



MiniScan MS-804FZY and MS-904HS



Integration Guide



***MiniScan MS-804FZY and MS-904HS
Integration Guide***

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Revision A
September 2003*



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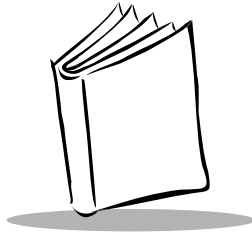
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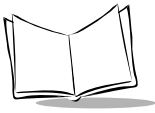
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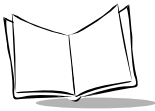
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About This Manual

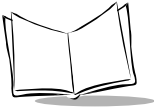
The *MS-804FZY and MS-904HS Integration Guide* provides general instructions for mounting, setting up, and programming the MiniScan MS-804FZY and MS-904HS.

Note: *It is recommended that an opto-mechanical engineer perform an opto-mechanical analysis prior to integration.*

Chapter Descriptions

Topics covered in this guide are as follows:

- **Chapter 1, Introduction**, provides an overview of the MS-804FZY and MS-904HS scanners, and explains the theory of operation.
- **Chapter 2, Installation**, describes the mechanical, electrical, optical and other environments related to installing the MS-804FZY and MS-904HS scanners.
- **Chapter 3, MS-804FZY Specifications**, provides the technical and scanning specifications for the **MS-804FZY scanner**.
- **Chapter 4, MS-904HS Specifications**, provides the technical and scanning specifications for the **MS-904HS scanner**.
- **Chapter 5, Scanning**, provides information on scanning and trigger modes.
- **Chapter 6, Maintenance and Troubleshooting**, provides information on maintaining and troubleshooting the MS-804FZY and MS-904HS scanners.
- **Chapter 7, Parameter Menus** describes the programmable parameters, provides bar codes for programming, and hexadecimal equivalents for host download programming.
- **Chapter 8, Simple Serial Interface (SSI)** describes scanner-specific updates to the *Simple Serial Interface (SSI) Programmer's Guide*.



- [Chapter 9, Mounting Template](#), provides a mounting template for the MS-804FZY and MS-904HS scanners.

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 Documents

The following documents provide more information for the MiniScan MS-804FZY and MS-904HS scanners.

- *MiniScan Family of Scanners Quick Reference Guide*, p/n 72-58809-xx
- *Simple Serial Interface (SSI) Programmer's Guide*, p/n 72-40451-xx
- *Simple Serial Interface (SSI) Developer's Guide*, p/n 72-50705-xx

Service Information

If you have a problem with your equipment, contact the [Symbol Support Center](#). 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 symbol readability, 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.*

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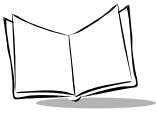
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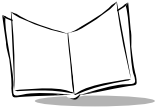
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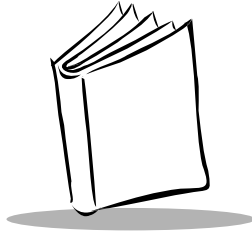
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MS-804FZY and MS-904HS Integration Guide



Chapter 1

Introduction



Caution

Use of controls, adjustments or procedures other than those specified here can result in hazardous laser light exposure.

Overview

The MiniScan family of fixed-mount scanners are specifically designed for stand-alone applications, and OEM applications such as kiosks.

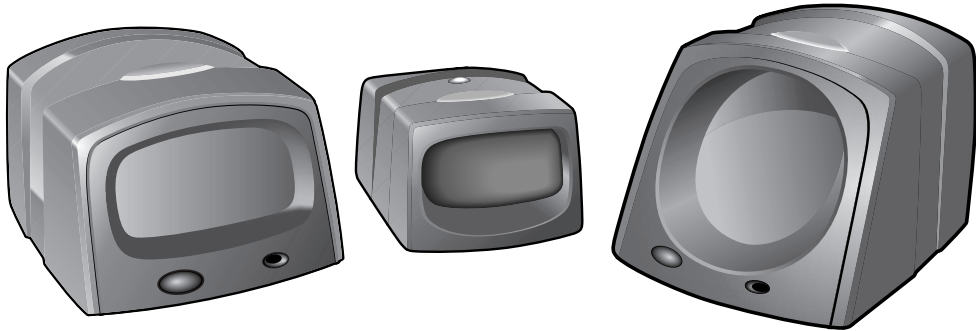
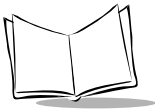


Figure 1-1. MiniScan Family of Scanners

MS-804FZY and MS-904HS scanners are extremely compact, provide easy and flexible integration of bar code scanning into a host device, and offer high-performance scanning on 1D bar codes. The MS-804FZY is ideal for medical instruments and manufacturing applications, and the MS-904HS is perfect for applications such as clinical diagnostics, conveyer belts or assembly lines.

MiniScan MS-804FZY and MS-904HS Features

- Stand-alone or OEM applications
- Quick and easy integration for OEM devices
- Excellent scanning performance on 1D bar codes
- Easy programming and configuration
- Flexible mounting options.

Typical Applications

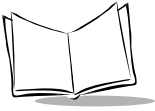
MiniScan is the perfect solution for the following applications:

Fixed Mount Standalone Applications

- Clinical diagnostics
- Medical instruments
- Conveyer belts
- Assembly lines.

OEM Applications

- Kiosks / ATMs
- Music listening stations
- Medical instruments
- Clinical diagnostics
- Lottery terminals / gaming.



Block Diagram

The MiniScan block diagram illustrates the functional relationship of the MiniScan components. A detailed description of each component in the block diagram is also provided.

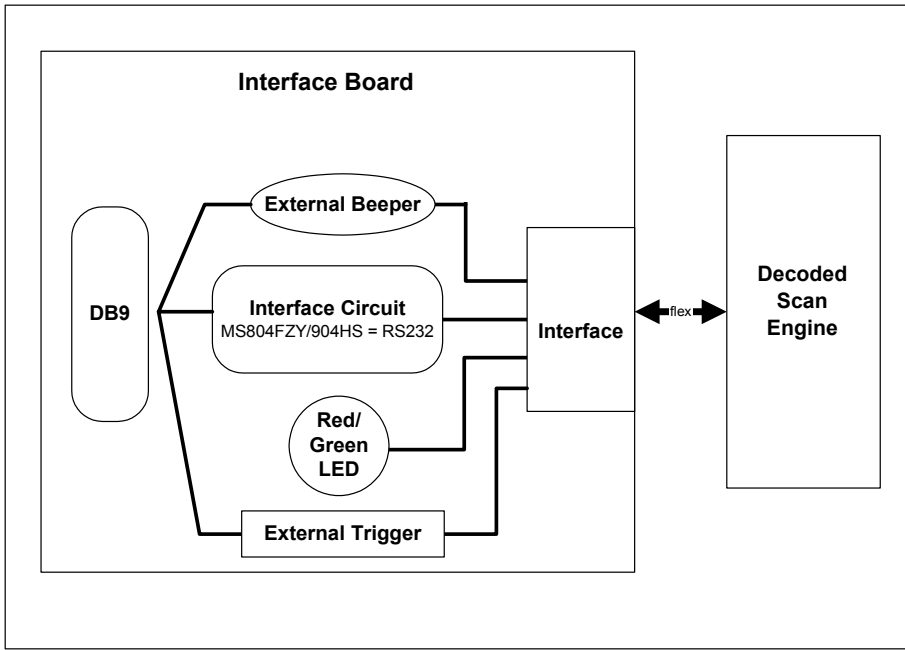


Figure 1-2. MiniScan Block Diagram

Miniscan Block Diagram Descriptions

Decoded Scan Engine - The scan engine emits a beam of laser light that reflects off the bar code to be decoded. Black bars absorb light, white spaces reflect light. The scan engine collects the reflected light and processes the signal through several analog filters. The filtered signal is digitized into a Digitized Barcode Pattern (DBP). Timing information is analyzed by the decoder micro-controller to decode and transmit the data contained in the bar code. Data transmission is carried out using Symbol's proprietary SSI Interface.

Interface Board - The interface board converts TTL level SSI signals to proper RS-232 levels for connection to any RS-232 compliant host. It also contains a red/green LED for visual feedback, and provides for an external trigger and external beeper.

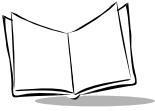
DB9 - The DB9 connector provides various interface signals used between a MiniScan scanner and the host. It also maintains pin compatibility with the previous generation LS 1220 host cables.

Scanning Pattern

The MS-804FZY and MS-904HS scanners emit a single scan line to quickly decode 1D bar codes.



Figure 1-3. Single Scan Line Scan Pattern



Beeper and LED Definitions

Table 1-1 provides standard beeper definitions, and Table 1-2 provides LED definitions.

Table 1-1. Standard Beeper Definitions (External Beeper Required)

Beeper Sequence	Indication
Standard Use	
1 Beep - short high tone	A bar code symbol was decoded (if decode beeper is enabled).
1 Beep - long high tone	Thermal shutdown.
Parameter Menu Scanning	
2 Beeps- short high tone	Correct entry scanned or correct menu sequence performed.
1 Beep- hi/lo/hi/lo tone	Successful program exit with change in the parameter setting.
2 Beeps - lo/hi tone	Input error, incorrect bar code, or <i>Cancel</i> scanned, wrong entry, incorrect bar code programming sequence; remain in program mode.
Communication	
4 Beeps - short high tone	Communication error.
4 Beeps - hi/hi/hi/lo	Receive error.
3 Beeps - lo/hi/lo	ADF transmit error.

Table 1-2. LED Definitions

LED	Indication
Red	Scanner is on.
Green	A bar code is successfully decoded.



Chapter 2

Installation

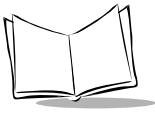
Overview

This chapter provides information on unpacking, mounting, and installing the MiniScan, and includes physical and electrical considerations.

Unpacking

Remove the MiniScan from its packing and inspect for damage. If the scanner is damaged, call the [Symbol Support Center](#) at the telephone number listed on [page xi](#).

KEEP THE PACKING. It is the approved shipping container and should be used if the equipment needs to be returned for servicing.



Mounting

There are two mounting holes on the bottom of the chassis.

Figure 2-1 provides mounting dimensions for the MiniScan scanner housing. For a mounting template, see [Mounting Template](#) on page 9-1.

Note: Use only non-magnetic M3x.5 screws with a maximum length of 3.6M for mounting the MiniScan scanner chassis.

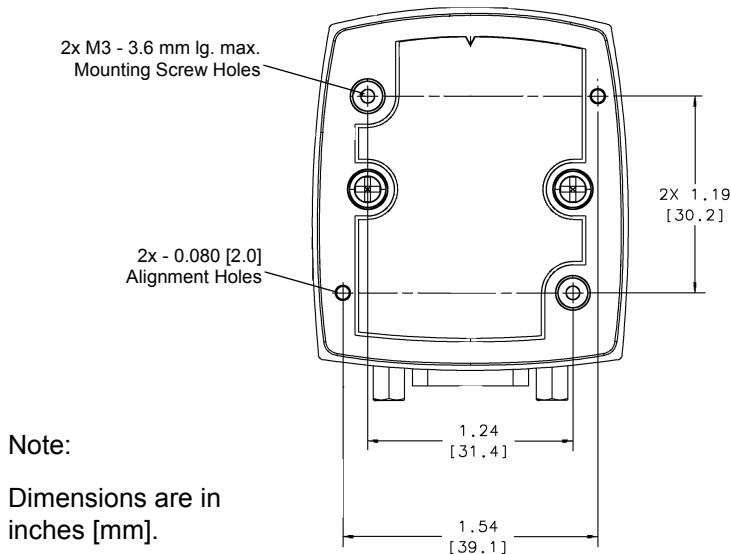


Figure 2-1. MS-804FZY/MS-904HS

Connecting MiniScan

To connect the MiniScan to the host, connect the scanner cables in the order shown in [Figure 2-2](#).

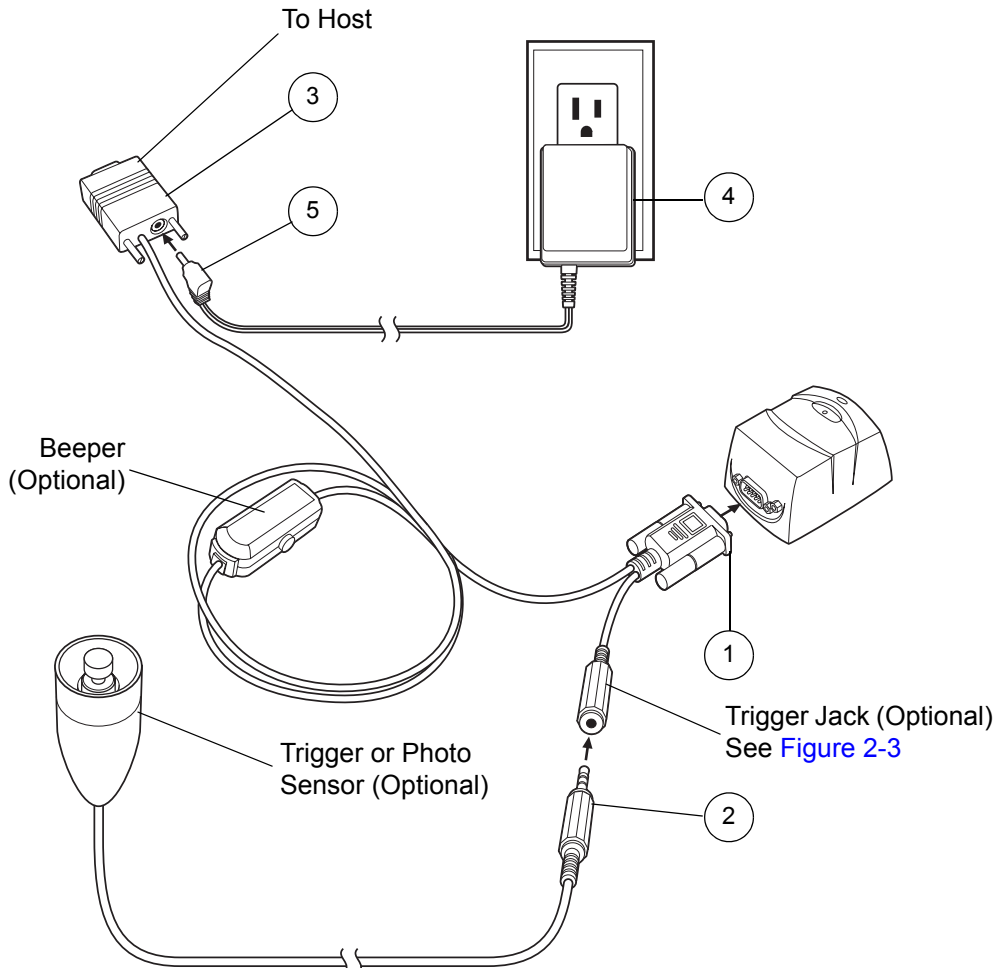


Figure 2-2. Typical Connection Diagram

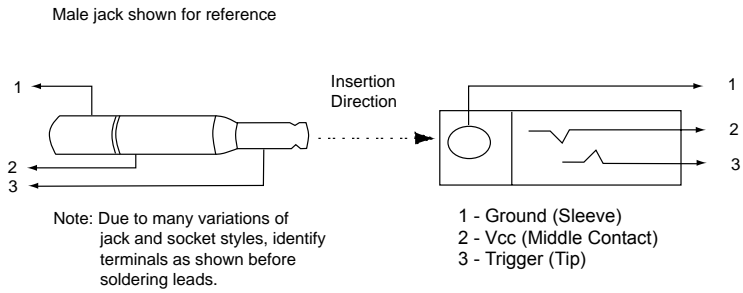
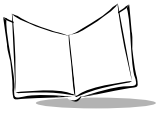
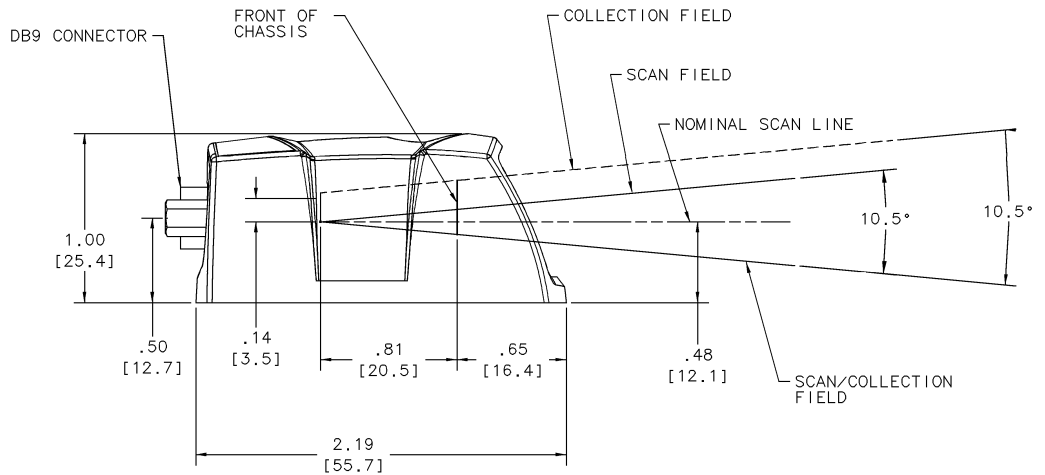


Figure 2-3. Trigger Jack Connector Pins

Mechanical Drawing

MS-804FZY



Notes:

Unless otherwise specified:

- Dimensions are in inches, dimensions in [] are mm.
- User mounting tolerances are not included.

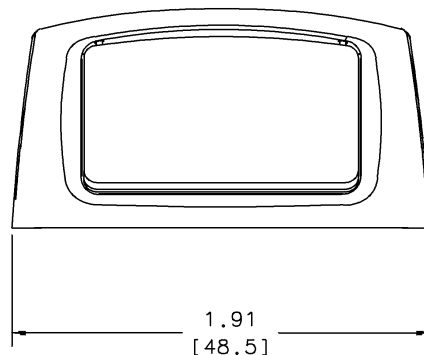
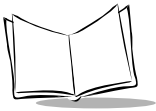
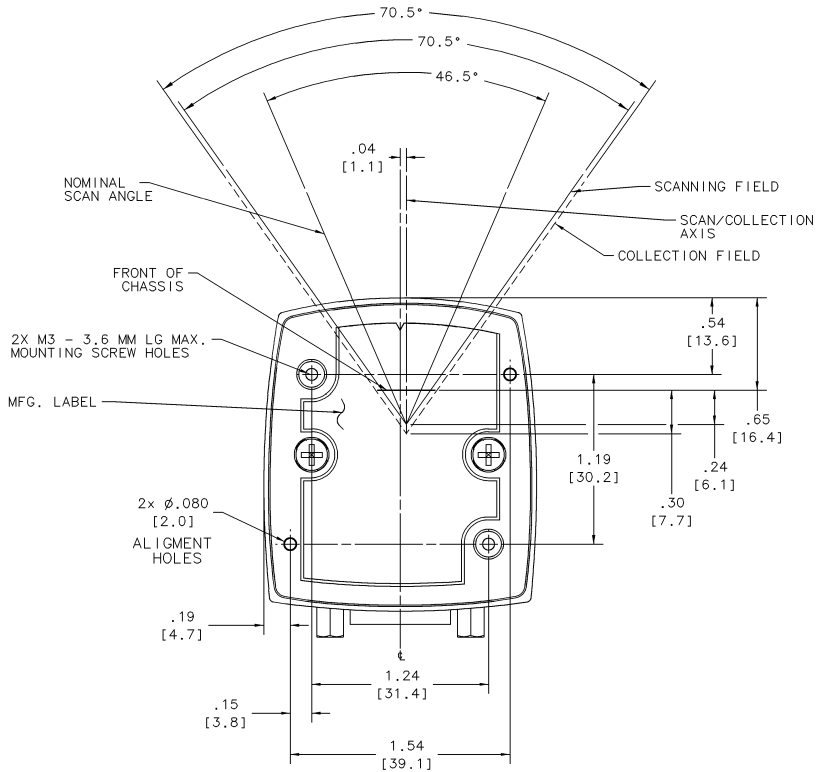


Figure 2-4. MS-804FZY Mechanical Drawing



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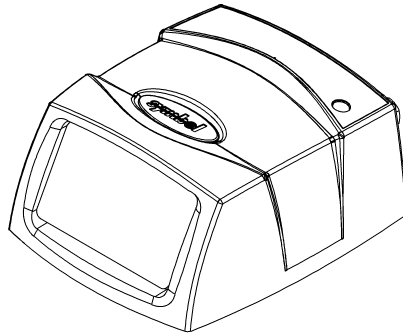
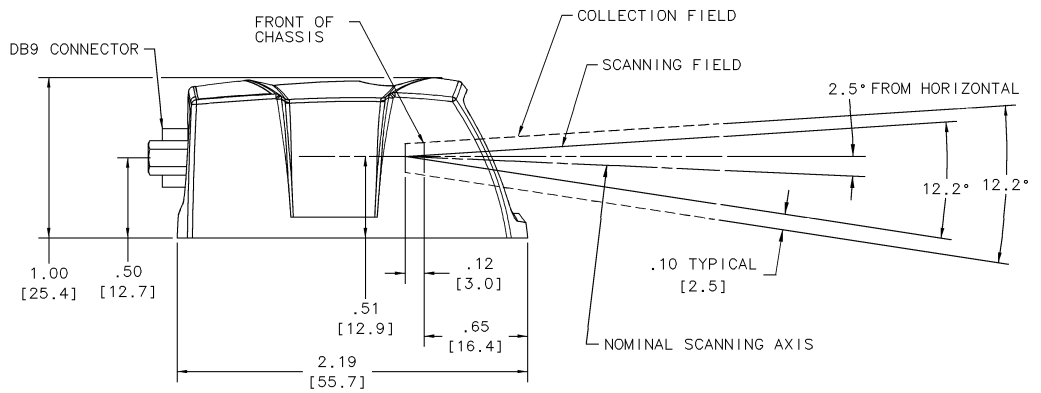


Figure 2-5. MS-804FZY Mechanical Drawing

MS-904HS



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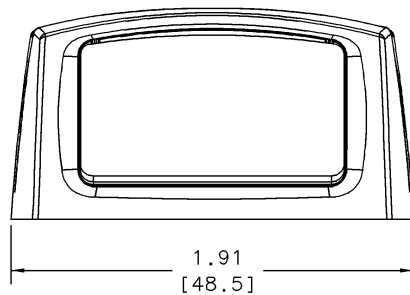
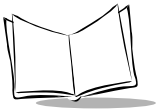
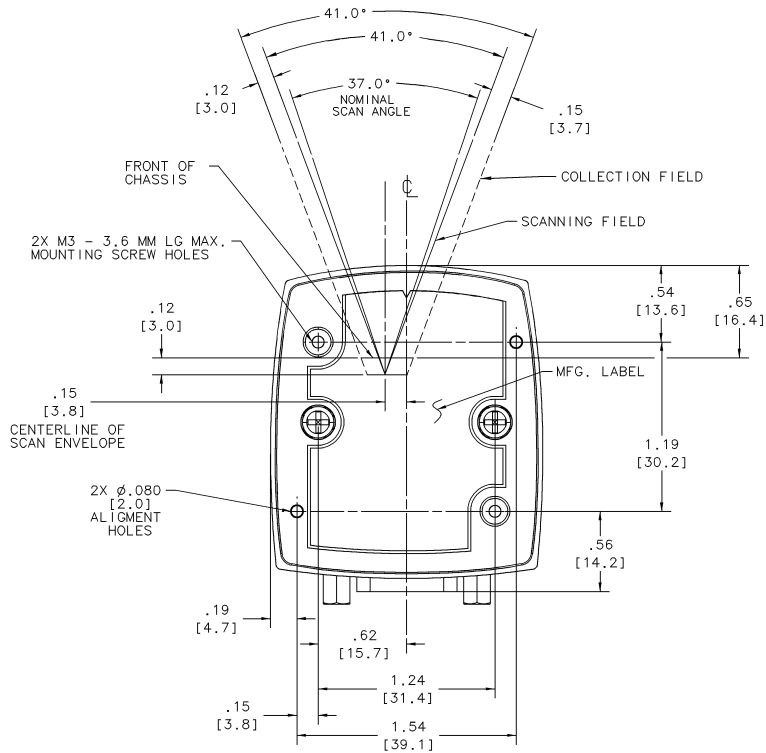


Figure 2-6. MS-904HS Mechanical Drawing



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- User mounting tolerances are not included.

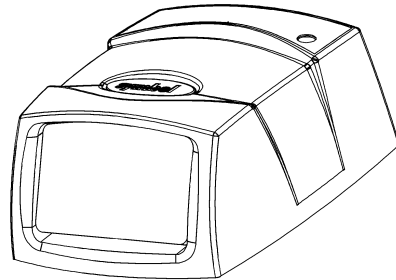


Figure 2-7. MS-904HS Mechanical Drawing

Location and Positioning

Caution

The location and positioning guidelines provided do not consider unique application characteristics. It is recommended that an opto-mechanical engineer perform an opto-mechanical analysis prior to integration.

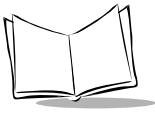
Note: *Integrate the scanner in an environment no more extreme than the product's specification, where the scanner will not exceed its temperature range. For instance, do not mount the scanner on to or next to a large heat source. When placing the scanner with another device, ensure there is proper convection or venting for heat. Follow these suggestions to ensure product longevity, warranty, and overall satisfaction with the scanner.*

Using the MiniScan as an Embedded Scanner

The MiniScan can be mounted to read symbols that are automatically presented, or that are presented in a pre-determined location. In these applications, MiniScan positioning with respect to the symbol is critical. Failure to properly position the MiniScan can result in unsatisfactory scanning performance. A thermal analysis is also recommended.

Two methods of positioning the scanner are provided:

- The [Calculating The Usable Scan Length Method](#) on page 2-10 can be used with consistently good quality symbols. It provides a mathematical solution to find the usable scan length.
- The [Testing The Usable Scan Length Method](#) on page 2-11 uses real situation testing to adjust the usable scan length to fit the application conditions.



Calculating The Usable Scan Length Method

Calculate usable scan length as follows (see [Figure 2-8 on page 2-11](#)):

$$L = 2 \times (D+d+B) \times \tan (A/2)$$

Table 2-1. Calculation Constants

Constants	B	A
MS-804FZY	0.89	46.5°
MS-804FZY (Narrow)	0.89	35°
MS-904HS	0.77	37°

where:

D = Distance (in inches) from the front edge of the host housing to the bar code.

d = The host housing's internal optical path from the edge of the housing to the front of the MiniScan scanner.

B = Internal optical path from the scan mirror to the front edge of the MiniScan scanner.

A = Scan angle in degrees.

Note: Usable scan length determined by this formula, or 90% of scan line at any working distance. This formula is based on good quality symbols in the center of the working range and length of bar code.

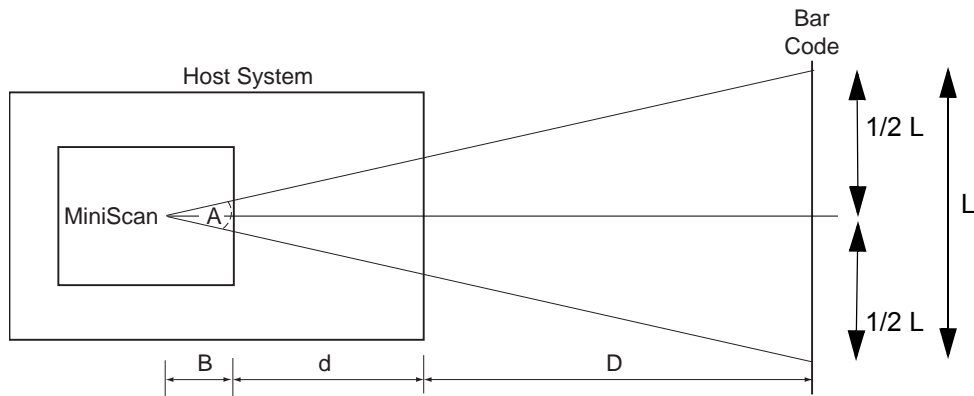


Figure 2-8. Usable Scan Length Diagram

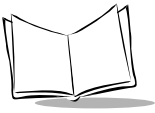
Testing The Usable Scan Length Method

Due to the variety of symbol sizes, densities, print quality, etc., there is no simple way to calculate the ideal symbol distance. To optimize performance, use the *Testing The Usable Scan Length* positioning method:

1. Measure the maximum and minimum distances at which the symbols can be read.
2. Check the near and far range on several symbols. If they are not reasonably consistent there may be a printing quality problem that can degrade the performance of the system. Symbol Technologies can provide advice on how to improve the installation.

Note: *Poor quality symbols (from bad printing, wear, or damage) may not decode well when placed in the center of the depth of field (especially higher density codes). The scan beam has a minimum width in the central area, and when the scanner tries to read all symbol imperfections in this area it may not decode. After a preliminary spot is determined using good quality symbols, test several reduced quality symbols and adjust the spot for the best overall symbol position.*

3. Locate the scanner so the symbol is near the middle of the near/far range.
4. Center the symbol (left to right) in the scan line whenever possible.



5. Position the symbol so that the scan line is as near as possible to perpendicular to the bars and spaces in the symbol.
6. Avoid specular reflection (glare) off the symbol by tilting the top or bottom of the symbol away from the scanner. The exact angle is not critical, but it must be large enough so that if a mirror were inserted in the symbol location, the reflected scan line would miss the front surface of the scanner. For the maximum allowable angles refer to the Skew, Pitch and Roll angles listed in each MiniScan *Technical Specifications* table.
7. If an additional window is to be placed between the scanner and the symbol, determine the optimum symbol location using a representative window in the desired window position. Review the sections of this chapter concerning window quality, coatings and positioning.
8. Give the scanner time to dwell on the symbol for several scans. When first enabled, the MiniScan may take two or three scans before it reaches maximum performance. Enable the MiniScan before the symbol is presented, if possible.

Conveyor Applications

Conveyor applications require setting the conveyor velocity to optimize the scanner's ability to read symbols. Also consider the orientation of the symbol with respect to the conveyor direction. [Figure 2-9 on page 2-13](#) illustrates the relationship of the conveyor velocity with respect to a symbol positioned perpendicular to the conveyor direction and [Figure 2-10 on page 2-14](#) illustrates the relationship of the conveyor velocity with respect to a symbol positioned parallel to the conveyor direction.

Symbol is Perpendicular to Conveyor Movement

With the symbol bars perpendicular to the conveyor belt direction (Picket Fence presentation) the relationship is:

$$V = (R \times (F-W)) / N$$

- Where:
- V = Velocity of the conveyor (inches/second)
 - R = Scan Rate (see technical specifications)
 - F = Field width of scan beam
 - W = Symbol Width (inches)
 - N = Number of scans over symbol (minimum of 10 scans)

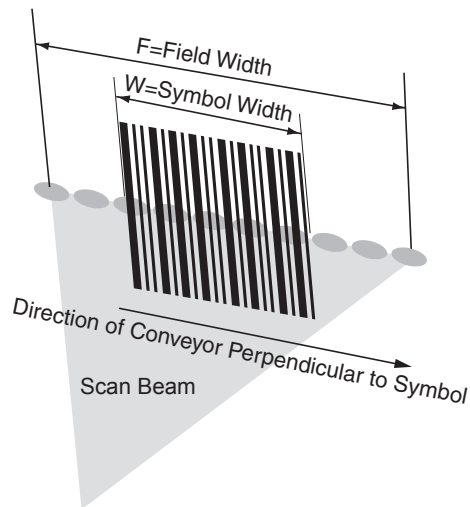


Figure 2-9. Symbol Perpendicular To Conveyor Movement

Symbol is Parallel to Conveyor Movement

With the symbol bars parallel to the conveyor belt direction (Ladder presentation) the relationship is:

$$\mathbf{V = (R \times H) / N}$$

where:

V = Velocity of the conveyor (inches/second)

R = Scan Rate (see technical specifications)

H = Symbol height

N = Number of scans over symbol (minimum of 10 scans)

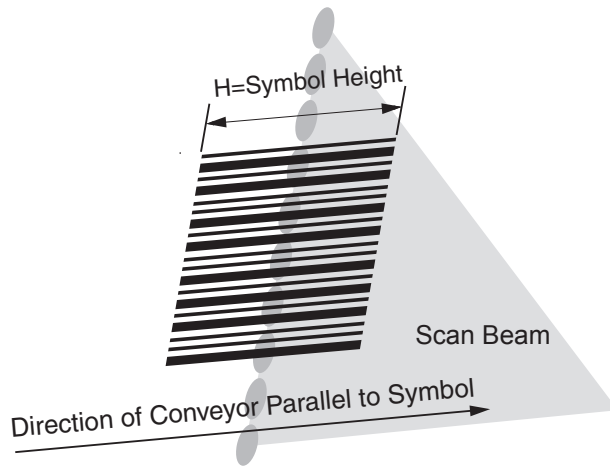
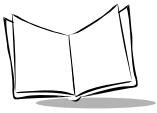
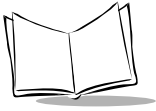


Figure 2-10. Symbol Parallel To Conveyor Movement

Accessories

The following accessories are available for the MiniScan scanner, and can be found in Symbol's Solution Builder (ordering guide).

- **For power connection**
 - 110V power supply, US, p/n 50-14000-008
 - 220V power supply, Europe, p/n 50-14000-009
 - 100V power supply, Asia, p/n 50-14000-010
 - 264V Universal power supply (also order cables below), p/n 50-14001-001
 - DC line cord (power supply to scanner), p/n 50-16002-009
 - AC line cord (wall outlet to power supply), p/n 23844-00-00
- **RS-232**
 - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and no beeper, p/n 25-13227-XX
 - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and beeper, p/n 25-13228-XX
 - Female DB9 with straight connector to RS-232 host (female DB9), p/n 25-58918-XX
 - Female DB9 with right angle connector to RS-232 host (female DB9), p/n 25-58919-XX
 - Female DB9 with straight connector to RS-232 host (female DB9), with trigger jack and no hardware handshaking, p/n 25-63736-XX
- **Cable Adapters**
 - Female 25 pin D, TxD on pin 2, p/n 50-12100-378
 - Female 25 pin D, TxD on pin 3, p/n 50-12100-377
 - Male 25 pin D, TxD on pin 2, p/n 50-12100-380
 - Male 25 pin D, TxD on pin 3, p/n 50-12100-379
- **Optional Accessories**
 - Push button trigger cable, p/n 25-04950-XX
 - Photo sensor trigger cable, p/n 25-13176-XX
- **other**
 - Software Developer's CD, p/n SW-60371-XX



Software Development CD

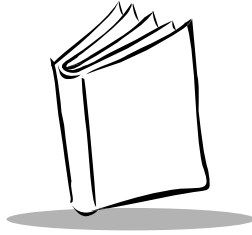
The Software Development CD provides the software tools required to integrate and communicate with the MS-804FZY and MS-904HS, including:

- Sample Windows® program with source code
- DLL with source code for building user applications
- ActiveX component (including help file) for easy integration into VisualBasic programs
- Simple Serial Interface documentation.

Note: *The MS-804FZY/MS-904HS scanner does not support 123Scan.*

With over 70 programmable parameters, the MS-804FZY and MS-904HS can be configured by scanning bar code menus, or through the serial interface using Symbol's Simple Serial Interface protocol.

For Windows®, DOS, and embedded system environments, the CD enables the user to take full advantage of the scanner's features and obtain maximum performance.

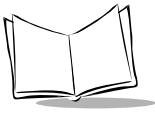


Chapter 3

MS-804FZY Specifications

Overview

This chapter provides the technical specifications of the MS-804FZY scanner, including decode zone and exit window characteristics.



MS-804FZY Electrical Interface

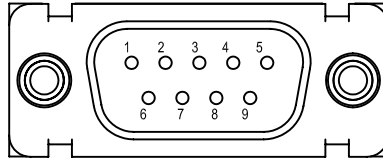


Figure 3-1. MiniScan Connector

Table 3-1 lists the pin functions of the MiniScan MS-804FZY interface.

Table 3-1. MS804FZY Electrical Interface

Pin No.	Pin Name	Type*	Function
1	Trigger	I	Signals scanner to begin scanning session.
2	TXD	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	RXD	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	Not used		
5	Ground		Power supply ground input and signal ground reference.
6	Power	I	5.0 VDC \pm 10%
7	CTS	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	RTS	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	Beeper/ Download	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50 mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.

*I = Input O = Output

MS-804FZY Technical Specifications

Table 3-2. MS-804FZY Technical Specifications @ 23°C

Item	Description
Power Requirements	
Input Voltage	5.0 VDC \pm 10%
Scanning Current	150 mA \pm 30 mA typical
Idle Current	110 mA \pm 10 mA typical
Standby Current	20 mA \pm 5 mA typical
V_{cc} Noise Level	200 mV peak-to-peak max.
Scan Rate	50 (\pm 6) scans/sec (bidirectional)
Laser Power	0.9 mW \pm 0.1 mW, λ = 650 nm nominal
Optical Resolution	0.005 in. minimum element width
Print Contrast	Minimum 25% absolute dark/light reflectance measured at 650 nm.
Scan Angle	Default: 46.5° Narrow: 35°
Pitch Angle	\pm 65° from normal (see Figure 3-2 on page 3-5)
Skew Tolerance	\pm 60° from normal (see Figure 3-2 on page 3-5)
Roll	\pm 30° from vertical (see Figure 3-2 on page 3-5)
Ambient Light Immunity	
Sunlight	8,000 ft. candles (86,112 lux)
Artificial Light	450 ft. candles (4,844 lux)
Drop	Multiple 30" drops
Vibration	Withstands a random vibration of 6.5 G's RMS along each of the 3 mutually perpendicular axes for a period of 1 hr per axis, over a frequency range of 20 Hz to 2,000 Hz.
ESD	\pm 15kV air discharge \pm 8kV indirect discharge
Laser Class	CDRH Class II, IEC Class 2
Operating Temperature	32° to 104°F (0° to 40°C)
Storage Temperature	-40° to 158°F (-40° to 70°C)

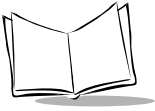
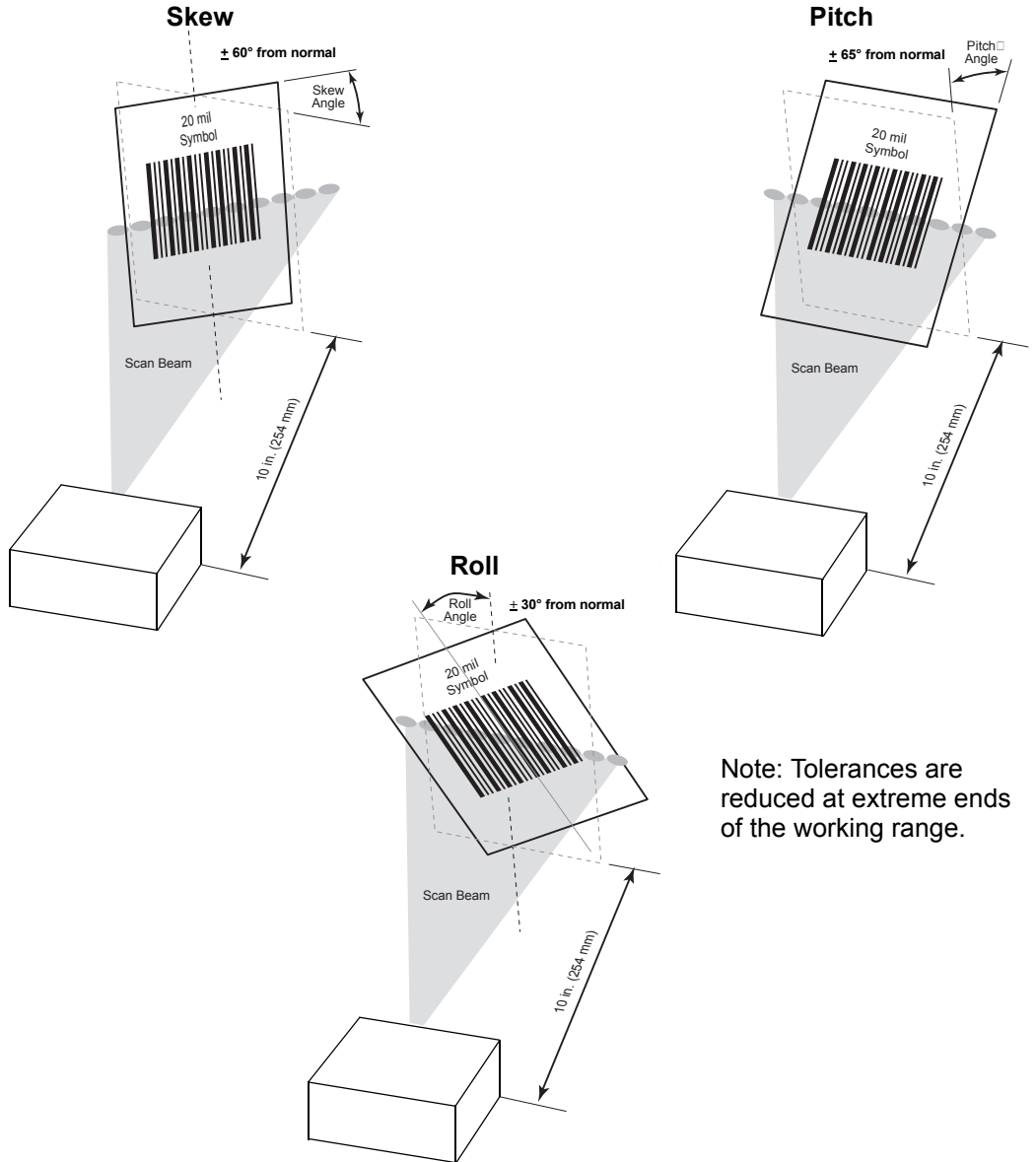


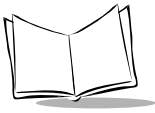
Table 3-2. MS-804FZY Technical Specifications @ 23°C (Continued)

Item	Description
Humidity	95% (non-condensing)
Height	1.02 in. (2.59 cm) maximum
Width	1.93 in. (4.90 cm) maximum
Depth	2.31 in. (5.87 cm) maximum
Weight	1.67 oz. (47.34 g)



Note: Tolerances are reduced at extreme ends of the working range.

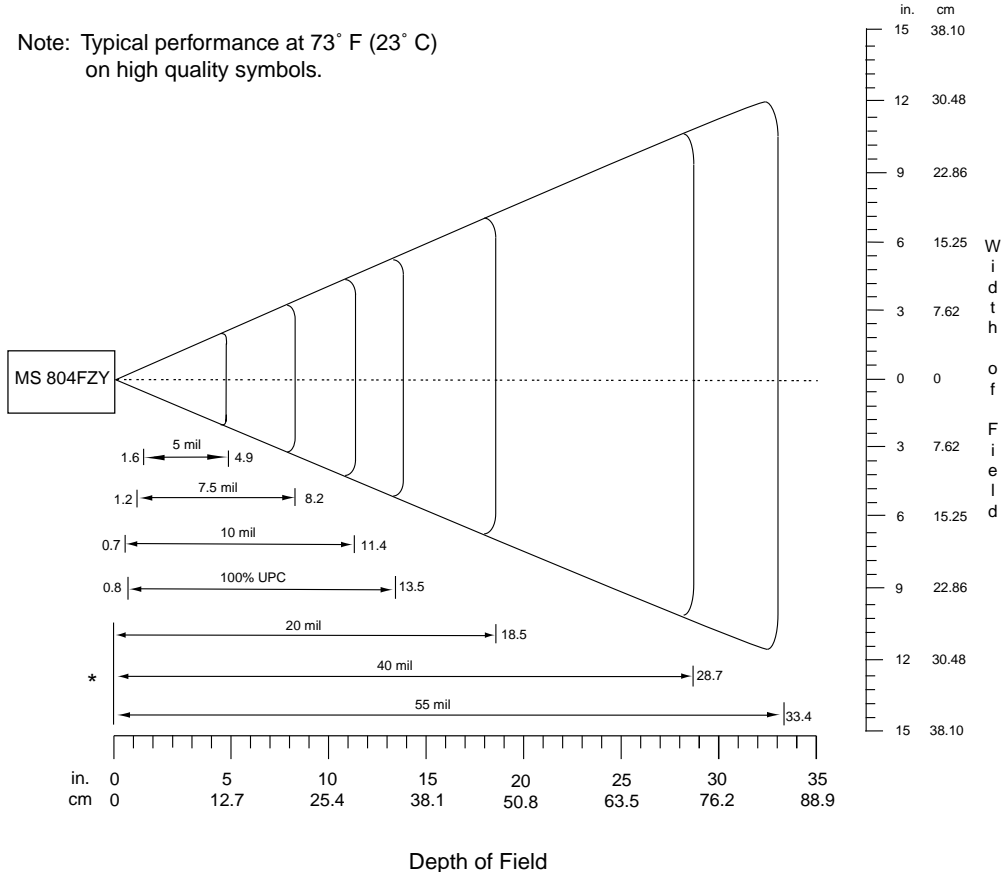
Figure 3-2. Skew, Pitch and Roll



MS-804FZY Decode Zone

The decode zone for the MS-804FZY scanner is shown in Figure 3-3. The figures shown are typical values. Table 3-3 lists the typical and guaranteed distances for selected bar code densities. The minimum element width (or “symbol density”) is the width in mils of the narrowest element (bar or space) in the symbol. To calculate this distance, see [Calculating The Usable Scan Length Method](#) on page 2-10.

Note: Typical performance at 73° F (23° C)
on high quality symbols.

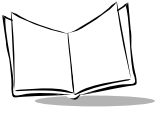


*Minimum distance determined by symbol length and scan angle

Figure 3-3. MS 804FZY Decode Zone

Table 3-3. MS 804FZY Decode Distances

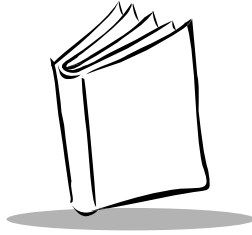
Symbol Density/ Symbol p/n / Bar Code Type/ W-N Ratio	Bar Code Content/ Contrast ¹	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
5 mil 64-17453-01 Code 39; 2.5:1	ABCDEFGH 90% MRD	1.6 in. 4.06 cm	4.9 in. 12.45 cm	2.5 in. 6.35 cm	4.0 in. 10.16 cm
7.5 mil 64-17452-01 Code 39; 2.5:1	ABCDEF 90% MRD	1.2 in. 3.05 cm	8.2 in. 20.83 cm	2.0 in. 5.08 cm	6.5 in. 16.51 cm
10 mil Code 39; 1:2.5	ABCDE 90% MRD	0.7 in. 1.78 cm	11.4 in. 28.96 cm	1.25 in. 3.18 cm	8.7 in. 22.10 cm
13 mil 64-05303-01 100% UPC	12345678905 90% MRD	0.8 in. 2.03 cm	13.5 in. 34.29 cm	1.5 in. 3.81 cm	11.0 in. 27.94 cm
20 mil 60-01429-01 Code 39; 2.2:1	123 90% MRD	Note 2	18.5 in. 46.99 cm	Note 2	14.0 in. 35.56 cm
40 mil 64-17457-01 Code 39; 2.2:1	AB 90% MRD	Note 2	28.7 in. 72.90 cm	Note 2	21.0 in. 53.34 cm
55 mil 64-17458-01 Code 39; 2.2:1	CD 90% MRD	Note 2	33.4 in. 84.84 cm	Note 2	23.0 in. 58.42 cm
Notes: 1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm. 2. Near ranges on lower densities (not specified) largely depend on the width of the bar code and the scan angle. 3. Working range specifications at ambient temperature (23°C), pitch=15°, roll=0°, skew=0°, photographic quality, ambient light<200 ft-c.					



Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge accuracy. Consider the width of the scan line at any given distance when designing a system.

[Calculating The Usable Scan Length Method](#) on page 2-10 describes how to calculate the usable scan length. The scan angle is provided in [Table 3-3](#).

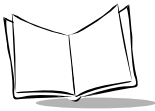


Chapter 4

MS-904HS Specifications

Overview

This chapter provides the technical specifications for the MS-904HS (High Performance) scanners.



MS-904HS Electrical Interface

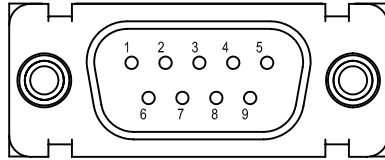


Figure 4-1. MiniScan Connector

Table 4-1 lists the pin functions of the MS-904HS interface.

Table 4-1. MS-904HS Electrical Interface

Pin No.	Pin Name	Type*	Function
1	Trigger	I	Signals scanner to begin scanning session.
2	TXD	O	Serial data transmit output. Drives the serial data receive input on the device communicating with the scanner.
3	RXD	I	Serial data receive input. Driven by the serial data transmit output on the device communicating with the scanner.
4	Not used		
5	Ground		Power supply ground input and signal ground reference.
6	Power	I	5.0 VDC \pm 10%
7	CTS	I	Clear-to-send handshaking input line, used only in conjunction with the RTS line. Optionally used by another device to signal the scanner to begin transmitting data.
8	RTS	O	Request-to-send handshaking output line, used only in conjunction with the CTS line. Optionally used by the scanner to signal another device that data is available to send.
9	Beeper/ Download	I/O	During normal operation this signal functions as an external beeper drive line. This signal can sink 50 mA of current to drive an external beeper, and is normally pulled up. This signal is also used to begin Flash Download operation when grounded externally during power up.

*I = Input O = Output

MS-904HS Technical Specifications

Table 4-2. MS-904HS Technical Specifications @ 23°C

Item	Description
Power Requirements	
Input Voltage	5.0 VDC \pm 10%
Scanning Current	130 mA \pm 30 mA typical
Idle Current	70 mA \pm 10 mA typical
Standby Current	20 mA \pm 5 mA typical
V_{cc} Noise Level	100 mV peak-to-peak max.
Scan Rate	186 (\pm 13) scans/sec (bidirectional)
Laser Power	0.8 mW \pm 0.1 mW, λ = 650 nm nominal
Print Contrast (minimum)	25% absolute dark/light reflectance measured at 650 nm
Scan Angle	37° (typical)
Skew Tolerance	\pm 45° from normal (see Figure 4-2 on page 4-5)
Pitch Angle	\pm 60° from normal (see Figure 4-2 on page 4-5)
Roll	\pm 30° from vertical (see Figure 4-2 on page 4-5)
Ambient Light Immunity	
Sunlight	8,000 ft. candles (86,112 lux)
Artificial Light	450 ft. candles (4,844 lux)
Drop	Multiple 30" drops
Vibration	Withstands a sinusoidal vibration of 4 G along each of the mutually perpendicular axes for a period of 1 hr per axis over a frequency range of 20Hz to 1600 Hz.
ESD	\pm 15kV air discharge \pm 8kV indirect discharge
Laser Class	CDRH Class II, IEC Class 2
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
Note: Environmental and/or Tolerance Parameters are not cumulative.	

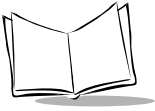
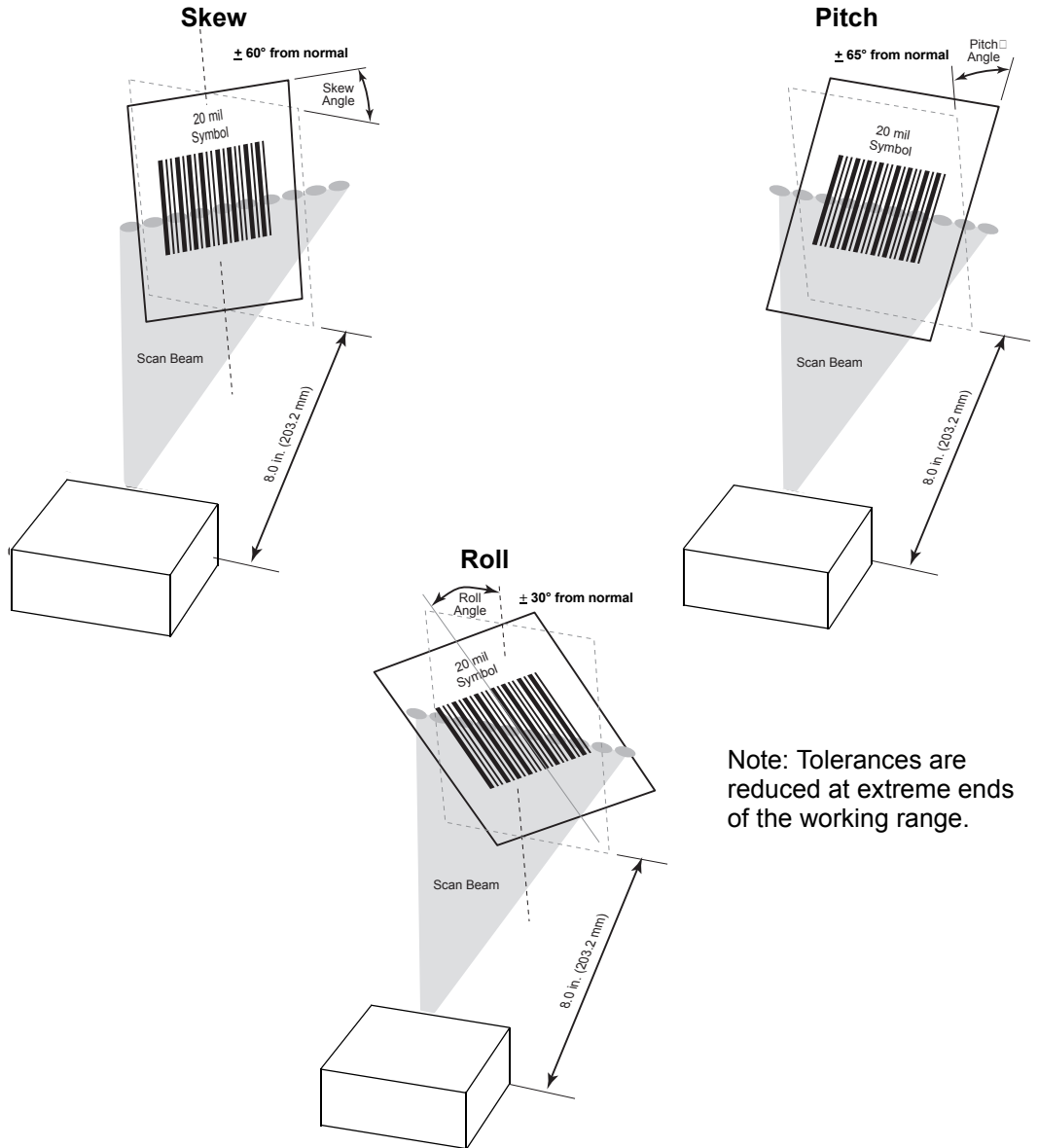


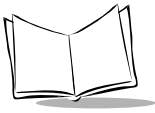
Table 4-2. MS-904HS Technical Specifications @ 23°C (Continued)

Item	Description
Height	1.02 in. (2.59 cm) maximum
Width	1.93 in. (4.90 cm) maximum
Depth	2.31 in. (5.87 cm) maximum
Weight	1.70 oz. (48.20 g)
Note: Environmental and/or Tolerance Parameters are not cumulative.	



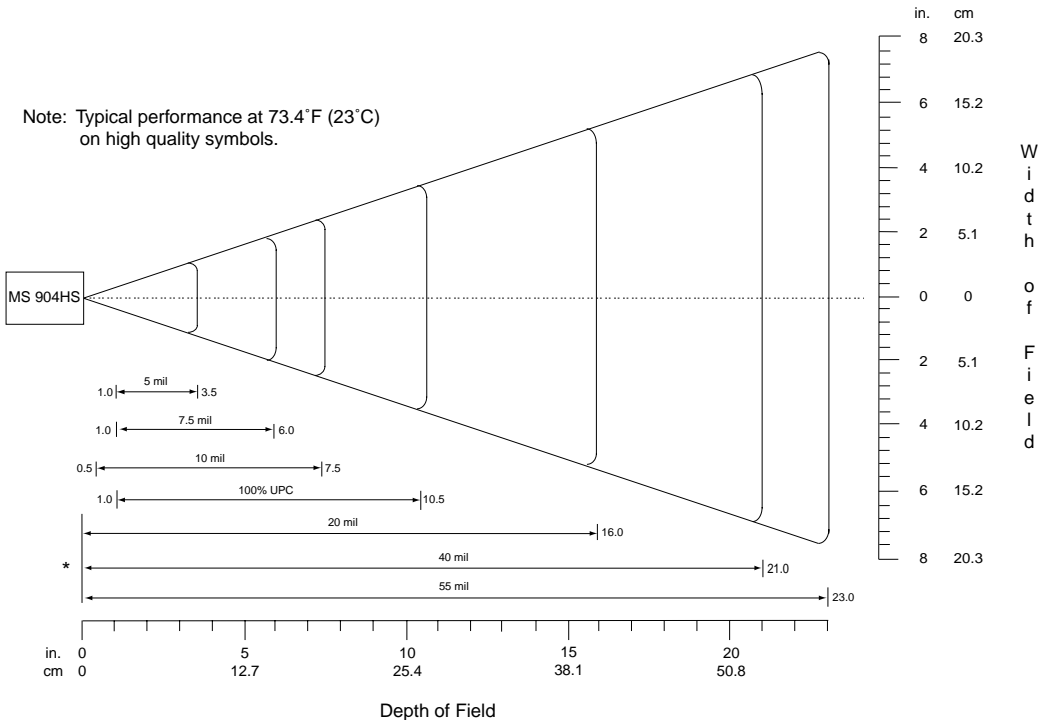
Note: Tolerances are reduced at extreme ends of the working range.

Figure 4-2. MS-904HS Skew, Pitch and Roll



MS-904HS Decode Zone

The figures shown are typical values. [Table 4-3 on page 4-7](#) lists the typical and guaranteed distances for selected bar code densities. The minimum element width (or “symbol density”) is the width in mils of the narrowest element (bar or space) in the symbol. The maximum usable length of a symbol at any given range is shown below. To calculate this distance, see [Calculating The Usable Scan Length Method](#) on page 2-10.



*Minimum distance determined by symbol length and scan angle

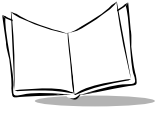
Figure 4-3. MS-904HS Decode Zone (Typical)

Table 4-3. MS-904HS Decode Distances

Symbol Density/ Symbol p/n / Bar Code Type/ W-N Ratio	Bar Code Content/ Contrast ¹	Typical Working Ranges		Guaranteed Working Ranges	
		Near	Far	Near	Far
5 mil 64-17453-01 Code 39; 1:2.5	ABCDEFGH 90% MRD	1.0 in. 2.54 cm	3.5 in. 8.89 cm	1.5 in. 3.81 cm	2.5 in. 6.35 cm
7.5 mil 64-17452-01 Code 39; 1:2.5	ABCDEF 90% MRD	1.0 in. 2.54 cm	6.0 in. 15.24 cm	1.5 in. 3.81 cm	5.0 in. 12.7 cm
10 mil Code 39; 1:2.2	FGH 90% MRD Note 4	0.5 in. 1.27 cm	7.5 in. 19.05 cm	1.1 in. 2.79 cm	6.0 in. 15.24 cm
13 mil 64-05303-01 100% UPC	12345678905 90% MRD	1.0 in. 2.54 cm	10.5 in. 26.67 cm	1.5 in. 3.81 cm	9.0 in. 22.86 cm
20 mil 60-01429-01 Code 39; 1:2.2	123 90% MRD Note 4	Note 2	16.0 in. 40.64 cm	Note 2	14.0 in. 35.56 cm
40 mil 64-17457-01 Code 39; 1:2.2	AB 90% MRD Note 4	Note 2	21.0 in. 53.34 cm	Note 2	16.5 in. 41.91 cm
55 mil 64-17458-01 Code 39; 1:3	CD 90% MRD Note 4	Note 2	23.0 in. 58.42 cm	Note 2	17.5 in. 44.45 cm

Notes:

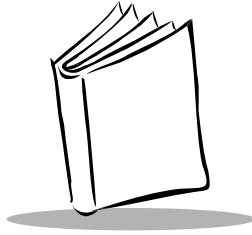
1. CONTRAST measured as Mean Reflective Difference (MRD) at 650 nm.
2. Near ranges on lower densities (not specified) largely depend on the width of the bar code and the scan angle.
3. Working range specifications at ambient temperature (23°C), pitch=15°, roll=0°, skew=0°, photographic quality, ambient light<200 ft-c.
4. The MS-904HS does not decode 1 to 4 digit Code 39 bar codes by default. To test this specification, enable Code 39 Length 2 bar codes (see [Set Lengths for Code 39](#) on page 7-53).



Usable Scan Length

The decode zone is a function of various symbol characteristics including density, print contrast, wide-to-narrow ratio, and edge accuracy. Consider the width of the scan line at any given distance when designing a system.

[Calculating The Usable Scan Length Method](#) on page 2-10 describes how to calculate the usable scan length. The scan angle is provided in [Table 4-3](#).



Chapter 5 Scanning

Overview

This chapter provides information on scanning and the various triggering options.

Scanning Tips

When scanning, make sure the symbol to be scanned is within the scanning range. See [Calculating The Usable Scan Length Method](#) on page 2-10. Align the bar code with the scan beam. The green decode LED lights to indicate a successful decode.

Scan the Entire Symbol

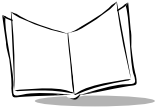
- The scan beam must cross every bar and space on the symbol.
- The larger the symbol, the farther away the scanner should be positioned.
- Position the scanner closer for symbols with bars that are close together.

RIGHT



WRONG





Position at an Angle

Do not position the scanner exactly perpendicular to the bar code. In this position, light can bounce back into the scanner's exit window and prevent a successful decode.

Triggering Options

Level Trigger (Default)

The laser is enabled and decode processing begins when the trigger line is activated. Decode processing continues until a good decode occurs, the trigger is released, or the Laser-On time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the trigger line is released and then reactivated.



Level

Continuous

The laser is enabled continuously and decode processing is continuously active. The scanner can be configured to scan and transmit a bar code, and then not decode the same bar code or any bar code for a set period of time. See [Timeout Between Decodes](#) on page 7-16 to customize the application to the rate at which bar codes are presented.



Continuous

Note: *This option is not recommended during scanner programming via bar code menus.*

Pulse Trigger

The laser is enabled and decode processing begins when the trigger line is activated. Decode processing continues regardless of the trigger line until a good decode occurs, or until the Laser On Time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the trigger line is released and then reactivated.



Pulse

Blinking

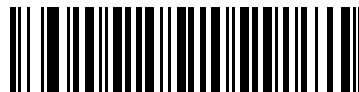
The laser blinks at a 25% duty cycle (reduced to 10% after 30 seconds of inactivity), until a bar code is presented. When a bar code is presented, the laser remains on until either the bar code is decoded or removed, or the session timeout expires. Once the bar code is decoded, the scanner will not decode it again until the bar code is removed.



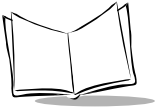
Blinking

Host Trigger

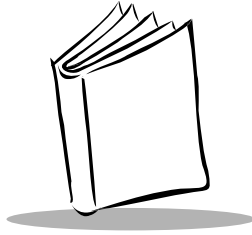
The laser is enabled and decode processing begins in response to an SSI Start Decode message from the host. Decode processing continues until a good decode occurs, an SSI Stop Decode message is received, or the Laser On Time expires. The laser is disabled once decode processing is complete. The next decode attempt will not occur until the next Start Decode message is received.



Host



MS-804FZY and MS-904HS Integration Guide



Chapter 6

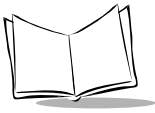
Maintenance and Troubleshooting

Overview

The chapter provides information on maintenance and troubleshooting.

Maintenance

Cleaning the exit window is the only maintenance required. Do not allow any abrasive material to touch the window. Clean the scan window with a damp cloth and, if necessary, a non-ammonia based detergent.



Troubleshooting

Problem	Possible Cause	Possible Solutions
No red LED or nothing happens during a scan attempt.	No power to the scanner.	Check the system power. Confirm that the correct host interface cable is used.
		Connect the power supply.
		Re-connect loose cables.
Scanner cannot read the bar code.	Interface/power cables are loose.	Re-connect loose cables.
	Scanner is not programmed for the correct bar code type.	Make sure the scanner is programmed to read the type of bar code to be scanned. Try scanning other bar code(s) and other bar code types.
	Incorrect communication parameters.	Set the correct communication parameters (baud rate, parity, stop bits, etc.)
	Bar code symbol is unreadable.	Check the symbol to make sure it is not defaced. Try scanning similar symbols of the same code type.
	Inappropriately hot environment.	Remove the scanner from the hot environment, and allow it to cool down.
Laser activates, followed by a beep sequence.	Beeper is configured.	Refer to beeper indications for beeper indication descriptions.

Note: If after performing these checks the symbol still does not scan, contact the distributor or call the [Symbol Support Center](#) at the telephone number listed on [page xi](#).



Chapter 7

Parameter Menus

This chapter describes the programmable parameters, and provides bar codes for programming and hexadecimal equivalents for host download programming.

Throughout the programming bar code menus, default values are indicated with asterisks (*).



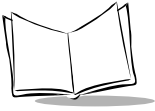
Operational Parameters

The MS-804FZY and MS-904HS are shipped with the default settings shown in [Table 7-1 on page 7-3](#). These default values are stored in non-volatile memory and are preserved even when the scanner is powered down.

There are two ways to change the default values:

- Scan the appropriate bar codes in this chapter. These new values replace the standard default values in memory. To recall the default parameter values, scan the [Set All Defaults](#) bar code on page 7-9.

or



- Download data through the scanner's serial port using Symbol's Simple Serial Interface (SSI). Hexadecimal parameter numbers are shown in this chapter below the parameter title, and options are shown in parenthesis beneath the accompanying bar codes. See the *Simple Serial Interface (SSI) Programmer's Guide* for detailed instructions for changing parameters using this method.

Default Table

[Table 7-1](#) lists the defaults for all parameters, and the page number each parameter appears on. To change any option, scan the appropriate bar code(s).

Table 7-1. Default Table

Parameter	Parameter Number	Default	Page Number
Set Default Parameter		All Defaults	7-9
Scanning Options			
Beeper Tone	91h	High Frequency	7-10
Beeper Frequency Adjustment (MS-804FZY only)	F07 91h	2500 Hz	7-11
Laser On Time	88h	3.0 sec	7-12
Power Mode	80h	Low Power	7-13
Trigger Mode	8Ah	Level	7-14
Aiming Mode	F0h 7Eh	Disabled	7-15
Time-out Between Same Symbol	89h	1.0 sec	7-16
Time-out Between Different Symbols	90h	0.0 sec	7-16
Beep After Good Decode	38h	Enable	7-18
Transmit "No Decode" Message	5Eh	Disable	7-19
Parameter Scanning	ECh	Enable	7-20
Linear Code Type Security Level	4Eh	1	7-21
Bi-directional Redundancy	43h	Disable	7-23
UPC/EAN			
UPC-A	01h	Enable	7-24
UPC-E	02h	Enable	7-24
UPC-E1	0Ch	Disable	7-26
EAN-8	04h	Enable	7-27

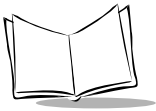


Table 7-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
EAN-13	03h	Enable	7-28
Bookland EAN	53h	Disable	7-29
Decode UPC/EAN Supplementals	10h	Ignore	7-30
Decode UPC/EAN Supplemental Redundancy	50h	7	7-32
Transmit UPC-A Check Digit	28h	Enable	7-33
Transmit UPC-E Check Digit	29h	Enable	7-34
Transmit UPC-E1 Check Digit	2Ah	Enable	7-35
UPC-A Preamble	22h	System Character	7-36
UPC-E Preamble	23h	System Character	7-37
UPC-E1 Preamble	24h	System Character	7-38
Convert UPC-E to A	25h	Disable	7-39
Convert UPC-E1 to A	26h	Disable	7-40
EAN-8 Zero Extend	27h	Disable	7-41
UPC/EAN Security Level	4Dh	0	7-42
Linear UPC/EAN Decode	44h	Disable	7-44
UPC Half Block Stitching	4Ah	Disable	7-45
Code 128			
Code 128	08h	Enable	7-46
UCC/EAN-128	0Eh	Enable	7-47
ISBT 128	54h	Disable	7-48

Table 7-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Code 39			
Code 39	00h	Enable	7-49
Trioptic Code 39	0Dh	Disable	7-50
Convert Code 39 to Code 32	56h	Disable	7-51
Code 32 Prefix	E7h	Disable	7-52
Set Length(s) for Code 39	12h 13h	MS-804FZY: Length within Range: 02-55 MS-904HS: Length within Range: 04-37	7-53
Code 39 Check Digit Verification	30h	Disable	7-55
Transmit Code 39 Check Digit	2Bh	Disable	7-56
Code 39 Full ASCII Conversion	11h	Disable	7-57
Code 93			
Code 93	09h	Disable	7-58
Set Length(s) for Code 93	1Ah 1Bh	Length within Range: 04-55	7-59
Interleaved 2 of 5			
Interleaved 2 of 5	06h	Disable	7-61
Set Length(s) for I 2 of 5	16h 17h	1 Discrete Length: 14	7-62
I 2 of 5 Check Digit Verification	31h	Disable	7-64
Transmit I 2 of 5 Check Digit	2Ch	Disable	7-65

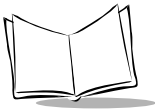


Table 7-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
Convert I 2 of 5 to EAN 13	52h	Disable	7-66
Discrete 2 of 5			
Discrete 2 of 5	05h	Disable	7-67
Set Length(s) for D 2 of 5	14h 15h	1 Discrete Length: 12	7-68
Codabar			
Codabar	07h	Disable	7-70
Set Lengths for Codabar	18h 19h	Length within Range: 05-55	7-71
CLSI Editing	36h	Disable	7-73
NOTIS Editing	37h	Disable	7-74
MSI Plessey			
MSI Plessey	0Bh	Disable	7-75
Set Length(s) for MSI Plessey	1Eh 1Fh	MS-804FZY: Length Within Range: 06 - 55 MS-904HS: Length Within Range: 05 - 55	7-76
MSI Plessey Check Digits	32h	One	7-78
Transmit MSI Plessey Check Digit	2Eh	Disable	7-79
MSI Plessey Check Digit Algorithm	33h	Mod 10/Mod 10	7-80

Table 7-1. Default Table (Continued)

Parameter	Parameter Number	Default	Page Number
RSS (MS-804FZY Only)			
RSS-14	0xF0 0x52	Disable	7-81
RSS-Limited	0xF0 0x53	Disable	7-82
RSS-Expanded	0xF0 0x54	Disable	7-83
Data Options			
Transmit Code ID Character	2Dh	None	7-84
Prefix/Suffix Values Prefix Suffix 1 Suffix 2	69h 68h 6Ah	NULL LF CR	7-86
Scan Data Transmission Format	EBh	Data as is	7-88
Simple Serial Interface (SSI) Options			
Baud Rate	9Ch	9600	7-90
Parity	9Eh	None	7-92
Check Parity	97h	Enable	7-94
Software Handshaking	9Fh	Enable	7-95
Decode Data Packet Format	EEh	Unpacketed	7-97
Stop Bit Select	9Dh	1	7-98
Intercharacter Delay	6Eh	0	7-99
Host Serial Response Time-out	9Bh	2 sec	7-99

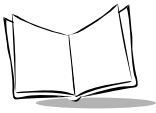


Table 7-1. Default Table (Continued)

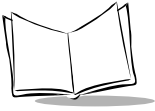
Parameter	Parameter Number	Default	Page Number
Host Character Time-out	EFh	200 msec	7-100
Event Reporting			
Decode Event	F0h 00h	Disable	7-102
Boot Up Event	F0h 02h	Disable	7-103
Parameter Event	F0h 03h	Disable	7-104

Set Default Parameter

Scan this bar code to return all parameters to the values listed in [Table 7-1 on page 7-3](#).



Set All Defaults

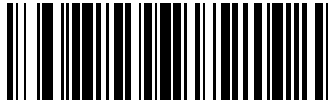


Scanning Options

Beeper Tone

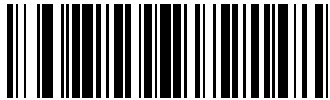
Parameter # 91h

To select a decode beep frequency (tone), scan the appropriate bar code.



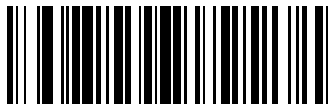
Low Frequency

(02h)



Medium Frequency

(01h)



***High Frequency**

(00h)

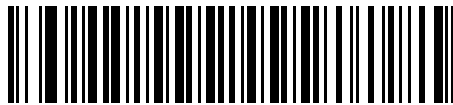
Beeper Frequency Adjustment (MS-804FZY Only)

Parameter # F0h 91H

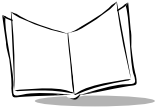
This parameter adjusts the frequency of the high beeper tone from the nominal 2500 Hz to another frequency matching the resonances of the installation. It is programmable in 10 Hz increments from 1220 Hz to 3770 Hz.

To increase the frequency, scan the bar code below, then scan three numeric bar codes beginning on [page 7-105](#) that correspond to the desired frequency adjustment divided by 10. For example, to set the frequency to 3000 Hz (an increase of 500 Hz), scan numeric bar codes 0, 5, 0, corresponding to 50, or (500/10).

To decrease the frequency, scan the bar code below, then scan three numeric bar codes beginning on [page 7-105](#) that correspond to the value (256 - desired adjustment/10). For example, to set the frequency to 2000 Hz (a decrease of 500 Hz), scan numeric bar codes 2, 0, 6, corresponding to 206, or (256 - 500/10).



Beeper Frequency Adjustment



Laser On Time

Parameter # 88h

This parameter sets the maximum time decode processing continues during a scan attempt. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds.

To set a Laser On Time, scan the bar code below. Next scan two numeric bar codes beginning on [page 7-105](#) that correspond to the desired on time. Times less than 1.0 second must have a leading zero. For example, to set an on time of 0.5 seconds, scan the bar code below, then scan the *0* and *5* bar codes. To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Laser On Time

Power Mode

Parameter # 80h

This parameter determines whether or not power remains on after a decode attempt. In Low Power mode, the scanner enters into a low power consumption mode when possible, provided all WAKEUP signals are released. In Continuous On mode, power remains on after each decode attempt.



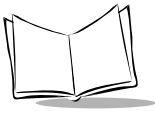
Continuous On

(00h)



***Low Power**

(01h)



Triggering Modes

Parameter # 8Ah

- **Level** - A trigger pull activates the laser and decode processing. The laser remains on and decode processing continues until a trigger release, a valid decode, or the Laser On Time-out is reached.
- **Pulse** - A trigger pull activates the laser and decode processing. The laser remains on and decode processing continues until a valid decode or the Laser On Time-out is reached.
- **Continuous** - The laser is always on and decoding.
- **Blinking** - This trigger mode is used for triggerless ScanStand operation. Scanning range is reduced in this mode. This mode cannot be used with scanners that support an aim mode.
- **Host** - A host command issues the triggering signal. The scanner interprets an actual trigger pull as a Level triggering option.



*Level
(00h)



Pulse
(02h)



Continuous
(04h)



Blinking
(07h)



Host
(08h)

Aiming Mode

Parameter # F0h 7Eh

For handheld mode only, select an aiming dot to appear for a normal or extended period of time.



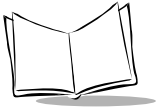
***No Aiming Dot
(00h)**



**Aiming Dot
Normal (200 ms) Timeout
(01h)**



**Aiming Dot
Extended (400 ms) Timeout
(02h)**



Timeout Between Decodes

Timeout Between Decodes, Same Symbol

Parameter # 89h

When in Continuous triggering mode, this parameter sets the minimum duration of not decoding data before the scanner decodes a second bar code identical to one just decoded. This reduces the risk of accidentally scanning the same symbol twice. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The recommended interval is 0.6 seconds.

Timeout Between Decodes, Different Symbol

Parameter # 90h

This option sets the minimum duration of not decoding data before the scanner decodes a second (different) bar code. This is used in continuous-on mode to prevent the beeper from beeping when a different symbol appears in the scanner's field of view before the timeout period between decodes expires. This is programmable in 0.1 second increments from 0.0 to 9.9 seconds. The recommended value is 0.0 seconds.

Select the timeouts between decodes for the same or different symbols.

1. Scan the option bar code you wish to set.
2. Scan two numeric bar codes beginning on [page 7-105](#) which correspond to the desired interval, in 0.1 second increments.

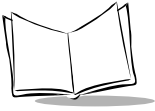
To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



**Timeout Between Decodes -
The Same Symbol**



**Timeout Between Decodes -
Different Symbols**



Beep After Good Decode

Parameter # 38h

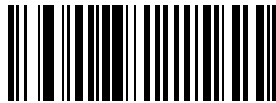
Scan this symbol to set the scanner to beep after a good decode.



***Beep After Good Decode**

(01h)

Scan this symbol to set the scanner not to beep after a good decode. The beeper still operates during parameter menu scanning and indicates error conditions.



Do Not Beep After Good Decode

(00h)

Transmit “No Read” Message

Parameter # 5Eh

Enable this option to transmit “NR” if a symbol does not decode. Any enabled prefix or suffixes are appended around this message.



Enable No Read

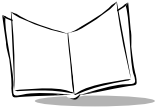
(01h)

When the parameter is disabled, and a symbol can not be decoded, no message is sent to the host.



***Disable No Read**

(00h)



Parameter Scanning

Parameter # ECh

To disable the decoding of parameter bar codes, scan the bar code below. The **Set Defaults** parameter bar code can still be decoded. To enable decoding of parameter bar codes, either scan **Enable Parameter Scanning*, *Set All Defaults* or set this parameter to 01h via a serial command.



***Enable Parameter Scanning**

(01h)



Disable Parameter Scanning

(00h)

Linear Code Type Security Level

Parameter # 4Eh

Note: Does not apply to Code 128.

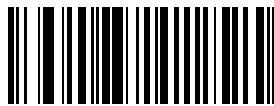
The MS-804FZY and MS-904HS offer four levels of decode security for linear code types (e.g., Code 39, Interleaved 2 of 5). Select higher security levels for decreasing levels of bar code quality. As security levels increase, the scanner's aggressiveness decreases.

Select the security level appropriate for your bar code quality.

Linear Security Level 1

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

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



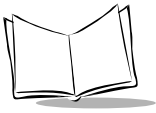
***Linear Security Level 1
(01h)**

Linear Security Level 2

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



***Linear Security Level 2
(02h)**



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:

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

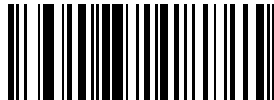


Linear Security Level 3

(03h)

Linear Security Level 4

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



Linear Security Level 4

(04h)

Bi-directional Redundancy

Parameter # 43h

This parameter is only valid when a [Linear Code Type Security Level](#) is enabled (see [page 7-21](#)). When this parameter is enabled, a bar code must be successfully scanned in both directions (forward and reverse) before being decoded.



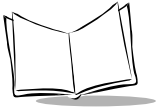
Enable Bi-directional Redundancy

(01h)



***Disable Bi-directional Redundancy**

(00h)



UPC/EAN

Enable/Disable UPC-A

Parameter # 01h

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



***Enable UPC-A**

(01h)



Disable UPC-A

(00h)

Enable/Disable UPC-E

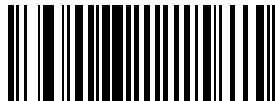
Parameter # 02h

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



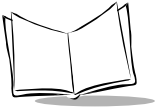
***Enable UPC-E**

(01h)



Disable UPC-E

(00h)



Enable/Disable UPC-E1

Parameter # 0Ch

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



Enable UPC-E1

(01h)



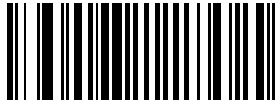
***Disable UPC-E1**

(00h)

Enable/Disable EAN-8

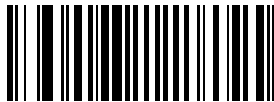
Parameter # 04h

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



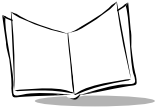
***Enable EAN-8**

(01h)



Disable EAN-8

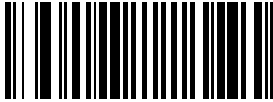
(00h)



Enable/Disable EAN-13

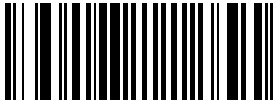
Parameter # 03h

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



***Enable EAN-13**

(01h)



Disable EAN-13

(00h)

Enable/Disable Bookland EAN

Parameter # 53h

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



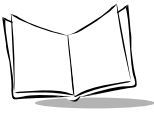
Enable Bookland EAN

(01h)



***Disable Bookland EAN**

(00h)



Decode UPC/EAN Supplementals

Parameter # 10h

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, the scanner does not decode UPC/EAN symbols without supplemental characters.
- If **UPC/EAN without supplemental characters** is selected, and the MS-804FZY/MS-904HS is presented with a UPC/EAN plus supplemental symbol, the scanner decodes the UPC/EAN and ignores the supplemental characters.
- If **autodiscriminate** is selected, scan [Decode UPC/EAN Supplemental Redundancy](#) on [page 7-32](#), then select a value from the numeric bar codes beginning on [page 7-105](#). A value of 5 or more is recommended.
- If **Enable 378/379 Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '378' or '379' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.
- If **Enable 978 Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '978' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.
- If **Enable Smart Supplemental Mode** is selected, the scanner identifies supplementals for EAN-13 bar codes starting with a '378', '379', or '978' prefix only. All other UPC/EAN bar codes are decoded immediately and the supplemental characters ignored.

Note: *To minimize the risk of invalid data transmission, we recommend selecting whether to read or ignore supplemental characters.*

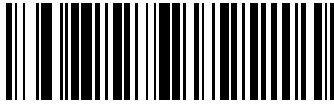
Select the desired option by scanning one of the following bar codes.



Decode UPC/EAN With Supplementals

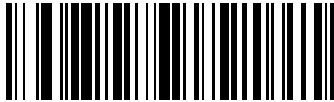
(0x01)

Decode UPC/EAN Supplementals (continued)



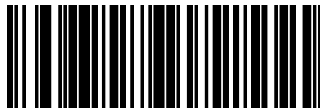
***Ignore UPC/EAN With Supplementals**

(0x00)



Autodiscriminate UPC/EAN Supplementals

(0x02)



Enable 378/379 Supplemental Mode

(0x04)



Enable 978 Supplemental Mode

(0x05)



Enable Smart Supplemental Mode

(0x03)

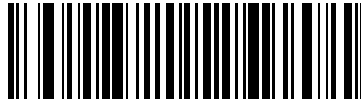


Decode UPC/EAN Supplemental Redundancy

Parameter # 50h

With *Autodiscriminate UPC/EAN Supplementals* selected, this option adjusts the number of times (from 2 to 30) a symbol without supplementals is decoded before transmission. 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 7-105](#). Enter a leading zero for single digit numbers. To change the selection or to cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).

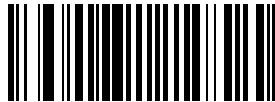


**Decode UPC/EAN
Supplemental Redundancy**

Transmit UPC-A Check Digit

Parameter # 28h

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



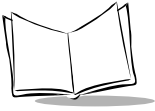
***Transmit UPC-A Check Digit**

(01h)



Do Not Transmit UPC-A Check Digit

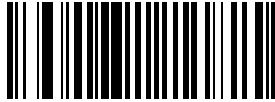
(00h)



Transmit UPC-E Check Digit

Parameter # 29h

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



***Transmit UPC-E Check Digit**

(01h)



Do Not Transmit UPC-E Check Digit

(00h)

Transmit UPC-E1 Check Digit

Parameter # 2Ah

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



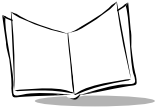
***Transmit UPC-E1 CHECK DIGIT**

(01h)



Do Not Transmit UPC-E1 Check Digit

(00h)



UPC-A Preamble

Parameter # 22h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-A symbol. Select one of the following options for transmitting UPC-A preamble to the host device: transmit system character only, transmit system character and country code ("0" for USA), or transmit no preamble.



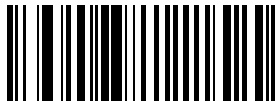
No Preamble
(<DATA>)

(00h)



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

(01h)



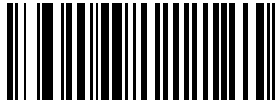
System Character & Country Code
(< COUNTRY CODE> <SYSTEM CHARACTER> <DATA>)

(02h)

UPC-E Preamble

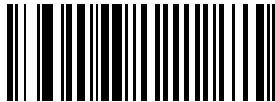
Parameter # 23h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-E symbol. Select one of the following options for transmitting UPC-E preamble to the host device: transmit system character only, transmit system character and country code ("0" for USA), or transmit no preamble.



No Preamble
(<DATA>)

(00h)



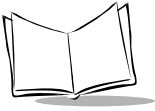
***System Character**
(<SYSTEM CHARACTER> <DATA>)

(01h)



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

(02h)



UPC-E1 Preamble

Parameter # 24h

Preamble characters (Country Code and System Character) can be transmitted as part of a UPC-E1 symbol. Select one of the following options for transmitting UPC-E1 preamble to the host device: transmit system character only, transmit system character and country code ("0" for USA), or transmit no preamble.



No Preamble
(<DATA>)

(00h)



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

(01h)



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

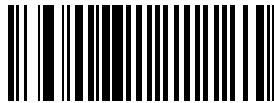
(02h)

Convert UPC-E to UPC-A

Parameter # 25h

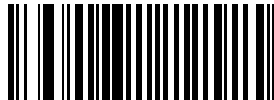
This parameter converts UPC-E (zero suppressed) decoded data to UPC-A format before transmission. After conversion, data follows UPC-A format and is affected by UPC-A programming selections (e.g., Preamble, Check Digit).

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



**Convert UPC-E To UPC-A
(Enable)**

(01h)



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

(00h)



Convert UPC-E1 to UPC-A

Parameter # 26h

Enable this parameter to convert UPC-E1 (zero suppressed) 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).

Scan **DO NOT CONVERT UPC-E TO UPC-A** to transmit UPC-E1 (zero suppressed) decoded data.



**Convert UPC-E1 To UPC-A
(Enable)**

(01h)



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

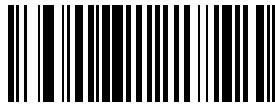
(00h)

EAN Zero Extend

Parameter # 27h

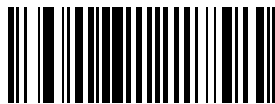
When this parameter is enabled, five leading zeros are added to decoded EAN-8 symbols to make them compatible in format to EAN-13 symbols.

Disable this parameter to transmit EAN-8 symbols as is.



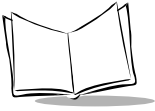
Enable EAN Zero Extend

(01h)



***Disable EAN Zero Extend**

(00h)



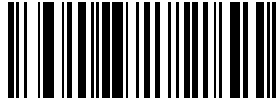
UPC/EAN Security Level

Parameter # 4Dh

The MS-804FZY and MS-904HS offer four levels of decode security for UPC/EAN bar codes. Select higher levels of security for decreasing levels of bar code quality. Increasing security decreases the scanner's aggressiveness, so choose only that level of security necessary for the application.

UPC/EAN Security Level 0

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



***UPC/EAN Security Level 0**

(00h)

UPC/EAN Security Level 1

Select this option if misdecodes occur. This security level eliminates most misdecodes.

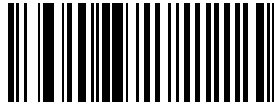


UPC/EAN Security Level 1

(01h)

UPC/EAN Security Level 2

Select this option if Security level 1 fails to eliminate misdecodes.

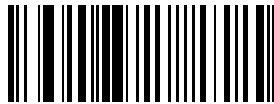


UPC/EAN Security Level 2

(02h)

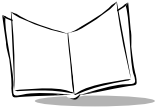
UPC/EAN Security Level 3

If misdecodes still occur after selecting Security Level 2, select this security level. Be advised, selecting this option is an extreme measure against misdecoding severely out of spec bar codes. Selecting this level of security significantly impairs the decoding ability of the scanner. If this level of security is necessary, try to improve the quality of the bar codes.



UPC/EAN Security Level 3

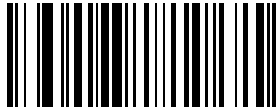
(03h)



Linear UPC/EAN Decode

Parameter # 44h

This option applies to code types containing two adjacent blocks (e.g., UPC-A, EAN-8, EAN-13). When enabled, a bar code is transmitted only when both the left and right blocks are successfully decoded within one laser scan. Enable this option when bar codes are in proximity to each other.



Enable Linear UPC/EAN Decode

(01h)



***Disable Linear UPC/EAN Decode**

(00h)

UPC Half Block Stitching

Parameter # 4Ah

This parameter enables UPC Half Block Stitching.



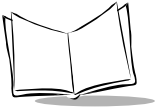
Enable UPC Half Block Stitching

(01h)



***Disable UPC Half Block Stitching**

(00h)

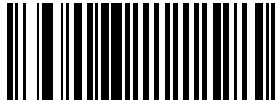


Code 128

Enable/Disable Code 128

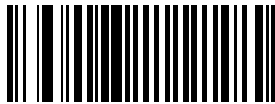
Parameter # 08h

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



***Enable Code 128**

(01h)



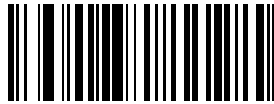
Disable Code 128

(00h)

Enable/Disable UCC/EAN-128

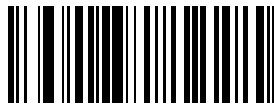
Parameter # 0Eh

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



***Enable UCC/EAN-128**

(01h)



Disable UCC/EAN-128

(00h)



Enable/Disable ISBT 128

Parameter # 54h

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



Enable ISBT 128

(01h)



***Disable ISBT 128**

(00h)

Lengths for Code 128

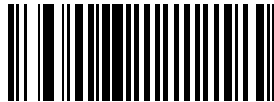
No length setting is required for Code 128.

Code 39

Enable/Disable Code 39

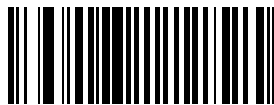
Parameter # 00h

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



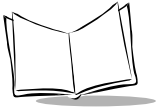
***Enable Code 39**

(01h)



Disable Code 39

(00h)



Enable/Disable Trioptic Code 39

Parameter # 0Dh

Trioptic Code 39 is a variant of Code 39 used in marking computer tape cartridges. Trioptic Code 39 symbols always contain six characters. Do not enable Trioptic Code 39 and Code 39 Full ASCII simultaneously.

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



Enable Trioptic Code 39

(01h)



***Disable Trioptic Code 39**

(00h)

Convert Code 39 to Code 32

Parameter # 56h

Code 32 is a variant of Code 39 used by the Italian pharmaceutical industry. Scan the appropriate bar code below to enable or disable converting Code 39 to Code 32.



**Convert Code 39 To Code 32
(Enable)**

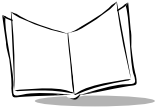
(01h)

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



***Do Not Convert Code 39 To Code 32
(Disable)**

(00h)



Code 32 Prefix

Parameter # E7h

Enable this parameter to add the prefix character “A” to all Code 32 bar codes. [Convert Code 39 to Code 32](#) must be enabled for this parameter to function.



Enable Code 32 Prefix

(01h)



***Disable Code 32 Prefix**

(00h)

Set Lengths for Code 39

Parameter # L1 = 12h, L2 = 13h

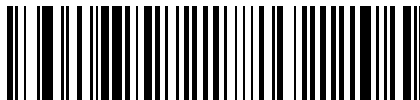
The length of a code refers to the number of characters (i.e., human readable characters), including check digit(s) the code contains. Lengths for Code 39 may be set for any length, one or two discrete lengths, or lengths within a specific range. If Code 39 Full ASCII is enabled, **Length Within a Range**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

One Discrete Length - This option limits decodes to only those Code 39 symbols containing a selected length. Lengths are selected from the numeric bar codes beginning on [page 7-105](#). For example, to decode only Code 39 symbols with 14 characters, scan **Code 39 - One Discrete Length**, then scan **1** followed by **4**. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).

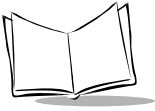


Code 39 - One Discrete Length

Two Discrete Lengths - This option limits decodes to only those Code 39 symbols containing either of two selected lengths. Lengths are selected from the numeric bar codes beginning on [page 7-105](#). For example, to decode only those Code 39 symbols containing either 2 or 14 characters, select **Code 39 - Two Discrete Lengths**, then scan **0**, **2**, **1**, and then **4**. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Code 39 - Two Discrete Lengths



Length Within Range - This option limits decodes to only those Code 39 symbols within a specified range. The range is selected using the numeric bar codes beginning on [page 7-105](#). 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). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Code 39 - Length Within Range

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

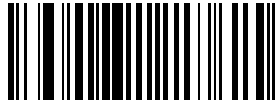


Code 39 - Any Length

Code 39 Check Digit Verification

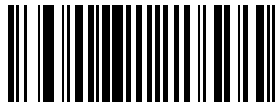
Parameter # 30h

When this feature is enabled, the scanner checks the integrity of all Code 39 symbols to verify that the data complies with specified check digit algorithm. Only those Code 39 symbols which include a modulo 43 check digit are decoded.



Enable Code 39 Check Digit

(01h)



***Disable Code 39 Check Digit**

(00h)



Transmit Code 39 Check Digit

Parameter # 2Bh

Scan this symbol to transmit the check digit with the data.



**Transmit Code 39 Check Digit
(Enable)**

(01h)

Scan this symbol to transmit data without the check digit.



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

(00h)

Enable/Disable Code 39 Full ASCII

Parameter # 11h

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**.

Do not enable Code 39 Full ASCII and Trioptic Code 39 simultaneously.

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



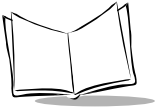
Enable Code 39 Full ASCII

(01h)



***Disable Code 39 Full ASCII**

(00h)



Code 93

Enable/Disable Code 93

Parameter # 09h

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



Enable Code 93

(01h)



***Disable Code 93**

(00h)

Set Lengths for Code 93

Parameter # L1 = 1Ah, L2 = 1Bh

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

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **Code 93 One Discrete Length**, then scan **1, 4**, to limit the decoding to only Code 93 symbols containing 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).

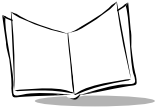


Code 93 - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **Code 93 Two Discrete Lengths**, then scan **0, 2, 1, 4**, to limit the decoding to only Code 93 symbols containing 2 or 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Code 93 - Two Discrete Lengths



Length Within Range - Select this option to decode only those codes 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 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Code 93 - Length Within Range

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



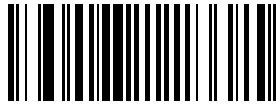
Code 93 - Any Length

Interleaved 2 of 5

Enable/Disable Interleaved 2 of 5

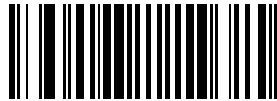
Parameter # 06h

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



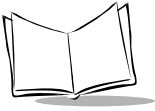
Enable Interleaved 2 Of 5

(01h)



***Disable Interleaved 2 Of 5**

(00h)



Set Lengths for Interleaved 2 of 5

Parameter # L1 = 16h, L2 = 17h

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

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **I 2 of 5 One Discrete Length**, then scan **1, 4**, to decode only I 2 of 5 symbols containing 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



I 2 of 5 - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **I 2 of 5 Two Discrete Lengths**, then scan **0, 2, 1, 4**, to decode only I 2 of 5 symbols containing 2 or 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



I 2 of 5 - Two Discrete Lengths

Length Within Range - Select this option to decode only codes 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 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



I 2 of 5 - Length Within Range

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

Note: *Selecting this option can lead to misdecodes for I 2 of 5 codes.*



I 2 of 5 - Any Length



I 2 of 5 Check Digit Verification

Parameter # 31h

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



***Disable**

(00h)



USS Check Digit

(01h)



OPCC Check Digit

(02h)

Transmit I 2 of 5 Check Digit

Parameter # 2Ch

Scan this symbol to transmit the check digit with the data.



**Transmit I 2 of 5 Check Digit
(Enable)**

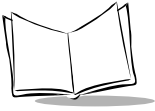
(01h)

Scan this symbol to transmit data without the check digit.



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

(00h)



Convert I 2 of 5 to EAN-13

Parameter # 52h

This parameter converts a 14 character I 2 of 5 code into EAN-13, and transmits to the host as EAN-13. To accomplish this, I 2 of 5 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.



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

(01h)



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

(00h)

Discrete 2 of 5

Enable/Disable Discrete 2 of 5

Parameter # 05h

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



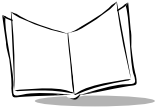
Enable Discrete 2 Of 5

(01h)



***Disable Discrete 2 Of 5**

(00h)



Set Lengths for Discrete 2 of 5

Parameter # L1 = 14h, L2 = 15h

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

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **D 2 of 5 One Discrete Length**, then scan **1, 4**, to decode only D 2 of 5 symbols containing 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



D 2 of 5 - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **D 2 of 5 Two Discrete Lengths**, then scan **0, 2, 1, 4**, to decode only D 2 of 5 symbols containing 2 or 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



D 2 of 5 - Two Discrete Lengths

Length Within Range - Select this option to decode codes 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 be preceded by a leading zero). Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



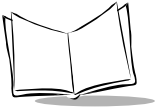
D 2 of 5 - Length Within Range

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

Note: *Selecting this option can lead to misdecodes for D 2 of 5 codes.*



D 2 of 5 - Any Length



Codabar

Enable/Disable Codabar

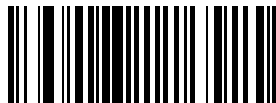
Parameter # 07h

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



Enable Codabar

(01h)



***Disable Codabar**

(00h)

Set Lengths for Codabar

Parameter # L1 = 18h, L2 = 19h

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

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **Codabar One Discrete Length**, then scan **1, 4**, to decode only Codabar symbols containing 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the [Cancel](#) bar code on [page 7-107](#).



Codabar - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **Codabar Two Discrete Lengths**, then scan **0, 2, 1, 4**, to decode only Codabar symbols containing 2 or 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the [Cancel](#) bar code on [page 7-107](#).



Codabar - Two Discrete Lengths



Length Within Range - Select this option to decode a code 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 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Codabar - Length Within Range

Any Length - Scan this option to decode Codabar symbols containing any number of characters.



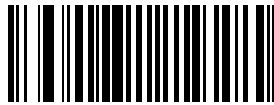
Codabar - Any Length

CLSI Editing

Parameter # 36h

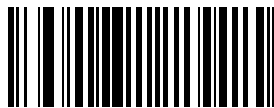
When enabled, this parameter strips the start and stop characters and inserts a space after the first, fifth, and tenth characters of a 14-character Codabar symbol.

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



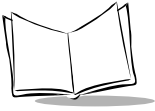
Enable CLSI Editing

(01h)



***Disable CLSI Editing**

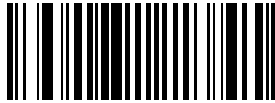
(00h)



NOTIS Editing

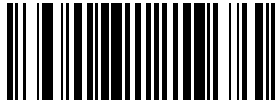
Parameter # 37h

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



Enable NOTIS Editing

(01h)



***Disable NOTIS Editing**

(00h)

MSI Plessey

Enable/Disable MSI Plessey

Parameter # 0Bh

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



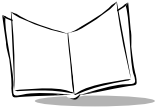
Enable MSI Plessey

(01h)



***Disable MSI Plessey**

(00h)



Set Lengths for MSI Plessey

Parameter # L1 = 1Eh, L2 = 1Fh

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

One Discrete Length - Select this option to decode only those codes containing a selected length. For example, select **MSI Plessey One Discrete Length**, then scan **1, 4**, to decode only MSI Plessey symbols containing 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



MSI Plessey - One Discrete Length

Two Discrete Lengths - Select this option to decode only those codes containing two selected lengths. For example, select **MSI Plessey Two Discrete Lengths**, then scan **0, 2, 1, 4**, to decode only MSI Plessey symbols containing 2 or 14 characters. Numeric bar codes begin on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



MSI Plessey - Two Discrete Lengths

Length Within Range - Select this option to decode codes 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 7-105](#). To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



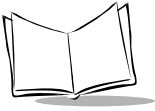
MSI Plessey - Length Within Range

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

Note: *Selecting this option can lead to misdecodes for MSI Plessey codes.*



MSI Plessey - Any Length



MSI Plessey Check Digits

Parameter # 32h

These check digits at the end of the bar code verify the integrity of the data. At least one check digit is required. Check digits are not automatically transmitted with the data.



***One MSI Plessey Check Digit**

(00h)

If two check digits is selected, also select an [MSI Plessey Check Digit Algorithm](#). See [page 7-80](#).



Two MSI Plessey Check Digit

(01h)

Transmit MSI Plessey Check Digit

Parameter # 2Eh

Scan this symbol to transmit the check digit with the data.



**Transmit MSI Plessey Check Digit
(Enable)**

(01h)

Scan this symbol to transmit data without the check digit.



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

(00h)



MSI Plessey Check Digit Algorithm

Parameter # 33h

When the Two MSI Plessey check digits option is selected, an additional verification is required to ensure integrity. Select one of the following algorithms.



***MOD 10/ MOD 11**

(00h)



MOD 10/ MOD 10

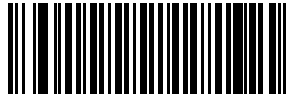
(01h)

RSS Codes (MS-804FZY Only)

RSS-14

Parameter # F0h 52h

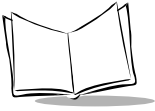
To enable or disable RSS-14, scan the appropriate bar code below.



**Enable RSS-14
(01h)**



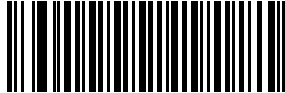
***Disable RSS-14
(00h)**



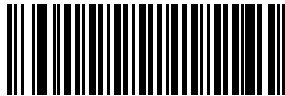
RSS-Limited

Parameter # F0h 53h

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



**Enable RSS-Limited
(01h)**

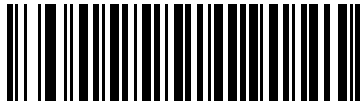


***Disable RSS-Limited
(00h)**

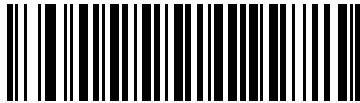
RSS-Expanded

Parameter # F0h 54h

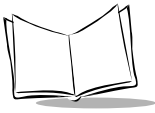
To enable or disable RSS-Expanded, scan the appropriate bar code below.



**Enable RSS-Expanded
(01h)**



***Disable RSS-Expanded
(00h)**



Data Options

Transmit Code ID Character

Parameter # 2Dh

A code ID character identifies the code type of a scanned bar code. This can be useful when decoding more than one code type. The code ID character is inserted between the prefix character (if selected) and the decoded symbol.

Select no code ID character, a Symbol Code ID character, or an AIM Code ID character. The Symbol Code ID characters are listed below.

Table 7-2. Symbol Code ID Characters

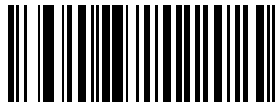
Code Type	Symbol Identifier
UPC-A, UPC-E, UPC-E1, EAN-13, EAN-8	A
Code 39, Code 32	B
Codabar	C
Code 128, ISBT 128	D
Code 93	E
Interleaved 2 of 5	F
Discrete 2 of 5, D 2of 5 IATA	G
Code 11	H
MSI Plessey	J
UCC/EAN 128	K
Bookland EAN	L
Trioptic Code 39	M
Coupon Code	N
RSS (all variants)	R
Composite*	T
Scanlet	W
*Note: UPC/EAN Composite is transmitted in two portions, each with a "T" prefix.	

Transmit Code ID Character (continued)



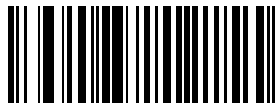
Symbol Code ID Character

(02h)



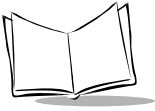
AIM Code ID Character

(01h)



***None**

(00h)



Prefix/Suffix Values

Parameter # P = 69h, S1 = 68h, S2 = 6Ah

A prefix and/or one or two suffixes can be appended to scan data for use in data editing. To set these values, scan a four-digit number (i.e., four bar codes) that corresponds to key codes for various terminals. See [Numeric Bar Codes](#) beginning on [page 7-105](#). To change the selection or cancel an incorrect entry, scan the [Cancel](#) bar code on [page 7-107](#).

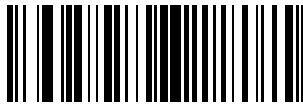
Note: *In order to use Prefix/Suffix values, first set the [Scan Data Transmission Format](#). See [page 7-88](#).*

Prefix/Suffix Values (continued)



Scan Prefix

(07h)



Scan Suffix 1

(06h)



Scan Suffix 2

(08h)



Data Format Cancel



Scan Data Transmission Format

Parameter # EBh

To change the Scan Data Transmission Format, scan one of the following eight bar codes corresponding to the desired format.



***Data As Is**

(00h)



<DATA> <SUFFIX 1>

(01h)



<DATA> <SUFFIX 2>

(02h)



<DATA> <SUFFIX 1> <SUFFIX 2>

(03h)

Scan Data Transmission Format (continued)



<PREFIX> <DATA >

(04h)



<PREFIX> <DATA> <SUFFIX 1>

(05h)



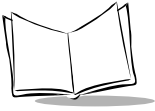
<PREFIX> <DATA> <SUFFIX 2>

(06h)



<PREFIX> <DATA> <SUFFIX 1> <SUFFIX 2>

(07h)

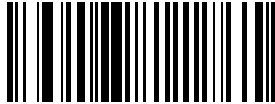


Simple Serial Interface (SSI) Options

Baud Rate

Parameter # 9Ch

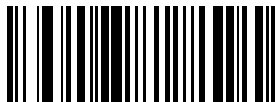
Baud rate is the number of bits of data transmitted per second. The scanner's baud rate setting should match the data rate setting of the host device. If not, data may not reach the host device or may reach it in distorted form.



Baud Rate 300
(01h)



Baud Rate 600
(02h)

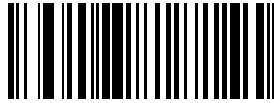


Baud Rate 1200
(03h)



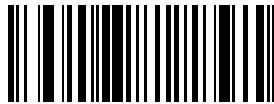
Baud Rate 2400
(04h)

Baud Rate (continued)



Baud Rate 4800

(05h)



***Baud Rate 9600**

(06h)



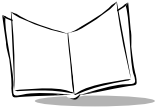
Baud Rate 19,200

(07h)



38,400

(08h)

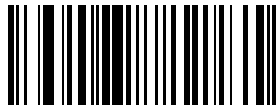


Parity

Parameter # 9Eh

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

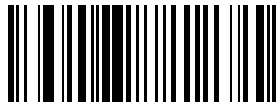
If you select **Odd** parity, the parity bit has a value 0 or 1, based on data, to ensure that an odd number of 1 bits is contained in the coded character.



Odd

(00h)

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

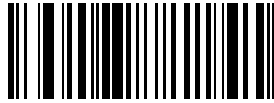


Even

(01h)

Parity (continued)

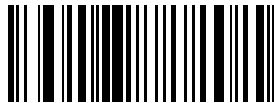
Select **Mark** parity and the parity bit is always 1.



Mark

(02h)

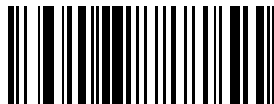
Select **Space** parity and the parity bit is always 0.



Space

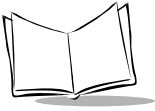
(03h)

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



***None**

(04h)



Check Parity

Parameter # 97h

Select whether or not to check the parity of received characters. Select the type of parity through the *Parity* parameter.



***Check Parity**

(01h)



Do Not Check Parity

(00h)

Software Handshaking

Parameter # 9Fh

This parameter offers control of the data transmission process in addition to that offered by hardware handshaking. Hardware handshaking is always enabled and cannot be disabled by the user.

Disable ACK/NAK Handshaking

When this option is selected, the decoder neither generates nor expects ACK/NAK handshaking packets.



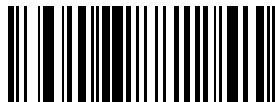
Disable ACK/NAK

(00h)

Enable ACK/NAK Handshaking

When this option is selected, after transmitting data, the scanner expects either an ACK or NAK response from the host. The scanner also ACKs or NAKs messages from the host.

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 resends its data up to two times before discarding the data and declaring a transmit error.



***Enable ACK/NAK**

(01h)



Host RTS Line State

Parameter # 9Ah

This parameter is used to set the idle state of the Serial Host RTS line.

The SSI Interface is intended to be used with host applications which also implement the SSI protocol. However, the scanner can be used in a "scan-and-transmit" mode to communicate with any standard serial communications software on a host PC (see [Decode Data Packet Format](#) on page 7-97). If transmission errors occur in this mode, the host PC may be asserting hardware handshaking lines which interfere with the SSI protocol. Scan the **HOST: RTS HIGH** bar code to address this problem.



***Host: RTS Low**

(00h)



Host: RTS High

(01h)

Decode Data Packet Format

Parameter # EEh

This parameter selects whether decoded data is transmitted in raw format (unpacketed), or transmitted with the packet format as defined by the serial protocol.

If the raw format is chosen, ACK/NAK handshaking is automatically disabled for decode data.



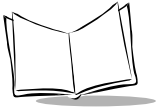
***Send Raw Decode Data**

(00h)



Send Packeted Decode Data

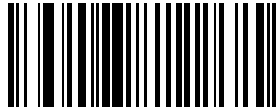
(01h)



Stop Bit Select

Parameter # 9Dh

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



***1 Stop Bit**

(01h)



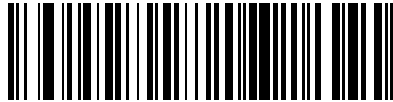
2 Stop Bits

(02h)

Intercharacter Delay

Parameter # 6Eh

The intercharacter delay gives the host system time to service its receiver and perform other tasks between characters. Select the intercharacter delay option matching host requirements. 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 7-105](#) to set the desired time-out. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Intercharacter Delay

Host Serial Response Time-out

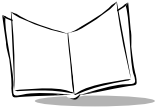
Parameter # 9Bh

This parameter specifies how long the decoder waits for an ACK or NAK before resending. Also, if the decoder wants to send, and the host has already been granted permission to send, the decoder waits for the designated time-out before declaring an error.

The delay period can range from 0.0 to 9.9 seconds in 0.1 second increments. After scanning the bar code below, scan two numeric bar codes beginning on [page 7-105](#). Time durations of less than 1.0 second require a leading zero. To change the selection or cancel an incorrect entry, scan the *Cancel* bar code on [page 7-107](#).



Host Serial Response Time-out



Host Character Time-out

Parameter # EFh

This parameter determines the maximum time the decoder waits between characters transmitted by the host before discarding the received data and declaring an error. The time-out is set in 0.01 second increments from 0.01 seconds to 0.99 seconds. After scanning the bar code below, scan two bar codes beginning on [page 7-105](#) to set the desired time-out. To change the selection or cancel an incorrect entry, scan the [Cancel](#) bar code on [page 7-107](#).



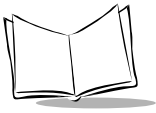
Host Character Time-out

Event Reporting

The host can request the decoder to provide certain information (events) relative to the decoder's behavior. Enable or disable the events listed in [Table 7-3](#) by scanning the appropriate bar codes on the following pages. Parameter number format for these parameters follows those shown in the *Simple Serial Interface (SSI) Programmer's Guide* for parameters numbered 256 or higher.

Table 7-3. Event Codes

Event Class	Event	Code Reported
Decode Event	Non parameter decode	01h
Boot Up Event	System power-up	03h
Parameter Event	Parameter entry error	07h
	Parameter stored	08h
	Defaults set (and parameter event is enabled by default)	0Ah
	Number expected	0Fh



Decode Event

Parameter # F0h 00h

When enabled, the scanner sends a message to the host whenever a bar code is successfully decoded. When disabled, no message is sent.



Enable

(01h)



***Disable**

(00h)

Boot Up Event

Parameter # F0h 02h

When enabled, the sends a message a message to the host whenever power is applied.
When disabled, no message is sent.



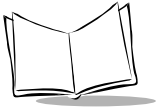
Enable

(01h)



***Disable**

(00h)



Parameter Event

Parameter # F0h 03h

When enabled, the scanner sends a message to the host when one of the events specified in [Table 7-3 on page 7-101](#) occurs. When disabled, no message is sent.



Enable

(01h)



***Disable**

(00h)

Numeric Bar Codes

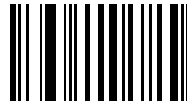
For parameters requiring specific numeric values, scan the appropriately numbered bar code(s).



0



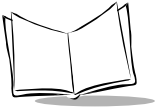
1



2



3



Numeric Bar Codes (continued)



4



5



6



7

Numeric Bar Codes (continued)



8



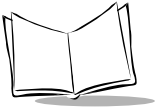
9

Cancel

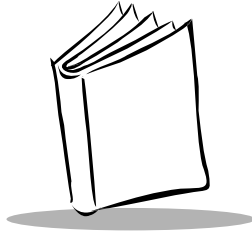
To change a selection or cancel an incorrect entry, scan the bar code below.



Cancel



MS-804FZY and MS-904HS Integration Guide



Chapter 8

Simple Serial Interface (SSI)

Simple Serial Interface (SSI)

The MS-804FZY and MS-904HS scanners communicate with a host device using Symbol's Simple Serial Interface (SSI).

The *Simple Serial Interface (SSI) Programmer's Guide* (p/n 72-40451-xx) provides general information on SSI, includes information on the decoder's hardware signals, and describes the commands. The following SSI information is specific to the MiniScan scanner.

Note: *The MS-804FZY/MS-904HS only supports Multipackaging Option 1. See the SSI Programmer's Guide for more information.*

Revision String

When the decoder sends the REPLY_REVISION message, the revision string is in the following format:

```
SW_REVISION <space> BOARD_TYPE <space> ENGINE_CODE <space> PGM_CHKSUM
```

where:

- **SW_REVISION** is the release name of the software
- **BOARD_TYPE** is *N* for non-flash decoder board, *F* for flash
- **ENGINE_CODE** indicates the type of scanner paired with the decoder
- **PGM_CHKSUM** is the two-byte checksum of the program code.

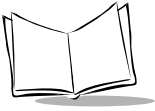


Table 8-1 lists the codes identifying the MiniScan scanner when using SSI.

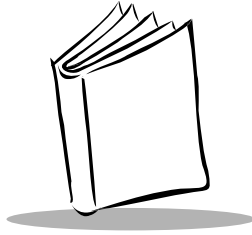
Table 8-1. MiniScan Codes

Code	Description
37h	MS-804FZY
00h	MS-904HS

SSI Commands Not Supported

The following SSI Commands included in the *Simple Serial Interface (SSI) Programmer's Guide* are NOT supported by the MiniScan scanner:

- C4h AIM_OFF
- C5h AIM_ON
- B1h IMAGE_DATA
- F7h IMAGER_MODE
- B4h VIDEO_DATA



Chapter 9

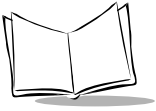
Mounting Template

Overview

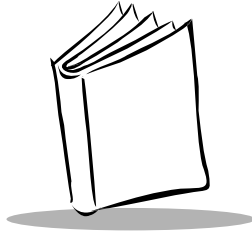
This chapter provides a mounting template for the MiniScan scanner. Tear out the page to use template.



Figure 9-1. Mounting Template

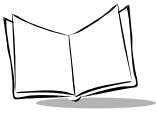


MS-804FZY and MS-904HS Integration Guide



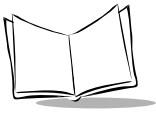
Glossary

Aperture	An opening which limits the amount of light or radiation passing through an optical system.
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 can be 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.



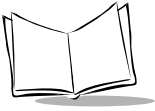
Byte	On an addressable boundary, eight adjacent binary digits (0 and 1) combined in a pattern to represent a specific character or numeric value. Bits are numbered from the right, 0 through 7, with bit 0 the low-order bit. One byte in memory can be used to store one ASCII character.
CDRH	Center for Devices and Radiological Health. A federal agency responsible for regulating laser product safety. This agency specifies various laser operation classes based on power output during operation.
CDRH Class 1	This is the lowest power CDRH laser classification. CDRH Class I devices are safe under reasonably foreseeable conditions of operation. Software and other controls to limit exposure to laser light may be required to achieve CDRH Class I operation. The CDRH time base for Class I devices is 10,000 seconds.
CDRH Class 2	CDRH Class II devices may not emit more than 1 milliwatt average radiant power. Eye protection for CDRH Class II devices is normally afforded by aversion responses, including the blink reflex.
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 encodation 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.
CLSI Editing	An option which inserts a space after the 1st, 5th, and 10th characters of a 14-character Codabar symbol. Length does not include start and stop characters.
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.
CTS	Clear to send.
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.
Digitized Bar Pattern (DBP)	A digital representation of a decoded bar 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.
Discrete Code	A bar code or symbol in which the spaces between characters (intercharacter gaps) are not part of the code.

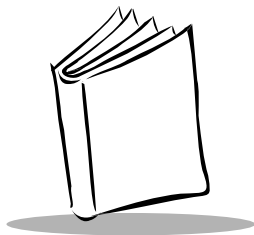


EAN	European Article Number. This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.
Element	Generic term for a bar or space.
Encoded Area	Total linear dimension occupied by all 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. IEC Class I devices are safe under reasonably foreseeable conditions of operation. Software and other controls to limit exposure to laser light may be required to achieve IEC Class 1 operation. The IEC time base for Class 1 devices is 100 seconds if intentional viewing of laser light is not required in the design or function of the device. The IEC time base for Class 1 devices is 30,000 seconds where intentional viewing of laser light is inherent in the design or function of the device.
IEC (825) Class 2	IEC Class 2 devices may not emit more than 1 milliwatt average radiant power. Eye protection for IEC Class 2 devices is normally afforded by aversion responses, including the blink reflex.
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.
MSI Plessey	A numeric-only bar code type. MSI Plessey consists of four bars and four adjacent spaces. Each bar/space pair consists of one information bit. A zero bit consists of a narrow bar followed by a wide space, while one bit consist of a wide bar followed by a narrow bar. The zero bit is one unit bar followed by a two-unit space and the one bit is a two-unit bar followed by a one unit space. The primary application for the MSI Plessey code is marking of retail shelves and subsequent scanning with portable devices for inventory purposes.
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 can be used over a range of magnifications (e.g., from 0.80 to 2.00 of nominal).
NOTIS Editing	An option that strips the start and stop characters from a decoded Codabar symbol.
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. $PCS = (R_L - R_D) / R_L$, where R_L is the reflectance factor of the background and R_D the reflectance factor of the dark bars.
Programming Mode	The state in which a scanner is configured for parameter values. See <i>Scanning Mode</i> .
Quiet Zone	A clear space, containing no dark marks, which precedes the start character of a bar code symbol and follows the stop character.
Random Access Memory (RAM)	Memory devices where any location in memory can be accessed as quickly as any other location.
Reflectance	Amount of light returned from an illuminated surface.
Resolution	The narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.
RTS	Request to send.
RSS	Reduced Space Symbology: A family of space efficient symbologies developed by UCC.EAN.
RxD	Received data.
Scan Area	Area intended to contain a symbol.



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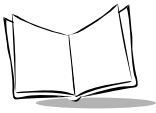
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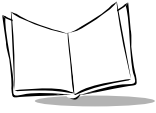
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