MV-7A OWNER'S MANUAL

Precision small animal electrosurgical generator

Please read and comprehend the manual before using the generator clinically

For sale to or on the order of a licensed veterinary physician for veterinary use only

Revised 2013-05-29

CONTENTS

Unit Set Up

Insert the medical grade power cord and seat it firmly.

Plug in the foot pedal cord. Note that the widest key on the plug faces up and that the plug goes in easily; any need to force indicates that the plug is not aligned correctly. Once the plug is in, rotate the locking ring clockwise about 1 turn to secure the plug.

Place the foot pedal where it will be convenient but as far out of the way of accidental activation as possible.

Note the active tone on/off switch on the back of the unit. With the switch up the tone is engaged and with the switch down the tone is off.

See the appropriate pages for clinical application setup as monopolar, bipolar, or monopolar “two-point”.

Basic Operation

Electrosurgery is a soft tissue modality and is not effective on hard tissue such as bone or dentin. Electrosurgery operates by introducing high frequency electrical energy into tissue via an electrode (or tip) which acts only as a conductor. The energy reacts with intra-cellular fluids to generate heat directly within the tissue: the tissue heats the electrode, not vice versa. As long as the net heat induced falls within the range that tissue can safely absorb and dissipate without burn response, the histological effects become:

incision

excision

coagulation

desiccation

The unit is controlled with a single foot pedal. Pressing the pedal causes the unit to generate radio frequency energy which is available at the output jacks. A yellow indicator on the front of the unit lights up when energy is being generated. There is also an active tone during activation, however, this tone may be turned off leaving only the light.

Two types of energy are available depending on the position of the “Surge” / “Coag” switch: cutting energy and coagulation energy. The cutting energy is a “blended” form which induces pronounced concurrent hemostasis during incision and excision. The coagulation energy is intended to produce hemostasis only by inducing coagulation in the target tissue.

Energy may be applied to tissue in several ways depending on the clinical indication at hand by altering the equipment set up:

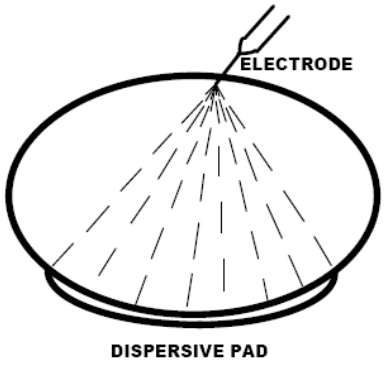
Monopolar application is where the electrosurgical energy introduced by the electrode induces histological effect at the treatment site then diffuses distally through the body back to the dispersive plate.

Bipolar application is where electrosurgical energy is applied though a forceps and the energy is constrained to the immediate volume of tissue between the forceps tips.

“Two-point” monopolar technique is where a forceps is used as the dispersive element and the electrosurgical energy passes proximally from the electrode into the forceps.

The amount of energy to be applied is controlled with the power knob. The correct setting depends primarily on the electrode size, however, finer titration is also made to accommodate physiological factors.

The MV-7A unit features an isolated output which does not recognize electrical ground as a valid electrical terminal and is therefore safe for use with EKG monitors, apnea monitors, pulse oximeters, etc. The unit is safe for bipolar laparoscopic coagulation. Note that unlike conventional ground referenced units, *the MV-7A will not work without two wires to the patient*, either in bipolar mode or in monopolar mode, i.e., the unit will not operate in monopolar mode without the dispersive plate.



The illustration shows the flow of electrosurgical energy through the body from the electrode (tip) to the dispersive plate. The advantage to this principle is the restraint of heat to the electrode site since current density over the dispersive pad is too low to generate significant heat. The disadvantage is current concentration within a narrow pedicular anatomic structure connecting the treatment site to the body, such as a testicle, kidney, or ovary, for example. This application is not recommended for treating such anatomic structures.

Positioning the dispersive plate is vital for the effective use of monopolar application. The large flexible pad supplied with the MV-7A works by capacitive coupling which eliminates shaving and direct skin contact. However, ***it is important to get the pad to conform to the patient's body as fully as practical and cover as much of the pad as possible.*** Placing this plate under the patient is the best way to use it effectively. If the patient is prone, be sure NOT to fold the limbs under the patient on top of the plate which will cause uneven bony protuberance to present between the patient and the plate compromising effectiveness. This plate may also be draped over the patient and work effectively, again, effort should be made to get the plate to conform to the body as closely as possible.

A 4" x 4" metal plate is optionally available also. Positioning this plate is a little different due to the smaller size, and covering as much of the plate as possible is more critical. The inside of the thigh is a good position since relatively little hair exists there. The belly is likewise a good place. This plate may be held in place with loosely wrapped gauze or a loosely wrapped "Ace" bandage.

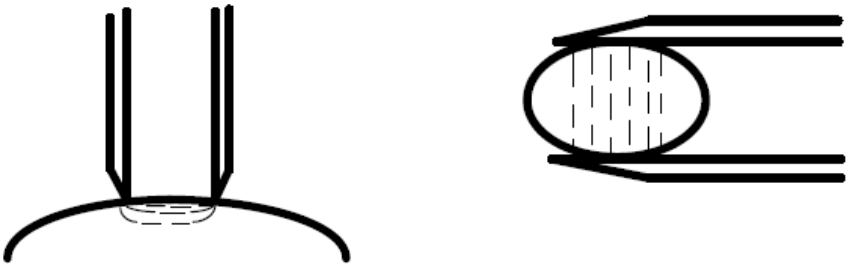
The important points of dispersive plate (or pad) positioning are:

Cover as much of the plate surface as possible. (critical with the metal plate)

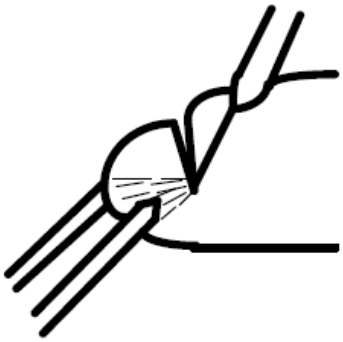
Avoid placing the plate over bony protuberance. (especially the metal plate)

Choose the least hairy area practical. (critical with the metal plate)

Bipolar Setup



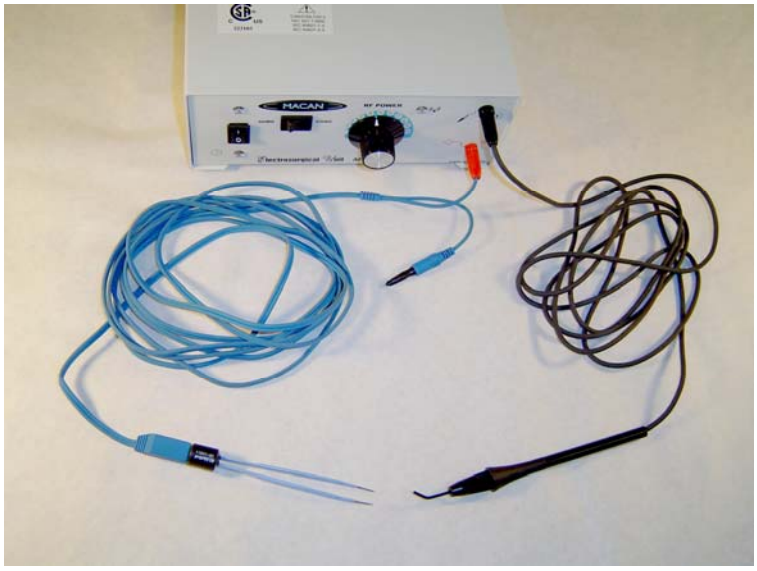
The above figures show how electrosurgical coagulating current introduced by a bipolar forceps is constrained to the immediate volume of tissue being treated. The figure on the left shows a bipolar forceps inducing superficial coagulation on the surface of an anatomic structure, and the one on the right shows vessel or tubal coagulation (also called electro-ligation). The advantage to this application is controllability, freedom from charring or burning, and it avoids involving the surrounding tissue which makes it effective on anatomic structures such as testes, ovaries, or kidneys where monopolar application is problematic. Note also that this application is effective in wet fields whereas monopolar forced coagulation is not.



The illustration shows a forceps acting as the dispersive element in the monopolar “two-point” application setup. Electrosurgical energy passes distally to the forceps rather than proximally through the body as in normal monopolar setup. This setup allows safe approach to the anatomic structures for which regular monopolar setup is problematic. This technique is limited to excision since the very small contact area afforded by the forceps will induce thermal injury at the contact point, however, for tissue which is to be sacrificed anyway this is irrelevant.

This application is especially effective for male neutering, as well as for avians and exotic pets since their small body mass does not support much electrosurgical current in the first place.

Note that the power setting for this application is significantly lower than for normal monopolar application since the electrical losses incurred by energy passing proximally through the body are absent.



The bipolar forceps with an insulator on the unused plug is shown for convenience. A monopolar forceps and cable from a medical supply house is preferred due to better contact area. Be sure to order an insulated type.

Surgical technique with electrosurgery differs significantly from scalpel surgery in that it is pressureless with electrosurgery. In fact, any resistance to guiding the electrode through tissue or a sensation of “dragging” indicates a problem. Scalpel surgery is not speed sensitive whereas with electrosurgery speed is critical to control the build up of net heat in the tissue during treatment.

During electrosurgical incision, a finite irreducible minimum heat is generated in the tissue which the tissue must absorb and which is subsequently dissipated by the capillary bed. ***It is vital to maintain an adequate surgical stroke speed to prevent a harmful build up of heat.*** Likewise, it is also vital to allow adequate cooling time between strokes in the same area. ***Developing good technique is a matter of practice*** and it is highly recommended that new users practice on a test medium such as steak to gain experience before clinical use.

In short, adequate stroke speed, or surgical technique, is the primary mechanism for controlling net heat build up in the treated tissue to within the thermal tolerance of the tissue. ***A stroke speed between 10mm/sec and 20mm/sec is good.*** Longer incisions may be done in an appropriate number of segments rather than a single pass so as to maintain accuracy of motion. Allow 10 seconds to elapse between incisions in the same area.

Note also that electrode size in terms of area in contact with tissue is a significant factor in that larger electrodes such as loops induce a great deal more heat than straight wires. A deft motion is especially important for large surface area electrodes while the straight wire electrodes are more forgiving of technique.

Initial Power Setting

The initial setting is dependant primarily on electrode size. The following are suggested stating values:

R-F10, R-F11	.010” incision wire	4.5
R-C53	.025” incision wire	5.5 to 6
R-L33	3,5mm loop	6
R-L35	5,0mm loop	7 for excision, 5.5 to 6 for planning
R-C51	coagulation ball	4.5 (coag mode)

Power Setting Titration

Like a pharmaceutical dose, power setting requires titration to accommodate physiological variations such as very vascular tissue or fibrotic tissue.

The criteria are subjective and assume an adequate, consistent surgical technique.

Setting way too low: no incision occurs, only coagulation burn

Setting too low: resistance to free electrode motion, or “drag” on the electrode

Setting slightly low: tissue detritus adhering to the electrode

CORRECT SETTING: **no dragging, no sparking, relatively clean electrode**

Setting slightly high: visible sparking

Setting too high: sparking, additional unwanted concurrent coagulation

Setting way too high: sparking, charring, carbon build up on electrode

Electrosurgical energy reacts with water in tissue, therefore, water content in tissue is a factor in determining the need for power setting titration. Fatty or fibrotic tissue will require a higher setting than muscle tissue for an equivalent incision quality due to the lower water content. Highly vascular tissue such as hepatic tissue or renal tissue may require a slightly lower setting than muscle.

Note also that power setting titration compensates for the losses incurred in the body mass and in the dispersive plate coupling to the body. Slight titrations for these factors are normal, however, an abnormally large titration strongly suggests a problem with the dispersive plate positioning or a fault in one of the cables. Such a condition should be investigated and corrected prior to continuing.

FIRE HAZARDS

Do not use in the presence of flammable anesthetics.

Do not use in the presence of flammable astringents or surgical cements. Allow fumes to evaporate before applying electrosurgery. Maintain adequate ventilation.

Do not allow concentrations of oxygen or nitrous oxide to pool in a cavity. This situation is especially exacerbated when gauze or cotton are present. NOTE PARTICULARLY THAT THE SPACE UNDER A SURGICAL DRAPE QUALIFIES AS A "CAVITY" IN TERMS OF FIRE HAZARD since it provides a space for gas pooling *and* provides combustible material.

Colon polypectomy is an especially serious situation due to the methane content of endogenous gasses. Fatal explosions have been reported. PROPER PREPARATION IS AN ABSOLUTE ESSENTIAL and so is constant monitoring for the presence of methane gas.

These fire precautions are not unique to electrosurgery, and apply equally to laser surgery and thermal cautery since serious incidents have been reported with the use of those modalities as well under the conditions mentioned.

ELECTROSURGICAL SMOKE

The smoke is generally considered a mild carcinogen and adequate ventilation should be maintained. The use of a smoke evacuator is recommended.

Electrosurgery volatizes bacteria and fungus, however, viruses can survive and may be present in smoke. If it is known that the patient has a viral infection capable of airborne transmission, the use of appropriate filtered masks is recommended in addition to smoke evacuation.

This is not unique to electrosurgery since laser surgery and thermal cautery incision share this.

OCCULECTOMY (eye removal)

This procedure is CONTRA-INDICATED FOR ELECTROSURGERY since current will follow the optic nerve back to the brain and induce grand mall seizure.

Although the use of bipolar technique or monopolar "two-point" technique show promise for doing this procedure safely and effectively, their use for this procedure has not been clinically investigated and reported, therefore, this contra-indication should be strictly adhered to.

Never coagulate directly in a tooth extraction socket.

The current will enter the nutrient foramen of the surrounding bone and necrotize the contents, resulting in osseous fissures and subsequent vascularization compromise.

Never apply forced monopolar coagulation to bone.

See the precaution regarding extraction sockets. When bleeding control on exposed bone is required, bipolar coagulation where the tips of the forceps are placed on the surface of the bone astride the bleed is the safe, effective method of choice.

Never use saline solution as an irrigation fluid during monopolar electrosurgery.

The conductive nature of saline effectively extends the surface of the electrode and can very easily result in a burn along the flow path. Use only sterile water or distilled water during monopolar electrosurgery. Saline is safe and effective as an irrigation fluid during bipolar electrosurgery, however, should be flushed first if monopolar electrosurgery is used subsequently.

When an electrosurgery unit suddenly appears to lack power, DO NOT TURN UP THE POWER SETTING TO A HIGH LEVEL UNTIL THE CABLES AND DISPERSIVE PLATE HAVE BEEN CHCKED FIRST.

Being subject to constant use, the cables have a finite life and can fail unexpectedly causing the symptom above. Similarly, if the dispersive plate is dislodged or unplugged the same symptom occurs. If the unit is turned way up, and a faulty cable or dispersive connection temporarily reconnects, a serious injury will probably result. *If power needs to be increased to compensate for tissue conditions as it sometimes is, do so a little at a time.*

Never use needle monitoring electrodes.

Although the MV-7A complies with IEC 60601-2-2 regulations regarding radio frequency leakage to insure compatibility with monitoring equipment, needle electrodes are contra-indicated never the less. Use pads wherever practical or clips, the lager the contact area the better.

Do not defeat the ground connection or use the unit with any type of two pin extension cord or adapter.

Do not use in the presence of a pacemaker (patient or staff) until the referring cardiologist has been consulted.

Modern pacemakers have built in EMI/RFI protection and compatibility with these has been investigated clinically and reported. The only way to be sure is to consult the cardiologist, however. Note also that defibrillating type pacemakers may require that the defibrillation function be turned off in the presence of electrosurgery, again, consultation is essential for certainty.

AVOID TOUCHING ANY METALLIC OR CONDUCTIVE OBJECT IN THE FIELD.

Any metallic object in contact with the active electrode becomes an extension of the electrode and can induce serious injury as a result. ***Insure adequate clearance so that a spark cannot possibly jump to the metallic object.*** *DOUBLE THIS PRECAUTION WHEN BIO-ELECTRIC LEADS ARE PRESENT, OR INDWELLING CATHETERS.*

Electrosurgery may cause interference with other equipment, adversely affecting the function of that equipment.

Although the MV-7A incorporates a medical grade EMI/RFI filter, surge suppression, and first order RF band pass filtration, never the less, electrosurgery emits powerful radio waves which can adversely affect sensitive unshielded devices.

ALWAYS BE VERY CAREFUL OF HANDPIECE OR FORCEPS PLACEMENT, *AND NEVER LEAVE A HANDPIECE OR FORCEPS LYING ON THE PATIENT.*

The use of non-conductive holsters or stowage clips is highly recommended.

Have direct view endoscopes, urethroscopes, and arthroscopes used with electrosurgery checked regularly by qualified personnel for insulation integrity.

Serious permanent injury to a surgeon's eye has been reported due to sparks from failed insulation in a urethroscope. In that case, the urethroscope was modified in house at the hospital where it was used. ***Do not modify accessories or cables from their factory configuration.***

The unit may be cleaned with soap and water or any common germicide. However, fluid should not be allowed to enter the unit which makes spray cleaners problematic. Spraying onto a cloth or paper towel then cleaning the unit with the cloth will work effectively.

The hand piece and dispersive cable are steam autoclavable (but not dry) at 275 F and 15 PSI for 30 minutes or 275 F at 30 PSI for 15 minutes. The electrodes are autoclavable at the same settings as well. For best service life, avoid coiling the cables tightly: coil them loosely during autoclave.

The “Flexi-plate” dispersive plate is not autoclavable. It may be cleaned with germicide solutions. It should not be soaked however.

The optional metal dispersive plate is autoclavable.

Support the electrodes on a flat surface when cleaning them. They may be cleaned with fine emery cloth or a paste of dental aluminum oxide. A *short* soaking in hydrogen peroxide may be used to soften protein build up. Do not scrape the electrodes since any nicks on the wire will result in failure during service.

The hand piece cable and dispersive cable have a finite service life and should be replaced once every 2 years for maximum reliability.

The unit itself does not require any calibration or special maintenance other than cleaning. However, for the utmost safety, it is strongly advised that the unit be checked annually by a qualified bio-med service for chassis leakage and ground integrity.

Cables should be inspected routinely for signs of wear or damage. ***DO NOT use a cable with any bare metal showing or damaged insulation.*** Replace it at once. Electrodes should be inspected periodically for insulation integrity. ***DO NOT use an electrode with damaged insulation. Replace it at once.***

The foot pedal is rust-proof and is splash-proof rated. It should not be inundated with fluid. However, if it is, it must be carefully dried out before using the unit again. The foot switch circuit is low voltage and electrically isolated to preclude electrical shock hazard, however, inundation may cause the unit to turn itself on due to the conductive fluid entering the switch mechanism itself.

Incisions

The MV-7A provides incision with pronounced concurrent hemostasis. The degree of concurrent hemostasis depends on the electrical parameters of the radio frequency energy, but also on the electrode geometry. Using the .025 wire electrodes, the R53 and R55, will increase the degree of concurrent hemostasis.

Full thickness dermal incision, such as initial incision, can delay healing and cause circatrix formation if excess collateral coagulation is induced since the layer of denatured tissue must be absorbed during healing. Adequate power and a deft stroke are required for optimal results. It is a matter of clinical judgment as to whether the thin wire electrode or the thicker one provide adequate collateral hemostasis in a given case with the understanding that small bleeds can be touched up with the “coag” current as required. Another alternative is to make a partial thickness incision with the thin wire electrode and finish the incision with the thicker electrode to induce the required concurrent hemostasis down in the sub dermal layer where most of the capillary bed exists. This technique will reduce net heat input into the tissue to avoid adding to the healing time and reduce subsequent circatrix formation.

Straight wire excision in the monopolar “two-point” mode follows the normal incision pattern from the point of view of the electrosurgical generator. Consequently, the use of a thicker electrode wire will increase concurrent hemostasis just like regular incision. Please do note that the power setting for the “two-point” technique is significantly lower than for regular monopolar use.

NOTE: although electrosurgical energy per se does not induce neuro-muscular stimulation, the frequency side bands induced by sparking do. When approaching muscle or muscular structures such as the bladder, it is imperative that the unit be set properly to avoid sparking. The use of irrigation to dampen sparking may be indicated as well as firmly gripping the muscle. ***Caution should be exercised near neural structures to avoid contact.***

Membranes offer higher electrical impedance to electrosurgical current than other tissues. The larger surface area of the R53 and R55 electrodes provide better cutting action than the thin wire for incising membranes.

R10 R11 R53 R55

Excisions

These take two forms. The first is with a loop electrode and is done in monopolar mode. The second is with a straight wire electrode and can be done in monopolar mode or monopolar “two-point” mode.

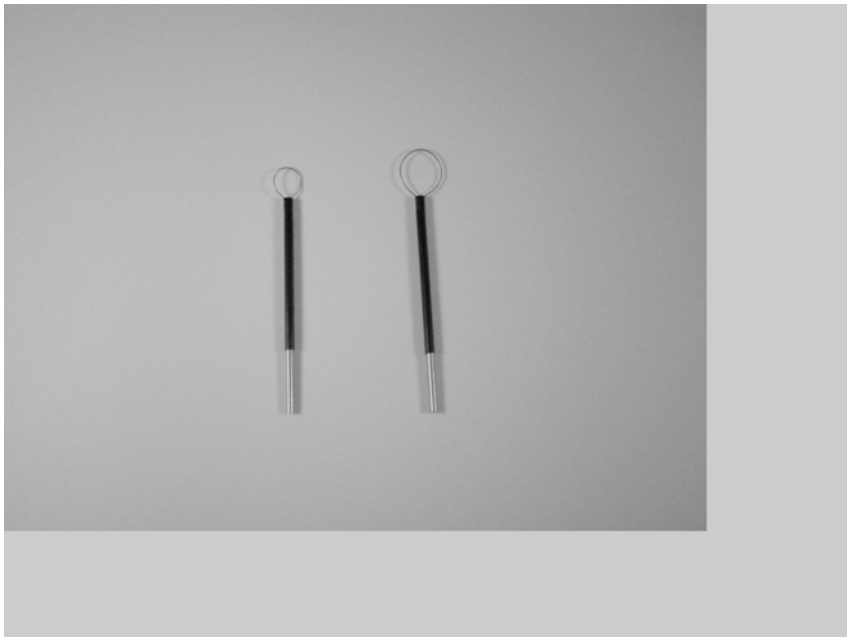
Loop electrode excision requires a higher power setting depending on loop size and requires a deft surgical stroke to avoid excessive collateral coagulation.

Note particularly that the cutting (“SURGE”) waveform provided by the MV-7A is a blended type which inherently induces concurrent hemostasis, hence collateral coagulum, and is therefore not inherently suitable for biopsy since the resultant thermal artifact will degrade the sample.

Note also that the limited power developed by the MV-7A limits loop excision size to 5mm.

The “two-point” technique has been covered under “incisions”.

Loop electrodes may be used to plane hyper-plastic or edentulous tissue in thin layers. In these cases, a power setting lower than for deep excision is appropriate. Note that the fibrotic character of edentulous tissue will require a relatively higher setting than for hyper-plastic tissue.



R33 R34

Bipolar Coagulation

This technique has the advantage of constraining electrosurgical energy to the immediate volume of tissue being treated thus avoiding the “current crowding” which is problematic in treating anatomic structures which are connected to the body via pedicular structures, works in wet fields, and is especially effective for the electro-ligation of vessels and tubes. In current practice these advantages have made bipolar coagulation the method of choice for most procedures.

Bipolar coagulation works equally well on the surface of tissue by placing the forceps upside down. This technique is effective to control bleeding from bone since the current will not enter the nutrient foramen.

Electro-ligation of vessels has a subjective aspect to it in that effect is judged by tissue color change. The tissue should visibly blanch when electro-ligation has achieved effect. The time to blanching depends primarily on power setting: a high setting will cause rapid blanching and may induce subsequent weakness in the vessel resulting in later hemorrhage. A time of 3 to 5 seconds is effective. Excessively slow time to blanching will likewise result in weakening, once again, with the possibility of subsequent hemorrhage. ***Holding current on until the vessel “pops” like a piece of meat in a sauté pan should be carefully avoided.***

Note that vessels or tubes over 3mm in diameter also require suture along with electro-ligation.

The MV-7A, due to it’s isolated output, is suitable for laparoscopic electro-ligation, however, power will need to be titrated to accommodate the electrical losses inherent in the laparoscope.

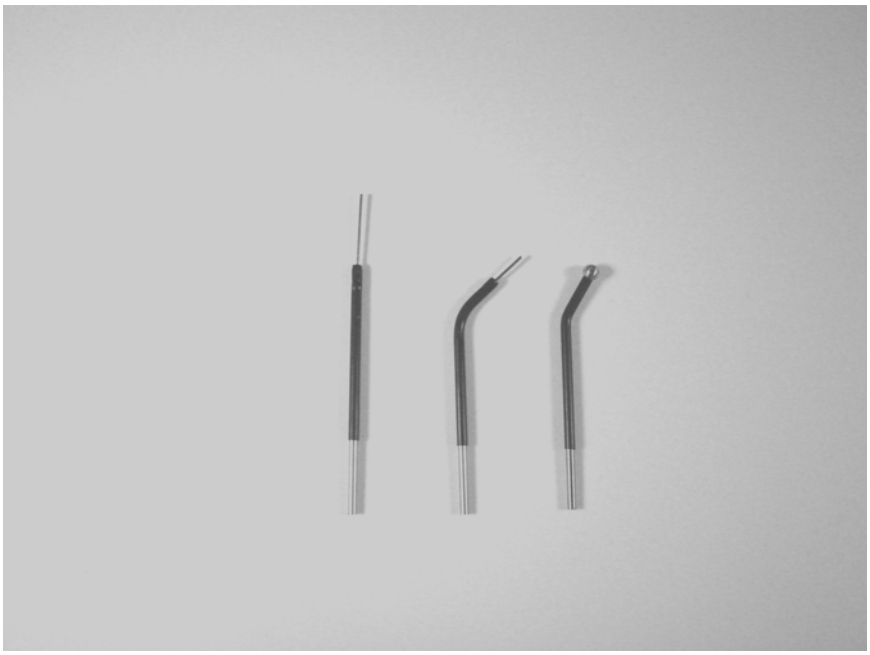
This is done in monopolar mode using the ball electrode. The normal constraints of monopolar application apply.

Effect is judged by tissue blanching. There are two ways to apply the technique: by timing using the pedal to control application time, and by activating the unit first then touching the ball to the tissue for the appropriate time. The latter method is better for small delicate application.

Note that fine coagulation can be achieved with the R53 or R54 electrodes. These may also be applied from their sides as well as from the ends. This is particularly handy to control small bleeds occurring during long incisions, especially full dermal thickness incision.

Generally speaking, monopolar forced coagulation is not effective in wet fields and should not be applied directly to bone since current concentration ion the nutrient foramen will result in necrotization of the contents with a subsequent osseous fissure and vascular compromise.

A traditional technique for small vessel electro-ligation is to grasp the vessel with a small hemostat and then apply the coagulation ball to the hemostat. While effective, the technique has the inherent limitations of monopolar application and should not be applied to structures which attach to the body through a pedicular structure.



R53 R55 R52

Fulguration

This is a monopolar application where electrosurgical energy is applied via an arc (spark) and is used primarily for tissue desiccation when treating skin lesions, however, the application is also effective for treating tumor excision sites to destroy metastatic remnants as well as enucleated cysts. The application is also effective for hemostasis on vascular organs where a lesion has been excised (under this circumstance the technique is called “soft” or “spray” coagulation). The effect is superficial in comparison to forced coagulation.

The MV-7A is an inherently low voltage unit, therefore, to do fulguration with it, an optional adaptor is required.

Very small spot fulguration is best achieved with an R62 electrode and large area treatment of tumor beds, enucleated cysts, or dermal lesions with the R52 ball electrode. The R53 or R55 electrodes provide a somewhat larger spot than the R62. Note that fulguration tends to dirty the electrodes significantly and will require some effort to clean up afterwards.

No green light when the unit is turned on.

Verify that the power cord is firmly seated.

Verify that the outlet is working by plugging in another appliance.

Verify that the power cord is good by testing it in another appliance.

No yellow light (or tone if turned on) when pedal is depressed

Verify that the foot switch is plugged in correctly

Verify that the foot switch cord is not damaged

Verify that the foot switch makes a “clicking” sound when depressed

Yellow light comes on but no cutting occurs

Verify that the dispersive plate is not dislodged

Check to make sure the dispersive plate is plugged into the cable

Check to make sure the dispersive cable is plugged into the unit

Check to make sure that the hand piece cable is plugged into the unit

Verify that the electrode is seated properly and the chuck is not gripping the insulation

Check cables for damage

Unit must be turned up very high to cut (normal tissue)

Verify dispersive plate positioning (plate is not dislodged, is well covered)

Check dispersive cable for damage

Check hand piece cable for damage

Checking cables.

These are subject to wear (see maintenance section) and accidental damage from carts running over them and similar situations. The cable integrity may be verified in several ways:

Electrical continuity test. This can be done by any electrician, bio-med technician, electronic repair shop, appliance repair shop, or automotive repair shop equipped for electrical servicing. Be sure to flex the cable, especially near the ends, during the test for accurate assessment.

Palpation. Lay the cable over the hand and press with the thumb nail. A soft spot indicates an occult conductor fracture inside the insulation. These typically occur within 3” of the ends, however, the condition may also be induced if the cable is run over by a cart or chair, which usually produces some visible damage to the insulation.

Radiograph. Occult conductor fractures are readily demonstrated by X-ray, either film or fluoroscope. A relatively low kVp setting is appropriate. Once again, failures typically occur near the ends.

Replacing fuses.

The fuses are carefully sized to provide fire safety in the event of a catastrophic component failure but also are sized to prevent nuisance trips. In other words, a blown fuse almost certainly indicates a need for professional service.

Unplug the unit from power. Double check this before proceeding.

Fuses are removed with a slotted screw driver by pushing in and turning ¼ turn.

Replace only with the exact type and rating. Use only safety agency approved types in their original packaging bearing the approval agency marking. Do not substitute type or ratings, or use unapproved generic fuses. Failure to observe this precaution may result in risk of fire or injury to the operator or patient.

The small 1/10A fuse is difficult to see. The best confirmation is by electrical continuity test, and a good fuse typically displays a resistance of 10 to 14 ohms.

Checking operation.

This may be done by placing a suitable test medium on the dispersive plate and performing incisions on it. Suitable test media are: steak, beef liver, hot dogs, lunch meats, lemons or oranges, or Ivory soap. Do not touch the test media during electrosurgery as a rather unpleasant tingle may result. Alternately, use a surgical glove to hold the media if required.

Steak is muscle tissue and approximates clinical behavior very well. Placing the steak directly on the plate will require lower power settings than clinical use since the normal losses through the body are absent. To simulate body losses place five kitchen type paper towels folded in half on the plate under the steak.

Beef liver is an especially sensitive indicator of concurrent hemostasis.

Lunch meat, hot dogs, and other processed/cooked meats will simply provide a go/no go indication, and, depending on fat and filler content, may require slightly higher settings.

Ivory soap is rendered fat. It will require a slightly high setting to show effect. The soap should not be too dry and may require a bit of scrapping to get a good moist surface. Wetting the soap will induce sparking. Cutting will inevitably drag due to the relatively high impedance of the soap. Some foam should come out of the incision as a result of the blended nature of the current. Turning the unit up very high in “coag” mode will also cut, but with a higher amount of foaming.

Citrus fruits will give a go/ no go indication. The resultant incisions inevitably have a carbonized border. Effective cutting occurs through the rind but not deep into the pulp.
Note that electrosurgery involves reaction with intra-cellular fluids, therefore, items such as paper, plastic, or metal cannot be cut.

These generally follow those where scalpel is traditionally used, however, the MV-7A offers concurrent hemostasis during incision and excision as well as coagulation which traditional scalpel does not.

Typical indications include:

Male neutering (monopolar “two-point” application preferred)

Female neutering (open surgery or laparoscopic where the ovarian artery is electro-ligated)

Ear cropping

Tail docking

De-claw (monopolar or monopolar “two-point” application)

De-bark (monopolar application or with bipolar. Requires special electrodes)

Treating dermal lesions, warts, moles

All open surgery indications (see incision section)

All dental indications

- Expose sub-gingival carie
- Reduce edentulous tissue
- Reduce hyper-plastic tissue
- Gingivectomy, gingiplasty
- Sterilize root canal
- Lance and reduce cysts, abscess
- Pulpotomy (for small teeth, spot fulguration is an effective pulpotomy method)

Note that the MV-7A is not recommended for ophthalmic surgery or biopsy, nor is it recommended for epilation due to the blended nature of the “SURGE” current.

Replacement accessories

Hand piece (with integral cable)	HPAC-1
Replacement nose cap	NCS-1
Dispersive cable	DPC-2
Dispersive plate (“Flexi-plate”)	FDP-1
Power cord	233008-06
Foot pedal	FP-971-SA

Optional accessories

Fulguration adaptor	ME6000	
Bipolar cable	BPC-1	
Forceps, straight, smooth, 114mm	BPF-S1	good for electro-ligation
Forceps, curved, serrated, 114mm	BPF-C1	grips tissue well
Forceps, straight, serrated, 101mm	BPF-S2	grips tissue well
Forceps, curved, serrated, 101mm	BPF-C2	grips tissue well
4” x 4” metal dispersive plate	DPP-1	autoclavable

NOTE: the forceps end of the bipolar cable is an industry standard “Two pin American” type and will accept forceps or disposable pens available from major medical suppliers.

NOTE: replacement electrodes are supplied in packages of two. See the MACAN Electrode Catalog for additional types.

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at 1-302-645-8068

by FAX at 1-302-645-7049

by e-mail at Info@macanmanufacturing.com

WARRANTY INFORMATION

The MV7A dental electrosurgery is warranted for 2 years from date of purchase, exclusive of accessories.

The warranty does not cover accidental damage. Damage arising from dropping, falling, or inundation will be assessed at normal repair rates. Damage from shipping must be reported to the common carrier and will be assessed at normal repair rates. Damage arising from improper packing will be assessed at repair rates. If the correct carton and packing materials are required to safely return a unit, please request them when the warranty claim is made.

All domestic warranty claims must be made through the MACAN business office to obtain a Return Authorization number for prompt service, proper credit, and accurate tracking. Warranty claims made through domestic dealers will be honored, but do please be aware that this will take a little more time. Customers outside the USA should submit warranty claims to their dealer.

The warranty is void if the unit cover is opened. Hospital clinical engineering departments, military medical equipment maintenance departments, and dealer repair departments should make special arrangements with the MACAN Customer Service Department before attempting repairs to a unit under warranty.

The warranty and all liability to MACAN is void if the unit or accessories are modified or tampered with. For special requirements, such as requests for schematic diagrams, contact the MACAN Customer Service Department.

Units returned for credit are subject to a restocking charge. Units returned for credit must be complete with all accessories since charges will be assessed for missing items.

USED ELECTRODES CANNOT BE RESTOCKED.

NOTICE ! **Do not return a unit under warranty or for service which is biologically contaminated. Please clean a contaminated unit or accessory or else pack it in an appropriate bio-hazard bag and label it accordingly.**

DISCLAIMER : **MACAN does not accept responsibility for the use of accessories other than those supplied by MACAN or those authorized in writing for use with the MV7A. Failure to function, damage to the unit, and injury to the patient or operator arising from the use of non-approved accessories are hereby disclaimed.**

MV-7A ELECTROSURGERY TECHNICAL SPECIFICATIONS

CLASSIFICATION class I medical, high frequency surgical, non-ionizing radiation device

CONFIGURATION monopolar, isolated output, type BF ports

OPERATING MODES SURGE 50%cut 50%coag blended 50watts into 100ohms +10%-5%, crest factor 1.8
Modulation : 2 x line frequency, 100 or 120Hz, sinosoidal

COAG 50% duty cycle 25watts into 100ohms +10%-5%, crest factor 2.6
Modulation : line frequency, 50 or 60Hz, sinosoidal

OUTPUT VOLTAGE 500V p-p (.5kVp p-p)

SOURCE IMPEDANCE 500ohms, nominal

OPERATING FREQUENCY 3.0mHz +/-5%, nominal

POWER CONTROL manual analog, continuously variable

OPERATIONAL DUTY CYCLE 10 seconds ON, 20 seconds OFF (not electronically enforced)

TEMPERATURE RANGE -20C to +85C storage, 0C to +40C operating, <80% RH non condensing

COOLING convection

SPALSH RATING IP0

ACTUATION single foot pedal (isolated low voltage circuit, IP20 splash resistant rust proof plastic pedal)

DISPERSIVE MONITOR N/A

ACTIVE INDICATION LED light, tone (defeatible)

POWER REQUIREMENTS 120V 60Hz, +/-10%, 240watts maximum consumption
230V 50Hz,+/-10%, 240VA maximum consumption
NOTE : field selection of operating voltage requires a skilled technician

SIZE AND WEIGHT 8.5”w, 3.5”h, 5.75d, not including controls and jacks 5.5# (9# shipping)

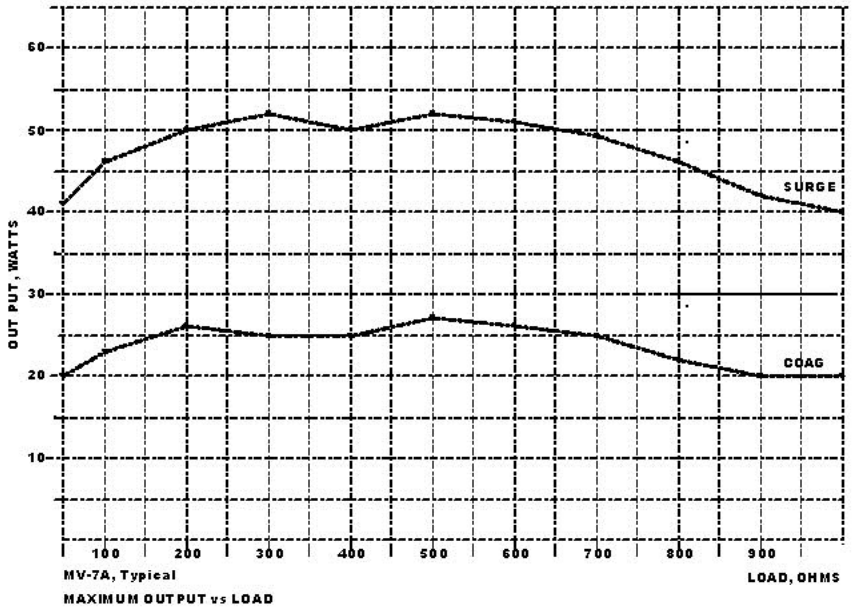
WARRANTY 2 years (exclusive of accessories)

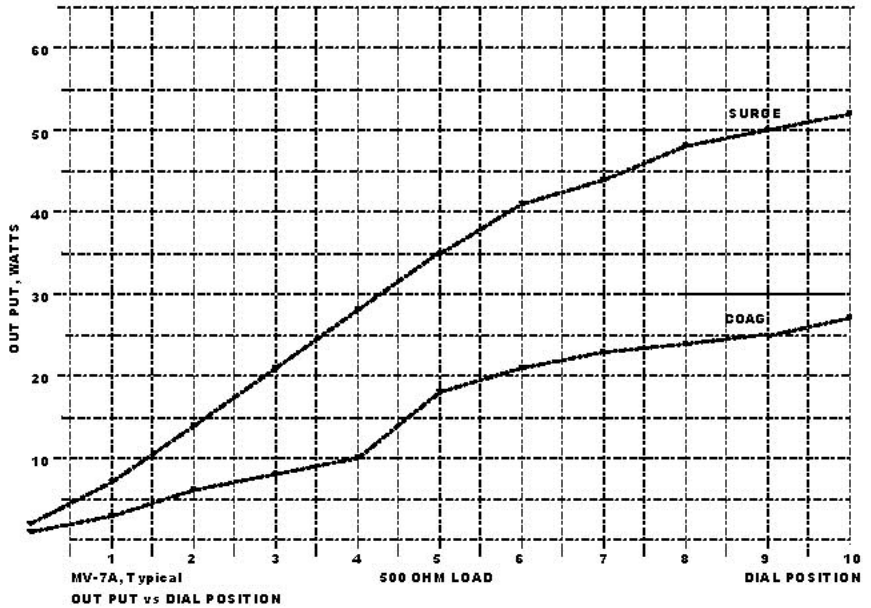
SAFETY APPROVAL Notified Body: MET Labs

Standard: UL 60601-1 & CSA C22.2 No. 601.1

Mark: C/US “Classified” mark, registration number E112955

Tested to: IEC 60601-1-1 Medical Safety
IEC 60601-1-2 Electromagnetic Compatibility
IEC 60601-1-2 High Frequency Surgical Particular Standards


OUT PUT, WATTS
60
50
40
30
20
10
SURGE
COAG
100
200
300
400
500
600
700
800
900
MV-7A, Typical
LOAD, OHMS
MAXIMUM OUTPUT vs LOAD


OUT PUT, WATTS
60
50
40
30
20
10
SURGE
COAG
1
2
3
4
5
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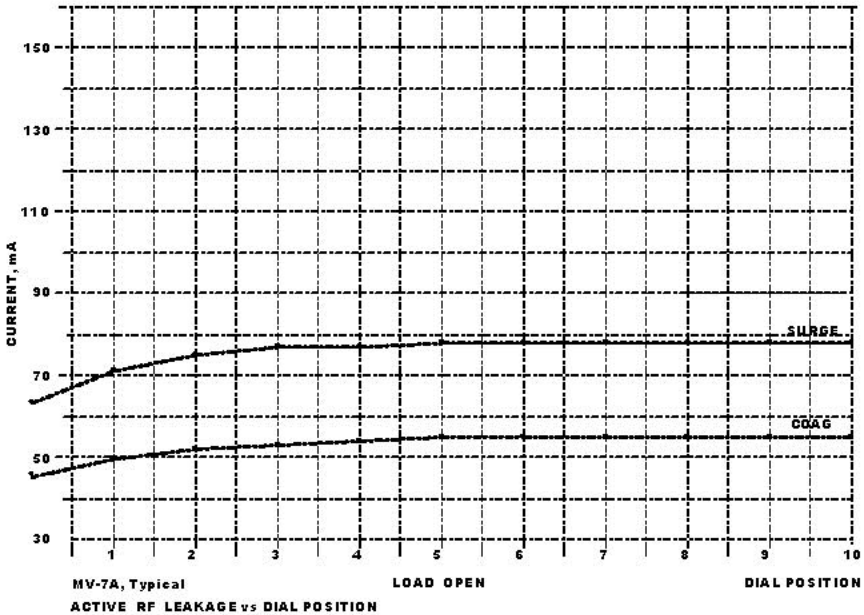
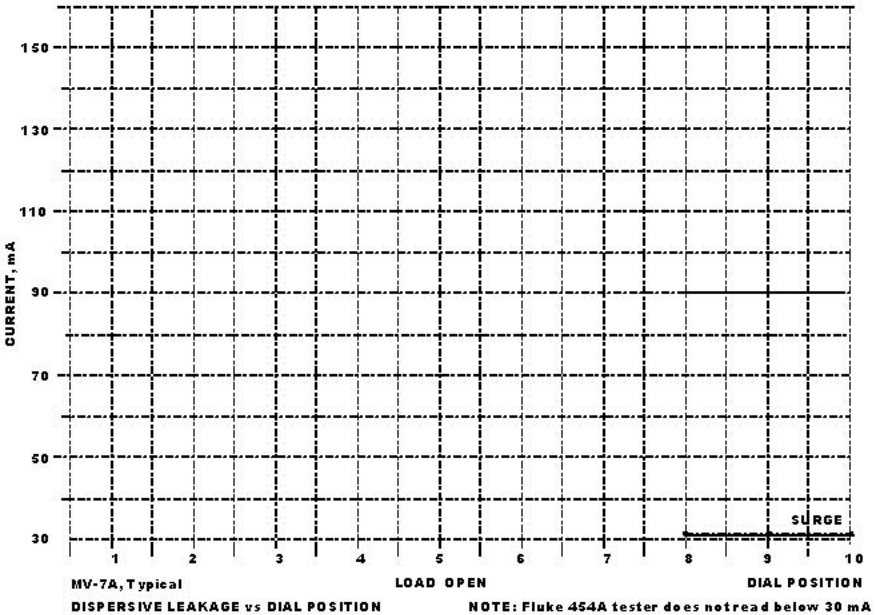
7
8
9
10
MV-7A, Typical
500 OHM LOAD
DIAL POSITION
OUT PUT vs DIAL POSITION


CURRENT, mA
150
130
110
90
70
50
30
SURGE
COAG
1
2
3
4
5
6
7
8
9
10
MV-7A, Typical
LOAD OPEN
DIAL POSITION
ACTIVE RF LEAKAGE vs DIAL POSITION


CURRENT, mA
150
130
110
90
70
50
30
SURGE
1
2
3
4
5
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7
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9
10
MV-7A, Typical
LOAD OPEN
DIAL POSITION
DISPERSIVE LEAKAGE vs DIAL POSITION
NOTE: Fluke 454A tester does not read below 30 mA

WARRANTY INFORMATION AND NOTES

Date of Purchase _____ **Serial Number** _____

Dealer _____

NOTES

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Thank You

Macan Manufacturing
20 Shay Lane
Milton, DE 19968
302-645-8068

Revised 2013-05-29