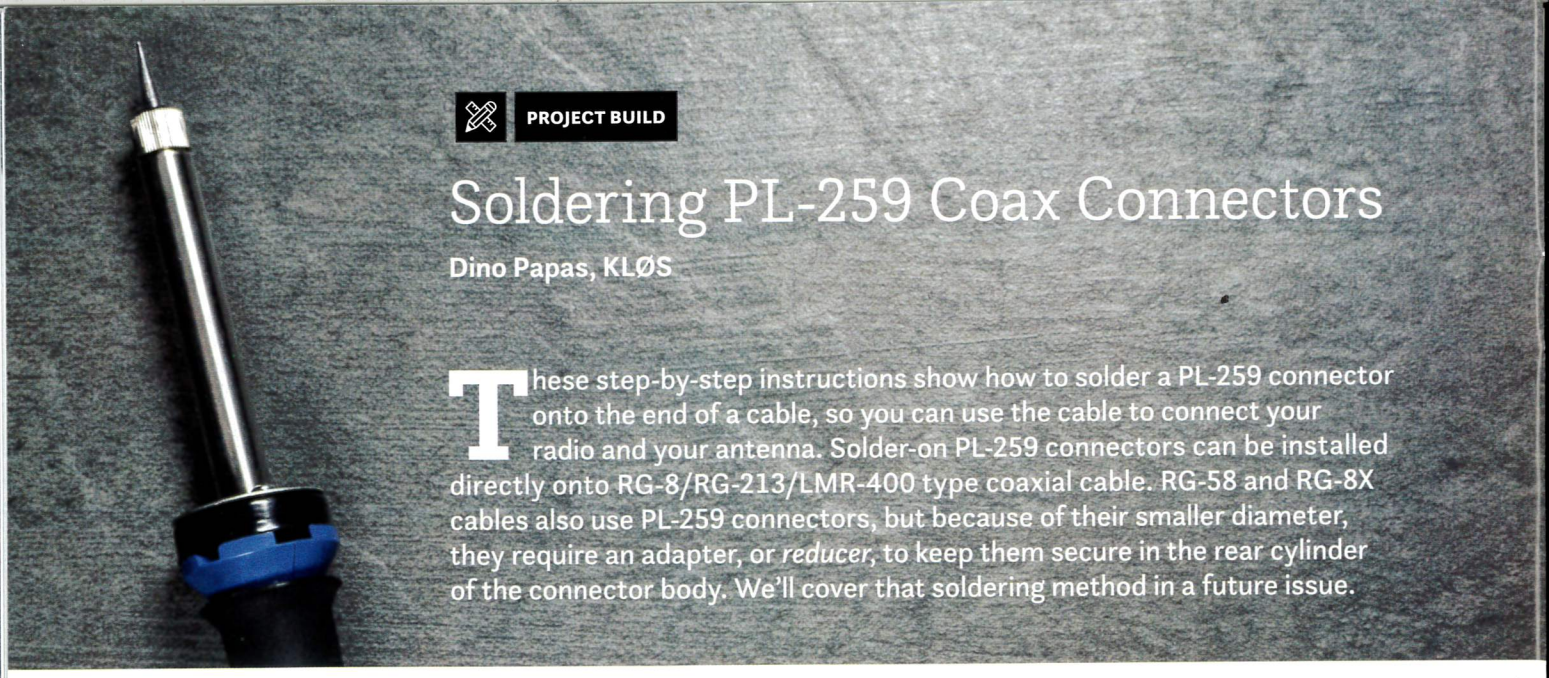


PROJECT BUILD

Soldering PL-259 Coax Connectors

Dino Papas, KLØS

These step-by-step instructions show how to solder a PL-259 connector onto the end of a cable, so you can use the cable to connect your radio and your antenna. Solder-on PL-259 connectors can be installed directly onto RG-8/RG-213/LMR-400 type coaxial cable. RG-58 and RG-8X cables also use PL-259 connectors, but because of their smaller diameter, they require an adapter, or *reducer*, to keep them secure in the rear cylinder of the connector body. We'll cover that soldering method in a future issue.

Tools

- Soldering gun, iron, or station with a blade-shaped tip
- Small vise to hold coax in place while you work on it
- Sharp knife, or box cutter with a fresh blade

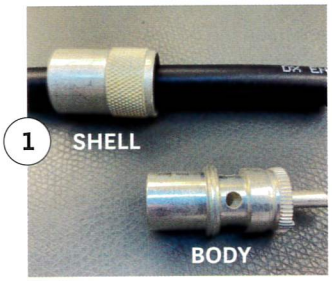
Materials

- Coax cable RG-8/RG-213/LMR-400
- Solder-on style PL-259 connectors
- Solder (leaded or lead-free rosin-core; *not* acid-based plumbing solder!)
- Solder wick for removing excess solder
- Isopropyl alcohol to remove solder flux residue
- Heat-shrink tubing (recommended but not required)

Step 1

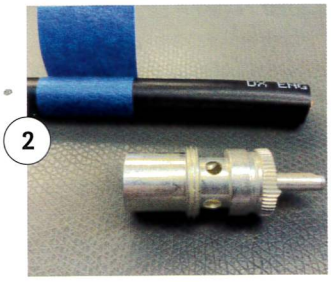
PL-259 connectors consist of a *body* and screw-on *shell* (see ①). Unscrew the shell and slip it over the cable you're installing the connector on, making sure you have it oriented correctly — you won't be able do this once you attach the connector body. If desired, slip a short piece of heat-shrink tubing over the cable as well, and push the tubing and the shell temporarily away from the end of the cable.

TIP **Heat-shrink tubing works well indoors to help stabilize the cable/connector assembly. Marine-grade tubing is good for outdoor use, as it has glue on the inner surface that melts when heated, creating a more waterproof connection.**



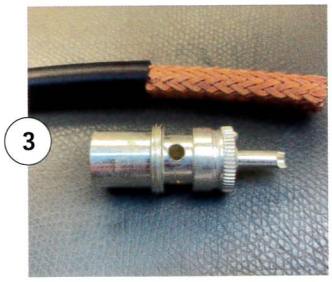
Step 2

Place the connector body alongside one end of the cable as a measuring guide. Wrap a piece of masking tape around the cable at the point where the connector body ends, to use as a temporary cutting guide (see ②). Use a sharp knife or box cutter to remove the outer jacket of the cable, exposing the braid approximately the length of the connector body (see ③). Take your time and be careful not to nick the braid as you're cutting the jacket.



Step 3

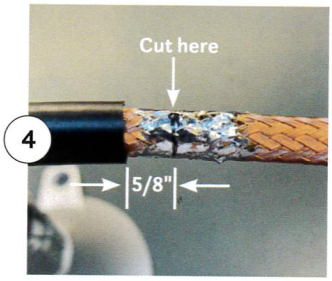
Touch the tip of the soldering iron to the braid, to heat the braid just enough so that the solder melts when you feed solid solder to that area. Do the same thing around the entire circumference of the braid, heating it a little as you go, applying solder to the heated part, then moving on until the whole circumference has been solidified with solder. Do this along 1" of the braid, past where the jacket ends. This stiffens the braid so it's easier to trim, and prepares it to accept the solder in Step 8.



Step 4

Mark the braid about 5/8" from the end of the jacket (see ④) and use your blade to cut through both the soldered braid and the dielectric, down to the inner conductor without nicking it.

TIP To make a cleaner cut and keep the dielectric from deforming, I use a hobby-style mini-tubing cutter.



④

Step 5

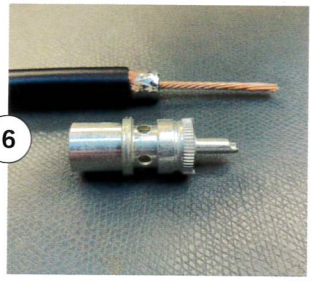
Twist and remove the detached braid and dielectric (see ⑤). This may take some effort, so pliers can help.

You can now see how the cable will fit into the body (see ⑥). The cable's inner conductor will go all the way through the connector body and protrude through the tip. The soldered braid will show through the holes in the body, and the cable's outer jacket will stop under the screw threads for the shell.


⑤

Step 6

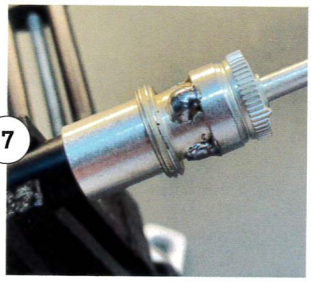
Prepare the connector body by quickly melting and applying a small bit of solder on top of each of the holes around it. We're not trying to make a good solder connection, yet so the applied solder may appear dull — what we call a *cold* solder joint (see the sidebar, "Rosin-Core vs. Acid-Based Solders"). Normally we avoid making cold solder connections, but here we simply want to temporarily place some solder where we'll need it for Step 8. Try to keep solder only on the holes; you can remove any excess from adjoining surfaces with solder wick if necessary.


⑥

Step 7

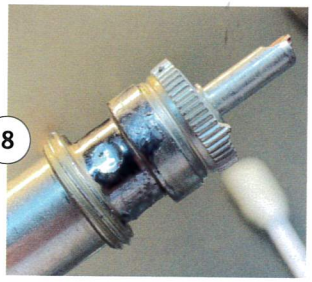
Screw the connector body onto the coax using a turning motion. The threads inside the cylinder will bite into the outer jacket of the cable, giving the connection mechanical strength (see ⑦). When the coax is fully seated, you'll be able to feel the increase in resistance as you turn.

TIP Using a rubber kitchen jar-top gripper can help you hold the cable securely.


⑦

Step 8

Secure the cable in a vise and apply the soldering iron's flat tip surface to the connector body, next to one of the solder blobs. When enough heat is applied, the solder will flow almost instantaneously into the hole and onto the prepared braid, connecting the braid to the connector body. Do this for each hole, then run the tip around the circumference of the body for a smooth solder surface. You can add a bit more solder to each hole to fill it completely (see ⑧). Do this quickly, as overheating the dielectric can melt and distort it, potentially changing the cable's characteristics inside the connection (see the sidebar, "How Much Heat?").


⑧

Step 9

Clip off the wire strands of the inner conductor where they protrude from the tip of the connector. Place your iron onto both the strands and the tip. This helps to orient the connector at a slight tip-up angle to allow solder to flow into the tip chamber. Apply enough solder to fill the void and cover the strands.

Rosin-Core vs. Acid-Based Solders

Solder is a mixture of lead combined with tin. Hams use it to make connections between electronic components. Applying heat changes solder from solid to liquid form, allowing it to flow and form a conductive metallic bond between the components. Electronic solder contains a rosin-based *flux*, typically a pine resin, which removes surface oxidation that can interfere with the bonding process. Removing heat lets the solder cool and return to solid form, making the electrical connection permanent. A good solder connection looks shiny, while a bad, or *cold*, solder joint will have a dull appearance. Plumbers and metal workers use solder with an acid-based flux, but hams should never use acid-core solder for ham projects, as it will destroy electrical connections.

Continues on following page.

Step 10

Clean off any residue with isopropyl alcohol on a swab or tissue, then lightly file away any sharp edges at the end of the tip.

Step 11

Check the continuity of the cable from end to end with an ohmmeter or continuity tester, and test to ensure there is no short circuit between the shell and tip.

Step 12

Slide the heat-shrink tubing over the end of the connector, and apply heat with a lighter or better yet, a heat gun (see (9)).

How Much Heat?

Your soldering iron needs to have enough thermal capacity to heat both the connector body and braid quickly so you don't overheat and damage the dielectric material; I set my soldering station to a temperature of 750° and use a chisel-style tip about 3/8" wide.

Dino Papas, KLØS, is a frequent QST *and* On the Air *contributor and has been an amateur radio operator for over 50 years. You can contact Dino at kl0s@arrl.net. Instructional photos by the author.*

The Metal that Helps the Connection

The most difficult and often frustrating part of installing solder-on connectors is establishing a good mechanical and electrical connection between the coax braid and the body of the connector. Early connectors were often nickel plated, making them difficult to solder to. Lightly filing away a bit of the plating helps. A better choice today are silver-type connectors, which accept solder much more readily.

Nickel-plated PL-259 connectors, like the one at right, can be difficult to solder to. Silver-type connectors, like the one at left, accept solder more readily.