

# TI-PROGRAMMABLE USER PROGRAM

PROGRAM TITLE

AIR-CORED SINGLE LAYER INDUCTOR CALCULATIONS

AUTHOR(S)

John Dale

DATE

9 June 2019

## Program description, equations, variables:

The program will calculate the self-inductance of a single-layered air-cored coil given the total number of turns in the coil, the radius of the coil and the length of the coil. The length and radius units are in imperial inches and the self-inductance is given in microHenries.

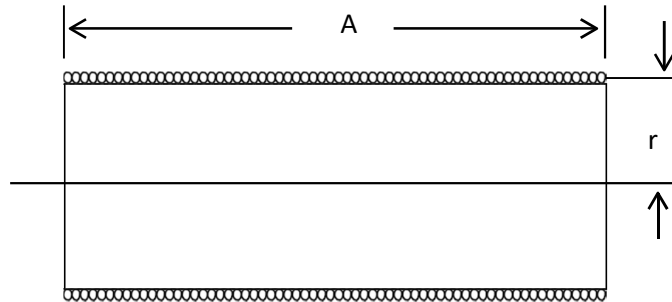


Figure (i)

For the coil shown in Figure (i) the self-inductance, L, is given by  $L = \frac{r^2 N^2}{(9r + 10A)}$

N=number of turns in the coil, A=length of the winding, r=coil radius.

The program will also calculate any one of the four variables if the other three are known.

Registers R00 to R03 inclusive are used to hold the values used by the equation above;

R00	A
R01	L
R02	r
R03	N

The label keys A - D inclusive are used to calculate the missing value;

A	L
B	N
C	A
D	r

## Necessary accessories:

## Operating limits and warnings:

If measurements are made in cm for A and r, divide by 2.54 before storing the values in the registers.

## References:

## USER INSTRUCTIONS

TITLE AIR-CORED INDUCTOR CALCULATIONS PAGE 2 OF 4



PROGRAMMER John Dale DATE 9 June 2019

STEP	PROCEDURE	ENTER	PRESS			DISPLAY
	To calculate the self-inductance of a 1" coil of 101 turns of 31AWG enamelled wire wound onto a 4" diameter former.					
1	Enter the value for A (1") and store in Register 00	A	1	STO	00	1.0000
2	Enter the value for N (101) and store in Register 03	N	101	STO	03	101.0000
3	Enter the value for r (2") and store in Register 02	r	2	STO	02	2.0000
4	Calculate the self-inductance, L, by using label key A		f	A		1457.2857
	To calculate the number of turns needed for a self-inductance of 200 microHenries store the value 200 in Register 01 and then use label key B.					
	The result should be <b>37.4166</b>					
	To calculate the length of coil needed for a self-inductance of 50 microHenries store the value 50 in Register 01, do step 2 and then use label key C.					
	The result should be <b>79.8080</b>					
	To calculate the coil diameter needed for a self-inductance of 1000 microHenries store the value 1000 in Register 01, do steps 1 and 2 and then use label key D.					
	Multiply the result by two to get the diameter of the coil. The result should be <b>3.0501</b>					



