



Troubleshooting Lessons Learned

The Tale of Two Barrel Connectors

Ben Koerner K5AYR

Jan-2021

Mission: Replace my original window jumpers with a permanent solution to get RF outside of the house.



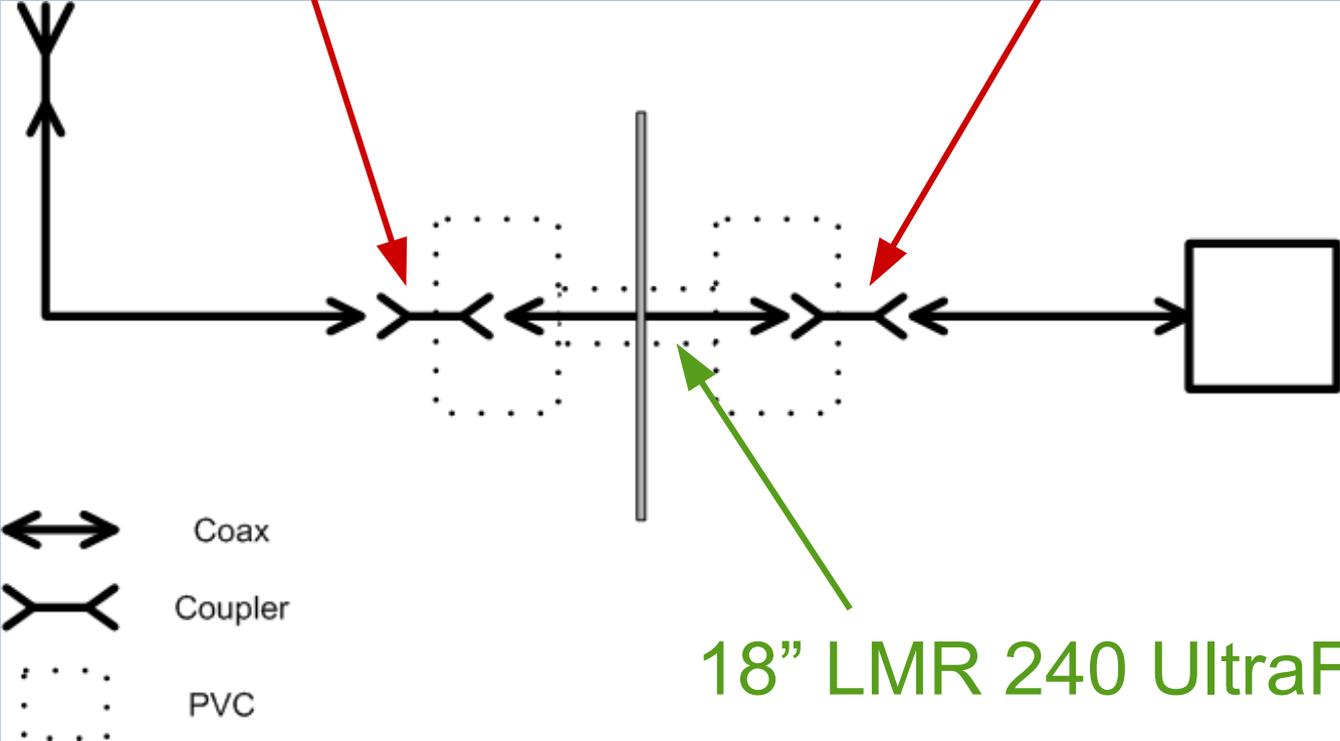
~.5 dB Insertion Loss
@ 450 MHz



<.1 dB Insertion Loss
@ 450 MHz

Design

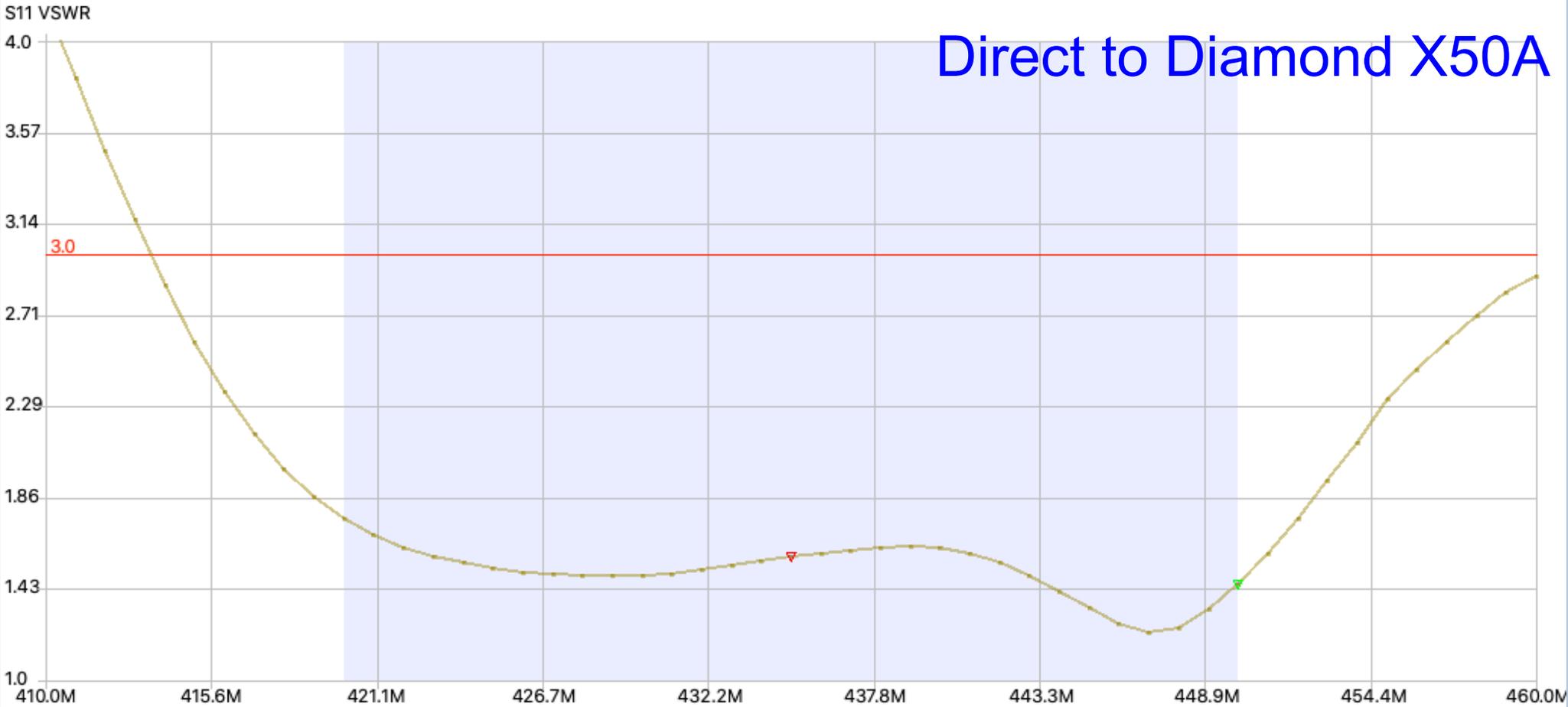
UHF Barrel Connectors



18" LMR 240 UltraFlex

Expected VSWR Sweep

Direct to Diamond X50A



Step 1: I need a hole in the house.



... that was easy.

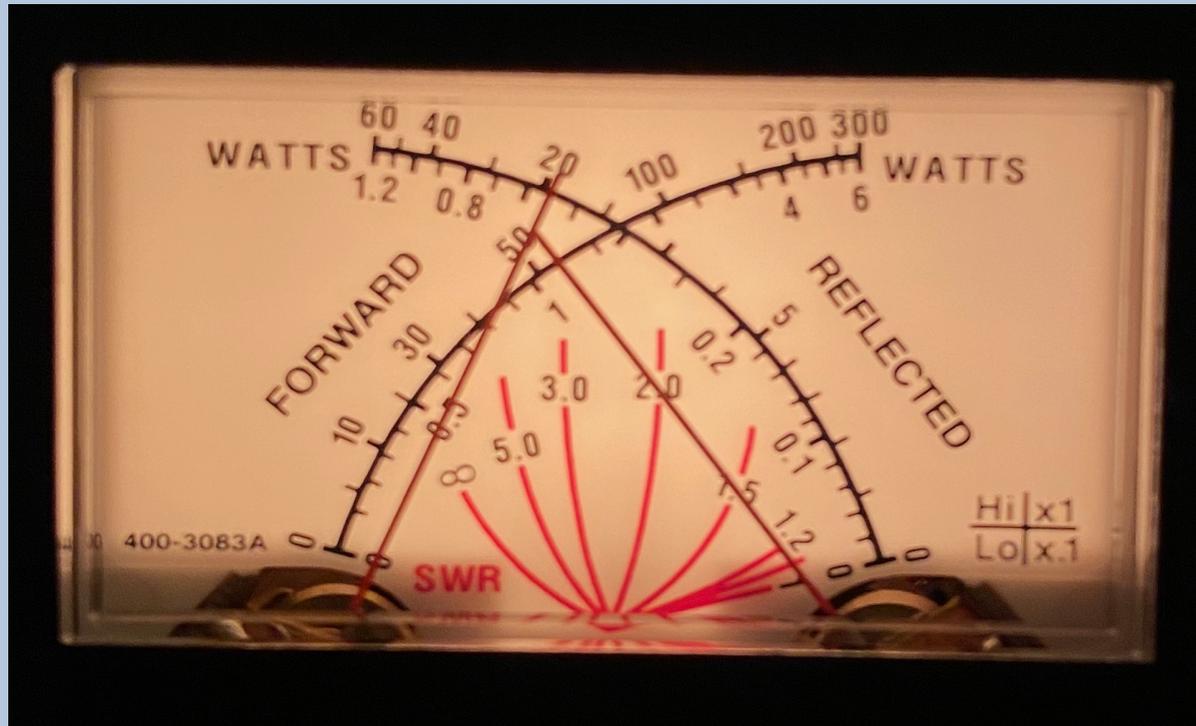


Step 2: Create jumpers and install housing.



... this is going to be a quick, simple, and easy project.

Step 3: Just connect and enjoy, right?



... why is my **VSWR 3:1** on 70 cm

Problem: High VSWR across most of the 70 cm band

Action 1: Use the NanoVNA to validate the problem



Problem: High VSWR across most of the 70 cm band

Action 2: It must be those off-brand UHF barrel connectors! Let's get some Amphenols to fix this.



Problem: High VSWR across most of the 70 cm band

Action 3: Just for fun, let's try some cheap eBay UHF Barrels. They can't be any better, right?

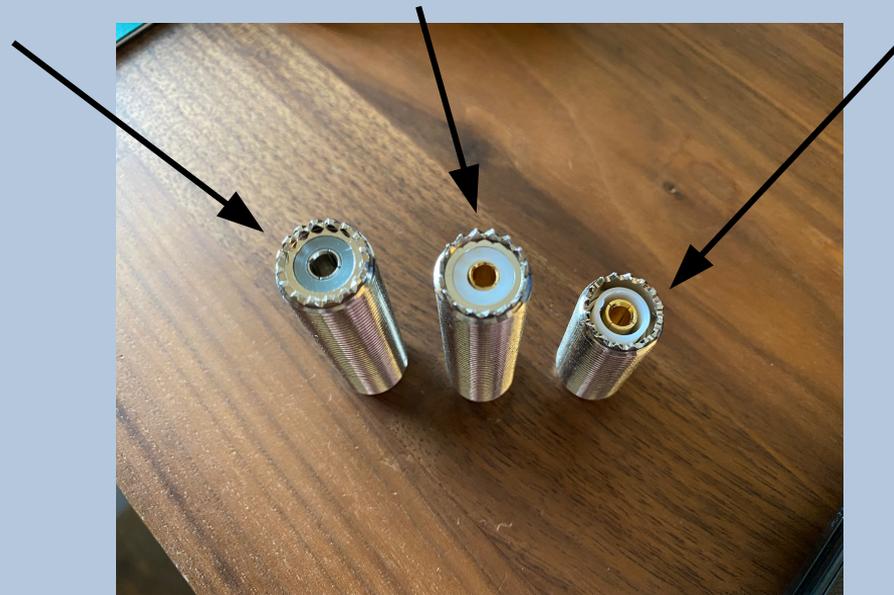


What are there differences between barrel connectors?

RFC Barrels
\$5, 2 in.
PTFE

Ebay's Best
\$2, 1.5 in.
AIR + PTFE

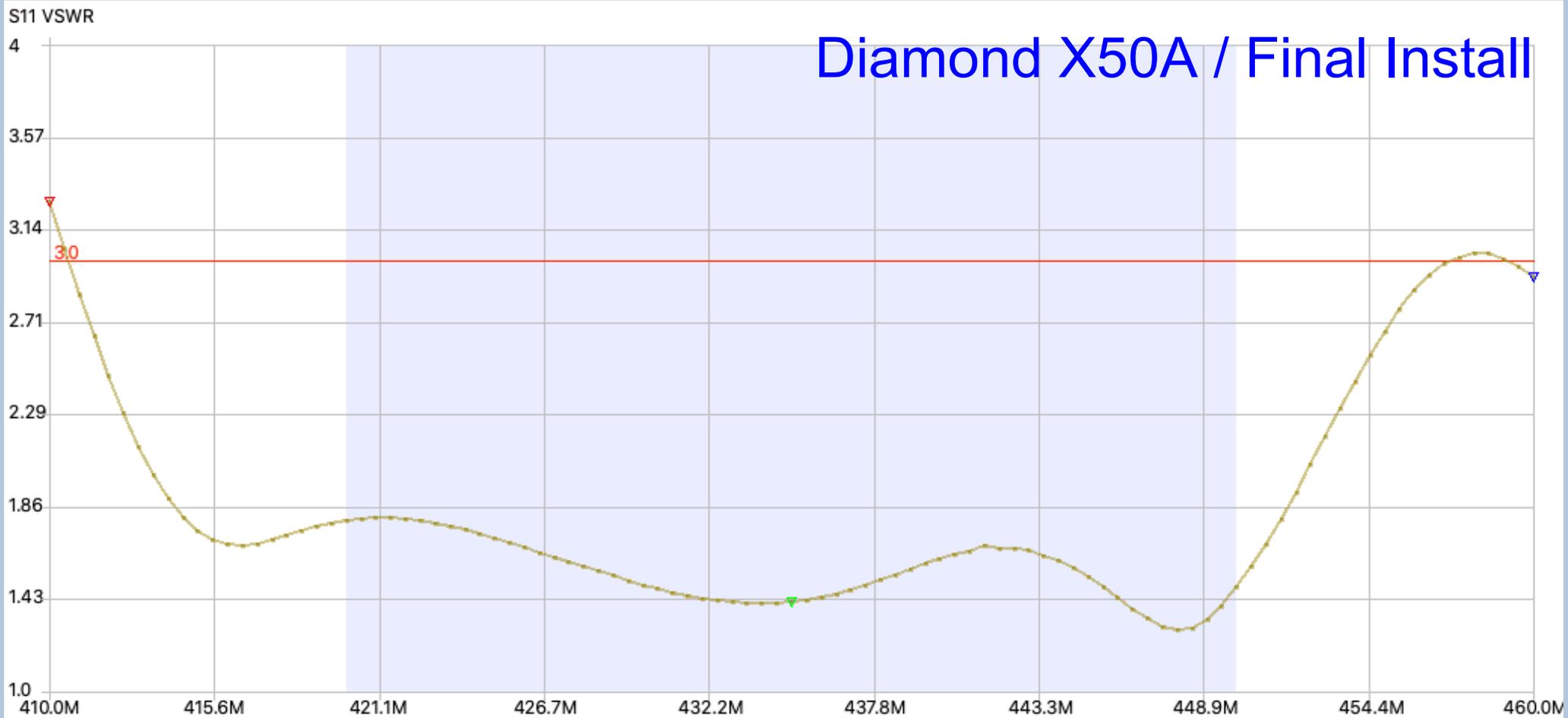
Amphenol
\$12, 2 in.
Delrin



**Hierarchy of Dielectrics:
Phenolic = ok
Delrin = good
PTFE = better
Air = best*

**Length or the connector and the dielectric material greatly impacts the performance of a UHF Barrel.*

Final Result



Lesson Learned

- 1- Clearly define the problem you are trying to fix
- 2- There is no correlation between quality and price ... seek to understand the engineering before buying \$12 UHF Barrels :)
- 3- Trust your instruments, but verify across multiple devices (Watt Meter, NanoVNA, radio SWR reading, etc)
- 4- Mock up a new system or design before installation and then test, test, test
- 5- Ham radio forums and websites are full of witchcraft and folklore - use data and science to guide your troubleshooting