

Working Copy – For Review Purposes Only!

Version #1.5 08/29/06 Aaron Holland

Up-dated D.Turnbull 10-18-2006 (MarkerSOP3.doc)

Up-dated D. Turnbull 12-11-06 (MarkerSOP4.doc)

Up-dated D.Turnbull 05-12-2008 (MarkerSOP5.doc)

Standard Operating Procedure Laser Marker



Introduction

This Standard Operating procedure applies to the Violino 3 laser marker housed in Niagara College's Laser Lab (V15). This workstation features a diode pumped, infrared (1064 nm), Nd:YAG laser and a red (35 nm) diode aiming laser.

Characteristics

Manufacturer: Laservall S.p.A.

Model: Violino 3 Laser Marker

Laser Type: Diode pumped, Nd: YAG (Neodymium: Yttrium Aluminium Garnet)

Laser: Class IV, within protective housing: Class I

Lens: f=100 mm, 60X60 mm marking area, focal spot diameter 50-100 μ m

F=160 mm, 110X110 mm marking area, focal spot diameter 75-125 μ m

CW Power: 20 Watts

Wavelength = 1064 nm

Pulse Width: 10 to 40 ns

Q-Switch frequency: up to 200 kHz

Peak power = 150kW max.

Cooling: Air cooled

Aiming Beam: 808nm – Class IIIa (3 mW)

Start-up

1. Check the logbook to ensure laser was left in working condition.

2. Make sure the exhaust hose is connected to the air extraction unit and that the unit is turned on. (F-1800C IP systems from RoFin). This unit should only be turned on when needed as the cost of a replacement HEPA/carbon filter is expensive (~\$500)

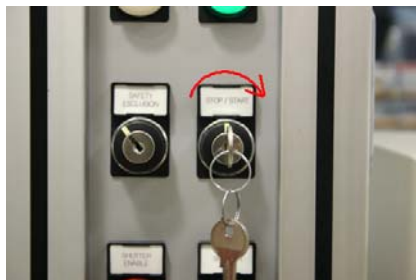
Model	Airflow	Power Supply	Motor Rating	Filtration
F1800C	400 cfm	115VAC, 60Hz	400 W	pleated pre-filter / HEPA / carbon – 5 lbs (2.5kg)



3. Turn on the Main Power switch (the red knob) located on the side of the Class I Enclosure (turn clockwise).



4. Turn on the laser by turning the start/stop switch on the workstation panel to the right. Green light above the key will come on. (Note: If system does not start when the key is turned, try press the shutter button. If the shutter was left on the system will not start. The shutter light will not be illuminated even if it is on at this point).



5. Turn on the PC and monitor.
7. If closed, open door by pressing the open door button on the workstation.

Emergency Shutdown

1. Press the “EMERGENCY STOP” button located on the front panel. This will cut-off all power to the laser and prevents it from running until the button is reset.

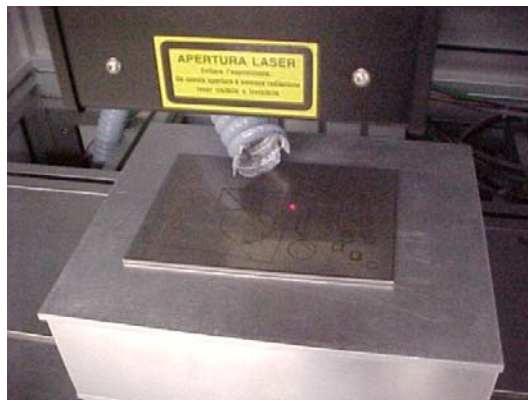


2. Shutdown the computer and turn off the monitor
3. Turn off the main power switch.
4. To reset the Emergency Stop button, push the button in and turn it clockwise then release.
5. Restart as above.

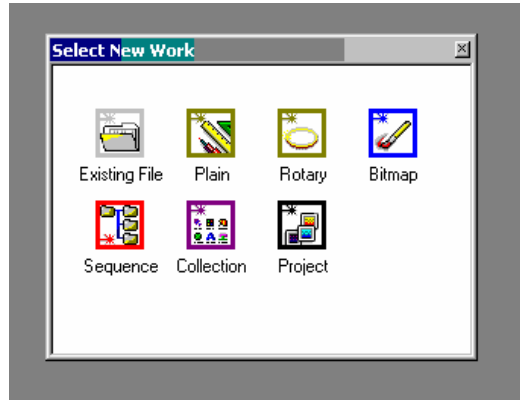
Focusing

For focus procedure to work, the order these steps are described must be followed.

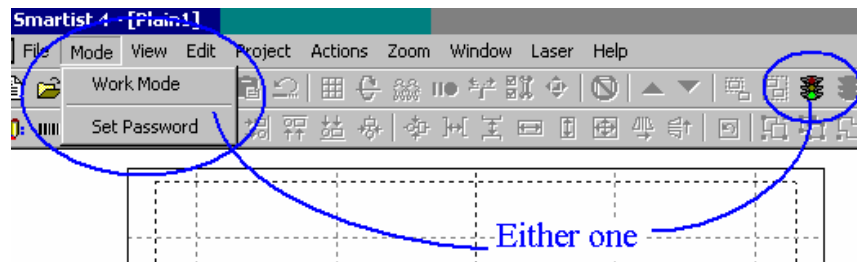
1. Initial set-up: Place a piece of scrap material of the same thickness as the piece to be marked onto table under the galvo head. Centre on the red aiming diode. **Note: focusing will cause a deep engraving mark. Do not use your work piece for this!**



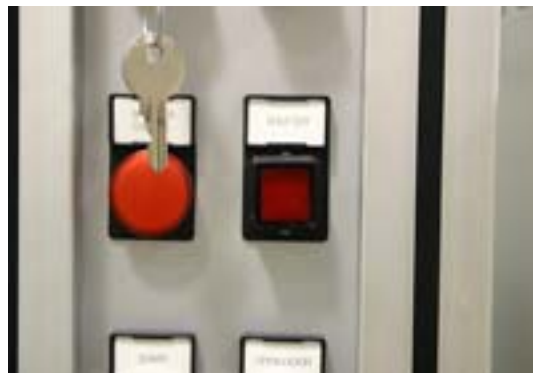
2. On the computer desktop, start the Smartist4 Software program.
3. With the Smartist4 program open start a new project (Press “file” then “New”).
4. Choose which type of project you wish to perform (Note: We do not have the equipment for the rotary project). For simple marking on a flat surface, the “Plain” option is used. This will put you into the work mode screen.



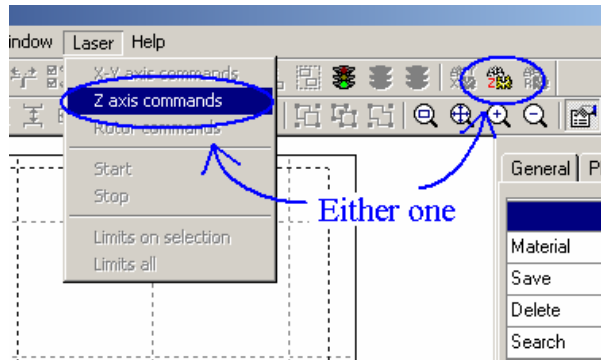
5. Make sure you are in the work mode screen,



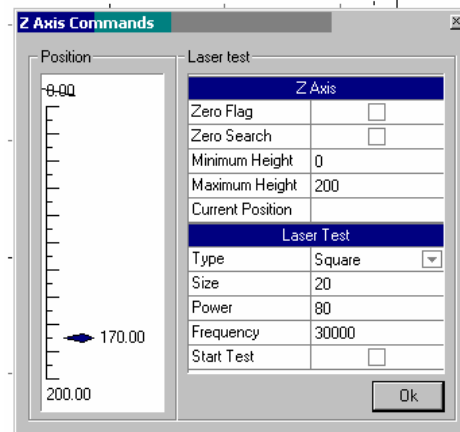
6. Turn the lamp inside the enclosure on. (Note: when viewing the red diode laser it is better to turn the lamp off).
5. Press start button on enclosure to close door.
6. Open shutter – press shutter button on Class 1. enclosure. (Note, the shutter button light will only light up to indicate the shutter is open when the door is closed.).



- Open Z-axis commands.



- The marker is now ready to engrave – clicking on the start test box will fire the laser with the size, power, and frequency entered (Note: power settings in the picture below are for stainless steel).



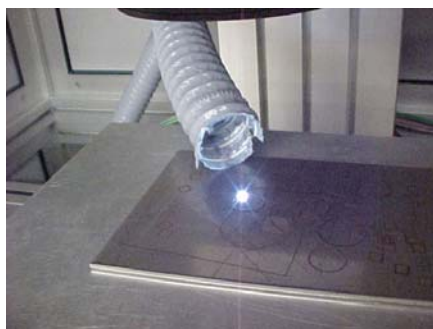
For 0.5 mm SS

$f=100\text{mm}$ lens z-axis position is around 180.6

$f=160\text{mm}$ lens z-axis position is around 103.7

- Note: Care must be taken to not hit the work piece and damage the galvo head when focusing. Pressing the Esc key on the keyboard will immediately stop any Z-axis movement.**

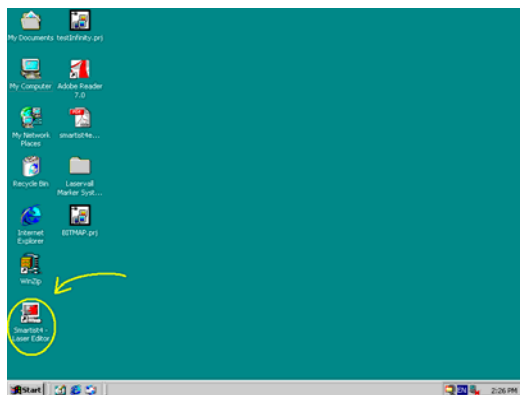
While looking through the window on the Class 1 enclosure and pressing the up or down arrows on the keyboard (press up to raise and down lower the laser), the beam will gradually focus to a smaller point and become more intense. When the beam is at its most intense point and is clearly engraving the piece of metal, release the button (see picture below, note the door is open for this photo. It would be closed under normal focussing conditions).



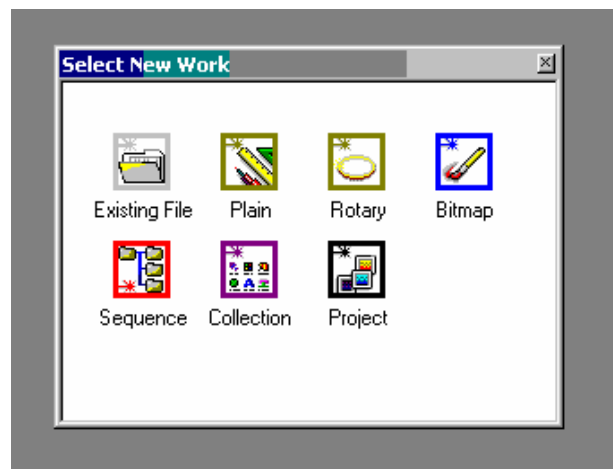
10. Fine tune the focusing by moving it up or down in small increments either by pressing the up and down arrows or by manually typing in the laser location in the specified field.
11. When done click on the start test box to stop lasing and open the door (Note: focussing may have to be done several times on a fresh area of the scrap material as focus will change as it engraves deeper into the scrap material).
12. When done close the z-axis window.

Operation

1. Note: if continuing from the focusing section above, proceed to step #5.
2. Start the Smartist4 Software program.

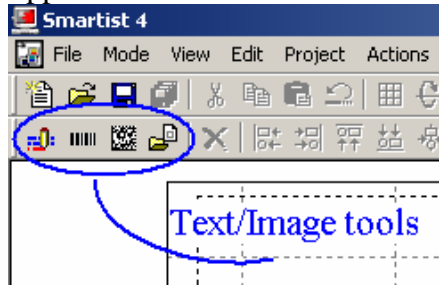


3. With the Smartist4 program open start a new project (Press “file” then “New”).
4. Choose which type of project you wish to perform (Note: We do not have the equipment for the rotary project). For simple marking on a flat surface, the “Plain” option is used. This will put you into the work mode screen.

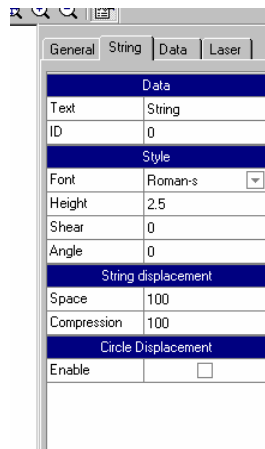


5. Press the green traffic light icon or click on “mode” then “edit mode” to enter the edit mode screen.

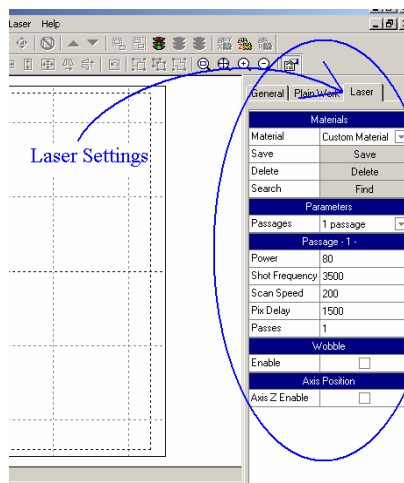
6. Enter desired text/image using one of the four tools available: String, Bar Code, Data Matrix and Import Image. For entering basic text press on string icon. A text box with “string” will appear on the edit mode screen.



7. On the right hand side of the screen characteristics of the image are shown. In the example below the characteristics of a string image is shown. **Be sure to press enter after each individual format change otherwise the system will reset the values to the previous settings.** Enter what you want in the text box and press enter. If string is too large it will appear a red colour. The font, height, and fill type can be adjusted as desired.



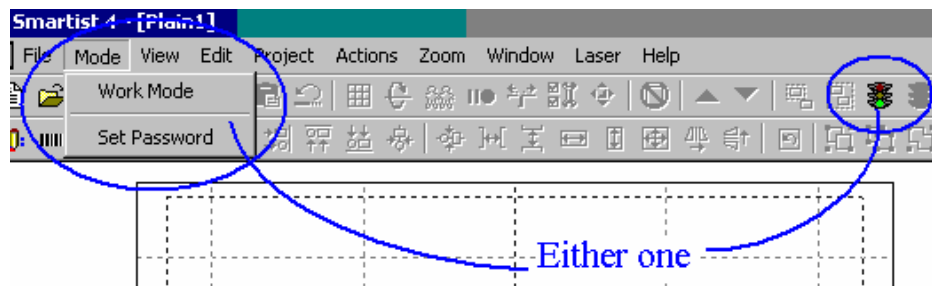
8. Set laser settings (limits are 3000-200000 shot frequency with higher frequencies causing deeper engravings.). **Make sure to hit enter after every single alteration.** Note: if laser setting are not displayed, check under “passages” if it reads “0 passage” then press “1 passage” and settings as below will be displayed. Power, shot frequency, scan speed, passes can be adjusted.



9. Additional strings can be added as in step 6, but laser settings will need to be set-up for each new string.

10. To check the location in the workstation for text in the edit mode press the limits icon (icon to the left of the green traffic light). This will outline the area to be engraved with the red diode laser (Note: turning off the lamp in the workstation helps view this). Sample can be aligned under the diode laser. **This must be turned off before proceeding or engraving laser will not start.**

10. Go to work mode when ready to mark material by either opening the 'Mode' option in the menu bar then click on work mode, or just click on the green street light.



11. Ensure the shutter is open (Note: The shutter light will be open if focusing section was completed otherwise you will have to press switch on workstation at this point see step #6 in focusing section).

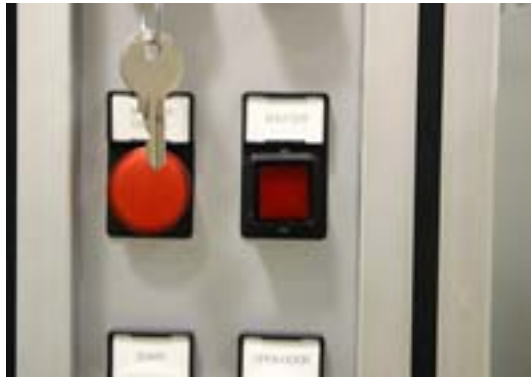
12. Push start button on enclosure panel. Door will close, shutter light will come on, and laser will start engraving.

13. When complete, door will open (Note: if the engraving is faint, laser setting can be adjusted and sample redone as long as it has not been moved).

14. When done close shutter and remove sample.

Shutdown

1. Write in the logbook the approximate laser running time and any relevant comments (i.e. reason of use, if left in working condition, etc).
2. Close the shutter if not already closed. (The shutter button light will only be illuminated when the door is closed).



3. Close the program.
4. Shut down operating system of PC and switch off the power of both the PC and the monitor.
5. Stop the laser by turning the Start/Stop key to the left (Stop).
6. Turn off the main power switch on the side of the enclosure (turn counter clockwise).
7. Turn off the fume extractor. (Note: the fume extractor is shared with the laser cutter so make sure it is not needed before turning it off).

FOR FURTHER DETAILS, SEE SMARTIST4 MANUAL