

Rogowski Coil Version 3 works! Making Coils (3/4)



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The third version procedure of making Rogowski Coil



- Adjusting from 謝知叡 and 潘奕佐 seniors' result.
- These slides recorded every steps of making Rogowski Coil, the whole duration is around 2 to 3 hours.
- I didn't measure the exact number of length, and some photos need to be updated.

Design of version three



- **Version 1**

- 68cm
- 136 turns
- 0.5cm space



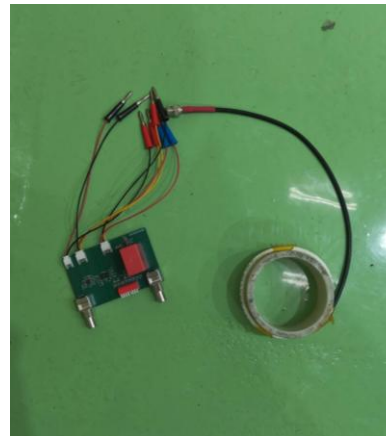
- **Version 2**

- 68cm
- 1072 turns
- 0cm space



- **Version 3 (*4)**

- 31.4cm
- 150 turns
- Even spacing



Rogowski Coils, Assemble!!!



- Mini Tokamak
 - Plasma current: red
- FIRST
 - Plasma current: _____
 - TFC: white
 - PFC3: black
 - PFC4: green
 - CS: red



Overview

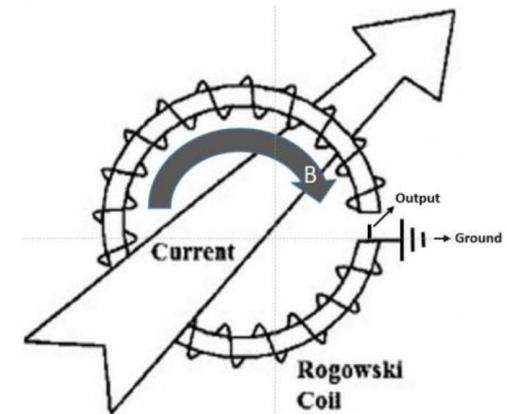


- **Concept**
- **Materials and tools**
- **Whole Body**
 - **Bottom**
 - **Head**
 - **Skin**

Concept of Rogowski Coil



- Being placed to sense the magnetic flux generated by the discharge current.
- According to Faraday's Law, the coil produces a voltage signal proportional to the change in plasma current.
- The output voltage is then processed through an integrator to reconstruct the real-time waveform of the plasma current.



Materials and tools



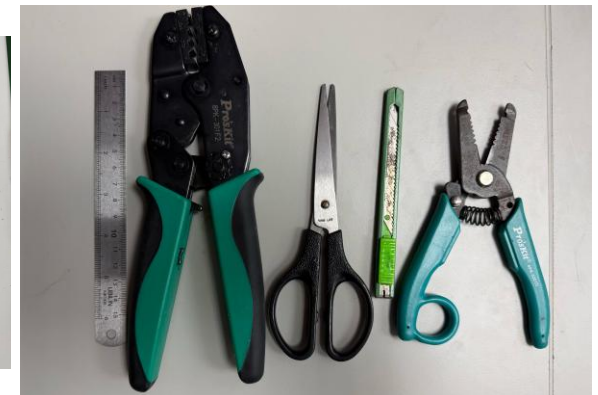
- **Materials (材料):**

- **AWG-30 Silver-Plated Wire: AWG-30 鍍銀線**
- **BNC Connector Set: BNC 接頭組**
- **Center Pin: 中心插針**
- **Crimp Sleeves / Ferrules (x2): 壓接管 (2個)**
- **Connector Body: 接頭本體**
- **RG-58 Coaxial Cable: RG-58 同軸線纜**
- **Aluminum Foil (from the cable): 線纜內的鋁箔紙**
- **Heat shrink tube 6.0: 熱縮套管6.0**



- **Tools (工具):**

- **Ruler: 尺**
- **Crimping Tool / Crimpers: 壓接鉗**
- **Scissors: 剪刀**
- **Utility Knife: 美工刀**
- **Wire Strippers: 撥線鉗**
- **Heat Gun: 熱風槍**



Whole p.1



- 擷取需要的 **RG-58 長度 + 5mm** 。
Cut the RG-58 coaxial cable to the required length+5mm.
- 剝除所需線圈長度 (不含格外5mm) 的外層絕緣 。
Strip the outer insulation to the required length(without the extra 5mm) for the coil.



Whole p.2



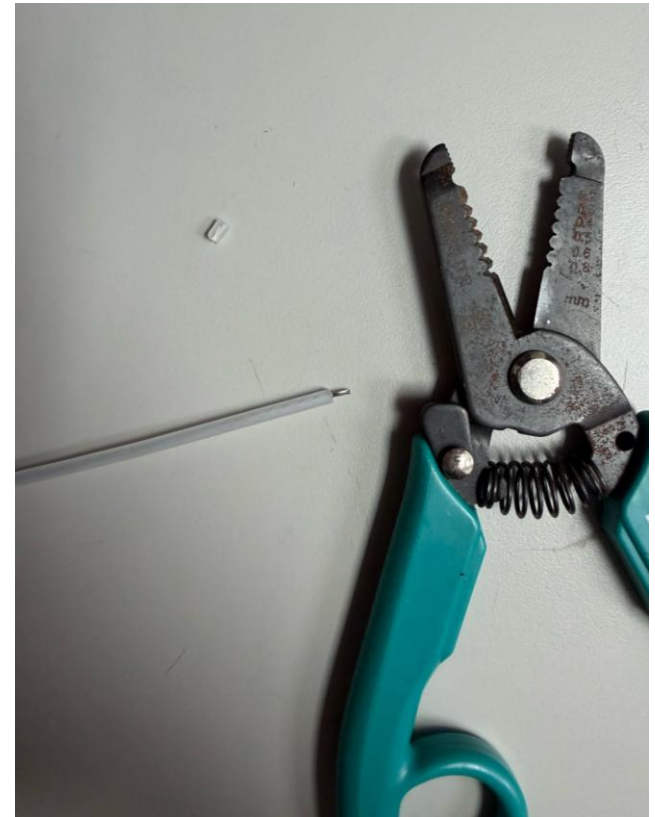
- 離絕緣處留大概5mm距離，剝除網線與鋁箔紙。Leave a 5mm gap from the insulation, and strip away the braided mesh and aluminum foil.
- 留下鋁箔紙並短邊對折成寬度5mm，銀色朝外。Keep the foil, fold the short side to 5 mm wide, with the silver side facing out.



Bottom p.1



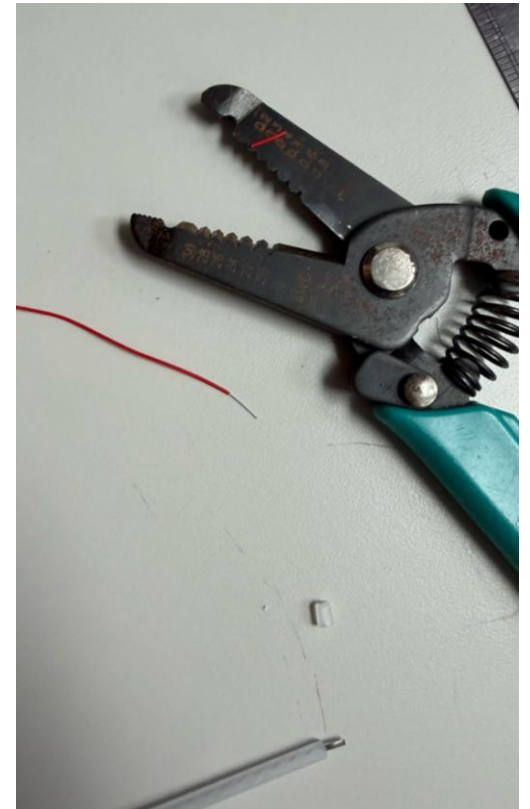
- 使用撥線鉗最下面那格鋸齒 (0.8mm) , 剝除內層絕緣大約2mm。
Strip the inner insulation about 2mm using the bottom slot (0.8mm) of the wire strippers.



Bottom p.2



- 使用撥線鉗鋸齒 (0.4mm) 剝除鍍銀線大約0.7cm的長度。
Strip about 0.7cm off using slot (0.4mm) of the wire strippers.



Bottom p.3



- 纏上同軸線上的最內層，並焊接。

Wrap around the innermost layer of the coaxial cable and solder it.

- 稍微拉拉看確定不會掉。

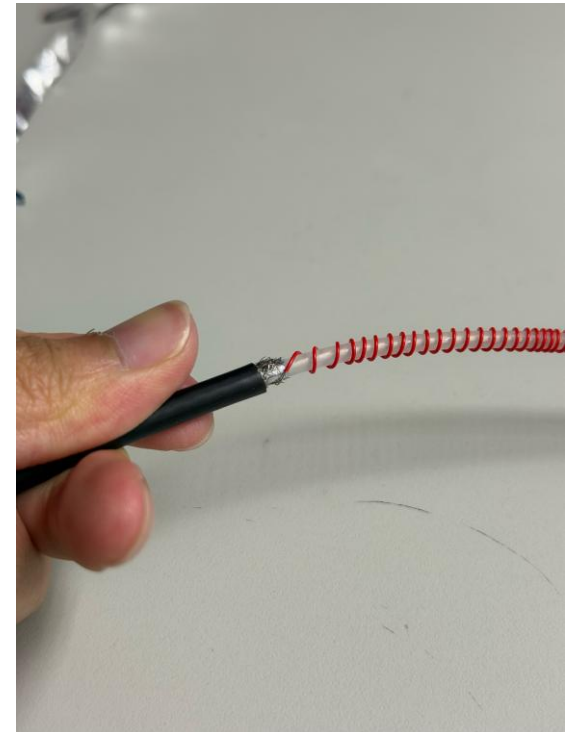
Give it a gentle pull to ensure it is secure.



Bottom p.4



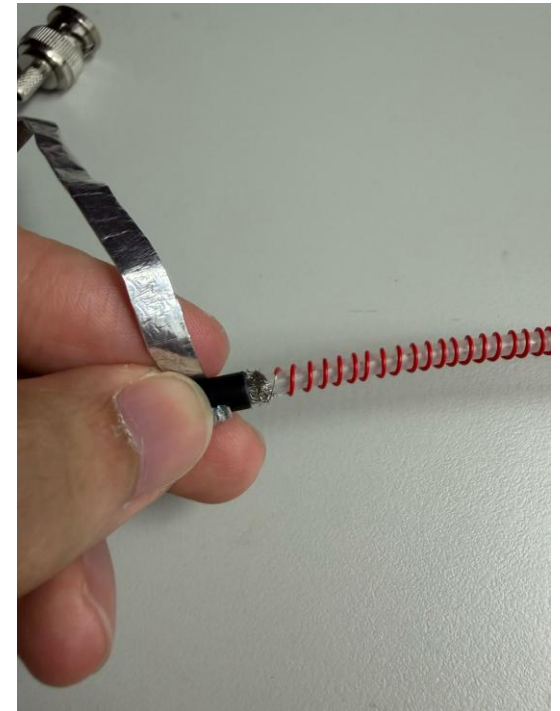
- 開始纏線圈。 **Start winding the coil.**
- 到最後也剝除鍍銀線尾端絕緣，並插入同軸線的網線。 **At the end, also strip the insulation from the tip of the silver-plated wire and insert it into the braided shield of the coaxial cable.**



Bottom p.5



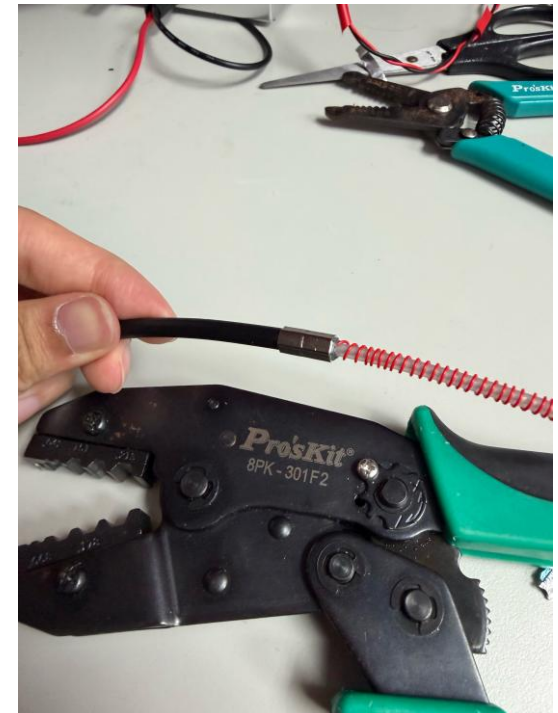
- 將鋁箔紙對折，兩面都銀色（導電面）朝外。 **Fold the aluminum foil in half so that both silver sides (the conductive sides) face outward.**
- 將鋁箔紙繞在網線上，讓寬度與外層絕緣相同。 **Wrap the aluminum foil around the braided shield, matching the width of the outer insulation.**



Bottom p.6



- 套上壓接管。 Slide the crimp sleeve onto the cable.
- 確認線圈沒有鬆動後，用壓接鉗最下面的鋸齒去壓接。 After confirming the coil is not loose, crimp it using the lowest notch of the crimping tool.



Head p.1



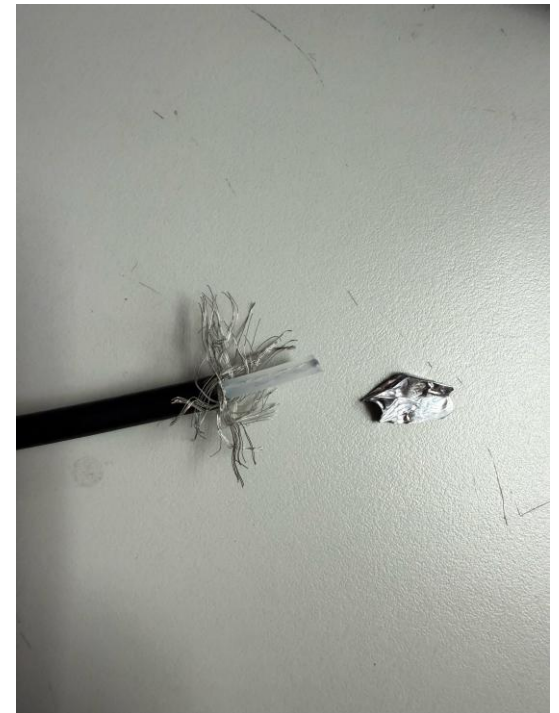
- 剝除 1.5 cm 的外層絕緣。 **Strip 1.5 cm of the outer insulation.**
- 套上壓接管。 **Slide the crimp sleeve onto the cable.**



Head p.2



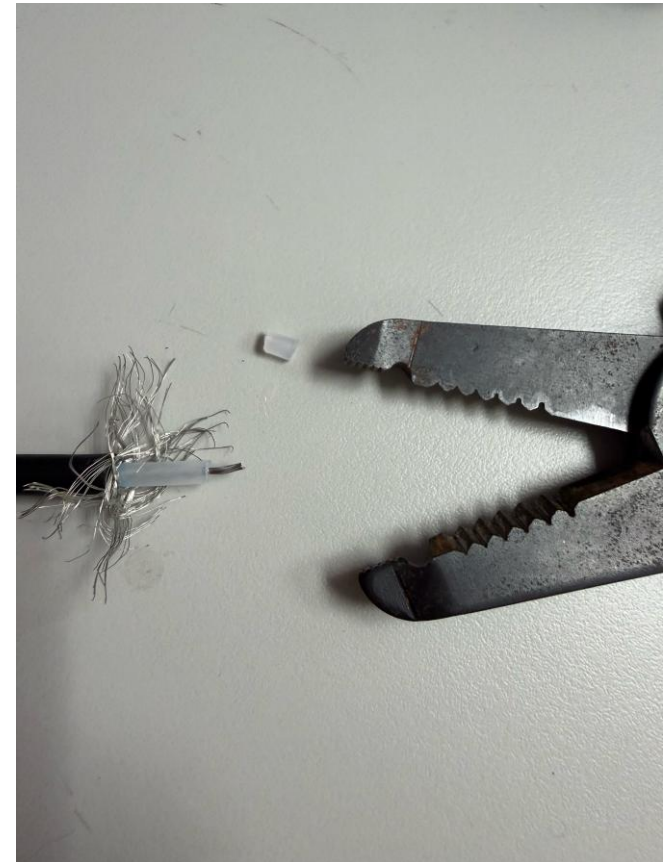
- 打開網線，剝除鋁箔紙。 **Unravel the braided shield and remove the aluminum foil.**



Head p.3



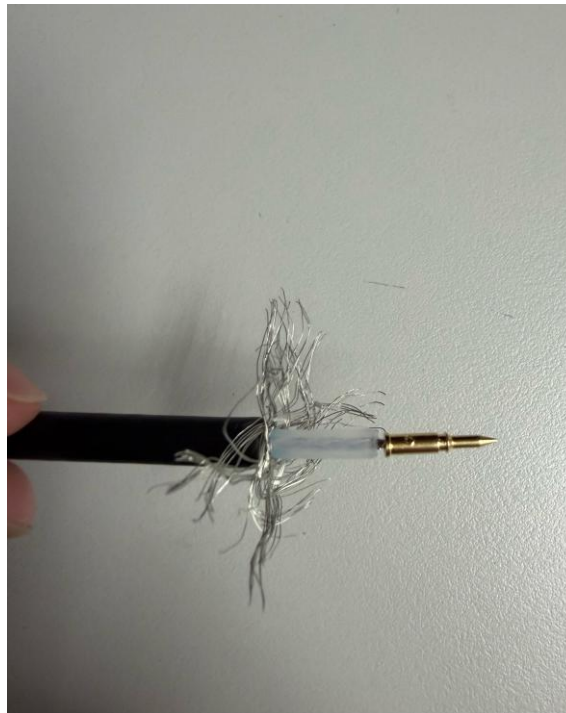
- 使用撥線鉗最下面那格鋸齒（ 0.8mm ） ， 剝除內層絕緣大約3mm 。
Strip the inner insulation about 3mm using the bottom slot (0.8mm) of the wire strippers.



Head p.4



- 套上 pin 。 Slide the pin onto the wire.
- 套上壓接管，待會使用。 Slide the crimp sleeve onto the cable for later use.
- 使用壓接鉗(0.68那格)壓緊 pin ，確認不會鬆動。 Crimp the pin tightly using the crimping tool(0.68 slot), and ensure it is not loose.



Head p.5



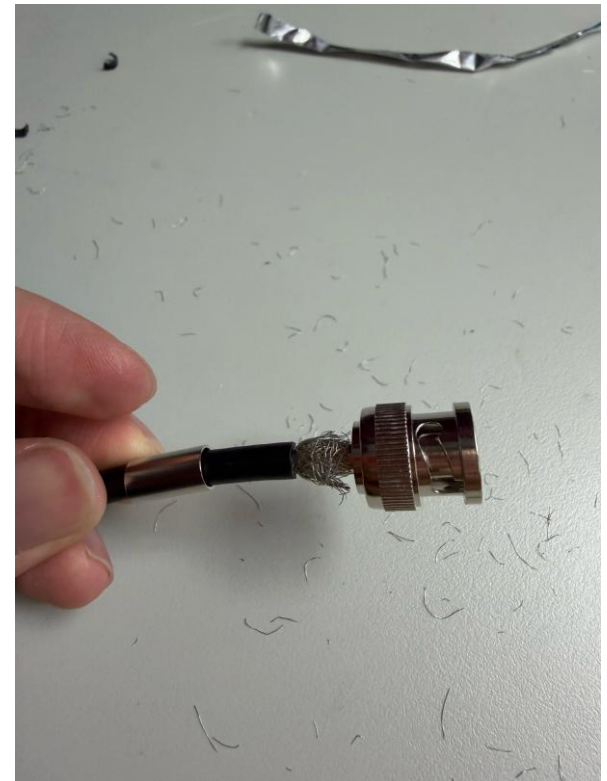
- 將 BNC 接頭裝上 pin 。 Push the BNC connector body onto the pin.
- 要聽到ㄅ—ㄚ一聲，確定有扣緊。 Make sure you hear a click to ensure it is locked into place.



Head p.6



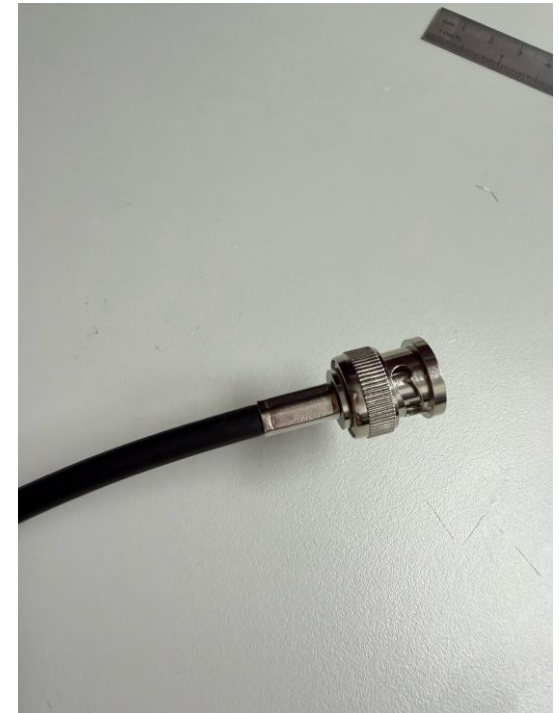
- 將網線梳回去 **Comb the braided shield back into place.**
- 把太長、超出 BNC 接頭的網線剪掉 **Trim away any excess braided shield that extends past the BNC connector.**



Head p.7



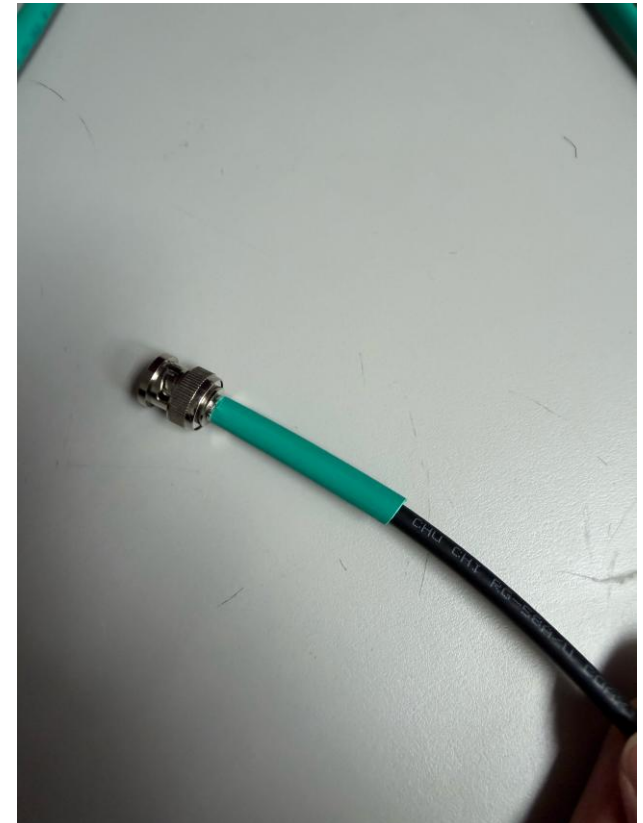
- 套上壓接管。 **Slide the crimp sleeve over the braided shield.**
- 用壓接鉗最下面的鋸齒去壓接。 **Crimp it using the lowest notch of the crimping tool.**



Skin p.1



- 套上熱縮套管。 Slide the heat shrink tubing on.
- 線圈處也要套。 Apply it to the coil section as well.



Skin p.2



- 使用熱風槍吹他們。 **Use the heat gun to shrink them.**
- **Bottom** 多餘的熱縮套管反折，可用尖嘴鉗夾著吹。 **Fold back the excess heat shrink tubing at the bottom, and hold it with needle-nose pliers while applying the heat gun.**



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