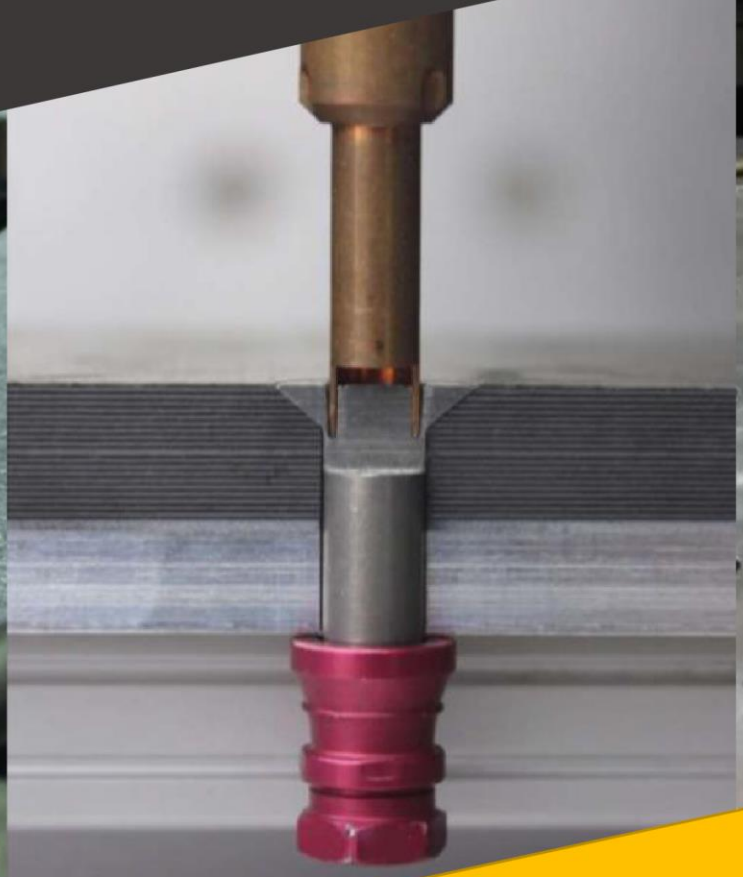
Perfect Point

E-drill Maintenance & Troubleshooting Guide

System Part Numbers CP1-SY-111 thru CP1-SY-175



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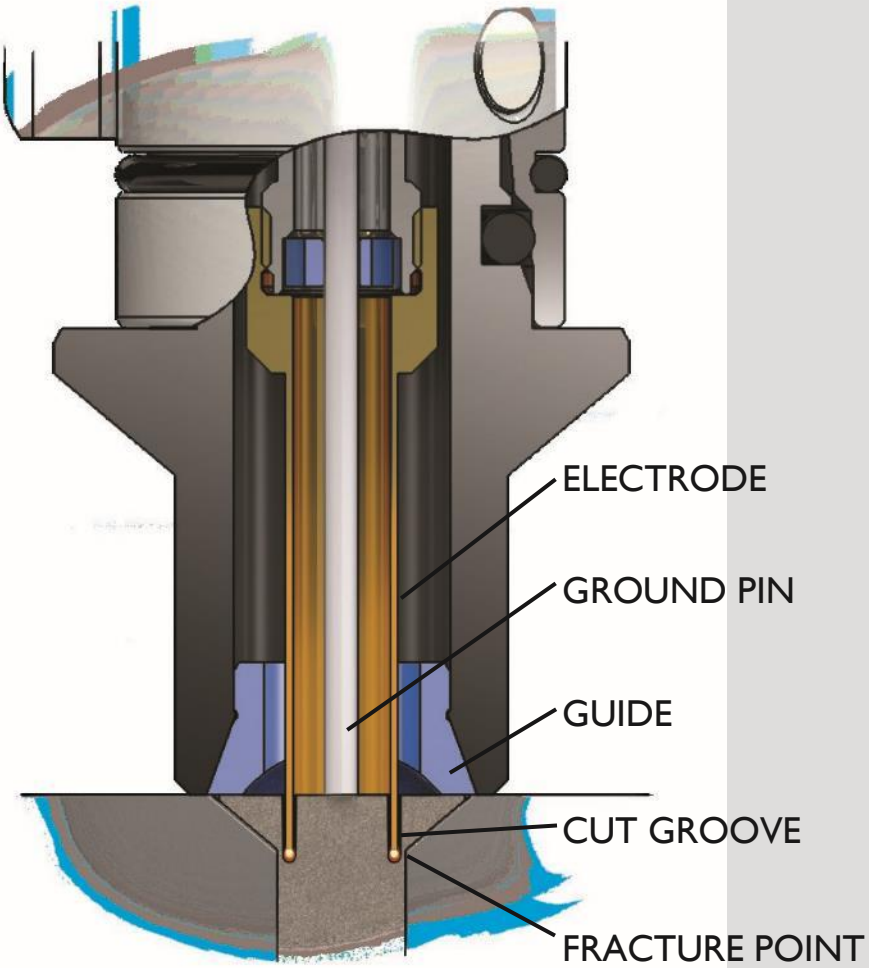
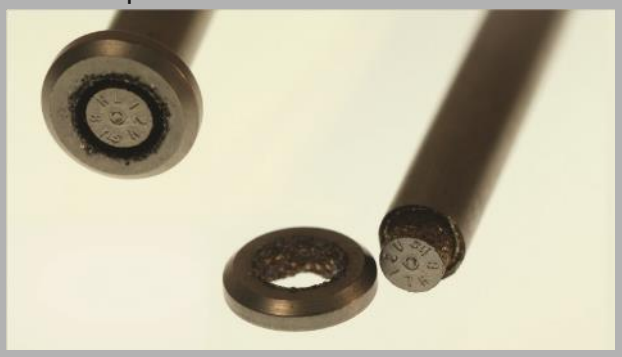
TECHNOLOGY



Perfect Point's patented handheld electro discharge machining (EDM) technology removes the hardest fasteners quickly and easily. The precision sized electrode cuts a circular groove of material from the fastener head leaving a very thin fracture point between the electrode and the airframe. The exact sizing of the electrode coupled with precision depth control greatly decreases the risk of airframe damage when compared to conventional removal methods. A closed-loop fluid system, consisting of filtered water, flushes the area and removes cut debris. Aggressive flushing during the cut means no heat is transferred to the surrounding area. The forceless cut process significantly reduces the risk of damage to the airframe and repetitive motion injury to the operator. Adaptable to flush head, protruding head and collar side applications. Reduced damage, fast cycle times, and elimination of debris result in efficiencies that mean a very quick return on investment.

PROCESS

A precision cut results in low punch out force, eliminating stress on the airframe structure. Drill shards are not created and all cut debris is captured, leaving only the severed fastener for cleanup.



- FORCELESS EDM CUTTING
- REDUCES AIRFRAME DAMAGE
- QUICK CYCLE TIMES
- CLOSED LOOP SYSTEM
- CAPTURES CUT DEBRIS
- LOW PUNCH OUT FORCE
- ERGONOMICALLY SUPERIOR
- WORKS ON ALL FASTENERS

WARNINGS:

The E-drill system is designed, built and calibrated to work with factory genuine parts and accessories. The use of non-authorized components, electrodes, or accessories can result in airframe damage, tool damage, personal injury, or death. Lethal high voltages are present throughout the Power Supply Cabinet. Follow all Warning and Caution statements outlined in this User Guide and all equipment Warning placards. Do not proceed with any periodic maintenance until factory trained and authorized, and this document has been thoroughly reviewed and understood. Only trained, authorized technicians should attempt tool use, tool selection, adjustments, dielectric system replenishment, and periodic maintenance. This unit is not field repairable; if any malfunctions are encountered please contact Perfect Point™ EDM Corporation immediately for service.

The Perfect Point E-drill system should be protected from freezing cold conditions that can crack or burst de-ionized water connections and plumbing. If the system is subjected to freezing temperatures, it should be thoroughly inspected by a trained technician for damage or leaks prior to use. If the system is to be stored or transported in low temperature conditions, then it should be fully drained first (see System Maintenance - section 4.1).

The Perfect Point E-drill system should not be operated in the rain or snow. If aircraft repairs necessitate outdoor operation in severe weather conditions, it is recommended the Mobile Service Unit be positioned under a protective awning or positioned in a protected area under or in the airframe. Cable connections should not be left in pooled water and should be kept elevated.

Product specifications are subject to change, and photographs in this document may not match the current E-drill product combinations exactly.

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Limited Warranty Statement

Perfect Point EDM Corp. warrants to the end user that its products will be free from defects in material and workmanship for a period of twelve (12) months from the date of delivery, but not more than eighteen (18) months after date of shipment, and the successful completion of operator equipment use and maintenance training. This warranty extends only to the original purchaser, is expressly in lieu of all other warranties, expressed or implied, and is further in lieu of all other liabilities or obligations for any consequential damages or losses incurred by the buyer in connection with the purchase or use of the product.

This warranty applies to systems subjected to normal operating conditions established by PPedm and explicitly excludes equipment subjected to:

- User alteration.
- Accident or damage caused by the end-user.
- Improper handling, installation, maintenance, application, or contamination as established by PPedm equipment operating instructions and preventative maintenance.
- Use with improper voltage.
- Use contrary to the operation instructions, and failure to properly service and maintain per PPedm instructions.
- The use of non-authorized components, electrodes, or accessories.

Use of counterfeit electrodes will result in eccentric cuts (which will cause airframe damage) incorrect cut depths, cutting times and electrode life. Use of counterfeit electrodes will also invalidate the warranty. PPEDM will not repair systems or components damaged by the use of counterfeit electrodes.

- Unauthorized disassembly, repair, or alteration by anyone other than PPedm Corp. No allowances will be made for repairs or alterations effected without specific written authorization from PPedm.

This warranty does not cover:

- Normal wear and tear of soft goods (seals, hoses, cables etc.), E-drill Adapters, Guides, Locators, Punch Pins or Punch Guides and other fixtures or tools.

Credit will NOT be allowed nor shipment accepted on any machine or component thereof without Perfect Point's prior written consent and issuance of a PPedm Return Material Authorization (RMA).

PPedm will at its option, repair or replace any defective machine or component thereof for the specified warranty period. PPedm reserves the right to substitute new equipment and/or improve the part(s) on any machine or part thereof judged defective without further liability. Machines or components thereof will be repaired and the warranty time continued.

All machines or components thereof returned for warranty consideration MUST NOT HAVE BEEN TAMPERED WITH and all anti-tamper seals and/or striping must be intact. Removed or destroyed anti-tamper seals and/or striping will be cause to VOID these warranty terms and conditions.

Liability Limitations: Under no circumstances shall PPedm have any liability for liquidated damages or collateral, consequential, or special damages loss of production or progress of production, whether resulting from delays in delivery or performance, breach of warranty, negligent manufacture or otherwise. Purchaser agrees to indemnify and hold harmless PPedm from all claims by third parties in excess of these limitations.

THIS WARRANTY IS THE SOLE WARRANTY OF PPedm AND ANY OTHER WARRANTIES EXPRESSED OR IMPLIED IN FACT, INCLUDING ANY WARRANTIES OF MERCHANTABILITY AND FITNESS FOR USE, ARE HEREBY SPECIFICALLY EXCLUDED.

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1. Product overview:

1.1. Major Components:

The E-drill system comprises; the Touch-Screen Display, Mounting Post and Cable assembly, the Hand Tool and Umbilical Cable assembly, and the Mobile Service Unit control cabinet. Various Tool Adapters, Electrodes and Accessories are supplied for removal of specific fastener configurations and materials.

1.2. Technical Specifications:

Fastener Sizes:	CG Hand tool - 5/32”–3/8”, Inc. oversize’s EG Hand Tool – 3/32”-1/4”, Inc. oversize’s
Fastener Material:	Aluminum, Titanium, Stainless Steel, Alloy Steel, Inconel, Monel etc.

E-drill Hand Tool Dimensions (approx.): 7.5” x 5” x 2”, 1.5 lb. (plus 10 ft. or 30 ft. umbilical)

Mobile Service Unit Dimensions:	26” x 56” x 18”, 175 lb. (including Toolbox & Adapter Kit)
Umbilical Extension:	20 ft. long (optional extra)
System Power Cable Assembly:	12 AWG, L6-20P Twist-lock Plug (except Europe), 25 ft. long
* Facility Power Requirements:	208/240VAC, Single Phase, 20 Amp, 50/60 Hz, L6-20 Twist-lock Receptacle Plug (except Europe)
Maximum Duty Cycle:	30 fasteners, or as many as possible with one electrode (whichever is the least), at the rate of 3 fasteners/minute (totaling 10 minutes). 1-minute minimum recovery time.

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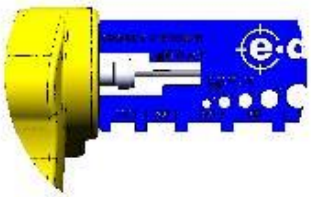
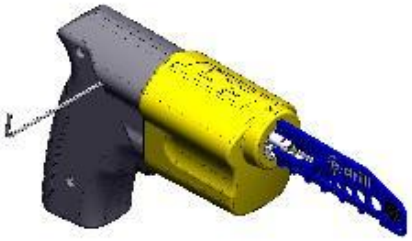
2. E-drill Daily Checklist

Please follow this checklist to maximize the performance and reliability of your E-drill System. The last section of this chapter shows typical damage which might be encountered.

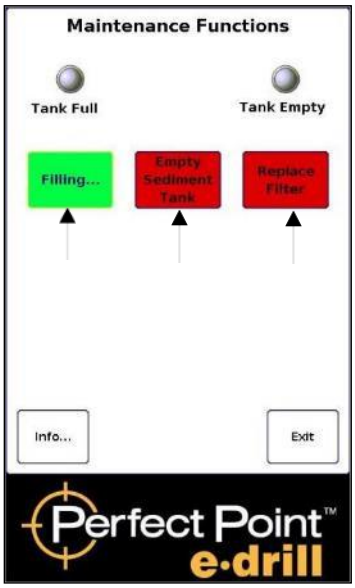
2.1. Hand tools





- CG – Check Ground Pin Protrusion using PPedm Ground Pin Setting tool. Adjust using 2mm Allen Key. (Refer to Fastener Removal Guide section 6.6.)
- CG – check clear insulator sleeve on ground pin.
- CG – Before cutting, check spring loaded movement of Ground Pin against the fastener head.
- Check correct size of electrode (refer to touch screen display) is installed and tightened with electrode wrench. Check electrode is not dented or has uneven wear – dress or replace as necessary).
- Check all cables, strain reliefs, hoses and connectors for damage.

2.2. Mobile Service Unit (Cart)



- Top-off before starting shift.
- Check Touch Screen Display for warnings (Sediment Tank or Filter).
- Ensure hand tool multi-connector bezel is tightened to detent. Check hoses are fully installed and seated.
- Check all cables, strain reliefs, hoses and connectors for damage.

2.3. Adapters, Locators, and electrode Guides

- Protruding head – Check bushing is snug fit around fastener head.
- Flush head visual – Check aperture ring is same size or slightly larger than fastener head, so head can be “sighted” for alignment.
- Flush head mechanical – Check size and correct type of Mechanical Locator. Check for wear or damage to locator tip. Check fastener recess is clean and paint-free, and locator fits into fastener head precisely.
- Adapter - Check tri-wing fit to hand tool.
- Electrode Guide – Guide should be snug-fit around correct size electrode. Check for wear and excessive play. Extract worn guides using the Guide Removal tool and replace.
- Check O-rings for wear or burn marks and replace as necessary (especially VFHL adapter red O-ring).
- Apply O-ring lube grease to adapter tri-wing feature (where it connects to hand-tool), and all adapter and locator O-rings.

2.4. Damage examples

Cable connectors typically receive much abuse while in service. The photo’s below show damage which can be incurred by such abuse.

The hand tool case is designed to withstand impacts, but if dropped on its electrode or drive tube mechanism then damage may occur. For this reason, it is always important to keep an electrode and adapter on the hand-tool, even when not in use.

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If a hand tool has been dropped and there is concern it may have been damaged, it may be checked by installing a new electrode, squeezing the trigger to ensure the electrode is at its full forward position, and measuring the protrusion of the electrode from the front of the chassis. A new electrode at the full forward position should protrude slightly under 1.5” from the front of the chassis as shown below.

3. System Maintenance

Beyond the daily checklist, periodic simple maintenance is required to keep the system operating properly. System maintenance is monitored by internal cut cycle counters, that will advise the operator when maintenance is recommended. Once the predetermined cut cycles are reached operator intervention is required to perform maintenance and reset the counters.

3.1. E-drill Factory Refurbishment and Upgrade Services

This document details recommended user maintenance and troubleshooting procedures for the E-drill product family. There are no user-serviceable components inside the Hand Tools or the Mobile Service Unit, and under no circumstances should the anti-tamper seals be damaged or removed and devices disassembled. Service tasks or repairs not covered by this document should be carried out by PPedm service personnel.

Please contact the PPedm Customer Service Hotline (714-891-6533) if you have any concerns or questions.

3.1.1. Factory Hand Tool Refurbishment services

E-drill Hand Tools are the most complex part of the entire E-drill system, and it is critical to keep the hand-tool in peak condition. In common with other high-duty aerospace tools, E-drill hand tools should be returned for factory service approximately after every 12,000 cuts. The factory service comprises replacement of seals, bearings, motors, O-rings, shafts, or any other worn parts that are encountered.

In addition, the factory service also includes any component or part upgrades which have occurred for that design since the unit was originally built. This may include upgraded circuit boards, seals, connectors or even the outer case. Refurbished systems are rebuilt to the same specification as the current manufactured product.

The hand tool Factory Refurb service is order # CP1-SP-001, and may be found on the WWW.PPEDM.COM web site.

3.1.2. Factory MSU Services

The E-drill MSU does not require a factory- recommended upgrade or service interval. The system is designed to provide many years of service with no additional tasks beyond the recommended user maintenance items. However, since the product was introduced several improvements have been made and as a result a number of standard factory refurbishment and upgrade services are available as well as factory system repair, should that be necessary.

Please contact the Service Hotline for details of MSU factory refurb. and Upgrade options.

3.2. MSU Maintenance Warnings and service procedures

A) The **Sediment Tank Maintenance Counter** will provide a maintenance warning at 1000 cut cycles. The system will continue to operate, but maintenance is recommended before the next shift. The Touch-Screen Display will indicate a “Sediment Tank Full” message when this occurs.

B) After the warning screen is activated, the system will count-down an additional 500 cut cycles before the system will automatically shut down at the mandatory 1500 cut cycle limit. It is recommended that sediment tank maintenance be completed between shifts, prior to the system forcing a shutdown.

C) The **Filter Maintenance Counter** will provide a maintenance warning to replace the pleated filter (see below) at 5000 cut cycles. As with the Sediment Tank, the system will continue to operate, but maintenance is recommended before the next shift. The Touch-Screen Display will indicate a “Filter Replacement Required” message when this occurs.

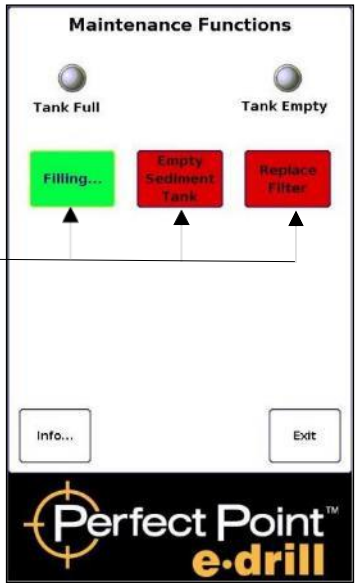
D) After the warning screen is activated, the system will count-down an additional 500 cut cycles before the system automatically shuts down at the mandatory 5500 cut cycle limit. As before, it is recommended that a filter replacement is completed between shifts, prior to the system forcing a shutdown.

3.3. Reset Maintenance Counter

If performed correctly, the Sediment Tank and Filter procedures (refer to sections 3.6 & 3.7 below), will automatically reset their respective counters. However, if the procedures are performed incorrectly, the counters will not be reset and the system will still be disabled. Both the Sediment Tank and Filter counters can be reset in Advanced Mode (see Appendix 2, Section 5.5 for reset instructions). It is not recommended that a counter be defeated by resetting it without servicing the system, and such activity will void the system warranty.

3.4. Maintenance Screens

System maintenance functions are accessed through the System Maintenance Screen, by pressing the *Maint.* button at the bottom right of the Home screen.



Buttons turn GREEN when function is active

Touching a button on the maintenance screen will turn the button on (green) activating the function. Touching the button again will turn the function off (red). The **Tank Full** and **Tank Empty** round indicator "lights" display system water level status in the Sediment Tank and will turn on and off automatically indicating water levels as the system is serviced.

The Informational screen is accessed by touching the "**Info"** button in the lower left corner of the main maintenance screen. The information screen contains system configuration details and firmware revisions. The screen also contains the **Total Cycles**, **Sediment Tank**, and **Filter** counters.

3.5. System "Top Off"

The DI water system requires periodic filling or "Top-Off" to replace small amounts of DI water lost during the cutting cycle. Should the system run low on water during operation, the hand tool will indicate a flashing red light and the display will indicate a

"Low Water Level" condition. To "Top-off", fill an open container with approximately 1 gallon of clean water, enter the maintenance Screen, touch the **Top-Off** function, and immerse the Adapter of the E-drill in a vessel of water (do not submerge the entire drill, only the front of the E-drill Adapter should be submerged).

Note: If using a hand-tool with 30' umbilical cable, a faster technique is to disconnect the hand tool fluid tubes at the back if the MSU and use the service tubing to fill; filling through the hand tool may take a long time.

CAUTION

Submersing the E-drill, its mechanism, or any parts other than the Adapter will destroy the E-drill electronics and void the system warranty. Submerging the E- drill in water may also cause operator injury due to electrical shock.

When the Tank is full the Full LED indicator will illuminate green and the pump will turn off automatically. The system is then ready for continued use.

*Note: The Top-Off pump may be stopped manually by pressing the **Top-Off** button a second time. Exiting the Maintenance Screen will also automatically turn the Top-Off function off. However, a "Low Water level" condition can only be cleared by completely filling the system, stopping the fill process manually or exiting Maintenance Screen will not clear the error.*

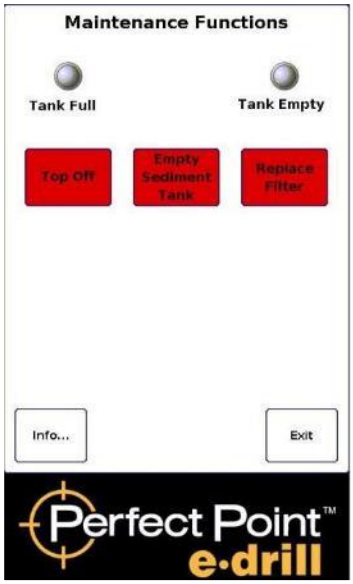
The Top-Off function will not work if the tank is already full.

3.6. Empty Sediment Tank

The E-drill is provided with a maintenance kit including a drain bowl, a Drain/Bleed Tube Pair and a Filter Bowl Wrench for the two water tanks. These tools are used when servicing the Sediment tank or Filter tank. Sediment tank cleaning is carried out as follows:

3.6.1. Disconnect the two Hand-Tool water connections on the back of the Power Supply Cabinet and connect one end of the Service Drain/Bleed Tube Pair to the Mobile Service Unit PRESSURE and VACUUM ports. Place the other end of the Drain/Bleed Tube Pair in a 1-gallon container (minimum).

3.6.2. Empty the system by pressing the **Empty Sediment Tank** button in the Maintenance Screen of the Touch-Screen Display. The button will change color to green and the system will automatically pump out sufficient water for the Sediment Bowl to be removed and cleaned. The pump will terminate automatically when sufficient water has been removed.



Once the pump is started a “pop-up” screen will appear prompting the user to reset the sediment tank counter. This function allows the operator to determine if the sediment tank is truly to be emptied, or if other system bleed/charge procedures are being performed (see Section 3.7) and allows the cut cycle counter to be reset or ignored as appropriate. Press the *YES* button to proceed.

3.6.3. Loosen the Dielectric Lock-Bolt on the frame to the right of the entire Filter Assembly. Rotate the assembly until nearly horizontal (see photograph at the end of this section) and retighten the Lock-Bolt.

3.6.4. Using the Filter Bowl Wrench provided with the system, loosen the Sediment Bowl (bowl on the right, marked Sediment). Use caution; there will be some residual water in the bowl. Unthread by hand; carefully remove the bowl without touching the pick-up tube or cloth covered level sensor assembly to its right. Dump sediment and clean out the Sediment Bowl with a clean, lint free shop towel.

Caution – Do not attempt to remove or clean the sock on the level sensor. This is not a service item and should not be touched. See photo right.

3.6.5. Prior to reassembly, inspect the bowl to ensure the large O-ring seal is clean and undamaged, properly lubricated and seated before reinstalling. Hand- thread the tank onto the Filter Cap Assembly, taking care not to unseat the O-ring or touch the center pick-up tube or the level sensor assembly. Use the Filter Bowl Wrench provided with the system to lightly tighten the bowl.

3.6.6. Return the Bowl Assembly to vertical position and tighten the Dielectric Filter Assembly Lock Bolt.

3.6.7. Ensure that the end of the drain/bleed tube is submerged in water, then recharge system using Dielectric Top-Off button. Ensure that water is being drawn into the system by watching for movement of air-bubbles when the procedure is started. If water is not being drawn into the system, it is likely that the O-ring is incorrectly installed. Re-tilt the assembly and re-install the bowl after O-ring seal is rectified.

3.6.8. When the tank is full the pump will automatically turn off. You may need to add more water to fully fill the tank.

Note: The pump may be stopped manually by pressing the Empty Sediment Tank button a second time.

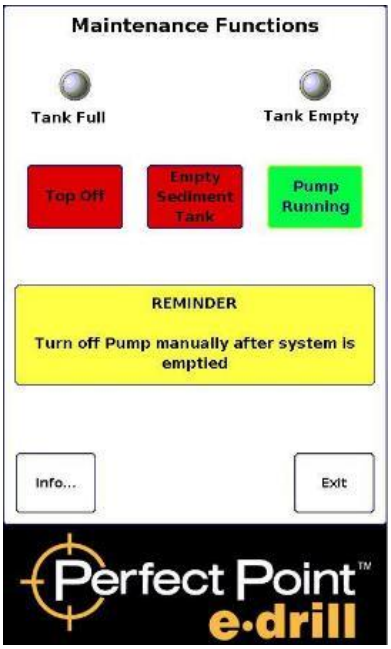
Note: The Empty Sediment Tank function only drains the Sediment Tank for servicing. It does not empty the entire system.

Rear of MSU with Filter Assembly in rotated position

3.7. Replace Filter

Completely emptying the system for replacement of the system filter is accomplished in the **Replace Filter** function. Procedure is as follows:

3.7.1. Connect the Fill/Drain Tubing to the Mobile Service Unit PRESSURE and VACUUM ports. Place the other end of the Drain/Bleed Tube Pair in a 2-gallon container (minimum).

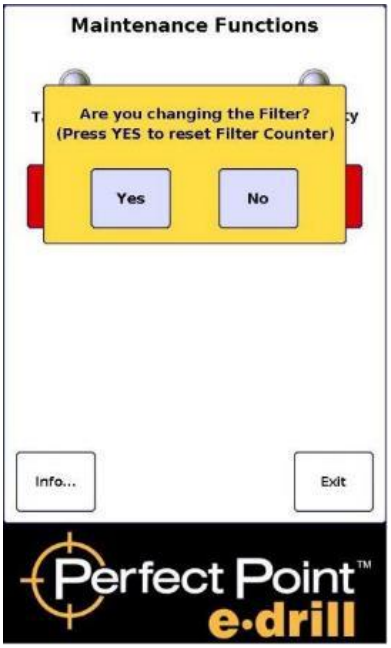


3.7.2. Press the **Replace Filter** button to empty the system.

3.7.3. The PUMP RUNNING message will display notifying the user that the function will run the fluid pump continuously until it is shut off manually by the operator. The pop-up screen reminds the operator that the running pump will need to be watched and shut off manually when no more water is being pumped out.

3.7.4. Press the green Pump Running button to stop the pump.

3.7.5. When the system is empty, and pump is stopped, a “pop up” screen will appear prompting the user to reset the Filter Counter. This function allows the operator to determine if system maintenance is being performed or if other system Bleed/Charge operations are being performed (see Section 3.7), and allow the cut cycle counter to be reset or ignored as appropriate.



3.7.6. Loosen the Dielectric Lock-Bolt to the right of the entire Filter Assembly. Rotate the assembly until nearly horizontal (see photograph on page 44) and retighten the Lock-Bolt.

3.7.7. Using the Filter Bowl Wrench provided with the system, loosen the Filter Bowl. Use caution; there will be some residual water in the bowl. Unthread by hand and carefully remove the bowl and filter. Discard the old filter, clean out the bowl with a lint-free cloth, and install a new filter into the bowl. (Do not attempt to wash out and re- use an old filter. It is a single-use device and will not re-seat correctly.)

Caution – PPedm recommends filters with the rubber end seal molded into the end caps. Rubber seals located in a plastic end cap can become dislodged during re-assembly and block the flow, adversely affecting performance. See photo right.

3.7.8. Prior to reassembly, inspect the bowl and replacement filter to ensure both O-ring seals (bowl and filter) are clean and properly lubricated and seated.

3.7.9. Return the Bowl Assembly to vertical position and tighten the Dielectric Filter Assembly Lock Bolt. **Important – return the filter assembly to the vertical position before re-installing the filter and bowl.**

3.7.10. Position the bowl and filter vertically under the housing and carefully lift and hand-thread the tank back onto the Filter Cap Assembly, taking care not to unseat either O-ring (bowl or filter). Use the Filter Bowl Wrench provided with the system to tighten the bowl.

3.7.11. After filter replacement the system must be completely refilled and bled. Follow section 3.7 for recharge and bleed procedure. If water is not being drawn into the system, it is likely that the O-ring is incorrectly installed. Re-tilt the assembly and re-install the bowl after O-ring seal is rectified.

3.8. System Bleeding and Charging Procedure:

System maintenance and connecting/disconnecting system components can cause air to become entrapped in the DI water system. Bleeding and charging is sometimes required to assure there is no trapped air in the DI system.

Note: During the following operations there may be some "screeching" from the Mobile Service Unit Pressure Regulator as the air is bled out of the system. This is normal and will disappear as the system is successfully bled.

3.8.1. Enter maintenance mode on the Touch-Screen Display, attach the Fill/Drain Tubing and run the Top-Off procedure (see Section 3.4) to assure the system is completely filled.

3.8.2. In the Maintenance Screen on the Touch-Screen Display, run the Empty Sediment Tank function (see Section 3.5). Water and entrapped air will be expelled through the tubing, until you achieve a strong stream of water. After expelling approximately 1 gallon of water the pump will automatically stop. The system will prompt you to confirm that you are resetting the

Sediment Tank Counter. Respond by pressing the *No* button.

3.8.3. Re-run the "Top-Off" procedure to refill the system (see Section 3.4).

This procedure should be sufficient to clear excess air out of the system. Repeat this procedure as necessary to bleed air from the system.

3.9. Checking Vacuum and pressure (CP1-SY-151 and above)

CP1-SY-151 is provided with Vacuum and Pressure gauges to check the performance of the Dielectric water system. Vacuum and pressure may be checked in Advanced Mode (see Appendix 1). It is suggested that this check be carried out monthly or when poor performance is suspected, per the following specifications:

3.9.1. Vacuum:

Connect the vacuum gauge with the blue hose to the vacuum port on the back of the MSU. In the advanced menus, under the Manual Tab, press the red Vacuum button to run the vacuum pump. The indicated vacuum should slowly rise to approximately 10"Hg in approximately 60 seconds.

Press the Vacuum button again to turn the pump off. Vacuum should hold or degrade slowly over 30 seconds approximately.

3.9.2. Pressure

Connect the pressure gauge with the black hose to the pressure port on the back of the MSU. In the advanced menus, under the Manual Tab, press the red Pressure button to run the pressure pump. The indicated pressure should quickly r rise to -80 PSI ±5 PSI. Press the Pressure button again to turn the pump off. Take care when disconnecting the gauge since the line will still be pressurized.

If either of the above specifications are not met visually inspect the bowl system or visible tubing for leaks. Also check the bowl O-rings are in-place and not damaged. Contact PPedm Customer Service Hotline (714.891.6533) if there ae no obvious leaks and O-ring problems,

3.10. Ground Pin Adjustment and Replacement (applies to CG hand-tools only):

3.10.1. Ground Pin adjustment is a critical parameter in efficient operation of the device (much like the electrode in a TIG welder). As described in the Weekly Maintenance Schedule (Section 3.8), the Ground Pin should be regularly checked for excessive burning or damage and correct protrusion from the front of the E-drill. The procedure for checking and adjusting, and if necessary, replacing the ground pin is as follows:

3.10.2. Prior to Ground Pin inspection, advance Electrode to the full forward position; remove any

installed Adapter and the Electrode from the E-drill and inspect the Ground Pin for excessive burning and/or damage.

3.10.3. Place the Ground Pin Setting Tool over the end of the hand-tool and across the Ground Pin tip. There should be no gap visible between the Gauge and the tip of the Ground Pin. If there is a gap the Ground Pin may be adjusted by loosening the internal Ground Pin Clamp Screw.

3.10.4. Fasteners with recessed heads may need the Ground Pin to be extended further than the default setting.

CAUTION

DO NOT COMPLETELY REMOVE THE CLAMP SCREW. Completely removing the screw will allow internal components to drop into the E-drill housing. Simply loosen the screw sufficiently to relieve the clamping force on the pin shaft.

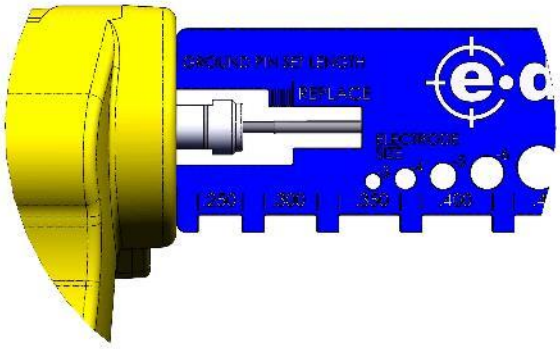
3.10.5. Fasteners with recessed heads may need the Ground Pin to be extended further than the default setting.

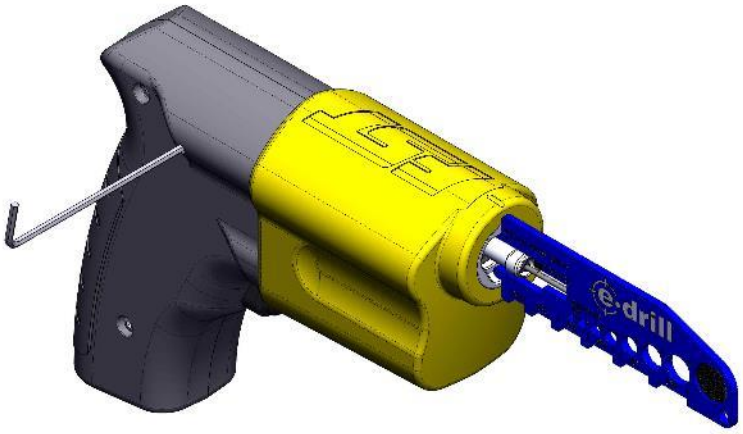
3.10.6. Carefully pull the Ground Pin out incrementally (do not use any tools for this – if properly loosened, the Ground Pin should slide out relatively easily), recheck Pin length with the Pin Gauge allowing the Gauge to push the Pin back to the correct protrusion.

3.10.7. To replace the Ground Pin, grip Ground Pin Assembly firmly and pull it straight out of the nose of the E-drill taking care not to bend it during extraction. Make sure there is no remaining clamping force on the Ground Pin if removal is difficult. As the Ground Pin Assembly is extracted, the Ground Pin Centering Guide will come out with the Ground Pin. Discard Ground Pin and Centering Guide once removed.

3.10.8. Lightly coat the shaft of the new Ground Pin Assembly with a light coating of O- Ring Lube (do not over lubricate). Insert the prepared Ground Pin Assembly into the nose of the E-drill pressing it through the E-drill's internal seals. Use care not to bend the Ground Pin during insertion. Use Ground Pin Gauge to set the proper pin length and secure the Ground Pin Clamp Screw (do not use excessive torque).

Press the Ground Pin Centering Guide on the Ground Pin Assembly into its seat in the Electrode Conducting Tube Bore using the tip of an Electrode. Install the required Electrode and Adapter and resume E-drill operation.





3.11. Draining of system for storage or transport.

The Perfect Point E-drill system should be protected from freezing conditions that can crack or burst de-ionized water connections and plumbing. If the system is subjected to freezing temperatures, it should be thoroughly inspected by a trained technician for damage or leaks prior to use. If the system is to be stored or transported in low temperature conditions, then it should be fully drained first.

To drain the system completely follow section 3.7 (Replace Filter). Before re-use follow section 3.8 (System Bleeding and Charging) to refill the dielectric system.

4. Trouble-Shooting Guide

This section of the Maintenance and Troubleshooting Guide lists common maintenance issues encountered and their solutions. In the event of issues, it is recommended that the E-drill Daily Checklist (section 2.0) is followed before using the deeper investigation steps listed in this section.

The troubleshooting section may be used in two ways. Firstly, common symptoms may be traced in the flow-charts in section 4.1.

Secondly, if the flow-charts do not resolve the issue, section 4.2 provides a more detailed set of fault descriptions and rectification.

If a solution cannot be found in this Trouble-Shooting Guide, do not hesitate to contact the Customer Service Hotline Phone at 714-891-6533. This number is located in 3 places on the system for ease of access.

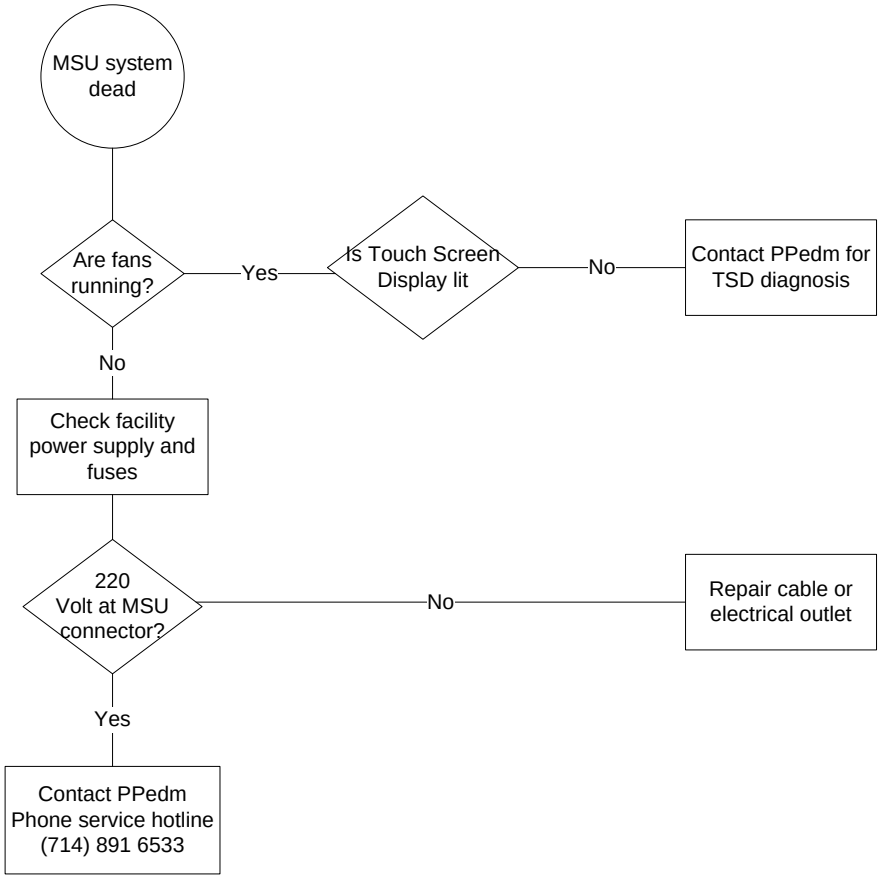
- Mobile Service Unit directly above the system power switch.
- The “Information” page of the “Maintenance” screen in the Touch Screen Display.
- Printed in the header of this Maintenance Guide.

4.1. Trouble-Shooting Diagnostic Flowcharts

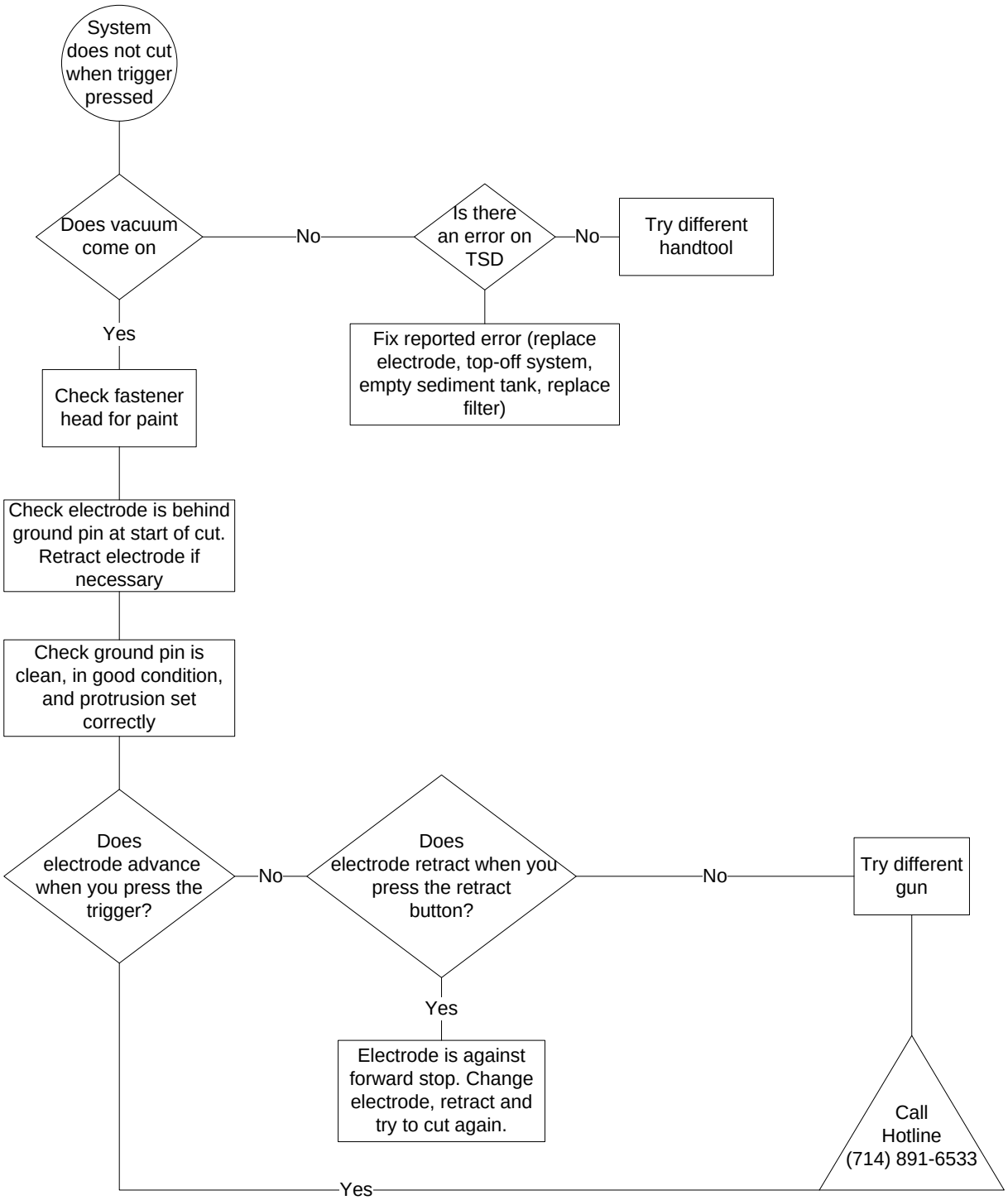
Flow charts cover the following conditions:

- MSU system dead.
- System does not cut when trigger pressed.
- Cutting too slow.
- NO vacuum at hand-tool.

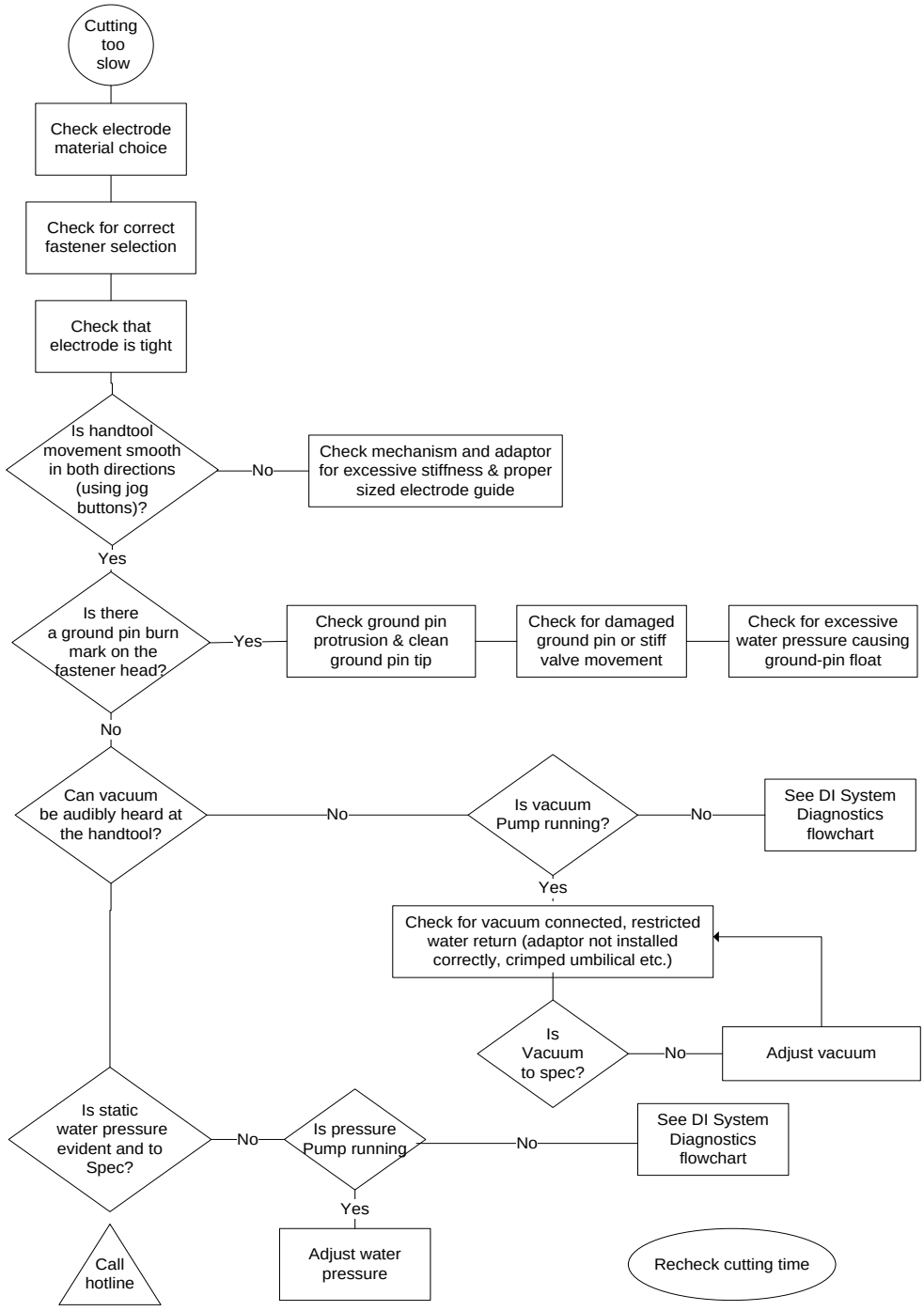
4.1.1. MSU system dead



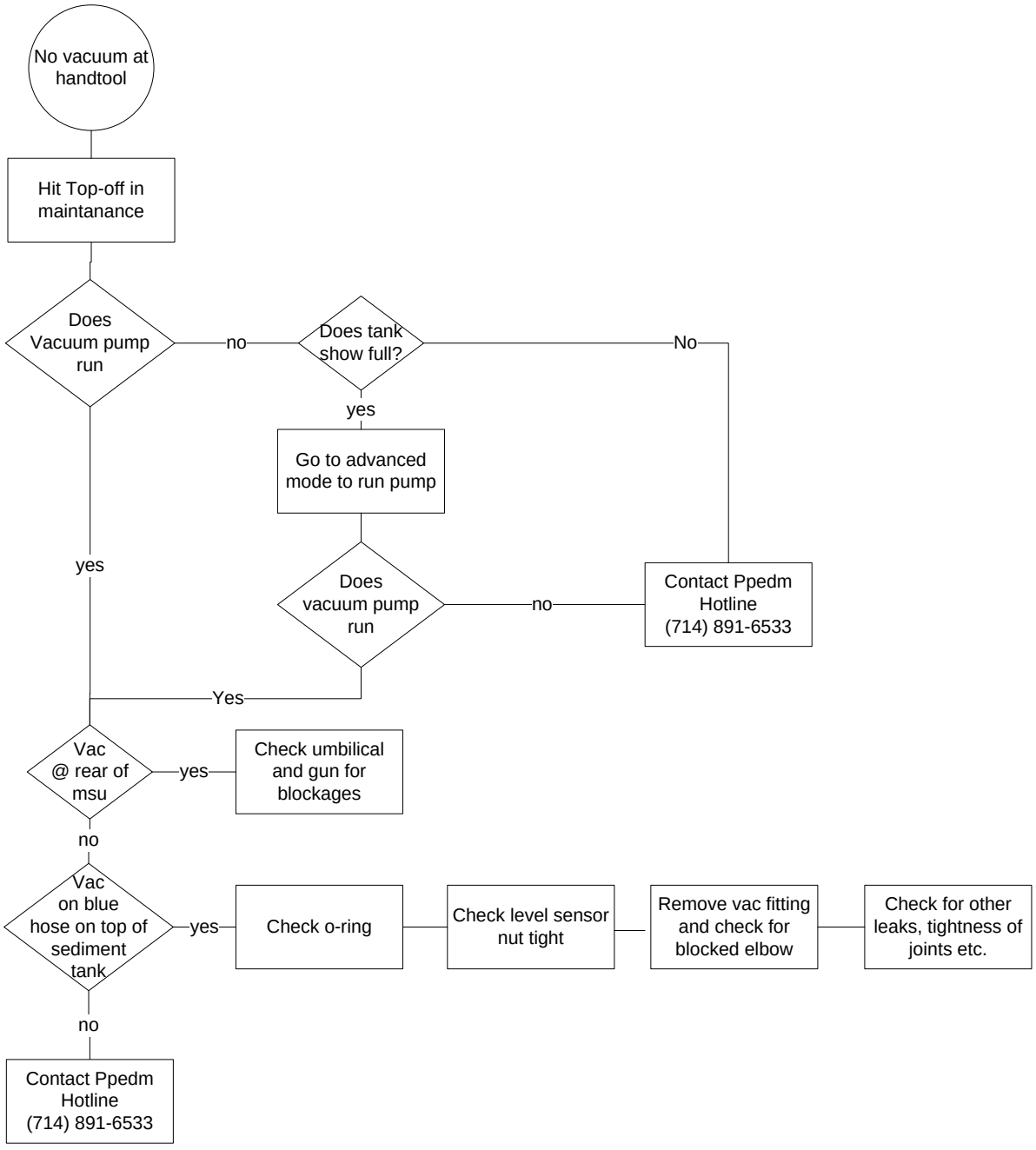
4.1.2. System does not cut when trigger pressed



4.1.3. Cutting too slow



4.1.4. No vacuum at hand-tool



4.2. Fault Descriptions and Rectifications

4.2.1. Mobile Service Unit General Fault

Trouble	Probable Cause	Remedy
No activity, no display, rear cooling fans not working.	No input power.	Check power connection and voltage. Check power switch is in on position. Check facility circuit breakers.
System displays **Low Dielectric Level** error.	Dielectric water is below minimum level.	Top-up dielectric level as described in Section 3.4.
Initial **top up** routine ends prematurely. Pressing the button again causes more top up, as if previous top up ended prematurely.	Normal behavior. Since the top-up routine is vacuum driven, when the vacuum stops the level drops slightly below its previous height during filling. Level is ok after the initial automatic stop.	
Vacuum Pump does not run during cutting.	Supply voltage too low.	Check facility power output.
	Pump damaged by flooding.	MSU requires service (see System Overflow entry on following page). Immediately contact PPedm for system service.
Mobile Service Unit makes loud screeching noise.	Air entrapped in the Mobile Service Unit Pressure Regulator.	Bleed DI system (See Ch. 3 System Maintenance, Section 3.7 System Bleeding and Charging)
System overflows during Top Off routine causing water puddle under the MSU.	System Sediment Tank Top Water Level sensor is jammed.	Immediately call the PPedm Customer Service Hotline for assistance.

4.2.2. E-drill general fault

Trouble	Probable Cause	Remedy
No cutting occurs, vacuum pump does not start.	Electrode needs replacement. Green light on hand-tool is flashing.	Replace electrode (see Section 2.1).
	System error. Flashing red light on hand-tool.	Observe error displayed on control terminal. Check water level. Contact the PPedm Customer Service Hotline for support.
	Hand-tool not connected to utility cabinet.	Recheck hand-tool connection on rear of cart. Ensure locking bezel is fully rotated.
No cutting occurs, vacuum pump starts but pressure pump does not start.	Fastener surface is not conductive.	Check that nose of hand-tool is placed over fastener, and all paint or sealant has been removed from fastener surface.
	CG Hand Tool will not cut.	Ground pin incorrectly adjusted or damaged.
	EG Hand Tool will not cut	Check for bad or loose ground clamp connection.
Cutting occurs but system shows red warning LED at end of cut.	Hand-tool trigger was released prematurely.	Re-cut fastener ensuring to hold down trigger until system finishes cutting.

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	Cutting process ended prematurely.	Check library setting for correct fastener type. Make an additional cut by squeezing trigger a second time while still in-place over fastener. The system will likely repeat the same error since less cutting was required in the second cycle.

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Trouble	Probable Cause	Remedy
Cutting not to depth. Water leaking around tip.	Hand-tool not firmly and consistently held in contact with fastener and airframe surface throughout cut.	Press hand-tool firmly over fastener and maintaining pressure until cut is complete.
Cycle time excessively long. Cutting too deep.	Hand-tool is not held stable during cut.	Hold hand-tool in a fixed position during cutting.
	Electrode is not tight.	Tighten electrode.
Cut slower than expected.	Electrode is not tight.	Check electrode tightness with electrode torque wrench.
	Ground Pin protrusion not sufficient, restricting water flow and/or causing bad ground connection.	Adjust Ground Pin protrusion with Ground Pin Setting Tool.
	Air in system.	Bleed DI system.
	Leaks in water system.	Check visually for leaks in water system or for crimped hoses. If you have access to a pressure gauge then check water pressure (see section 3.8, page 48.)
	Wrong fastener selected.	Check fastener settings.
	Wrong electrode type.	Check electrode material application.
	Operator error.	User lifted or moved E-drill during cut sequence.

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Trouble	Probable Cause	Remedy
Water sprays excessively out of hand-tool. Hand-tool cannot be held easily against work surface	Dielectric vacuum and water connections incorrect.	Check water tube connections. Tube connections at back of utility cabinet should not be crossed.
No cutting occurs. No water evident. Burning smell around electrode	Wrong Adapter in use for the fastener being removed resulting in the ground pin not being depressed sufficiently – typically a button-head tip is being used for a flush head fastener. Incorrectly adjusted or damaged Ground Pin.	Select the correct tip Adapter configuration for the fastener. If the wrong tip is used then the depression of the ground pin will not be sufficient for water flow, causing overheating and damage to the equipment.
Fastener does not punch out.	Wrong fastener settings.	Check all settings in the HHT.
	Wrong electrode type.	Check electrode application against fastener application.
	Insufficient cut depth programmed in HHT library.	Check fastener size.
	Oversize fastener.	If problem persists, contact PPedm Customer Service Hotline for assistance.
	User Error	User lifted hand-tool during cut sequence.

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Trouble	Probable Cause	Remedy
E-drill stops within a second of starting, and does not go to cut depth.	Ground Pin protrusion significantly out of adjustment or worn beyond its life. Paint, corrosion, or sealant on fastener head.	Adjust Ground Pin protrusion with Ground Pin Setting Tool. Clean fastener head for proper grounding. Cutting a depressed center fastener (such as a Torx or Phillips head) without specially adjusting the Ground Pin protrusion to match the fastener depth.
Electrode advances to limit and Hand Tool emits a constant buzzing noise.	E-drill Trigger is stuck in the on position.	Power off system. Check operation of trigger, clean surrounding area to attempt to free the trigger assembly. Trigger should “click” when depressed. Contact PPedm Customer Service Hotline if the problem persists.
Cutting is intermittent and cutting time is longer than usual.	Electrode has come loose in E-drill.	Remove Adapter, drive electrode forward using the trigger and re-tighten with the electrode torque tool.
Water leaking from E-drill retract button or ground pin adjusting holes.	E-drill seal failure	Call the PPedm Customer Service Hotline and obtain an RMA and return E-drill to PPedm for service.
Vacuum pump does not stop operating after 3 seconds of trigger release. E-drill “buzzing” and does not stop automatically at the end of stroke.	Water inside of E-drill.	Call the PPedm Customer Service Hotline and obtain an RMA and return E-drill to PPedm for service.

APPENDIX 1. Regulatory Declarations

CE Declaration of Conformity:

DECLARATION OF CONFORMITY

Application of Counsel Directives: 2014/30/EU and 2014/35/EU	
Standard to which conformity is declared:	EMC Directive 2014/30/EU EN61000-6-4:2006+A1:2011 EN55011 Class A Group 2 EN61000-6-2:2005 EN61000-4-2 EN61000-4-3 EN61000-4-4 EN61000-4-5 EN61000-4-6 EN61000-4-8 LVD Directive 2014/35/EU EN60974-1:2015
Manufacturer's Name:	Perfect Point EDM Corp.
Manufacturer's Address:	15192 Triton Lane Huntington Beach, CA 92649 714-892-3400
Equipment Description:	Plasma Cutting Tool
Equipment Class:	Generic Standard Industrial Environment Class A Group 2
Model Number:	E-Drill
I the undersigned hereby declare that the equipment specific above, conforms to the above Directives and Standards.	

HUNTINGTON BEACH, CA
Place:

William M Palleva
Signature:

WILLIAM M PALLEVA
Full Name:

V.P. PRODUCT DESIGN
Position:

CSA Certificate of Compliance:

CSA GROUP™

Certificate of Compliance

Certificate: 2402903 **Master Contract:** 250252

Project: 80041812 **Date Issued:** 2020-05-20

Issued To: **Perfect Point EDM Corporation**
15192 Triton Lane
Huntington Beach, California, 92649
United States

The products listed below are eligible to bear the CSA Mark shown with adjacent indicators 'C' and 'US' for Canada and US or with adjacent indicator 'US' for US only or without either indicator for Canada only.

Issued by: Omar Elouadrhiri
Omar Elouadrhiri

C SA® US

PRODUCTS
CLASS - C561101 - WELDING MACHINES
CLASS - C561181 - WELDING MACHINES Certified to US Standards

Fastener removal system, Model CP1-SY-01X, where X indicates the number of guns provided with the system. Rated 240 VAC, 50/60 Hz, 20 Amp. Mounted on wheels, unit is cord and plug connected with detachable cord.

APPLICABLE REQUIREMENTS
CSA E60974-1 – 2012 Arc Welding Equipment; Part 1: Welding Power Sources
ANSI /IEC 60974-1 - 2008 Arc Welding Equipment; Part 1: Welding Power Sources

MARKINGS: See descriptive report.

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CSA GROUP™

Supplement to Certificate of Compliance

Certificate: 2402903 **Master Contract:** 250252

The products listed, including the latest revision described below, are eligible to be marked in accordance with the referenced Certificate.

Product Certification History

Project	Date	Description
80041812	2020-05-20	FIR resolution for non-conformance issues noted in FC# 250652 FIR dated Oct. 12, 2019. Addition of alternate relay MP240D4. Product evaluation to CSA E60974-1 – 2012 / ANSI /IEC 60974-1 - 2008 based on Welding Equipment Notices No. 8 and 9.
0002526922	2012-05-18	Update to correct model number of cooling fan
0002402903	2011-06-15	Original Certification of Fastener Removal System, model CP1-SY-01X. Certified to the requirements of CAN/CSA-E60974-1-0 with Amendment 1: 2002, and UL 60974-1

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APPENDIX 2. Advanced Functions

5. Advanced Functions

The Advanced Functions screen is provided to enable the system to be adjusted to remove non-standard fasteners, and to provide functions to assist in fault diagnosis. To access advanced functions, the user will need to obtain a password from Perfect Point service personnel.

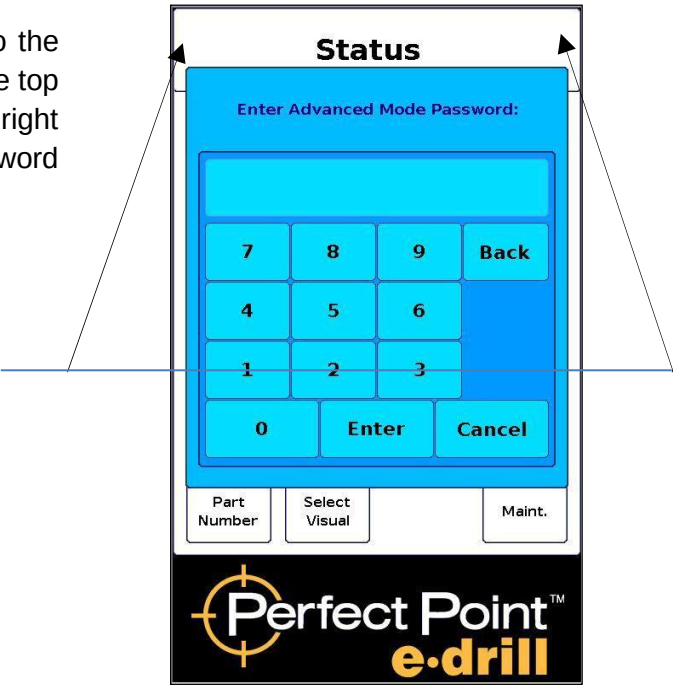
Advanced functions include:

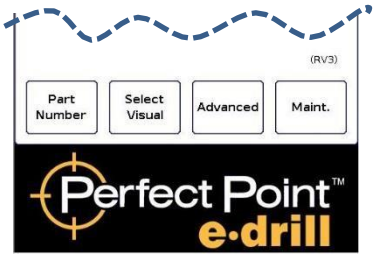
- Manual Setting of Depth of Cut and Cycle Time
- Manual Setting of Retract Distance
- Manual Extend & Retract of Electrode (May also be activated by function keys).
- Manual DI Pump and Vacuum Control
- Manual Spark Power Control

5.1. Password Entry:

To enable the advanced menu tab, return to the home screen, and then press in sequence the top left corner of the screen followed by the top right corner, within 2 seconds. A prompt for password will appear.

To enable Advanced Menu tab, press top left corner of screen then top right corner of screen in quick succession.





Enter the password provided by Perfect Point, followed by the *enter* button. If the procedure is completed correctly, the Advanced Mode will be enabled. While Advanced Mode is enabled, an **Advanced** tab is visible along the bottom of the screen.

5.2. Accessing Advanced Functions:

Pressing on the advanced tab will access the advanced functions. The advanced functions screen is divided into three tabs; **Current Part**, **System** and **Reset**.

5.3. Current Part tab – Override Library settings:

Under the **Current Part** tab an advanced user may override the **Cut Depth** or the **Target Time** for the current fastener being removed. After the setting is saved, then the home screen will re-appear with the over-ridden parameters shown in red.

NOTE: The over-ridden values do not modify the library permanently, and the over-rides are only valid until another fastener is selected (or the current fastener re-selected). If you believe a library entry is incorrect, please contact Perfect Point Technical Support hotline (714-891-6533

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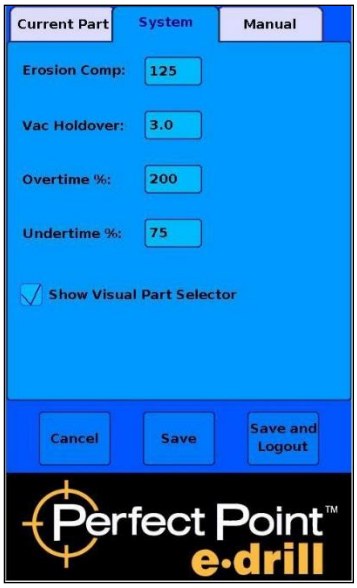
5.4. System tab - Override System Cut Parameters:



Under the **System** tab, an advanced user may override system cut related parameters, including Erosion Compensation, Vacuum Hold-Over (after trigger release), **Overtime,** and **Under-time** warning threshold settings. In addition, there are manual controls used for error diagnosis and a checkbox to control whether the visual selector is displayed (in some customer installations the visual selector is not displayed by default).

NOTE: Changes should only be made in the system screen by trained advanced users or service personnel. Incorrect usage of this screen could result in personal injury or damage to the equipment.

5.5. Manual tab - Reset System Counters and Update Part Number Library:

Under the **Manual** tab an advanced user may carry out several different manual functions, as follows:

1. Reset the counters for Sediment Tank and Filter Servicing. This should only be done after a service was recently performed, but the service was carried out incorrectly without resetting counters.

2. Manually turn on or off De-Ionized Water Pump and Vacuum Pump, or manually Extend or Retract the Electrode. These manual overrides are for diagnostic purposes and should only be used when instructed to by PPedm Service Hotline personnel.

3. Use the Part Number Library (PNL) from an external USB stick, or copy the USB PNL to the on-board memory. This functionality is used to trial-run a PNL change, and then transfer it to memory if it is successful. Please contact the PPedm Customer Service Hotline on 714.891.6533 if your PNL needs to be updated.

When the advanced user is finished with the advanced functions screens, (note that E-drill operation can only be carried out when the home screen is displayed), then the user may either **Cancel** (all changes are ignored and advanced mode is disabled), or **Save** the changes, (and return to Home Page but still in Advanced Mode), or **Save and Logout** (return to Home Page and log out of Advanced Mode). So that the advanced functions are not left on permanently, the system will automatically disable the advanced tab after 10 minutes.