

40-10 Meter Portable Dipole
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This article describes a simple, portable 40-10 meter *resonant* portable dipole that will handle a 100-watt transceiver. Also included is an in-line balun which cures the occasional “RF hot” problem when operating from a portable location with a poor (or no) ground system.

The balun consists of an FT114 -43 ferrite core wrapped with 10-turns of RG-174 coax as shown in Figure 1. A crossover winding gets the input and output ends of the coax on opposite sides of the ferrite core, which is necessary to fit the balun, an input RCA-style phono jack, and #6 stainless steel hardware into the mini-plastic box as shown in Figure 2 and photos A and B. Note the holes in the bottom of the box for a nylon cord loop used for supporting the assembly.

The multi-band dipole is a full-sized 20-meter dipole using 22 gauge stranded insulated wire and subdivided into switched sections to support the 20-, 17-, 15-, 12-, and 10-meter bands. Starting dipole lengths were based on the standard dipole formula ($L = 468/F$). This formula ensures the wires are a little long when using insulated wire (velocity factor is less). For the end-insulators, overlap one end of a 12-inch piece of nylon cord with the outside end of the 20-meter wire section and slide a 0.88-inch nylon spacer over the joint. Then fill the nylon spacer with hot glue or epoxy (see Figure 3). The nylon cord can be used to tie off the ends of the dipole for supporting the antenna. (Note: Use a match to cut the nylon cord. As the flame burns through the nylon cord, it fuses the ends of the cord so there is no unraveling.). Spade lugs (#6) are soldered onto the inner ends of the 10-meter sections. These spade lugs attach to the feedpoint/balun using #6 wing-nuts. Tack-solder all the wire sections to the switches and hang the dipole where you can easily get to it (between sections of fence is fine) for tuning purposes.

To tune the antenna, open all switches and adjust the two inner wire sections for lowest SWR on 10 meters using an antenna analyzer. Unsolder the wires on the switch ends and shorten them as necessary. Next switch in the 12-meter sections and adjust these sections for resonance. Continue this procedure for the 15, 17, and 20-meter bands. The resonant frequency will vary about 300 KHz/inch on 10-meters, 220 KHz/inch on 12-meters, 150 KHz/inch on 15 meters, 120 KHz/inch on 17 meters, and 75 KHz/inch on 20 meters.

Once the final lengths are determined, thread the wires through the switch mounting holes as shown in Figure 4 to give strain relief to the switch terminals. The CW-favored end-to-end wire lengths I wound up with are shown in Figure 5. A dab of epoxy on the holes fix the wires in place and keeps the insulation from wearing over time.

While the SWR will move around some due to changing portable locations, most of today's rigs can put out full power into a 2:1 SWR. The important thing is that the antenna is close to resonance. This ensures you won't suffer noticeable inefficiencies due to coax losses. I use a MFJ-902 tuner to trim up the SWR when necessary when using my IC-706MKIIG. The internal tuner in my IC-703 easily handles any SWR variations.

For 30- and 40-meter operation I added loading coils across the 10-meter switches. This keeps the antenna compact, and the 20-meter dipole length is also good for a condo balcony installation. The 30 -meter coils consist of two 6.5-uHy inductors (22T #20 enamel wire on T106-2 torroid cores). For 40-meters, you need 18.5-uHy inductors (36 T #20 enamel wire on T106-2 cores). Alligator clips on the torroid leads attach the coils across the 10-meter switches (10-meter switches “open” and all other switches “closed”). A dab of epoxy or hot glue keeps the turns in place. I also looped a 12” strand of nylon cord through each torroid to support the torroid on the antenna should the clip leads come loose in the wind. Refer to Photos C and D for the final loading inductors clipped across the 10-meter switches. Unless you are lucky, the SWR won’t be perfectly centered, so adjust the turns spacing a little to center the SWR. The SWR on 30- and 40-meters will probably exceed 2:1 at resonance since the antenna is physically short on these bands (lower radiation resistance). But again, my MFJ-902 takes care of any problems with my IC-706MKIIG, and the internal tuner in my IC-703 also takes care of any problems.

For a portable feedline, I use 15- and 25-foot sections of RG-174 coax terminated in male phono connectors. I use a female-to-female phono coupler to tie them together for a 40-foot feedline when necessary. RG-174 coax is OK for 100 watt rigs if the SWR isn’t too high, which is the case since this antenna is resonant on all bands. And phono connectors work just fine at HF. Photos E and F show some details of the antenna and feed mounted and in-use on the 15th floor balcony of a condo during our vacation on Mustang Island, Texas (IOTA NA092). Man– what a great portable location that was!!

To conclude, I’ve described a compact, simple , inexpensive and effective 40-10 meter portable dipole. So get out of the house and have fun operating HF portable!

Dipole/balun Parts List

<u>QTY</u>	<u>Description</u>	<u>Source/Part Number</u>	<u>Price</u>
8	DPDT slide switches	www.allelectronics.com SSW-37	4/\$1.00
1	Phono jack	www.allelectronics.com RCMJ	\$0.40
1	2.35”x1.38”x0.8” ABS case	www.allelectronics.com 1551-HBK	\$1.20
4	Shielded phono plug	www.allelectronics.com MPRP	\$0.50 ea
1	phono plug coupler	www.allelectronics.com AD-3	\$0.75
35 ft	#22 insulated stranded wire	www.allelectronics.com 22BK-100	\$5.75/100 ft
2	0.88” nylon spacer	www.allelectronics.com SP-195	10/\$1.00
40 ft	RG-174 coax	www.allelectronics.com RG-174	\$13.50/50 ft
1	FT114-43 ferrite core	kitsandparts.com FT114-43	5/\$5.00
4	T106-2 powdered iron core	kitsandparts.com T106-2	5/\$5.00
2	#6 lockwasher solder lugs	www.mouser.com 534-914	\$0.14
8	1.1” alligator clips	www.mouser.com 13AC-130	\$0.32 ea
2	SS #6 x ½” screw	Local hardware store	
4	SS #6 split lockwasher	Local hardware store	
2	SS #6 nut	Local hardware store	
2	SS #6 wing-nut	Local hardware store	
	Nylon cord	Local hardware store	

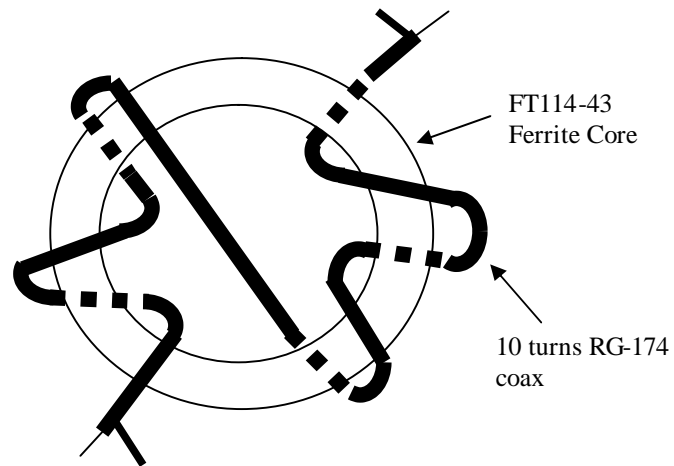


Figure 1: Balun Winding Details
5 Turns/Side (Not all turns shown)

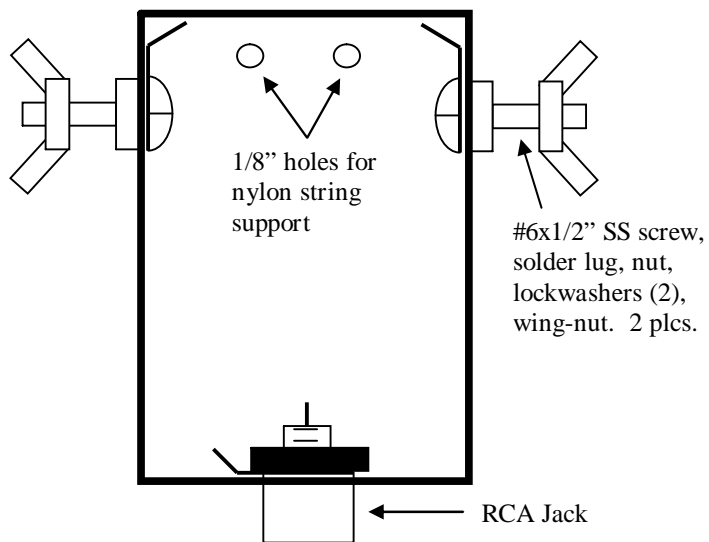


Figure 2: Balun/Center Support Box Details

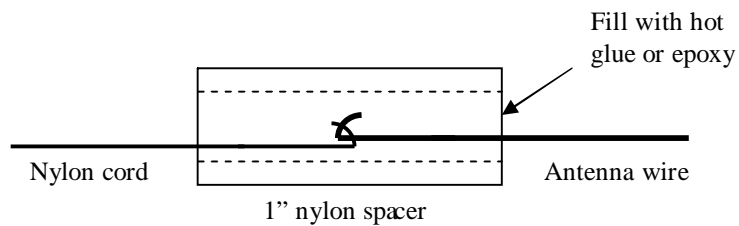


Figure 3: End insulator assembly details

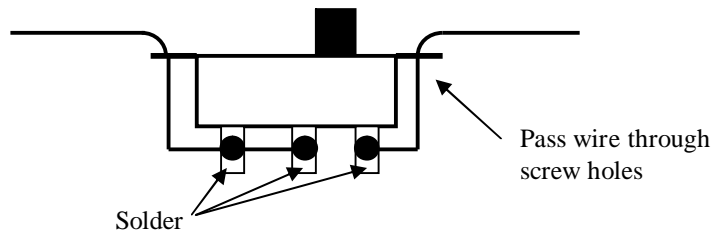


Figure 4: Switch Wiring

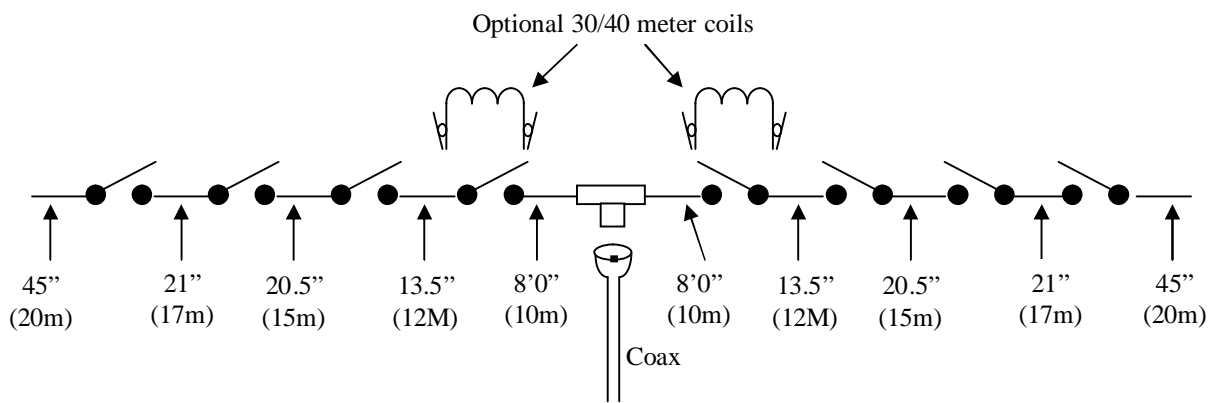


Figure 5: 40-10 meter Switched Dipole



Photo A: Balun In Box



Photo B: Box Backside



Photo C: 30M Inductor



Photo D: 40M Inductor



Photo E: Antenna Deployed



Photo F: Feedpoint