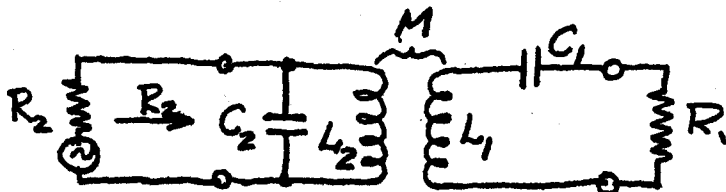


SIMPLIFIED BROADBAND COUPLER DESIGN FOR SPECIFIED SHUNT CAPACITANCE



For specified values of  $C_2$ ,  $R_1$ ,  $R_2$ ,  $f_1$  and  $f_2$ , the design procedure for a broadband coupler of the parallel tuned primary and series tuned secondary can proceed as follows.

- (1) Given the 1 db response frequencies  $f_2$  and  $f_1$ , compute  $f_m = \sqrt{f_1 f_2}$ ,  $f_2 - f_1$ ,  $Q = f_m / (f_2 - f_1)$  and  $k = 1 / \sqrt{1 + Q^2}$ .
- (2) Given the value of  $C_2$ , for the value of  $f_m$  determined in step (1) compute  $L_2$  using the formula  $L_2 = 1 / (2\pi f_m)^2 C_2$ . (A reactance chart or a reactance slide rule can be used for this computation since we are finding the value of  $L_2$  which will resonate with  $C_2$  at frequency  $f_m$ .)
- (3) Using the specified values of  $R_1$  and  $R_2$  and the computed parameters from (1) and (2), compute  $C_1$  and  $L_1$  using the formulas

$$C_1 = C_2 \left( \frac{R_2}{R_1} \right) \frac{1}{Q^2}$$

$$L_1 = L_2 \left( \frac{R_1}{R_2} \right) (Q^2 + 1)$$

- (4) Using the computed values of  $L_1$ ,  $L_2$  and  $k$ , compute the value of  $M$  using the formula

$$M = k \sqrt{L_1 L_2} \quad \text{or} \quad M = \frac{\sqrt{R_1 R_2}}{2\pi f_m Q}$$

COMPUTATIONS FOR  $L_2/L_1$ ,  $C_1/C_2$ , and  $k$  for  $R_2/R_1 = 60$  (or  $R_2 = 3000$  and  $R_1 = 50$ )

q	q <sup>2</sup>	1+q <sup>2</sup>	1+q <sup>2</sup>	k	C <sub>1</sub> /C <sub>2</sub>	L <sub>2</sub> /L <sub>1</sub>	1/q
.5	.25	1.25	1.12	.893	240.	48.00	2.000
1.0	1.00	2.00	1.41	.707	60.	30.00	1.000
1.5	2.25	3.25	1.80	.554	26.65	18.45	.666
2.0	4.00	5.00	2.24	.446	15.	12.00	.500
3.0	9.00	10.00	3.165	.316	6.67	6.00	.333
4.0	16.00	17.00	4.13	.242	3.75	3.53	.250
5.0	25.00	26.00	5.09	.1965	2.40	2.305	.200
6.0	36.00	37.00	6.09	.1642	1.666	1.622	.167
7.0	49.00	50.00	7.07	.1414	1.223	1.225	.143
8.0	64.00	65.00	8.06	.1241	0.938	0.923	.125
10.0	100.00	101.00	10.05	.0995	0.600	0.594	.100
12.0	144.00	145.00	12.04	.0831	0.417	0.4155	.0833
14.0	196.00	197.00	14.035	.0713	0.306	0.3045	.0714
16.0	256.00	257.00	16.031	.0623	0.2345	0.2335	.0625
18.0	324.00	325.00	18.028	.0555	0.1853	0.1845	.0555
20.0	400.00	401.00	20.025	.0499	0.1500	0.1496	.0500
25.0	625.00	626.00	25.020	.03995	0.0960	0.0958	.0400
50.0	2,500.00	2,501.00	50.01	.01998	0.0240	0.0240	.0200
100.0	10,000.00	10,001.00	100.005	.010	0.0060	0.0060	.0100