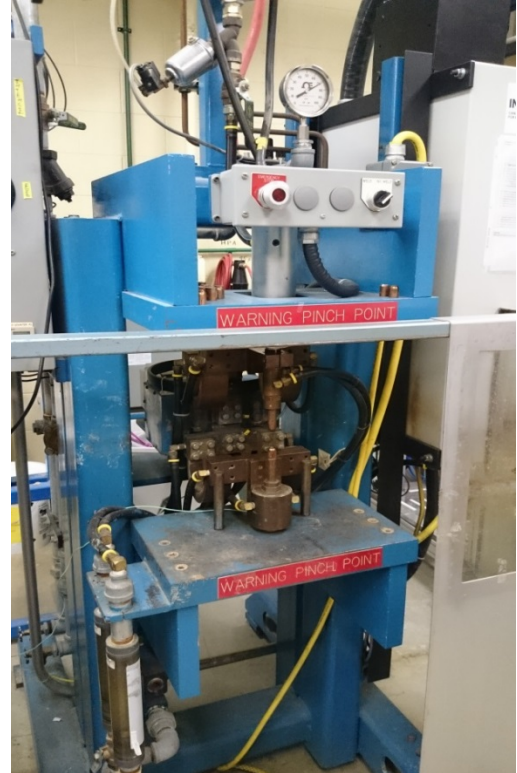




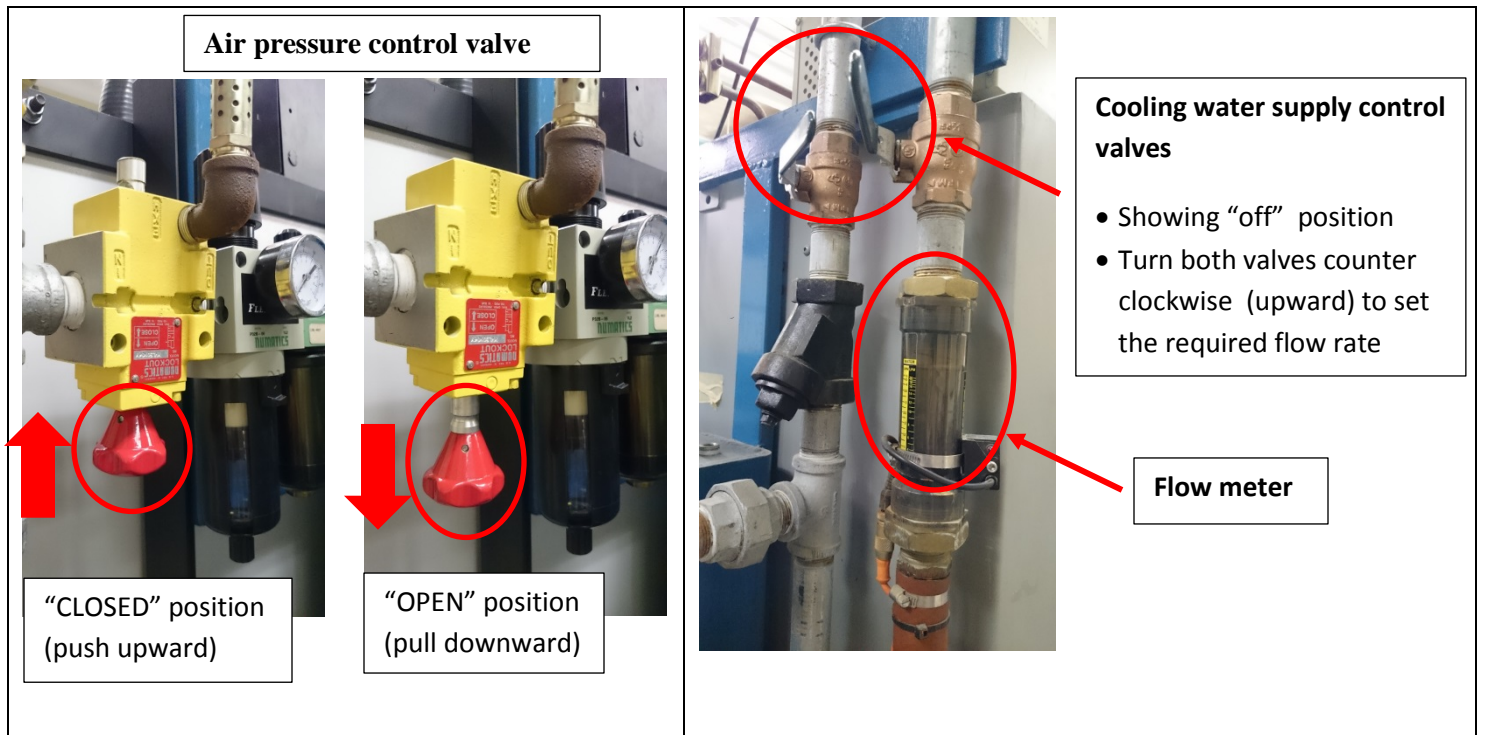
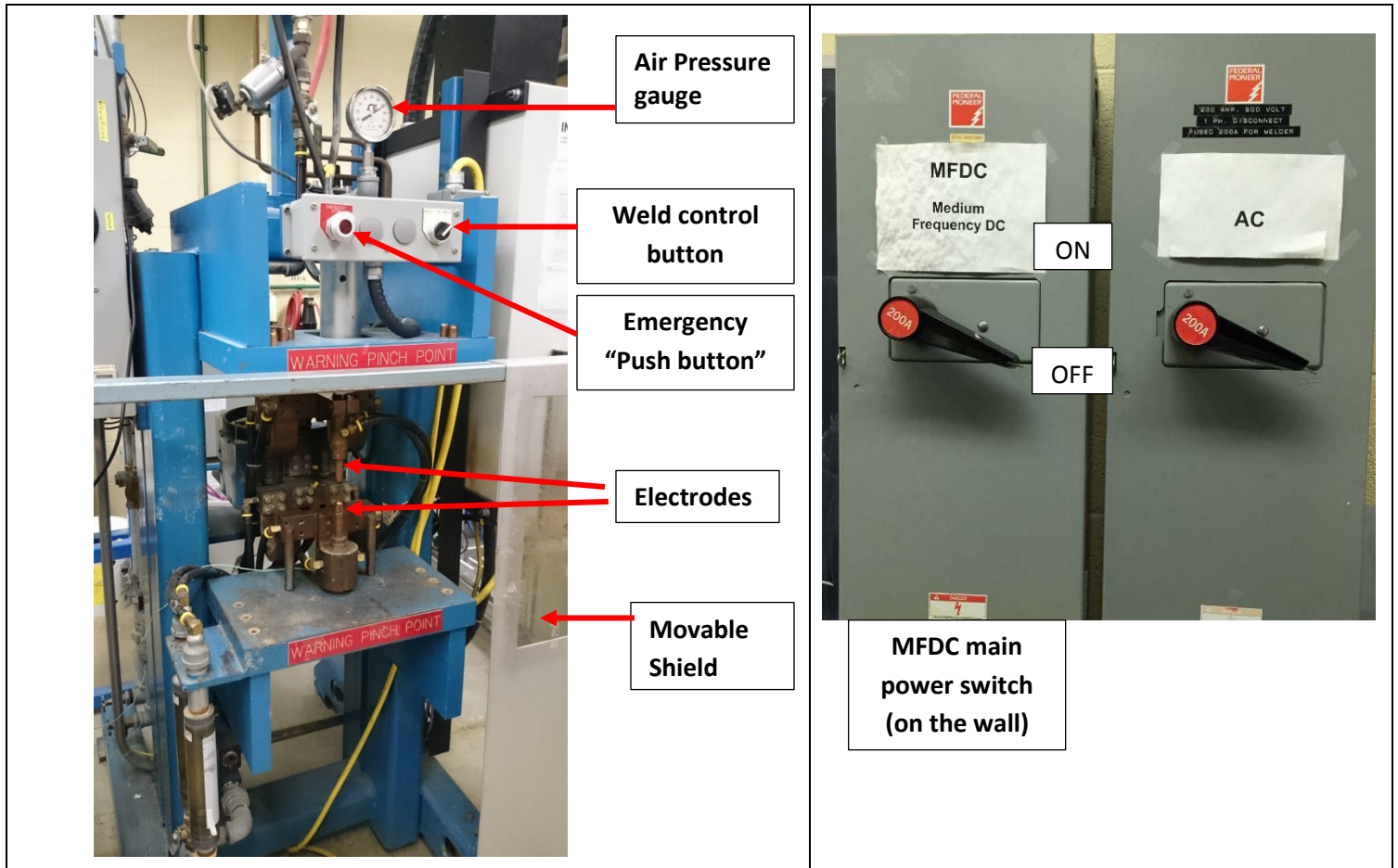
# Resistance Spot Welder Standard Operating Procedure

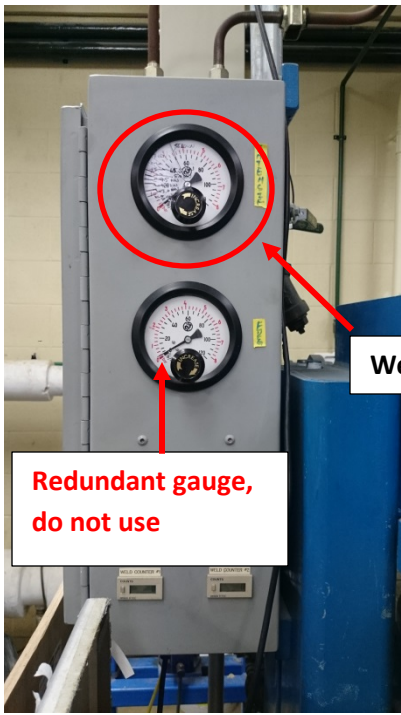
<b>Name</b>	<ul style="list-style-type: none"> <li>MFDC Resistance Spot Welder</li> </ul>
<b>Description</b>	<ul style="list-style-type: none"> <li>Description of procedure and equipment</li> </ul>
<b>Location</b>	<ul style="list-style-type: none"> <li>E3-2118J (Resistance Spot Welding lab.)</li> </ul>
<b>SOP Creation Date</b>	<ul style="list-style-type: none"> <li>Sept. 25, 2015</li> </ul>
<b>SOP Created By</b>	<ul style="list-style-type: none"> <li>Rufus Ighodaro</li> </ul>
<b>SOP Revision Date</b>	<ul style="list-style-type: none"> <li>January 19, 2016</li> </ul>
<b>SOP Revised By</b>	<ul style="list-style-type: none"> <li>Rufus Ighodaro</li> </ul>
<b>SOP Location</b>	<ul style="list-style-type: none"> <li><a href="http://inv.mme.uwaterloo.ca">inv.mme.uwaterloo.ca</a></li> </ul>
<b>Manual Location</b>	<ul style="list-style-type: none"> <li>E3-2118J</li> </ul>
<b>Equipment Owner</b>	<ul style="list-style-type: none"> <li>Prof. Norman Zhou (x36080)</li> </ul>
<b>Authorized Trainers</b>	<ul style="list-style-type: none"> <li>Rufus Ighodaro, Dongwoon Huh</li> </ul>
<b>Support Technicians</b>	<ul style="list-style-type: none"> <li>James Merli</li> <li>Email: <a href="mailto:jhmeril@uwaterloo.ca">jhmeril@uwaterloo.ca</a></li> <li>Tel.: 519-888-4567 (x38080)</li> <li>Location: E3-2103F</li> </ul>



<b>Significant Hazards</b>	<ul style="list-style-type: none"> <li>Finger(s) could get clamped if placed between the electrodes while operating the machine (Pinch point hazard); therefore use a holding device for small coupons</li> <li>Hot liquid metal may be ejected from work piece while welding (Expulsion hazard)</li> <li>While welding, fumes are released, which may be toxic (Fume hazard)</li> <li>Broken insulation and poor grounding of the machine may cause electrical hazards</li> </ul>
<b>Administrative Controls</b>	<ul style="list-style-type: none"> <li>Can only be used during standard working hours in the presence of a listed Authorized Trainer</li> <li>Can be used independently at any time by any student fully trained to use the equipment</li> <li>After standard working hours, can be used only with two or more people in the lab</li> </ul>
<b>Engineering Controls</b>	<ul style="list-style-type: none"> <li>Make sure the shield is in place before welding</li> <li>Ensure that ventilation is adequate</li> <li>Be sure to stay away from fume direction</li> </ul>
<b>PPE Required</b>	<ul style="list-style-type: none"> <li>Must use labcoat for body protection</li> <li>Must use eye protection device</li> <li>Use mask if excessive fumes are released during welding</li> </ul>

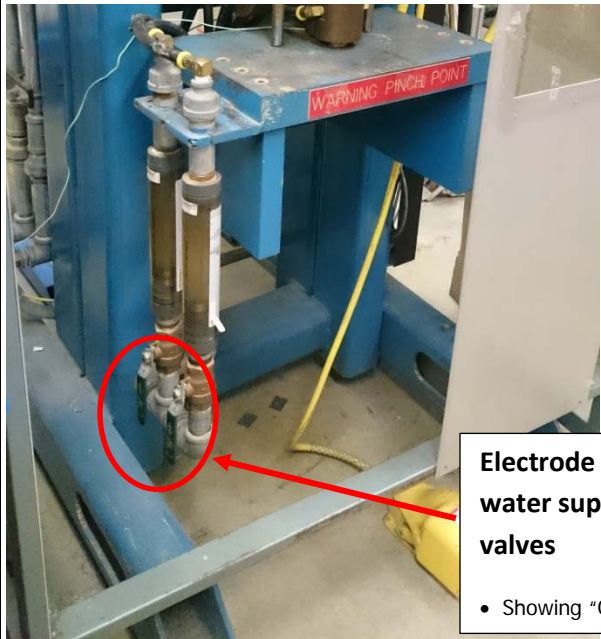
<b>Relevant Standards and Codes</b>	<ul style="list-style-type: none"> <li>• Occupational Safety And Health Administration (OSHA). Code of Federal Regulations, Title 29 Labor, Parts 1901.1 to 1910.1450</li> <li>• American National Standards Institute (ANSI). Safety in Welding, Cutting, and Allied Processes (ANSI Z49.1)</li> <li>• National Fire Protection Association (NFPA).</li> <li>• National Electric Code (NFPA 70)</li> <li>• Canadian Standards Association (CSA). Safety in Welding, Cutting and Allied Processes (Standard W117.2)</li> <li>• American National Standards Institute (ANSI). Practice for Occupational and Educational eye and Face Protection (ANSI Z87.1)</li> <li>• National Fire Protection Association (NFPA). Standard for Fire Prevention During welding, cutting and other hot-work (NFPA 51B)</li> </ul>
<b>Relevant MSDS</b>	All MSDSs can be found at <a href="http://msds.mme.uwaterloo.ca">msds.mme.uwaterloo.ca</a>
<b>Accident Procedure</b>	<p style="text-align: center;"><b>Response/Reporting procedures</b></p> <ul style="list-style-type: none"> <li>• Report all accidents to supervisor immediately or as soon as possible</li> <li>• For serious injuries or emergencies, call 911 or proceed to the UW Health Services</li> <li>• For treatment of all other injuries, proceed to: <ul style="list-style-type: none"> <li>○ Department/Residence → first aid kit / station location → E3 –2108H</li> <li>○ Health Services→ first aid services available 519-888-4096, ext. 84096</li> <li>○ Call UW Police (519-888-4911, ext. 22222) for assistance if the above services are not available</li> </ul> </li> </ul>
<b>Emergency Shutdown Procedure</b>	<ul style="list-style-type: none"> <li>• Push the Emergency (Red) button in front of the machine frame</li> <li>• Turn off the main switch (MFDC power switch) on the wall</li> <li>• Leave the lab and make the necessary repot</li> <li>• In case of fire, call UW police and fire department</li> </ul>





**Weld pressure gauge**

**Redundant gauge,  
do not use**



**Electrode cooling  
water supply control  
valves**  
• Showing "On" position

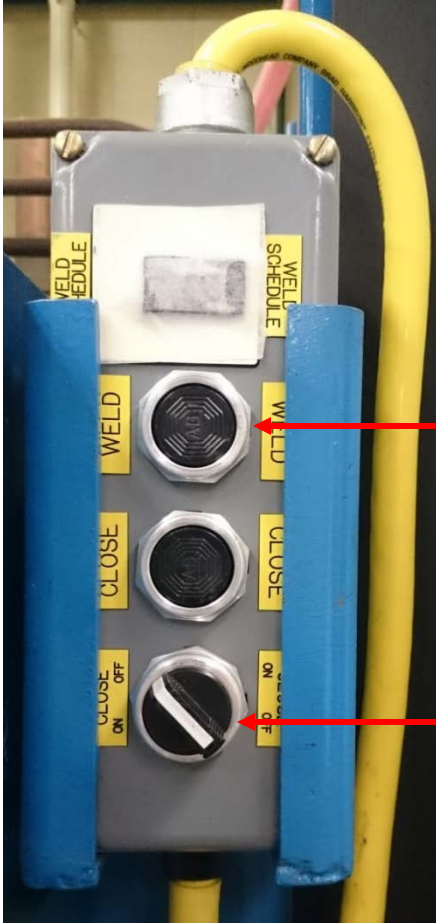
**Control panel**



**Switch lever**  
• Showing "OFF" position  
• Turn clockwise (90 degrees downward) to switch "ON"

**Program selector**  
• Showing "program  
"Number 4"  
• Turn up or down to  
select a program

**Welding process panel**



**Weld Button**

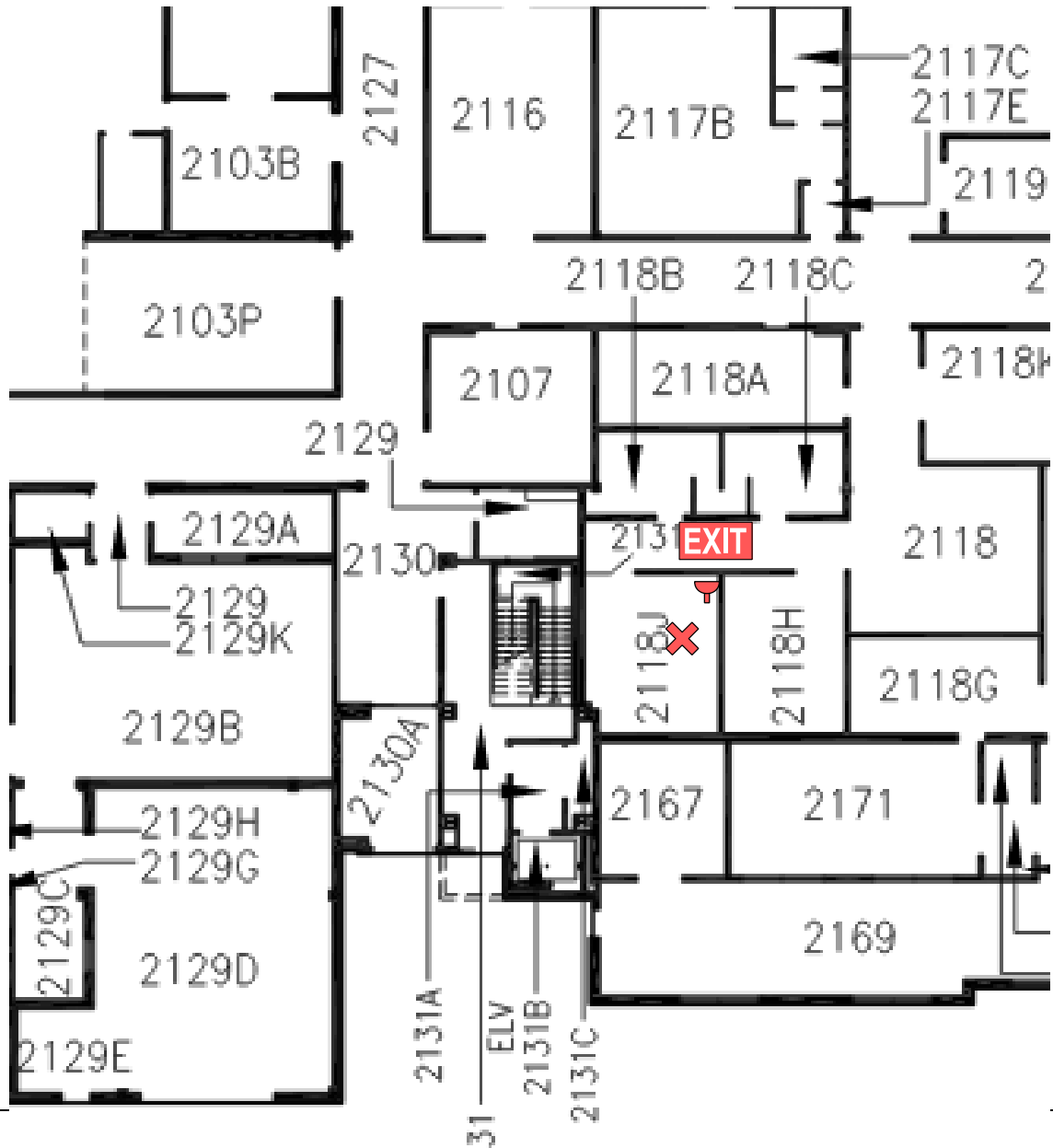
**Electrode clamp knob  
Showing "OFF" position**

**2-step foot-Pedal switch (alternative)**



**Foot-Pedal**

equipment	✘
exit	
fire extinguisher	
fire alarm pull	
eye wash	
shower	
phone	
sink	🚰
breaker panel	
lockout electrical	
lockout hydraulic	
lockout air	
lockout N <sub>2</sub>	
lockout CW	
lockout DCW	
lockout DHW	
lockout steam	



**Pre-start Checklist**

1. Ensure that there are no flammable materials around the welding machine (especially close to the electrodes)
2. Ensure that the electrode cooling water supply valves are in “open” position
3. On the Weld Process Panel Ensure that Electrode Clamp Knob is in “OFF” position
4. Check the Air Pressure Gauge to ensure that air pressure is supplied

## Operating Procedure

1. Check the start-up procedure and shot-down procedures (on page 8) before machine operation
2. Sign in to the user logbook (before doing any other thing)
3. Put on your lab gear (coat, gloves, eye protection, etc.)
4. Turn the MFDC main power switch to “ON” position
5. Pull the air Pressure Control Valve downwards to open
6. If you need to change welding electrode caps, go to end of page 8 for details, otherwise skip item 5
7. On the control panel, turn the switch to ‘ON’ position
8. Open the Cooling water supply control valves (two of them) and set the cooling water flow-rate to the required value, looking at the float in the flow meter
9. Set the required weld pressure using the dial on the Weld pressure gauge
10. Using a hand-held gauge, measure the weld pressure (or force):
  - Insert the load point of the gauge between the electrodes and resting on the face of the lower electrode
  - Clamp the gauge by turning the Electrode clamp knob on the Weld process panel to “ON” position
  - With the Weld control button in the “No weld” position, press the Weld button on the Weld process panel once
  - Take the reading from the gauge and ensure that it corresponds with the reading on the Weld pressure gauge
  - Store the hand pressure gauge in its place carefully
11. On the computer desktop, select the “Pegasus” program
12. On “Pegasus” open welding parameters
  - Input your desired welding parameters
13. On the control panel
  - The WELD knob set at “ON” position
  - Match your program number with the same as on the parameter selection on the computer

### **You are now ready to weld**

14. Insert your prepared specimen between the electrodes of the welder
15. Turn the Weld control knob to “Weld” position
16. On the Welding Process Panel, turn the electrode clamp knob to “ON” (This clamps the specimen and holds it in position)
17. Adjust the splash protection screen (Movable shield) to be in proper place i.e. between you and the electrodes
18. On the Welding Process Panel, press the “Weld” button (this executes the welding)
19. Turn the Electrode Clamp Knob to “OFF” (This opens the clamps to release the specimen)
20. Slide the movable shield away and take the specimen out.

\*Alternatively, using the 2-step pedal switch after step 17

18a. With the foot, depress the pedal one step i.e. half way (this closes the clamp to hold the work piece)

19a. Depress the foot pedal second step i.e. completely down (this executes the welding and releases the work-piece)

20. Slide the movable shield away and take the specimen out

### **End of welding process**

### **Start-up Procedure**

1. Perform preliminary weld test using low current and short weld time
2. Check the welding signal from the signal analyses on the computer
3. Touch the electrodes to ensure they are adequately being cooled

### **Shot-down procedure**

1. Turn the Weld control Knob to “No weld” position
2. Push the Air Pressure Control Valve upward to shut down air flow
3. Turn the Cooling Water Supply Control Valves to “off” position
4. On the control panel, turn switch lever “off” position
5. Turn the computer to “sleep” mode
6. Turn the MFDC main power switch to “Off” position
- 7.

### **Clean-up**

1. Clean-up and remove any left over from your specimens/ process
2. Mop-up water from around the work area

### **Maintenance and Repair**

1. Check the RSW machine components regularly
2. Refer to the manual during the maintenance/repair
3. Contact Centerline or other trained staffs for serious problems and electrical issues
  - i. Company: Centerline
  - ii. Address : CenterLine (Windsor) Limited 415 Morton Drive Windsor, ON N9J 3T8 Canada
  - iii. Service Tel.: 519-734-0080
  - iv. E-mail: [service@cntrline.com](mailto:service@cntrline.com)
  - v. Website: <http://www.cntrline.com/>



### **Changing Electrode caps**

1. With a plier, grip and turn the electrode cap to the left or right to loosen it
2. Take out the electrode cap and immediately place the replacement in its position
3. Do for the bottom and top electrode caps, either one can be done first
4. After the two caps have been replaced, turn the control panel switch to “ON”
5. On the welding process panel turn the Electrode clamp knob to “ON”, then to “OFF”
6. Repeat item v. once or twice to lock the electrode caps in position

**End of electrode cap replacement**