Installation
Custom Sensors Series RS12100 CCD Scan Engine

Introduction

The RS12100 Series CCD Scan Engines are designed to be incorporated into equipment designs. Two interfaces are provided. The RS-232 interface can be connected to a Com: port on a PC or any other device with an EIA/TIA RS-232C interface. The Keyboard Wedge interface connects between a PC keyboard and the computer console. When scanned, the characters in the barcode appear as though they were typed on the keyboard.

The Scanner has a wide reading aperture and is designed to operate at an optimum distance of 1.35", with a depth of field of ±0.20". The unit will read codes up to 3.1 inches long. When a barcode is placed in front of the scanner the code will be read, and the data transmitted. Additional data transmissions will not be made until the current barcode is removed from the scanner's view. This is the default mode for the scanner. Other modes can be setup by the used, and are described below.

Most common linear barcode symbologies are supported, including EAN/UPC, ISBN/ISSN, Code39, Code128, Codabar, Interleaved 2 of 5, Industrial 2 of 5, Matrix 2 of 5, DataLogic 2 of 5 (China Postal Code), and Code93.

Installation

There are two standard interfaces, RS-232 and Keyboard Wedge. Please consult the data sheet for the part numbers for each product..

The RS-232 Interface.

The model with the RS-232 interface is designed to connect to any device with a EIA/TIA RS-232 Interface. The connector is wired in DCE configuration. It will connect to a DTE port without the requirement for a null-modem cable. Note: most devices with RS-232 interfaces are configured as DTE. An external power supply is required, since there is no power available from a standard RS-232 connector. An accessory power supply, Model APS002 is available from Custom Sensors. If another power supply is used, it must be regulated 5VDC±10% @ 300 milliamps minimum and must have a power connector that is 5.5mm outside diameter and 2.1mm inside diameter. The center is positive. The RS-232 connector is a type DB-9S and is wired as shown in the table.

Pin	Name
1	Shld
2	TxD
3	RxD
4	N/C
5	GND
6	N/C
7	CTS
8	RTS
9	+5V

Connector Wiring.

The default communications parameters for the RS-232 port are: 9600 baud, no parity, 8 data bits, one stop bit (9600, N, 8,1). No handshaking protocols are activated for this port.

The Keyboard Wedge Interface.
The model with the keyboard wedge interface connects between the keyboard and the console of the computer. This model is available with two types of connectors; the 5-pin DIN or the 6-pin mini-DIN. Both units connect in the same manner. Turn off power to the computer. Unplug the keyboard cable. Plug the keyboard cable into the female connector on the scanner cable. Plug the male connector on the scanner cable into the computer keyboard connection. The scanner derives its power from the computer, so no external power supply is necessary. Turn on the Computer. The scanner should emit an audible tone.

To test the installation, start an application on the computer, such as a word processor, that displays characters typed on the keyboard. Scan the barcode below. The scanner should emit a tone. The characters in the barcode should appear as though they were typed on the keyboard.

Installing the CCD Scan Engine

The CCD Scanner reads barcodes through an elongated opening in the scanner. A light source consisting of several red LEDs behind a cylindrical lens illuminates the barcode. A CCD (Charge Coupled Device), similar to that used in digital cameras, registers an image of the barcode. A microcomputer decodes this image into the characters represented by the barcode, and sends them to the Keyboard Wedge or RS-232 Interface. The unit emits an audible tone on a successful read. It will not read again until the barcode is removed from its viewing area and replaced by a different barcode. The new barcode could actually be the same one as it saw previously. This is the default mode for the scanner. Three other modes are available. They are:

Continuous Reading - The scanner will read codes and transmit data continuously. This mode is handy for determining the working range of the scanner for a particular code type or size. It is normally used as a test mode.

Trigger On/Good Read Off - An external trigger signal controls when the scanner will read. The LEDs will turn on when the trigger switch is closed. A time is set for the maximum gate duration. The LEDs will turn off, and a data transmission made, when the code is read. If the code is not read within the allotted time, the LEDs will turn off, and no transmission will be made. Trigger switch wiring is shown in Figure 3.

Trigger On/Timer off - Operates similar to above, except the LEDs will remain on until the gate time expires, at which time the data transmission will be made.

The scanner should be mounted so that the barcode will be within the depth of field of the scanner. The optimum distance from the scanner is 1.35 inches and the depth of field is ±0.2 inch from optimum. The red beam of light indicates the reading area of the scanner. The barcode should be placed so that the red beam covers the entire code. Ideally, the code should be near the center of the beam. The maximum length of the barcode is 3.1" including quiet zone*. The scanner can usually be mounted perpendicular to the barcode. If the barcodes being read are on plastic laminated cards, have a plastic overlay to protect the code, or are printed on shiny material, the scanner may have to be installed at a slight angle relative to the code. An angle of 10° is usually sufficient. Figure 1 shows the scanner aligned so that the barcode is 10° from being perpendicular to the code.

The speed that the barcode can pass the scanner depends on the orientation of the scanner relative to the direction of travel. This is illustrated in Figure 2. If the code is moving in a direction parallel to the bars in the code, "Best Direction" in the figure, the following equation can be used to estimate the maximum allowable speed of the code past the scanner.

S = H / .01

Where S is the speed of the code, in inches per second and H is the height of the barcode, in inches. As can be seen, the higher the barcode symbol, the faster it can pass the scanner. If the barcode is passing the scanner from left to right, rather than top to bottom, the barcode speed will be limited to about three inches per second, or less. A CCD scanner does not yield optimal performance for codes passing in this direction.

* A 10X quite zone is required for all barcodes. This is an area, clear of printing or other graphics, equal to ten times the width of the narrowest bar or space in the barcode.

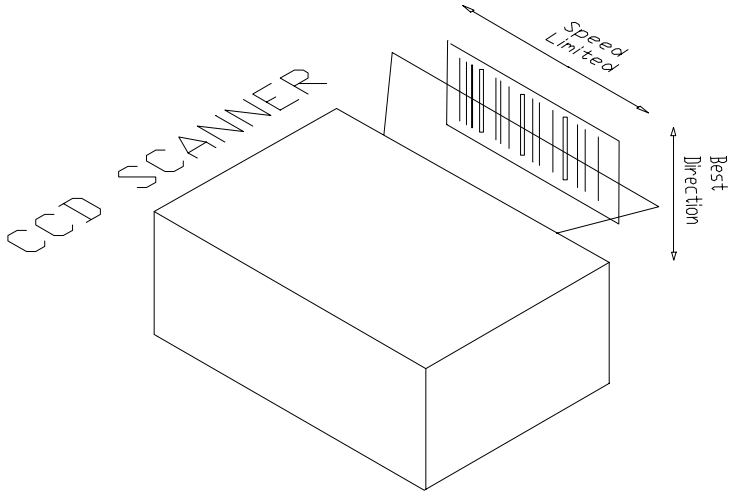


Figure 2.

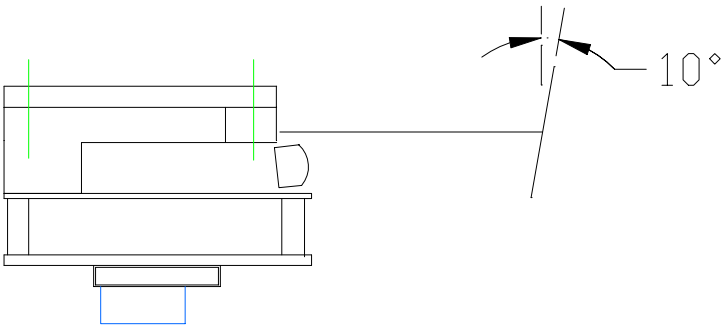


Figure 1. Scanner Tilt

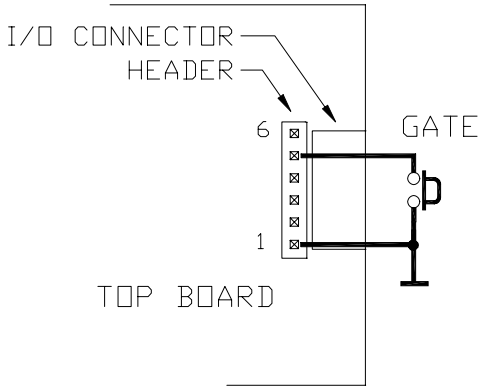
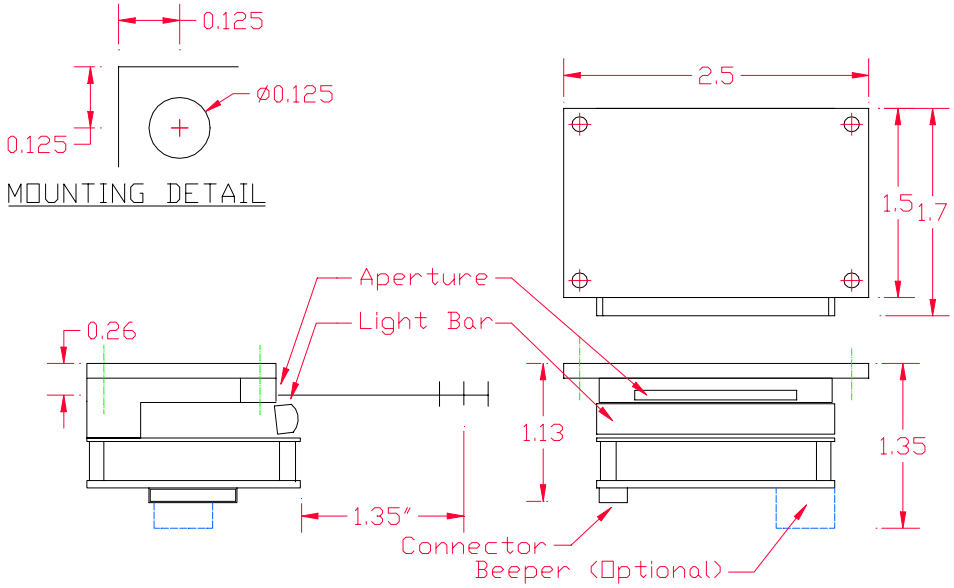


Figure 3. Gate Connection

Dimensions:



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TROUBLESHOOTING

The following items illustrate common problems encountered in the initial installation of the CCD Scanner.

Common Scanning Problems

A barcode will not read, no tone is heard or indicator does not flash.

Make sure that the barcode is not wider than 3.1". Remember, the width of the code also includes quiet zones, equal to 10 times the width of a narrow bar, at each end of the code.

Make sure the code is approximately centered in the scanner beam.

Make sure that the scanner will read that barcode type, and that type is enabled.

Make sure that the code is of reasonable quality in that the printing is not smeared an there seems to be good contrast between the bars and spaces.

In Default Mode, a barcode is put in front of the scanner and read. The barcode is removed. The same barcode is palced in front of the scanner again, but will not read.

The scanner may be seeing light to dark transitions from printing or other information in its view after the code was removed. The scanner thinks the code is still there. In this mode tha scanner should be looking into space, or seeing a constant background.

Keyboard Wedge Configuration.

Connectors will not fit the keyboard.

The scanner can be ordered with the two most popular connectors used on IBM PC and PC compatible keyboards; the 5-pin DIN connector and the 6-Pin mini-DIN connector. Adapters may be necessary to interface to your keyboard.

The scanner beeps and the indicator flashes, but no data appears on the screen.

Type a few characters on the keyboard to test the connection. If characters do not appear on the screen, check each cable connection as well as the connection to the scanner. The keyboard function is not altered by the scanner.

RS-232 Configuration

The scanner beeps and the indicator flashes, but no data seems to be transmitted.

Make sure the Baud Rate, Word Length and Parity of the scanner match the host device being communicated with.

Make sure that the “handshake” requirements of the scanner and the host device agree.

Check the connection to the host device. The Scanner is configured as DCE (Data Communications Equipment). It can connect to a device configured as DTE (Data Terminal Equipment) with a straight cable. Make sure a null-modem cable is not being used.

Use a breakout box or other tester to determine if data is being transmitted from the scanner and not being received properly. This device will also indicate the status of the handshake lines.

Test Barcodes

Code 39

Interleaved 2 of 5

Code 128

UPC-A

EAN-13

Bookland

UPC-E

EAN-8

UPC w/ 5 digit supplemental

Codabar

Code 93

Scanner Configuration

Using Barcodes or a Serial Data Terminal

Introduction

The Custom Sensors RS12100 Series CCD Barcode Scan Engine can be configured by scanning the barcodes in this section of the manual, or by serial transmissions to to the scanner's RS-232 port. Serial programming applies only to the RS-232 models . Keyboard wedge models must be configured using barcodes.

Configuration Using Barcodes

There are four special barcodes that are used in the configuration process. These are the START, END, ABORT and SET codes. These codes appear at the top of every even page so they are readily available at any point in the configuration process. Their function is as follows:

The **START** code begins the configuration process. It signals the Scanner that the Configuration mode is being entered and the barcodes it will be reading are the barcodes in this manual.

The **ABORT** code signals the scanner to disregard any configuration changes made since the START code was scanned, as long as the END code has not been scanned. In effect, it ends the configuration process with no changes made. To start again, scan the START Code.

The **END** code ends the configuration process, saves the configuration changes in the scanner's nonvolatile memory, and returns the scanner to its normal operating mode.

The **SET** code sets all scanner parameters to their default value. Notice that each parameter listed in this manual has a default value. Scan the START code, then SET to set all parameters to their default values.

To configure the scanner using barcodes, first scan the START code. Next scan any of the barcodes in this manual for the parameters you want to change. If you make a mistake, you can always scan the ABORT code and start over again. When you have changed the desired parameters, scan the END code to return the scanner to normal operation.

Start

START

END

End

Abort

ABORT

SET

Set

Configuration Using a Serial Terminal

The scanner can be configured using a serial terminal or a PC configured as a terminal. The PC should be running a telecom program, such as Procomm or Windows Hyper Terminal. Hyper Terminal should be configured for a direct connection to an available Com Port. The serial communications parameters of the terminal or PC must agree with those of the scanner. The default scanner communications parameters are: 9600 baud, No Parity, 8 data bits, one stop bit.

Serial scanner setup is actually performed in the same manner as the barcode setup. Instead of scanning barcodes, the same characters contained in the barcodes are sent to the scanner through the serial port. As with barcode programming there are four special character sequences that control scanner setup. They are:

START - The characters **.$/%** (period, dollar sign, forward slash, percent sign) start the configuration. Sending these characters to the scanner signals the scanner to enter the configuration mode. The scanner will sound a series of tones. Subsequent character transmissions will be interpreted as configuration commands.

ABORT - The characters **ABCF** can be sent to abort serial configuration. The scanner will return to normal operation. Any changes made since entering the configuration mode will be disregarded. The scanner will sound a series of tones indicating that it has exited configuration mode.

END - The characters **EOCF** are sent to exit the configuration mode. Any configuration changes that were made since entering the configuration mode are saved to nonvolatile memory within the scanner. The scanner will sound a series of tones indicating it has exited configuration mode.

SET - The characters **SADF** are sent to the scanner, following the START characters, to set all parameters to their default value. Unless specified, all scanners are shipped with parameters set to their default values. The scanner will sound a series of tones indicating that the default values have been set and that the scanner is exiting configuration mode.

The example on the following page illustrates how these character sequences are used.

Serial Programming Example

The following portions of the manual list both the barcode and the characters to be sent in the serial transmission. For example to set the serial transmission parameters to 38,400, N , 8, 1 (38,400 baud, no parity, 8 data bits, 1 stop bit), the manual will list the following barcodes:

38400

AL8*

8 Data Bits

AM2*

One Stop Bit

AM3*

No Parity

AN1*

The barcodes can be scanned to set the parameters. The characters beneath the barcodes can be sent to the scanner with a serial terminal to set the same parameters. To set the scanner's communications as outlined above send the following from the serial terminal:

Send: .$/%

Tones will sound indicating start of programming mode.

Send: AL8*AM2*AM3*AN1*

A single tone will sound after each individual command.

(Note: these commands can be sent in any order.)

Send: EOCF

A series of tones will sound indicating that the scanner has exited the programming mode.

Start

START

END

End

Abort

ABORT

SET

Set

Scanner Communications Settings

The RS-232 communications parameters can be changed if desired. The default parameters are: 9600 baud, No Parity, 8 Data Bits, One Stop Bit. To change the parameters, scan the Start code at the top of a page. Scan the code corresponding to the new communications parameter. Scan the code for another parameter if desired. Scan the end code.

Baud Rate

300

AL1*

600

AL2*

1200

AL3*

2400

AL4*

4800

AL5*

9600

AL6*

19200

AL7*

38400

AL8*

Data Bits

7 Data Bits

AM1*

8 Data Bits

AM2*

Stop Bits

One Stop Bit

AM3*

Two Stop Bits

AM4*

Parity

No Parity

AN1*

Odd Parity

AN2*

Space Parity

AN3*

Even Parity

AN4*

Mark Parity

AN5*

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Handshaking.
The default setting for Handshaking is None. Four handshaking protocols are available if desired. They are. Xon/Xoff, Ack/Nak, RTS/CTS (Scanner Ready) and RTS/CTS (Data Ready). The difference between the two RTS/CTS modes lie in how the RTS output responds. In Scanner Ready mode, the RTS line is true as long as the scanner is powered up and ready to read. In Data Ready Mode, RTS is true when the scanner has read a code and has data to send.

No Handshaking
AS1*

Xon/Xoff
AS2*

Ack/Nak
AS4*

RTS/CTS (Scanner Ready)
AS5*

RTS/CTS (Data Ready)
AS3*

ACK/NAK Response Time - CTS Observation Time.
When ACK/NAK Handshaking is selected, and there is no ACK or NAK response within a set period of time, data for the current read is disgarded. When either RTS/CTS Handshaking mode is selected, If a CTS is not received within a set period of time after an RTS is issued, the data for the current read is disgarded. 500 milliseconds is the default time.

300 milliseconds
BA1*

500ms.(Default)
BA2*

1 second
BA3*

2 seconds
BA4*

3 seconds
BA5*

5 seconds
BA6*

Forever
BAA*

Terminator Characters.
The terminator character is the last character in the RS-232 Transmission. The exception is the STX/ETX combination. This places an STX Character before the barcode data and an ETX character after the data. To choose one of the terminators, scan the START code, then one of the terminator character codes, then the END code.

None
AR1*

CR/LF Default
AR4*

CR
AR2*

Space
AR5*

ESC
AR7*

TAB
AR6*

CTRL-C
AR8*

EXEC
AR9*

EOT
ARB*

STX...ETX
ARA*

Start

START

END

End

Abort

ABORT

SET

Set

Keyboard Wedge Settings

This section can be used to set parameters particular to the Keyboard Wedge Model.

Alphabetic Characters

Alpha characters can be sent as upper case or lower case (shifted or not shifted) . Lower case is default.

Lower Case

AQ2*

Upper Case

AQ3*

Number Characters

There are two sets of number keys on the standard PC/AT keyboard. The number keys on the top row of the main part of the keyboard can be used (default), or the number keys on the keypad can be used. If the keypad is used, make sure that the scroll lock key is not active. Some accounting programs expect numeric input from the keypad.

Keyboard

AQ6*

Keypad

AQ7*

Keyboard Speed

There are two keyboard speed settings available, Normal and Turbo. The Turbo setting will send the data faster, but may not be compatible with all computers. If the computer drops characters in Turbo mode, switch back to Normal.

Normal

AQ4*

Turbo

AQ5*

Keyboard Type

The following barcodes can be scanned to select the type of keyboard being used. This scanner works with IBM PC/XT, PC/AT and PS/2 type keyboards. PC/AT is Default.

PC/AT PS/2 30 - 80

AP1*

PC/XT

AP2*

PS/2 25, 30 IBM55

AP3*

Function Key Emulation

This keyboard wedge supports function Key Emulation. This is supported with Full ASCII Code 39, Code 128 and Code 93, which can encode all 128 ASCII characters. In this mode, the non-printable ASCII characters (hex values 01 thru 1B) are translated to keyboard keys, including the twelve function keys. Values 01 thru 0C are translated to F1 thru F12 respectively. The Carriage Return character is translated to the Enter key. Escape and Horizontal Tab are Escape and TAB. The remaining keys, in the order of their ASCII values, are translated as follows: Back Space, Home, Page Up, Page Dn, End, Up Arrow, Down Arrow, Left Arrow, Right Arrow, Insert and Delete.

Enable (Default)
AZA*

Disable
AZB*

Preamble and Postamble

A Preamble and Postamble can be added to the keyboard wedge transmission. They can be up to 10 characters each. The preamble data will precede the barcode data in the transmission to the computer. The characters in the postamble will follow the barcode data. The following is an example of entering a preamble of "abc" to the data transmission. First, convert the characters "abc" to Hexadecimal Numbers. To do this use the table in Appendix B. The characters "abc" translate to the Hexadecimal numbers 61, 62 and 63. Scan the START code above, then the Preamble code below. Turn to Appendix C. Scan the following barcodes: 6, 1, 6, 2, 6, and 3. Scan the SET code at the bottom of Appendix C. Scan the End code at the top of any page. The Postamble is programmed similarly, except the postamble code is scanned. If an error is made during the process, it can be aborted by scanning the Cancel code below.

Preamble
AO2*

Postamble
AO3*

Cancel
HLZ*

Keyboard language

The keyboard language can be set by scanning one of the codes below. The default language is United States (US).

US
AYB*

Belgian
AY1*

Danish
AY2*

French
AY3*

German
AY4*

Italian
AY5*

Portuguese
AY6*

Spanish
AY7*

Swedish
AY8*

Swiss
AY9*

UK
AYA*

Terminator Characters

The terminator characters for Keyboard Wedge Mode are the same as for RS-232 operation as shown on page 2-3.

Start

START

END

End

Abort

ABORT

SET

Set

Barcode Type Settings

Scanning the barcodes below controls the barcode types that the scanner is set to decode. By default the scanner decodes Code 39, Codabar, EAN-8, EAN-13, UPC-A, UPC-E and Code 128.

Code Type	On	Off
Code 39	Code 39 On SE1*	Code 39 Off SD1*
Interleaved 2 of 5	Interleaved 2 of 5 On SE2*	Interleaved 2 of 5 Off SD2*
Standard 2 of 5	Standard 2 of 5 On SE3*	Standard 2 of 5 Off SD3*
Matrix 2 of 5	Matrix 2 of 5 On SE4*	Matrix 2 of 5 Off SD4*
Codabar	Codabar On SE5*	Codabar Off SD5*
EAN-8	EAN-8 On SE7*	EAN-8 Off SD7*
EAN-13/UPC-A	EAN-13/UPC-A On SE6*	EAN-13/UPC-A Off SD6*
UPC-E	UPC-E On SE8*	UPC-E Off SD8*
ISBN/ISSN	ISBN/ISSN On SEF*	ISBN/ISSN Off SDF*
EAN/UPC Add-on	Add-Ons On SE9*	Add-Ons Off SD9*

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Code Type	On	Off
Code 128	Code 128 On SEA*	Code 128 Off SDA*
Code 93	Code 93 On SEB*	Code 93 Off SDB*
DataLogic 2 of 5	DataLogic 2 of 5 On SEE*	DataLogic 2 of 5 Off SDE*

Specific Code 39 Parameters

There are two types of Code 39, Full ASCII and Standard. Standard Code 39 is able to encode the numbers 0 thru 9, upper case letters A thru Z and the Space, -, ., *, $, /, +, and % characters. The Full ASCII version can encode all 128 ASCII Characters. Note: Full ASCII is default. Code 39 has an asterisk (*) as a start and stop character. The scanner can be setup to transmit the start/stop characters if desired. Code 39 can be printed with a Modulus 43 check character. The scanner can be setup to calculate the check character and transmit it. Note: if the check character calculation fails, no transmission is made.

Code 39 Type	Standard AA1*	Full ASCII AA2*
Transmit Start/Stop?	Yes AA4*	No AA3*
Verify Check Character	Yes AA6*	No AA5*
Transmit Check Character	Yes AA8*	No AA7*

Start

START

END

End

Abort

ABORT

SET

Set

Specific Codabar Parameters

Codabar can have several sets of Start/Stop characters, depending on the specific application. The scanner can be setup to transmit the proper set, or not to transmit the characters at all. Codabar can also have a check character. The scanner can be setup to calculate the character and transmit it with the barcode data.

Transmit Start/Stop

Yes AE2*

No Default AE1*

Start/Stop Characters

ABCD/ABCD AE3*

ABCD/TN*E AE4*

abcd/abcd Default AE5*

abcd/tn*e AE6*

Verify Check Digit

Yes AEA*

No Default AE9*

Transmit Check Digit

Yes AE8*

No Default AE7*

Specific Interleaved 2 of 5 Parameters

Interleaved 2 of 5 Code may be printed with a Modulo 10 check character. If so, the scanner can be setup to verify the check digit and transmit it along with the other characters in the code. Interleaved 2 of 5 may also be setup to read specific length codes. The default setup reads any length between 2 and 32 digits. When setting up lengths or ranges, the numbers used must be Hexadecimal numbers. To convert a decimal number to Hexadecimal, turn to Appendix A. Look up the decimal number in the left column and then find the Hexadecimal equivalent in the right column.

Examples:

Example 1: To read an Interleaved 2 of 5 code that is between 10 and 20 digits long. First convert 10 and 20 to Hexadecimal numbers. 10 = 0A. 20 = 14. Scan the "Barcode Length" code below. Turn to Appendix C. Scan the code for 0, then the code for A, then the code for 1, then the code for 4. Scan the SET code in Appendix C. Scan the end code at the top of any page.

Example 2: Specific code lengths may also be specified. Up to 3 lengths may be specified. To setup the scanner so that it will only read 12, 16 and 20 digit codes, do the following. First convert 12, 16 and 20 to Hexadecimal numbers using the table in Appendix A. 12 = 0C. 16 = 10. 20 = 14. Next, scan the Custom Define Label. Next, turn to Appendix C and scan the barcodes corresponding to 0, C, 1, 0, 1 and 4. Next, scan the SET code in Appendix C. Scan the END code at the top of any page.

Verify Check Digit

Transmit Check Digit

Barcode Length

Custom Define

Specific Standard 2 of 5 Parameters

Standard 2 of 5 Code may be printed with a Modulo 10 check character. If so, the scanner can be setup to verify the check digit and transmit it along with the other characters in the code. Standard 2 of 5 may also be setup to read specific length codes. The default setup reads any length between 2 and 32 digits. When setting up lengths or ranges, the numbers used must be Hexadecimal numbers. To convert a decimal number to Hexadecimal, turn to Appendix A. Look up the decimal number in the left column and then find the Hexadecimal equivalent in the right column.

Examples:

Example 1: To read a Standard 2 of 5 code that is between 10 and 20 digits long. First convert 10 and 20 to Hexadecimal numbers. 10 = 0A. 20 = 14. Scan the "Barcode Length" code below. Turn to Appendix C. Scan the code for 0, then the code for A, then the code for 1, then the code for 4. Scan the SET code in Appendix C. Scan the end code at the top of any page.

Example 2: Specific code lengths may also be specified. Up to 3 lengths may be specified. To setup the scanner so that it will only read 12, 16 and 20 digit codes, do the following. First convert 12, 16 and 20 to Hexadecimal numbers using the table in Appendix A. 12 = 0C. 16 = 10. 20 = 14. Next, scan the Custom Define Label. Next, turn to Appendix C and scan the barcodes corresponding to 0, C, 1, 0, 1 and 4. Next, scan the SET code in Appendix C. Scan the END code at the top of any page.

Verify Check Digit

Transmit Check Digit

Barcode Length

Custom Define

Specific Matrix 2 of 5 Parameters.

Matrix 2 of 5 Code may be printed with a Modulo 10 check character. If so, the scanner can be setup to verify the check digit and transmit it along with the other characters in the code. Standard 2 of 5 may also be setup to read specific length codes. The default setup reads any length between 2 and 32 digits. When setting up lengths or ranges, the numbers used must be Hexadecimal numbers. To convert a decimal number to Hexadecimal, turn to Appendix A. Look up the decimal number in the left column and then find the Hexadecimal equivalent in the right column.

Examples:
Example 1: To read a Matrix 2 of 5 code that is between 10 and 20 digits long. First convert 10 and 20 to Hexadecimal numbers. 10 = 0A. 20 = 14. Scan the "Barcode Length" code below. Turn to Appendix C. Scan the code for 0, then the code for A, then the code for 1, then the code for 4. Scan the SET code in Appendix C. Scan the end code at the top of any page.

Example 2: Specific code lengths may also be specified. Up to 3 lengths may be specified. To setup the scanner so that it will only read 12, 16 and 20 digit codes, do the following. First convert 12, 16 and 20 to Hexadecimal numbers using the table in Appendix A. 12 = 0C. 16 = 10. 20 = 14. Next, scan the Custom Define Label. Next, turn to Appendix C and scan the barcodes corresponding to 0, C, 1, 0, 1 and 4. Next, scan the SET code in Appendix C. Scan the END code at the top of any page.

Verify Check Digit

Yes

AD6*

No Default

AD5*

Transmit Check Digit

Yes

AD4*

No Default

AD3*

Barcode Length

Length

AD1*

Custom Define

Custom Define

AD2*

Specific EAN-13 Parameters.

By default, all digits in the EAN-13 barcode are transmitted from the scanner. The scanner can be programmed to truncate (not transmit) a number of leading digits and also not to transmit the check digit, which is the last digit in the code. To truncate leading digits first, scan the Truncate Leading Digits code below. Next turn to Appendix C. To truncate 1 digit, scan the barcode for 0, then the barcode for 1. To truncate two digits, scan the barcode for 0 , then the barcode for 2. Scan the SET code at the bottom of Appendix C, then the END Code.

Transmit Check Digit

Yes Default

AF6*

No

AF5*

Truncate Leading Digits

Truncate

AF1*

Specific EAN-8 Parameters

By default, all digits in the EAN-8 barcode are transmitted from the scanner. The scanner can be programmed to truncate (not transmit) a number of leading digits and also not to transmit the check digit, which is the last digit in the code. To truncate leading digits first, scan the Truncate Leading Digits code below. Next turn to Appendix C. To truncate 1 digit, scan the barcode for 0, then the barcode for 1. To truncate two digits, scan the barcode for 0 , then the barcode for 2. Scan the SET code at the bottom of Appendix C, then the END Code.

Transmit Check Digit

Yes Default

AH4*

No

AH3*

Truncate Leading Digits

Truncate

AH1*

Specific UPC-A Parameters.

By default, all digits in the UPC-A barcode are transmitted from the scanner. The scanner can be programmed to truncate (not transmit) a number of leading digits and also not to transmit the check digit, which is the last digit in the code. To truncate leading digits first, scan the Truncate Leading Digits code below. Next turn to Appendix C. To truncate 1 digit, scan the barcode for 0, then the barcode for 1. To truncate two digits, scan the barcode for 0 , then the barcode for 2. Scan the SET code at the bottom of Appendix C, then the END Code.

Transmit Check Digit — Yes Default AG6* — No AG5*

Truncate Leading Digits — Truncate AG1*

Specific UPC-E Parameters

By default, all digits in the UPC-E barcode are transmitted from the scanner. The scanner can be programmed to truncate (not transmit) a number of leading digits and also not to transmit the check digit, which is the last digit in the code. To truncate leading digits first, scan the Truncate Leading Digits code below. Next turn to Appendix C. To truncate 1 digit, scan the barcode for 0, then the barcode for 1. To truncate two digits, scan the barcode for 0 , then the barcode for 2. Scan the SET code at the bottom of Appendix C, then the END Code. The Scanner can also be set to convert a UPC-E Code to a UPC-A. Every UPC-E barcode was actually derived from a UPC-A Code.

Transmit Check Digit — Default Yes AI4* — No AI3*

Truncate Leading Digits — Truncate AI1*

Convert UPC-E to UPC-E — Yes AI5* — NO AI6*

Specific DataLogic 2 of 5 Parameters.
DataLogic 2 of 5 Code may be printed with a Modulo 10 check character. If so, the scanner can be setup to verify the check digit and transmit it along with the other characters in the code. DataLogic 2 of 5 may also be setup to read specific length codes. The default setup reads any length between 2 and 32 digits. When setting up lengths or ranges, the numbers used must be Hexadecimal numbers. To convert a decimal number to Hexadecimal, turn to Appendix A. Look up the decimal number in the left column and then find the Hexadecimal equivalent in the right column.

Examples:
Example 1: To read a DataLogic 2 of 5 code that is between 10 and 20 digits long. First convert 10 and 20 to Hexadecimal numbers. 10 = 0A. 20 = 14. Scan the "Barcode Length" code on this page. Turn to Appendix C. Scan the code for 0, then the code for A, then the code for 1, then the code for 4. Scan the SET code in Appendix C. Scan the end code at the top of any page.

Example 2: Specific code lengths may also be specified. Up to 3 lengths may be specified. To setup the scanner so that it will only read 12, 16 and 20 digit codes, do the following. First convert 12, 16 and 20 to Hexadecimal numbers using the table in Appendix A. 12 = 0C. 16 = 10. 20 = 14. Next, scan the Custom Define Label. Next, turn to Appendix C and scan the barcodes corresponding to 0, C, 1, 0, 1 and 4. Next, scan the SET code in Appendix C. Scan the END code at the top of any page.

Verify Check Digit

Yes

AX6*

No

AX5*

Transmit Check Digit

Yes

AX4*

No

AX3*

Barcode Length

Length

AX1*

Custom Define

Custom Define

AX2*

General Scanner Parameters

Operating Modes

The scanner has four basic operating modes. In the **Default Mode** the scanner will make a single data transmission for each barcode presented to it. It will not make another data transmission until that code leaves its field of view. The code can be replaced by a different code, or the same code. This is a self gating method. Only one data transmission is made per code, but no gate signal is required.

Default Mode
AK8*

In the **Free Running Mode**, the scanner scans a barcode and transmits data as fast as possible. No type of gating is used. This mode is normally used as a test mode to evaluate the operating range of the scanner for a particular code.

Free Running
AK5*

The **Trigger On / Good Read Off Mode** requires an external trigger signal. Section 1 of this Manual shows how to install a hardware trigger. The trigger may be a switch or photoelectric control. Pin 5 is grounded during the trigger period. A momentary trigger signal turns on the light source and enables the scanner to read. A good read turns off the light source. The data transmission is made. If the code is not read after 3 seconds, the light source is turned off and no transmission is made. To set this mode, first scan the START code, then scan the code below. Scan the END code at the top of any even page.

Trig On GR Off
AK1*

The **Trigger On / Adjustable Time Mode** operates similar to above except the time is setable rather than being fixed at three seconds. To set this mode, first scan the START code, then the code below. Turn to Appendix C. Scan two digits corresponding to the time in seconds. For example, if the desuired time is eight seconds, scan zero, then 8. Scan the SET code in Appendix C. Scan the END code at the top of any even page.

Trig On Adj Time
AK6*

The **Trigger Enable/Disable Mode** uses the trigger to enable and disable the scanner from reading. When enabled the scanner performs as in Default mode, as described on the previous page. On powerup the scanner will be disabled. Momentarily grounding the trigger contact enables the scanner to read. Momentarily grounding the trigger contact again will disable the scanner. To set the scanner to this mode, scan the START code at the top of any even page. Scan the barcode below. Scan the END code at the top of any even page.

Trigger Enable/Disa

AK3*

In **Flash Mode** the scanner will remain on for a selectable period of time. Go off for about one-half second and then flash on again. When a code is read the time is reset. The scanner will only read once during each on-time. Grounding the trigger pin will hold the scanner off. To set the scanner to this mode, scan the START code at the top of any even page. Scan the code below. Turn to Appendix C. Scan two digits corresponding to the time in seconds. For example, if the desuired time is eight seconds, scan zero, then 8. Scan the SET code in Appendix C. Scan the END code at the top of any even page.

Flash Mode

AK7*

In **Trigger Enable Mode** the scanner will be disabled and the light turned off when power is applied. The unit will remain off until the scanner receives a momentary trigger signal. The light source will be switched on and the scanner will be enabled to read. The scanner action from this point will be the same as Default Mode. To set the scanner to this mode scan the START code at the top of any even page. Scan the code below. Scan the END code.

Trigger Enable

AK4*

Start

START

END

End

Abort

ABORT

SET

Set

Preamble and Postamble

A Preamble field and Postamble field may be added to the scanner data transmission. The Preamble consists of up to 10 characters that will precede the barcode data in the serial transmission. The Postamble consists of up to 10 characters that will immediately follow the barcode data in the serial transmission. The following example is for entering a preamble of "abc" to the data transmission. First, convert the characters "abc" to Hexadecimal Numbers. To do this use the table in Appendix B. The characters "abc" translate to the Hexadecimal numbers 61, 62 and 63. Scan the START code above, then the Preamble code below. Turn to Appendix C. Scan the following barcodes: 6, 1, 6, 2, 6, and 3. Scan the SET code at the bottom of Appendix C. Scan the End code at the top of any page. The Postamble is programmed similarly, except the postamble code is scanned. If an error is made during the process, it can be aborted by scanning the Cancel code below.

Preamble

AO2*

Postamble

AO3*

Cancel

HLZ*

Code Identifier Characters

If the scanner is set to read more than one barcode type, it is often desirable to have a method of determining which code type was read on any specific read. This can be accomplished by assigning a code type identifier character to specific barcode types. When the data is transmitted, the identifier character is transmitted imediately preceding the barcode data. To assign an identifier to a code type, first scan the START code at the top of the page. Next, scan the code below corresponding to the code type. Next, turn to Appendix B and look up the Hexadecimal value for the character you want to assign. For example, if the character were "A" then the value would be 41. Next, proceed to Appendix C and scan the barcodes for the two characters in the Hex value; 4 and 1 in our example. Next, scan the Set Code at the bottom of Appendix C. Then, scan the END code at the top of any page.

Code 39

AU1*

Interleaved 2 of 5

AU2*

Standard 2 of 5

AU3*

Martix 2 of 5

AU4*

Codabar

AU5*

EAN-13

AU6*

UPC-A

AU7*

EAN-8

AU8*

UPC-E

AU9*

DataLogic 2 of 5

AUC*

Code 93

AUB*

Code 128

AUD*

To Remove an Identifier Character for a particular code type, scan the START at the top of any page. Scan the code for corresponding to the code type on the previous page. Scan the Cancel code below. Scan the END code at the top of any page. To turn off Identifier transmission for all codes, scan the START code, the Identifier Off code below, then the END code. The Identifier On Code can be used to turn it back on.

Cancel

HLZ*

Identifier Off

AZF*

Identifier On

AZE*

Appendix A

The table below is used to convert the desired code length to a Hexadecimal number. Locate the code length in the left column, then read the corresponding Hexadecimal value in the right column.

Decimal	Hex	Decimal	Hex
1	01	17	11
2	02	18	12
3	03	19	13
4	04	20	14
5	05	21	15
6	06	22	16
7	07	23	17
8	08	24	18
9	09	25	19
10	0A	26	1A
11	0B	27	1B
12	0C	28	1C
13	0D	29	1D
14	0E	30	1E
15	0F	31	1F
16	10	32	20

Appendix B

Use Appendix B to enter Preamble and Postamble fields. Each character in the Preamble or Postamble must be entered as a two character Hex value. Look up the value for each character in the table below.

Character	Hex Value	Character	Hex Value	Character	Hex Value
Space	20	A	41	b	62
!	21	B	42	c	63
"	22	C	43	d	64
#	23	D	44	e	65
$	24	E	45	f	66
%	25	F	46	g	67
&	26	G	47	h	68
'	27	H	48	i	69
(	28	I	49	j	6A
)	29	J	4A	k	6B
*	2A	K	4B	l	6C
+	2B	L	4C	m	6D
,	2C	M	4D	n	6E
-	2D	N	4E	o	6F
.	2E	O	4F	p	70
/	2F	P	50	q	71
0	30	Q	51	r	72
1	31	R	52	s	73
2	32	S	53	t	74
3	33	T	54	u	75
4	34	U	55	v	76
5	35	V	56	w	77
6	36	W	57	x	78
7	37	X	58	y	79
8	38	Y	59	z	7A
9	39	Z	5A	{	7B
:	3A	[	5B	|	7C
;	3B	\	5C	}	7D
<	3C	]	5D	~	7E
=	3D	^	5E		7F
>	3E	_	5F		
?	3F	`	60		
@	40	a	61		

Appendix C

Appendix C contains the barcodes that correspond to the Hexadecimal characters. Notice that when any character is converted to a Hexadecimal value in Appendix B, that the character consists of numbers 0 thru 9 or letters A thru F.

0

HL0*

1

HL1*

2

HL2*

3

HL3*

4

HL4*

5

HL5*

6

HL6*

7

HL7*

8

HL8*

9

HL9*

A

HLJ*

B

HLK*

C

HLL*

D

HLM*

E

HLN*

F

HLO*

SET

HLE*

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