

MADE **in** USA

IRADION

Ceramic Core CO₂ Lasers

OPERATOR'S MANUAL

RS232 Interface



92-3006 Rev. A



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1. Overview

Iradion Infinity Series lasers offer to the user the ability to communicate with the laser using RS232 communication. The RS232 communication signals are available on one of the two ports on the rear-side of the laser: J7 HD-15 style, or J8 RJ45 style.

Iradion offers users a convenient GUI interface, or the user can interface directly using a predefined command set.

2. Equipment Required

2.1. Windows PC (windows 7 OS or higher) with IRADION COMM WRITER II software installed and USB to serial port converter or build in serial port.

3. Software installation.

- The software installation package consists of two files.
 - **Setup.exe** and **Setup.msi**.
- Execute the **setup.msi** file.
- Follow the prompts to install the software (see figure 1 to figure 4).
- Windows will ask permission to install the software, this will require administrative access to the computer. Answer 'yes'.
- By default the software will be installed to the default program file location. In most computers, this will be *c:\program files* or *c:\program files (X86)*. It will create a directory *IRADION\CommWriter2*. The setup program will allow you to change the destination of the files. (see figure 2)
- A shortcut will also be placed on the user's desktop. (see figure 5)
- **Note:** In some cases, the setup program may require you to update windows OS. An internet connection is required to perform the update. The setup program will download required updates if necessary.

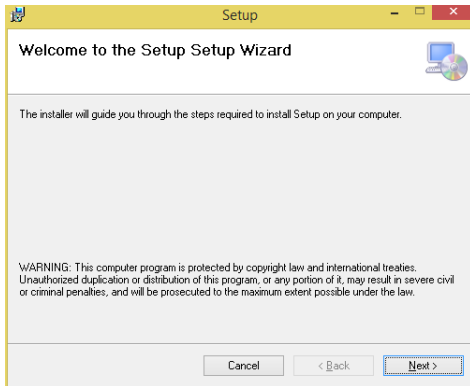


Figure 1 Setup Wizard to start installation.

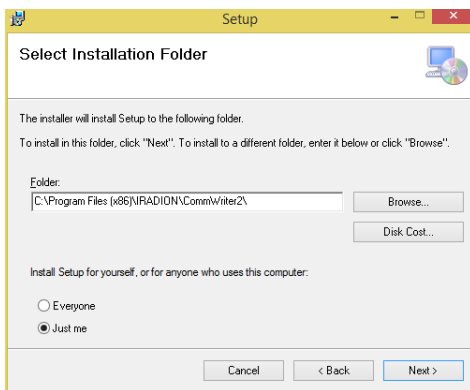


Figure 2 select installation destination

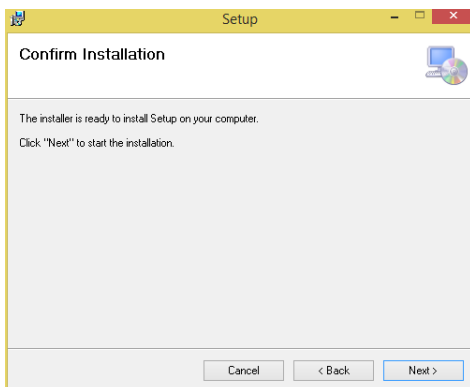


Figure 3 Confirm installation

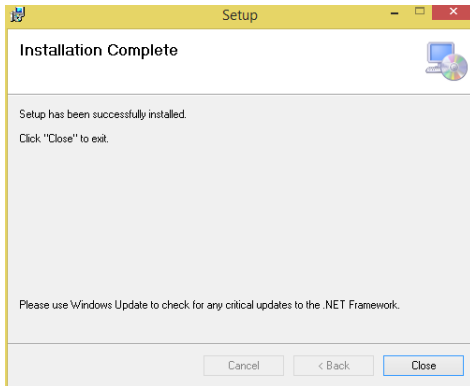


Figure 4 Complete installation



Figure 5 Desktop Icon

4. Using the Software

- 4.1. Confirm the serial port on the windows PC is functional.
- 4.2. Connect the serial port (PC) to the IRADION CO2 laser's serial port using appropriate cabling. Refer to IRADION LASER user guide on how to connect the cabling.
- 4.3. Run IRADION COMM WRITER II software. There should be short cut on the desktop for the software.
- 4.4. Setup the communication port.
- 4.5. Click on the **comm port** combo box (see figure 6 and figure 7).
- 4.6. Select the available comm port. The comm port combo box contains the name(s) of all serial port found installed in computer. If there is no comm port showing in the combo box, the computer had failed to locate a serial port installed. The software will not function without a working serial port.
- 4.7. Click on the **Start monitor loop** button to open the comm port and start automatically polling the status of the laser. (see figure 6) Note: You have to select a comm port first, otherwise this button will be disabled. Upon success on initializing the comm port, the status bar (bottom of the application) will show the connection status as **connection:true**. The comm port opened also will be show in the status bar's left side.
- 4.8. The **Command window** will show all available commands. (see figure 8)
- 4.9. Select desired command to send by clicking on it in the **command windows**.
 Send the command by clicking on the **Send Command** button. Alternative way to send command is to double-click on it inside the **Command window**.

4.10. If the communication to the laser is successful, the application will start filling in following information boxes by polling the laser:

- Laser state.
- Simmer duty
- Pulse stretch
- Temp
- Interlock
- Temp Warning
- Laser fault
- Laser VDC
- Laser serial
- Laser voltage Setting
- Rated power
- Measured power
- Auto fan
- Firmware version
- Mod low ground

4.11. If the communication failed, the application will display a failure status in the status bar. The program will time out after 10 seconds and signal a failure if the communication did not respond. A dialog box will be shown to reset the serial port or to exit the application. (see figure 9)

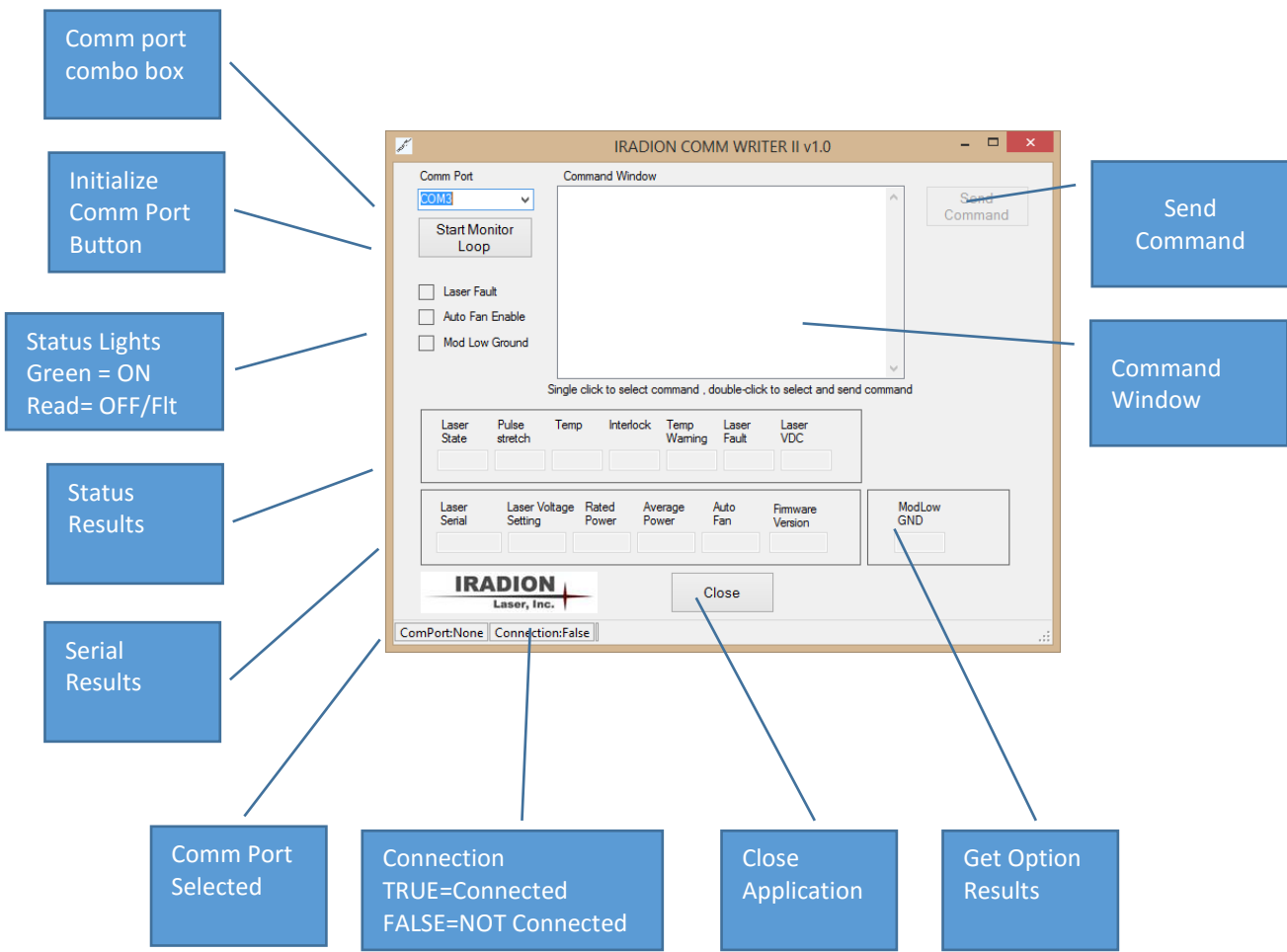


Figure 6 Comm Writer II startup view

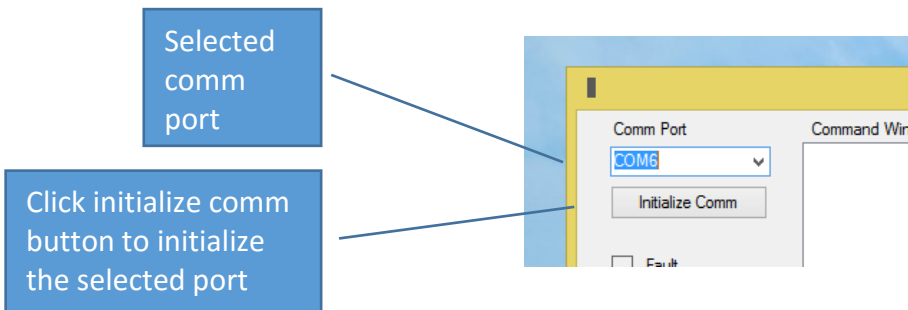
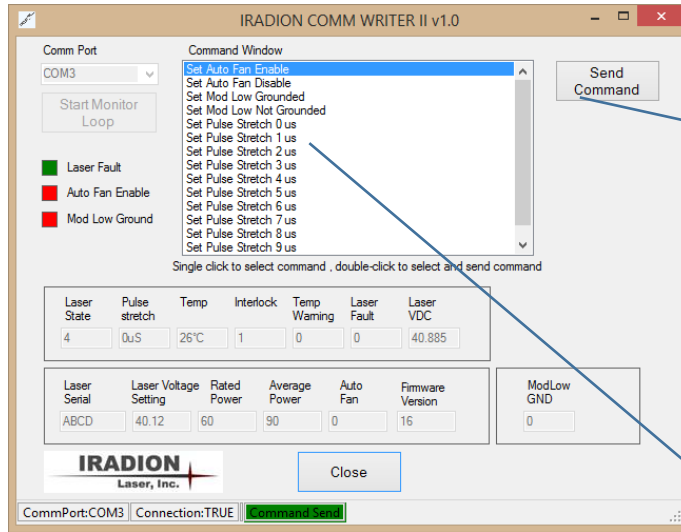


Figure 7 Select comm port

Grayed out=Connected

Connected Port

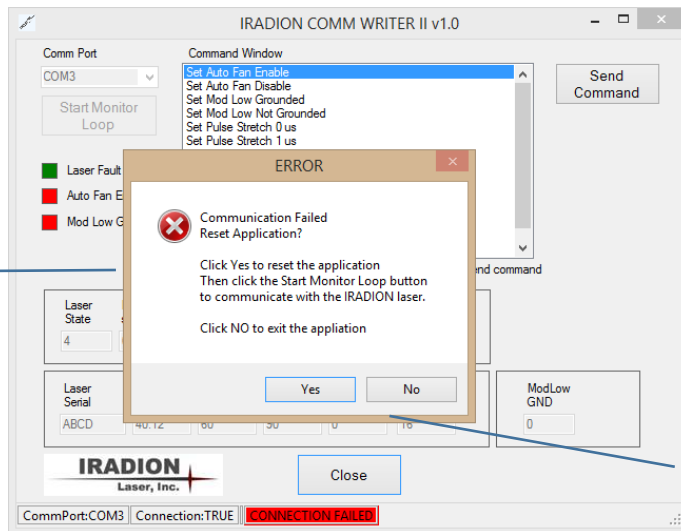


Send command button is enabled because connection is true.

Command windows is filled with available commands. Set Auto Fan Enable is

Figure 8 Comm writer connected state view

Connection Failure



Communication failed. Click YES to reset the application or NO to exit the application.

Figure 9 Comm writer error message

5. LC Command Packets Listing

4.1 This section describes the packet protocol for transmitting and receiving data via the RS232 com line to the Iradion Laser Controller Card.

4.2 Note: The Iradion Controller Card is programmed to reply only when queried and does not automatically transmit strings.

6. Serial Data Format

6.1. The serial data format is RS232 - 19.2K baud, 8 data bits, no parity and 1 stop bit.

7. Command Packet Format:

7.1. The command packet is made up of ascii text characters as described below.

Start	Cmd	Length	Data	Data End	Check	End
-------	-----	--------	------	----------	-------	-----

8. Packet Characters:

- Start \$ character.
- Cmd 2 characters, ascii hex format 00 – FF.
- Length * 2 characters, ascii hex format 00 – FF.
- Data 0 to n characters, ascii hex format 000000...N – FFFFFFFF...N
- Data End & character.
- Check 2 characters, ascii hex format 00 – FF.
- End 2 characters, carriage return and line feed.

Length - Number of characters in the packet includes Start to End characters.
A Cmd packet with no data field has a length of ten.

9. Check Character Calculation

9.1. The check characters are calculated by adding the Start, Cmd, Length, Data and Data End ascii characters then representing the byte value as two ascii characters.

10. Command Response:

10.1. After a valid command is processed a response packet is sent.

11. Response Packet Format

11.1. The response packet is made up of ascii text characters as described below.

Start	Cmd	Length	Data	Data End	Check	End
-------	-----	--------	------	----------	-------	-----

12. Packet Characters:

Start	# character.
Cmd	2 characters, ascii hex format 00 – FF.
Length *	2 characters, ascii hex format 00 – FF.
Data	0 to n characters, ascii hex format 000000...N – FFFFFFFF...N
Data End	& character
Check	2 characters, ascii hex format 00 – FF.
End	2 characters, carriage return and line feed.

* Length - Number of characters in the packet includes Start to End characters.

Command Function Cmd Data

Get Status 0x10

Response Packet 0x10 (Get Status Command)

Packet Length—0x01 to 0xFF.
(See above Packet Characters for description)
P1 = Laser State – (0x04=OK; 0x05=Fault)
0 = init
1 = idle
2 = delay
3 = armed
4 = normal
5 = fault

P2 = CPLD ID—A2
 P3 = Simmer Frequency byte – 0x31 to 0xC7
 200 KHz to 50 KHz, 5 KHz steps
 P4 = Simmer Duty Cycle byte – 0x00 to 0x14
 0 to 20%, 1% steps
 P5 = Pulse Stretch byte – 0x00 to 0x64
 0 to 10 us, 1 us step
 P6 = Get Temp. 0x01 to 0xFF (In Degree 'C')
 P7 = Get VSWR Status (0x00=OK; 0x01=Fault)
 P8 = Get Interlock Status (0x01='On'; 0x00='OFF')
 P9 = Get Temp. Warning Status (0x01='On'; 0x00='OFF')
 P10 = Get Laser Fault Status (0x01='On'; 0x00='OFF')
 P11 = Get Laser VDC - 0x0000 to 0xFFFF (85mV/count)

Packet Termination

Command Function	Cmd	Data
Set Simmer Frequency	0x11	p3 = Simmer Frequency byte - 0x31 to 0xC7 200 KHz to 50 KHz, 5 KHz steps
Response Packet	0x11	Same as Get Status Response Packet
Set Simmer Duty Cycle	0x12	p1 = Simmer Duty Cycle byte - 0 to 20%, 1% steps
Response Packet	0x12	Same as Get Status Response Packet
Set Pulse Stretch	0x13	p1 = Pulse Stretch byte – 0 to 10 us, 1 us step
Response Packet	0x13	Same as Get Status Response Packet
Command Function	Cmd	Data
Get Laser Serial Number	0x20	

Response Packet

0x20 (Get Laser Serial Number Command)
Packet Length—0x01 to 0xFF. (See above Packet Characters for description)
p1 = Laser Serial # - 2 bytes – 0x0001 to 0xFFFF
p2 = Laser Set Voltage 2 bytes 0x0001 to 0xFFFF
p3 = Laser Power Rating byte - 0x01 to 0xFF
p4 = Laser Power Measured byte - 0x01 to 0xFF
p5 = Auto-Fan Enable byte – (0x01 or 0xFF “On”, 0x00 “Off”)
p6 = Firmware Version byte – 0x00 to 0xFF)

Get Laser Serial Number:

A memory registry has been assigned to the LCC to store the identity of the laser including the serial number, the set voltage, the laser’s power rating, the laser’s measured power (at the nominal set voltage), the enable Auto-Fan, the Firmware Version.

p1) The first 4 characters or p1 packet are the serial number expressed in hexadecimal up to FFFF or 65,535 lasers and represents the serial number accumulated irrespective of the power rating of the laser.

p2) Laser Set Voltage:

ok

Retrieving Laser Set Voltage is part of the “Get Laser Serial Number Command” code. This Command will return a p2 Packet; this double byte will return a value between 0x0000 and 0xFFFF. The actual voltage = (count value) X (85 mV).

p3) Laser Power Rated:

Retrieving Laser Power Rated is part of the “Get Laser Serial Number Command” code. This Command will return a p3 Packet; this byte will return a value between 0x00 and 0xFF. This value is the rated laser output power.

p4) Laser Power Measured:

Retrieving Laser Power measured is part of the "Get Laser Serial Number Command" code. This Command will return a p4 Packet; this byte will return a value between 0x00 and 0xFF. This is the actual laser output power measured during the final testing procedure.

p5) Enable Auto-Fan:

Retrieving Auto-Fan is part of the "Get Laser Serial Number Command" code. This Command will return a p5 Packet; this byte will return a value of 0x01 or 0xFF if Auto-Fan is enabled; 0x00 if Auto-Fan is disabled.

p6) Firmware Version:

Retrieving Firmware Version is part of the "Get laser Serial Number Command" code. This Command will return a p6 Packet; this byte will return a value between 0x00 and 0xFF. The format is XX.

Example: 04BF 01D8 3C 55 01 0A = laser SN 1215, laser voltage set to 40V, laser power set to 60W, laser power measured 85W, Auto-Fan enabled 01, Firmware Ver-0A.

30 Watts = 1E
40 Watts = 28
50 Watts = 32
(and so forth to)
255 Watts = FF

The Identity code in Hex is entered during production and is not user accessible.

The Identity is reported back only when asked via the RS232 com link using "Get Laser Serial Number".

Command Function	Cmd	Data
Set Auto-Fan Enable	0x16	p5 = Auto-Fan Enable byte-(0x01)ex
Response Packet	0x16	Same as Get Laser Serial Number Response Packet
Set Auto-Fan Disable	0x16	p5 = Auto-Fan Disable byte-(0x00)
Response Packet	0x16	Same as Get Laser Serial Number Response Packet
Command Function	Cmd	Data
Get Options	0x18	
Response Packet	0x18	(Get Options Command) Packet Length—0x01 to 0xFF. (See above Packet Characters for description) P1 = Set Mod-Low byte – (0x01 or 0xFF “On”, 0x00 “Off”) P2 = Laser life “On Time” —(0x00000000 to 0xFFFFFFFF) P3 = KeySwitch Enable byte—(0x01 or 0xFF “On”, 0x00 “Off”)
Command Function	Cmd	Data
Set Mod Low Grounded	0x15	p1 = Mod-Low “Grounded” byte-(0x01)
Response Packet	0x15	Same as Get Options Response Packet
Set Mod Low Not Grounded	0x15	p1 = Mod-Low “Not Grounded” byte-(0x00)
Response Packet	0x15	Same as Get Options Response Packet
Command Function	Cmd	Data
Set laser On Time	0x17	p1 = Set Laser “On Time” quad byte-(0XXXXXXXX). This value can be any value from 0x0 to 0xFFFFFFFF.
Response Packet		No response packet. This Command assigns a Laser “On Time” to memory.

13. The Command Functions list

Get Status	\$100A&1C
Get Options	\$180A&24
Get Laser Serial Number	\$200A&1D
Set Laser On Time	\$1712XXXXXXXX&XX
Set Auto Fan Enable	\$160C01&85
Set Auto Fan Disable	\$160C00&84
Set Mod Low Grounded	\$150C01&84
Set Mod Low Not Grounded	\$150C00&83
Set Keylock Switch Enable	\$210C01&81
Set Keylock Switch Disable	\$210C01&82
Set Simmer Frequency 50 KHz	\$110CC7&99
Set Simmer Frequency 55 KHz	\$110CB5&96
Set Simmer Frequency 60 KHz	\$110CA6&96
Set Simmer Frequency 65 KHz	\$110C99&91
Set Simmer Frequency 70 KHz	\$110C8E&9C
Set Simmer Frequency 75 KHz	\$110C84&8B
Set Simmer Frequency 80 KHz	\$110C7C&99
Set Simmer Frequency 85 KHz	\$110C75&8B
Set Simmer Frequency 90 KHz	\$110C6E&9A
Set Simmer Frequency 95 KHz	\$110C68&8D
Set Simmer Frequency 100 KHz	\$110C63&88
Set Simmer Frequency 105 KHz	\$110C5E&99
Set Simmer Frequency 110 KHz	\$110C5A&95
Set Simmer Frequency 115 KHz	\$110C56&8A
Set Simmer Frequency 120 KHz	\$110C52&86
Set Simmer Frequency 125 KHz	\$110C4F&99
Set Simmer Frequency 130 KHz	\$110C4C&96
Set Simmer Frequency 135 KHz	\$110C49&8C
Set Simmer Frequency 140 KHz	\$110C46&89
Set Simmer Frequency 145 KHz	\$110C44&87
Set Simmer Frequency 150 KHz	\$110C42&85
Set Simmer Frequency 155 KHz	\$110C40&83
Set Simmer Frequency 160 KHz	\$110C3E&97
Set Simmer Frequency 165 KHz	\$110C3C&95
Set Simmer Frequency 170 KHz	\$110C3A&93
Set Simmer Frequency 175 KHz	\$110C38&8A
Set Simmer Frequency 180 KHz	\$110C37&89
Set Simmer Frequency 185 KHz	\$110C35&87
Set Simmer Frequency 190 KHz	\$110C34&86
Set Simmer Frequency 195 KHz	\$110C32&84
Set Simmer Frequency 200 KHz	\$110C31&83
Set Simmer Duty Cycle 0%	\$120C00&80

Set Simmer Duty Cycle 1%	\$120C01&81
Set Simmer Duty Cycle 2%	\$120C02&82
Set Simmer Duty Cycle 3%	\$120C03&83
Set Simmer Duty Cycle 4%	\$120C04&84
Set Simmer Duty Cycle 5%	\$120C05&85
Set Simmer Duty Cycle 6%	\$120C06&86
Set Simmer Duty Cycle 7%	\$120C07&87
Set Simmer Duty Cycle 8%	\$120C08&88
Set Simmer Duty Cycle 9%	\$120C09&89
Set Simmer Duty Cycle 10%	\$120C0A&91
Set Simmer Duty Cycle 11%	\$120C0B&92
Set Simmer Duty Cycle 12%	\$120C0C&93
Set Simmer Duty Cycle 13%	\$120C0D&94
Set Simmer Duty Cycle 14%	\$120C0E&95
Set Simmer Duty Cycle 15%	\$120C0F&96
Set Simmer Duty Cycle 16%	\$120C10&81
Set Simmer Duty Cycle 17%	\$120C11&82
Set Simmer Duty Cycle 18%	\$120C12&83
Set Simmer Duty Cycle 19%	\$120C13&84
Set Simmer Duty Cycle 20%	\$120C14&85
Set Pulse Stretch 0 us	\$130C00&81
Set Pulse Stretch 1 us	\$130C0A&92
Set Pulse Stretch 2 us	\$130C14&86
Set Pulse Stretch 3 us	\$130C1E&97
Set Pulse Stretch 4 us	\$130C28&8B
Set Pulse Stretch 5 us	\$130C32&86
Set Pulse Stretch 6 us	\$130C3C&97
Set Pulse Stretch 7 us	\$130C46&8B
Set Pulse Stretch 8 us	\$130C50&86
Set Pulse Stretch 9 us	\$130C5A&97
Set Pulse Stretch 10 us	\$130C64&8B