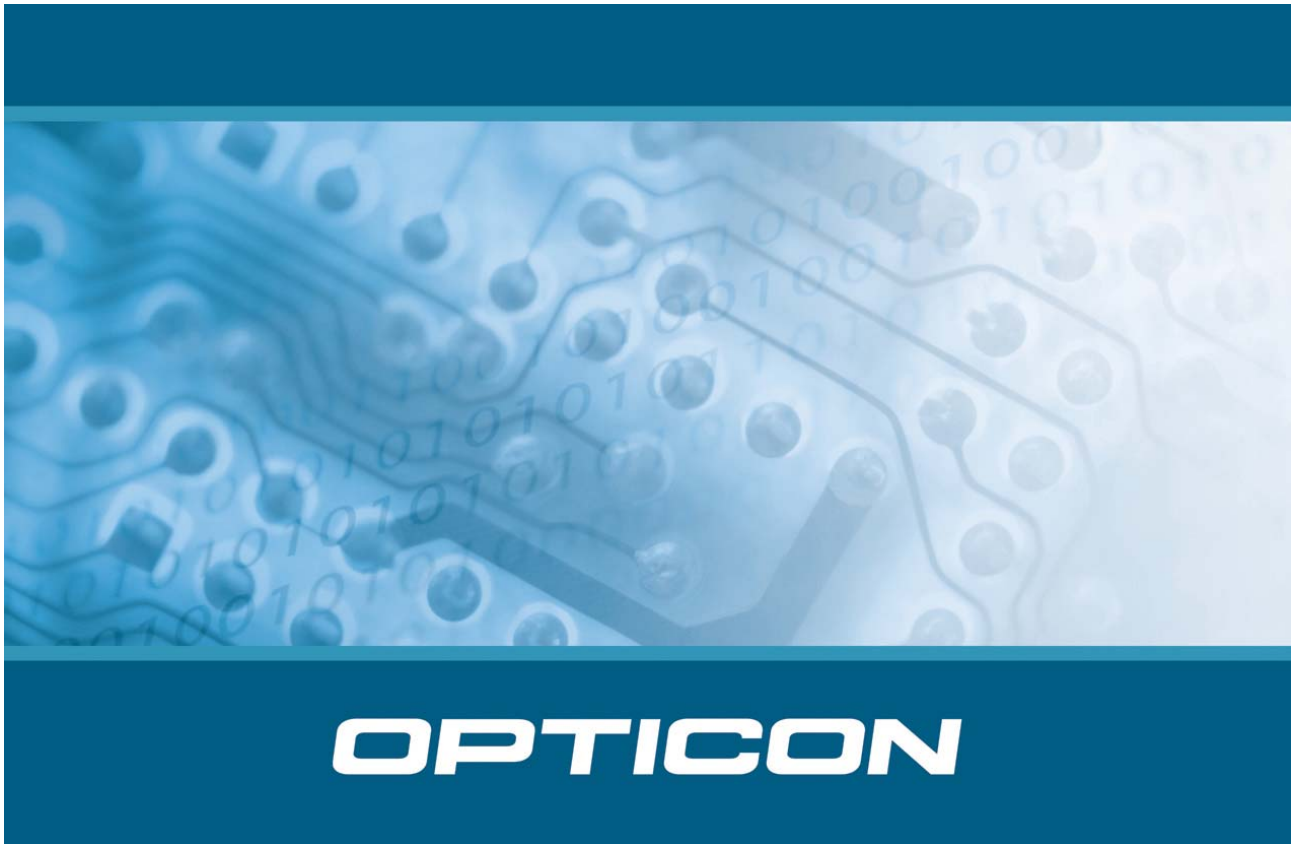
Software Guide



MDL – 1000 / 2000

Specification for Software Interface

Laser Scan Engine with Built-in Decoder

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1. ABSTRACT

This specification provides interface specifications of an X1 laser scan engine with a built-in decoder (“X1” is a tentative name of this product. This product shall be hereinafter called as “this scan engine”).

2. OVERVIEW

This scan engine is a compact laser scan engine with a built-in decoder, which is possible to be installed in various handheld products such as handy terminals.
The host system controls this scan engine and inputs scanned data in serial communication.
This material provides information on the control method and the connection between this scan engine and its host system.

3. INTERFACE

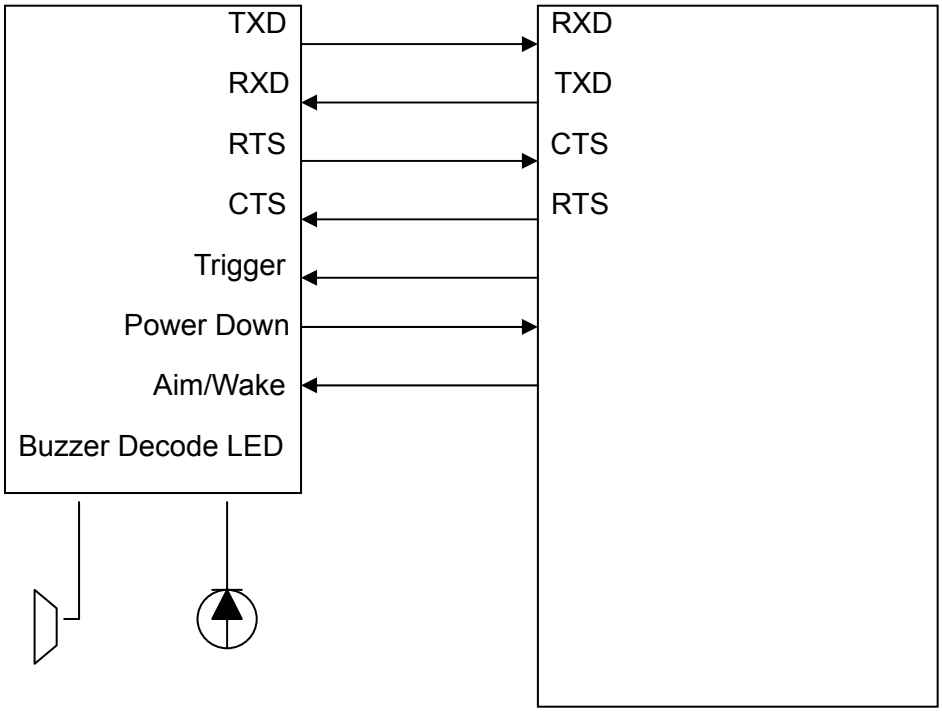
3-1. Interface Signal

Signals used to connect this scan engine and host system are as follows:

Signal	Input/Output	Function	Notes
RXD	Input	Serial Receive Data	
TXD	Output	Serial Transmit Data	
CTS	Input	Clear To Send Request for the host system to transmit the data at L-level	
RTS	Output	Request To Send Feasible to receive the data at L-level	
Trigger	Input	Signal to Start the Decoding L Active	
Buzzer	Output	Output of rectangular-wave for Buzzer drive.	
Decode LED	Output	Output of the level signal for LED	
Power Down	Output	Output for Power Mode of this scan engine. Output of H-level signal in Low Power mode.	
Aim/Wake	Input	Input to recover from Low Power Mode to the aiming state. (L Active) In the Continuous Power Mode, it is an input of aiming control.	

3-2. Connection Method

The connection between the scan engine and the host system will be carried out as follows:



3-3. Serial Communication Specifications

This chapter provides specifications of serial data transmission.

- Asynchronous
- Data Length: 8 bit fixed
- Parity: Odd Numbers / Even Numbers / None (default setting: none)
- Stop Bit: 1 or 2 bit (default setting: 1 bit)
- Baud Rate: 300bps to 115200bps (default setting: 9600bps)

3-4. Hardware Handshake

This chapter provides the information on the sequence of hardware handshake.
It is based on the presumption that RTS and CTS signals stay at H-level after the initialization.

(1) Sending command from the host system to this scan engine

1) The host system confirms that CTS signal is at H-level
2) The host system shows that there is command data being sent by setting RTS signal to L-level.
3) This scan engine detects that CTS signal has been changed to L-level and shows that it is possible to receive the command by changing RTS signal to L- level.
4) The host system detects that CTS signal has been changed to L-level and transmits data to TXD signal.
5) When transmission of the last data character completes, the host system sets back RTS signal to H-level.
6) This scan engine detects that CTS signal has been set back to the H-level and sets back RTS signal to the H level.

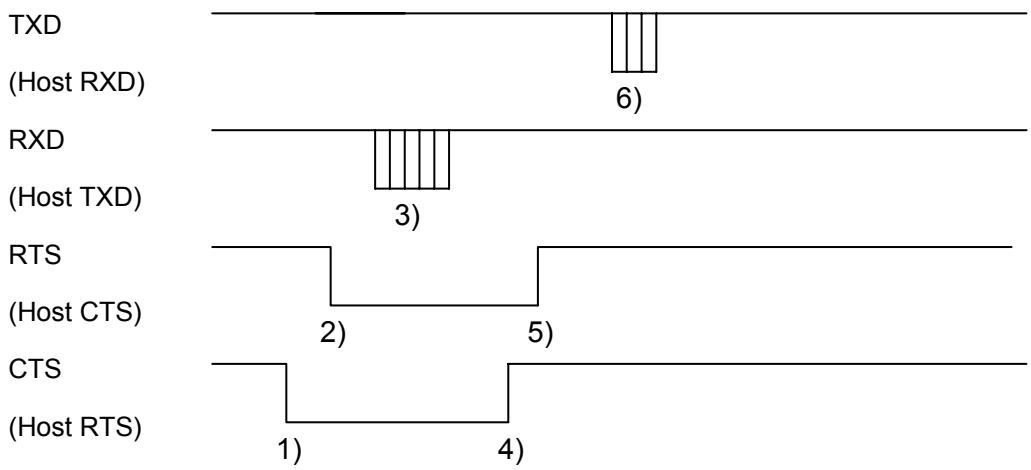
(2) Sending data from this scan engine to the host system

7) This scan engine confirms that CTS signal has been set to H-level.
   When CTS signal stays at L-level, it is deemed that there is a command being sent from the host system so that the data transmission shall be cancelled.
8) The decoder transmits the data to TXD signal.
   When CTS signal is set to L-level while the data is under transmission, it is deemed that there is a command being sent from the host system and data transmission shall be cancelled to prioritize reception of command.
   When the data transmission is cancelled to prioritize reception of command, the data shall be resent after reception of command.
   When there is no command being sent from the host system and CTS signal is set back to H-level, cancelled data transmission shall restart.

3-5. Communication Procedure (example)

This chapter provides the information on the communication procedure between this scan engine and the host system. The sequence of this procedure is as follows:

(1) Transfer of the command data packet from the host system to this scan engine

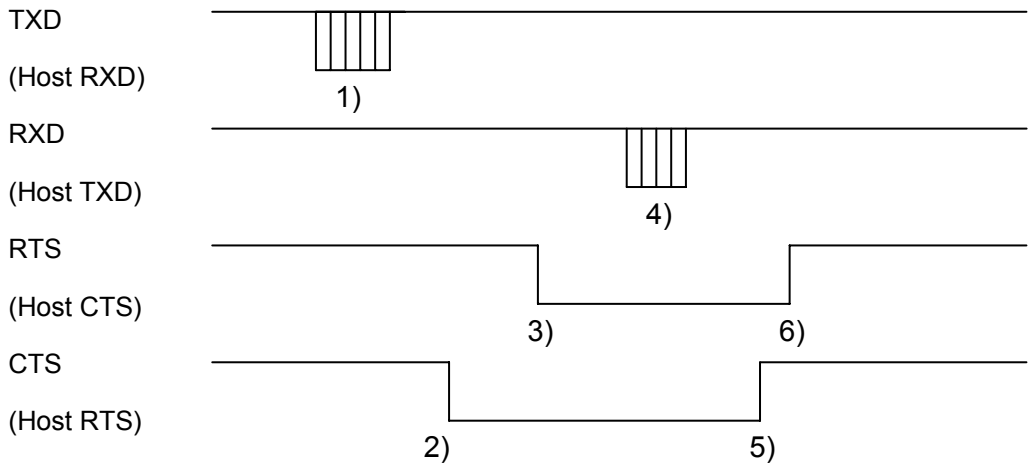


1) The host system sets RTS signal to L-level for the data packet transmission.
2) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to the L-level.
3) The host system confirms that CTS signal has been set to L-level and starts transmission of command data packets.
4) The host system sets back RTS signal to H-level after transmission.
5) This scan engine confirms that CTS signal has been set back to H-level and sets back the RTS signal to H-level.
6) This scan engine sends back responses.

Note: When ACK/NAK protocol is not selected, the sequence of procedure described in 6) shall not occure. Also, ACK response shall not be sent for the command below. It is a command to send back the response data from this scan engine.

PARAM_REQ/REQ_REV

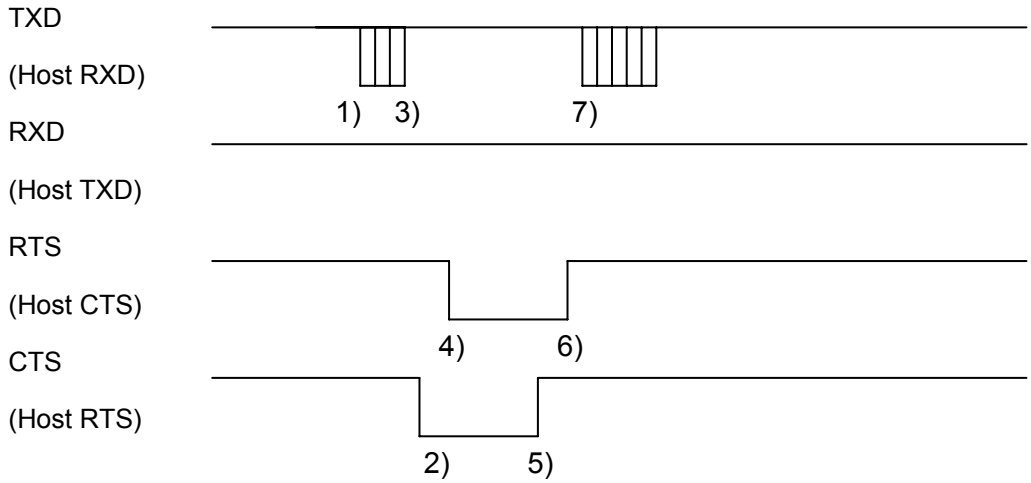
(2) Data transfer from this scan engine to the host system



1) This scan engine confirms that CTS signal has been set to H-level and sends command data packets.
2) The host system sets RTS signal to L-level for transmission of response to the data sent.
3) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to L-leve.
4) The host system sends the response.
5) The host system sets back RTS signal to H-level after transmission of the response.
6) This scan engine detects that CTS signal has been set back to H-level and sets back the RTS signal to H-level.

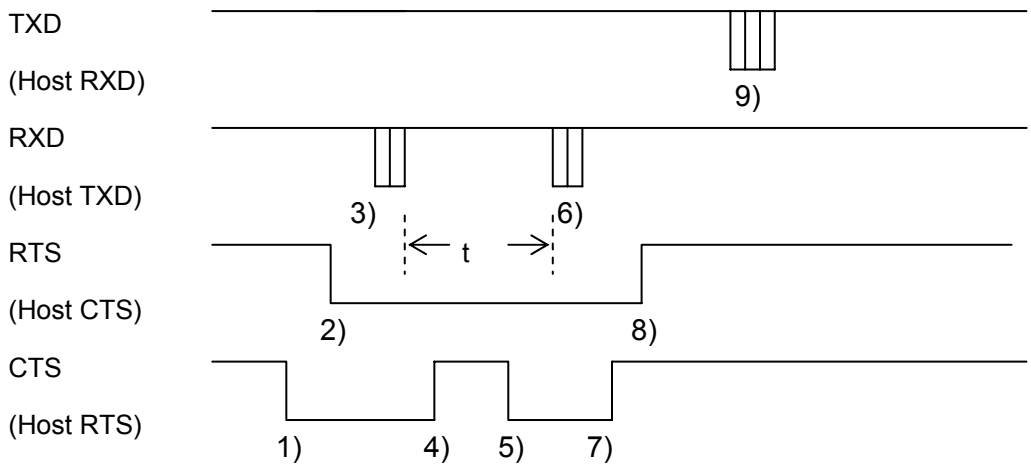
Note: When ACK/NAK protocol is not selected, it is not necesarry to carry out the sequence of procedure listed above in 2) to 5).

(3) Inhibition of the data transfer from this scan engine to the host system.



1) This scan engine confirms that CTS signal has been set to H-level and transmits the data.
2) To stop the data tranfer, the host system sets RTS signal to L-level.
3) This scan engine detects that CTS signal has been set to L-level and stops the data transmission.
4) This scan engine sets RTS signal to L-level.
5) The host system sets back RTS signal to H-level to restart the data transfer.
6) This scan engine detects that CTS signal has been set back to H-level and sets back RTS signal to the H-level.
7) This scan engine restarts the data transfer.

(4) Segmental transfer of command data packets from the host system to this scan engine

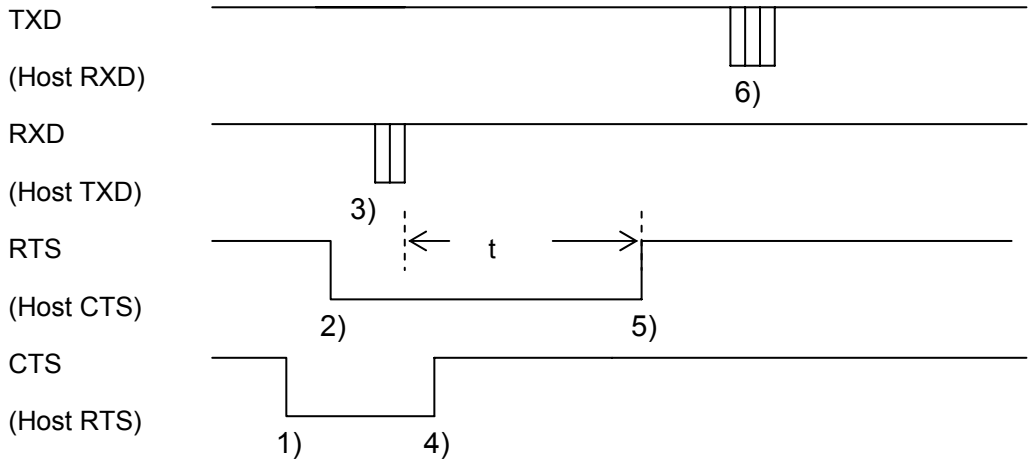


t: setting value of Host Character Time-out

1) The host system sets RTS signal to L-level for transmission.
2) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to L-level.
3) The host system confirms that CTS signal has been set to L-level and transmits command packets.
4) The host system suspends transmission and resets RTS signal to H-level. In this case, this scan engine does not detect that CTS signal has been set to H-level so that RTS signal stays at L-level. Therefore, it will continue to be ready for the data packet reception. Although, the host system needs to restart transmission of data packets within the setting value of “Host Character Time-out”.
5) The host system sets back RTS signal to L-level.
6) The host system restarts transmission.
7) The host system sets back RTS signal to H-level again after a completion of data packet transmission.
8) This scan engine detects that CTS signal has been set back to H-level and sets back RTS signal to H-level.
9) This scan engine sends out the response.

Note: When ACK/NAK protocol is not selected, the sequence described in 9) shall not occur.

(5) Error: From the host system to this scan engine: in host character time-out

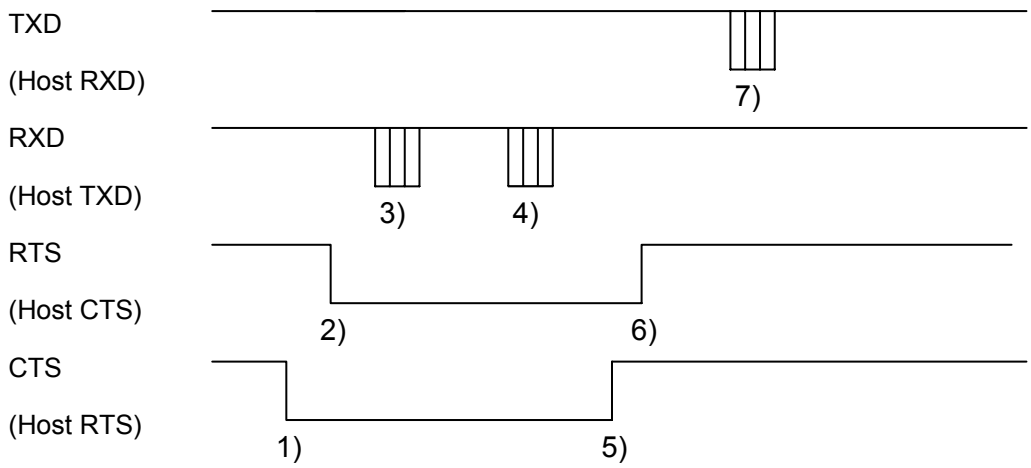


t: setting value of Host Character Time-out

1) The host system sets RTS signal to L-level for transmission.
2) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to L-level.
3) The host system, after confirming that CTS signal has been set to L-level, transmits command data packets.
   The host system suspends the packet transmission for once and sets RTS signal to H-level. In this case, this scan engine does not detect that CTS signal has been set to H-level so that RTS signal stays at L-level. Therefore, it will continue to be ready for the data packet reception. However, the host system needs to restart transmission of data packets within the setting value of “Host Character Time-out”.
4) This scan engine takes time-out of the data packet receiption and sets back RTS signal to H-level.
5) This scan engine sends out the NAK response.

Note: When ACK/NAK protocol is not selected, the sequence described in 6) shall not occur.

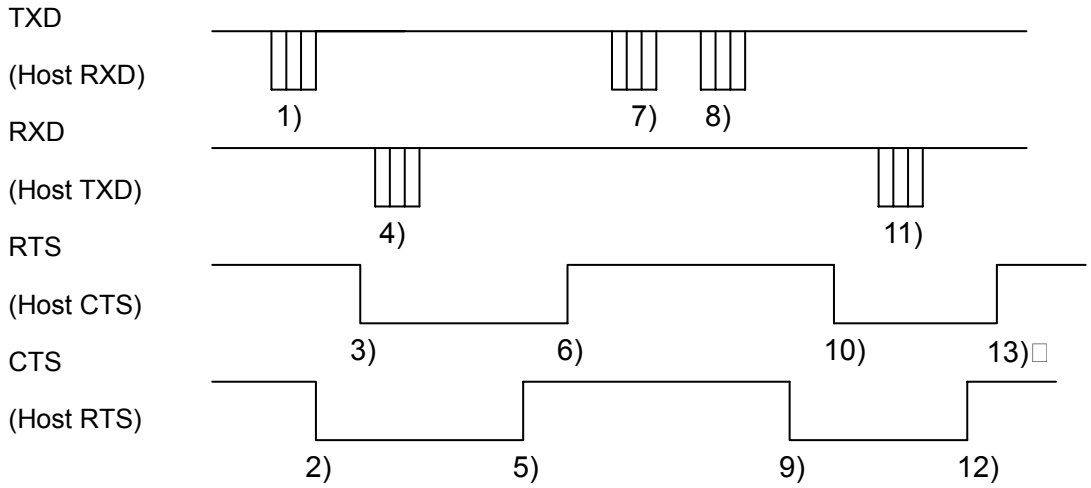
(6) Error: Duplicated command data transmission from the host system to this scan engine



1) The host system sets RTS signal to L-level for transmission.
2) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to L-level.
3) The host sytem, after confirming that CTS signal has been set to L-level, transmits a command data packet.
4) The host system repeatedly transmits same command data packets.
5) The host system sets back RTS signal to H-level.
6) This scan engine detects that CTS signal has been set back to H-level and sets back RTS signal to H-level.
7) The scan engine responses ACK only to the command data packet of 3).

Note: When ACK/NAK protocol is not selected, the sequence described in 7) shall not occur.

(7) Suspension of data transmission



1) This scan engine is transmitting the data.
2) The host system sets RTS signal to L-level for the command data packet transmission.
3) This scan engine, after confirming that CTS signal has been set to L-level, suspends data transmission and sets RTS signal to L-level.
4) The host system, after confirming that CTS signal has been set to L-level, transmits command data packets.
5) The host system sets back RTS signal to H-level.
6) This scan engine, after confirming that CTS signal has been set to H-level, sets back RTS signal to H-level.
7) This scan engine responses to the command data packet.
8) This scan engine retransmits the data suspened in 1)
9) The host system sets RTS signal to L-level to send response to the data being sent.
10) This scan engine detects that CTS signal has been set to L-level and sets RTS signal to L-level.
11) The host system send out the response.
12) The host system sets back RTS signal to H-level.
13) This scan engine detects that CTS signal has been set back to H-level and sets back RTS signal to H-level.

Note: When ACK/NAK protocol is not selected, the sequence described in 7) and from 9) to 13) shall not occur.

3-6. ACK/NAK Protocol and Data Format

(1) Command Data Packets (from the host system to this scan engine)

The command data sent out from the host system shall be in the command packet format defined separately in this specification.
It is possible to enable or disable ACK or NAK response changing the settings of “Software Handshaking”.
To configure exact settings, it is recommendable to control transmission of ACK and NAK responses with “Enable ACK/NAK.

(2) Transmission of Decoded Data (from this scan engine to the host system)

In transmitting decoded data from this scan engine, it is possible to choose between the packet format and unpacket format.
Also, it is possible to control transmission of ACK and NAK responses by setting ”Software Handshaking”.

1) Packet Data with ACK/NAK Control
Decoded data will be transmitted in the packet format. (Refer to 4-2-6)
After transmission of the decoded data, this scan engine waits for the response from the host system.
When the response time for the host system runs out, the host system retries transmission of responses twice. However, if it fails in transmission after those retrying, transmission is deemed as error and it discards the response data.

2) Unpacket Data with ACK/NAK Control
This scan engine only transmits the result of decoding (including pre/suffix) and shall not wait for the response of the host system.
However, the response to the command data packet shall be sent.

3) Packet Data without ACK/NAK Control
Decoded data shall be transmitted in packet format. However, this scan engine shall not wait for the response of the host system.

4) Unpacket Data without ACK/NAK Control
This scan engine only transmits the result of decoding (including pre/suffix) and shall not wait for the response of the host system.

3-7. Packet Format

This Chapter Provides the Information on Packet Format.

Length	Operation Code	Message Source	Status	Data	Checksum

The details on data packet format are as follows:

Field Name	Format	Sub-Field	Function
Length	1 Byte	Length	The length of a packet excluding Checksum.
Operation Code	1 Byte	Refer to pg 4	Packet ID
Message Source	1 Byte	00 : Module 04 : Host	Identifies where the data packets come from.
Status	Bit 0	Retransmit	0: First time for the data packet to be sent 1: Subsequent Transmission
	Bit 1	Continuation	0: The last data packet of multi packet. 1: The middle data packet of multi packet.
	Bit 2	Reserved	Always set to 0
	Bit 3	Change Type	0: Temporary Changes 1: Nonvolatile Changes
	Bit 4 to 7		Always set to 0
Data	Variable Length		Data filed of individual data packet
Checksum	2 Bytes		Two's complement sum of message contents (from Length to Data Field). Data sent as high byte followed by low bite.

4. PACKET

4-1. Data Packet Table

Table of data packet sent in and out between this scan engine and the host system:
H: the host system, M: this scan engine

Name	Message Source	Opcode (Hex)	Function
AIM_OFF	H	C4	Aiming Off
AIM_ON	H	C5	Aiming On
BEEP	H	E6	Buzzer On
CMD_ACK	H,M	D0	ACK Response
CMD_NAK	H,M	D1	NAK Response
DEC_DATA	M	F3	Decoded Data
EVENT	M	F6	Event Reporting
LED_OFF	H	E8	Indicator LED Off
LED_ON	H	E7	Indicator LED On
PARAM_DFLT	H	C8	Set all the parameter default values.
PARAM_REQ	H	C7	Request for Current Parameter Setting Data
PARAM_DATA	H,M	C6	Parameter Data
REPLY_REV	M	A4	Version Data of the Scan Engine
REQ_REV	H	A3	Request for Version Data
SCAN_DIS	H	EA	Disable Scanning
SCAN_ENB	H	E9	Enable Scanning
SLEEP	H	EB	Request to Shift to Low Power Mode
START_DEC	H	E4	Start Decoding
STOP_DEC	H	E5	Stop Decoding

4-2. Details on Data Packet

4-2-1 AIM_OFF

- Function: Aiming Off

Length	Operation Code	Message Source	Status	Checksum
04	C4	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum.
Operation Code	C4	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: Retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Turn off the Aiming pattern.

4-2-2. AIM_ON

- Function: Aiming On

Length	Operation Code	Message Source	Status	Checksum
04	C5	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum.
Operation Code	C5	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Turn on the Aiming pattern.

Aiming can be controlled by this command data packet only when the Trigger Mode is in the "HOST". Other than that, it will be responded with NAK.

This command is to turn on the aiming and it is not a command to activate actual scanning (decoding).

4-2-3. BEEP

Function: Turn on the Buzzer

Length	Operation Code	Message Source	Status	Beep Code	Checksum
05	E6	04			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum.
Operation Code	E6	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: Bit1: Unused		
Beep Code			Beep Type ID
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Sound a buzzer.
Length, frequency, patterns, number of times of buzzer are as follows:

Beep Code	Length	Frequency	No. of Time	Beep Code	Length	Frequency	No. of Time
00	Short	High	1	OD	Long	High	4
01	Short	High	2	0E	Long	High	5
02	Short	High	3	0F	Long	Low	1
03	Short	High	4	10	Long	Low	2
04	Short	High	5	11	Long	Low	3
05	Short	Low	1	12	Long	Low	4
06	Short	Low	2	13	Long	Low	5
07	Short	Low	3	14	Fast Repeat	Hi-Lo-Hi-Lo	4
08	Short	Low	4	15	Slow Repeat	Hi-Lo-Hi-Lo	4
09	Short	Low	5	16	Mix 1	Hi-Lo	2
0A	Long	High	1	17	Mix 2	Lo-Hi	2
0B	Long	High	2	18	Mix 3	Hi-Lo-Hi	3
0C	Long	High	3	19	Mix 4	Lo-Hi-Lo	3

4-2-4. CMD_ACK

- Feature: ACK

Length	Operation Code	Message Source	Status	Checksum
04	D0			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum.
Operation Code	D0	1	Packet ID
Message Source	0:Module 4:Host	1	From The Host System to This Scan Engine and vice versa
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Acknowledgement for command data.

4-2-5. CMD_NAK

- Feature: NAK

Length	Operation Code	Message Source	Status	Cause	Checksum
04	D1				

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum.
Operation Code	D1	1	Packet ID
Message Source	0:Module 4:Host	1	From The Host System to This Scan Engine and vice versa
Status	Bit0: retransmit Bit1: Unused	1	
Cause	Reason code	1	0 : Reserved 1: Checksum failure 2: Illegal Operation Code or Format 6: Other negative acknowledgement Others: Reserved
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Negative acknowledgement for command data.

4-2-6. DEC_DATA

- Feature: Decode Data

Length	Operation Code	Message Source	Status	Bar Code type	Decoded Data	Checksum
	F3	00				

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	F3	1	Packet ID
Message Source	0:Module	1	From The Host System to This Scan Engine and vice versa
Status	Bit0: retransmit Bit1: Unused	1	
Bar code Type	Refer to the Table 4-2-6	1	Barcode ID
Decoded Data	data	Variable	Decoded data in ASCII
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Data packed to output decoded data.

Table 4-2-6: Code Type (HEX)

Undefined	00	MSI/Prssy	0E
Code 39	01	EAN128	0F
Codabar（NW7）	02	UPC E1	10
Code128	03	UPC E1 with 2-digit Supplemental	50
Industrial 2of5	04	UPC E1 with 5-digit Supplemental	90
(Reserved)	05	Code 39 Full ASCII	13
Interleaved 2of5	06	Trioptic Code39	15
Code 93	07	Bookland EAN	16
UPC A	08	(Reserved)	17
UPC A with 2-digit Supplemental	48	Code 32(Italian Pharma Code)	20
UPC A with 5-digit Supplemental	88	RSS Limited	23
UPC E	09	RSS-14	24
UPC E with 2-digit Supplemental	49	RSS Expanded	25
UPC E with 5-digit Supplemental	89		
EAN 8	0A		
EAN 8 with 2-digit Supplemental	4A		
EAN 8 with 5-digit Supplemental	8A		
EAN 13	0B		
EAN 13 with 2-digit Supplemental	4B		
EAN 13 with 5-digit Supplemental	8B		

4-2-7. EVENT

- Feature: Indicates the occurrence of following events.

Length	Operation Code	Message Source	Status	Event Code	Checksum
05	F6	00			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	F6	1	Packet ID
Message Source	0:Module	1	From This Scan Engine to The Host System
Status	Bit0: retransmit Bit1: Unused	1	
Event Code	Refer to the Table 4-2-7	1	Event Code
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Table 4-2-7: Event Code

Event	Function	Event Code (Hex)	Parameter (Hex)
Decode	Completion of Decoding	01	F0 00
Boot Up	System Power-UP This event indicates Power-up of this scan engine.	03	F0 02
Parameter	Event codes shall be output as the following events occur.		F0 03
	Parameter menu "Error in Input"	07	
	Parameter menu "Completion of Scanning"	08	
	Either of following events: Completion of scanning a parameter menu bar code of which values need to be set by scanning numeric bar codes. Completion of scanning numeric bar codes.	0F	

EVENT data shall be transmitted only when it is enabled by setting specific parameter.

4-2-8. LED_OFF

- Feature: Deactivate indicator LED

Length	Operation Code	Message Source	Status	LED Selection	Checksum
05	E8	04		01	

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	E8	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
LED Selection	Bit0-7 : LED NO.	1	Bit:0 Decode LED Other bits are undefined.
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-9. LED_ON

- Feature: Activate indicator LED

Length	Operation Code	Message Source	Status	LED Selection	Checksum
05	E7	04		01	

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	E7	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
LED Selection	Bit0-7: LED NO.	1	Bit:0 Decode LED Other bits are undefined.
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-10. PARAM_DFLT

- Feature: Sets back all parameters and settings to their factory default values.

Length	Operation Code	Message Source	Status	Checksum
04	C8	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	C8	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-11. PARAM_REQ

- Feature: Request current values of parameters

Length	Operation Code	Message Source	Status	Request Data	Checksum
05	C7	04			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	C7	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Request Data	<pn><pn><pn>..	Variable	Selects Parameter number. 0xFE selects all parameters
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-12. PARAM_DATA

- Feature: Values of parameters

Length	Operation Code	Message Source	Status	Checksum
	C6			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	C6	1	Packet ID
Message Source	0:Module 4:Host	1	From The Host System to This Scan Engine (setting) From This Scan Engine to The Host System (Response to PARM_REQ)
Status	Bit0: retransmit Bit1: Unused Bit3: Change Type	1	Bit3 : 0: Temporary Changes 1: Nonvolatile Changes Unused bits must be set this field to 0
Beep Code	Refer to “Beep” Command	1	Enables BEEP If beep is not required, set this field to FF
Param Data	Refer to pg 5	Variable	
Checksum		2	Two’s complement sum of message contents (from Length to Data Field).

Param_data shall be in either of the following data format:
<pn><Value>
or
<extended pn><pn offset><value>
Refer to Chapter 5. Parameter for the detailed information Parameters.

- It is possible to assign multiple parameters for Param_data field.
  e.g.) 80008A085E01
  8000：Power Mode Continuous
  8A08：Trigger Mode Host
  5E01: “NO READ” Message Enable
  If the parameter IDs or the values are unsupported (illegal), this scan engine shall ignore those parameters but respond ACK to the command data.

4-2-13. REPLY_REV

- Feature: Provides software revision data of this scan engine

Length	Operation Code	Message Source	Status	Revision	Checksum
	A4	00			

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	A4	1	Packet ID
Message Source	0:Module	1	From This Scan Engine to The Host System
Status	Bit0: retransmit Bit1: Unused	1	
Revision	Data		Version ID
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-14. REQ_REV

- Feature: Request software revision data of this scan engine

Length	Operation Code	Message Source	Status	Checksum
04	A3	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	A3	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-15. SCAN_DIS

- Feature: Disables scanning bar codes

Length	Operation Code	Message Source	Status	Checksum
04	EA	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	EA	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

When this scan engine receives this command, it shall ignore all trigger or START_DEC requests.

4-2-16. SCAN_ENB

- Feature: Enable scanning bar codes

Length	Operation Code	Message Source	Status	Checksum
04	E9	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	E9	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Permits scanning operation which has been disabled by SCAN_DIS.
Scanning is enabled upon power-up. Therefore, this command need only be send if a prior SCAN_DISABLE command has been sent.

4-2-17. SLEEP

- Feature: Request to start low power operation.

Length	Operation Code	Message Source	Status	Checksum
04	EB	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	EB	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

4-2-18. START_DEC

- Feature: Start Decoding

Length	Operation Code	Message Source	Status	Checksum
04	E4	04		

Field	Format	Size (Byte)	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	E4	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Start decoding operation.
When TRIGGER_MODE parameter is set to HOST, Trigger signals shall be ignored and only this parameter shall be valid.

4-2-19. STOP_DEC

- Feature: Stop Decoding

Length	Operation Code	Message source	Status	Checksum
04	E5	04		

Field	Operation Code	Message Source	Function
Length	Length	1	The length of a packet excluding checksum
Operation Code	E5	1	Packet ID
Message Source	4:Host	1	From The Host System to This Scan Engine
Status	Bit0: retransmit Bit1: Unused	1	
Checksum		2	Two's complement sum of message contents (from Length to Data Field).

Stop decoding action operation.
Just like START_DEC, this is valid only when TRIGGER_MODE is set to HOST.

5. PARAMETER

5-1 Table of Parameters

The following is list of parameters send out in PARM_DATA

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
BEEP Volume	8C	00 03 09	Low Mid. High	○
BEEP Frequency	91	02 01 00	Low Mid. High	○
BEEP Frequency (Value Setting)	F0 91	Value	Setting Range: 1220Hz-3770Hz Step 10Hz	2500Hz
Decoding Time	88	Value	Setting Range: 0.5sec-9.9sec Step 0.1sec	3.0sec
Aiming Delay	ED	Value	Setting Range: 0.0sec-9.9sec Step 0.1sec	0.0sec
Scan Angle	BF	05 06	Narrow Wide	○
Power Mode	80	00 01	Continuous Low Power	○
Trigger Mode	8A	00 02 04 07 08 09	Level Pulse Continuous Reserve Host Decode while trigger signal is active	○
Duplication Buffer Time-out	89	Value	Setting Range: 0.0sec～9.9sec Step 0.1sec	1.0sec
Good Decode Beep	38	01 00	Enable Disable	○
“NO READ” message	5E	01 00	Enable Disable	○
Check Level (Linear Code applicable to Codabar/MSI/D.2of5 and i.2of5)	4E	01 02 03 04	Level 1 Level 2 *Refer to “5-2-5. Linear Code” Level 3 for the details of each level. Level 4	○
Verification Method	43	01 00	Sequential Verification based on results of bi-directional scanning. Interval Verification based on the result of scanning in one direction	○

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
Decoding UPC-A	01	00 01	Disable Enable	 ○
Decoding UPC-E	02	00 01	Disable Enable	 ○
Decoding UPC-E1	0C	00 01	Disable Enable	○
Decoding EAN-8	04	00 01	Disable Enable	 ○
Decoding EAN-13	03	00 01	Disable Enable	 ○
Decoding Bookland EAN	53	00 01	Disable Enable	○
UPC/EAN Supplemental	10	01 00 02 04 05 03 06	Decode Disable Auto Discriminate Enable 378/379 Enable 978 Enable Smart Supplemental Mode Enable 491	○
UPC/EAN Supplemental Data Consistency Verification	50	Value	Refer to “5-2-6 Supplemental Data Consistency Verification”	7
Transmit UPC-A Check Digits	28	00 01	Disable Enable	 ○
Transmit UPC-E Check Digits	29	00 01	Disable Enable	 ○
Transmit UPC-E1 Check Digits	2A	00 01	Disable Enable	 ○
UPC-A Preamble	22	00 01 02	<DATA> <SYSTEM CHARACTER><DATA> <COUNTRY CODE><SYSTEM CHARACTER> <DATA>	○
UPC-E Preamble	23	00 01 02	<DATA> <SYSTEM CHARACTER><DATA> <COUNTRY CODE><SYSTEM CHARACTER> <DATA>	○
UPC-E1 Preamble	24	00 01 02	<DATA> <SYSTEM CHARACTER><DATA> <COUNTRY CODE><SYSTEM CHARACTER> <DATA>	○
Convert UPC-E to UPC-A	25	00 01	Disable Enable	○
Convert UPC-E1 to UPC-A	26	00 01	Disable Enable	○

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
EAN Zero Extend	27	00 01	Disable Enable Add 5 digits of “0” before EAN-8 code.	○
Convert EAN-8 to EAN-13	E0	00 01	Disable Enable When “EAN Zero Extend” is enabled, the code ID will be specified as EAN-13 after the conversion	○
UPC/EAN Checkup	4D	00 01 02 03	Level 0 Level 1 *Refer to “5-2-5. UPC/EAN” Level 2 for the details of each level. Level 3	○

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
Decoding of Code 128	08	00 01	Disable Enable	 ○
Decoding of EAN-128	0E	00 01	Disable Enable	 ○
Decoding of Code 39	00	00 01	Disable Enable	 ○
Decoding of Trioptic Code 39	0D	00 01	Disable Enable	○
Covert Code 39 to Code 32 (Italian Pharma Code)	56	00 01	Disable Enable	○
Code 32 Prefix	E7	00 01	Disable Enable	○
Fix Length of Code 39	12（L1） 13（L2）	Value	Refer to “5-2-1. Setting the Length of Bar Codes”	2-49
Code 39 Check Digits	30	00 01	Disable Enable	○
Transmit Code 39 Check Digits	2B	00 01	Disable Enable	○
Enable/Disable Code 39 Full ASII	11	00 01	Disable Enable	○
Decoding of Code 93	09	00 01	Disable Enable	○
Fix Length of Code 93	1A（L1） 1B（L2）	Value	Refer to “5-2-1. Digit Number Setting”	4-55
Decoding of Interleaved 2of5	06	00 01	Disable Enable	 ○
Fix Length of Interleaved 2of5	16（L1） 17（L2）	Value	Refer to “5-2-1. Digit Number Setting”	14
Interleaved 2of5 Check Digits	31	00 01 02	Disable USS Check Digits OPCC Check Digits	○
Transmit Interleaved 2of5 Check Digits	2C	00 01	Disable Enable	○
Convert I.2of5 to EAN-13	52	00 01	Disable Enable	○
Decoding of Industrial 2of5	05	00 01	Disable Enable	○
Fix Length of Industrial 2of5	14（L1） 15（L2）	Value	Refer to “5-2-1. Digit Number Setting”	12
Decoding of Codabar (NW7）	07	00 01	Disable Enable	○
Fix Length of Codabar (NW7）	18（L1） 19（L2）	Value	Refer to “5-2-1. Digit Number Setting”	5-55

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
Codabar CLSI Editing	36	00 01	Eliminate Start/Stop Character and Insert space (20H) after the first, fifth and tenth digits. *Eliminate Start/Stop Characters only when it is 14-digit bar code.	○
No Transmit Codabar Start/Stop Character	37	00 01	Disable Enable	○
Decoding of MSI/Plessey	0B	00 01	Disable Enable	○
Fix Length of MSI/Plessey	1E（L1） 1F（L2）	Value	Refer to “5-2-1. Digit Number Setting”	6-55
MSI/Plessey Check Digits	32	00 01	One Check Digit Two Check Digits	○
Transmit MSI Check Digits	2E	00 01	Disable Enable	○
MSI Check Digit Algorithm	33	00 01	Mod10/Mod11 Mod10/Mod10 *Only valid when the Check Digits are in 2 digit numbers.	○
Decode of RSS-14	F0 52	00 01	Disable Enable	○
Decode of RSS-Limited	F0 53	00 01	Disable Enable	○
Decode of RSS-Expand	F0 54	00 01	Disable Enable	○
Transmit Code ID	2D	00 01 02	Disable AIM Specification Symbol Technologies Specification	○
Prefix/Suffix Value	69 (P) 68（S1） 6A (S2)	Value	P: prefix S1: suffix1 S2: suffix2 Value is specified in ASCII codes	NULL LF CR
Data Transmission Format	EB	00 01 02 03 04 05 06 07	<data> Data Only <data><suffix1> <data><suffix2> <data><suffix1><suffix2> <prefix><data> <prefix><data><suffix1> <prefix><data><suffix2> <prefix><data><suffix1><suffix2>	○

Name	Parameter NO.(Hex)	Value (Hex)	Function	Default
Baud Rate	9C	01 02 03 04 05 06 07 08 10 11	300 600 1200 2400 4800 9600 19200 38400 57600 115200	○
Parity	9E	00 01 02 03 04	Odd Even Reserve Reserve None	○
Software Handshaking	9F	00 01	Disable ACK/NAK Enable ACK/NAK	○
Data Packet Format	EE	00 01	Disable（Raw Data） Enable (Packet Data)	○
Response Timeout	9B	Value	Setting Range: Zero(0sec)－9.9sec Step 0.1sec	2.0sec
Stop Bit	9D	01 02	1bit 2bit	○
Intercharacter Delay	6E	Value	Setting Range: 0－99msec Step 1msec	0 sec
Host Character Time-out	EF	Value	Setting Range: 10ms－990ms Step 10ms	200m sec
Decode Event	F0 00	00 01	Disable Enable	○
Boot-UP Event	F0 02	00 01	Disable Enable	○
Parameter Event	F0 03	00 01	Disable Enable	○
Parameter Scan (Disable or Enable scanning of menu bar codes.)	EC	01 00	Disable Enable	○

5-2 Common Elements to All Parameters

5-2-1. Fixing the Length of Bar Codes

(1) Fixing to One Discrete Length
L1<Number of Digits>L2<00>
(2) Fixing to Two Discrete Lengths
L1< Number of Digits A>L2< Number of Digits B>
(3) Fixing to Length within a Range
L1<Minimum Length>L2<Maximum Length>
(4) Fixing to Any Length
L1<00>L2<00>

5-2-2. Value Settings

When directly inputting values, input must be done using binary data.
e.g. It is programmable in 0.1 second increments so if the decode processing time is 2 seconds, it needs to be input as 20(0x14).

5-2-3. Timing to Reflect the Changes to New Parameters

If Baud Rate, Stop, Bits, Parity, Response Time-out, ACK/NAK Handshake are changed using PARAM_SEND, the ACK responses to the PARAM_SEND uses the previous values for these parameters. The new values then take effect from the subsequent transaction.

5-2-4. Linear Code Consistency Verification

- Linear Security Level 1 (Default Setting Value)
  The following types of linear codes must be successfully read twice before transmission.

Symbology	Length
Codabar(NW-7)	All
MSI	4 digits or less
Industrial 2 of 5	8 digits or less
Interleaved 2 of 5	8 digits or less

- Linear Security Level **2**
  All types of linear codes must be successfully read twice before transmission.

- Linear Security Level 3
  The following types of linear codes must be successfully read three times before transmission.
  Any other types of codes must be successfully read twice before transmission.

Symbology	Length
MSI	4 digits or less
Industrial 2 of 5	8 digits or less
Interleaved 2 of 5	8 digits or less

- Linear Security Level 4
  All types of linear codes must be successfully read three times before transmission.

5-2-5. UPC/EAN Consistency Verification

- Level0 (Default Setting Value)
  There will be no consistency verification before transmission.

- Level1
  UPC, EAN, and JAN bar codes must be successfully read twice before transmission.
  (1 consistency checkup)

- Level2
  UPC, EAN, and JAN bar codes must be successfully read three times before transmission.
  (2 consistency checkups)

- Level3
  UPC, EAN, and JAN bar codes must be successfully read four times before transmission.
  (3 consistency checkups)

5-2-6. UPC and EAN Supplemental Data Consistency Verification

With “Auto Discriminate” of “Decoding of UPC and EAN Code Supplemental Data” selected, this option adjusts the number of times a symbol without supplementals will be decoded before transmission. The range is from 2 to 20 times. Five or above is recommended when decoding a mix of UPC and EAN symbols with and without supplemental Data with “Auto Discriminate” option is selected. (Default Setting is 7 times.)

5-2-7. Decoding of UPC, EAN and JAN Supplemental Data

By setting parameter values (0x10), it is feasible to control the decoding of supplemental data as follows:

- Disable(0x00) … values in ( ) indicates default setting values
  This setting enables the decoding of UPC, EAN and JAN bar codes with or without supplemental data. It enables the decoding of UPC, EAN and JAN bar codes with supplemental data but the supplemental data code shall not be transmitted.

- Decode(0x01)
  This setting enables the decoding of UPC, EAN and JAN bar codes with supplemental data. It does not enable the decoding of UPC, EAN and JAN bar codes without supplemental data.

- Auto Discriminate(0x02)
  With this setting, It automatically discriminates UPC, EAN and JAN bar codes with and without supplemental data and enables the decoding.

- Enable 378/379/978/491(0x03)
  This setting enables the decoding only when those bar codes with supplemental data start with “378”, “379”, "978” or “491”.
  In case with UPC, EAN and JAN bar codes with other supplemental data, this setting shall ignore those supplemental data.

- Enable 378/379(0x04)
  This setting enables the decoding only when EAN-13 bar codes start with “378” or “379”
  In case with UPC, EAN and JAN bar codes with other supplemental data, this setting shall ignore those supplemental data.

- Enable 978(0x05)
  This setting enables the decoding only when EAN-13 bar codes start with “978”.
  In case with UPC, EAN and JAN bar codes with other supplemental data, this setting shall ignore those supplemental data.

- Enable 491(0x06)
  This setting shortens JAN13 bar codes which start with “491” to 5 digits of supplemental data. (Used for decoding of bar codes on magazines).
  In case with UPC, EAN and JAN bar codes with other supplemental data, this setting shall ignore those supplemental data.

5-2-8. Code ID

With parameter 0x2D, a code ID character can be added.

・Symbol Technologies Specification IDs

ID	Symbology	ID	Symbology
A	UPC-A,UPC-E,UPC-E1,EAN-8,EAN-13	G	Industrial 2of5
B	Code39,Code32	J	MSI/Plessey
C	Codabar	K	UCC/EAN-128
D	Code128	L	Bookland EAN
E	Code93	M	Triopic Code39
F	Interleaved 2of5	R	RSS-14,RSS-Limited,RSS-Expand

・AIM Specification IDs *** CD stands for check digit**

Flag	Code Character	Symbology	Option Value	Option
	A	Code39	0 1 3 4 5 7	No CD processing of not in full ASCII format. CD checked and transmitted CD checked but not transmitted. Full ASCII Full ASCII and CD checked Full ASCII and CD checked but not transmitted.
	C	Code128	0 1 2	Standard Code 128 (Does not star with FNC1) EAN-128: Starts with FNC1 EAN-128: FNC1 after the first character.
	E	UPC/EAN	0 1 2 4	UPC-A/EAN-13: Full data with 13 digits** Supplemental data with 2 digits Supplemental data with 5 digits EAN-8 e.g.: Output of UPC-A with 5-digit supplemental data “0012345678905-12345” will be: **]E0**0012345678905**]E2**12345
	F	Codabar (NW7)	0 1	No CD processing CD checked.
	G	Code93	0	Always set to “0” (no other option)
	I	Interleaved 2of5	0 1 3	No CD processing CD checked CD checked but not transmitted
	M	MSI/Plessey	0 1	CD (Mod10) checked. CD (Mod 10) checked but not transmitted.
	S	Industrial 2of5	0	Always set to “0” (no other option)
	X	Code39 Trioptic/ Bookland EAN	0	Always set to “0” (no other option)
	e	RSS	0	Always set to “0” (no other option)

**AIM ID UPC-E and UPC-E1 will automatically be converted to UPC-A when decoded.

6. POWER MODE

Power modes are controlled by the power mode parameters and it enables to choose between “Continuous Power Mode” to “Low Power Mode”.

6-1. Continuous Power Mode

In Continuous Power Mode, this scan engine remains active after each decode attempt. It enables quicker response to the requests for trigger signal input and so on.

6-2. Low Power Mode

In Low Power Mode, this scan engine enters into low power consumption Idle state.
To recover from Low Power Mode, it needs to satisfy one of the following conditions:

(1) In case when CTS signal is set to L-level and the data transmission request is sent to the host system, this scan engine sets RTS signal to H-level and waits for the data to be transmitted.
If it was recovered from the Low Power Mode by changing CTS signal level, it must maintain the Idle state for a second after the data transmission.

(2) In case when the trigger signal is set to active, the decoding operation shall be restarted.
If the trigger mode is set to “Host”, decoding operation shall be set to “Pulse”.
If the trigger signal is still set to active after a completion of decoding or the decoding time-out, it shall not go back to the Low Power Mode.

(3) In case when AIM/WAKE signal is set to L-level, this scan engine puts aiming on and gets into Idle state.
If the input signal is set to “Pulse”, it sets back to the Low Power Mode in a second.
If the input signal is set to a level, it maintains Idle state while it is active.

> If it satisfies more than 2 of the fore-going conditions, signals input afterward may be ignored.
> Please input signals after confirming the recovery with the Power Down signal (see below).

6-3. Power Down Signal

Power Down signal outputs the level of power mood state of this scan engine.
If in the Low Power state, Power Down signal is set to H-level and if not, it is set to L-level.

7. TIMING CHARACTERISTICS

The following chat shows timing characteristics

Parameter	Symbol	Fig.	Min	Max	Unit
Power-ON Reset Time	tRst	1		2.5	ms
Power-ON Initialize Time (Note 1)	tInit	1		250	ms
Host RTS low to Module RTS low	tRl	2		20	ms
Command Execution time	tEx	2		30	ms
Host Transmit delay	tHd	2	0		ms
Host Transmit Hold time	tHh	2	0		ms
Module Response Delay	tTx	2		45	µs
Trigger Hold Time (Pulsed)	tAw	3	4		ms
Trigger Release Time (Level)	tHw	3	20		ms

*Note 1: While in Power-on Initialize Time, the command or trigger signals shall be ignored.

Fig.1 Power-on Sequence

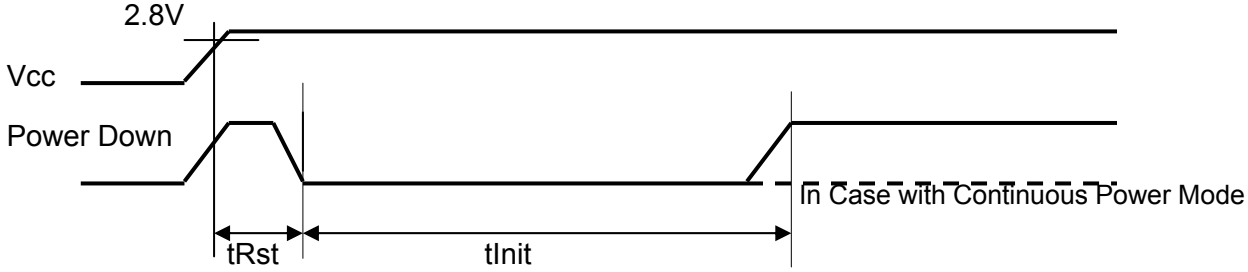


Fig.2 Command Sequence

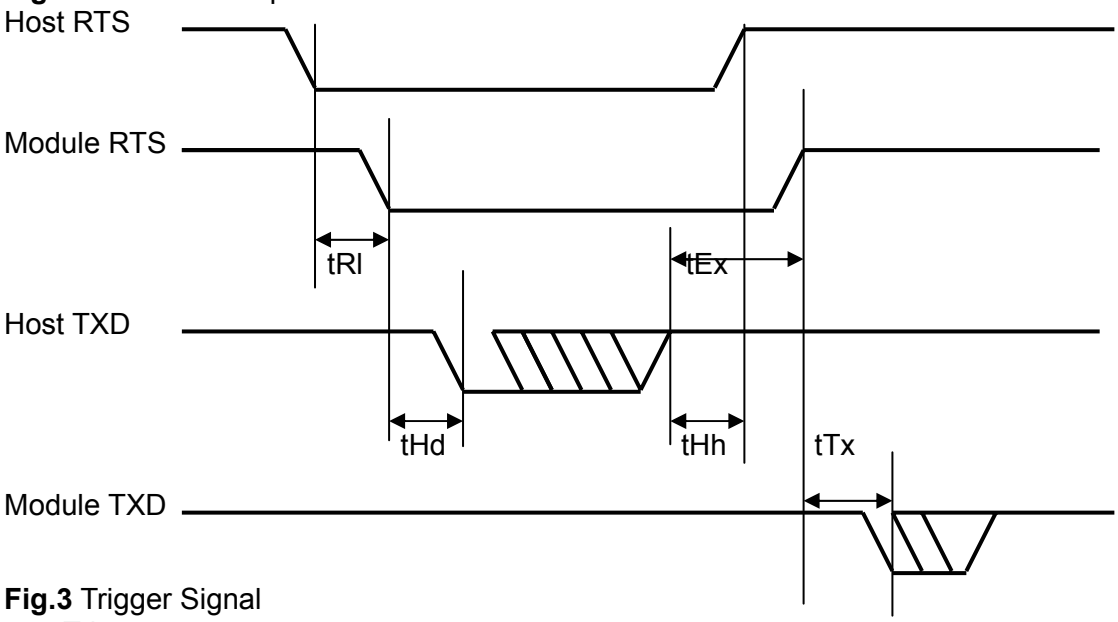
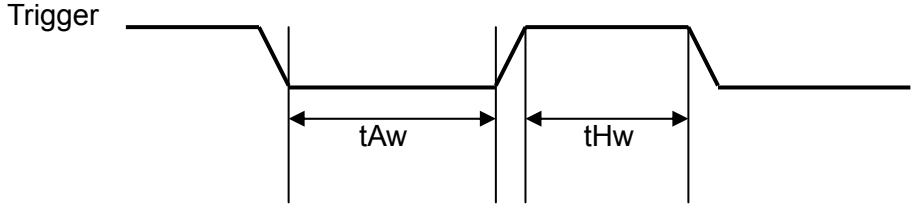


Fig.3 Trigger Signal



8. PARAMETER MENUS

8-1 Parameter Menu Bar Codes

Parameter menu bar codes are bar codes developed based on unique standards to program the feature of this scan engine.
Parameter menu bar codes are bar codes with features programmed. Therefore, it is possible to select or change features by simply scanning them. To set values, scan appropriate numeric bar codes on page 108.
These default values are stored in non-volatile memory and are preserved even when the scanner is powered down.

To reset everything to the factory default setting values, scan “Default Value” bar code.
In this chapter, the default values of parameter menu are indicated in figures with asterisk (*).

Figures with asterisk indicate default values

*Medium Noise (0x01)

Feature

8-2 Definition of Beeping Sound

When Scanning Normal Bar Codes	
Buzzer	Description
pip (Single Sound)	Completion of scanning. (Feasible to carry out a scanning of next bar code.)
trrr trrr trrr ⋯ (Continuous Sound)	Detection of an error in transmission of the scanned bar code. This buzzer goes on when the option is not appropriately set. Please confirm the option setting.

When Scanning Parameter Menu Bar Codes	
Buzzer	Description
pip (Single Sound)	Completion of scanning or the correct operation in accordance with the parameter menu was carried out.
peep (Single Sound)	Error in entries. Scanned wrong bar code. Scanned “Cancel” bar code. Parameter menu is invalidated.
pip pip pip ⋯ (Continuous Sound)	Program was completed correctly and changes in accordance with the parameter became effective.

8-3 Setting Features with Parameter Menu

Mostly, it is possible to set a parameter by scanning one bar code. For example, to increase the frequency of the beep sound, all needed is to scan ”High Frequency” bar code on page 49. If the parameter entry is successfully completed, a beep sound, which sounds like “pip pip pip”, will go on. To set the decoding time-out, it is necessary to scan more than one parameter menu bar codes. Its procedure is explained in this paragraph.

・Error in Scanning

Except as otherwise noted, the mistake in scanning operation can be fixed by re-scanning a correct parameter bar code.

8-4 Default Setting Parameters (0xC8)

In case of resetting the feature or resetting the values to factory default values, scan a parameter menu below.

*Default Setting

8-5 Parameter Scanning (0xEC)

To disable parameter scanning, scan “Disable Parameter Scanning” bar code shown below. Note that scanning of “Default Setting” parameter bar code is still feasible even after parameter scanning is disabled.
To enable parameter scanning, scan a bar code “Enable Parameter Setting” or “Default Setting”.


*Enable Parameter Scanning (0x01)


Disable Parameter Scanning (0x00)

8-6 Beep Volume（0x8C）

Scan any of bar codes listed below to set the volume of beep sound.


Low Volume（0x00）


*Medium Volume（0x03）


High Volume（0x09）

8-7 Beep Frequency（0x91）

Scan any of bar codes listed below to set the pitch (frequency) of beep sound.


Low Pitch Sound (0x02）


*Medium Pitch Sound (0x01)


High Pitch Sound（0x00）

8-8 Beep Frequency Adjustment（Value Setting）（OxF0 0x91）

These values are to adjust the frequency (pitch) of scanning beep sound. The value can be set from the minimum of 1220 Hz to the maximum of 3770 Hz. The value is programmable in 10 Hz increments. Default setting is at 2500 Hz.

To increase the frequency of beep noise, scan the bar code below and then scan 3 numeric bar codes listed on page 108 that correspond to the desired frequency adjustment. If the desired frequency value is only one or two digits, please scan “0” bar code first so that the value will be set in 3 digits.
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 of beep noise, scan the bar code below and then scan 3 numeric bar codes listed on page 108 that correspond to the desired frequency adjustment. If the desired frequency value is only one or two digits, please scan “0” bar codes first so that the value will be set in 3 digits.
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)

Adjustment of Beep Sound Frequency Values
（Default:2500Hz）

8-9 Scanning Time（0x88）

This parameter sets maximum time decode processing continues during a scan attempts. It is programmable in 0.1 second increments from 0.5 to 9.9 seconds. The default setting of the time out is 3.0 seconds.
To set scanning time, scan the bar code below and then scan 2 numeric bar codes on page 108 that correspond to the desired scanning time. If the desired value is a single digit number, it must have a leading zero. Please scan the “0” bar code first.
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 cancel and incorrect entry, scan “Cancel” bar code on page 108.

Decoding Time
（Default Setting: 3.0 Seconds）

8-10 Aiming Duration (0xED)

It is possible to set certain aiming duration before a scan attempt begins by activating Trigger Signal or a START_DEC command.
It is programmable in 0.1 second increments from 0.0 to 9.9 seconds. Default setting of aiming duration is set to 0.0 second.
To set an aiming duration, scan the bar code below and then scan 2 numeric bar codes on page 108 that correspond to the desired aiming duration. If the desired value is a single digit number, it must have a leading zero. Scan the “0” bar code first.
For example, to set an aiming duration of 0.5 seconds, scan the bar code below, then scan the “0” and “5” bar codes. To change or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Aiming Duration
(Default: 0.0 sec)

8-11 Scan Angle (0xBF)

This parameter sets the scan angle to narrow or wide.

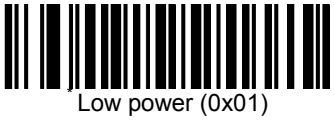
Narrow Angle（0x05）

*Wide Angle (0x06)

8-12 Power Mode (0x80)

This parameter determines the power mode of this scan engine after scanning operation.
In Low Power mode, this scan engine goes back to the low power state after a completion of scanning operation. Therefore, the battery life shall be longer.
In continuous power mode, the power status shall be remained after a completion of scanning operation.
In case where the power supply comes from a device which uses batteries for its own power supply, please set the power mode to “Low Power”.


Sequential (0x00)


Low power (0x01)

8-13 Trigger Mode (0x8A)

Scan the appropriate bar code below to trigger the scan engine.

Level:
In this mode, scanning starts when Trigger signal is set to L-level.
Scanning ends either when Trigger signal is set to H-level, scanning is not completed within the time-out period, or scanning attempt is successfully completed.

Pulse：
In this mode, scanning starts when Trigger signal is set to L-level.
Scanning ends either when scanning attempt is successfully completed or scanning is not completed within the time-out period.

Continuous：
In this mode, the laser stays on and decoding. After a decoding and an output of the bar code data is completed, it is possible to decode the same bar code again but it does not output the data again.

Host:
In this mode, scanning starts with START_DEC command.
Scanning ends either when scanning attempt is successfully completed or scanning is not completed within the time-out period.

Decode While Trigger Signal is Active：
This mode is almost the same as Level mode. However, there is no time-out limitation with this mode.
Scanning ends either when scanning attempt is successfully completed or trigger signal is set to H-level.

While in Host mode, scanning shall not be started by Trigger signal. However, if it was recovered from low power state with the Trigger signal, scanning can start with Trigger signal. This operation is similar to that of Pulse mode.


*Level (0x00)


Pulse (0x02)


Continuous (0x04)


Host（0x08）

Decode While Trigger Signal is Active（0x09）

8-14 Duplication Buffer Time-out (0x89）

This parameter sets the minimum time that must elapse before the scanner decodes a second bar code identical to the one just decoded. It is programmable in 0.1 second increments from 0.0 to 9.9 seconds.
To set a time-out, scan the bar code below and then scan 2 numeric bar codes on page 108. If the desired value is a single digit number, it must have a leading zero. Scan the “0” bar code first.
For example, to set a time-out of 0.5 seconds, scan the bar code below, then scan the “0” and “5” bar codes. To change the change or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Duplication Buffer Time-out
(Default: 1.0 sec)

8-15 Good Decode Buzzer (0x38)

Scan the bar code “Enable” to set the scanner to beep after a successful decode.

*Enable Buzzer（0x01）

Scan the bar code “Disable” to set the scanner not to beep after a good decode. The beeper still operates during parameter menu scanning and indicates error conditions.

Disable Buzzer（0x00）

8-16 “NO READ” Message (0x5E）

This parameter enables or disables transmission of “No Read” message.
When this parameter is set to “Enable”, “NR” message shall be sent to the host if a decoding attempt is not successfully done during the timeout period.
Any enabled prefixes of suffixes are appended around this message.
When this parameter is set to “Disable”, no massage shall be sent to the host even if a decoding attempt fails.


Enable No Read (0x01)


*Disable No Read (0x00）

8-17 Level of Linear Code Consistency Verification (0x4E)

This parameter offers 4 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 the security levels increase, the scanner's aggressiveness decreases. Select the security level suitable for the bar code quality.

Note: Symbols such as UPC or EAN are not applicable to this parameter.

Linear Security Level 1

The following types of linear codes must be successfully read twice before transmission.

Symbology	Length
Codabar(NW-7)	All
MSI	4 digits or less
Industrial 2 of 5	8 digits or less
Interleaved 2 of 5	8 digits or less

*Level 1 (0x01)

Linear Security Level 2

All types of linear codes must be successfully read twice before transmission.

Level 2 (0x02)

Linear Security Level 3

The following types of linear codes must be successfully read three times before transmission.
All the other types of linear codes must be successfully read twice before transmission.

Symbology	Length
MSI	4 digits or less
Industrial 2 of 5	8 digits or less
Interleaved 2 of 5	8 digits or less

Level 3 (0x03)

Linear Security Level 4

All types of linear codes must be successfully read three times before being decoded.

Level 4 (0x04)

8-18 Verification Method (0x43)

This parameter is only valid when a Linear Code Type Security Level is enabled.
When this parameter is set to “Sequential”, bar codes must be successfully scanned in both directions.
When this parameter is set to “Interval”, bar codes must be successfully scanned only in one direction.


Sequential (0x01)


*Interval (0x00)

8-19 UPC/EAN

This parameter enables or disables scanning of UPC and EAN bar codes. It also determines the output format of such bar codes.

8-19-1 Enable/Disable UPC-A (0x01)

Scan the appropriate bar code below to enable or disable UPC-A.

*Enable UPC-A (0x01)

Disable UPC-A (0x00)

8-19-2 Transmit UPC-A Check Digits（0x28）

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

*Enable Transmission of UPC-A Check Digits (0x01)

Disable Transmission of UPC-A Check Digits (0x00)

8-19-3 UPC-A Preamble (0x22)

After scanning of a UPC-A bar code, preamble characters (Country Code and System character) can be added before the bar code data. The Country Code value shall be fixed to “0”. Such preamble data is transmitted as a part of a UPC-A bar code. Select one of the following options for transmitting UPC-A preamble characters to the host.


Without Preamble Characters (0x00) - (<Data>)


*System Character (0x01) - (<System Character><Data>)


System Character and Country Code (0x02) - (<Country Code><System Character><Data>)

8-19-4 Enable/Disable UPC-E (0x02）

Scan the appropriate bar code below to enable or disable UPC-E.

*Enable UPC-E (0x01)

Disable UPC-E (0x00)

8-19-5 Transmit UPC-E Check Digits (0x29)

Scan the appropriate bar code below to transmit bar code data with or without UPC-E Check Digits.

*Enable Transmission of UPC-E Check Digits（0x01）

Disable Transmission of UPC-E Check Digits（0x00）

8-19-6 UPC-E Preamble (0x23)

After scanning of a UPC-E bar code, preamble characters (Country Code and System character) can be added before the bar code data. The Country Code value shall be fixed to “0”. Such preamble data is transmitted as a part of a UPC-E symbol. Select one of the following options for transmitting UPC-E preamble characters to the host.

Without Preamble Characters (0x00)
(<Data>)

*System Character (0x01)
(<System Character><Data>)

System Character and Country Code (0x02)
(<Country Code><System Character><Data>)

8-19-7 Convert UPC-E to UPC-A (0x25)

When setting this parameter to “Enable”, UPC-E decoded data shall be converted into UPC-A format before transmission. In this case, transmission of UPC-A preamble characters and check digits shall be done as separately specified.
When setting this parameter to “Disable”, UPC-E decoded data shall not be converted into UPC-A format and shall be transmitted as it is.


Enable Conversion of UPC-E to UPC-A (0x01)


*Disable Conversion of UPC-E to UPC-A (0x00)

8-19-8 Enable/Disable UPC-E1 (0x0C)

Scan the appropriate bar code below to enable or disable UPC-E1.
Note: UPC-E1 is not a UCC (Uniform Code Council) approved Symbology.


Enable UPC-E1 (0x01)


*Disable PC-E1 (0x00)

8-19-9 Transmit UPC-E1 Check Digits (0x2A)

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

*Enable Transmission of UPC-E1 Check Digits (0x01)

Disable Transmission of UPC-E1 Check Digits (0x00)

8-19-10 UPC-E1 Preamble (0x24)

After scanning of a UPC-E1 bar code, preamble characters (Country Code and System character) can be added before the bar code data. The Country Code value shall be fixed to “0”. Such preamble data is transmitted as a part of a UPC-E1 symbol. Select one of the following options for transmitting UPC-E1 preamble characters to the host.

Without Preamble Characters (0x00)
(<Data>)

*System Character (0x01)
(<System Character><Data>)

System Character and Country Code (0x02)
(<Country Code><System Character><Data>)

8-19-11 Convert UPC-E1 to UPC-A (0x26)

When this parameter is set to “Enable”, UPC-E1 decoded data shall be converted into UPC-A format before transmission. In this case, transmission of UPC-A preamble characters and check digits shall be done as separately specified.
When this parameter is set to “Disable”, UPC-E1 decoded data shall not be converted into UPC-A format and shall be transmitted as it is


Enable Conversion of UPC-E1 to UPC-A (0x01)


*Disable Conversion of UPC-E1 to UPC-A (0x00)

8-19-12 Enable/Disable EAN-8 (0x04)

Scan the appropriate bar code below to enable or disable EAN and JAN-8.

*Enable EAN/JAN-8 (0x01)

Disable EAN/JAN-8 (0x00)

8-19-13 Enable/Disable EAN-13 (0x03)

Scan the appropriate bar code below to enable or disable EAN and JAN-8.

8-19-14 EAN Zero Extend (0x27)

When this parameter is set to “Enable”, this parameter adds five leading zeros to decoded EAN and JAN-8 bar code data before transmission so that the data shall be compatible in format to EAN and JAN-13 bar code data.


Enable (0x01)


*Disable (0x00)

8-19-15 Convert EAN-8 to EAN-13 (0xE0)

When EAN/JAN-8 Zero Extend is enabled, it is possible to label the extended symbol as either an EAN-13 bar code, or an EAN-8 bar code. This affects “Transmit Code ID Character”.

*EAN/JAN-13 (0x00)

EAN/JAN-8 (0x01)

8-19-16 Enable/Disable Bookland EAN (0x53)

Scan the appropriate bar code below to enable or disable Bookland EAN.

Enable Bookland EAN (0x01)

*Disable Bookland EAN (0x00)

8-19-17 UPC/EAN Supplementals (0x10)

Supplementals are appended characters (2 or 5) according to specific code format conventions (e.g., UPC-A+2, UPC-E+2, EAN/JAN 13+2).

7 options listed below are available:

- When “Disable” is selected for this parameter
  UPC, EAN or JAN bar codes with and without supplementals shall be decoded. Supplemental code shall not be transmitted after a completion of decode attempt.

- When “Decode” is selected for this parameter
  Only UPC, EAN or JAN bar codes with supplementals shall be decoded. UPC, EAN or JAN bar codes without supplementals shall not be decoded.

- When “Auto Discriminate” is selected for this parameter
  UPC, EAN or JAN bar codes with or without supplementals shall be decoded after they are automatically discriminated.

- When “Enable 378/379/978/491” is selected for this parameter
  Decoding shall be implemented when leading 3 digits of a bar code are either “378', '379', "978”, or “491”. In case it decodes other UPC, EAN or JAN bar codes with supplementals, it ignores supplementals.

- When “Enable 378/379” is selected for this parameter
  Decoding shall be implemented when leading 3 digits of an EAN-13 bar code are either ”378” or “379”. In case it decodes other UPC, EAN or JAN bar codes with supplementals, it ignores supplementals. .

- When “Enable 978” is selected for this parameter
  Decoding shall be implemented when leading 3 digits of an EAN-13 bar code are “978”. In case it decodes other UPC, EAN or JAN bar codes with supplementals, it ignores supplementals.

- When “Enable 491” is selected for this parameter
  Automatically decode only the 5 digits of supplementals when the leading 3 digits of a JAN-13 bar code are “491”. In case it decodes other UPC, EAN or JAN bar codes with supplementals, it ignores supplementals.

*Disable (0x00)

Decode (0x01)

Auto Discriminate (0x02)

Enable 378/379/978/491 (0x03)

Enable 378/379 (0x04)

Enable 978 (0x05)

Enable 491 (0x06)

8-19-18 UPC/EAN Supplementals Verification Method (0x50)

With “Auto Discriminate” UPC, EAN or JAN Supplementals selected, this option adjusts the number of times symbol without supplementals will be decoded before transmission. The range is from 2 to 20 times. Five or above is recommended when decoding a mix of UPC, EAN, or JAN bar codes with and without supplementals. (Default Value is 7 times.)
Scan the bar code below to select a decode verification value and then scan 2 numeric bar codes on page 108.
Single digit numbers must have a leading zero. To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Decode UPC/EAN/JAN Supplementals for Verification
(Default: 7)

8-19-19 Code128/EAN128/UPC/EAN/JAN/Code93 Verification Method (0x4D)

This parameter offers 4 levels of decode security for Code128, EAN128, UPC, EAN, JAN or Code93 bar codes. Select security levels for decreasing levels of bar code quality.
As the security levels increase, the scanner's aggressiveness decreases. Select the security level suitable for the bar code quality.

Security Level 0
There will be no consistency verification before transmission.


*Level 0 (0x0)

Security Level 1
Those types of bar codes must be successfully read twice before transmission.


Level 1 (0x01)

Security Level 2
Those types of bar codes must be successfully read three times before transmission.


Level 2 (0x02)

Security Level 3
Those types of bar codes must be successfully read four times before transmission.


Level 3 (0x03)

8-20 Code 128/EAN-128

8-20-1 Enable/Disable Code 128 (0x08)

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

*Enable (0x01)

Disable (0x00)

8-20-2 Enable/Disable UCC/ENA-128 (0x0E)

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

*Enable (0x01)

Disable (0x00)

8-21 Code 39

8-21-1 Enable/Disable Code (0x00)

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

*Enable (0x01)

Disable (0x00)

8-21-2 Enable/Disable Trioptic Code 39 (0x0D)

To enable or disable Trioptic Code 39, scan the appropriate bar code below. Trioptic Code 39 bar codes are always consisted by 6 characters.


Enable (0x01)


*Disable (0x00)

8-21-3 Convert Code 39 to Code 32 (Code39 Italian Pharma Code) (0x56)

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

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


Enable (0x01)


*Disable (0x00)

8-21-4 Code 32 Prefix (0xE7)

Enable this parameter to add the prefix character “A” to all Code 32 bar codes.

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


Enable (0x01)


*Disable (0x00)

8-21-5 Fixing the Length of Code 39 (0x12/0x13)

Length for Code 39 may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains. If Code 39 Full ASCII is enabled, “Length within a Range” or “Any Length” are the preferred options.

Fixing to One Discrete Length:
This option limits decodes to only those Code 39 bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only Code 39 bar codes with 14 characters, scan “Code 39 – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Code 39 – One Discrete Length

Fixing to Two Discrete Lengths:
This option limits decodes to only those Code 39 bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those Code 39 bar codes containing either 2 or 14 characters, select “Code 39 – Two Discrete Lengths” and then scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Code 39 – Two Discrete Lengths

Fixing to Length within a Range:
This option limits decodes to only those Code 39 bar codes within a specified range. For example, to decode Code 39 bar codes containing between 4 and 12 characters, first scan “Code 39 – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Code 39 – Length within a Range

Fixing to Any Length:
Scan this option to decode Code 39 bar codes containing any number of characters.

Code 39 – Any Length

8-21-6 Code 39 Check Digit Verification (0x30)

When this feature is enabled, the scanner checks the integrity of all Code 39 bar codes to verify that the data complies with specified check digit algorithm


Verify (0x01)


*Do Not Verify (0x00)

8-21-7 Transmit Code 39 Check Digits (0x2B)

Scan the appropriate bar code below to enable or disable the transmission of Code 39 check digits.

Transmit (0x01)

*Do Not Transmit (0x00)

8-21-8 Enable/Disable Code 39 Full ASCII (0x11)

Scan the appropriate bar code below to enable or disable Code 39 Full ASCII.
“Auto Discriminate” may not be able to discriminate Code 39 and Code 39 Full ASCII
(Note: To enable this parameter, Code 39 must be enabled in advance.)


Enable (0x01)

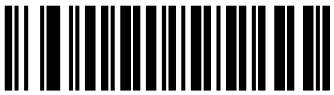

*Disable (0x00)

8-22 Code 93

8-22-1 Enable/Disable Code 93 (0x09)

Scan the appropriate bar code below to enable or disable Code 93.


Enable (0x01)


*Disable (0x00)

8-22-2 Fixing the Length of Code 93 (0x1A/0x1B)

Length for Code 93 may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains.

Fixing to One Discrete Length:
This option limits decodes to only those Code 93 bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only Code 93 bar codes with 14 characters, scan “Code 93 – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Code 93 – One Discrete Length

Fixing to Two Discrete Lengths:
This option limits decodes to only those Code 93 bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those Code 93 bar codes containing either 2 or 14 characters, select “Code 93 – Two Discrete Lengths” and then scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108


Code 93 – Two Discrete Lengths

Fixing to Length within a Range:
This option limits decodes to only those Code 93 bar codes within a specified range. For example, to decode Code 93 bar codes containing between 4 and 12 characters, first scan “Code 93 – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Code 93 – Length within a Range

Fixing to Any Length:
Scan this option to decode Code 93 bar codes containing any number of characters.


Code 93 – Any Length

8-23 Interleaved 2of5

8-23-1 Enable/Disable Interleaved 2of5 (0x06)

Scan the appropriate bar code below to enable or disable Interleaved 2of5.

*Enable (0x01)

Disable (0x00)

8-23-2 Fixing the Length of Interleaved 2of5 (0x16/0x17)

Length for Interleaved 2of5 may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains.

Fixing to One Discrete Length:

This option limits decodes to only those Interleaved 2of5 bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only Interleaved 2of5 bar codes with 14 characters, scan “Interleaved 2of5 – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Interleaved 2of5 – One Discrete Length

Fixing to Two Discrete Lengths:

This option limits decodes to only those Interleaved 2of5 bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those Interleaved 2of5 bar codes containing either 2 or 14 characters, select “Interleaved 2of5 – Two Discrete Lengths”. Then, scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Interleaved 2of5 – Two Discrete Lengths

Fixing to Length within a Range:

This option limits decodes to only those Interleaved 2of5 bar codes within a specified range. For example, to decode Interleaved 2of5 bar codes containing between 4 and 12 characters, first scan “Interleaved 2of5 – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Interleaved 2of5 – Length within a Range

Fixing to Any Length:

Scan this option to decode Interleaved 2of5 bar codes containing any number of characters.
(Note: Selecting this option may lead to misdecodes for Interleaved 2of5.)


Interleaved 2of5 – Any Length

8-23-3 Interleaved 2of5 Check Digit Verification (0x31)

When this feature is enabled, the scanner checks the integrity of all Interleaved 2of5 bar codes to verify that the data complies with specified check digit algorithm (USS: Uniform Symbology Specification or OPCC: Optical Product Code Council).


* Disable (0x00)


USS Check Digits (0x01)


OPCC Check Digits (0x02)

8-23-4 Transmit Interleaved 2of5 Check Digits (0x2C)

Scan the appropriate bar code below to enable or disable the transmission of check digits with the data.

Transmit Interleaved 2of5 Check Digits (0x01)

*Do Not Transmit Interleaved 2of5 Check Digits (0x00)

8-23-5 Convert Interleaved 2of5 to EAN-13 (0x52)

This parameter converts a 14 character Interleaved 2of5 bar code into EAN-13, and transmits to the host as EAN-13. To accomplish this, Interleaved 2of5 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 Interleaved 2of5 to EAN-13 (0x01)

*Do Not Convert Interleaved 2of5 to EAN-13 (0x00)

8-24 Industrial 2of5

8-24-1 Enable/Disable Industrial 2of5 (0x05)

Scan the appropriate bar code below to enable or disable Industrial 2of5.


Enable (0x01)


*Disable (0x00)

8-24-2 Fixing the Length of Industrial 2of5 (0x14/0x15)

Length for Industrial 2of5 may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains.

Fixing to One Discrete Length:

This option limits decodes to only those Industrial 2of5 bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only Industrial 2of5 bar codes with 14 characters, scan “Industrial 2of5 – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Industrial 2of5 – One Discrete Length

Fixing to Two Discrete Lengths:

This option limits decodes to only those Industrial 2of5 bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those Industrial 2of5 bar codes containing either 2 or 14 characters, select “Industrial 2of5 – Two Discrete Lengths”. Then, scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Industrial 2of5 – Two Discrete Lengths

Fixing to Length within a Range:

This option limits decodes to only those Industrial 2of5 bar codes within a specified range. For example, to decode Industrial 2of5 bar codes containing between 4 and 12 characters, first scan “Industrial 2of5 – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Industrial 2of5 – Length within a Range

Fixing to Any Length:

Scan this option to decode Industrial 2of5 bar codes containing any number of characters.
(Note: Selecting this option may lead to misdecodes for Industrial 2of5.)


Interleaved 2of5 – Any Length

8-25 Codabar(NW7)

8-25-1 Enable/Disable Codabar (NW7) (0x07)

Scan the appropriate bar code below to enable or disable Codabar (NW7).

Enable (0x01)

*Disable (0x00)

8-25-2 Fixing the Length of Codabar (NW7) (0x18/0x19)

Length for Codabar (NW7) may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains.

Fixing to One Discrete Length:

This option limits decodes to only those Codabar (NW7) bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only Codabar (NW7) bar codes with 14 characters, scan “Codabar (NW7) – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Codabar (NW7) – One Discrete Length

Fixing to Two Discrete Lengths:

This option limits decodes to only those Codabar (NW7) bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those Codabar (NW7) bar codes containing either 2 or 14 characters, select “Codabar (NW7) – Two Discrete Lengths”. Then, scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Codabar (NW7) – Two Discrete Lengths

Fixing to Length within a Range:

This option limits decodes to only those Codabar (NW7) bar codes within a specified range. For example, to decode Codabar (NW7) bar codes containing between 4 and 12 characters, first scan “Codabar (NW7) – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


Codabar (NW7) – Length within a Range

Fixing to Any Length:

Scan this option to decode Codabar (NW7) bar codes containing any number of characters.


Codabar (NW7) – Any Length

8-25-3 Codabar CLSI Editing (0x36)

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 (NW7) bar code.

Note: Bar code length does not include start and stop characters.


Enable CLSI Ending (0x01)


*Disable CLSI Ending (0x00)

8-25-4 No Transmit Codabar (NW7) Start/Stop Character (0x37)

Scan the appropriate bar code below to enable or disable transmission of the start or stop character of a decoded Codabar (NW7) bar code.

Do Not Transmit (0x01)

*Transmit (0x00)

8-26 MSI Plessey

8-26-1 Enable/Disable MSI Plessey (0x0B)

Scan the appropriate bar code below to enable or disable MSI Plessey.


Enable (0x01)


*Disable (0x00)

8-26-2 Fixing the Length of MSI Plessey (0x1E/0x1F)

Length for MSI Plessey may be set for “Any Length”, “One Discrete Length”, “Two Discrete Lengths”, or “Length within a Range”.
The length of a code refers to the number of characters including check digits that the code contains.

Fixing to One Discrete Length:

This option limits decodes to only those MSI Plessey bar codes containing a selected length. Length is selected from the numeric bar codes on page 108. For example, to decode only MSI Plessey bar codes with 14 characters, scan “MSI Plessey – One Discrete Length” and then scan numeric bar codes “1” followed by “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108


MSI Plessey – One Discrete Length

Fixing to Two Discrete Lengths:

This option limits decodes to only those MSI Plessey bar codes containing either of two selected lengths. Lengths are selected from the numeric bar codes on page 108. For example, to decode only those MSI Plessey bar codes containing either 2 or 14 characters, select “MSI Plessey – Two Discrete Lengths”. Then, scan numeric bar codes “0”, “2”, “1” and “4”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


MSI Plessey – Two Discrete Lengths

Fixing to Length within a Range:

This option limits decodes to only those MSI Plessey bar codes within a specified range. For example, to decode MSI Plessey bar codes containing between 4 and 12 characters, first scan “MSI Plessey – Length within a Range” and then scan numeric bar codes of “0”, “4”, “1” and “2”.
(Note: Single digit numbers must always be preceded by a leading zero.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


MSI Plessey – Length within a Range

Fixing to Any Length:

Scan this option to decode MSI Plessey bar codes containing any number of characters.
(Note: Selecting this option may lead to misdecodes for MSI Plessey.)


MSI Plessey – Any Length

8-26-3 MSI Plessey Check Digits (0x32)

There check digits at the end of the bar code verify the integrity of the data. At least one check digit is always required. Check digits are not automatically transmitted with the data.
Please refer to “8-26-4 Transmit MSI Plessey Check Digits” for details.

*One MSI Plessey Check Digit (0x00)

If the “Two MSI Plessey Check Digits” option is selected, also select an “MSI Check Digit Algorithm”.

Two MSI Plessey Check Digits (0x01)

8-26-4 Transmit MSI Plessey Check Digits (0x2E)

Scan the appropriate bar code below to enable or disable transmission of MSI Plessey Check Digits after a completion of decoding.

Enable (0x01)

*Disable (0x00)

8-26-5 MSI Plessey Check Digit Algorithm (0x33)

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” or “Mod 10/Mod 10”.


Mod 10/Mod 11 (0x00)


*Mod 10/Mod 10 (0x01)

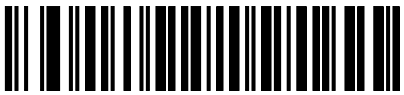
8-27 RSS (Reduced Space Symbology)

Reduced Space Symbology may be divided into: RSS-14, RSS-Expanded and RSS-Limited. Also, there are one-row version and two-row versions of RSS-14 and RSS-Expanded.

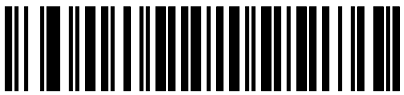
Scan the appropriate bar code below to enable or disable each version of RSS bar codes.

8-27-1 Enable/Disable RSS-14 (0xF0 0x52)

Scan the appropriate bar code below to enable or disable RSS-14.



Enable (0x01)



*Disable (0x00)

8-27-2 Enable/Disable RSS-Limited (0xF0 0x53)

Scan the appropriate bar code below to enable or disable RSS-Limited.

Enable (0x01)

*Disable (0x00)

8-27-3 Enable/Disable RSS-Expanded (0xF0 0x54)

Scan the appropriate bar code below to enable or disable RSS-Expanded.

Enable (0x01)

*Disable (0x00)

8-28 Transmit Code ID Character (0x2D)

The code ID character is inserted between the prefix character (if selected) and the decoded bar code data.
Please refer to “5-2-8. Code ID” for the details on “Symbol Technologies Specification Code ID” and “AIM Specification Code ID”.


Symbol Technologies Specification Code ID (0x02)


AIM Specification Code ID (0x01)


*No Code ID Character（0x00）

8-29 Prefix/Suffix

8-29-1 Prefix (0x69)

A prefix can be appended to scan data for use in data editing.
To set prefix values, scan four numeric bar codes on page 108 that correspond to ASCII values listed on page 109 and 110. (To set ASCII values of “CR/ENTER”, scan numeric bar codes “1”, “0”, “1” and “3”.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.
Note: In order to use Prefix values, the Scan Data Transmission Format must be set.


Prefix (0x69)

8-29-2 Suffix 1/2 (0x68/0x6A)

One or two suffixes can be appended to scan data for use in data editing.
To set suffix values, scan four numeric bar codes on page 108 that correspond to ASCII values listed on page 109 and 110. (To set ASCII values of “CR/ENTER”, scan numeric bar codes “1”, “0”, “1” and “3”.)
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.
Note: In order to use Prefix values, the Scan Data Transmission Format must be set.


Suffix 1 (0x68)


Suffix 2 (0x6A)

8-30 Scan Data Transmission Format

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


*Data as is (0x00)


＜Data＞＜Suffix 1＞ (0x01)


＜Data＞＜Suffix 2＞ (0x02)


＜Data＞＜Suffix 1＞＜Suffix 2＞ (0x03)


＜Prefix＞＜Data＞ (0x04)


＜Prefix＞＜Data＞＜Suffix 1＞ (0x05)


＜Prefix＞＜Data＞＜Suffix 2＞ (0x06)


＜Prefix＞＜Data＞＜Suffix 1＞＜Suffix 2＞ (0x07)

8-31 Serial Parameter

8-31-1 Baud Rate (0x9C)

Baud rate is the number of bits of data transmitted per second.
Scan the appropriate bar code below to set the speed of data transmission of RS-232C.


300bps (0x01)


600bps (0x02)


1200bps (0x03)


2400bps (0x04)


4800bps (0x05)


*9600bps (0x06)


19200bps (0x07)


38400bps (0x08)


57600bps (0x10)


115200bps (0x11)

8-31-2 Parity (0x9E)

Select the parity type according to host device requirements.


Odd (0x00)


Even (0x01)


*None (0x04)

8-31-3 Software Handshaking (0x9F)

Scan the appropriate bar code below to enable or disable ACK/NAK handshaking packets.

Disable ACK/NAK (0x00)

*Enable ACK/NAK (0x00)

8-31-4 Decoded Data Packet Format (0xEE)

This parameter selects whether decoded data is transmitted in raw format (unpacketed), or transmitted with the packet format as defined as the serial protocol.
If the raw format is selected, ACK/NAK handshaking is disabled for decode data.


*Send Raw Decode Data (0x00)


Send Packeted Decode Data (0x01)

8-31-5 Host Serial Response Time-out (0x9B)

This parameter specifies how long the decoder waits for an ACK or NAK before resending. The delay period can range from 0.0 to 9.9 seconds in 0.1 second increments. After scanning the bar code below, scan 2 numeric bar codes on page 108.
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.


(Default:2.0sec)

8-31-6 Stop Bit (0x9D)

Scan any of bar codes listed below to set the stop bit.

*1 Stop Bit (0x01)

2 Stop Bit (0x02)

8-31-7 Intercharacter Delay (0x6E)

This parameter gives the host system time to service its receiver and perform other tasks between characters.
The delay period may be set in the range from no delay to 99 msec in 1 msec increments.
After scanning the bar code below, scan 2 numeric bar codes on page 108 to set the desired time-out.
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Intercharacter Delay
(Default: 0 sec.)

8-31-8 Host Character Timeout (0xEF)

This parameter determines the maximum time it waits between characters transmitted by the host before discarding the received data. The time-out is set in 0.01 second increments from 0.01 second to 0.99 seconds. After scanning the bar code below, scan 2 numeric bar codes on page 108 to set the desired time-out.
To change the selection or cancel an incorrect entry, scan “Cancel” bar code on page 108.

Host Character Time-out
(Default: 200 msec.)

8-32 Event Reporting

8-32-1 Decode Event (0xF0,0x00)

If “Enable” is selected, the massage (0x01) shall be transmitted to the host when a bar code other than a parameter bar code is decoded.
When “Disable” is selected, the message shall not be transmitted.


Enable (0x01)


*Disable (0x00)

8-32-2 Boot Up Event (0xF0, 0x02)

When “Enable” is selected, the massage (0x03) shall be transmitted to the host at Power Up. When “Disable” is selected, the message shall not be transmitted.

Enable (0x01)

*Disable (0x00)

8-32-3 Parameter Event (0x0F,0x03)

When enabled, the decoder sends a message to the host after scanning parameter menu. When disabled, no message is sent.

Code Reported	Event
0x07	Parameter Menu “Error in Input”
0x08	Parameter Menu “Completion in Scanning”
0x0F	Completion of scanning a parameter menu bar code of which values need to be set by scanning numeric bar codes. Or, completion of scanning numeric bar codes.


Enable (0x01)


*Disable (0x00)

8-33 Numeric Bar Codes

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


0


1


2


3


4


5


6


7


8


9

8-34 Cancel

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


Cancel

8-35 Prefix/Suffix Values

A prefix and/or one or two suffixes can be appended to scan data for use in data editing.

To set these values, scan four bar codes that correspond to ASCII values listed below.

ASCII Value	ASCII Character
1000	NUL
1001	SOH
1002	STX
1003	ETX
1004	EOT
1005	ENQ
1006	ACK
1007	BELL
1008	BCKSPC
1009	HORIZ TAB
1010	LF/NW LN
1011	VT
1012	FF
1013	CR/ENTER
1014	SO
1015	SI
1016	DLE
1017	DC1
1018	DC2
1019	DC3
1020	DC4
1021	NAK
1022	SYN
1023	ETB
1024	CAN
1025	EM
1026	SUB
1027	ESC
1028	FS
1029	GS
1030	RS
1031	US
1032	Space
1033	!
1034	“
1035	#

ASCII Value	ASCII Character
1036	$
1037	%
1038	&
1039	‘
1040	(
1041	)
1042	*
1043	+
1044	,
1045	-
1046	.
1047	/
1048	0
1049	1
1050	2
1051	3
1052	4
1053	5
1054	6
1055	7
1056	8
1057	9
1058	:
1059	;
1060	<
1061	=
1062	>
1063	?
1064	@
1065	A
1066	B
1067	C
1068	D
1069	E
1070	F
1071	G

ASCII Value	ASCII Character
1072	H
1073	I
1074	J
1075	K
1076	L
1077	M
1078	N
1079	O
1080	P
1081	Q
1082	R
1083	S
1084	T
1085	U
1086	V
1087	W
1088	X
1089	Y
1090	Z
1091	[
1092	¥
1093	]
1094	^
1095	_
1096	`
1097	a
1098	b
1099	c
1100	d
1101	e
1102	f

ASCII Value	ASCII Character
1103	g
1104	h
1105	i
1106	j
1107	k
1108	l
1109	m
1110	n
1111	o
1112	p
1113	q
1114	r
1115	s
1116	t
1117	u
1118	v
1119	w
1120	x
1121	y
1122	z
1123	{
1124	|
1125	}
1126	~