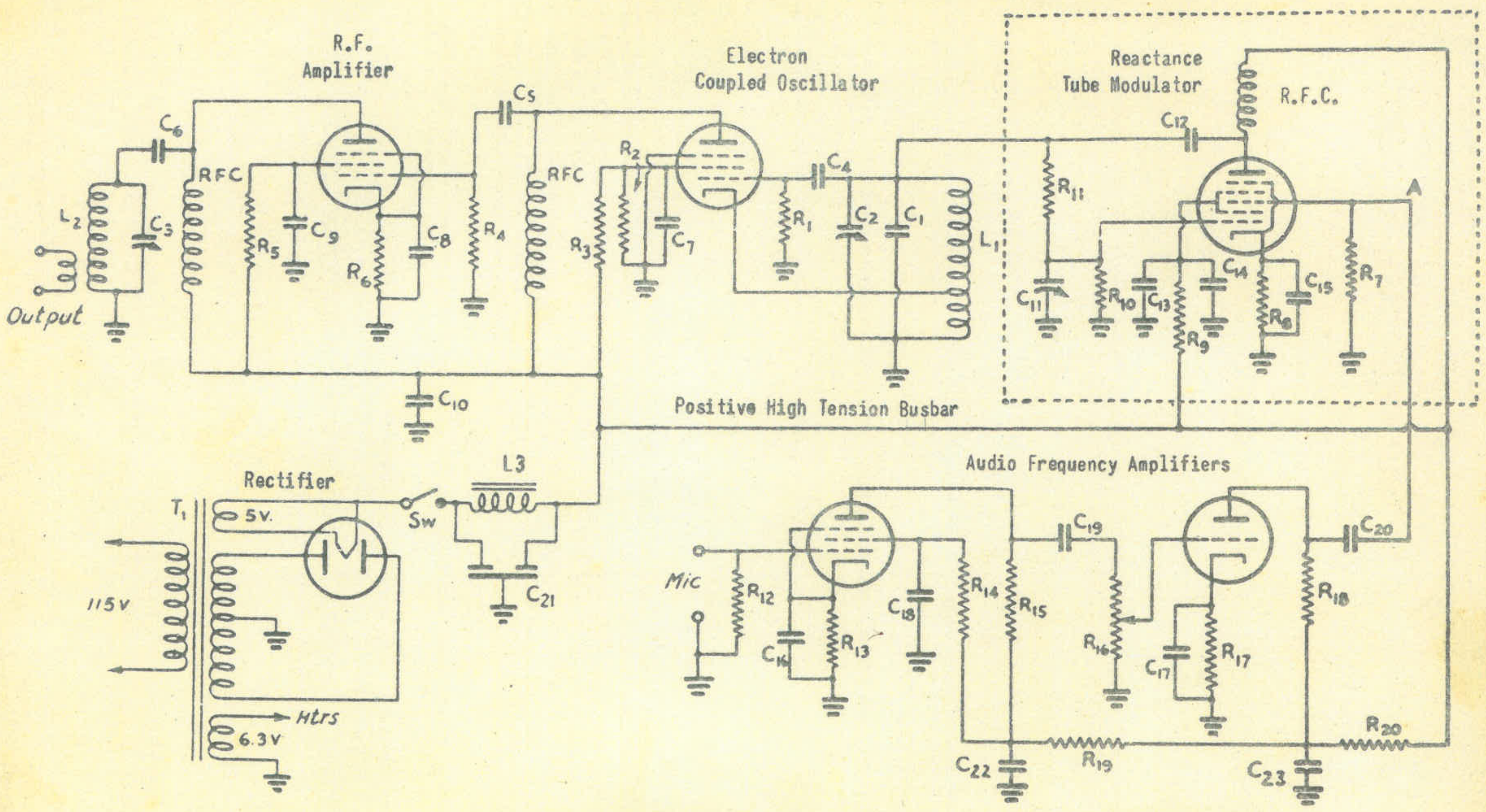


REACTANCE TUBE METHOD OF FREQUENCY MODULATIONS

Frequency Modulation

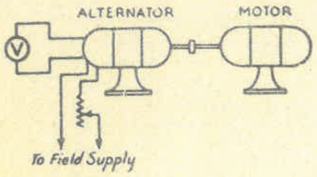


Fig. 1A

Amplitude Modulated Wave

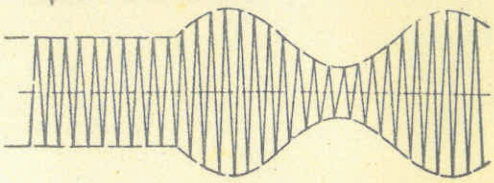


Fig. 1B

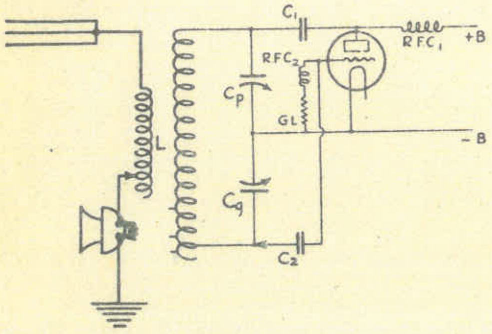


Fig. 1C

Same Intelligence Transmitted by Frequency Modulated Wave

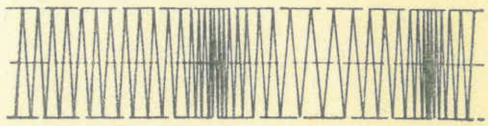


Fig. 1D

Single Cycle of Frequency Modulated Wave for an Instant When the Frequency is Increasing

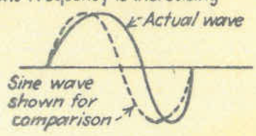


Fig. 1E

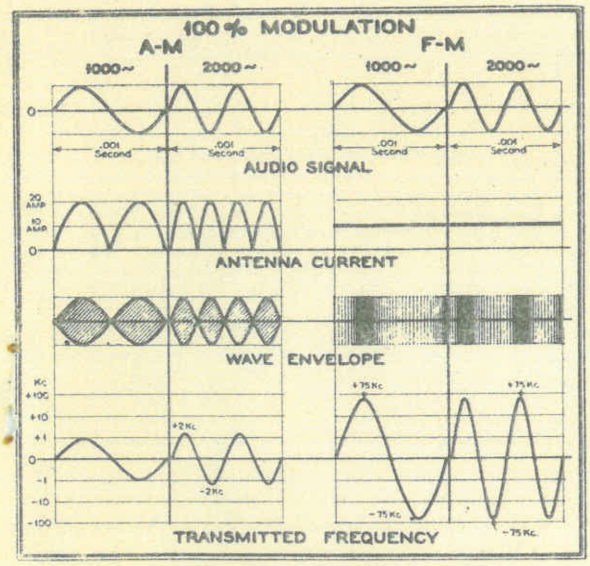


Fig. 3

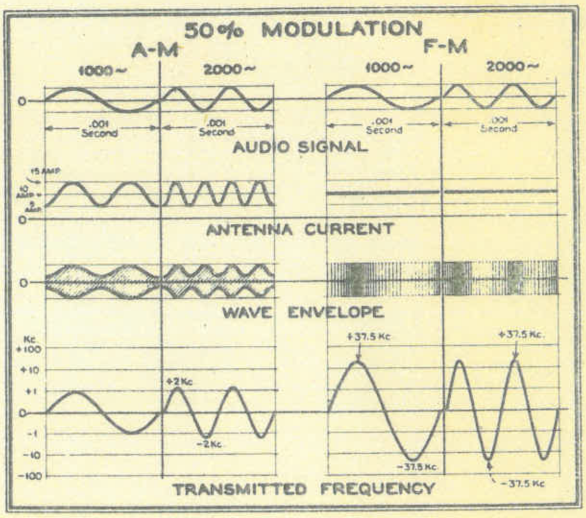


Fig. 4

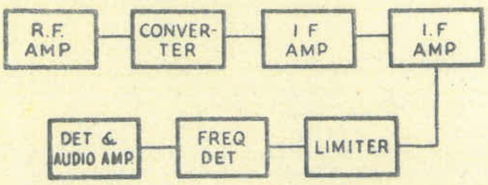


Fig. 6

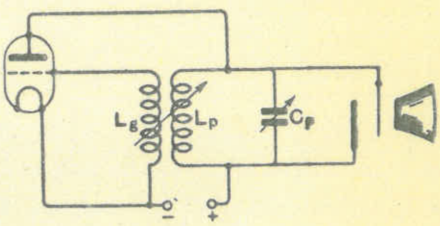


Fig. 2

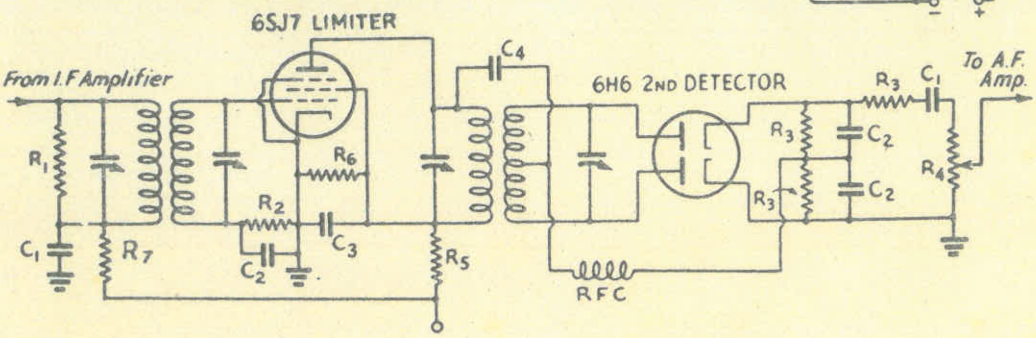


Fig. 7

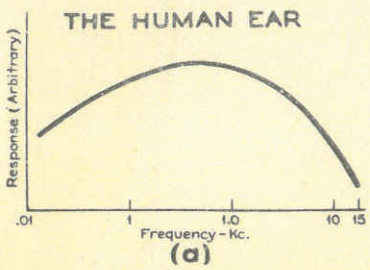


Fig. 9A

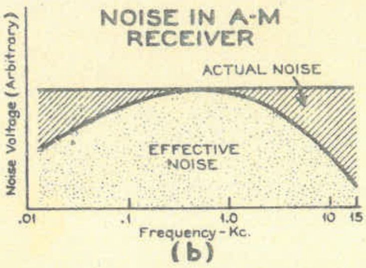


Fig. 9B

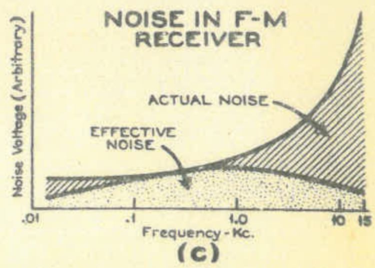


Fig. 9C

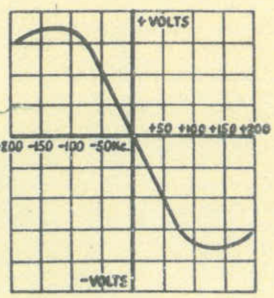


Fig. 8

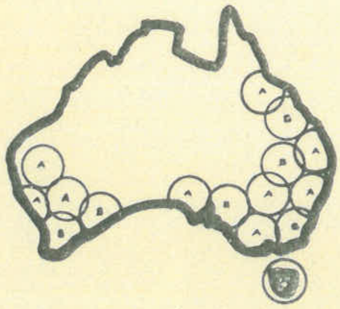


Fig. 10

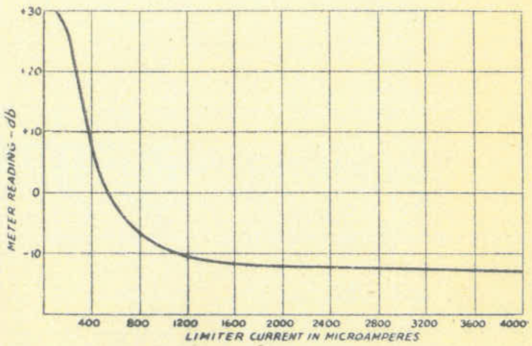


Fig. 11

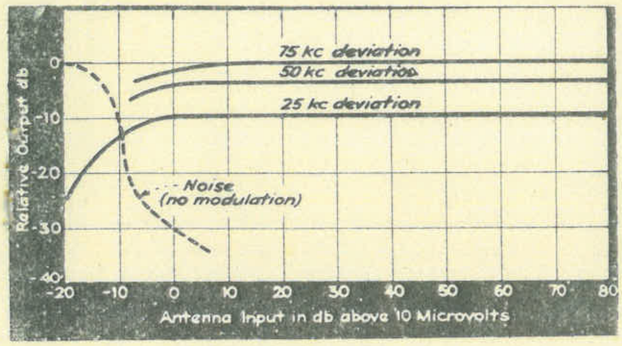


Fig. 12

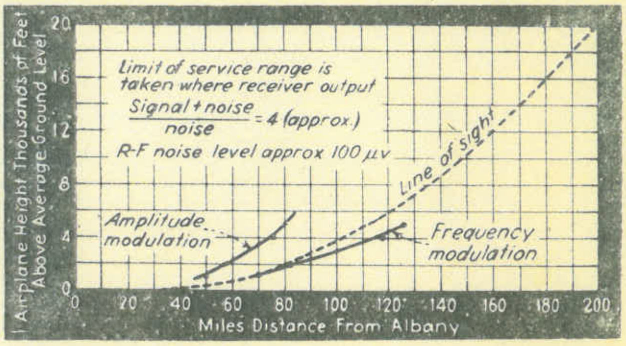


Fig. 13

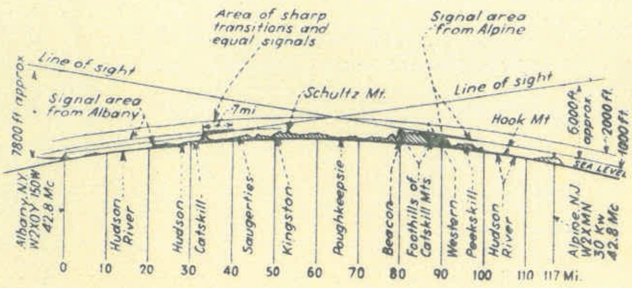


Fig. 14

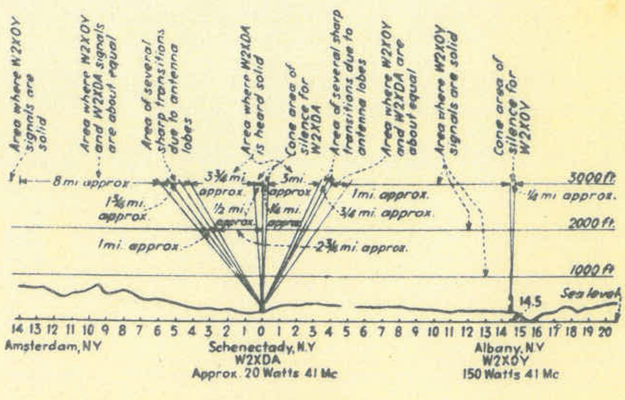


Fig. 15

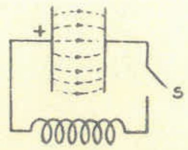


Fig. 1 - Condition of circuit prior to switch being closed. Condenser charged.

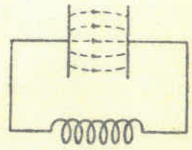


Fig. 2 - Condenser commences to discharge through inductance.

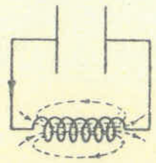


Fig. 3 - Condenser discharged, but electromagnetic field exists about inductance.

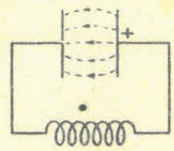


Fig. 4 - Condenser again charged but of opposite polarity.

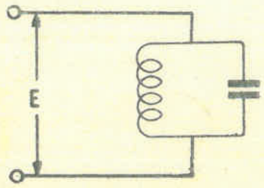
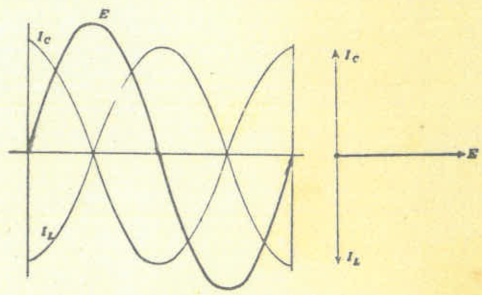


Fig. 5 - Conditions which exist in an Oscillatory circuit.



Current and Voltage Relations for Fig. 5.

MAGNETIC & ELECTROSTATIC COUPLING.

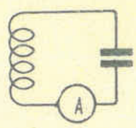


Fig. 6 - Insertion of H.F. ammeter into Oscillatory circuit, shows current present.

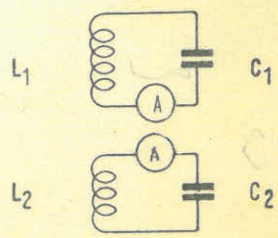


Fig. 7 - Circuit L_2C_2 oscillates due to energy induced from circuit L_1C_1.

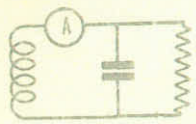


Fig. 8 - The electrical losses of L_1C_1 are increased when another circuit is coupled.

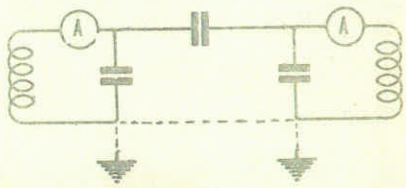


Fig. 9 - Circuit L_1C_1 and L_2C_2 are coupled by C_3 No magnetic coupling exists.

DEVELOPMENT OF HALF WAVE ANTENNA.

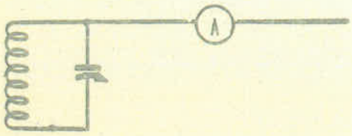


Fig. 10 - Oscillatory circuit with length of wire attached.

Fig. 11 - Half Wave of wire, with H.F. Ammeters inserted for purpose of determining current distribution.

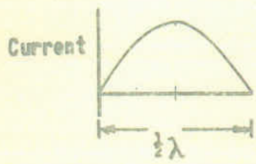


Fig. 12 - Current distribution in a half wave of wire.

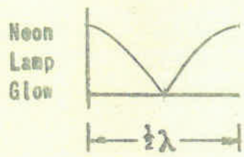


Fig. 13 - Neon lamp glow plotted against different wire positions.

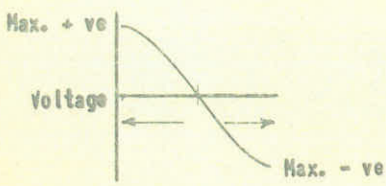


Fig. 14 - Voltage existing at different wire positions.

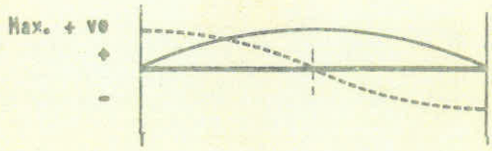
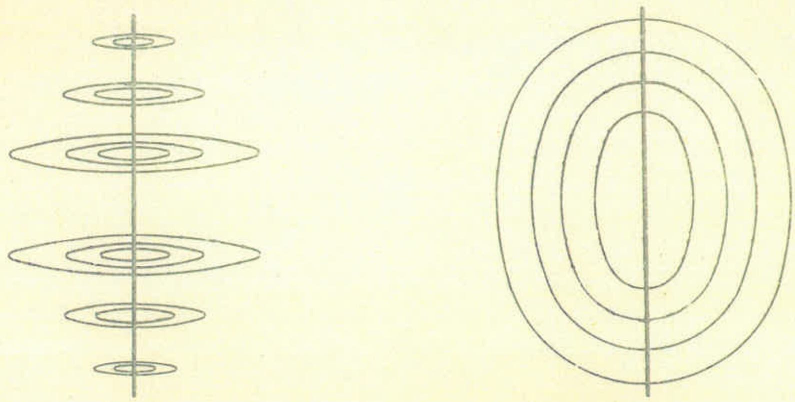


Fig. 15 - Current and Voltage distribution on half wave of wire. 90^0 phase difference exists.



Electromagnetic Electrostatic

Fig. 16 - Electromagnetic and Electrostatic fields which exist about a half wave of wire.

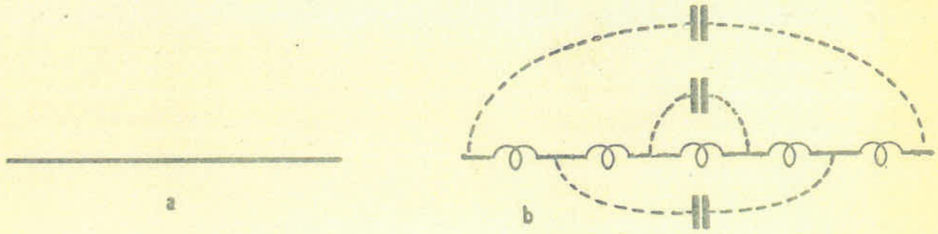


Fig. 17a - Half wave antenna as usually drawn.

Fig. 17b - The same antenna showing L and C distribution.

RADIATION

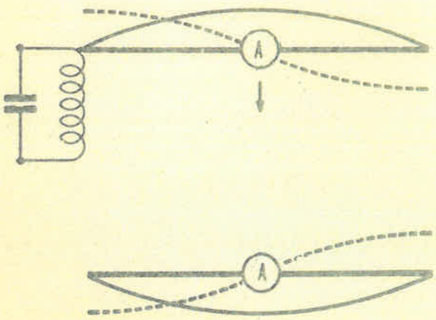


Fig. 18 - Energy is radiated or transferred to the half wave of wire.

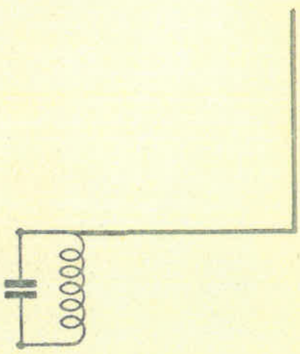


Fig. 19 - Radiation decreased.

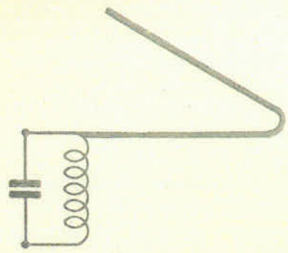


Fig. 20 - Radiation very small.

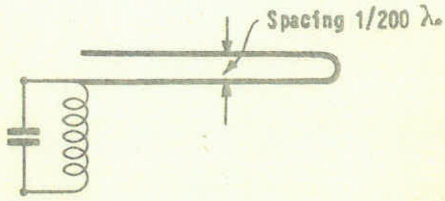


Fig. 21 - Radiation NIL.

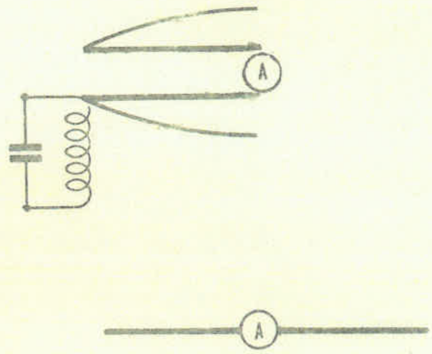


Fig. 22 - No radiation occurs as ammeter A_2 fails to indicate.

DEVELOPMENT OF FEEDER SYSTEMS.

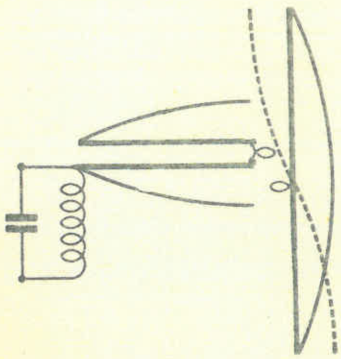


Fig. 23 - Energy transferred to ½λ by virtue of the folded ½λ antenna.

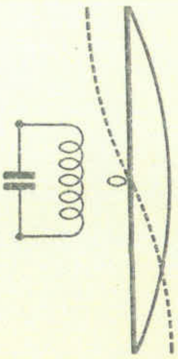


Fig. 24 - Energy transferred to ½λ wire by magnetic coupling to L.C. circuit.

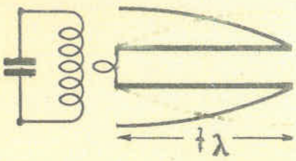


Fig. 25 - Fold antenna. Radiation zero. Voltage exists at ends.

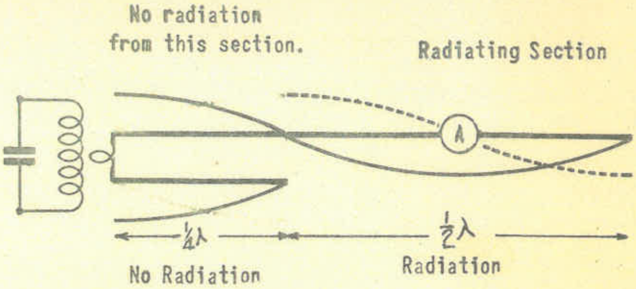


Fig. 26 - Antenna excited from $\frac{1}{4}\lambda$ feeder.

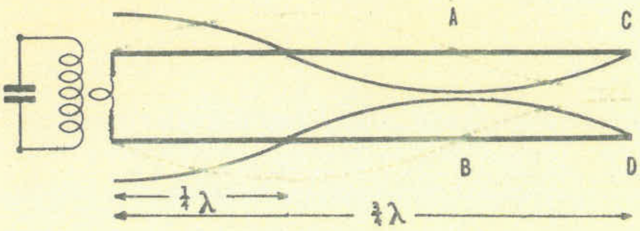


Fig. 27 - Feeder length increased from $\frac{1}{4}\lambda$ to $\frac{3}{4}\lambda$.
Voltage antinode exists at ends.

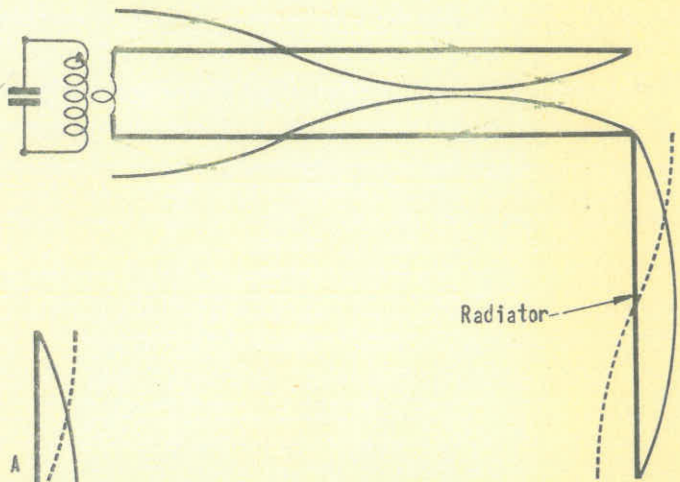


Fig. 28 - Radiator excited from $\frac{3}{4}\lambda$ feeder.

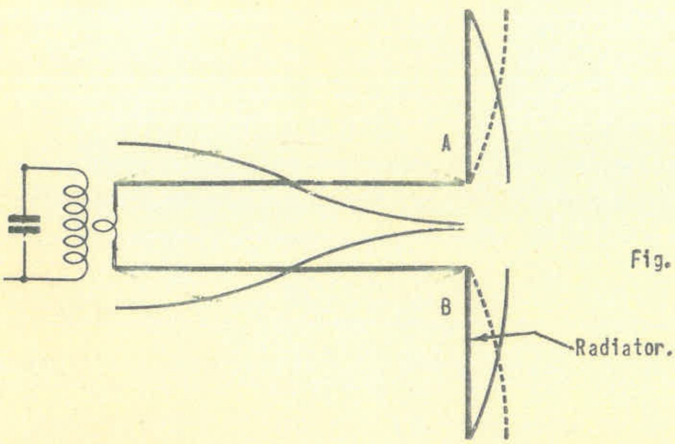


Fig. 29a - Radiator excited from $\frac{1}{2}\lambda$ feeder

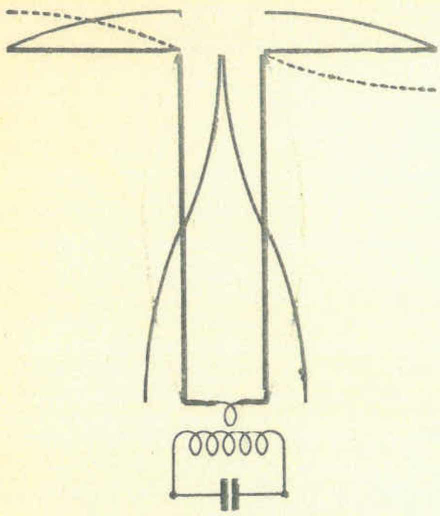


Fig. 29(b) - Feeder 2 - ½λ per side.

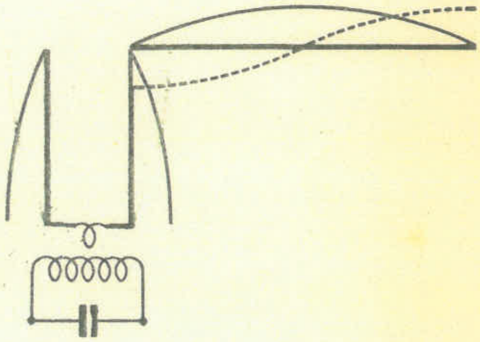


Fig. 29(c) - Feeder 1 - ¼λ per side.

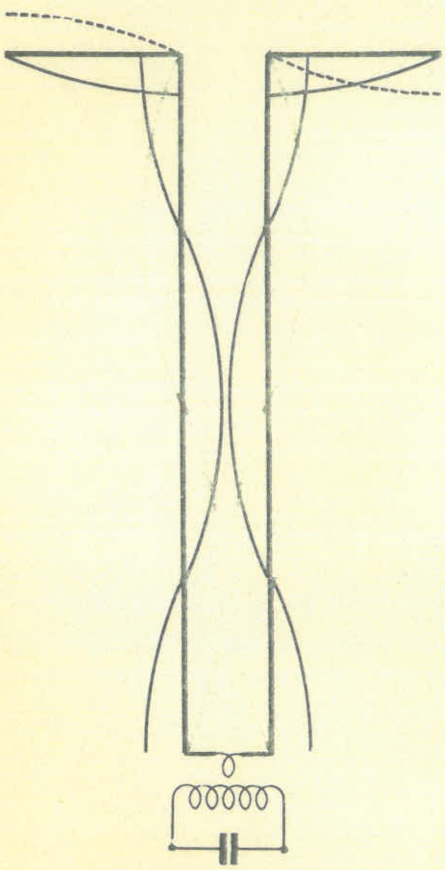


Fig. 29(d) - Feeder 4 - ¼λ per side.

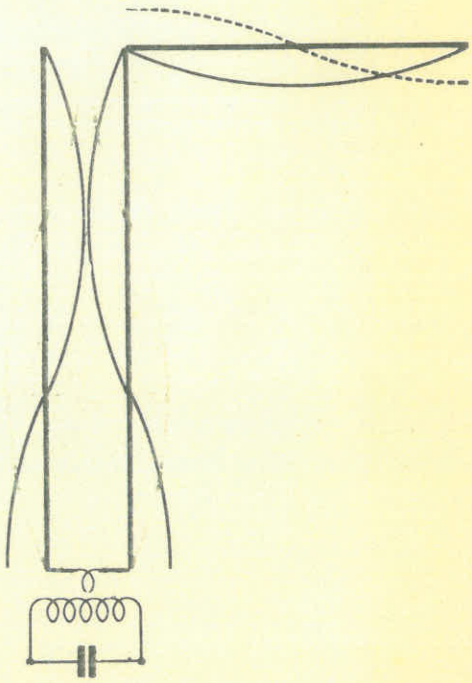


Fig. 29(e) - Feeder 3 - ¼λ per side.

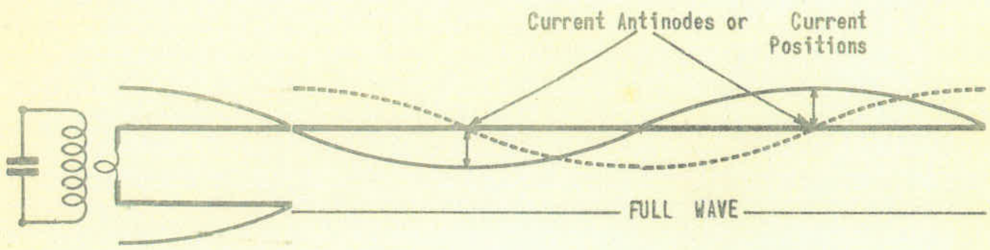


Fig. 30 - Full wave antenna, voltage fed. Note that current antinodes are 180° out of phase voltage polarities at antenna ends, are in phase.

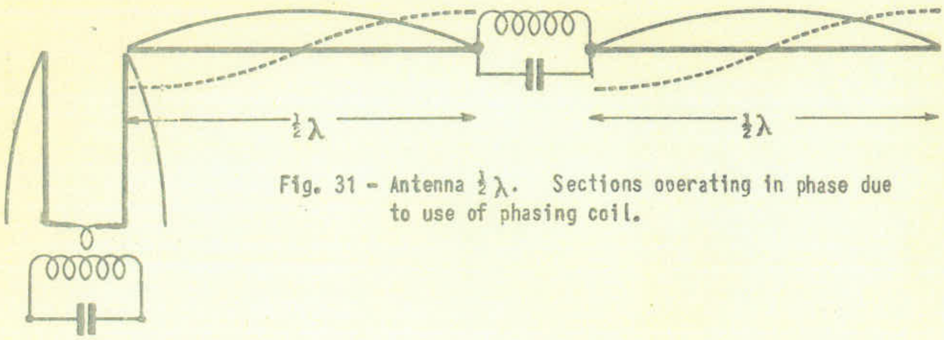


Fig. 31 - Antenna ½λ. Sections operating in phase due to use of phasing coil.

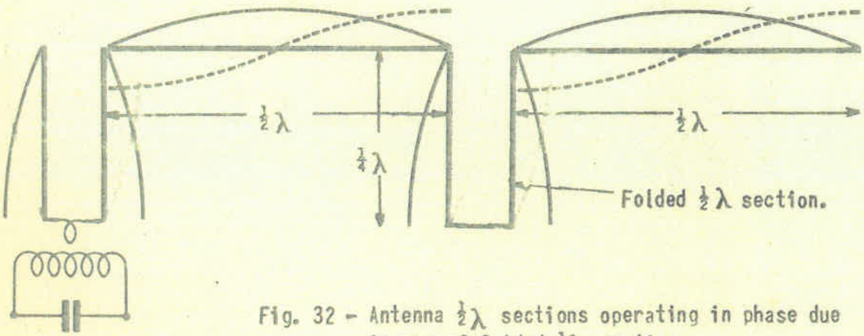
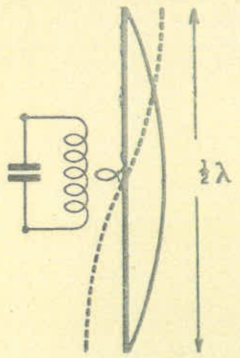
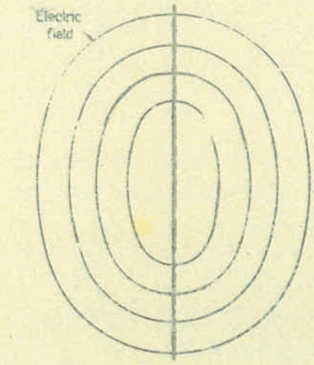


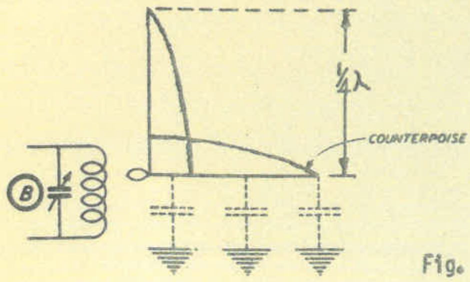
Fig. 32 - Antenna ½λ sections operating in phase due to use of folded ½λ section.

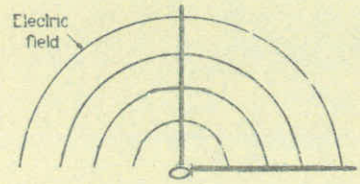




Electrostatic field.

Fig. 33 - ½λ antenna current fed.





Electrostatic field.

Fig. 34 -

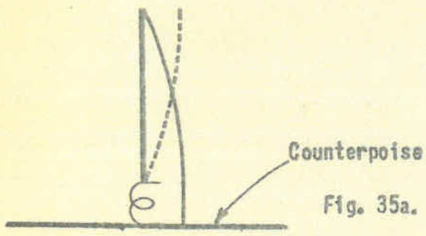


Fig. 35a.

(a)

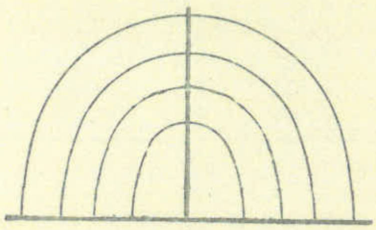


Fig. 35b.

(b)

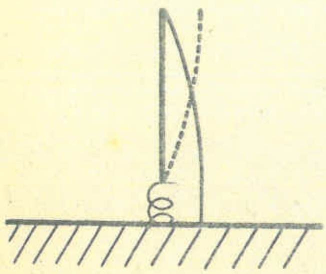


Fig. 36 - Earth replaces ½ wave section or counterpoise.

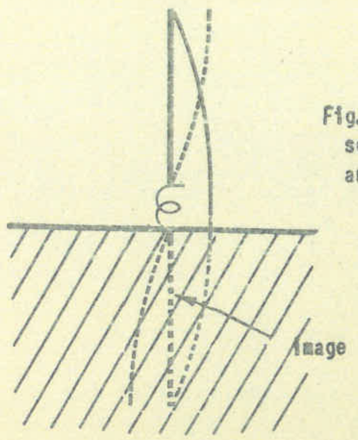


Fig. 37 - The missing ½ wave section is supplied by an "image".

Antenna and Feeder Current Measurements.

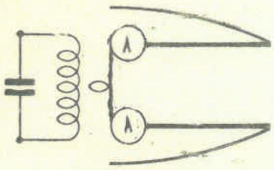


Fig. 38

Method of measuring feeder current when the center of the coil is not accessible.

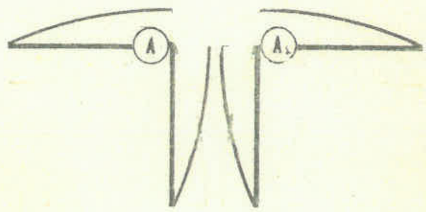


Fig. 39

Method of measurement of antenna current when current excited.

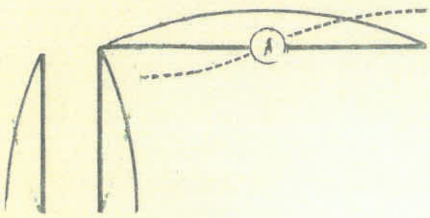


Fig. 40

When Voltage excited, antenna current can be ascertained with one ammeter.

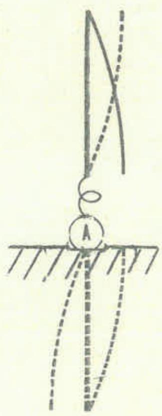


Fig. 41

Antenna current always measured in ground lead.

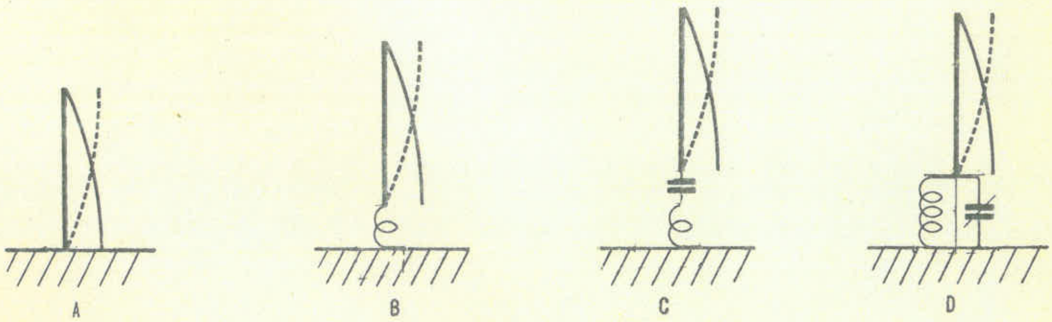
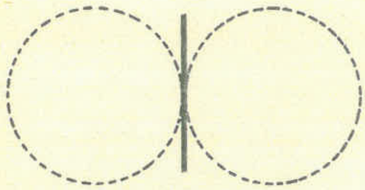


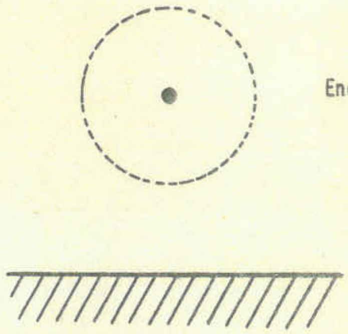
Fig. 42.

Antenna electrical length can be adjusted by inductance or capacity. The type of adjustment used is dependent on the physical length.



View looking down on antenna.

a.



End View.

b.

Fig. 43 - Horizontal antenna; <u>radiation</u> is a <u>maximum broadside on</u> and <u>a</u> <u>minimum end on.</u>

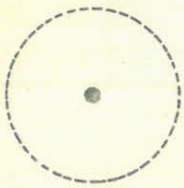


Fig. 44a - Vertical antenna, view looking down, radiation pattern circular.

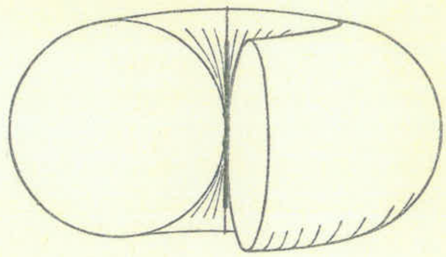


Fig. 44b.

Solid pattern or "Doughnut" radiator from vertical antenna.

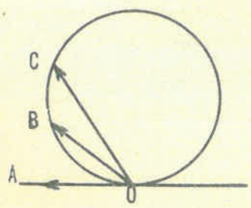


Fig. 45.

Fig. 45 - The effective directive pattern of horizontal antenna depends upon the angle of radiation concerned.

Vertical plane Radiation patterns of Vertical Half Wave Antennas above perfectly conducting ground.

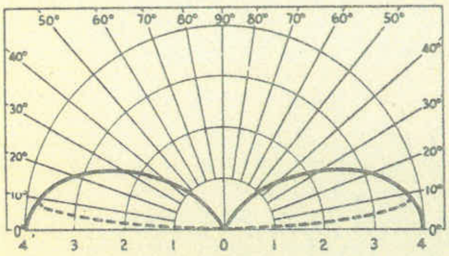


Fig. 46 - Antenna height = $\frac{1}{4}$ wave.

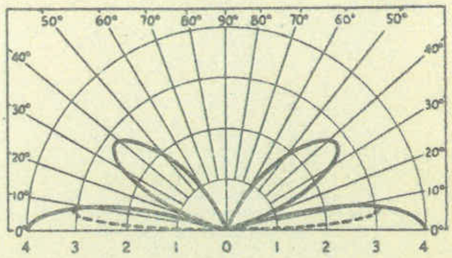


Fig. 48 - Antenna height = $\frac{3}{4}$ wave.

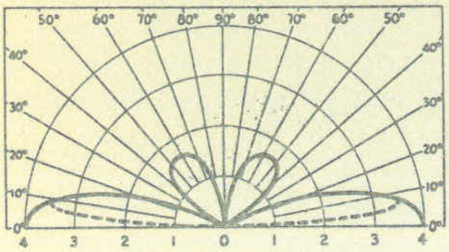


Fig. 47 - Antenna height = $\frac{1}{2}$ wave

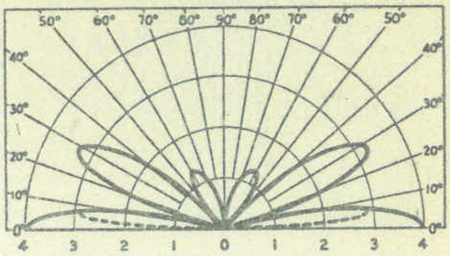


Fig. 49 - Antenna height = 1 wave.

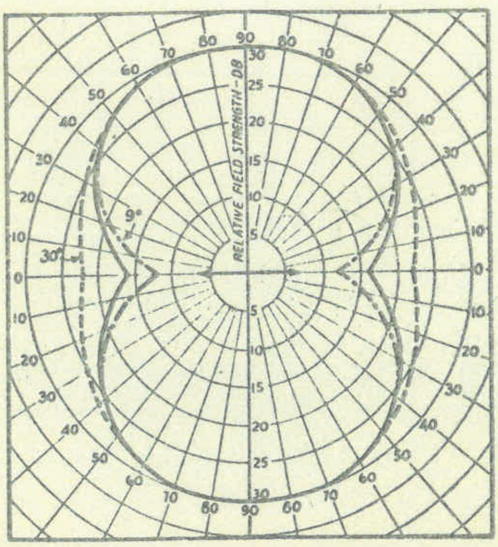


Fig. 50 - Directive patterns of a horizontal half wave antenna at three radiation angles.

Vertical plane Radiation patterns of Horizontal Half Wave antennas above perfectly conducting ground.

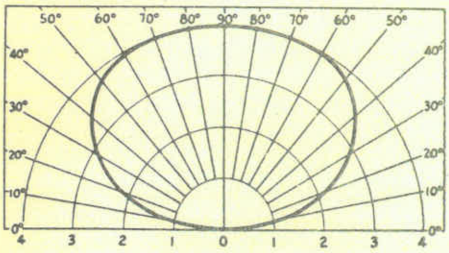


Fig. 51a - In direction of wire, height = ¼ wave.

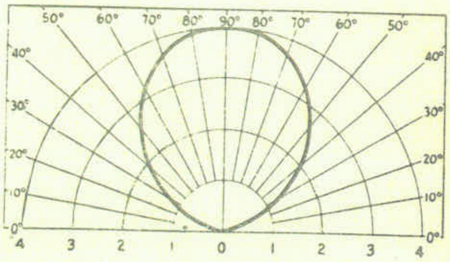


Fig. 51b - At right angles to wire, height = ¼ wave.

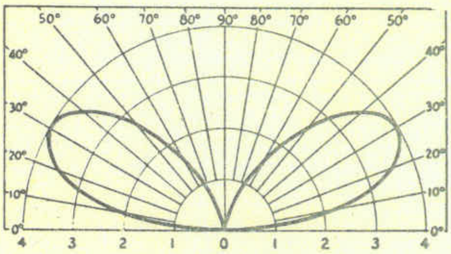


Fig. 52a - In direction of wire, height = ½ wave.

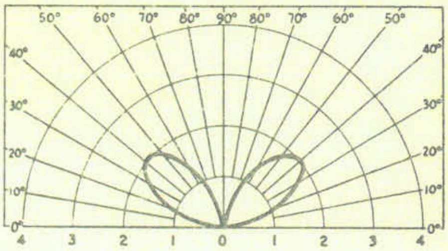


Fig. 52b - At right to wire, height = ½ wave.

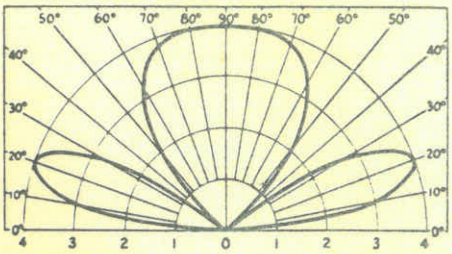


Fig. 53a - In direction of wire, height = ¾ wave.

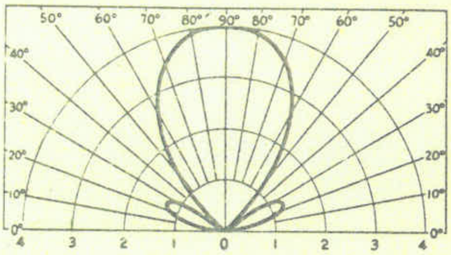


Fig. 53b - At right angles to wire, height = ¾ wave.

Vertical plane Radiation patterns of Horizontal Half Wave
Antenna above perfectly conducting ground.

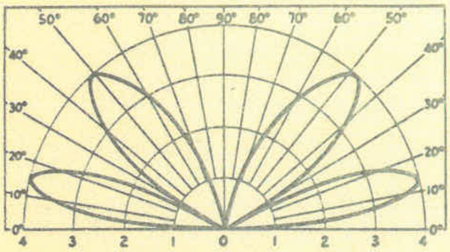


Fig. 54a - In direction of wire,
height = 1 wave.

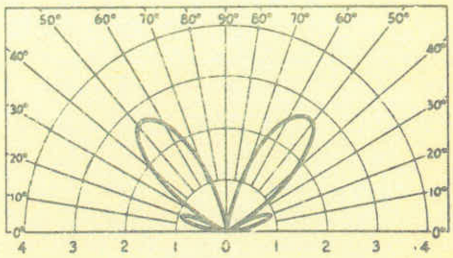


Fig. 54b - At right angles to wire,
height = 1 wave.

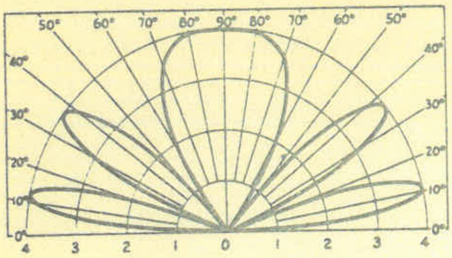


Fig. 55a - In direction of wire,
height = 1¼ wave.

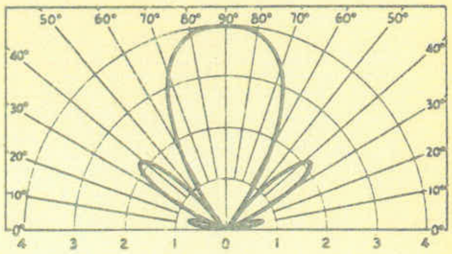


Fig. 55b - At right angles to wire,
height = 1¼ wave.

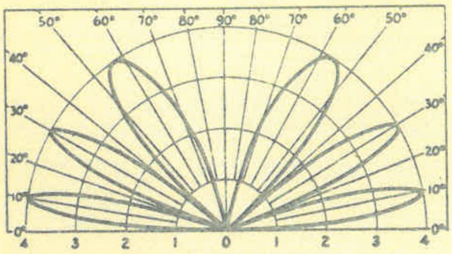


Fig. 56a - In direction of wire,
height = 1½ wave.

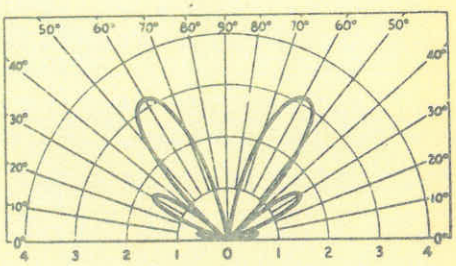


Fig. 56b - At right angles to wire,
height = 1½ wave.

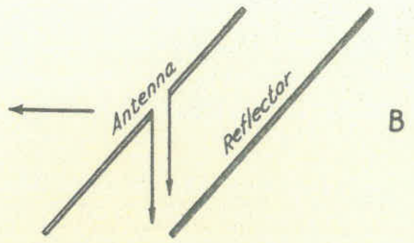


Fig. 57 - Antenna and Reflector system showing direction of Radiation.

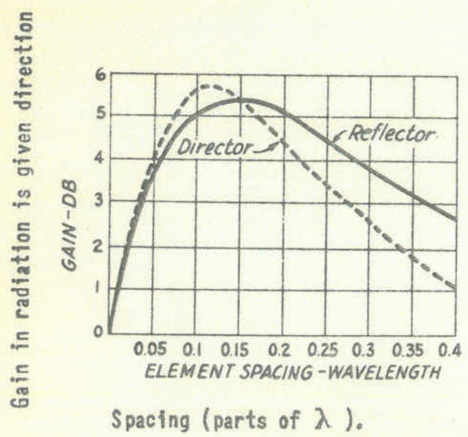


Fig. 58 - Maximum radiation in a given direction is controlled by spacing between antenna and reflector.

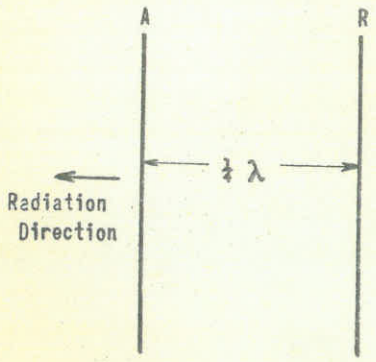
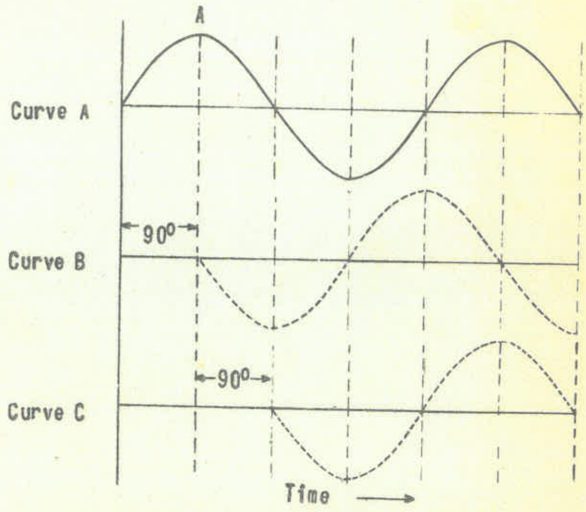
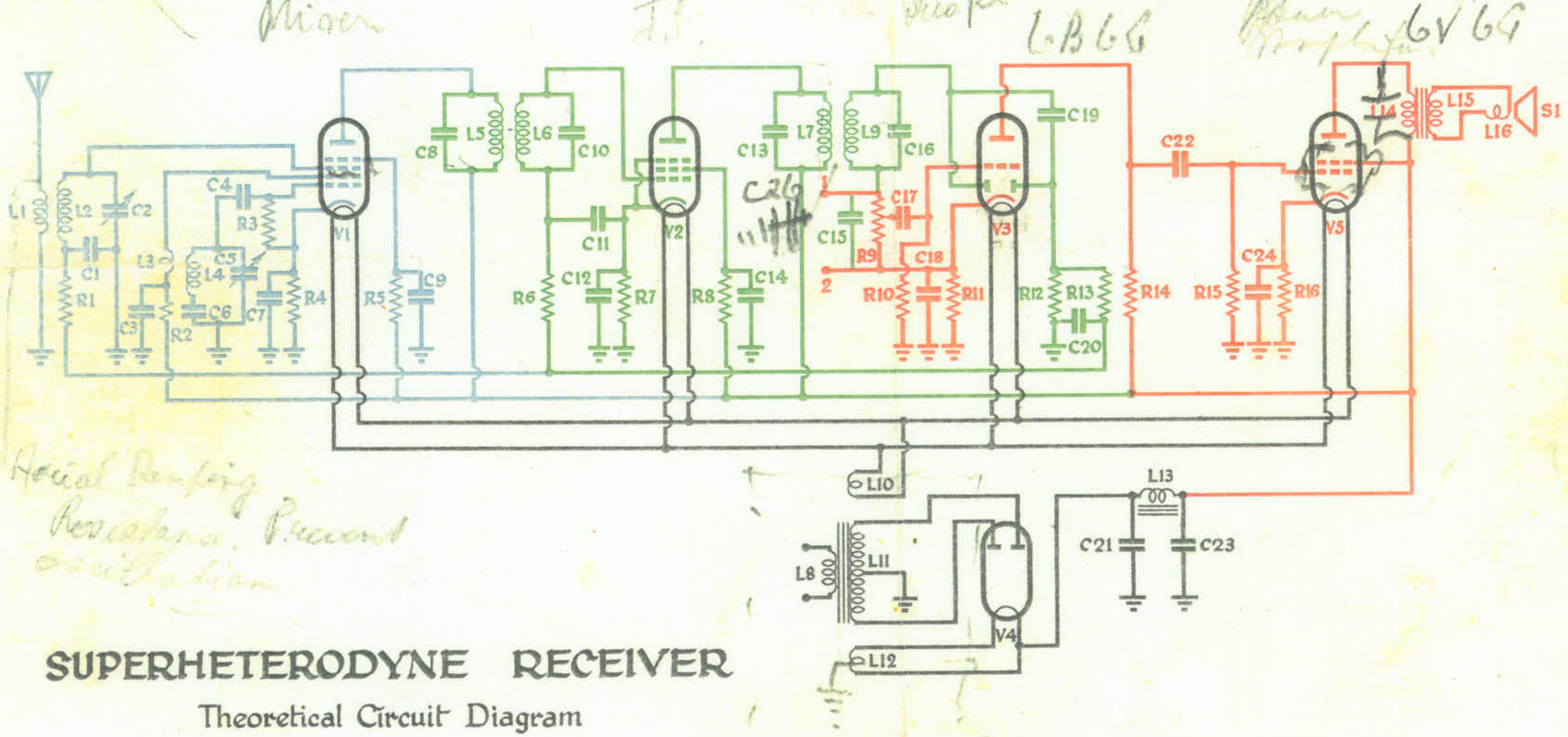


Fig. 59 - Energy arriving at antenna, due to reflector, is in phase with energy from antenna proper.



CONDENSERS	C1 C2 C3 · C4 C5 C6 C7 · C8 C9 · C10 C11 C12 · C13 C14 · C15 · C16 C17 C18 · C19 C20 C21 C22 C23 · C24 · C25 · C26
RESISTANCES	R1 · R2 · R3 R4 · R5 · R6 · R7 · R8 · R9 R10 R11 · R12 R13 R14 · R15 · R16
INDUCTANCES	L1 L2 · L3 L4 · L5 L6 · L7 L9 L11 L8 L10 L12 · L13 · L14 L15 · L16
MISCELLANEOUS	V1 · V2 · PICK UP 1.2 · V3 V4 · V5 · S1



SUPERHETERODYNE RECEIVER

Theoretical Circuit Diagram

MELBOURNE TECHNICAL COLLEGE

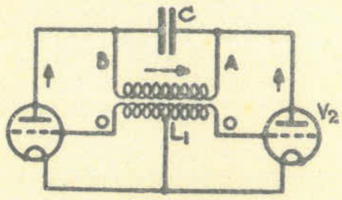


Fig. 1. - START. No voltage on grids, plate currents equal. LC circuit commencing to charge condenser.

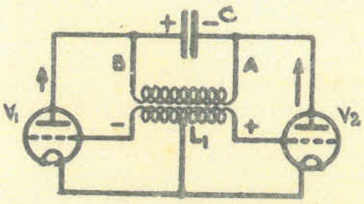


Fig. 2 - Condenser charged, left grid minus, I_A for V_1 drops, I_A for V_2 rises (compare arrow sizes)

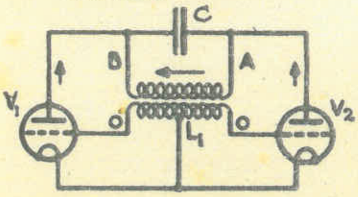


Fig. 3 - Condenser discharges, voltages on grids zero as in Fig. 1. Anode currents equal as in Fig. 1.

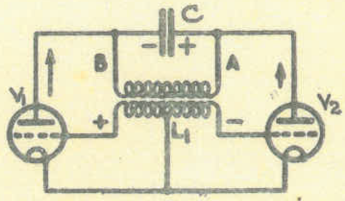


Fig. 4 - Condenser charged opposite to Fig. 2, right grid minus I_A for V_2 drops I_A for V_1 rises.

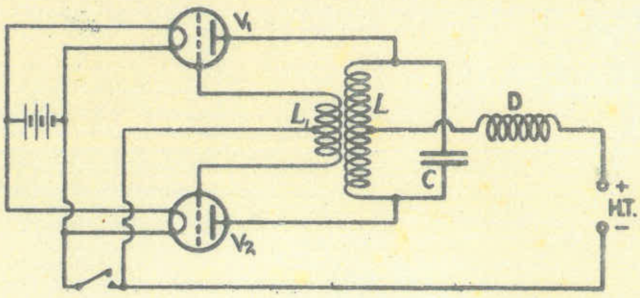


Fig. 5 - Practical example of a self excited push-pull oscillator, using the principles shown in Figs. 1-4. Note that a choke D is necessary to keep the R.F. from the a high tension supply.
The frequency of operation in all the above cases is governed by L. and C.

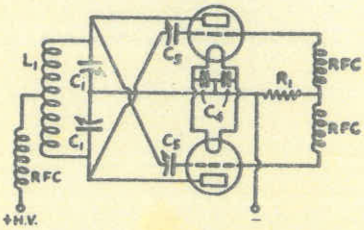


Fig. 6 - Circuit arrangement of a Colpitt's push-pull oscillator

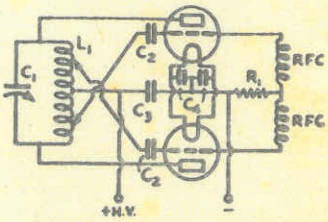


Fig. 7 - Circuit arrangement of a Hartley push-pull oscillator

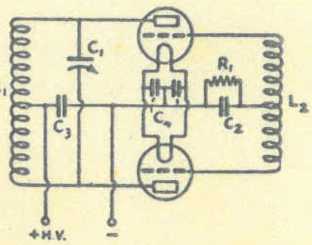


Fig. 8 - Circuit arrangement of a tuned anode (T.N.T.) push-pull oscillator

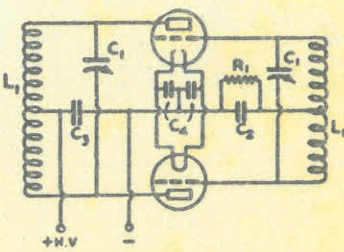


Fig. 9 - Circuit arrangement of a tuned anode tuned grid (T.A.T.G.) push-pull oscillator.

Calculation of Grid Bias Requirements.

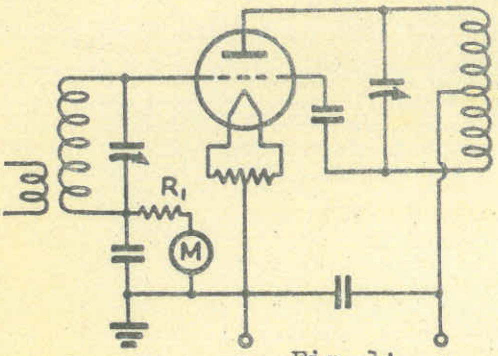


Fig. 1A

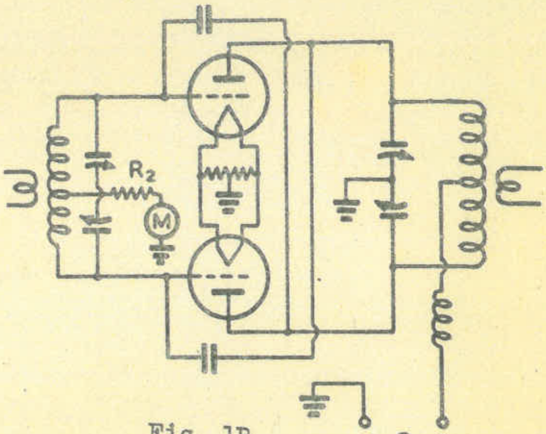


Fig. 1B

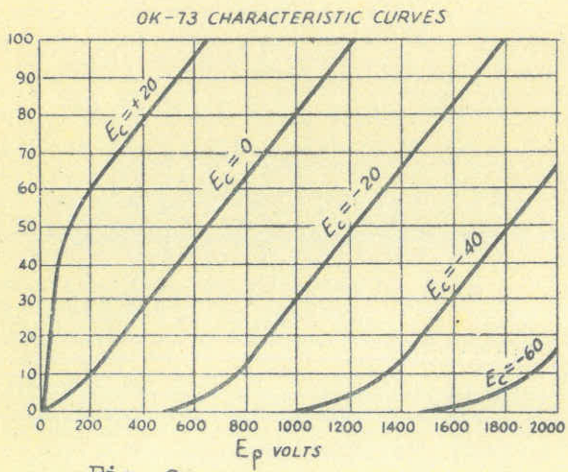


Fig. 2.

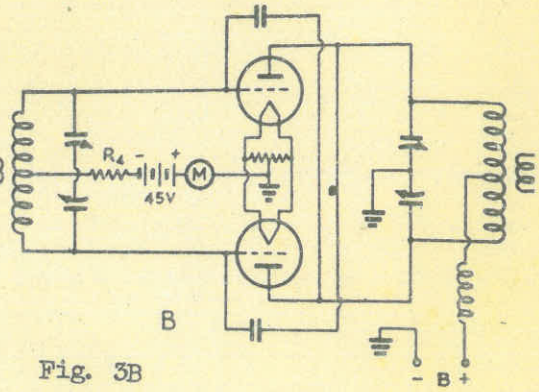


Fig. 3B

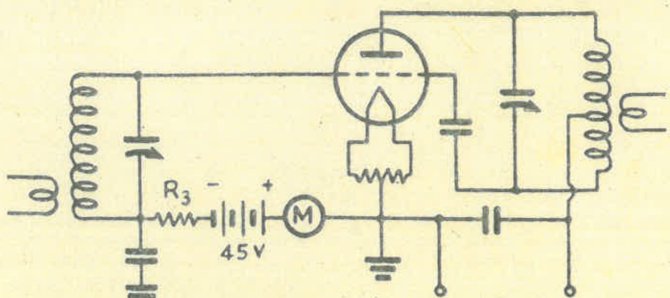


Fig. 3A

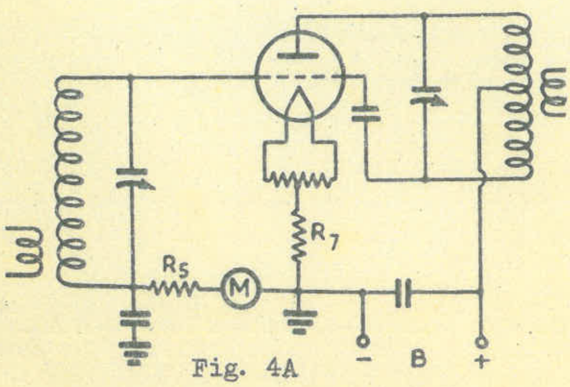


Fig. 4A

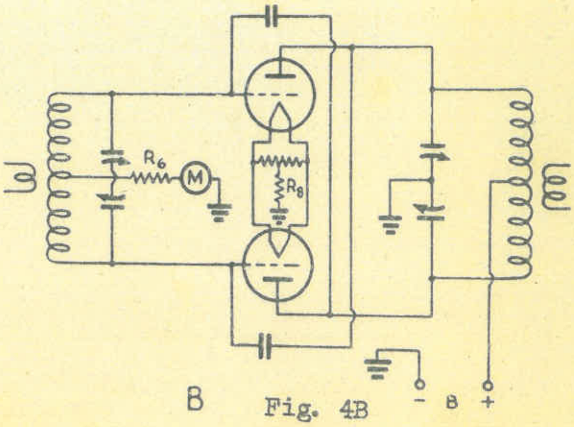


Fig. 4B

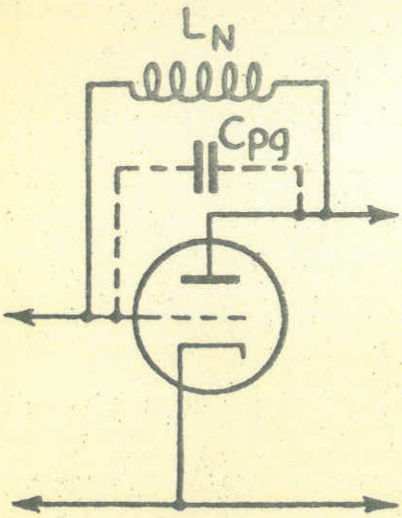


Fig. 1.

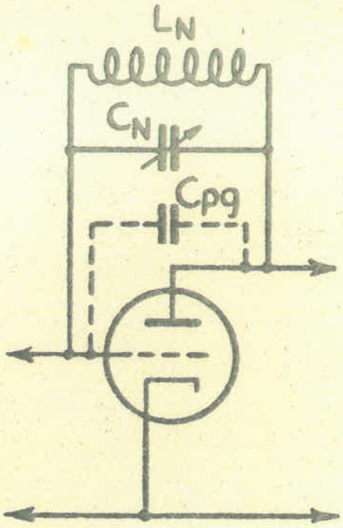


Fig. 2.

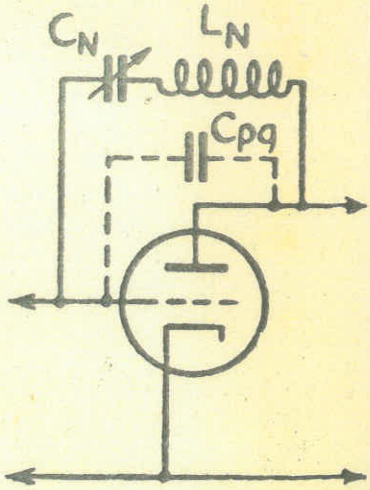


Fig. 3.

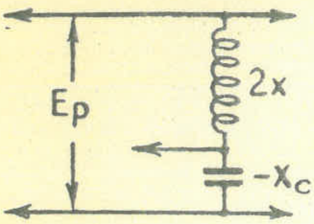


Fig. 4.

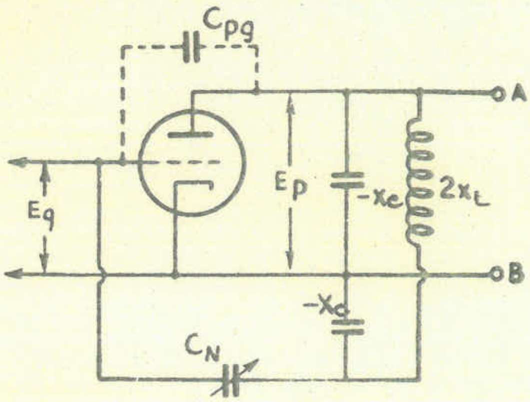


Fig. 5.

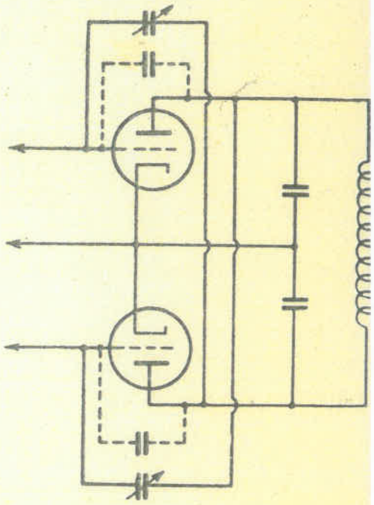


Fig. 6.

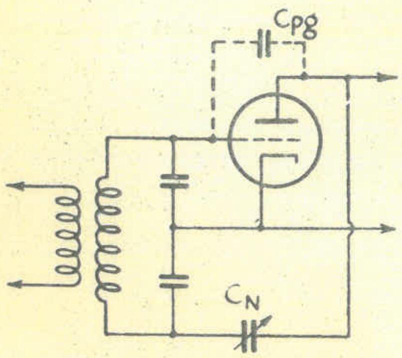


Fig. 7

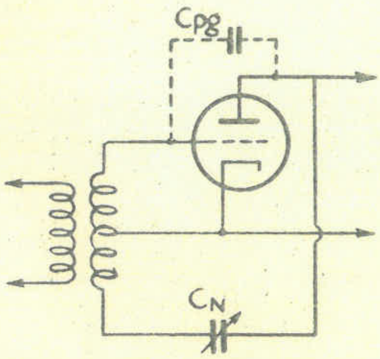


Fig. 8.

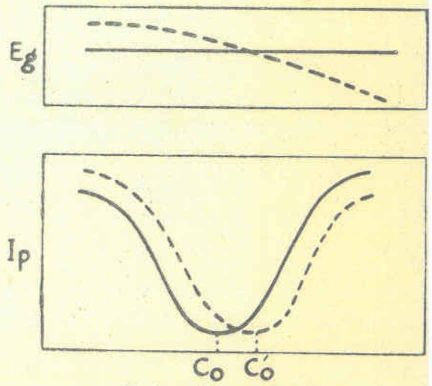


Fig. 9

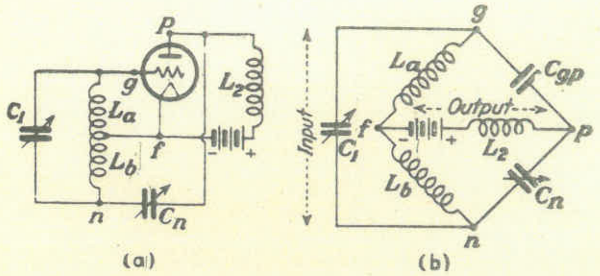


Fig. 10.

Fig. 10 (a) - Shows a Rice or Plate neutralizing circuit.
(b) is the electrical equivalent of (a) clearly illustrating the wheatstone bridge principle.

Fig. 11 (a) - is the neutrodyne or negative reaction type of neutralizing circuit, also it is often referred to as grid neutralization.
(b) is the electrical equivalent of (a).

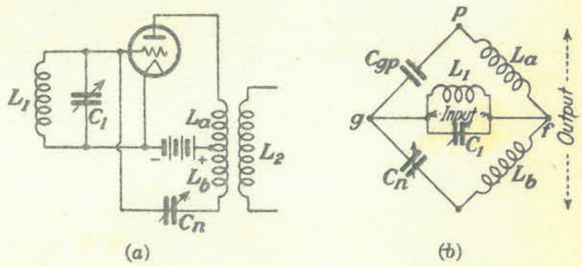


Fig. 11.

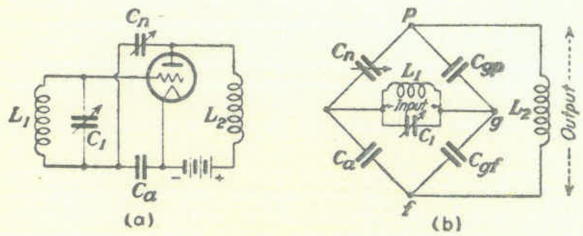


Fig. 12.

Fig. 12 (a) - is a neutralizing circuit in which the division of R.F. potentials is done solely by capacities.
(b) shows the electrical equivalent in bridge form.

Fig. 13 - Shows a two stage transmitter incorporating a crystal oscillator driving a neutralized triode valve, note that neutrodyne or negative reaction, neutralizing circuit.

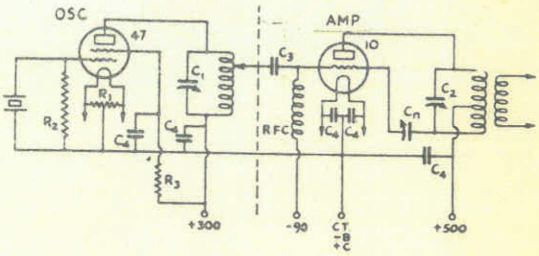
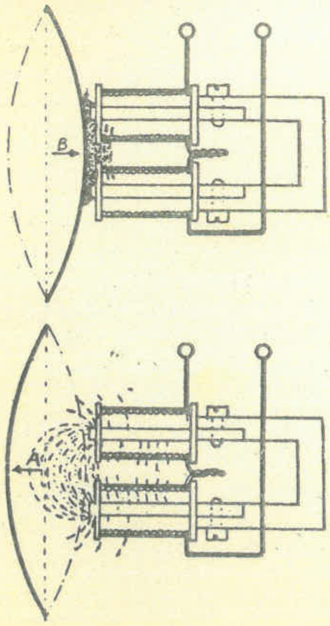


Fig. 13.



(a) Increased flux due to inward movement of the diaphram.

(b) Decreased flux due to outward movement of the diaphram.

Fig. 1 - Magnetic Microphone showing how electric currents are produced by the flexing of the iron diaphram.

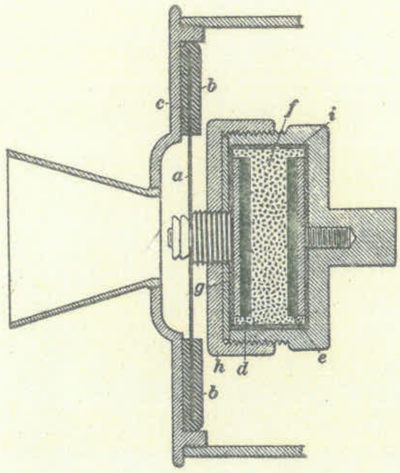


Fig. 2 - Solid back type of carbon granule microphone see text for details

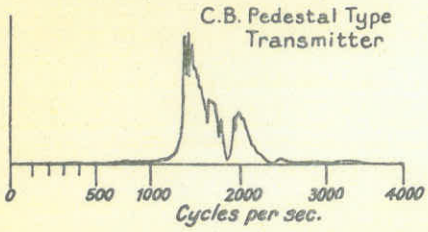
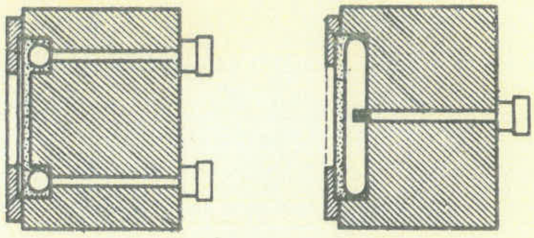


Fig. 3 - Output frequency response curve of a solid back microphone.



Plan View. Elevation View.

Fig. 4 - Reisz or transverse current type of carbon granule microphone.

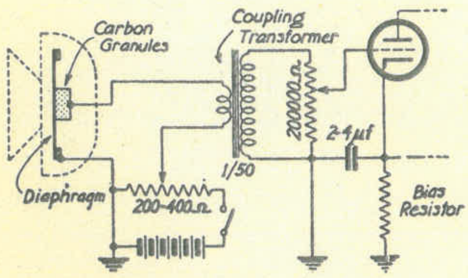


Fig. 5 - Circuit diagram of a carbon microphone coupled to a valve amplifier and volume control.

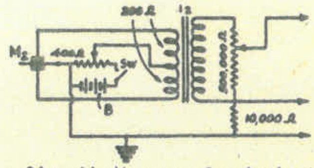


Fig. 6 - Circuit diagram of output circuit of a push pull or double button microphone.

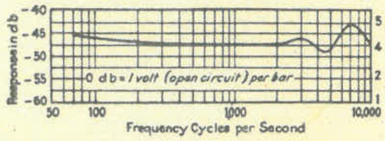


Fig. 7 - Frequency response of the microphone shown Fig.

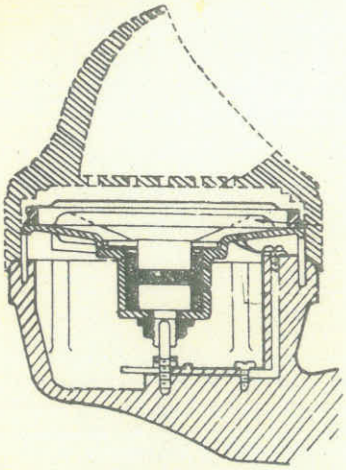


Fig. 9 - Replacement Capsule shown fitted in position in a telephone handset.

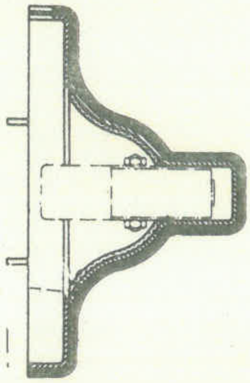


Fig. 11 - Pilots Mask Microphone showing how all the voice energy is deflected from the sides of the mask to both faces of the Microphone capsule.

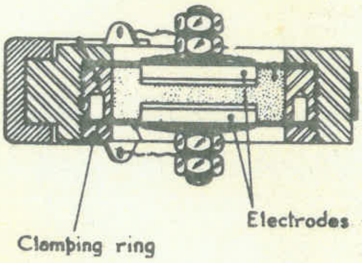


Fig. 12 - Aircraft carbon granule microphone using double compression on the granules. The action is not a push pull one as is the case with that shown in Fig. 13.

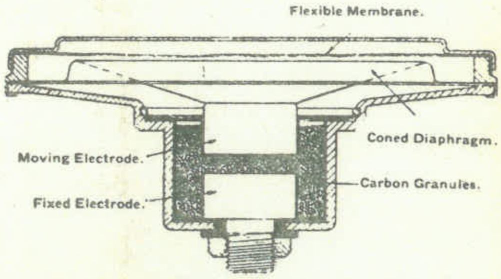


Fig. 8 - "Immersed" carbon granule microphone of the replacement capsule pattern. This type is used in modern telephones.

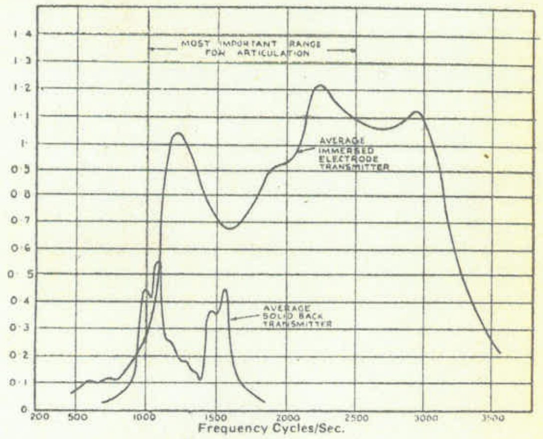


Fig. 10 - Output frequency response of the immersed capsule compared with the solidback telephone of Fig. 2.

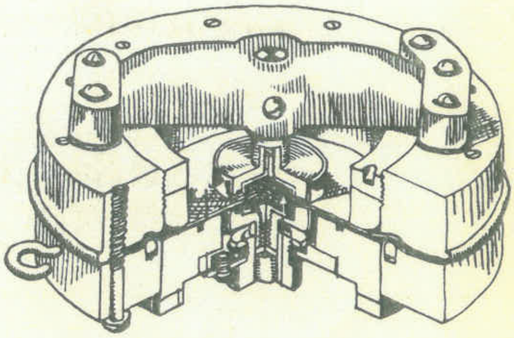


Fig. 13 - Push pull solid backed microphone. Compression on one set of the granules loosens up on the other set.