BELDEN 89259 Cross Connect Speaker Cables (Jon Risch Design)

COMPONENTS REQUIRED

The listed components are products that we carry and what we have used to build this high-end speaker cable. Visit **John Risch's** web site for original design application, cable recommendation and technical information.

DESCRIPTION	QUANTITY FOR 8ft PAIR
• Belden 89259 Coaxial Cable	4 x (8ft long)
• Cardas GRS R Spade	8
• Ø3/8" TechFlex	2 x (8ft long)
• Ø1/2" Adhesive Lined 3:1 Heat Shrink	2 x (4ft long) and 4 x (5" long)
• Ø1/2" Neoprene 2:1 Heat Shrink	4 x (4" long)
• Ø3/8" Heat Shrink (Black)	2 x (3.5" long) and 2 x (2" long) and 2 x (1" long)
• Ø3/8" Heat Shrink (Red)	2 x (3.5" long) and 2 x (2" long) and 2 x (1" long)
• Ø1/4" Heat Shrink (Black)	4 x (1/4" long)
• Ø1/4" Heat Shrink (Red)	4 x (1/2" long) and 4 x (1/4" long)
• HGA 4% Pure Silver Solder	As required

89259 Coax

GRS R Spade

3/8" TechFlex

Heat Shrinks

HGA Silver Solder

TOOLS REQUIRED

The below list are suggested tools that can be used to build these cables. Through trial and error we found that the ***optional tools*** worked well with our method of assembly.

Soldering Iron

Stripper/ Cutter

Heat Gun

Multimeter

Teflon® Tape

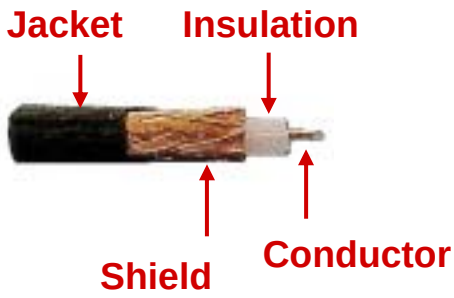
(Optional Tools):

Soldering Iron

Philips Screw Drive

Vise

PREPARING ONE 8ft TWISTED CABLE



1. Using a cable cutter, cut two 8ft length of Coax cables
2. Measure and mark 4" from end of cable for stripping **(Fig. 1)**
3. Using an X-Acto knife, lightly cut Teflon Jacket along measured length **(Fig. 2)**
4. Pull back slit Jacket and trim away excess **(Fig. 3)**
5. **Repeat** steps 2-4 for all ends of each cables
6. Using the two Ø1/4" x 1/2" long red heat shrinks, Color code both ends of **one cable** as the Signal cable (Hot Side) **(Fig.4)**

NOTE: Color coding will help identify the cable after it has been spiraled together

Fig.1: Measure stripping length

Fig.2: Lightly cut along measured length

Fig.3: Pull slit Jacket back and cut away excess

Fig.4: Use Ø1/4" x 1/2" long red Heat Shrink to identify both ends of one cable as Signal Wire

SPIRAL CABLES AND TIGHTLY SECURE WITH HEAT SHRINKS

7. Line up both cables and spiral total length tightly around one another with a maximum of **2-3** spirals per foot **(Fig. 5)**

NOTE: The spirals tend to naturally hold the cables together nicely. However, using heat shrink will help encapsulate the cable and keep them from moving relative to one another.

8. Place Ø1/2" x 5" long Adhesive lined heat shrink over spiraled cable approximately 2" away from stripped end … then heat shrink in place. Do the same to the other end **(Fig.6)**
9. Now place the mid point of Ø1/2" x 4ft long Adhesive lined Heat Shrink in mid point of spiraled cable and shrink in place **(Fig.7)**

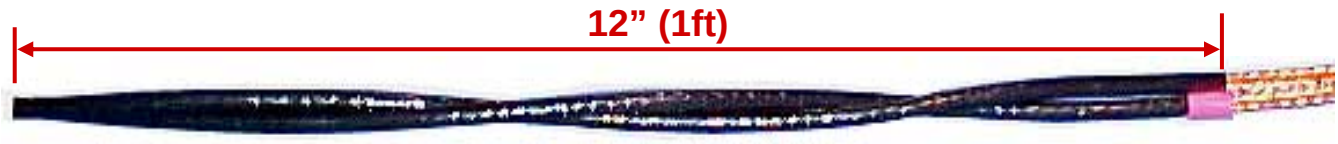


Fig.5: Spiral both cables tightly together with maximum **2-3** spirals every **12" (1ft)**

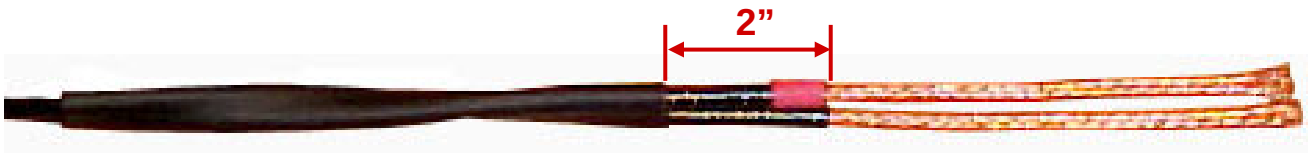


Fig.6: Shrink Ø1/2" x 5" long Adhesive HS 2" away from stripped end

Fig.7: Place Ø1/2" x 4ft Adhesive HS in center of spiraled cable and shrink in place

PREPARE TERMINAL LEADS AND SOLDER CROSS-CONNECT

10. Pull back copper braided shield and cut away **3”** of the 4” of center conductor and insulator **(Fig. 8)**
11. Straighten out shield … then use a pointed tool to create opening on copper braided shield to fish out the remaining **1”** center conductor **(Fig. 9)**
12. Strip away **1/2”** of insulation with Stripper/Cutter tool **(Fig. 10)**

NOTE: Use the 3” scrap to practice stripping off insulator from center conductor. This will help determine correct wire gauge size on Stripping tool so not to cut into center conductor

13. Repeat steps 10-12 for all ends of cable **(Fig. 10)**

Fig.8: Pull back cooper braided shield and cut away 3” of insulator/conductor

Fig.9: Straighten out shield …then use a pointed tool to fish out remaining 1” insulator/conductor

Fig.10: Use cutting/stripping tool to strip away 1/2” of insulator

PEPARE TERMINAL LEADS AND SOLDER CROSS-CONNECT (Cont.)

14. Take the red and black Ø1/4" x 1/4" long HS to cover exposed shield located between Teflon jacket and insulator. Do this to both cables **(Fig. 11)**

NOTE: The exposed shield MUST be covered to prevent shorting

15. Cross connect center conductor with the adjacent shield by bending entire center conductor 60° and wrapping center conductor wire around shield **(Fig. 12)**

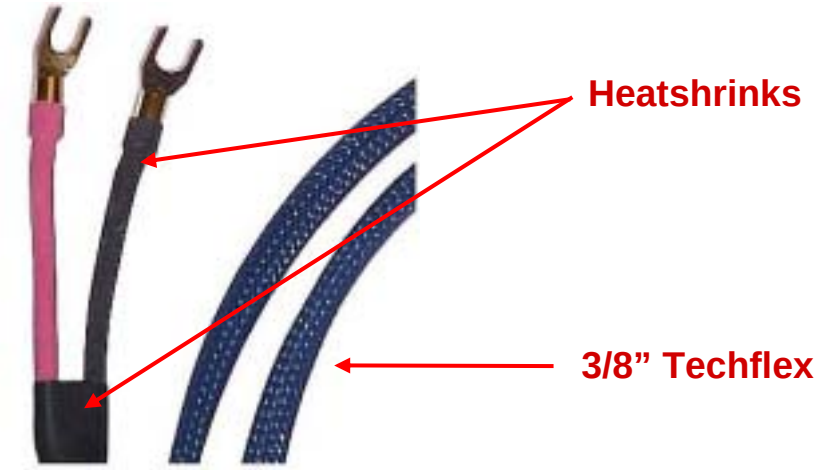
16. Solder the wrapped conductor wire to the copper shield **(Fig. 13)**

Fig.11: Use red and black 1/4" long HS to cover exposed shield

Fig.12: Bend and wrap conductor around adjacent shield

Fig.13: Soldering Cross-Connect

DRESS THE CABLE AND SOLDER LUGS



NOTE: Before going any further, use Multimeter to test cable continuity. Make sure the cable is not shorted. If cable is shorted then it is easier to repair cable at this stage.

17. Rap bare terminal leads with Teflon® tape leaving approximate 3/4" free at tip to solder connectors **(Fig. 14)**

18. Heat shrink rapped terminal leads with Ø3/8" x 3” long black and red HS at their respective sides **(Fig. 15)**

19. Repeat steps 17-18 for the other end.

Fig.14: Use Teflon® tape and rap terminal lead, leaving 3/4” free for soldering connectors

Fig.15: Heat shrink terminal leads over Teflon tape using Ø3/8” x 3” long HS

DRESS THE CABLE AND SOLDER LUGS (Cont.)

20. Wrap both exposed ends of the black and red terminal leads together and insert into techflex expandable sleeving **(Fig. 16)**

21. Place Ø1/2" x 3" long black Neoprene HS over techflex end and 1/2" over terminal lead cables **(Fig. 17)**

NOTE: Because Neoprene requires longer time to shrink, wrap Techflex with Teflon tape to protect it from melting.

22. Temporary wrap Teflon tape at edge of Neoprene and over Techflex and shrink in place **(Fig. 17)**

Fig.16: Wrap both ends and insert Techflex sleeving

Fig.17: Use Ø1/2" x 3" long black Neoprene HS and shrink over techflex and 1/2" over terminal leads

DRESS THE CABLE AND SOLDER LUGS (Cont.)

23. Insert the 2” long and the 1” long Ø3/8” HS and the brass sleeving over terminal lead **(Fig. 18)**
24. Heat the exposed end of the terminal lead and apply small amounts of silver solder **(Fig.18)**
25. Using soldering iron heat spade lug and then fill barrel with silver solder **(Fig. 19)**

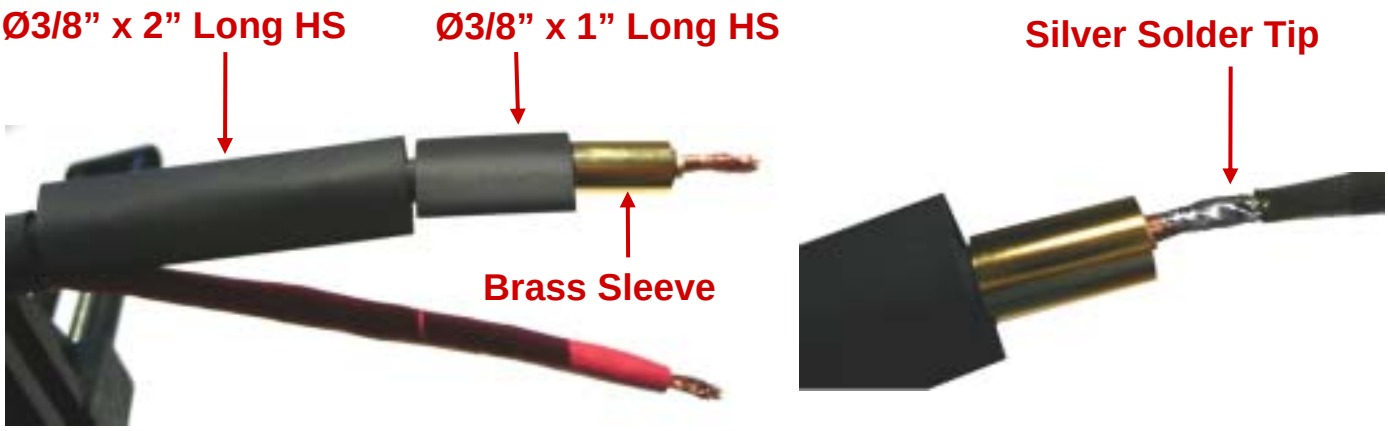


Fig.18: Insert 2” long and 1” long Ø3/8” HS and brass sleeve over terminal ... then apply silver solder to end

Fig.19: Heat spade barrel and fill with silver solder

DRESS THE CABLE AND SOLDER LUGS (Cont.)

26. With spade lug clamped in place, place terminal lead in spade barrel **(Fig. 20)**
27. Place hot soldering iron on top of terminal lead and spade barrel until solder in barrel is in liquid form ... then pull soldering iron away to allow the soldering joint to cool **(Fig. 20)**
28. Once solder joint has cooled, slide brass sleeve over soldered joint **(Fig. 20)**
29. Slide Ø3/8" x 1" long HS over brass sleeve and heat shrink in place **(Fig. 21)**
30. Slide Ø3/8" x 2" long HS over 1" long HS and heat shrink in place **(Fig. 21)**
31. **Repeat steps 23-30 for all terminal leads**

Fig20: Hold terminal lead in spade barrel and solder in place ... then cover solder joint with brass sleeve

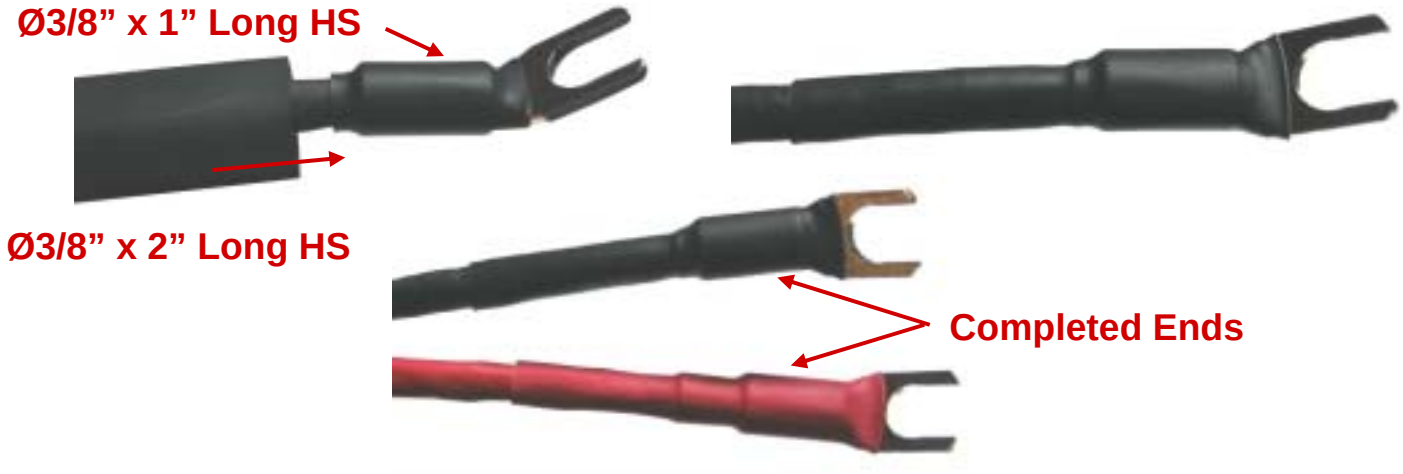


Fig.21: Heat Shrink both 1" long and 2" long HS over brass sleeve and partially over spade lug.