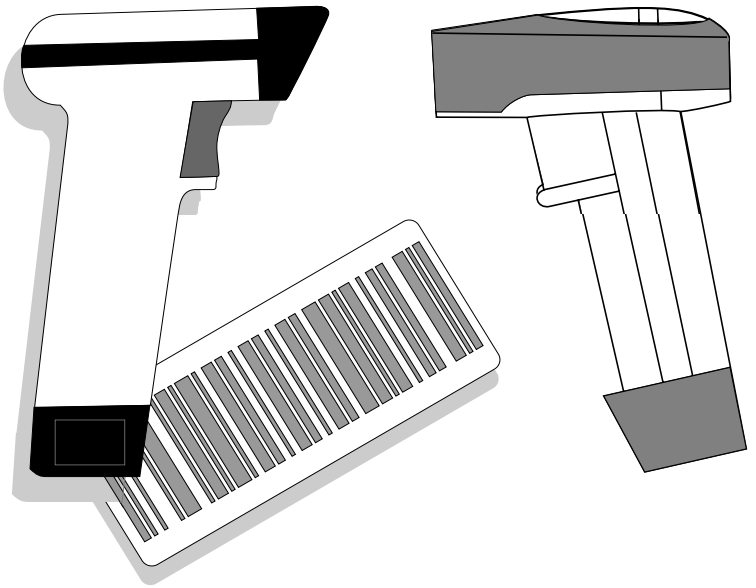
PSC®

HANDHELD LASER SCANNERS

SP400

PSC QUICKSCAN™ 6000/6000plus



RS-232 INTERFACE PROGRAMMING

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Disclaimer

Reasonable measures have been taken to ensure that the information included in this manual is complete and accurate. However, PSC reserves the right to change any specification at any time without prior notice.

Contents

NOTES

RS-232 Interface Programming

For your convenience, this guide provides minimal configuration and option settings for your scanner's RS-232 interface. For more detailed programming information and features, reference the SP400 *Programming Guide* (R44-1020) or the *QuickScan 6000/6000 Plus Programming Guide* (R44-1540), available from your dealer.

The QuickScan 6000/6000 Plus Interface (I/F) Cable

To disconnect the I/F cable at the scanner, insert a bent paper clip or 0.050" hex driver into the opening marked CABLE RELEASE as shown in Figure 1, and push inward. Once the connector latch is released, continue to hold the latch in while carefully pulling the cable free.

Connect the QuickScan 6000/6000 Plus scanner to your system using ONLY the proper PSC approved QuickScan 6000/6000 Plus I/F cable.

WARNING

Connection using an unapproved cable can result in damage to the scanner. QuickScan 6000/6000 Plus cables can be identified by a cable I.D. code printed on a white label, approximately 1" in length, attached to them.

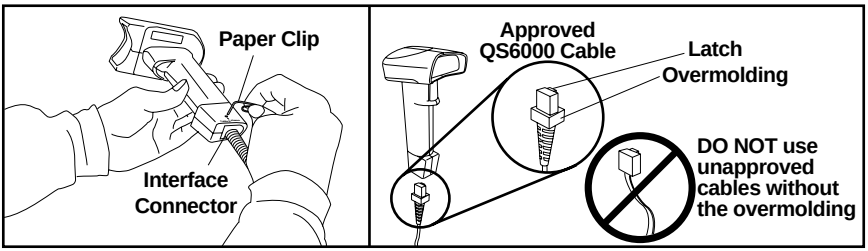


Figure 1. Disconnecting/Connecting the QuickScan 6000/6000 Plus I/F Cable

NOTE

QuickScan 6000 Plus I/F cables offer an enhanced capability that will automatically select the host-specific interface type when the cable is attached. For example, a scanner attached using an RS-232 cable will automatically communicate via RS-232; when attached using a Keyboard Wedge cable, it will automatically communicate with a Keyboard Wedge system.

Changing the Scanner's Interface

Scan the appropriate label below to select the desired RS-232 interface.

RS-232 Interface Selection

Scan this label to enable the RS-232 interface.

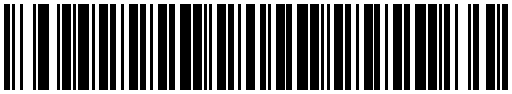
SNI RS-232 Interface Selection (QuickScan6000/6000 Plus Only)

Scan this label to enable the SNI RS-232 interface.

Return to Factory Configuration

If, during a programming session, you wish to reset the scanner's configuration to its original factory settings, scan the Return to Factory label below. Use this label ONLY IF NECESSARY, since it will reset any changes made to this interface during any previous programming session.

RETURN TO FACTORY



PROGRAMMING MODE

The scanner must be placed in Programming Mode before its configuration can be altered using the bar codes in this guide. Enter programming mode by scanning the SET barcode at the top of each programming set. The scanner's green light will flash continuously, indicating the scanner is in Programming Mode.

While in Programming Mode, the scanner will recognize only specially formatted programming bar code labels like those contained in this guide, and will not decode bar code labels of any other type. Scan all programming bar code labels needed to set the scanner's features to the desired settings. The scanner will beep after each bar code label is scanned, indicating that the setting has been stored in memory. The scanner will emit a rejection tone if a scanned bar code programming label isn't valid.

To exit Programming Mode and save all changes made during the programming session, scan the END bar code at the bottom of each programming set. The scanner will return to normal operation.

Disconnecting power during Programming Mode will cause the scanner to return to its previous settings.

BAUD RATE

Use the bar codes on this page to select the communications Baud Rate. Only one Baud Rate selection may be active at any one time.

BAUD RATE

SET

= 110[2] (SP400 ONLY)

= 300 (SP400 ONLY)

= 600 (SP400 ONLY)

= 1200

= 2400

= 4800

= 9600

= 19200

= 38400 (QS ONLY)

[1]Only ***SP400*** units manufactured after Mar. 1, 1995 can use the 38,400 baud label below.
[2]To reset from 38,400 baud to 110 baud, use the "Reset 110 baud" label below.

SPECIAL SP400 BAUD SETTINGS

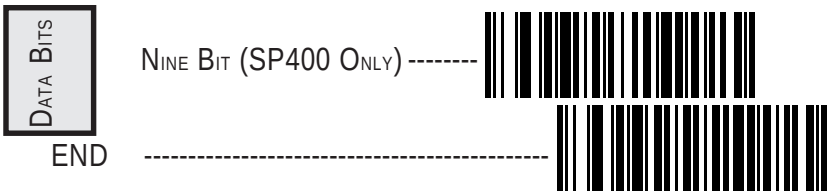
= 38400[1]

= RESET 110[2]

Data Format Settings

Check your host system manual to find out your system's communications requirements. This table shows the acceptable format options.

Data Bits	Start Bit	Parity Bit(s)	Stop Bit(s)
Seven	1	0	2
Seven	1	1	1
Seven	1	1	2
Eight	1	0	1
Eight	1	0	2
Eight	1	1	1
Nine	1	0	1



HANDSHAKING

Review your system documentation to identify system handshaking requirements, and use these labels to change the setting if required.

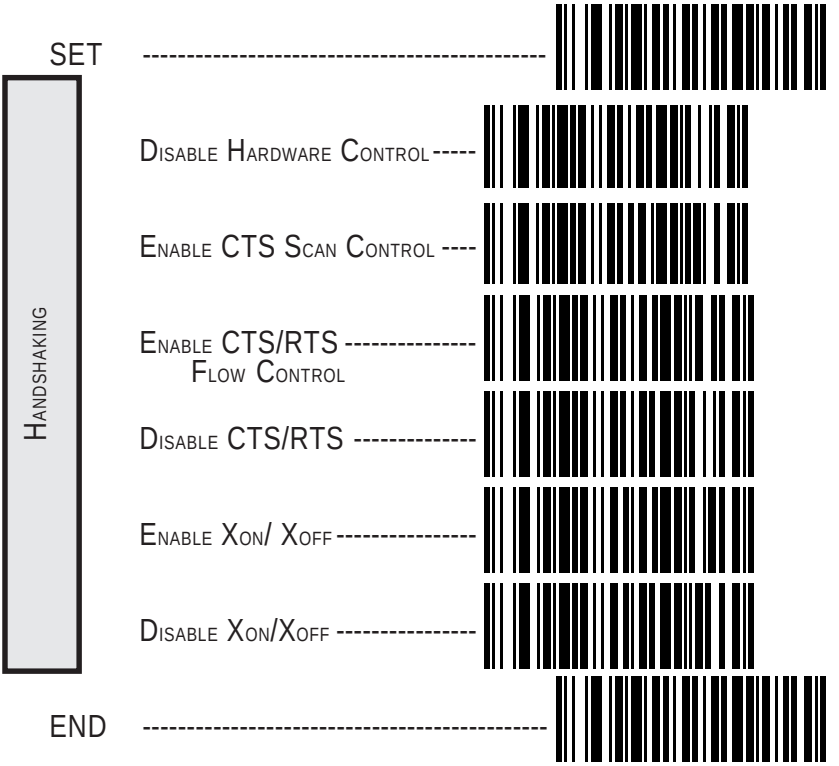
CTS/RTS(Flow Control) — is hardware handshaking. The RTS (Ready to Send) line is activated by the scanner. Only after receiving an active Clear to Send (CTS) signal from the host is the data sent. The scanner's RTS line is only active during data transmission.

CTS Scan Control — is also a hardware control. When scan control is enabled, label transmission is disabled until CTS is asserted and de-asserted.

XON/XOFF — this is software handshaking that allows the host to control data transmission. The XON (SEND) and XOFF (STOP) commands from the host controls the scanner's transmission of bar code data.

> NOTE
>
> Hardware/software controls are mutually exclusive. Enable only one of these features at a time, as enabling multiple controls can produce unpredictable results.

HANDSHAKING—CONTINUED



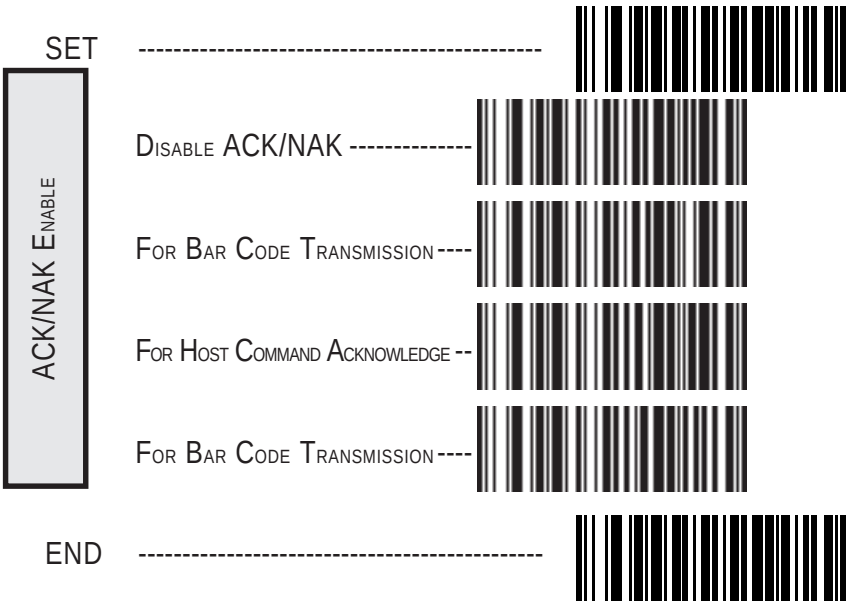
RS-232 ACK/NAK Options (QuickScan 6000 Plus ONLY)

Several ACK/NAK parameters can be set for your QuickScan 6000 Plus scanner. Contact your PSC® dealer if the specific ACK/NAK option you wish to set is not included in this section.

Options for RS-232 ACK/NAK are:

- Disable ACK/NAK
- Enable ACK/NAK for bar code transmission
- Enable ACK/NAK for host command acknowledge
- Enable ACK/NAK for bar code transmission and host command acknowledge.

(These features available for QuickScan 6000 Plus ONLY)



HOST ECHO[1] (SP400 ONLY)

Host Echo allows a dumb terminal (Host) to transmit keyboard data through the scanner (Echo) to a main computer. Scanned label data will take priority over keyboard data.

HOST ECHO

SET----------

ENABLE HOST ECHO ----------
(SP400 ONLY)

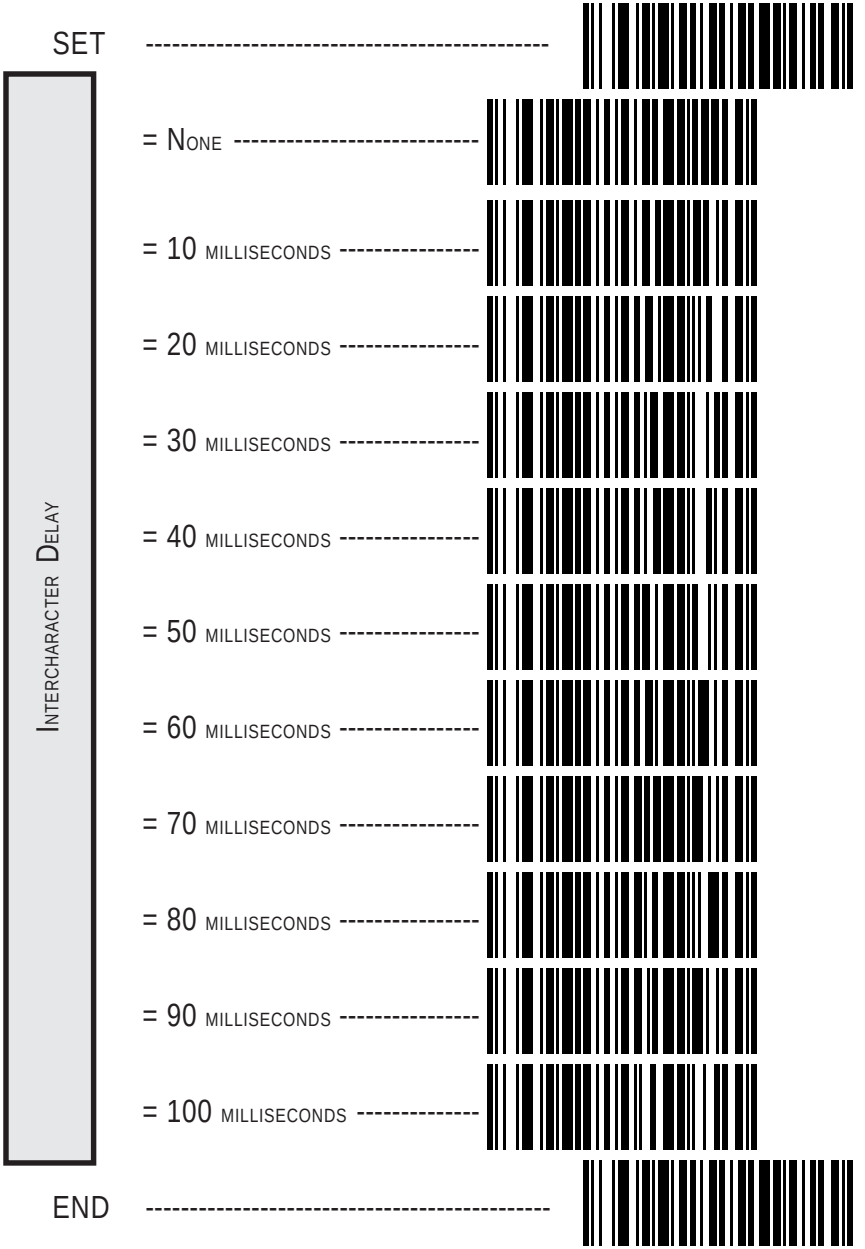
DISABLE HOST ECHO ----------
(SP400 ONLY)

END ----------

[1]This feature not available on SP400 units manufactured before Mar. 1, 1995.

INTERCHARACTER DELAY

Intercharacter Delay refers to the pause, if any, between each character before it is sent to the host. This time delay is used to control the flow of data from the scanner, but it should not be required for most applications.



Setting Prefix and/or Suffix Characters (Preamble/Postamble)

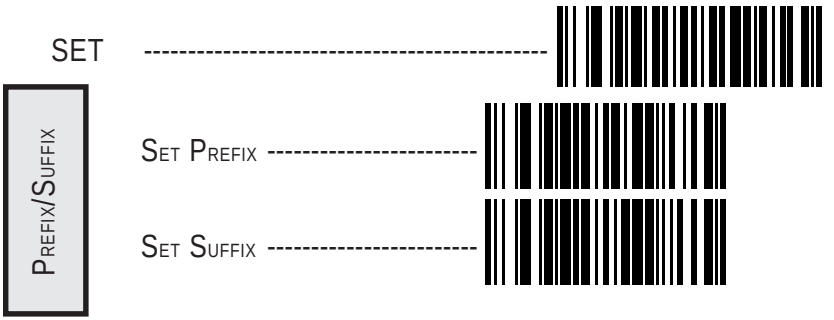
To set the prefix or suffix, identify your specific system requirements for modification of the settings, then follow these steps:

1. Look at the ASCII chart on the inside back cover of this manual and identify the ASCII character and the corresponding Hex Code you will use as the prefix or suffix.
2. Scan the SET label below.
3. Scan either the SET PREFIX or SET SUFFIX label.
4. Scan the Hex Code for that character.
   (e.g. 03, 8F, ...FF)

> NOTE
>
> If you make a mistake, or lose your place while setting this option, scan the END label to exit Programming Mode. The scanner will sound an error tone to indicate that programming was incomplete, and the setting will remain as it was before entering Programming Mode.

5. If setting a single digit, scan the ONE CHARACTER ONLY label on the second page following.
6. Scan the END label.

You have set the prefix or suffix.



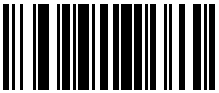
SETTING PREFIX AND/OR SUFFIX CHARACTERS

NOTE

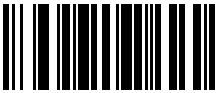
You must scan the SET label and either the SET PREFIX or SET SUFFIX label before using the labels on this page.

0 ----------

1 ----------



2 ----------

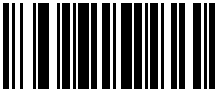


3 ----------

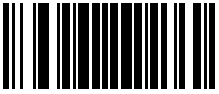
4 ----------

5 ----------

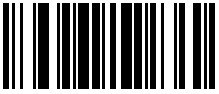
6 ----------



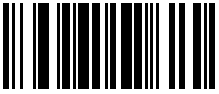
7 ----------



8 ----------



9 ----------



NOTE

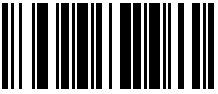
You must scan the SET label and either the SET PREFIX or SET SUFFIX label before using the labels on this page.

A ----------

B ----------

C ----------

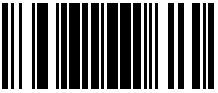
D ----------



E ----------

F ----------

ONE CHARACTER ONLY ----------



END ----------

SETTING SYMBOLOGY SPECIFIC LABEL IDENTIFIERS (LABEL I.D.)

Symbology-specific label identifiers comprise one or two ASCII characters that can precede or follow barcode label data as it is transmitted to the host. The host uses these characters as a means of distinguishing between symbologies.

Industry standards have been established for symbology-specific label identifiers, and are listed in the table below. Most scanners will have factory default identifiers preset to these standards.

UPC-A	'A'	EAN-8 (5 Add-on)	'FF'
UPC-E	'E'	EAN-8 (8 Add-on)	'FF'
EAN-8	'FF'	EAN-13 (2 add-on)	'F'
EAN-13	'F'	EAN-13 (5 Add-on)	'F'
UPC-A (2 add-on)	'A'	EAN-13 (8 Add-on)	'F'
UPC-A (5 Add-on)	'A'	Code 39	'*'
UPC-A (8 Add-on)	'A'	Codabar	'%'
UPC-E (2 add-on)	'E'	Interleaved.2 of 5	'i'
UPC-E (5 Add-on)	'E'	Code 93	'&'
UPC-E (8 Add-on)	'E'	Code 128	'#'
EAN-8 (2 add-on)	'FF'	MSI/Plessey	'@'

TABLE 1. INDUSTRY STANDARD LABEL IDENTIFIERS (ALL ARE PREFIXES)

To set symbology-specific label identifiers:

1. Look at the ASCII chart on the inside back cover and identify the ASCII character(s) and the corresponding Hex Code(s) for the ASCII characters you will use as identifiers. You will also need to determine whether the character(s) will need to be sent as a prefix or a suffix.

   For example: You need to change the label identifier prefix for UPC-A to 'A1'.

2. Scan the SET label below.

3. Scan either the TRANSMIT LABEL I.D. AS PREFIX or TRANSMIT LABEL I.D. AS SUFFIX, depending on your requirements.

   For our example, the 'transmit as prefix' label would be scanned.

SETTING SYMBOLOGY SPECIFIC LABEL IDENTIFIERS (LABEL I.D.) CONTINUED

4. Scan the label representing the symbology whose label identifier you wish to modify.

   In our example, we would scan the 'UPC-A' symbology label.

5. Identify and scan the digits that correspond to the Hex Values.

   The hex values from the ASCII chart that correspond to 'A1' from our example are as follows: 41_{hex} = 'A', and 31_{hex} = '1'. Thus, we would scan digit programming labels in this order: 4, 1, 3, 1.

6. Scan the END label.

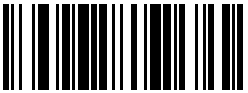
   In our example, you have changed the default label identifier prefix for UPC-A from 'A' to 'A1'.

Label I.D. Symbology Selection

Set Symbology Specific Label Identifier for:

UPC-A ----------

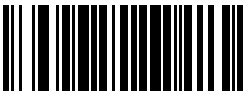
UPC-A w/2 digit add-on --------



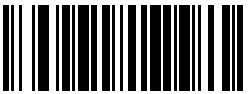
UPC-A w/5 digit add-on --------

UPC-A w/C128 add-on --------

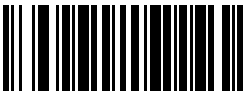
UPC-E ----------



UPC-E w/2 digit add-on --------

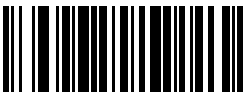


UPC-E w/5 digit add-on --------

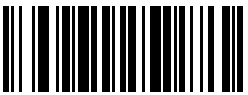


UPC-E w/C128 add-on --------

EAN-8 ----------



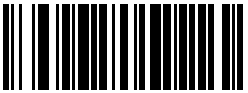
EAN-8 w/2 digit add-on --------



EAN-8 w/5 digit add-on --------

EAN-8 w/C128 add-on --------

EAN-13----------

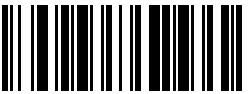


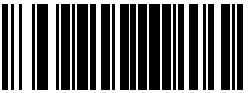
Label I.D. Symbology Selection
Continued

Set Symbology Specific Label Identifier for:

EAN-13 w/2 digit add-on ------ 

EAN-13 w/5 digit add-on ------ 

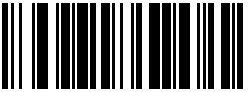
EAN-13 w/C128 add-on ------- 

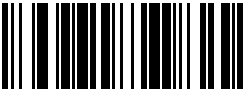
Code 39 ---------- 

Codabar ---------- 

Interleaved 2 of 5 ---------- 

Standard 2 of 5 ---------- 

Code 93 ---------- 

Code 128 ---------- 

MSI/Plessey ---------- 

END ---------- 

How to Set Single Character Label I.D.

If you only want a single character identifier, follow this modified procedure for setting label identifier.

1. Look at the ASCII chart shown on page 36 and identify the ASCII character and the corresponding Hex Code for the ASCII character you will use as the symbology specific identifier.
2. Scan the SET label.
3. Scan the label identifier label for the symbology identifier that you are going to change.

   As an example, assume that you want to change the label identifier for EAN-8 from the default setting FF to the ASCII value 8. Scan the Set Symbology Specific Label Identifier barcode for EAN-8.

5. Identify the hex value that correspond to the ASCII character.

   In this example '8' equals 38_{hex}.

   Simply follow the hex value for '8' (38_{hex}) with the One Character Only label. This tells the scanner that '8' is a single digit label identifier.

6. Scan the barcodes values.

   For the example in step five, scan 3, 8, One Character Only on the following two pages.

> NOTE
>
> If you make a mistake, or lose your place while setting this option, scan the END label to exit Programming Mode. The scanner will sound an error tone (six rapid beeps) to indicate that programming was incomplete, and the setting will remain as it was before entering Programming Mode.

7. Scan the END label.

   You have changed the default label identifier for EAN-8 from 'FF' to '8'.

Disabling Label I.D. for a Specific Symbology

This procedure is the same as setting a single character symbology identifier, except you should scan two zeros and the One Character Only labels before scanning the END label.

Symbology Specific Label Identifiers Characters

Use the labels on this page to change or modify symbology identifiers.

Setting Label I.D. Characters

0 ----------

1 ----------

2 ----------

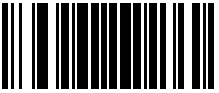
3 ----------

4 ----------

5 ----------

6 ----------

7 ----------



8 ----------

9 ----------

Setting Label I.D. Characters

A

B

C

D

E

F

One Character Only

END

UNIVERSAL SYMBOLOGY SELECTION

To set the scanner to read all symbologies, scan the ENABLE ALL SYMBOLOGIES bar code below.

NOTE

DO NOT scan SET or END bar codes when programming universal symbology features. Programming mode is automatically entered and exited when one of the two special bar codes below are scanned.

ENABLE ALL SYMBOLOGIES

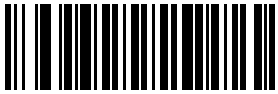
DISABLE ALL SYMBOLOGIES[1]

1 Code 128 is always active for the purpose of reading programming bar code labels, however, the scanner does not transmit data to the host when in Programming Mode.

SYMBOLOGY SELECTION

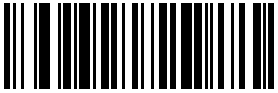
The bar code programming labels on the following pages allow you to enable or disable individual symbologies.

SET ----------

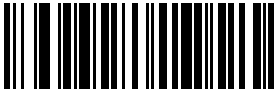


ENABLE UPC/EAN ----------

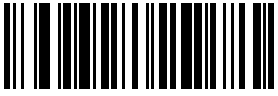
DISABLE UPC/EAN ----------



ENABLE CODE 39 ----------



DISABLE CODE 39 ----------



ENABLE PHARMACODE[2] 39 --------

DISABLE PHARMACODE 39 --------

ENABLE INTERLEAVED 2 OF 5 ------

DISABLE INTERLEAVED 2 OF 5 -----

ENABLE STANDARD 2 OF 5 --------

2 Code 39 must first be enabled for the scanner to read PharmaCode 39 labels. Enabling PharmaCode 39 will convert Code 39 data to PharmaCode format whenever possible.

DISABLE STANDARD 2 OF 5 -------

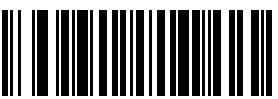
ENABLE IATA[3] ----------

DISABLE IATA----------

ENABLE CODABAR ----------

DISABLE CODABAR ----------

ENABLE CODE 93----------



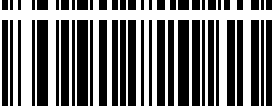
DISABLE CODE 93 ----------

ENABLE CODE 128 ----------

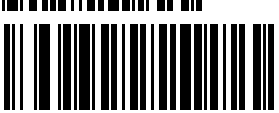
DISABLE CODE 128[4] ----------

ENABLE MSI/PLESSEY ----------

DISABLE MSI/PLESSEY----------



END ----------



3 Standard 2 of 5 must first be enabled before IATA can be enabled, however, the scanner wil not read Standard 2 of 5 labels when IATA is enabled.

4 Code 128 is always active for the purpose of reading programming bar code labels. Scanning the DISABLE ALL SYMBOLOGIES or the DISABLE CODE 128 labels disables Code 128 transmission to the host (disables decoding of all C128 non-programming labels).

UPC Data Format Settings

These settings affect UPC data format when RS-232 or OCIA is the active interface. Number System Digit (NSD) settings operate with RS-232 and Keyboard Wedge interfaces ONLY.

---

1 NSD = Number System Digit. The NSD character is the character that precedes the UPC bar code. The NSD for regular UPC-A bar codes is a zero. Other commonly used Number System Digits used with UPC-A are:

- 2 - used for random weight items such as meat and produce
- 3 - used for the drug and health items
- 4 - used for in-store non-food items
- 5 - used for coupons

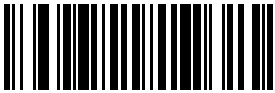
2 If UPC-E is expanded to UPC-A, the transmission of Check Digit (CD) and NSD will be determined by the UPC-A settings on this page, not by these settings.

EAN Data Format Settings

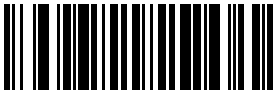
These settings affect EAN data format when RS-232 is the active interface.

EAN-8

Send Check Digit ----------



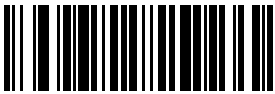
Don't Send Check Digit --------



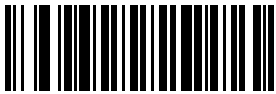
EAN-13

Send Check Digit ----------

Don't Send Check Digit --------



END ----------



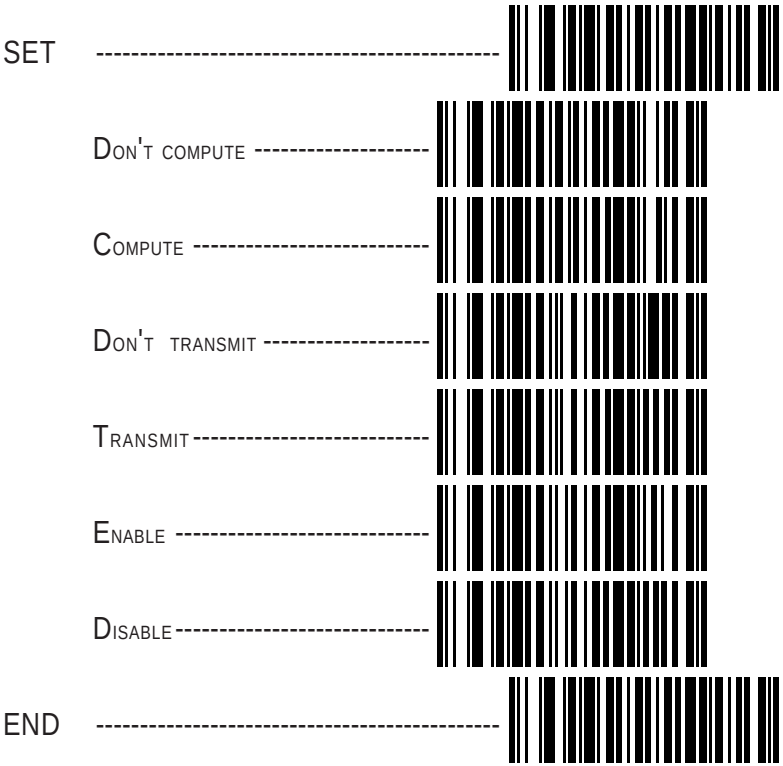
INTERLEAVED 2 OF 5

The Interleaved 2 of 5 symbology has the following programmable features:

Check Digit — calculate the Check Digit to verify that the Check Digit contained in the bar code label is correct. If you enable this feature, your bar codes must contain a Check Digit.

You may also choose to transmit or not transmit the Check Digit independent of whether the Check Digit is calculated by the scanner. Transmit Check Digit will have no effect unless the Compute Check Digit feature is enabled. If you choose Don't Compute Check Digit, the scanner sends the Check Digit encoded in the bar code without verifying its accuracy. If you choose both Compute Check Digit and Don't Transmit Check Digit, the scanner will remove the Check Digit's contents before sending the bar code data to the host.

Variable Length — If you select variable length, the scanner will recognize labels with an even number of digits between 04 and 50 digits.



Setting Interleaved 2 of 5 Fixed and Minimum Label Lengths

All interfaces that are shipped with the standard factory configuration are set to read variable length labels. If you switch from variable to fixed length labels (by disabling variable lengths on the previous page), the default fixed label lengths are 14 digits and 8 digits. Follow the steps below to change these defaults. All fixed length settings for Interleaved 2 of 5 must be an even number.

Set Fixed

1. Identify the fixed length settings you want to make.
2. Scan the SET label.
3. Scan the ENABLE FIRST FIXED barcode.

Setting Fixed Lengths

If you are setting a length less than ten, you must scan a zero first and then the length digit (04, 06, 08).

4. Set the first fixed label length by scanning the correct digits from the next two pages.

   If you need to set a second fixed length, continue with step five. If you do not need to set a second fixed length scan the NO SECOND FIXED LENGTH below and skip to step seven.

5. Scan the SET SECOND FIXED label.
6. Set the second fixed label length by scanning the correct digits from this page.
7. Scan the END label to complete the procedure.

Setting Minimum Label Length

1. Identify the minimum length setting you want to make. The selectable range is 02 to 50 characters.
2. Scan the SET label.
3. Scan the SET MINIMUM LABEL LENGTH barcode.

If you are setting a length less than ten, you must scan a zero first and then the length digit (04, 06, 08).

4. Set the minimum label length by scanning the correct digits from the next two pages
5. Scan the END label.

SET

Interleaved 2 of 5 Fixed and Minimum Label Lengths

Set First Fixed Length

Set Second Fixed Length

No Second Fixed Length

Set Minimum Label Length

0

1

2

3

4

6

8

END

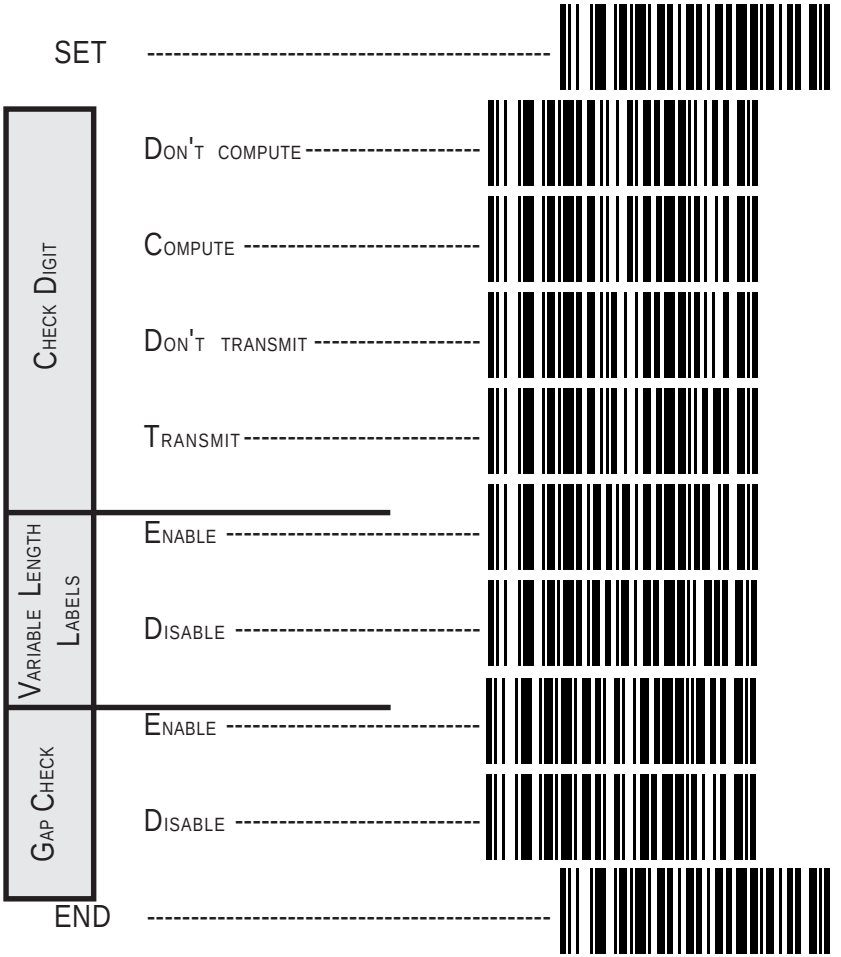
CODABAR CHECK DIGIT & VARIABLE LENGTH

These programming labels determine whether you compute and send the check digit contents and enables variable length.

Check Digit — (See Interleaved 2 of 5 Check Digit.)

Variable Length — If variable length is disabled, only labels of two specified lengths can be read. The two fixed lengths are configurable.

Gap Check — If Gap Check is enabled, the scanner verifies the uniformity of the gaps between characters.



CODABAR FIXED LENGTH

Most scanners shipped from the factory are set to read variable length labels for Codabar. If you switch from variable to fixed length labels, the factory set fixed label lengths are 14 and 08. Follow the steps below to change these defaults.

ENABLE FIXED

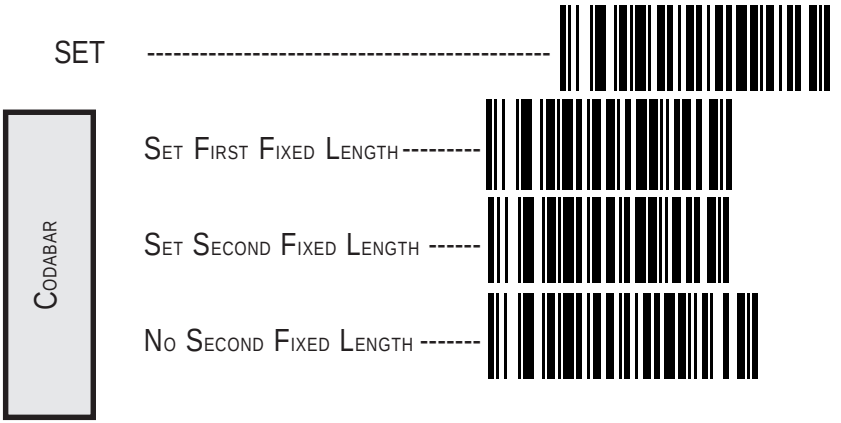
1. Identify the fixed length settings you want to make.
2. Scan the SET label.
3. Scan the SET FIRST FIXED LENGTH label.

SETTING LENGTHS

If you are setting a length less than ten, you must scan a zero first and then the length digit (02, ...09).

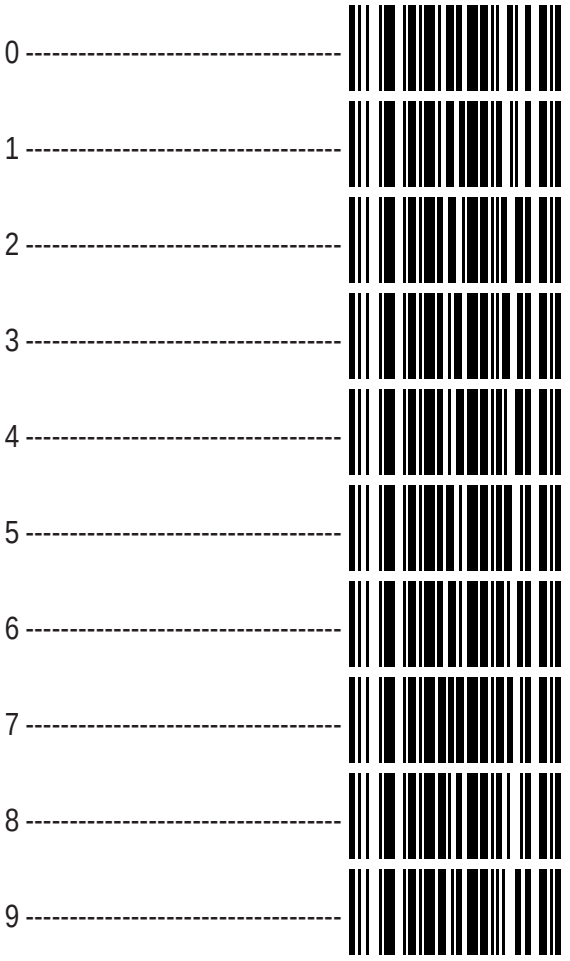
4. Set the first fixed length label by scanning the correct digits from the next page. The selectable range is from 03 to 50.

   If you need to set a second fixed length, continue with step five. If you do not need to set a second fixed length, scan the NO SECOND FIXED LENGTH label below and skip to step seven.



5. Scan the SET SECOND FIXED LENGTH label.
6. Set the second fixed label length by scanning the correct digits from this page. The selectable range is from 03 to 50.
7. Scan the END label to complete the procedure.

CODABAR SET FIXED LENGTHS



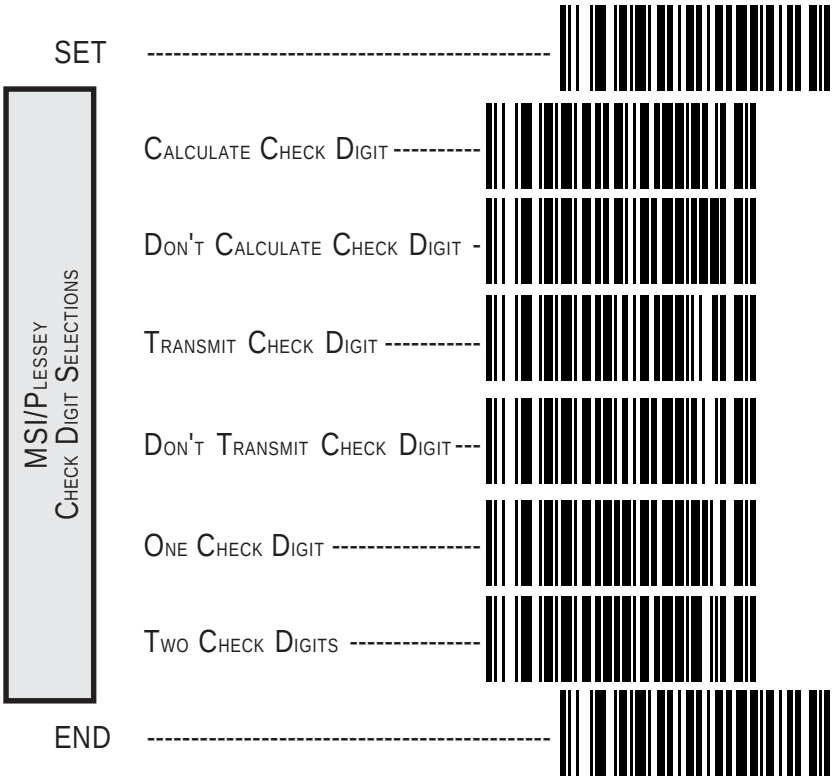
MSI/Plessey Check Digit

MSI/Plessey Check Digit options include:

Check Digit Calculation — calculate the Check Digit to verify the labels contents have been read correctly. If you enable this feature, your bar codes must include a Check Digit. You may also choose to transmit or not transmit the Check Digit.

Transmit Check Digit — enable or disable transmission of MSI/Plessey Check Digit(s).

Number of Check Digits — specify either one or two Check Digits.



NOTES

NOTES

ASCII CHARACTER SET

The table on this page shows a set of ASCII characters and their corresponding Hex Values. The Hex Values in this table are needed for setting symbology specific label identifiers, as well as enabling custom prefix and suffix characters.

ASCII CHAR.	HEX VALUE	ASCII CHAR.	HEX VALUE	ASCII CHAR.	HEX VALUE	ASCII CHAR.	HEX VALUE
nul	00	sp	20	@	40	`	60
soh	01	!	21	A	41	a	61
stx	02	"	22	B	42	b	62
etx	03	#	23	C	43	c	63
eot	04	$	24	D	44	d	64
enq	05	%	25	E	45	e	65
ack	06	&	26	F	46	f	66
bel	07	'	27	G	47	g	67
bs	08	(	28	H	48	h	68
ht	09	)	29	I	49	i	69
lf	0A	*	2A	J	4A	j	6A
vt	0B	+	2B	K	4B	k	6B
ff	0C	'	2C	L	4C	l	6C
cr	0D	-	2D	M	4D	m	6D
so	0E	.	2E	N	4E	n	6E
si	0F	/	2F	O	4F	o	6F
dle	10	0	30	P	50	p	70
dc1	11	1	31	Q	51	q	71
dc2	12	2	32	R	52	r	72
dc3	13	3	33	S	53	s	73
dc4	14	4	34	T	54	t	74
nak	15	5	35	U	55	u	75
syn	16	6	36	V	56	v	76
etb	17	7	37	W	57	w	77
can	18	8	38	X	58	x	78
em	19	9	39	Y	59	y	79
sub	1A	:	3A	Z	5A	z	7A
esc	1B	;	3B	[	5B	{	7B
fs	1C	<	3C	\	5C	|	7C
gs	1D	=	3D	]	5D	}	7D
rs	1E	>	3E	^	5E	~	7E
us	1F	?	3F	_	5F	del	7F

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