BrightArcs DRSSTC 3 User Manual

IT IS ESSENTIAL THAT YOU READ THIS DOCUMENT FOR SAFE AND RELIABLE COIL OPERATION.

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Diagram:

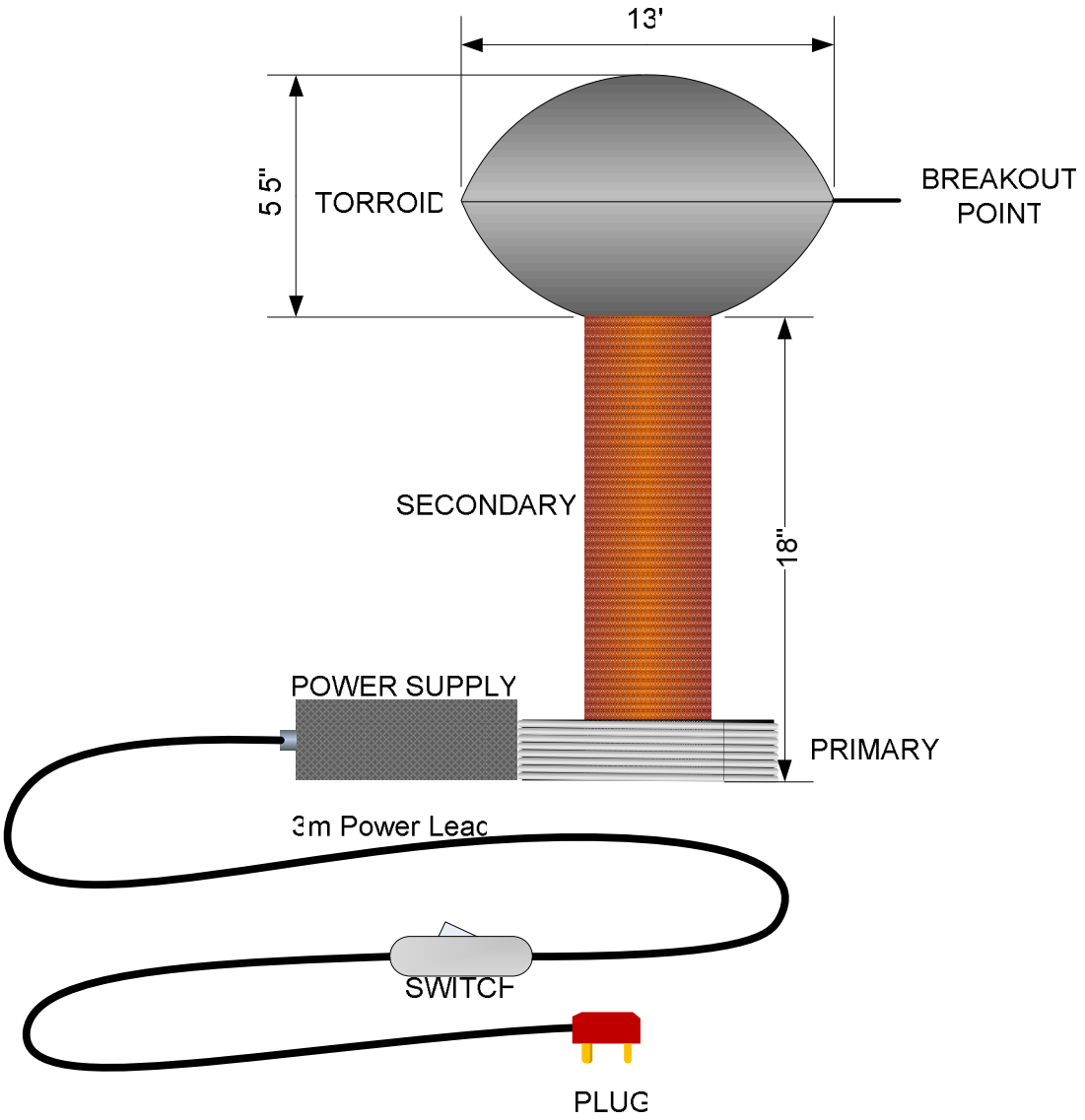

Figure 1. Coil components

Safety:

It is advised that you read and understand all aspects of this manual before use. Improper use of the device may cause personal injury, death, fire or criminal proceedings. BrightArcs can not be held responsible for any resulting losses as a result of using their product. The user is solely responsible for the safety of themselves and others, it is essential that they read this document.

DO NOT:

- Never pull the plug out whilst operating the coil since this effectively removes the earth connection and WILL result in electric shock unless the coil is grounded at another location (case is ground).
- Never draw a spark to your body or any other hand held object.
- Operate the coil at a distance of >2.5 m and never leave unattended.
- Do not remove the polystyrene spacers, the coil must be centralised within the primary.
- Do not operate near flammable materials.

Electrocution:

A Tesla Coil is a device that creates many thousands of volts in order to produce impressive plasma displays in the surrounding air. The voltage produced has two components, the alternating current (AC) and the direct current (DC) parts.

The DC component arises as a result of the capacitance of the coil discharging into a grounded object. If this current flows into a person, it will cause a sensation of pain similar to a Van de Graaff generator. The Tesla coil will repeat this sensation at over 500 times per second during each pulse; This results in a very painful shock. Users who wear pacemakers or electronic health maintenance devices should never approach a coil. Even healthy adults occasionally suffer cardiac arrest as a result of electric shocks; BrightArcs advice is to NEVER APPROACH AN OPPERATING COIL.

The insulative pipe supporting the coils will accumulate charge during operation, this will result in a residual charge building up on the coil over the several minutes after turn off. If the device is unplugged then a small static shock will result when handling the coil; To avoid this, leave the coil plugged in with the switch in the off position for 5 minutes before unplugging (or ground the case externally before handling).

The coil may cause grounded objects to produce small shocks when touched. This is usually because the person is standing between the coil and a grounded object and hence offering a path for the high frequency AC current. To avoid this, the person could either ground themselves by holding a grounded object or (preferably) move to the other side of the object so that they are no longer presenting a path to the AC current i.e. Not between the coil and a grounded object.

Interference:

The high frequency AC component has a low chance of causing injury by electrocution, but it does pose a serious problem to other electrical equipment. The AC field around the coil WILL cause damage to electronic devices such as: Computers, Telephones, Alarm systems, Smoke detection systems, Televisions, Transmitting/Receiving equipment, Game consoles, Appliances and any circuit containing electronic components. It is recommended that the coil is operated away from these items by a separation of 10m. The AC component will also travel along extension cables and through ring mains in buildings causing damage to devices at greater distances. It is recommended that these devices are unplugged before operation.

Fire:

The plasma created by the coil is extremely hot, particularly when arcing to a grounded object. Contact with a flammable material will cause instant flames. In addition, flammable gas will also be immediately ignited and operation near a potential gas source should be avoided.

Health:

BrightArcs have found no evidence that observing the coil will cause injury, people with sensitive eyes should be aware that the bright flashes my cause discomfort. Furthermore, PEOPLE WITH PHOTOSENSITIVE EPILEPSY SHOULD NEVER WATCH THE COIL. There is no evidence that the high frequency electric field can cause damage to living tissue, a safe observation distance is 3m or more.

The sound that the coil produces is extremely loud and can result in tinnitus after long exposure. Ear protection is essential for more than a few minutes of operation. Always warn observers of the loud noises before switching the coil on to avoid trauma.

Legality:

THIS COIL PRODUCES INTERFERING ELECTROMAGNETIC RADIATION if operated outside a grounded cage enclosure this device will be breaking the law according to broadcasting regulations in most countries. However, BrightArcs has not heard of a single incidence where legal action by the FCC or similar governing body has been taken. Please remember this when dealing with complaints by amateur radio enthusiasts who will be able to hear the coil on their radios over large distances.

Assembly:

The DRSSTC comes almost completely assembled. There are two operations needed to complete the kit.

1) Fit a suitable grounded plug to the power lead. A UK type plug is supplied. USE ONLY A 3A FUSE MAXIMUM. Failure to use a fused plug may result in fire or personal injury.
2) Assemble both halves of the torroid. The torroid is supplied in two halves. These can be attached using the conductive tape supplied or by gluing or welding the two halves together. Attach the supplied break out point to the rim of the torroid if full length sparks are desired.

The torroid can then be placed on top of the coil and power can be applied.

Breakout point:

The breakout point diverts the power of the coil into a single dominant leader, this allows the coil to arc over the full 20 inches (or more). The break out point can be any sharp object attached to the rim of the torroid. A piece of suitable wire is included to make the break out point. BrightArcs recommend that you use the breakout point since it allows the coil to be operated with a more predictable (safer) plasma display. Always point the breakout point in the direction you want the streamer (plasma) to go. Do not point the breakout

point downwards since this could cause coil damage. I picture of the optimum breakout point orientation is shown in Figure 2.

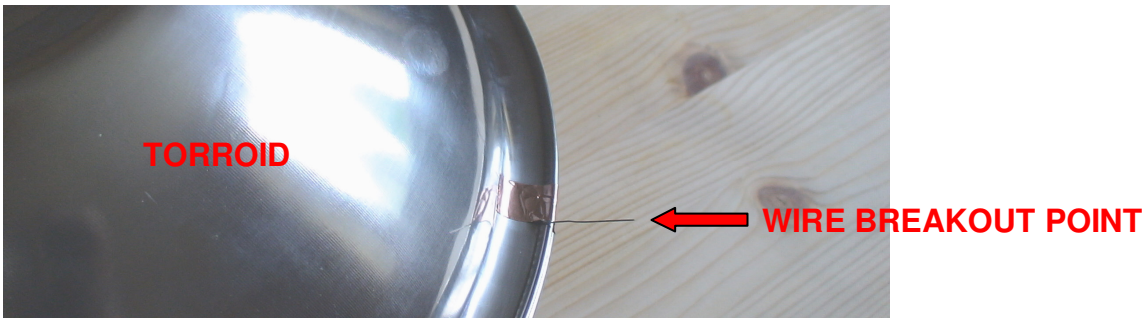

Figure 2. Breakout point orientation

Operation:

Tesla coils can be unreliable is improperly operated; please adhere to the following to ensure safe, reliable and long life operation.

Do's and Don'ts:

1) Never unplug during operation (this removes the ground connection).
2) Always wait 5 minutes before unplugging the coil after switch off.
3) Always use only the specified voltage (NO VARIAC!).
4) Always operate within temperature 5 - 30℃.
5) Always operate the coil at a safe distance of >2.5m.
6) Always place the torroid on top of the coil.
7) Never operate near flammable materials.
8) Preferably use the break out point with the coil (much safer).
9) Never operate on a metallic surface (any metal under the coil base severely reduces performance).
10) Never operate in humid environments.
11) Never operate in condensing environments.
12) Never operate if damp.
13) Always be ready to turn off the coil quickly.
14) Always remove dust from the secondary using a duster before use.
15) Always ground the coil (grounded via plug for most uses).
16) Only allow arcing to grounded objects.
17) Preferably do not allow continuous arcing.

18) Ensure the power supply case temperature never exceeds 60℃ (check whilst coil is switched off).

Look out for:

Sharp objects around the coil (even blades of grass are conductors), dust on the secondary, shifted primary or other changes to the Tesla coil may lead to flash over. Do no place any object within the zone shown in Figure 3. If sparks are observed near or around the base of the coil, switch off immediately to avoid damage to the secondary. Most flash overs are minor problems and are the result of dirt or moisture on the coil, remove the cause and resume operation. Flash overs can also be caused if the primary has slid up the former, slide it back down carefully so that it is level with the base of the coil. Occasionally, a coil may be damaged by a flash over, removing the cause in this case will not fix the problem; The coil need repairing. Flash overs should NEVER occur, if you see even a small spark near the base of the coil, switch off and investigate to cause.

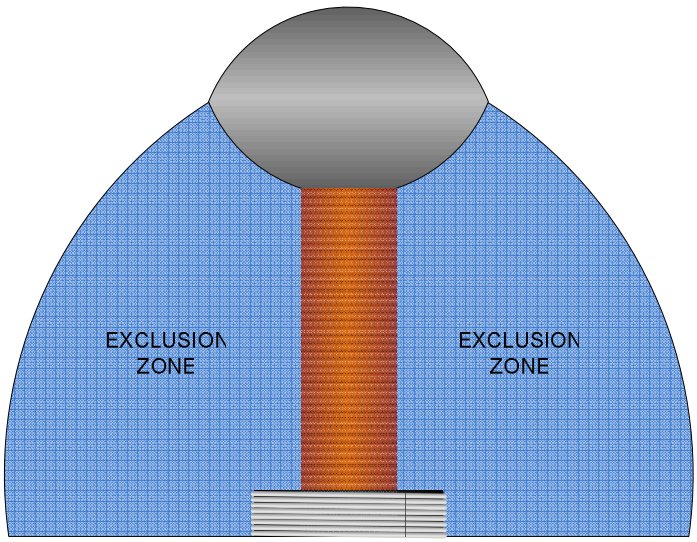

Figure 3. Exclusion zone

The torroid contacts the coil by a copper tape located at the top. If there is insufficient contact, arcing may result at this connection which will eventually lead to coil damage. If arcing is observed, reposition the torroid to make proper contact. It may be desirable to permanently affix the torroid to the coil, this can be done using a glue gun or other adhesive. Be careful to preserve the torroid connection when gluing the torroid.

Coil repair:

This can be done using “Duck, All Weather Repair Tape” and insulative varnish (RS part 199-1480). Clean areas, separate burned windings, apply varnish and wind 2 layers of the thick polyethylene tape (Duck, All Weather Repair Tape) over the damage. Contact BrightArcs for further details as needed.

Tuning:

This coil is self tuning within a wide range and will not normally require any adjustment. However, if operated in an enclosed space, the resonant frequency of the coil may drop sufficiently to cause a reduced spark output. If this occurs, operate the coil in a less enclosed space. More experienced users might try to alter the coil turns ratio (by adding a primary turn), it should be noted here that this will void the guarantee.

Guarantee:

The guarantee covers all aspects of the electronic power supply assembly for 1 year or 300 hours of operation, whichever is sooner. The guarantee is for the repair of the power supply and return to the customer (or refund). The guarantee is only valid if the product is used within the operating conditions defined in the operation section. A monitoring device within the product records operating conditions and operating time. Any attempts to open the case will invalidate the warranty.

To make a claim, the ENTIRE product must be returned in adequate packaging, the original packaging is preferred (the secondary must be adequately protected for postage). The guarantee does not cover the secondary winding. Repair or rewinding data will be supplied in the case of a damaged secondary coil.