

# Center-Fed 20/15/10 m Trapped Dipole

## DIY 1:1 Current Balun

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Center frequencies: 20 m = 14.275 MHz · 15 m = 21.350 MHz · 10 m = 28.400 MHz

### Color Legend (for diagrams)

- Trap: core = gray · winding = orange · Lead A = red · Lead B = blue · cap links = purple dashed · capacitor plates = black.
- Layout: antenna wire = black · 10 m traps = green · 15 m traps = orange · feedpoint block = gray · DIY 1:1 balun = blue.
- NanoVNA: NanoVNA = dark blue box · coupling loop = green dashed · trap = orange · coax/test leads = black.
- DIY balun: enclosure = gray · toroids = gray · coax turns = purple · center path = red · shield path = blue.

### Bill of Materials (DIY Build, 100–200 W)

#### \*\*Antenna & Traps:\*\*

- Ferrite toroids for traps: \*\*FT240-61\*\* (preferred) or FT240-52; one per trap (stack two for long-duty digital).
- Silver-mica capacitors: \*\*22 pF\*\* (10 m traps) and \*\*39 pF\*\* (15 m traps), each \*\*≥2–3 kV\*\*.
- Trap winding wire: \*\*16–18 AWG\*\* enamel or PTFE-insulated; antenna legs: \*\*14–16 AWG\*\* stranded copper.
- Hardware: ring lugs or small FR-4 tabs; stainless M4/M5 fasteners; insulators and rope for ends.
- Weatherproofing: heat-shrink; epoxy or neutral-cure silicone; PTFE tape for core wrap.

#### \*\*DIY 1:1 current balun (choke):\*\*

- 2× \*\*FT240-31\*\* (or FT240-43) toroid cores (stacked).
- \*\*RG-142\*\* or \*\*RG-400\*\* PTFE coax, ~18–24 in (45–60 cm).
- \*\*SO-239\*\* bulkhead connector; 2× stainless studs/eye bolts for antenna terminals.
- Weatherproof enclosure (~6×4×2 in), stainless hardware, heat-shrink, sealant.

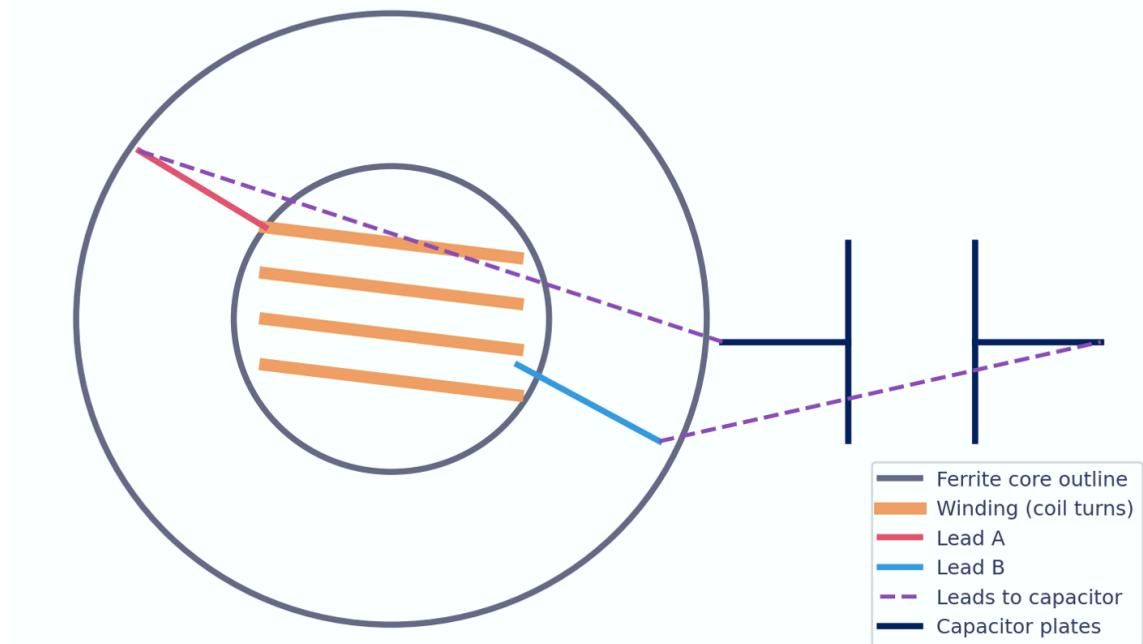
## Trap Targets & Starting Values

Trap	Target $f_0$	Capacitor	Inductance target	Turns (FT240-61)
10 m	28.400 MHz	22 pF ( $\geq 2-3$ kV)	1.43 $\mu$ H	$\approx 3$ turns (2 if stacked)
15 m	21.350 MHz	39 pF ( $\geq 2-3$ kV)	1.42 $\mu$ H	$\approx 3$ turns (2 if stacked)

## 10 m vs 15 m Trap — Quick Cut Sheet

Trap	Band center	Cap value	Target $f_0$	Turns (FT240-61)	Install position
10 m	28.400 MHz	22 pF ( $\geq 2-3$ kV)	28.400 MHz	$\approx 3$ (2 if stacked)	Closest to feedpoint
15 m	21.350 MHz	39 pF ( $\geq 2-3$ kV)	21.350 MHz	$\approx 3$ (2 if stacked)	Further out from feedpoint

## Trap Diagram (Color)



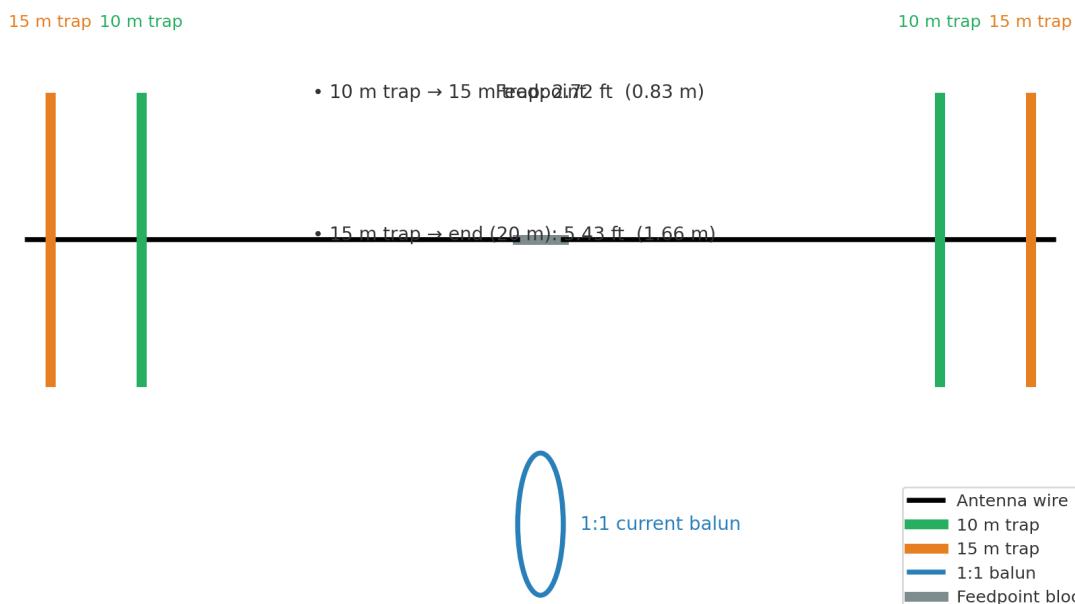
## Pre-Cut Lengths & Layout (Color)

Per-leg section	Feet	Meters	Notes
Feedpoint → 10 m trap	8.24	2.51	Trim to center 10 m
10 m trap → 15 m trap	2.72	0.83	Trim to center 15 m
15 m trap → end (20 m)	5.43	1.66	Trim to center 20 m

Trapped Dipole Layout — 20 / 15 / 10 m (Center-Fed, 1:1 Balun)

Per-side starting cuts (then trim):

- Feedpoint → 10 m trap: 8.24 ft (2.51 m)



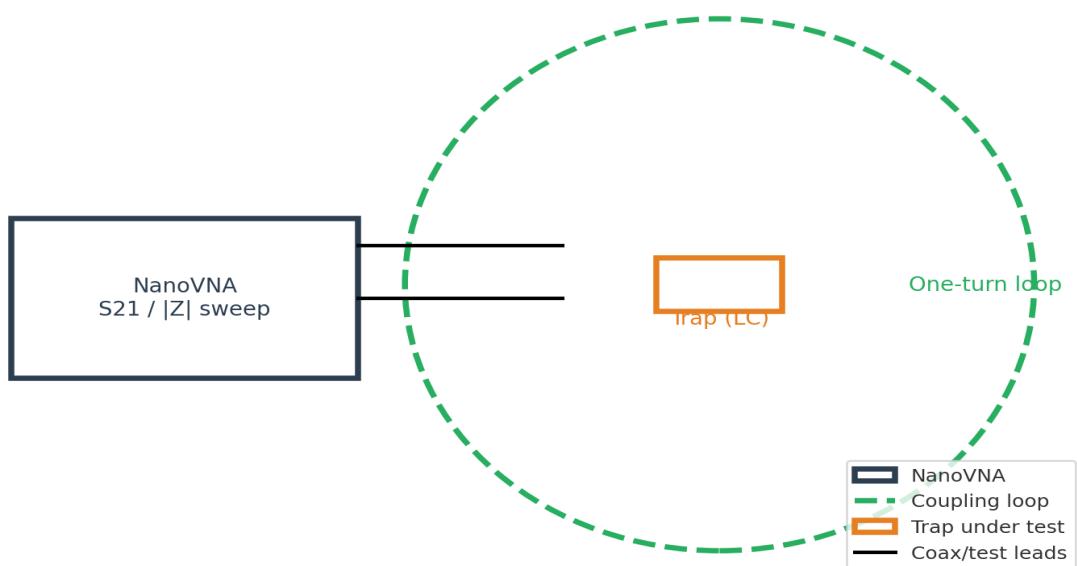
## Build Each Trap — Step by Step

1. Wrap the toroid with one layer of PTFE tape (protects wire, improves Q).
2. Wind tight, even turns: \*\*3 turns\*\* (single FT240-61) or \*\*2 turns\*\* (stacked cores).
3. Solder the silver-mica capacitor across the coil ends (parallel-LC). Keep leads \*\*very short\*\*.
4. Add mechanical strain relief (ring lugs/FR-4 ears + hardware).
5. Weatherproof with heat-shrink and a thin bead of epoxy/silicone.

## Bench-Tune Traps with a NanoVNA (Color)

- 10 m trap target: \*\*28.400 MHz\*\* • 15 m trap target: \*\*21.350 MHz\*\*
- Make a \*\*one-turn coupling loop\*\* and place the trap inside it (no direct connection). Sweep and look for a \*\*deep notch/dip\*\*. Spread turns to raise  $f_0$ ; squeeze to lower. Re-check after sealing.

### Trap Bench Tuning with NanoVNA — Color Keyed



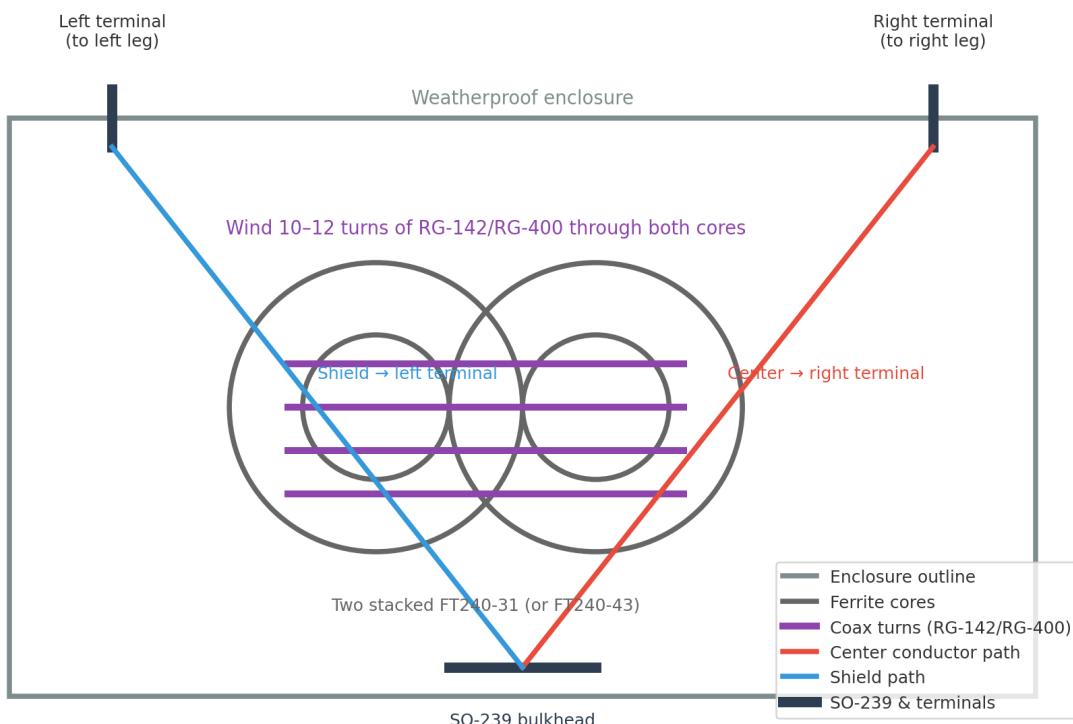
## Assembly (Center-Fed with DIY 1:1 Current Balun)

- Mount the \*\*DIY 1:1 current balun\*\* at the feedpoint; support the box and add coax strain relief + a drip loop.
- Attach the two inner wires from the balun's balanced posts to each leg.
- Insert the \*\*10 m trap pair\*\* at \*\*8.24 ft\*\* per side; trim those inner sections to center 10 m.
- Insert the \*\*15 m trap pair\*\* \*\*2.72 ft\*\* beyond the 10 m traps; trim that section to center 15 m.
- Add the \*\*outer tails\*\* (\*\*5.43 ft\*\*) and trim to center 20 m.
- Raise to operating height, keep symmetry, and iterate tiny trims across all three bands.

## DIY 1:1 Current Balun (Choke) — Build Instructions (Color)

Recommended: \*\*two stacked FT240-31\*\* toroids for broad HF choking (covers 20–10 m well). FT240-43 is an alternative.

DIY 1:1 Current Balun (Choke) — Color Diagram



- **\*\*Parts (DIY balun):\*\***
- 2× FT240-31 (or FT240-43) toroid cores (stack with tape/epoxy).
- RG-142 or RG-400 PTFE coax, ~18–24 in (45–60 cm).
- SO-239 bulkhead connector; 2× stainless studs/eye bolts for antenna terminals.
- Weatherproof enclosure (~6×4×2 in), stainless hardware, heat-shrink, sealant.

**\*\*Winding & assembly steps:\*\***

1. Stack the two toroids and bind them together with fiberglass or high-temp tape.
2. Drill the enclosure: one hole for SO-239 (bottom/side), two for the antenna terminals (top), and one for a coax strain relief.
3. Cut the coax. Leave enough length for **\*\*10–12 turns** through both cores plus leads to SO-239 and the terminal lugs.
4. Wind the coax **\*\*evenly through both cores as a bundle\*\*** (not separately): aim for **\*\*10–12 turns\*\***. Keep bends smooth and spacing even.
5. Terminate one end of the coax to the **\*\*SO-239\*\*** (center to pin, shield to body/ground).
6. Terminate the other end inside the box: **\*\*center conductor → right terminal\*\***, **\*\*shield → left terminal\*\*** (balanced posts).
7. Strain-relieve the coax inside. Seal all penetrations with silicone; add a small **\*\*drain hole\*\*** on the bottom edge.
8. Label the terminals (Left/Right leg). Optionally, add a ferrite bead sleeve on the feedline just outside the box.

**\*\*Check:\*\*** With an analyzer on the feedline, the balun should not significantly detune your tuned antenna and should suppress common-mode currents (SWR stays stable when the feedline is moved).

## Power Handling & Reliability (100–200 W)

- Use FT240-61 for traps and **\*\*FT240-31\*\*** for the choke balun. Stack cores for long-duty digital operation.
- Use **\*\*≥2–3 kV silver-mica\*\*** capacitors in traps; keep all leads short; weatherproof thoroughly.
- After tuning, key a steady carrier: traps/balun may be warm but should not run hot. If hot, add core volume or reduce duty cycle.