

Data on the BC-610 Tank Coils

EUGENE BLACK, JR., W2ESO*

Now that you've got them, here's what to do with 'em.

ONE SATURDAY afternoon some time back, as I sat by my receiver, listening to a W4 and a W9 commiserating on the current lack of DX at that moment on 20, the postman rang my bell. Without much reluctance—there wasn't even a G trickling through at the time—I killed the receiver and went out to find the current issue of this notable magazine in the mailbox. Starting as usual at the back of the book, my trained eye skipped and squirmed through the surplus ads, finally alighting on one which read "BC-610 500 Watt Tank Coils—Set of 14 for \$5." Even the untrained eye opened at this one! Thought they were sharp, those California fellers—but they couldn't fool a real Manhattan surplus-sniper, toughened by the harsh realities of Cortlandt Street. I *knew* this must mean 7 plate coils and 7 link coils equals 14, but even so it looked like a bargain. So I went back to the shack and wrote out a check, first turning on the neon sign which spelled out in letters three feet high the following considerate message to my neighbors: "W2ESO OFF THE AIR, RESUME LOOKING AT YOUR TELEVISION RECEIVERS."

About five Saturday afternoons later, the doorbell sounded off again. This time it was a truckman, leaning on a large wooden crate and waving a bill for something like \$8.00 worth of shipping charges covering transportation of said piano box and contents from California. Noting out of the corner of my eye (the sharp one), that the box was branded "DOUBLET KIT FOR SCR-399," and secretly conjuring up a vision of how those West Coast slickers had slipped up and had accidentally included a pair of thirty foot masts along with my seven coils, I quickly paid the man off, refraining from any comments which had anything to do with his keeping the change.

With the help of two neighbors, who did not own television sets, I eventually got the box into my apartment. As I attacked the iron bands on the outside with a crowbar, I made rapid mental calculations on how many pairs of masts plus complete antenna assemblies could be contained along with a mere handful of modest 500-watt coils in a thing of this size. By the time the last 3/4-inch plank from the top and the handle of my prybar had given way simultaneously, my delusions had risen to somewhere in the altitude of four masts lashed end to end, carrying a 14-mc dipole above the rooftops of the two 12-story buildings which

towered about a hundred feet above my humble dwelling.

Clearing away the timber, I reached incautiously into the yawning depths of the box and split the shoulder of a new shirt. On the second try, I dredged up a foil-wrapped carton big enough for a Super-Pro, but strangely lighter. Within were a number of objects, also overseas wrapped in metal foil. I ripped open one, unwound a few yards of waxed paper, and found a glistening tank coil, apparently suitable for a guy with enough nerve to operate around 1 megacycle, but labeled "2.0-3.5 mc." Another try uncovered its twin brother. As the third coil began to emerge from its wrappings, it looked as though I had drawn three of a kind, and as the prospect of owning 7 shiny 2-3.5 mc coils bore down on me, I began to oscillate violently (mentally, that is) between the alternatives of (1) peeling down these monsters for 14 or 28 mc, etc, or (2) finding six other birds who had somehow gotten in the same fix, involving the remaining six coil types. The improbability of the latter reminded me of a story about a magician¹, so I calmed down and unwrapped the other four coils, to find that I didn't have three of a kind after all, but rather three pairs covering from 2.0 to 5.7 mc., and a single marked 5.7 to 8. Very odd, I thought, but at least I had 80 and 40 under control, so back to the wooden box for those masts. Nothing doing there—empty—when suddenly inspiration gave me a swift kick. Suppose there was another layer of stuff packed in that corrugated carton? A quick look showed that I had only gotten down to a false bottom halfway down, and underneath what do you think I found? *I wuz robbed! No masts in there, but seven more coils—making two full sets!*

All kidding aside, I don't regret my bargain at

1 The story, probably apocryphal, concerns a young magician doing his first club date — I heard it told about Thurston. It seems he was put on the spot by the Master of Ceremonies, who after introducing him, said "Of course, you don't depend on marked cards and trick decks for your effects, do you, Mr. X?"

"Of course not," Mr. X lied indignantly.

"In that case," the MC continued, "you won't mind if we add an additional note of interest by using a deck of our monogrammed cards," and had an attendant bring up a new sealed deck to our hero on the stage.

While Mr. X fumbled around with the cards, stalling for time and probably wishing he knew how to make himself disappear, he suddenly discovered that by some weird chance, he had been given a faulty deck, consisting of 52 aces of spades—and with a setup like that, he pulled some card tricks that night that nobody has duplicated since.

*130 East 24 St., N.Y. 10, N. Y.

all, and on occasion have put the duplicate coils to good use in a separate antenna tuner. However, in using these coils I have been made aware of the fact that the BC-610 design involved somewhat lower LC tank ratios than is usual amateur practice; as a result, when using any one of a number of high-voltage medium-current tubes, including the 810, 813 and 250TH, with accepted values of tank capacity, I have wound up using a coil marked for a lower frequency range. For example, with a tank condenser of 50- $\mu\mu\text{f}$ per section (Cardwell XG-50-XD), the 4.5—5.7 mc coil resonates on 7 mc with the condenser just about fully meshed, while the 8-11 mc coil tunes to 14 mc with the tank condenser set at about 75% of maximum capacity.

After discussing this with some of the local gang who had run into the same thing, I prepared the accompanying table, which should be a time saver to any buyer who has not yet made his own calculations. While I made my initial determinations of tuning ranges by plugging the coils into the rig and checking frequency coverage with a grid-dip meter, most of the tabulated data was taken with the use of Boonton 160A and 170A Q-Meters. The average ham will be interested primarily in the listed values of capacity required to tune a coil to a given ham frequency; as is customary, the values given are the sum of the tank capacity, tube output capacity plus stray circuit capacity (wiring, etc.). In some cases, additional listings are made where coils were altered. The 14-18 mc coil is made usable on the 28-mc

band in this manner. My 50- $\mu\mu\text{f}$ -per-section tank condenser is too small for 3.5-mc operation, of course, so it is padded up with a surplus 50- $\mu\mu\text{f}$ vacuum condenser for this band. Since this restricts the possible tuning range drastically, it is necessary to cut the coil to rather close tolerances, and at that only the c.w. part of the band is covered. This fits in with my operating preferences here, as I learned prewar why not to use 75 phone in the middle of New York City, but the chap who wants 4.0 mc coverage will either have to trim the coil a bit further or start out with a larger tank condenser.

The significant Q readings are those taken at the operating frequency where the coil is to be used. Coil manufacturers do not generally publish this kind of information, but I have some manufacturers' literature on a similar type of prewar origin, and these figures are in good agreement, showing the same drop off in Q with increasing frequency. Knowledge of coil Q is of use in calculating tank circuit efficiency which in turn helps in estimating the allowable power level at which the coils can be used. The tank efficiency²

is equal to $\frac{Q \text{ coil} - Q \text{ loaded circuit}}{Q \text{ coil}}$, where the loaded Q is of the order of 12 to 15. For example, the modified 14-18 mc coil has an unloaded Q of 170 at 28 mc. If we assume a loaded Q of 15,

$$\% \text{ Eff.} = \frac{170 - 15}{170} \times 100 = 91\%.$$

² Terman, Radio Engineer's Handbook, p. 450.

TABLE I

Coil No.	Marked Freq. Range mc	Test Freq. kc	Capacity Required for Resonance $\mu\mu\text{f}$	"Q"	Description of Alterations
1735	2 - 3 .5	1800	131	340	none
		2000	105	345	none
		3500	41.5	240	3 turns off each end
		3700	36	240	3 turns off each end
1736	3.5 - 4 .5	3500	61.5	375	none
		3750	53	375	none
		4000	46	375	none
		3500	70	375	1 turn off each end
		3750	60	375	1 turn off each end
		4000	52.5	375	1 turn off each end
1737	4.5 - 5 .7	7000	Appx. 25*		none
1738	5.7 - 8 .0	7000	37	375	none
1739	8 - 11	14000	Appx. 22*		none
1740	11 - 14	14000	31	140	none
		21000	Appx. 16*		none
1741	14 - 18	14000	54	150	none
		21000	Appx. 25*		none
		21000	37	150	1 turn off each end
		28000	19	170	1 turn off each end

*Note: Calculated value. Minimum capacity setting of Model 160-A Q-Meter is 30 $\mu\mu\text{f}$.