

Blowing Stuff Up is Part of Ham Radio: (No it's not)

And it shouldn't be if you take your time and think it through, but sometimes (^*^%#\$) happens. A few years ago I bought a SDRPlay RSP1 SDR receiver and started playing around with it. I hooked it up to my Butternut HF6V vertical and it was great to be able to span the bands from 10 kHz to 2 GHz on that little wonder. Then the unthinkable happened. Without disconnecting it from the antenna I transmitted on my inverted V that was only about 20' away. Poof! The receiver stopped working immediately and I had a brick on my hands. After a severe self flogging with a cat - o - nine tails and pulling my fingernails out I took it apart with the intention of finding the failed components. Nobody told me that they were about the size of a gnat's nuts though. Nothing looked too bad except the input diodes were little black smudges on the PC board. That's easy to fix so I replaced them and tried it. No luck. I persisted for a few weeks until I finally gave up and ordered some parts with the intention of replacing them and getting it to work. Still no luck, so it's still a brick and it's all my fault for not thinking it through in the first place. Of course a couple of months later I replaced it with a new one and it's been part of my band scope system on the TS-590S for a few years now. I tapped into the input circuit before any bandpass filters on the radio but after the T/R switch that protects the input to its receiver. It has worked perfectly for a couple of years and I don't plan on changing anything. If it ain't broke don't fix it. That is not the ham's creed however and I have bitten my fingernails down to the first knuckle many times trying to restrain myself from trying to "improve???" the arrangement. So far I've been successful. But that brings me to something new.

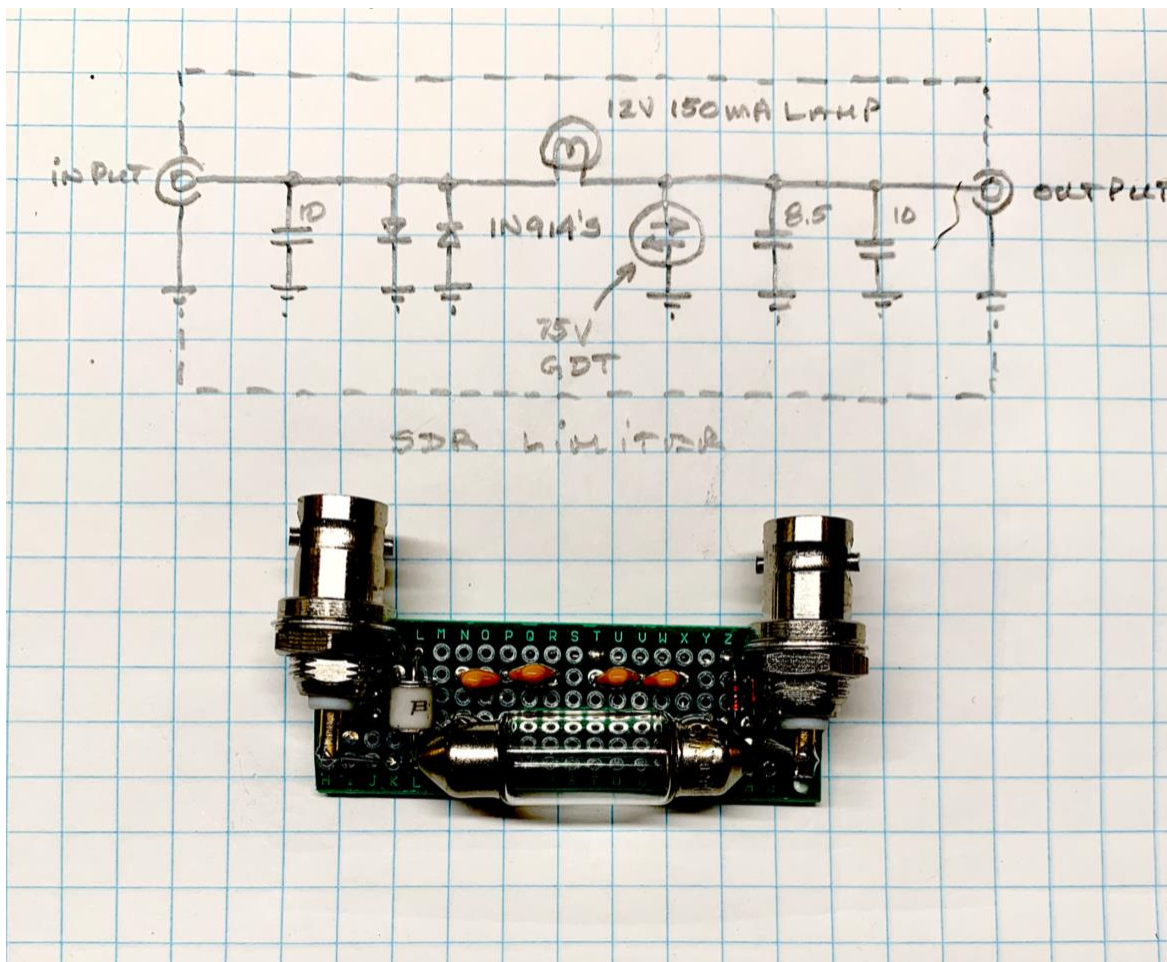
The other day, I had a spare couple of hundred bucks burning a hole in my pocket and no matter how hard I tried to keep the old Dodge from heading that way, I just had to go to GPS Central and buy something. So I bought the brand new RSP DX by SDRPlay. When I got it home, I put it on my RX loop and it is fantastic. Then I thought about my colossal screw up a couple of years ago and decided to research a way to protect this new toy with a device to limit the amount of energy I put into it no matter what antenna I connected it to. I found an article by Phil Salas AD5X about a front-end protector in high signal environments. I decided to build it and that is what my article for this week is about.... I hope you enjoy it.

Like all articles I write I tried to condense it down into some pretty simple descriptions with pictures, so let's begin.

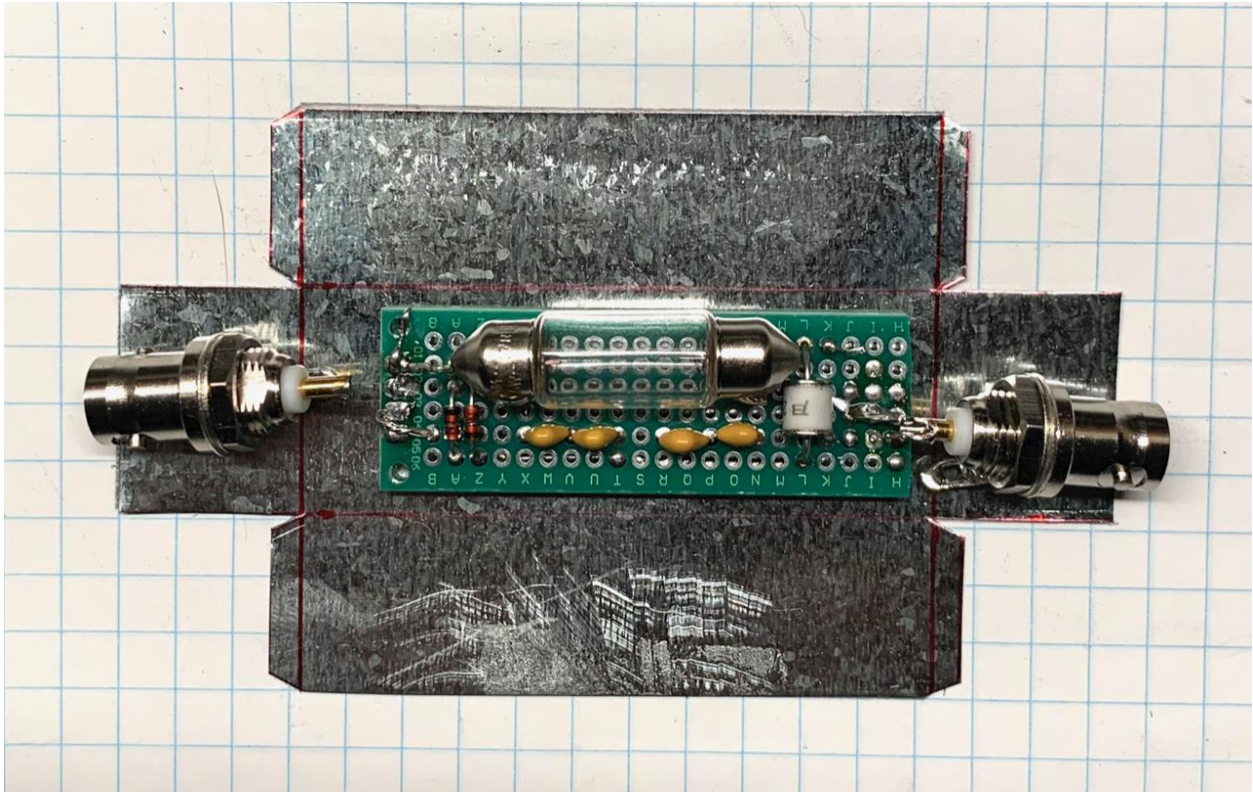
1. Draw out the schematic and learn how it works, then source the parts with substitutions where necessary
2. Do up the parts list:

- Napa Auto Parts - a small 5W 12V cartridge light bulb
- Digi-Key - a 70-volt GDT (Gas Discharge Tube)
- 2 - 1N914 diodes from the junk drawers
- 2 - 20pf 50v ceramic capacitors and 2 - 47pf ceramic capacitors from the junk drawers
- 2 - BNC female bulkhead connectors from the junk drawers (I buy these 20 at a time from Aliexpress or wherever)
- A small piece of PC protoboard to build the protector on
- A small piece of tin plate from a 3' piece of 4" heating duct tube from Home Hardware

3. Build the little device on the protoboard



4. Test the device completely to see if it is going to work. I did this by connecting it to my spectrum analyzer with a 50 ohm termination at the output and it limited any size of signal to -8 dBm so it worked perfectly and then I tried it with a transmitter on 5 - 100 watts being keyed and with it in line to the receiver and it limited it to -8 dBm as well so it protected the front end of the receiver from near field on the vertical and other horizontal antennas connected. Voila!
5. Then I did the layout for the little box I wanted to install it in
6. Now it's time to cut the tin out and make the box. The exact layout on paper is under the cut-out. Cut out the outline with tin snips and bend it into the size of box you want taking into consideration the mounting of the PC board and the BNC connectors. (By the way I measured everything in mm just because I'm a modern kind of guy.)



7. Solder the ends of the box and drill and cut holes into each end to mount the BNC connectors and the best way to do that is using a tapered reamer. (See I told you the layout was under there.)



8. Install the components into the box by sticking the PC board to the bottom of the box with foam tape and solder the connections and cover the top with a piece of aluminum foil ducting tape and label it



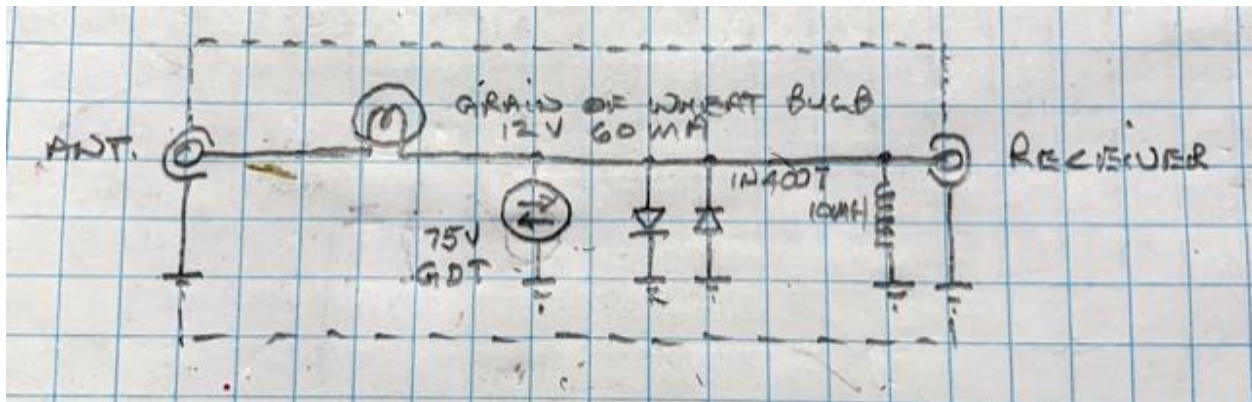
So that's this weeks project just for the fun of it. If you want more information on this or any other of my weekly projects just send me an email at ve6arg@shaw.ca. By the way this one is in full service now and works perfectly. Stop blowing stuff up if you can by thinking it through before you do something stupid. We all do it but taking the time to protect those vulnerable toys is worth it. Disconnect things that you are not using so they don't get zapped unintentionally. See you next week.

73

Tom VE6ARG

Blowing Stuff Up is Part of Ham Radio: (an update)

Thanks to Don VE6JY and his comments on the Breakfast Club Net to me about what he would do to make that SDR protector even better here are some changes to the schematic that he suggested, and I agree with his reasoning completely. The light bulb I used is simply too big and because of that I have ordered a bunch of Grain of Wheat bulbs that are 12-volt 60 ma bulbs instead. I have also changed the diodes to 1N4007's instead and put them after the light bulb and added a 1 mH RF choke across the receiver input. Don also suggested I rename the input and output to Antenna and Receiver to remove any confusion that might have as to where to connect the devices. So, there are the changes...



Thanks, Don, for the suggestions.

73

Tom VE6ARG