

Magnetic Loop Antenna Prototype Testing (more info at www.n6na.org/magloop)

At 0.1" plate spacing, the 3 inch 7 plate sets Monarch capacitor range was measured as 16 - 49 pF with an MFJ-259B antenna analyzer. This capacitor resonated a 96" long (2.55 foot diameter) loop of RG-8/U cable from 17.250 MHz to 30.620 MHz. The following impedances were measured at the end of a 36" length of RG-58/U connected to a 22" coupling loop of RG-58/U:

Frequency MHz	SWR	Resistance ohms	Reactance ohms
18.1	1.1	47	8
21	1.1	55	6
25	1.3	51	17
28	1.3	46	12
30	1.4	55	18

Test transmissions at 100 watts produced no arcing of the capacitor at any frequency.

The measured maximum capacitance of this capacitor with 0.1 inch plate spacing was 49 pF compared to 53.5 pF as expected from the [Monarch Capacitor online calculator](#). The AA5TB loop calculator predicted that this loop of 0.4 inch diameter RG-8/U should resonate near 15.5 MHz at maximum capacitance, but the measured minimum frequency was 17.25 MHz which is the predicted frequency for a conductor diameter of 1 inch. If with this plate spacing your antenna does not tune as low in frequency as planned, the antenna frequency may be lowered by increasing the maximum capacitance by spacing the plates closer, adding more plates, or by increasing the loop length.

Varying Capacitance and Loop Length

We made the following changes to the capacitor (Version A) described above in order to measure the effect on the tuning range of the antenna.

- **Version A:** the capacitor as originally assembled, 7 complete plate sets with 0.1" plate spacing using two 0.12" 8-32 nuts for spacers.
- **Version B:** the capacitor reassembled with 0.09" plate spacing using one 0.12" 8-32 nut flanked by two 0.05" washers for spacers.
- **Version C:** Version B with another rotor plate and pair of stator plates added.
- **Version D:** Version C with another rotor plate for a total of 9 rotor plates and 8 pairs of stator plates.

The capacitance ranges and the tuning frequency ranges were then measured with each capacitor for loop lengths of 96", 101.5" and 113" and are listed in the table below. You may check with [Monarch Capacitors](#) for availability if you wish to purchase additional plates for your capacitor.

				Loop length in. (diameter ft.) Frequency Range (MHz)					
Capacitor Version	Plate Spacing	Capacitance pF		96" (2.55')		101.5" (2.7')		113" (3')	
		Min	Max	Min	Max	Min	Max	Min	Max
A	0.1"	16	49	17.25	30.62	16.7	29.45	15.7	27.5
B	0.09"	16	57	16.5	30.3	15.9	29	14.9	27.1
C	0.09"	19	68	15.3	29.1	14.8	27.9	13.8	26.1
D	0.09"	19	72	14.9	28.8	14.4	27.6	13.6	25.8