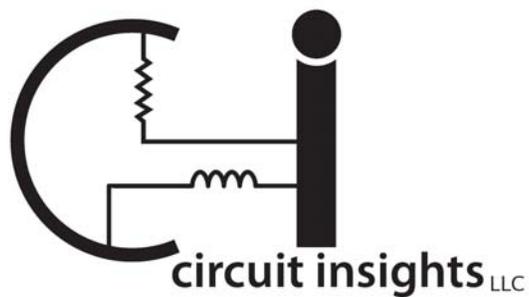


*To ensure personal safety and avoid damage to equipment, follow all safety and care instructions.*



## E-300/D-311 Instruction Manual ©

Version 3.0  
December 2, 2012



*To ensure personal safety and avoid damage to equipment, follow all safety and care instructions.*

## SAFETY INSTRUCTIONS



1. NEVER OPERATE, USE OR HANDLE ANY ELECTRICAL EQUIPMENT IN A MANNER INCONSISTENT WITH ITS OPERATING OR SAFETY INSTRUCTIONS. ALWAYS FOLLOW ALL SAFETY CAUTIONS AND INSTRUCTIONS PROVIDED BY THE MANUFACTURER OF YOUR OTHER ELECTRICAL EQUIPMENT WHILE USING THE LOOP SLOOTH™. IF YOU ARE UNSURE ABOUT THE SAFE HANDLING, USE OR OPERATION OF YOUR ELECTRICAL EQUIPMENT, CONTACT THE MANUFACTURER AND OBTAIN ALL INFORMATION YOU NEED. CIRCUIT INSIGHTS LLC IS NOT RESPONSIBLE FOR YOUR SAFE OPERATION, USE AND HANDLING OF ANY EQUIPMENT NOT MANUFACTURED BY CIRCUIT INSIGHTS LLC.



2. NEVER DISCONNECT THE POWER SAFETY GROUND OF ANY INSTRUMENT AS THIS WOULD DISABLE THE PROTECTION PROVIDED BY THE SAFETY GROUND AND MAKE USERS VULNERABLE TO POSSIBLE SHOCK AND ELECTROCUTION IN THE EVENT OF A FAULT. GROUND LOOPS SHOULD ONLY BE REMOVED BY CHANGING THE CONFIGURATION OF SIGNAL-LEVEL CABLES CONNECTED TO INSTRUMENTS OR DEVICES.



3. THE LOOP SLOOTH™ IS INTENDED TO TRACE CURRENTS FLOWING IN GROUND CONDUCTORS AND SHOULD ONLY BE LINKED TO CABLES HAVING GROUNDED SHIELDS, TO INSULATED POWER CORDS CONTAINING A GROUND WIRE, AND TO STRUCTURES SUCH AS PIPES THAT ARE GROUNDED. DO NOT LINK THE LOOP SLOOTH™ TO ANY OTHER TYPE OF CONDUCTOR. DO NOT LINK THE LOOP SLOOTH™ TO UNGROUNDED CABLES AS HAZARDOUS VOLTAGES MAY BE PRESENT.

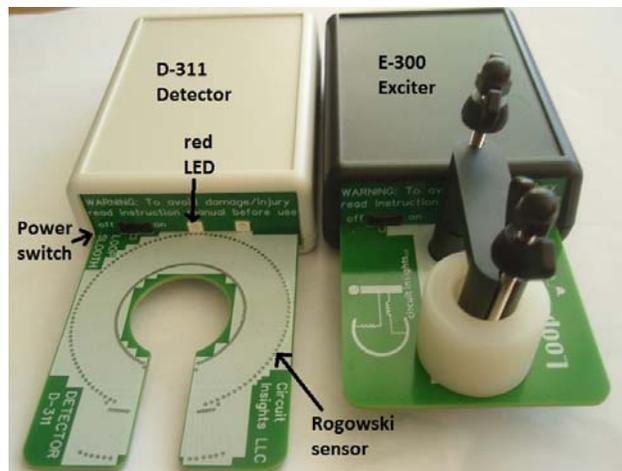


4. DO NOT USE THE LOOP SLOOTH™ ON AN OPERATING PULSED POWER SYSTEM. EVEN THOUGH CABLES ARE GROUNDED, LARGE TRANSIENT GROUND LOOP VOLTAGES PRODUCED BY PULSES COULD ENDANGER THE OPERATOR OF THE LOOP SLOOTH™ AND COULD DAMAGE THE LOOP SLOOTH™ EXCITER OR DETECTOR.

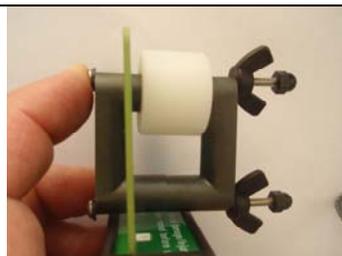
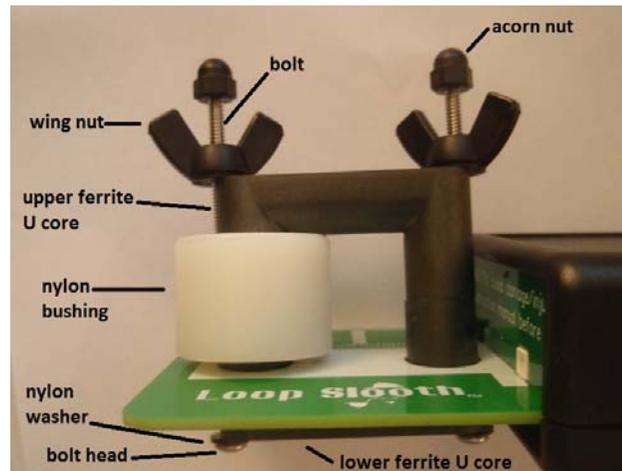
### Rogowski coil and ferrite core care instructions



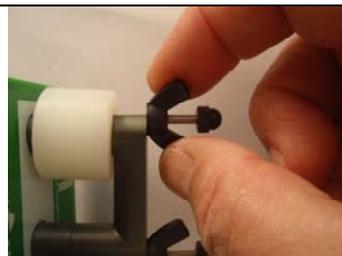
The Rogowski sensor (printed circuit board sticking out of top of Detector) is fragile and should not be touched unnecessarily. It should not be bent, scraped, or placed in electrical contact with any circuit. The cable under test should be located at the center of the circle without touching. The ferrite core material (U-shapes) is brittle and should not be subject to impact forces or excessively tight clamping. The two U-shapes simply have to be in contact with each other; they should not be clamped together with substantial force.



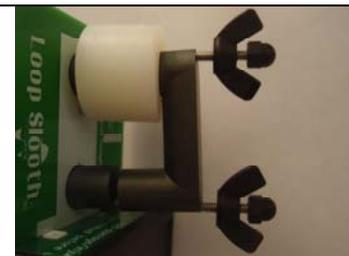
## 1. Linking the E-300 Exciter to a cable



1. Using two fingers from one hand, push slightly on both bolt heads to prevent bolt rotation.



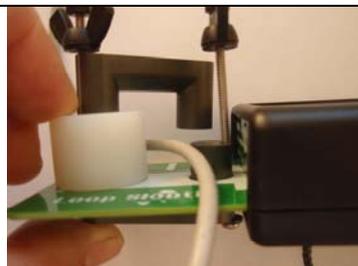
2. While pushing bolt heads with one hand, use other hand to rotate and loosen wing nut until it is about three bolt threads from acorn nut. Do not remove or loosen acorn nut.



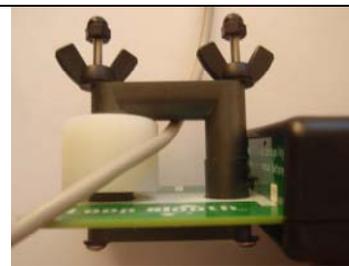
3. Repeat step 2 for other wing nut so both wing nuts are separated from ferrite as in photo. All the while, maintain slight pushing on bolt heads as in step 1.



4. While continuing to push on bolt heads as in step 1, use fingers from other hand to tilt right bolt (see photo above) and then disengage this bolt from right slot of upper ferrite. Lift upper ferrite and gently swing it away from tilted bolt while keeping ferrite left side captured in white nylon bushing.



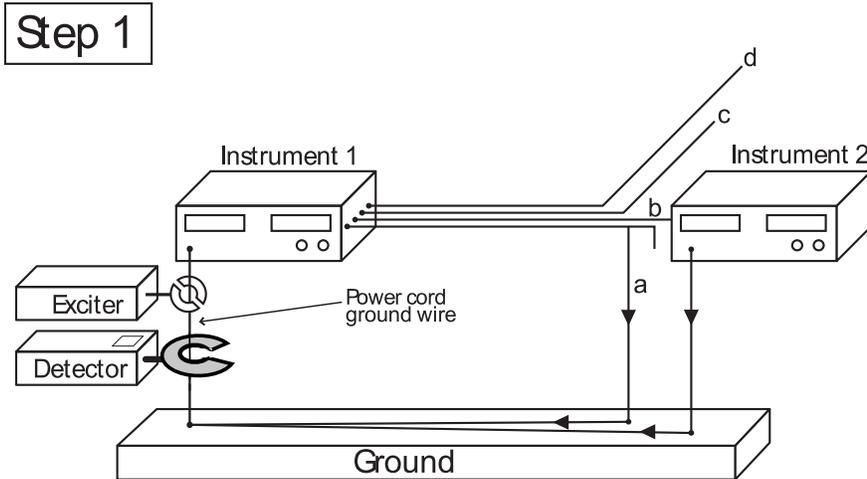
5. Insert cable to be linked. Then rotate upper ferrite back to be aligned with lower ferrite while cable remains linked. Re-engage tilted right bolt back in upper ferrite slot. Do not force bolt as ferrite is brittle.



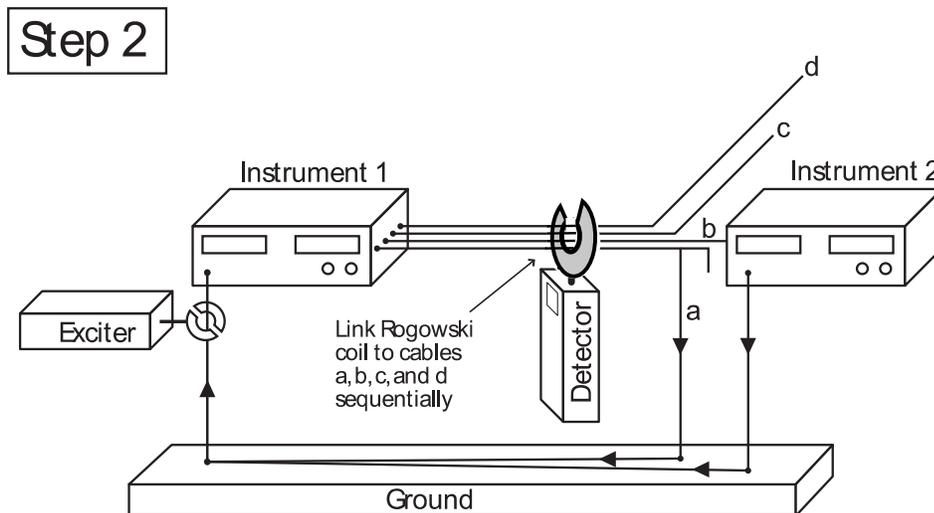
6. Rotate wing nuts until they touch ferrite with just enough clamping force to keep upper ferrite from moving relative to lower ferrite. Do not over-tighten as this could crack brittle ferrite. Clamped ferrite fixture may be loose in circuit board but this does not affect magnetic coupling efficiency.

## 2. Finding a ground loop

**Step 1:** As sketched below, both the Exciter and Detector modules are first linked to the power cord of an instrument suspected of belonging to a ground loop and are powered on. A ground loop involving this power cord exists if the Detector red LED illuminates when both Exciter and Detector are powered on. *All wires shown are ground or shield wires.*



**Step 2:** The Exciter is kept linked to the power cord and turned on. As sketched below, the Detector is then sequentially linked to all cables connected to the instrument. In the situation shown below, linking one or both of cables a,b will cause the Detector red LED to illuminate because these cables are both part of a ground loop. The path of the ground loop is followed by linking the detector to the cable at successive points along the cable.

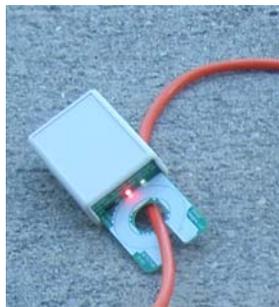


### 3. Tutorial demonstration

Units are shipped with batteries installed and are ready to use. Turn units off when not in use to preserve battery life.

Take a 10-50 feet long extension cord and plug one end into the other (like a snake biting its tail) to form a test loop as in photo below. This test loop simulates a ground loop such as when two instruments are plugged into a wall outlet and have one or more interconnecting cables with grounded shields. By following the procedure on p.3, link the Exciter ferrite core to the extension cord as in close-up photo (bottom, right). Locate the Detector module so that the extension cord passes through the center of the Rogowski sensor circle as in close-up (bottom, left); this is referred to as the Detector *linking* the extension cord.

Turn on both the Exciter and Detector modules using the small slide switches. The green power LED indicators will illuminate on both modules. The Detector module red ground loop indicator LED will illuminate. This red LED will extinguish if any of the following occur: either module is de-linked from the extension cord, the loop is broken by unplugging one end of the cord from other, one or both modules are turned off. The Loop Slooth detects that the extension cord forms a loop. The Exciter drives a 100 kHz AC current around the loop; the Detector detects the 100 kHz AC magnetic field associated with this current.



close-up views



## 4. Reference and patent information

P. M. Bellan, *Simple system for locating ground loops*, Rev. Sci. Instrum. **78**, Art. No. 065104 (2007).

Tutorial on website [www.LoopSlooth.com](http://www.LoopSlooth.com) discusses the physics of ground loops

US Patent No. 7,791,353 B2

## 5. Important notices

**CIRCUIT INSIGHTS LLC MAKES NO WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO FITNESS FOR A PARTICULAR PURPOSE. USER IS RESPONSIBLE FOR DETERMINING WHETHER THE PRODUCT IS SUITABLE AND SAFE FOR A PARTICULAR PURPOSE.**

**LIMITATION OF REMEDIES AND LIABILITY: IF THE PRODUCT BECOMES DEFECTIVE WITHIN ONE YEAR AFTER PURCHASE, THE EXCLUSIVE REMEDIES AT CIRCUIT INSIGHT LLC'S OPTION WILL BE TO REPAIR OR REPLACE THE DEFECTIVE PRODUCT WITH A NEW OR REFURBISHED PRODUCT. THIS REMEDY DOES NOT APPLY TO PRODUCTS THAT HAVE BEEN PHYSICALLY OR ELECTRICALLY DAMAGED OR ABUSED. CIRCUIT INSIGHTS LLC SHALL NOT OTHERWISE BE LIABLE FOR ANY LOSS OR DAMAGES, WHETHER DIRECT OR INDIRECT, SPECIAL, INCIDENTAL, OR CONSEQUENTIAL, REGARDLESS OF THE LEGAL THEORY ASSERTED, INCLUDING NEGLIGENCE, FAULTY DESIGN, UNCLEAR INSTRUCTIONS, WARRANTY, OR STRICT LIABILITY.**

## 6. FCC Compliance Statement

**Federal Communications Commission:** Verified to comply with FCC rules for Cable Locating Equipment, Part 15 Section 15.3(d) and Section 15.213, as reproduced below.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) this device may not cause harmful interference, and
- (2) this device must accept any interference received, including interference that may cause undesired operation.

Note that FCC regulations provide that changes or modifications not expressly approved by Circuit Insights LLC could void your authority to operate this equipment.

### **Sec. 15.3 Definitions**

(d) Cable locating equipment. An intentional radiator used intermittently by trained operators to locate buried cables, lines, pipes, and similar structures or elements. Operation entails coupling a radio frequency signal onto the cable, pipes, etc. and using a receiver to detect the location of that structure or element.

### **Sec. 15.213 Cable locating equipment**

An intentional radiator used as cable locating equipment, as defined in Sec. 15.3(d), may be operated on any frequency within the band 9-490 kHz, subject to the following limits: Within the frequency band 9 kHz, up to, but not including, 45 kHz, the peak output power from the cable locating equipment shall not exceed 10 watts; and, within the frequency band 45 kHz to 490 kHz, the peak output power from the cable locating equipment shall not exceed one watt. If provisions are made for connection of the cable locating equipment to the AC power lines, the conducted limits in Sec. 15.207 also apply to this equipment.

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## 7. Loop Slooth™ Specifications

<b>E-300 Exciter</b>	Excitation frequency	100 kHz
	Power switch	slide on/off
	Power on indicator	green LED
	Effective source impedance	0.5 Ohm
	Effective source voltage	360 mV
	Maximum output power	54 mW
	Maximum output current	720 mA
	Battery	9 volt
	Battery life	2 hours
	Current Transformer bore	14 mm
	Dimensions (approximate)	150 mm x 65 mm x 75 mm
	Case material	black ABS
	Weight with battery	0.2 kg
	Environmental	indoor use only

<b>D-311 Detector</b>	Detection frequency	100 kHz
	Power switch	slide on/off
	Quick ground loop indicator	red LED
	Power on indicator	green LED
	Battery	9 volt
	Battery Life	2 hours
	Rogowski Sensor Jaw Width	approximately 11 mm
	Dimensions (approximate)	160 mm x 65 mm x 28 mm
	Case material	white ABS
	Weight with battery	0.2 kg
	Environmental	indoor use only

[www.loopslooth.com](http://www.loopslooth.com)

circuit-insights@charter.net

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Find Ground Loops  
*fast* without  
disconnecting any  
cables!