WDG-5912

Spec Sheet

Programmable USB Wedge

WDG-5912SS

Product Specifications

The WDG-5912 Wedge is a compact and durable device which automatically adds badge data to IBM and compatible PC systems, Tektronix systems, MAC OS X, as well as most popular POS terminals.

The Wedge enhances productivity in a wide variety of retail, security , and Time & Attendance applications by converting badge, wand, or scanner information to the appropriate keystrokes. Input can be Wiegand, Strobed ABA, or RS232 Serial data.

The WDG-5912 parameters are programmable through a serial connection to a VT-100 terminal or equivalent (configured for 9600 baud 8,1,N). Trailers, headers, and badge number processing are configurable through the programming interface. Refer to the WDG-5912 programming manual for detailed programming instructions. The WDG-5912 will work with most host computers that support a USB keyboard interface.

Supply Voltage: 5 Vdc from USB Interface
Supply Current: 100mA
Readers requiring 100mA or greater current
or greater than 5 VDC will require an
external supply

Physical Dimensions: 4.25" x 1.125" excluding
connectors.

For indoor use only

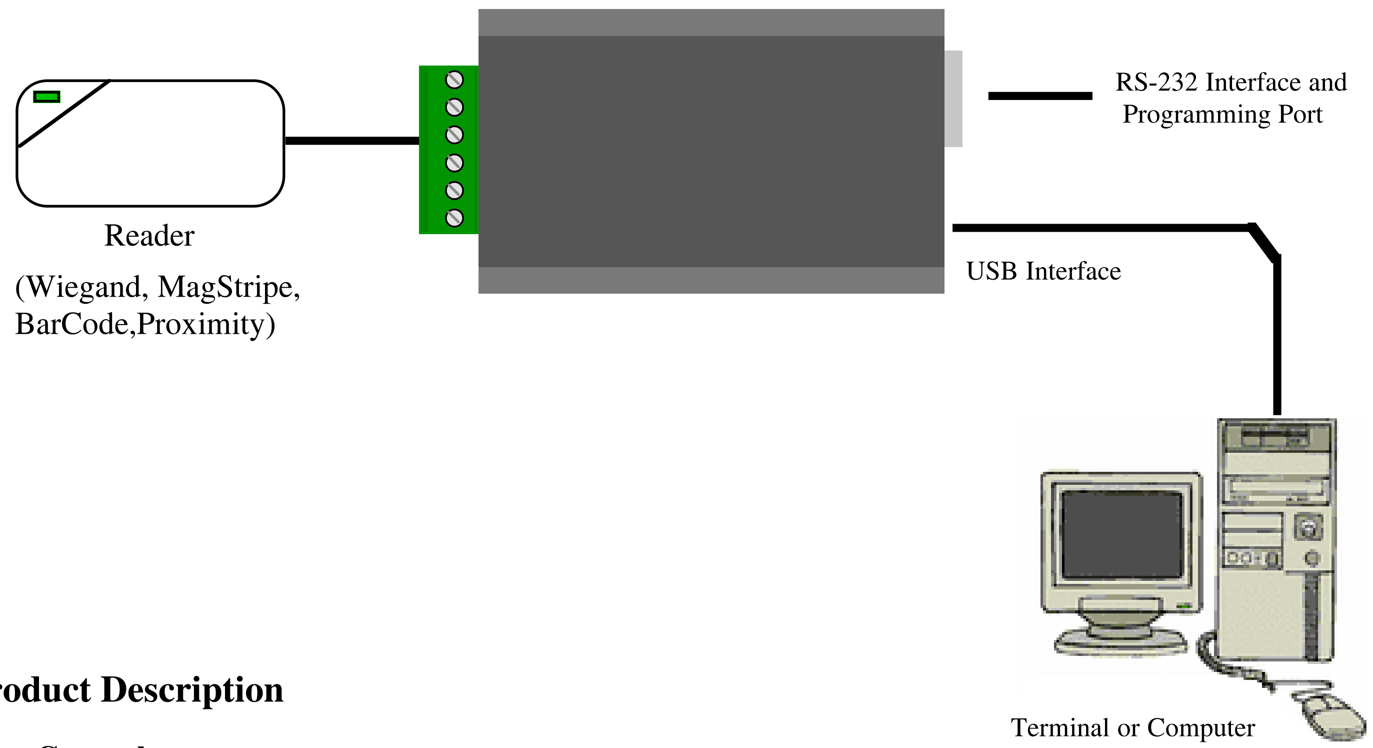
This complies with part 15 of the FCC rules
Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and

CYPRESS

WDG-5912
Connection Diagram

Cypress Computer Systems, Inc. • 1778 Imlay City Rd. • Lapeer, MI 48446-3206
TX(810)245-2300 • FX(810)245-2332 • www.cypresscom.com

Programmable USB Wedge
Adds Automatic Data Entry to Computers and Terminals


RS-232 Interface and Programming Port
Reader
(Wiegand, MagStripe, BarCode,Proximity)
USB Interface
Terminal or Computer

Product Description

General

The WDG-5912 Wedge is a compact and durable device which automatically adds badge data to IBM and compatible PC systems, Tektronix systems, MAC OS X, as well as most popular POS terminals. The Wedge enhances productivity in a wide variety of retail, security , and Time & Attendance applications by converting badge, wand, or scanner information to the appropriate keystrokes. Input can be Wiegand, Strobed ABA, or RS232 Serial data.

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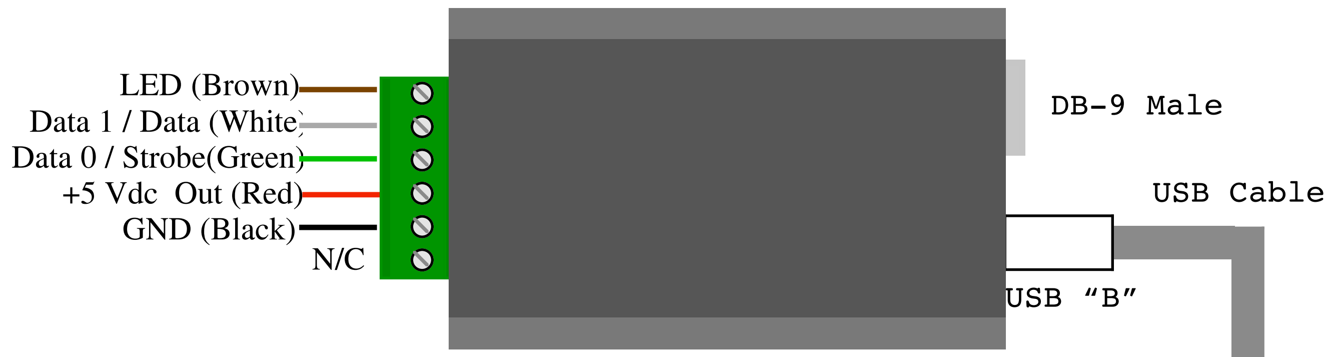
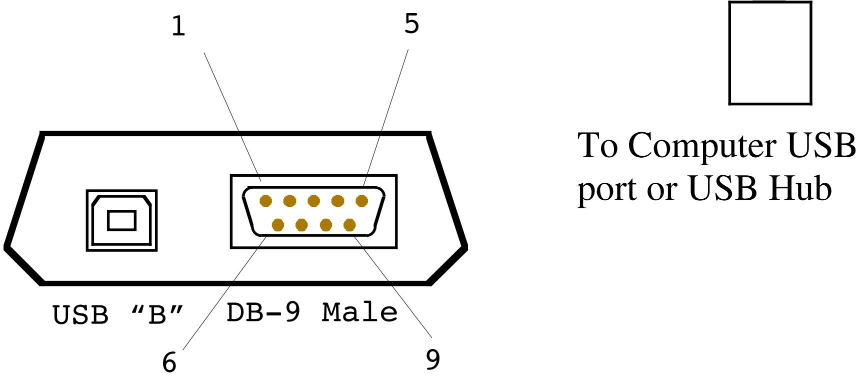
Standard WDG-5912 Connections



Supply Voltage: 5 Vdc from USB Interface
Supply Current: 100mA

Readers requiring 100mA or greater current or greater than 5 VDC will require an external supply.



DB-9 Connections to standard PC Com Port

Wedge	Computer
DB9-2	DB9-3
DB9-3	DB9-4
DB9-5	DB9-5

DB-9 Connections

2	RXD (Data In)
3	TXD (Data Out)
5	GND
9	+ 5VDC Out

The RS-232 port is set for 9600 Baud, 8,N,1.

All printable ASCII data received from the port will be sent to the USB keyboard output.

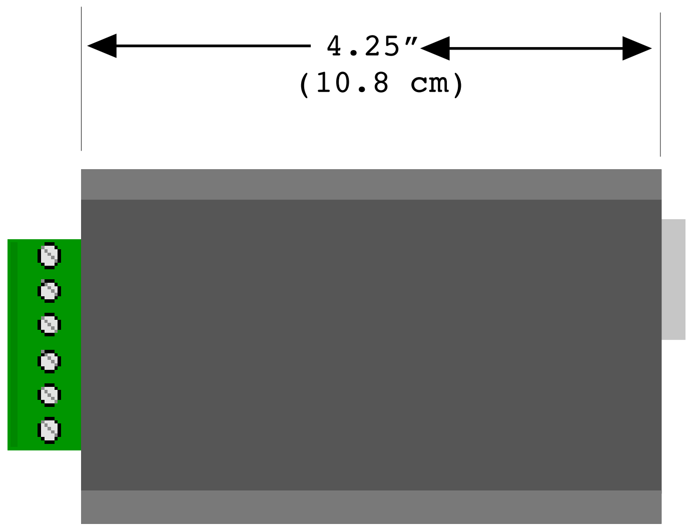
The RS-232 port also provides the programming interface for the wedge. Refer to programming manual for details.

STATEMENT OF COMPLIANCE

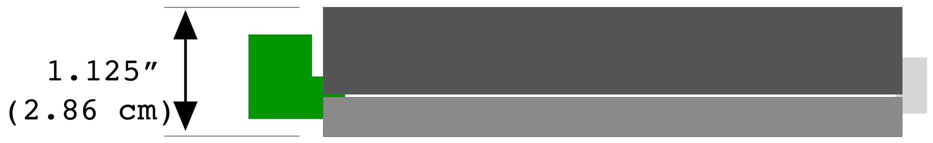
This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received, including interference that may cause undesired operation.

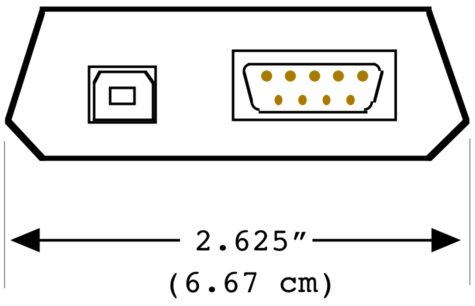
WDG-5912 Dimensions



Top View

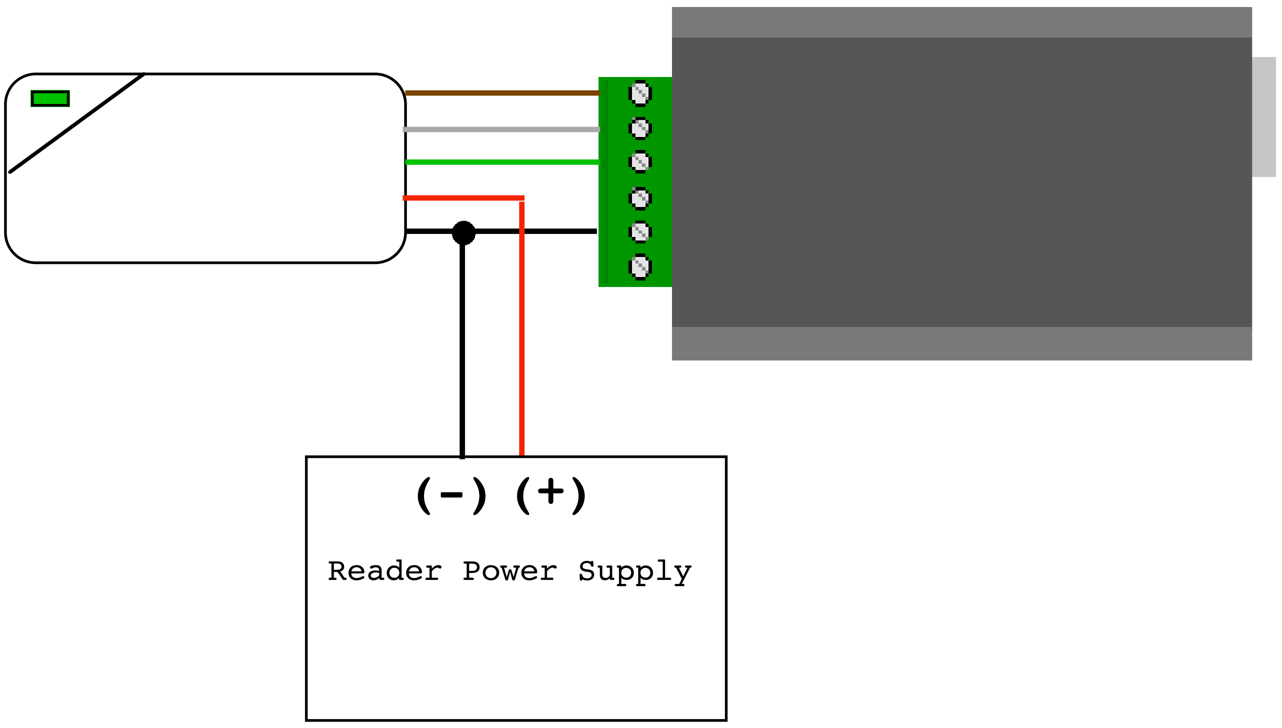


Side View



WDG-5912 External Supply for Reader

An external power supply may be required for applications where the combined current requirements of the wedge and reader exceed the capacity of the USB interface. A power supply will also be required for readers that specify more than 5 volts supply voltage (i.e. 12VD



Ground is connected to Reader and Wedge.

Power (+VDC) is connected to reader ONLY.

External power should not be applied to +5 VDC connection of wedge.

CYPRESS

WDG-5912 Programming Instructions

Cypress WDG-5912 USB Programmable Wedge

WDG-5912 Programming - Getting Started

A programming interface is provided for the WDG-5912 through the RS-232 port. Programming There are some important differences between the 4612 series and 5912 procedures.

Required equipment to program the WDG-5912:

1. RS-232 cable F-F Crossover type.

2. Terminal program (such as Hyperterminal) running VT-100 emulation at 9600 baud, 8, N, 1 with Echo ON, no hardware handshaking.

3. RS-232 port on host computer running the terminal program.

Placing the Wedge into programming mode:

The WDG-5912 in normal operation will pass all printable ASCII characters input to the serial port to the USB keyboard output. To utilize the RS-232 port for programming purposes it is necessary to place the port / wedge into programming mode.

The wedge should be connected to the computer through the USB cable to provide power. The RS-232 cable should be installed and the terminal program running.

Type the characters + + + into the terminal program.

The wedge should answer with “Command mode”.

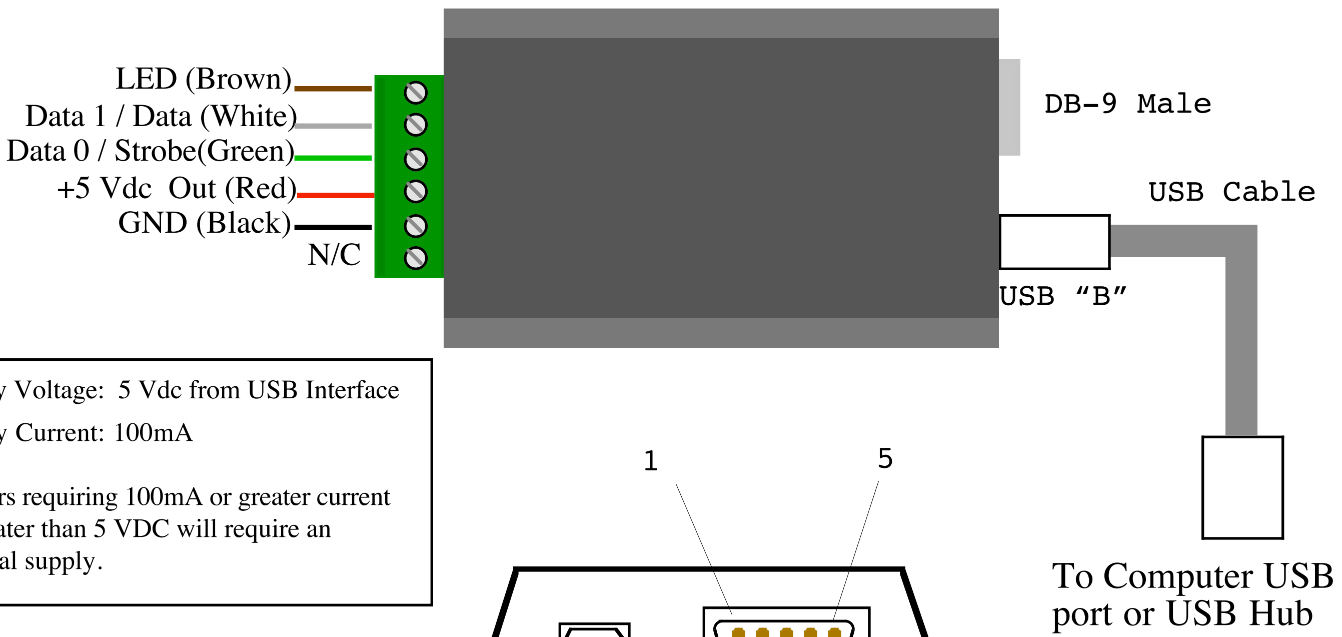
Now the standard Cypress programing commands can be used i.e. \R \L etc. If you have not used the Cypress programming interface, this manual will cover the details in the following pages.

After programming is complete, the wedge can be placed back into normal operation by pressing the “Esc” (Escape) key.

Note: If you are using the same computer to program and host the USB interface, a condition can occur during programming where a keepers will enter an infinite loop. This can happen when; the terminal program is the active window, the wedge is in normal mode, and a key other than + is pressed. The wedge will output the character to the terminal window where it will be fed back to the wedge through the RS-232 port where it will then be output as a keystroke.

To terminate this condition, briefly unplug the RS-232 connection to the wedge.

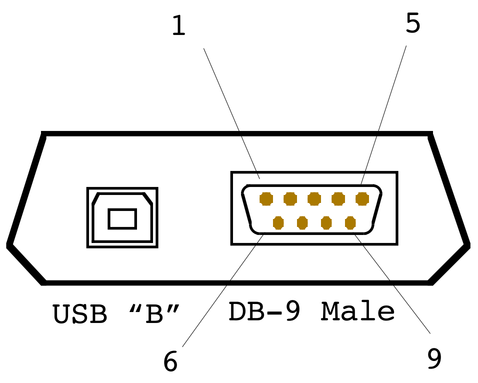
Standard WDG-5912 Connections



Supply Voltage: 5 Vdc from USB Interface

Supply Current: 100mA

Readers requiring 100mA or greater current or greater than 5 VDC will require an external supply.



DB-9 Connections to standard PC Com Port (Programming Cable)

Wedge	Computer
DB9-2	DB9-3
DB9-3	DB9-4
DB9-5	DB9-5

DB-9 Connections

2	RXD (Data In)
3	TXD (Data Out)
5	GND
9	+ 5VDC Out

The RS-232 port is set for 9600 Baud, 8,N,1.

All printable ASCII data received from the port will be sent to the USB keyboard output.

The RS-232 port also provides the programming interface for the wedge. Refer to programming manual for details.

WDG-5912 Programming - The Programming Interface

Basic Command Structure:

All commands start with a Backslash "\" and are upper case only

\P - Load Simulator Template
\P@ = defaults
\PH = Badge Peeler {hexadecimal output}

\Q - Load Reader Template
\Q@ = defaults
\QH = Badge Peeler {No Processing of Formats}

\R - Show Reader Parameters

\S - Show Simulator Parameters

\L - Burn specified NVRAM locations

`\P [template code]`

\P@ - load default Simulator Parameters
\PA - load profile A
...
\PZ - load profile Z

`\Q [template code]`

\Q@ - load default Reader Parameters
\QA - load profile A
...
\QZ - load profile Z

`\L [number of bytes to burn] [Starting address] [Hex codes...]`

\L01075FF - programs $FF into location $075
\L060C508FF08200100 - programs 6 bytes starting at location $0C5: 08 FF 08 20 01 00
>>
When you've typed the nth byte, you'll get the ">>" prompt.

Step by Step - Using the Wedge for custom Wiegand formats

This section will explain how to use the Cypress programmable wedge to generate Facility Code and Badge numbers from Wiegand data streams of 24 to 64 bits.

The user should be familiar with Decimal, Hexadecimal and Binary number systems and a reader should reconnected to the wedge and be operational. condition.

The user will also need to know any formatting details of the decoded data.

Different processes are required for Strobed/ABA or Wiegand/ABA data. These procedures apply to Wiegand/Binary data only.

There are several steps involved in getting the desired facility code and badge numbers from Wiegand data using the Cypress Wedge.

These are:

1. Determine the number of bits in the raw Wiegand data.
2. Determine the actual data bits (raw data) from the Wiegand card reader.
3. Determine where the desired facility code is located in the raw data.
4. Determine where the desired badge data is located in the raw data.
5. Composing programming strings to filter the facility code and badge data from the incoming raw Wiegand data.
6. Determine the number of decimal digits for the facility code and badge data.
7. Composing programming strings to correctly display the decimal facility code and badge numbers.

We will go through each step with the “Standard” 26 bit Wiegand badge as an example:

First, determine the number of bits in the data stream and the raw data coming from the reader/badge.

Place the Wedge into “Badge Peeler” mode by entering \PH and \QH into the programming interface.

This will cause the wedge to generate an output that displays the number of bits and the badge data in raw hexadecimal format.

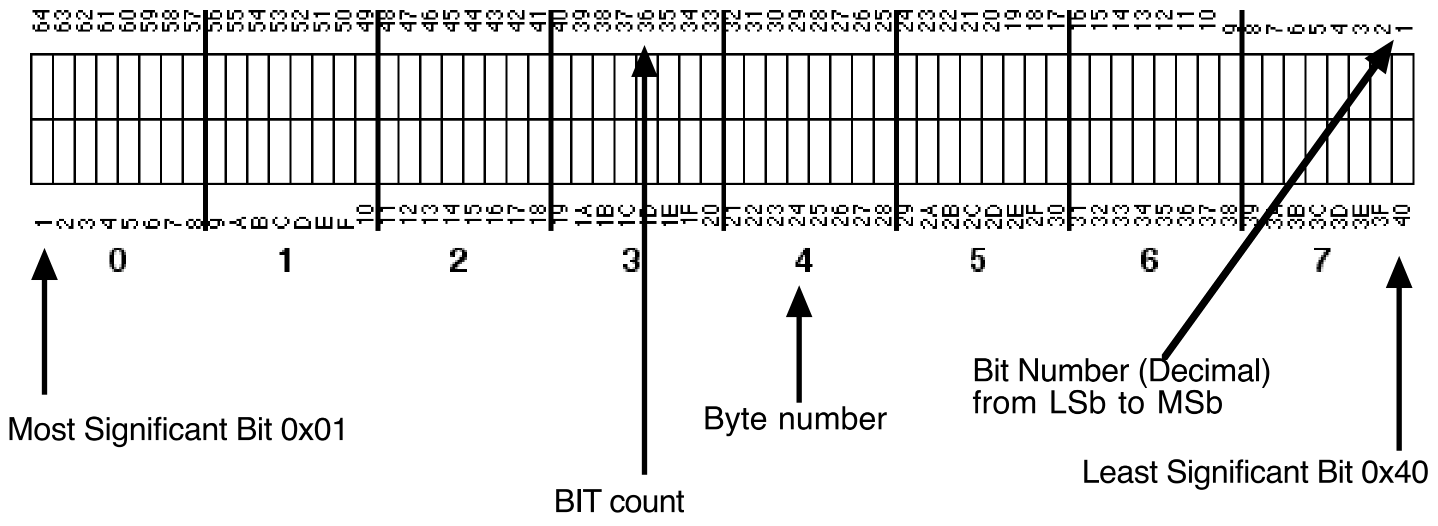
Lets say our 26 bit badge yielded the output “ 26=000002F62712” from the badge peeler mode. We now know it is 26 bits (the numbers before “=”) and we have the raw binary data in hexadecimal form.

We will use the worksheet provided at the end of this document to work out the bit positions and conversion information. The worksheet can be printed and used with pen and pencil for calculating the programming strings.

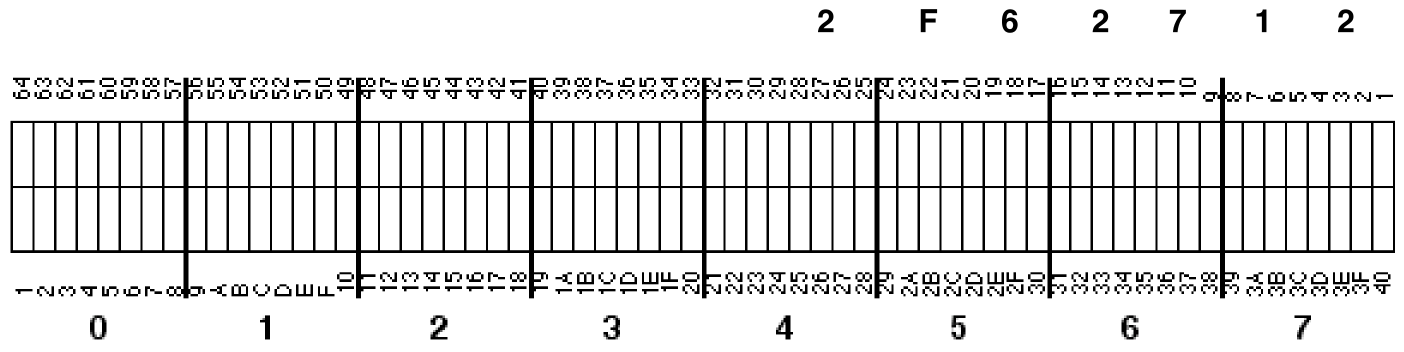
Reset the programming parameters back to factory defaults using the reset jumper block before proceeding.

Step by Step - Using the Wedge for custom Wiegand formats

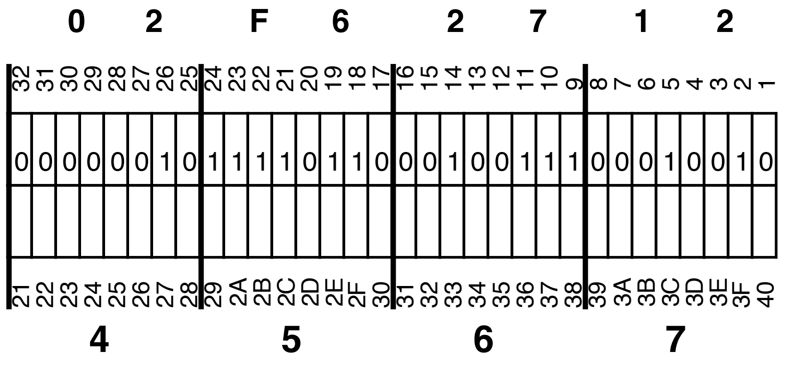
This worksheet grid represents the internal 8 byte buffer of the Cypress Programmable Wedge



0 1 2 3 4 5 6 7
Most Significant Bit 0x01
BIT count
Byte number
Bit Number (Decimal) from LSb to MSb
Least Significant Bit 0x40

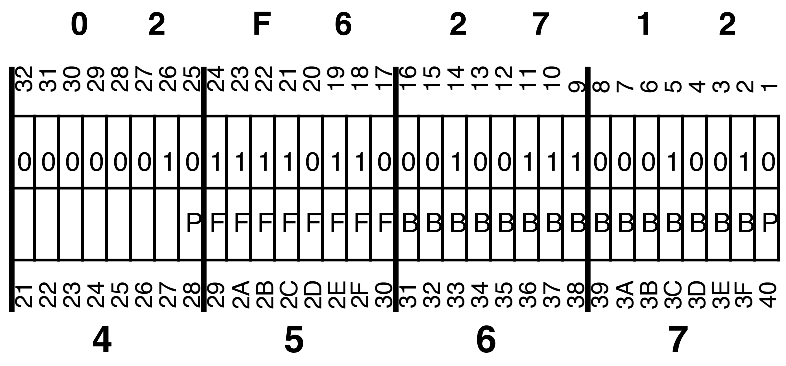


First write the individual Hexadecimal digits over each 4 bit group (2 per byte) starting from Right to left. The upper most significant bits/bytes are zero padded.



Each Hex digit is converted to its binary equivalent and filled into the bit boxes.
We added a zero above the most significant byte for clarity.
The bits are processed Right Justified.

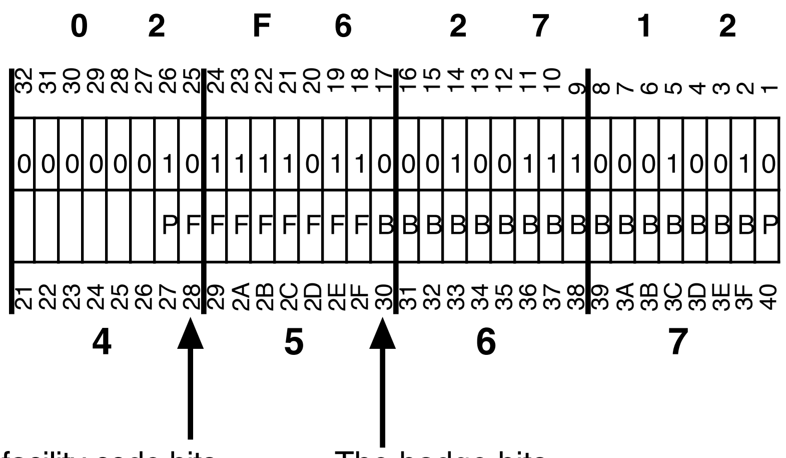
Step by Step - Using the Wedge for custom Wiegand formats



Assuming we know the badge format, we can define bit functions by location.
If you do not know the badge format, then you will have to find the bit pattern in the raw stream that represents the desired facility code and/or badge number.

The best way to find an expected number is to take the decimal badge number or facility code and convert it to hexadecimal. Then look for the binary bit pattern in the raw data represented by the hexadecimal number.

Since we know what a “standard 26 bit” format is, we can define the bit functions and their positions:
P = Parity Bit
F = Facility Code bit
B = Badge number bit



The facility code bits start at 0x28 and are 8 bits long

The badge bits start at 0x30 and are 16 (0x10) bits long

Now we can gather parameters that will be entered into the wedge programming interface.
Notice that these locations will filter out the parity bits.

Step by Step - Using the Wedge for custom Wiegand

The Wiegand preprocessor string for Wiegand Preprocessor 0 (WPP0) would be:

\L050C50828083010

Broken down to each parameter:

\L	; Programming string prefix
05	; There are 5 bytes of data in the programming string
0C5	; The address in the programming parameter map of WPP0
08	; Defines 8 byte (64 bit buffer) to hold data
28	; Start of facility code bits in 64 bit buffer (0x28)
08	; Defines 8 bit length of facility code data
30	; Start of badge number data in 64 bit buffer (0x30)
10	; Defines 16 bit length of badge data (0x10)

Now we need to tell the Wiegand Preprocessor (WPP0) to process 26 bit streams using the above criteria.

Wiegand Binary Format Table - Wedge programming interface

```
075
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
00 00 01 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

The number in the upper left corner is 0x75, a hexadecimal number that gives the starting address of the Format Table. The 24 bit format would start at 0x75.

For example, a 32 bit format would be located at 0x7D

The 26 bit format we are interested in is located at 0x77.

Now that we know the address of the 26 bit format, we will place a 0x02 in that location. The 0x02 tells the Wedge to use Wiegand Preprocessor #0 (WPP0)

See next page for details on the programming string to set 0x02 at location 0x77

The programming string to tell the wedge “Use WPP0 on 26 bit formats would be:

\L0107D02

Broken down to each parameter:

\L	; Programming string prefix
01	; There are 1 bytes of data in the programming string
077	; The address of the programmed parameter (26 bit)
02	; Parameter that defines use of Wiegand Preprocessor 0 (WPP0)

Lets assume we want the Facility Code to output as a 3 digit decimal number.
Upper digits will be zero padded from left to right.
The programming string to tell the wedge to use a 3 digit decimal number for the Facility Code:

\L0105B03

Broken down to each parameter:

\L	; Programming string prefix
01	; There are 1 bytes of data in the programming string
05B	; The address of the programmed parameter
03	; The number of digits to use in the Facility field. (This can be set to zero if no Facility needed)

Lets assume we want the Badge Number to output as a 5 digit decimal number.
Upper digits will be zero padded from left to right.
The programming string to tell the wedge to use a 5 digit decimal number as the Badge:

\L0105D05

Broken down to each parameter:

\L	; Programming string prefix
01	; There are 1 bytes of data in the programming string
05D	; The address of the programmed parameter
05	; The number of digits to use in the badge Field

If the four strings are entered through the programming interface:

\L050C50828083010
\L0107D02
\L0105B03
\L0105D05

Then our output from the raw data in our example would be:

12305001

Commands

\R A similar screen will appear when connected to a VT-220 type terminal

```
               ======== Reader Parameters =======
073 Interface: 00
074    Format: 00
075
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
00 00 01 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00

0C5 User 0 WPP: 000000000000
0CB + Offset 0: 0000                 0CD - Offset 0: 0000
0DC User 1 WPP: 0000000000
0E1 Odd Mask 1: 000000000000000000   0EA Even Mask 1:000000000000000000

0F3 ABA Clock Polarity: 00
0F4 ABA PAN (Strt,Num): 00,00
0F6 ABA XAN (Strt,Num): 00,00
```

`073 Interface: 00`
`074    Format: 00`

073 is the address of the Interface Parameter. It indicates the type of reader connected to the wedge.
00 = Wiegand, 01= Strobed.

The Format Parameter is also used to specify the type of reader. **00 = Binary, 01 = ABA encoding**

To change the Interface and format parameters, use the following examples:
`\L0107300` - Wiegand Interface
`\L0107301` - Strobed Interface
`\L0107400` - Binary Formats (24 to 103 bits)
`\L0107401` - ABA Formats

Since the 2 fields are sequential in memory, the following example shows both parameters being set with one command string:

`\L020730001` - Wiegand Interface with ABA Encoding

WDG-5912 Programming - The Reader interface Screen

Wiegand Binary Format Table

```
075
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
00 00 01 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

Starting at address 075, the table indicates which process is to be applied to the various number of bits that could be encountered.
00 = default
01 = standard
02 = User defined WPP 0
03 = User defined WPP 1
FF = ignore

To change the process byte for 32 bits, use the following command string:

\L0107D02 - change to “User Defined WPP 0”
{remember, you are counting in HEX not decimal}

WPP = Wiegand Pre Processor

Default Process:

0D FF 08 15 54

13 bytes in buffer
field 1 = num of bits read
Badge Field starts 21 bits
84 bits in badge field

FF - Field 1 contains the number of bits read instead of the contents of the buffer at a specified location. Therefore, the 3rd byte (08) is ignored.

The default process is useful for “dumping” all the information in a Wiegand badge. Parity Bits, fixed codes, site code, badge number, etc. By using the FF code as shown, the number of bits will be accumulated for later output by the simulator.

You would use this to process a standard 26 bit Wiegand Format

Standard Process:

08 28 08 30 10

16 bits in badge field
Start of Badge Field (48 bits)
8 bits in FC field
Start of Facility Code Field (40 bits)
8 bytes in buffer (64 bits)

0C5 User 0 WPP: 0000000000

This is a little complicated but definable. The WPP tells the Reader Interface how to process the incoming bit stream. Number of bytes needed to buffer the read, how far into the buffer the Facility Code field is, number of bits in the Facility Code, starting position of the Badge Field, how many bits.

Let's take a typical coding form and create a User Defined WPP.

```
          1         2         3
012345678901234567890123456789012345
e011010FFFFFFFFFFCCCCCCCCCCCCCCCCCCo
```

36 bit custom format

some fixed bits at 1,2,3,4,5 &, 6

Facility Code = 10 bits
Start Position = 7

Card Number = 18 bits
Start Position 17

Pick a buffer size that will hold the entire read (64,88, or 103)

```
             1         2         3         4         5         6
0123456789012345678901234567890123456789012345678901234567890123
                            e011010FFFFFFFFFFCCCCCCCCCCCCCCCCCCo
123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0
               1               2               3               4
```

64 bit Buffer
(8 bytes)

Example User Process: **08 24 0A 2E 12**

10 bits in
Facility Code
Field

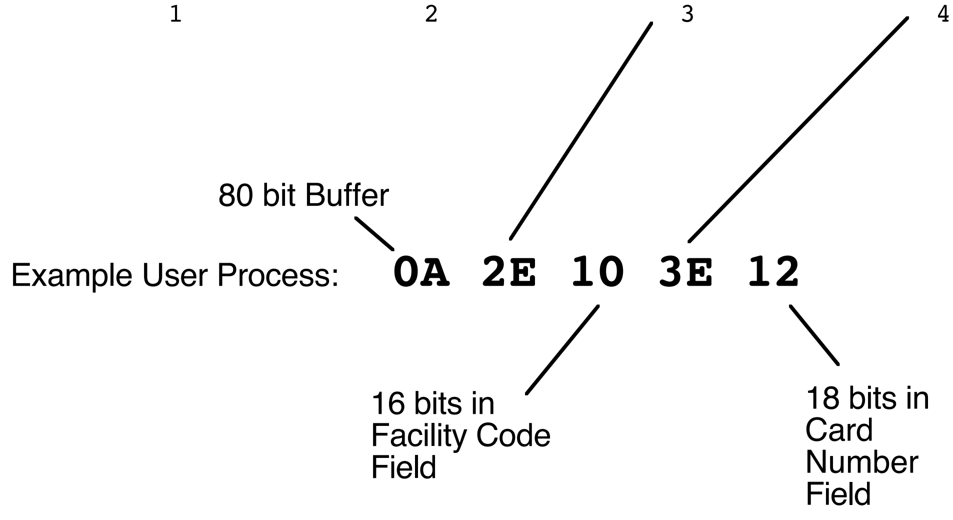
18 bits in
Card
Number
Field

To force the 36 bit format to be processed using the WPP, set the process code to 2.
\L0108102
type **\R** to confirm programming

WDG-5912 Programming - Details of the Wiegand PreProcessor

Pick a buffer size that will hold the
entire read (64,80, or 103)

```
         1         2         3         4         5         6         7         7
01234567890123456789012345678901234567890123456789012345678901234567890123456789
                                            e011010FFFFFFFFFFCCCCCCCCCCCCCCCCCCo
123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0123456789ABCDEF0
               1               2               3               4               5
```



0CB + Offset: 0000

0CB is the address of the +Offset Parameter. It is a value that will be added to the binary value in the lowest 2 bytes of the buffer before processing takes place. This is useful for outputting a number based on the internal badge number + a constant.

Example:

Internal number = 123
Constant = 999
Output = 1122

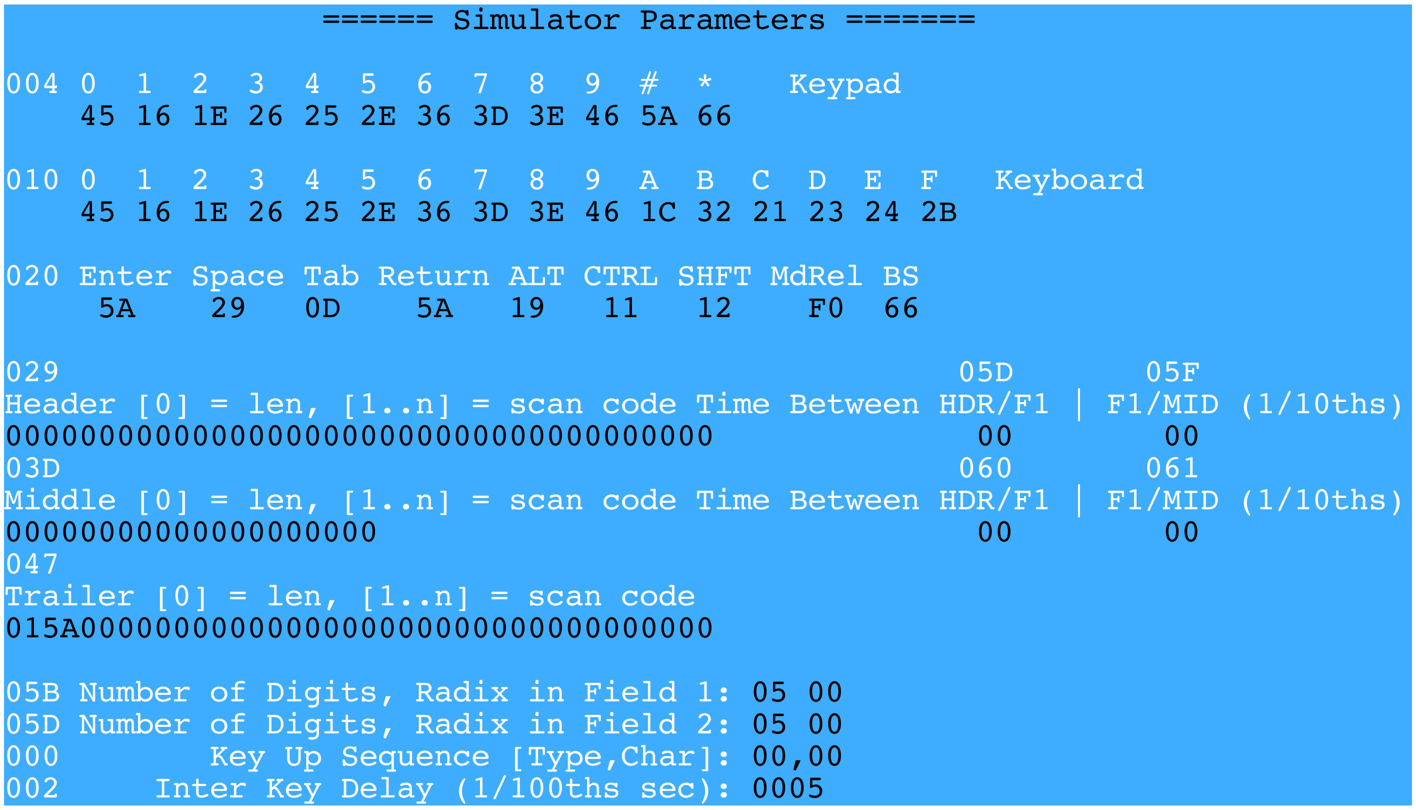
To accomplish this, the constant (999) must be shifted into the proper location for the addition to work. If using the WPP described above, the constant would be shifted left by one bit. So the value (hexadecimal) in the + Offset parameter would be 07CE or 999*2.

```
e011010FFFFFFFFFFCCCCCCCCCCCCCCCCCCo
                   0000011111001110_
```

WDG-5912 Programming - The Simulator (Output) Screen

\S

A similar screen will appear when connected to a VT-220 type terminal



```
                 ====== Simulator Parameters =======

004 0  1  2  3  4  5  6  7  8  9  #  *    Keypad
    45 16 1E 26 25 2E 36 3D 3E 46 5A 66

010 0  1  2  3  4  5  6  7  8  9  A  B  C  D  E  F   Keyboard
    45 16 1E 26 25 2E 36 3D 3E 46 1C 32 21 23 24 2B

020 Enter Space Tab Return ALT CTRL SHFT MdRel BS
     5A    29   0D     5A    19   11   12     F0  66

029                                                05D       05F
Header [0] = len, [1..n] = scan code Time Between HDR/F1 | F1/MID (1/10ths)
00000000000000000000000000000000000000              00        00
03D                                                060       061
Middle [0] = len, [1..n] = scan code Time Between HDR/F1 | F1/MID (1/10ths)
00000000000000000000                                00        00
047
Trailer [0] = len, [1..n] = scan code
015A0000000000000000000000000000000000

05B Number of Digits, Radix in Field 1: 05 00
05D Number of Digits, Radix in Field 2: 05 00
000       Key Up Sequence [Type,Char]: 00,00
002    Inter Key Delay (1/100ths sec): 0005
```

WDG-5912 Programming - The Simulator (Output) Screen

```
05B Number of Digits, Radix in Field 1: 05 00
05D Number of Digits, Radix in Field 2: 05 00
```

Field 1 is typically the Facility Code Field, 2 is the Badge Field.

If you don't want the Facility Code, simply enter a 0 for the Number of digits.

The significance of the fields is determined by the Processing Format chosen.

`\L0105B00`	Suppress field 1 output
`\L0105D07`	7 digits for badge number (field 2)

The output RADIX (Decimal / HEX) can also be set differently for each field. This comes in handy when there is a need to see all bits in a format. Set field 1 to Decimal, Set field 2 to HEX then set the processing format to "Default".

Set the number of output digits for field 2 to something large enough to hold the number of bits expected (2 + number of bits / 4 is typical) and set the RADIX to Hex (01). Set field 1 to output 3 digits (the bit count). Make sure the format you are presenting is set to process as default (00). Put a Middle key sequence to separate the 2 fields (a Space is fine).

`\L0105B0300`	Field 1 setup
`\L0205D0F01`	Field 2 setup
`\L0203D0129`	Middle "Space" delimiter

When you present a badge, the following output style should occur.

```
032  00000005FF005B3
 /           /
```

Number of bits

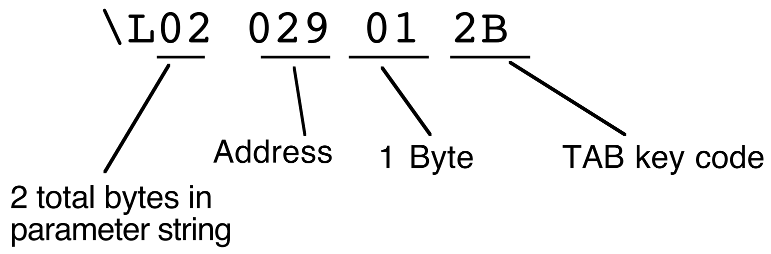
Hex representation of ALL bits

Header, Middle, and Trailer Strings

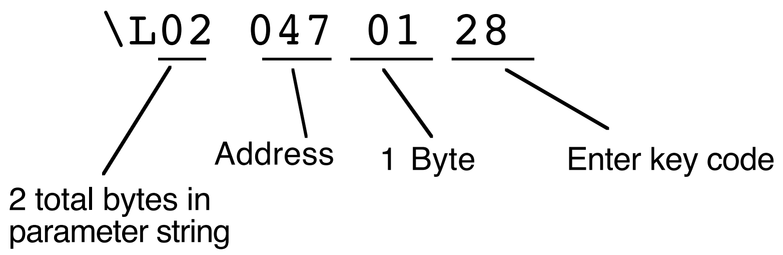
It is possible to send characters and control keystrokes such as the Enter key either before, between fields, and after the keyboard data has been sent. The header is sent before the data string is sent from the USB port, the Middle is sent between Field 1 and Field 2 and the Trailer is sent after Field 2.

For **Header, Middle, Trailer** strings - The number of characters and scan codes must be included in the string. The USB interface does not require Key up codes to be entered.

This programming string will send the TAB key before sending the data.



This programming string will send the ENTER key after sending the data.



You're probably wondering, how do you know TAB is 2B and ENTER is 28? Some are listed on the simulator screen and others are listed in a table at the end of this manual that lists the keys and their ID codes. These codes are in Hexadecimal.

If you need to send a shifted character, i.e. capital letter or punctuation of the numeric keys? Set the most significant bit of the character you are sending.
example: The letter "X" is coded as 1B. This will send a small "x". If a shift X is needed (caps) then take 1B which is 0001 1011 in binary and add a one to the most significant bit.
1001 1011 would be 9B. 9B will send as Shift X (Caps). This can be applied to other characters as needed.

Typical Wiegand Processes

35 bit Corp 1000 - CARD NUMBER ONLY, followed by TAB key

```
\L0108002
\L050C508200A2C14
\L0105D07
\L0105B00
\L02059120D
```

(This is the factory default but it is a good place to start if you want to experiment with WPPs)
Standard 26 bit - 10 digit output, followed by Enter key

```
\L0107702
\L050C50828083010
\L0105D05
\L0105B05
\L02059125A
```

If you want to see all bits in the badge as well as a count of the number of bits, use the 'H' Profiles:

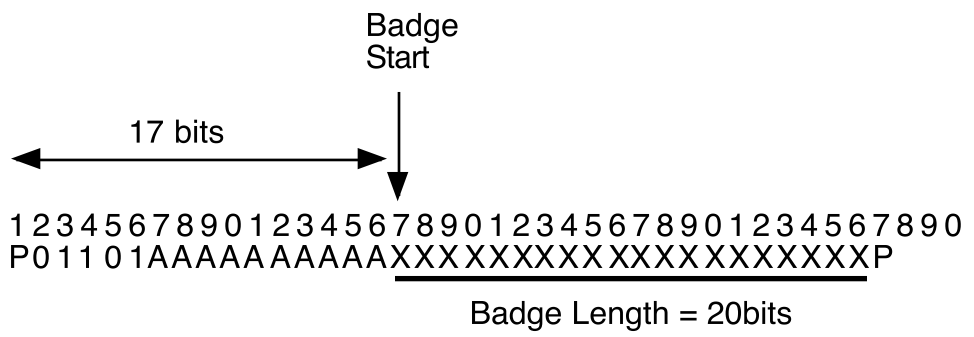
```
\PH
\QH                     35=000003F0093A
```

Number of bits

HEX representation of ALL bits

Programming the Cypress 5912 programmable wedge using the Cypress Website utility

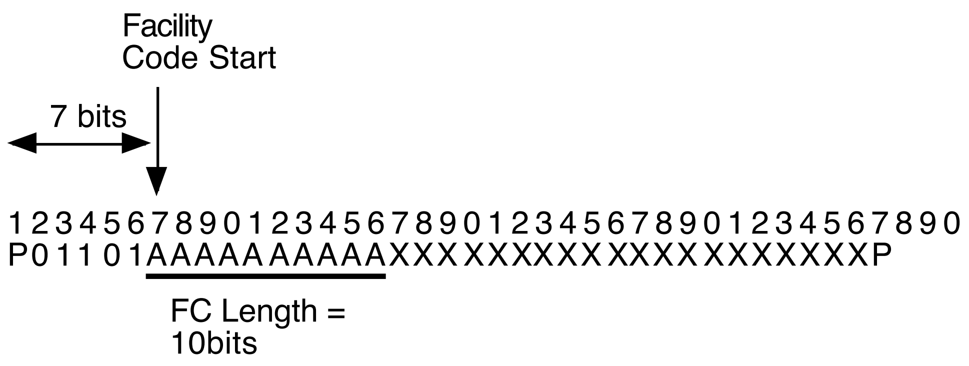
Determining Badge Number Parameters



Badge Start = 17 (17 bits starting from left side)

Badge Len = 20

Determining Facility Code Parameters



FC Start = 7 (7 bits starting from left side)

FC Len = 10

Determining Output Simulator Parameters

FC output = 5 Badge Output = 7	In this example the FC is 10 bits long, which yields a maximum decimal value of 1024. 5 digits is the default setting and is large enough to hold this value. The Badge number is 20 bits long, which yields a maximum decimal value of 1048576. 7 digits are necessary to hold this value.

Typical Strobed / ABA Processes

These are the parameters that will need to be changed to work with a magstripe / ABA type reader. Settings should be made after using the reset to factory defaults jumper.
The parameters listed below may need to be changed depending on the exact type of reader. This example will work with an Mercury MR-5 reader.

Interface Parameter 073: Needs to be set to 01 (Strobed interface)
\L0107301

Format Parameter 074: Needs to be set to 01 (ABA format)
\L0107401

ABA Clock Polarity 0F3: Can be set to 00 or 01 This will depend on the reader. We will set it to 01 for our example.
\L010F301

ABA PAN 0F4: Primary Account Number. This parameter sets the location of the significant data in the primary account number area of the card. Our example shows, start at the 6th digit and use the next 5 digits.
\L020F40605

Number of digits , Radix in Field 1 05B: Determines how many characters to use for the first field (PAN) output. We will use 5 digits for the example
\L0105B05

Number of digits , Radix in Field 2 05D: Determines how many characters to use for the first field (XAN) output. We will not be using any digits from the XAN.
\L0105B00

Example card output: B1234567890FX
B = Start Sentinel F = End Sentinel X = Checksum

PAN select digits: $\text{B12345}\underbrace{\text{67890}}_{\text{Take 5 digits starting at digit \#6}}\text{FX}$

Field 1 use 5 digits: Output from keyboard will be 67890.

WDG-5912 Programming - Reset to Factory

It may be necessary to reset the WDG-5912 to factory default parameters. If the wedge is to be reset the cover will have to be removed.

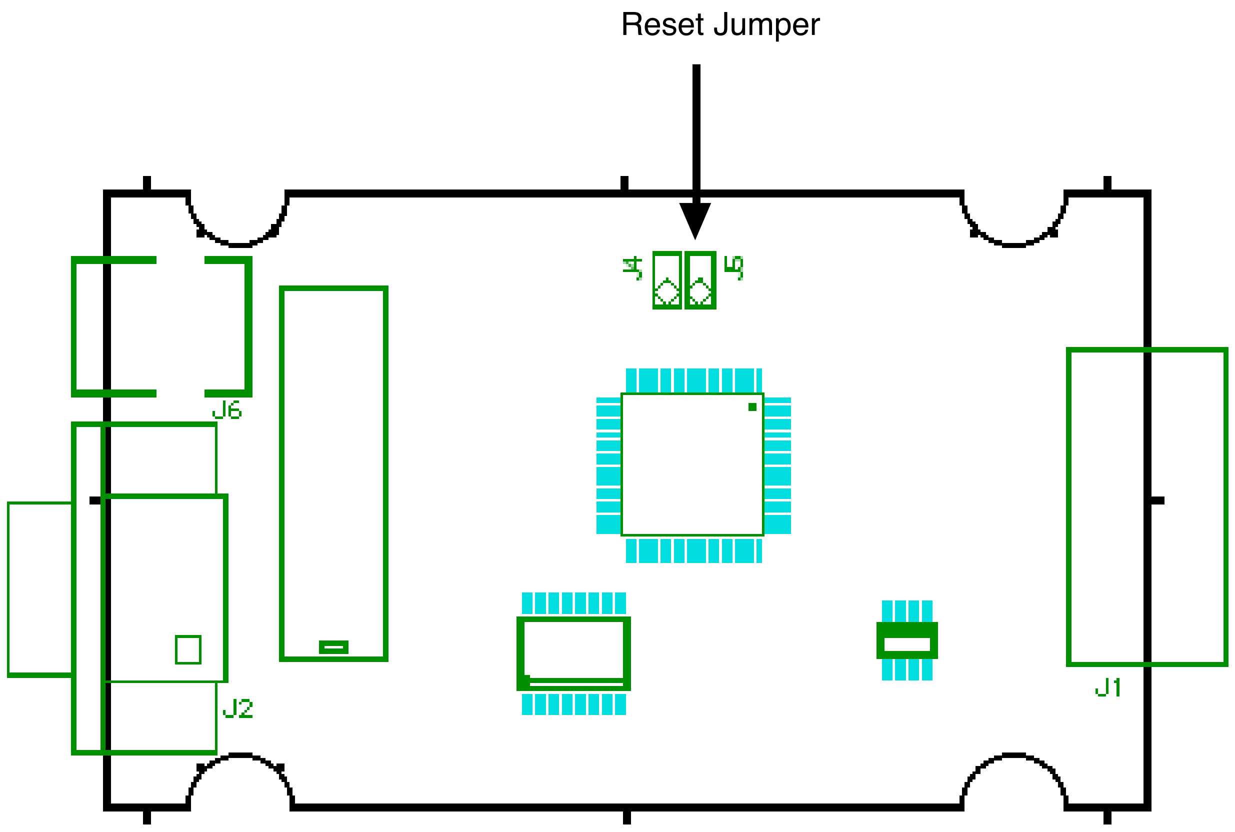
Remove USB cable from wedge.

A jumper will need to be installed on J5.

Install USB cable to apply power to wedge.

Wait at least 30 seconds.

Remove USB cable and then remove Reset Jumper from pins of J5. Jumper can be stored on one pin of the header.



Wiegand bit encoding worksheet for the Cypress Programmable

	1			64		1			64
	2			63		2			63
	3			62		3			62
0	4			61	0	4			61
	5			60		5			60
	6			59		6			59
	7			58		7			58
	8			57		8			57
	9			56		9			56
	A			55		A			55
	B			54		B			54
1	C			53	1	C			53
	D			52		D			52
	E			51		E			51
	F			50		F			50
	10			49		10			49
	11			48		11			48
	12			47		12			47
	13			46		13			46
2	14			45	2	14			45
	15			44		15			44
	16			43		16			43
	17			42		17			42
	18			41		18			41
	19			40		19			40
	1A			39		1A			39
	1B			38		1B			38
3	1C			37	3	1C			37
	1D			36		1D			36
	1E			35		1E			35
	1F			34		1F			34
	20			33		20			33
	21			32		21			32
	22			31		22			31
	23			30		23			30
4	24			29	4	24			29
	25			28		25			28
	26			27		26			27
	27			26		27			26
	28			25		28			25
	29			24		29			24
	2A			23		2A			23
	2B			22		2B			22
5	2C			21	5	2C			21
	2D			20		2D			20
	2E			19		2E			19
	2F			18		2F			18
	30			17		30			17
	31			16		31			16
	32			15		32			15
	33			14		33			14
6	34			13	6	34			13
	35			12		35			12
	36			11		36			11
	37			10		37			10
	38			9		38			9
	39			8		39			8
	3A			7		3A			7
	3B			6		3B			6
7	3C			5	7	3C			5
	3D			4		3D			4
	3E			3		3E			3
	3F			2		3F			2
	40			1		40			1

APPENDIX A - Keystroke ID code lookup ta

Key	Code	Key	Code	Key	Code
0	27	a	84	A	4
1	1E	b	85	B	5
2	1F	c	86	C	6
3	20	d	87	D	7
4	21	e	88	E	8
5	22	f	89	F	9
6	23	g	8A	G	0A
7	24	h	8B	H	0B
8	25	i	8C	I	0C
9	26	j	8D	J	0D
Backspace	2A	k	8E	K	0E
Enter	28	l	8F	L	0F
Keypad 0	62	m	90	M	10
Keypad 1	59	n	91	N	11
Keypad 2	5A	o	92	O	12
Keypad 3	5B	p	93	P	13
Keypad 4	5C	q	94	Q	14
Keypad 5	5D	r	95	R	15
Keypad 6	5E	s	96	S	16
Keypad 7	5F	t	97	T	17
Keypad 8	60	u	98	U	18
Keypad 9	61	v	99	V	19
Keypad Enter	58	w	9A	W	1A
		x	9B	X	1B
Space	2C	y	9C	Y	1C
TAB	2B	z	9D	Z	1D
Left Alt	E2				
Left Ctrl	E0	!	9E	:	B3
Left Shift	E1	"	B4	;	33
Right Alt	E6	#	A0	<	B6
Right Shift	E5	$	A1	=	2E
		%	A2	>	B7
		&	A4	?	B8
		'	34	@	9F
		(	A6	[	2F
		)	A7	\	31
		*	A5	]	30
		+	AE	^	A3
		,	36	_	AD
		-	2D	{	AF
		.	37	|	7C
		/	3B	}	B0
				~	B5

STATEMENT OF COMPLIANCE

This device complies with part 15 of the FCC Rules.

Operation is subject to the following two conditions:
(1) This device may not cause harmful interference, and
(2) this device must accept any interference received,
including interference that may cause undesired operation.

Using the Cypress Programmable Wedge for custom Wiegand formats

This application note will explain how to use the Cypress programmable wedge to generate Facility Code and Badge numbers from Wiegand data streams of 24 to 64 bits.

This application note assumes that the user is familiar with Decimal, Hexadecimal and Binary number systems and that a reader is connected to the wedge and is operational.
The user will also need to know any formatting details of the decoded data.

Different processes are required for Strobed/ABA or Wiegand/ABA data. These procedures apply to Wiegand/Binary data only.

There are several steps involved in getting the desired facility code and badge numbers from Wiegand data using the Cypress Wedge.

These are:

1. Determine the number of bits in the raw Wiegand data.
2. Determine the actual data bits (raw data) from the Wiegand card reader.
3. Determine where the desired facility code is located in the raw data.
4. Determine where the desired badge data is located in the raw data.
5. Composing programming strings to filter the facility code and badge data from the incoming raw Wiegand data.
6. Determine the number of decimal digits for the facility code and badge data.
7. Composing programming strings to correctly display the decimal facility code and badge numbers.

We will go through each step with the "Standard" 26 bit Wiegand badge as an example:
Determine the number of bits in the data stream and the raw data coming from the reader/badge.

Place the Wedge into "Badge Peeler" mode by entering \PH and \QH into the programming interface.

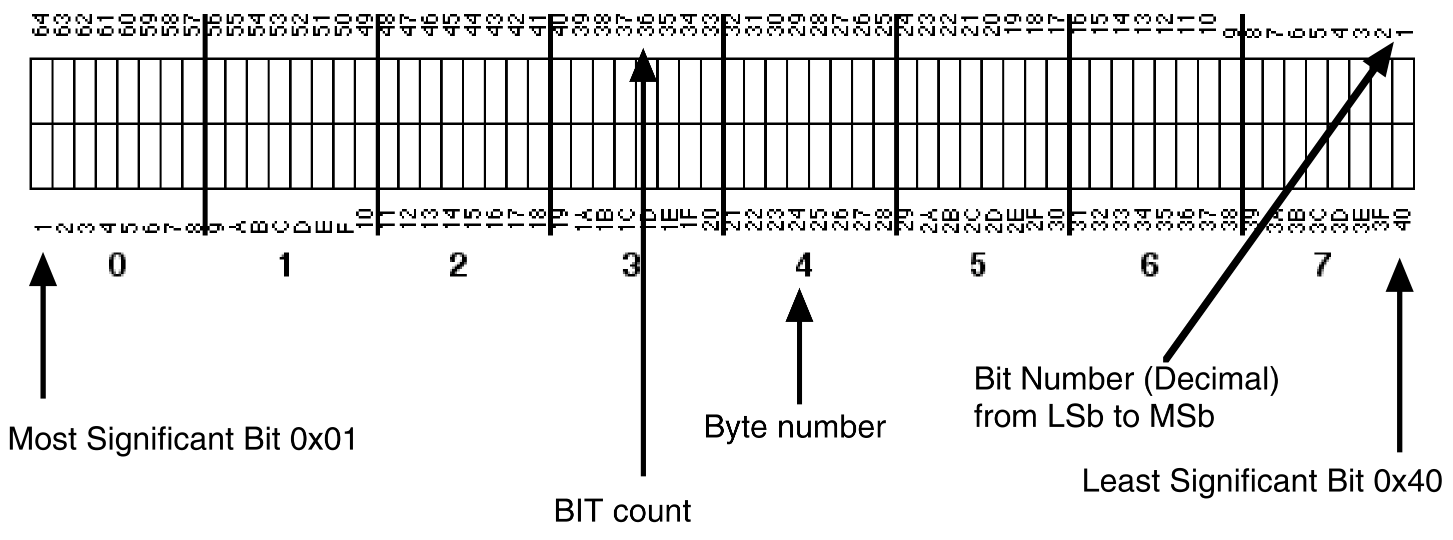
This will cause the wedge to generate an output that displays the number of bits and the badge data in raw hexadecimal format.

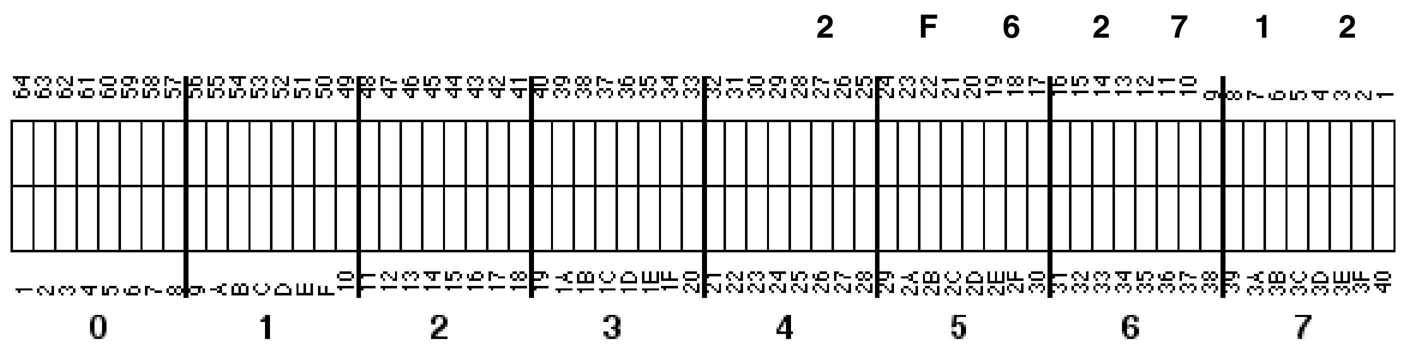
Lets say our 26 bit badge yielded the output " 26=000002F62712" from the badge peeler mode. We now know it is 26 bits (the numbers before "=") and we have the raw binary data in hexadecimal form.

We will use the worksheet provided at the end of this document to work out the bit positions and conversion information. The worksheet can be printed and used with pen and pencil for calculating the programming strings.

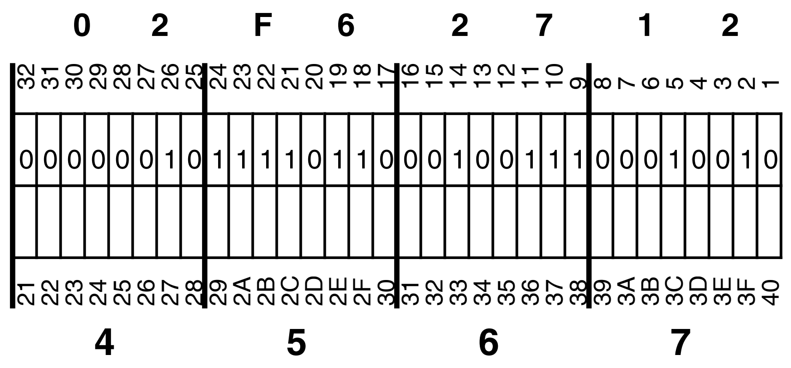
Reset the programming parameters back to factory defalts using the reset jumper block before proceeding.

This worksheet grid represents the internal 8 byte buffer of the Cypress Programmable Wedge

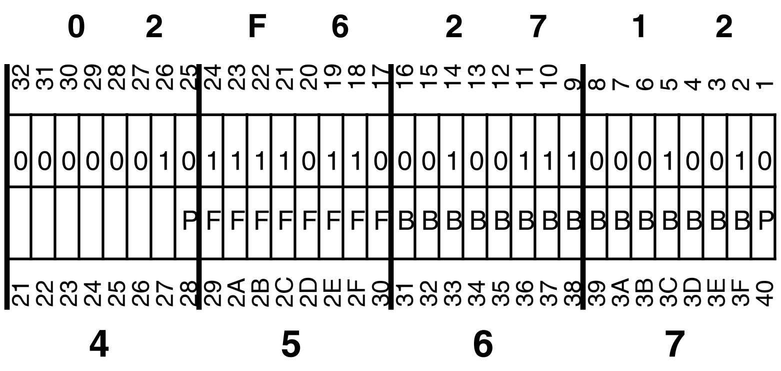

0 1 2 3 4 5 6 7
Most Significant Bit 0x01
BIT count
Byte number
Bit Number (Decimal) from LSb to MSb
Least Significant Bit 0x40



First write the individual Hexadecimal digits over each 4 bit group (2 per byte) starting from Right to left.
The upper most significant bits/bytes are zero padded.



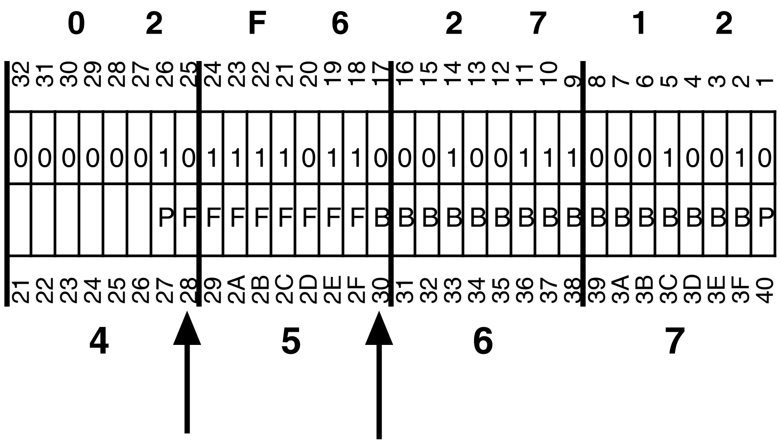
Each Hex digit is converted to its binary equivalent and filled into the bit boxes.
We added a zero above the most significant byte for clarity.
The bits are processed Right Justified.



Assuming we know the badge format, we can define bit functions by location.
If you do not know the badge format, then you will have to find the bit pattern in the raw stream that represents the desired facility code and/or badge number.

The best way to find an expected number is to take the decimal badge number or facility code and convert it to hexadecimal. Then look for the binary bit pattern in the raw data represented by the hexadecimal number.

Since we know what a "standard 26 bit" format is, we can define the bit functions and their positions:
P = Parity Bit
F = Facility Code bit
B = Badge number bit



The facility code bits start at 0x28 and are 8 bits long

The badge bits start at 0x30 and are 16 (0x10) bits long

Now we can gather parameters that will be entered into the wedge programming interface. Notice that these locations will filter out the parity bits.

The Wiegand preprocessor string for Wiegand Preprocessor 0 (WPP0) would be:

\L050C50828083010

Broken down to each parameter:

\L	; Programming string prefix
05	; There are 5 bytes of data in the programming string
0C5	; The address in the programming parameter map of WPP0
08	; Defines 8 byte (64 bit buffer) to hold data
28	; Start of facility code bits in 64 bit buffer (0x28)
08	; Defines 8 bit length of facility code data
30	; Start of badge number data in 64 bit buffer (0x30)
10	; Defines 16 bit length of badge data (0x10)

Now we need to tell the Wiegand Preprocessor (WPP0) to process 26 bit streams using the above criteria.

Wiegand Binary Format Table - Wedge programming interface

```
075
24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
00 00 01 00 00 00 00 00 00 00 00 01 00 00 00 00 00 00 00 00 00
45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
```

The number in the upper left corner is 0x75, a hexadecimal number that gives the starting address of the Format Table. The 24 bit format would start at 0x75.

For example, a 32 bit format would be located at 0x7D

The 26 bit format we are interested in is located at 0x77.

Now that we know the address of the 26 bit format, we will place a 0x02 in that location. The 0x02 tells the Wedge to use Wiegand Preprocessor #0 (WPP0)

See next page for details on the programming string to set 0x02 at location 0x77

The programming string to tell the wedge “Use WPP0 on 26 bit formats would be:

\L0107D02

Broken down to each parameter:

\L ; Programming string prefix

01 ; There are 1 bytes of data in the programming string

077 ; The address of the programmed parameter (26 bit)

02 ; Parameter that defines use of Wiegand Preprocessor 0 (WPP0)

Lets assume we want the Facility Code to output as a 3 digit decimal number.
Upper digits will be zero padded from left to right.
The programming string to tell the wedge to use a 3 digit decimal number for the Facility Code:

\L0105B03

Broken down to each parameter:

\L ; Programming string prefix

01 ; There are 1 bytes of data in the programming string

05B ; The address of the programmed parameter

03 ; The number of digits to use in the Facility field. (This can be set to zero if no Facility needed)

Lets assume we want the Badge Number to output as a 5 digit decimal number.
Upper digits will be zero padded from left to right.
The programming string to tell the wedge to use a 5 digit decimal number as the Badge:

\L0105D05

Broken down to each parameter:

\L ; Programming string prefix

01 ; There are 1 bytes of data in the programming string

05D ; The address of the programmed parameter

05 ; The number of digits to use in the badge Field

If the four strings are entered through the programming interface:

\L050C50828083010
\L0107D02
\L0105B03
\L0105D05

Then our output from the raw data in our example would be:

12305001

Wiegand bit encoding worksheet for the Cypress Programmable Wedge

	1			64
	2			63
	3			62
0	4			61
	5			60
	6			59
	7			58
	8			57
	9			56
	A			55
	B			54
1	C			53
	D			52
	E			51
	F			50
	10			49
	11			48
	12			47
	13			46
2	14			45
	15			44
	16			43
	17			42
	18			41
	19			40
	1A			39
	1B			38
3	1C			37
	1D			36
	1E			35
	1F			34
	20			33
	21			32
	22			31
	23			30
4	24			29
	25			28
	26			27
	27			26
	28			25
	29			24
	2A			23
	2B			22
5	2C			21
	2D			20
	2E			19
	2F			18
	30			17
	31			16
	32			15
	33			14
6	34			13
	35			12
	36			11
	37			10
	38			9
	39			8
	3A			7
	3B			6
7	3C			5
	3D			4
	3E			3
	3F			2
	40			1

	1			64
	2			63
	3			62
0	4			61
	5			60
	6			59
	7			58
	8			57
	9			56
	A			55
	B			54
1	C			53
	D			52
	E			51
	F			50
	10			49
	11			48
	12			47
	13			46
2	14			45
	15			44
	16			43
	17			42
	18			41
	19			40
	1A			39
	1B			38
3	1C			37
	1D			36
	1E			35
	1F			34
	20			33
	21			32
	22			31
	23			30
4	24			29
	25			28
	26			27
	27			26
	28			25
	29			24
	2A			23
	2B			22
5	2C			21
	2D			20
	2E			19
	2F			18
	30			17
	31			16
	32			15
	33			14
6	34			13
	35			12
	36			11
	37			10
	38			9
	39			8
	3A			7
	3B			6
7	3C			5
	3D			4
	3E			3
	3F			2
	40			1