

## OAT BOX COILS: DIFFERENT DIAMETERS

Can't find a 5-inch oat box for your radio? We've tabulated below the number of turns (wire loops) for various L values (inductance) needed for 3, 4, and 5 inch coil forms. The OB1 manual – downloadable from our website at <http://www.midnightscience.com/article-index.html> discusses how to wind the coil and which L value to chose.

Oat Box Diameter	Turns	Coil length	L in micro-henries	Wire-feet
<b>5 inch</b>	<b>56</b>	<b>3.0</b>	<b>388</b>	<b>73.3</b>
5 inch	48	2.4	310	62.8
5 inch	40	2.0	235	52.4
5 inch	36	1.8	200	47.2
<b>4 inch</b>	<b>67</b>	<b>3.36</b>	<b>350</b>	<b>70.2</b>
4 inch	60	3.00	300	62.8
4 inch	53	2.63	250	55.5
4 inch	45	2.25	200	47.1
<b>3 inch</b>	<b>99</b>	<b>4.95</b>	<b>350</b>	<b>77.8</b>
3 inch	87	4.36	300	68.3
3 inch	75	3.77	250	58.9
3 inch	63	3.17	200	49.4

*In general, use the top value for turns for the coil diameter you chose. Wind the number of taps called for in the manual. An Alligator clip is shipped with the kit that allows you to clip to one of those taps to adjust the amount of L for station tuning. Note that the smaller the diameter of the oat box, the more turns you must put on the coil. Total wire length needed stays roughly the same, less than 80 feet of #24 AWG.*

### How to calculate L values (inductance).

We use the following formula, named after H. Wheeler.

$$L = \frac{r^2 N^2}{10Np + 9r}, \text{ where } r \text{ is the radius in inches, } N \text{ \# of turns, } p \text{ wire spacing in inches.}$$

The #24 hookup wire shipped with the OB1 kit has a p – outer diameter including insulation – of 0.05 inches.

Example. Find L for a 5-inch box, using #24 wire and 56 turns.  $L = (2 \cdot 2)(56 \cdot 56) / (10 \cdot 56 \cdot .05 + 9 \cdot 2) = 388$ .

A calculator using this formula can be found on our website -

<http://www.midnightscience.com/formulas-calculators.html> .