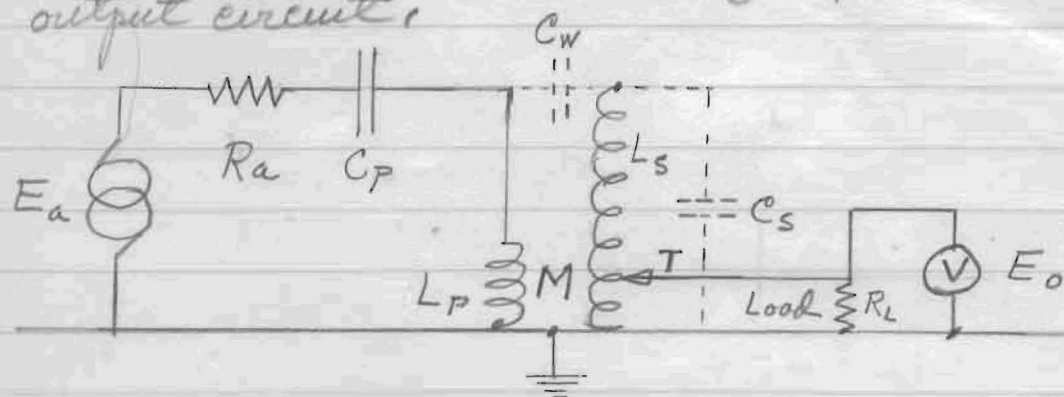


31/3/64

## Design.

The actual coupler is symmetrical in relation to ground. However one half may be represented as a series tuned input circuit magnetically coupled to a parallel tuned output circuit.



$E_a$  = Voltage induced into antenna proportional to frequency.

$E_o$  = Voltage across load

$R_a$  = Antenna series resistance

$R_L$  = Load resistance

$C_p$  = Primary series capacity caused by an antenna a bit short for self resonance

$C_s$  = Secondary shunt capacity. It is distributed capacity of coil. It must be kept low to give large bandwidth.

$C_w$  = Capacity between wires of primary and secondary. It must be kept low to prevent response curve becoming asymmetrically high at high frequencies.

$L_p$  = Primary inductance required to cancel reactance of  $C_p$  at desired resonant frequency.

$L_s$  = Secondary inductance. It must be kept high to give large bandwidth.

$M$  = Mutual inductance between  $L_s$  and  $L_p$ . It must be large to give large bandwidth.

3/3/64

## Primary

Increasing (decreasing) inductance raises (lowers) the low frequency peak and lowers (raises) the high frequency peak. The center of response is moved to a lower (higher) frequency.

## Secondary

Increasing (decreasing) inductance raises (lowers) the high frequency peak and lowers (raises) the low frequency peak. The center of response is moved to a lower (higher) frequency.

## Load

Increasing (decreasing) turns increases (decreases) the damping and decreases (increases) the effective coupling. The depth of valley is decreased (increased) but height of peaks is relatively unchanged. This is because output voltage is about proportional to turns provided these are only a small part of total turns. The load partially shorts the turns across which it is connected. Consequently increasing (decreasing) turns decreases (increases) total secondary inductance with results described above. This detuning phenomenon can be reduced by keeping the load resistance high compared to reactance of turns it is connected across.

The detuning phenomenon may be eliminated by placing load in series with center of secondary. However the required values of resistance may be much less than 600 ohms. Consequently a severe loss may be incurred when some low value is brought up to required by use of series resistors to line.