QRO Coaxial "Tee" Fitting

by WA4NJP, Ray Rector

There is a need for better, lower loss coaxial fittings. There is also a need for connectors that will handle more power. When we look at the everyday components we use in our hobby, they normally will handle about all the power we can afford to run. The normal PL259, the N connector and BNC are in every day use in most of all our antenna systems. How well do they perform? Are they reliable? Are they easy to install and weatherproof? These are some of the first thoughts we have about these connectors. I have an additional concern as I operate a bit on the edge of all of this connector's ability. How will the connector perform if it is run at the max power, higher than normal SWR, and possible not properly weatherproofed? Most will fail, when abused in these conditions. Murphy's Law will also prevail, it will be dark, cold, windy, rain or snow and the connector will be at the top of the tower. These conditions also can only coincide with contest operations or that rare one you have been trying to work on 6 Meter EME.

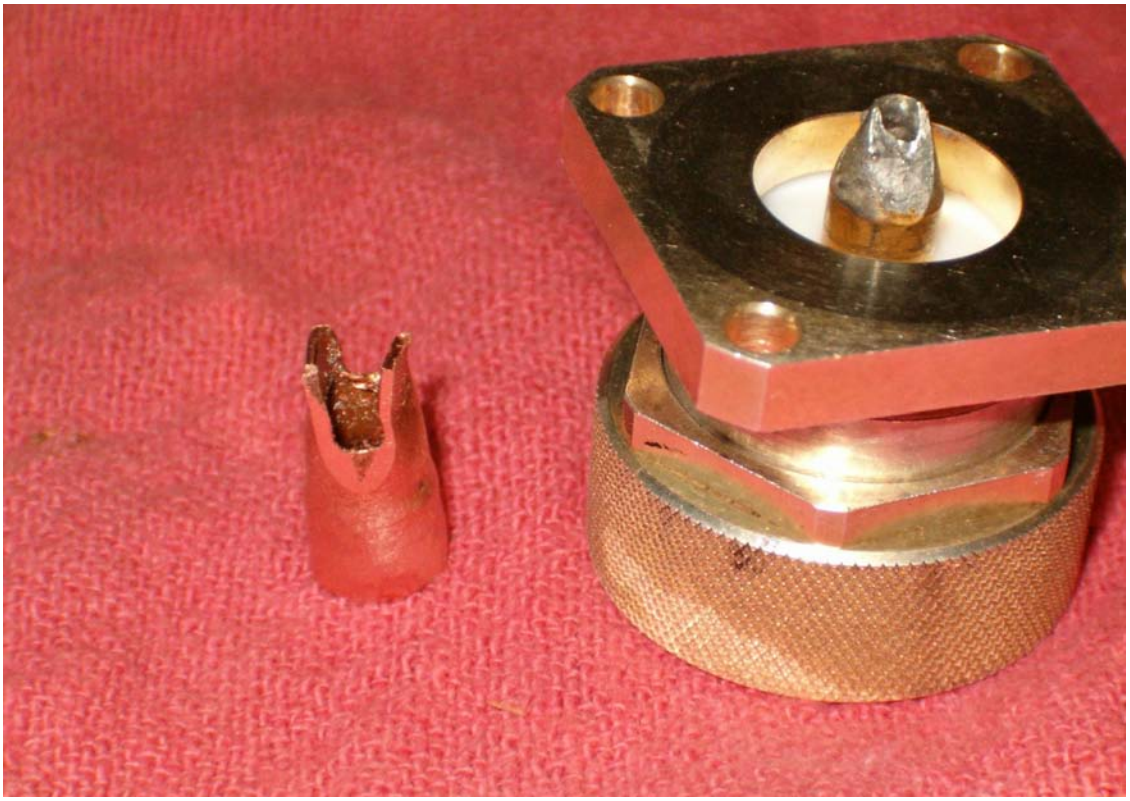
The connector that has given me this kind of grief is a 1-5/8" N connector at the antenna on my 6 meter system. For some reason I have had several failures of this connector. The center pin just burns up, I have replaced the pin, replaced the entire connector, and replaced the mating connector. Even with all new, I have no confidence that it will perform on the night I need it.

WA4NJP 6 meter EME array, elevated to the moon 4 x 8 elements with 1 5/8 feed line.
So out with the N connectors and in with the 7/16 DIN connector. Now I have a connector at the end of my feed line that will handle anything I want to do.

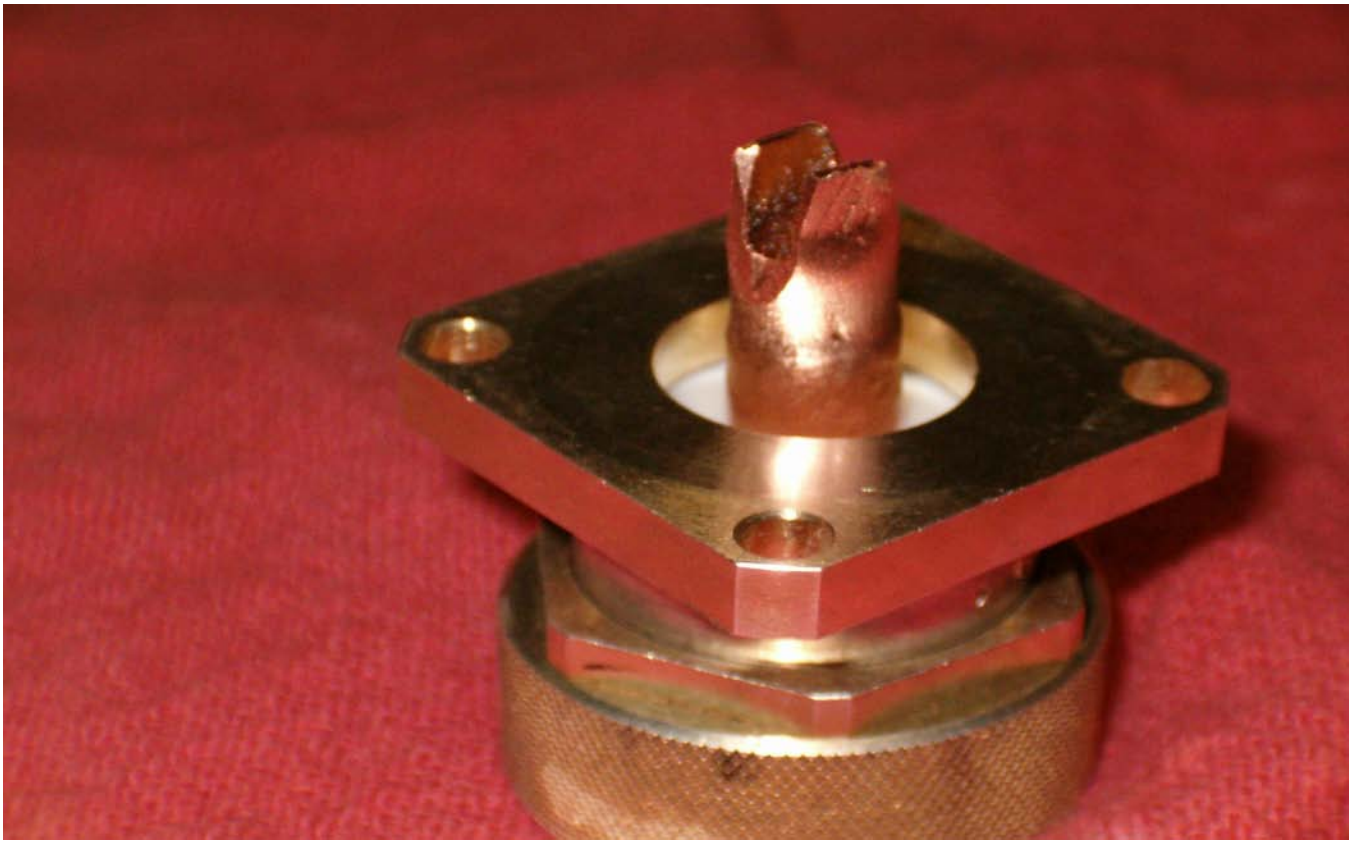
Now, this creates another problem, how do I connect this to the antenna system without going through just one, single pin N connector? The answer is another one of my QRO projects. In the phasing line scheme, I use as the first part, a ½ wave power divider made of 2 sections of 50 coax. So there is a "T" connector as the input to this power divider. The concept of this article is to make a "T" that is bulletproof, weather proof and that it is "NJP" reliable.

An Aluminum block is drilled and tapped so as to accept 2 "N" connectors and one male chassis 7/16 DIN connector. Depending on your particular configuration, you may want to exchange the male 7/16 DIN connector with a female version; male DIN connectors are much more readily available for end ends of flexible jumper cables such as LMR-600UF. All openings on the block are fitted with "O" rings, for waterproofing. The block is 1.375" x 1.375" x 1", with holes drilled and tapped in centers of the sides to mount the components.

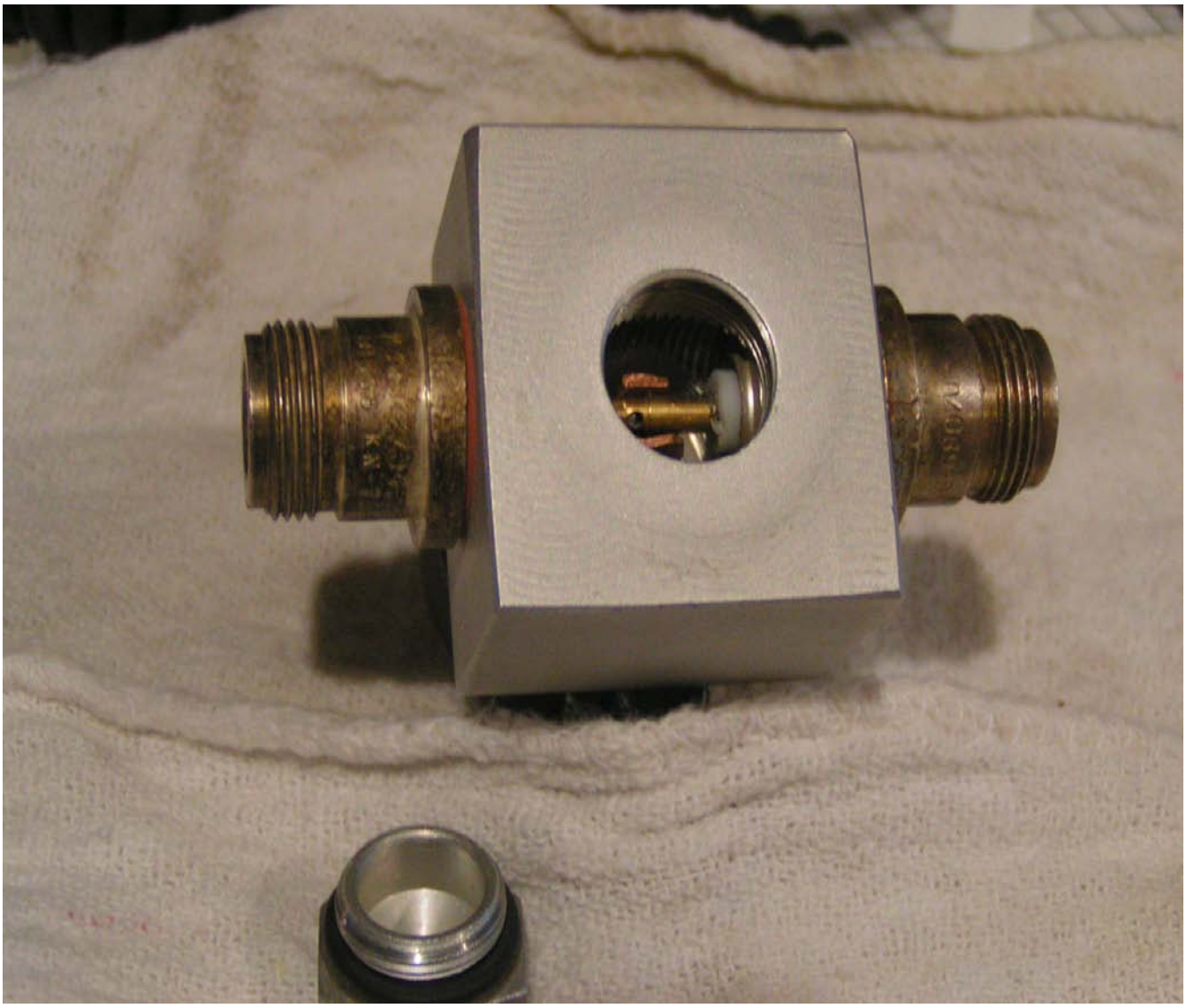
An “O” ring grove is machined under the DIN connector for weatherproofing and 4 holes are drilled and tapped to mount the 7/16 DIN connector. The block is drilled on 4 sides, 2 for mounting the UG-680 N connectors; one for mounting the 7/16 DIN connector; and on the opposite side for an access hole to allow for assembly.



A copper “Bullet” is formed from tubing to make the short inner connection, I used a short piece of 5/16 copper tubing and hand worked the shape with a rounded end punch. I cut the slot with a hack saw and shaped it with a file.



The Bullet is placed on the center connector and soldered, be sure to clean and smooth any excess solder. Wash with denatured alcohol and be sure it is dry before tinning the bullet and the shorting piece between the N connectors. Then assemble as outlined below.



The grove that is filed into the end of the bullet is aligned so as to accept the solder pins from the two UG –680 connectors when assembled in the block.

Assembly order: (*use Dow Corning DC-4 grease on all threads and O-rings)*

1) The 7/16 DIN connector is mounted to the block with "O" ring under connector in the machined O-ring grove, use Stainless hardware to secure connector to block.

2) The two UG-680 N connectors are screwed into the block, they are supplied with "O" rings. A short piece of copper wire is inserted to bridge the short gap. This is all within the "Grove" that was filed into the Bullet that is soldered to the 7/16 DIN connector.

3) Use good grade of 3 % silver bearing solder and with 250 watt or larger soldering iron, solder the connection through the remaining access hole. Fill the void with Dow Corning DC-4, screw on the cap.

The result is a “Tee” fitting with 7/16 DIN input and two “N” connector output. At 50 MHz the minor impedance difference and it being used as center connection on the power divider creates so little additional loss that it will not be noticed even on EME signals. It has been tested at > 66dBm for long periods of time and really works!