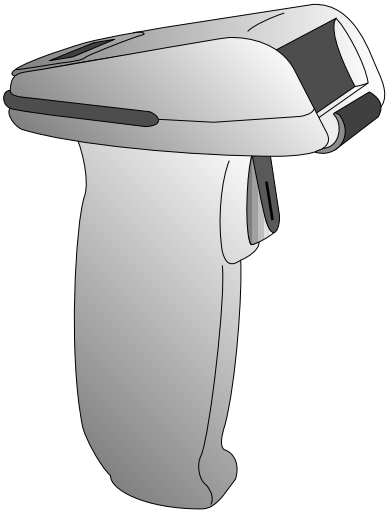
LS 1000

Product Reference Guide

Click on red text at any location in the manual to jump to the specified chapter, topic, or reference.



70-17529-01

Revision A

March, 1996

symbol®

Symbol Technologies, Inc.
One Symbol Plaza
Holtsville, N.Y. 11742-1300
http://www.symbol.com

FCC and Industry Canada Information

This device complies with Part 15 of the FCC rules.. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations. Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Factory Service

If you have a problem, contact the Symbol Support Center at the telephone number on the next page.

Before calling, have the model number and several of your bar code symbols at hand.

Call the Support Center from a phone near the scanning equipment so that the service person can try to talk you through your problem. If the equipment is found to be working properly and the problem is symbol readability, Samples of your bar codes will be requested for analysis at our facility.

If your problem cannot be solved over the phone, you may need to return your equipment for servicing. If that is necessary, you will be given specific directions.

> **Note:** Symbol Technologies is not responsible for any damages incurred during shipment if the approved shipping container is not used. Shipping the units improperly can possibly void the warranty. If the original shipping container was not kept, contact Symbol to have another sent to you.

Symbol Support Center

In the U.S.A., for service information, warranty information or technical assistance call:

SYMBOL SUPPORT CENTER

1-800-653-5350

If you purchased your Symbol product from a Symbol Business Partner, contact that Business Partner for service.

Canada

Mississauga, Ontario

Canadian Headquarters
(905) 629-7226

Europe

Wokingham, England

European Headquarters
01734-771-222 (Inside UK)
+44-1734-771-222 (Outside UK)

Asia

Singapore

Symbol Technologies Asia, Inc.
337-6588 (Inside Singapore)
+65-337-6588 (Outside Singapore)

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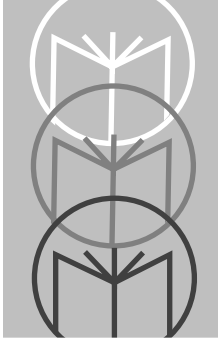


Chapter 1 Introduction and Set-up

Introduction

Symbol Technologies Inc., the world leader in hand-held laser scanning now offers 21st century technology, while maintaining compatibility with today's existing systems. The LS 1000 Series of hand-held laser scanners offers the best performance in retail and light industrial applications. Advanced ergonomic design ensures comfortable use for extended periods of time.

The LS 1000 series hand-held scanner is based on the Visible Laser Diode (VLD). This state of the art technology gives the scanner a wider decode zone, greater depth of field, and a visible scan beam. This model reads color bar codes and symbols printed on all substrates. See LS 100x Decode Zone .

Here's what each member of the LS 1000 family offers you:

- LS 1000 - The aggressiveness of this discrete scanner is typical of the LS 1000 family's performance. It connects easily to, and is programmed by, the complete line of Symbol Technologies portable terminals and the full range of SYMBOLLINK® and OmniLink^{tm} interface controllers.
- LS 1004 - With a simple cable change, this scanner is compatible with:
  - RS 232C asynchronous terminals
  - Synapse^{tm} "Smart Cables", which allow you to connect to IBM 4683/4, 4693/4 series of terminals
    All leading OCIA terminals, including NCR, Nixdorf, and ICL terminals, using an XT, AT, or PS/2 -style keyboard (when using as a keyboard wedge, all scanned data is entered into your terminal in the form of keystrokes - no changes to your host system are necessary)
  - Popular OCR terminals, such as Fujitsu and ICL.

All of the LS 1000 series scan automatically at the rate of 36 scans per second. For decode capability, see LS 100x Technical Specifications .

Audience

The intended audience for this manual is personnel performing installation / setup and programming of LS 100x scanners.

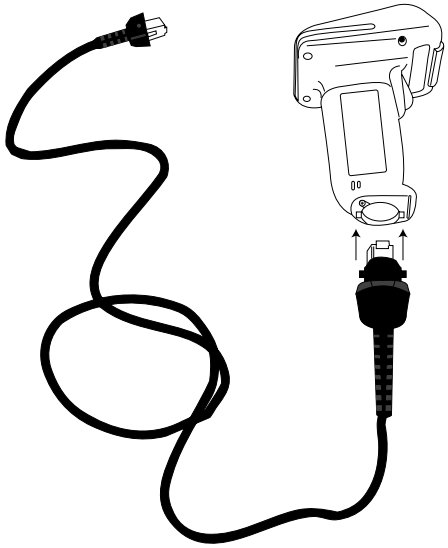
Set-Up

Unpacking

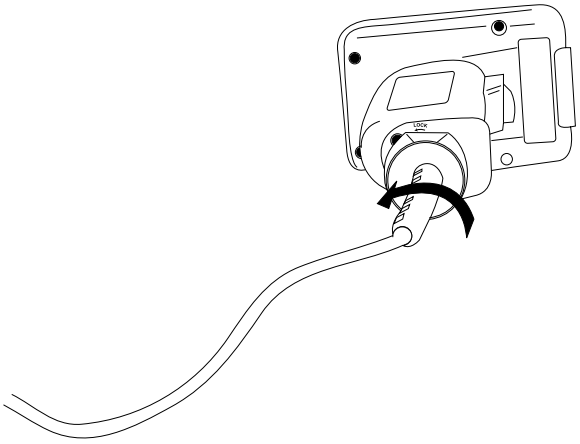
Remove the scanner from its packing and inspect it for damage. If the scanner was damaged in transit, call the ***Symbol Support Center*** at one of the telephone numbers listed in the front of this manual. KEEP THE PACKING. It is the approved shipping container and should be used if you ever need to return your equipment for servicing.

Installing the Cable

1. Insert the cable into the receptable on the bottom of the scanner, as shown below:



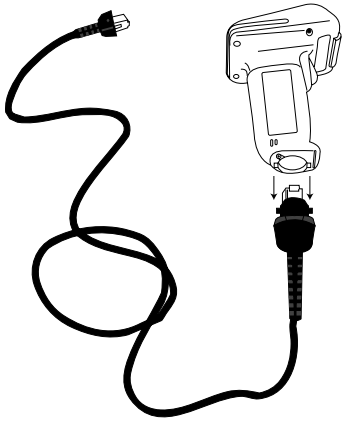
2. Twist the cable to the left to lock in place, as shown below:



Switching Cables

Different cables are required for different hosts. To change the scanner cable:

1. "Unlock" the cable by twisting to the right.
2. Pull the cable out of the receptacle on the bottom of the scanner.



3. Insert a new cable in the receptacle.
4. Twist to the left to lock the new cable in place.

Connecting to a Host

With some terminal types, the LS 100x is unable to answer host terminal polls until the appropriate host type is selected. This may result in an error message generated by the host. To correct this situation, select proper parameter values and initialize the host terminal. See Chapter 4 for more information.

RS-232C

For external power operation with Synapse "Smart Cable"

- Plug the scanner into the Synapse "Smart Cable".
- Connect the Synapse cable with the host connector.
- Connect the power supply to the input receptacle located on the Synapse cable.

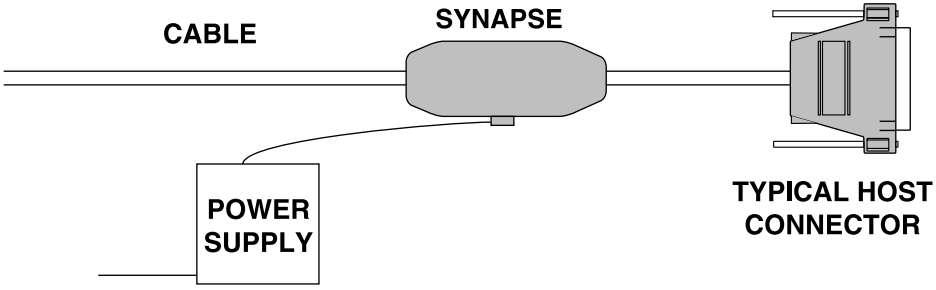


Figure 1-1. RS-232C External Power Connection using Synapse Cable

For external power operation with Flying Lead Connector

- Plug the cable into the scanner.
- Plug the Power Supply into the receptacle on the Flying Lead connector.

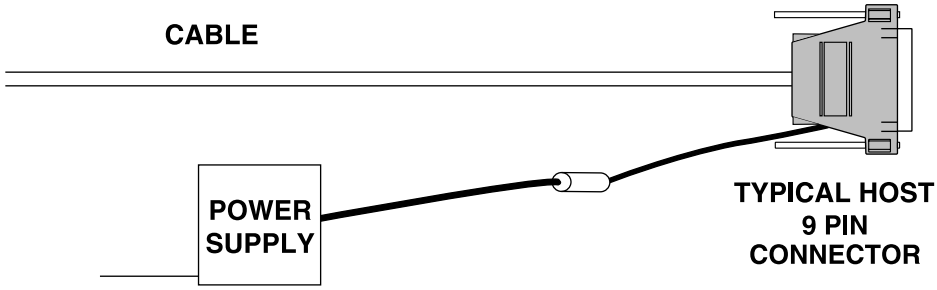


Figure 1-2. RS-232C External Power Connection: Flying Lead Connector to a 9-pin Host Connector

For external power operation with 25-pin Host Connector

- Plug the cable into the scanner.
- Plug the Power Supply into the receptacle on the side of the 25-pin Host Connector

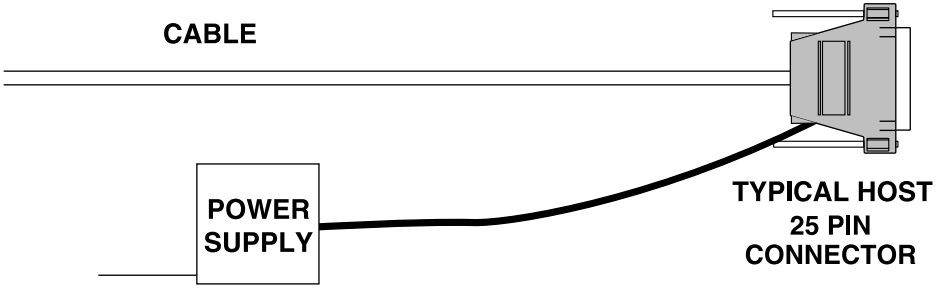


Figure 1-3. RS-232C External Power Connection: 25-pin Host Connector

RS-232C (Contd)

For battery operation:

- Insert a 9-volt battery into the battery box. See ***Battery Box Operation*** .
- Plug the scanner's 9-pin connector at the end of the cord into one end of the battery box.
- An output cable from the battery box connects the LS 1000 to the RS-232C input device. Connect one end of this cable to the battery box and the other to the appropriate port on the host device.

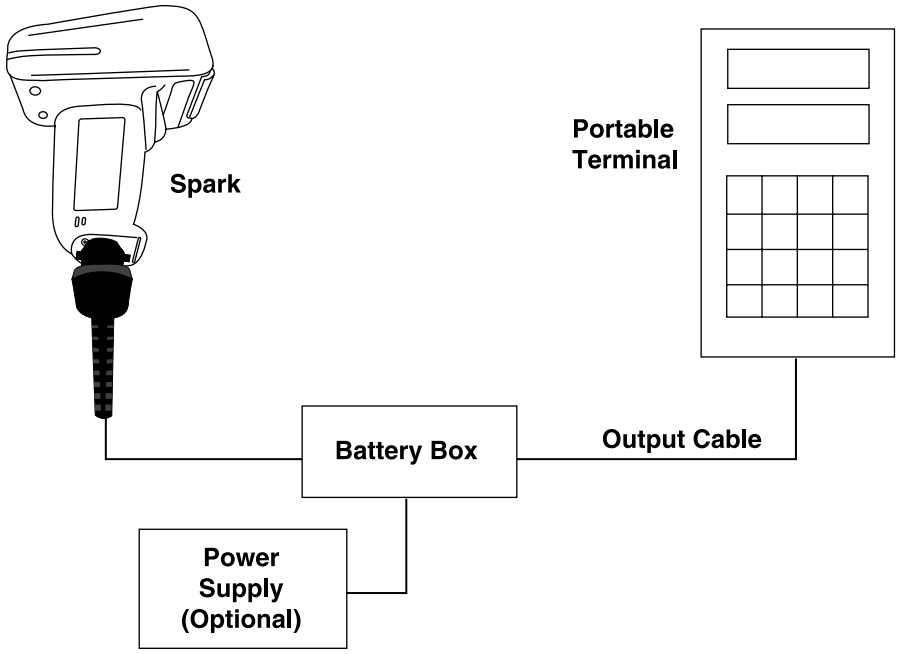


Figure 1-4. RS-232C Operation

IBM 468X/9X

Plug the SDL modular connector at the end of the selected Synapse "Smart" cable into the appropriate port (**5B**, **9B**, **9C**, **9E**, or **17**). Check that the connection is secure. To install an LS 1004 on an IBM 468X / 469X host:

1. Connect a synapse adaptor cable to the scanner, using the procedure described in "Installing the Cable " .
2. Plug the other end of the adaptor cable into the synapse cable's female connector.

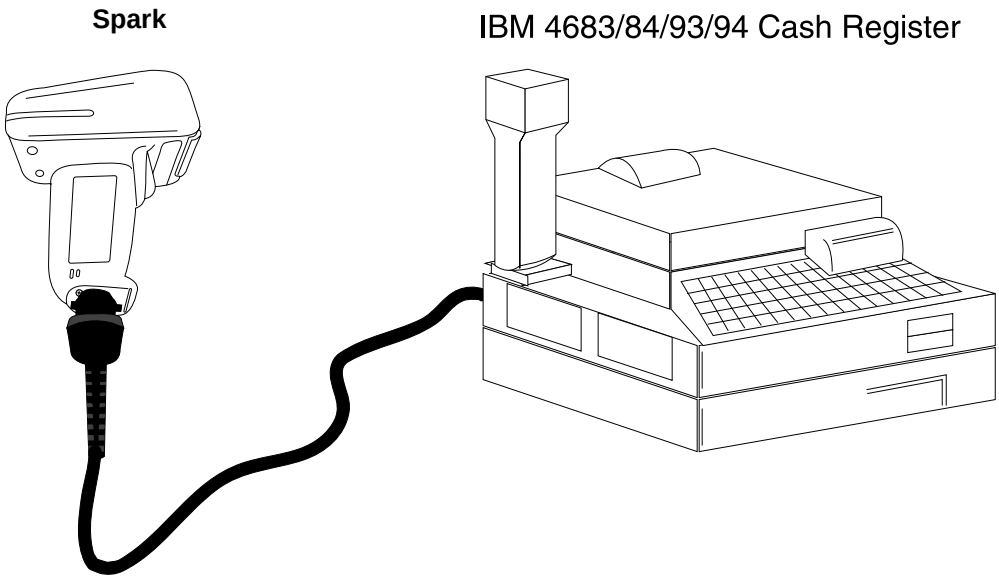


Figure 1-5. Typical System Configuration

IBM 468X/9X (Contd)

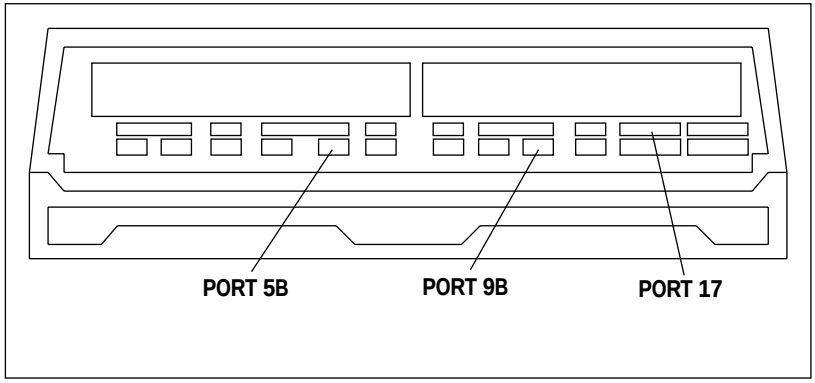


Figure 1-6. IBM 4683 Rear Panel with Cover Removed

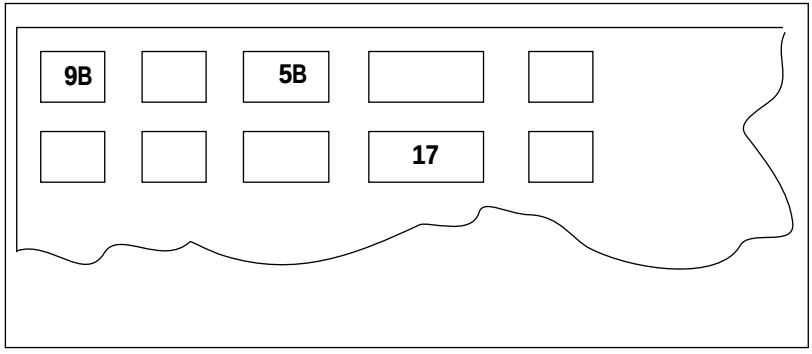


Figure 1-7. IBM 4684 Rear Panel with Cover Removed

IBM 468X/9X (Contd)

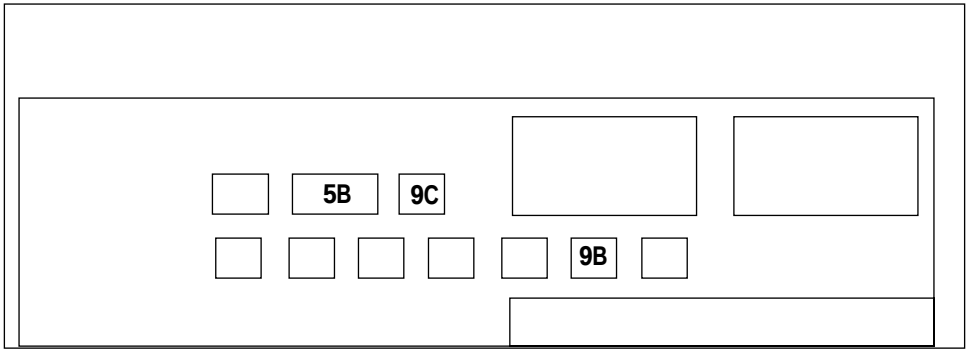


Figure 1-8. IBM 4693 Rear Panel with Cover Removed

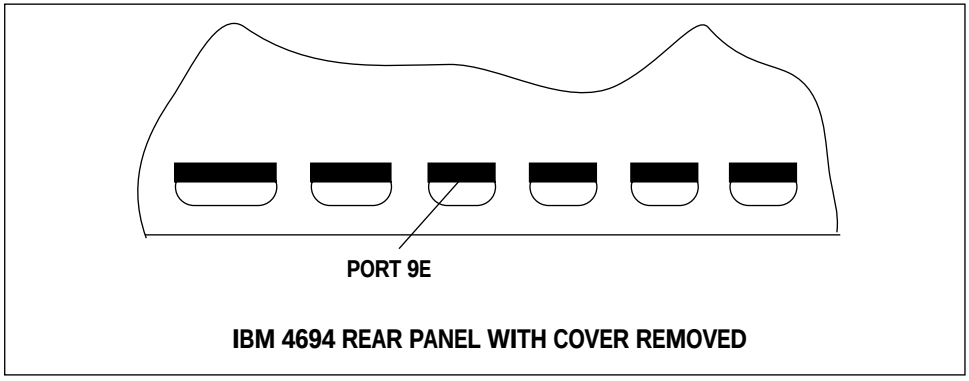
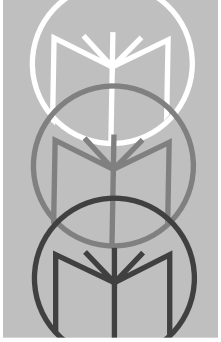


Figure 1-9. IBM 4694 Rear Panel with Cover Removed

Wand Emulation, OCIA, OCR, and Keyboard Wedges

A Synapse Adaptor Cable is required when connecting the LS 1004 to any of these hosts using Synapse. See the instructions packed with the appropriate Synapse cable.



Chapter 2 Scanning

Introduction

This chapter covers the techniques involved in scanning bar codes. Included are specific instructions on how to hold the scanner at the appropriate angle to ensure an accurate decode.

Ready, Test, Scan

1. Ready

   Make sure all connections are secure.

2. Test

   Aim the scanner away from you and press the trigger. When you press the trigger, the scanning beam is energized. On the LS 1000, the length of time the beam remains on depends on the controller or terminal into which it is plugged. On the LS 1004, the scanner is energized for approximately 1 second (default).

3. Scan

   Make sure the symbol you want to scan is within the scanning range. See the ***LS 100x Decode Zone*** .

   Aim and press the trigger. On the LS 1000, the scan beam and SCAN LED lights for 3.5 seconds, or until a successful decode occurs. On the LS 1004, if you use the scanner in default Low Power operating mode, the DECODE LED remains on until power down (maximum of 1 second). If the unit is programmed for Continuous power operating mode, the DECODE LED stays on until the next trigger pull.

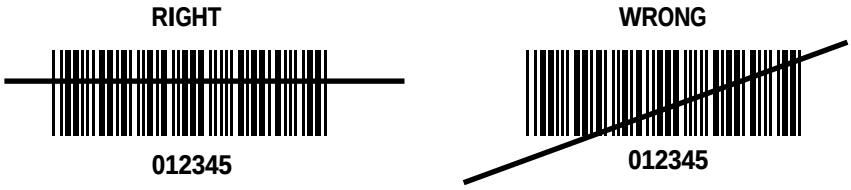
The scanner has read the symbol when:

- You hear a short, high tone beep (if the beeper is enabled).
- The DECODE LED lights.

Aiming

Scan the Entire Symbol

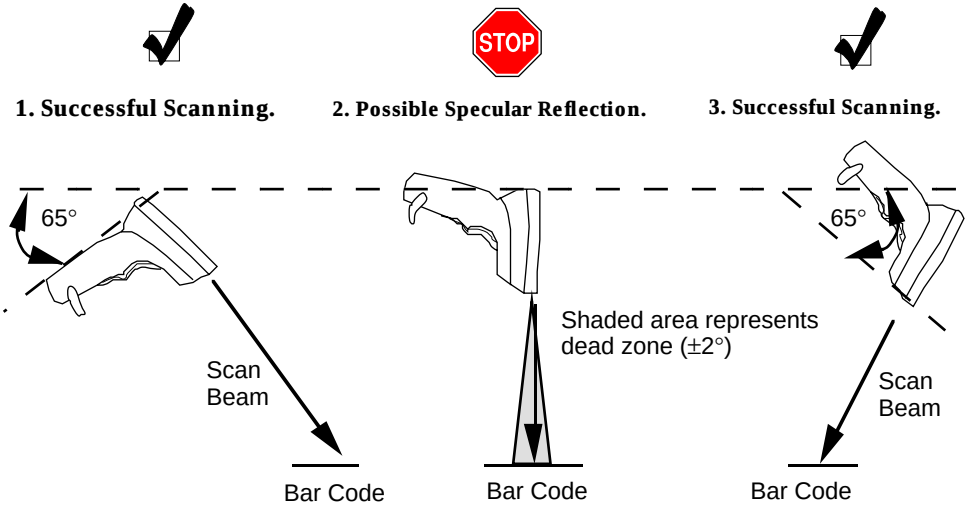
- Your scan beam must cross every bar and space on the symbol.
- The larger the symbol, the farther away you should hold the scanner.
- Hold the scanner closer for symbols with bars that are close together.
- A short, high tone beep indicates a good decode.

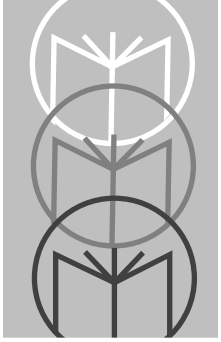


Hold at an Angle

Do not hold the scanner directly over the bar code. Laser light reflecting *directly* back into the scanner from the bar code is known as specular reflection. This strong light can "blind" the scanner and make decoding difficult. The area where specular reflection occurs is known as a "dead zone".

You can tilt the scanner up to 65° forward or back and achieve a successful decode. Simple practice quickly shows what tolerances to work within.





Chapter 3
Maintenance & Specifications

Introduction

This chapter covers the suggested maintenance of the LS 100x scanner, as well as the technical specifications, available accessories, pinouts, and beeper definitions.

Maintaining the LS 1000 Scanner

Battery Box Operation

When using the LS 1000 Series with a battery box, you can use either an alkaline battery (recommended), or a nickel-cadmium rechargeable battery. Low power is signalled by 4 short, high-tone beeps, coupled with scanning interruptions. If this occurs, change or recharge the battery as soon as possible. For battery box operation:

1. Insert a 9-volt battery into the battery box.
2. Plug the scanner's 9-pin connector at the end of the coil cord into the end of the battery box.
3. An output cable from the battery box connects the LS 1000 Series to the host device. Connect one end of this cable to the battery box and the other to the appropriate port on the host device.

   Note: Not all applications require a power supply or battery box. The output cable depends on the wand being replaced. See the *Product Ordering Guide* for more information.

Changing the Battery

- Disconnect the battery box.
- To open the battery box, push up on the flanges at one end of the pack.
- Remove the old battery.
- Insert the new or recharged 9-volt battery into the battery box. Match the positive (+) and negative (-) terminals on the battery with the corresponding terminals in the battery box.

Recharging a Nickel-Cadmium Battery

- Remove the battery from the battery box and place it in the recharging unit (not supplied by Symbol).
- To recharge the battery, follow the instructions supplied with the recharging unit.

Maintenance

Cleaning the exit window is the only maintenance required.

- Do not allow any abrasive material to touch the window.
- Remove any dirt particles with a damp cloth.
- Wipe the window using a damp cloth, and if necessary, a non-ammonia based detergent.
- Do not spray water or other cleaning liquids directly into the window.

Accessories

Required Accessories

Required accessories are listed in the ***Product Ordering Guide***. Optional accessories are available at extra cost.

Table 3-1. LS 1000 Required Accessories

Part Number	Description
ND1221	One undecoded cable
70-17422-01	LS 1000 Series Quick Reference Guide

Table 3-1. LS 1004 Required Accessories

Part Number	Description
ND1223	One RS-232 Cable 9-pin female TxD pin 2, or
ND1224	One RS-232 Cable 25-pin male TxD pin 3, or
ND1225	One RS-232 Cable 25-pin TxD pin 3
ND1222	Synapse Adapter Cable
70-17422-01	LS 1000 Series Quick Reference Guide

Optional Accessories

Optional accessories, listed in the ***Product Ordering Guide***, include various stands and holders, which are supplied at extra cost. Additional units of standard accessories may also be purchased at extra cost.

What If...

Nothing happens when you follow the operating instructions?

You Should

- Check the system power; is there a battery in the battery box?
- Be sure the scanner is programmed for the terminal in use.
- Make sure the scanner is programmed to read the type of bar code you are scanning.
- Check for loose cable connections.
- Check the symbol to make sure it is not defaced.
- Try scanning test symbols of the same code type.
- Be sure you are within the proper scanning range.

Symbol is decoded, but not transmitted to the host terminal?

You Should

- Be sure the proper host type is selected (See Chapter 4).

Scanned data is incorrectly displayed on the terminal?

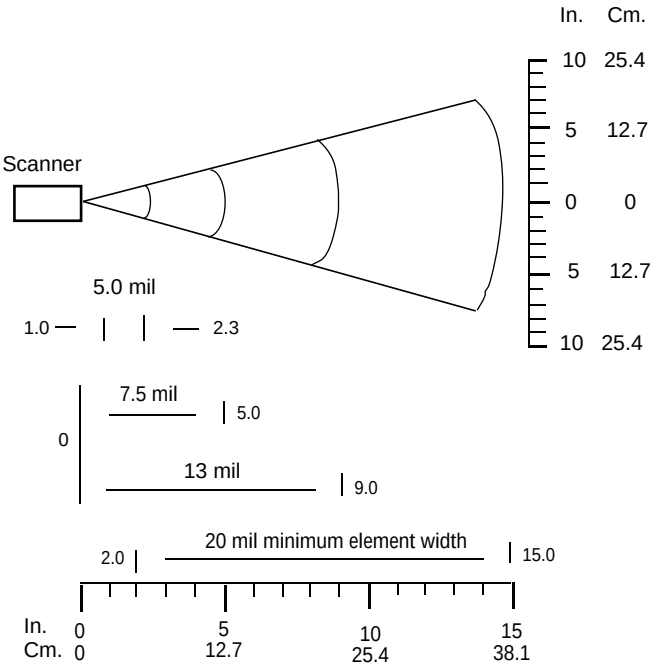
You Should

- Make sure the system is programmed for the correct keyboard type.
- Make sure the CAPS LOCK key is off.
- Be sure the proper host is selected.
- Be sure editing options (e.g. UPC-E to UPC-A Conversion) are properly programmed.

If after performing these checks the symbol still does not scan, contact your distributor or call the Symbol Support Center. See Symbol Support Center for the telephone number.

LS 100x Technical Specifications

LS 100x Decode Zone



Depth of field as a function of minimum element width.

Figure 3-1. LS 100x Decode Zone

Table 3-1. Technical Specifications (LS 1000)

Item	Description
Power Requirements*	
Discrete	4.8 to 14 VDC (max) 80 mA @ 5VDC typical
Decode Capability	Transmission of decoded information will depend on the capabilities of the attached terminal.
Beeper Operation	User-selectable: Enabled, Disabled, Volume, Tone
Scan Repetition Rate	36 (± 3) scans / sec (bidirectional)
Skew Tolerance	± 65˚ from normal
Pitch	± 60˚ from normal
Decode Depth of Field	See Decode Zone
Print Contrast Minimum	25% absolute dark / light differential, measured at 670 nm.
Ambient Light Immunity	
Artificial Lighting	450 ft. candles 4844 lux
Sunlight	8000 ft. candles86112 lux

Table 3-1. Technical Specifications (LS 1000) (Continued)

Item	Description
Operating Temperature	32° to 104°F0° to 40°C
Storage Temperature	-40° to 140°F-40° to 60°C
Humidity	5% to 95% (non-condensing)
Durability	4-ft. drop to concrete1.2 m
Dimensions **Height** **Length** **Width**	 4.8 in.122 mm 3.7 in.93 mm 2.4 in.60 mm
Laser Classifications	CDRH Class II IEC 825 Class 2
Start-Up Time	<50 msec from scan enable
Data Acquisition Time	<110 msec from scan enable
Minimum Element Width	0.005 in0.127 mm
Maximum Element Width	0.020 in

Table 3-2. Technical Specifications (LS 1004)

Item	Description
Power Requirements*	
RS-232C/Synapse	4.75 to 14.5 VDC (max) 100mA @ 5VDC typical
Low Power	4.75 to 14 VDC (max) 200 mA @ 5V typical
Decode Capability	The LS 100x can be programmed to decode the following code types: UPC/EAN, Code 39, Code 39 Full ASCII, Code 93, Codabar, Interleaved 2 of 5, Code 128, EAN 128, and Discrete 2 of 5. Set code length(s) for any linear code type. The LS 100x can auto-discriminate between all of the above code types except for Code 39 and Code 39 Full ASCII.
Beeper Operation	User-selectable: Enabled, Disabled., Volume, Tone
Scan Repetition Rate	36 (± 3) scans/sec (bidirectional)
Skew Tolerance	± 65˚ from normal
Pitch	± 60˚ from normal
Decode Depth of Field	See Decode Zone
Print Contrast Minimum	25% absolute dark/light differential, measured at 670 nm.
Ambient Light Immunity	
Artificial Lighting	450 ft. candles 4844 lux
Sunlight	8000 ft. candles86112 lux

Table 3-2. Technical Specifications (LS 1004) (Continued)

Item	Description
Operating Temperature	32° to 104°F0° to 40°C
Storage Temperature	-40° to 140°F-40° to 60°C
Humidity	5% to 95% (non-condensing)
Durability	4-ft. drop to concrete1.2 m
Dimensions **Height** **Length** **Width**	 4.8 in.122 mm 3.7 in.93 mm 2.4 in.60 mm
Laser Classifications	CDRH Class II IEC 825 Class 2
Start-Up Time	<50 msec from scan enable
Data Acquisition Time	<110 msec from scan enable
Minimum Element Width	0.005 in0.127 mm
Maximum Element Width	0.020 in5.08 mm

*For direct host power connection, make sure the host terminal supplies sufficient power for the specified operation. Symbol is not responsible for damage to host equipment or system mis-operation due to an insufficient power condition.

Table 3-3. Pinouts - LS 1000

Pin	LS 1000	Function
1	VBAT	Power Supply
2	VBAT	Power Supply
3	GND	Ground
4	ENABLE	Scan Enable
5	SOS	Start of Scan
6	TRIGGER*	Trigger Signal
7	DECODE	Successful Decode
8	DBP	Digital Bar Pattern
9	N.C.	Non-Connected
10	N.C.	Non-Connected

* active low

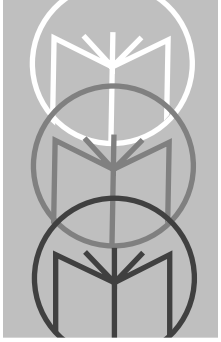
Table 3-4. Pinouts - LS 1004

Pin	LS 1004	Function
1	Data	Data Line (for synapse)
2	VBAT	Power Supply
3	GND	Ground
4	RTS	Request to Send (for RS-232C)
5	RXD*	Receive Data Input (for RS-232C)
6	N.C.	Non-Connected (for RS-232C)
7	DTR	Data Terminal Ready (for RS-232C)
8	TXD*	Transmit Data Output (for RS-232C)
9	CTS	Clear to Send (for RS-232C)
10	Clock	Clock Line (for Synapse)

* active low

Table 3-5. Beeper Indications

Standard Use **Beeper Sequence**	**Indication**
1 Beep - short high tone	A bar code symbol was decoded (if decode beeper is enabled).
4 Beeps - long low tone	A transmission error has been detected in a scanned symbol. The last data scanned was lost. Scan the last data again.
4 Beeps - short high tone	Low power indication; no further scanning is possible. Change or recharge battery.
3 Beeps - short high tone	Power-up (continuous power mode only)
Parameter Menu Scanning	
1 Beep - short high tone	Appropriate menu within the scanning sequence has been read
1 Beep - warble sound	Parameter value entered successfully
2 Beeps - long low tone	Parameter not entered, or incorrect sequence performed. Scan CANCEL and restart the scanning sequence.



Chapter 4
Programming The LS 1004

Introduction

This chapter provides information on how to program the LS 1004 scanner. Before programming the scanner, follow the instructions in the Appendix section of Chapter 1.

The default table, shown on the following page, illustrates the default values with which the scanner is shipped. If the default values suit your requirements, scan the Appendix barcode. This will set the scanner to the default parameters. Changing the scanner's programmable parameters is accomplished by scanning the bar codes provided in this section.

The following table lists the defaults for all parameters. If you wish to change any option, scan the appropriate bar code(s)

Table 4-1. Default Table

Parameter	Default
Appendix	All Defaults
Appendix	RS-232C
Appendix	Disable
Appendix	Enable
Appendix	Middle
Appendix	High Level
Appendix	1 second
Appendix	Low Power
Appendix	Disable
Appendix	No Message
Appendix	Disable
Appendix	All
UPC/EAN	
Appendix	Enable
Appendix	Enable
Appendix	Disable
Appendix	Disable
Appendix	Disable
Appendix	No Supplemental
Appendix	System Character
Appendix	Level 0
Code 128	
Appendix	Enable

Table 4-1. Default Table

Parameter	Default
Appendix	Disable
Code 39	
Appendix	Enable
Appendix	Disable
Appendix	Disable
Appendix	Enable
Code 93	
Appendix	Enable
I 2 of 5	
Appendix	Enable
Appendix	14 (length 1) 0 (length 2)
Appendix	Disable
Appendix	Disable
D 2 of 5	
Appendix	Enable
Appendix	Disable
Appendix	12 (length 1) 0 (length 2)
Codabar	
Appendix	Enable
Appendix	Disable
Appendix	Disable
Data Options	
Appendix	Disable

Table 4-1. Default Table

Parameter	Default
Appendix	None
Appendix	CR/LF
RS-232C	
Appendix	9600
Appendix	Even
Appendix	7 Data Bits (with Parity)
Appendix	Two
Appendix	Enable
Appendix	None
Appendix	None
Appendix	0msec

Scanning Sequence

A scanning sequence establishes a value for one parameter type. During a scanning sequence, bar codes are scanned to select a parameter. All bar codes necessary for programming the scanner are provided in the Appendix section of this manual.

Scanning Sequence Example

In this example, assume you want to program the scanner for all default settings except for two parameters, Appendix and Appendix .

Since you want to keep the majority of the default settings, scan the Appendix bar code. The default for DECODE UPC ONLY is DISABLED, but in this example, you need it enabled. To do this, scan the DECODE UPC ONLY ENABLE bar code. You'll hear hi/lo/hi/low warble. The warble sound indicates that the scanner has been successfully programmed for the selected parameter. Other beeper indications are listed in Chapter 3.

The default for INTERCHARACTER DELAY is 0 msec, but you need it set to 2 msec. To program the scanner for a 2msec intercharacter delay, scan the bar codes listed below. This sequence includes a two-digit entry; single-digit entries require a leading zero.

		You'll hear...
1.	Scan INTERCHARACTER DELAY	Short high tone
2.	Scan 0	Short high tone
3.	Scan 2	Hi/Lo/Hi/Lo warble

Errors While Scanning

Don't worry if you make an error during a scanning sequence. If you're scanning a multi-step sequence, scanning CANCEL removes you from that sequence so that you can start again.

Otherwise, simply scan the single correct bar code for the desired parameter.

Parameter Descriptions

Refer to the Default table in the front of this chapter for the default settings for each parameter type.

Set Parameter Defaults

Scanning the SET ALL DEFAULTS bar code returns all parameters to the default values listed in the Default Table.

SET ALL DEFAULTS

Host Interface Select

Scan the bar code corresponding to your host type. You must select a host type when you first set up the scanner and whenever you change host type.

SET RS-232C HOST

SET SYNAPSE HOST

Power On Beep Enable/Disable

This option, if selected, causes the beeper to sound at power-up (in continuous power mode only).

Power On Beep Enable

Power On Beep Disable

Beeper after Decode

This option determines whether the beeper sounds during normal scanning. Usually, it is desirable to operate the unit with the beeper enabled. In all cases, the beeper operates during parameter menu scanning and indicates error conditions. See the Appendix 3-5 section in Chapter 3.

Beeper Enable

Beeper Disable

Beeper Tone

Three options are available for beeper tone (frequency); low, middle, and high.

Beeper Tone Low

Beeper Tone Mid

Beeper Tone High

Beeper Volume

Three options are available for beeper volume; low, middle, and high.

Beeper Volume Low

Beeper Volume Mid

Beeper Volume High

Decode Attempt Time

This parameter sets the length of time the scanner laser beam will remain on while attempting to scan a symbol.

0.5 seconds

1.0 seconds

1.5 seconds

2.0 seconds

2.5 seconds

3.0 seconds

3.5 seconds

4.0 seconds

4.5 seconds

5.0 seconds

5.5 seconds

6.0 seconds

Decode Attempt Time (cont'd)

6.5 seconds

7.0 seconds

Operating Mode

This parameter determines whether or not power remains on after a decode attempt. The LOW POWER option provides for power-down after each scan attempt, while the CONTINUOUS option provides for power to remain on after each scan attempt.

Continuous

Low Power

Aggressive Scan Mode

This parameter is available in the continuous operation mode only. When you set this parameter to be enabled, the scanner scans the mirror continuously, even if it does not illuminate the laser diode.

Aggressive Scan Enable

Aggressive Scan Disable

Transmit "No Decode" Message

This feature gives you the option to transmit "NR" when a symbol does not decode. Prefixes and suffixes enabled will be appended around this character.

Transmit "NO DECODE" Message

Do Not Transmit "NO DECODE" Message

Decode Redundancy

When you select ENABLE CODABAR DECODE REDUNDANCY, a Codabar symbol must be decoded in both directions before being accepted as a successful decode. If you select ENABLE ALL CODE TYPES DECODE REDUNDANCY, all bar code symbols must be decoded in both directions before being accepted as successful decodes.

Enable CODABAR Decode Redundancy

Enable ALL CODE TYPES Decode Redundancy

Disable CODABAR Decode Redundancy

Disable ALL CODE TYPES Decode Redundancy

Code Types

Selecting the ENABLE ALL CODE TYPES bar code below enables the following symbologies:

- UPC Versions A and E (EAN 8 and 13)
- Code 39
- Interleaved 2 of 5
- Code 93
- Codabar
- Discrete 2 of 5
- Code 128
- Code 39 Full ASCII

The scanner autodiscriminates between all of the above symbologies, except for Code 39 and Code 39 Full ASCII.

Enable All Code Types

Disable All Code Types

UPC/EAN

Enable/Disable UPC/EAN

Enable UPC/EAN

Disable UPC/EAN

Transmit UPC-E/UPC-A

Select this option if decoded UPC-E or UPC-A symbols are transmitted with or without the check digit.

Transmit UPC-A check digit

Do Not Transmit UPC-A Check Digit

Transmit UPC-E check digit

Do Not Transmit UPC-E Check Digit

Decode UPC Only (Not EAN)

If selected, this option limits the scanner's capability to UPC versions only. It disables EAN decode capability.

Decode UPC Only Enable

Decode UPC Only Disable

Convert UPC-E to UPC-A

Select this option to convert UPC-E (zero suppressed) decode data to UPC-A format before transmission. After conversion, data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

Convert UPC-E to UPC-A

Do Not Convert UPC-E to UPC-A

EAN Zero Extend

This parameter adds five leading zeros to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

Enable EAN Zero Extend

Disable EAN Zero Extend

Decode UPC/EAN Supplemental

This option is used to select whether UPC/EAN is decoded with or without supplemental characters, or whether the unit will autodiscriminate between the two. Supplementals are additionally appended characters, according to specific code format conventions (e.g., UPC A+2, UPC E+2, EAN 8+5). If UPC/EAN with supplemental characters 2-digit or 5-digit only is selected, UPC/EAN symbols without supplemental characters won't be decoded. If UPC/EAN without supplemental characters is selected and the scanner is presented with a UPC/EAN plus supplemental symbol, the UPC/EAN will be decoded and the supplemental characters will be ignored. If autodiscrimination is chosen, the scanner will, after additional processing to ensure a good decode, transmit either. If UPC/EAN with supplemental characters is selected, UPC/EAN without supplemental characters is ignored.

Decode UPC/EAN Supplementals

Ignore UPC/EAN Supplementals

Autodiscriminate UPC/ EAN Supplementals

Decode UPC/EAN 2-digit Supplementals Only

Decode UPC/EAN 5- digit Supplementals Only

UPC A and E Preamble(s)

Three options are available for the lead-in characters for decoded UPC-A or UPC-E symbols transmitted to the host device. Select one preamble for UPC-A decodes and one for UPC-E decodes. These lead-in characters are considered part of the symbol itself. The three options are:

- a system character only
- the country code and system character
- no preamble

The system character is the digit printed to the extreme left of a UPC symbol. The country code for UPC is always zero, and it cannot be transmitted without the system character.

UPC-A Pream-

None

System Character

System Character and Country Code

UPC-E Pream-

None

System Character

System Character and Country Code

UPC/EAN Security Level

The scanner offset four levels of decode security for UPC/EAN bar codes. Increasing levels of security are provided for decreasing levels of bar code quality. There is an inverse relationship between security and scanner aggressiveness, so be sure to choose only that level of security necessary for any given application.

Security Level 0 - This is the default setting which allows the scanner to operate in its most aggressive state, while providing sufficient security in decoding in spec UPC/EAN bar codes.

Security Level 1 - As bar code quality levels diminish, certain characters become prone to mis-decodes before others (i.e., 1, 2, 7, 8). If you are experiencing mis-decodes of poorly printed bar codes, and the mis-decodes are limited to these characters, select this security level.

Security Level 2 - If you are experiencing mis-decodes on poorly printed bar codes, and the mis-decodes are not limited to characters 1, 2, 7 and 8, select this security level.

UPC/EAN Security Level 0

UPC/EAN Security Level 1

UPC/EAN Security Level 2

Code 128

Enable/Disable Code 128

Enable CODE 128

Disable CODE 128

Send CODE 128 Function Character

If selected, CODE 128 function characters are sent as:

- FN1=0X1D
- FN2=0X81
- FN3=0X82
- FN4=0X83

This option will be enabled when data format is 8 bits. Even if this option is disabled or data format is 7 bits, FN1 will still be set as 0X1D, unless FN1 is in the first or second character in a bar code message.

Transmit CODE 128 Function Character Enabled

Transmit CODE 128 Function Character Disabled

Code 39

Enable/Disable Code 39

Enable Code 39

Disable Code 39

CODE 39 Modulo 43 Check

When enabled, this parameter checks the integrity of a CODE 39 symbol to ensure it complies with specified algorithms.

Verify Code 39 Check Digit

Do Not Verify Code 39 Check Digit

Transmit CODE 39 Check Digit

When enabled, CODE 39 Check Digit will be sent to the host.

Transmit CODE 39 Check Digit Enable

Transmit CODE 39 Check Digit Disable

Enable/Disable Code 39 Full ASCII

Enable Code 39 Full ASCII

Disable Code 39 Full ASCII

Code 93

Enable/Disable Code 93

Enable Code 93

Disable Code 93

Interleaved 2 of 5

Enable/Disable Code I 2 of 5

Enable Code I 2 of 5

Disable Code I 2 of 5

Fixed Lengths for Code I 2 of 5

Select one or two lengths for the Interleaved 2 of 5 codes. If you set both Length 1 and Length 2 to 0, the scanner can read any length within 36 characters. It is recommended that you set the I 2 of 5 modulus 10 check to enabled when you set both Length 1 and Length 2 to 0.

If any default setting is in effect and is an appropriate length, it need not be reset. Length 1 may range from 00-36 and Length 2 may range from 00-36.

I 2 of 5 Length 1
(RANGE00-36)

I 2 OF 5 Length 2
(RANGE 00-36)

Fixed Lengths for Code 2 of 5 (cont'd)

0

1

2

3

4

5

6

7

8

9

CANCEL

I 2 of 5 Modulo 10 Check

When enabled, this parameter checks the integrity of a Interleaved 2 of 5 symbol to ensure it complies with specific algorithms.

I 2of 5 Modulo 10 Check Digit Enable

I 2of 5 Modulo 10 Check Digit Disable

ITF14/EAN13 Conversion

This feature converts a 14-character I 2 of 5 code into EAN13, and transmits to the host as EAN13. In order to accomplish this, the I 2 of 5 code must be enabled, one length (either LENGTH 1 or LENGTH 2) must be set to 14, the code must have a leading zero and proper trailing check digit.

ITF-14/EAN-13 Conversion

ITF-14/EAN-13 Conversion Disable

Discrete 2 of 5

Enable/Disable D 2 of 5

Enable Code D 2 of

Disable Code D 2 of

D 2 of 5 Modulo 10 Check

When enabled, this parameter checks the integrity of a Discrete 2 of 5 symbol to ensure it complies with specific algorithms.

D 2 of 5 Modulo 10 Check Digit Enable

D 2 of 5 Modulo 10 Check Digit Disable

Fixed Lengths for Code 2 of 5

Select one or two lengths for the Discrete 2 of 5 codes. If you set the both of them (Length 1 and Length 2) to 0, the scanner can read any length within 36 characters. It is recommended that you set the D 2 of 5 modulus 10 check to enabled when you set both Length 1 and Length 2 to 0.

If any default setting is in effect and is an appropriate length, it need not be reset. Length 1 may range from 00-36 and Length 2 may range from 00-36

D 2 of 5 Length 1 (RANGE 00-36)

D 2 OF 5 Length 2 (Range 00-36)

Fixed Lengths for Code 2 of 5 (cont'd)

0

1

2

3

4

5

6

7

8

9

CANCEL

Codabar

Enable/Disable Codabar

Enable Codabar

Disable Codabar

CLSI Editing

Use this parameter to insert a space after the 1st, 5th, and 10th characters of a 14-character Codabar symbol. This symbol length includes start and stop characters.

Enable CLSI Editing

Disable CLSI Editing

NOTIS Editing

This option strips the start and stop characters from decoded Codabar symbols.

Enable NOTIS Editing

Disable NOTIS Editing

Data Options

Transmit Code ID Character

A code ID character identifies the code type of a scanned bar code. This may be useful when the scanner is decoding more than one code type. In addition to any single-character prefixes already selected, the code ID character is appended as a prefix to the decode. The code ID characters are:

ID Character	Meaning
A	UPC-A, UPC-E, EAN-13, EAN-8
B	Code 39
C	Codabar
D	Code 128
E	Code 93
F	Interleaved 2 of 5
G	Discrete 2 of 5 or Discrete 2 of 5 IATA

Transmit Code ID Character

Do Not Transmit Code ID Character

Prefix

The scanner adds one of the following start-of-text characters to transmitted data.

- None
- Start-of-text (STX)
- One user-defined prefix (can be any ASCII character) See the ASCII Character Table in Appendix A for more information.

Prefix None

Prefix STX

User's Choice Prefix Character

Suffix

- Select one or two end-of-text characters to be added to transmitted data.
- None
- CR (Carriage Return) - Returns the cursor to the same position on the line after each decode.
- LF (Line Feed) - Moves the cursor down a line after each decode.
- CR & LF - Allow you to select where the cursor on a display terminal returns to after it displays each decoded symbol. Selecting both CR and LF returns the cursor to the same position on successive lines after each decode. If you select no control code, the cursor remains where it stopped after the last transmission.
- HT (Horizontal Tab) - Moves the cursor one tab space.
- End -of-text <ETX> - One or two characters, user-defined. Refer to the ASCII Character table in Appendix A for more information.

Suffix None

Suffix ETX

Suffix CR

Suffix CR/LF

Suffix LF

Suffix HT

User's Choice Suffix Character 1

User's Choice Suffix Character 2

Prefix/Suffix Values

0

1

2

3

4

5

6

7

8

9

CANCEL

RS-232C

Baud Rate

Baud Rate is the number of bits of data transmitted per second. The unit's baud rate setting should match the data rate setting of the host device. If not, data may not reach the host device, or may reach it in distorted form.

300

2400

600

4800

1200

9600

19200

Parity

A parity check bit is the most significant bit of each ASCII coded character. If you select ODD parity, the parity bit will have a value of 0 or 1, based on data, to ensure that an odd number of 1 bits are contained in the coded character.

If you select EVEN parity, the parity bit will have a value, 0 or 1, to ensure that and even number of 1 bits are contained in the coded character.

If you select MARK parity, the parity bit will always be 1.
If you select SPACE parity, the parity bit will always be 0.

Select the parity type according to the host device requirements.

ODD

EVEN

MARK

SPACE

NONE

Data Format

This parameter sets the transmit data format. The options are:

- 7 Data Bits (With Parity) (default)
- 8 Data Bits (With Parity)
- 8 Data Bits (Without Parity)

7-Bit

8-Bit

Stop Bit Select

The stop bit(s) at the end of each transmitted character marks the end of transmission of one character and prepares the receiving device for the next character in the serial data stream. The number of stop bits (one or two) selected depends on the number the receiving terminal is programmed to accommodate. Set the number of stop bits to match host device requirements.

1 STOP BIT

2 STOP BITS

Check Parity

This option determines whether the parity of received characters is checked. The type of parity used is selectable through the PARITY parameter.

Check Parity of Receive Data Enable

Check Parity of Receive Data Disable

Hardware Handshaking

Hardware handshaking allows you to check the readiness of the receiving device before data is transmitted. If the receiving device is periodically occupied with other tasks, hardware handshaking is needed to prevent loss of transmitted data.

Select whether the scanned data is to be transmitted as soon as it is available or whether transmission should follow the RTS / CTS procedure.

None

RTS/CTS

Software Handshaking

This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. These options may be combined; for example, ACK/NAK with ENQ.

- No software handshaking

None

- ACK/NAK only
  The ACK/NAK option checks the success or failure of transmission. The scanner expects one of the following host responses after a data transmission:

  <ACK> acknowledges a valid and successful transmission.
  <NAK> indicates a problem with the transmission.

  Whenever a NAK is received, the unit retransmits the same data and awaits an ACK/NAK response. After three unsuccessful attempts to transmit the same data, the scanner aborts any further communication attempts of that message.

ACK/NAK

- ENQ ONLY
  The ENQ option needs the host to request data before it is transmitted to the host. This ensures that data transmission occurs only when the host is ready to receive.

  When you select the wait for ENQ option, the scanner waits for an ENQ from the host before it transmits data; otherwise, the unit transmits data without waiting for an ENQ character from the host. With ENQ enabled, the scanner must receive an ENQ from the host within a 2-second period after the last activity, or a

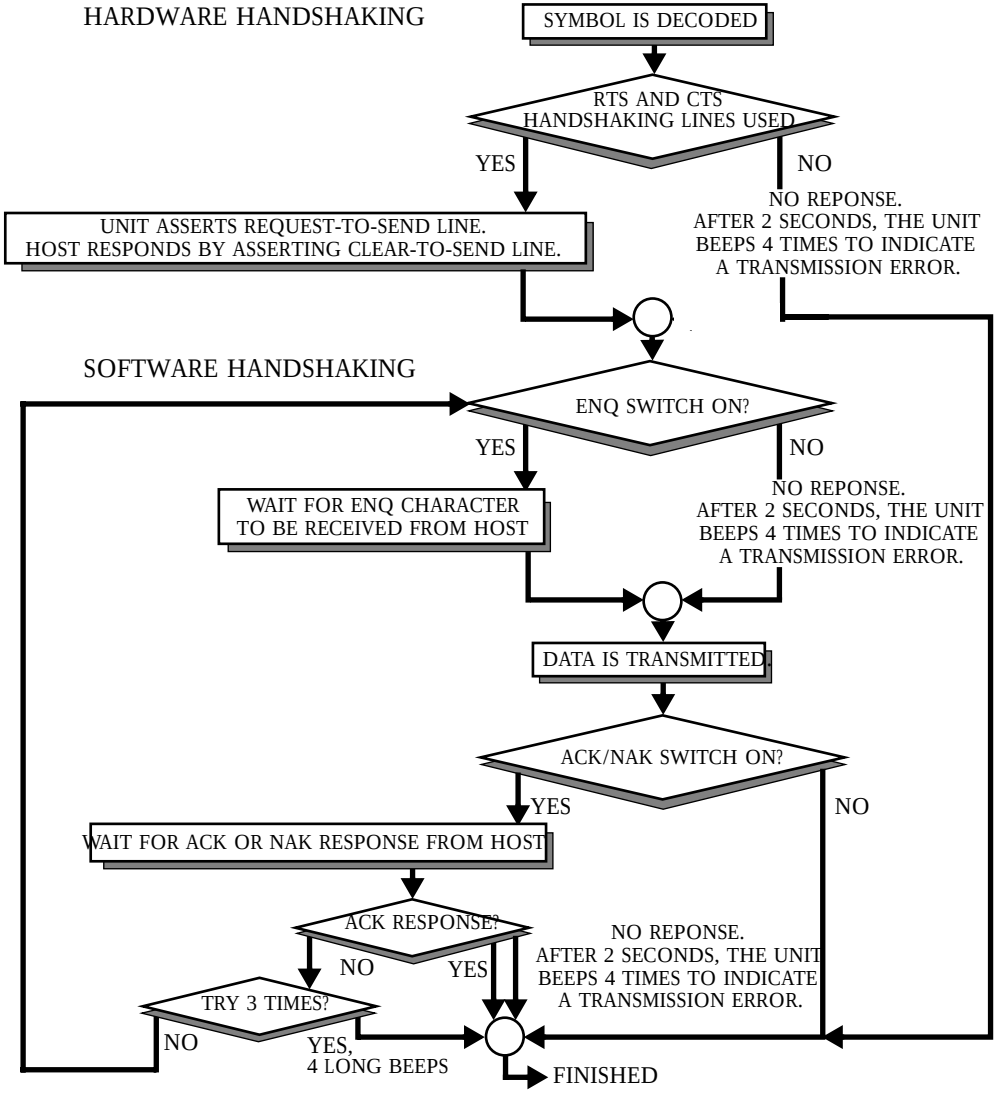
transmission error occurs.

ENQ Only

- ACK / NAK with ENQ
  This option combines both handshaking options.

ACK/NAK with ENQ

Hardware and Software Handshaking Sequence



Communications Delays and Time-Outs (Intercharacter Delay)

Selecting the intercharacter delay gives the host system time to service its receiver and perform other tasks between characters. Select from no delay to a 99 msec. delay between transmission of each character.

Intercharacter Delay

Intercharacter Delay Values (cont'd)

0

1

2

3

4

5

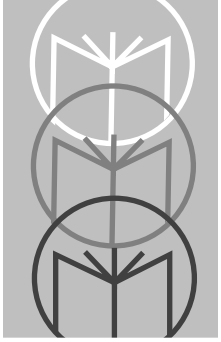
6

7

8

9

CANCEL



Chapter 5 Glossary

ASCII - American Standard Code for Information Interchange. A 7 bit code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.

BIT - Binary digit. One bit is the basic unit of binary information. Generally, eight consecutive bits compose one byte of data. The pattern of 0 and 1 values within the byte determines its meaning.

BOOKLAND EAN - A specially-formatted European Article Numbering symbol with 13 characters (EAN-13), the first 3 of which are “978”.

BYTE - On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.

CDRH - Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.

CHECK DIGIT - A digit used to verify a correct symbol decode. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

CODABAR - A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters: (- $: / , +).

CODE 128 - A high density symbology which allows the controller to encode all 128 ASCII characters without adding extra symbol elements.

CODE 3 OF 9 (CODE 39) - A versatile and widely used alphanumeric bar code symbology with a set of 43 character types, including all uppercase letters, numerals from 0 to 9, and 7 special characters (- . / + % $ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

CODE 93 - An industrial symbology compatible with Code 39 but offering a full character ASCII set and a higher coding density than Code 39.

CONTINUOUS SYMBOLOGY - A bar code or symbol in which all spaces within the symbol are parts of characters. There are no intercharacter gaps in a continuous code. The absence of gaps allows for greater information density.

DECODE - To recognize a bar code symbology (e.g., UPC/EAN) and then analyze the content of the specific bar code scanned.

DECODE ALGORITHM - A decoding scheme that converts pulse widths into data representation of the letters or numbers encoded within a bar code symbol.

DISCRETE SYMBOLOGY - A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

DISCRETE 2 OF 5 - A binary bar code symbology representing each character by a group of five bars, two of which are wide. The location of wide bars in the group determines which character is encoded; spaces are insignificant. Only numeric characters (0 to 9) and START/STOP characters may be encoded.

EAN - European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

HOST COMPUTER - A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs, and network control.

IEC - International Electrotechnical Commission. This international agency regulates laser safety by specifying various laser operation classes based on power output during operation.

IEC CLASS I (IEC 825 Class I) - This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 25 seconds of laser operation within any 100 second window and an automatic laser shutdown if the scanner's oscillating mirror fails.

INTERCHARACTER GAP - The space between two adjacent bar code characters in a discrete bar code.

INTERLEAVED BAR CODE - A bar code in which characters are paired together, using bars to represents the first character and the intervening spaces to represent the second.

INTERLEAVED 2 OF 5 - A binary bar code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bar / spaces) within each group determines which characters are encoded. This continuous code type uses no intercharacter spaces. Only numeric (0 to 9) and START / STOP characters may be encoded.

LASER - An acronym for Light Amplification by Stimulated Emission of Radiation. The laser is an intense light source. Light from a laser is all the same frequency, unlike the output of an incandescent bulb. Laser light is typically coherent and has a high energy density.

LASER DIODE - A semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.

PARAMETER - A variable that can have different values assigned to it.

PROGRAMMING MODE - The state in which a scanner is configured for parameter values. See **SCANNING MODE**.

QUIET ZONE - A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.

REDUNDANCY - A decoding method which requires a bar code be recognized redundantly on a number of sweeps of the scan beam before a decode is declared. While slowing the time-to-decode, redundancy can help lower the possibility of a mis-decode of poorly printed symbols.

SCANNER - An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol. Its three main components are:

1. Light source (laser or photoelectric cell) - illuminates a bar code.
2. Photodetector - registers the difference in reflected light (more light reflected from spaces).
3. Signal conditioning circuit - transforms optical detector output into a digitized bar pattern.

SCANNING MODE - The scanner is energized, programmed, and ready to read a bar code.

SCANNING SEQUENCE - A method of programming or configuring parameters for a bar code reading system by scanning bar code menus.

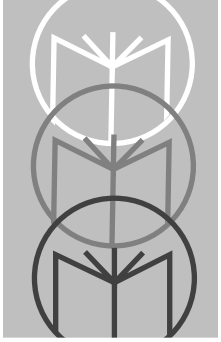
SELF-CHECKING CODE - A symbology that uses a checking algorithm to detect encoding errors within the characters of a bar code symbol.

START/STOP CHARACTER - A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

SYMBOL - A scannable unit that encodes data within the conventions of a certain symbology, usually including start/stop characters, quiet zones, data characters, and check characters.

SYMBOLOGY - The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39).

UPC - Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which can be any of four widths. The standard symbology for retail food packages in the United States.



Chapter 6 ASCII Character Set

ASCII Character Set

Table 6-1. ASCII Character Set

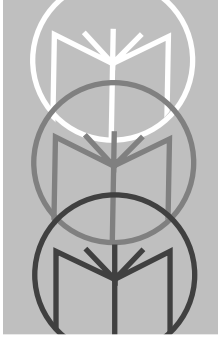
ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
000	%U	CTRL 2	024	$X	CTRL X
001	$A	CTRL A	025	$Y	CTRL Y
002	$B	CTRL B	026	$Z	CTRL Z
003	$C	CTRL C	027	%A	CTRL [
004	$D	CTRL D	028	%B	CTRL \
005	$E	CTRL E	029	%C	CTRL]
006	$F	CTRL F	030	%D	CTRL 6
007	$G	CTRL G	031	%E	CTRL -
008	$H	CTRL H	032	Space	Space
009	$I	CTRL I	033	/ A	!
010	$J	CTRL J	034	/ B	‘
011	$K	CTRL K	035	/ C	#
012	$L	CTRL L	036	/ D	$
013	$M	CTRL M	037	/ E	%
014	$N	CTRL N	038	/ F	&
015	$O	CTRL O	039	/ G	‘
016	$P	CTRL P	040	/ H	(
017	$Q	CTRL Q	041	/ I	)
018	$R	CTRL R	042	/ J	*
019	$S	CTRL S	043	/ K	+
020	$T	CTRL T	044	/ L	,

Table 6-1. (Continued) ASCII Character Set

021	$U	CTRL U	045	-	-
022	$V	CTRL V	046	.	.
023	$W	CTRL W	047	/	/
ASCII Value	**Full ASCII Code 39 Encode Char.**	**Keystroke**	**ASCII Value**	**Full ASCII Code 39 Encode Char**	**Keystroke**
048	0	0	073	I	I
049	1	1	074	J	J
050	2	2	075	K	K
051	3	3	076	L	L
052	4	4	077	M	M
053	5	5	078	N	N
054	6	6	079	O	O
055	7	7	080	P	P
056	8	8	081	Q	Q
057	9	9	082	R	R
058	/ Z	:	083	S	S
059	%F	;	084	T	T
060	%G	<	085	U	U
061	%H	=	086	V	V
062	%I	>	087	W	W
063	%J	?	088	X	X
064	%V	@	089	Y	Y
065	A	A	090	Z	Z
066	B	B	091	%K	[
067	C	C	092	%L	\
068	D	D	093	%M	]
069	E	E	094	%N	^
070	F	F	095	%O	_
071	G	G	096	%W	‘

Table 6-1. (Continued) ASCII Character Set

072	H	H	097	+A	a
ASCII Value	**Full ASCII Code 39 Encode Char.**	**Keystroke**	**ASCII Value**	**Full ASCII Code 39 Encode Char**	**Keystroke**
098	+B	b	113	+Q	q
099	+C	c	114	+R	r
100	+D	d	115	+S	s
101	+E	e	116	+T	t
102	+F	f	117	+U	u
103	+G	g	118	+V	v
104	+H	h	119	+W	w
105	+I	i	120	+X	x
106	+J	j	121	+Y	y
107	+K	k	122	+Z	z
108	+L	l	123	%P	{
109	+M	m	124	%Q	|
110	+N	n	125	%R	}
111	+O	o	126	%S	~
112	+P	p	127		Undefined



Appendix A Errata

Table A-1. ASCII Character Set

264	ALT 2	275	ALT K	286	ALT V
265	ALT A	276	ALT L	287	ALT W
266	ALT B	277	ALT M	288	ALT X
267	ALT C	278	ALT N	289	ALT Y
268	ALT D	279	ALT O	290	ALT Z
269	ALT E	280	ALT P	291	ALT [
270	ALT F	281	ALT Q	292	ALT \
271	ALT G	282	ALT R	293	ALT]
272	ALT H	283	ALT S	294	ALT 6
273	ALT I	284	ALT T	295	ALT -
274	ALT J	285	ALT U		
Misc. Key	**Keystroke**	**Misc. Key**	**Keystroke**	**Misc. Key**	**Keystroke**
301	PA 1	309	CMD 7	317	°
302	PA 2	310	CMD 8	318	1/2
303	CMD 1	311	CMD 9	319	¶
304	CMD 2	312	CMD 10	320	§
305	CMD 3	313	¥	321	|
306	CMD 4	314	£	322	0/00
307	CMD 5	315	¤		
308	CMD 6	316	¬		

PF Keys	Keystroke	PF Keys	Keystroke	PF Keys	Keystroke
401	PF 1	409	PF 9	417	PF 17
402	PF 2	410	PF 10	418	PF 18
403	PF 3	411	PF 11	419	PF 19
404	PF 4	412	PF 12	420	PF 20
405	PF 5	413	PF 13	421	PF 21
406	PF 6	414	PF 14	422	PF 22
407	PF 7	415	PF 15	423	PF 23
408	PF 8	416	PF 16	424	PF 24
F Keys	**Keystroke**	**F Keys**	**Keystroke**	**F Keys**	**Keystroke**
501	F 1	514	F 14	527	F 27
502	F 2	515	F 15	528	F 28
503	F 3	516	F 16	529	F 29
504	F 4	517	F 17	530	F 30
505	F 5	518	F 18	531	F 31
506	F 6	519	F 19	532	F 32
507	F 7	520	F 20	533	F 33
508	F 8	521	F 21	534	F 34
509	F 9	522	F 22	535	F 35
510	F 10	523	F 23	536	F 36
511	F 11	524	F 24	537	F 37
512	F 12	525	F 25	538	F 38
513	F 13	526	F 26	539	F 39

Numeric Keypad	Keystroke	Numeric Keypad	Keystroke	Numeric Keypad	Keystroke
642	*	649	1	656	8
643	+	650	2	657	9
644	Undefined	651	3	658	Enter
645	-	662	4	659	Num Lock
646	.	663	5	660	00
647	/	664	6		
648	0	665	7		
Extended Keypad	**Keystroke**	**Extended Keypad**	**Keystroke**	**Extended Keypad**	**Keystroke**
701	Break	708	Backspace	715	Up Arrow
702	Delete	709	Tab	716	Dn Arrow
703	Pg Up	710	Print Screen	717	Left Arrow
704	End	711	Insert	718	Right Arrow
705	Pg Dn	712	Home	719	Back Tab
706	Pause	713	Enter		
707	Scroll Lock	714	Escape		

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