LS1900 Series

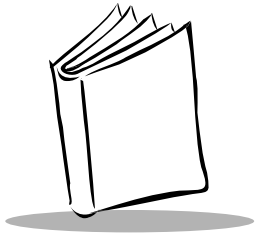
Product Reference Guide

LS1900 Series
Product Reference Guide

72-50930-01
Revision A
June 2001

symbol®

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



Contents

About This Guide

Introduction ix
Chapter Descriptions ix
Notational Conventions x
Related Publications x
Service Information x
Symbol Support Center xi
LS1900 Series Warranty xiii
    LS1900 Series Warranty Coverage and Procedure xiv
    General xiv

Chapter 1. Getting Started

Introduction 1-1
Unpacking Your Scanner 1-2
Setting Up the LS1900 Series Scanner 1-3
    Installing the Interface Cable 1-3
    Removing the Interface Cable 1-4
    Connecting to a Host 1-4

Chapter 2. Scanning

Introduction 2-1
Beeper Definitions 2-2
LED Definitions 2-3
Scanning in Hand-Held Mode 2-4
    Scanning with the LS190xx 2-4
Aiming 2-5
Decode Zones 2-6
Scanning in Hands-Free Mode 2-8
    Assembling the Stand 2-8

Mounting the Stand (optional) 2-9
Scanning in the Stand 2-10

Chapter 3. Maintenance and Technical Specifications

Introduction 3-1
Maintenance 3-1
Troubleshooting 3-2
Technical Specifications 3-3
LS1900 Series Signal Descriptions 3-5

Chapter 4. Programming the Scanner

Introduction 4-1
Scanning Sequence Examples 4-2
Errors While Scanning 4-2
Standard Default Parameters 4-3
Parameter Descriptions 4-10
Set Default Parameter 4-10
Trigger Mode 4-11
Beeper Tone 4-12
Beeper Volume 4-13
Laser On Time 4-14
Power Mode 4-15
Beep After Good Decode 4-16
Transmit “No Read” Message 4-17
Linear Code Type Security Level 4-18
Bi-directional Redundancy 4-20
Host Types 4-21
Enable/Disable UPC-E/UPC-A/UPC-E1 4-50
Enable/Disable EAN-8/EAN-13 4-51
Enable/Disable Bookland EAN 4-52
Decode UPC/EAN Supplementals 4-53
Decode UPC/EAN Supplemental Redundancy 4-54
Transmit UPC-A/UPC-E/UPC-E1 Check Digit 4-55
UPC-A Preamble 4-56
UPC-E Preamble 4-57
UPC-E1 Preamble 4-58
Convert UPC-E to UPC-A 4-59
Convert UPC-E1 to UPC-A 4-60
EAN Zero Extend 4-61
Convert EAN-8 to EAN-13 Type 4-62
UPC/EAN Security Level 4-63
UPC/EAN Coupon Code 4-65

Random Weight Check Digit. 4-66
Linear Supplementals. 4-67
Enable/Disable Code 128. 4-68
Enable/Disable UCC/EAN-128. 4-69
Enable/Disable ISBT 128 4-70
Enable/Disable Code 39. 4-71
Enable/Disable Trioptic Code 39 4-72
Convert Code 39 to Code 32 4-73
Code 32 Prefix 4-74
Set Lengths for Code 39. 4-75
Code 39 Check Digit Verification 4-77
Transmit Code 39 Check Digit 4-78
Enable/Disable Code 39 Full ASCII 4-79
Code 39 Buffering (Scan & Store) 4-80
Enable/Disable Code 93. 4-83
Set Lengths for Code 93. 4-84
Code 11 4-86
Set Lengths for Code 11. 4-87
Code 11 Check Digit Verification 4-89
Transmit Code 11 Check Digits 4-90
Enable/Disable Interleaved 2 of 5. 4-91
Set Lengths for Interleaved 2 of 5 4-92
I 2 of 5 Check Digit Verification. 4-94
Transmit I 2 of 5 Check Digit 4-95
Convert I 2 of 5 to EAN-13 4-96
Enable/Disable Discrete 2 of 5 4-97
Set Lengths for Discrete 2 of 5 4-98
Enable/Disable Codabar. 4-100
Set Lengths for Codabar 4-101
CLSI Editing 4-103
NOTIS Editing. 4-104
Enable/Disable MSI Plessey. 4-105
Set Lengths for MSI Plessey 4-106
MSI Plessey Check Digits. 4-108
Transmit MSI Plessey Check Digit 4-109
MSI Plessey Check Digit Algorithm 4-110
RSS 14 4-111
Transmit Code ID Character. 4-113
Intercharacter Delay 4-114
Pause Duration. 4-115
Prefix/Suffix Values 4-116
Scan Data Options 4-117
Numeric Bar Codes 4-119
Cancel 4-121

Chapter 5. Advanced Data Formatting

Introduction 5-1
Rules: Criteria Linked to Actions 5-1
Using ADF Bar Codes 5-2
Special Commands 5-2
- Begin New Rule 5-2
- Save Rule 5-2
- Erase 5-2
- Quit Entering Rules 5-3
- Disable Rule Set 5-3

Criteria 5-3
- Code Types 5-3
- Code Lengths 5-3
- Message Containing A Specific Data String 5-3
- Specific String at Start 5-3
- Specific String, Any Location 5-3
- Any Message OK 5-3
- Rule Belongs To Set 5-4

Actions 5-4
- Send Data 5-4
- Setup Field(s) 5-4
- Modify Data 5-5
- Pad Data With Spaces 5-6
- Pad Data With Zeros 5-6
- Beeps 5-6
- Send Keystroke (Control Characters and Keyboard Characters) 5-6
- Turn On/Off Rule Sets 5-6

ADF Bar Code Menu Example 5-6
- Rule 1: The Code 128 Scanning Rule 5-7
- Rule 2: The UPC Scanning Rule 5-7
- Alternate Rule Sets 5-8
- Rules Hierarchy (in Bar Codes) 5-9
- Default Rules 5-10

Special Commands 5-11
- Begin New Rule 5-11
- Save Rule 5-11
- Erase 5-12
- Quit Entering Rules 5-12
- Disable Rule Set 5-13

Criteria 5-14
- Code Types 5-14
- Code Lengths 5-16
- Specific Data String 5-20

Numeric Keypad 5-21
Rule Belongs To Set 5-22
Actions 5-23
Send Data 5-23
Setup Fields 5-26
Send Preset Value 5-31
Modify Data 5-32
Pad Data with Spaces 5-33
Pad Data with Zeros 5-37
Beeps 5-41
Control Characters 5-42
Keyboard Characters 5-46
Send ALT Characters 5-58
Send Command Characters 5-62
Send Special Characters 5-64
Send Keypad Characters 5-65
Send Function Key 5-69
Turn On/Off Rule Set 5-75
Alphanumeric Keyboard 5-76

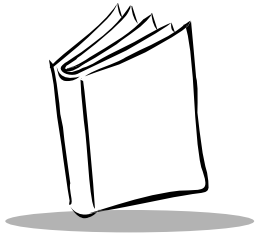
Appendix A. Programming Reference

Symbol Code Identifiers A-1
AIM Code Identifiers A-2
Prefix / Suffix Values A-5
ASCII Character Set A-8
Keyboard Maps A-14

Glossary

Index

Feedback



About This Guide

Introduction

The *LS1900 Series Product Reference Guide* provides general instructions for setting up, programming, operating, maintaining, and troubleshooting the LS1900 Series scanners.

Chapter Descriptions

- Chapter 1, *Getting Started* provides a product overview, unpacking instructions, and information about connecting your scanner to a host.
- Chapter 2, *Scanning* describes parts of the scanner, beeper and LED definitions, how to use the scanner in hand-held and hands-free modes, and decode zones.
- Chapter 3, *Maintenance and Technical Specifications* provides information on how to care for your scanner, troubleshooting, and technical specifications.
- Chapter 4, *Programming the Scanner* provides all the bar codes necessary to program your scanner.
- Chapter 5, *Advanced Data Formatting* (ADF) describes how to customize scanned data before transmitting to the host.
- Appendix A, *Programming Reference* provides a table of AIM code identifiers, ASCII character conversions, and keyboard maps.

Notational Conventions

The following conventions are used in this document:

- Bullets (•) indicate:
  - action items
  - lists of alternatives
  - lists of required steps that are not necessarily sequential
- Sequential lists (e.g., those that describe step-by-step procedures) appear as numbered lists.

Related Publications

The *LS1900 Series Quick Reference Guide*, p/n 72-51366-xx, provides general information to help the user get started with the scanner. It includes basic set-up and operation instructions.

For the latest versions of the *LS1900 Series Quick Reference Guide* and *Product Reference Guide* go to: http://www.symbol.com/manuals.

Service Information

If you have a problem with your equipment, contact the *Symbol Support Center* for your region. See page xi for contact information. Before calling, have the model number, serial 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 reading bar codes, the Support Center will request samples of your bar codes for analysis at our plant.

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

For service information, warranty information or technical assistance contact or call the Symbol Support Center in:

United States [1]
Symbol Technologies, Inc.
One Symbol Plaza
Holtsville, New York 11742-1300
1-800-653-5350
1-631-738-2400

Canada
Symbol Technologies Canada, Inc.
2540 Matheson Boulevard East
Mississauga, Ontario, Canada L4W 4Z2
905-629-7226

United Kingdom
Symbol Technologies
Symbol Place
Winnersh Triangle, Berkshire RG41 5TP
United Kingdom
0800 328 2424 (Inside UK)
+44 208 945 7529 (Outside UK)

Asia/Pacific
Symbol Technologies Asia, Inc.
230 Victoria Street #04-05
Bugis Junction Office Tower
Singapore 188024
337-6588 (Inside Singapore)
+65-337-6588 (Outside Singapore)

Australia
Symbol Technologies Pty. Ltd.
432 St. Kilda Road
Melbourne, Victoria 3004
1-800-672-906 (Inside Australia)
+61-3-9866-6044 (Outside Australia)

Austria
Symbol Technologies Austria GmbH
Prinz-Eugen Strasse 70
Suite 3
2.Haus, 5.Stock
1040 Vienna, Austria
1-505-5794 (Inside Austria)
+43-1-505-5794 (Outside Austria)

Denmark
Symbol Technologies AS
Gydevang 2,
DK-3450 Allerod, Denmark
7020-1718 (Inside Denmark)
+45-7020-1718 (Outside Denmark)

Europe/Mid-East Distributor Operations
Contact your local distributor or call
+44 118 945 7360

Finland
Oy Symbol Technologies
Kaupintie 8 A 6
FIN-00440 Helsinki, Finland
9 5407 580 (Inside Finland)
+358 9 5407 580 (Outside Finland)

France
Symbol Technologies France
Centre d'Affaire d'Antony
3 Rue de la Renaissance
92184 Antony Cedex, France
01-40-96-52-21 (Inside France)
+33-1-40-96-52-50 (Outside France)

Germany
Symbol Technologies GmbH
Waldstrasse 68
D-63128 Dietzenbach, Germany
6074-49020 (Inside Germany)
+49-6074-49020 (Outside Germany)

Italy
Symbol Technologies Italia S.R.L.
Via Cristoforo Columbo, 49
20090 Trezzano S/N Navigilo
Milano, Italy
2-484441 (Inside Italy)
+39-02-484441 (Outside Italy)

Latin America Sales Support
7900 Glades Road
Suite 340
Boca Raton, Florida 33434 USA
1-800-347-0178 (Inside United States)
+1-561-483-1275 (Outside United States)

Mexico
Symbol Technologies Mexico Ltd.
Torre Picasso
Boulevard Manuel Avila Camacho No 88
Lomas de Chapultepec CP 11000
Mexico City, DF, Mexico
5-520-1835 (Inside Mexico)
+52-5-520-1835 (Outside Mexico)

Netherlands
Symbol Technologies
Kerkplein 2, 7051 CX
Postbus 24 7050 AA
Varsseveld, Netherlands
315-271700 (Inside Netherlands)
+31-315-271700 (Outside Netherlands)

Norway
Symbol Technologies
Trollasveien 36
Postboks 72
1414 Trollasen, Norway
66810600 (Inside Norway)
+47-66810600 (Outside Norway)

South Africa
Symbol Technologies Africa Inc.
Block B2
Rutherford Estate
1 Scott Street
Waverly 2090 Johannesburg
Republic of South Africa
11-4405668 (Inside South Africa)
+27-11-4405668 (Outside South Africa)

Spain
Symbol Technologies S.A.
Edificioi la Piovera Azul
C. Peonias, No. 2 - Sexta Planta
28042 Madrid, Spain
9-1-320-39-09 (Inside Spain)
+34-9-1-320-39-09 (Outside Spain)

Sweden
Symbol Technologies AB
Albygatan 109D
Solna
Sweden
84452900 (Inside Sweden)
+46 84452900 (Outside Sweden)

[1]Customer support is available 24 hours a day, 7 days a week.

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

LS1900 Series Warranty

Symbol Technologies, Inc (“Symbol”) manufactures its hardware products in accordance with industry-standard practices. Symbol warrants that for a period of five (5) years from date of shipment, products will be free from defects in materials and workmanship.

This warranty is provided to the original owner only and is not transferable to any third party. It shall not apply to any product (i) which has been repaired or altered unless done or approved by Symbol, (ii) which has not been maintained in accordance with any operating or handling instructions supplied by Symbol, (iii) which has been subjected to unusual physical or electrical stress, misuse, abuse, power shortage, negligence or accident or (iv) which has been used other than in accordance with the product operating and handling instructions. Preventive maintenance is the responsibility of customer and is not covered under this warranty.

Wear items and accessories having a Symbol serial number, will carry a 90-day limited warranty. Non-serialized items will carry a 30-day limited warranty.

LS1900 Series Warranty Coverage and Procedure

During the warranty period, Symbol will repair or replace defective products returned to Symbol's manufacturing plant in the US. For warranty service in North America, call the Symbol Support Center at 1-800-653-5350. International customers should contact the local Symbol office or support center. If warranty service is required, Symbol will issue a Return Material Authorization Number. Products must be shipped in the original or comparable packaging, shipping and insurance charges prepaid. Symbol will ship the repaired or replacement product freight and insurance prepaid in North America. Shipments from the US or other locations will be made F.O.B. Symbol's manufacturing plant.

Symbol will use new or refurbished parts at its discretion and will own all parts removed from repaired products. Customer will pay for the replacement product in case it does not return the replaced product to Symbol within 3 days of receipt of the replacement product. The process for return and customer's charges will be in accordance with Symbol's Exchange Policy in effect at the time of the exchange.

Customer accepts full responsibility for its software and data including the appropriate backup thereof.

Repair or replacement of a product during warranty will not extend the original warranty term.

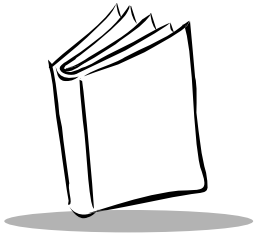
Symbol's Customer Service organization offers an array of service plans, such as on-site, depot, or phone support, that can be implemented to meet customer's special operational requirements and are available at a substantial discount during warranty period.

General

Except for the warranties stated above, Symbol disclaims all warranties, express or implied, on products furnished hereunder, including without limitation implied warranties of merchantability and fitness for a particular purpose. The stated express warranties are in lieu of all obligations or liabilities on part of Symbol for damages, including without limitation, special, indirect, or consequential damages arising out of or in connection with the use or performance of the product.

Seller's liability for damages to buyer or others resulting from the use of any product, shall in no way exceed the purchase price of said product, except in instances of injury to persons or property.

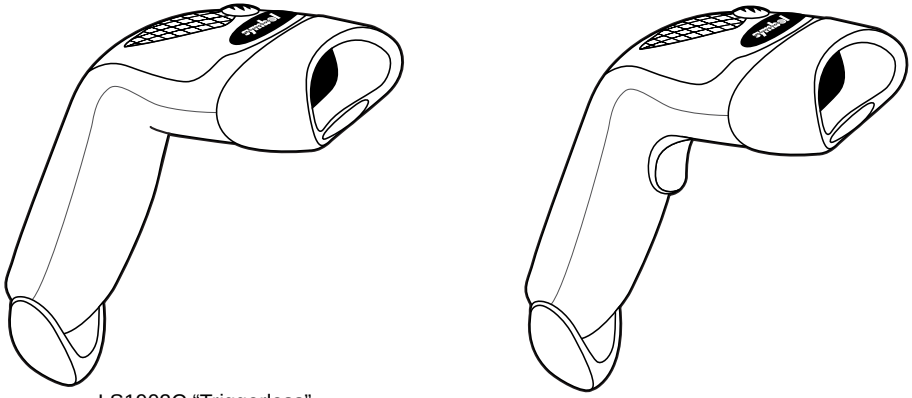
Some states (or jurisdictions) do not allow the exclusion or limitation of incidental or consequential damages, so the proceeding exclusion or limitation may not apply to you.



Chapter 1
Getting Started

Introduction

The LS1900 Series scanner combines excellent scanning performance and advanced ergonomics to provide the best value in a lightweight laser scanner. Whether used as a hand-held scanner or in hands-free mode in a stand, the LS1900 Series ensures comfort and ease of use for extended periods of time.



LS1902C “Triggerless”

LS1900T/LS1902T “Triggered”

Figure 1-1. LS1900 Series Scanner

Note: *Unless otherwise noted, the term LS190xx refers to all versions of the scanner.*

Here's what each member of the LS190xx family offers you:

- LS1902T - This triggered decoded scanner supports the following interfaces:
  - Standard RS-232C connection to a host. Proper communications of the scanner with the host is set up by scanning bar codes.
  - Keyboard Wedge connection to a host. Scanned data is interpreted by your host as keystrokes.
    - International Keyboards supported: North America, German, French, French International, Spanish, Italian, Swedish, British, and Japanese.
  - Wand Emulation connection to a host. The scanner is connected to a portable data terminal, a controller, or host which collects the data as wand data and interprets it for the host.
  - Synapse capability which allows you to connect to a wide variety of host systems using a Synapse and Synapse adapter cable to connect to a host.
- LS1902C - This 'triggerless' decoded scanner offers the same technology and design as the LS1902T.
- LS1900T - This undecoded version of the LS1902T provides connectivity to portable terminals and external interface controllers.

Unpacking Your Scanner

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 on page xi. **KEEP THE PACKING**. It is the approved shipping container and should be used if you ever need to return your equipment for servicing.

Setting Up the LS1900 Series Scanner

Installing the Interface Cable

1. Plug the interface cable modular connector into the cable interface port on the bottom of the LS1900 Series handle. (See Figure 1-2.)
2. Gently tug the cable to ensure the connector is properly secured.
3. Connect the other end of the interface cable to the host. (See *Connecting to a Host* on page 1-4.)
4. Refer to *Parameter Descriptions* on page 4-10 for information about programming your scanner.

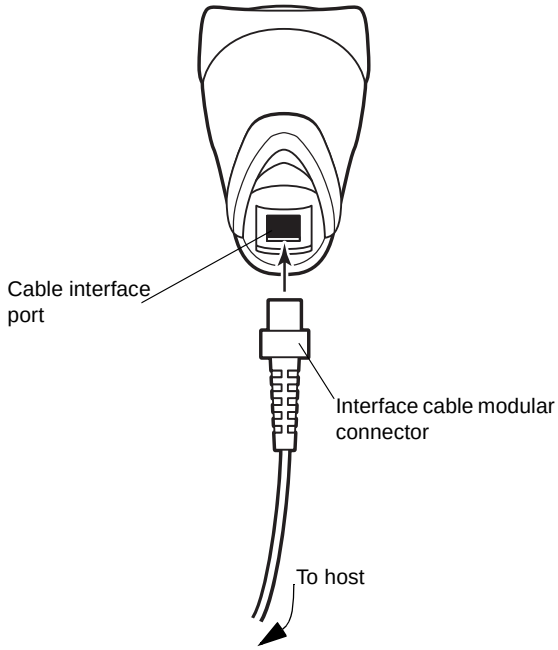


Figure 1-2. Installing the Cable

Removing the Interface Cable

Different cables are required for different hosts. To remove the interface cable:

1. Unplug the installed cable's modular connector by depressing the connector clip with the tip of a screwdriver.
2. Carefully slide out the cable.
3. Follow the steps for *Installing the Interface Cable* on page 1-3 to connect a new cable.

Connecting to a Host

The LS1900 Series scanner supports RS-232C, Keyboard Wedge, Wand Emulation, and Synapse to interface to a host system. This section describes how to set up each of these connections.

Connecting Power

If your host does not provide power to the scanner, you will need an external power connection to the scanner:

1. Connect the interface cable to the bottom of the scanner, as described in *Installing the Interface Cable* on page 1-3.
2. Connect the other end of the interface cable to the host (refer to your host manual to locate the correct port).
3. Plug the power supply into the power jack on the interface cable. Plug the other end of the power supply into an AC outlet.

Connecting an RS-232C Interface

This connection is made either directly from the scanner to the host, or indirectly through a Synapse adapter cable to the host.

RS-232C Direct Connection

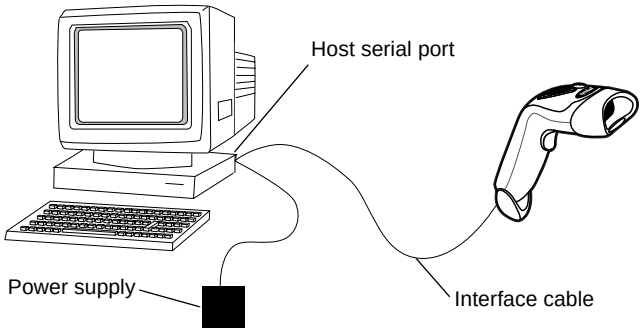


Figure 1-3. RS-232C Direct Connection

1. Connect the RS-232C interface cable to the bottom of the scanner, as described in *Installing the Interface Cable* on page 1-3.
2. Connect the other end of the interface cable to the serial port on the host.
3. Connect the power supply.

Connecting a Keyboard Wedge Interface

When configured for Keyboard Wedge input, the host accepts input from the scanner as keystrokes. The LS1900 Series scanner can perform Keyboard Wedge input using a Keyboard Wedge cable, or a Synapse adapter cable (see Figure 1-6 on page 1-8).

Keyboard Wedge Cable Connection

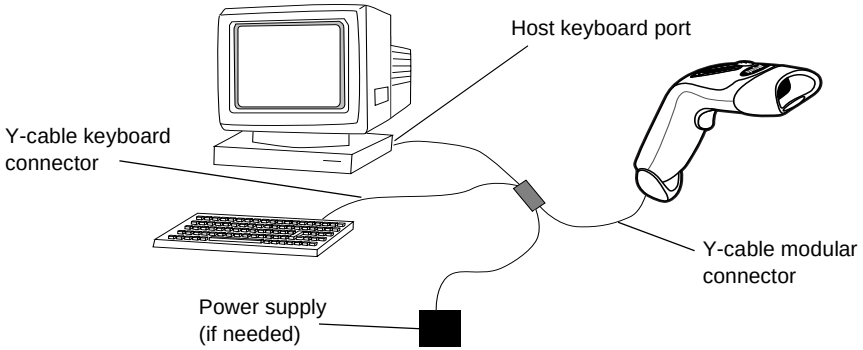


Figure 1-4. Keyboard Wedge Connection with Y-cable

1. Switch off the host and unplug the keyboard connector.
2. Attach the modular connector of the Y-cable to the cable interface port on the scanner. (See *Installing the Interface Cable* on page 1-3.)
3. Connect the round male DIN host connector of the Y-cable to the keyboard port on the host device.
4. Connect the round female DIN keyboard connector of the Y-cable to the keyboard.
5. If needed, attach the optional power supply to the connector in the middle of the Y-cable.
6. Ensure that all connections are secure.
7. Switch on your host system. You are now ready to read bar codes.

Note: *During scanning, PC-compatible host terminals should be in CAPS LOCK OFF mode.*

Connecting a Wand Emulation Interface

To perform Wand Emulation, connect the scanner to a portable data terminal, or a controller which collects the data as wand data and interprets it for the host.

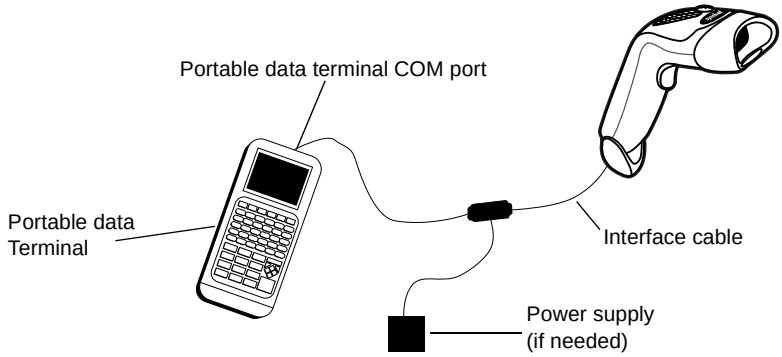


Figure 1-5. Wand Emulation Connection

1. Connect the Wand Emulation interface cable to the bottom of the scanner, as described in *Installing the Interface Cable* on page 1-3.
2. Connect the other end of the interface cable to the COM port on the portable data terminal or controller.
3. Plug one end of the power supply cable into the power receptacle on the interface cable. Plug the other end of the power supply cable into a wall outlet.

Connecting a Synapse Cable Interface

Note: See the *Synapse Interface Guide* provided with your Synapse cable for detailed setup instructions.

Symbol's Synapse Smart Cables enable interfacing to a variety of hosts. The appropriate Synapse cable has the built-in intelligence to detect the host to which it is connected.

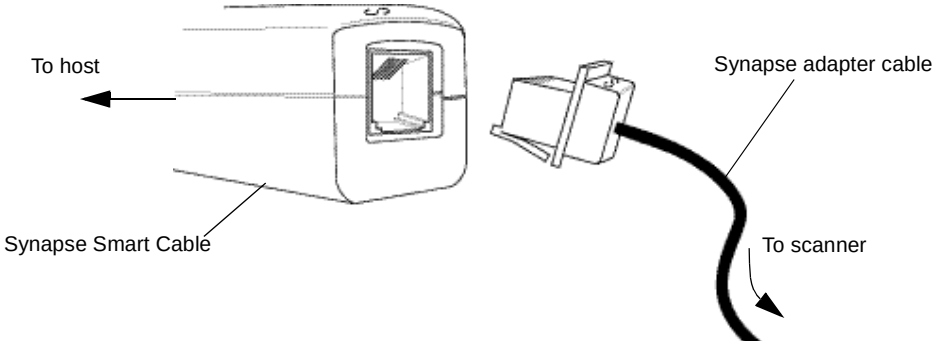
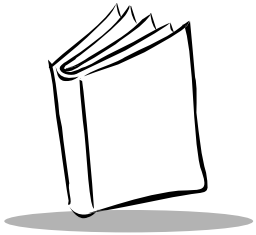


Figure 1-6. Synapse Cable Connection

1. Plug the Synapse adapter cable (p/n 25-32463-xx) into the bottom of the scanner, as described in *Installing the Interface Cable* on page 1-3.
2. Plug the other end of the adapter cable into the Synapse Smart Cable.
3. Connect the other end of the Synapse Smart Cable to the host.



Chapter 2
Scanning

Introduction

This chapter covers the techniques involved in scanning bar codes, beeper and LED definitions, and general instructions and tips about scanning.

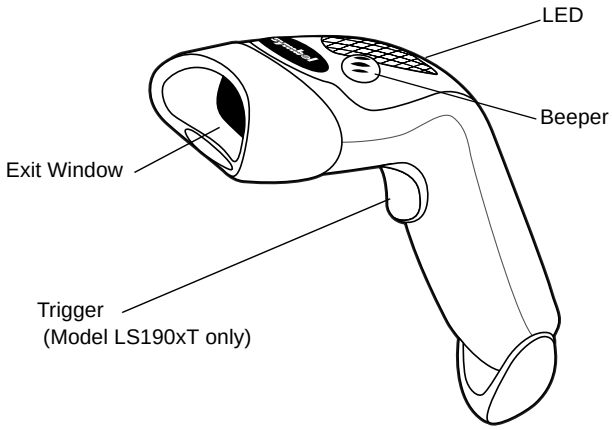


Figure 2-1. LS1900 Series Scanner Parts

Beeper Definitions

The scanner communicates with the user by emitting different beep tones and patterns. Table 2-1 defines beep sequences that occur during both normal scanning and while programming the scanner.

Table 2-1. Standard Beeper Definitions

Beeper Sequence	Indication
Standard Use	
Short high tone	A bar code symbol was decoded (if decode beeper is enabled).
4 Beeps - long low tone	A transmission error was detected in a scanned symbol. The data is ignored. This occurs if a unit is not properly configured. Check option setting.
5 Beeps - low tone	Conversion or format error.
Lo/hi/lo tone	ADF transmit error.
Hi/hi/hi/lo tone	RS-232C receive error.
Parameter Menu Scanning	
Short high tone	Correct entry scanned or correct menu sequence performed.
Lo/hi tone	Input error, incorrect bar code or “Cancel” scanned, wrong entry, incorrect bar code programming sequence; remain in program mode.
Hi/lo tone	Keyboard parameter selected. Enter value using bar code keypad.
Hi/lo/hi/lo tone	Successful program exit with change in the parameter setting.
Code 39 Buffering	
Hi/lo tone	New Code 39 data was entered into the buffer.
3 Beeps - long high tone	Code 39 buffer is full.
Lo/hi/lo tone	The buffer was erased, or there was an attempt to transmit an empty buffer. The Code 39 buffer was erased or there was an attempt to clear or transmit an empty buffer.

Table 2-1. Standard Beeper Definitions (Continued)

Beeper Sequence	Indication
4 Beeps - long low tone	Error in data transmission.
Lo/hi tone	A successful transmission of buffered data.

LED Definitions

In addition to beep tones, the scanner communicates with the user using a two-color LED display. Table 2-2 defines LED colors that display during scanning.

Table 2-2. Standard LED Definitions

LED	Indication
Off	No power is applied to the scanner, or the scanner is on and ready to scan.
Green	A bar code was successfully decoded.
Red	A data transmission error or scanner malfunction occurred.

Scanning in Hand-Held Mode

Install and program your scanner. (Refer to Chapter 4, *Programming the Scanner* for instructions on programming your scanner.) If you need assistance, contact your local supplier or the *Symbol Support Center*.

Scanning with the LS190xx

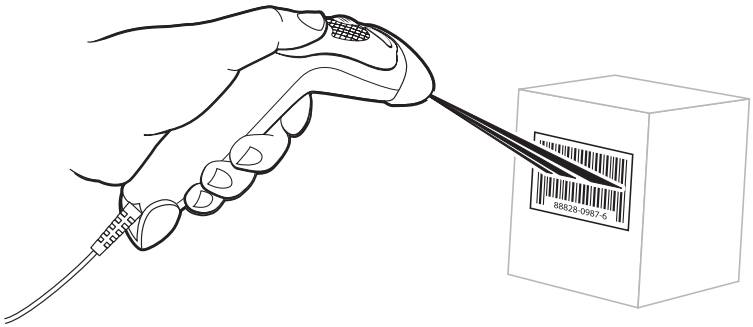
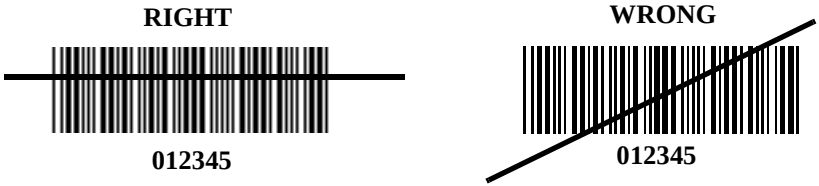


Figure 2-2. Scanning with the LS190xx

1. Ensure all connections are secure. (See *Connecting to a Host* on page 1-4.)
2. Aim the scanner at the bar code. If your scanner has a trigger, aim and press the trigger. (See *Aiming* on page 2-5 and *Decode Zones* on page 2-6.)
3. Ensure the scan line crosses every bar and space of the symbol.



4. Upon successful decode, the scanner beeps and the LED turns green. (For more information on beeper and LED definitions, refer to Table 2-1 and Table 2-2.)

Aiming

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 specular reflection can 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 (Figure 2-3). Simple practice quickly shows what tolerances to work within.

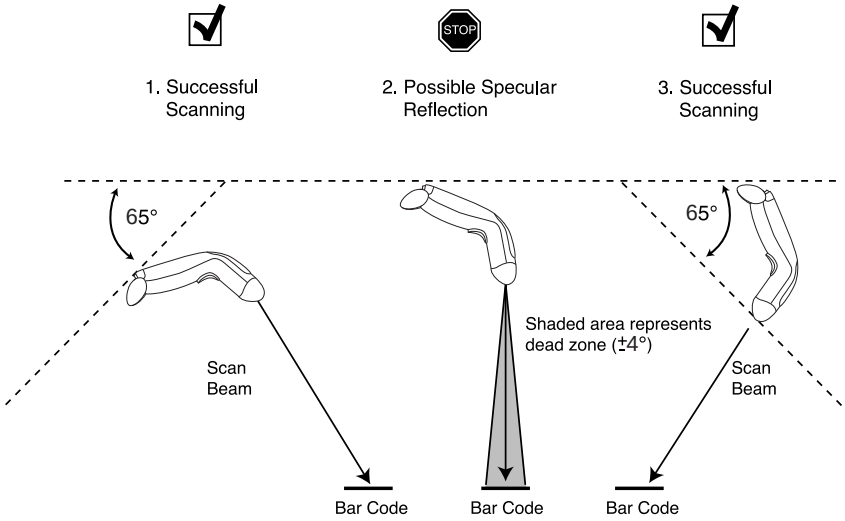
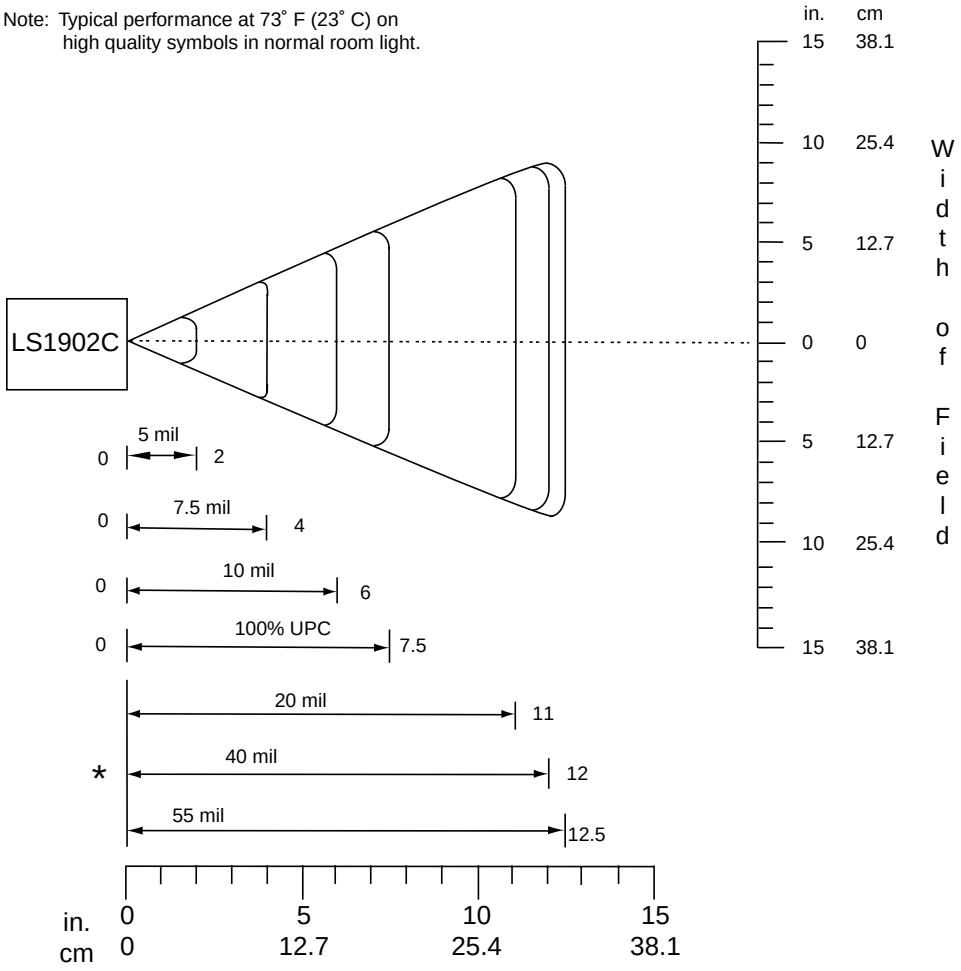


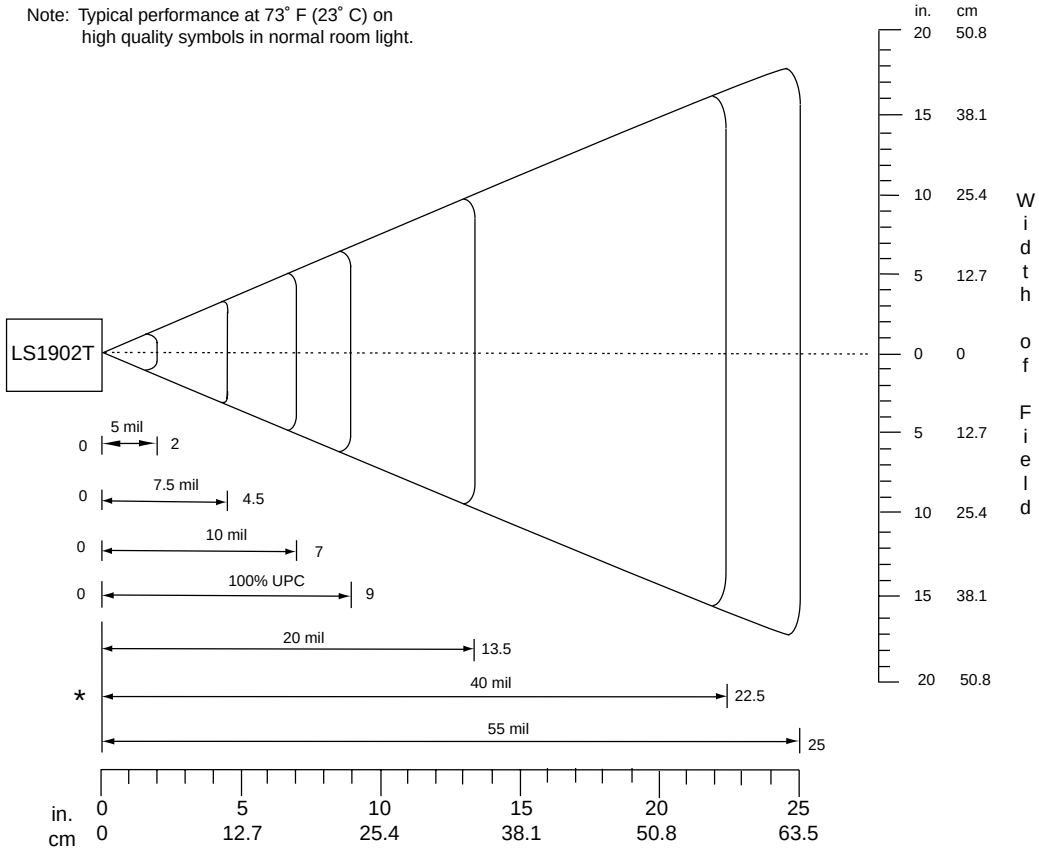
Figure 2-3. Maximum Tilt Angles and Dead Zone

Decode Zones



*Minimum distance determined by symbol length and scan angle

Figure 2-4. LS1902C Decode Zone



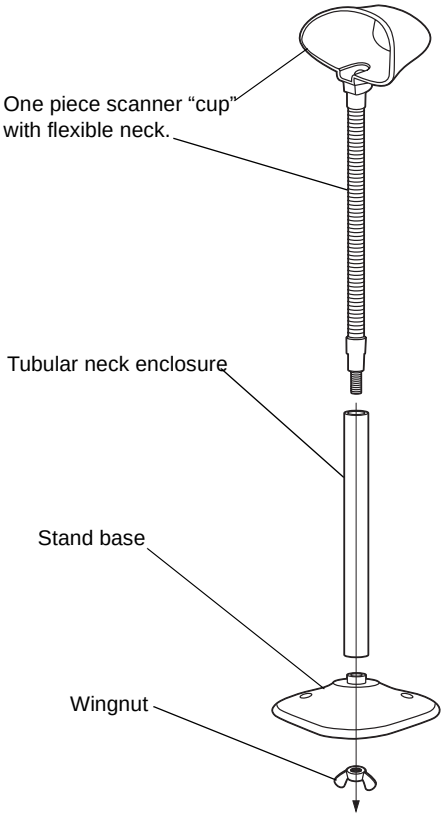
*Minimum distance determined by symbol length and scan angle

Figure 2-5. LS1900T/LS1902T Decode Zone

Scanning in Hands-Free Mode

The LS1900 Series Intellistand adds greater flexibility to your scanning operation. Refer to *Assembling the Stand*, *Mounting the Stand (optional)*, and *Scanning in the Stand* for detailed information about hands-free scanning.

Assembling the Stand



1. Unscrew the wingnut from the bottom of the one piece scanner “cup”.
2. Insert the neck of the scanner “cup” into the tubular neck enclosure.
3. Fit the bottom of the neck piece into the opening on the top of the stand base.
4. Tighten the wingnut underneath the base to secure the cup and neck piece to the base.
5. Bend the neck to the desired position for scanning.

Mounting the Stand (optional)

You can attach the base of the LS190xx scanner's stand to a flat surface using two screws or double-sided tape (not provided).

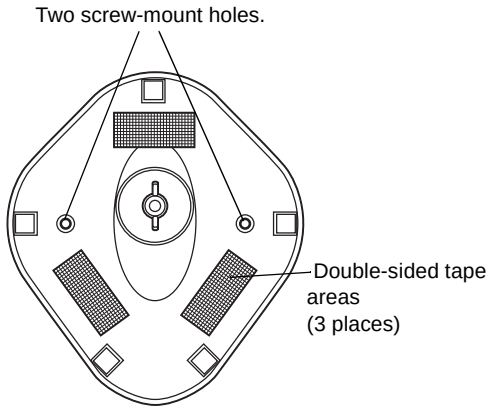


Figure 2-6. Mounting the Stand

Screw Mount

1. Position the assembled base on a flat surface.
2. Screw one #10 wood screw into each screw-mount hole until the base of the stand is secure (see Figure 2-6).

Tape Mount

1. Peel the paper liner off one side of each piece of tape and place the sticky surface over each of the three rectangular tape holders.
2. Peel the paper liner off the exposed sides of each piece of tape and press the stand on a flat surface until it is secure (see Figure 2-6).

Note: *Mounting the stand is optional.*

Scanning in the Stand

When seated in the stand's "cup", the scanner's built-in sensor places the LS190xx in constant-on mode. When the scanner is removed from the stand it operates in its normal hand-held mode (e.g., constant-on mode or trigger mode, depending on the model).

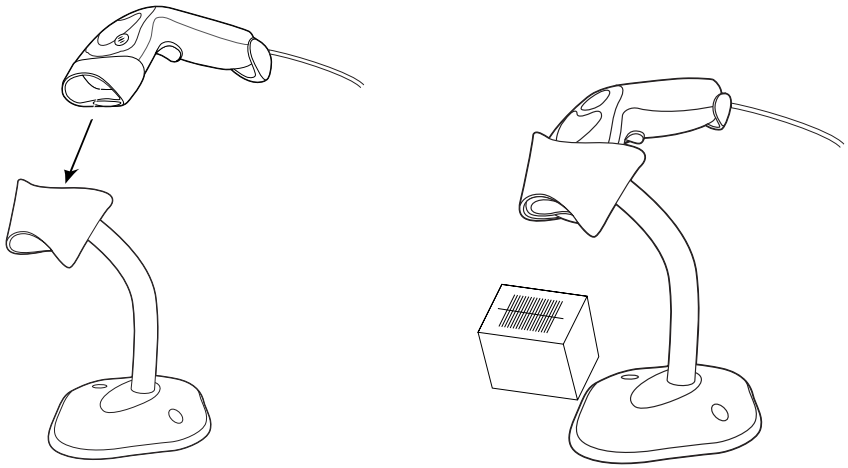
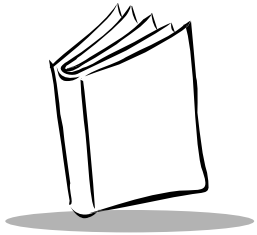


Figure 2-7. Inserting and Using the Scanner in the Stand

1. Ensure all cable connections are secure.
2. Insert the LS190xx scanner in the optional hands-free stand by placing the front of the scanner into the stand's "cup" (see Figure 2-7). When not in use, the scanner's laser is in a constant blinking state.
3. To scan a bar code, present the bar code and ensure the scan line crosses every bar and space of the symbol. (See *Aiming* on page 2-5 and *Decode Zones* on page 2-6.)
4. The scan beam becomes steady when the scanner is decoding the bar code.
5. Upon successful decode, the scanner beeps and the LED turns green.



Chapter 3
Maintenance and Technical Specifications

Introduction

This chapter covers the LS1900 Series suggested maintenance, troubleshooting, technical specifications, and signal descriptions (pinouts).

Maintenance

Cleaning the exit window is the only maintenance required. A dirty window may affect scanning accuracy.

- Do not allow any abrasive material to touch the window
- Remove any dirt particles with a damp cloth
- Wipe the window using a tissue moistened with ammonia/water
- Do not spray water or other cleaning liquids directly into the window
- Do not remove the rubber nose of the scanner.

Troubleshooting

Table 3-1. Troubleshooting

Problem	Possible Causes	Possible Solutions
Nothing happens when you follow the operating instructions.	No power to the scanner.	Check the system power. Ensure the power supply is connected if your configuration requires a power supply.
	Interface/power cables are loose.	Check for loose cable connections.
Laser comes on, but symbol does not decode.	Scanner is not programmed for the correct bar code type.	Be sure the scanner is programmed to read the type of bar code you are scanning.
	Bar code symbol is unreadable.	Check the symbol to make sure it is not defaced. Try scanning test symbols of the same bar code type.
	Distance between scanner and bar code is incorrect.	Move the scanner closer to or further from the bar code.
Symbol is decoded, but not transmitted to the host.	Scanner is not programmed for the correct host type.	Scan the appropriate host type bar code.
Scanned data is incorrectly displayed on the host.	Scanner is not programmed to work with the host. Check LS1900 Series host type parameters or editing options.	Be sure proper host is selected. (See Chapter 4, *Programming the Scanner*.) For RS-232C, ensure the scanner's communication parameters match the host's settings. For a keyboard wedge configuration, ensure the system is programmed for the correct keyboard type, and the CAPS LOCK key is off. Be sure editing options (e.g., UPC-E to UPC-A Conversion) are properly programmed.

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

Technical Specifications

Table 3-2. Technical Specifications

ITEM	DESCRIPTION
Power Requirements	**LS 1902C/T:** 4.5 – 5.5 VDC @ 100 mA nominal **LS 1900T:** 4.8 – 14 VDC @ 80mA nominal
Stand-By Current	1 mA (max)
Decode Capability	UPC/EAN, UPC/EAN with supplementals, UCC/EAN 128, Code 39, Code 39 Full ASCII, Codabar, Interleaved 2 of 5, Discrete 2 of 5, Code 128, Code 93, MSI/Plessey, Code 11, UCC/EAN, RSS, Code 32, Coupon Code, and Bookland EAN
Beeper Operation	User-selectable: Enable, Disable
Beeper Volume	User-selectable: three levels
Beeper Tone	User-selectable: three tones
Decode Depth of Field	Refer to *LS1902C Decode Zone* on page 2-6 and *LS1900T/LS1902T Decode Zone* on page 2-7
Scan Repetition Rate	Approximately 44 scans/sec. (bidirectional)
Skew Tolerance	± 60° min. (from normal)
Pitch Tolerance	± 65° (from normal)
Roll Tolerance	± 10° (from normal) dependent on bar code height
Print Contrast Minimum	25% minimum reflectance differential, measured at 650 nm.
Ambient Light Immunity Indoor: Outdoor:	 450 Ft Candles (4,842 Lux) 8,000 Ft Candles (86,112 Lux)
Durability	5 ft (1.5 m) drops to concrete
Operating Temperature	32° to 104° F (0° to 40° C)
Storage Temperature	-40° to 140° F (-40° to 60° C)
Humidity	5% to 95% (non-condensing)

Table 3-2. Technical Specifications (Continued)

ITEM	DESCRIPTION
Weight (without cable)	**LS1902C/T:** 4.2 oz. (120 g) **LS1900T:** 4.0 oz. (115 g)
Dimensions: Height Weight Depth	 5.3 in. (3.4 cm) 2.5 in. (6.4 cm) 2.2 in. (5.7 cm)
Laser Classifications	CDRH Class 2 (triggered models) IEC Class 1 (triggerless models)
Minimum Element Width	5 mil (0.127 mm)

LS1900 Series Signal Descriptions

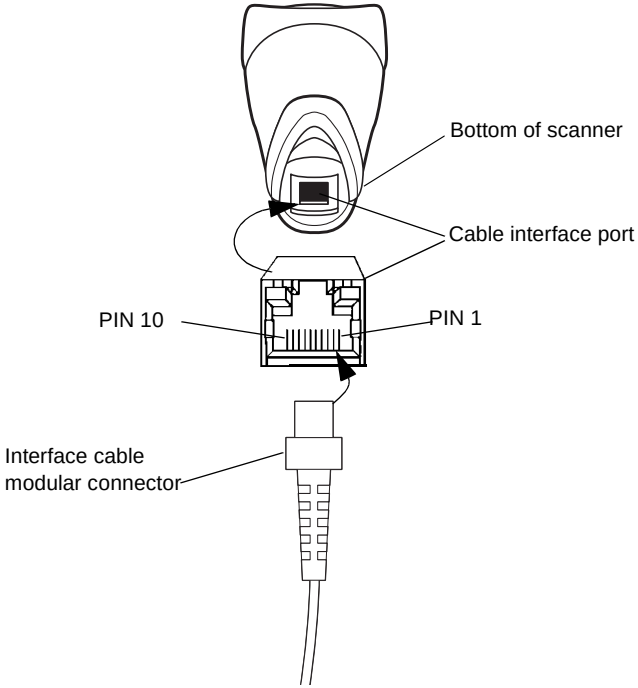
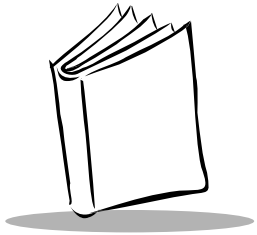


Figure 3-1. LS1900 Series Scanner Cable Pinouts

The following signal descriptions apply to the connection between the scanner and the cable, and are for reference only.

Table 3-3. Signal Pin-outs

Pin	LS1900	LS1902			
		Synapse	**RS-232C**	**Keyboard Wedge**	**Wand**
1	Reserved	SynClock	Reserved	Reserved	Reserved
2	Power	Power	Power	Power	Power
3	Ground	Ground	Ground	Ground	Ground
4	Enable	Reserved	TxD	KeyClock	DBP
5	SOS	Reserved	RxD	Reserved	Reserved
6	Trigger*	SynData	RTS	KeyData	RTS
7	Decode	Reserved	CTS	Reserved	Reserved
8	DBP	Reserved	Reserved	Reserved	Reserved
9	Reserved	Reserved	Reserved	TermData	CTS
10	Reserved	Reserved	Reserved	TermClock	Reserved



Chapter 4
Programming the Scanner

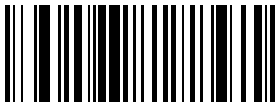
Introduction

You have the option to program the LS1900 Series scanner to perform various functions, or activate different features. This chapter describes each feature and provides the programming bar codes necessary for selecting these features for your scanner. Before programming, follow the instructions in Chapter 1, *Getting Started*.

Your scanner is shipped with the settings shown in the *Default Table* on page 4-3. These default values are stored in non-volatile memory and are preserved even when the scanner is powered down. If the default values suit your requirements, no programming is necessary. Features other than default values are set by scanning single bar codes or short bar code sequences.

Even if the default parameters suit your needs, if you are not using a Synapse cable you must select a host type. After you hear the power-up beeps, select a host type beginning on page 4-21. This only needs to be done once, upon the first power-up when connected to a new host.

To return all features (except Host Type) to their default values, all you need to do is scan the *Set All Defaults* bar code on page 4-10. Throughout the programming bar code menus, default values are indicated with asterisks (*).



Scanning Sequence Examples

In most cases you need only scan one bar code to set a specific parameter. For example, if you want to set the baud rate to 19,200, simply scan the **19,200** bar code listed under *Baud Rate* on page 4-25. The scanner issues a short high tone and the LED turns green, signifying a successful parameter entry.

Other parameters, such as specifying Serial Response Time-Out or setting Data Transmission Formats, require that you scan several bar codes. This procedure is described later in this chapter.

Errors While Scanning

Unless otherwise specified, if you make an error during a scanning sequence, just re-scan the correct parameter.

Standard Default Parameters

The following table lists the defaults for all parameters. If you wish to change any option, scan the appropriate bar code(s) provided in the Parameter Descriptions section beginning on page 4-10.

Table 4-1. Default Table

Parameter	Default	Page Number
Scanner Preferences		
Set Default Parameter	All Defaults	4-10
Trigger Mode	Trigger Mode	4-11
Beeper Tone	High	4-12
Beeper Volume	High	4-13
Laser On Time	3.0 Sec	4-14
Power Mode	Low Power	4-15
Beep After Good Decode	Enable	4-16
Transmit “No Read” Message	Disable	4-17
Linear Code Security Levels	1	4-18
Bi-directional Redundancy	Disable	4-20
Host Selection		
Select Default Host Type	No Host	See Host Types
Host Types		
RS-232C	Standard	4-23
Keyboard Wedge	IBM-AT	4-36

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Wand	Standard	4-46
RS-232C Parameters		
RS-232C Host Types	Standard	4-23
Baud Rate	9600	4-26
Parity Type	None	4-28
Check Receive Errors	Disable	4-28
Hardware Handshaking	None	4-30
Software Handshaking	None	4-31
Host Serial Response Time-out	2.0 Sec	4-33
RTS Line State	Low RTS	4-34
Stop Bit Select	1	4-34
ASCII Format	8-Bit	4-35
Beep on <BEL>	Disable	4-35
Keyboard Wedge Parameters		
Keyboard Wedge Host Type	IBM-AT	4-36
Country Selection	American	4-38
Unknown Characters	Disable	4-41
Intercharacter Delay	0 msec	4-42
Emulate Keypad	Disable	4-43
Send Make Break	Disable	4-43

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Caps Lock	Disable	4-44
Caps Cancel	Disable	4-44
Alternate Numeric Keypad Emulation	Disable	4-45
Wand Emulation Parameters		
Wand Emulation Host Types	Standard (Symbol)	4-46
Leading Margin	80 msec	4-47
Polarity	Bar High/Margin Low	4-48
Ignore Unknown Characters	Enable	4-48
Convert to Code 39	Disable	4-49
Code 39 Full ASCII Conversion	Disable	4-49
UPC/EAN		
UPC-A	Enable	4-50
UPC-E	Enable	4-50
UPC-E1	Disable	4-50
EAN-8	Enable	4-51
EAN-13	Enable	4-51
Bookland EAN	Disable	4-52
Decode UPC/EAN Supplementals (2 and 5 digits)	Ignore	4-53
Decode UPC/EAN Supplemental Redundancy	7	4-54
Transmit UPC-A Check Digit	Enable	4-55

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Transmit UPC-E Check Digit	Enable	4-55
Transmit UPC-E1 Check Digit	Enable	4-55
UPC-A Preamble	System Character	4-56
UPC-E Preamble	System Character	4-57
UPC-E1 Preamble	System Character	4-58
Convert UPC-E to A	Disable	4-59
Convert UPC-E1 to A	Disable	4-60
EAN-8 Zero Extend	Disable	4-61
Convert EAN-8 to EAN-13 Type	Type is EAN-13	4-62
UPC/EAN Security Levels	0	4-63
UPC/EAN Coupon Code	Disable	4-65
Random Weight Check Digit	None	4-66
Linear Supplementals	Disable	4-67
Code 128		
Code 128	Enable	4-68
UCC/EAN-128	Enable	4-69
ISBT 128	Enable	4-70
Code 39		
Code 39	Enable	4-71
Trioptic Code 39	Disable	4-72

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Convert Code 39 to Code 32	Disable	4-73
Code 32 Prefix	Disable	4-74
Set Length(s) for Code 39	2 to 55	4-75
Code 39 Check Digit Verification	Disable	4-77
Transmit Code 39 Check Digit	Disable	4-78
Code 39 Full ASCII Conversion	Disable	4-79
Buffer Code 39	Disable	4-80
Code 93		
Code 93	Disable	4-83
Set Length(s) for Code 93	4 to 55	4-84
Code 11		
Code 11	Disable	4-86
Set Lengths for Code 11	4 to 55	4-87
Code 11 Check Digit Verification	0	4-89
Transmit Code 11 Check Digit	Disable	4-90
Interleaved 2 of 5 (ITF)		
Interleaved 2 of 5 (ITF)	Enable	4-91
Set Length(s) for I 2 of 5	14	4-92
I 2 of 5 Check Digit Verification	Disable	4-94
Transmit I 2 of 5 Check Digit	Disable	4-95

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Convert I 2 of 5 to EAN 13	Disable	4-96
Discrete 2 of 5 (DTF)		
Discrete 2 of 5	Disable	4-97
Set Length(s) for D 2 of 5	12	4-98
Codabar		
Codabar	Disable	4-100
Set Lengths for Codabar	5 to 55	4-102
CLSI Editing	Disable	4-103
NOTIS Editing	Disable	4-104
MSI Plessey		
MSI Plessey	Disable	4-105
Set Length(s) for MSI Plessey	1 to 55	4-107
MSI Plessey Check Digits	One	4-108
Transmit MSI Plessey Check Digit	Disable	4-109
MSI Plessey Check Digit Algorithm	Mod 10/Mod 10	4-110
RSS 14		
RSS 14	Disable	4-111
RSS Limited	Disable	4-112
RSS Expanded	Disable	4-112
Data Options		

Table 4-1. Default Table (Continued)

Parameter	Default	Page Number
Transmit Code ID Character	None	4-113
Intercharacter Delay	0 Sec	4-114
Pause Duration	0 Sec	4-115
Prefix Value	7013 <CR><LF>	4-116
Suffix Value	7013 <CR><LF>	4-116
Scan Data Options	Data as is	4-117

Parameter Descriptions

Set Default Parameter

Scanning this bar code returns all parameters to the default values listed in Table 4-1 on page 4-3.

Set All Defaults

Trigger Mode

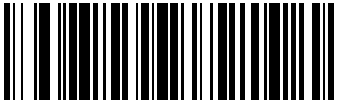
This parameter is for **“triggered” models** only. Scan the **Triggerless Mode** bar code to turn off trigger functionality and place the scanner in constant on mode. Scan the **Trigger Mode** bar code to activate the trigger and turn off constant on mode.

***Trigger Mode**

Triggerless Mode

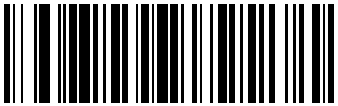
Beeper Tone

To select a decode beep frequency (tone), scan the **LOW FREQUENCY, MEDIUM FREQUENCY**, or **HIGH FREQUENCY** bar code.



Low Frequency

Medium Frequency



***High Frequency**

Beeper Volume

To select a beeper volume, scan the **LOW VOLUME, MEDIUM VOLUME**, or **HIGH VOLUME** bar code.

Low Volume

Medium Volume

***High Volume**

Laser On Time

This parameter sets the maximum time that decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds. The default Laser On Time is 3.0 seconds.

To set a Laser On Time, scan the bar code below. Next scan two numeric bar codes beginning on 4-119 that correspond to the desired time on. Single digit numbers must have a leading zero. For example, to set an On Time of .5 seconds, scan the bar code below, then scan the “0” and “5” bar codes. If you make an error, or wish to change your selection, scan **CANCEL** on page 4-121.

Laser On Time

Power Mode

This parameter determines whether or not power remains on after a decode attempt. When in low power mode, the scanner enters into a low power consumption mode to preserve battery life after each decode attempt. When in continuous power mode, power remains on after each decode attempt. Use low power mode when drawing power from a battery powered device, such as a portable terminal.

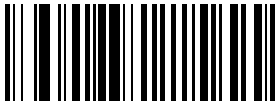
Continuous On

***Low Power**

Beep After Good Decode

Scan a bar code below to select whether or not the unit beeps after a good decode. If **DO NOT BEEP** is selected, the beeper still operates during parameter menu scanning and indicates error conditions.

***Beep After Good Decode**
(Enable)



Do Not Beep After Good Decode
(Disable)

Transmit “No Read” Message

Scan a bar code below to select whether or not a “No Read” message is transmitted. When enabled, the characters NR are transmitted when a bar code is not decoded. Any prefixes or suffixes which are enabled are appended around this message. When disabled, if a symbol does not decode, nothing is sent to the host.

Enable No Read

***Disable No Read**

Linear Code Type Security Level

The LS1900 Series scanner offers four user selectable levels of decode security for linear code types (e.g., Code 39, Interleaved 2 of 5). Higher security levels are selected for decreasing levels of bar code quality. As security levels increase, the scanner's decode speed may decrease. Select the security level appropriate for your bar code quality.

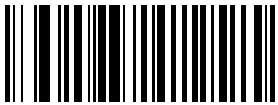
Note: *This does not apply to Code 128.*

Linear Security Level 1

The following code types must be successfully read twice before being decoded:

Table 4-1.

Code Type	Length
Codabar	All
MSI Plessey	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less



***Linear Security Level 1**

Linear Security Level 2

All code types must be successfully read twice before being decoded.

Linear Security Level 2

Linear Security Level 3

Code types other than the following must be successfully read twice before being decoded. The following codes must be read three times:

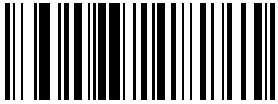
Table 4-1.

Code Type	Length
MSI Plessey	4 or less
D 2 of 5	8 or less
I 2 of 5	8 or less
Codabar	8 or less

Linear Security Level 3

Linear Security Level 4

All code types must be successfully read three times before being decoded.



Linear Security Level 4

Bi-directional Redundancy

This parameter is only valid when a *Linear Code Type Security Level* (see page 4-18) is enabled. When this parameter is enabled, a bar code must be successfully scanned in both directions (forward and reverse) before being decoded.

Enable Bi-directional Redundancy

***Disable Bi-directional Redundancy**

Host Types

If you are using a Synapse cable, Synapse auto-detects your host so no host bar codes need to be scanned. If you are not using a Synapse cable you must select a host type in either the RS-232C, Keyboard Wedge, or Wand Emulation section.

RS-232C Parameters

Five RS-232C hosts are set up with their own parameter default settings (Table 4-2). Selecting the ICL, Fujitsu, Nixdorf Mode A, or Nixdorf Mode B terminal sets the defaults listed below. These defaults take precedence over standard defaults and remain selected if the Set Defaults bar code is scanned.

Table 4-2. Terminal Specific RS-232C

Parameter	Standard (Default)	ICL	FUJITSU	NIXDORF Mode A	NIXDORF Mode B
Transmit Code ID	No	Yes	Yes	Yes	Yes
Data Transmission Format	Data as is	Data/Suffix	Data/Suffix	Data/Suffix	Data/Suffix
Suffix	CR/LF (7013)	CR (1013)	CR (1013)	CR (1013)	CR (1013)
Baud Rate	9600	9600	9600	9600	9600
Parity	None	Even	None	Odd	Odd
Hardware Handshaking	None	RTS/CTS Option 3	None	RTS/CTS Option 3	RTS/CTS Option 3
Software Handshaking	None	None	None	None	None
Serial Response Time-out	2 Sec.	9.9 Sec.	2 Sec.	9.9 Sec.	9.9 Sec.
Stop Bit Select	One	One	One	One	One
ASCII Format	8-Bit	8-Bit	8-Bit	8-Bit	8-Bit
Beep On <BEL>	Disable	Disable	Disable	Disable	Disable
RTS Line State	Low	High	Low	Low	Low = No data to send

RS-232C Host Parameters (continued)

Selecting the ICL, Fujitsu, Nixdorf Mode A, or Nixdorf Mode B terminal enables the transmission of code ID characters as listed in Table 4-3 below. These code ID characters are not programmable and are separate from the Transmit Code ID feature. The Transmit Code ID feature should not be enabled for these terminals.

Table 4-3. Terminal Specific Code ID Characters

	ICL	FUJITSU	NIXDORF Mode A	NIXDORF Mode B
UPC-A	A	A	A0	A0
UPC-E	E	E	C0	C0
EAN-8	FF	FF	B	B
EAN-13	F	F	A	A
Code 39	C <len>	None	M	M
Codabar	N <len>	None	N	N
Code 128	L <len>	None	K	K
I 2 of 5	I <len>	None	I	I
Code 93	None	None	L	L
D 2 of 5	H <len>	None	H	H
UCC/EAN 128	L <len>	None	P	P
MSI/Plessey	None	None	O	O
Bookland EAN	F	F	A	A
Trioptic	None	None	None	None
Code 11	None	None	None	None
RSS 14	None	None	None	None
RSS Limited	None	None	None	None
RSS Expanded	None	None	None	None

RS-232C Host Interfaces

To select an RS-232C host interface, scan one of the following bar codes.

***Standard RS-232C**

ICL RS-232C

Nixdorf RS-232C Mode A

Nixdorf RS-232C Mode B

RS-232C Host Interfaces (continued)

Fujitsu RS-232C

OPOS

Baud Rate

Baud rate is the number of bits of data transmitted per second. The scanner'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.

Baud Rate 1200

Baud Rate 2400

Baud Rate 4800

Baud Rate (continued)

***Baud Rate 9600**

Baud Rate 19,200

Baud Rate 38,400

Parity

A parity check bit is the most significant bit of each ASCII coded character. Select the parity type according to host device requirements.

If you select **ODD** parity, the parity bit has a value 0 or 1, based on data, to ensure than an odd number of 1 bits are contained in the coded character.

Odd

If you select **EVEN** parity, the parity bit has a value 0 or 1, based on data, to ensure than an even number of 1 bits are contained in the coded character.

Even

Select **MARK** parity and the parity bit is always 1.

Mark

Parity (continued)

Select **SPACE** parity and the parity bit is always 0.

Space

If no parity is required, select **NONE**.

***None**

Check Receive Errors

Select whether or not the parity, framing, and overrun of received characters are checked. The type of parity used is selectable through the **PARITY** parameter.

Check For Received Errors

***Do Not Check For Received Errors**

Hardware Handshaking

The data interface consists of an RS-232C port designed to operate either with or without the hardware handshaking lines, *Request to Send (*RTS*)*, and *Clear to Send (*CTS*)*.

If Standard RTS/CTS handshaking is not selected, scan data is transmitted as it becomes available. If Standard RTS/CTS handshaking is selected, scan data is transmitted according to the following sequence:

- The controller reads the CTS line for activity. If CTS is asserted, the controller waits up to 2 seconds for the host to negate the CTS line. If, after 2 seconds (default), the CTS line is still asserted, the scanner sounds a transmit error, and any scanned data is lost.
- When the CTS line is negated, the controller asserts the RTS line and waits up to 2 seconds for the host to assert CTS. When the host asserts CTS, data is transmitted. If, after 2 seconds (default), the CTS line is not asserted, the scanner sounds a transmit error, and discards the data.
- When data transmission is complete, the controller negates RTS 10 msec after sending the last character.
- The host should respond by negating CTS. The controller checks for a negated CTS upon the next transmission of data.

During the transmission of data, the CTS line should be asserted. If CTS is deasserted for more than 50 ms between characters, the transmission is aborted, the scanner sounds a transmission error, and the data is discarded.

If the above communications sequence fails, the scanner issues an error indication. In this case, the data is lost and must be rescanned.

If Hardware Handshaking and Software Handshaking are both enabled, Hardware Handshaking takes precedence.

Note: *The DTR signal is jumpered to the active state.*

None

Scan the bar code below if no Hardware Handshaking is desired.

***None**

Standard RTS/CTS

Scan the bar code below to select Standard RTS/CTS Hardware Handshaking.

Standard RTS/CTS

RTS/CTS Option 1

When RTS/CTS Option 1 is selected, the scanner asserts RTS before transmitting and ignores the state of CTS. The scanner deasserts RTS when the transmission is complete.

RTS/CTS Option 1

RTS/CTS Option 2

When Option 2 is selected, RTS is always high or low (user-programmed logic level). However, the scanner waits for CTS to be asserted before transmitting data. If CTS is not asserted within 2 seconds (default), the scanner issues an error indication and discards the data.

RTS/CTS Option 2

RTS/CTS Option 3

When Option 3 is selected, the scanner asserts RTS prior to any data transmission, regardless of the state of CTS. The scanner waits up to 2 seconds (default) for CTS to be asserted. If CTS is not asserted during this time, the scanner issues an error indication and discards the data. The scanner deasserts RTS when transmission is complete.

RTS/CTS Option 3

Software Handshaking

This parameter offers control of the data transmission process in addition to, or instead of, that offered by hardware handshaking. There are five options.

If Software Handshaking and Hardware Handshaking are both enabled, Hardware Handshaking takes precedence.

None

When this option is selected, data is transmitted immediately.

***None**

ACK/NAK

When this option is selected, after transmitting data, the scanner expects either an ACK or NAK response from the host. When a NAK is received, the scanner transmits the same data again and waits for either an ACK or NAK. After three unsuccessful attempts to send data when NAKs are received, the scanner issues an error indication and discards the data.

The scanner waits up to the programmable Host Serial Response Time-out to receive an ACK or NAK. If the scanner does not get a response in this time, it issues an error indication and discards the data. There are no retries when a time-out occurs.

ACK/NAK

ENQ

When this option is selected, the scanner waits for an ENQ character from the host before transmitting data. If an ENQ is not received within 2 seconds, the scanner issues an error indication and discards the data. The host must transmit an ENQ character at least every 2 seconds to prevent transmission errors.

ENQ

ACK/NAK with ENQ

This combines the two previous options.

ACK/NAK with ENQ

XON/XOFF

An XOFF character turns the scanner transmission off until the scanner receives an XON character. There are two situations for XON/XOFF:

- XOFF is received before the scanner has data to send. When the scanner has data to send, it waits up to 2 seconds for an XON character before transmission. If the XON is not received within this time, the scanner issues an error indication and discards the data.
- XOFF is received during a transmission. Data transmission then stops after sending the current byte. When the scanner receives an XON character, it sends the rest of the data message. The scanner waits indefinitely for the XON.

XON/XOFF

Host Serial Response Time-out

This parameter specifies how long the scanner waits for an ACK, NAK, or CTS before determining that a transmission error has occurred. This only applies when in one of the ACK/NAK Software Handshaking modes, or RTS/CTS Hardware Handshaking option.

The delay period can range from 0.0 to 9.9 seconds in .1-second increments. After scanning the bar code below, scan two numeric bar codes beginning on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Host Serial Response Time-out

RTS Line State

This parameter sets the idle state of the Serial Host RTS line. Scan a bar code below to select **LOW RTS** or **HIGH RTS** line state.

***Host: Low RTS**

Host: High RTS

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 selected (one or two) 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

ASCII Format

This parameter allows the scanner to interface with devices requiring a 7-bit or 8-bit ASCII protocol.

7-Bit

***8-Bit**

Beep on <BEL>

When this parameter is enabled, the scanner issues a beep when a <BEL> character is detected on the RS-232C serial line. <BEL> is issued to gain a user's attention to indicate an illegal entry or other important event.

Beep On <BEL> Character (Enable)

***Do Not Beep On <BEL> Character (Disable)**

Keyboard Wedge Parameters

Keyboard Wedge Host Interfaces

Scan the appropriate bar code below to select your host interface.

IBM PS/2

***IBM AT**

IBM AT NOTEBOOK

Keyboard Wedge Host Interfaces (continued)

IBM XT

NCR 7052

Country Selection

Scan the appropriate bar code below to select the corresponding national keyboard type.

***American**

German

French

Country Selection (continued)

French International

Spanish

Italian

Swedish

Country Selection (continued)

British

Japanese

Unknown Characters

When enabled, all data is sent except for unknown characters, and no error beeps are sounded. Unknown characters are those characters the selected terminal does not recognize. When disabled, bar codes with unknown characters are decoded, but not transmitted to the host. A decode beep is followed by a communications error beep indication.

Send Unknown Characters (Enable)

***Do Not Send Unknown Characters (Disable)**

Intercharacter Delay

Increasing the intercharacter delay gives the host system time to service its receiver and perform other tasks between characters.

Short (5 MS) Delay

Medium (50 MS) Delay

Long (99 MS) Delay

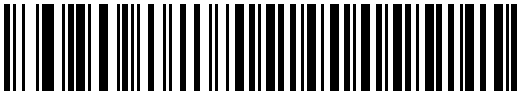
For systems that can handle faster character transmission, scan the **NO DELAY** bar code below.

***No Delay**

Emulate Keypad

When enabled, all characters are sent as ASCII sequences over the numeric keypad. For example, ASCII A would be sent as “ALT make” 0 6 5 “ALT Break”.

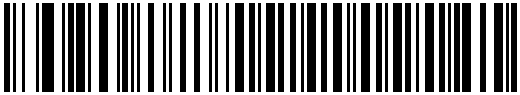
Enable Emulate Keypad



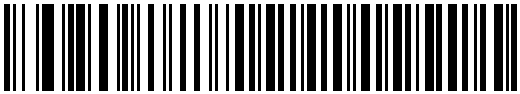
***Disable Emulate Keypad**

Send Make Break

When enabled, the scan codes for releasing a key are not sent.



Enable Send Make Break



***Disable Send Make Break**

Caps Lock

When enabled, the keyboard acts as if the Caps Lock key is always pressed.

Enable Caps Lock On

***Disable Caps Lock On**

Caps Cancel

When enabled, on AT or AT Notebook machines, the keyboard ignores the state of the Caps Lock key. Therefore, an ‘A’ in the bar code is sent as an ‘A’ no matter what the state of the keyboard’s Caps Lock key.

Enable Caps Off

***Disable Caps Off**

Alternate Numeric Keypad Emulation

When enabled, it translates a normal keyboard character into its Alt-numeric keypad equivalent. This only works for AT, AT Notebook, or PS/2 machines.

Enable Alternate Numeric Keypad Emulation

***Disable Alternate Numeric Keypad Emulation**

Wand Emulation Parameters

Wand Emulation Host Interfaces

Scan the appropriate bar code below to select your host interface.

***Symbol**

MSI

Telxon

Norand

Leading Margin

Scan a bar code below to select a leading margin. A leading margin is the length of leading space data that precedes the first bar of scan data in milliseconds. The minimum allowed value is 80 msec and the maximum is 250 msec. A value of 0 is the default and is interpreted as 80 msec.

***80 msec**

140 msec

200 msec

Polarity

Scan the appropriate bar code below to select polarity.

***Bar High/Margin Low**

Bar Low/Margin High

Unknown Characters

When enabled, all data is sent except for unknown characters, and no error beeps are sounded. Unknown characters are those characters the selected terminal does not recognize. When disabled, bar codes with unknown characters are decoded, but not transmitted to the host. A decode beep is followed by a communications error beep indication.

Send Unknown Characters

***Do Not Send Unknown Characters**

Convert to Code 39

Scan the appropriate bar code below to enable or disable the conversion of all bar code data to Code 39.

Enable Convert to Code 39

***Disable Convert to Code 39**

Code 39 Full ASCII Conversion

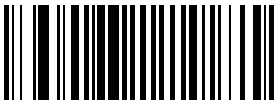
Scan the appropriate bar code below to enable or disable the conversion of all bar code data to Code 39 full ASCII data.

Enable Code 39 Full ASCII Conversion

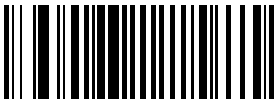
***Disable Code 39 Full ASCII Conversion**

Enable/Disable UPC-E/UPC-A/UPC-E1

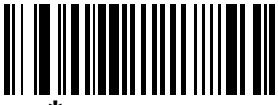
To enable or disable UPC-E, UPC-A or UPC-E1, scan the appropriate bar code below.



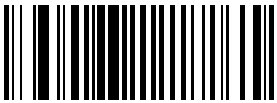
***Enable UPC-E**



Disable UPC-E



***Enable UPC-A**



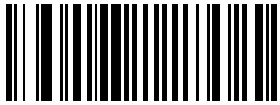
Disable UPC-A

Enable UPC-E1

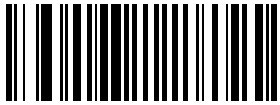
***Disable UPC-E1**

Enable/Disable EAN-8/EAN-13

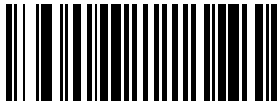
To enable or disable EAN-8 or EAN-13, scan the appropriate bar code below.



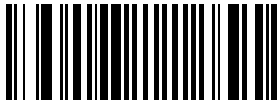
***Enable EAN-8**



Disable EAN-8



***Enable EAN-13**



Disable EAN-13

Enable/Disable Bookland EAN

To enable or disable Bookland EAN, scan the appropriate bar code below.

Enable Bookland EAN

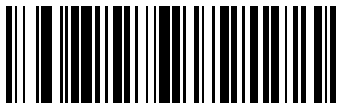
***Disable Bookland EAN**

Decode UPC/EAN Supplementals

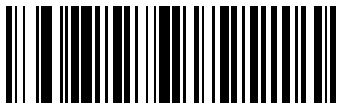
Supplementals are additionally appended characters (2 or 5) according to specific code format conventions (e.g., UPC A+2, UPC E+2, EAN 8+2). Three options are available.

- If UPC/EAN with supplemental characters is selected, UPC/EAN symbols without supplemental characters are not decoded.
- If UPC/EAN without supplemental characters is selected, and the LS1900 Series scanner is presented with a UPC/EAN plus supplemental symbol, the UPC/EAN is decoded and the supplemental characters ignored.
- An autodiscriminate option is also available. If this option is selected, choose an appropriate *Decode UPC/EAN Supplemental Redundancy* value from the next page. A value of 5 or more is recommended.

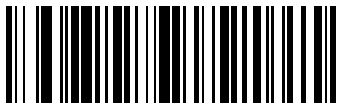
Note: *In order to minimize the risk of invalid data transmission, it is recommended that you select either to decode or ignore supplemental characters.*



Decode UPC/EAN With Supplementals



***Ignore UPC/EAN With Supplementals**

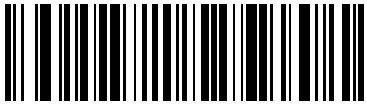


Autodiscriminate UPC/EAN Supplementals

Decode UPC/EAN Supplemental Redundancy

With Autodiscriminate UPC/EAN Supplementals selected, this option adjusts the number of times a symbol without supplementals is decoded before transmission. The range is from two to twenty times. Five or above is recommended when decoding a mix of UPC/EAN symbols with and without supplementals, and the autodiscriminate option is selected.

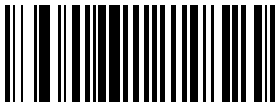
Scan the bar code below to select a decode redundancy value. Next scan two numeric bar codes beginning on page 4-119. Single digit numbers must have a leading zero. If you make an error, or wish to change your selection, scan **CANCEL** on page 4-121.



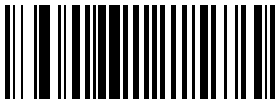
Decode UPC/EAN
Supplemental Redundancy

Transmit UPC-A/UPC-E/UPC-E1 Check Digit

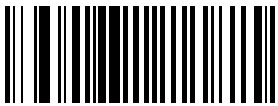
Scan the appropriate bar code below to transmit the symbol with or without the UPC-A, UPC-E or UPC-E1 check digit.



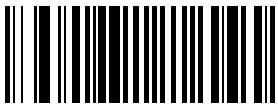
***Transmit UPC-A Check Digit**



Do Not Transmit UPC-A Check Digit



***Transmit UPC-E Check Digit**



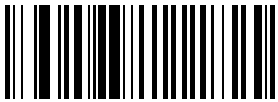
Do Not Transmit UPC-E Check Digit

***Transmit UPC-E1 Check Digit**

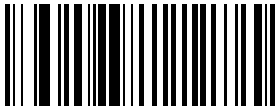
Do Not Transmit UPC-E1 Check Digit

UPC-A Preamble

Three options are given for lead-in characters for UPC-A symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.



No Preamble
(<DATA>)

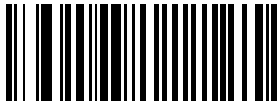


***System Character**
(<SYSTEM CHARACTER> <DATA>)

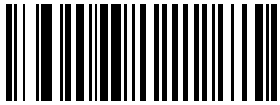
System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

UPC-E Preamble

Three options are given for lead-in characters for UPC-E symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.



No Preamble
(<DATA>)



***System Character**
(<SYSTEM CHARACTER> <DATA>)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

UPC-E1 Preamble

Three options are given for lead-in characters for UPC-E1 symbols transmitted to the host device: transmit system character only, transmit system character and country code (“0” for USA), and no preamble transmitted. The lead-in characters are considered part of the symbol.

No Preamble
(<DATA>)

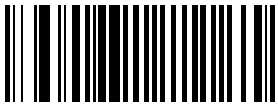
***System Character**
(<SYSTEM CHARACTER> <DATA>)

System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

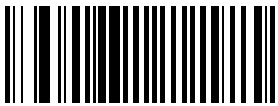
Convert UPC-E to UPC-A

This parameter converts UPC-E (zero suppressed) decoded data to UPC-A format before transmission. After conversion, the data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

Scanning **DO NOT CONVERT UPC-E TO UPC-A** allows you to transmit UPC-E (zero suppressed) decoded data.



Convert UPC-E to UPC-A (Enable)



***Do Not Convert UPC-E to UPC-A (Disable)**

Convert UPC-E1 to UPC-A

This parameter converts UPC-E1 decoded 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).

Scanning **DO NOT CONVERT UPC-E1 TO UPC-A** allows you to transmit UPC-E1 decoded data.

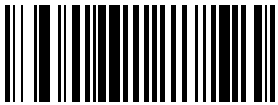
Convert UPC-E1 to UPC-A
(Enable)

***Do Not Convert UPC-E1 to UPC-A**
(Disable)

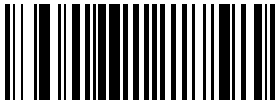
EAN Zero Extend

If this parameter is enabled, five leading zeros are added to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

Disabling this parameter returns EAN-8 symbols to their normal format.



Enable EAN Zero Extend



***Disable EAN Zero Extend**

Convert EAN-8 to EAN-13 Type

When EAN Zero Extend is enabled, this parameter gives you the option of labeling the extended symbol as either an EAN-13 bar code or an EAN-8 bar code. This affects Transmit Code ID Character.

When EAN Zero Extend is disabled, this parameter has no effect on bar code data.

Type is EAN-8

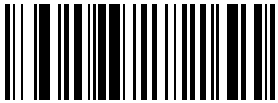
***Type is EAN-13**

UPC/EAN Security Level

The LS1900 Series scanner offers 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 decode speed, so be sure to choose only that level of security necessary for any given application.

UPC/EAN Security Level 0

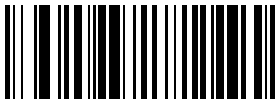
This is the default setting which allows the scanner to operate fastest, while providing sufficient security in decoding “in-spec” UPC/EAN bar codes.



***UPC/EAN Security Level 0**

UPC/EAN Security Level 1

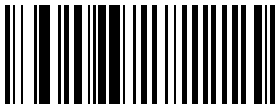
As bar code quality levels diminish, certain characters become prone to misdecodes before others (i.e., 1, 2, 7, 8). If you are experiencing misdecodes of poorly printed bar codes, and the misdecodes are limited to these characters, select this security level.



UPC/EAN Security Level 1

UPC/EAN Security Level 2

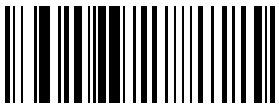
If you are experiencing misdecodes of poorly printed bar codes, and the misdecodes are not limited to characters 1, 2, 7, and 8, select this security level.



UPC/EAN Security Level 2

UPC/EAN Security Level 3

If you have tried Security Level 2, and are still experiencing misdecodes, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selection of this level of security may significantly impair the decoding ability of the scanner. If this level of security is necessary, you should try to improve the quality of your bar codes.



UPC/EAN Security Level 3

UPC/EAN Coupon Code

When enabled, this parameter decodes UPC-A, UPC-A with 2 supplemental characters, UPC-A with 5 supplemental characters, and UPC-A/EAN 128 bar codes. *Autodiscriminate UPC/EAN With Supplemental Characters* must be enabled.

Enable UPC/EAN Coupon Code

***Disable UPC/EAN Coupon Code**

Random Weight Check Digit

A 4-digit or 5-digit random weight check digit may be embedded in a UPC-A or EAN-13 bar code for added price verification. To enable either of these options, or to disable this parameter entirely, scan the appropriate bar code below.

***Random Weight Check Digit - None**

Random Weight Check Digit – 4-Digit Type

Random Weight Check Digit – 5-Digit Type

Linear Supplementals

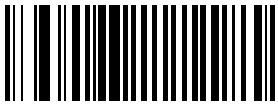
This option applies to code types containing two or five character supplementals. When enabled, a bar code is transmitted only when both the supplemental block and its adjacent block are successfully decoded within one laser scan.

Enable Linear Supplemental Decode

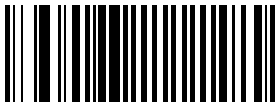
***Disable Linear Supplemental Decode**

Enable/Disable Code 128

To enable or disable Code 128, scan the appropriate bar code below.



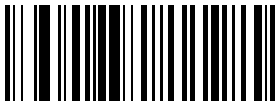
***Enable Code 128**



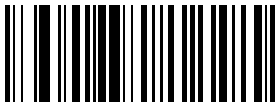
Disable Code 128

Enable/Disable UCC/EAN-128

To enable or disable UCC/EAN-128, scan the appropriate bar code below.



***Enable UCC/EAN-128**



Disable UCC/EAN-128

Enable/Disable ISBT 128

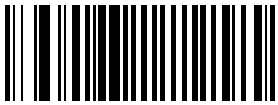
To enable or disable ISBT 128, scan the appropriate bar code below.

***Enable ISBT 128**

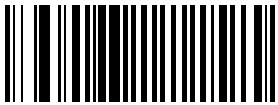
Disable ISBT 128

Enable/Disable Code 39

To enable or disable Code 39, scan the appropriate bar code below.



***Enable Code 39**



Disable Code 39

Enable/Disable Trioptic Code 39

Trioptic Code 39 symbols always contain six characters. To enable or disable Trioptic Code 39, scan the appropriate bar code below.

Enable Trioptic Code 39

***Disable Trioptic Code 39**

Note: *Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously. If you get an error beep when enabling Trioptic Code 39, disable Code 39 Full ASCII and try again.*

Convert Code 39 to Code 32

Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.

Note: *Code 39 must be enabled in order for this parameter to function.*

Enable Convert Code 39 to Code 32

***Disable Convert Code 39 to Code 32**

Code 32 Prefix

Scan the appropriate bar code below to enable or disable adding the prefix character “A” to all Code 32 bar codes.

Note: *Convert Code 39 to Code 32 must be enabled for this parameter to function.*

Enable Code 32 Prefix

***Disable Code 32 Prefix**

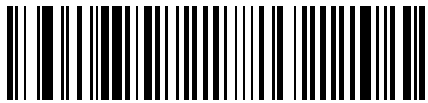
Set Lengths for Code 39

Lengths for Code 39 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. If Code 39 Full ASCII is enabled, **Length Within a Range** or **Any Length** are the preferred options.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Code 39 One Discrete Length**, then scan **1**, **4**, only Code 39 symbols containing 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 39 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Code 39 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, only Code 39 symbols containing 2 or 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.



Code 39 - Two Discrete Lengths

Set Lengths for Code 39 (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode Code 39 symbols containing between 4 and 12 characters, first scan **Code 39 Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

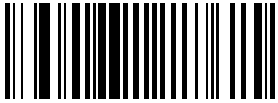
Code 39 - Length Within Range

Any Length - Scanning this option allows you to decode Code 39 symbols containing any number of characters.

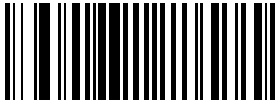
Code 39 - Any Length

Code 39 Check Digit Verification

When enabled, this parameter checks the integrity of a Code 39 symbol to ensure it complies with specified algorithms. Only those Code 39 symbols which include a modulo 43 check digit are decoded when this parameter is enabled.



Enable Code 39 Check Digit



***Disable Code 39 Check Digit**

Transmit Code 39 Check Digit

Scan a bar code below to transmit data with or without the check digit.

Transmit Code 39 Check Digit (Enable)

***Do Not Transmit Code 39 Check Digit (Disable)**

Enable/Disable Code 39 Full ASCII

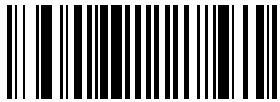
To enable or disable Code 39 Full ASCII, scan the appropriate bar code below.

When enabled, the ASCII character set assigns a code to letters, punctuation marks, numerals, and most control keystrokes on the keyboard.

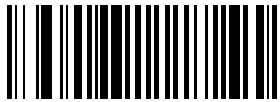
The first 32 codes are non-printable and are assigned to keyboard control characters such as **BACKSPACE** and **RETURN**. The other 96 are called printable codes because all but **SPACE** and **DELETE** produce visible characters.

Code 39 Full ASCII interprets the bar code special character ($ + % /) preceding a Code 39 character and assigns an ASCII character value to the pair. For example, when Code 39 Full ASCII is enabled and a **+B** is scanned, it is interpreted as **b**, **%J** as **?**, and **$H** emulates the keystroke **BACKSPACE**. Scanning **ABC$M** outputs the keystroke equivalent of **ABC ENTER**. Refer to Table A-3 on page A-3.

The scanner does not autodiscriminate between Code 39 and Code 39 Full ASCII.



Enable Code 39 Full ASCII



***Disable Code 39 Full ASCII**

Note: *Trioptic Code 39 and Code 39 Full ASCII cannot be enabled simultaneously. If you get an error beep when enabling Trioptic Code 39, disable Code 39 Full ASCII and try again.*

Code 39 Buffering (Scan & Store)

When you select the Scan and Store option (Buffer Code 39), all Code 39 symbols having a leading space as a first character are temporarily buffered in the unit to be transmitted later. The leading space is not buffered.

Decode of a valid Code 39 symbol with no leading space causes transmission in sequence of all buffered data in a first-in first-out format, plus transmission of the “triggering” symbol. See the following pages for further details.

When the scan and transmit option is selected (Do Not Buffer Code 39), all decoded Code 39 symbols are transmitted without being stored in the buffer.

Scan and Store affects Code 39 decodes only. If you select Scan and Store, we recommend that you configure the scanner to decode Code 39 symbology only.

Buffer Code 39
(Enable)

***Do Not Buffer Code 39**
(Disable)

While there is data in the transmission buffer, deleting Code 39 buffering capability via the parameter menu is not allowed. The buffer holds 200 bytes of information.

To disable Code 39 buffering when there is data in the transmission buffer, first force the buffer transmission (see *Transmit Buffer* on page 4-82) or clear the buffer. Both the **CLEAR BUFFER** and **TRANSMIT BUFFER** bar codes are length 1. *Be sure Code 39 length is set to include length 1.*

Buffer Data

To buffer data, Code 39 buffering must be enabled and a symbol must be read with a space immediately following the start pattern.

- Unless the data overflows the transmission buffer, the scanner issues a lo/hi beep to indicate successful decode and buffering. See *Overfilling Transmission Buffer*.
- The scanner adds the message, excluding the leading space to the transmission buffer.
- No transmission occurs.

Clear Transmission Buffer

To clear the transmission buffer, scan the following symbol, which contains only a start character, a dash (minus), and a stop character.

- The scanner issues a short hi/lo/hi beep to signal that the transmission buffer was erased, and no transmission has occurred.
- The scanner erases the transmission buffer.
- No transmission occurs.

Clear Buffer

Note: *The Clear Buffer bar code is of length 1. In order to scan this command, be sure Code 39 length is set to include length 1.*

Transmit Buffer

To transmit the buffer, read a symbol containing either the first or second condition:

1. Only a start character, a plus (+), and a stop character, such as the following symbol.

- The scanner signals that the transmission buffer was sent (a lo/hi beep).
- The scanner sends the buffer.
- The scanner clears the buffer.

Transmit Buffer

2. A Code 39 bar code with leading character other than a space.

- The scanner signals a good decode and buffering of that decode has occurred by giving a hi/lo beep.
- The scanner transmits the buffer.
- The scanner signals that the buffer was transmitted with a lo/hi beep.

Note: *The Transmit Buffer bar code is of length 1. In order to scan this command, be sure Code 39 length is set to include length 1.*

Overfilling Transmission Buffer

If the symbol just read results in an overflow of the transmission buffer:

- The scanner indicates that the symbol was rejected by issuing three long, high beeps.
- No transmission occurs. Data in buffer is not affected.

Attempt to Transmit an Empty Buffer

If the symbol just read was the transmit buffer symbol and the Code 39 buffer is empty:

- A short lo/hi/lo beep signals that the buffer is empty.
- No transmission occurs.
- The buffer remains empty.

Enable/Disable Code 93

To enable or disable Code 93, scan the appropriate bar code below.

Enable Code 93

***Disable Code 93**

Set Lengths for Code 93

Lengths for Code 93 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Code 93 One Discrete Length**, then scan **1**, **4**, only Code 93 symbols containing 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 93 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Code 93 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, only Code 93 symbols containing 2 or 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 93 - Two Discrete Lengths

Set Lengths for Code 93 (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode Code 93 symbols containing between 4 and 12 characters, first scan **Code 93 Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 93 - Length Within Range

Any Length - Scanning this option allows you to decode Code 93 symbols containing any number of characters.

Code 93 - Any Length

Code 11

To enable or disable Code 11, scan the appropriate bar code below.

Enable Code 11

***Disable Code 11**

Set Lengths for Code 11

Lengths for Code 11 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Code 11 One Discrete Length**, then scan **1**, **4**, only Code 11 symbols containing 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 11 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Code 11 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, only Code 11 symbols containing 2 or 14 characters are decoded. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Code 11 - Two Discrete Lengths

Set Lengths for Code 11 (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode Code 11 symbols containing between 4 and 12 characters, first scan **Code 11 Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

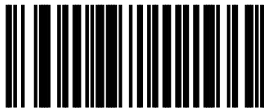
Code 11 - Length Within Range

Any Length - Scanning this option allows you to decode Code 11 symbols containing any number of characters.

Code 11 - Any Length

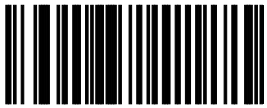
Code 11 Check Digit Verification

This selects the check digit mechanism for the decoded code 11 bar code. The options are to disable the check (0), check for a one-digit check digit or check for a two-digit check digit.



***Disable (0)**

One-Digit Check Digit

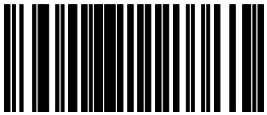


Two-Digit CHeck Digit

Transmit Code 11 Check Digits

This bar code selects whether or not to transmit any of the check digits on the end of a Code 11 barcode.

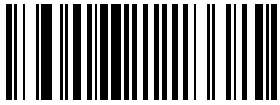
Transmit Code 11 Check Digit (Enable)



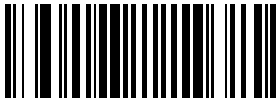
***Do Not Transmit Code 11 Check Digit (Disable)**

Enable/Disable Interleaved 2 of 5

To enable or disable Interleaved 2 of 5, scan the appropriate bar code below, and select an Interleaved 2 of 5 length from the following pages.



***Enable Interleaved 2 of 5**



Disable Interleaved 2 of 5

Set Lengths for Interleaved 2 of 5

Lengths for I 2 of 5 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **I 2 of 5 One Discrete Length**, then scan **1**, **4**, the only I 2 of 5 symbols decoded are those containing 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

I 2 of 5 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **I 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only I 2 of 5 symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

I 2 of 5 - Two Discrete Lengths

Set Lengths for Interleaved 2 of 5 (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode I 2 of 5 symbols containing between 4 and 12 characters, first scan **I 2 of 5 Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

I 2 of 5 - Length Within Range

Any Length - Scanning this option allows you to decode I 2 of 5 symbols containing any number of characters.

Note: *Selecting this option may increase the chance of misdecoding I 2 of 5 codes.*

I 2 of 5 - Any Length

I 2 of 5 Check Digit Verification

When enabled, this parameter checks the integrity of an I 2 of 5 symbol to ensure it complies with the specified algorithm, either Uniform Symbology Specification (USS), or Optical Product Code Council (OPCC).

***Disable**

USS Check Digit

OPCC Check Digit

Transmit I 2 of 5 Check Digit

Scan a bar code below to transmit data with or without the check digit.

Transmit I 2 of 5 Check Digit
(Enable)

***Do Not Transmit I 2 of 5 Check Digit**
(Disable)

Convert I 2 of 5 to EAN-13

This parameter converts a 14 character I 2 of 5 code into EAN-13, and transmits to the host as EAN-13. In order to accomplish this, the I 2 of 5 code must be enabled, one length must be set to 14, and the code must have a leading zero and a valid EAN-13 check digit.

Scanning a single bar code below, **Convert I 2 of 5 to EAN-13 (Enable)**, accomplishes this function.

Convert I 2 of 5 to EAN-13 (Enable)

***Do Not Convert I 2 of 5 to EAN-13 (Disable)**

Enable/Disable Discrete 2 of 5

To enable or disable Discrete 2 of 5, scan the appropriate bar code below.

Enable Discrete 2 of 5

***Disable Discrete 2 of 5**

Set Lengths for Discrete 2 of 5

Lengths for D 2 of 5 may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **D 2 of 5 One Discrete Length**, then scan **1**, **4**, the only D 2 of 5 symbols decoded are those containing 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

D 2 of 5 - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **D 2 of 5 Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only D 2 of 5 symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

D 2 of 5 - Two Discrete Lengths

Set Lengths for Discrete 2 of 5 (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode D 2 of 5 symbols containing between 4 and 12 characters, first scan **D 2 of 5 Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

D 2 of 5 - Length Within Range

Any Length - Scanning this option allows you to decode D 2 of 5 symbols containing any number of characters.

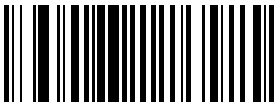
Note: *Selecting this option may increase the chance of misdecoding D 2 of 5 codes.*

D 2 of 5 - Any Length

Enable/Disable Codabar

To enable or disable Codabar, scan the appropriate bar code below.

Enable Codabar



***Disable Codabar**

Set Lengths for Codabar

Lengths for Codabar may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains. It also includes any start or stop characters.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **Codabar One Discrete Length**, then scan **1**, **4**, the only Codabar symbols decoded are those containing 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Codabar - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **Codabar Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only Codabar symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Codabar - Two Discrete Lengths

Set Lengths for Codabar (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode Codabar symbols containing between 4 and 12 characters, first scan **Codabar Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

Codabar - Length Within Range

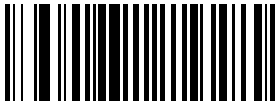
Any Length - Scanning this option allows you to decode Codabar symbols containing any number of characters.

Codabar - Any Length

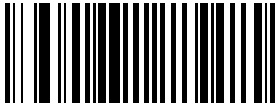
CLSI Editing

When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol.

Note: *Symbol length does not include start and stop characters.*



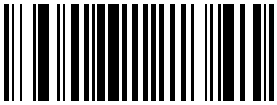
Enable CLSI Editing



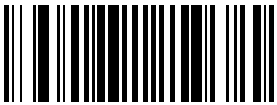
***Disable CLSI Editing**

NOTIS Editing

When enabled, this parameter strips the start and stop characters from a decoded Codabar symbol.



Enable NOTIS Editing



***Disable NOTIS Editing**

Enable/Disable MSI Plessey

To enable or disable MSI Plessey, scan the appropriate bar code below.

Enable MSI Plessey

***Disable MSI Plessey**

Set Lengths for MSI Plessey

Lengths for MSI Plessey may be set for any length, one or two discrete lengths, or lengths within a specific range. The length of a code refers to the number of characters (i.e., human readable characters) the code contains, and includes check digits.

One Discrete Length - This option allows you to decode only those codes containing a selected length. For example, if you select **MSI Plessey One Discrete Length**, then scan **1**, **4**, the only MSI Plessey symbols decoded are those containing 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

MSI Plessey - One Discrete Length

Two Discrete Lengths - This option allows you to decode only those codes containing two selected lengths. For example, if you select **MSI Plessey Two Discrete Lengths**, then scan **0**, **2**, **1**, **4**, the only MSI Plessey symbols decoded are those containing 2 or 14 characters. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

MSI Plessey - Two Discrete Lengths

Set Lengths for MSI Plessey (continued)

Length Within Range - This option allows you to decode a code type within a specified range. For example, to decode MSI Plessey symbols containing between 4 and 12 characters, first scan **MSI Plessey Length Within Range**. Then scan **0**, **4**, **1,** and **2** (single digit numbers must always be preceded by a leading zero). Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.

MSI Plessey - Length Within Range

Any Length - Scanning this option allows you to decode MSI Plessey symbols containing any number of characters.

Note: *Selecting this option may increase the chance for misdecoding MSI Plessey codes.*

MSI Plessey - Any Length

MSI Plessey Check Digits

Check digits, located at the end of the bar code, verify the integrity of the data. At least one check digit is always required. Check digits are not automatically transmitted with the data (refer to *Transmit MSI Plessey Check Digit* on page 4-109).

***One MSI Plessey Check Digit**

Two MSI Plessey Check Digit

Transmit MSI Plessey Check Digit

Scan a bar code below to transmit data with or without the check digit.

Transmit MSI Plessey Check Digit (Enable)

***Do Not Transmit MSI Plessey Check Digit (Disable)**

MSI Plessey Check Digit Algorithm

When the two MSI Plessey check digits option is selected, an additional verification is required to ensure integrity. Either of the two following algorithms may be selected.

MOD 10/MOD 11

***MOD 10/MOD 10**

RSS 14

To enable or disable RSS, scan the appropriate bar code below.

Enable RSS

***Disable RSS**

RSS 14 (continued)

Enable RSS Limited

***Disable RSS Limited**

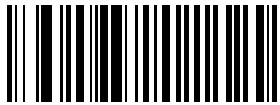
Enable RSS Expanded

***Disable RSS Expanded**

Transmit Code ID Character

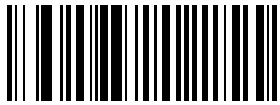
A code ID character identifies the code type of a scanned bar code. This may be useful when the scanner is decoding more than one code type. In addition to any single character prefix already selected, the code ID character is inserted between the prefix and the decoded symbol.

The user may select no code ID character, a Symbol Code ID character, or an AIM Code ID character. For Code ID Characters, see *Symbol Code Identifiers* on page A-1 and *AIM Code Identifiers* on page A-2.



Symbol Code ID Character

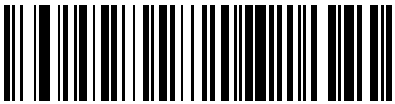
AIM Code ID Character



***None**

Intercharacter Delay

Select the intercharacter delay option matching host requirements. The intercharacter delay gives the host system time to service its receiver and perform other tasks between characters. The delay period can range from no delay to 99 msec in 1-msec increments. After scanning the bar code below, scan two bar codes beginning on page 4-119 to set the desired time-out. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.



Intercharacter Delay

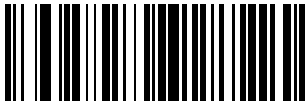
Pause Duration

This parameter allows a pause to be inserted in the data transmission. Pauses are set by scanning a two-digit number (i.e., two bar codes), and are measured in 0.1 second intervals. For example, scanning bar codes “0” and “1” inserts a 0.1 second pause; “0” and “5” gives you a 0.5 second delay. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **DATA FORMAT CANCEL** on page 4-118.

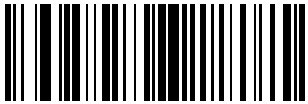
Pause Duration

Prefix/Suffix Values

A prefix/suffix may be appended to scan data for use in data editing. These values are set by scanning a four-digit number (i.e., four bar codes) that corresponds to key codes for various terminals. See Table A-4 on page A-6 for conversion information. Numeric bar codes begin on page 4-119. If you make an error or wish to change your selection, scan **CANCEL** on page 4-121.



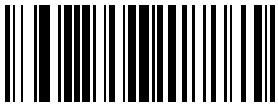
Scan Prefix



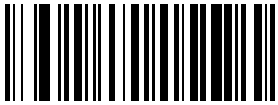
Scan Suffix

Scan Data Options

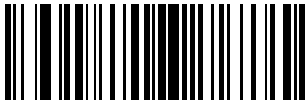
To change the Scan Data Transmission Format, scan the **SCAN OPTIONS** bar code below. Then select one of four options. When you have made your selection, scan the **ENTER** bar code on the next page. If you make a mistake, scan the **DATA FORMAT CANCEL** bar code on the next page.



Scan Options

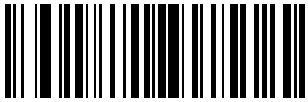


Data As Is



<DATA> <SUFFIX>

Scan Data Transmission Format (continued)



<PREFIX> <DATA>

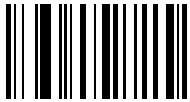
<PREFIX> <DATA> <SUFFIX>

Enter

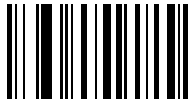
Data Format Cancel

Numeric Bar Codes

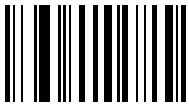
For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).



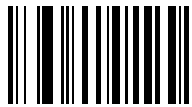
0



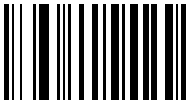
1



2



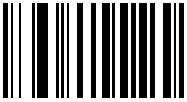
3



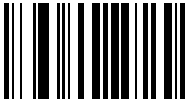
4

Numeric Bar Codes (continued)

5



6



7

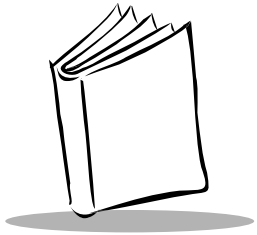
8

9

Cancel

If you make an error or wish to change your selection, scan the bar code below.

Cancel



Chapter 5
Advanced Data Formatting

Introduction

Advanced Data Formatting (ADF) is a means of customizing data before transmission to your host device. Scan data can be edited to suit your particular requirements.

ADF can be implemented through scanning a related series of bar codes, which begin on page 5-11.

Rules: Criteria Linked to Actions

In ADF, data is customized through **rules**. These rules perform detailed actions when the data meets certain criteria. One rule may consist of single or multiple criteria applied to single or multiple actions.

For instance, a data formatting rule could be the following:

Criteria*:* *When scan data is Code 39, length 12, and data at the start position is the string "129"*,

Actions*:* *pad all sends with zeros to length 8,*
send all data up to X,
send a space.

If a Code 39 bar code of 1299X1559828 is scanned, the following is transmitted: 00001299<space>. If a Code 39 bar code of 1299X15598 is scanned, this rule is ignored because the length criteria has not been met.

The rule specifies the editing conditions and requirements before data transmission occurs.

Using ADF Bar Codes

When you program a rule, make sure the rule is logically correct. Plan ahead before you start scanning.

To program each data formatting rule:

- **Start the Rule**. Scan the **BEGIN NEW RULE bar code on page 5-11**.
- **Criteria**. Scan the bar codes for all pertinent criteria. Criteria can include code type (e.g., Code 128), code length, or data that contains a specific character string (e.g., the digits “129”). These options are described in *Criteria on page 5-3*.
- **Actions**. Scan all actions related to, or affecting, these criteria. The actions of a rule specify how to format the data for transmission. These options are described in *Actions on page 5-4*.
- **Save the Rule**. Scan the **SAVE RULE** bar code on page 5-11. This places the rule in the “top” position in the rule buffer.
- If you make errors during this process, some special-purpose bar codes may be useful: **Erase Criteria and Start Again**, **Erase Actions and Start Again**, **Erase Previously Saved Rule**, etc.

Criteria, actions, and entire rules may be erased by scanning the appropriate bar code (see page 5-12).

Beeper Definitions on page 2-2 help guide you through the programming steps.

Special Commands

Begin New Rule

Scan this bar code first when programming a data formatting rule.

Save Rule

Scan this bar code to complete a data formatting rule.

Erase

Use these bar codes to erase criteria, actions, and rules.

Quit Entering Rules

Scan this bar code to quit entering rules.

Disable Rule Set

These bar codes allow you to disable particular rule sets.

Criteria

Code Types

Select any number of code types to be affected. All selected codes must be scanned in succession, prior to selecting other criteria. *If you don't select a code type, all code types will be affected.*

Code Lengths

Define the number of characters the selected code type must contain. *If you don't select a code length, selected code types of any length will be affected*.

Message Containing A Specific Data String

Select whether the formatting affects data that begins with a specific character or data string, or contains a specific character or data string.

Specific String at Start

Scan this bar code, then scan the bar codes representing the desired character or characters (up to a total of 8) in the *Alphanumeric Keyboard* on page 5-76.

Specific String, Any Location

Scan this bar code, then, using the *Numeric Keypad* on page 5-21, scan a two-digit number representing the ***position*** (use a leading “zero” if necessary). Then scan the desired character or characters (up to a total of 8) on the *Alphanumeric Keyboard* on page 5-76, followed by the **END OF MESSAGE** bar code on page 5-82.

Any Message OK

By not scanning any bar code, all selected code types are formatted, regardless of information contained.

Rule Belongs To Set

Select the set a rule belongs to. (There are four possible rule sets.)

Actions

Select how to format the data for transmission.

Send Data

Send all data that remains, send all data up to a specific character selected from the *Alphanumeric Keyboard*, or send the next N characters. N = any number from 1 to 254, selected from the *Alphanumeric Keyboard*.

Setup Field(s)

Define fields as follows:

Move Cursor To a Character

Scan the **MOVE CURSOR TO CHARACTER** bar code on page 5-26, then any printable ASCII character from the *Alphanumeric Keyboard*. When this is used, the cursor moves to the position after the matching character. If the character is not there, the rule fails and ADF tries the next rule.

Move Cursor to Start of Data

Scan this bar code to move cursor to the beginning of the data.

Move Cursor Past a Character

This parameter moves the cursor past all sequential occurrences of a selected character. For example, if the selected character is ‘A’, then the cursor moves past ‘A’, ‘AA’, ‘AAA’, etc. Scan the **MOVE CURSOR PAST CHARACTER** bar code on page 5-26, then select a character from the *Alphanumeric Keyboard*. If the character is not there, the cursor does not move (i.e., has no effect).

Skip Ahead “N” Characters

Scan one of these bar codes to select the number of positions ahead you wish to move the cursor.

Skip Back “N” Characters

Scan one of these bar codes to select the number of positions back you wish to move the cursor.

Send Preset Value

Send Values 1 through 6 by scanning the appropriate bar code. These values must be set using the prefix/suffix values in Table A-4 on page A-6.

Value 1 = Scan Suffix

Value 2 = Scan Prefix

Modify Data

Modify data in the ways listed. The following actions work for all send commands that follow it within a rule. If you program *pad zeros to length 6, send next 3 characters, stop padding, send next 5 characters,* three zeros are added to the first send, and the next send is unaffected by the padding. These options do not apply to the **Send Keystroke** or **Send Preset Value** options.

Remove All Spaces

To remove all spaces in the send commands that follow, scan this bar code.

Crunch All Spaces

To leave one space between words, scan this bar code. This also removes all leading and trailing spaces.

Stop Space Removal

Scan this bar code to disable space removal.

Remove Leading Zeros

Scan this bar code to remove all leading zeros.

Stop Zero Removal

Scan this bar code to disable the removal of zeros.

Pad Data With Spaces

To pad data to the left, scan the bar code containing the desired number of spaces. This parameter is activated by Send commands.

Pad Data With Zeros

To pad data to the left, scan the bar code containing the desired number of zeros. This parameter is activated by Send commands.

Beeps

Select a beep sequence for each ADF rule.

Send Keystroke (Control Characters and Keyboard Characters)

Scan the “Send __” bar code for the keystroke you wish to send.

Turn On/Off Rule Sets

Use these bar codes to turn rule sets on and off.

ADF Bar Code Menu Example

This section provides an example of how ADF rules are entered and used for scan data.

An auto parts distribution center wants to encode manufacturer ID, part number, and destination code into their own Code 128 bar codes. The distribution center also has products that carry UPC bar codes, placed there by the manufacturer. The Code 128 bar codes have the following format:

MMMMMPPPPPDD

Where: M = Manufacturer ID

P = Part Number

D = Destination Code

The distribution center uses a PC with dedicated control characters for manufacturer ID <CTRL M>, part number <CTRL P>, and destination code <CTRL D>. At this center the UPC data is treated as manufacturer ID code.

The following rules need to be entered:

When scanning data of code type Code 128, send the next 5 characters, send the manufacturer ID key <CTRL M>, send the next 5 characters, send the part number key <CTRL P>, send the next 2 characters, send the destination code key <CTRL D>.

When scanning data of code type UPC/EAN, send all data, send the manufacturer ID key <CTRL M>.

To enter these rules, follow the steps below:

Rule 1: The Code 128 Scanning Rule

Step	Bar Code	On Page	Beep Indication
1	Begin New Rule	5-11	High High
2	Code 128	5-14	High High
3	Send next 5 characters	5-23	High High
4	Send <CTRL M>	5-43	High High
5	Send next 5 characters	5-23	High High
6	Send <CTRL P>	5-44	High High
7	Send next 2 characters	5-23	High High
8	Send <CTRL D>	5-42	High High
9	Save Rule	5-11	High Low High Low

Rule 2: The UPC Scanning Rule

Step	**Bar Code**	**On Page**	**Beep Indication**
1	Begin New Rule	5-11	High High
2	UPC/EAN	5-14	High High
3	Send all remaining data	5-23	High High
4	Send <CTRL M>	5-43	High High
5	Save Rule	5-11	High Low High Low

If you made any mistakes while entering this rule, scan the **QUIT ENTERING RULES** bar code on page 5-12. If you already saved the rule, scan the **ERASE PREVIOUSLY SAVED RULE** bar code on page 5-12.

Alternate Rule Sets

ADF rules may be grouped into one of four alternate sets which can be turned on and off when needed. This is useful when you want to format the same message in different ways. For example, a Code 128 bar code contains the following information:

Class (2 digits), Stock Number (8) digits, Price (5 digits)

This bar code might look like this:

245671243701500

where:

Class = 24

Stock Number = 56712437

Price = 01500

Ordinarily you would send this data as follows:

24 (class key)

56712437 (stock key)

01500 (enter key)

But, when there is a sale, you may want to send only the following:

24 (class key)

56712437 (stock key)

and the cashier will key the price manually.

To implement this, you would first enter an ADF rule that applies to the normal situation. This rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, send the data that remains, send the Enter key.

The “sale” rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key.

To switch between the two sets of rules, a “switching rule” must be programmed. This rule specifies what type of bar code must be scanned to switch between the rule sets. For

example, in the case of the “sale” rule above, the rule programmer wants the cashier to scan the bar code “M” before a sale. To do this, a rule can be entered as follows:

When scanning a bar code of length 1 that begins with “M”, select rule set number 1.

Another rule could be programmed to switch back.

When scanning a bar code of length 1 that begins with “N”, turn off rule set number 1.

The switching back to normal rules can also be done in the “sale” rule. For example, the rule may look like this:

When scanning a bar code of length 15, send the next 2 characters, send the class key, send the next 8 characters, send the stock key, turn off rule set 1.

It is recommended that you scan the **DISABLE ALL RULE SETS** bar code on page 5-13 after programming a rule belonging to an alternate rule set.

In addition to enabling and disabling rule sets within the rules, you can enable or disable them by scanning the appropriate bar codes on 5-13.

Rules Hierarchy (in Bar Codes)

The order of programming individual rules is important.The most general rule should be programmed last.

All programmed rules are stored in a buffer. As they are programmed, they are stored at the “top” of a rules list. If three rules have been created, the list would be configured as follows:

Third Rule

Second Rule

First Rule

When data is scanned, the rules list is checked from top to bottom to determine if the criteria matches (and therefore, if the actions should occur). Input is modified into the data format specified by the first matching set of criteria it finds. Be sure that your most general rule is the last one programmed.

For example, if the THIRD rule states:

When scanning a bar code of any length, send all data, then send the ENTER key.

And the SECOND rule states:

> **When scanning a Code 128 bar code of length 12, send the first four characters, then send the ENTER key, then send all remaining data.**

If a Code 128 bar code of length 12 were scanned, the THIRD rule would be in effect. The SECOND rule would appear to not function.

Note also that ADF rules are actually created when you use the standard data editing functions. Scan options are entered as ADF rules, and the hierarchy mentioned above also applies to them. For the LS1900, this applies to prefix/suffix programming in the parameter *Scan Data Transmission Format*.

These rules reside in the same “rule list” as ADF Rules, so the order of their creation is also important.

Default Rules

Every unit has a default rule to send all scan data. Units with custom software may have one or more default rules burned in. The rules hierarchy checks user programmable rules first, then the default rules. Default rules can be disabled by entering the following general rule in the user programmable buffer:

> **When receiving scan data, send all data.**

Since this rule always applies, ADF will never go into the default rules.

Special Commands

Begin New Rule

Scan this bar code to start entering a new rule.

BEGIN NEW RULE

Save Rule

Scan this bar code to save the rule you entered.

SAVE RULE

Erase

Use these bar codes to erase criteria, actions, or rules.

ERASE CRITERIA AND START AGAIN

ERASE ACTIONS AND START AGAIN

ERASE PREVIOUSLY SAVED RULE

ERASE ALL RULES

Quit Entering Rules

Scan this bar code to quit entering rules.

QUIT ENTERING RULES

Disable Rule Set

Use these bar codes to disable rule sets.

DISABLE RULE SET 1

DISABLE RULE SET 2

DISABLE RULE SET 3

DISABLE RULE SET 4

DISABLE ALL RULE SETS

Criteria

Code Types

Scan the bar codes for all code types desired before selecting other criteria.

CODE 39

CODABAR

CODE 128

D 2 OF 5

IATA 2 OF 5

I 2 OF 5

CODE 93

UPC-A

UPC-E

EAN-8

Code Types (Cont'd)

EAN-13

MSI PLESSEY

EAN 128

UPC-E1

BOOKLAND

TRIOPTIC

Code Lengths

Scan these bar codes to define the number of characters the selected code types must contain. Select one length per rule only.

Note: *This is not a keypad.*

1

2

3

4

5

6

7

8

Code Lengths (Cont'd)

9

10

11

12

13

14

15

16

Code Lengths (Cont'd)

17

18

19

20

21

22

23

24

Code Lengths (Cont'd)

25

26

27

28

29

30

Specific Data String

After scanning the following bar code:

1. Enter a string using the *Alphanumeric Keyboard* beginning on page 5-76.
2. Scan **END OF MESSAGE** on page 5-82.

SPECIFIC STRING AT START

After scanning the following bar code:

1. Enter a location using the *Numeric Keypad* on page 5-21.
2. Enter a string using the *Alphanumeric Keyboard* beginning on page 5-76.
3. Scan **END OF MESSAGE** on page 5-82.

SPECIFIC STRING ANY LOCATION

Numeric Keypad

Bar codes on this page should not be confused with those on the alphanumeric keyboard.

0

1

2

3

4

5

6

7

8

9

CANCEL

Rule Belongs To Set

Scan a bar code below to select which set a rule belongs to.

RULE BELONGS TO SET 1

RULE BELONGS TO SET 2

RULE BELONGS TO SET 3

RULE BELONGS TO SET 4

Actions

Send Data

Use these bar codes to send data.

SEND DATA UP TO CHARACTER

SEND ALL DATA THAT REMAINS

SEND NEXT CHARACTER

SEND NEXT 2 CHARACTERS

SEND NEXT 3 CHARACTERS

SEND NEXT 4 CHARACTERS

SEND NEXT 5 CHARACTERS

SEND NEXT 6 CHARACTERS

SEND NEXT 7 CHARACTERS

Send Data (Cont'd)

SEND NEXT 8 CHARACTERS

SEND NEXT 9 CHARACTERS

SEND NEXT 10 CHARACTERS

SEND NEXT 11 CHARACTERS

SEND NEXT 12 CHARACTERS

SEND NEXT 13 CHARACTERS

SEND NEXT 14 CHARACTERS

SEND NEXT 15 CHARACTERS

SEND NEXT 16 CHARACTERS

SEND NEXT 17 CHARACTERS

Send Data (Cont'd)

SEND NEXT
18 CHARACTERS

SEND NEXT
19 CHARACTERS

SEND NEXT
20 CHARACTERS

Setup Fields

Scan a bar code below to move the cursor in relation to a specified character. Then enter a character by scanning a bar code from the *Alphanumeric Keyboard* beginning on page 5-76.

Note: *If there is no match when the rule is interpreted and the rule fails, the next rule is checked.*

MOVE CURSOR TO CHARACTER

MOVE CURSOR TO START

MOVE CURSOR PAST CHARACTER

SEND PAUSE

Skip Ahead

Use the following bar codes to skip ahead characters.

SKIP AHEAD
1 CHARACTER

SKIP AHEAD
2 CHARACTERS

SKIP AHEAD
3 CHARACTERS

SKIP AHEAD
4 CHARACTERS

SKIP AHEAD
5 CHARACTERS

SKIP AHEAD
6 CHARACTERS

SKIP AHEAD
7 CHARACTERS

SKIP AHEAD
8 CHARACTERS

Skip Ahead (Cont'd)

SKIP AHEAD
9 CHARACTERS

SKIP AHEAD
10 CHARACTERS

Skip Back

Use the following bar codes to skip back characters.

SKIP BACK
1 CHARACTERS

SKIP BACK
2 CHARACTERS

SKIP BACK
3 CHARACTERS

SKIP BACK
4 CHARACTERS

SKIP BACK
5 CHARACTERS

SKIP BACK
6 CHARACTERS

SKIP BACK
7 CHARACTER

SKIP BACK
8 CHARACTERS

Skip Back (Continued)

SKIP BACK
9 CHARACTERS

SKIP BACK
10 CHARACTERS

Send Preset Value

Use these bar codes to send preset values.

SEND VALUE 1

SEND VALUE 2

SEND VALUE 3

SEND VALUE 4

SEND VALUE 5

SEND VALUE 6

Modify Data

Use the bar codes below to modify data.

REMOVE ALL SPACES

CRUNCH ALL SPACES

STOP SPACE REMOVAL

REMOVE LEADING ZEROS

STOP ZERO REMOVAL

Pad Data with Spaces

Use these bar codes to pad data with spaces.

PAD SPACES TO LENGTH 1

PAD SPACES TO LENGTH 2

PAD SPACES TO LENGTH 3

PAD SPACES TO LENGTH 4

PAD SPACES TO LENGTH 5

PAD SPACES TO LENGTH 6

PAD SPACES TO LENGTH 7

PAD SPACES TO LENGTH 8

Pad Data with Spaces (Cont'd)

PAD SPACES TO LENGTH 9

PAD SPACES TO LENGTH 10

PAD SPACES TO LENGTH 11

PAD SPACES TO LENGTH 12

PAD SPACES TO LENGTH 13

PAD SPACES TO LENGTH 14

PAD SPACES TO LENGTH 15

PAD SPACES TO LENGTH 16

Pad Data with Spaces (Cont'd)

PAD SPACES TO LENGTH 17

PAD SPACES TO LENGTH 18

PAD SPACES TO LENGTH 19

PAD SPACES TO LENGTH 20

PAD SPACES TO LENGTH 21

PAD SPACES TO LENGTH 22

PAD SPACES TO LENGTH 23

PAD SPACES TO LENGTH 24

Pad Data with Spaces (Continued)

PAD SPACES TO LENGTH 25

PAD SPACES TO LENGTH 26

PAD SPACES TO LENGTH 27

PAD SPACES TO LENGTH 28

PAD SPACES TO LENGTH 29

PAD SPACES TO LENGTH 30

STOP PAD SPACES

Pad Data with Zeros

Use these bar codes to pad data with zeros.

PAD ZEROS TO LENGTH 1

PAD ZEROS TO LENGTH 2

PAD ZEROS TO LENGTH 3

PAD ZEROS TO LENGTH 4

PAD ZEROS TO LENGTH 5

PAD ZEROS TO LENGTH 6

PAD ZEROS TO LENGTH 7

PAD ZEROS TO LENGTH 8

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 9

PAD ZEROS TO LENGTH 10

PAD ZEROS TO LENGTH 11

PAD ZEROS TO LENGTH 12

PAD ZEROS TO LENGTH 13

PAD ZEROS TO LENGTH 14

PAD ZEROS TO LENGTH 15

PAD ZEROS TO LENGTH 16

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 17

PAD ZEROS TO LENGTH 18

PAD ZEROS TO LENGTH 19

PAD ZEROS TO LENGTH 20

PAD ZEROS TO LENGTH 21

PAD ZEROS TO LENGTH 22

PAD ZEROS TO LENGTH 23

PAD ZEROS TO LENGTH 24

Pad Data With Zeros (Cont'd)

PAD ZEROS TO LENGTH 25

PAD ZEROS TO LENGTH 26

PAD ZEROS TO LENGTH 27

PAD ZEROS TO LENGTH 28

PAD ZEROS TO LENGTH 29

PAD ZEROS TO LENGTH 30

STOP PAD ZEROS

Beeps

Select one beep sequence per ADF rule.

BEEP ONCE

BEEP TWICE

BEEP THREE TIMES

Control Characters

Scan these bar codes to send control characters.

SEND CONTROL 2

SEND CONTROL A

SEND CONTROL B

SEND CONTROL C

SEND CONTROL D

SEND CONTROL E

SEND CONTROL F

SEND CONTROL G

Control Characters (Cont'd)

SEND CONTROL H

SEND CONTROL I

SEND CONTROL J

SEND CONTROL K

SEND CONTROL L

SEND CONTROL M

SEND CONTROL N

SEND CONTROL O

Control Characters (Cont'd)

SEND CONTROL P

SEND CONTROL Q

SEND CONTROL R

SEND CONTROL S

SEND CONTROL T

SEND CONTROL U

SEND CONTROL V

SEND CONTROL W

Control Characters (Cont'd)

SEND CONTROL X

SEND CONTROL Y

SEND CONTROL Z

SEND CONTROL [

**SEND CONTROL **

SEND CONTROL]

SEND CONTROL 6

SEND CONTROL -

Keyboard Characters

Use these bar codes to send keyboard characters.

SEND SPACE

SEND !

SEND “

SEND #

SEND $

SEND %

SEND &

SEND ‘

Keyboard Characters (Cont'd)

SEND (

SEND)

SEND *

SEND +

SEND ,

SEND -

SEND .

SEND /

Keyboard Characters (Cont'd)

SEND 0

SEND 1

SEND 2

SEND 3

SEND 4

SEND 5

SEND 6

SEND 7

Keyboard Characters (Cont'd)

SEND 8

SEND 9

SEND :

SEND ;

SEND <

SEND =

SEND >

SEND ?

Keyboard Characters (Cont'd)

SEND @

SEND A

SEND B

SEND C

SEND D

SEND E

SEND F

SEND G

Keyboard Characters (Cont'd)

SEND H

SEND I

SEND J

SEND K

SEND L

SEND M

SEND N

SEND O

Keyboard Characters (Cont'd)

SEND P

SEND Q

SEND R

SEND S

SEND T

SEND U

SEND V

SEND W

Keyboard Characters (Cont'd)

SEND X

SEND Y

SEND Z

SEND [

**SEND **

SEND]

SEND ^

SEND _

Keyboard Characters (Cont'd)

SEND ‘

SEND a

SEND b

SEND c

SEND d

SEND e

SEND f

SEND g

Keyboard Characters (Cont'd)

SEND h

SEND i

SEND j

SEND k

SEND l

SEND m

SEND n

SEND o

Keyboard Characters (Cont'd)

SEND p

SEND q

SEND r

SEND s

SEND t

SEND u

SEND v

SEND w

Keyboard Characters (Cont'd)

SEND x

SEND y

SEND z

SEND {

SEND |

SEND }

SEND ~

Send ALT Characters

SEND ALT 2

SEND ALT A

SEND ALT B

SEND ALT C

SEND ALT D

SEND ALT E

SEND ALT F

SEND ALT G

Send ALT Characters (Cont'd)

SEND ALT H

SEND ALT I

SEND ALT J

SEND ALT K

SEND ALT L

SEND ALT M

SEND ALT N

SEND ALT O

Send ALT Characters (Cont'd)

SEND ALT P

SEND ALT Q

SEND ALT R

SEND ALT S

SEND ALT T

SEND ALT U

SEND ALT V

SEND ALT W

Send ALT Characters (Cont'd)

SEND ALT X

SEND ALT Y

SEND ALT Z

SEND ALT [

**SEND ALT **

SEND ALT]

SEND ALT 6

SEND ALT -

Send Command Characters

SEND PA 1

SEND PA 2

SEND CMD 1

SEND CMD 2

SEND CMD 3

SEND CMD 4

Send Command Characters (Cont'd)

SEND CMD 5

SEND CMD 6

SEND CMD 7

SEND CMD 8

SEND CMD 9

SEND CMD 10

Send Special Characters

SEND YEN CHARACTER

SEND POUND STERLING CHARACTER

SEND BOMB CHARACTER

SEND HOOK CHARACTER

SEND BULLET

SEND 1/2

SEND PARAGRAPH

SEND SECTION

SEND VERTICAL

Send Keypad Characters

SEND KEYPAD *

SEND KEYPAD +

SEND KEYPAD -

SEND KEYPAD .

SEND KEYPAD /

SEND KEYPAD 0

SEND KEYPAD 1

SEND KEYPAD 2

SEND KEYPAD 3

SEND KEYPAD 4

Send Keypad Characters (Cont'd)

SEND KEYPAD 5

SEND KEYPAD 6

SEND KEYPAD 7

SEND KEYPAD 8

SEND KEYPAD 9

SEND KEYPAD ENTER

SEND KEYPAD

Send Keypad Characters (Cont'd)

SEND BREAK KEY

SEND DELETE KEY

SEND PAGE UP KEY

SEND END KEY

SEND PAGE DOWN KEY

SEND PAUSE KEY

SEND SCROLL LOCK

SEND BACKSPACE KEY

SEND TAB KEY

SEND PRINT SCREEN KEY

Send Keypad Characters (Cont'd)

SEND INSERT KEY

SEND HOME KEY

SEND ENTER KEY

SEND ESCAPE KEY

SEND UP ARROW KEY

SEND DOWN ARROW

SEND LEFT ARROW KEY

SEND RIGHT ARROW KEY

SEND BACK TAB CHARACTER

Send Function Key

SEND F1 KEY

SEND F2 KEY

SEND F3 KEY

SEND F4 KEY

SEND F5 KEY

SEND F6 KEY

SEND F7 KEY

SEND F8 KEY

SEND F9 KEY

SEND F10 KEY

Send Function Key (Cont'd)

SEND F11 KEY

SEND F12 KEY

SEND F13 KEY

SEND F14 KEY

SEND F15 KEY

SEND F16 KEY

SEND F17 KEY

SEND F18 KEY

SEND F19 KEY

SEND F20 KEY

Send Function Key (Cont'd)

SEND F21 KEY

SEND F22 KEY

SEND F23 KEY

SEND F24 KEY

SEND F25 KEY

SEND F26 KEY

SEND F27 KEY

SEND F28 KEY

SEND F29 KEY

SEND F30 KEY

Send Function Key (Cont'd)

SEND PF1 KEY

SEND PF2 KEY

SEND PF3 KEY

SEND PF4 KEY

SEND PF5 KEY

SEND PF6 KEY

SEND PF7 KEY

SEND PF8 KEY

SEND PF9 KEY

SEND PF10 KEY

Send Function Key (Cont'd)

SEND PF11 KEY

SEND PF12 KEY

SEND PF13 KEY

SEND PF14 KEY

SEND PF15 KEY

SEND PF16 KEY

SEND PF17 KEY

SEND PF18 KEY

SEND PF19 KEY

SEND PF20 KEY

Send Function Key (Cont'd)

SEND PF21 KEY

SEND PF22 KEY

SEND PF23 KEY

SEND PF24 KEY

SEND PF25 KEY

SEND PF26 KEY

SEND PF27 KEY

SEND PF28 KEY

SEND PF29 KEY

SEND PF30 KEY

Turn On/Off Rule Set

Use these bar codes to turn rule sets on and off.

TURN ON RULE SET 1

TURN ON RULE SET 2

TURN ON RULE SET 3

TURN ON RULE SET 4

TURN OFF RULE SET 1

TURN OFF RULE SET 2

TURN OFF RULE SET 3

TURN OFF RULE SET 4

Alphanumeric Keyboard

SPACE

#

$

%

*****

+

-

.

/

!

Alphanumeric Keyboard (Continued)

“

&

‘

(

)

:

;

<

=

>

Alphanumeric Keyboard (Continued)

?

@

[

\

]

^

_

`

Alphanumeric Keyboard (Continued)

Bar codes on this page should not be confused with those on the numeric keypad.

0

1

2

3

4

5

6

7

8

9

Alphanumeric Keyboard (Continued)

A

B

C

D

E

F

G

H

I

J

Alphanumeric Keyboard (Continued)

K

L

M

N

O

P

Q

R

S

T

Alphanumeric Keyboard (Continued)

U

V

W

X

Y

Z

CANCEL

END OF MESSAGE

Alphanumeric Keyboard (Continued)

a

b

c

d

e

f

g

h

i

j

Alphanumeric Keyboard (Continued)

k

l

m

n

o

p

q

r

s

t

Alphanumeric Keyboard (Continued)

u

v

w

x

y

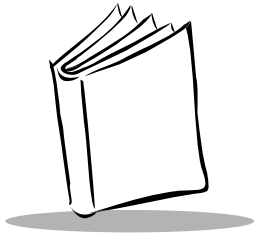
z

{

|

}

~



Appendix A
Programming Reference

Symbol Code Identifiers

Table A-1. Code Characters

Code Character	Code Type
A	UPC-A, UPC-E, UPC-E1, EAN-8, EAN-13
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
J	MSI Plessey
K	UCC/EAN-128
L	Bookland EAN
M	Trioptic Code 39
N	Coupon Code

AIM Code Identifiers

Each AIM Code Identifier contains the three-character string **]cm** where:

] = Flag Character (ASCII 93)
c = Code Character (see Table A-2)
m = Modifier Character (see Table A-3)

Table A-2. Code Characters

Code Character	Code Type
A	Code 39
C	Code 128
E	UPC/EAN
F	Codabar
G	Code 93
H	Code 11
I	Interleaved 2 of 5
M	MSI Plessey
S	D2 of 5, IATA 2 of 5
X	Code 39 Trioptic
X	Bookland EAN
X	Coupon Code

The modifier character is the sum of the applicable option values based on Table A-3.

Table A-3. Modifier Characters

Code Type	Option Value	Option
Code 39	0	No check character or Full ASCII processing.
	1	Reader has checked one check character.
	3	Reader has checked and stripped check character.
	4	Reader has performed Full ASCII character conversion.
	5	Reader has performed Full ASCII character conversion and checked one check character.
	7	Reader has performed Full ASCII character conversion and checked and stripped check character.
	Example:A Full ASCII bar code with check character W, **A+I+MI+DW**, is transmitted as **]A7**AimId where 7 = (3+4).	
Trioptic Code 39	0	No option specified at this time. Always transmit 0.
	Example:A Trioptic bar code 412356 is transmitted as **]X0**412356	
Code 128	0	Standard data packet, no Function code 1 in first symbol position.
	1	Function code 1 in first symbol character position.
	2	Function code 1 in second symbol character position.
	Example:A Code (EAN) 128 bar code with Function 1 character in the first position, FNC1 Aim Id is transmitted as **]C1**AimId	
I 2 of 5	0	No check digit processing.
	1	Reader has validated check digit.
	3	Reader has validated and stripped check digit.
	Example:An I 2 of 5 bar code without check digit, 4123, is transmitted as **]I0**4123	
Codabar	0	No check digit processing.
	1	Reader has checked check digit.
	3	Reader has stripped check digit before transmission.
	Example:A Codabar bar code without check digit, 4123, is transmitted as **]F0**4123	

Table A-3. Modifier Characters (Continued)

Code Type	Option Value	Option
Code 93		
	0	No options specified at this time. Always transmit 0.
	Example:A Code 93 bar code 012345678905 is transmitted as **]G0**012345678905	
MSI Plessey	0	Single check digit checked.
	1	Two check digits checked.
	2	Single check digit verified and stripped before transmission.
	3	Two check digits verified and stripped before transmission.
	Example:An MSI Plessey bar code 4123, with a single check digit checked, is transmitted as **]M0**4123	
D 2 of 5	0	No options specified at this time. Always transmit 0.
	Example:A D 2 of 5 bar code 4123, is transmitted as **]S0**4123	
UPC/EAN	0	Standard packet in full EAN country code format, which is 13 digits for UPC-A and UPC-E (not including supplemental data).
	1	Two-digit supplement data only.
	2	Five-digit supplement data only.
	4	EAN-8 data packet.
	Example:A UPC-A bar code 012345678905 is transmitted as **]E0**0012345678905	
Bookland EAN	0	No options specified at this time. Always transmit 0.
	Example:A Bookland EAN bar code 123456789X is transmitted as **]X0**123456789X	

Prefix / Suffix Values

The following values can be assigned as prefixes or suffixes for ASCII character data transmission. If you're using a keyboard interface, refer to the *Synapse "Smart Cable" Interface Guide* for keystroke prefix/suffix values.

Table A-4. Prefix/Suffix Values

Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character	Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character
1000	%U	NUL	1030	%D	RS
1001	$A	SOH	1031	%E	US
1002	$B	STX	1032	Space	Space
1003	$C	ETX	1033	/A	!
1004	$D	EOT	1034	/B	"
1005	$E	ENQ	1035	/C	#
1006	$F	ACK	1036	/D	$
1007	$G	BELL	1037	/E	%
1008	$H	BCKSPC	1038	/F	&
1009	$I	HORIZ TAB	1039	/G	‘
1010	$J	LF/NW LN	1040	/H	(
1011	$K	VT	1041	/I	)
1012	$L	FF	1042	/J	*
1013	$M	CR/ENTER	1043	/K	+
1014	$N	SO	1044	/L	,
1015	$O	SI	1045	-	-
1016	$P	DLE	1046	.	.
1017	$Q	DC1	1047	/	/
1018	$R	DC2	1048	0	0
1019	$S	DC3	1049	1	1
1020	$T	DC4	1050	2	2
1021	$U	NAK	1051	3	3
1022	$V	SYN	1052	4	4
1023	$W	ETB	1053	5	5
1024	$X	CAN	1054	6	6
1025	$Y	EM	1057	7	7
1026	$Z	SUB	1056	8	8
1027	%A	ESC	1057	9	9
1028	%B	FS	1058	/Z	:
1029	%C	GS	1059	%F	;

Table A-1. Prefix/Suffix Values (Cont'd)

Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character	Prefix/Suffix Value	Full ASCII Code 39 Encode Char.	ASCII Character
1060	%G	<	1095	%O	_
1061	%H	=	1096	%W	`
1062	%I	>	1097	+A	a
1063	%J	?	1098	+B	b
1064	%V	@	1099	+C	c
1065	A	A	1100	+D	d
1066	B	B	1101	+E	e
1067	C	C	1102	+F	f
1068	D	D	1103	+G	g
1069	E	E	1104	+H	h
1070	F	F	1105	+I	i
1071	G	G	1106	+J	j
1072	H	H	1107	+K	k
1073	I	I	1108	+L	l
1074	J	J	1109	+M	m
1075	K	K	1110	+N	n
1076	L	L	1111	+O	o
1077	M	M	1112	+P	p
1078	N	N	1113	+Q	q
1079	O	O	1114	+R	r
1080	P	P	1115	+S	s
1081	Q	Q	1116	+T	t
1082	R	R	1117	+U	u
1083	S	S	1118	+V	v
1084	T	T	1119	+W	w
1085	U	U	1120	+X	x
1086	V	V	1121	+Y	y
1087	W	W	1122	+Z	z
1088	X	X	1123	%P	{
1089	Y	Y	1124	%Q	|
1090	Z	Z	1125	%R	}
1091	%K	[	1126	%S	~
1092	%L	\	1127		Undefined
1093	%M	]			
1094	%N	^	7013		ENTER

ASCII Character Set

Table A-5. ASCII Character Set

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1000	%U	CTRL 2	1024	$X	CTRL X
1001	$A	CTRL A	1025	$Y	CTRL Y
1002	$B	CTRL B	1026	$Z	CTRL Z
1003	$C	CTRL C	1027	%A	CTRL [
1004	$D	CTRL D	1028	%B	CTRL \
1005	$E	CTRL E	1029	%C	CTRL]
1006	$F	CTRL F	1030	%D	CTRL 6
1007	$G	CTRL G	1031	%E	CTRL -
1008	$H	CTRL H	1032	Space	Space
1009	$I	CTRL I	1033	/A	!
1010	$J	CTRL J	1034	/B	‘
1011	$K	CTRL K	1035	/C	#
1012	$L	CTRL L	1036	/D	$
1013	$M	CTRL M	1037	/E	%
1014	$N	CTRL N	1038	/F	&
1015	$O	CTRL O	1039	/G	‘
1016	$P	CTRL P	1040	/H	(
1017	$Q	CTRL Q	1041	/I	)
1018	$R	CTRL R	1042	/J	*
1019	$S	CTRL S	1043	/K	+
1020	$T	CTRL T	1044	/L	,
1021	$U	CTRL U	1045	-	-
1022	$V	CTRL V	1046	.	.
1023	$W	CTRL W	1047	/	/
1048	0	0	1073	I	I

Table A-5. ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1049	1	1	1074	J	J
1050	2	2	1075	K	K
1051	3	3	1076	L	L
1052	4	4	1077	M	M
1053	5	5	1078	N	N
1054	6	6	1079	O	O
1055	7	7	1080	P	P
1056	8	8	1081	Q	Q
1057	9	9	1082	R	R
1058	/Z	:	1083	S	S
1059	%F	;	1084	T	T
1060	%G	<	1085	U	U
1061	%H	=	1086	V	V
1062	%I	>	1087	W	W
1063	%J	?	1088	X	X
1064	%V	@	1089	Y	Y
1065	A	A	1090	Z	Z
1066	B	B	1091	%K	[
1067	C	C	1092	%L	\
1068	D	D	1093	%M	]
1069	E	E	1094	%N	^
1070	F	F	1095	%O	_
1071	G	G	1096	%W	‘
1072	H	H	1097	+A	a
1098	+B	b	1113	+Q	q
1099	+C	c	1114	+R	r
1100	+D	d	1115	+S	s

Table A-5. ASCII Character Set (Continued)

ASCII Value	Full ASCII Code 39 Encode Char.	Keystroke	ASCII Value	Full ASCII Code 39 Encode Char	Keystroke
1101	+E	e	1116	+T	t
1102	+F	f	1117	+U	u
1103	+G	g	1118	+V	v
1104	+H	h	1119	+W	w
1105	+I	i	1120	+X	x
1106	+J	j	1121	+Y	y
1107	+K	k	1122	+Z	z
1108	+L	l	1123	%P	{
1109	+M	m	1124	%Q	|
1110	+N	n	1125	%R	}
1111	+O	o	1126	%S	~
1112	+P	p	1127		Undefined

Table A-5. ASCII Character Set (Continued)

ASCII Value	**Full ASCII Code 39 Encode Char.**	**Keystroke**	**ASCII Value**	**Full ASCII Code 39 Encode Char**	**Keystroke**
ALT Keys	Keystroke	ALT Keys	Keystroke	ALT Keys	Keystroke
2064	ALT 2	2075	ALT K	2086	ALT V
2065	ALT A	2076	ALT L	2087	ALT W
2066	ALT B	2077	ALT M	2088	ALT X
2067	ALT C	2078	ALT N	2089	ALT Y
2068	ALT D	2079	ALT O	2090	ALT Z
2069	ALT E	2080	ALT P	2091	ALT [
2070	ALT F	2081	ALT Q	2092	ALT \
2071	ALT G	2082	ALT R	2093	ALT]
2072	ALT H	2083	ALT S	2094	ALT 6
2073	ALT I	2084	ALT T	2095	ALT -
2074	ALT J	2085	ALT U		
Misc. Key	Keystroke	Misc. Key	Keystroke	Misc. Key	Keystroke
3001	PA 1	3009	CMD 7	3017	°
3002	PA 2	3010	CMD 8	3018	1/2
3003	CMD 1	3011	CMD 9	3019	¶
3004	CMD 2	3012	CMD 10	3020	§
3005	CMD 3	3013	¥	3021	|
3006	CMD 4	3014	£	3022	0/00
3007	CMD 5	3015	¤		
3008	CMD 6	3016	¬		

Table A-5. ASCII Character Set (Continued)

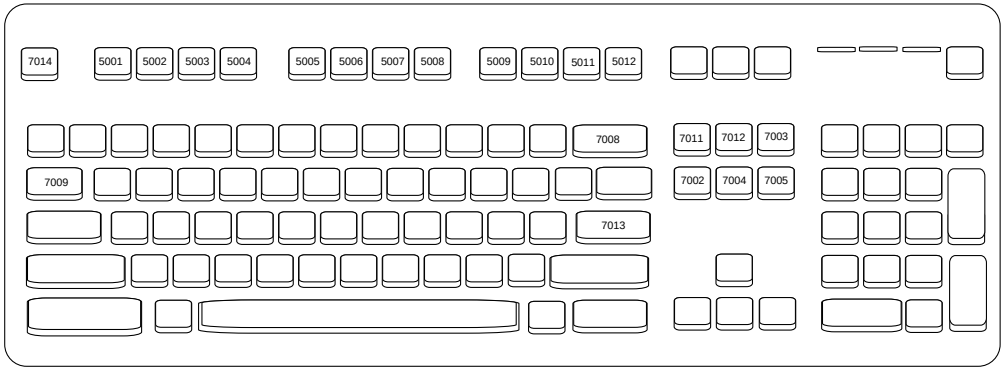
ASCII Value	**Full ASCII Code 39 Encode Char.**	**Keystroke**	**ASCII Value**	**Full ASCII Code 39 Encode Char**	**Keystroke**
PF Keys	Keystroke	PF Keys	Keystroke	PF Keys	Keystroke
4001	PF 1	4009	PF 9	4017	PF 17
4002	PF 2	4010	PF 10	4018	PF 18
4003	PF 3	4011	PF 11	4019	PF 19
4004	PF 4	4012	PF 12	4020	PF 20
4005	PF 5	4013	PF 13	4021	PF 21
4006	PF 6	4014	PF 14	4022	PF 22
4007	PF 7	4015	PF 15	4023	PF 23
4008	PF 8	4016	PF 16	4024	PF 24
F Keys	Keystroke	F Keys	Keystroke	F Keys	Keystroke
5001	F 1	5014	F 14	5027	F 27
5002	F 2	5015	F 15	5028	F 28
5003	F 3	5016	F 16	5029	F 29
5004	F 4	5017	F 17	5030	F 30
5005	F 5	5018	F 18	5031	F 31
5006	F 6	5019	F 19	5032	F 32
5007	F 7	5020	F 20	5033	F 33
5008	F 8	5021	F 21	5034	F 34
5009	F 9	5022	F 22	5035	F 35
5010	F 10	5023	F 23	5036	F 36
5011	F 11	5024	F 24	5037	F 37
5012	F 12	5025	F 25	5038	F 38
5013	F 13	5026	F 26	5039	F 39

Table A-5. ASCII Character Set (Continued)

ASCII Value	**Full ASCII Code 39 Encode Char.**	**Keystroke**	**ASCII Value**	**Full ASCII Code 39 Encode Char**	**Keystroke**
Numeric Keypad	Keystroke	Numeric Keypad	Keystroke	Numeric Keypad	Keystroke
6042	*	6049	1	6056	8
6043	+	6050	2	6057	9
6044	Undefined	6051	3	6058	Enter
6045	-	6062	4	6059	Num Lock
6046	.	6063	5	6060	00
6047	/	6064	6		
6048	0	6065	7		
Extended Keypad	Keystroke	Extended Keypad	Keystroke	Extended Keypad	Keystroke
7001	Break	7008	Backspace	7015	Up Arrow
7002	Delete	7009	Tab	7016	Dn Arrow
7003	Pg Up	7010	Print Screen	7017	Left Arrow
7004	End	7011	Insert	7018	Right Arrow
7005	Pg Dn	7012	Home	7019	Back Tab
7006	Pause	7013	Enter		
7007	Scroll Lock	7014	Escape		

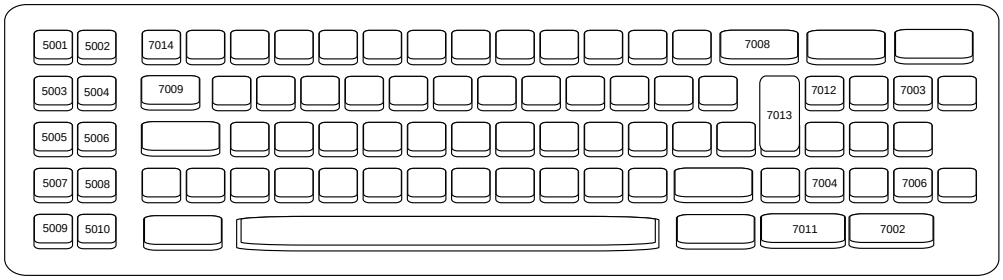
Keyboard Maps

The following keyboard maps are provided for prefix/suffix keystroke parameters and are used only with scanners that support data formatting. To program the prefix/suffix values, see the bar codes on page.

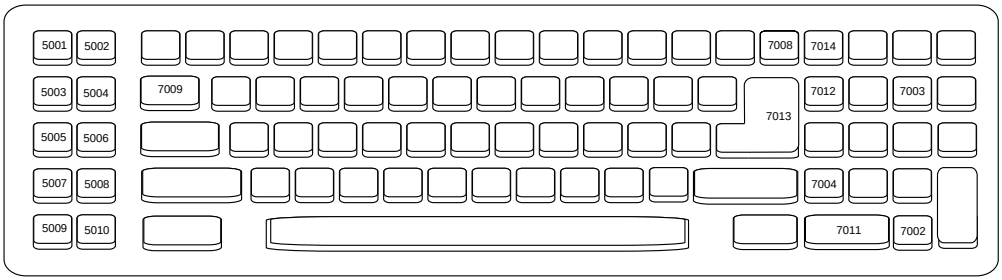


IBM PS2 type keyboard

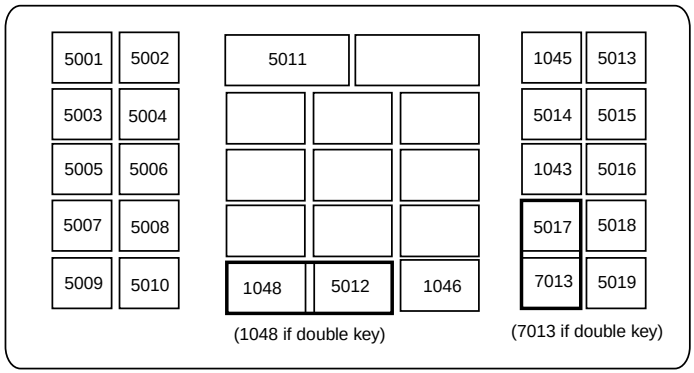
.



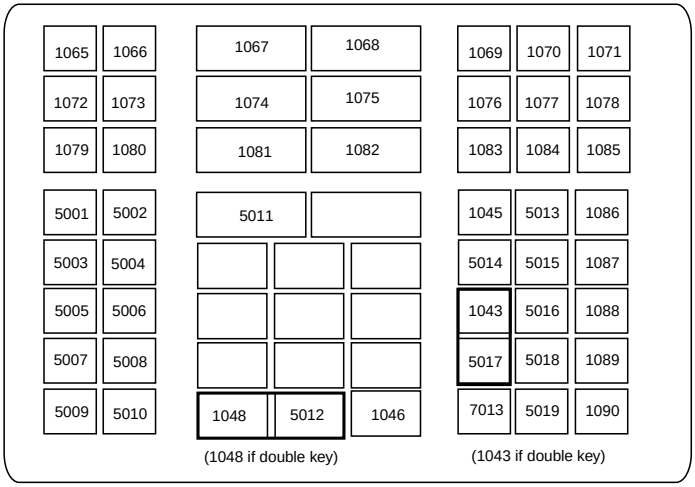
IBM PC/XT



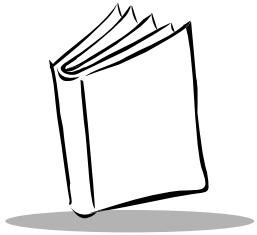
IBM PC/AT



NCR 7052 32-KEY



NCR 7052 58-KEY



Glossary

Aperture	The opening in an optical system defined by a lens or baffle that establishes the field of view.
ASCII	American Standard Code for Information Interchange. A 7 bit-plus-parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the U.S.
Autodiscrimination	The ability of an interface controller to determine the code type of a scanned bar code. After this determination is made, the information content is decoded.
Bar	The dark element in a printed bar code symbol.
Bar Code Density	The number of characters represented per unit of measurement (e.g., characters per inch).
Bar Height	The dimension of a bar measured perpendicular to the bar width.
Bar Width	Thickness of a bar measured from the edge closest to the symbol start character to the trailing edge of the same bar.
Baud Rate	A measure of the data flow or number of signaling events occurring per second. When one bit is the standard "event," this is a measure of bits per second (bps). For example, a baud rate of 50 means transmission of 50 bits of data per second.
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.

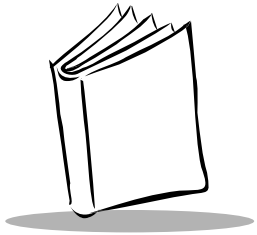
Byte	On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory is used to store one ASCII character.
CDRH	Center for Devices 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.
CDRH Class 1	This is the lowest power CDRH laser classification. This class is considered intrinsically safe, even if all laser output were directed into the eye's pupil. There are no special operating procedures for this class.
CDRH Class 2	No additional software mechanisms are needed to conform to this limit. Laser operation in this class poses no danger for unintentional direct human exposure.
Character	A pattern of bars and spaces which either directly represents data or indicates a control function, such as a number, letter, punctuation mark, or communications control contained in a message.
Character Set	Those characters available for encoding in a particular bar code symbology.
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.

Code Length	Number of data characters in a bar code between the start and stop characters, not including those characters.
Continuous Code	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.
Dead Zone	An area within a scanner's field of view, in which specular reflection may prevent a successful decode.
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.
Depth of Field	The range between minimum and maximum distances at which a scanner can read a symbol with a certain minimum element width.
Discrete Code	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.
Element	Generic term for a bar or space.
Encoded Area	Total linear dimension occupied by all characters of a code pattern, including start/stop characters and data.
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 (825) Class 1	This is the lowest power IEC laser classification. Conformity is ensured through a software restriction of 120 seconds of laser operation within any 1000 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 code.
Interleaved Bar Code	A bar code in which characters are paired together, using bars to represent 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 - 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 gallium-arsenide semiconductor type of laser connected to a power source to generate a laser beam. This laser type is a compact source of coherent light.
LED Indicator	A semiconductor diode (LED - Light Emitting Diode) used as an indicator, often in digital displays. The semiconductor uses applied voltage to produce light of a certain frequency determined by the semiconductor's particular chemical composition.
MIL	1 mil = 1 thousandth of an inch.
Misread (Misdecode)	A condition which occurs when the data output of a reader or interface controller does not agree with the data encoded within a bar code symbol.
Nominal	The exact (or ideal) intended value for a specified parameter. Tolerances are specified as positive and negative deviations from this value.
Nominal Size	Standard size for a bar code symbol. Most UPC/EAN codes are used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).
Parameter	A variable that can have different values assigned to it.

Percent Decode	The average probability that a single scan of a bar code would result in a successful decode. In a well-designed bar code scanning system, that probability should approach near 100%.
Print Contrast Signal (PCS)	Measurement of the contrast (brightness difference) between the bars and spaces of a symbol. A minimum PCS value is needed for a bar code symbol to be scannable. PCS = (RL - RD) / RL, where RL is the reflectance factor of the background and RD the reflectance factor of the dark bars.
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.
Reflectance	Amount of light returned from an illuminated surface.
Resolution	The narrowest element dimension which is distinguished by a particular reading device or printed with a particular device or method.
Scan Area	Area intended to contain a symbol.
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.
Space	The lighter element of a bar code formed by the background between bars.
Specular Reflection	The mirror-like direct reflection of light from a surface, which can cause difficulty decoding a bar code.

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.
Substrate	A foundation material on which a substance or image is placed.
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.
Symbol Aspect Ratio	The ratio of symbol height to symbol width.
Symbol Height	The distance between the outside edges of the quiet zones of the first row and the last row.
Symbol Length	Length of symbol measured from the beginning of the quiet zone (margin) adjacent to the start character to the end of the quiet zone (margin) adjacent to a stop character.
Symbology	The structural rules and conventions for representing data within a particular bar code type (e.g. UPC/EAN, Code 39).
Tolerance	Allowable deviation from the nominal bar or space width.
UPC	Universal Product Code. A relatively complex numeric symbology. Each character consists of two bars and two spaces, each of which is any of four widths. The standard symbology for retail food packages in the United States.
Visible Laser Diode (VLD)	A solid state device which produces visible laser light.



Index

A

actions 5-4
ADF 5-1
  actions 5-1, 5-4, 5-23
  alphanumeric keyboard 5-76
  alternate rule sets 5-8
  bar code menu example 5-6
  beep 5-41
  code length 5-3
  code lengths 5-16
  code types 5-3, 5-14
  criteria 5-1, 5-14
  default rules 5-10
  numeric keypad 5-21
  pad spaces 5-33
  pad zeros 5-37
  rule belongs to set 5-22
  rules 5-1
  rules hierarchy 5-9
  send characters 5-23
  send control characters 5-42
  send value 5-31
  setup fields 5-26
  skip ahead characters 5-27
  skip back characters 5-29
  space removal 5-32
  special commands 5-11
  specific data string 5-20
  zero removal 5-32
advanced data formatting 5-1
  actions 5-1, 5-4, 5-23
  alphanumeric keyboard 5-76
  alternate rule sets 5-8
  bar code menu example 5-6
  beep 5-41
  code length 5-3
  code lengths 5-16
  code types 5-3, 5-14
  criteria 5-1, 5-14
  default rules 5-10
  numeric keypad 5-21
  pad spaces 5-33
  pad zeros 5-37
  rule belongs to set 5-22
  rules 5-1
  rules hierarchy 5-9
  send characters 5-23
  send control characters 5-42
  send value 5-31
  setup fields 5-26
  skip ahead characters 5-27
  skip back characters 5-29
  space removal 5-32
  special commands 5-11
  specific data string 5-20
  zero removal 5-32
aiming 2-5
assembling the stand 2-8

B

bar codes
  beep after good decode 4-16
  beeper tone 4-12
  beeper volume 4-13
  bi-directional redundancy 4-20
  codabar 4-100
    CLSI editing 4-103
    lengths 4-101

NOTIS editing 4-104
code 11
lengths 4-87, 4-88
code 128 4-68
ISBT 128 4-70
UCC/EAN-128 4-69
code 39 4-71
buffering 4-80
check digit verification 4-77
full ASCII 4-79
lengths 4-75
transmit buffer 4-82
transmit check digit 4-78
code 93 4-83
lengths 4-84, 4-85
data options 4-113
pause duration 4-115
prefix/suffix values 4-116
scan data xmission format 4-117
transmit code ID character 4-113
discrete 2 of 5 4-97
lengths 4-98, 4-99
host types 4-21
interleaved 2 of 5 4-91
check digit verification 4-94
convert to EAN-13 4-96
lengths 4-92, 4-93
transmit check digit 4-95
keyboard wedge 4-36
alternate numeric 4-45
caps cancel 4-44
caps lock 4-44
country selection 4-38
emulate keypad 4-43
host interfaces 4-36
intercharacter delay 4-42
send make break 4-43
unknown characters 4-41
laser on time 4-14
linear code type security level 4-18
MSI plessey 4-105
check digit algorithm 4-110
check digits 4-108
lengths 4-106
transmit check digit 4-109
numeric bar codes 4-119
power mode 4-15
RS-232C parameters 4-21
ASCII format 4-35
baud rate 4-25
beep on bel 4-35
check receive errors 4-28
hardware handshaking 4-29
host serial response time-out . . . 4-33
intercharacter delay 4-114
parity 4-27
RTS line state 4-34
software handshaking 4-31
stop bit select 4-34
set defaults 4-10
transmit no read message 4-17
trigger mode 4-11
UPC/EAN 4-50, 4-65
bookland EAN 4-52
check digit 4-55
convert UPC-E to UPC-A . 4-59, 4-60
coupon code 4-65
EAN zero extend 4-61
EAN-8/EAN-13 4-51
security level 4-63
supp redundancy 4-54
supplementals 4-53
UPC-A preamble 4-56
UPC-E preamble 4-57
UPC-E/UPC-A 4-50
wand emulation 4-46
code 39 full ASCII 4-49
convert to code 39 4-49
host interfaces 4-46
leading margin 4-47
polarity 4-48
unknown characters 4-48

C

cables
installing 1-3
interface 1-4

removing cables 1-4
code identifiers
AIM code IDs A-2
Symbol code IDs A-1
code types
ADF 5-14
connecting power 1-4
criteria 5-3

D

decode zones 2-6
LS1900T/LS1902T 2-7
LS1902C 2-6
default parameters 4-3
default table 4-3

H

host interfaces
keyboard wedge 4-36
RS-232C 4-23
wand emulation 4-46
host types 4-21

K

keyboard wedge connection 1-5
keyboard wedge parameters 4-36

M

maintenance 3-1
mounting the stand 2-9

N

notational conventions x

P

parts 2-1
pinouts
scanner signal descriptions 3-5
power supply
connecting 1-4
prefix values A-5
prefix/suffix values A-5

S

scanner defaults 4-3
scanner parts 2-1
scanning
aiming 2-5
errors 4-2
hand-held 2-4
hands-free 2-8, 2-10
sequence example 4-2
service information x
setup
connecting an RS-232C interface 1-5
connecting interface cable 1-4
connecting keyboard wedge interface 1-5
connecting power 1-4
connecting power supply 1-4
connecting synapse interface 1-8
installing the cable 1-3
unpacking 1-2
signal descriptions 3-5
specifications 3-3
stand
assembling 2-8
mounting 2-9
standard defaults 4-3
suffix values A-5
support center xi
symbol support centers xi
synapse cable connection 1-8

T

technical specifications 3-3

U

unpacking 1-2

W

wand emulation connection 1-7
wand emulation parameters 4-46

Tell Us What You Think...

We'd like to know what you think about this Guide. Please take a moment to fill out this questionnaire and fax this form to: (631) 738-3318, or mail to:

Symbol Technologies, Inc.
One Symbol Plaza M/S B-4
Holtsville, NY 11742-1300
Attention: Technical Publications Manager

IMPORTANT: If you need product support, please call the appropriate customer support number provided. Unfortunately, we cannot provide customer support at the fax number above.

User's Guide Title:_____
(please include revision level)

How familiar were you with this product before using this guide?

☐ Very familiar ☐ Slightly familiar ☐ Not at all familiar

Did this guide meet your needs? If not, please explain.

_____
_____

What topics need to be added to the index, if applicable?

_____
_____

What topics do you feel need to be better discussed? Please be specific.

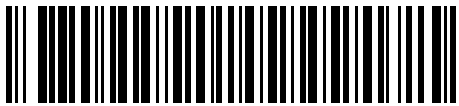
_____
_____

What can we do to further improve our guides?

_____
_____

Thank you for your input—We value your comments.

LS1900 Series Product Reference Guide



72-50930-01
Revision A — June 2001

Symbol Technologies, Inc. One Symbol Plaza, Holtsville N.Y. 11742-1300