

MEGADYNE

MEGA POWER™

Electrosurgical Generator

SERVICE MANUAL




The Mega Power Electrosurgical Generator is manufactured in the United States by:

MEGADYNE®

Megadyne Medical Products, Inc.

11506 South State Street
Draper, UT 84020 USA
Phone: 801-576-9669
800-747-6110 (U.S.A. only)


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Quality First International Limited
20 Eversley Road, Bexhill-on-Sea
East Sussex, TN40 1HE
United Kingdom

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Mega Power Patent numbers: D491,666 D491,667 Mega 2000 is a registered trademark of
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Preface

This service manual is for use only by qualified and trained personnel. It is intended for servicing the Megadyne Mega Power Electrosurgical Generator only. For clinical use of this system, please refer to the Mega Power User's Manual.

Service Centers/Shipping Instructions

Maintenance/Service

It is recommended that maintenance calibration testing be performed at annual intervals. Refer to the calibration testing section in this manual for details.

In addition to calibration testing routinely inspect the power cord, footswitch cables, and connectors for any signs of damage. Replace damaged cords and/or connectors immediately.

Should your Mega Power Electrosurgical Generator require service or repair, please contact Megadyne's Customer Service department to obtain a Returned Goods Authorization (RGA) number. Return the generator in its original packaging if possible with the RGA number written on the address label to:

MEGADYNE Medical Products, Inc.
11506 South State Street
Draper, UT 84020
USA

Phone: 801-576-9669/800-747-6110 (U.S.A. only)
Fax: 801-576-9698

Limited Warranty

For the periods and the conditions specified below, Megadyne warrants to the original purchaser that the Mega Power Electrosurgical Generator will perform to our published specifications when used and maintained in accordance with our written instructions.

The Mega Power Electrosurgical Generator is warranted to be free of defects under normal use and maintenance for two years from the date of purchase. Megadyne will, at its option, repair or replace the defective product without charge, using new or remanufactured parts. Megadyne reserves the right to make a repair in its factory, at any authorized repair facility, or at the purchaser's premises.

An unauthorized repair of the Mega Power Electrosurgical Generator will void this warranty. In addition, the warranty is null and void if the Mega Power Electrosurgical Generator is used other than is specified in the Operator's Manual. Without limitation, the warranty does not cover damage caused by customer misuse of the Mega Power Electrosurgical Generator.

THIS WARRANTY IS IN LIEU OF ANY OTHER WARRANTIES EXPRESSED OR IMPLIED, AND ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS EXPRESSLY DISCLAIMED. Purchaser's exclusive remedy for any failure of the Mega Power Electrosurgical Generator is as provided in this Limited Warranty. In no event shall Megadyne be liable for any special, incidental, consequential, indirect or other similar damages arising from break of warranty, break of contract, negligence or any other legal theory.

Introduction and General Description

The Megadyne Mega Power Electrosurgical Generator is designed to produce radio frequency (RF) current for cutting and coagulation during surgical procedures. It is an isolated output generator.

This manual describes the attributes and specifications of the generator, describes the internal workings, and provides a guide to the procedures necessary for calibrating, testing and servicing the unit. For reasons of personnel safety and continuing reliability, the generator should not be operated, calibrated, tested, or internally examined by anyone except trained technicians who are skilled in the operation and service of medical electronics equipment.

Component-level electronic repair is restricted to Megadyne authorized personnel.

List of Assemblies

The MEGA POWER generator contains the following subassemblies:

- Front Panel
 - Control switch overlay
 - Indicators
 - Display Printed Circuit Board
 - Power switch

- Rear Panel
 - Footswitch receptacles
 - Volume control
 - Power entry module
 - Grounding lug
 - RS232C port for system control and diagnostics

- Internal assemblies
 - Power Factor Printed Circuit Board
 - Microcontroller Printed Circuit Board
 - Footswitch Printed Circuit Board
 - Main Printed Circuit Board
 - High Voltage Power Supply
 - RF Output
 - Heatsink Assemblies
 - Low Voltage Power Supply
 - Safety Circuits
 - Fan Assembly

Warnings

The warnings given below pertain to testing, calibration, and servicing of the generator. The service technician should also be aware of the warnings given in the Operators' Manual for clinical use of the generator.









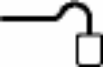
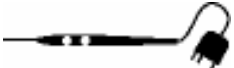

- For operation of the generator, connect the power to a properly grounded receptacle. Do not use a power plug adapter.
- Accessories connected to the generator are sources of high voltage, high current, and high frequency electricity. Touching the non-insulated portion of these accessories or any conductive surfaces that come in contact with these accessories during activation may result in serious injury.
- Turn off and unplug the generator prior to cleaning. Rubbing a cleaning cloth over the front panel may inadvertently activate the pressure-sensitive switches, thus turning the generator on or changing the power or mode settings.
- Disconnect the power cord and wait at least five minutes before performing any procedures that require removal of the outer shell, or replacement of parts or boards to allow discharge of power supply components.
- When testing, calibrating, or troubleshooting with the shell off, be aware that potentially lethal AC, and DC voltages may be present on some components and exposed metal surfaces. These constitute a serious shock hazard. Do not touch any of these surfaces. Use non-conductive tools and isolated or high impedance test probes with high voltage insulated handles.
- Do not wear ground straps when power is on.
- When testing, calibrating, or troubleshooting with the outer shell and fan assembly off, be aware that high voltage RF is present on many of the conductive surfaces whenever the generator is activated. These constitute a serious burn hazard. During activation of the RF output, it is not only unsafe to directly touch exposed metal surfaces but it is also possible for an arc to form between a conductive surface and a body part. Keep fingers at least one inch away from any internal generator parts while the generator is activated.
- Use the lowest possible power settings to achieve the desired effects.
- Do not install or activate the generator in the presence of flammable anesthetics or oxidizing gases such as nitrous oxide (N₂O) and oxygen.
- Non-flammable agents should be used for cleaning and disinfection wherever possible.
- Flammable agents used for cleaning or disinfecting, or as solvents of adhesives, should be allowed to evaporate before RF activation.
- Cautery tips that are activated or hot during calibration or troubleshooting can cause a fire. Do not place them near or in contact with flammable materials and substances.

Cautions

The cautions given below pertain to testing, calibration, and servicing of the generator. The service technician should also be aware of the cautions given in the user manual for clinical use of the generator

- Read all instructions prior to installation and operation.
- Use properly grounded AC outlets when connecting the generator power cord.
- Do not place containers of fluids on the generator, or allow fluids to spill on the generator.
- Do not operate the generator without adequate clearance for ventilation. Space between the bottom of the feet and the floor of the generator should be free of obstruction. At least two inches of air should separate the sides, back, and top of the generator from any ventilation-obstructing surface. Do not place the generator in a small, non-ventilated location.
- Connect accessories (e.g. pencil, foot cord, bipolar instruments, return electrode, etc.) to the proper receptacle using connectors specifically designed for the intended purpose. Follow the instructions for use provided by accessory manufacturers.
- Apparent low power output or failure of the electrosurgical equipment to function correctly at normal settings may indicate faulty application of the dispersive electrode or failure of an electrical lead. Do not increase power output before checking for obvious defects or misapplication.
- Do not coil electrosurgical accessory cords, and do not wrap electrosurgical accessory cords around metal objects. This may induce current flow to unintentional areas causing, shocks, burns,
- With the fan assembly removed, do not activate the generator for more than one half hour at full rated power and load. Activating the generator beyond the recommended Duty Cycle of ten seconds on and thirty seconds off for long periods of time can cause system overheating.
- When repairing the generator, follow the static control guidelines for semiconductors in order to avoid damaging individual components or board assemblies.

Symbols

Symbol	Description
	ON (Power)
O	OFF (Power)
	Read instructions prior to use
	Generator output is floating with respect to ground
	Defibrillator proof type CF equipment
	Dangerous Voltage
	Equipotentiality
	Foot Switch
	Speaker
	Fuse
	Return electrode connection
	Hand control receptacle
	Foot control receptacle

Operating Instructions

With the generator in the “OFF” position be sure that the power cord is fully inserted into both the generator receptacle on the back of the generator and into the appropriate grounded outlet (figure 1). The generator will function in either the 100 or 240 volt modes depending on the power applied to the generator.

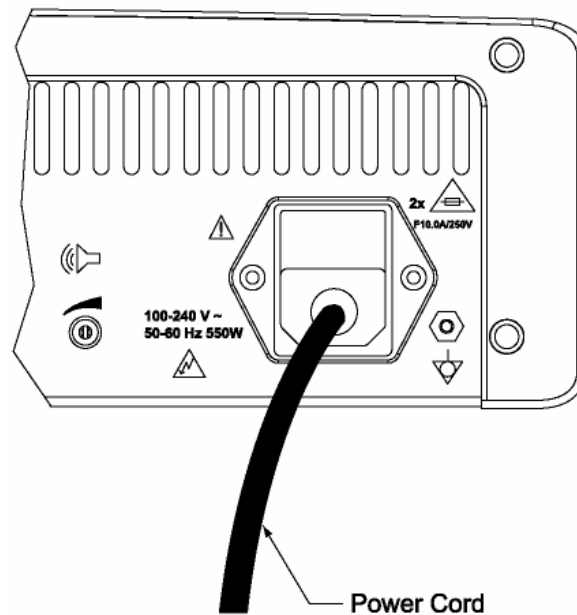


Figure 1.

Foot Controls: If footswitches are to be used for activating the active electrode, attach the monopolar, and/or bipolar foot controls to their appropriate receptacles while the generator is in the “off” position (figure 2). If footswitches are not used during the procedure disconnect the footswitches from their receptacles.

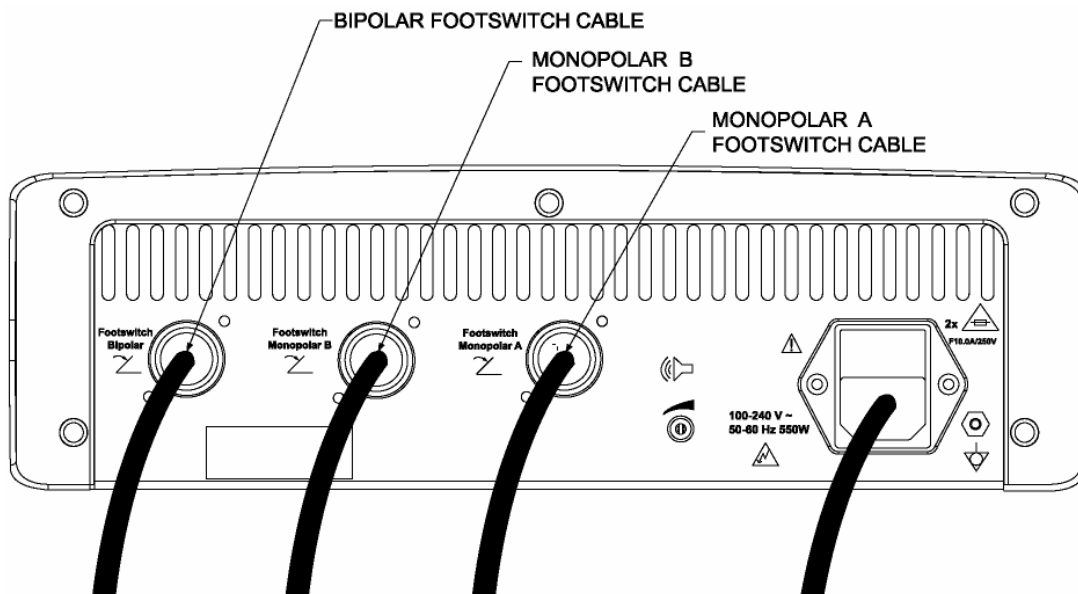


Figure 2.

Patient Return Electrodes: Install a patient return electrode according to the electrode manufacturer's instructions for use. Megadyne recommends the use of the Mega Soft™ family of Reusable Patient Return Electrodes, however, the Mega Power Electrosurgical Generator is compatible with all approved return electrodes. Insert the return electrode cable into the proper receptacle (figure 3).

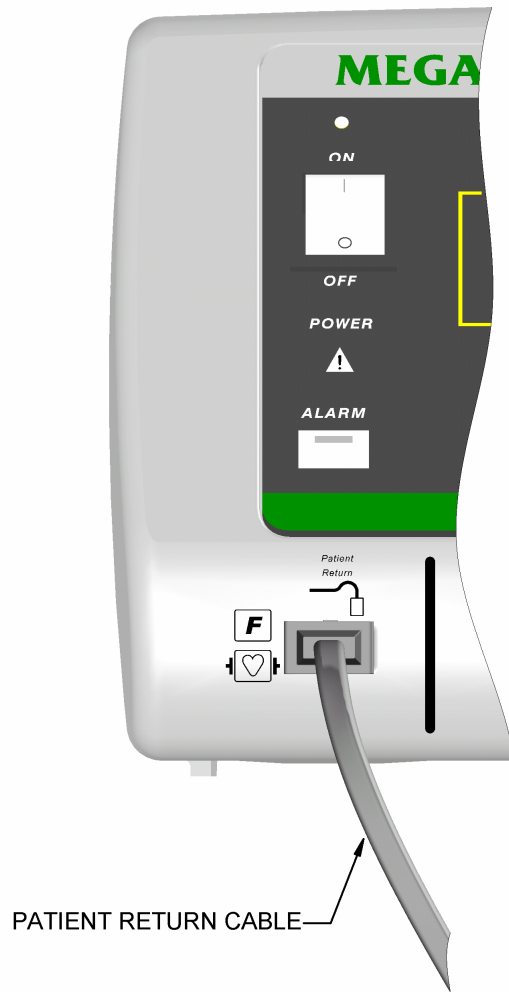


Figure 3.

Active Accessories: The Active Accessories are the monopolar hand switching pencils, electrodes, monopolar foot cords, and bipolar cords. Megadyne recommends the use of the Megadyne family of Active Accessories, including E-Z Clean® electrodes. Fully insert the Active Accessories into their appropriate receptacles ensuring that no metal is exposed (figure 4)

Powering the Generator: Turn on the generator by placing the “ON/OFF” switch into the “ON” position. Once the generator completes the start-up and self check routines of approximately 8 seconds, the power displays will show dashed lines.

Power Settings: To recall the last power setting used, press the RECALL key. Power settings may also be initiated by using the up arrow key when the dashed lines are displayed on the panel. Power settings may be adjusted by using the up and down arrow keys.

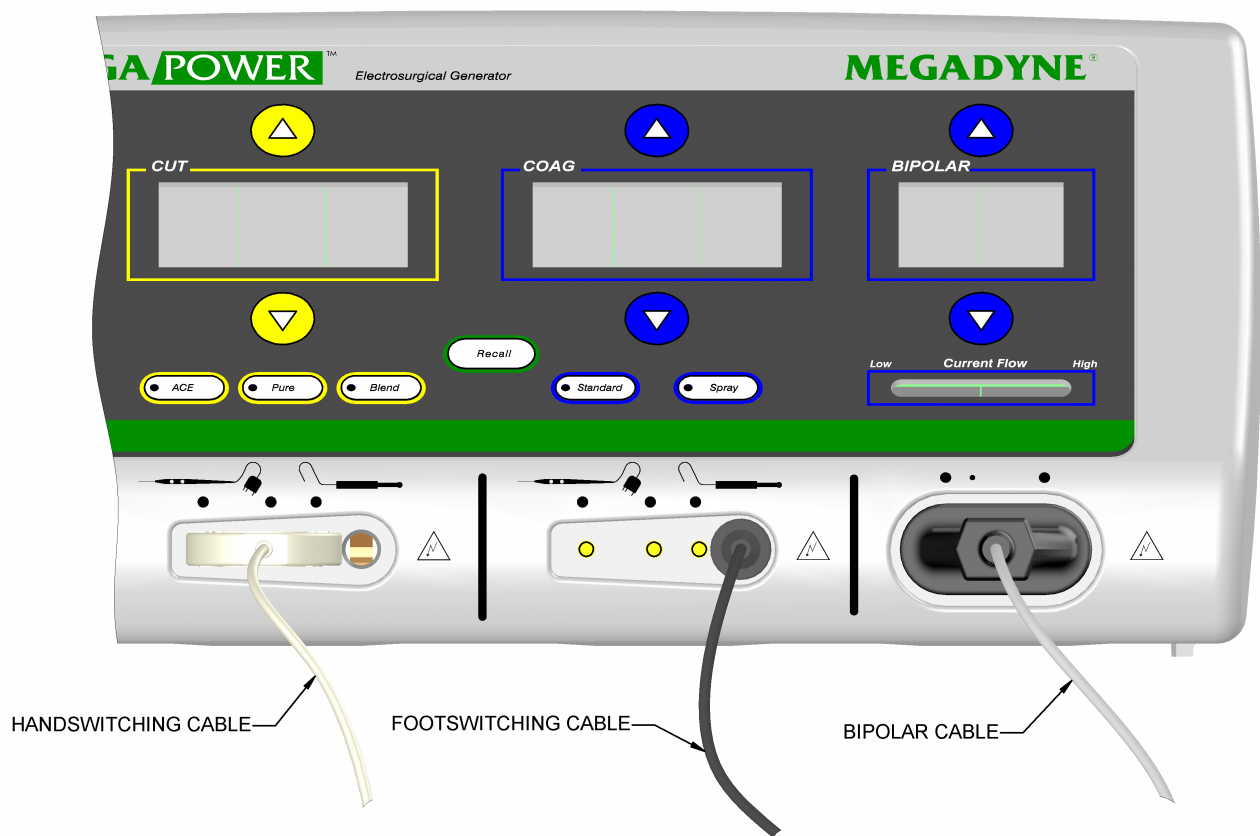


Figure 4.

Modes: Select the proper mode for monopolar “CUT” and “COAG” by depressing the appropriate mode key (figure 5). The indicator light on that key will illuminate when the mode has been selected.

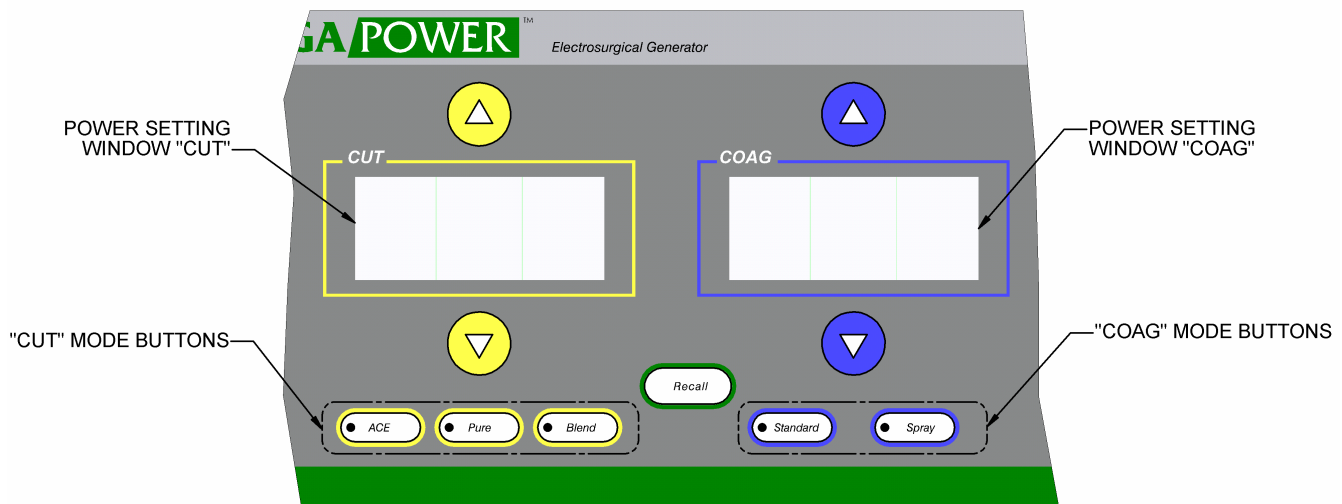


Figure 5.

Activating the Generator: Monopolar accessories attached to the monopolar hand switching receptacles may be activated by depressing either the “CUT” or “COAG” keys on the pencil, or foot pedals. Depressing either the “CUT” or “COAG” foot pedals will deliver power to the device attached to that channel. Only one active device may be plugged into each channel at a time (i.e. either the 3-prong pencil cord, or phone plug style cord).

Note: Only one monopolar accessory can be activated at a time.

Depressing the single footswitch of the bipolar foot control will activate bipolar instruments attached to the bipolar receptacles. For bipolar hand switching devices, closing the tips of the bipolar forceps will engage the switch on the instrument and will activate the device.

Note: The cut or coag display will become brighter when activated, while the unused display will dim.

Cleaning: Disconnect the power cord from the wall outlet prior to cleaning the generator. Use a mild detergent, or disinfectant to clean the generator. Abrasive cleaners will scratch the displays. Do not allow fluids to drain inside the generator.

Front Panel Controls, Indicators, and Receptacles

The Mega Power generator is designed as a full-functioning, easy to use electro-surgical unit for cutting and coagulating tissue (figure 6).

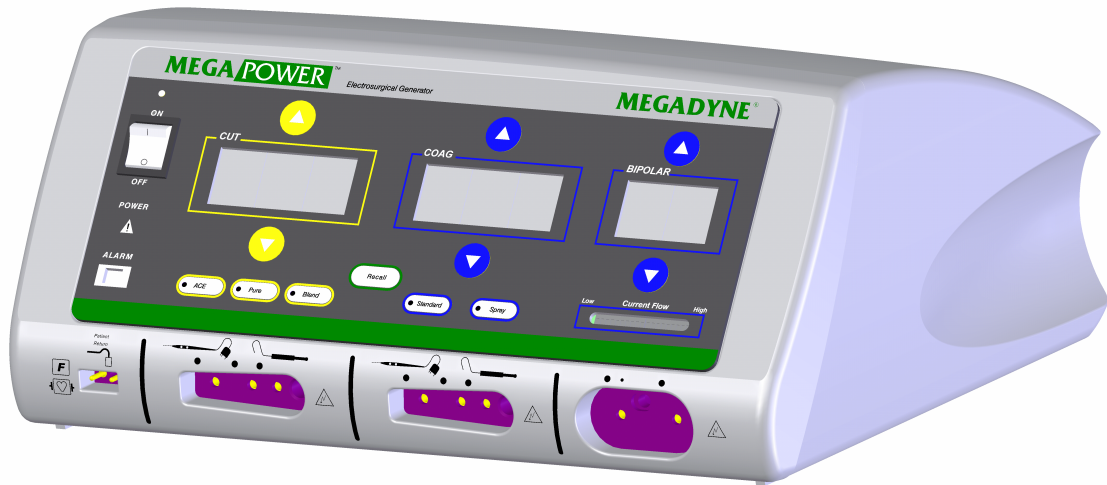


Figure 6.

Information regarding Mega Power functions and descriptions are detailed on the pages to follow.

The following descriptions correspond to controls, indicators, and receptacles on the front panel of the generator shown below (figure 7).

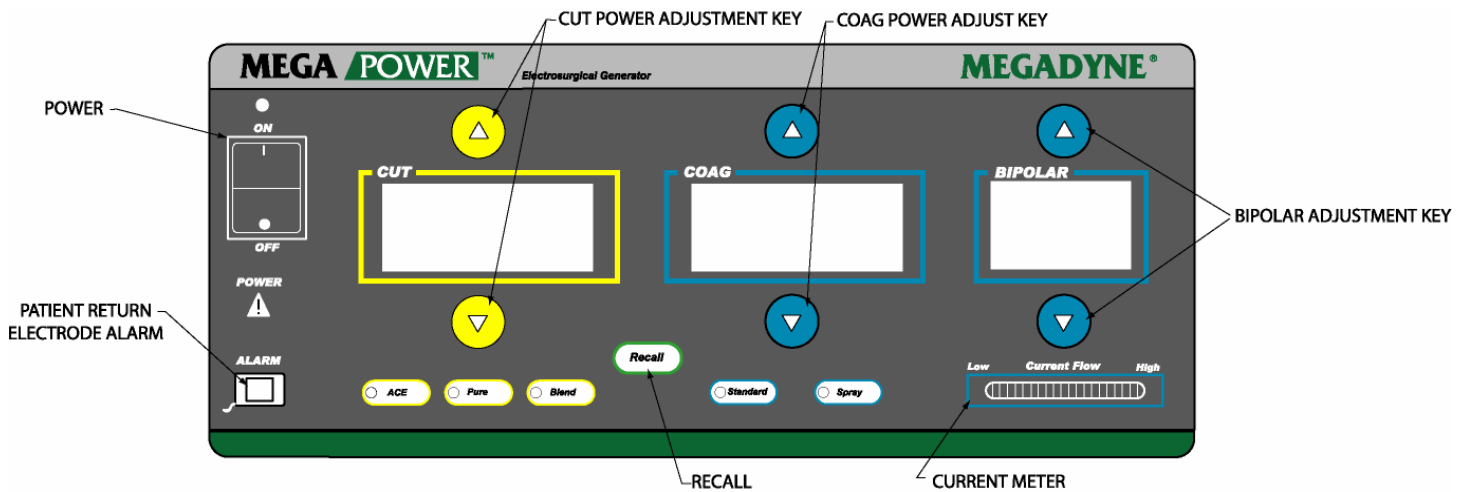


Figure 7.

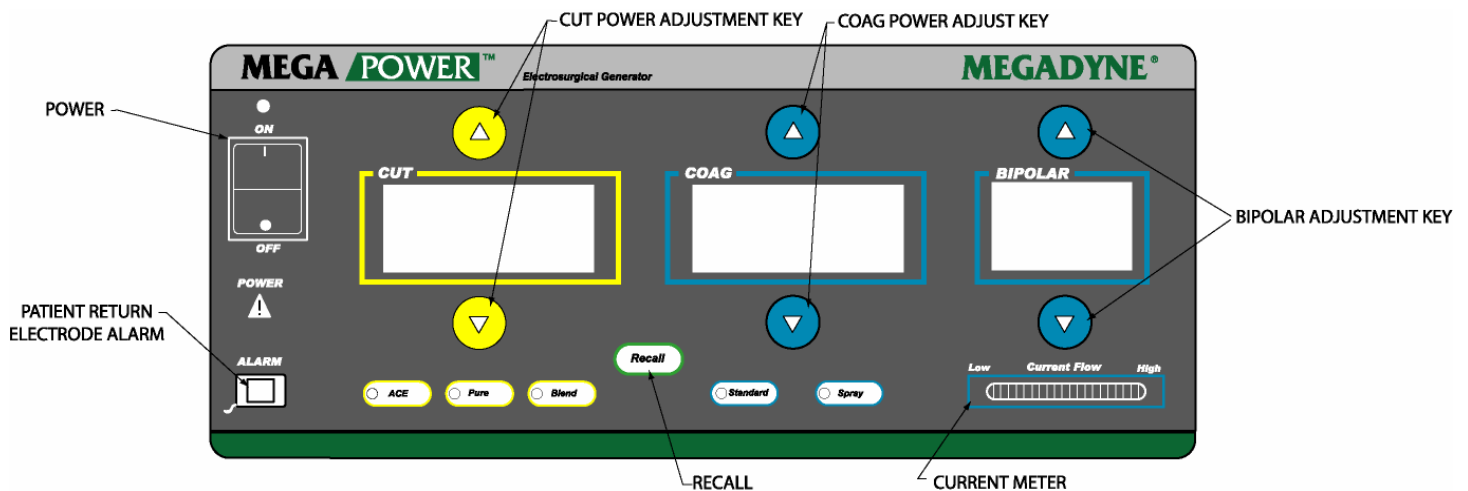
1. **POWER:** The power on/off switch is located in the top left-hand corner of the unit. The unit is turned “ON” when the ‘|’ is depressed and the light above the switch illuminates. The generator is turned “OFF” when the ‘o’ is depressed and the light above the switch is extinguished.
2. **CUT:** The cut controls are color coded yellow. The large numerical display indicates the power setting. The arrow ‘up’ key will increase power settings in one watt increments up to 40W and in increments of 5W thereafter to a maximum of 300W. The arrow ‘down’ key will decrease power settings in increments of five watts from 300W to 40W and in one watt increments thereafter.

Selecting the “ACE” key places the generator in the ACE (Advanced Cutting Effect) cut mode. The ACE mode automatically controls the output power of the generator to provide the surgeon with a consistent cutting effect. Little hemostasis is achieved in this mode. In the ACE mode the light on the key will illuminate indicating that this mode is selected, and the power display will show “ACE”. Power can not be manually adjusted by using the up and down arrow keys.

Selecting the “PURE” key places the generator function into a standard cutting mode. The light on the key will illuminate indicating that this mode is selected. The standard cut, or PURE mode allows the user to manually set desired power which is delivered during activation. Little hemostasis is achieved when in this mode.

Selecting the “BLEND” key places the generator cut function into a blended cutting mode. The light on the key will illuminate indicating that it is selected. This is a mix of the cutting and coagulation waveforms. The maximum power allowed in this mode is 200 W. It provides a cutting effect and a higher level of hemostasis than either the “ACE” or “PURE” cut modes.

During the case, the last BLEND setting used will remain in memory until the mode or power setting is changed. Once the generator is turned Off, and On again, depressing the RECALL button will recall the last mode and power setting used.



3. **COAG:** The coag controls are color coded blue. The large numerical display indicates the power setting. The arrow 'up' key will increase power settings in increments of one watt up to 40W and in 5W increments thereafter to a maximum of 120W.

The arrow 'down' key will decrease power settings in increments of five watts from 120W to 40W and in one watt increments thereafter.

Selecting the "STANDARD" key places the generator coag function into the desiccation mode. The light on the key will illuminate indicating that this mode is selected. The desiccation mode provides hemostasis to tissue that is in contact with the active electrode and provides diminished cutting effect when compared to cut modes.

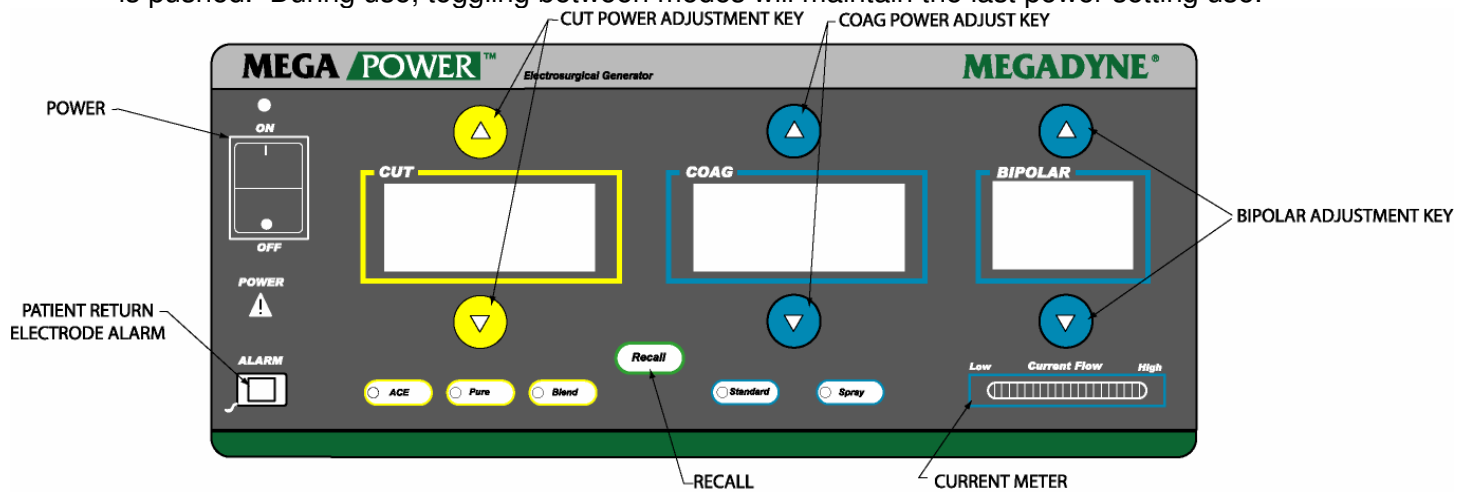
Coag with Cut Mode

To achieve more cutting effect in the STANDARD Coag mode, press the Pure Cut and the Standard Coag buttons simultaneously. This activates a second coag mode (Coag with Cut) for surgeons desiring a mild cutting effect during coagulation. When this mode is activated, the Standard Coag button will "blink" on and off. To return to the Standard Coag mode, simply press the Standard Coag button once, or go to Spray Coag and back to the Standard Coag mode. The blinking light will turn to a solid light and you will be returned to the Standard Coag mode. Powering down the system will also return the Mega Power to the Standard Coag mode. The second Coag mode can easily be recalled (if it was the last mode used) upon start up by pressing the RECALL key or simply use the instructions above to activate the mode

Selecting the "SPRAY" key places the generator coag function into the spray, or fulguration mode. The light on the key will illuminate indicating that this mode is selected. During the case, the last SPRAY setting used will remain in memory as a convenience to users when toggling between modes during a case. Once the generator is turned Off, and On again, depressing the SPRAY mode will change the mode, but not the power setting for patient safety.

The fulguration mode uses higher peak to peak voltages to allow current to "jump" from the active electrode through air to the target tissue producing sparks. This provides hemostasis in a more broad area with less depth of tissue damage when compared to desiccation. The SPRAY coag mode provides diminished cutting effect when compared to cut modes.

4. **RECALL:** The RECALL key is provided as a convenience to users and recalls the last mode and the last power setting used after the system is turned on, and the recall button is pushed. During use, toggling between modes will maintain the last power setting use.



5. **Bipolar:** The BIPOLAR controls are color coded blue. The large numerical display indicates the power setting. The arrow 'up' key will increase power settings in increments of one watt up to 80W. The arrow 'down' key will decrease power settings in increments of one watt.

When the bipolar mode is used the current will flow between the two tips of the instrument and will desiccate tissue. The bipolar mode can be activated with either a hand switching device, or with a bipolar footswitch.


The Mega Power offers two bipolar settings, a standard/micro bipolar and a macro bipolar.

Standard/Micro Bipolar

The Mega Power automatically boots up in the Standard/Micro bipolar setting. This setting is utilized for the majority of all bipolar cases and delivers a precise and controlled bipolar effect. The initial voltage is kept low to prevent sparking and the system maintains a specific power curve to achieve the proper tissue effect.

Macro Bipolar

Bipolar cases requiring a more rapid onset of power and higher voltage power output utilize a macro bipolar power curve. To access the Macro bipolar setting, simultaneously press the Standard and Spray Coag buttons as instructed below.

<p><u>Coag with Cut Effect:</u></p> <p>To activate the Coag with Cut effect, <u>simultaneously</u> press the Pure Cut and the Standard Coag buttons.</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid yellow; border-radius: 15px; padding: 5px; text-align: center;">● Pure</div> <div style="border: 1px solid blue; border-radius: 15px; padding: 5px; text-align: center;">● Standard</div> </div> <p>When this mode is selected, the Standard Coag button will blink as an indication that this effect is active.</p>	<p><u>Macro Bipolar:</u></p> <p>To activate the Macro Bipolar, <u>simultaneously</u> press the Standard and Spray Coag buttons.</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid green; border-radius: 15px; padding: 5px; text-align: center;">● Standard</div> <div style="border: 1px solid green; border-radius: 15px; padding: 5px; text-align: center;">● Spray</div> </div> <p>When the Macro Bipolar mode is selected, the two green vertical lights illuminated on the current meter upon start up will disappear.</p> <div style="text-align: center;"> <p>Low Current Flow High</p>  </div> <p>To revert back to the Standard Bipolar Mode, <u>simultaneously</u> press the Standard and Spray Coag buttons. You will know when you are in the standard Bipolar mode when you see two vertical green lights illuminated on the current Meter.</p>	<p><u>Bipolar Tone:</u></p> <p>To activate the Bipolar Tone in the Macro Bipolar Mode, <u>simultaneously</u> press the Pure Cut and Blend buttons. A tone will indicate that the current meter Bipolar tone has been turned on.</p> <div style="display: flex; justify-content: space-around;"> <div style="border: 1px solid yellow; border-radius: 15px; padding: 5px; text-align: center;">● Pure</div> <div style="border: 1px solid yellow; border-radius: 15px; padding: 5px; text-align: center;">● Blend</div> </div> <p style="text-align: center; font-size: small;">Tone for Macro Bipolar Only</p> <p style="text-align: right; font-size: x-small;">3150596-01 REV A 8-29-2007</p>
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6. Mega Power Bipolar Current Meter

The Mega Power Electrosurgical Generator Bipolar macro setting features a Bipolar Current Meter with both a visual graph and bipolar tone to provide an indication of the amount of current flow between the tips of the bipolar instrument.

Bipolar Current Meter Tone

The current meter **bipolar tone** can be activated and deactivated when desired. To activate the Mega Power current meter bipolar tone, press the “Pure” and “Blend” keys on the front display panel simultaneously. A single tone will indicate that the bipolar current meter tone is activated. During use, the bipolar tone will begin with a rapid tone and reduce to a slower, metered tone as current flow is diminished.

The bipolar current meter tone is turned off in one of two ways:

- 1). Press the Pure and Blend keys simultaneously. A tone will indicate the current meter bipolar tone has been disabled.
- 2). Or, simply turn the main power switch off on the front panel.

The Mega Power bipolar current meter tone will need to be turned on as instructed above each time the unit is powered on if the tone is desired during the case.

Bipolar Visual Indicator

The **visual indicator** will appear automatically when bipolar is in use. As tissue becomes desiccated it becomes more resistive and less current flows. Non-desiccated tissue will allow relatively high current flows and will illuminate all, or most of the green lights on the bar graph. Desiccated tissue will restrict current flow, reducing the number of lights illuminated on the bar graph.

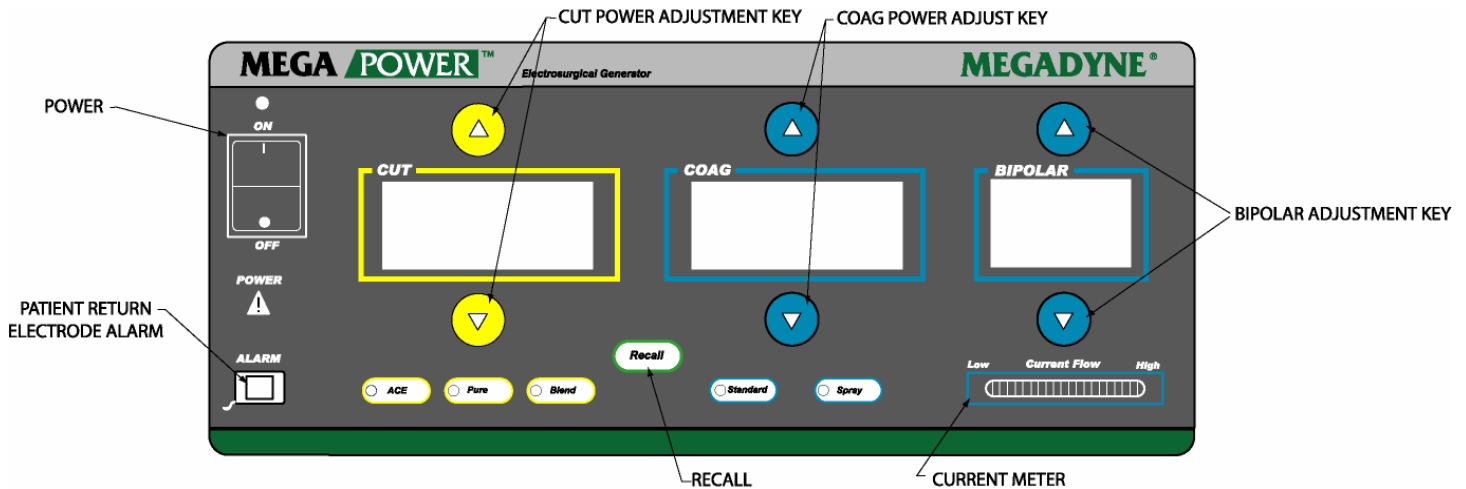
7. **Hand switching Accessory Receptacles:** The two monopolar hand switching receptacles are designed to accept standard three-prong active accessory devices (e.g. an electrosurgical pencil). Either receptacle may be used.

Note: Only one monopolar accessory can be activated at a time.

8. **Foot switching Accessory Receptacle:** The Foot switching accessory receptacle on the front of the generator accepts most, 8 mm diameter male style phone plug style connector from active accessory cords. Power is delivered to

this receptacle when the monopolar footswitch is attached to the appropriate receptacle on the back of the generator and is depressed by the operator.

Note: Only one monopolar accessory can be activated at a time.



9. **Bipolar Receptacle:** The bipolar receptacle can accept either a foot switching accessory or a hand switching accessory. A foot switching instrument requires the two large connectors to be inserted into the two mating receptacles. A hand switching instrument uses an additional male pin on the molded connector which is inserted into the smaller mating receptacle. **Note: Bipolar and monopolar accessories may not be activated simultaneously.**
10. **Patient Return Electrode Receptacle:** This receptacle accepts both single plate and split plate return electrodes.

Megadyne recommends use of the Mega Soft Reusable Patient Return Electrode family of products with the Mega Power electrosurgical generator.

11. **Patient Return Electrode Alarm:**

When the generator is turned “ON” with nothing inserted into the Patient Return Electrode Receptacle, the pad alarm will be illuminated “red” and the alarm will sound. When a single plate pad is plugged into the receptacle with a sufficient connection the alarm light will turn “green”.

When a monitoring, or split pad is plugged into the patient return electrode receptacle the generator performs a test to insure that the pad is properly attached to the patient. When the pad is properly installed the alarm icon will be illuminated “green”. If excessive impedance is detected in the split pad or the impedance increases by more than 30% from the initial measured value, the alarm will sound and the alarm symbol will be illuminated “red”.

Megadyne recommends use of the Mega Soft Reusable Patient Return Electrode family of products with the Mega Power electrosurgical generator.

Additional information on the Patient Return Electrode Alarm can be found in the Troubleshooting Section of this Manual.

Rear Panel Controls, Indicators, and Receptacles

The following descriptions correspond to controls, indicators, and receptacles on the back panel of the generator shown below.

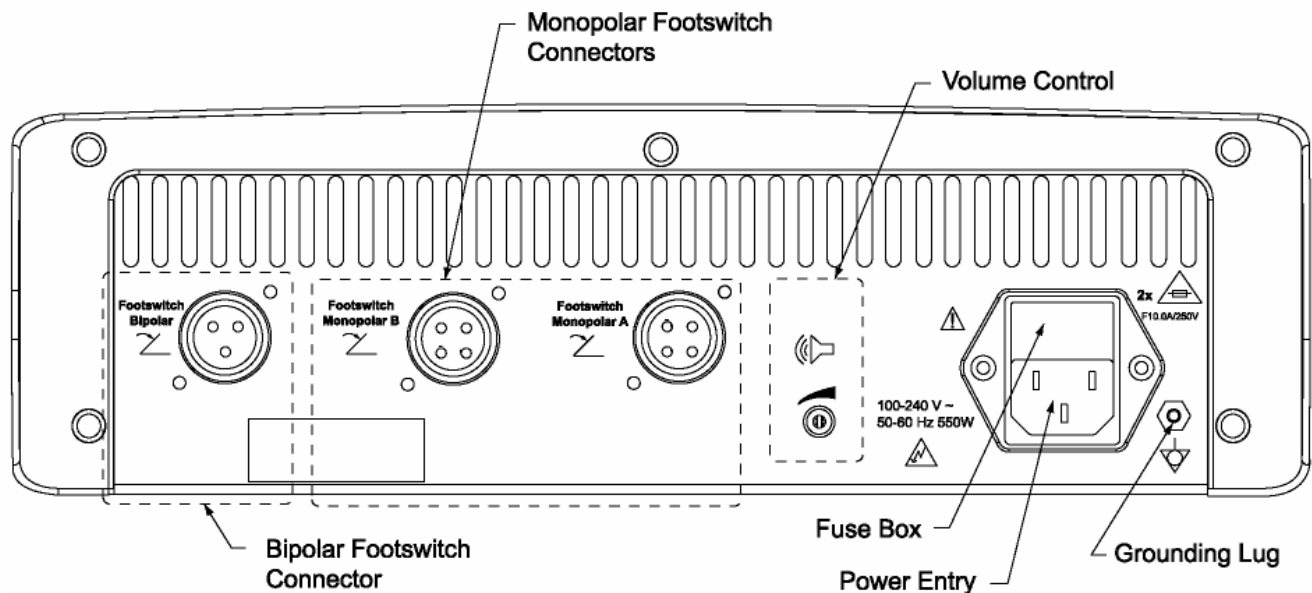


Figure 8.

1. **Volume Control:** The volume level is preset at the factory for all alarms. Volume control for Cut and Coag tones may be increased by turning the knob in a clockwise direction, and decreased by turning the knob in a counter-clockwise direction.
2. **Monopolar Footswitch Connector:** A Megadyne two pedal footswitch is connected by inserting the keyed connector into the proper receptacles and tightening the threaded collar. The Monopolar A footswitch will activate accessories attached to the A receptacles on the front of the generator. The B footswitch will activate accessories in the B receptacles on the front of the generator.
3. **Bipolar Footswitch Connector:** A Megadyne one pedal footswitch is connected by inserting the keyed connector into the proper receptacle and tightening the threaded collar.
4. **Power Cord Connector:** The hospital grade 3-prong power cord supplied with the generator is inserted here to provide power to the unit.
5. **Grounding Lug:** The grounding lug is provided for additional grounding of the chassis when required.
6. **Fuse Box:** The fuse box can be accessed by using a small flat instrument to open the drawer and pulling the receptacle towards you. If the fuse has been damaged replace with the proper size fuse (two each F10.0/250V).

7. Bar Code and Serial Number Plate: The unique serial number is listed on the plate with a corresponding bar code (figure 9).

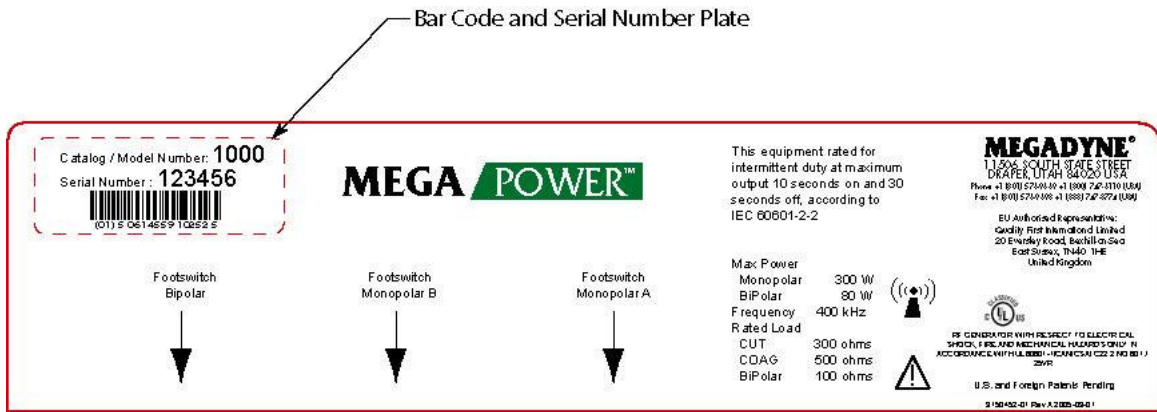


Figure 9

Calibration Check

Active outputs

This test requires an ESU analyzer and test leads for connection to generator. This test can also be performed with fixed loads and a current Loop. All equipment used must be able to measure true RMS.

1. Connect the Mega Power monopolar A output to the ESU analyzer. Short the two leads from the return electrode and connect them to the ESU analyzer.
2. Set the Mega Power to the PURE CUT @ 20 watts, and set the ESU analyzer to 300 ohms.
3. Activate the Mega Power using the footswitch on monopolar A. Verify an audible tone while the ESU is activated.
4. Activate the Mega Power and Verify the output power is 20 Watts +/- 4 watts using the ESU analyzer.
5. Change the power setting on the Mega Power to 300 watts, activate the Mega Power and Verify the output power is 300 Watts +/- 60 watts using the ESU analyzer
6. Set the Mega Power to the STANDARD COAG @ 20 watts, and set the ESU analyzer to 500 ohms.

7. Activate the Mega Power using the footswitch on monopolar A. Verify and an audible tone while the ESU is activated.
8. Activate the Mega Power and Verify the output power is 20 Watts +/- 4 watts using the ESU analyzer.
9. Change the power setting on the Mega Power to 120 watts, activate the Mega Power and Verify the output power is 120 Watts +/- 24 watts using the ESU analyzer.
10. Disconnect the Mega Power monopolar A from the ESU analyzer and connect the Bipolar output to the ESU analyzer.
11. Set the Mega Power Bipolar to 10 watts, and set the ESU analyzer to 100 ohms.
11. Activate the Mega Power using the bipolar footswitch. Verify and an audible tone while the ESU is activated.
12. Activate the Mega Power and Verify the output power is 10 Watts +/- 2 watts using the ESU analyzer.
13. Change the power setting on the Mega Power to 80 watts, activate the Mega Power and Verify the output power is 80 Watts +/- 16 watts using the ESU analyzer.
14. Both footswitch monopolar A & B, and hand activation monopolar A & B should be tested.

Contact Quality Monitoring (CQM) Test.

This test requires test leads to connect to the CQM receptacle, fixed load resistors and a variable load resistor.

15. Turn on the Mega Power ESU, the alarm should be red.
16. Attach a 50 ohm load across the two wires of the test lead. Plug the CQM Test lead into the Patient Return Receptacle. The alarm light should turn green.
17. Unplug the CQM Test lead from the ESU, the alarm should sound and the light should turn red.
18. Attach a 150 ohm load across the two wires of the test lead. Plug the CQM Test lead into the Patient Return Receptacle. The alarm light should remain red.
19. Unplug the CQM Test lead from the ESU.
20. Attach a variable resistor set at 50 ohms across the two wires of the CQM test lead. Plug the CQM Test lead into the Patient Return Receptacle. The light should turn green.

21. Adjust the variable resistor to increase the resistance until the alarm sounds and the light turns red. Read the variable resistor, it should be between 58 and 72 ohms.

Megadyne recommends a yearly calibration check of the Mega Power Electrosurgical Generator. If your Mega Power is found to be out of calibration, please send your system directly to Megadyne for calibration. Contact Megadyne customer service to obtain an RGA number and shipping instructions prior to sending the Mega Power in for calibration.

Megadyne Medical Products, Inc.

11506 South State Street
Draper, UT 84020 USA
Phone: 801-576-9669
800-747-6110 (U.S.A. only)

Troubleshooting/Error Codes

Troubleshooting - follow the steps in the order listed for the appropriate problem.

No output power:

1. Check that the generator power switch is in the “on” position.
2. Insure the generator is plugged into a grounded, functioning outlet and that the power cord is securely attached to the receptacle at the rear of the generator.
3. Check the cables and connections to insure that they are intact and securely connected.
4. Insure the patient return electrode is properly installed and connected to the generator. If the patient return electrode alarm light stays illuminated red, see **Patient Return Electrode Alarm Stays On** section.
5. Check that the active accessories are attached.
6. Check to see if the unit is in the “Standby” mode (dashed lines in display) or if the power setting is too low. Adjust the power accordingly.
7. Turn the generator to the “Off” position and then back to the “On” position.
8. Replace the accessory devices (i.e. pencil, or footswitch).
9. Check the fuse and replace it if necessary.
10. If the problem is not corrected with the above steps, use a backup generator and return the unit for service.

Diminished Power Output:

1. Check all accessories for proper set-up and installation.

Patient Return Electrode Alarm Stays On:

1. Check the return electrode cables to insure that they are securely attached to the pad and generator.
2. Make sure “sticky” pads are securely attached to the patient over a good muscular, vascular area.
3. If the patient return electrode alarm light remains illuminated red, replace the return electrode and/or return electrode cable.
4. Turn the generator to the “Off” position and then back to the “On” position.
5. If the alarm condition cannot be immediately corrected use a backup generator.

Greater than Expected Neuromuscular Stimulation:

1. Discontinue use of active accessories.
2. Check all connections for secure fit before continuing use of the generator.
3. Decrease the power setting or change to STANDARD COAG from SPRAY COAG as relevant.
4. If neuromuscular stimulation continues replace the generator with a backup unit.
5. Have qualified service personnel test the generator for abnormal low frequency current leakage.
6. If excessive low frequency current leakage is detected return for service.

Monitor Interference:

Monitor interference can be an artifact of Electrosurgery. Steps to minimize interference are as follows:

1. Insure that the ECG electrode is well attached to the patient through proper skin preparation prior to electrode placement.
2. Insure the electrosurgical cables (active and return) do not cross the cables of the affected equipment.
3. Plug the affected equipment into a separate power outlet.
4. Use the lowest possible power setting to achieve the desired effect.
5. Interference is usually greatest in the SPRAY COAG mode; it can be reduced by using a lower voltage mode such as STANDARD COAG.
6. Check all connections to the generator, patient return electrode, and accessories.
7. Some manufacturers of ECG electrodes offer RF (radio frequency) choke filters for use in the monitor leads. These filters reduce interference while the generator is activated. RF filters minimize the potential for an electrosurgical burn at the site of the monitor electrode.

Error Codes

The Mega Power is designed to assist the user in identifying failure modes. When specific conditions are met an error code will be shown in the large displays.

If any of the following errors are displayed and are not cleared by turning the system off then on, record the error displayed and call Megadyne Customer Service at 1-800-747-6110 (US only) (International: 1-801-576-9698).

Error Code	Description	Explanation
201	Communication Error	Internal communications between internal micro controllers has failed.
202	Watchdog Error	Internal Watchdog microcontroller has detected an error and has shut the system down for safety reasons.
203	Dosage Error	The Master microcontroller has detected an excessive amount of power consumption compared with the RF output power being delivered.
204	Relay Error	One or more relays have failed the relay diagnostic test.
205	Activation Error	One or more of the foot switches or hand switches were in the active state during power up.
206	CQM Error	An error was detected in the CQM Network during the Power On Self Test (POST).
207	Front Panel Button Press Error	A button press was detected during POST, this condition is not permitted.
208	Active Measurement Diagnostics Error B+	An error was detected in the B+ Voltage sense network during Power On Self Test (POST).
209	PFC Shutdown	The internal power supply has reached an overload condition and has shutdown. The unit may be reset by turning off the power if the overload condition has cleared, such as an over temperature condition.
210	Calibration Constants Checksum Error	The Master Microcontroller reads the calibration constants and the checksum from EEPROM. If the values do not match an error is displayed.
211	WD CQM Error	The Watchdog has detected a CQM Error.
212	CQM Test Error	The WD has detected an error in the CQM Network during the Power On Self Test (POST).
213	WD Dosage Error	The Watchdog Microcontroller has detected an excessive amount of power consumption compared with the RF output power being delivered.

214	Primary Relay Control Error	The Watchdog has detected the inappropriate activation of the Primary Relay.
215	MP1 Relay Control Error	The Watchdog Microcontroller has detected inappropriate activation of the MP1 Relay.
216	MP2 Relay Control Error	The Watchdog Microcontroller has detected inappropriate activation of the MP2 Relay.
217	Secondary Relay Control Error	The Watchdog Microcontroller detected a failure of the Secondary Relay.
218	Frequency Error	The Watchdog Microcontroller has detected the incorrect output waveform.
219	Power Control Error	The Watchdog Microcontroller has detected the incorrect power setting on the HVPS.
220	Active Measurement Diagnostics Error I+	An error was detected in the I+ current sense network during Power On Self Test (POST).
221	Active Measurement Diagnostics Error VSV	An error was detected in the voltage sense network (VSV) during Power On Self Test (POST).
222	Idle State Feedback Error	The analog signal levels are above the specified levels during an idle state condition.
223	WD_Primary Relay Sense Error	The Watchdog Microcontroller detected an error in the Primary Relay.
224	WD MP1 Relay Sense Error	The Watchdog Microcontroller detected an error in the MP1 Relay.
225	WD MP2 Relay Sense Error	The Watchdog Microcontroller detected an error in the MP2 Relay.
226	WD Secondary Relay Sense Error	The Watchdog Microcontroller detected an error in the Secondary Relay.
227	Master Primary Relay Sense Error	The Master Microcontroller detected an error in the Primary Relay.
228	Master MP1 Relay Sense Error	The Master Microcontroller detected an error in the Primary Relay.
229	Master MP2 Relay Sense Error	The Master Microcontroller detected an error in the MP2 Relay.
230	Master Secondary Relay Sense Error	The Master Microcontroller detected an error in the Secondary Relay.

Technical Specifications

General Equipment Specifications

Equipment Classification

Equipment Type

Degree of protection against ingress of water

Patient Circuit

Cooling

IEC 60601-1 Class I
IEC 60601-1 Type CF
Meets ANSI/AAMI HF-18,
UL 60601-1 1st Ed.,
IEC 60601-2-2
Isolated from Earth Ground
Natural Convection,
Modulated Internal Fans

Physical Characteristics

Width

40.5 cm (15.9 inches)

Depth

40.5 cm (15.9 inches)

Height

20 cm (7.9 inches)

Weight

8.65 kg (19 lbs)

Operating Environment

The Mega Power generator is designed and tested to operate within the following environmental parameters.

Temperature Range: +10°C (+50°F) to +40°C (+104°F)

Humidity Range: 15% to 75% Non-condensing

Atmospheric Pressure: 700 hPA (10.2 psi) to 1060 hPA (15.37 psi)

Warm-up requirements

If the Mega Power is stored outside of the above range, allow the unit to stabilize at room temperature for a minimum of one hour before use.

Storage Environment

The Mega Power generator is designed and tested for storage within the following environmental parameters.

Temperature Range: -40°C (-40°F) to +70°C (+158°F)

Humidity Range: 10% to 100 %, Condensing

Atmospheric Pressure: 500 hPA (7.25 psi) to 1060 hPA (15.37 psi)

Audio frequencies

ACE Cut, Pure CUT and Blend 840 Hz ± 10%

Standard Coag and Spray Coag 520 Hz ± 10%

Bipolar 480 Hz ± 10%

Alarms

Power Limit (One beep) 1980 Hz ± 10%

Errors (Two beeps) 1980 Hz ± 10%

CQM (Three Beeps) 2550 Hz ± 10%

The volume of the CUT, COAG and BIPOLAR active signals can be adjusted up and down. They have a minimum volume of 40 dB at a distance of one meter. The alarm volume is fixed to exceed 65 dB at a distance of one meter per the requirements of ANSI/AAMI HF-18.

Type and Rating of Fuses: 2 each F10.0/250V

Electrical properties

Nominal Operating Voltage: 100 – 240 VAC
 Nominal Operating Frequency: 50-60 Hz

Output Power Variation

Output variation as a function of input variation <5%

Output Power Characteristics

Mode	Power (Watts)	Output Tolerance	Rated Load Ohms	Maximum Open Circuit Voltage Vp-p	Operating Frequency kHz	Crest Factor Nominal @ Rated Load
Monopolar CUT						
ACE Cut	150	20%	200	1500	400	1.4
Pure Cut	300	20%	300	3000	400	1.4
Blend	200	20%	300	4000	400	3.0
Monopolar COAG						
Spray	120	20%	500	7200	400	8.0
Standard	120	20%	500	5800	400	7.4
Coag with Cut	120	20%	500	4000	400	6.0
Bipolar						
Standard/Micro	80	20%	100	760	400	1.4
Macro	80	20%	100	760	400	1.4

Low Frequency (50 - 60 Hz) Leakage Current

	NC	SFC
Earth Leakage Current general	< 300 µA	< 1.0 mA
Enclosure	< 100 µA	< 500 µA
Patient Leakage Current	< 10 µA	< 50 µA
Patient Auxiliary Current d.c.	< 10µA	< 50 µA
Patient Auxiliary Current a.c.	< 100µA	< 500 µA

High Frequency (RF) Leakage Current

Monopolar Modes (all settings at the maximum)

Patient Return to Ground	<150mA
Active to Ground	<150mA
Bipolar Mode (Maximum setting)	
Each Lead to Ground	< 63mA

Power Consumption

Maximum mains current	100-120 VAC	220-240 VAC
Idle	0.3 A	0.15 A
Cut	5.0 A	2.5 A
Coag	2.4 A	1.2 A
Bipolar	1.3 A	0.65 A
Power Factor Correction		
Idle	0.85	0.70
Cut	0.99	0.98
Coag	0.98	0.97
Bipolar	0.95	0.93

Power Cord

Hospital Grade three prong connector

Power Duty Cycle

Under maximum power conditions, the Mega Power generator is designed to operate safely with activation times of 10 seconds on, 30 seconds off for one hour.

Audio Volume

The MEGA POWER system is designed to generate the following audio levels:

Mode	Frequency	Volume Adjustability
Pure Cut	840 Hz \pm 10 %	40 to 65 dB
ACE	840 Hz \pm 10 %	40 to 65 dB
Blend	840 Hz \pm 10 %	40 to 65 dB
Coag Standard	520 Hz \pm 10 %	40 to 65 dB
Coag Spray	520 Hz \pm 10 %	40 to 65 dB
Bipolar	480 Hz \pm 10 %	40 to 65 dB
Bipolar Monitor	800 to 1600 Hz \pm 10 %	40 to 65 db
Power Limit Alarm(One beep)	1980 Hz \pm 10 %	> 65 dB non-adjustable
Errors (Two beeps)	1980 Hz \pm 10 %	> 65 dB non-adjustable
CQM (Three Beeps)	2550 Hz \pm 10 %	> 65 dB non-adjustable

Contact Quality Monitor

Megadyne recommends the use of the Mega 2000 Patient Return Electrode. Due to the built-in safety (self current limiting) of the Megadyne Mega 2000 patient return electrode, the CQM limitation is no longer essential.

If a disposable split pad is used with the Mega Power, the system will perform as follows:

Acceptable Resistance Range (thermal safety).

Return electrode: 5 to 135 ohms or up to 30% increase in the initial measured contact resistance between the return pad and the patient.

CQM Alarm Activation (thermal safety)

When the measured resistance exceeds the aforementioned parameters, the CQM indicator will flash red, an alarm tone will sound twice, and the RF output will be disabled. The Mega Power system will remain in this mode until the unsafe condition is corrected.

RS232C Port

This communication port is located in the back panel behind a removable plate. The RS232 Port is used for calibration. See the calibration section in the Service Manual for details.

Declaration for Electromagnetic Emissions

The Mega Power is intended for use in the electromagnetic environment specified below. The user of the Mega Power should assure that the Mega Power is used in such environment.

RF Emissions CISPR 11	Group 2	The Mega Power must emit electromagnetic energy in order to perform its intended function.
RF Emissions CISPR 11	Class A	The Mega Power is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic Emissions IEC 61000-3-2	Class A	
Voltage Fluctuations/Flicker Emissions IEC 61000-3-3	Complies	

Declaration for Electromagnetic Immunity

The Mega Power is intended for use in the electromagnetic environment specified below. The user of the Mega Power should assure that the Mega Power is used in such environment.

Immunity Test	IEC 60601 Test Level	Compliance Level	Electromagnetic environment - guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6kv contact ± 8kv air	Full compliance	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient/burst IEC 61000-4-4	± 2kv for power supply lines ± 1kv for input/output lines	Full compliance	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1kv differential mode ± 2kv common mode	Full compliance	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-11	<5% Ut (>95% dip in Ut) for 0.5 cycle 40% Ut (60% dip in Ut) for 5 cycles 70% Ut (30% dip in Ut) for 25 cycles <5% Ut (>95% dip in Ut) for 5 sec	Full compliance	Mains power quality should be that of a typical commercial or hospital environment. If the user of the Mega Power requires continued operations during power mains interruptions, it is recommended that the Mega Power be powered from an uninterruptible power supply or a battery.
Power frequency (50/60 Hz) magnetic field. IEC 61000-4-8	3 A/m	Full compliance	Power frequency magnetic fields should be at levels characteristic of a typical commercial or hospital environment

Disposal

The equipment can be disposed of at the end of its useful life as with normal electronic scrap. Notice: Follow local governing ordinances and recycling plans regarding disposal or recycling of device components.

Approved Accessories

Megadyne recommends use of the following Megadyne accessory devices with the Mega Power Electrosurgical Generator. These accessory devices have been tested and are approved for use at the peak voltages listed in this manual.

The user is responsible to insure that any other accessories used with the Mega Power ESU are rated for the maximum peak output voltages (reference to diagrams included herein); set at the intended output control setting in the intended operating mode.

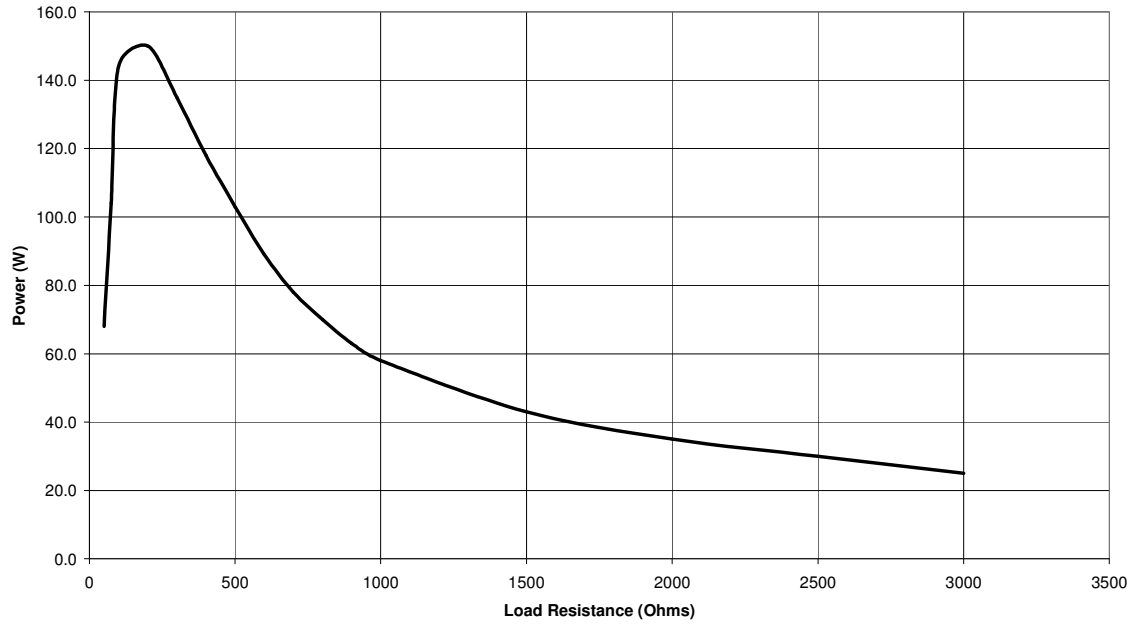
Item Description	Catalog Number
Monopolar Footswitch	1400
Bipolar Footswitch	1450
MEGA Soft Patient Return Electrode	0800, 0830, M2K-01
Re-CORDalbe adhesive backed Patient Return Electrodes.	0850, 0855, 0870, 0875
E-Z Clean Electrodes	contact MEGADYNE for item numbers
Electrosurgical Pencils with tips	0035, 0035H, 0037, 0037H, 0039, 0039H
Active Electrode Cables and Adapters	0075

Warning: The use of accessories other than those specified above may result in increased emissions or decreased immunity of the Mega Power Electrosurgical Generator.

Power Curve Graphs

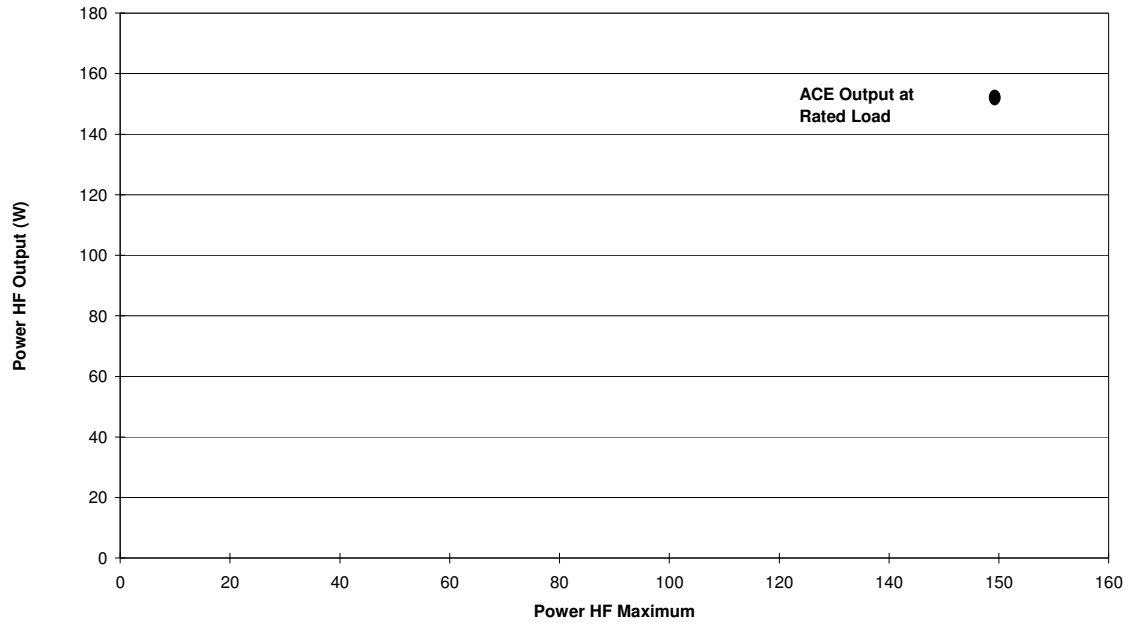
Ace Power Curve Graphs

ACE Cut - Output Power vs Load Resistance

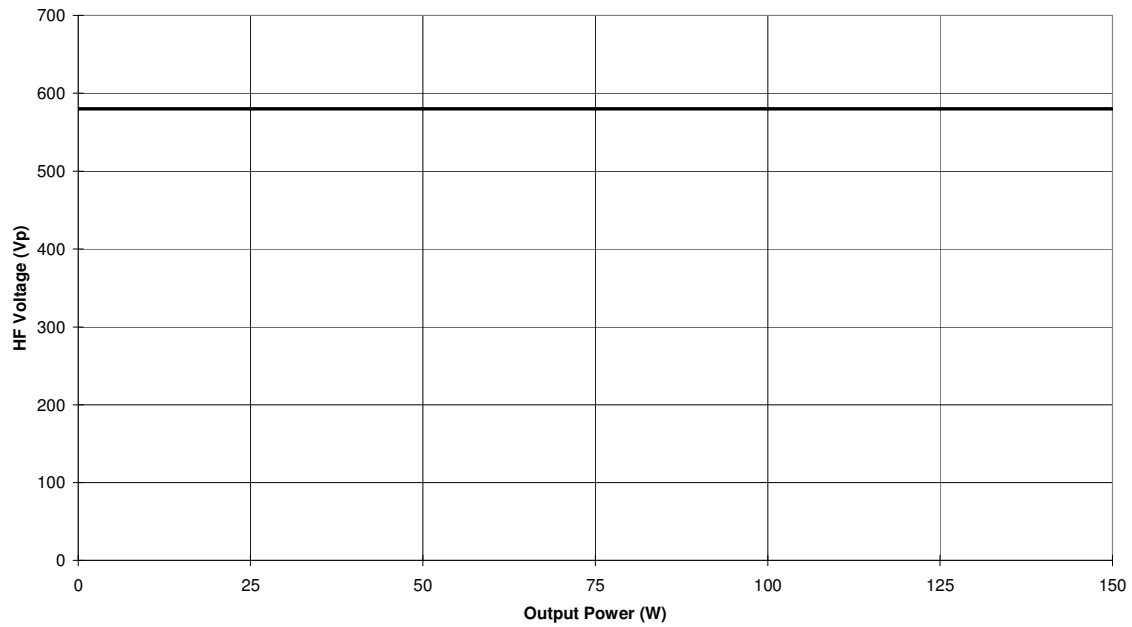


ACE - Power Output vs Power Max

RI = 300 Ohms

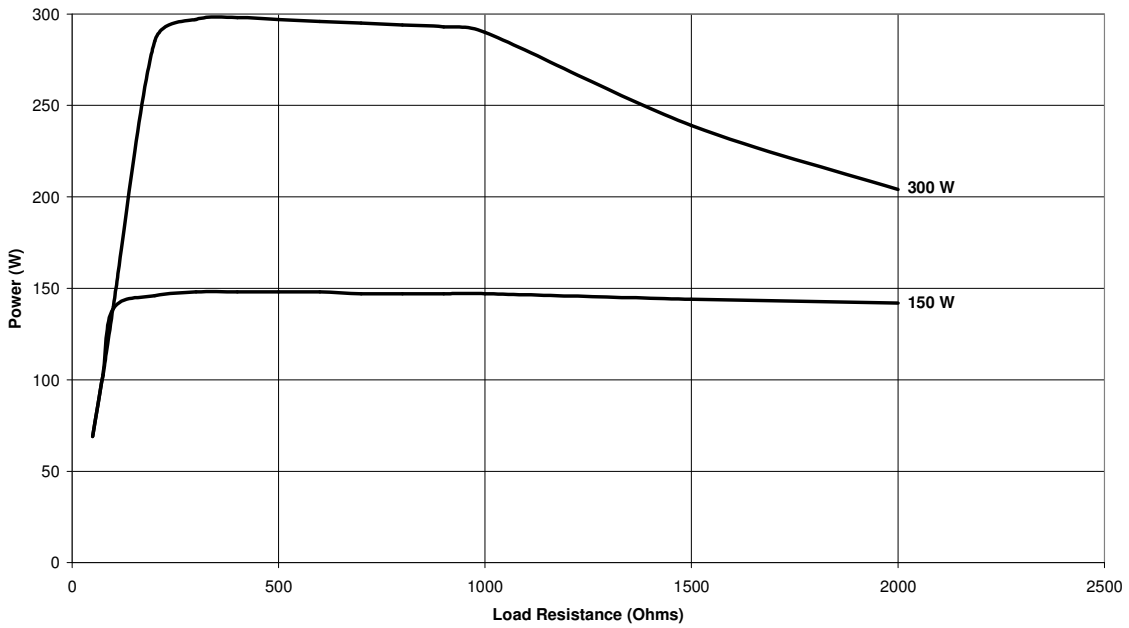


ACE - HF Voltage vs Output Power



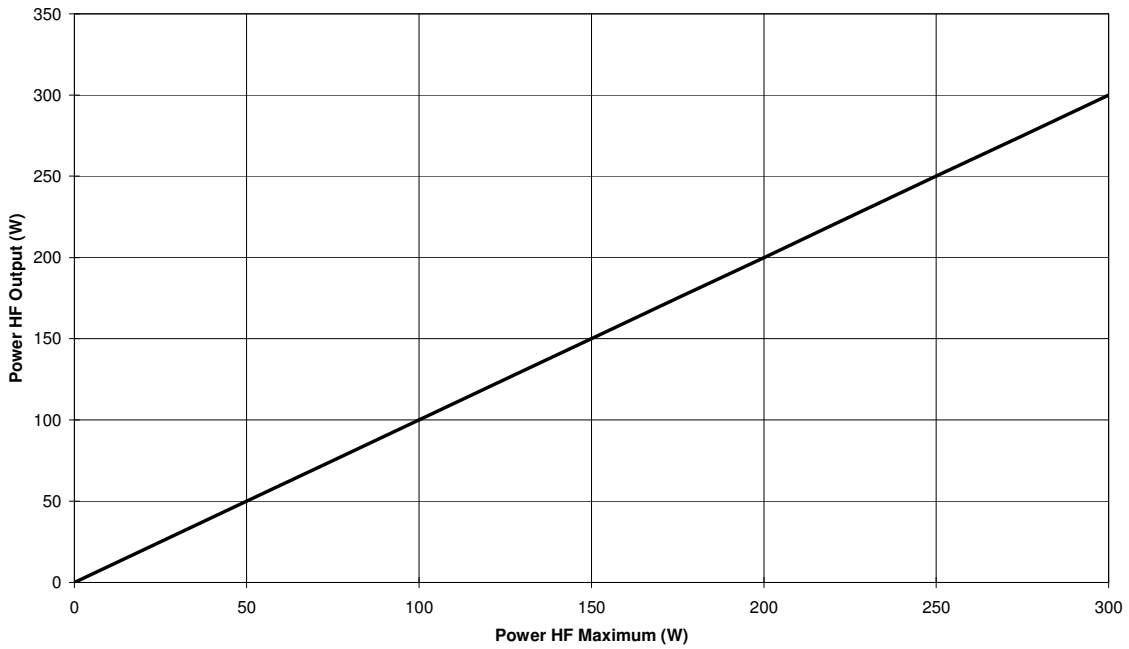
Pure Cut Output Power Graphs

Pure Cut - Output Power vs Load Resistance

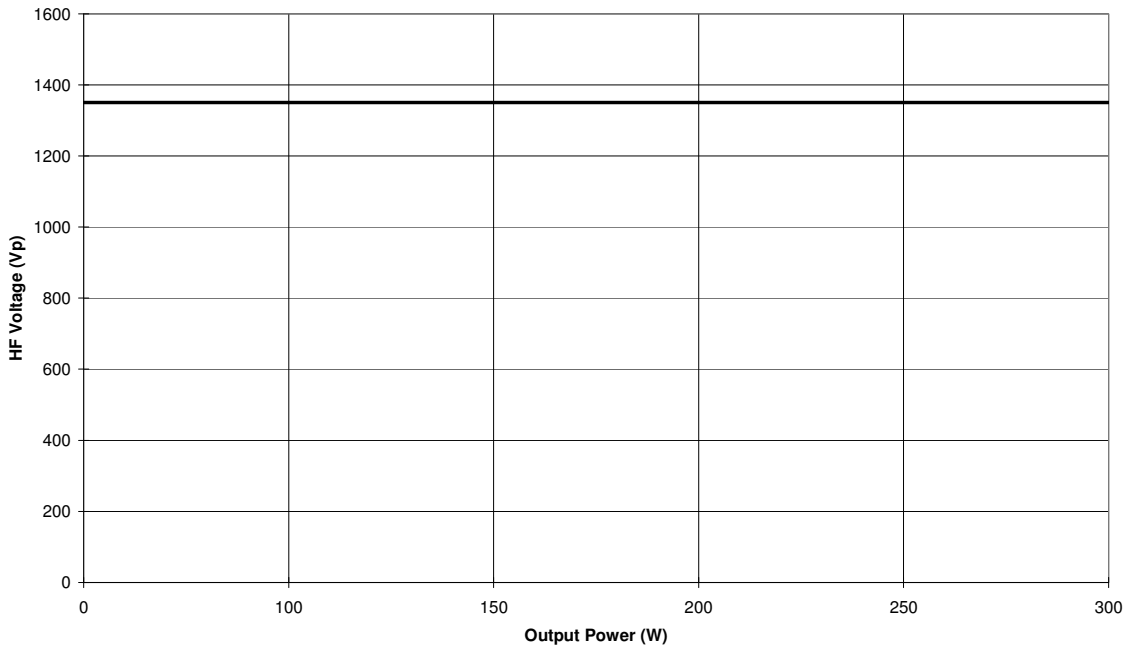


Pure Cut - Power Output vs Power Max

RI = 300 Ohms

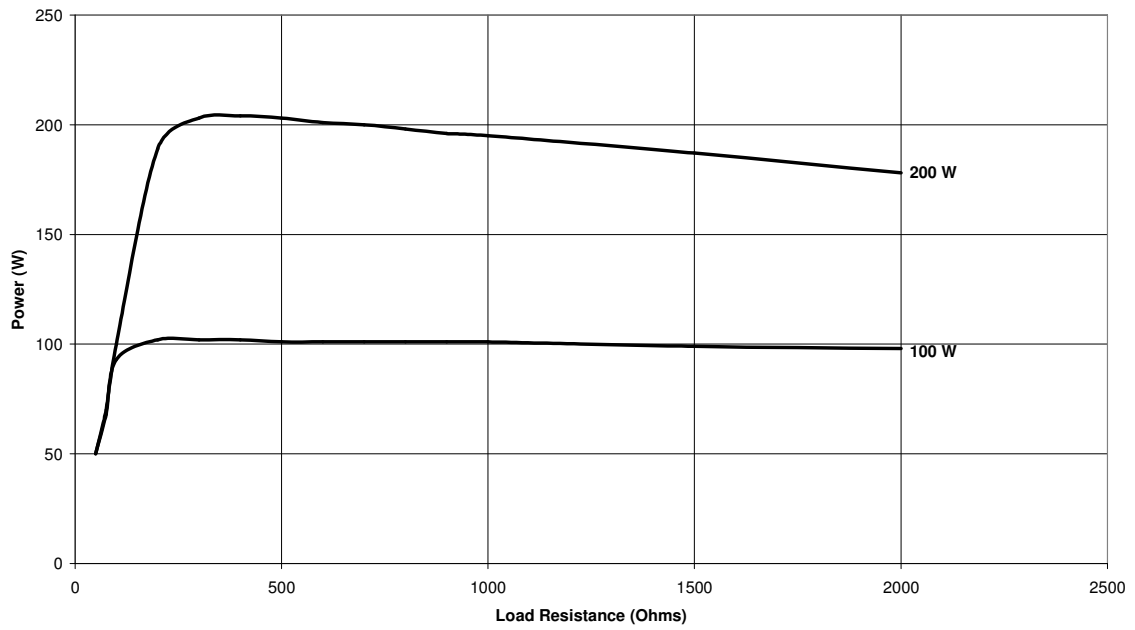


Pure Cut - HF Voltage vs Output Power



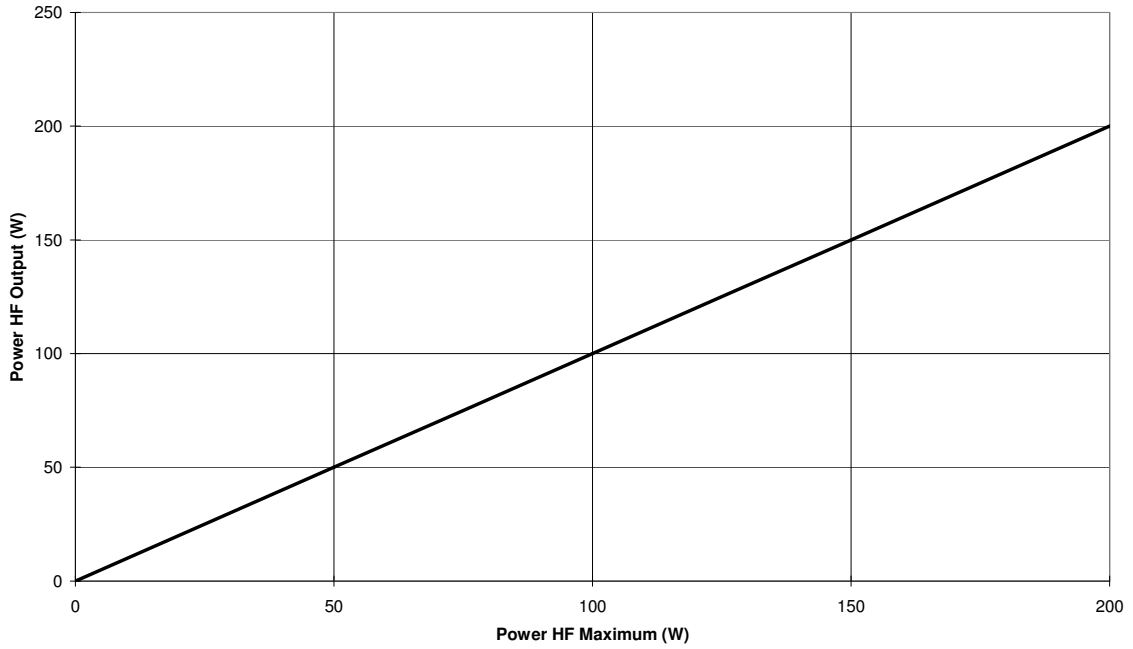
Blend Output Power Graphs

Blend Cut - Output Power vs Load Resistance

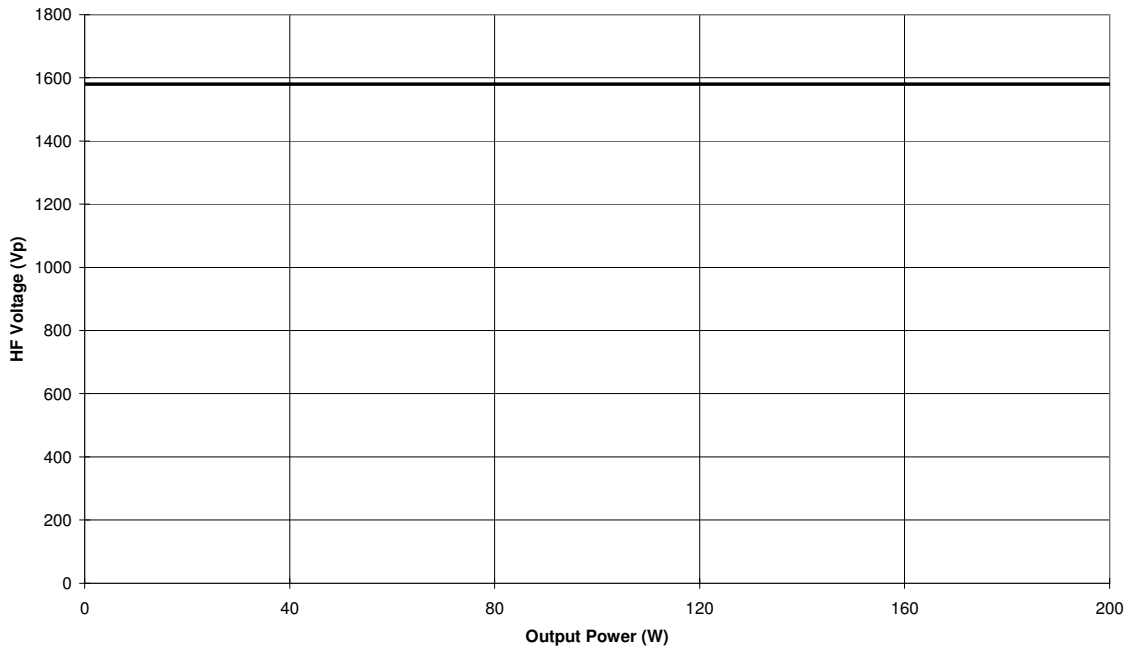


Blend Cut - Power Output vs Power Max

RI = 300 Ohms

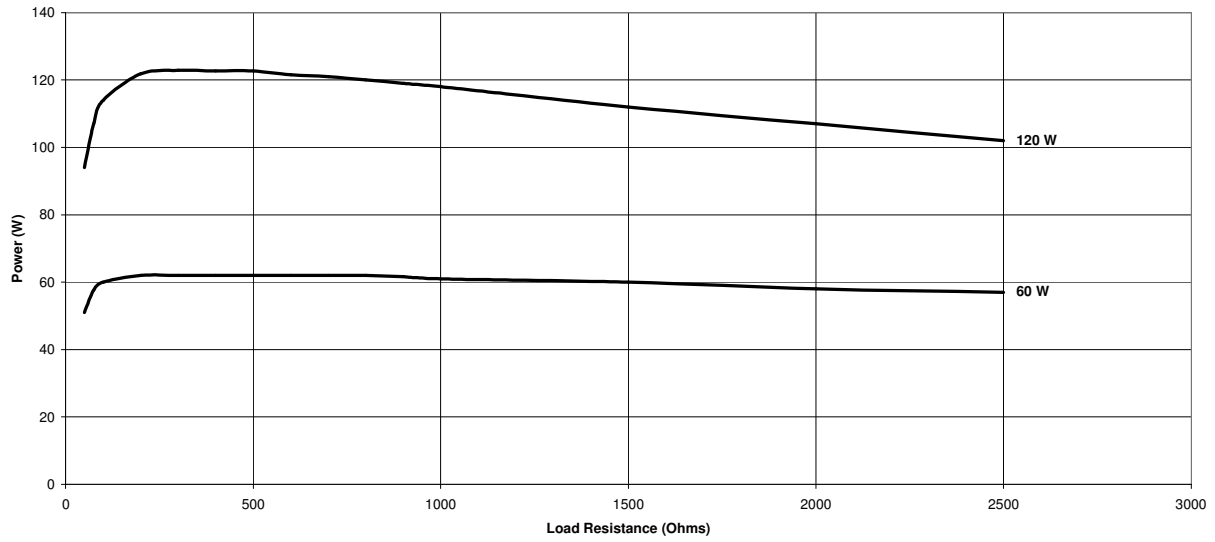


Blend Cut - HF Voltage vs Output Power

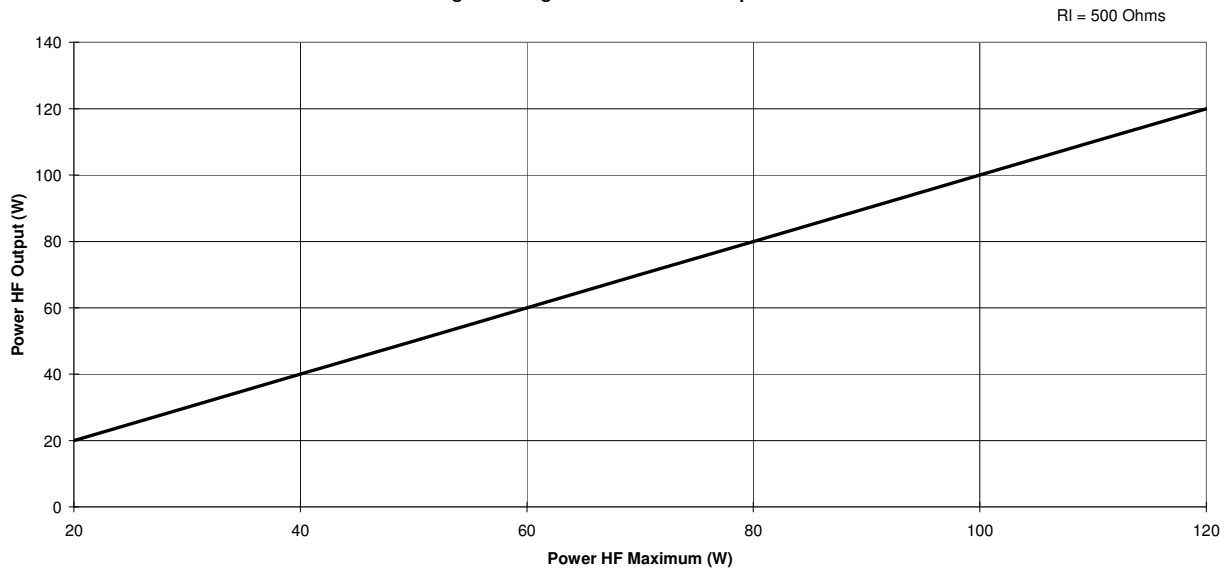


Standard Coagulation Output Power Graphs

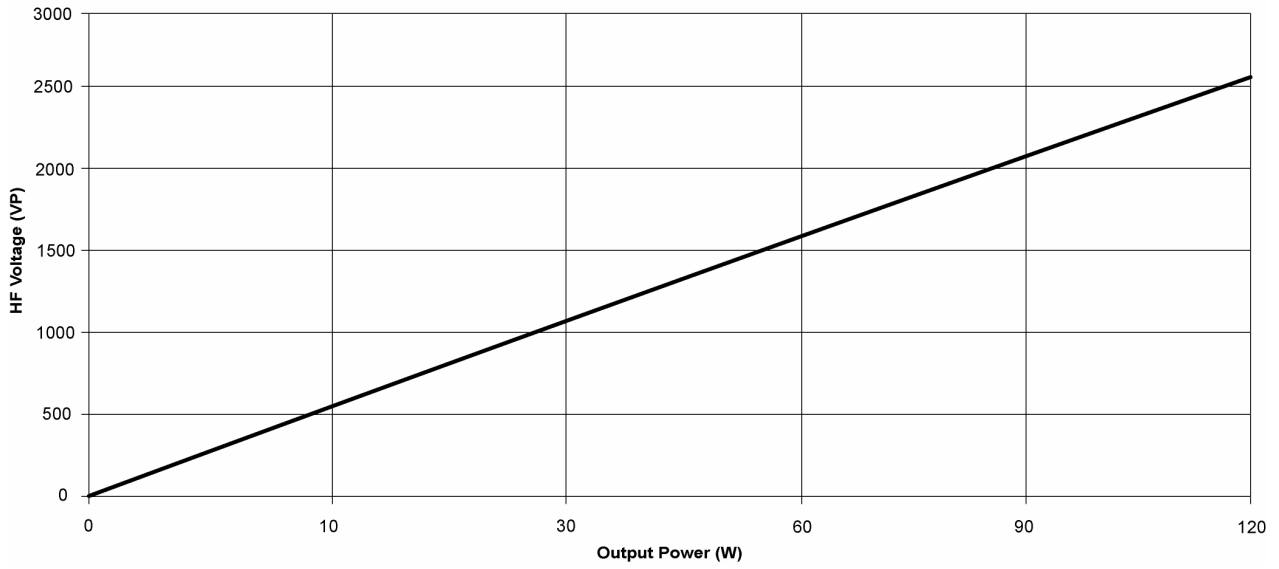
Standard Coag and Coag with Cut - Output Power vs Load Resistance



Standard Coag and Coag with Cut - Power Output vs Power Max

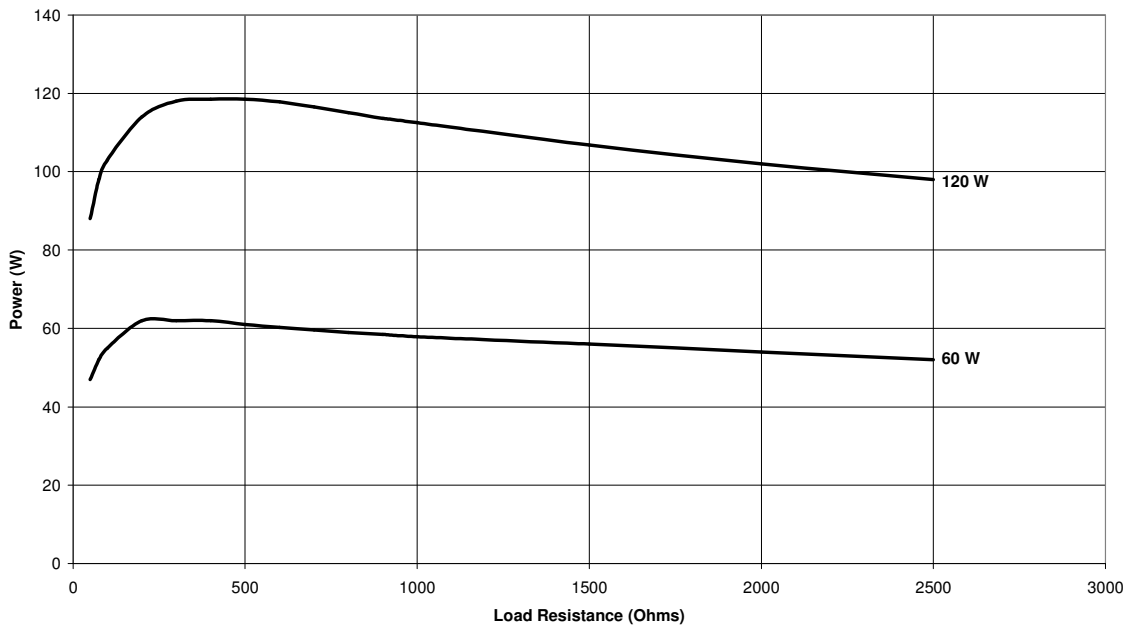


Standard Coag and Coag with Cut - HF Voltage vs Output Power



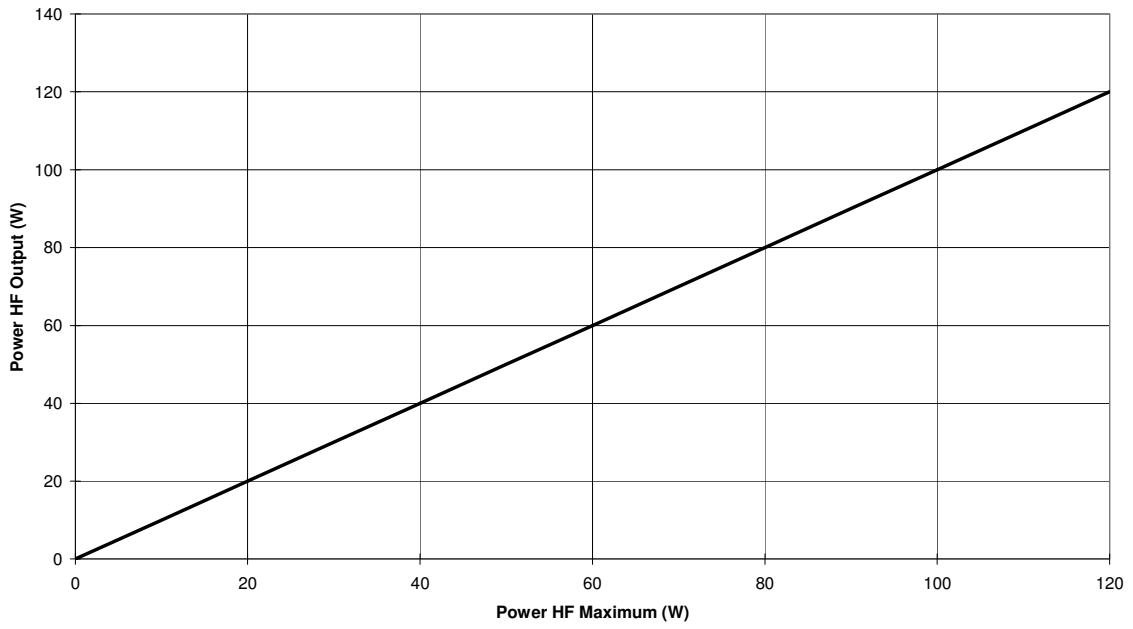
Spray Coagulation Output Power Graphs

Spray Coag - Output Power vs Load Resistance

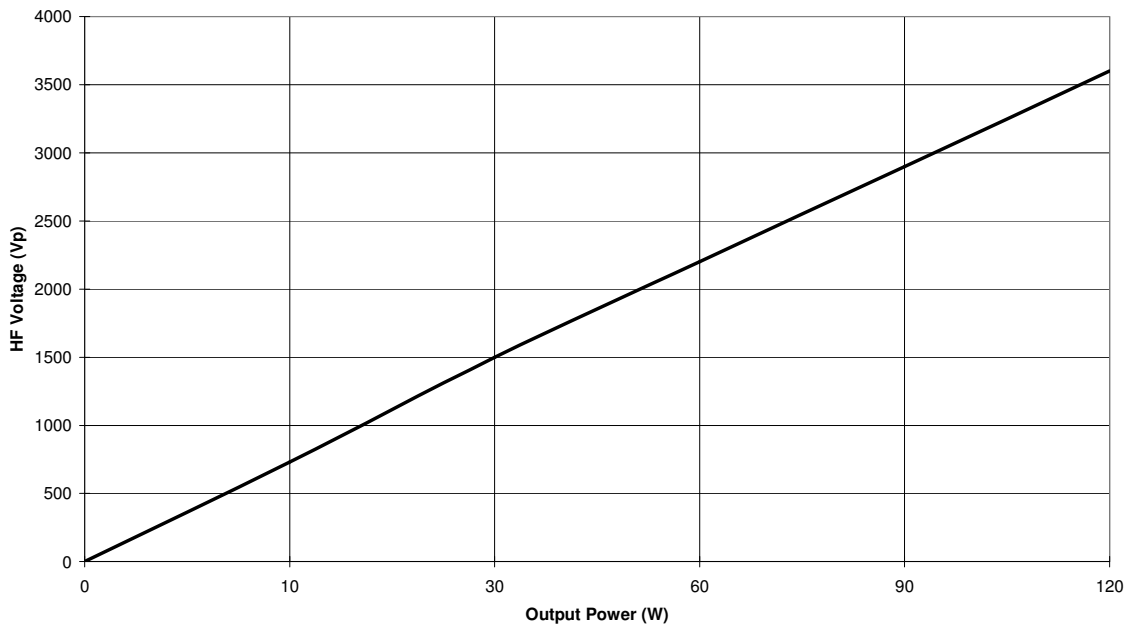


Spray Coag - Power Output vs Power Max

RI = 500 Ohms

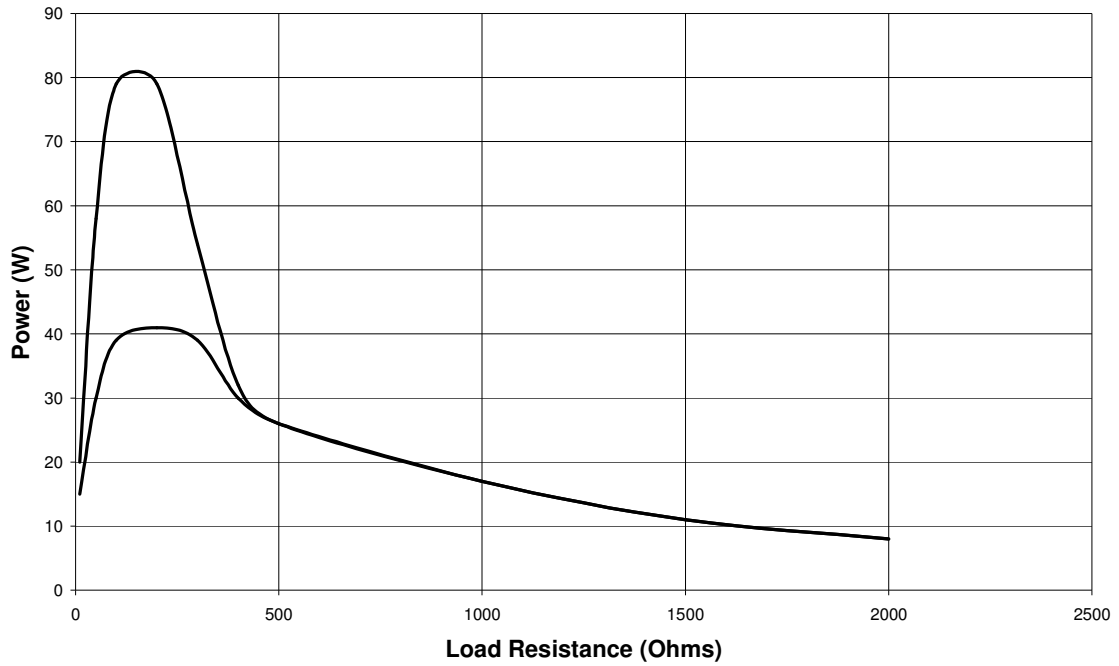


Spray Coag - HF Voltage vs Output Power

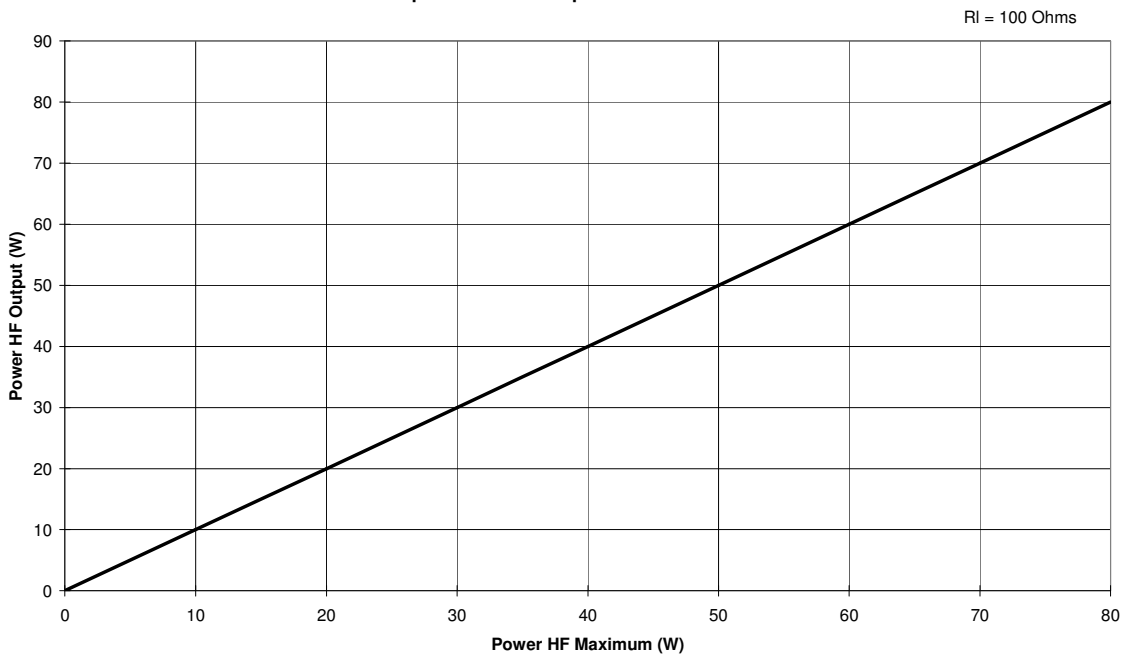


Bipolar Output Power Graphs

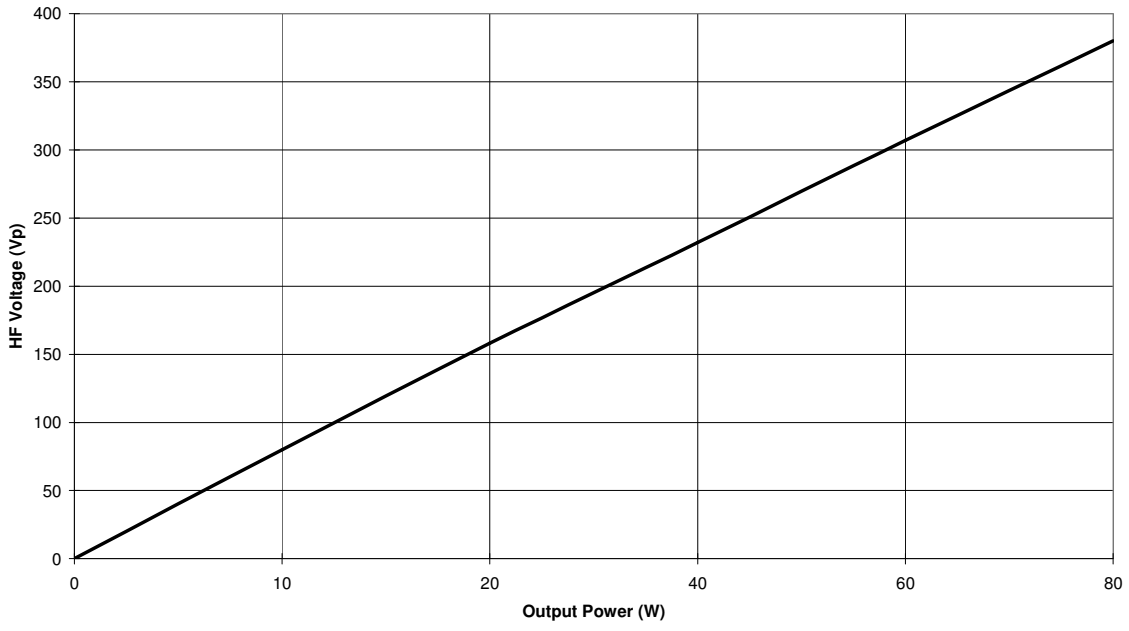
Bipolar - Output Power vs Load Resistance



Bipolar - Power Output vs Power Max



Bipolar - HF Voltage vs Output Power



Printed Circuit Board Replacement Procedures

1. Serviceable components and assemblies can be replaced by following the procedures outlined in this section.
 - ESU Cover and Chassis Cover
 - Fuses, two in the Power Entry Module and one on the Motherboard
 - Controller Board
 - Power Conversion Board
 - Heat sinks (left, center and right heat sinks) and associated heat sink components
 - Front Panel Display
 - Low Voltage Power Supply
 - Motherboard
 - Footswitch
 - Power Entry Module

Warning

Electrical Shock Hazard – To allow stored energy to dissipate after power is disconnected, wait at least five minutes before replacing parts

Caution

The generator contains electrostatic-sensitive components. When repairing the generator, work at a static-control workstation. Wear a grounding strap when handling electrostatic-sensitive components, except when working on an energized generator. Handle circuit boards by their nonconductive edges. Use an antistatic container for transport of electrostatic-sensitive components and circuit boards.

2. For Service Centers and Megadyne trained facilities.

Additional information on assembly replacement is available on Mega Power Service and Repair Video Instruction 3000146-01. This instruction is in DVD format and can be viewed by opening InterVideo WinDVD on your personal computer and inserting the disk into the DVD drive.

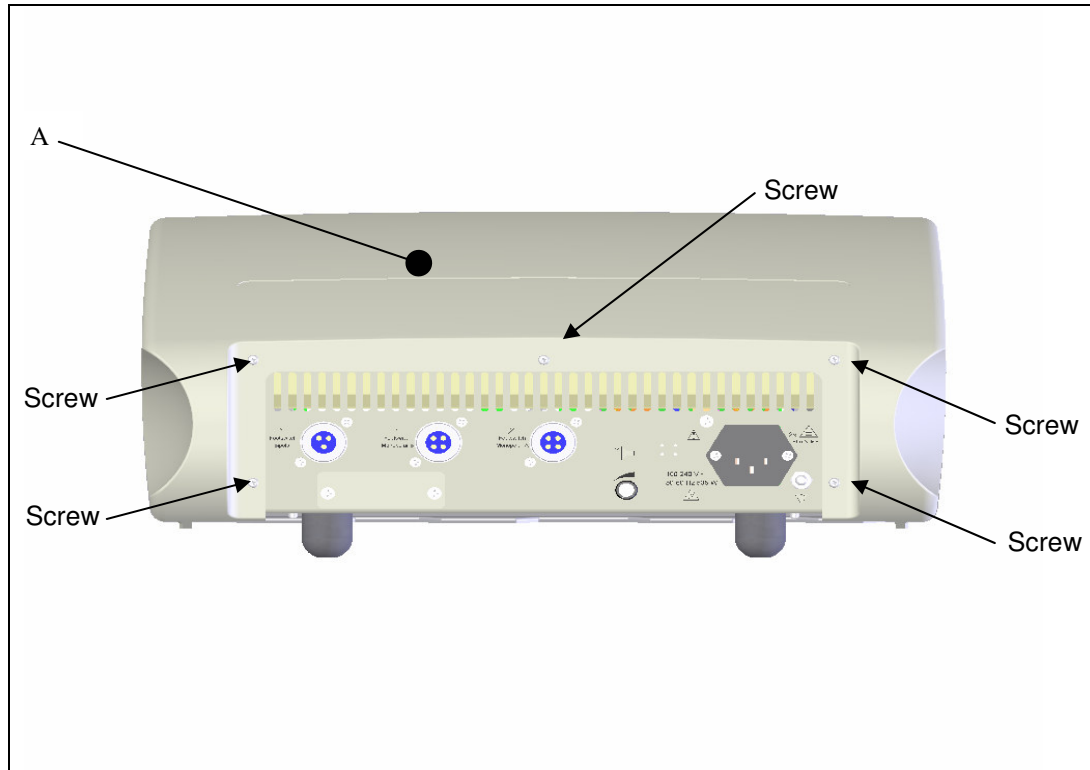
Equipment required:

- Phillips screwdriver

Step 1 – Remove the ESU Cover and Chassis Cover

Turn off the generator, Disconnect the power cord from the wall receptacle

Remove the five (5) screws that secure the cover (item A) to the chassis. Pull the cover off of the chassis by pulling the ESU cover horizontally toward the rear of the ESU.

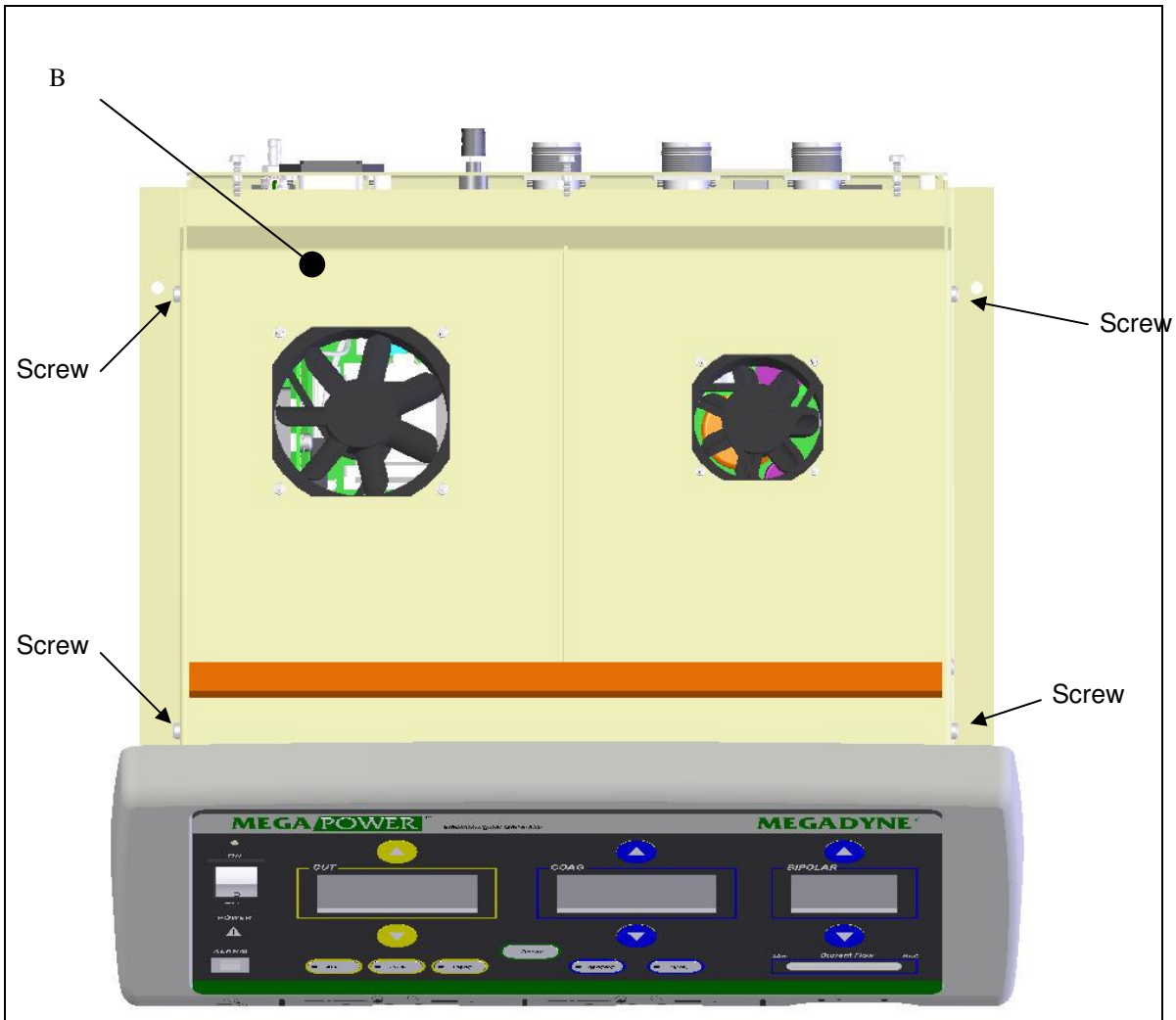


Remove the ESU Cover and Chassis Cover , continued

Remove the chassis cover (item B):

Remove the four (4) screws that secure the Chassis Cover to the Chassis. Lift the front of the Chassis Cover and remove both wire harness connectors from the front panel which connect to the Chassis Cover.

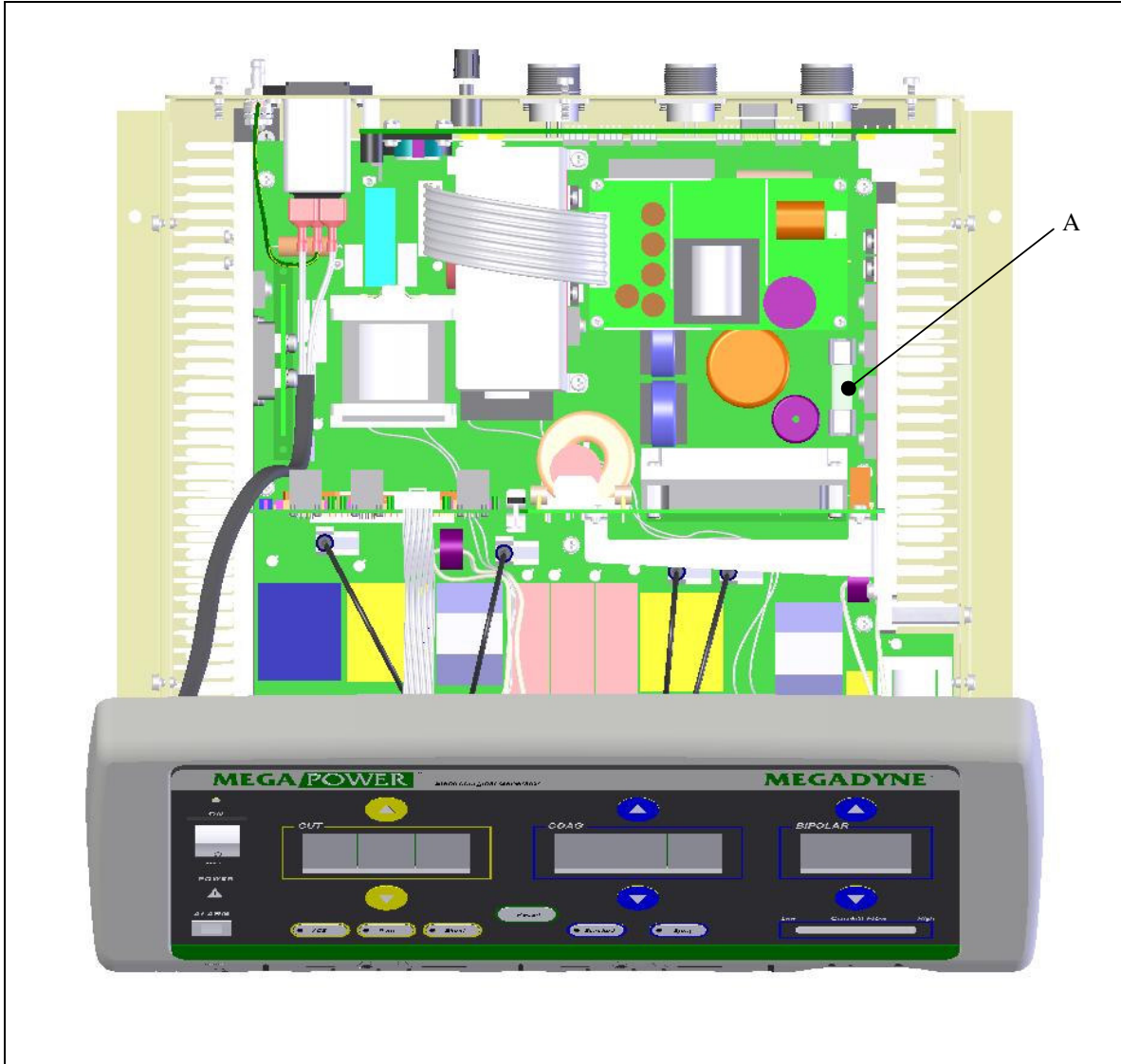
Note – Step 1 will be required before proceeding with any of the following steps.



Step 2 – Fuse Replacement

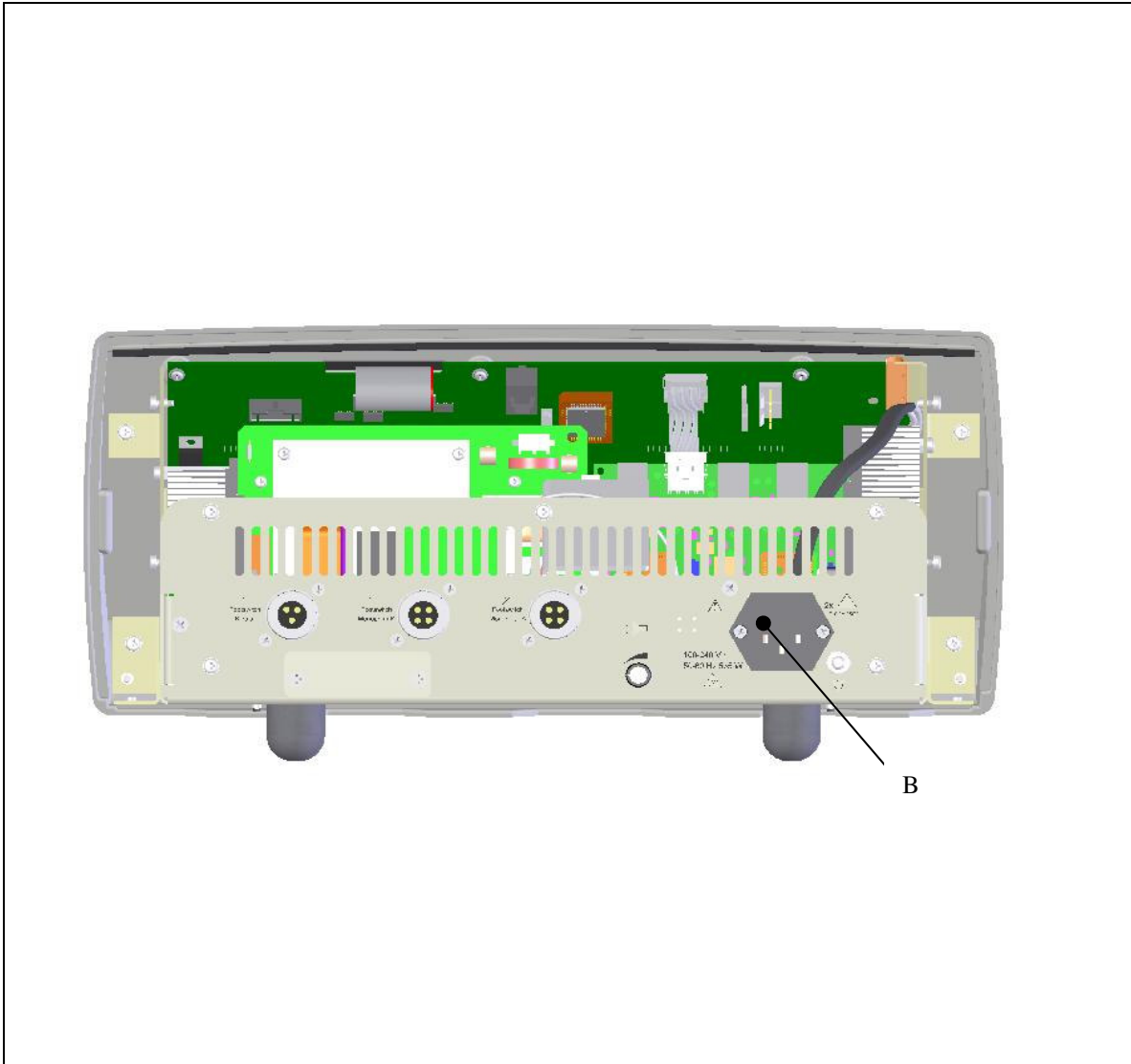
Motherboard Fuse Replacement

Remove the fuse (item A) by pulling straight up on the fuse until it's free of the fuse clip. Replace with a new fuse by pressing the fuse straight down until the fuse snaps into place.



Power Entry Module Fuse Replacement

Remove the fuses in the Power Entry Module by prying open the access drawer (item B) with a small flat blade screw driver. Replace the fuses in the drawer and return the drawer to the module.



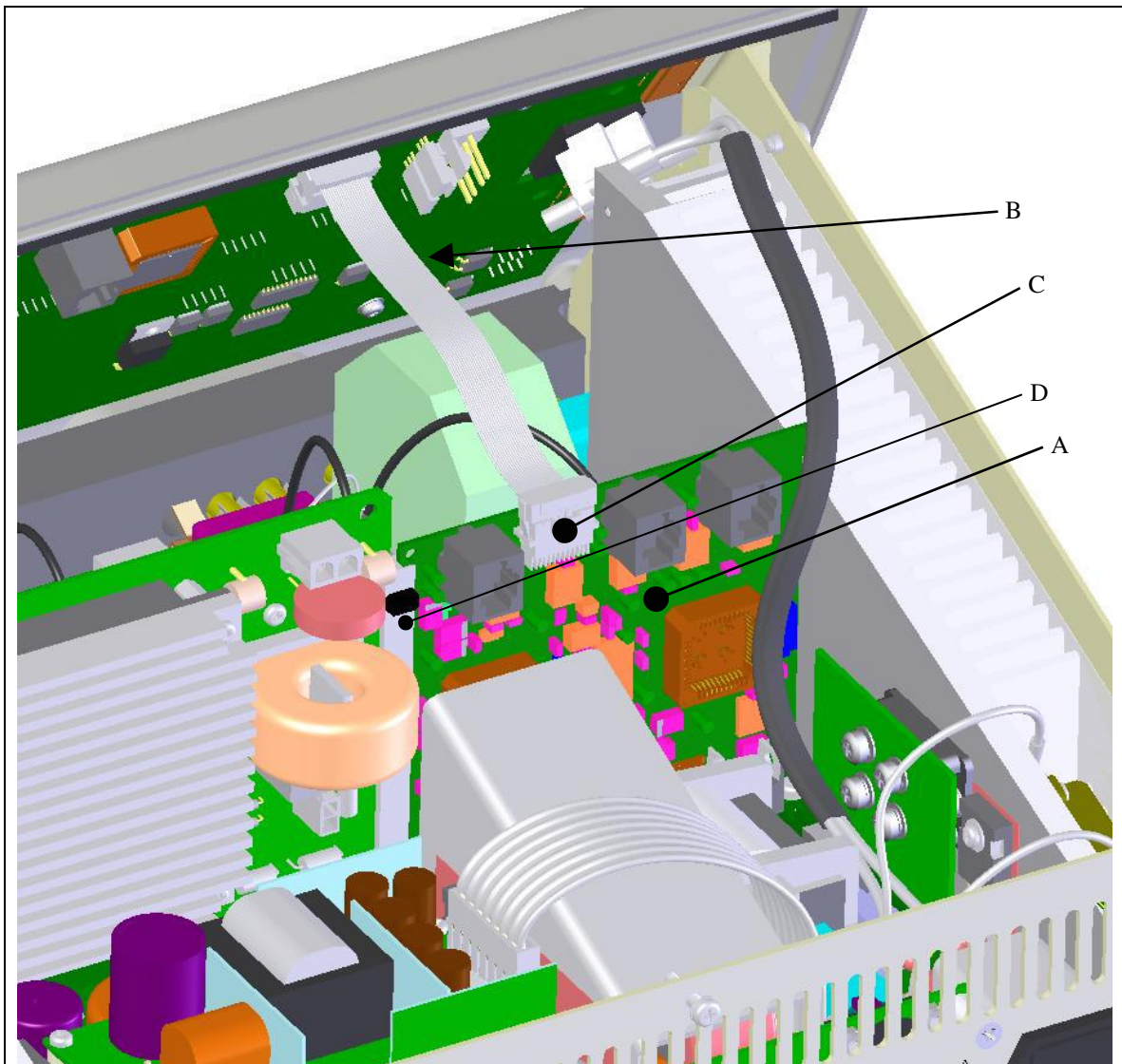
Step 3 – Removal/Replacement of the Controller Board

If it is determined in the Troubleshooting Section that the controller board needs replacing, please follow the instructions below:

Disconnect the display board ribbon cable (item B) from the controller board by squeezing the sides of the connector (item C) and pulling straight up.

Unlock the controller board from the card guide by pressing the card lock (item D) toward the rear of the ESU. Carefully slide the controller board straight up through the card guides to disconnect it from the motherboard. Set the board aside in an antistatic container for reinstallation.

Repeat steps in reverse order to install Controller board.



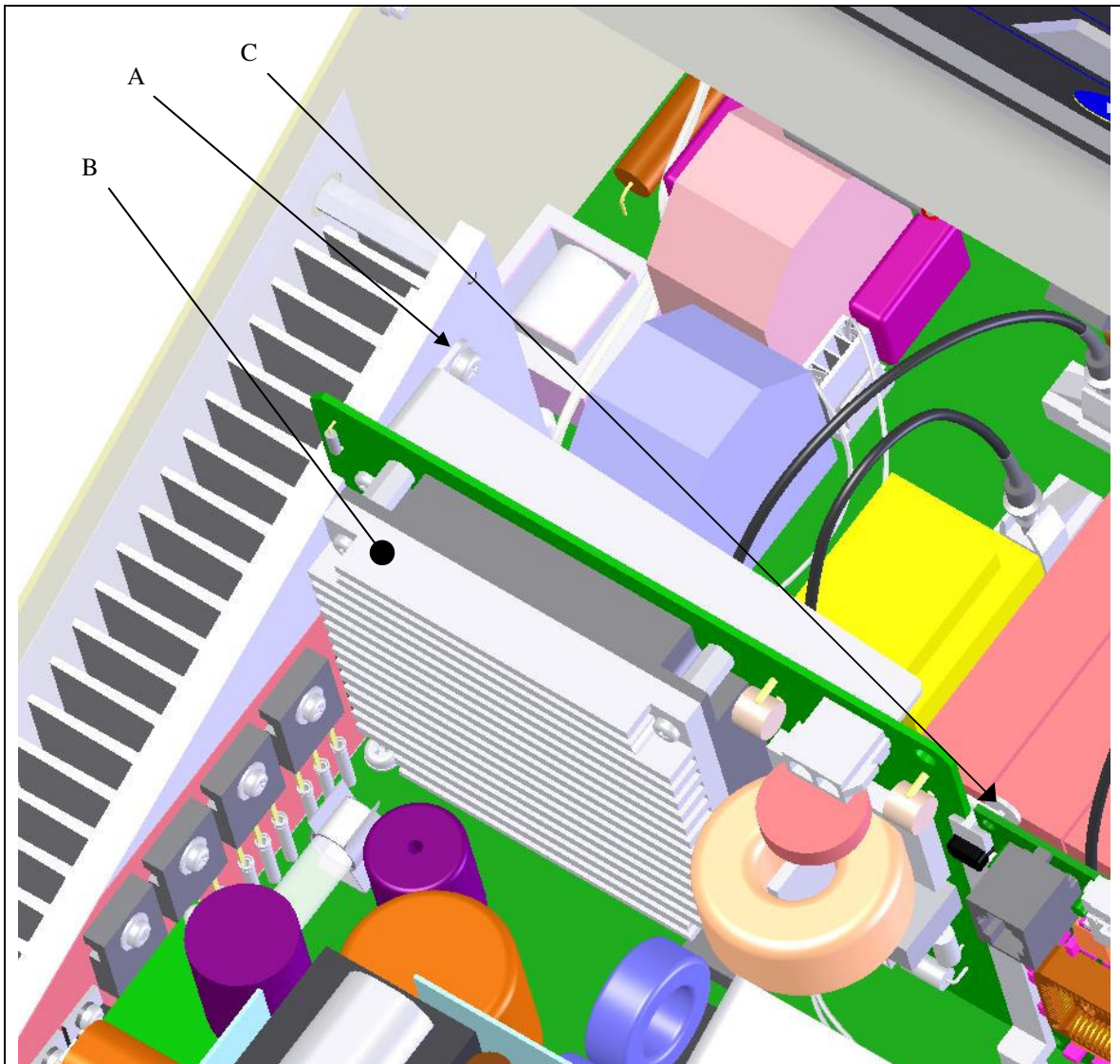
Step 4 – Removal/ Replacement of the Power Conversion Board

If it is determined in the Troubleshooting Section that the power conversion board needs replacing, please follow the instructions below:

Remove one screw (item A) from associated heat sink .

Unlock the controller board from the card guide by pressing the card lock (item C) toward the rear of the ESU. Carefully slide the power conversion board (item B) straight up through the card guides to disconnect it from the motherboard. Set the power conversion board aside in an antistatic container for reinstallation.

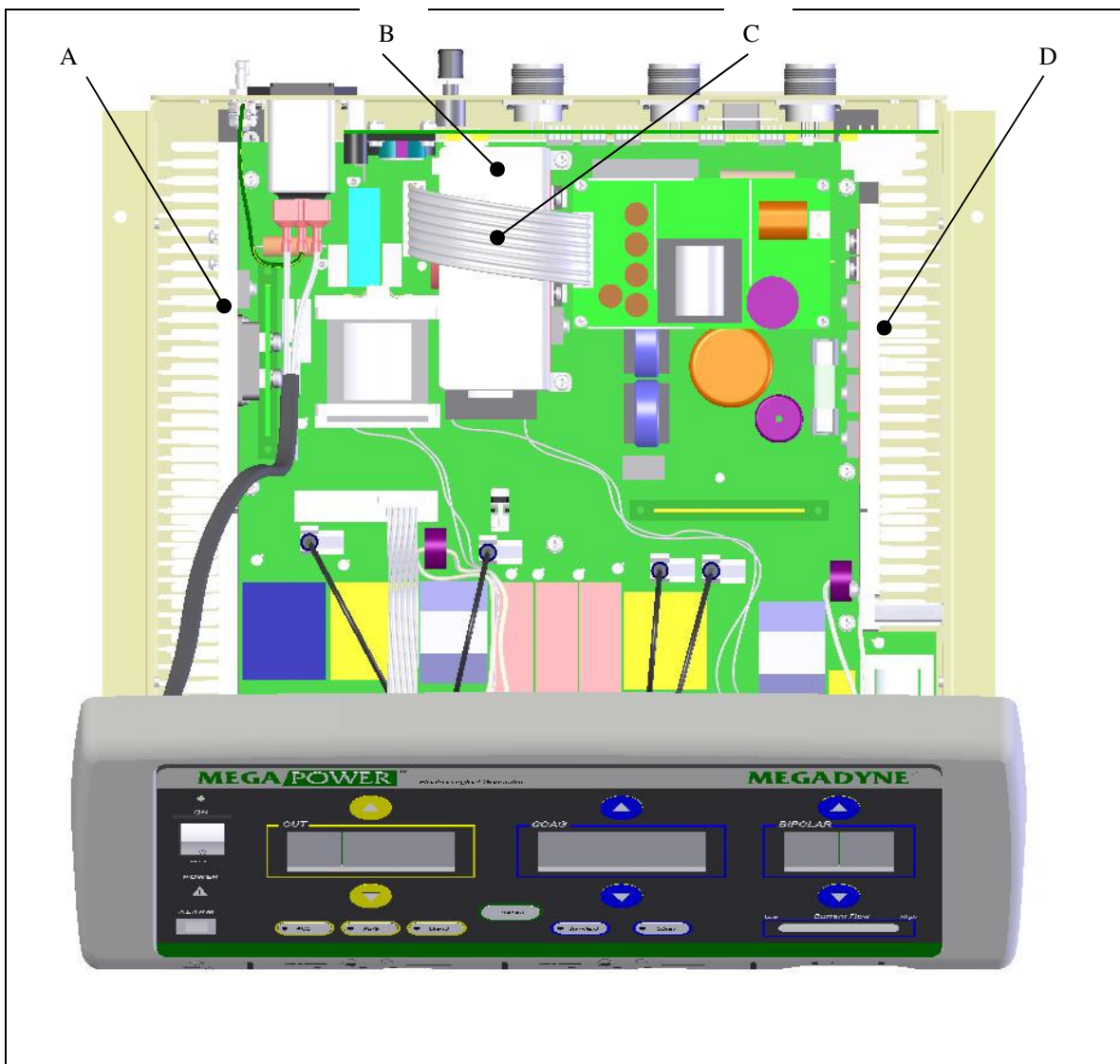
Repeat steps in reverse order to install Power Conversion Board.

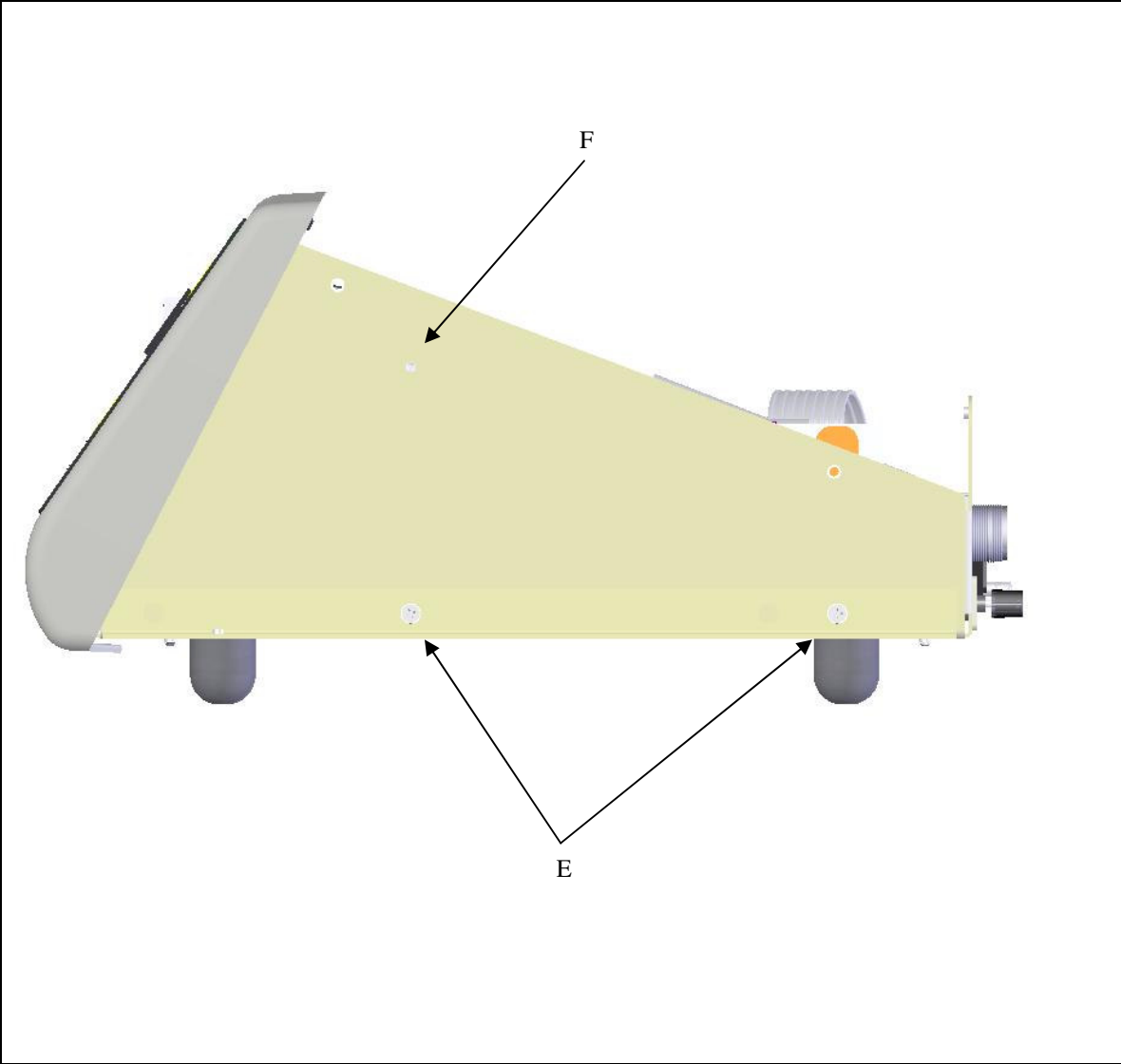


Step 5 – Removal/Replacement of the Heat Sinks

This step applies to item A, left heatsink and item D, right heatsink. Remove the two (2) screws through the access holes (items E, see diagram on next page.) located on the flanking chassis plates attached on each side of the ESU. Remove one (1) screw on the chassis (item F, see diagram on next page). Pull the heat sink upwards to remove it.

This step applies to item B, center heatsink. Remove item C, low voltage supply harness, to obtain access to item B. Remove the two screws securing the heat sink (item B) to the motherboard. Pull the heatsink upwards to remove it. Repeat steps in reverse order to install Heat sinks.





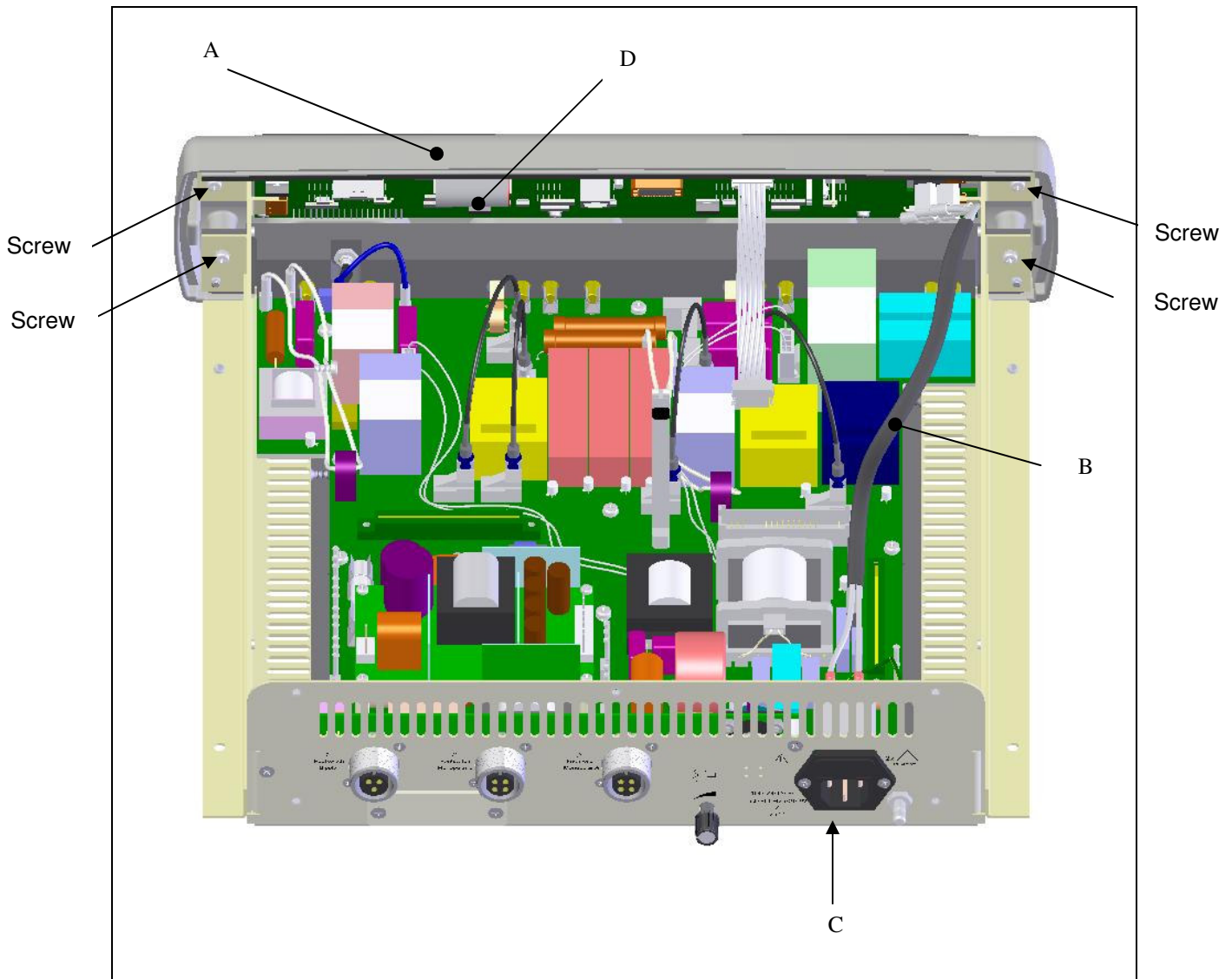
Step 6 – Removal/Replacement of the Front Panel Display

Remove the four (4) screws securing the front panel display (item A) to the chassis. Disconnect the wires (item B) connecting the front panel to the power entry module (item C) at the power entry module.

Disconnect the wire harness that runs from the front panel to the Power Conversion Board (PCB) at the Power Conversion board.

Remove the PCB from the front cover by unplugging the ribbon cable (item D) and removing the six (6) screws holding the PCB to the molded front panel (not shown).

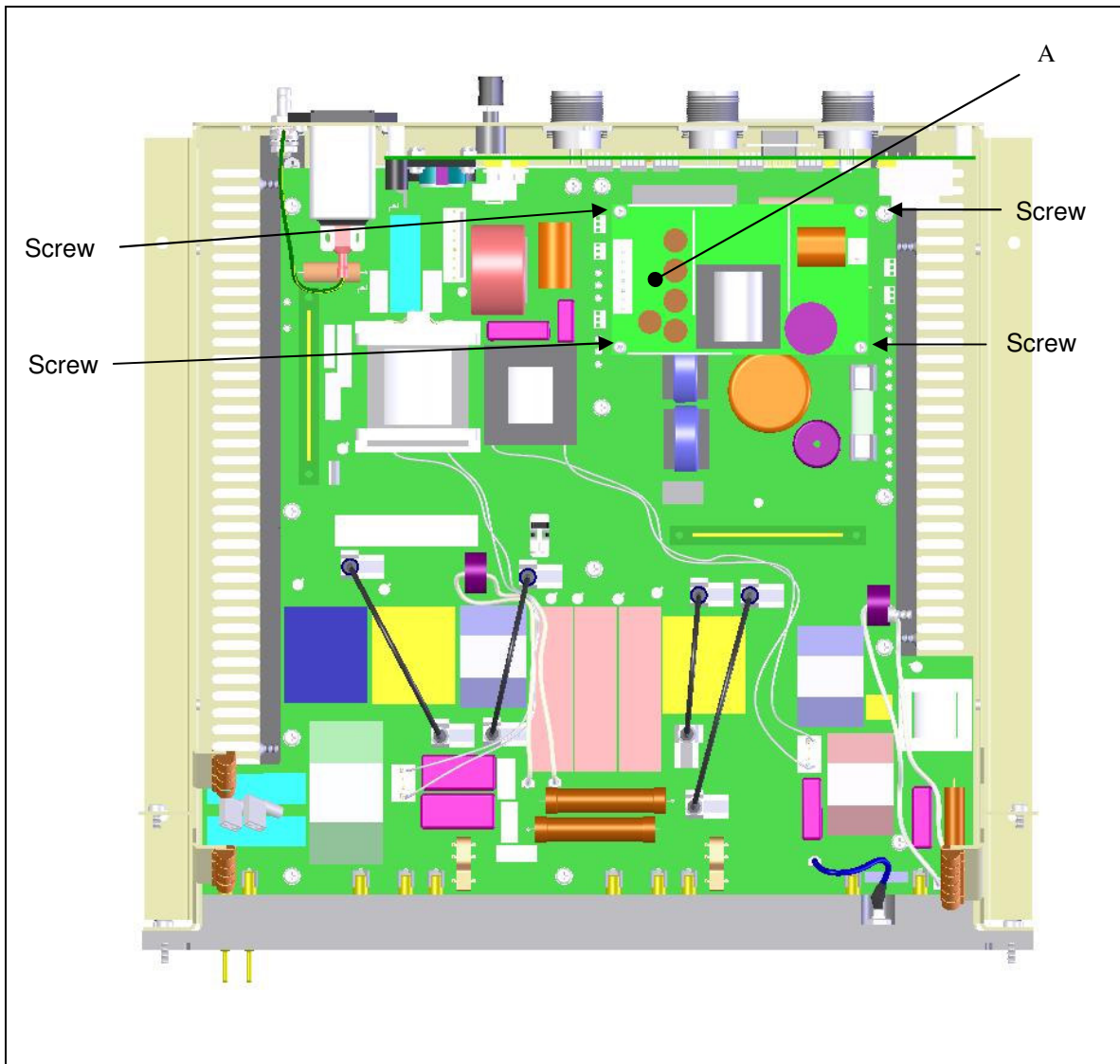
Repeat steps in reverse order to install the front panel display and PCB.



Step 7 – Removal/Replacement the Low Voltage Power Supply

Remove the four (4) screws securing the low voltage power supply (item A) to the chassis.

Repeat steps in reverse order to install the low voltage power supply.



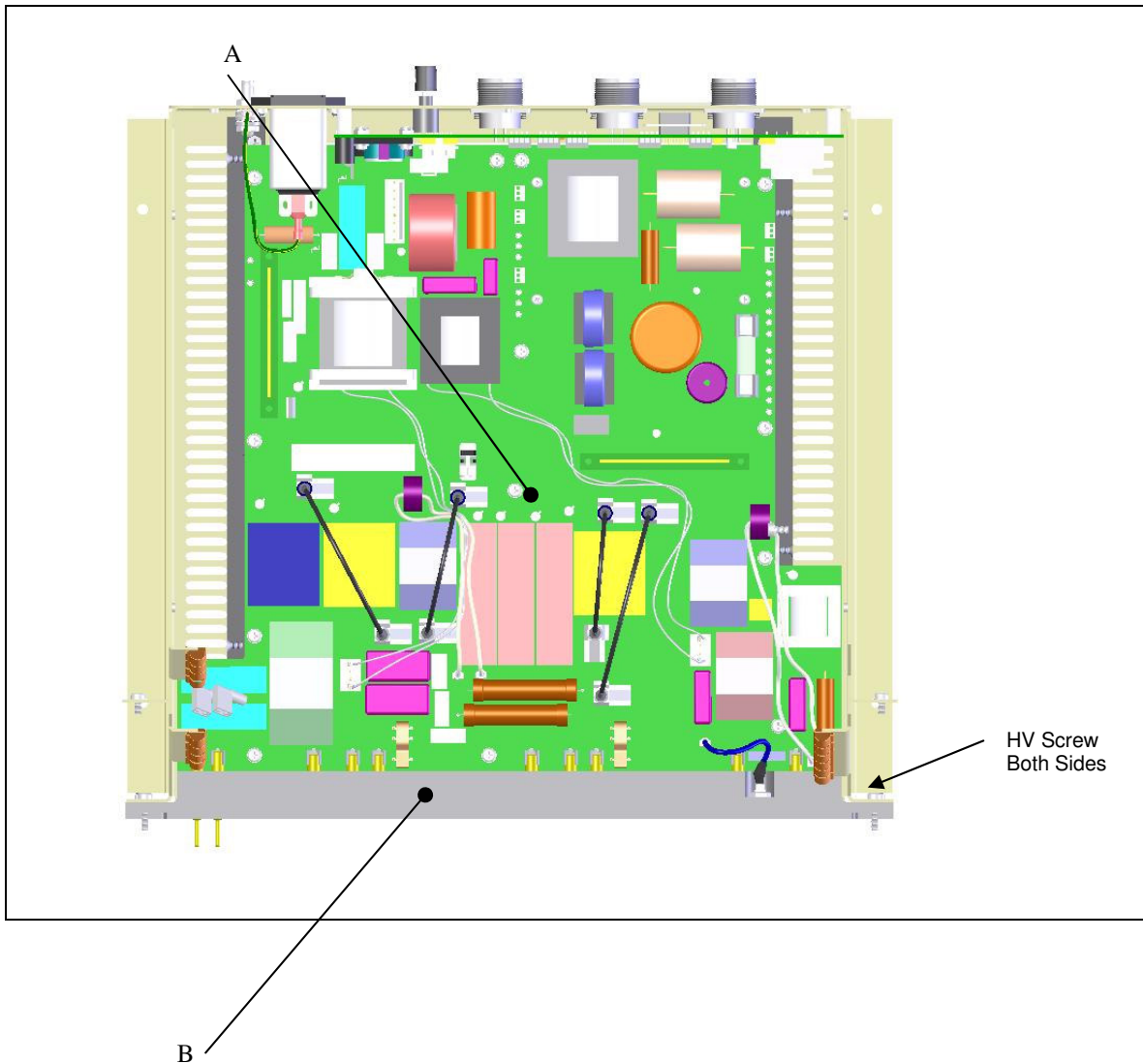
Step 8 – Removal/Replacement of the Motherboard

Remove the two (2) high-voltage connector screws and fifteen (15) chassis screws securing the motherboard (item A) to the chassis.

Pull horizontally towards the front on the high-voltage connector (item B) to remove the motherboard from the chassis.

HV Screw

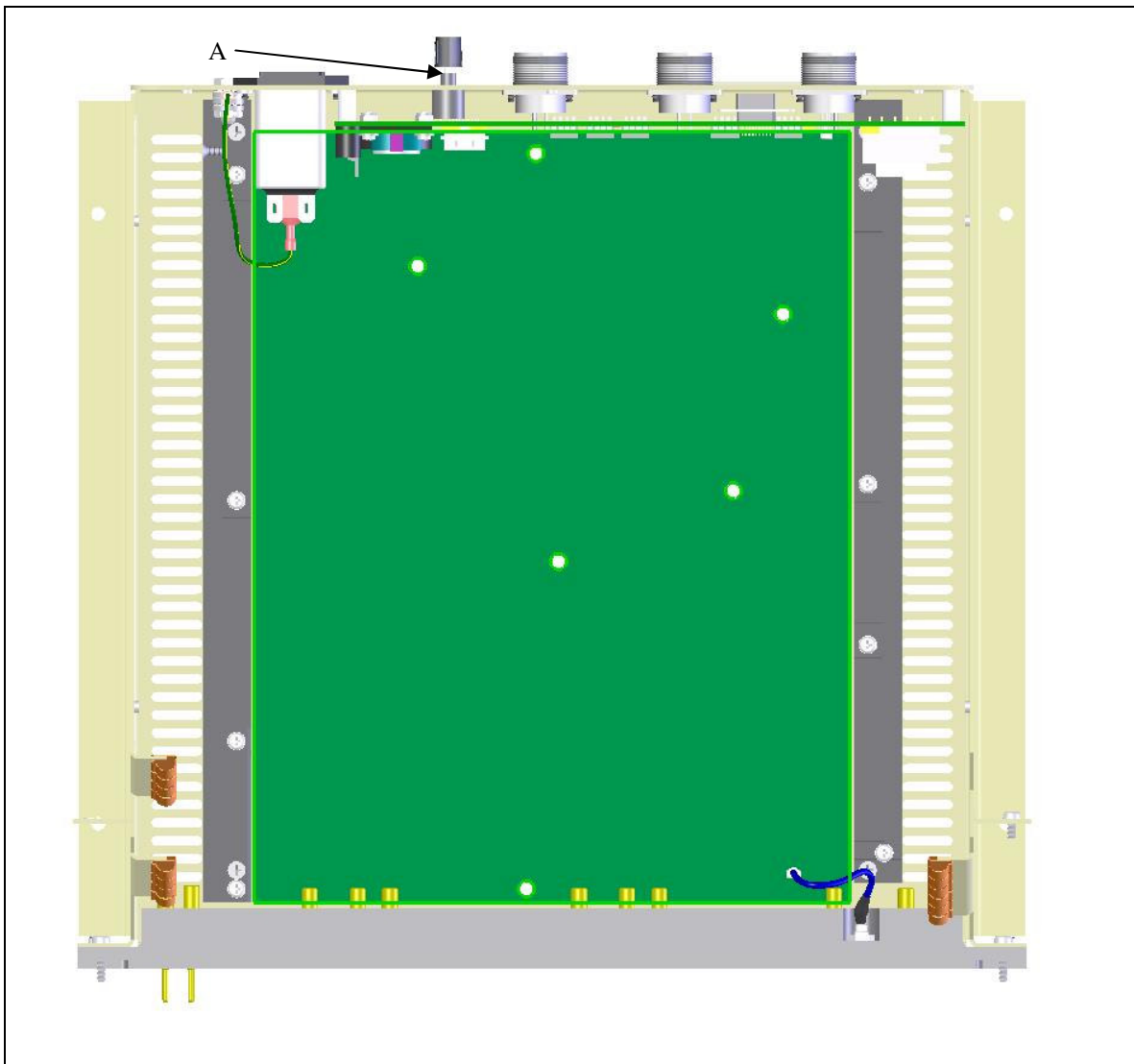
Repeat steps in reverse order to install the motherboard.

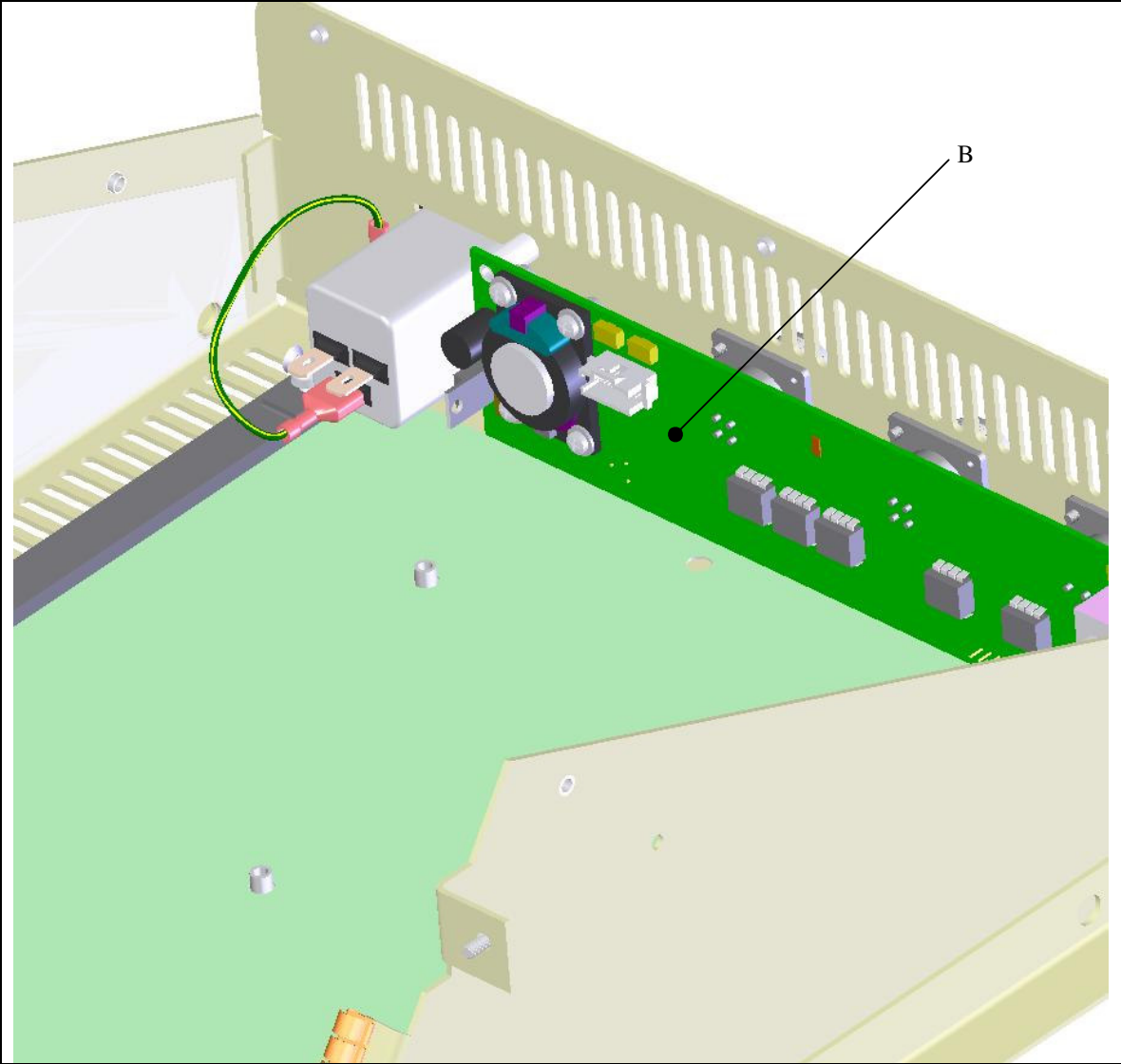


Step 9 – Removal/Replacement of the footswitch board

Loosen the set screw on the volume knob (item A) and remove the volume knob. Remove the nut securing the volume control on the other side of the chassis. Remove six (6) #4-40 screws and two (2) #6-32 screws to remove the footswitch board (item B. See diagram on next page) from the chassis.

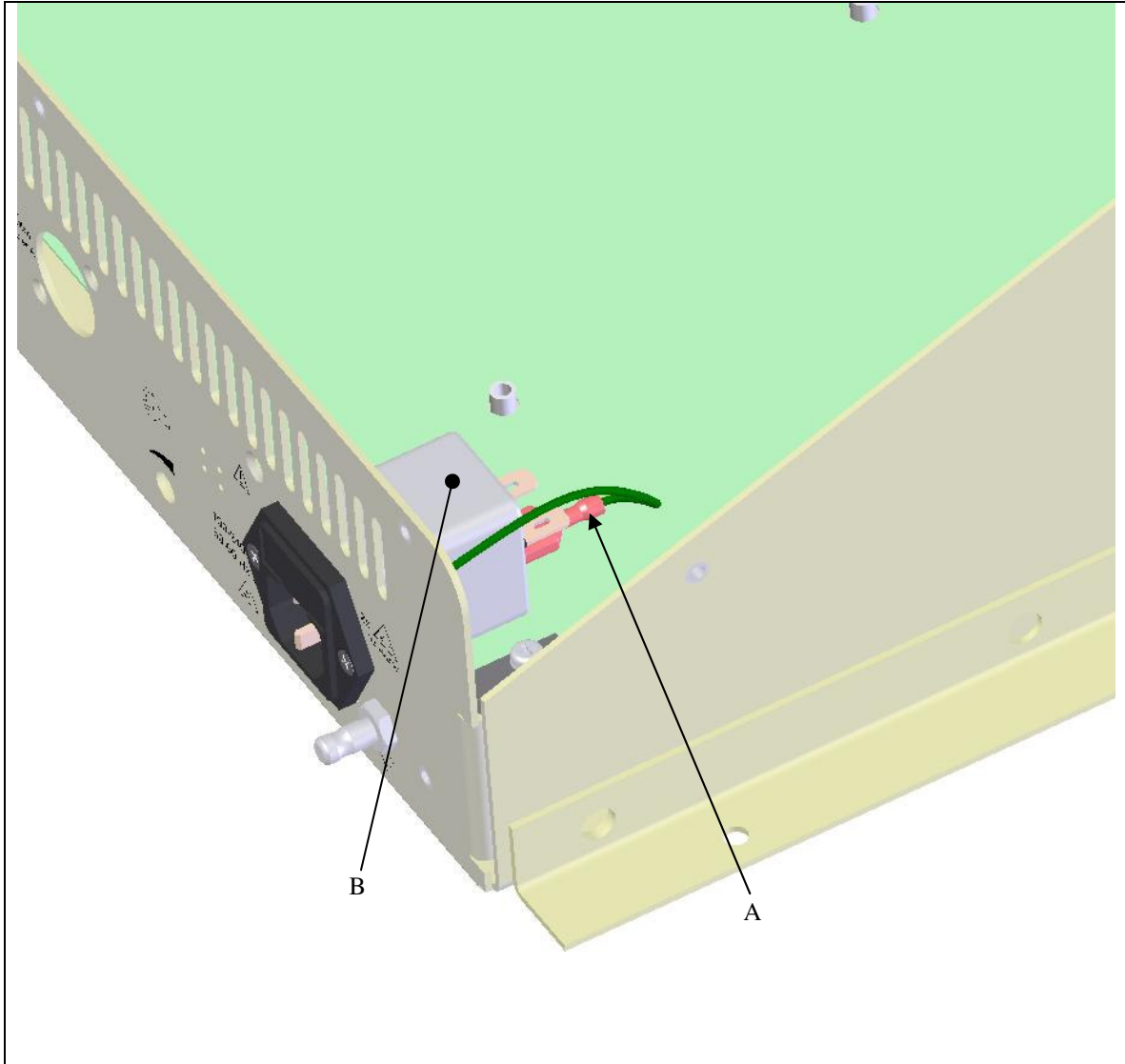
Repeat steps in reverse order to install the footswitch board.





Step 10 – Removal/Replacement of the Power Entry Module

Remove the wire connector (item A) at the power entry module (item B).
Remove the two screws that secure the power entry module to the chassis and pull towards the rear of the chassis until the power entry module is clear of the chassis.
Repeat steps in reverse order to install the power entry module.



Parts List

Description	Part Number
Center Heatsink Assembly	6020089-01
Mother Board Assembly	6020088-01
High Voltage Connector Assembly	6020090-01
Right Side Heatsink Assembly	6020091-01
Left Side Heatsink Assembly	6020092-01
Front Panel Molded Nosecone w/o PCB	6020093-01
Front Panel Assembly with PCB	6020094-01
Controller PCB	6020095-01
Power conversion PCB	6020096-01
Foot Control PCB	6020097-01
Top cover Assembly	6020098-01
Fan (3 x 3 x 5) with Connector	6020099-01
Fan (2.4 x 2.4 x 5) with Connector	6020100-01
Harness, Foot Control to Main PCB	3750009-01
Harness, Controller to Front Panel	3750010-01
Harness, Power, Main to Switch	3750011-01
Harness, Power Switch to PFC	3750012-01
Harness, Power PFC to LV Supply	3750013-01
Harness, Low Voltage Supply to Main	3750014-01
Harness, Line Ground to Chassis	3750015-01
Fiber Optic Cable	3750019-01
Low Voltage Power Supply	4600012-01
AC Power Switch	4600038-01
3 Amp Motherboard Fuse	4600040-02
Line Filter Fuse	4600039-01
Cord, Power, 15'	4600034-01
Screw, Phillips, Pan Head, 4-40 X 1/4	5600006-01
Screw, Phillips, Pan Head, 4-40 X 3/8	5600006-02
Screw, Phillips, Pan Head, 4-40 X 2.0	5600006-03
Screw, Phillips, Flat Head 4-40 X 1/4	5600007-01
Screw, Phillips, Flat Head 6-32 X 3/8	5600007-04
Screw, Phillips, Flat Head 6-32 X 3/8	5600007-05
Screw, Phillips, Flat Head 6-32 X 5/8	5600007-10
Screw, Phillips Pan Head SEMS 6-32 X 3/8	5600008-02
Screw, Phillips Pan Head SEMS 6-32 X 5/8	5600008-03
Screw, Phillips Pan Head SEMS 6-32 X 3/8	5600008-05
Screw, Phillips Pan Head SEMS 4-40 X 5/16	5600008-06
Standoff, Hex .25 X 1.125	4600031-01
Standoff, Hex .25 X 2.25	4600028-01
Module, Power Entry, 10A	4600014-01
Knob, Volume control	4600037-01

Glossary

Active Electrode	An electrosurgical instrument or accessory that concentrates the electric current at the surgical site.
Bipolar Electrosurgery	Electrosurgery in which current flows locally between two electrodes that are positioned around a segment of tissue to create a surgical effect (usually desiccation). Current passes from one electrode, through the desired tissue, to the other electrode, thus completing the circuit without entering any other part of the patient's body.
Capacitive Coupling	The passage of high frequency electrical current from one conductor to an adjacent conductor, even though the conductors are separated by air, or insulation.
Coagulation	The electrosurgical effect that results from heating due to high current density in the tissue causing cellular fluid to evaporate. This disrupts the tissue structure, shrinking the open vessels and creating a coagulum mass. This combination of tissue reformation results in hemostasis. A high voltage waveform is generally used with intermittent application of current.
Contact Area w/Mega 2000 Return Electrodes	Area of the reusable electrode which bears the weight of the patient.
Current	The flow of electrons in a circuit measured in amperes. An ampere is defined as the number of electrons moving past a given point per second. The flow of electricity.
Cutting	The electrosurgical effect which results from high current density in the tissue causing cellular fluid to convert to steam and burst the cell structure. Voltage is low and current is high.
Direct Coupling	The condition that occurs when one electrical conductor (the active electrode) comes into direct contact with another secondary conductor (tissue, scopes, graspers). Electrical current will flow from the first conductor into the secondary one and energize it.

Electrosurgery	The use of high frequency electrical current through tissue to create a desired clinical effect (cutting or coagulating).
Electrosurgical Circuit	A closed path through which an electric current is caused to flow by application of a voltage between the active and return terminals of an electrosurgical generator.
Impedance	The opposition to the flow of electric current through conductors, resistors, capacitors or inductors, measured in ohms. An ohm is the voltage differential across a circuit segment which results from the passage of one ampere of current.
Insulation Failure	The condition that occurs when the insulation barrier around an electrical conductor is breached. As a result, current may travel outside the intended circuit.
Isolated Output	The output of an electrosurgical generator that is not referenced to earth (ground).
Monopolar Electrosurgery	A surgical procedure that directs current from the surgical site through the patient's body and back to the generator with the use of a patient return electrode.
Patient Return Electrode	A plate or pad that recovers the therapeutic current from the patient in a low density format and safely returns it to the electrosurgical generator. Also known as dispersive electrode, neutral electrode, grounding pad, split plate electrode, monitoring electrode, and gel pad.
Resistance	The opposition to the flow of electric current through a conductor or resistor, measured in ohms. Resistance is a special case of impedance.
Return Electrode Contact Quality Monitoring (RECQM)	A system that actively monitors tissue impedance between the patient's body and the patient return electrode and interrupts the power if the quality of the contact is compromised.
Voltage	The force that pushes electric current through an impedance; electromotive force or potential difference expressed in volts. One volt is the force necessary to push one ampere through an impedance of one ohm. It is also the potential difference created by the passage on one ampere through an impedance of one ohm.

Appendix

Safety Compliance

UL 2601-1, Medical and Dental Equipment, 2nd edition

CAN/CSA-22.2 No. 601.1-M90 Medical Electrical Equipment, General Requirements for Safety, 2nd edition

IEC 60601-1, Medical Electrical Equipment, General Requirements for Safety, 2nd edition.

IEC 60601-1-4, Safety for Programmable Electronic Systems, 1997

IEC 60529:2001, Degrees of Protection provided by Enclosures

ANSI/AAMI ES-1 1993, Safe current limits for Electromedical Apparatus

Applicable Particular Requirements

IEC 60601-2-2 Particular requirements for the safety of high frequency surgical equipment, 1998

ANSI/AAMI HF 18:2001 Electrosurgical Devices

Electromagnetic Compliance

EN 55011:1998 Industrial, Scientific and Medical (ISM) Radio-Frequency Equipment Radio Disturbance Characteristics - Limits and Methods of Measurement CISPR 11:1997, Modified

IEC 60601-1-2:2001 Medical Electrical Equipment - Part 1-2: General Requirements for Safety - Collateral Standard: Electromagnetic Compatibility - Requirements and Tests

CISPR 11:1997, Industrial, scientific and medical (ISM) radio- frequency equipment – Electromagnetic disturbance characteristics – Limits and methods of measurement

FCC 47 CFR Part 18 1998, Industrial, Scientific and Medical Equipment