

7. Replace the 10 mH inductor with the 1 mH unit and repeat steps two through six, recording results in Table 5.3.
8. Using the data of Tables 5.2 and 5.3, create plots of inductive reactance versus frequency.

Nom. Data Tables

$$10 \text{ mH} \rightarrow 0.97 \text{ mH}$$

$$100 \text{ mH} \rightarrow 103.6 \text{ mH}$$

$$10 \text{ k}\Omega \rightarrow 9.8636 \text{ k}\Omega$$

$i_{\text{source(p-p)}}$	1.0238 mA
$R_{\text{coil of } 10 \text{ mH}}$	67.853 Ω
$R_{\text{coil of } 10 \text{ mH}}$	17.649 Ω

$$= \frac{10 \text{ V}_{pp}=10}{R_{act}=9863.6}$$

Table 5.1

20 mH nom.

Frequency	$X_L$ Theory	$V_{L(p-p)}$ Exp	$X_L$ Exp (Ω)	% Dev
10k	626 Ω	636 mV	627	0.14%
20k	1253 Ω	1.27 V	1253	0
30k	1879 Ω	1.93 V	1904	1.30%
40k	2506 Ω	2.60 V	2565	2.35%
50k	3132 Ω	3.31 V	3265	4.23%
60k	3759 Ω	4.13 V	4074	8.38%
80k	5012 Ω	5.80 V	5722	14.15%
100k	6264 Ω	7.64 V	7536	20.30%

Table 5.2

200mH norm.

Frequency	X <sub>L</sub> Theory (J)	V <sub>L(p-p)</sub> Exp	X <sub>L</sub> Exp (J)	% Dev
10 k	6509	5.74 V	5662	13.02
20 k	13019	8.73 V	8622	33.86
30 k	19528	9.84 V	9706	50.30
40 k	26038	10.2 V	10062	61.36
50 k	32547	10.2 V	10061	61.09
60 k	39056	9.92 V	9785	74.95
80 k	52075	9.20 V	9075	82.57
100 k	65094	8.73 V	8621	86.77

Table 5.3

## Questions

The reactance is

- What is the relationship between inductive reactance and frequency?

✓ Generally increasing with frequency.

- What is the relationship between inductive reactance and inductance?

The relationship between inductive reactance and inductance is linear, as a 10x increase in inductance results in a 10x increase in reactance.

- If the 10 mH trial had been repeated with frequencies 10 times higher than those in Table 5.2, what effect would that have on the experiment?

Due to parasitic capacitance, the relationship would be inverted after a certain frequency.

- Do the coil resistances have any effect on the plots?

No notable effect of the coil resistances has been noted on the plots.

10 mH

