express Centronics from its shipping carton. Inspect the contents and make sure that you received all items listed on the shipping order. Place all packing material back into the shipping carton and save these items. Should you ever need to return the SB/2K Express Centronics to Spur Products Corporation, you should do so using the original carton.

If the SB/2K Express Centronics has been damaged in shipping or any parts are missing, notify Spur Products immediately at (208) 377-0001.

PLACE SB/2K EXPRESS CENTRONICS ON FLAT SURFACE

Place the SB/2K Express Centronics on the flat, stable surface you have chosen for its location.

CONNECT THE POWER CABLE

The SB/2K Express Centronics automatically adapts for 110V or 230V operation. Connect the power cord to the SB/2K Express Centronics by inserting it into the AC power receptacle on the rear of the SB/2K Express Centronics.

NOTE: A 110V power cord is provided with the SB/2K Express Centronics. For 230V usage, please refer to the requirements listed in Appendix C.

Plug the other end of the cord into a grounded 3-prong AC power outlet (or a UL-approved extension cord with sufficient capacity which is then plugged into a suitable outlet).

NOTE: Do not power on the SB/2K Express Centronics at this point.

CONNECT THE DEVICE CABLES

Spur Products Corp. recommends that you label all cables with the name of the device to which it connects and the number of the port you have assigned to it. This way, if the cable is removed for any reason, you can easily reconnect it.

Parallel Cable—Connect the host computer to the SB/2K Express Centronics using a standard 25-pin parallel Centronics cable no longer than 25 feet (7.62 meters).

Bus and Tag Cables—You will need two (2) IBM Serpentine ("Bus and Tag") Cable Assemblies long enough to connect the SB/2K Express Centronics to the printer. Note that one end of each serpentine cable is colored dark gray (or black) while the other end of the cable is light gray (or white).

Connect the dark gray end of each serpentine cable to the SB/2K Express Centronics and the light gray end of the cable to your printer.

Bus and Tag Terminators—Connect the IBM Bus & Tag terminators to the printer's "Bus Out" and "Tag Out" ports.

VERIFY A SUCCESSFUL INSTALLATION

You are now ready to apply power to the SB/2K Express Centronics. Plug the power cable into a wall outlet and attach the cable to the SB/2K Express Centronics connector labeled "Power".

NOTE: If the SB/2K Express Centronics boots successfully, but does not display "Online*" in the LCD message window located in the upper right of the front panel, you will need to troubleshoot for the message that is displayed. Refer to *Chapter 5, Troubleshooting*, for descriptions of LCD messages and their causes.

CHAPTER 3—USING THE SB/2K EXPRESS WITH XEROX AND IBM 3211-COMPATIBLE PRINTERS

The SB/2K Express Centronics' modes of operation fall into four general categories:

- Power-On Mode – internal diagnostics, automatic printer configuration
- Online Operation – automatic operation; the SB/2K Express Centronics' default
- Offline Operation – used to manually configure the printer
- Test Modes – used to send a test pattern to the printer, perform dumps of the incoming datastream, and to measure throughput

In this manual, a device is considered "offline" if it is not logically connected to the "preceding" device in the chain. For example, when the SB/2K Express Centronics is "offline", communication with the host computer is disabled; but communication between the SB/2K Express Centronics and the printer can still occur.

POWER-ON MODE

When the SB/2K Express Centronics is powered-on, the SB/2K Express Centronics performs a series of internal diagnostic tests. If these tests are completed successfully, the SB/2K Express Centronics displays the following message:

```
PASSED SELF TEST
```

Because of its internal switch settings, the SB/2K Express Centronics then automatically configures the printer by sending the following loads:

- Load the Universal Character Set Buffer (UCSB) with an upper and lower case train image (T-11)
- Load the Forms Control Buffer (FCB) with a 66 line form at 6 lines per inch

If these loads are successful, the SB/2K Express Centronics then goes online with the host computer. The SB/2K Express Centronics will indicate that it is in Online Mode by displaying the following message:

```
ONLINE*
```

ONLINE OPERATION

When the SB/2K Express Centronics displays the message "ONLINE*", the SB/2K Express Centronics is "online" with the host computer. When the SB/2K Express Centronics is online, the host can perform the following:

- Normal Printing
- Universal Character Set Buffer (UCSB) Loads
- Forms Control Buffer (FCB) Loads
- Special Data Transfers (such as downloading files and fonts to the printer)

Some of the activities listed above will require the use of the SB/2K Express Centronics' special modes of operation (see "Special Modes of Operation").

NORMAL PRINTING

During normal printing, the SB/2K Express Centronics converts all incoming data and ASCII control characters to EBCDIC and transmits this data to the printer using the IBM multiplex channel in "burst" mode, converting all Line Feeds, Form Feeds, etc. to "Space" or "Skip Immediate" commands.

SB/2K EXPRESS CENTRONICS ASCII-TO-EBCDIC TRANSLATION

Most host systems transmit ASCII datastreams to their parallel centronics port, while most channel-attached printers use the EBCDIC character set. For example, when the SB/2K Express Centronics receives an ASCII "A" (X'41) from the host, it transmits an EBCDIC "A" (X'C1) to the printer. For more information about the SB/2K Express Centronics' internal ASCII-to-EBCDIC translation, refer to the appropriate table in *Appendix B, ASCII-to-EBCDIC Translation Tables*.

NOTE: Custom translation table PROMs are available for an additional charge from the manufacturer.

LOADING THE UCSB

The UCSB load is normally used in IBM 3211 environments to filter non-printable characters from the data stream. In Xerox environments all characters are considered printable; consequently UCSB loads are usually "ignored." The SB/2K Express Centronics' internal ROMs contain two user-selectable UCSB loads.

When necessary, the UCSB may be loaded in one of three ways:

- **OFFLINE**: You may select either the "LOAD UCSB A" or "LOAD UCSB B" options from the SB/2K Express Centronics' "OFFLINE LOADS" submenu (see "Offline Loads").
- **AUTO-LOAD UCSB**: When online, the SB/2K Express Centronics will automatically load the UCSB with one of the train images when instructed to do so. To activate this mode, transmit one of the following two-byte escape sequences as the first two bytes in any line of print:

Mode	Escape Sequence
Auto-load UCSB A	1F 46
Auto-load UCSB B	1F 47

- **USER-LOAD UCSB**: You can perform an UCSB load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING THE FCB

The Forms Control Buffer (FCB) defines the locations of the channels used in "Skip to Channel" commands. FCB loads are required in IBM 3211 environments, but are usually "ignored" in Xerox environments.

The SB/2K Express Centronics' internal ROMs contain two user-selectable FCB loads. To redefine the printer's default channel assignments, the user may reload the Forms Control Buffer (FCB). This can be implemented in one of three ways:

- **OFFLINE**: You may select either the "LOAD FCB A" or "LOAD FCB B" options from the SB/2K Express Centronics' "OFFLINE LOADS" submenu (see "Offline Loads").

- **AUTO-LOAD FCB MODE**: When online, the SB/2K Express Centronics will automatically load the FCB with one of its forms images when instructed to do so. To activate this mode, transmit one of the following two-byte escape sequences as the first two bytes in any line of print:

Mode	Escape Sequence
Auto-load FCB A	1F 48
Auto-load FCB B	1F 49

- **USER-LOAD FCB MODE**: You can perform an FCB load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

SPECIAL DATA TRANSFER MODES

Certain types of data transfers, such as downloading fonts or performing FCB loads, require special processing. Most of these "special" data transfers require access to all 256 EBCDIC codes and all possible Channel Command Words (CCWs).

The SB/2K Express Centronics is not an entirely transparent device in that certain codes are interpreted as control characters. Reserved characters such as Line Feeds, Form Feeds, and Carriage Returns do not normally pass freely through the SB/2K Express Centronics. The SB/2K Express Centronics provides three methods for bypassing its normal data interpretation:

- **Transparent Data Transfer Mode** (also referred to as "**Transparent Mode**"). This mode is used to send data transparently to the printer, and is typically used to perform "loads".

- **Hexadecimal Data Transfer Mode** (also referred to as "**Hex-Dump Mode**"). This mode is an alternate method of sending data transparently to the printer using a hexadecimal format. This method can be used by hosts that have difficulty transmitting "binary" data to their parallel port.

- **Midline Hex-Dump Mode**. This mode temporarily places the SB/2K Express Centronics in Hexadecimal Data Transfer Mode in the middle of a line, and is typically used to embed short escape sequences into the datastream that the printer receives.

NOTE: Transparent Mode, Hex-Dump Mode and Midline Hex-Dump Mode can be used to transmit non-printable characters to the printer.

Before continuing the discussion of these special modes of operation, first consider a typical data transfer using IBM Channel protocol:

- The channel control unit (in this case, the SB/2K Express Centronics) first issues a Channel Command Word (CCW) to the printer. The CCW tells the printer how to handle the data which is about to follow.

- The SB/2K Express Centronics then transfers the data to the printer. The printer then processes the data in the manner specified by the CCW.

During normal printing, the SB/2K Express Centronics generates all necessary Channel Command Words by monitoring the data stream for certain control characters. When the SB/2K Express Centronics encounters these special characters, it then issues the corresponding CCWs to the printer.

The SB/2K Express Centronics ceases its interpretation of these control characters while in its Transparent or Hex-Dump modes of operation. **This means that you must also supply a CCW to be issued to the printer as part of the escape sequence invoking these special modes of operation.** Your printer manual should contain a list of acceptable CCWs and descriptions of the associated data transfer formats.

Transparent Mode

Transparent Mode is activated by transmitting the following five-byte escape sequence as the first five bytes in any line of print:

```
Transparent Mode      1F 4B [CCW] [MSB] [LSB]
```

`[CCW]` is the command word that will be passed on to the device. The SB/2K Express Centronics will remain in Transparent Mode until the number of bytes specified in the `[MSB]/[LSB]` portion of the escape sequence have been transmitted. The actual number of bytes equals (256 x `[MSB]`) + `[LSB]` and ranges from 1 to 65535 bytes (0000 - FFFF).

For example, to transfer 128 bytes (X'0080) of data to the printer along with the command "Write & Space 1" (X'09), the 5-byte escape sequence would be as follows:

```
Transparent Mode      1F 4B 09 00 80
```

The SB/2K Express Centronics would remain in this mode until 128 bytes have been received from the host computer.

While in Transparent Mode (until the [MSB]/[LSB] counters have been satisfied) the following rules apply:

- The [CCW] portion of the escape sequence must be a valid "Write" or "Load" type of command. No error checking of this command takes place in the SB/2K Express Centronics.

- The [MSB]/[LSB] portion of the escape sequence must not exceed the maximum number of bytes that the attached device can accept in a single burst. Any attempt to transfer a number of bytes greater than the device can handle will result in a truncation of the data transfer. However, the SB/2K Express Centronics will continue to accept data until the number of bytes equals the [MSB]/[LSB] portion of the escape sequence.

  The only method of prematurely exiting the Transparent Mode of operation is to do the following:

  - Stop transmitting data to the SB/2K Express Centronics from the host.

  - Temporarily take the printer attached to the SB/2K Express Centronics offline.

  - Press the SB/2K Express Centronics' <Clear> switch.

Sample FCB Load

To demonstrate the Transparent Mode in greater detail, this Subsection illustrates a typical Forms Control Buffer (FCB) load with the following features:

- The Channel Command Word (CCW) for loading the FCB is X'63.

- The length of the form is 66 lines (X'42) at six lines per inch.

- Channel 1 equals line 1 of the form.

- Channel 2 equals line 9 of the form.

- Channel 12 equals line 65 of the form.

- The last byte of the load contains a flag bit, indicating the end of the load.

To function properly, the printer must receive the following commands and data (in hexadecimal) from the SB/2K Express Centronics:

Command	Data									
63	01	00	00	00	00	00	00	00	02	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	0C	10				

In order to generate the FCB load described above, a host must transmit the following data stream (in hexadecimal) to the SB/2K Express Centronics:

1F	4B	63	00	42	01	00	00	00	00	00	00	00	02	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	0C	10									

Hex-Dump Mode

Hex-Dump Mode allows the user to transmit codes in two-byte hexadecimal format (all printable characters) which the SB/2K Express Centronics then concatenates into a single EBCDIC byte. For example, to send the byte X'01 to the printer while in Hex-Dump Mode, the user would transmit two bytes to the SB/2K Express Centronics: X'30 (an ASCII "0") and X'31 (an ASCII "1").

The actual escape sequence and format for the Hex-Dump Mode are as follows:

Command	Data Bytes	Description
Print & Spc 0	1F 4C {CCW} (no data)	Places the SB/2K Express Centronics into Hexadecimal Data Transfer Mode
Print & Spc 0	{Data} {Data} {Data}…	Carriage returns are ignored
Print & Spc 0	{Data} {Data} {Data}…	Carriage returns are ignored
Space 1Line	(no data)	Line feed terminates Hexadecimal Data Transfer Mode and returns the SB/2K Express Centronics to normal operation

NOTE: The braces around a particular byte indicate that the byte is to be transmitted by the host system as two hexadecimal digits. For example, the byte {FB} would be transmitted by the host system as an ASCII “F” and “B”.

{CCW} is the command word that will be passed on to the device. For example, if the CCW you wish to send is a “Load FCB” = X'63, transmit an ASCII “6” and “3” in the place of {CCW}. All lines of data must be sent using the host system's “Print and Space 0” command which suppresses the Line Feed character from being generated.

To terminate the transfer and exit Hex-Dump Mode, send the SB/2K Express Centronics a Line Feed. While in Hex-Dump Mode, the SB/2K Express Centronics ignores all Carriage Returns, allowing the user to transmit data in multiple print lines. Note that several print lines can be combined into one long data transfer to the printer as long as no Line Feeds are received by the SB/2K Express Centronics, signifying the end of the transfer.

The following rules also apply to data transfers using Hex-Dump Mode:

- The {CCW} portion of the escape sequence must be a valid “Write” or “Load” type of command.
- The length of the data transfer must not exceed the maximum number of bytes that the attached device can accept. Any attempt to transfer a number of bytes greater than the device can handle will result in a truncation in the data transfer. The SB/2K Express Centronics will however continue to accept data until the sequence is terminated by a Line Feed character.
- The actual escape sequence that places the SB/2K Express Centronics into Hex-Dump Mode must end with a X'0D.

Sample FCB Load

To demonstrate Hex-Dump Mode in greater detail, this Subsection performs the same typical Forms Control Buffer (FCB) load.

Again, the features of this sample FCB load are:

- The Channel Command Word (CCW) for loading the FCB is X'63.
- The length of the form is 66 lines at six lines per inch.
- Channel 1 equals line 1 of the form.
- Channel 2 equals line 9 of the form.
- Channel 12 equals line 65 of the form.
- The last byte of the load contains a flag bit, indicating the end of the load.

To function properly, the printer must receive the following commands and data (in hexadecimal) from the SB/2K Express Centronics:

Command	Data										
63	01	00	00	00	00	00	00	00	00	02	00
	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	0C	10

To generate the FCB load described previously, the host system must transmit the following print lines (in hexadecimal) to the SB/2K Express Centronics:

1F	4C	36	33	0D	30	31	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	32	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
30	30	30	30	30	30	C3	31	30	0A						

Midline Hex-Dump Mode

Midline Hex-Dump Mode allows the user to place the SB/2K Express Centronics into and out of Hex-Dump Mode in the middle of a line, **temporarily** bypassing the SB/2K Express Centronics' data interpretation. This mode of operation is typically used to imbed escape sequences for the printer in the middle of a print line.

There are two escape sequences for invoking Midline Hex-Dump Mode, depending on whether you are at the beginning of a line or in the middle of a line:

Escape Sequence	Description
1F	Used to invoke Midline Hexdump Mode in the middle of a line
1F 1F	Used to invoke Midline Hexdump Mode at the beginning of a line

In either case, a X'1F is also used to terminate Midline Hexdump Mode and return the SB/2K Express Centronics to normal operation.

While the SB/2K Express Centronics is in Midline Hex-Dump Mode, only pairs of valid hexadecimal characters (“0” to “F”) will be processed and sent to the printer. All other characters will be discarded by the SB/2K Express Centronics until the Midline Hex-Dump Mode is deactivated by a X'1F.

For example, let's say you want to send the following EBCDIC characters to the printer with an embedded two-byte escape sequence (X'FF, X'02):

```
ABC<FF><02>DEF
```

To generate the print line above, the host system must transmit the following ASCII datastream (shown in hexadecimal) to the SB/2K Express Centronics:

```
41   42   43   1F   46   46   30   32   1F   44   45   46   0D   0A
```

The printer will receive the following commands and data from the SB/2K Express Centronics:

Command	Data Bytes
Write & Spc.1	C1 C2 C3 FF 02 C4 C5 C6

To concatenate two short print lines into one long print line, activate the Midline Hex-Dump Mode at the end of the first print line by terminating the line with a X’1F. Any carriage control bytes at the end of the first print line will be ignored by the SB/2K Express Centronics, because they are not valid hexadecimal characters (“0” to “F”). Begin the next print line with 1F to deactivate Midline Hex-Dump Mode and to resume normal printing.

Occasionally, a printer may require an escape sequence at the beginning of a print line. To start a line already in Midline Hex-Dump Mode (to later drop back into normal print mode), transmit the following two-byte escape sequence to the SB/2K Express Centronics in the first four print positions of a line:

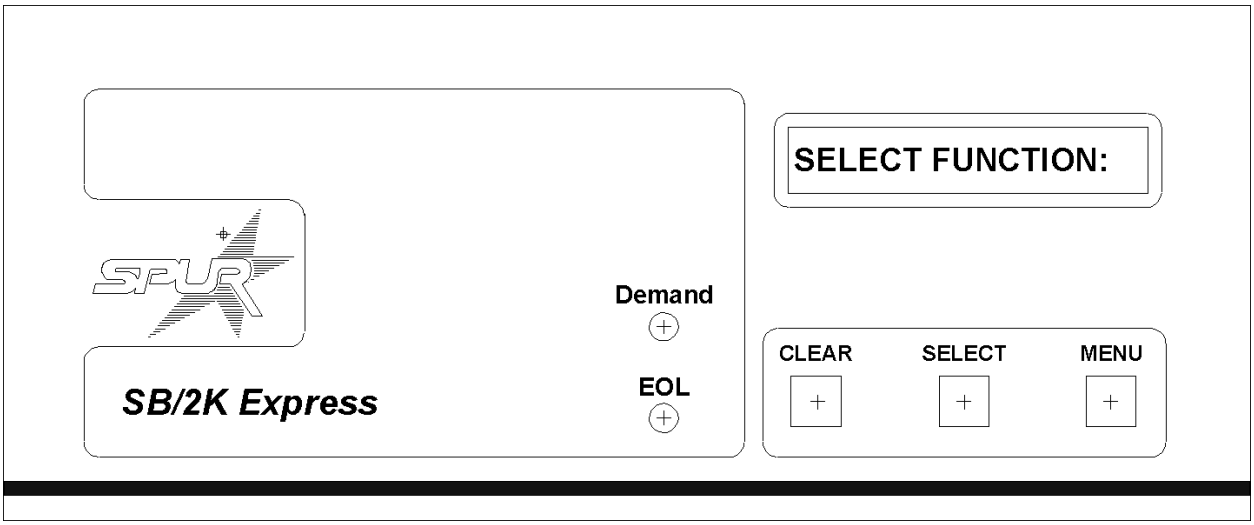
```
Midline Hex-Dump Mode      1F    1F
```

This causes the SB/2K Express Centronics to transmit a “Write & Space 0” command (01) to the printer and then enter Midline Hex-Dump Mode. Once the SB/2K Express Centronics is in Midline Hex-Dump Mode, only pairs of valid hexadecimal characters (“0” to “F”) will be processed and sent to the printer. The SB/2K Express Centronics will discard all other characters until the Midline Hex-Dump Mode is deactivated.

OFFLINE OPERATION

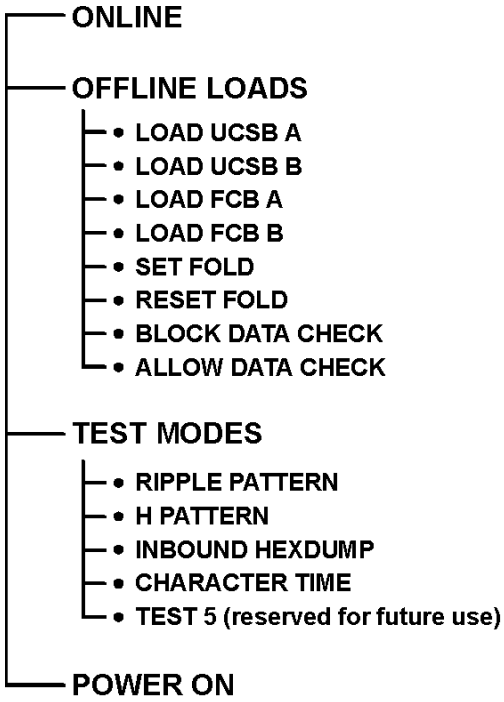
As described above, the SB/2K Express Centronics automatically goes online with the host computer when powered up. The SB/2K Express Centronics' menus allow you to manually perform printer initialization loads (UCSB and FCB). To access the SB/2K Express Centronics' menus, press the SB/2K Express Centronics' `<Clear>` key. Release this key, wait approximately 1 second, and then press and hold the `<Menu>` key.

The message "`SELECT FUNCTION`:" will appear on the SB/2K Express Centronics' display (as illustrated in the following figure):



MENU TREE

You can now use the <Menu> and <Select> keys to scroll through the SB/2K Express Centronic's menu items, enter submenus, and select functions as shown in the following menu tree:



OFFLINE LOADS

You can use the SB/2K Express Centronics' menus to perform various offline loads to configure the printer. For example, to Load FCB B from the SB/2K Express Centronics' internal ROMs press the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Select> (enters submenu)
• LOAD UCSB A	<Menu>
• LOAD UCSB B	<Menu>
• LOAD FCB A	<Menu>
• LOAD FCB B	<Select> (activates load)

Once a function has been "selected," the SB/2K Express Centronics will display an asterisk (*) after the function name to indicate that the mode is active. For example, "LOAD FCB B*" indicates that the SB/2K Express Centronics is in the process of loading FCB B from its internal ROMs.

TEST MODES

The SB/2K Express Centronics provides four Test Mode options:

- **Ripple Pattern** – used to send a ripple test pattern to the printer
- **H Pattern** – used to send a test pattern consisting of the character "H" to the printer
- **Inbound Hex-Dump Mode** – used to perform dumps of the incoming datastream
- **Character Time** – used to measure the SB/2K Express Centronics' throughput

Ripple Pattern

Selecting `Ripple Pattern` from the Test Mode submenu causes the SB/2K Express Centronics to send a sliding test pattern to the printer. If the SB/2K Express Centronics is Online (displaying the message "`ONLINE*`"), hold in the `<Clear>` switch for approximately 2 seconds, release the `<Clear>` switch and press and hold in the <Menu> switch until the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display.

The Ripple Pattern is then selected by pressing the following switches:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
• TEST MODES	<Select> (enters submenu)
• RIPPLE PATTERN	<Select>

Ripple Pattern causes the SB/2K Express Centronics to begin transmitting a sliding test pattern to the printer. If the SB/2K Express Centronics is successful in engaging the printer, an asterisk "*" will be placed after the mode, indicating that the mode has been activated:

```
RIPPLE PATTERN*
```

Wait about 3 seconds and then press the `<Menu>` key to end the sliding test pattern. The SB/2K Express Centronics will continue printing the test pattern until the current page is completed, and will then return to the "SELECT FUNCTION:" menu.

H Pattern

Selecting `H Pattern` from the Test Mode submenu causes the SB/2K Express Centronics to send a test pattern consisting 66 lines of the character "H" per page to the printer. If the SB/2K Express Centronics is Online (displaying the message "ONLINE*"), hold in the `<Clear>` switch for approximately 2 seconds, release the `<Clear>` switch and press and hold in the `<Menu>` switch until the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display.

The H Pattern is then selected by pressing the following switches:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
• TEST MODES	<Select> (enters submenu)
• RIPPLE PATTERN	<Menu>
• H PATTERN	<Select>

The SB/2K Express Centronics to begin transmitting the H test pattern to the printer. If the SB/2K Express Centronics is successful in engaging the printer, an asterisk "*" will be placed after the mode, indicating that the mode has been activated:

```
H PATTERN*
```

Wait about 3 seconds and then press the `<Menu>` key to end the test pattern. The SB/2K Express Centronics will continue printing until the current page is completed, and will then return to the "SELECT FUNCTION:" menu.

Inbound Hex-Dump Mode

Inbound Hex-Dump Mode provides a diagnostic utility used to view the datastream that the SB/2K Express Centronics is receiving from the host system. Frequently, data transmitted from the host may contain non-printable characters (escape sequences, etc.). Because these escape sequences are typically "invisible", it is sometimes very difficult to debug an application when problems occur.

If the SB/2K Express Centronics is Online (displaying the message "ONLINE*"), hold in the `<Clear>` switch for approximately 2 seconds, release the `<Clear>` switch and press and hold in the `<Menu>` switch until the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display.

Before activating Inbound Hex-Dump mode, verify that the printer is online and ready to print by sending a ripple test pattern (described above) to the printer. Wait about 3 seconds and then press the `<Menu>` key to end the sliding test pattern. The SB/2K Express Centronics will continue printing the test pattern until the current page is completed, and will then return to the "SELECT FUNCTION:" menu.

If you are using a Xerox printer, end the print job in progress by entering **ENDJOB** on the printer console. The console should display the following messages:

```
JOB xxxx HAS COMPLETED INPUT PHASE
RESUMING OUTPUT
JOB xxxx HAS COMPLETED PRINTING
```

The printer should now physically print the test patterns accumulated in the page buffer from the preceding step.

NOTE: DO NOT continue past this point until you have successfully printed the SB/2K Express Centronics' sliding test pattern.

Make sure the printer is started. If you are using a Xerox printer, enter **STA ,ONLINE** on the printer console. This causes the printer go "ready" and begin processing host commands. The Xerox console should display the following message:

```
"ON-LINE" INPUT IS WAITING FOR DATA
```

The SB/2K Express Centronics should still be displaying the "SELECT FUNCTION:" message.

To activate Inbound Hex-Dump Mode, press the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
• TEST MODES	<Select>
• RIPPLE PATTERN	<Menu>
• H PATTERN	<Menu>
• INBOUND HEX	<Select>

Once in Inbound Hex-Dump Mode, the SB/2K Express Centronics will transmit a hexadecimal representation of every byte received from the host, in a two-nibble format.

For example, if the host system transmits the following datastream to the SB/2K Express Centronics:

```
HELLO<CR><LF>
```

The SB/2K Express Centronics will send the following datastream to the printer:

```
48      45      4C      4C      4F      0D      0A
```

NOTE: While the SB/2K Express Centronics is in Inbound Hex-Dump Mode, the SB/2K Express Centronics will transmit 32 bytes of incoming data to the printer per line. Most printers will only print "completed" print lines. To force the printer to print the last line of the file you are trying to diagnose, it may be necessary to transmit up to 31 additional bytes of data to complete the current line.

To exit Inbound Hex-Dump Mode and to resume normal printing:

- Make sure no jobs are being transmitted by the host.
- Depress the SB/2K Express Centronics' `<Clear>` switch. This will cause the SB/2K Express Centronics to reset and resume its normal power-on sequence.

If the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display, press the keys indicated in the following table to place the SB/2K Express Centronics online with the host:

When You See the Message:	You Should Press:
SELECT FUNCTION	<Menu>
ONLINE	<Select>

Character Time

Character Time provides a diagnostic tool used to pinpoint the cause of throughput problems. Selecting this option causes the SB/2K Express Centronics to stop its normal data interpretation. The SB/2K Express Centronics will continue to accept data, but will discard all bytes received into the "bit bucket".

To activate Character Time, press the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
TEST MODES	<Select>
• RIPPLE PATTERN	<Menu>
• H PATTERN	<Menu>
• INBOUND HEX	<Menu>
• CHARACTER TIME	<Select>

To exit Character Time and to resume normal printing:

- Make sure no jobs are being transmitted by the host.
- Depress the SB/2K Express Centronics' `<Clear>` switch. This will cause the SB/2K Express Centronics to reset and resume its normal power-on sequence.

If the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display, press the keys indicated in the following table to place the SB/2K Express Centronics online with the host:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Select>

ERROR CONDITIONS

Throughout the printing operation, the SB/2K Express Centronics monitors the condition of the printer. In the event that an error condition is reported, the SB/2K Express Centronics performs a diagnostic "sense" subroutine to determine if the error condition requires some form of operator intervention (for example, in the case of a forms jam). If operator intervention is indicated, the SB/2K Express Centronics reports a "not ready" condition to the host system.

Xerox page printers report only one type of error condition, no matter what is wrong with the printer: "not ready – operator intervention required." In this case, the SB/2K Express Centronics' LCD will display the following messages:

```
PRINTER ERROR
ERR:400000000000
```

The ERRor code is the six sense bytes (in hexadecimal) last received from the printer. (These sense bytes are described in detail in an IBM printer manual.)

This error message will remain on the SB/2K Express Centronics' LCD until the problem has been corrected on the printer, causing the printer to generate a "Request In". A "Ready" condition is then reported to the host system and printing continues normally.

MENU DESCRIPTIONS

The following table provides a functional description of each of the SB/2K Express Centronics' menu items:

Menu Option	When You Press the <Select> Key
ONLINE	Causes the SB/2K Express Centronics to go "online" with the host computer. This enables data transfer from the host to the printer, if the printer is "online" and "ready" to receive data.
OFFLINE LOADS	Causes the SB/2K Express Centronics to enter into the OFFLINE LOADS submenu, beginning with the menu item "LOAD UCSB A".
• LOAD UCSB A	Causes the SB/2K Express Centronics to load the printer's Universal Character Set Buffer (UCSB) from its internal ROMs with a T-11 train image (upper and lowercase characters)
• LOAD UCSB B	Causes the SB/2K Express Centronics to load the printer's Universal Character Set Buffer (UCSB) from its internal ROMs with an A-11 train image (uppercase characters)
• LOAD FCB A	Causes the SB/2K Express Centronics to load the printer's Forms Control Buffer (FCB) from its internal ROMs with a form 66 lines at six lines per inch.
• LOAD FCB B	Causes the SB/2K Express Centronics to load the printer's Forms Control Buffer (FCB) from its internal ROMs with a form 88 lines at eight lines per inch.
• SET FOLD	Causes the SB/2K Express Centronics to send the command "SET FOLD" to the printer, which causes lowercase characters to be "folded" into uppercase characters.
• RESET FOLD	Causes the SB/2K Express Centronics to send the command "RESET FOLD" to the printer, which cancels the "SET FOLD" command and restores the printer to normal operation.
• BLOCK DATA CHECK	Causes the SB/2K Express Centronics to send the command "BLOCK DATA CHECK" to the printer, which tells the printer to **not report** errors caused by unprintable characters (characters not found in the UCSB load).
• ALLOW DATA CHECK	Causes the SB/2K Express Centronics to send the command "ALLOW DATA CHECK" to the printer, which tells the printer to **report** errors caused by unprintable characters (characters not found in the UCSB load).

Menu Option	When You Press the <Select> Key
TEST MODES	Causes the SB/2K Express Centronics to enter into the TEST MODES submenu, beginning with the menu item “RIPPLE PATTERN”.
• RIPPLE PATTERN	Causes the SB/2K Express Centronics to transmit a sliding test pattern to the printer for diagnostic purposes. This pattern continues until the <Menu> key is pressed.
• H PATTERN	Causes the SB/2K Express Centronics to transmit a test pattern consisting of “H” characters to the printer for diagnostic purposes. This pattern continues until the <Menu> key is pressed.
• INBOUND HEX	Causes the SB/2K Express Centronics to enter “INBOUND HEXDUMP” mode, which is used to debug application software. The SB/2K Express Centronics goes “online” and accepts input from the host computer. But instead of transmitting this data to the printer, the SB/2K Express Centronics sends a hexadecimal dump of the data received from the host to the printer (see “Inbound Hex-Dump Mode”).
• CHARACTER TIME	Causes the SB/2K Express Centronics to stop its normal data interpretation, accept data, but discard all bytes received into the “bit bucket.” CHARACTER TIME provides a diagnostic tool to assist Spur Customer Support in pinpointing the cause of any throughput problems which might occur.
• TEST 5	Reserved for future use.
POWER ON	Causes the SB/2K Express Centronics to go through its power-on sequence, including its default loads (see “Power-On Sequencing”).

COMMAND SUMMARY

The SB/2K Express Centronics supports other IBM 3211 features such as folding (converting to upper case), data check, and forms control (VFU). ASCII control codes are used to activate these features wherever a literal translation exists. Features that are not literal translations of ASCII control codes are supported using “escape” sequences.

The following codes have been selected to conform to ASCII control codes:

Command	Code
Line Feed	0A
Form Feed	0C
Carriage Return	0D
Skip to Channel 01	80
Skip to Channel 02	81

Command	Code
Skip to Channel 03	82
Skip to Channel 04	83
Skip to Channel 05	84
Skip to Channel 06	85
Skip to Channel 07	86
Skip to Channel 08	87
Skip to Channel 09	88
Skip to Channel 10	89
Skip to Channel 11	8A
Skip to Channel 12	8B
Space 00 lines	90
Space 01 lines	91
Space 02 lines	92
Space 03 lines	93
Space 04 lines	94
Space 05 lines	95
Space 06 lines	96
Space 07 lines	97
Space 08 lines	98
Space 09 lines	99
Space 10 lines	9A
Space 11 lines	9B
Space 12 lines	9C
Space 13 lines	9D
Space 14 lines	9E
Space 15 lines	9F

The following additional escape sequences have been defined to allow access to the printer's unique features. With the exception of Midline Hex-Dump mode, the SB/2K Express Centronics will only recognize the escape character X'1F if it is the very first printable character of a line:

Command	Sequence
Raise Cover	1F 41
Allow Data Check	1F 42
Block Data Check	1F 43
Set Folding	1F 44
Reset Folding	1F 45
Auto-load UCSB A	1F 46
Auto-load UCSB B	1F 47
Auto-load FCB A	1F 48
Auto-load FCB B	1F 49
Transparent Mode	1F 4B
Hex-Dump Mode	1F 4C {CCW} 0D ... terminate with LF
Midline Hex Dump Mode	1F (Middle of Line)
Midline Hex Dump Mode	1F 1F (Start of Line)

CHAPTER 4—USING THE SB/2K EXPRESS WITH IBM 3800-COMPATIBLE PRINTERS

The SB/2K Express Centronics' modes of operation fall into four general categories:

- Power-On Mode – internal diagnostics, automatic printer configuration
- Online Operation – automatic operation; the SB/2K Express Centronics' default
- Offline Operation – used to manually configure the printer
- Test Modes – used to send a test pattern to the printer, perform dumps of the incoming datastream, and to measure throughput

In this manual, a device is considered "offline" if it is not logically connected to the "preceding" device in the chain. For example, when the SB/2K Express Centronics is "offline", communication with the host computer is disabled; but communication between the SB/2K Express Centronics and the printer can still occur.

POWER-ON MODE

When the SB/2K Express Centronics is powered-on, the SB/2K Express Centronics performs a series of internal diagnostic tests. If these tests are completed successfully, the SB/2K Express Centronics displays the following message:

```
PASSED SELF TEST
```

Because of its internal switch settings, the SB/2K Express Centronics then automatically configures the printer by sending the following loads:

- Clear Printer (X'87)
- Load WCGM B (X'53: Text 1 & 2)
- Select CAT 0 (X'47)
- Load CAT B (X'83: Text 1 & 2)
- Set Block Data Check (X'73)
- Load FCB A (X'63: 11" form at 6 lpi)

If these loads are successful, the SB/2K Express Centronics then goes online with the host computer. The SB/2K Express Centronics will indicate that it is in Online Mode by displaying the following message:

```
ONLINE*
```

ONLINE OPERATION

When the SB/2K Express Centronics displays "ONLINE*" it is online with the host system. When the SB/2K Express Centronics is online, the host can perform the following:

- Normal Printing
- Writable Character Graphic Module (WCGM) Loads
- Character Arrangement Table (CAT) Loads
- Forms Control Buffer (FCB) Loads
- Forms Overlay Sequence Control Loads
- Graphic Character Modification Loads
- Copy Modification Loads
- Copy Number Loads
- Forms Overlay Buffer (FOB) Loads
- Special Data Transfers (such as downloading files and fonts to the printer)
- Special Commands to the printer

Some of the activities listed above will require the use of the SB/2K Express Centronics' special modes of operation (see "Special Modes of Operation").

NORMAL PRINTING

During normal printing, the SB/2K Express Centronics converts all incoming data and ASCII control characters to EBCDIC and transmits this data to the printer using the IBM multiplex channel in "burst" mode, converting all Line Feeds, Form Feeds, etc. to "Space" or "Skip Immediate" commands

SB/2K EXPRESS CENTRONICS ASCII-TO-EBCDIC TRANSLATION

Most host systems transmit ASCII datastreams to their parallel centronics port, while most channel-attached printers use the EBCDIC character set. For example, when the SB/2K Express Centronics receives an ASCII "A" (X'41) from the host, it transmits an EBCDIC "A" (X'C1) to the printer. For more information about the SB/2K Express Centronics' internal ASCII-to-EBCDIC translation, refer to the appropriate table in *Appendix B, ASCII-to-EBCDIC Translation Tables*.

NOTE: Custom translation table PROMs are available for an additional charge from the manufacturer.

LOADING THE WCGM

ROMs containing two user-selected WCGM code groups have been installed in the SB/2K Express Centronics. Because the IBM 3800 printer uses font images loaded from an internal disk or from the host, the WCGM must be loaded before printing. This can be implemented in one of three ways:

- **OFFLINE**: You may select either the "LOAD WCGM A" or "LOAD WCGM B" options from the SB/2K Express Centronics' "OFFLINE LOADS" submenu (see "Offline Loads").

- **AUTO-LOAD WCGM**: When online, the SB/2K Express Centronics will automatically load the WCGM with one of these groups when instructed to do so. To activate this mode, transmit one of the following two-byte escape sequences as the first two bytes in any line of print:

Mode	Escape Sequence
Auto-load WCGM A	1F 44
Auto-load WCGM B	1F 45

- **USER-LOAD WCGM**: You can perform a WCGM load following the rules specified in IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING THE CAT

Because the IBM 3800 printer uses font images loaded from an internal diskette or from the host, you must load a Character Arrangement Table (CAT) before printing. ROMs, containing two user-selectable 256-byte CATs were installed within the SB/2K Express Centronics. CAT loads can be performed in one of three ways:

- **OFFLINE**: You may select either the "LOAD CAT A" or "LOAD CAT B" options from the SB/2K Express Centronics' "OFFLINE LOADS" submenu (see "Offline Loads").

- **AUTO-LOAD CAT**: When online, the SB/2K Express Centronics will automatically load the CAT with one of its tables when instructed to do so. To activate this mode, transmit one of the following two-byte escape sequences as the first two bytes in any line of print:

Mode	Escape Sequence
Auto-load CAT A	1F 46
Auto-load CAT B	1F 47

- **USER-LOAD CAT**: You can perform your own CAT load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING THE FCB

The Forms Control Buffer (FCB) defines the locations of the channels used in "Skip to Channel" commands. The SB/2K Express Centronics' internal ROMs contain two user-selectable forms images. To redefine the printer's default channel assignments, the user may reload the FCB. This can be implemented in one of three ways:

- **OFFLINE**: You may select either the "LOAD FCB A" or "LOAD FCB B" options from the SB/2K Express Centronics' "OFFLINE LOADS" submenu (see "Offline Loads").

- **AUTO-LOAD FCB**: When online, the SB/2K Express Centronics will automatically load the FCB with one of its forms images when instructed to do so. To activate this mode, transmit one of the following two-byte escape sequences as the first two bytes in any line of print:

Mode	Escape Sequence
Auto-load FCB A	1F 48
Auto-load FCB B	1F 49

- **USER-LOAD FCB**: You can perform an FCB load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING FORMS OVERLAY SEQUENCE CONTROL

The Forms Overlay Sequence Control directs the printing of the forms overlay image and the number of printed copies. The SB/2K Express Centronics supports this feature in only one way:

- **USER-LOAD FORMS OVERLAY SEQUENCE CONTROL**: You can perform a forms overlay sequence control load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING GRAPHIC CHARACTER MODIFICATION

The Load Graphic Character Modification command transfers replacement characters to any WCGM in the printer. The SB/2K Express Centronics supports this feature in only one way:

- **USER-LOAD GRAPHIC CHARACTER MODIFICATION**: You can perform a graphic character modification following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING COPY MODIFICATION

Copy modification information is sent from the system to the printer using the Load Copy Modification command. The SB/2K Express Centronics supports this feature in only one way:

- **USER-LOAD COPY MODIFICATION**: You can perform a copy modification following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING COPY NUMBER

The Load Copy Number establishes the reference copy number for the first copy of a data set transmission. The SB/2K Express Centronics supports this feature in only one way:

- **USER-LOAD COPY NUMBER**: You can perform a load copy number following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

LOADING FORMS OVERLAY BUFFER (FOB)

The Forms Overlay Buffer (FOB) is used to download an electronic form that can be merged with variable print data. The SB/2K Express Centronics supports this feature in only one way:

- **USER-LOAD FOB**: You can perform a FOB load following the rules specified in the IBM printer manual using one of the SB/2K Express Centronics' special modes of operation (see "Special Data Transfer Modes").

SPECIAL DATA TRANSFER MODES

Certain types of data transfers, such as downloading fonts or performing FCB loads, require special processing. Most of these "special" data transfers require access to all 256 EBCDIC codes and all possible Channel Command Words (CCWs).

The SB/2K Express Centronics is not an entirely transparent device in that certain codes are interpreted as control characters. Reserved characters such as Line Feeds, Form Feeds, and Carriage Returns do not normally pass freely through the SB/2K Express Centronics. The SB/2K Express Centronics provides three methods for bypassing its normal data interpretation:

- **Transparent Data Transfer Mode** (also referred to as "**Transparent Mode**"). This mode is used to send data transparently to the printer, and is typically used to perform "loads".

- **Hexadecimal Data Transfer Mode** (also referred to as "**Hex-Dump Mode**"). This mode is an alternate method of sending data transparently to the printer using a hexadecimal format. This method can be used by hosts that have difficulty transmitting "binary" data to their parallel port.

- **Midline Hex-Dump Mode**. This mode temporarily places the SB/2K Express Centronics in Hexadecimal Data Transfer Mode in the middle of a line, and is typically used to embed short escape sequences into the datastream that the printer receives.

NOTE: Transparent Mode, Hex-Dump Mode and Midline Hex-Dump Mode can be used to transmit non-printable characters to the printer.

Before continuing the discussion of these special modes of operation, first consider a typical data transfer using IBM Channel protocol:

- The channel control unit (in this case, the SB/2K Express Centronics) first issues a Channel Command Word (CCW) to the printer. The CCW tells the printer how to handle the data which is about to follow.

- The SB/2K Express Centronics then transfers the data to the printer. The printer then processes the data in the manner specified by the CCW.

During normal printing, the SB/2K Express Centronics generates all necessary Channel Command Words by monitoring the data stream for certain control characters. When the SB/2K Express Centronics encounters these special characters, it then issues the corresponding CCWs to the printer.

The SB/2K Express Centronics ceases its interpretation of these control characters while in its Transparent or Hex-Dump modes of operation. **This means that you must also supply a CCW to be issued to the printer as part of the escape sequence invoking these special modes of operation.** Your printer manual should contain a list of acceptable CCWs and descriptions of the associated data transfer formats.

Transparent Data Transfer Mode

The Transparent Mode should only be used by hosts that support 8 data bits. It is activated by transmitting the following five-byte escape sequence as the first five bytes in any line of print:

```
Transparent Mode      1F 4A [CCW] [MSB] [LSB]
```

`[CCW]` is the command word that will be passed on to the device. The SB/2K Express Centronics will remain in Transparent Mode until the number of bytes specified in the `[MSB]/[LSB]` portion of the escape sequence have been transmitted. The actual number of bytes equals (256 x MSB) + `[LSB]` and ranges from 1 to 65535 bytes (0000 - FFFF).

For example, to perform a Load WCGM command (X'53) followed by the four data bytes X'8E, X'90, X'0F, and X'11, the following nine-byte data transfer is required:

```
1F   4A   53   00   04   8E   90   0F   11
```

The SB/2K Express Centronics will issue the channel command X'53 to the printer. The four bytes of data received from the host will then be transmitted to the printer without translation.

While in Transparent Mode (until the MSB/LSB counters have been satisfied), the following rules apply:

- The [CCW] portion of the escape sequence must be a valid "Write" or "Load" (not a "Control" or "Status") type of command. No error checking of this command takes place in the SB/2K Express Centronics.

- The `[MSB]/[LSB]` portion of the escape sequence must not exceed the maximum number of bytes that the attached device can accept in a single burst. Any attempt to transfer a number of bytes greater than the device can handle will result in a truncation of the data transfer. However, the SB/2K Express Centronics will continue to accept data until the number of bytes equals the `[MSB]/[LSB]` portion of the escape sequence.

  The only method of prematurely exiting the Transparent Mode of operation is to do the following:

  - Stop transmitting data to the SB/2K Express Centronics from the host.
  - Temporarily take the printer attached to the SB/2K Express Centronics offline.
  - Press the SB/2K Express Centronics' <Clear> switch.

Sample FCB Load

To demonstrate the Transparent Mode in greater detail, this subsection illustrates a typical Forms Control Buffer (FCB) load with the following features:

- The Channel Command Word (CCW) for loading the FCB is X'63.
- The length of the FCB load can be determined using the following formula:

  Number of printable lines per page + 6

  In this example, we'll be using a 66-line form printing Perf-to-Perf. Therefore, the actual length of the form will be 72 bytes (X'48)

- Perf-to-Perf printing is indicated by making the first three bytes X'0B X'00 X'00, and the last three bytes X'00 X'00 X'00
- Channel 1 appears in the first printable line of the form.

To function properly, the printer must receive the following commands and data (shown in hexadecimal) from the SB/2K Express Centronics:

Command	Data									
63	0B	00	00	**01**	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00
	00	00								

In order to generate the FCB load described above, a host must transmit the following data stream (in hexadecimal) to the SB/2K Express Centronics:

1F	4B	63	00	48	0B	00	00	01	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00
00	00	00	00	00	00	00	00	00	00	00	00	00			

Hex-Dump Data Transfer Mode

The Hex-Dump Mode should be used by hosts that only support 7 data bits, but can also be used by hosts supporting 8 data bits. It lets you transmit codes in two-byte hexadecimal format (all printable characters) which the SB/2K Express Centronics then concatenates into a single EBCDIC byte. For example, to send the byte X'01 to the printer while in Hex-Dump Mode, you would transmit two bytes to the SB/2K Express Centronics: X'30 (an ASCII "0") and X'31 (an ASCII "1").

The actual four-byte escape sequence and format for the Hex-Dump Mode are as follows:

Command	Data Bytes	Description
Print & Spc 0	1F 4B {CCW} (no data)	Places the SB/2K Express Centronics into Hexadecimal Data Transfer Mode
Print & Spc 0	{Data} {Data} {Data}…	Carriage returns are ignored
Print & Spc 0	{Data} {Data} {Data}…	Carriage returns are ignored
Space 1 Line	(no data)	Line feed terminates Hexadecimal Data Transfer Mode and returns the SB/2K Express Centronics to normal operation

NOTE: The braces around a particular byte indicate that the byte is to be transmitted by the host system as two hexadecimal digits. For example, the byte {X'FB} should be transmitted by the host system as an ASCII "F" and "B".

{CCW} is the command word that will be passed on to the device. For example, if the CCW you wish to send is a "Load FCB" = X'63, transmit an ASCII "6" and "3" in the place of {CCW}. All lines of data must be sent using the host system's "Print and Space 0" command, which suppresses the Line Feed character from being generated. To terminate the transfer and exit Hex-Dump Mode, generate a Line Feed by sending a "Space 1 Line immediate" to the SB/2K Express Centronics.

While in Hex-Dump Mode, the SB/2K Express Centronics ignores all carriage returns, which allows you to transmit data in multiple print lines. Note that several print lines can be combined into one long data transfer to the printer as long as no Line Feeds are received by the SB/2K Express Centronics, which indicates the end of the transfer.

The following rules also apply to data transfers using Hex-Dump Mode:

- The {CCW} portion of the escape sequence must be a valid "Write" (not "Read") type of command.
- The length of the data transfer must not exceed the maximum number of bytes that the attached device can accept. Any attempt to transfer a number of bytes greater than the device can handle will result in a truncation in the data transfer. The SB/2K Express Centronics will, however, continue to accept data until the sequence is terminated by a Line Feed character.
- The transmission containing the four-byte escape sequence must not include anything other than the escape sequence.

NOTE: Any data in the same transmission as the escape sequence will be ignored.

Sample FCB Load

To demonstrate the Hex-Dump Mode in greater detail, this subsection analyzes a typical Forms Control Buffer (FCB) load.

As before, the features of this sample FCB load are:

- The Channel Command Word (CCW) for loading the FCB is X'63.
- The length of the FCB load can be determined using the following formula:

  Number of printable lines per page + 6

  In this example, we'll be using a 66-line form printing Perf-to-Perf. Therefore, the actual length of the form will be 72 bytes (X'48)
- Perf-to-Perf printing is indicated by making the first three bytes X'0B X'00 X'00, and the last three bytes X'00 X'00 X'00
- Channel 1 appears in the first printable line of the form.

To function properly, the printer must receive the following commands and data (in hexadecimal) from the SB/2K Express Centronics:

Command	Data											
63	0B	00	00	01	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00
	00	00	00	00	00	00	00	00	00	00	00	00

To generate the FCB load described previously, the host system must transmit the following print lines (in hexadecimal) to the SB/2K Express Centronics:

```
1F  4B  36  33  0D  30  42  30  30  30  30  30  31  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  30  30  30  30  30  30  30  30  30  30  30
30  30  30  30  30  0A
```

Midline Hex-Dump Mode

Midline Hex-Dump Mode allows the user to place the SB/2K Express Centronics into and out of Hex-Dump Mode in the middle of a line, **temporarily** bypassing the SB/2K Express Centronics' data interpretation. This mode of operation is typically used to

- Imbed escape sequences for the printer in the middle of a print line.
- Concatenate short print lines into one long print line.

To activate and deactivate the Midline Hex-Dump Mode, send the following two-byte escape sequence in any print position other than column 1.

```
Midline Hex-Dump Mode      1F
```

While the SB/2K Express Centronics is in Midline Hex-Dump Mode, only pairs of valid hexadecimal characters ("0" to "F") will be processed and sent to the printer. All other characters will be discarded by the SB/2K Express Centronics until the Midline Hex-Dump Mode is deactivated.

For example, let's say you want to send the following EBCDIC characters to the printer with an embedded two-byte escape sequence (X'FF, X'02):

```
ABC<FF><02>DEF
```

To generate the print line described above, the host system must transmit the following ASCII datastream (shown in hexadecimal) to the SB/2K Express Centronics. There are two escape sequences for invoking Midline Hex-Dump Mode, depending on whether you are at the beginning of a line or in the middle of a line:

```
41   42   43   1F   46   46   30   32   1F   44   45   46   0D   0A
```

The printer will receive the following commands and data from the SB/2K Express Centronics:

Command	Data Bytes
Write & Spc.1	C1 C2 C3 FF 02 C4 C5 C6

To concatenate two short print lines into one long print line, activate the Midline Hex-Dump Mode at the end of the first print line by terminating the line with a X'1F. Any carriage control bytes at the end of the first print line will be ignored by the SB/2K Express Centronics, because they are not valid hexadecimal characters ("0" to "F"). Begin the next print line with 1F to deactivate Midline Hex-Dump Mode and to resume normal printing.

Occasionally, a printer may require an escape sequence at the beginning of a print line. To start a line already in Midline Hex-Dump Mode (to later drop back into normal print mode), transmit the following two-byte escape sequence to the SB/2K Express Centronics in the first four print positions of a line:

```
Midline Hex-Dump Mode      1F    1F
```

This causes the SB/2K Express Centronics to transmit a "Write & Space 0" command (01) to the printer and then enter Midline Hex-Dump Mode. Once the SB/2K Express Centronics is in Midline Hex-Dump Mode, only pairs of valid hexadecimal characters ("0" to "F") will be processed and sent to the printer. All other characters will be discarded by the SB/2K Express Centronics until the Midline Hex-Dump Mode is deactivated.

PRINTER SETUP FILES

Ultimately, you may require fonts, CATs and FCBs that are not resident on the printer or the SB/2K Express Centronics. The easiest way to automate the printer configuration process is to create Printer Setup Files. Each file would contain all the necessary font, CAT, FOB, and FCB data required to configure the printer, along with any necessary SB/2K Express Centronics escape sequences. Once a Printer Setup File has been created, the printer can be configured by transmitting the Printer Setup File to the SB/2K Express Centronics before sending your application data.

Spur Products' optional CLOADER© utilities can simplify the process of creating Printer Setup Files. As an added bonus, CLOADER includes over 85 public-domain fonts.

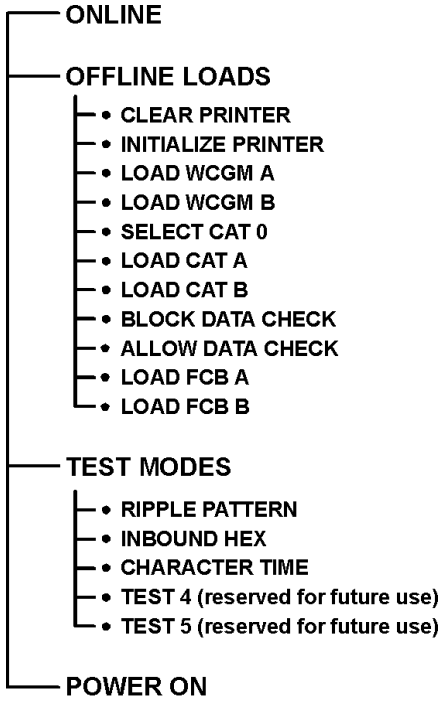
OFFLINE OPERATION

As described above, the SB/2K Express Centronics automatically goes online with the host computer when powered up. The SB/2K Express Centronics' menus allow you to manually perform printer initialization loads (UCSB and FCB). To access the SB/2K Express Centronics' menus, press the SB/2K Express Centronics' `<Clear>` key. Release this key, wait approximately 1 second, and then press and hold the `<Menu>` key.

The message "`SELECT FUNCTION`:" will appear on the SB/2K Express Centronics' display (as illustrated in the following figure):

MENU TREE

You can now use the <Menu> and <Select> keys to scroll through the SB/2K Express Centronics' menu items, enter submenus, and select functions as shown in the following menu tree:



OFFLINE LOADS

Before an IBM 3800-compatible printer can print, the printer must be configured with the following:

- **Fonts** – Must be loaded into the printer's active memory. Fonts can be downloaded from the host, or retrieved from the printer's diskette into active memory through the use of the "Load Writable Character Graphic Module (WCGM)" command.

- **Character Arrangement Table (CAT**) – Must be loaded, which directs the incoming characters to the proper graphic image for that character. The WCGM loads and CAT loads work together to map incoming characters to their respective graphic character.

- **Forms Control Buffer (FCB**) – Load must be performed, which defines the number of lines per page and line spacing.

The SB/2K Express Centronics automatically performs these loads during its Power-On sequence so that you may immediately use the printer. However, there may be occasions when you would like to use WCGM, CAT, and FCB loads that are different from the SB/2K Express Centronics' defaults. This can be done in one of three ways:

- Using the SB/2K Express Centronics' menus

- Changing the SB/2K Express Centronics' internal DIP switches

- Online, using escape sequences provided for this purpose

The SB/2K Express Centronics' internal ROMs contain two WCGM loads, two CAT loads, and two FCB loads. Four printer-resident fonts are supported by combining different WCGM loads (fonts loaded from the printer's diskette into active memory) with different CAT loads:

Font	WCGM Load	CAT Load
Gothic 10	A	A
Gothic 12	A	B
Gothic 15	B	A
Text 1 & 2	B	B

Gothic 10

For example, to print using the Gothic 10 font, using an 11" form at 6 lpi, you would make the following selections from the SB/2K Express Centronics menu:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Select> (Enters submenu)
• CLEAR PRINTER	<Select> (Clears printer)
• INIT. PRINTER	<Select> (Initializes printer)
• LOAD WCGM A	<Select> (Loads WCGM A)
• SELECT CAT 0	<Select> (Loads CAT 0)
• LOAD CAT A	<Select> (Loads CAT A)
• BLOCK DATA CHK	<Select> (Sets Block Data Check)
• LOAD FCB A	<Select> (Loads FCB A)

Once the function has been "selected," the SB/2K Express Centronics will display an asterisk (*) after the function name to indicate that the mode is active. For example, "LOAD CAT A*" indicates the SB/2K Express Centronics is in the process of loading CAT A from its internal ROMs.

NOTE: the Gothic 10 font resident on most IBM 3800-compatible printers contains only UPPERCASE characters. To use a Gothic 10 font containing both upper- and lowercase characters you must download the font from the host system through the SB/2K Express Centronics.

Gothic 12

To print using the Gothic 12 font, using an 11" form at 8 lpi, you would make the following selections from the SB/2K Express Centronics menu:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Select> (Enters submenu)
• CLEAR PRINTER	<Select> (Clears printer)
• INIT. PRINTER	<Select> (Initializes printer)
• LOAD WCGM A	<Select> (Loads WCGM A)
• SELECT CAT 0	<Select> (Loads CAT 0)
• LOAD CAT A	<Select> (Loads CAT A)
• LOAD CAT B	<Select> (Loads CAT B)
• BLOCK DATA CHK	<Select> (Sets Block Data Check)
• LOAD FCB A	<Select> (Loads FCB A)
• LOAD FCB B	<Select> (Loads FCB B)

NOTE: the Gothic 12 font resident on most IBM 3800-compatible printers contains only UPPERCASE characters. To use a Gothic 12 font containing both upper- and lowercase characters you must download the font from the host system through the SB/2K Express Centronics.

Gothic 15

To print using the Gothic 15 font, using an 11” form at 6 lpi, you would make the following selections from the SB/2K Express Centronics menu:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Select> (Enters submenu)
• CLEAR PRINTER	<Select> (Clears printer)
• INIT. PRINTER	<Select> (Initializes printer)
• LOAD WCGM A	<Menu>
• LOAD WCGM B	<Select> (Loads WCGM B)
• SELECT CAT 0	<Select> (Loads CAT 0)
• LOAD CAT A	<Select> (Loads CAT A)
• BLOCK DATA CHK	<Select> (Sets Block Data Check)
• LOAD FCB A	<Select> (Loads FCB A)

NOTE: the Gothic 15 font resident on most IBM 3800-compatible printers contains only UPPERCASE characters. To use a Gothic 15 font containing both upper- and lowercase characters you must download the font from the host system through the SB/2K Express Centronics.

Text 1 & 2

To print using the Text 1 & 2 font, using an 11" form at 8 lpi, you would make the following selections from the SB/2K Express Centronics menu:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Select> (Enters submenu)
• CLEAR PRINTER	<Select> (Clears printer)
• INIT. PRINTER	<Select> (Initializes printer)
• LOAD WCGM A	<Menu>
• LOAD WCGM B	<Select> (Loads WCGM B)
• SELECT CAT 0	<Select> (Loads CAT 0)
• LOAD CAT A	<Menu>
• LOAD CAT B	<Select> (Loads CAT B)
• BLOCK DATA CHK	<Select> (Sets Block Data Check)
• LOAD FCB A	<Menu>
• LOAD FCB B	<Select> (Loads FCB B)

The FCB loads define various physical aspects of the forms being used, including the number of lines per page, the line spacing, and any channel assignments that are being used.

The SB/2K Express Centronics supports the following FCB loads:

FCB Load	Description
A	Loads an 11" form at 6 lines per inch
B	Loads an 11" form at 8 lines per inch

TEST MODES

The SB/2K Express Centronics provides three Test Mode options:

- **Ripple Pattern** – used to send a ripple test pattern to the printer
- **Inbound Hex-Dump Mode** – used to perform dumps of the incoming datastream
- **Character Time** – used to measure the SB/2K Express Centronics' throughput

Ripple Pattern

Selecting `Ripple Pattern` from the Test Mode submenu causes the SB/2K Express Centronics to send a sliding test pattern to the printer. If the SB/2K Express Centronics is Online (displaying the message "`ONLINE*`"), hold in the `<Clear>` switch for approximately 2 seconds, release the `<Clear>` switch and press and hold in the <Menu> switch until the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display.

The Ripple Pattern is then selected by pressing the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
TEST MODES	<Select> (enters submenu)
• RIPPLE PATTERN	<Select>

Ripple Pattern causes the SB/2K Express Centronics to begin transmitting a sliding test pattern to the printer. If the SB/2K Express Centronics is successful in engaging the printer, an asterisk "*" will be placed after the mode, indicating that the mode has been activated:

```
RIPPLE PATTERN*
```

Wait about 3 seconds and then press the `<Menu>` key to end the sliding test pattern. The SB/2K Express Centronics will continue printing the test pattern until the current page is completed, and will then return to the "SELECT FUNCTION:" menu.

Inbound Hex-Dump Mode

Inbound Hex-Dump Mode provides a diagnostic utility used to view the datastream that the SB/2K Express Centronics is receiving from the host system. Frequently, data transmitted from the host may contain non-printable characters (escape sequences, etc.). Because these escape sequences are typically "invisible", it is sometimes very difficult to debug an application when problems occur.

If the SB/2K Express Centronics is online (displaying the message "ONLINE*"), hold in the <Clear> switch for approximately 2 seconds, release the <Clear> switch and press and hold in the <Menu> switch until the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display.

Before activating Inbound Hex-Dump Mode, verify that the printer is online and ready to print by sending a ripple test pattern (described above) to the printer. Wait about 3 seconds and then press the <Menu> key to end the sliding test pattern. The SB/2K Express Centronics will continue printing the test pattern until the current page is completed, and will then return to the "SELECT FUNCTION:" menu.

To activate Inbound Hex-Dump Mode, press the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
TEST MODES	<Select>
• RIPPLE PATTERN	<Menu >
• INBOUND HEX	<Select>

Once in Inbound Hex-Dump Mode, the SB/2K Express Centronics will transmit a hexadecimal representation of every byte received from the host, in a two-nibble format.

For example, if the host system transmits the following datastream to the SB/2K Express Centronics:

```
HELLO<CR><LF>
```

The SB/2K Express Centronics will send the following datastream to the printer:

```
48      45      4C      4C      4F      0D      0A
```

NOTE: While the SB/2K Express Centronics is in Inbound Hex-Dump Mode, the SB/2K Express Centronics will transmit 32 bytes of incoming data to the printer per line. Most channel-attached printers will only print "completed" print lines. To force the printer to print the last line of the file you are trying to diagnose, it may be necessary to transmit up to 31 additional bytes of data to complete the current line.

To exit Inbound Hex-Dump Mode and to resume normal printing:

- Make sure no jobs are being transmitted by the host.
- Depress the SB/2K Express Centronics' <Clear> switch. This will cause the SB/2K Express Centronics to reset and resume its normal power-on sequence.

If the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display, press the keys indicated in the following table to place the SB/2K Express Centronics online with the host:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Select>

Character Time

Character Time provides a diagnostic tool used to pinpoint the cause of throughput problems. Selecting this option causes the SB/2K Express Centronics to stop its normal data interpretation. The SB/2K Express Centronics will continue to accept data, but will discard all bytes received into the "bit bucket".

To activate Character Time, press the keys indicated in the following table:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Menu>
OFFLINE LOADS	<Menu>
TEST MODES	<Select>
• RIPPLE PATTERN	<Menu>
• H PATTERN	<Menu>
• INBOUND HEX	<Menu>
• CHARACTER TIME	<Select>

To exit Character Time and to resume normal printing:

- Make sure no jobs are being transmitted by the host.
- Depress the SB/2K Express Centronics' `<Clear>` switch. This will cause the SB/2K Express Centronics to reset and resume its normal power-on sequence.

If the "SELECT FUNCTION:" message appears on the SB/2K Express Centronics' display, press the keys indicated in the following table to place the SB/2K Express Centronics online with the host:

When You See the Message:	You Should Press:
SELECT FUNCTION:	<Menu>
ONLINE	<Select>

ERROR CONDITIONS

Throughout the printing operation, the SB/2K Express Centronics monitors the condition of the printer. In the event that an error condition is reported, the SB/2K Express Centronics performs a diagnostic "sense" subroutine to determine if the error condition requires some form of operator intervention (for example, in the case of a forms jam). If operator intervention is indicated, the SB/2K Express Centronics reports a "not ready" condition to the host system. In this case, the SB/2K Express Centronics' LCD will display the following messages:

```
PRINTER ERROR
ER1: 40 00 00 00
```

The ER1 code indicates the first four sense bytes (in hexadecimal) last received from the printer. (These sense bytes are described in detail in an IBM printer manual.) Usually these four sense bytes are sufficient to diagnose a problem with the printer. To view the remaining sense bytes, press the <Select> key to cycle through the display:

```
ER2: 00 00 00 00
ER3: 00 00 00 00
ER4: 00 00 00 00
ER5: 00 00 00 00
ER6: 00 00 00 00
```

This error message will remain on the SB/2K Express Centronics' LCD until the problem has been corrected on the printer, causing the printer to generate a "Request In". A "Ready" condition is then reported to the host system and printing continues normally.

In IBM 3800 environments, the most common error condition other than "not ready" is the following:

```
PRINTER ERROR
ER1: 02 08 E0 xx
```

The bytes X'02 and X'08 indicate that there was a mismatch between the forms length set on the printer and the FCB load just received by the printer.

MENU DESCRIPTIONS

The following table provides a functional description of each of the SB/2K Express Centronics' menu items:

Menu Option	When You Press the <Select> Key
ONLINE	Causes the SB/2K Express Centronics to go "online" with the host computer. This enables data transfer from the host to the printer, if the printer is "online" and "ready" to receive data.
OFFLINE LOADS	Causes the SB/2K Express Centronics to enter into the OFFLINE LOADS submenu, beginning with the menu item "CLEAR PRINTER".
• CLEAR PRINTER	Causes the SB/2K Express Centronics to send a "CLEAR PRINTER" (X'87) command to the printer.
• INIT. PRINTER	Causes the SB/2K Express Centronics to send an "INITIALIZE PRINTER" (X'37) command to the printer.
• LOAD WCGM A	Causes the SB/2K Express Centronics to send a Writable Character Graphic Module (WCGM) load (X'53) with WCGM A.
• LOAD WCGM B	Causes the SB/2K Express Centronics to send a Writable Character Graphic Module (WCGM) load (X'53) with WCGM B.
• SELECT CAT 0	Causes the SB/2K Express Centronics to send a "SELECT CAT 0" command (X'47). A CAT must be select before it can be loaded.
• LOAD CAT A	Causes the SB/2K Express Centronics to send a Character Arrangement Table (CAT) load (X'83) with CAT A.
• LOAD CAT B	Causes the SB/2K Express Centronics to send a Character Arrangement Table (CAT) load (X'83) with CAT B.
• BLOCK DATA CHECK	Causes the SB/2K Express Centronics to send the command "BLOCK DATA CHECK" (X'73) to the printer, which tells the printer to **not report** errors caused by unprintable.
• ALLOW DATA CHECK	Causes the SB/2K Express Centronics to send the command "ALLOW DATA CHECK" (X'7B) to the printer, which tells the printer to **report** errors caused by unprintable characters.
• LOAD FCB A	Causes the SB/2K Express Centronics to send a Forms Control Buffer (FCB) load (X'63) to the printer.
• LOAD FCB B	Causes the SB/2K Express Centronics to send a Forms Control Buffer (FCB) load (X'63) to the printer.

Menu Option	When You Press the <Select> Key
TEST MODES	Causes the SB/2K Express Centronics to enter into the TEST MODES submenu, beginning with the menu item “RIPPLE PATTERN”.
• RIPPLE PATTERN	Causes the SB/2K Express Centronics to transmit a sliding test pattern to the printer for diagnostic purposes. This pattern continues until the <Menu> key is pressed.
• INBOUND HEX	Causes the SB/2K Express Centronics to enter “INBOUND HEXDUMP” mode, which is used to debug application software. The SB/2K Express Centronics goes “online” accepts input from the host computer. But instead of transmitting this data to the printer, the SB/2K Express Centronics sends a hexadecimal dump of the data received from the host to the printer (see “Inbound Hex-Dump Mode”).
• CHARACTER TIME	Causes the SB/2K Express Centronics to stop its normal data interpretation, accept data, but discard all bytes received into the “bit bucket.” CHARACTER TIME provides a diagnostic tool to assist Spur Customer Support in pinpointing the cause of any throughput problems that might occur.
• TEST 4	Reserved for future use.
• TEST 5	Reserved for future use.
POWER ON	Causes the SB/2K Express Centronics to go through its power-on sequence, including its default loads (see “Power-On Sequencing”).

COMMAND SUMMARY

The SB/2K Express Centronics supports other IBM 3800 features using control codes. The following provides the codes:

Command	Code
Skip to Channel 01	80
Skip to Channel 02	81
Skip to Channel 03	82
Skip to Channel 04	83
Skip to Channel 05	84
Skip to Channel 06	85
Skip to Channel 07	86
Skip to Channel 08	87

Command	Code
Skip to Channel 09	88
Skip to Channel 10	89
Skip to Channel 11	8A
Skip to Channel 12	8B
Skip 0 lines	90
Skip 1 line	91
Skip 2 lines	92
Skip 3 lines	93
Skip 4 lines	94
Skip 5 line	95
Skip 6 lines	96
Skip 7 lines	97
Skip 8 lines	98
Skip 9 line	99
Skip 10 lines	9A
Skip 11 lines	9B
Skip 12 lines	9C
Skip 13 line	9D
Skip 14 lines	9E
Skip 15 lines	9F

The following additional escape sequences have been defined to allow access to the printer's unique features. With the exception of Midline Hex-Dump mode, the SB/2K Express Centronics will only recognize the escape character 1F if it is the very first printable character of a line:

Command	Code
Select Translate Table 0	1F 30
Select Translate Table 1	1F 31
Select Translate Table 2	1F 32
Select Translate Table 3	1F 33
Clear Printer	1F 41
Allow Data Check	1F 42
Block Data Check	1F 43
Auto-load WCGM A	1F 44

Command	Code
Auto-load WCGM B	1F 45
Auto-load Translate Table A	1F 46
Auto-load Translate Table B	1F 47
Auto-load FCB A	1F 48
Auto-load FCB B	1F 49
Transparent Data	1F 4A [CCW] [MSB]
Hex-Dump Data Transfer	1F 4B {CCW} 0D terminate with Line Feed
Midline Hex-Dump	1F (middle of line)
Midline Hex-Dump	1F 1F (start of line)
Transparent Command	1F 4C [CCW]
Hex Command	1F 4D {CCW} 0D
Initialize Printer	1F 4E
Mark Form	1F 4F
End of Transmission	1F 50

CHAPTER 5—TROUBLESHOOTING

This chapter provides information for troubleshooting some of the common problems you may encounter with the SB/2K Express Centronics. If, after using the troubleshooting information in this chapter, a problem persists and you believe that you have a defective product, then call Spur Customer Support (208-377-0001).

When the SB/2K Express Centronics is turned on, it performs a self-test. During the startup process, messages will be displayed in the LCD message window on the front panel of the SB/2K Express Centronics. The LCD window should display the following series of messages:

```
POWER ON*

PASSED SELF TEST
```

The SB/2K Express Centronics attempts to locate the printer's address on the channel. Because the printer is offline, the following message will display in the LCD window:

```
SEARCHING…

PRINTER OFFLINE
```

If these messages do not display, refer to the following table to determine the possible cause and corrective action you may need to perform.

Message Displayed	**Cause and Corrective Action**
(no display)	Check the power connection to the SB/2K Express Centronics.
FAILED TEST 1	The SB/2K Express Centronics has an internal problem. Call Spur Customer Support, because the unit may need to be returned for service.
FAILED TEST 2	
FAILED TEST 3	
FAILED TEST 4	

Message Displayed	Cause and Corrective Action
PASSED SELF TEST	(Message remains on the display) IBM Channel protocol problem resulting from one of the following: • Missing or defective bus and tag cables or terminators. • Defective channel interface in the printer. • The SB/2K Express Centronics IBM channel drivers are not functioning properly. **NOTE**: Self tests have been completed successfully, but when the SB/2K Express Centronics attempted to perform its power-on loads, a TEST I/O could not be completed. This indicates a physical problem with the channel.
POWER ON*	The printer is in an "online" state and is "ready" to receive data. The SB/2K Express Centronics power-on loads were in progress when a problem occurred on the channel. The printer is supposed to be "offline" at this point. Turn off the printer and retry the procedure again from the beginning. If this does not correct the problem, the printer needs to be serviced.
SEARCHING…	The printer's online interface is not functioning properly, but it responded to at least one address with a correct offline indication. Could be caused by a cable problem, but the printer probably needs to be serviced.
PRINTER ERROR ERR:400000000000	The printer is in an "online" state, but "not ready" to receive data when the power-on UCSB and FCB loads began. The printer is supposed to be "offline" at this point. Turn off the printer and retry the procedure from the beginning. If this does not correct the problem, the printer's online interface needs to be serviced.
PRINTER ERROR ER1: 40 00 00 00	The printer is in an "online" state, but "not ready" to receive data when the power-on loads began. The printer is supposed to be "offline" at this point. Turn off the printer and retry the procedure from the beginning. If this does not correct the problem, the printer's online interface needs to be serviced.

Message Displayed	Cause and Corrective Action
SELECT FUNCTION:	The printer is in an “online” state and is “ready” to receive data. The power-on loads have been completed. The printer is supposed to be “offline” at this point. Turn off the printer and retry the procedure from the beginning. If this does not correct the problem, the printer probably needs to be serviced.

If you cannot print to the SB/2K Express Centronics after you install it, check the following:

1. Make sure that the both the printer and the SB/2K Express Centronics are powered on, that the SB/2K Express Centronics is securely connected to the printer, and that the printer is on-line and ready.

2. If you are still having problems printing from the host computer, try to isolate the problem to either the host side or the printer side. To verify that the SB/2K Express Centronics can communicate with the printer, use the menu modes to transmit a test pattern. You must be able to print a test pattern from the SB/2K Express Centronics to the printer before communication with the host is possible.

APPENDIX A—PRINTER CONFIGURATION

XEROX CENTRALIZED PRINTERS

CONFIGURE THE PRINTER HARDWARE

Configure the Xerox printer online interface hardware to the following specifications:

- Set the printer's address DIP switches to 0F as shown in Figure A-1 (for Xerox 4050, 4090, 4650, 8700 or 9700 printers) or as shown in Figure A-2 (for Xerox 4060 or 4075 printers).

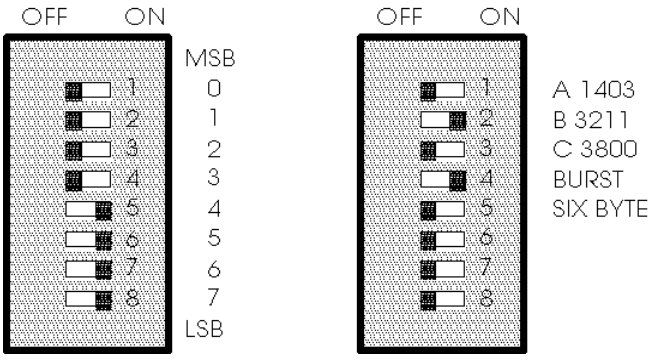


Figure A-1. Printer DIP switch settings (for Xerox 4050, 4090, 4650, 8700 or 9700 printers).

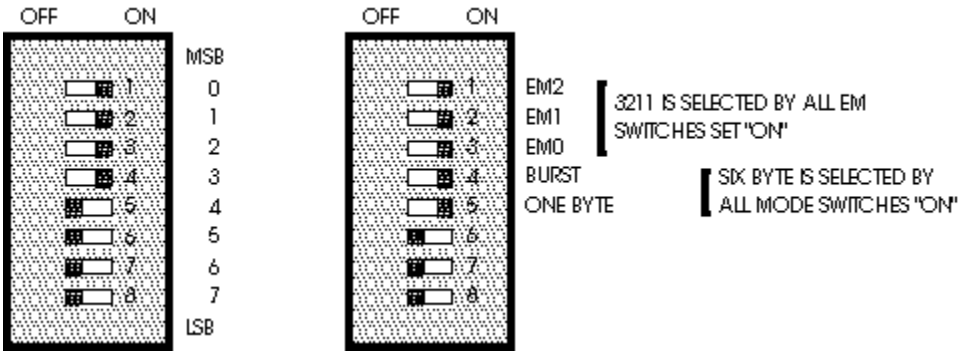


Figure A-2. Printer DIP switch settings (for Xerox 4060 or 4075 printers).

- Set the printer's system configuration switches to emulate an IBM 32ll printer in “Burst” Mode, again as shown in Figure A-1 or A-2.

- Set the Online switch on the Xerox printer's online interface adapter to “On.”

CONFIGURE PRINTER SOFTWARE

If you are connecting the SB/2K Express Centronics to a Xerox 4050, 4090, 4135, 4635, 4650, 8700 or 9700 printer, power up the printer and sysgen the printer's software to the following specifications:

Setting	Description
Address	X'0F
Emulation	3211 in "burst" mode
UCSB	"Ignore" (found in the ONLINE.JSL file)

NOTE: Do not place the printer online at this time.

IBM 3211-COMPATIBLE PRINTERS

Make sure the printer is configured as follows:

Setting	Description
Address	X'0F
Emulation	IBM 3211 in "burst" mode
Priority	High or Low
Interface Type	Single Tag (not "Data In/Data Out")

IBM 3800-COMPATIBLE PRINTERS

Make sure the printer is configured as follows:

Setting	Description
Address	X'0F
Emulation	IBM 3800 (compatibility mode) in "burst" mode
Priority	High or Low
Interface Type	Single Tag (not "Data In/Data Out")

APPENDIX B—ASCII-TO-EBCDIC TRANSLATION TABLES

This appendix provides translation tables for converting ASCII codes into EBCDIC for product types:

- SB/2K Express Centronics(8) to a Xerox printer (P/N TOPA12768-C1X)
- SB/2K Express Centronics(8) to a Xerox printer (P/N TOPA12768-C2X)
- SB/2K Express Centronics(8) to an IBM 3211 printer (P/N TOPA12768-C1A)
- SB/2K Express Centronics(8) to an IBM 3800-compatible printer (P/N TOPA12768-C1B)
- SB/2K Express Wang to a Xerox printer (P/N TOPA12768-W0X)
- SB/2K Express HP400 to a Xerox printer (P/N TOPA12768-F1X)
- SB/2K Express NCR Tower to a Xerox printer (P/N TOPA12768-R1X)

SB/2K EXPRESS CENTRONICS (8) TO A XEROX PRINTER

The SB/2K Express Centronics (TOPA12768-C1X) uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express Centronics(8) to Xerox ASCII-to-EBCDIC Translation Table (PROM US264A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	28	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	19	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	FE	4A	EF	EB	22	EE	DC	21	10	14	20	40	40	40	40
B0	A1	1E	B2	B3	40	0C	1D	0E	40	B1	13	1F	80	90	40	FD
C0	DB	DF	DA	DE	CF	CD	CB	CA	8A	BA	78	75	73	74	72	71
D0	70	69	65	67	64	66	63	59	62	56	57	55	54	1C	40	30
E0	49	52	48	51	47	46	45	44	42	43	41	3F	3D	3E	3C	3B
F0	3A	39	35	37	34	36	33	31	32	2E	2F	2D	2C	1B	40	40

** indicates Control or Reserved Codes

SB/2K EXPRESS CENTRONICS (8) TO A XEROX PRINTER

The SB/2K Express Centronics (TOPA12768-C2X) uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express Centronics(8) to Xerox ASCII-to-EBCDIC Translation Table (PROM US303A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	5F	80	90	9E	AB	AC	AE	BC	40	**	40	**	**	CC	FF
10	8C	**	9C	**	CE	EC	BF	BB	77	76	C0	FA	D0	40	**	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	79	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	A1	40
80	B0	B1	B2	B3	B4	B5	B6	B7	B8	B9	8D	8E	A0	9D	DD	DC
90	9A	AA	AF	9F	8F	BE	FE	FD	FC	FB	EF	EE	ED	EB	EA	E1
A0	DF	DE	DB	DA	CF	CD	CB	CA	BA	8A	78	75	74	73	72	71
B0	70	69	68	67	66	65	64	63	62	59	58	57	56	55	54	53
C0	52	51	49	48	47	46	45	44	43	42	41	3F	3E	3D	3C	3B
D0	3A	39	38	37	36	35	34	33	32	31	30	2F	2E	2D	2C	2B
E0	2A	29	28	27	26	25	24	23	22	21	20	1F	1E	1E	1C	1B
F0	1A	19	18	17	16	15	14	13	12	11	10	0F	0E	0D	0C	0B

** indicates Control or Reserved Codes

SB/2K EXPRESS CENTRONICS (8) TO AN IBM 3211 PRINTER

The SB/2K Express Centronics uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express Centronics(8) to IBM 3211 ASCII-to-EBCDIC Translation Table (PROM US264A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	28	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	19	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	FE	4A	EF	EB	22	EE	DC	21	10	14	20	40	40	40	40
B0	A1	1E	B2	B3	40	0C	1D	0E	40	B1	13	1F	80	90	40	FD
C0	DB	DF	DA	DE	CF	CD	CB	CA	8A	BA	78	75	73	74	72	71
D0	70	69	65	67	64	66	63	59	62	56	57	55	54	1C	40	30
E0	49	52	48	51	47	46	45	44	42	43	41	3F	3D	3E	3C	3B
F0	3A	39	35	37	34	36	33	31	32	2E	2F	2D	2C	1B	40	40

** indicates Control or Reserved Codes

SB/2K EXPRESS CENTRONICS (8) TO AN IBM 3800-COMPATIBLE PRINTER

The SB/2K Express Centronics uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express Centronics(8) to IBM 3800 ASCII-to-EBCDIC Translation Table (PROM US260A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	79	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	C0	4F	D0	17	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	69	4A	65	40	10	40	62	49	57	80	58	40	40	40	40
B0	66	55	12	13	40	1D	1E	47	40	11	90	59	39	38	40	68
C0	BF	00	9F	FD	8B	8A	73	EC	EB	EE	8F	75	FB	04	FC	FA
D0	40	CF	DD	06	ED	FE	8C	77	8E	DE	08	DF	8D	02	40	67
E0	9D	01	BA	BD	AB	AA	74	9C	9A	9B	BB	DB	A1	95	CB	DC
F0	40	BC	EF	07	DA	BE	AC	76	AE	9E	09	CD	AD	03	40	40

** indicates Control or Reserved Codes

SB/2K EXPRESS WANG TO A XEROX PRINTER

The SB/2K Express Centronics uses the following table to convert the ASCII codes transmitted by the Wang system into EBCDIC before sending them to the printer:

SB/2K Express Wang to Xerox ASCII-to-EBCDIC Translation Table (PROM US264A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	28	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	19	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	FE	4A	EF	EB	22	EE	DC	21	10	14	20	40	40	40	40
B0	A1	1E	B2	B3	40	0C	1D	0E	40	B1	13	1F	80	90	40	FD
C0	DB	DF	DA	DE	CF	CD	CB	CA	8A	BA	78	75	73	74	72	71
D0	70	69	65	67	64	66	63	59	62	56	57	55	54	1C	40	30
E0	49	52	48	51	47	46	45	44	42	43	41	3F	3D	3E	3C	3B
F0	3A	39	35	37	34	36	33	31	32	2E	2F	2D	2C	1B	40	40

** indicates Control or Reserved Codes

SB/2K EXPRESS HP400 TO A XEROX PRINTER

The SB/2K Express HP400 uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express HP400 to Xerox ASCII-to-EBCDIC Translation Table (PROM US264A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	28	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	19	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	FE	4A	EF	EB	22	EE	DC	21	10	14	20	40	40	40	40
B0	A1	1E	B2	B3	40	0C	1D	0E	40	B1	13	1F	80	90	40	FD
C0	DB	DF	DA	DE	CF	CD	CB	CA	8A	BA	78	75	73	74	72	71
D0	70	69	65	67	64	66	63	59	62	56	57	55	54	1C	40	30
E0	49	52	48	51	47	46	45	44	42	43	41	3F	3D	3E	3C	3B
F0	3A	39	35	37	34	36	33	31	32	2E	2F	2D	2C	1B	40	40

** indicates Control or Reserved Codes

SB/2K EXPRESS NCR TOWER TO A XEROX PRINTER

The SB/2K Express NCR Tower uses the following table to convert the ASCII codes transmitted by the host computer into EBCDIC before sending them to the printer:

SB/2K Express NCR Tower to Xerox ASCII-to-EBCDIC Translation Table (PROM US264A)

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	40	40	40	40	40	40	40	40	40	40	**	40	**	**	40	40
10	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	**
20	40	5A	7F	7B	5B	6C	50	7D	4D	5D	5C	4E	6B	60	4B	61
30	F0	F1	F2	F3	F4	F5	F6	F7	F8	F9	7A	5E	4C	7E	6E	6F
40	7C	C1	C2	C3	C4	C5	C6	C7	C8	C9	D1	D2	D3	D4	D5	D6
50	D7	D8	D9	E2	E3	E4	E5	E6	E7	E8	E9	AD	E0	BD	6A	6D
60	28	81	82	83	84	85	86	87	88	89	91	92	93	94	95	96
70	97	98	99	A2	A3	A4	A5	A6	A7	A8	A9	8B	4F	9B	19	40
80	**	**	**	**	**	**	**	**	**	**	**	**	40	40	40	40
90	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
A0	40	FE	4A	EF	EB	22	EE	DC	21	10	14	20	40	40	40	40
B0	A1	1E	B2	B3	40	0C	1D	0E	40	B1	13	1F	80	90	40	FD
C0	DB	DF	DA	DE	CF	CD	CB	CA	8A	BA	78	75	73	74	72	71
D0	70	69	65	67	64	66	63	59	62	56	57	55	54	1C	40	30
E0	49	52	48	51	47	46	45	44	42	43	41	3F	3D	3E	3C	3B
F0	3A	39	35	37	34	36	33	31	32	2E	2F	2D	2C	1B	40	40

** indicates Control or Reserved Codes

APPENDIX C—CABLING ISSUES

CABLING OPTIONS SUMMARY

This appendix describes cabling considerations you should be aware of when installing a SB/2K Express Centronics.

- Power Supply Cord
- Bus and Tag Cable Assemblies
- Parallel Printer Cables

POWER CORD REQUIREMENTS

110V USAGE

The power cord for use with the SB/2K Express Centronics at 110V must meet the following requirements: Detachable, maximum 4.5m long., Listed, rated 250V, min. 10A incorporating 16/3 AWG. Type SJT flexible cord. One end terminate with a parallel blade, grounded, molded on attachment plug (NEMA 5-15P) configuration; other end terminated with molded-on (CEE 22) appliance coupler.

230V USAGE

The power cord for use with the SB/2K Express Centronics at 230V must meet the following requirements: Detachable, maximum 4.5 meters long. Listed, rated 250V, min. 7A incorporating 16/3 AWG. Type SJT flexible cord. One end terminate with a parallel blade, grounded, molded on attachment plug (NEMA 6-15P) configuration; other end terminated with molded-on (CEE 22) appliance coupler.

BUS AND TAG CABLE ASSEMBLIES

IBM Serpentine ("Bus and Tag") cable assemblies allow the connection of the SB/2K Express Centronics to a high-speed printer.

NOTE: One end of the cable is colored dark gray (or black), while the other end is light gray (or white). Connect the dark gray end of each cable to the SB/2K Express Centronics, and the light gray end to the printer.

BUS AND TAG TERMINATORS

IBM Bus and Tag terminator assemblies (#5440649 and #5440650) must be installed on the Bus Out and Tag Out ports on the printer for proper operation.

PARALLEL PRINTER CABLES

The input cable from the host computer to the SB/2K Express Centronics is a standard 25-pin Centronics cable. The maximum length for the cable should not exceed 25 feet (7.62 meters) long. Table C-1 shows the signal assignments for the Centronics-style parallel interface.

Table C-1. Centronics Connector Signal Assignments.

Pin	Direction	Function	Active Level
1	Output	Data Strobe	Low
2	Output	Printer Data 1	High
3	Output	Printer Data 2	High
4	Output	Printer Data 3	High
5	Output	Printer Data 4	High
6	Output	Printer Data 5	High
7	Output	Printer Data 6	High
8	Output	Printer Data 7	High
9	Output	Printer Data 8	High
10	Input	Acknowledge	Low
11	Input	Busy	High
12	Input	Paper End	High
13	Input	Select	High
14	Output	Autofeed (gnd)*	Low
15	Input	Printer Fault	Low
16	Output	Prime	Low
17	Output	Select Input (gnd)*	Low
18 - 25	N/A	Ground	

* = The signal is tied to ground in the SB/2K Express Centronics

APPENDIX D— SB/2K EXPRESS DIP SWITCH SETTINGS

SB/2K EXPRESS CENTRONICS TO XEROX

The following table defines the SB/2K Express Centronics' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch
	ON	Disables the <Menu> switch
3	OFF**	Operation Out falls at the end of a Test I/O (allows the printer to go offline cleanly)
	ON	Operation Out does not fall at the end of a Test I/O (may prevent some printers from going offline cleanly)
4	OFF	Performs Set Block Data Check during Power-On Sequence
	ON**	Bypasses Set Block Data Check during Power-On Sequence
5	OFF	Loads the UCSB with an uppercase train image (A-11)
	ON**	Loads the UCSB with an upper and lowercase train image (T-11)
6	OFF	Loads the FCB with an 88-line form at 8 lpi
	ON**	Loads the FCB with a 66-line form at 6 lpi
7	OFF	Loads UCSB & FCB during Power-On Sequence
	ON**	Does not load UCSB & FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express Centronics and changing any of the settings described in the table.

SB/2K EXPRESS CENTRONICS TO IBM 3211

The following table defines the SB/2K Express Centronics' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch
	ON	Disables the <Menu> switch
3	OFF	Operation Out falls at the end of a Test I/O (allows the printer to go offline cleanly)
	ON**	Operation Out does not fall at the end of a Test I/O (may prevent some printer from going offline cleanly)
4	OFF**	Performs Set Block Data Check during Power-On Sequence
	ON	Bypasses Set block Data Check during Power-On Sequence
5	OFF	Loads the UCSB with an uppercase train image (A-11)
	ON**	Loads the UCSB with an upper- and lowercase train image (T-11)
6	OFF	Loads the FCB with an 88-line form at 8 lpi
	ON**	Loads the FCB with a 66-line form at 6 lpi
7	OFF**	Loads UCSB & FCB during Power-On Sequence
	ON	Does not load UCSB & FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express Centronics and changing any of the settings described in the table.

SB/2K EXPRESS CENTRONICS TO IBM 3800

The following table defines the SB/2K Express Centronics' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch on the front panel
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch on the front panel
	ON	Disables the <Menu> switch
3	OFF**	Loads WCGM A (Gothic 10, gothic 15)
	ON	Loads WCGM B (Gothic 10, Gothic 12)
4	OFF**	Loads CAT B (Gothic 12, Text 1 & 2)
	ON	Loads CAT A (Gothic 10, Gothic 15)
5	OFF**	Performs Set Block Data Check
	ON	Bypasses Set Block Data Check
6	OFF	Loads FCB B with an 88-line form at 8 lpi
	ON**	Loads FCB A with a 66-line form at 6 lpi
7	OFF**	Loads WCGM, CAT, Block Data Check, and FCB during Power-On Sequence
	ON	Does not load WCGM, CAT, Block Data Check, and FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express Centronics and changing any of the settings described in the table.

SB/2K EXPRESS WANG TO XEROX

The following table defines the SB/2K Express' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch
	ON	Disables the <Menu> switch
3	OFF**	Operation Out falls at the end of a Test I/O (allows the printer to go offline cleanly)
	ON	Operation Out does not fall at the end of a Test I/O (may prevent some printers from going offline cleanly)
4	OFF	Performs Set Block Data Check during Power-On Sequence
	ON**	Bypasses Set Block Data Check during Power-On Sequence
5	OFF	Loads the UCSB with an uppercase train image (A-11)
	ON**	Loads the UCSB with an upper- and lowercase train image (T-11)
6	OFF	Loads the FCB with an 88-line form at 8 lpi
	ON**	Loads the FCB with a 66-line form at 6 lpi
7	OFF	Loads UCSB & FCB during Power-On Sequence
	ON**	Does not load UCSB & FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express and changing any of the settings described in the table.

SB/2K EXPRESS HP400 TO XEROX

The following table defines the SB/2K Express' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch
	ON	Disables the <Menu> switch
3	OFF**	Operation Out falls at the end of a Test I/O (allows the printer to go offline cleanly)
	ON	Operation Out does not fall at the end of a Test I/O (may prevent some printers from going offline cleanly)
4	OFF	Performs Set Block Data Check during Power-On Sequence
	ON**	Bypasses Set Block Data Check during Power-On Sequence
5	OFF	Loads the UCSB with an uppercase train image (A-11)
	ON**	Loads the UCSB with an upper and lowercase train image (T-11)
6	OFF	Loads the FCB with an 88-line form at 8 lpi
	ON**	Loads the FCB with a 66-line form at 6 lpi
7	OFF	Loads UCSB & FCB during Power-On Sequence
	ON**	Does not load UCSB & FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express and changing any of the settings described in the table.

SB/2K EXPRESS NCR TOWER TO XEROX

The following table defines the SB/2K Express' internal DIP switch settings. The double asterisks (**) in the table indicates the default setting.

Switch	Setting	Definition
1	OFF**	Enables the <Select> switch
	ON	Disables the <Select> switch
2	OFF**	Enables the <Menu> switch
	ON	Disables the <Menu> switch
3	OFF**	Operation Out falls at the end of a Test I/O (allows the printer to go offline cleanly)
	ON	Operation Out does not fall at the end of a Test I/O (may prevent some printers from going offline cleanly)
4	OFF	Performs Set Block Data Check during Power-On Sequence
	ON**	Bypasses Set Block Data Check during Power-On Sequence
5	OFF	Loads the UCSB with an uppercase train image (A-11)
	ON**	Loads the UCSB with an upper and lowercase train image (T-11)
6	OFF	Loads the FCB with an 88-line form at 8 lpi
	ON**	Loads the FCB with a 66-line form at 6 lpi
7	OFF	Loads UCSB & FCB during Power-On Sequence
	ON**	Does not load UCSB & FCB during Power-On Sequence
8	OFF**	Online Mode after Power-On Sequence
	ON	Menu Mode after Power-On Sequence

NOTE: Please call Spur Customer Support at 208-377-0001 before opening the SB/2K Express and changing any of the settings described in the table.