

# Abbeon Cal, Inc.

## Model BD-50E HIGH FREQUENCY GENERATOR OPERATING MANUAL



**DESCRIPTION.** The Model BD-50E is a rugged tester designed for testing tank lining and other applications where extended use is necessary. The unit is operated by a transformer which limits the current and isolates the unit from the power line for safety protection. The low voltage (magnet coil) and high voltage (resonator coil) are separated, making the unit run cooler than the hand-held models. This also allows for an extended period of use, up to no more than about 3 hours of use, with a similar cool down period.

It has a peak output voltage of between 20,000 to 50,000 V,  $\pm 2$  kV, at a frequency of 0.5 MHz. The current output is approximately 1 mA.

The Output Adjustment Knob is graduated from 1 to 11. The actual output voltage will vary depending upon the electrode used, as a larger electrode will load down the unit. Also, there is some variation in output from unit to unit, and will vary depending upon the condition of the vibration contacts inside the unit. Worn contacts will decrease the output. As a rule however, these are the approximate outputs that can be expected from a unit that is operating properly:

POSITION NO.	1	3	5	7	9	11
Voltage	20,000	27,000	32,000	38,000	43,000	49,000

Four models are available for different input voltages:

Model BD-50E (SKU 15001), 115 V, 50/60 Hz, with 12101 Electrode Tip .  
Model BD-50EV (SKU 15021xx-10), 230 V, 50/60 Hz, with 12101 Electrode Tip.  
Model BD-50ET Tank Lining Tester Kit (SKU 15031), 115 V, 50/60 Hz, with 12101, 12131, and 12141 Electrode Tips. A carrying case is optional.  
Model BD-50EV Tank Lining Tester Kit (SKU 15061xx-10), 230 V, 50/60 Hz, with 12101, 12131, and 12141 Electrode Tips. A carrying case is optional.

The 115 V model is also available equipped with a power line filter for use around sensitive electronic equipment (SKU 15001-10, and 15031-10).

The “V” in the Model Number, BD-50EV, designates a line cord plug for use for 230 V input. The “xx” designates the line cord plug type furnished with models typically used outside of North America. All of these 230 V models are equipped with a power line filter.

A 6 ft. (1.8 m) cable from the control box to the high voltage handle is provided with standard, but a longer cable, up to 15 ft. (4.5 m) can be special ordered. Contact Electro-Technic for specific details and ordering information.

**INSTALLATION.** A standard tip electrode, Part No, 12101, illustrated above, but not below is included with each model. To install it, press it into the tip of the generator handle. To remove, grasp its base firmly, and with a gentle twisting motion, pull out from the generator tip. Never insert or remove the electrode while power is on.

#### Accessory Electrodes for the Model BD-50E



These electrodes, plus the 12101 Standard Tip, are the only factory approved electrodes for the Model BD-50E. No other electrodes should be used.

After the electrode is inserted, plug the power line cord into its matching receptacle, providing the proper voltage for the unit, either 115 V or 230 V.

## OPERATION.

- 1) Turn the Output Adjustment Knob fully counterclockwise, and then turn the Power Switch to its ON position.
- 2) Turn the Output Adjustment Knob clockwise to adjust the voltage for the desired spark length. Hold the tip close to the chassis of the unit, or a common ground point, to observe and adjust the length of the spark. For thick materials, the spark should be adjusted for near maximum length. For very thin materials, a shorter spark is desired. A one inch spark represents a peak voltage of approximately 50,000 volts.
- 3) When the tip is scanning close to a metal surface, there will be a purple color spark, or corona discharge glow.
- 4) Once the unit is adjusted, pass the electrode over the material being tested. The electrode can be passed directly over most materials, however, with thin linings, keep the electrode no more than 1/8 in. above the surface being tested.

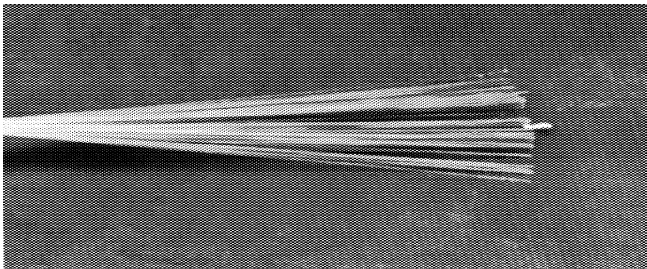


Photo at left shows a pin hole located in a sheet of rubber, with a metal backing, using the 12141 Fan Tip Electrode

- 5) When the electrode passes over a pinhole, crack, or similar type flaw, observe a bright white, concentrated spark jumping from the electrode to the metal, or similarly conducting surface below the lining or coating. A reprint of an article showing a flaw being detected is included with these instructions.

## SAFETY PRECAUTIONS.



It is used in industrial applications for pinhole leak detection, and to ionize a gas inside a bulb or similar device to determine whether a good vacuum is being held inside the device. It is also used as a lamp starter, principally in printing industry.

Only factory approved electrodes should be used. No other electrodes should be used with this device. Never operate without an electrode.

Never touch or come in contact with the high voltage output of this device, nor with any device it is energizing.



Since its output is 500 kHz, it radiates its energy for a short distance. It may interfere with sensitive electronic devices near by. If a user is wearing a pace maker or similar device, their physician should be contacted prior to using this device. The same should be said for women who are pregnant.

A small amount of ozone gas is generated as a by-product. Use in a well-ventilated area.

Do not operate out of doors on in or around a flammable or explosive environment.

**CALIBRATION SERVICE.** Factory calibration service is available for a nominal charge. It includes test data for all output positions with a number of electrodes, and is traceable to a NIST standard. Yearly calibration is recommended. Request a Return Authorization Number prior to returning to the factory for calibration.

**MAINTENANCE / INSPECTIONS.** If the output level of the Model BD-50E is required to be verified when this instrument is in use, check the output with a Model 12701 Peak Voltage Calibrator, shown below.



The only component in this equipment that should be checked is the vibrating contacts that make and break the circuitry, generating the high frequency. These contacts, made of a tungsten alloy, erode with use. Eventually, they erode to a point where the output of the unit decreases.

If the Model BD-50E receives light duty use, and is otherwise functioning properly, an annual inspection is recommended. If the unit is used on a frequent basis, has been dropped, or the maximum output is found to be decreasing, then a quarterly inspection is warranted.

To check the contacts, with the power removed from the unit, remove the cover and visually check the contacts for carbon built-up, burn marks, excessive pitting or erosion. Also check that the contacts are aligned properly.

To replace the contacts, remove the magnet coil assembly. Loosen the locking nut and back up the screw all the way back. Remove the top assembly and then remove the top contact and then the bottom contact assembly.

Replace the bottom contact assembly, making sure that enough room is left between the bottom contact and the magnet coil top, so that the armature can vibrate freely, with about 0.035 to 0.040 in. clearance.

Replace the top contact assembly, making sure that the two contact points will be aligned with each other when they are pushed together.

Reinstall the top assembly and then the magnet coil assembly.



**CAUTION.** Take precautions not to touch any wires, as power to be unit will have to be applied with the cover removed to perform this operation.

To adjust the contacts use a screw driver to turn the adjusting screw to push the contacts until there is a spark between the contacts, the contacts are aligned, and that the armature is vibrating freely.

Then tighten the nut, reinstall the screw cap and the cover.

Recheck the output with the Model 1270 Peak Voltage Calibrator.

If you should have any further questions, contact Electro-Technic Products, Inc. for additional technical assistance.

**TROUBLESHOOTING AND REPAIR.** There are no user serviceable parts inside the unit. In the event that the unit requires service, send it back to the factory. However, parts are available separately, so an experienced electronics technician can make repairs. The following troubleshooting guide is furnished:

Check all connections for loose or broken wires. If the pilot light does not come on, check for shorts and for input voltage at the fuse. If fuse is blown, replace it with a 3/4 A Slo-Blo for 115 V units, and 1/2 A Slo-Blo for 230 V units.

If the fuse is Okay, check the power cord for shorts, and replace if necessary. Test the ON/OFF Switch.

If the pilot light comes on, check the transformer for voltage between the secondary leads. If voltage is Okay, then check the magnet coil for resistance between 65 to 72 ohms for 115 V units, and 262 to 270 ohms for 230 V units.

Check the contacts for the presence of a spark. If no spark, move the adjusting screw clockwise or counterclockwise. If the spark comes on, the unit is Okay. If not, check the printer circuit board for shorts and clean the contacts at the positions of the switch. If this does not solve the problem, replace the board. If the contacts of the magnet coil are working Okay, but there is still no output at the electrode tip, and the power supply to handle wire is Okay, then replace the resonator coil.

**REPAIR PARTS. The following are repair parts for the BD-50E models.  
Contact the factory for price and availability**

<b>Part Number</b>	<b>Description</b>
12101	Electrode Tip
002-0005-1	Nut, 10-32, Hex, for Electrode Socket
010-0003-1	Isolation Transformer, 115 V
010-0012-1	Transformer, Step Down, 230 to 115 V
011-0008-1	Magnet Coil
011-0023-1	Choke Coil Assembly
011-0024-1	Resonator Coil Assembly
021-0053-1	Capacitor, 0.1 uF, 800 V
023-0027-1	Power Supply / Generator Cord, 6 ft min., 15 ft. max
025-7532-1	Printed Circuit Board Assembly
025-0032-1	Printed Circuit Board
027-0065-1	Power Line Filter
028-0002-1	Pilot Light
029-0002-1	Fuse Holder
029-0024-3	Fuse, 1/2 A, Slow-Blow, for 230 V Models
029-0030-1	Fuse, 3/4 A, Slow-Blow, for 115 V Models
029-0085-1	Switch, Rotary, Heavy Duty
033-0006-1	Cover, for Cabinet
033-7005-3	Cabinet, without Cover
035-0003-1	Top Spring Rivet Contact Assembly
035-0017-1	Armature Assembly
035-0008-1	Bridge, with Posts, Ratchet, and Adjusting Screws
044-0003-1	Top Housing, Bakelite, Cone
044-0004-1	Bottom Housing, Bakelite
044-0007-1	Molded Spool Core
044-0011-3	Adjusting Knob, w/Line
045-0003-1	Electrode Socket
049-0001-1	Cabinet Handle Assembly
049-0025-1	Nut Driver, 5/16 in.
050-0037-1	Tungsten Screw Contact
050-0079-1	Cover Cap, Brass
051-0001-1	Spacer, Teflon
053-0003-1	Standoff, Nylon
059-0040-1	Switch, Toggle, SPST, w/leads attached
060-0002-1	Line Cord Set, 3 Conductor, 115 V
060-000X-1	Line Cord Set, 3 Conductor, 230 V, Specify Type
060-0100-1	Ribbon Cable Choke Assembly
070-0059-3	Carton. Packing, with Insert
080-1500-1	Handle Assembly (Resonator), with 6 ft. Cord
083-0003-1	Housing, Bakelite, BD-50E, Complete

**Special Note Regarding CE Marking.** The Model BD-50EV generates a high voltage corona of approximately 500 kHz. However by the very nature of its design, it will produce electromagnetic interference (EMI) as a result of its operation. Electric arc welders, for example, are another product that by its very nature and mode of operation produces EMI.

As a result, the Model BD-50EV cannot meet the European Union Electromagnetic Compatibility (EMC) Directive 89/336/EEC, and cannot be CE marked.

It does, however, meet EN61010-1:1993 Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use, following the provisions of the Low Voltage Directive 73/23/EEC, as amended by 93/68/EEC

Because of the risk of EMI, a risk assessment should be carried out prior to use of this equipment.

The power output of the Model BD-50EV is limited. The effective range of EMI is less than about 1 meter on so in all directions. Metal objects nearby may bend or deflect this radiation. Therefore, there is some risk that it might interfere with electronic equipment 1 meter or so from this apparatus. This might include telephones, computers, cell phones, for example. Operators who wear pacemakers may also wish to consult with a physician prior to using this equipment.

If interference with equipment is detected, move the Model BD-50EV further away, or schedule its operation when the affected equipment is not in operation. Consult plant safety personnel regarding its use.

If you should have any further questions, contact Electro-Technic Products, Inc. for additional technical assistance.