

WDP™

Second Keyboard and USB Bar Code Readers



Bar Codes
appear as
keyed data on
PC or
Macintosh
computers

Owner's Guide



Warning: This equipment generates, uses and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

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Introduction

Worth Data's WDP Readers are versatile bar code readers that attach to the IBM PC, any PC keyboard-compatible computer, and all PC or Mac USB ports. The WDP provides bar code input data to any host computer program exactly as if the data had been typed at the keyboard, including function and control key support. WDP Reader features include:

- **Bar codes**

The WDP Reader automatically reads and discriminates between Code 39, Full ASCII Code 39, STK Code, ITF Interleaved 2 of 5, Codabar, Code 128, EAN-13, EAN-8, UPC-E, UPC-A (with or without supplements), GS1 DataBar, MSI, LabelCode4, LabelCode5, Code 93, and Plessey.

- **PC Attachment**

The WDP provides an easy-to-use keyboard interface for the PC. Scanned data is displayed on the PC as keyboard data - transparent to the host application. The WDP also offers a dedicated USB port for PC or Mac, providing an alternative to the legacy keyboard interface. Data scanned using the USB interface appears as keyed data to the application.

- **Integrated Wedge Readers**

The Integrated Laser Readers and the Integrated Slot Badge Reader are complete WDP Readers with the decoder built into the scanner itself. Just plug the unit in between your computer and keyboard or USB port and you're ready to go. The Keyboard interface works on any PC keyboard-compatible computer while the USB interface works on PC's and Mac's. Available models are the LZ160-WDP, the LZ160-USB, the LZ310-WDP, Th LZ310-USB, the LZ410-WDP, the LZ410-USB Integrated Lasers, the SLV-WDP Integrated Slot Badge Reader (USB only) and the SLI-WDP Integrated Infrared Slot Badge Reader (USB only).

- **Scanner options**

The WDP P22 Reader can accommodate a variety of scanners. Scanner options include a stainless steel wand scanner, hand-held laser scanners, MagStripe scanners for reading credit card magnetic strips, and bar code slot scanners for badges and other thin, flat surfaces.

- **Configuration is easy**

The WDP Reader is easily configured for your system by scanning a bar coded Setup Menu. There are no dip switches to set. The PC Y cable can be switched from 5 pin to 6 pin and vice versa.

Installation

Components of WDP Reader

In the event the shipping box shows damage on arrival, please note the damage on the carrier's receipt log. Open the box and inspect the contents for damage. If there is visible damage, or if the unit fails to work, contact us with the details of the trouble; we will be happy to send you a replacement.

The contents of your WDP Reader shipment should include some or all of the following:

1. A P22 WDP Reader, Integrated Laser Reader, or Integrated Slot Badge Reader.
2. Velcro strips which can be used to conveniently attach the reader (P22) to the side of your computer, monitor or desk.
3. A cable for attaching the WDP Reader to your computer.
For the: P22 F31 Keyboard Y-Cable *or*
C21 USB Cable

For the: LZxxx-WDP C41 Keyboard Y-Cable

For the: LZxxx-USB C40 USB Cable

For the: SLx-WDP C44-A USB Cable ONLY
4. A Scanner (unless you ordered an Integrated Reader).
5. A scanner holder (or slot-scanner card deck).
6. A Utilities CD-ROM with Manuals & Setup Menus in PDF Format.



You probably didn't receive a power supply with your P22 WDP - even though your external P22 WDP decoder box has a Power jack. Power supplies are rarely needed. Using a power supply *other* than a **Worth Data Power Supply**, (our part number F10 for 110v), will probably burn out the WDP circuit board. Damage caused by a non-Worth Data power supply is *not* covered by warranty. **DON'T PLUG OTHER POWER SUPPLIES INTO THE WDP** -- even if the connector does fit, you will fry the WDP board.

If your power supply does not display this label, it does not belong to your WDP reader. Only plug in a power supply that comes from Worth Data and displays this label.

Installation

The keyboard wedge attachment and the USB attachment are available for both integrated readers and readers that use a separate decoder box (P22). Having a reader that consists of a separate decoder box and scanner allows you to add a power supply for low-power situations (99.9% of all PC's won't need a power supply) and allows for the attachment of more than one scanner (i.e. a bar code scanner *and* a magstripe scanner). The integrated models have the decoder conveniently built-in to the scanner.

- **USB Interface (PC and Mac)**

The Reader is attached directly to the USB port of the computer using a USB Cable C21 (on a P22), C40 (for the LZ160-USB, the LZ310-USB and the LZ410-USB) or the C44-A for the SLV and SLI-WDP Slot Badge Readers. The Windows® or Macintosh® operating systems provide the software required to access the USB port. Data coming from the scanner through the USB port appears as keyboard data in your application. No power supply is required for the USB interface.

Models with built-in USB are:

P22 Wand/Laser/Magstripe-ready Decoder
LZ160-USB Integrated Laser Reader
LZ310-USB Integrated Laser Reader
LZ410-USB Integrated Laser Reader
SLV-WDP Integrated Slot Badge Reader
SLI-WDP Integrated Infrared Slot Badge Reader

- **Keyboard Wedge (PC Only)**

The Reader is placed near the computer, and is connected between the computer and keyboard using a Y cable (F31/1 or C41). Velcro is included for convenient attachment to your computer, monitor, desk, etc. Bar code data is received via the computer's keyboard port.

Integrated Keyboard Wedge models are:

LZ160-WDP Integrated Laser Reader
LZ310-WDP Integrated Laser Reader
LZ410-WDP Integrated Laser Reader

Keyboard Wedge models that require a separate decoder box are:

P22 Wand/Laser/Magstripe-ready decoder

USB Installation for PC or Mac

Model LZ160-USB, LZ310-USB, LZ410-USB, SLV-USB and SLI-USB

The Integrated WDP Readers have an integrated USB port that can be attached directly to the USB port on any PC or Macintosh. The LZ160-USB, LZ310-USB, and LZ410-USB Readers use the C40 USB Cable, and the SLV-WDP and SLI-WDP use the C44-A USB Cable.

When you plug the Integrated Reader into the USB port, Windows 7, Vista, XP, 2000, ME, 98SE or the Mac will sense the new device and proceed to install the necessary software for a HID USB Keyboard (Windows systems may ask for the original Windows CD-ROM to install the needed USB drivers - be prepared). There are no additional drivers needed other than what is already standard in Windows or the Mac OS. Also, the Integrated Reader automatically senses the USB interface so there are no **Computer Interface** settings necessary. To install the Integrated Reader on the USB port:

1. Plug the flat USB connector end of the C40 or C44-A cable into a USB port on the host computer or USB hub.
2. The computer will sense the USB device and install the necessary software. The necessary drivers are standard in both Windows and the Mac. In Windows, simply click "Next" or press ENTER at each prompt until the installation is complete. If you have a problem with your USB installation, please see **Appendix I, Resolving USB Installation Issues** for details.



Model P22

The WDP-P22 decoder has an integrated USB port that can be attached directly to the USB port on any PC or Macintosh. When you plug the P22 into the USB port, Windows 7/Vista/XP/2000/ME/98SE or the Mac will sense the new device and proceed to install the necessary software. There are no additional drivers needed other than what is already in Windows or the Mac OS (Windows systems may ask for the original Windows CD-ROM to install the needed HID USB drivers - be prepared). Also, the P22 automatically senses the USB interface so there are no **Computer Interface** settings necessary on the P22. To install the WDP-P22 on the USB port:

1. Plug the flat USB connector end of the C21 cable into a USB port on the host computer or USB hub.
2. Plug the small square end of the C21 cable into the USB port on the WDP. On the P22, the USB port is next to the power jack.
3. At this point, the computer will sense the USB device and install the necessary software. The necessary drivers are already located on your hard drive in both Windows and the Mac (for Windows systems, have your Windows installation CD ready. In Windows, simply click "Next" or press ENTER at each prompt until the installation is complete. If you have a problem with your Windows USB installation, please see **Appendix I, Resolving USB Installation Issues** for details.



P22 USB Installation with Scanner



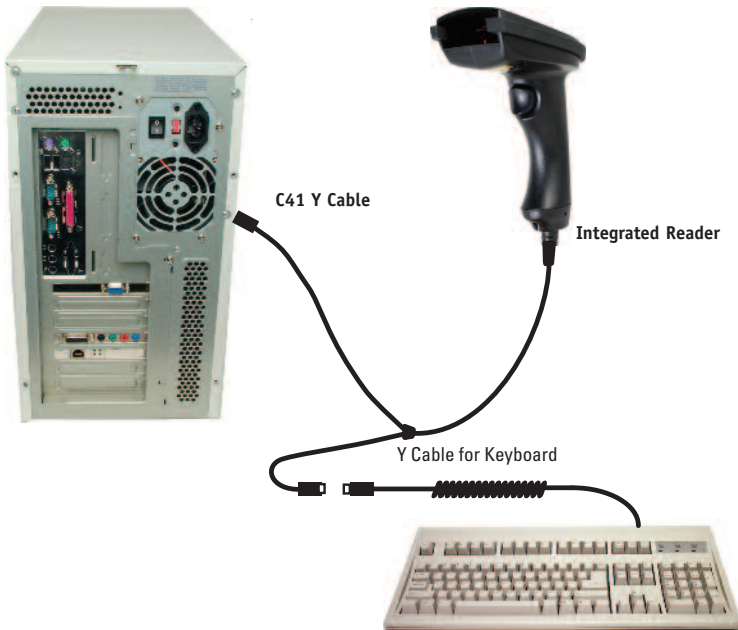
Keyboard Wedge Installation on PC

Model LZ160-WDP, LZ310-WDP and LZ410-WDP



All of the above models of the Integrated Readers use Keyboard Y-Cables to connect between the keyboard and PC. This cable will come already attached to the Reader. The cable for the LZ160-WDP, LZ310-WDP and LZ410-WDP Lasers is the C41.

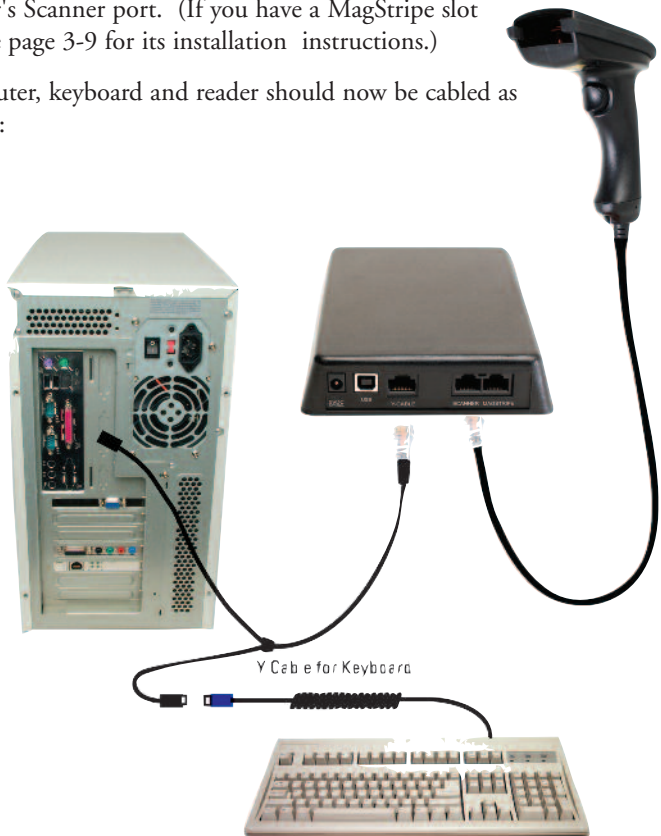
1. With the power **OFF** on the computer, unplug the keyboard cable from where it plugs into the back of the computer and note its location. (The Keyboard Y-Cable is convertible from a 5 pin cable by using standard keyboard 5 pin to 6 pin adapter cables available at most electronics stores).
2. Plug the keyboard cable into the "Y" cable's round female DIN connector.
3. With the power still **OFF** on the computer, plug the "Y" cable's male DIN connector into the back of the PC where the keyboard had been plugged in. Be sure not to plug into the mouse port by mistake.
4. Your computer, keyboard and reader should now be cabled as shown here: (the example shows the LZxxx-WDP Reader)



Integrated Reader Keyboard Wedge Installation

Model P22

1. With the power OFF on the computer, unplug the keyboard cable from where it plugs into the back of the computer and note its location.
2. Plug the keyboard cable into the "Y" cable's round female DIN connector.
3. With the power still OFF on the computer, plug the "Y" cable's male DIN connector into the back of the PC where the keyboard had been plugged in. Be sure not to plug into the mouse port by mistake.
4. Plug the modular telephone style jack (RJ45) at the Y end of the "Y" cable into the WDP P22 Reader's "Y" cable port.
5. Plug the wand, laser scanner, or bar code slot scanner into the P22 Reader's Scanner port. (If you have a MagStripe slot scanner, see page 3-9 for its installation instructions.)
6. Your computer, keyboard and reader should now be cabled as shown here:

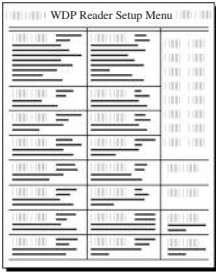


Keyboard installation for P22 Reader

Wands and Lasers can be mounted on the side of your monitor, computer or other surface using the laser scanner holder. Slot scanners can be permanently mounted to a desk, wall or other surface by using the threaded holes on the bottom.

WDP Reader Setup

Configuring the WDP Reader



Turn on your computer: You should hear three beeps from the WDP-- an indication that the reader is functioning correctly.

Find the **WDP Reader Setup Menu** on the Utilites CD-ROM and print it out - it is also available in **Appendix J** of this manual (For bar code slot scanners, the **WDP Reader Setup Menu** is a deck of bar coded cards). This simple menu lets you easily configure the WDP Reader to work with almost any computer system, and tailor its bar code reading and formatting characteristics precisely to your needs. To scan **WDP Reader Setup Menu** bar codes and

configure your reader and you are new to bar code scanning be sure to read **Chapter 3; Scanners and Scanning Technique**.

These are the WDP Reader's default settings. The WDP Reader is shipped configured to these settings, and can be reset to them at any time by reading the **Start Setup, Reset** and **End Setup** bar codes on the **WDP Reader Setup Menu**. If you need to change any settings, or want to learn more about the WDP Reader options, the next pages explain, step by step, how to set them and what they do.

Parameter	Default Setting	Parameter	Default Setting
Code 39	Code 39 enabled	MSI/Plessey	MSI/Plessey disabled
	Check Digit disabled		Check Digits not transmitted
	Start/Stop characters not transmitted		Label Code 4/5 disabled
	Accumulate Mode enabled		
	Caps Lock OFF		
2 of 5	1 2of 5 disabled	Code 128	Code 128 disabled
	6 digit code length		UCC-128/EAN disabled
	Check digit disabled		Bar Code ID's disabled
UPC/EAN	UPC/EAN enabled	Code 93	Code 93 disabled
	UPC Supplements disabled		Full ASCII extension disabled
	UPC-E compressed, NSC of 0		
	Transmit UPC-A in UPC-A format		
	ISBN conversion disabled		
	UPC-A NSC and EAN-13 first two characters and check digits transmitted		
	UPC-E NSC and EAN-8 first two characters and check digits not transmitted		
General			
Configuration	PC with USA keyboard Configuration		
Settings	Data Transmission timing NONE		
	NO preamble or postamble set		
	CR as Terminator Character		
	Medium pitch beep tone		
	Auto-detect Magstripe scanner		

Using the WDP Reader Setup Menu

You may use a WDP Setup Menu provided in Appendix J of this manual or on the Utilites CD-ROM or on our website www.barcodehq.com/downloads.html.

1 If you have never scanned before, refer to **Chapter 3** for scanning instructions. To configure your reader using the *WDP Reader Setup Menu*, you must first scan the **Start Setup** code at the top left corner. Do this now. You'll hear two beeps. During Setup, nothing will be transmitted to your computer; the Reader Setup Menu codes are strictly for configuring the reader. If you did not hear two beeps, try scanning the code again, until you hear the two beeps.

2 Next, choose the topic you want to change an option for, and scan its code. Let's use **Beep Tone**, at the lower left corner of the menu, as an example. Scan the **Beep Tone** code now. You'll hear two beeps.

3 Then, choose the option you want to change, from the list next to the topic bar code you just scanned. For **Beep Tone**, the options range from **0** for the lowest pitch to **4** for the highest pitch. Using the "Barpad Table" on the right side of the Reader Setup Menu, scan the number or letter associated with the option you have selected. Let's change the beep pitch to **Highest**. Now scan the **4** on the "Barpad Table". You will again hear two beeps.

4 Now scan **End Setup** (at the top-right corner of the *WDP Reader Setup Menu*) to complete the setup exercise. You'll hear three beeps. If you followed the instructions correctly and successfully changed beep tone to "highest", the three beeps will be higher in pitch than the other beeps had been. If they aren't higher in pitch, repeat the steps on this page until you are successful at changing the beep tone.

Now that your beep tone is at the "highest" pitch, you may want to change it back to "medium" or a different setting. Repeat the steps above, selecting the option you prefer to "highest" in step 3.

When you've successfully changed the beep pitch, and are ready to configure the reader for your specific application, scan **Start Setup** again. Continue scanning topics and options until you've made all the changes you desire, and then scan **End Setup** to complete setup.

The next section describes in detail each WDP Reader option. Default settings are shown in bold in this manual and are marked with an * on the *WDP Reader Setup Menu*.

WDP Setup Parameters

Beep Tone

Lowest	0
Low	1
Medium	2
High	3
Highest	4
Turn Beeper OFF, No "Laser Good" LED	5
Turn Beeper OFF, Yes "Laser Good" LED	6
No Aiming Dot for LZ400-D	9
1 Second Aiming Dot	A
2 Second Aiming Dot	B
3 Second Aiming Dot	C
4 Second Aiming Dot	D
5 Second Aiming Dot	E
6 Second Aiming Dot	F

The WDP Reader gives you a choice of five different beep pitches. The aiming dot settings are for use with an LZ400-D laser only.

Code 39

Enable Code 39	0
Disable Code 39	1
Enable Full ASCII Code 39	2
Disable Full ASCII Code 39	3
Enable Code 39 Accumulate Mode	4
Disable Code 39 Accumulate Mode	5
Enable Start/stop character transmission	6
Disable Start/Stop character transmission	7
Enable Mod 43 Check Digit	8
Disable Mod 43 Check Digit	9
Enable Check Digit Transmission	A
Disable Check Digit Transmission	B
Caps Lock ON	C
Caps Lock OFF	D

For information about **Code 39**, **Full ASCII Code 39** and **Accumulate Mode**, see *Appendix A*. The Storage Tek variation of Code 39 is also supported any time Code 39 is enabled.

Enabling Start/Stop character transmission means that the WDP Reader will transmit the * Start/Stop characters to your computer along with the data. For example, data of 1234 would be transmitted as *1234*. Most people don't need this option, but it is useful if you want your software to be able to differentiate between keyboard and bar code data.

Enabling the Mod 43 Check Digit requires the units position of your data to match the calculation for the check digit explained in *Appendix A*. If you've enabled the check digit, **enabling Check Digit transmission** causes the reader to transmit the check digit to your computer along with the bar code data.

"**Caps Lock ON**" means that lowercase letters read as data will be transmitted as uppercase, and uppercase as lower. Numbers, punctuation and control characters are not affected. "**Caps Lock OFF**" means that letters will be transmitted exactly as read.

UPC/EAN

Enable UPC/EAN	0
Disable UPC/EAN	1
Enable UPC/EAN Supplements	2
Disable UPC/EAN Supplements	3
Enable transmission of UPC-A NSC and EAN-13 first two digits	4
Disable transmission of UPC-A NSC and EAN-13 first two digits	5
Enable transmission of UPC-A/EAN-13 Check Digit	6
Disable transmission of UPC-A/EAN-13 Check Digit	7
Enable transmission of UPC-E NSC and EAN-8 first digit	8
Disable transmission of UPC-E NSC and EAN-8 first digit	9
Enable transmission of UPC-E/EAN-8 Check Digit	A
Disable transmission of UPC-E/EAN-8 Check Digit	B
UPC-E Compressed	C
UPC-E Expanded	D
EAN-8 observes 9 and A above	E
EAN-8 if forced to transmit 8 digits	F
UPC-A transmitted in UPC-A format	(see below)
UPC-A transmitted in EAN-13 format	(see below)
ISBN conversion disabled	(see below)
ISBN conversion enabled	(see below)

For general information about UPC and EAN, see *Appendix E*.

Enabling supplements allows you to read 2 and 5-digit supplemental codes used with magazines and books. This disallows right-to-left reading of UPC/EAN codes, to assure that the supplement doesn't get skipped. This setting also allows for reading of the *UCC/EAN 128 Extended Coupon Code*. The Extended Coupon Code consists of a UPC (must have NSC of 5) or an EAN (NSC of 99) code along with a Code 128 supplemental code right next to it. This setting allows you to read the Code 128 supplement as long as the correct NSC characters are present in the UPC or EAN code.

Enabling transmission of UPC or EAN NSC's (leading digits, 1 for UPC; 2 for EAN-13) or Check Digits means that these digits will be transmitted to your computer along with the rest of the UPC or EAN data.

UPC-E Compressed Format transmits UPC-E codes as is; Expanded Format adds zeros to make them the same length as UPC-A.

UPC-E can be used in either normal **UPC-E format** (implicit NSC of 0) or UPC-E1 format (NSC of 1). **UPC-E1** settings are found in the **2 of 5 Code** parameter. Setting **8** enables UPC-E1 reading while **9** disables UPC-E1 (**9** is the default). It is very easy to read an EAN-13 bar code partially as UPC-E1, so don't enable UPC-E1 when reading EAN-13.

If you wish the **UPC-A data to be transmitted in EAN-13 format**, (with an additional leading 0 for the USA's country code), you should scan Terminator Character and F. Scanning E, the default, sets UPC back to no country code transmitted.

ISBN bar codes are EAN-13 bar codes where the first three digits are the "Bookland" country code of 978 for books and 977 for periodicals, and the following nine are the first nine digits of the ISBN. The ISBN settings are located in the **Terminator Character** parameter. To enable transmission of ISBN bar codes in ISBN format (the nine ISBN digits plus a new calculated mod-11 check digit), scan **Terminator Character** and **D**. Scanning **C**, the default, disables conversion to ISBN format.

Code 93

Enable	0
Disable	1
Enable Full ASCII	2
Disable Full ASCII	3

For more information about Code 93, See *Appendix G*.

2 of 5 Code

Enable Interleaved 2 of 5	0
Disable Interleaved 2 of 5	1
Enable Interleaved 2 of 5 check digit	2
Disable Interleaved 2 of 5 check digit	3
Enable check digit transmission	4
Disable check digit transmission	5
Enable Standard 2 of 5	6
Disable Standard 2 of 5	7
Enable UPC-E1	8
Disable UPC-E1	9

For information about Interleaved 2 of 5, see *Appendix D*.

Enabling the check digit requires that the data's units position (last character) match the calculation for the check digit explained in *Appendix D*. If you have enabled the check digit and want to transmit the check digit to the computer along with the rest of the bar code data, choose "Enable check digit transmission".

See the UPC/EAN parameter on page 2-4 for more information on UPC-E1 format.

2 of 5 Data Length

Default Length	06
-----------------------	-----------

2 of 5 Code is so susceptible to interpreting partial scans as valid reads that the WDP Reader uses fixed-length data as a safeguard. To choose a data length, scan it as a two-digit number using the Barpad Table. For example, to select 8-digit data length, you would scan a 0 and then a 8. Because Interleaved 2 of 5 is required to be an even number of digits in length, you must use an even number.

If you're unsure of your bar code length, temporarily set length to 00, read a bar code, and count its digits. Variable-length 2 of 5 codes are very dangerous.

Codabar

Enable Codabar	0
Disable Codabar	1
Enable CLSI Codabar	2
Disable CLSI Codabar	3
Disable Start/Stop character transmission	4
Enable Start/Stop character transmission	5

For information about Codabar, see *Appendix B*.

CLSI format is a form of Codabar often used by libraries

Enabling Start/Stop character transmission means that the WDP will transmit the Start and Stop characters to your computer along with the bar code data. Enable transmission if you are varying the Start and Stop characters according to label type in order to differentiate between bar code data and data from the keyboard. Most people do not need to transmit the Start/Stop characters.

Code 128

Disable Code 128	0
Enable Standard Code 128	1
Disable UCC-128/EAN-128	2
Enable UCC-128/EAN-128	3
Bar Code ID's transmitted	E
Bar Code ID's not transmitted	F

See *Appendix C* for details on Code 128 and UCC-128/EAN-128.

Bar Code ID's are characters assigned to each bar code type to identify that particular type of code. These Bar Code ID's can be used to identify what type of bar code you are using when you are not sure or you want your application to differentiate between the different types. The Bar Code ID's are assigned as follows:

Bar Code	ID	Bar Code	ID
Codabar	a	Code 39	b
UPC-A	c	EAN-13	d
1 2 of 5	e	2 of 5 (standard)	f
Code 128	g	Code 93	i
MSI	j	magstripe data	m
UPC-E(0)	n	UPC-E1 (1)	o
EAN-8	p	Storage Tek	s
Plessey	x	LabelCode 4	y
LabelCode 5	z	RSS-14	r

MSI and Plessey

Disable MSI and Plessey	0
Enable MSI with 1 Mod 10 check digit	1
Enable MSI with 2 Mod 10 check digits	2
Enable MSI with 1 Mod 11 and 1 Mod 10 check digit	3
Transmit no check digits	4
Transmit 1 Check digit	5
Transmit 2 Check digits	6
Enable Plessey Code	7
Enable LabelCode5	8
Enable LabelCode4	9

Plessey has two check digits which are not transmitted. MSI, Plessey, LabelCode4, and LabelCode5 are mutually exclusive. For information about MSI codes, see *Appendix F*.

If you've enabled the Mod 10 or Mod 11 check digit(s), enabling transmission of one or two check digits causes the WDP Reader to transmit it/them to your computer along with the bar code data.

Enabling check digit transmission (if check digit(s) are enabled) causes the WDP to transmit it/them to your computer along with bar code data.

GS1 DataBar (RSS-14)

Disable GS1 DataBar RSS-14	0
Enable Standard 14 digits	1
Enable 14 plus Identifiers	2
Enable 14 plus UCC 128 Emulation	3

By default, standard GS1 DataBar (RSS-14) is disabled, scan 1 to enable. Options 3 and 4 enable the alternate GS1 DataBar formats. For more information on GS1 DataBar, see the AIM website at http://www.aimglobal.org/standards/symbinfo/rss_overview.asp

Computer Interface

PC Keyboard	1
PC "learned timing"	3

If you are connecting to a USB (PC or Mac) port with any WDP, the Reader will sense the USB interface. No Computer Interface setting is necessary.

The WDP automatically senses if you have a Y cable plugged into a PC keyboard port. If you have trouble with the PC keyboard interface, try the "learned timing" setting described below. Always test your keyboard after changing interface settings. If you see "garbage" on your screen, you may need to re-boot before continuing.

The PC "learned timing" can learn your keyboard timing and save it. Scan **Start Setup, Computer Interface, 3** for PC and then press a key on the computer keyboard (the WDP beeps once). Now scan **End Setup** and the timing is captured by the WDP. Learned timing *does not* apply to a USB connection of any kind.

Preamble

A "Preamble" is a user-specified data string transmitted at the beginning of each bar code. For example, if you specify the preamble @@ and read data of **123456**, "@@123456" would be transmitted to your computer.

The default is no preamble. To select a preamble, scan up to 15 characters from the "**FULL ASCII MENU**" on the back of the Reader Setup Menu, and then scan **SET** when you're done. To return to the no preamble setting, scan **CLEAR** here instead of scanning **SET** or any characters from the **FULL ASCII MENU**.

You can trim 1-15 leading characters from bar code codes by scanning a ~ (tilde -- ASCII 126) followed by a single digit, 1 through F (A through F are for 10 to 15), as part of the Preamble. (Bar codes which are shorter than the amount-to-trim are transmitted with no trimming.) Consider the examples in the following table to understand how trimming works:

Bar Code Data	Preamble	Data Transmitted
123	XYZ	XYZ123
12345678	-3XYZ	XYZ45678
12345678	-9	12345678
12345	-A	~A12345
123456	-5	6

You can also trim selectively by bar code type. For example, you can trim 2 characters from Code 39 and a different amount from other bar code outputs. This is done by using the bar code ID character in conjunction with the tilde (-). A preamble of ~b2~c1 says trim **2** characters from the front of **Code 39** output and trim **1** character from the front of **UPC-A**. Refer to the Code 128 parameters previous discussion for a list of the ID character associated with each bar code type.

For advanced PC users: **Emulating special keys in the preamble:** Programmers and other advanced PC users can also embed keyboard hex scan codes in the preamble, for emulation of key presses specific to their computers, such as the left shift key or F12 key. This is done by specifying the make and break hex scan codes for one or more keys enclosed in "left" and "right" apostrophes (` and ').

Make and break codes are hardware-specific -- see the keyboard section of your computer's manual or tech references for descriptions of its make and break codes. Break codes follow one of two conventions depending on which "keycode set" a keyboard uses. Keycode set 1 (usually on XT-style systems) uses a two-digit break code formed by adding hex 80 to the make code. Keycode set 2 (usually on AT-style systems) uses two digit break codes: the first is **F0** and the second is identical to the make code.

For example, let's say you want to emulate the left shift key. First, using the **FULL ASCII MENU**, you'd scan a left apostrophe, to identify subsequent characters as keyboard scan codes. Next, the two-digit hex make code -- let's say it's

12. First you'd scan a **1** and then a **2**. Next, the break code. Let's say your computer uses keycode **2** break codes of **F0** followed by the make code. Finally, a right apostrophe to mark the end of the scan codes. ` **1 2 F 0 1 2** ' (scanned from the Full ASCII Menu) The preamble is limited to 15 characters. As the single scan code example above uses eight characters, you can see that you can't put very many keyboard scan codes in the preamble.

A final use of the Preamble/Postamble is to enter a minimum/maximum length check for bar code data read. Use the Preamble or Postamble by entering `|nnmm` where `|` is ASCII 124, `"nn"` is the two digit minimum to be read and `"mm"` is the two digit maximum to be read.

Postamble

"Postamble" refers to a user-specified data string transmitted at the end of each bar code. For instance, if you specify the postamble `@@` and read data of **123456**, `"123456@@"` would be transmitted to your computer.

To select a postamble, scan up to 15 characters from the **"FULL ASCII MENU"** on the back of the Reader Setup Menu, scanning **SET** when done. To return to no postamble (the default setting), scan **CLEAR** here instead of scanning **SET** or any characters from the **FULL ASCII MENU**.

You can trim 1-15 trailing characters from bar code codes by scanning a `~` (tilde -- ASCII 126) followed by a single digit, 1 through F (A through F are for 10 to 15). (Bar codes which are shorter than the amount-to-trim are transmitted without trimming.) Consider the examples in the following table to understand the options of the Postamble:

Bar Code Data	Postamble	Data Transmitted
123	XYZ	123XYZ
12345678	~3XYZ	12345XYZ
12345678	~9	12345678
12345	~A	12345~A
123456	~5	1

Bar codes which are shorter than the sum of the Postamble trimming and Preamble trimming will be transmitted without trimming.

You can also trim selectively by bar code type. For example, you can trim 2 characters from Code 39 and a different amount from other bar code outputs. This is done by using the bar code ID character in conjunction with the tilde (`~`). A postamble of `~b2~c1` says trim **2** rightmost characters from **Code 39** output and trim **1** rightmost character from the **UPC-A**. (Use **m** for trimming Magstripe). Refer to the Code 128 parameters previous discussion for a list of the ID character associated with each bar code type.

For advanced PC users: **Emulating special keys in the postamble**
See the "*emulating special keys in the preamble*" section on page 2-8.

A final use of the Preamble/Postamble is to enter a minimum/maximum length check for bar code data read. Use the Preamble or Postamble by entering |*nnmm* where "|" is ASCII 124, "*nn*" is the two digit minimum to be read and "*mm*" is the two digit maximum to be read.

Data Transmission Timing

None	0
Short	1
Short Medium	2
Medium	3
Long	4

Timing does not apply to any USB attachment.

Before trying this, try the "learned timing" discussed on page 2-7.

For **Computer Interface 1**, the WDP Reader can transmit bar code data at five different rates. Most computers work at the fastest speed ("None"), but some systems require slower rates. Try the "None" setting, and (when you're done configuring it) try reading some codes. If you get partial or garbled reads, try other timing settings to solve the problem (the USB interface require any timing adjustments). Try each timing rate (fast to slow); don't assume that if the slowest and fastest don't work, the intermediate settings won't either. After each failing attempt at timing setting, type "12" in the upper keyboard row to be sure the keyboard has not been locked or confused; if the "12" doesn't type correctly, reboot before trying a new timing setting.

Reset

Don't scan **Reset** unless you're sure you want to restore the WDP Reader to its default settings (as described on page 2-1), erasing all changes you've made, because that's exactly what **Reset** will do.

MagStripe (P22 reader only)

Autosensing - None	0
Track 1 (<i>autosensing</i>)	1
Track 2 (<i>autosensing</i>)	2
Track 3 (<i>autosensing</i>)	3
Dual Track Scanner, Output both only (<i>autosensing</i>)	4
Dual Track Scanner, Output both or 2 only	5
Track 1 or 3 Only on Dual Track Scanner	6
Track 2 only output on Dual Track Scanner	7
Track 1&2&3 Scanner, all 3 or 1&2 only (<i>autosensing</i>)	8
Track 1&2&3 Scanner, all 3 or 1 only	9
Caps Lock Off (<i>just for MagStripe</i>)	E
Caps Lock On (<i>upper case alpha for magstripe</i>)	F

The P22 reader is autosensing for Magstripe scanners. If you have a scanner attached, most will be auto-sensed (see the settings above). If you have no magstripe attached, it will sense that too. If you need to use one of the settings that are NOT autosensed, you will have to make the change yourself. For example, if you have a dual-track scanner and want to read both tracks 1 and 2, the P22 will autosense setting 4, but if you really want to read just track 2, you will need to manually change it to setting 5. (A scanner is required).

For all Driver's licenses,(including California) setting 8 will be autosensed, but you will have to change it for setting 9. See page 3-9 for more information on the MagStripe scanner.

Characters

This setup option allows you to output ASCII characters different from the ones scanned. (Don't use this option to configure the WDP Reader for your non-US keyboard -- instead, use the *Keyboard Country* option described below.)

For example: Suppose you want the WDP Reader to output a hex 92 character every time you scan a 1 (hex 31); you want to remap hex 31 to hex 92, (If you're using 8 data bits, output of 80-F8 codes is possible.) Your Full ASCII Menu has ASCII and hex values for the 128 characters.

- 1) Scan the **Start Setup** Bar Code
- 2) Scan the **Characters** Bar Code on the Setup Sheet.
- 3) Scan **3 1** and **9 2** to output hex **92** when reading a "1".
- 4) Scan up to 7 other pairs of character reassignments.
- 5) Scan **Set** when complete.
- 6) Scan **End Setup** to exit setup mode.

You can also eliminate characters by reassigning hex codes to FF. For example, to strip all \$ (dollar sign) characters from transmission, you would follow the above instructions and scan **2 4 F F** in step 3.

Magstripe output is frequently required to be changed to conform to some specific software package's requirement. For example, you might want to change the = and ^ separator characters to spaces or CRs. Between trimming and replacement, you should be able to reformat the Magstripe output to conform to most requirements.

Keyboard Country

This option configures the WDP Reader for your choice of 15 keyboard country settings, such as USA (the default), UK, French, German, etc.

Scan the keyboard country bar code and then the two-digit code for your keyboard country (listed on the Reader Setup Menu), such as 14 for UK.

USA	00	French	02	German	02	Belgian	03
Fr. Canadian	04	Danish	05	Dutch	06	Italian	07
Latin America	08	Norwegian	09	Portuguese	10	Spanish	11
Swedish	12	Swiss	13	U.K.	14		

Terminator Characters

Enter (carriage return)	0
None	1
Tab	2

Depending on your application, you may wish the WDP Reader to transmit bar code data to your computer with an Enter (carriage return), a Tab at the end, or with no extra terminating character at all.

If you need a terminator character other than CR or HT (such as LF for UNIX), you can get it by specifying **None** here and then selecting your desired terminator character(s) through the Postamble specification.

Scanners and Scanning Technique

Different bar code applications require different scanner solutions. Worth Data offers a variety of scanners as described below:

Laser Scanners offer not only the ease of "point-and-shoot" scanning, but allow the user to scan from a distance away. These features make Lasers easier to use than wands, faster than wands, and allow the user to scan bar codes in hard-to-reach places (i.e. shelves).

Wand Scanners fit most basic bar code scanning applications quite well, but require the user to actually touch the bar code and draw a line through it - similar to using a pencil.

Slot Badge Scanners let the user slide a bar coded card through a slot, similar to using the familiar magnetic stripe card scanners. The bar code must be oriented and positioned correctly on the card for this scanner to work. Typical applications include club membership cards and library cards.

Magnetic Stripe Scanners are familiar to most users - the user slides a card with a magnetic stripe on it (i.e. credit card or drivers license) through the slot to read it. Magnetic Stripe scanners are available to read different tracks of encoded data on the card. You must know beforehand which track you need to read, then get the appropriate scanner.

Laser Scanners

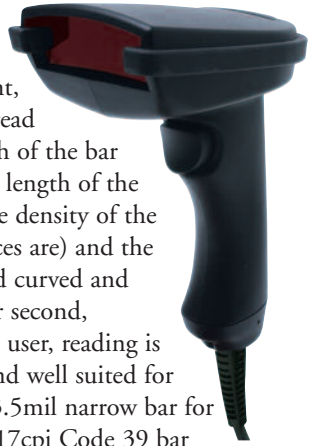
Worth Data offers Integrated Laser Readers (scanner has decoder built-in; LZ160-WDP/USB, LZ310-WDP/USB, and LZ410-WDP/USB) as well as separate undecoded Laser scanners that plug into the P22 WDP Decoder. Laser's offer these advantages:

- Fast reading of difficult-to-read bar codes
- Can read bar codes from a distance: 0" - 10" for the LZ160 Laser
0" - 12" for the LZ3xx Laser and
0" - 18" for the LZ4xx Laser
- Can read moving objects, such as on an assembly line
- No-hands operation when mounted in our S11 or S21 Stand. Scanners mounted in these stands flash automatically and scan when an object passes underneath them. See page 3-5 for details on stand use.
- Ability to read through thick (up to five inches) glass or plastic laminates
- Ability to read curved or uneven surfaces, such as plastic bags of items.

Laser Scanners

LZ160, LZ160-USB & LZ160-WDP

The LZ160 (for P22), LZ160-USB and the LZ160-WDP Keyboard Wedge Integrated Laser Readers are triggered, 5 volt, visible light, laser beam imaging laser scanners. They can read from 0" to 10" away, depending on the length of the bar code. There is no particular limitation on the length of the bar code, readability is dependent on both the density of the code (how close or far apart the bars and spaces are) and the length of the code. The LZ160 series can read curved and uneven surfaces. The Laser scans 50 times per second, scanning until it has a successful read - to the user, reading is instantaneous. The LZ160 series is durable and well suited for every day use and can read bar codes with a 3.5mil narrow bar for high density reading. This is equivalent to a 17cpi Code 39 bar code. If you need to read even higher density codes take a look at the LZ3xx and/or the LZ4xx series scanners below that use the Symbol® 1200 scan engines, .



LZ300, LZ310-USB & LZ310-WDP

The LZ300 (for P22), the LZ310-USB and the LZ310-WDP Keyboard Wedge Integrated Laser Readers are triggered, 5 volt, visible light, moving beam laser scanners. They can read from 0" to 12" away, depending on the length of the bar code. There is no particular limitation on the length of the bar code, readability is dependent on both the density of the code (how close or far apart the bars and spaces are) and the length of the code. The LZ3xx can read curved and uneven surfaces. The Laser scans 36 times per second, scanning until it has a successful read - to the user, reading is instantaneous. The LZ3xx uses the Symbol® 1200WA scan engine, is very durable, has a lifetime warranty on the moving scan element, and a 2 year warranty - it is well suited for every day use.

LZ400, LZ410-USB & LZ410-WDP

The LZ400 (for P22), the LZ410-USB and the LZ410-WDP Keyboard Wedge Integrated Laser Readers are triggered, 5 volt, visible light, moving beam laser scanners - just like the LZ3xx lasers above. The difference is that the LZ4xx lasers use a more powerful laser and thus can read from 0" to 18" away, depending on the length of the bar code. All of the other LZ3xx features above apply to the LZ4xx as well. The LZ4xx is typically used in warehouses where greater distance is an advantage. Plus it has a longer warranty of 3 years.

Tips for Laser Scanning

Simply aim the laser scanner straight at the bar code and pull the trigger. The beam must cover the bar code from end-to-end, including a "quiet zone" of white space both before and after the bar code. The beam should cover only 1 bar code. Use a piece of blank paper to cover any adjacent bar codes if they are too close to the one you are trying to scan.

To read longer bar codes, move the Laser further away to create a wider beam. To read bar codes that are "high density" (the bars and spaces are very close together), you will need to move the Laser closer to the bar code.

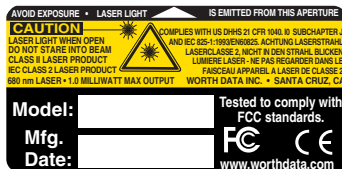
With the LZ160, you can read a typical 100% UPC code from 0" to 10" away, the LZ3xx, you can read a typical UPC code from 0" to 12" away - the LZ4xx can read the same code from up to 18" away. You should be able to read the Test Label shown below with any Worth Data Laser - LZ160, LZ3xx or LZ4xx - from anywhere between 2" and 10" away - probably



TEST LABEL

even further!

Our lasers use a low-power, 650-680 nm IEC/CDRH Class II visible laser diode. Although momentary exposure to a CDRH II laser scanner is not known to be harmful, avoid staring directly into the beam or shining the beam into



Laser and CCD Scanner Options

Special options for your Laser and CCD scanner that can be set from the bar coded **WDP Setup Menu**:

Double-Scan Checking

By default, the WDP reader keeps reading until it gets two results that are exactly the same. This “double-scan checking” takes a little longer but minimizes the possibility of misreads - especially when reading poorly printed codes or reading through windsheids. To **disable** “double-scan checking” :

Scan **Start Setup**

Scan **Code 39**

Scan **F** to disable “double-scan checking”

Scan **End Setup**

To enable “double-scan checking” again, scan **E** instead of **F**.

Continuous Scanning Option for older CCD Scanners

Sometimes it is desirable to read sheets or lists of bar codes without having to activate the trigger before each read. To activate the CCD continuous scanning :

Scan the **Stand Mode** bar code (see page 3-6)

To turn off Continuous Scanning, scan the **Stand Mode** bar code again.

Aiming Dot for LZ400 Scanner *(does not apply to LZ410 Integrated scanners)*

The LZ400 scanner can be set to project an “aiming dot” for a specified number of seconds before the beam spreads and attempts to read the bar code. This is useful when reading bar codes in direct sunlight or when trying to read one code when bar codes are close together (see the barpad on our Setup menu). To set the aiming dot :

Scan **Start Setup**

Scan **Beep Tone**

Scan **A** for 1 sec., **B**=2 sec., **C**=3 sec., **D**=4 sec., **E**=5 sec., **F**=6 sec.

Scan **End Setup**

To turn off the aiming dot, scan **9**, the default setting.

Scanning the same bar code twice

This will work for the LZ160-xxx, the LZ310-xxx, the LZ410-xxx and the P22 reader with any laser.

When using the scanner in “Stand Mode”, you can scan the same bar code two times in a row by simple holding the bar code under the scanner for 3 seconds. To avoid accidental reading of the same bar code twice, you can lengthen the amount of time the scanner requires to read the bar code again. Setting the time to the maximum (9) should guarantee that you will not accidentally scan the same bar code twice. Alternately, you can shorten the time (the default is 3) to reduce the amount of time you need to keep the bar code under the scanner.

Scan **Start Setup**

Scan **Preamble**

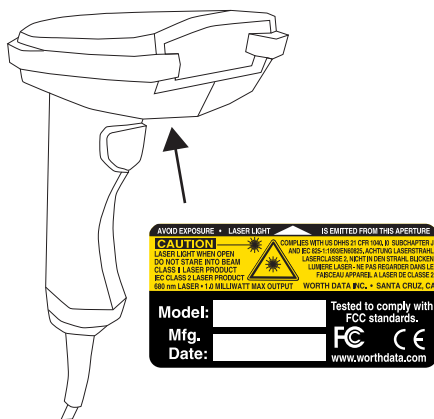
Scan _ x, where x=1-9 seconds (the default is 3), the _ character is ASCII 095/HEX 5F on the Full ASCII Menu)

Scan **SET**

Scan **End Setup**

CAUTION CLASS 2 LASER LIGHT - DO NOT STARE INTO BEAM

Avoid aiming the laser into your own eyes or other people's eyes. The required safety label advising the user of the laser cautions appears on our lasers as shown below.



The LZ160, LZ160-USB, LZ160-WDP, LZ300, LZ400, LZ310-USB, LZ310-WDP, LZ410-USB and LZ410-WDP are covered by one or more of the following U.S. patents:

Patent#:4,360,798; 4,387,297; 4,460,120; 4,496,831; 4,593,186; 4,603,262; 4,607,156; 4,652,750; 4,673,805; 4,736,095; 4,816,660; 4,845,350; 4,896,026; 4,897,532; 4,923,281; 4,933,538; 4,992,717; 5,015,833; 5,017,765; 5,021,641; 5,029,183; 5,047,617; 5,103,461; 5,113,445; 5,140,144; 5,142,550; 5,149,950; 5,157,687; 5,168,148; 5,168,149; 5,180,904; 5,229,591; 5,230,088; 5,235,167; 5,243,655; 5,247,162; 5,250,791; 5,250,792; 5,262,627; 5,280,163; 5,280,164; 5,280,498; 5,304,786; 5,304,788; 5,321,246; 5,377,361; 5,367,151; 5,373,148; 5,378,882; 5,396,053; 5,396,055; 5,399,846; 5,404,081; 5,410,139; 5,410,140; 5,142,198; 5,418,812; 5,420,411; 5,436,440; 5,444,231; 5,449,891; 5,449,893; 5,468,949; 5,479,000; 5,479,002; 5,479,441; 5,504,322; 5,528,621; 5,532,469; 5,543,610; 5,545,889; 5,552,592; 5,578,810; 5,589,680; 5,612,531

"Hands-Free" Scanning

A stand is available for all of the Worth Data Lasers that allows for "hands-free" bar code reading. The stand is available in a mountable "goose neck" (S11) or in a free-standing version with a base (S21). Just before placing the scanner in the stand, scan the "**Stand On/Off**" bar code on the stand or on the WDP Setup Menu to put the scanner into automatic-reading mode.

When using a Laser in "stand" mode, the important thing is to position the laser correctly in the stand for efficient scanning. You will know the laser is angled or positioned correctly by observing how often the laser "cycles" off and on. If the LZ300, LZ310-XXX and the LZ410-XXX are positioned correctly, they will cycle off and on quickly - once every 1/2 second. If the laser stays on for more than 2 seconds, then it is not positioned correctly in the stand. Readjust the scanner angle (30 degrees is optimum) and watch the laser again. The LZ160, LZ160-XXX will cycle on a fixed pattern of flashes regardless of the position of the scanner.



The older LI50 and LI50-WDP CCD's, and LZ150 and LZ150-XXX lasers can be used with the stand also. As with the laser scanners described above, you must scan the bar code on the stand to put the reader into "stand" mode before placing it in the stand. Once in "stand" mode, the bar code can be presented anywhere from .5" to 7" (dependent upon density) away from the scanner and be read without having to pull the trigger.

The LI50 and LI50-WDP CCD's can also work in "triggerless" mode without the stand. Simply scan the "**Stand On/Off**" bar code and the CCD will always be scanning. This is useful in scanning columns of bar codes on a page. To return to "triggered" scanning, just scan the "**Stand On/Off**" bar code again.

Wands

If ordered with a wand, your P22 WDP Reader comes with an F52 medium/high resolution bar code wand, capable of reading bar codes ranging in quality from dot-matrix printed up to bar codes printed on a laser or thermal transfer printer.

Wand Scanning Technique

Using the illustration as a guide, follow these tips for proper scanning with a wand:

- Hold the "wand" as you would a pencil, lightly placing your fingers around the wand. If you do not see a red light at the tip of the wand, check to make sure that you are using a **VISIBLE** light wand, not an **INFRARED** light wand. Infrared wands show no light at the tip of the wand.
- Your scanning should start in the white space about $\frac{1}{4}$ " to the left or right of the bar code. This area is called the "quiet zone". If you are reading a UPC code with a supplement, you **MUST** scan from left to right; otherwise, you can scan from either direction.
- You should be holding the wand as if it were a pencil, approximately 30 degrees from perpendicular. Some bar codes, especially those that are high density, may require that you adjust the angle of the wand to be almost per-pendicular to the bar code. Starting in the "quiet zone", quickly and lightly draw an imaginary line through the entire bar code, ending within the $\frac{1}{4}$ " "quiet zone" at the other end of the bar code. **DO NOT** scan slowly or press down hard with the wand - neither one will make it easier to read your bar code.
- Never stop in the middle of the bar code. Pass the wand smoothly across the bar code, stopping only when you have reached the "quiet zone" at the other end.
- Do not move the wand tip above or below the lines of the bar code. Keep the wand tip within the confines of the bar code during the entire scan; the whole point is to draw as straight a line as possible through the middle of the bar code.



To practice scanning, open up Notepad or a similar program in Windows® or on the Macintosh (or the DOS prompt if using DOS). Use the Test Label on page 3-3 and the technique illustration above to practice scanning with your wand. You should hear an audible beep and see TEST LABEL displayed on computer screen after every scan. If you do not see TEST LABEL, check your technique, especially the angle and speed of the scan.

Using the Bar Code Slot Scanner (P22, SLV-WDP and SLI-WDP only)

Depending on your application, you may wish to use a slot scanner as your bar code input device instead of or in addition to a wand, Laser or CCD. Worth Data sells a bar code slot scanner that is designed for reading bar codes printed on badges or ID cards. It can also be used for reading bar codes on file folders, envelopes and any other thin, flat surfaces with bar codes printed along an edge. There are two types of bar code slot scanners:

- The standard bar code slot scanner is a high-resolution scanner using visible-red light.
- Optionally, you can specify a high-resolution infrared-light scanner.

To read a card or other object with the bar code slot scanner, orient the card so that its bar code faces the lighted side of the scanner. Now make a continuous wipe motion through the slot.

For optimum use with the slot scanner, bar codes should be printed or applied so that the center of the bar code is .5" from the edge of the card.



The Slot Scanner can be permanently mounted to a desk or wall through the threaded mounting holes. If you have ordered only a slot scanner (you don't have a wand, Laser or CCD) for the P22 or you have a SLV or SLI-WDP Integrated Slot Badge Reader model, you will need the **WDP Card Setup Deck** in addition to or instead of the Reader Setup Menu.

The Slot Scanner will work in the Scanner port or the Magstripe port of the P22 WDP.

The SLV-WDP and the SLI-WDP are integrated models with the decoder built into the slot scanner itself. They are available as a USB interface ONLY.



Using the MagStripe Slot Scanner (P22 only)

The MagStripe Slot Scanner options (track 1, track 2, track 3, or track 1 and 2 or 2 and 3 or Track 1/2/3) enable the WDP Reader to read credit and other magnetic-strip cards without disconnecting or disabling the bar code wand. It's a stationary scanner which reads tracks 1 and 2 of magnetically-encoded cards meeting the standards defined by ANSI x 4.13, ANSI x 4.16 1983, ISO 3554 and ISO 2894.

To use a MagStripe Slot Scanner:

- The MagStripe Slot Scanner must be plugged into your WDP Reader's MagStripe port (next to the Scanner port).
- The MagStripe scanner can be permanently mounted to a surface using the threaded holes on the bottom. To use the MagStripe Slot Scanner, turn the card upside-down so the stripe can be read. Move the card through the scanner in a continuous swipe in the direction of the arrow.

When the reader makes a good read, it will beep once and transmit the data to the computer. Plug the MagStripe Scanner into the WDP Reader as shown below. The WDP will autosense the Magstripe reader and configure itself according to the settings on page 2-10. If you need to use a setting other than the autosensed default, use the Reader Setup Menu to configure your reader for your MagStripe scanner track setting desired, as described on page 2-10.



Special Features

Function and Control Key Support

The WDP Reader can also transmit key sequences for **function**, **control**, **alt** (**command** and **option** keys on Macs), **cursor** and **shift** keys, for ease of use with the many software packages using these keys for menus or commands. These “keystrokes” are scanned in to your Preamble or Postamble in order to add them to every scan from your reader. For this to work, you must have Full ASCII Code 39 enabled on your reader (this is the default setting). To use them in your Preamble or Postamble, see pages 2-8 and 2-9 for details. Scan the corresponding bar code from the Full ASCII menu to emulate the chosen key.

PC Key	Mac Key	Full ASCII Menu Bar Code
F1	F1	SOH (f1)
F2	F2	STX (f2)
F3	F3	ETX (f3)
F4	F4	EOT (f4)
F5	F5	ENQ (f5)
F6	F6	ACK (f6)
F7	F7	BEL (f7)
F8	F8	SO (f8)
Numpad 5*	Enter	LF
Enter	Return	CR
F9	F9	SI (f9)
F10	Cmdn On	DLE (f10)
Del	Del	DC1 (Del)
Insert	Cmdn Off	DC2 (Ins)

PC Key	Mac Key	Full ASCII Menu Bar Code
Left Arrow*	Left Arrow+	DC3 ()
Rt Arrow*	Rt Arrow+	DC4 (→)
Dn Arrow*	Dn Arrow+	NAK ()
Up Arrow*	Up Arrow+	SYN ()
Pg Up*	Pg Up+	V \overline{F} (Pg Up)
Pg Dn*	Pg Down+	FF (Pg Dn)
Home*	Home+	ETB (Home)
End*	End+	CAN (End)
Shift ON	Shift ON	EM (Shift ON)
Shift OFF	Shift OFF	SUB (Shift OFF)
Control On	Control On+	FS (Ctrl ON)
Control Off	Control Off+	GS (Ctrl OFF)
Alt On	Option On	RS (Alt ON)
Alt Off	Option Off	US (Alt OFF)

* refers to the keys on the Number pad on the far right side of a PC keyboard. To emulate any of the keys above, scan the appropriate bar code from the FULL ASCII MENU. For example, to emulate the F5 key, scan the ENQ bar code.

+ these keys apply to Mac ADB interface ONLY. For Mac USB, you must use the keys in the table below.

PC Key	Mac Key	Full ASCII Menu Bar Codes
Insert	Ins	NUL 0
Delete	del	NUL . (period)
End	end	NUL 1
Down Arrow	down arrow	NUL 2
Page Down	page down	NUL 3
Left Arrow	left arrow	NUL 4
Line Feed	Line Feed	NUL 5

PC Key	Mac Key	Full ASCII Menu Bar Codes
Right Arrow	right arrow	NUL 6
Home	home	NUL 7
Up Arrow	up arrow	NUL 8
Page Up	page up	NUL 9
Windows ON	control ON	NUL C
Windows OFF	control OFF	NUL D
ENTER (num)	ENTER (num)	NUL E

This chart corresponds to the small center section of keys between the main letter keys and the Numeric keypad on the right of the keyboard and requires you to scan two bar codes from the FULL ASCII MENU - the NULL bar code and then the appropriate character. For example, to emulate the END key, scan the NULL bar code, then the 1 bar code.

Function keys F1 through F10, and numeric-pad keys

Function keys F1 through F10, and numeric-pad keys (such as Left Arrow and Del), are encoded by a single control character as shown in the table above. Simply scan the correct bar code from the FULL ASCII MENU.

For example, if the WDP reads the bar code **SOH** (ASCII 001 -- a control-A) from the FULL ASCII MENU, it will transmit an F1 key sequence to your computer.

Function keys F11 and F12

Function keys F11 and F12 require two bar codes to be scanned to make these functions keys. The F11 key is created by combining the **Null** and **SOH**. The F12 key is created by combining the **Null** and the **STX**.

Shift, Ctrl and Alt keys

Shift, Ctrl and Alt keys require three sequences

- 1) The ON code generated when the Shift, Ctrl or Alt key is pressed.
- 2) The other key to be used in conjunction with the Shift, Ctrl or Alt key.
- 3) The OFF code generated when the Shift, Ctrl or Alt key is released.

For example, to properly emulate the keystrokes for Ctrl-C, you would scan the bar code for Control ON (**FS**), **C**, and Control OFF (**GS**).

Windows Key

The Windows key on a Windows keyboard is transmitted by scanning 4 bar codes - **NULL** and **C** for *Windows On* (pressing down) and **NULL** and **D** for *Windows Off* (releasing the key).

Macintosh Command and Option Keys on USB

When you have a WDP Reader attached to a Macintosh Computer's USB port, to emulate the Command key, use the Windows key ON/OFF bar codes **NULL, C** (Command ON) and **NULL, D** (Command OFF) For the Option Key ON/OFF use **RS** (Option On) and **US** (Option Off).

If you have an older Worth Data Reader (before 6/99), you can also imitate the Command Key by keycodes in the Preamble/Postamble. To transmit Command N would be: 'E01F'N'E0F01F'

Transmitting any ASCII character using its 3-digit ASCII code

You can also transmit any ASCII character from 000 to 255 by emulating the PC technique of typing a character's ASCII number on the numeric pad while holding down the Alt key. For example, to transmit ASCII 250, you would scan the bar codes for:

Keystroke	Full ASCII Menu Bar Code
Alt ON	RS
Ins (<i>0 on the numeric pad</i>)	DC2
Down Arrow (<i>2 on the numeric pad</i>)	NAK
Numpad 5	LF
Ins (<i>0 on the numeric pad</i>)	DC2
Alt OFF	US

Accumulate Mode

Accumulate Mode is an option (which can be enabled or disabled using the Reader Setup Menu's Code 39 section) allowing the reader to accumulate multiple bar codes in its buffer, then transmit them to the computer as if they had been a single bar code. This is useful for entering quantities and other variable data.

It works with Code 39 only, and can't be used with a check digit. When the reader reads a bar code with a leading space, it beeps and buffers the data without transmission. It continues to read and buffer bar codes (up to 40 characters) until it reads a bar code without a leading space. Then the entire buffer (including that last code) is transmitted as one long bar code. A bar code of a double minus (--) sign clears the buffer. Scanning a backspace code (\$H) backspaces in Full ASCII mode. A handy code for Enter (as seen on the "Barpad" below) is a Start/Stop only. (No data.) If you don't have a Terminator Character programmed, you will have to scan a CR (see the Full ASCII menu) instead of the Enter bar code shown below.

This numeric "Barpad" illustrates Accumulate Mode. Scan 5, 3, 8, and Enter. The reader transmits a single message of 538.



0



1



2



3



4



5



6



7



8



9



Clear



Backspace



Enter

Troubleshooting

A reader P22 installed in Wedge mode using a Y-Cable doesn't beep three times when you power up your system, or the keyboard locks up, or you get a "keyboard error" or "301" message.

- Check the cable connections to make sure everything is plugged in securely. With a PC, make sure the keyboard cable is plugged into the keyboard port (Purple on modern PC's) rather than the mouse port (Green).
- If, after checking the connections, you still have a problem, your computer and keyboard combination probably doesn't have enough left-over power to drive the bar code reader also. Disconnect the scanner from the WDP P22 Reader and reboot your system. If the system boots correctly when the scanner is not attached, you solve the problem by ordering a Worth Data 5-volt external power supply (part number F10) for your P22 WDP.
- If the system still doesn't boot correctly with the scanner disconnected, a Worth Data regulated power supply (don't use someone else's power supply or you will damage the reader) - will probably still correct the problem. If you are using a USB reader and there many devices, you may need either a power supply on the WDP (P22 only), or you may need a powered USB hub device.

Using USB, the reader initializes and then turns off.

- There is not enough power available on the USB port. If you are connected to a USB port on the keyboard, try connecting to a USB port on the CPU itself. You may need to buy a powered USB Hub with its own power supply - you can pick them up inexpensively at your nearest computer store.

Using USB, the reader powers up and beeps when a bar code is scanned but no data is transmitted.

- Go to the **Control Panel**, then to **System**, then **Device Manager**. Check your **HID** devices. Right click on the **HID** device to see if the device is working properly. If it is not, click on **Driver** and proceed to reinstall the driver. **See Appendix I for details for your operating system.**

The reader won't beep when reading bar codes

- Recheck all the connections using the installation section as a guide. Try reading a known good bar code - the test label on page 3-2, following the steps for scanning in **Chapter 3; Scanners and Scanning Technique**. If you're trying to read Code 39 bar codes with leading spaces (such as the Barpad on page 4-3) and have enabled **Accumulate Mode**, those bar codes will not be transmitted to your computer until you read a bar code without a leading space. Try reading the Test Label on page 3-2 as an example of a known good label.
- If the read failure is on Interleaved 2 of 5 codes, make sure the data length is the same that you selected on the Reader Setup Menu. Be sure you don't

have the check digit enabled for Code 39 or Interleaved 2 of 5 if you're trying to read data without check digits.

- If you are using a laser scanner (especially a long-range laser), you may need to increase the length of time the scanner attempts to read. The default is a 2-second beam. To change to a 4-second beam, scan *Start Setup, 2 of 5 Code, F*, then *End Setup*. Scanning **E** instead of F sets the beam back to 2 seconds.
- If you are using a P22 decoder connected to a USB port with an older wand scanner, you need to open the P22 decoder and change the S1 switch to “wand” instead of “laser”. Typical symptoms are a dim wand light and no reading. See Appendix J for a diagram.

Extra characters at the beginning or end of your bar code data

- Clear the Preamble and Postamble.
- Make sure you haven't enabled transmission of any start/stop characters, checksums, leading digits or terminator characters that you don't want transmitted. For UPC-E, select Compressed transmission if you don't want it padded with extra zeros.

The reader transmits incorrect data to the screen

Reread page 2-7 and make sure you chose the proper Computer Interface.

- If part of the data is correct and part missing, you need to tell the WDP Reader to transmit data at a different rate. First try **Learned Timing** on page 2-7, and if that doesn't work, resort to changing Data Transmission Timing on page 2-10 (Keyboard Interface ONLY).
- If the reader is transmitting punctuation characters (!@#\$%^&*) when reading numeric bar codes, or transmitting letters in the wrong (upper/lower) case, you may have a Num Lock, Caps Lock, shift or timing problem. Check your keyboard to see if the Num Lock or Caps Lock keys have been activated. Finally, try "learned timing" (See Page 2-7) or changing your Data Transmission Timing (See page 2-10).
- If you're using Code 39, read page 2-4 to see if you've set Caps Lock properly for your application. If your Code 39 bar codes include punctuation characters %, \$, / or +, the reader is seeing them as part of Full-ASCII Code 39 sequences. Using the Reader Setup Menu, disable Full ASCII Code 39.
- If you are using a laser scanner and are reading poorly printed codes or scanning through a windshield, make sure “double-scan checking” is enabled (It is the default setting). “Double-scan checking” does take longer (it forces the reader to keep scanning until it gets two identical reads) but will eliminate mis-reads. “Double-scan checking” is set under the Code 39 setup parameter by scanning *Start Setup, Code 39, E*, then *End Setup*. Scanning **F** instead of **E** will disable this option.

Poor read rate

- Try reading the test label on page 3-2 (following the scanning instructions in **Chapter 3**) as an example of a known good bar code. Examine your bar codes to make sure they have dark bars, clearly defined bars and white spaces, and a "quiet zone" of at least 1/4 inch to the left and right. If the bars are grey, or so dark that they "bleed" into the white spaces, the person or organization printing them will need to adjust the printer or get a new ribbon or toner cartridge for it.
- Carefully follow the scanning instructions in **Chapter 3** when reading any and all bar codes. As straightforward as scanning may seem, many people who call Worth Data with a complaint about poor read rate are simply not doing it correctly.
- If you're using an infrared bar code wand, be sure the bar codes you're trying to read were printed with infrared-quality ink. Make sure you're using the right type of wand for the type of bar codes you're trying to read.
- Pry the wand tip off; clean the inside with a soft, lint-free cloth. Carefully blow off any debris from the red plastic lens.
- Erratic or low read rates can also result with systems that supply unusually low current or voltage to the keyboard. To test for this, turn your system off, disconnect the keyboard from the "Y" cable, and turn it back on. Then try reading the same bar codes. The system will probably be in a keyboard error state and not display the bar code data on the screen, but all you're interested in is listening for the beeps that signify good reads. If the WDP Reader has a much higher read rate without the keyboard attached, you can probably solve the problem by using a Worth Data regulated 5-volt external power supply (F10).

5-volt power adapters for keyboard wedge installation:

The 5-volt adapter (F10 for 110V, F11 for 220V, F14 for UK 220V, and F13 for Australia 240V) is used to power the WDPs with separate decoder box configurations (P22) where the computer supplies unusually-low voltage or current to the keyboard.



Don't use anything but a Worth Data power supply or you will probably damage the reader. The Worth Data power supply is regulated and has a specific polarity. Almost all other power supplies are unregulated and will damage the WDP is used. Just because the connector fits, don't use it.

If your power supply does not display this label, it does not belong to your WDP reader. Only plug in a power supply that comes from Worth Data and displays this label.

Specifications for Code 39



123ABC

Code 39 (or Code 3 of 9) is the de facto standard of non-retail American industry. It is widely used in the automotive industry (AIAG specifications) as well as in government and military applications (LOGMARS specifications). Code 39 is flexible, features a large

character set, variable data length and density, and bi-directional readability. Code 39 is extremely accurate; substitution errors are almost nonexistent. Its character set consists of numbers 0 through 9, upper case A-Z, and characters Space, \$, %, / + and -.

The name "Code 39" comes from both the fact that its character set originally contained 39 characters (it now has 43) and from its structure. Each character is formed of three wide and six narrow elements, made up of five bars and four spaces. Code 39's density can vary from a low of .75 characters per inch (cpi) to a high of 9.4 cpi. There should be a ¼" "quiet zone" (white space) to the left and right of the bar code. Code 39 uses an asterisk (*) as a start and stop character. This character must precede and follow the data in the bar code. The WDP gives you the option of transmitting or not transmitting these characters when the bar code is read.

Exact specifications for Code 39 and other bar code symbologies can be obtained from ANSI at the address below:

American National Standards Institute
Customer Service
11 West 42nd St.
New York, NY 10036
<http://web.ansi.org>
document ANSI/AIM BC1-1995

Mod 43 Check Character

Standard Code 39 can be printed with a "Mod 43 Check Character". This Mod 43 check character cannot be used with Full Ascii Code 39. The check character is derived by assigning a value to each character in the data to be bar coded from the table as follows:

Char	Value	Char	Value	Char	Value	Char	Value
0	0	B	11	M	22	X	33
1	1	C	12	N	23	Y	34
2	2	D	13	O	24	Z	35
3	3	E	14	P	25	-	36
4	4	F	15	Q	26	.	37
5	5	G	16	R	27	Space	38
6	6	H	17	S	28	\$	39
7	7	I	18	T	29	/	40
8	8	J	19	U	30	+	41
9	9	K	20	V	31	%	42
	A	10	L	21	W	32	

Here is an example to illustrate how the check character is calculated for bar code data of 123XYZ:

1. Take the sum of the values assigned to each character:

$$\mathbf{1 + 2 + 3 + 33 + 34 + 35 = 108}$$

1 2 3 X Y Z

2. Divide the sum by 43: (thus the name modulus 43)

$$\mathbf{108/43 = 2 \text{ with a Remainder of } 22}$$

3. Find the character corresponding with the remainder.

M (value 22) is the CHECK CHARACTER

The data becomes 123XYZM, with M added as the Mod-43 check character.

Full ASCII Extension to Code 39

"Full-ASCII Code 39" expands the Code 39 character set to include all 128 ASCII characters. Symbols 0-9, A-Z and punctuation characters . and - are identical to their Code 39 representations. Lower-case letters, additional punctuation characters and control characters are represented by sequences of two Code 39 characters.

This table depicts the Full ASCII character set as a function of Code 39 characters:

ASCII	C39	ASCII	C39	ASCII	C39	ASCII	C39
NUL	%U	SP	Space	@	%V	'	%W
SOH	\$A	!	/A	A	A	a	+A
STX	\$B	"	/B	B	B	b	+B
ETX	\$C	#	/C	C	C	c	+C
EOT	\$D	\$	/D	D	D	d	+D
ENQ	\$E	%	/E	E	E	e	+E
ACK	\$F	&	/F	F	F	f	+F
BEL	\$G	'	/G	G	G	g	+G
BS	\$H	(	/H	H	H	h	+H
HT	\$I	)	/I	I	I	i	+I
LF	\$J	*	/J	J	J	j	+J
VT	\$K	+	/K	K	K	k	+K
FF	\$L	,	/L	L	L	l	+L
CR	\$M	-	- or /M	M	M	m	+M
SO	\$N	.	. or /N	N	N	n	+N
SI	\$O	/	/O	O	O	o	+O
DLE	\$P	0	0 or /P	P	P	p	+P
DC1	\$Q	1	1 or /Q	Q	Q	q	+Q
DC2	\$R	2	2 or /R	R	R	r	+R
DC3	\$S	3	3 or /S	S	S	s	+S
DC4	\$T	4	4 or /T	T	T	t	+T
NAK	\$U	5	5 or /U	U	U	u	+U
SYN	\$V	6	6 or /V	V	V	v	+V
ETB	\$W	7	7 or /W	W	W	w	+W
CAN	\$X	8	8 or /X	X	X	x	+X
EM	\$Y	9	9 or /Y	Y	Y	y	+Y
SUB	\$Z	:	/Z	Z	Z	z	+Z
ESC	%A	;	%F	[	%K	}	%P
FS	%B	<	%G	\	%L	|	%Q
GS	%C	=	%H	]	%M	{	%R
RS	%D	>	%I	^	%N	~	%S
US	%E	?	%J	_	%O	DEL	%T,%X

See page 4-1 for instructions on encoding **Function**, **Control**, **Alt** and **Shift** keys with Full-ASCII Code 39 bar code characters.

Appendix B

Codabar



a29934567a

Codabar is widely used in libraries, blood banks, the cotton industry and transportation industries. Its' character set consists of numbers 0 through 9, and punctuation characters + . - / : and \$. Symbols a, b, c, d, t, n, * and e are used as start and stop characters. Characters are constructed of four bars and three spaces.

Codabar is a numeric-only code, but different combinations of start and stop characters can be used to identify different types of labels. Codabar's variable data length and extremely low error rate make for a versatile bar code.

Codabar start/stop transmission

The Codabar section on the WDP Setup Menu lets you determine whether Codabar start/stop characters are transmitted or not. If you are varying start/stop characters with different types of labels, you'll want to "Enable Stop/Start character Transmission". Start/stop character transmission can also be helpful if you want your program to differentiate between data coming from the WDP reader and data coming from the keyboard. If neither of these situations apply, you'll probably want to disable it.

Code 128 Specifications



AB123456

Code 128 is a very powerful bar code, combining an extensive character set and variable length with compactness and error checking. The character set contains all 128 ASCII characters with each character made up of three bars and three spaces. Each element (bar or space) varies from one to four units in width, totaling 11 units of width per character. Code 128 contains two levels of error checking:

- Each character is checked for internal parity, and
- The last character is a checksum.

Code 128 has three subsets, A, B and C. Subset A contains alphanumeric characters and unprintable control characters, subset B contains alphanumeric characters plus printable control characters and subset C contains only numeric characters and uses a 2-character encoding scheme to create a more compact bar code. Code 128 uses an internal Mod 103 check character that is not displayed by the bar code reader. Code 128 bar codes can be made up of only one subset or may be a combination of several.

The Code 39 features of *Accumulate Mode*, *Caps Lock ON* and *Caps lock OFF* also apply to Code 128.

UCC-128/ EAN-128

UCC-128/EAN-128 Code is a subset of Code 128 adopted by the UCC and EAN council's for use as a shipping label symbology. UCC/EAN-128 bar codes always start with a Function Code 1 character. In addition, all variable length fields are terminated by a Function Code 1 character unless they are the last field in the bar code.

The WDP outputs the following for the special function codes and start sequences:

]C1 *Start C/Function Code 1*

^] *(GS) Function Code 1 as a variable string terminator*

If UCC/EAN 128 is enabled, the WDP reader looks for the Start C/Function Code 1 characters to indicate a UCC/EAN 128 bar code. **The UCC Serial Shipping Container Code** specification calls for a 19 digit UCC/EAN 128 code with an additional Mod 10 Check Digit (20 digits in all for the code). The Mod 10 Check digit is calculated the same as the Interleaved 2 of 5 example in Appendix D. It is the data length as well as the MOD 10 check digit that distinguishes the **Serial Shipping Container Code** from other UCC /EAN 128 bar codes.

GS1-128 UCC/EAN 128 is enabled by scanning the appropriate bar codes on the *WDP Reader Setup Menu*. If **UCC/EAN 128** is *enabled*, you will be able to read both standard Code 128 as well as the UCC/EAN 128 bar codes with the Function 1 character and the Mod 10 check digit.

The GS1-128 UCC 128 specification is used extensively by the retail industry. If you have a requirement for a UCC 128 Serial Shipping Container bar code, be



GS1-128 UCC/EAN Code 128 Serial Shipping Container Code

sure to follow the specification as closely as possible as many vendors will impose fines for non-conformance. For more information on GS1-128 UCC 128, contact the GS1 (formerly the Uniform Code Council) at:

GS1 US
7887 Washington Village Drive, Suite 300
Dayton, OH 45459
ph 937-435-3870
fax 937-435-7317
email: info@gs1us.org
8:00 am to 6:00pm EST Mon-Fri

Many of the specifications are available online at:

<http://www.gs1us.org>

Interleaved 2 of 5 Code



123456

Interleaved 2 of 5 Code is a numeric-only, even-number-of-digits bar code. It is widely used in warehouse and industrial applications. A combination of five elements, two wide and three narrow represent each character. Odd-number position digits are encoded in the bars, even-number positions in the spaces.

Interleaved 2 of 5 Code is so susceptible to partial scans being interpreted as valid reads that we recommend at least one of the following safeguards:

- Use one length of I 2 of 5 code. Using one length of data allows you to tell the TriCoder to look for one length of I 2 of 5 code only. By default, the TriCoder is set to look for a 6 digit I 2 of 5 code but you can set the length to something different using the TriCoder Setup Menu. Setting the length to 00 digits allows variable length bar codes scanning. If you must use the 00 setting, we recommend that you then use the "Minimum/Maximum" data length field when creating a program in the TriCoder to check each field for the proper length.
- Use a check digit. Worth Data' LabelRIGHT printing program automatically calculates and prints a check digit upon request using the method below:

Interleaved 2 of 5 Mod 10 check digit calculation

1. Assume that the bar code data is 1987.
2. Starting with the least significant digit (in this case, a 7), label the digits alternatively even and odd.

7 - even

8 - odd

9 - even

1 - odd

3. Take the sum of the odd digits:

$$8 + 1 = 9$$

4. Multiply the sum of the even digits by 3:

$$(7 + 9) \times 3 = 48$$

5. Add the results of steps 3 and 4:

$$9 + 48 = 57$$

6. Subtract the result of step 5 from the next highest multiple of 10:

$$60 - 57 = 3$$

7. The checksum becomes the low-order digit:

$$19873$$

8. Because the data now has an odd length, a leading zero is added, for the final result of:

$$019873$$

UPC/EAN Specifications



UPC symbols are found on almost all grocery products and many other retail items. The UPC code most people are familiar with (UPC-A) is a fixed-length (12 digits) numeric only code, with the first digit controlled by UPC coding assignments and the last digit a checksum. UPC-E and UPC-E1 are variations of the standard UPC-A code.

Each digit is constructed of two bars and two spaces. UPC has very precise standards of code size, structure, and numbers to be used.



EAN is an international superset of UPC. EAN-13 has 13 digits, with the first two digits representing a country code. The final digit is, as with UPC, a check digit. EAN-8 is a shorter version on the EAN-13 code containing seven data digits and ending again with a checksum.

The exact UPC/EAN symbol specifications are available from:

GS1 US
7887 Washington Village Drive, Suite 300
Dayton, OH 45459
ph 937-435-3870
fax 937-435-7317
email: info@gs1us.org
8:00am to 6:00pm EST Mon-Fri

Specifications are also available via the internet at:

<http://www.gs1us.org>

Keep the following guidelines in mind when printing UPC bar codes:

- If you plan to use a "supermarket-type" in-counter scanner to read the codes, specify a bar code height of at least .9" for an optimal first read rate.
- Make it an early practice to observe the numbering conventions of the UPC Council. Do not label unmarked merchandise with a bar code whose numbers may conflict with those already assigned. If products with these numbers are not in your store now, they are likely to be in the future, causing conflicts in your inventory system.

The leading Number System Character, (the first number of the 11 digits to be entered) should conform to these UPC assignments:

- 0,6,7,8** Regular UPC 12 digit codes with numbers assigned by the UPC Council. (Do not use 0 as the leading number for in-store marking).
- 2** Store-marked random weight items of meat and produce.
- 3** Reserved for National Drug Code and Health Related Items.
- 4** Use this leading digit for in-store marking of non-food items.
- 5** Reserved for coupons. Do not use this today, or you will not be able to process coupons through your system tomorrow.

UPC 2 and 5-character supplemental codes



The UPC standards include the addition of a 2 or 5-character supplemental code used with magazines and paperback books. To read the supplements, you must first enable them using the *WDP Reader Setup Menu*.

NOTE: Enabling the supplements disallows the reading of UPC codes from right to left to assure that the supplement does not get missed.

ISBN Specifications

ISBN (International Standard Book Numbering) bar codes are essentially EAN-13 with a 5 digit supplement, where the first 3 digits are the Bookland country codes of 978 for books and 977 for periodicals. Although the bar code contains 18 characters, the ISBN format uses only 9 of them, along with a newly calculated Mod-11 check digit. For example, a bar code containing the numbers 978055337062153495 would transmit as 0553370626 in the ISBN format. The WDP has the option of transmitting in the ISBN format.

ISBN specifications are available from:



ISBN 0-553-37062

**American National Standards
Institute**
Customer Service
11 West 42nd St.
New York, NY 10036
<http://web.ansi.org>
document ISO 2108:1992

The UPC/EAN checksum character

The last character in a UPC-A, UPC-E, UPC-E1, EAN-13 or EAN-8 bar code is the checksum. For reference, these are the methods of calculation:

Checksum calculation for UPC-A, EAN-13 and EAN-8

Use Worth Data's phone number (it's not a real UPC-A code) as sample data:

18314589938

Assign even and odd positions, starting at the right and moving left:

8	3	9	9	8	5	4	1	3	8	1
odd	even	odd	even	odd	even	odd	even	odd	even	odd

1. Starting with the leading digit, 8, take the sum of all the characters in the odd positions.

$$8 + 9 + 8 + 4 + 3 + 1 = 33$$

2. Multiply the result of step 1 by 3.

$$33 \times 3 = 99$$

3. Now take the sum of all the even-position characters.

$$3 + 9 + 5 + 1 + 8 = 26$$

4. Add the result in Step 2 to the result in Step 3.

$$99 + 26 = 125$$

5. Subtract the result from the next higher multiple of 10.

$$\text{Next higher multiple of 10 over 125} = 130$$

$$130 - 125 = 5$$

5 is the Modulo-10 check character. The data to be printed becomes:

183145899385

This same formula is used for EAN-13 (using the 1-12 digits) and EAN-8 (using the 1-7 digits).

UPC-E Checksum Calculation

Use the sample data of 123456 to demonstrate the UPC-E checksum calculation:

1. The 6 digit UPC-E code is converted to a 10-digit code, using an expansion scheme based on the sixth digit:

If the code ends in:	UPC-E data	Insertion digits	Insertion Position	10 digit code
0	abcde0	0 0 0 0	3	ab 0 0 0 0 cde
1	abcde1	1 0 0 0	3	ab1 0 0 0 cde
2	abcde2	2 0 0 0	3	ab2 0 0 0 cde
3	abcde3	0 0 0 0	4	abc0 0 0 0 de
4	abcde4	0 0 0 0	5	abcd 0 0 0 0 e
5	abcde5	0 0 0 0	6	abcde 0 0 0 0 5
6	abcde6	0 0 0 0	6	abcde 0 0 0 0 6
7	abcde7	0 0 0 0	6	abcde 0 0 0 0 7
8	abcde8	0 0 0 0	6	abcde 0 0 0 0 8
9	abcde9	0 0 0 0	6	abcde 0 0 0 0 9

Because the sample UPC-E code ends in a 6, the insertion digits 0000 are inserted at the sixth digit (insertion position 6):

1234500006

2. Add the Number System Character of 0 to the sample data:

01234500006

3. Use the UPC-A check digit calculation described in the previous section to produce a check digit as if it were a UPC-A code. The check digit for the sample data is:

5

4. The complete 8 digit code consists of the Number System Character, the original 6 digit code and the check digit:

01234565

MSI/Plessey Specifications

Plessey is a variable length numeric only bar code. MSI Bar Code is a variable length, numeric-only code with an automatically appended Modulus 10 check digit. MSI is sometimes called Modified Plessey Code. If the user specifies an additional check digit, the MSI code can be 14 digits long, otherwise it has a maximum length of 13 characters. This is how the MSI check digit(s) are calculated:

The MSI Mod 10 check digit is calculated as follows:

The example bar code data is:

82345

1. Form a number from the odd positions, starting in the units position.

835

2. Multiply the new number by 2

$$(835) \times 2 = 1670$$

3. Add the digits of product

$$1 + 6 + 7 + 0 = 14$$

4. Add the even digits of the original number to the result in 3

$$2 + 4 + 14 = 20$$

5. Subtract the result from the next highest multiple of 10

$$20 - 20 = 0$$

6. New Check Digit

0

7. Data with check digit is:

823450

The MSI Mod 11 check digit is calculated as follows:

The example bar code data is:

943457842

1. Assign a checking factor to each number, starting with the units position of the number (in this example, the 2) up to the highest order position (the 9). Use checking factors of:

2,3,4,5,6,7,2,3,4,5,6,7...

2. Multiply the checking factor with its assigned number and add the products:

$$4 + 12 + 32 + 35 + 30 + 28 + 6 + 12 + 36 = 195$$

3. Divide the sum by 11

$$195/11 = 17 \text{ remainder } 8$$

4. Subtract remainder from 11

$$11 - 8 = 3$$

5. New Check Digit

3

(If the remainder is 10, no check digit is added.)

6. Data with check digit is:

943457823

Code 93 Specifications

Code 93 is variable length, continuous, bi-directional, compact code. Code 93 is an alphanumeric bar code which consists of 43 data characters (0-9,A-Z,\$/+% .- and Space), 4 control characters, and a unique start/stop character. The entire set of 128 ASCII characters is represented in Code 93 using combinations of control characters and data characters.

The control characters are $\textcircled{\$}$ $\textcircled{\%}$ $\textcircled{/}$ and $\textcircled{+}$. Full ASCII 93 is created by pairing these control characters with normal data characters. It is almost identical to the pairings for Code 39; Code 39 uses \$M to produce a Carriage Return (ASCII 13) character -- Code 93 uses $\textcircled{\$}$ M to produce the Carriage Return.

Code 93's two built-in check digits greatly minimize the possibility of reader substitution errors. These check digits are never transmitted by the bar code reader. Code 93's Start and Stop characters are also never transmitted.

If you have not decided which bar code type to use for your application and are considering using Code 93, while we agree that Code 93 is an excellent code, we believe that Code 128 is generally preferable because:

1. Code 93 does not have the numeric compression capability that 128 does,
and
2. Code 93 requires pairings to make all Full ASCII characters while 128 does not.

*Appendix H***ASCII Code Equivalent Table**

The 128 ASCII codes and their 3 digit decimal equivalents are detailed in the table below.

Char	hex	ASCII	Char	hex	ASCII	Char	hex	ASCII	Char	hex	ASCII
NUL	00	000	SP	20	032	@	40	064	'	60	096
SOH	01	001	!	21	033	A	41	065	a	61	097
STX	02	002	"	22	034	B	42	066	b	62	098
ETX	03	003	#	23	035	C	43	067	c	63	099
EOT	04	004	\$	24	036	D	44	068	d	64	100
ENQ	05	005	%	25	037	E	45	069	e	65	101
ACK	06	006	&	26	038	F	46	070	f	66	102
BEL	07	007	'	27	039	G	47	071	g	67	103
BS	08	008	(	28	040	H	48	072	h	68	104
HT	09	009	)	29	041	I	49	073	i	69	105
LF	0A	010	*	2A	042	J	4A	074	j	6A	106
VT	0B	011	+	2B	043	K	4B	075	k	6B	107
FF	0C	012	,	2C	044	L	4C	076	l	6C	108
CR	0D	013	-	2D	045	M	4D	077	m	6D	109
SO	0E	014	.	2E	046	N	4E	078	n	6E	110
SI	0F	015	/	2F	047	O	4F	079	o	6F	111
DLE	10	016	0	30	048	P	50	080	p	70	112
DC1	11	017	1	31	049	Q	51	081	q	71	113
DC2	12	018	2	32	050	R	52	082	r	72	114
DC3	13	019	3	33	051	S	53	083	s	73	115
DC4	14	020	4	34	052	T	54	084	t	74	116
NAK	15	021	5	35	053	U	55	085	u	75	117
SYN	16	022	6	36	054	V	56	086	v	76	118
ETB	17	023	7	37	055	W	57	087	w	77	119
CAN	18	024	8	38	056	X	58	088	x	78	120
EM	19	025	9	39	057	Y	59	089	y	79	121
SUB	1A	026	:	3A	058	Z	5A	090	z	7A	122
ESC	1B	027	;	3B	059	[	5B	091	}	7B	123
FS	1C	028	<	3C	060	\	5C	092	|	7C	124
GS	1D	029	=	3D	061	]	5D	093	}	7D	125
RS	1E	030	>	3E	062	^	5E	094	~	7E	126
US	1F	031	?	3F	063	_	5F	095	DEL	7F	127

Resolving USB Installation Issues

The USB HID (Human Interface Device) keyboard driver is standard with Windows®. Most recent versions of Windows include necessary files in the installed Windows system folders so driver installation is easy if not automatic. It is possible for the user to cancel the HID driver installation before it is completed and this results in a problem.

Restarting Windows does NOT initiate a re-installation; the user must go into the device management utility in Windows. Location and operation of the device management utility is different depending on the version of Windows:

Windows® XP:

1. Go to the **Start menu**.
2. Select **Control Panel**.
3. Switch to **Classic View** if you are in **Category View**
4. Select **System**.
5. Select **Hardware** tab.
6. Select **Device Manager**
7. Double Click on **Human Interface Devices**
8. Locate the USB Human Interface Device with a ! in the icon.
9. Click on **Update Driver**
10. Follow instructions.

If XP fails to find the driver on the computer's hard disk, you may have to insert and point to the original Windows XP CD-ROM to complete the installation. Also make sure you have rights to add new hardware to your computer - some XP installations problems can be solved by logging in as the **Administrator** of the computer.

11. Click **Finish**

Windows® 98SE & ME:

1. Go to the **Start** menu.
2. Go to **Settings**.
3. Select **Control Panel**.
4. Go to **System**.
5. Click on the **Device Manager** tab.
6. Double Click on the **USB Human Interface Devices**
7. Click on the **Reinstall Driver** button.
8. Follow directions. If the installer cannot find the right driver file on your hard disk, you may have to insert the original Windows® 98SE or ME CD-ROM and point to it to complete the installation.
9. Click **Finish**.

Windows® 2000:

1. Log on as **Administrator** and open the **Administrative Tools** folder in your **Control Panel**.
2. Run the **Computer Management** utility.
3. Select the **Tree** tab on the left panel
4. Find the **Device Manager** entry under **System Tools** and click on it. The right panel will display current devices.
5. Problem devices will be identified with an **!** icon. Find either the **HID Keyboard Device** under *Keyboards* or the **USB Human Interface Device** under *Human Interface Devices* and double-click on one of those entries.
6. Select the **Driver** tab at the top of the window and click on the **Update Driver** button. Follow the prompts to re-install the HID driver.

Windows 7 & Vista:

1. Go to the **Start menu**.
2. Select **Control Panel**.
3. Switch to **Classic View** if you are in **Category View**
4. Select **System**.
5. Select **Hardware** tab.
6. Select **Device Manager**
7. Double Click on **Human Interface Devices**
8. Locate the USB Human Interface Device with a **!** in the icon.
9. Click on **Update Driver**
10. Follow instructions.

If Windows 7 or Vista fails to find the driver on the computer's hard disk, you may have to insert and point to the original Windows 7 or Vista CD-ROM to complete the installation. Also make sure you have rights to add new hardware to your computer - many Windows 7 or Vista installations problems can be solved by logging in as the **Administrator** of the computer. In order to install new hardware in Windows 7 or Vista you may need to turn off the **UAC** (UserAccount Control). **UAC** is turned off using the **User Account** icon. **UAC** is turned on using the **Security Center** icon.

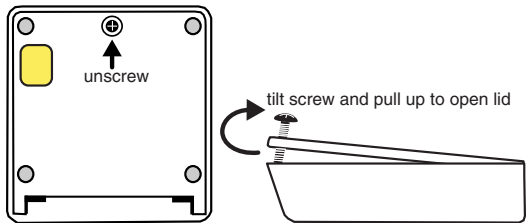
Appendix J

WDP P22 Board Diagram

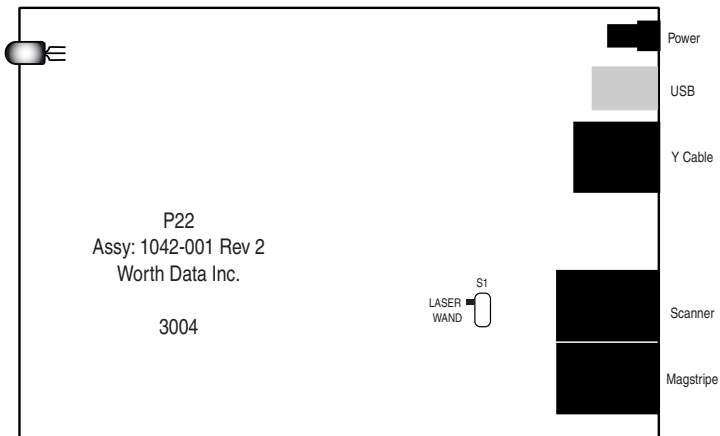
Typically, there will be no reason to have to open the WDP P22 decoder case. But, if you have ordered your P22 to replace an older WDP reader and you are using the same wand as before, you may need to change a switch on the WDP P22 circuit board. If you are having these symptoms and conditions with your P22 reader, you need to open the case and change the switch:

- You are connected to the USB port
- Using an older wand from a previous reader
- Your wand has a dim light instead of the the bright red light at the tip
- Your reader beeps on power up but does not beep when you try to scan a bar code

To open the reader case:



Move the S1 switch from Laser to Wand:



WDP Setup Menu

To change a setting using the WDP Setup Menu:

- Scan **START SETUP** to enter setup mode
- Scan the **parameter** you want to change (i.e. Code 3 of 9)
- Choose the **setting** you want to change and scan the corresponding letter or number from the Barpad Table (0-9, A-F)
- When all changes have been made, scan **END SETUP**
- For Preamble and Postamble settings, use the **FULL ASCII MENU**
- * indicates default settings

Start Setup



End Setup



Code 3 of 9



- *0 **Enable Code 39**
1 Disable Code 39
- *2 **Enable Full ASCII Code 39**
3 Disable Full ASCII Code 39
- *4 **Enable Accumulate Mode**
5 Disable Accumulate Mode
- 6 Transmit Start/Stop characters
- *7 **Don't transmit Start/Stop characters**
8 Enable Mod 43 Check Character
- *9 **Disable Mod 43 Check Character**
A Transmit Mod 43 Check Character
- *B **Don't transmit Mod 43 Check Character**
C Caps Lock ON
- *D **Caps Lock OFF**

UPC/EAN



- *0 **Enable UPC/EAN**
1 Disable UPC/EAN
- 2 Enable Supplements
- *3 **Disable Supplements**
- *4 **Transmit UPC-A NSC**
5 Don't transmit UPC-A NSC
- *6 **Transmit UPC-A Check Digit**
7 Don't transmit UPC-A Check Digit
- 8 Transmit UPC-E NSC & EAN-8 Flag Ch
- *9 **Don't transmit UPC-E NSC & EAN-8 Flag Ch**
A Transmit UPC-E & EAN-8 Check digit
- *B **Don't transmit UPC-E & EAN-8 Check digit**
- *C **UPC-E Compressed transmission**
D UPC-E Expanded transmission
- *E **EAN-8 observes 9 & A above**
F EAN-8 is forced to transmit 8 digits always

2 of 5 Code



- 0 Enable I 2 of 5
- *1 **Disable I 2 of 5**
2 Enable check digit
- *3 **Disable check digit**
4 Transmit check digit
- *5 **Don't transmit check digit**
6 Enable 2 of 5
- *7 **Disable 2 of 5**

2 of 5 Length



Scan 2 digit length (default is 06)

GS1 DataBar RSS-14



- 0 **Disable RSS-14** 2 14 + Identifiers
- 1 Standard 14 digits 3 14 + UCC-128 Emulation

Start Setup



End Setup



Code 93



- 0 Enable Code 93
- * 1 **Disable Code 93**
- 2 Enable Full ASCII Code 93
- * 3 **Disable Full ASCII Code 93**

Code 128



- 0 **Disable 128**
- * 1 Enable 128
- 2 **Disable UCC/EAN-128**
- * 3 Enable UCC/EAN-128

Codabar



- 0 Enable Codabar
- * 1 **Disable Codabar**
- 2 Enable CLSI Codabar
- * 3 **Disable CLSI Codabar**
- * 4 **Suppress start/stop characters**
- 5 Enable start/stop characters

MSI/Plessey



- * 0 **Disable MSI**
- 1 Enable MSI 1 Mod 10 check digit
- 2 Enable MSI 2 Mod 10 check digits
- 3 Enable MSI Mod 11/10 check digits
- * 4 **Transmit no check digit**
- 5 Transmit 1 check digit
- 6 Transmit 2 check digits
- 7 Enable Plessey
- 8 Enable Labelcode 5
- 9 Enable Labelcode 4

Computer Interface



- * 1 **PC Keyboard and USB Wedge Saver**
- 3 PC Learned Timing

Data Transmission Timing



- * 0 **None**
- 1 Short
- 2 Short Medium
- 3 Medium
- 4 Long

This adjusts for differences in BIOS and clock speeds

Terminator Character



- * 0 **Enter**
- 1 None
- 2 Tab

Beep Tone



- 0 Lowest
- 1 Low
- * 2 **Medium**
- 3 High
- 4 Highest
- 5 No Beep Tone

Characters



Scan up to 8 sets of hex characters to reassign and delete characters in the bar code output. Scan SET when completed.

Keyboard Country



- * 00 **USA**
- 01 French
- 02 German
- 03 Belgian
- 04 Fr. Canadian
- 05 Danish
- 06 Dutch
- 07 Italian
- 08 Latin Amer.
- 09 Norwegian
- 10 Portuguese
- 11 Spanish
- 12 Swedish
- 13 Swiss
- 14 U.K.

Start Setup



End Setup



Preamble



Scan up to 15 characters from the **Full ASCII Menu**. Scan SET when completed.

Postamble



Scan up to 15 characters from the **Full ASCII Menu**. Scan SET when completed.

Magstripe



*0 None

- 1 Track 1
- 2 Track 2
- 3 Track 3
- 4 Tracks 1 & 2, 2 & 3

*E Caps Lock OFF

- F Caps Lock ON

SET



CLEAR



Clears Preamble & Postamble and resets current individual parameter back to default settings.

STAND MODE



Scan this bar code to put the WDP into and out of "hands-free" stand mode when using the S21 and S11 Stands.

Future Code 1



Future Code 2



BARPAD TABLE

0	8
1 9	
2	A
3	B
4	C
5	D
6	E
7	F

RESET



Warning: Scanning this bar code after scanning START SETUP will reset the reader back to all of the default parameter settings.

Full ASCII Menu

NUL 000 00	SOH(f1) 001 01	STX(f2) 002 02	ETX(f3) 003 03
EOT(f4) 004 04	ENQ(f5) 005 05	ACK(f6) 006 06	BEL(f7) 007 07
BS 008 08	TAB 009 09	LF 010 0A	VT(Pg Up) 011 0B
FF(Pg Dn) 012 0C	CR 013 0D	SO(f8) 014 0E	SI(f9) 015 0F
DLE(f10) 016 10	DC1(Del) 017 11	DC2(Ins) 018 12	DC3(←) 019 13
DC4(→) 020 14	NAK(↓) 021 15	SYN(↑) 022 16	ETB(Home) 023 17
CAN(End) 024 18	EM(Shift On) 025 19	SUB(Shift Off) 026 1A	Esc 027 1B
FS(Ctrl On) 028 1C	GS(Ctrl Off) 029 1D	RS(Alt On) 030 1E	US(Alt Off) 031 1F
SP 032 20	! 033 21	" 034 22	# 035 23
\$ 036 24	% 037 25	& 038 26	' 039 27
(040 28	) 041 29	* 042 2A	+ 043 2B
, 044 2C	- 045 2D	. 046 2E	/ 047 2F
0 048 30	1 049 31	2 050 32	3 051 33
4 052 34	5 053 35	6 054 36	7 055 37

8
056 38

9
057 39

:
058 3A

;
059 3B

<
060 3C

=
061 3D

>
062 3E

?
063 3F

@
064 40

A
065 41

B
066 42

C
067 43

D
068 44

E
069 45

F
070 46

G
071 47

H
072 48

I
073 49

J
074 4A

K
075 4B

L
076 4C

M
077 4D

N
078 4E

O
079 4F

P
080 50

Q
081 51

R
082 52

S
083 53

T
084 54

U
085 55

V
086 56

W
087 57

X
088 58

Y
089 59

Z
090 5A

[
091 5B

\
092 5C

]
093 5D

^
094 5E

~
095 5F

096 60

a
097 61

b
098 62

c
099 63

d
100 64

e
101 65

f
102 66

g
103 67

h
104 68

i
105 69

j
106 6A

k
107 6B

l
108 6C

m
109 6D

n
110 6E

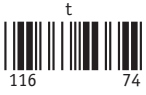
o
111 6F

p
112 70

q
113 71

r
114 72

s
115 73



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