WB5DYG SHIELDED RECEIVE LOOP ANTENNAS

Disclaimer:
The loop antenna and balun designs described here are quite common and were compiled from many reference sources; WB5DYG makes no claim of holding proprietary information herein. I would be negligent to not point out the work of Joe Carr KI4PV (SK) that was considered here along with lots of help from my local loop guru Chuck, AC7GZ.

WHY LOOPS?
For those of us with restrictive antenna covenants, small urban lots, and a high urban noise floor, shielded receive loops are an excellent option. They are quiet, work well, and do not have to be mounted high above the ground to perform. These antennas will work well outside, on a small patio, or even mounted in an attic out of sight. Loops also have a rather sharp null, which can allow the loop to be rotated to reduce interference such as from power lines or the neighbor’s noisy LED patio lighting. While there is considerable theory involved with loops as with any antenna, I am skipping that here to just present a practical solution that works well and is easy to construct.

CONSTRUCTION MATERIALS
Most of my loops are 3 ft. in diameter and built from scrap 1/2” Heliax® hard line coax. This rigid feed line provides a fairly self-supporting antenna. However, I have also built them from regular coax with a PVC support. RG-6 cable TV coax works great and can make for a nice portable solution that can be rolled up for transport.

BALUN AND PREAMPS
While there are numerous receive loop designs which incorporate preamps, I have not ever bothered. My experience with preamps in my noisy urban Phoenix environment is they amplify the noise floor as much as the signal and do nothing to improve the signal to noise ratio. My loops utilize a common 4:1 balun wound on a toroid core. This provides matching from the balanced loop to the unbalanced feedline to the receiver, good impedance transformation, and I believe a bit of voltage gain for improved signal strength.

LOOP PATTERN
The loop has a figure 8 pattern with nulls that are perpendicular to the plane of the loop. While this directionality can vary based on frequency and loop size, the loop will typically have fairly sharp nulls.

Looking down on loop from the top.
SOME OF MY LOOPS

Three foot loop mounted in the attic.

Backyard loop being tested.

Portable loop made from RG-6 cable TV coax. This is a 2 ft diameter loop that works well.
This diagram illustrates the basic connections. The 1" gap at the top of the loop is critical, and must be exactly in the center of the loop to maintain the electrical symmetry of the antenna. The shields should not be connected at any point at the gap at the top of the antenna.
This is T1, the balun. It is a simple bifilar wound transformer that is not overly critical, other size cores and mixes would probably work. Remember, these antennas are for receive only!

MORE INFO
An Internet search for “shielded receive loops” will turn up a wealth of information. Sometimes… too much information! There are many debates, theoretical dissertations, designs, and opinions out there. I say, “Don’t analyze until you paralyze!” Grab some coax and make yourself a loop. Give it a try, experiment with different designs and aspects, and just keep it fun while building a station accessory that will be a great addition.

Typically, loops perform better at lower frequencies where the loop diameter is a fraction of the wavelength. However, I have been amazed at the performance of the three-foot loop form LF, MF, and HF even as far up as 30 MHz. The three foot loop is currently being used to copy WSPR while band hopping from 2190 meters through 10 meters and, even with the current downward swing of the sunspot cycle, it is receiving hits from all over the world day and night on multiple bands. There are probably better antenna designs for frequencies above 15 MHz or so, but the loop will still perform well for a wideband, low profile antenna.

One last word…
Joe Carr’s Loop Antenna Handbook
Very much worth having on your bookshelf and available from numerous vendors including:
https://www.universal-radio.com/catalog/books/0016.html

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