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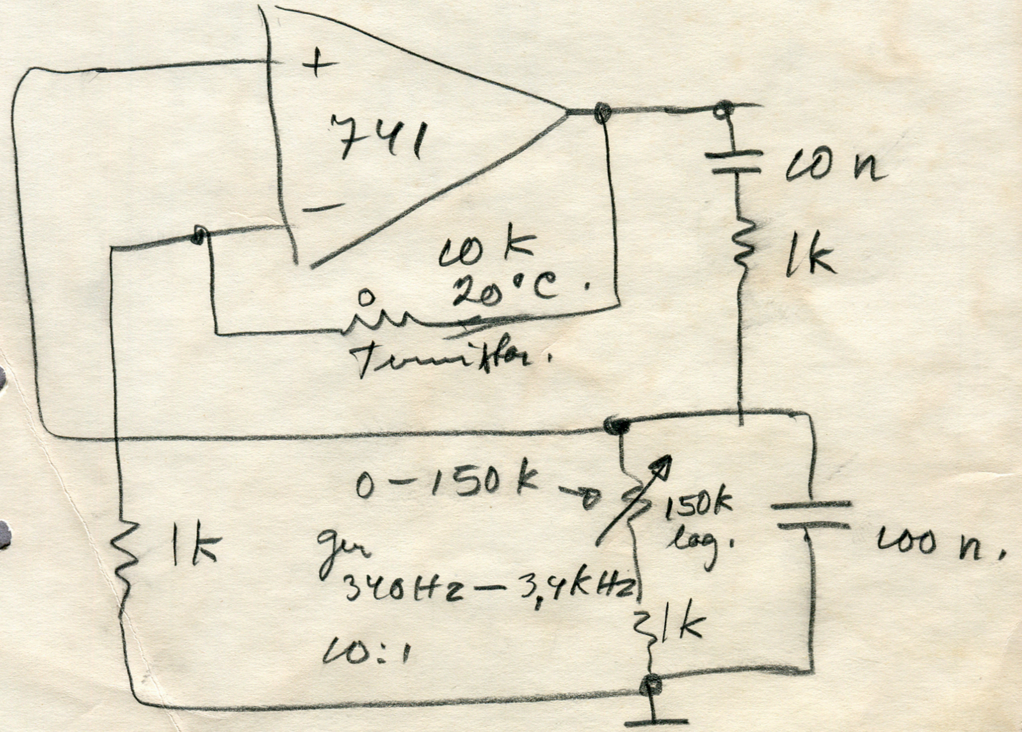
Wien oscillator with single component frequency control.



5 is more satisfactory due to the fact that the two constant-current generators (VT2) feed into a constant-voltage point (Fig. 6) or into an effective load R_{b1} (Fig. 7) which is in parallel with the high output impedance of VT1.

2.3. *Transistor Output Resistance*

Both the methods described so far involve the transistor output resistance. This resistance may be determined from the actual and equivalent circuit of Fig. 9, where the input to the transistor is short-circuited, a generator is placed between ground and collector and the output resistance R_o is found from the ratio E_{ac}/i_g.

The circuit equations are:

$$i_g = i_c + \beta i_b$$
$$i_b(1+\beta) + i_c + i_e = 0$$
$$i_b(R_b + r_b) = i_e(R_e + r_e)$$
$$E_{ac} = E_{ab} + E_{bc} = -i_b(r_b + R_b) + i_c r'_c$$

if we find i_e and i_c in terms of i_g then we may express the ratio

$$\frac{E_{ac}}{i_g} = R_o = \frac{r_b + R_b + r'_c\left(1 + \beta + \dfrac{r_b + R_b}{r_e + R_e}\right)}{1 + \dfrac{r_b + R_b}{r_e + R_e}} \quad \text{......(1)}$$

(i) suppose the source impedance is very high ($R_b \to \infty$) then

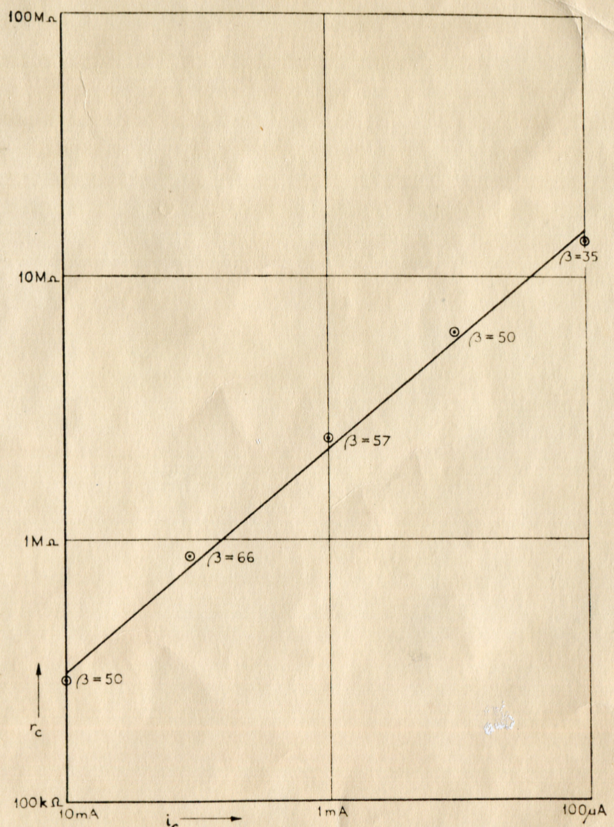


Fig. 10. Variation of r_c with I_c.