



ELECTRO-TECHNIC PRODUCTS INC.

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**Model BD-40E HIGH FREQUENCY GENERATOR
OPERATING MANUAL**



DESCRIPTION. The Model BD-40E is a rugged tester designed for testing tank lining and other applications where thin linings and coatings are encountered, typically 1/8 in. or less. The unit is operated by a transformer which limits the current and isolates the unit from the power line for safety protection. Electronic circuitry controls the output to the high voltage (resonator coil), instead of vibrating contacts, thus making the unit run cooler than the hand-held models. This also allows for an extended period of use, up to 3 to 4 hours of use, with a similar cool down period.

It has an output of between 2,000 to 20,000 volts, pulsed DC output. The current output at the electrode tip is approximately 1 mA.

Two models are available for different input voltages:

Model BD-40E, 115 V, 50/60 Hz, with 12201 Electrode Tip.

Model BD-40EV, 230 V, 50/60 Hz, with 12201 Electrode Tip.

Leak Testers, Corona Treaters, Science Education Products

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INSTALLATION. A standard tip electrode, Part No, 12201, 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-40E



These electrodes, plus the 12201 Standard Tip, are the only factory approved electrodes for the Model BD-40E. 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.

Except for the 12201 Tip Spring, all other Electro-Technic electrodes shown above have a plastic spacer in between the electrode tip and the base that fits into the socket of the Tester. This spacer separates the two metal parts. A spark must jump this gap before the voltage can be applied to the electrode tip. This spacer/air gap effectively isolates the electrode tip from line voltage in the unlikely event of a short in the Tester.

A Part Number 12461 Shorting Block is used with any of the electrodes which have this plastics spacer when they are used at voltage settings of approximately 6,000 V and below for use in testing thinner coatings and liners. If this part is not installed on the electrode when the Model BD-40E is operated below 6,000 V, the output of the Model BD-40E may need to be set higher than desired to jump the ¼ in. spark gap inside the electrode.

One of these shorting blocks is supplied with each Model BD-40E, for installation when one of the above illustrated electrodes is used. A shorting block can be factory installed on any of these electrodes if specified on the order.

To install this part, push the black plastic block over the white plastic spacer of the electrode. Make certain the spring clips of the block make contact with both metal parts of the electrode.

Do not attempt to install this shorting block on the 12201 Spring Tip electrode, as this electrode does not have a plastic spacer.

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 $\frac{1}{2}$ inch spark represents a peak voltage of approximately 25,000 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 $\frac{1}{8}$ in. above the surface being tested.

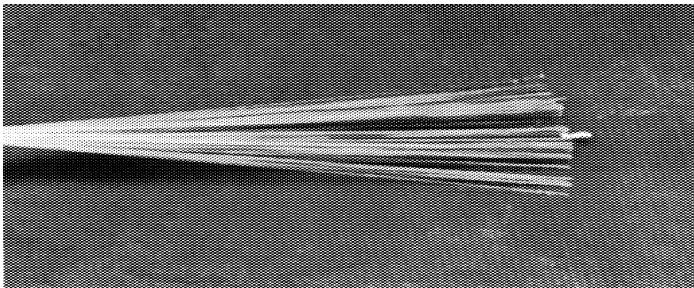


Photo at left shows a pin hole located in a sheet of rubber with a metal backing, using the 12141 Fan Tip Electrode.

- 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.

CALIBRATION SERVICE. Factory calibration service is available for a nominal charge. It includes test data for the minimum, mid-point, and maximum 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.



SAFETY PRECAUTIONS.

It is used in industrial applications for pinhole leak detection.

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.

Special Note Regarding CE Marking. The Model BD-40EV 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-40EV 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-40EV 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-40EV 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.

MAINTENANCE / INSPECTIONS. If the output level of the Model BD-40E is required to be verified when this instrument is in use, check the output with a Model 12701 Peak Voltage Calibrator, shown below, voltages between 10,000 and 20,000 volts. For voltages lower than 10,000 volts, specific calibrated spark gaps are available. Contact Electro-Technic for details.



If the Model BD-40E 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.

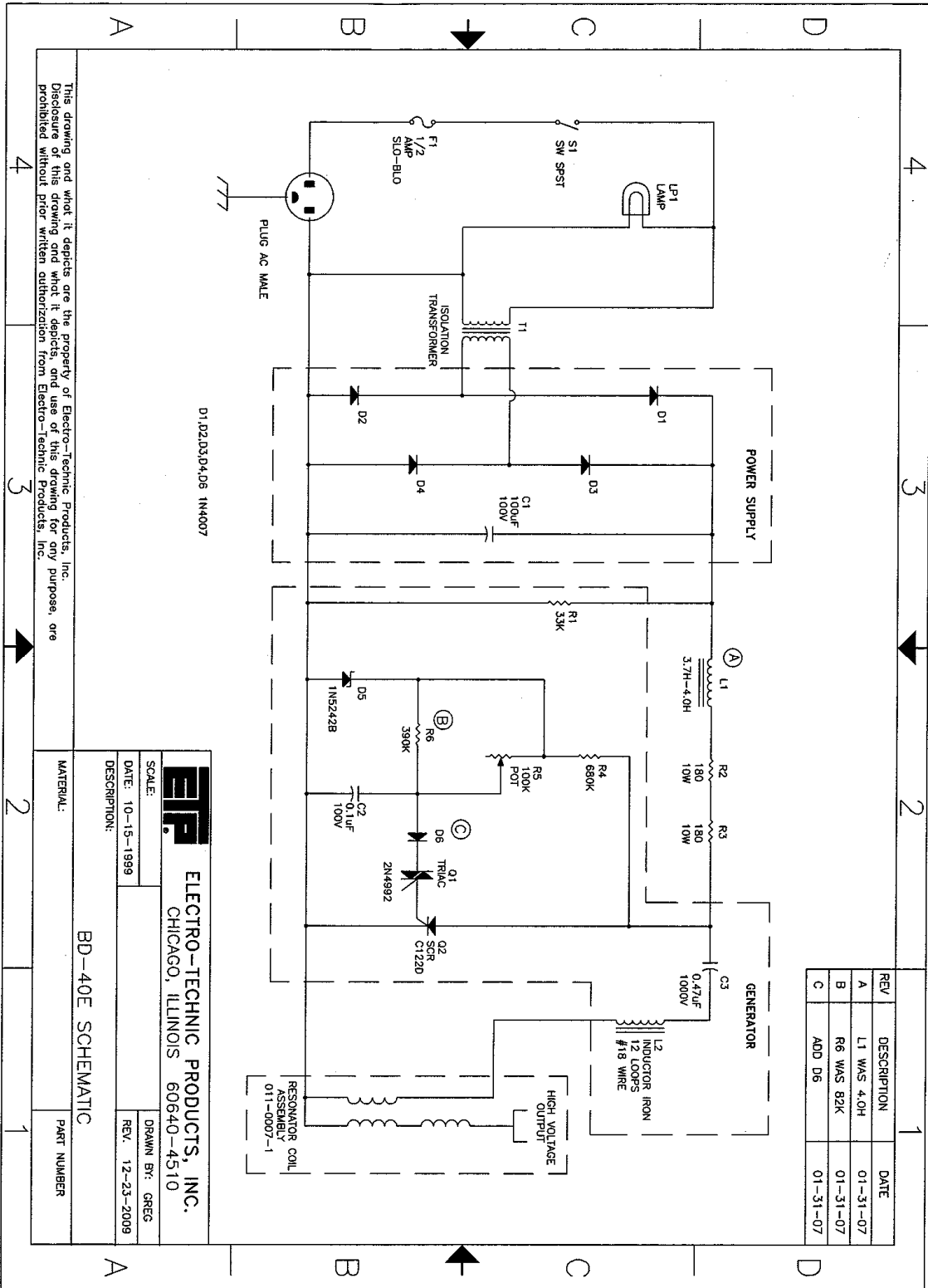
TROUBLESHOOTING AND REPAIR. There are no user serviceable parts inside the unit. In the event that the unit requires service, send it back to the factory. However, parts are available separately, so an experienced electronics technician can make repairs. The following troubleshooting guide is furnished:

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 1/2 A Slo-Blo fuse. If the fuse is Okay, check the power cord for shorts, and replace if necessary. Test the ON/OFF Switch.

If 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-40E models. Contact the factory for price and availability

Part Number	Description
12201	Electrode Tip, Spring
002-0005-1	Nut, 10-32, Hex, for Electrode Socket
010-0009-1	Transformer, 115 V
010-0012-1	Transformer, Step Down, 230 to 115 V
010-0013-1	Choke, 4 H
011-0024-1	Resonator Coil
020-0033-1	Potentiometer, 100 kilohm
021-0005-6	Capacitor, 0.1 uF, 100 V, Generator
021-0024-6	Capacitor, 100 uF, Electrolytic, Power Supply
021-0026-1	Capacitor, 0.47 uF, 1000 V, Generator
022-0011-6	SCR, High Voltage, Generator
022-0015-1	DIAC, Generator
022-0026-1	Diode, Zener, Generator
023-0027-1	Power Supply / Generator Cord, 6 ft minimum
025-7518-1	Printed Circuit Board Assembly, Generator
025-7519-1	Printed Circuit Board Assembly, Power Supply
028-0002-1	Pilot Light
029-0002-1	Fuse Holder
029-0024-3	Fuse, 1/2 A, 3 AG, Slow Blow, BD-40E
033-0006-1	Cover, Cabinet
033-7011-3	Cabinet, without Cover
044-0003-1	Top Housing, Cone
044-0004-1	Bottom Housing, Line Cord Side
044-0008-1	Voltage Adjusting Knob
045-0003-1	Electrode Socket
049-0001-1	Cabinet Handle Assembly
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
080-1503-1	Generator and Cord, without Power Supply
083-0001-1	Housing, Bakelite



REV	DESCRIPTION	DATE
A	L1 WAS 4.0H	01-31-07
B	R6 WAS 82K	01-31-07
C	ADD D6	01-31-07

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ETP ELECTRO-TECHNIC PRODUCTS, INC.
CHICAGO, ILLINOIS 60640-4510

SCALE: _____ DRAWN BY: GREG
DATE: 10-15-1999 REV. 12-23-2009
DESCRIPTION: _____

BD-40E SCHEMATIC

MATERIAL: _____ PART NUMBER _____

D1.D2.D3.D4.D6 1N4007