

Troubleshooting Electrosurgical Equipment and Accessories

All medical device equipment and accessories should be in good working order prior to use. It is the responsibility of each facility's biomedical engineering department to test equipment on a *routine basis* to determine if medical devices are functioning within specifications. It is the OR staff's responsibility to check equipment and accessories for proper function prior to *each use*.

No device or accessory should be used if a malfunction is suspected.

Because all manufacturers' products are unique, this Valleylab Clinical Hotline News publication will not address other manufacturers' products. The following recommendations are specific to Valleylab generators and accessories only.

ESUs (electrosurgical units) are used on a routine basis for most surgical procedures. ESUs are also considered one of most hazardous medical devices used in the OR today. Unfortunately, many nurses and doctors are not formally trained to use ESUs and do not understand settings, modes, and electrosurgical technique. Electrosurgical generators are routinely turned on and left in the default Cut and Coag mode. The settings are chosen with little regard to surgical procedure, the instrument, the electrode, or surgical technique. Because there are relatively few problems with ESUs, it is often taken for

granted that they will function properly from day to day, procedure after procedure.

Valuable time can be wasted if any piece of equipment is not operating properly. A malfunctioning electrosurgical unit might severely injure the patient or a staff member, or jeopardize the patient's life. An emergency is not the time to learn how to troubleshoot. It is imperative to be prepared in order to quickly troubleshoot or replace an ESU, if necessary. **A backup ESU should be available at all times.**

Staff members and surgeons should be inserviced on equipment, according to hospital policy. Most hospitals now have competency guidelines for staff members.

General recommendations

Prior to use

- Attend formal inservices, according to hospital policy.
- Read the user's guide and keep the guide with equipment at all times.
- Heed the cautions and warnings listed in the user's guide.
- Become familiar with the controls, ports, and alarm indicators.



Jan Fickling RN, CNOR
Clinical Product Specialist



Inga Lisa Johnson RN, BSN
Clinical Product Specialist



Cherie Ryan Loeffler RN, BSN, CNOR
Clinical Product Specialist

Clinical Information Hotline News is a free service provided by Valleylab for the advancement of perioperative safety. To request additional copies, please contact:

Clinical Information Hotline

1-800-255-8522 (follow prompt) or 1-800-551-0109 (follow prompt)

clinical.hotline@valleylab.com

For Hotline News-www.valleylab.com

For Accredited Continuing Nursing Education-www.valleylabeducation.org

tyco / Healthcare / **Valleylab**

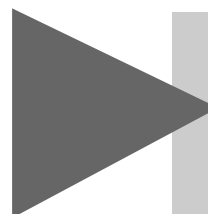
Day of surgery

- Check the biomedical preventative maintenance sticker for expiration date.
- Check for visual signs of damage to the ESU.
- Check electrical cord and plug for integrity.
- Plug cord into functional wall receptacle.
- Turn unit on and allow internal self-check before adjusting modes or settings.
- Observe for audio and visual alarms and, if present, refer to the attached “Correcting Malfunctions and Alarms” chart.
- If an error code is displayed in the Cut display window, note the error code, then re-cycle the unit by turning it off and back on. Allow another self-check. If the error code persists, replace the unit and contact the biomedical department.
- Visually check all active cords and adapters for integrity.
- Connect necessary bipolar or monopolar footswitch pedal cords to the appropriate ports on the front or back of the unit (see user’s guide).
- Accessories such as a PRE (patient return electrode) or active cords may be attached at any time, but the best time to attach them is after the unit has had a successful self-check.

- Connect accessories to the proper receptacle. **Improper connection may result in inadvertent accessory activation.**¹
- Monopolar accessories are to be connected **only** to monopolar receptacles. Bipolar accessories are to be connected **only** to bipolar receptacles. All accessories must fit securely without forcing the accessory into the port. Do not use any accessory that does not connect properly, or that has cuts, nicks, or other visible signs of wear.
- For a monopolar procedure, place the PRE on the patient according to manufacturer’s instructions.
- If a “REM™ Alarm” appears at anytime, refer to the attached chart or the “Correcting a REM™ Alarm Condition” section in the generator user’s guide. If the REM™ alarm persists, replace the unit. *If a non-REM™ PRE is connected to a REM™ system generator, no REM™ system alarm will activate at any time.*
- Select appropriate settings according to the procedure, surgeon request, and accessories to be used. Always start with the lowest recommended settings and adjust accordingly.
- Check that all active accessories are connected to the unit.

The “Correcting Malfunctions and Alarms” chart on the following page can be detached and laminated for reference purposes.

- Complete troubleshooting instructions are in the generator user’s guide.
- Notify the biomedical engineering department to report any suspected malfunction.



Clinical Information Hotline News

is also available for
viewing and printing from
our website:

www.valleylab.com

Correcting Malfunctions and Alarms

Valleylab REM™ system generators alarm and deactivate when the unit senses a malfunction. If problems persist, contact the hospital biomedical department.

| Situation | Possible Cause | Solution |
|--|---|---|
| ESU will not turn on | Disconnected or loose cord | <ul style="list-style-type: none"> Check connections and reconnect unit |
| | Faulty wall outlet | <ul style="list-style-type: none"> Use another wall outlet |
| Older Valleylab models (i.e., Force 2™) ESU is on, but does not complete self-test <ul style="list-style-type: none"> Cannot set power settings Cut and Coag windows show ---- (dashes) | Possible internal malfunction | <ul style="list-style-type: none"> Re-cycle unit (turn unit off and back on) Use backup ESU |
| | Unit is in Standby mode and will not allow settings entry | <ul style="list-style-type: none"> Press Ready button |
| | Footswitch pedal may be depressed as unit is turned on Bipolar or monopolar mode or settings buttons may be stuck | <ul style="list-style-type: none"> Turn unit off Check that nothing is resting on footswitch pedals Disconnect all footpedals, if necessary Check front panel buttons Re-cycle unit Use backup unit |
| Newer models (i.e., Force FX™, Force EZ™) System alarm shows error code in Cut display window <ul style="list-style-type: none"> Cannot set power settings Error code will not clear | Footswitch pedal may have been depressed while unit was being turned on Bipolar or monopolar mode or settings buttons may be stuck | <ul style="list-style-type: none"> Note error code number Turn unit off Check that nothing is resting on footswitch pedals Check front panel buttons Disconnect all footpedals, if necessary Re-cycle unit |
| | Possible internal malfunction | <ul style="list-style-type: none"> If alarm persists, use backup ESU |
| Accessory is activated via handswitch or footswitch, but there is no or intermittent ESU output | Malfunctioning instrument or accessory | <ul style="list-style-type: none"> Check all accessories and connections Replace accessory, if needed |
| | Incomplete or incorrect footswitch pedal connection | <ul style="list-style-type: none"> Reconnect footswitch pedal cable If ESU has two monopolar footswitch ports, ensure that the instrument and footswitch cord are lined up (i.e., Monopolar 1 to Monopolar 1) |
| | Possible internal malfunction | <ul style="list-style-type: none"> Use backup ESU |
| Force EZ™ Accessory: No power during footswitch activation | Instrument is connected to the front panel Accessory port while the footswitch pedal cord is connected to the monopolar port on the back panel | <ul style="list-style-type: none"> Connect footswitch pedal cord to front Accessory port and press "Footswitch Selector" to indicate "Accessory" Or, connect accessory to "Monopolar" port on the front panel |
| No tissue effect | Power setting is too low | <ul style="list-style-type: none"> Adjust power settings |
| No power Audio and visual alarm | PRE cord is not connected | <ul style="list-style-type: none"> Connect PRE cord to REM™ port |
| | Internal malfunction | <ul style="list-style-type: none"> Use backup unit |
| REM™ Alarm Note: There will be no REM™ safety alarm unless a REM™ patient return electrode is used with a REM™ system generator See complete instructions in user's guide, "Correcting a REM™ Alarm Condition" section | REM™ return electrode cord is not plugged securely into the REM™ generator | <ul style="list-style-type: none"> Reinsert the REM™ PRE plug to the REM™ port |
| | Cord or REM™ pin is damaged | <ul style="list-style-type: none"> Replace PRE |
| | PRE is not making complete contact with the patient | <ul style="list-style-type: none"> Check pad-to-patient interface and either attach existing PRE or replace PRE |
| | No apparent reason for REM™ alarm High patient impedance causing REM™ alarm (i.e., excessive adipose tissue, dry skin condition, diaphoresis) | <ul style="list-style-type: none"> Replace REM™ PRE <p>Use Valleylab multiple return s-cord adapter (E0507-B) to apply two REM™ patient return electrodes</p> <ol style="list-style-type: none"> Plug the E0507-B into the REM™ return electrode port Insert two REM™ patient return electrodes into the adapter (PREs should be close to surgical site, and may be placed close together, such as on the same limb, but PREs are not to touch one another.) |
| | Excessive hair | <ul style="list-style-type: none"> Change PRE site or shave site |
| | REM™ alarm persists after above steps have been taken | <ul style="list-style-type: none"> Use backup generator |

Other Possible Malfunctions

| Situation | Possible Cause | Solution |
|--|---|--|
| Abnormal neuromuscular stimulation (Stop surgery immediately) | Demodulation due metal-to-metal arcing or sparking | <ul style="list-style-type: none"> • Check all connections to the generator, PRE, and accessories for loose fit or damage • Ensure that the active instrument is not touching metal, i.e., metal retractor) |
| | Use of high voltage modes, such as Spray or Fulgurate | <ul style="list-style-type: none"> • Use lower voltage modes, such as Desiccate or Blend modes and lower settings, if possible |
| If neuromuscular stimulation persists^{2*} | Abnormal 50-60 Hz leakage currents | <ul style="list-style-type: none"> • Stop procedure • Use backup unit |
| Continuous monitor interference with EKG and other vital sign monitors, i.e., EEG, video, IV delivery systems, pulse oximeters³ | Faulty chassis-to-ground or loose connections | <ul style="list-style-type: none"> • Check all monitor and ESU connections • Re-connect or change outlets • Use separate outlets for each medical device, if possible • Avoid extensions or power strips, if possible • Replace loose or damaged cords and adapters • Use backup ESU |
| | Poor RF (radiofrequency) filtration systems in monitoring equipment | <ul style="list-style-type: none"> • Replace monitoring device |
| Monitor interference occurs only when ESU is activated³ | Metal-to-metal sparking | <ul style="list-style-type: none"> • Check all ESU, cord, adapter, instrument, and monitor connections |
| | Cords and cables are bundled or touching, causing excessive current leakage | <ul style="list-style-type: none"> • Separate all cords; do not bundle for cord management • Check all cords for compromised insulation • Do not use any metal object for cord management |
| | Cords may be damaged | <ul style="list-style-type: none"> • Replace any or all accessory cords |
| | Monitoring leads may be too close to electrosurgical instrument or PRE | <ul style="list-style-type: none"> • Place monitoring equipment and leads as far away as possible from surgical site • Place leads distal to PRE |
| | High settings in coag (Fulgurate or Spray) modes | <ul style="list-style-type: none"> • Reduce power settings and decrease voltage by using Desiccate or Blend modes with short activations |
| | Continued interference Ground wiring Monitor choke system | <ul style="list-style-type: none"> • Contact biomedical department, Valleylab Technical Service, and monitor manufacturer |
| Pacemaker or ICD (Internal Cardiac Defibrillator) interference Stop procedure immediately⁴ Prior to use with pacemaker or ICD <i>Contact pacemaker or ICD manufacturer for safety guidelines or refer to generator user's guide</i> | RF activation causing battery malfunction or untended ICD activation | <ul style="list-style-type: none"> • Stop procedure and perform immediate emergency care • Perform immediate emergency care • Contact cardiologist and device manufacture prior to continuing procedure⁴ |

1) Valleylab, Force FX™-C Electrosurgical Generator with Instant Response™ Technology User's Guide, 1999: 3-5.

2) Valleylab Clinical Information Hotline News, Vol. 4 Issue 1, March 1999: "Ouch! I just Got Shocked!".

3) Valleylab Clinical Information Hotline News, Vol. 6 Issue 1, March 2001: "Electromagnetic Interference".

4) Valleylab Clinical Information Hotline News, Vol. 7 Issue 3, November 2002: "Electrosurgical Safety Update – Pacemakers and Implanted Cardiac Defibrillators".



Clinical Information Hotline News is a free service provided by Valleylab for the advancement of perioperative safety. To request additional copies, please contact:

Clinical Information Hotline

1-800-255-8522 (follow prompt) or 1-800-551-0109 (follow prompt)

clinical.hotline@valleylab.com

For Hotline News-www.valleylab.com

For Accredited Continuing Nursing Education-www.valleylabeducation.org