

HP-41C PROGRAM DESCRIPTION

PROGRAM TITLE

COIL

AUTHOR(S)

John Dale

DATE

11 September 2026

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.

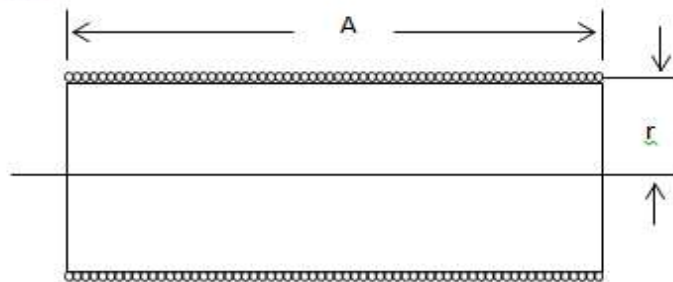


Figure (i)

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 User keys A - E inclusive are used to enter parameters and to calculate the missing value;

A	Enter parameters
B	L
C	A
D	N
E	r

Necessary accessories:

Operating limits and warnings:

The calculator must be in USER mode. If measurements are made in cm for A and r , divide by 2.54 before storing the values in the registers.

References:

HP-41C USER INSTRUCTIONS	
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[illegible]

REGISTERS							NOTES
0	1	2	3	4	5	6	
A	L	r	N				
7	8	9	10	11	12	13	
14	15	16	17	18	19	20	
USER KEYS							
A	Save parameters			F			
B	Calculate L			G			
C	Calculate A			H			
D	Calculate N			I			
E	Calculate r			J			

HP-41C PROGRAM NAME:		COIL
DATE:	11 September 2026	Purpose: To calculate the self-inductance of a single layer, air-cored coil.
AUTHOR:	John Dale	
STEP	PROGRAM STATEMENT	DESCRIPTION
0001	LBL 'COIL'	
0002	LBL A	Inputs the coil parameters
0003	'TURNS?'	
0004	PROMPT	
0005	STO 03	
0006	'LENGTH?'	
0007	PROMPT	
0008	STO 00	
0009	'DIAM?'	
0010	PROMPT	
0011	2	
0012	/	
0013	STO 02	
0014	'INDUCT?'	
0015	PROMPT	
0016	STO 01	
0017	RTN	
0018	LBL 01	Subroutine to calculate r^2N^2
0019	RCL 02	Recall radius [r]
0020	X ²	
0021	RCL 03	Recall number of turns (N)
0022	X ²	
0023	*	
0024	RTN	Returns r^2N^2 in display register
0025	LBL 02	Subroutine to calculate (9r+10A)
0026	RCL 02	Recall radius [r]
0027	9	
0028	*	9r
0029	RCL 00	Recall coil length (A)
0030	10	
0031	*	10A
0032	+	9r+10A
0033	RTN	Returns (9r+10A) in display register
0034	LBL B	Program to calculate self-inductance of coil (L)
0035	XEQ 01	Calculates r^2N^2
0036	XEQ 02	Calculates (9r+10A)
0037	/	
0038	RTN	Returns self-inductance in display register.
0039	LBL C	Program to calculate the length of the coil
0040	XEQ 01	Calculates r^2N^2
0041	RCL 01	Recalls self-inductance (L)
0042	/	
0043	RCL 02	Recall radius [r]

0044	9	
0045	*	
0046	-	
0047	10	
0048	/	
0049	RTN	Returns length of coil in display register.
0050	LBL D	Program to calculate number of turns
0051	XEQ 02	Calculates $(9r+10A)$
0052	RCL 01	Recall self-inductance (L)
0053	*	$L(9r+10A)$
0054	RCL 02	Recall radius [r]
0055	X^2	
0056	/	
0057	SQRT	
0058	RTN	Returns number of turns in display register.
0059	LBL E	Program to calculate coil diameter [2r]
0060	RCL 01	Recall self-inductance (L)
0061	9	
0062	*	
0063	X^2	$(9L)^2$
0064	RCL 03	Recall number of turns (N)
0065	X^2	
0066	RCL 01	Recall self-inductance (L)
0067	*	N^2L
0068	RCL 00	Recall coil length (A)
0069	*	N^2LA
0070	40	
0071	*	$40N^2LA$
0072	+	$40N^2LA+(9L)^2$
0073	SQRT	$\sqrt{40N^2LA+(9L)^2}$
0074	RCL 01	Recall self-inductance (L)
0075	9	
0076	*	$9L$
0077	+	$9L+\sqrt{40N^2LA+(9L)^2}$
0078	RCL 03	Recall number of turns (N)
0079	X^2	
0080	2	
0081	*	$2N^2$
0082	/	$(9L+\sqrt{40N^2LA+(9L)^2})/2N^2$
0083	2	
0084	*	
0085	RTN	Returns coil diameter in display register
0086	END	
0087		
0088		
0089		
0090		