

User's Manual



Smart Wand
Serial Communication
25-MSH23-01
Ver. November 2000



8 Olympic Drive
Orangeburg, NY 10962
Tel 845.365-0090
Fax 845.365-1251
www.opticonUSA.com

Table of Contents

PART I Scanning

General Information	1
RS232 Interface	2
Set Up	3
Scanning	6
User Maintenance	7
Troubleshooting	7
Factory Service	8
Technical Specifications	9
FCC Information	10
Warranty	11
Glossary	12

Part II Bar Code Menu Functions

Reset All Defaults	17
Symbology Selection	18
Symbology Additions	19
Code 39 Settings	20
Codabar Settings	21
2 of 5 Settings	22
MSI/Plessey Settings	23
Trigger Options	23
Code ID	24
Bar Code Length Options	25
Baud Rate Settings	26
Data Format	27
Handshaking	28
Prefix/Suffix Options	29
Beeper Settings	30

NOTICE

OPTICON has taken every step to ensure that the information included in this manual is accurate, however we reserve the right to change any specification at any time without prior notice.

General Information

The Opticon smart wand is an intelligent wand with a built-in, state-of-the-art 16-bit single chip decoder. Housed in a durable polycarbonate plastic case, the OPTICON smart wand offers unparalleled performance at an economical price with the following features:

- Internal decoder
- Optional "Good Read" LED indicator light
- "Good Read" audible beeper
- Optional ON/OFF switch (MSH-220)
- User replaceable ruby ball tip and cable
- Autodiscriminates among all major bar code symbologies
- Bar code menu programmable

RS232 Interface

The RS232 smart wand has a built-in decoder allowing it to connect directly to a personal computer without the need for a separate decoder box. The smart wand operates with any RS232 serial asynchronous communication port. It decodes the bar code label and the resultant ASCII data is transmitted to the communication port. +5 Volts must be supplied to the smart wand, either from the computer, or via an external power supply.

The default communications parameters are as follows:

- Baud Rate 9600
- Data Bits 8
- Parity None
- Stop Bits 1

Set Up

Unpacking

Remove the smart wand from its packaging and inspect it for damage. If the smart wand was damaged in transit, call the Opticon Customer Service Dept. at 800-636-0090.

Installation

The standard RS232 smart wand cable is terminated with a DB25 female connector. In most cases, an external power supply will be needed to power the wand unless the RS232 port on the receiving device has +5 volts on pin #25.

Installation is as follows:

1. Connect the external power supply cable to the RS232 serial port.
2. Connect the smart wand to the external power supply cable if required. If not, go to step 5.
3. Connect the power transformer (barrel type connector) to the corresponding DB25 connector on the power supply cable.
4. Plug the power transformer into a wall socket (110V ac). The LED at the tip of the smart wand should now illuminate when the trigger is touched.
5. Power up the receiving device (computer). Make sure the software on the receiving device is set for the same communication parameters as the RS232 smart wand (e.g. 9600 baud, 8 data bits, 1 stop bit and no parity).

Programming the Smart Wand

This booklet provides an easy way of changing many operating parameters. A parameter is changed by scanning a bar code associated with a specific function.

To select menu options:

1. Scan "Start/End Program Menu". The smart wand will beep once to indicate that it is ready to be programmed.
2. Make parameter selection from menu (two beeps indicate that the parameter has been scanned).
3. Scan "Start/End Program Menu". The smart wand will beep once more. This completes the operation and the new parameter is saved in the memory.

NOTE: (👉) A pointing finger indicates scanner default settings.

Programming via a Computer

Most of the parameters, except those related to the wand's interface (e.g. baud rate, data bits) can be changed by sending a command to the smart wand from the host. The parameters chosen this way are only effective while the power is supplied to the smart wand and will be lost as soon as the power is switched off unless the "Z2" (save settings) command is sent to the smart wand after all changes have been made.

The command format is as follows:

<ESC><command><CR>

For example: To make the smart wand read only Code 39, send command as <ESC><A2><CR>. To save the new setting, send <ESC><Z2><CR>.

NOTE: The smart wand will not accept keyboard commands while:

1. The smart wand is in communication with the host.
2. The smart wand is in programming mode (after reading "Start/End Program Menu").

Scanning

If the wand has a trigger switch, depress the button near the tip. Red LED illumination will emit from the ruby ball tip of the wand. If the wand does not have a trigger switch, then the red LED will remain illuminated as long as the computer system is on.

1. Place the tip of the wand about $\frac{1}{4}$ to $\frac{1}{2}$ inch to the right or left of the bar code. The wand tip must make contact with the bar code label.
2. Move the wand over the bar code label with uniform speed. For maximum performance, slightly tilt the wand while scanning.
3. The wand will beep to indicate an audible good read* (if it does not beep, make sure the beeper is enabled, page 30). If the wand has a "good read" LED indicator (MSH-220 only), it will illuminate indicating a good read.

* The wand will read all enabled bar code symbologies listed in the menu section of this manual.

User Maintenance

There is no user maintenance required for the Opticon smart wand. Replacement wand tips and cables are available from Opticon. To remove wand tip, simply rotate the tip counter-clockwise. To remove cable, simply pry the rubber cover backward and remove the cable from the wand.

Troubleshooting

If after performing the following checks, the smart wand is still not functioning, contact your distributor or call Opticon Technical Support at 800-636-0090.

1. If the wand tip does not illuminate once the previous instructions have been followed:
 - Make sure the power supply is plugged into a 110V outlet.
 - Check for loose cable connections.
2. If the wand tip illuminates but "good read" beep is not heard and no data appears on the computer:
 - Make sure the smart wand is making direct contact with the bar code when trying to read it.
 - Is the bar code label readable? Does it meet bar code specifications?
 - Make sure to scan at a rapid pace- the wand will not read if the pace is too slow.
 - Does the smart wand read other bar code labels? (If yes, the non-reading label may be a label which the smart wand is not programmed to decode.)

3. If the wand tip illuminates and a "good read" beep is heard, but no data appears on the computer:
 - Verify that the application software running on the computer is setup to work with the serial port.
 - Make sure the communication parameters on both the smart wand and the computer are exactly the same (i.e. baud rate, data bits, stop bits, parity).

Factory Service

When calling Opticon Technical Support, please have the unit model number and several bar code labels readily at hand.

Technical Specifications

Physical

Case Material	Polycarbonate, off white
Tip	Synthetic Ruby Ball
Cable	Straight
Dimensions	6.5 x 1.25 x 0.75 inches
Weight	3 oz. (approx.)
Cable Length	5 ft. (approx.)

Optical

Light Source	Red LED 660 nm
Tilt Angle	35° max.
Resolution	6 mil (min.)
Depth of Field	Contact smart wand
Scan Speed	2 to 60 inches per second

Electrical

Supply Voltage	4.5 to 5.5 VDC
Current	
Operating	50 mA nominal
Standby	5 mA

Environmental

Temperature	
Operating	+32° to +120° F
Storage	+15° to +160° F
Humidity	5 to 95% RH (non-condensing)
Shock	40" drop onto hardwood

Interface

RS232	Asynchronous Serial Output
-------	----------------------------

Accessories Available

28-WAND2-01	Smart Wand Stand
-------------	------------------

FCC Information

This equipment has been tested and is found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate RF energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communication. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at their own expense.

Changes or modifications not expressly approved by the party responsible for compliance could void the users authority to operate this equipment.

Warranty

This smart wand is warranted for a period of five (5) years from date of shipment from Opticon, including all defects in material and workmanship for the first year and electronics only thereafter. Opticon will repair or replace products which prove to be defective in material or workmanship under proper use within the warranty period at its option. Opticon will consider any product out-of-warranty if the unit has been subjected to misuse, accident or incorrect installation. No other warranties are expressed or implied, including but not limited to the implied warranties of merchantability and fitness for a particular purpose. Opticon is not liable for consequential damages.

If the smart wand must be returned, please contact Opticon to obtain an RMA (Return Merchandise Authorization) number prior to returning the product. The Customer Service Dept. may be reached at 800-636-0090.

NOTE: Returned merchandise will NOT be accepted without a RMA number indicated clearly on the outside of the carton.

Glossary

ASCII - American Standard Code for Information Interchange. A 7 bit plus parity code representing 128 letters, numerals, punctuation marks, and control characters. It is a standard data transmission code in the US.

Autodiscrimination - The ability of bar code reading equipment to recognize and correctly decode more than one symbology.

Bar Code - An automatic identification technology which encodes information into an array of varying width parallel rectangle bars and spaces.

Bar Code Density - The number of data characters which can be represented in a linear unit of measure. Bar code density is often expressed in characters per inch.

CCD (Charged Coupled Device) - A technology in which scanning is accomplished with an array of LED's flooding the bar code with light.

Check Digit - A digit used to verify a correct symbol code. The scanner inserts the decoded data into an arithmetic formula and checks that the resulting number matches the encoded check digit. Check digits are required for UPC but are optional for other symbologies. Using check digits decreases the chance of substitution errors when a symbol is decoded.

Codabar - A discrete self-checking code with a character set consisting of digits 0 to 9 and six additional characters (- \$: / . +).

Glossary (cont.)

Code 128 - A high density symbology which allows the controller to encode all ASCII characters without adding extra symbol elements.

Code 3 of 9 (Code 39) - A versatile and widely used alphanumeric bar code symbology with a set of 43 characters types, including all upper case letters, numerals from 0 to 9 , and 7 special characters (- / . + % \$ and space). The code name is derived from the fact that 3 of 9 elements representing a character are wide, while the remaining 6 are narrow.

Decode - To recognize a bar code symbology and then analyze the content of the specific bar code scanned.

Default - A standard setting assigned to a parameter type unless a different setting is assigned to that parameter.

Depth of field - The distance between the maximum and minimum plane in which bar code reader is capable of reading symbols.

EAN (European Article Number) - This European/International version of the UPC provides its own coding format and symbology standards. Element dimensions are specified metrically. EAN is used primarily in retail.

Encode - To translate data into machine readable form using the format and conventions of a specific bar code symbology.

Host Computer - A computer that serves other terminals in a network, providing such services as computation, database access, supervisory programs, and network control.

Glossary (cont.)

Interleaved 2 of 5 - A binary code symbology representing character pairs in groups of five bars and five interleaved spaces. Interleaving provides for greater information density. The location of wide elements (bars/spaces) within each group determines which characters are encoded. This continuous code type uses no Inter-character spaces. Only numeric (0 to 9) and START/STOP characters may be encoded.

Parameter - A setting that can have a different function assigned to it.

Programming mode - The state in which a scanner is configured for parameter settings.

Quiet Zone - A clear space, containing no machine readable marks, which precedes the start character of a bar code symbol and follows the stop characters.

Read Rate - The ratio of the number of successful reads on the first attempt to scan to the total number of attempts.

Resolution - In a bar code system, the narrowest element dimension which can be distinguished by a particular reading device or printed with a particular device or method.

RS232 - A common interface standard that permits DTEs and DCEs to connect successfully.

Scanner - An electronic device used to scan bar code symbols and produce a digitized pattern that corresponds to the bars and spaces of the symbol.

Scanning Mode - The scanner is energized, programmed, and ready to read a bar code.

Glossary (cont.)

Start/Stop Character - A pattern of bars and spaces that provides the scanner with start and stop reading instructions and scanning direction. The start and stop characters are normally to the left and right margins of a horizontal code.

Symbology - The structural rules and conventions for representing data within a particular bar code type.

UPC (Universal Product Code) - A relatively complex numeric symbology. Each character consists of two bar codes and two spaces, each of which can be any of four widths. The standard symbology for retail food packages in the United States.



* This page left intentionally blank *

Part II

Bar Code Menu Functions

Reset All Defaults









When scanned, "U0" will set all parameters back to their default settings. "Z3" will display the version number and contents of the RAM (contact Opticon to decipher the code).

Z9	Start/End Program Menu	
U0	Reset all defaults	











Symbology Selection

By default, the smart wand automatically reads WPC (without add-on), Code 39, Codabar and 2 of 5 bar code symbologies. If only one symbology is required, programming the scanner to read only that symbology will speed operation and eliminate read errors.

Z9	Start/End Program Menu	
A1	WPC Only	
A2	Code 39 Only	
A3	Codabar Only	
A4	2 of 5 Only	
A5	Code 93 Only	
A6	Code 128 Only	
A7	MSI/Plessey Only	







Symbology Additions

Use this menu to enable symbologies to the single symbology selected from menu on page 18. If for example you need to read Code 39, Code 128 and Codabar only, simply program Code 39 only on page 18, followed by Add Code 128 and Add Codabar below.

Z9	Start/End Program Menu	
B0	Enable WPC (no add-on)	
B2	Enable Code 39	
B3	Enable Codabar	
B4	Enable 2 of 5	
B5	Enable Code 93	
B6	Enable Code 128	
B7	Enable MSI/Plessey	

Code 39 Settings







If the Code 39 label was printed with a check sum character, "C1" instructs the smart wand to calculate the check sum character and compare it with the actual check sum character. If the calculated check sum character does not match the actual check sum character, the data will be discarded. "D0" and "d1" instruct the wand to either transmit or not transmit the start/stop characters.

Z9	Start/End Program Menu	
C0	Do not calculate check sum	
C1	Calculate check sum	
D0	Do not transmit start/stop	
D1	Transmit start/stop	
H3	Enable single digit	



Codabar Settings




The smart wand allows the user to either transmit or not transmit the start/stop characters. If the user chooses to transmit the start/stop characters, there are four different options from which to choose.

Z9	Start/End Program Menu	
F0	Do not transmit start/stop	
F1	Xmit start/stop as ABCD/TN*E	
F2	Xmit start/stop as abcd/tn*e	
F3	Xmit start/stop as ABCD/ABCD	
F4	Xmit start/stop as abcd/abcd	







2 of 5 Settings

If the 2 of 5 label was printed with a check sum character, "G1" instructs the wand to calculate the check sum character and compare it with the actual check sum character. If the calculated check sum character does not match the actual check sum character, the data will be discarded.

Z9	Start/End Program Menu	
G0	Do not calculate check sum	
G1	Calculate check sum	






MSI/Plessey Settings

Z9	Start/End Program Menu	
C2	Do not xmit check sum characters	
C3	Xmit 1 check sum character	
C4	Xmit 2 check sum characters	







Trigger Options

Z9	Start/End Program Menu	
S7	Trigger disable	
S8	Trigger enable	



Code ID




Z9	Start/End Program Menu	
I0	Do not xmit Code ID	
I1	Xmit Type I Code ID	
I2	Xmit Type II Code ID	



ID characters can be transmitted as a prefix before each symbology as follows:

Symbology	ID Type I	ID Type II
Codabar	a	N
Code 39	b	M
UPC-A	c	A
UPC-E	c	C
EAN-13	d	A
EAN-8	d	B
JAN-13	d	A
JAN-8	d	B
Interleaved 2 of 5	f	I
Industrial 2 of 5	e	I
Standard 2 of 5	e	H
Code 93	i	M
Code 128	j	M
MSI/Plessey	k	M

Bar Code Length Options

Z9	Start/End Program Menu	
H0	Not fixed	
H1	Fixed	



By default, the smart wand is set to read any length bar code. The user has the option, however, to instruct the wand to read labels of only a certain length. Below are two examples.

A. One character length is set:










1. Scan Start/End Program Menu
2. Scan FIXED
3. Scan a bar code of desired length
4. Repeat step 3
5. Scan Start/End Program Menu

B. Two character lengths are set:

1. Scan Start/End Program Menu
2. Scan FIXED
3. Scan first bar code of desired length
4. Scan second bar code of desired length
5. Scan Start/End Program Menu

This parameter affects the following codes: Code 39, 2 of 5, Codabar and MSI/Plessey. The following codes are not affected: WPC, Code 93 and Code 128.









Baud Rate Settings

Z9	Start/End Program Menu	
K0	150 Baud	
K1	300 Baud	
K2	600 Baud	
K3	1200 Baud	
K4	2400 Baud	
K5	4800 Baud	
K6	9600 Baud	
K7	19200 Baud	



Data Format





The smart wand is programmable for the number of data bits, number of stop bits and either odd or even parity.

Z9	Start/End Program Menu	
L0	7 data bits	
L1	8 data bits	
M0	No parity bits	
M1	Even parity	
M2	Odd parity	
N0	1 stop bit	
N1	2 stop bits	



Handshaking










- ◆ **Free Running** - the data is transmitted regardless of control signals
- ◆ **Busy/Read** - The smart wand waits for a "Clear to Send" signal from host computer before transmitting the data. The "Request to Send" signal from the wand is always ON except when it is receiving commands from the host computer, or when it is sending data.
- ◆ **Modem** - The wand puts "Request to Send" signal ON, and waits for "Clear to Send" signal from the host computer to be ON, then starts transmitting the data. When the transmission has been completed, the wand turns the "Request to Send" signal OFF.

Z9	Start/End Program Menu	
P0	Free Running	
P1	Busy/Read	
P2	MODEM (Scanner :DTE)	











Prefix/Suffix Options

The smart wand is programmable for a number of prefixes and/or suffixes, including CR, LF, etc.

Z9	Start/End Program Menu	
O0	None	
O1	/CR	
O2	/LF	
O3	/CR, LF	
O4	STX/ETX	
O5	STX/CR, ETX	
O6	STX, LF, ETX	
O7	STX/CR, LF, ETX	



Beeper Settings

Z9	Start/End Program Menu	
W0	No beep	
W1	Hardware beep 2kHz, 80ms	
W2	Software beep, 3kHz, 200ms	
W3	Software beep, 3kHz, 200ms	
W5	Beep Volume 1 (Minimum)	
W6	Beep Volume 2	
W7	Beep Volume 3	
W8	Beep Volume 4 (Maximum)	