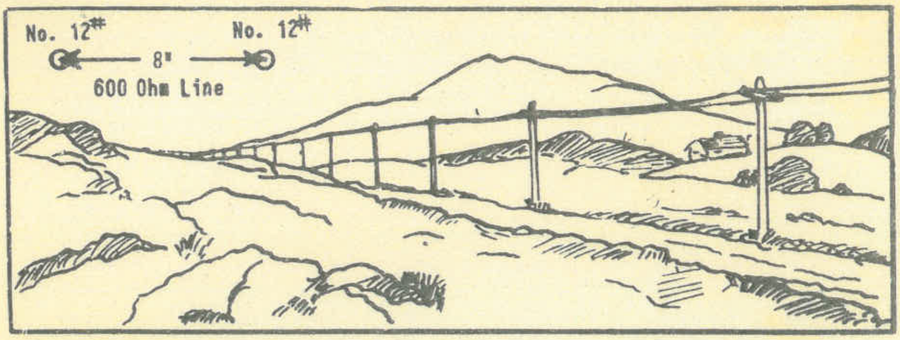


Fig. 1 - Transmission Line of Infinite Length and constructed of No. 12 Gauge copper wire and arranged with 8" spacing between centers of wires.

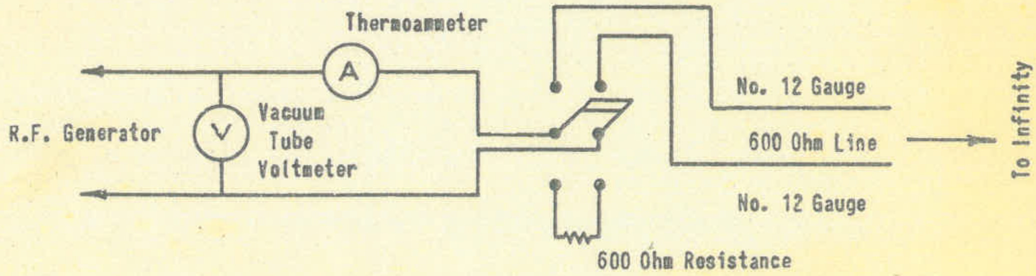


Fig. 2 - Method of measuring the impedance of a test resistance or an infinite length of line.

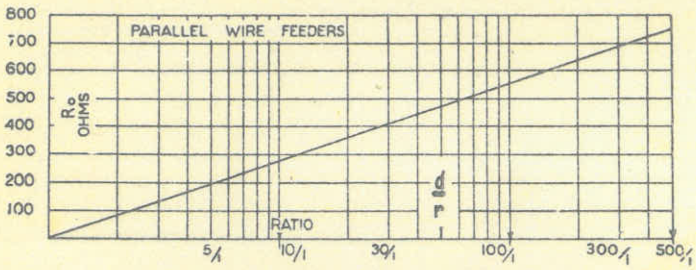


Fig. 3 - Graph showing Characteristic Impedance Z_0 in terms of the ratio of distance between centers of wires d and r the radius of the wires.

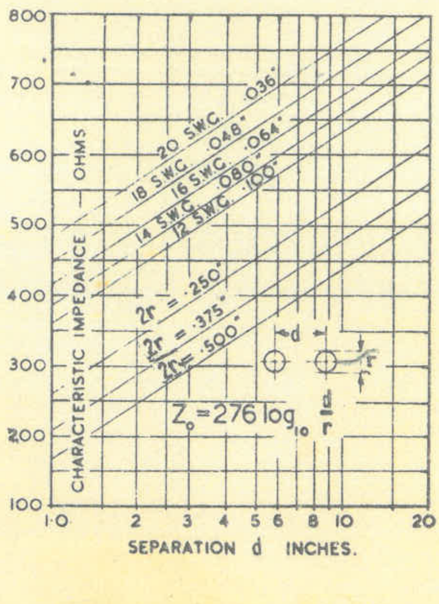


Fig. 4 - Set of graphs showing values of Z_0 for various gauges of wires and rods in terms of spacing in inches. Note that parallel wire lines using wires can be obtained for values of Z_0 between 800 and 400 ohms and that lower impedances than these require the use of rods.

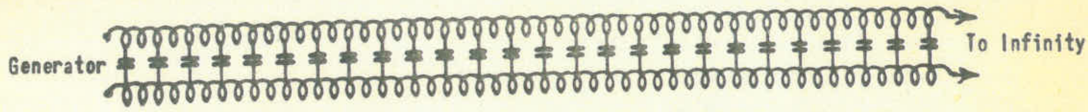


Fig. 5 - The infinite line without losses shown as being made up of distributed inductance and capacity.

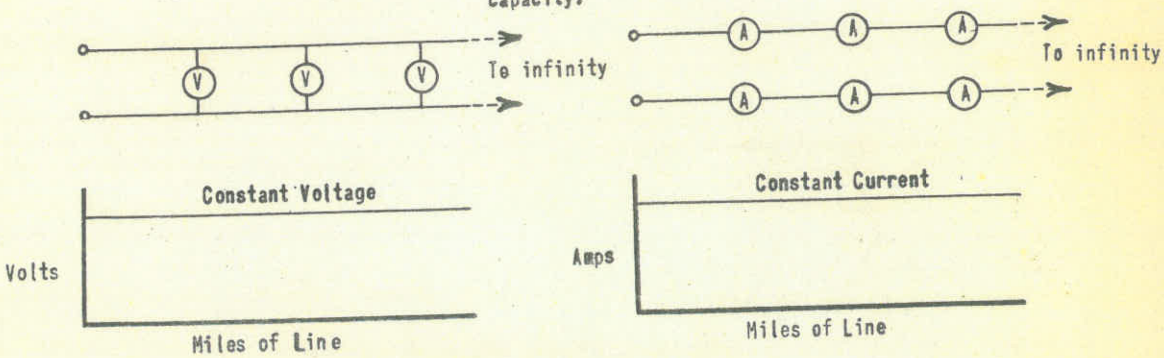


Fig. 6 - Graphs of Current and Voltage readings obtained at any points along an infinite line with no losses.

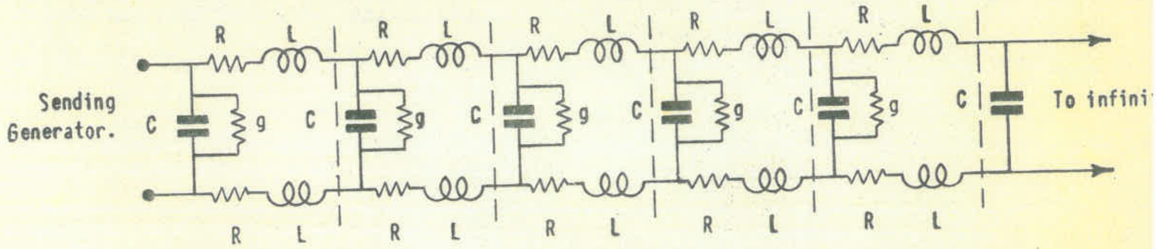
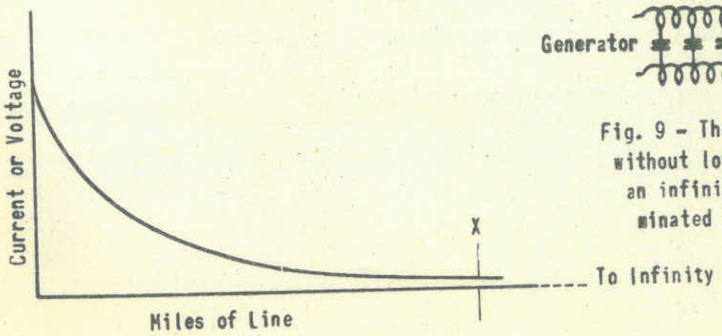


Fig. 7 - An Infinite line with losses such as would exist in practice. The line is shown as being made up of resistances and inductances along each unit length of the line and condensers shunted by resistances across each unit length of the line.



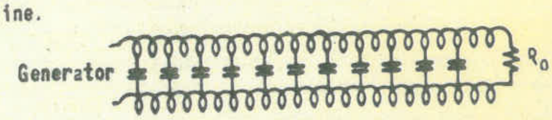


Fig. 9 - The short length of transmission li without losses acts in exactly the same way an infinite line when the short line is te minated in a resistance R_0 equal in value Z_0 the characteristic impedance

Fig. 8 - Deacy of voltage or current in a transmission line containing the losses shown in Fig. 7. When the current or voltage falls to 1/30th of the sending value, the line can be said to be equal to an infinite length for all practical purposes.

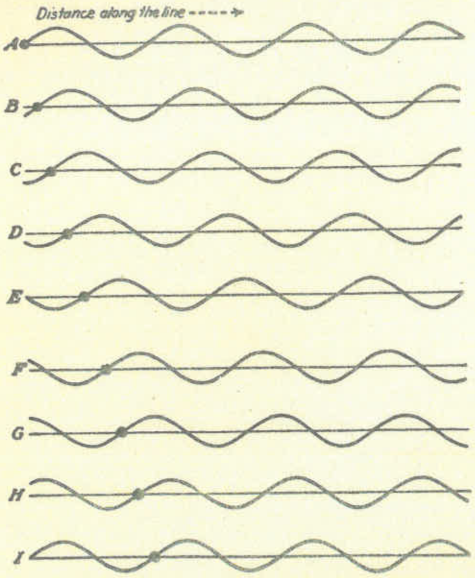


Fig. 10 - One complete cycle showing how the wave progresses along the transmission line.

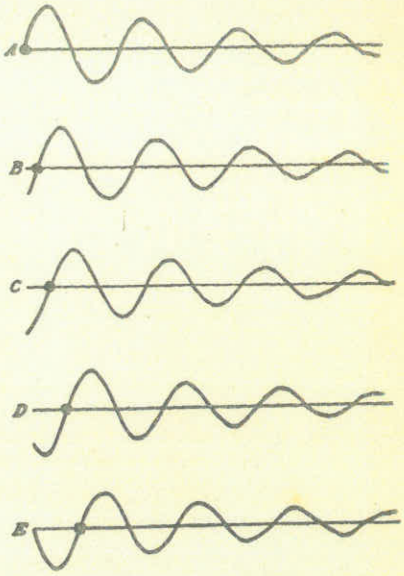


Fig. 11 - One half cycle showing how the wave travels along the line having attenuation or losses.

R.F. Generator

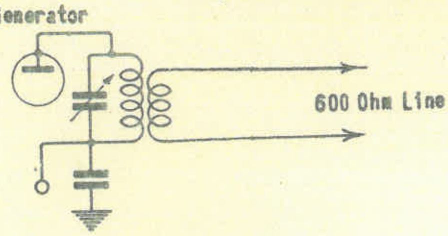


Fig. 12 - Coupling of a transmission line to a valve oscillator or amplifier closed circuit or tank. The 2000 ohm tank couples to the 600 ohm line by means of a 1.8 to one step down transformer.

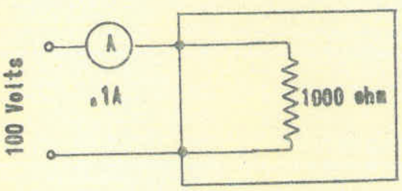


Fig. 13 - One hundred volts feeding a resistor in a sealed box. By Ohm's Law it must be 1000 Ohms.

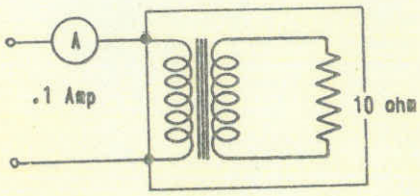


Fig. 14 - One hundred volts feeding a resistor through a transformer. By Ohm's Law the resistance is again 1000 ohms.

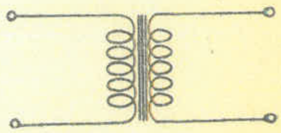


Fig. 15 - No load on the secondary makes the primary act as an open circuit.

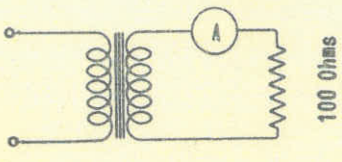


Fig. 16 - The load of a 100 ohms on a 10 to 1 step down transformer reflects 10000ohms back into the primary.

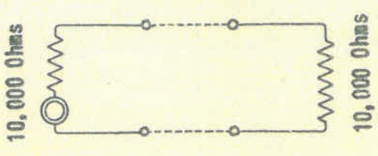


Fig. 17 - 10,000 ohm generator correctly matched to a 10,000 ohms load.

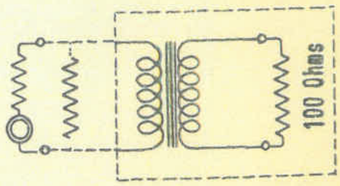


Fig. 18 - 10,000 ohm generator correctly matched to a fictitious 10,000 ohm load, though the actual load is only 100 ohms.

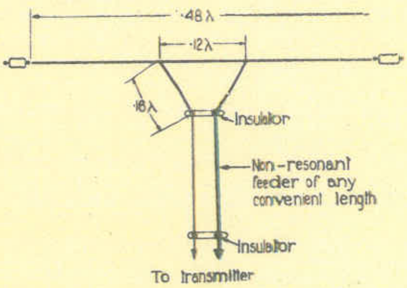


Fig. 19 - Linear matching of a 600 ohm line to an antenna by fanning out to a value of R_0 at .12 λ.

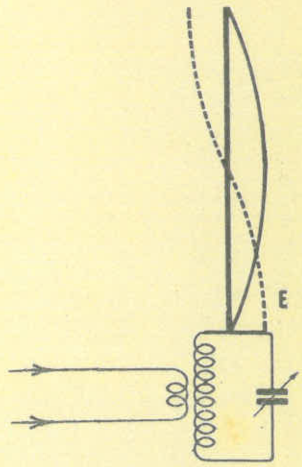
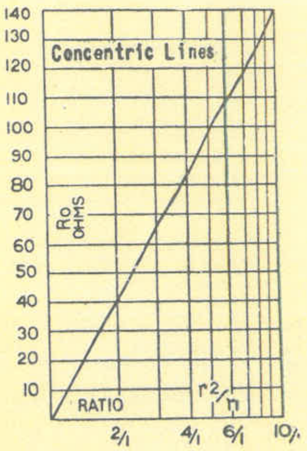


Fig. 20 - Matching of the 600 ohm line to the antenna closed circuit by transformer action.

Fig. 21 - Parallel wire line embedded wire flex Z_0 = 72 ohms.

Fig. 22 - Twisted pair flex with cotton braid covering. Z_0 = 150 ohms.



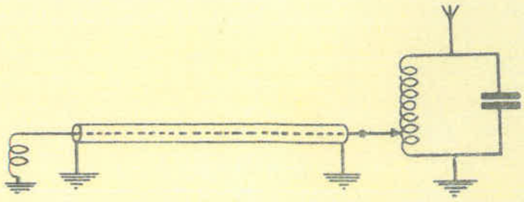


Fig. 24 - Operation of a concentric line in practice.

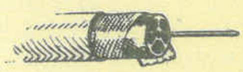


Fig. 25 - Typical flexible concentric line using porcelain spacers.

Fig. 23 - Graph showing values of Z_0 in terms of ratios of r_2/r_1.

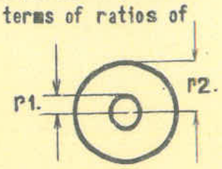


Fig. 26 - Solid rubber dielectric concentric line. Losses are higher than for an air dielectric.

Fig. 27 - Attempt to reduce the amount of rubber used as the dielectric by shaped spacers.

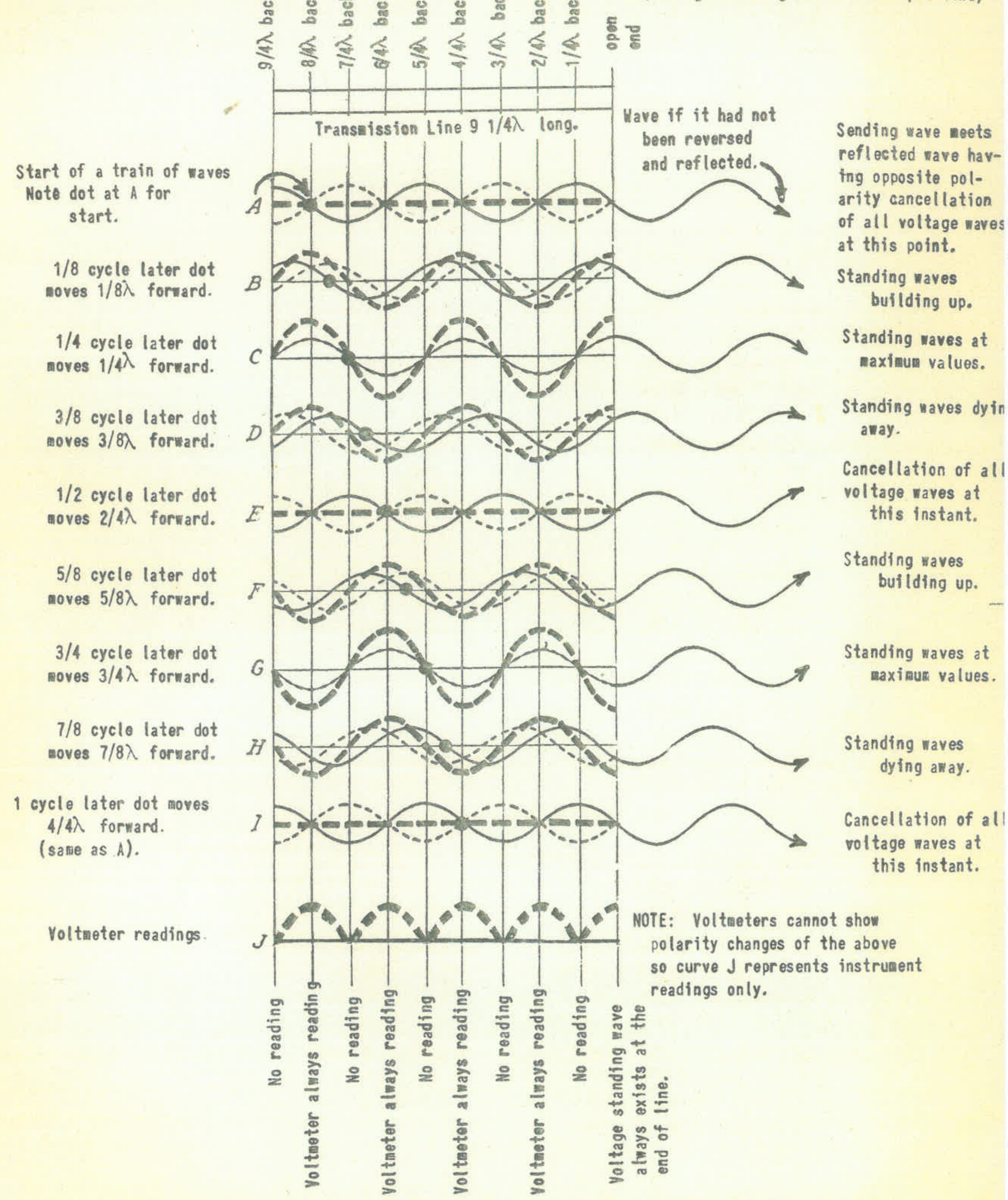


Fig. 28 - Process of building up standing waves of voltage in a transmission line terminated in an open circuit.

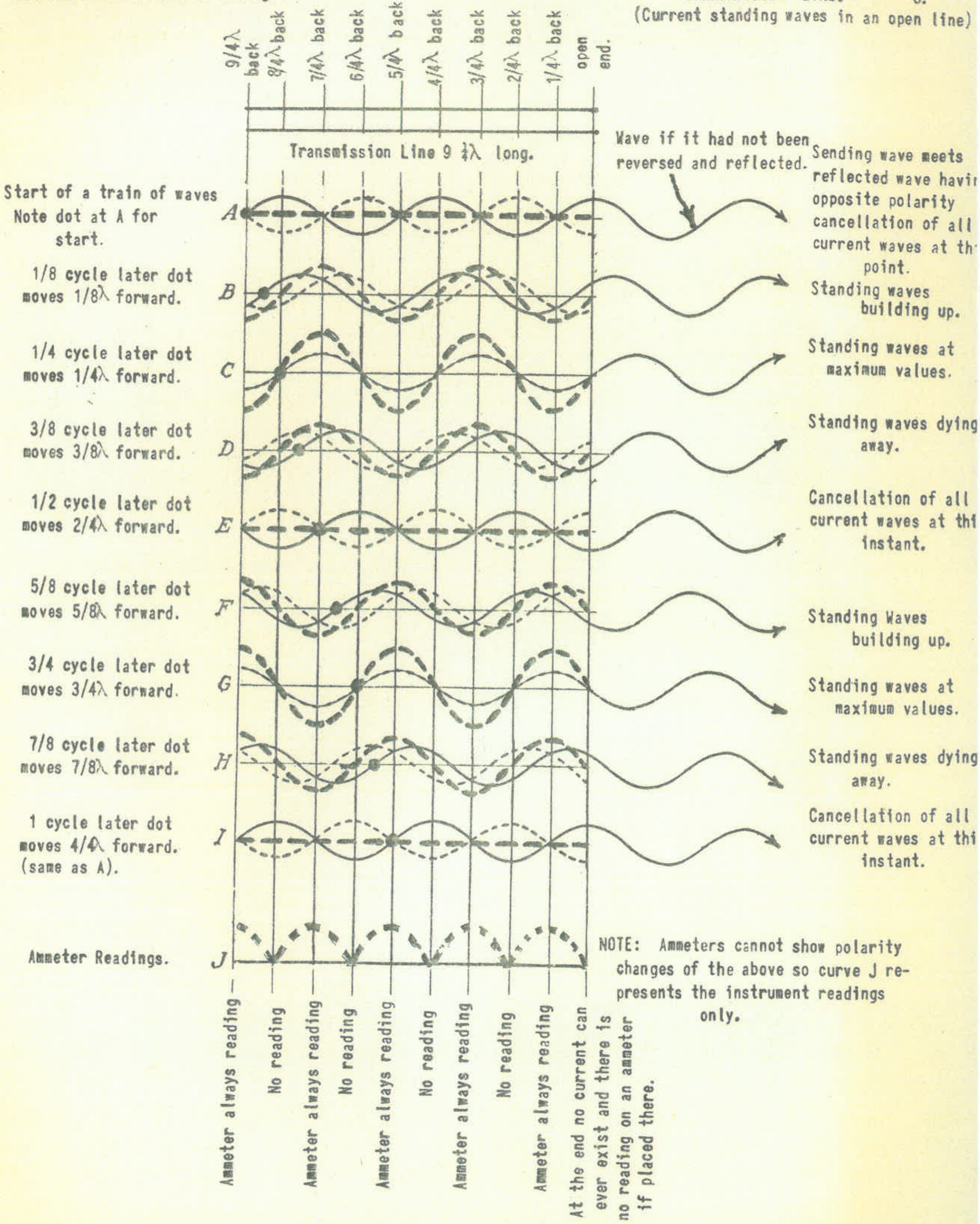


Fig. 29 - Process of building up standing waves of current in a transmission line terminated in an open circuit.

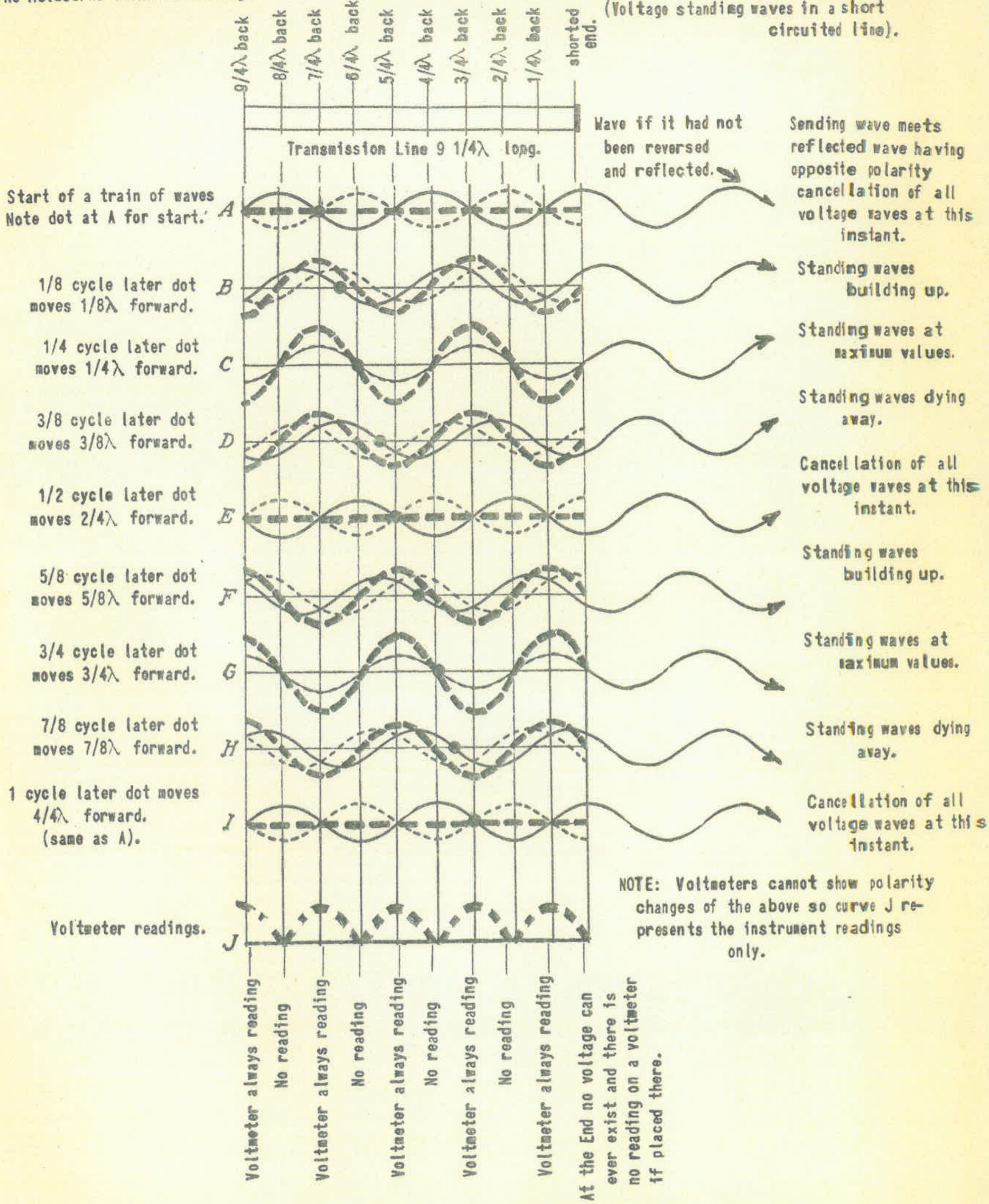


Fig. 30 - Process of building up standing waves of voltage in a transmission line terminated in a short circuit.

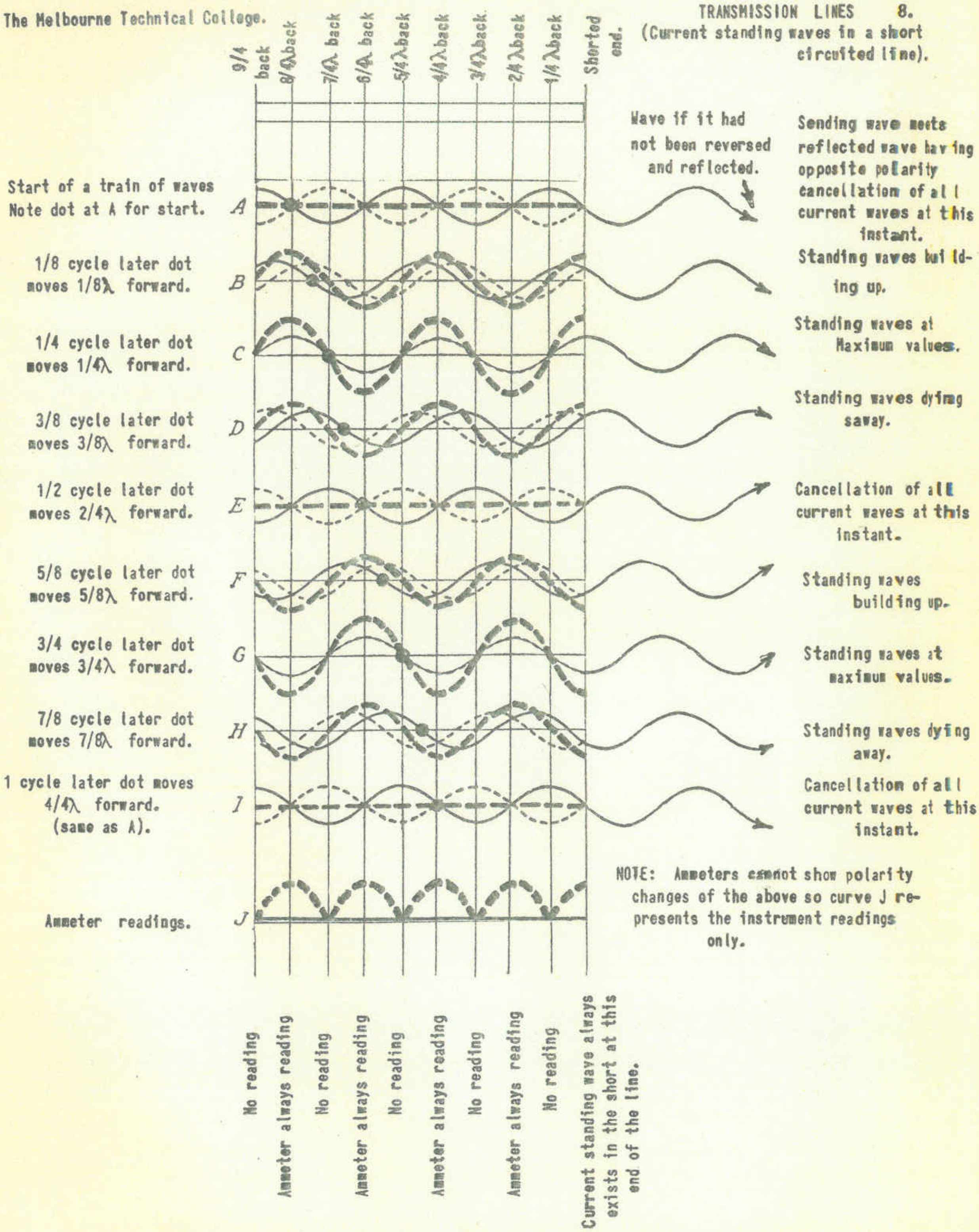


Fig. 31 - Process of building up standing waves of current in a transmission line terminated in a short circuit.

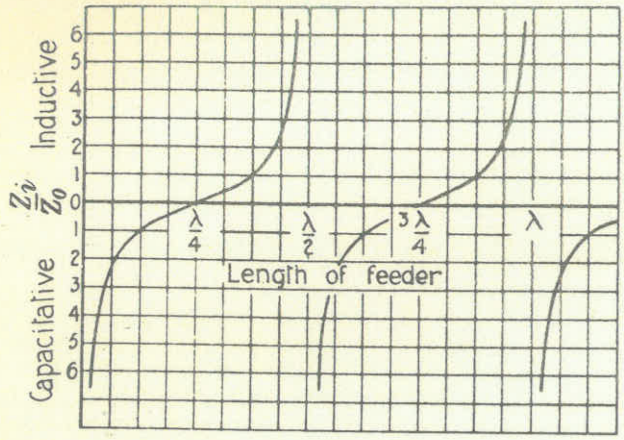


Fig. 32 - Impedance changes along an open circuited line. At the end (left) the value is an infinite X_C. A point ¼λ back is resistive but zero and at ½λ it is X_L and infinite changing immediately to X_C infinity.

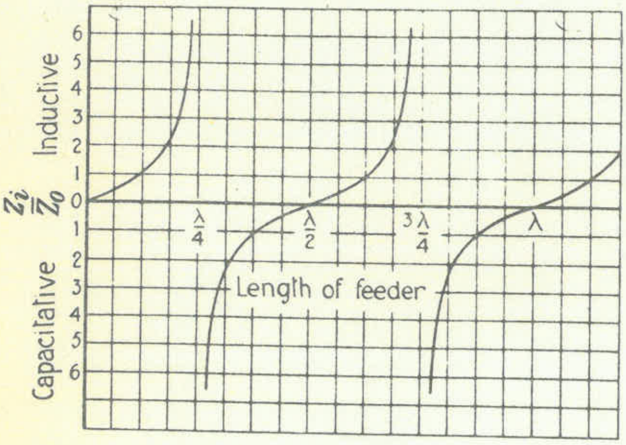


Fig. 33 - In the shorted line the end value is resistive and zero, ¼λ back it is X_L and infinite changing immediately to finite X_C.

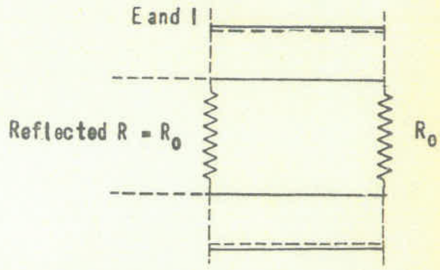


Fig. 34 - A value of R_0 reflected to a point ¼λ back.

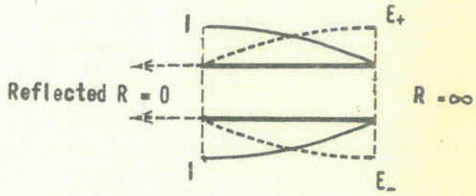


Fig. 35 - An open circuit reflects R = 0 at a point ¼λ back.

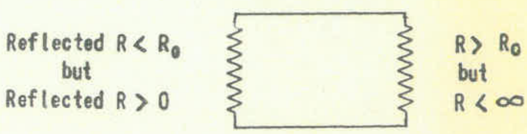


Fig. 36 - A value of R greater than R_0 reflects a value less than R_0 at a point ¼λ back.

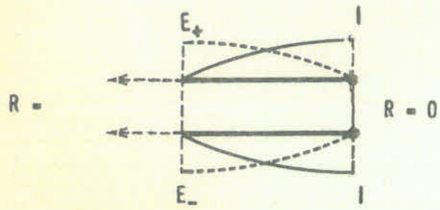


Fig. 37 - A short circuit reflects R = ∞ at a point ¼λ back.

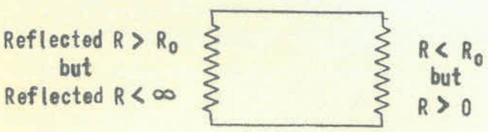


Fig. 38 - A value of R less than R_0 reflects a value of R greater than R_0 at a point ¼λ back.

Fig. 37 - 72 ohm parallel wire rubber embedded flex carrying supply to a 600 ohm open wire line.

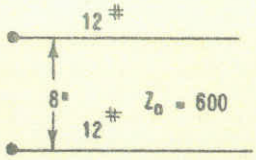


Fig. 38 - 600 ohm open wire line requiring energy from a 600 generator which is, in this case, only a 72 ohm line.

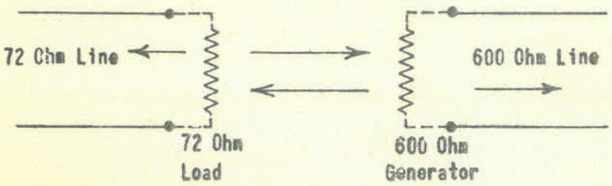


Fig. 39 - Requirements for correct working. The 600 ohm section must be made to appear as 72 ohms viewed from the 72 ohm flex and vice versa.

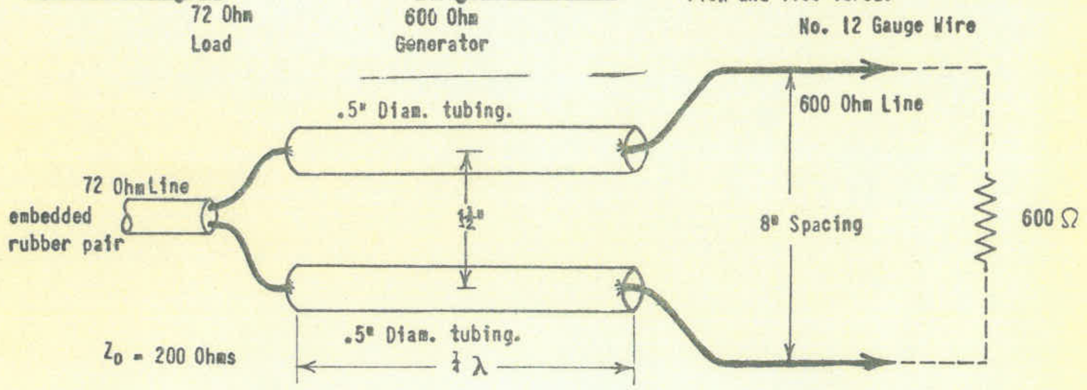
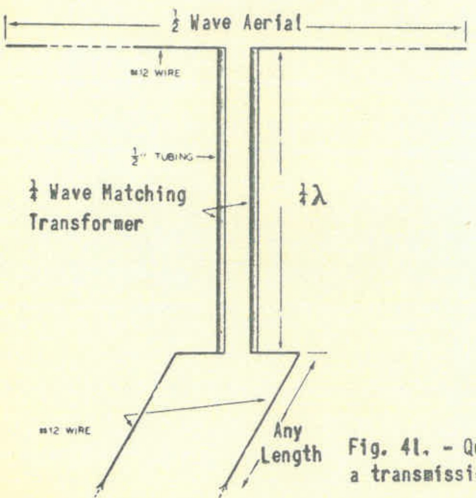


Fig. 40 - Quarter wave matching transformer, using ½" diameter copper tubing. The transformer makes the 600 ohm line appear to the 72 ohm line as a 72 ohm resistance which is its correct terminating value and prevents wave reflection.



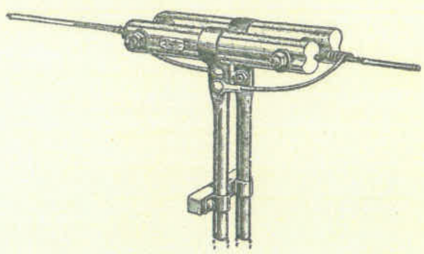


Fig. 42 - Top section of a quarter wave matching transformer showing method of connecting the antenna.

Fig. 41. - Quarter wave matching transformer used to connect a transmission line to a half wave antenna.

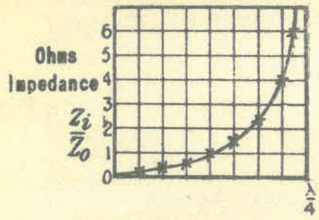


Fig. 43 - Variation of impedance between wires along a transmission line $\frac{1}{4}\lambda$ long and with a shorted end (measured in terms of Z_0)

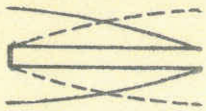


Fig. 44 - Current and Voltage Distribution along the $\frac{1}{4}\lambda$ of line referred to in Fig. 43.

Fig. 45 - 600 ohm line tapping on to a $\frac{1}{4}\lambda$ feeder at a point having an impedance of 600 ohms.

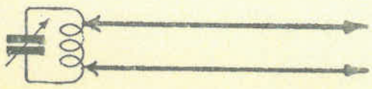


Fig. 46 - Paralleltuned circuit fed from a 600 ohm line to show exact simularity with $\frac{1}{4}\lambda$ feeder.

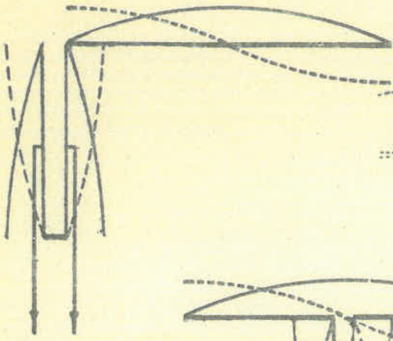


Fig. 47 - Half wave antenna voltage fed from $\frac{1}{4}\lambda$ feeders, which, in turn, are fed from a 600 ohm line as in Fig. 45.

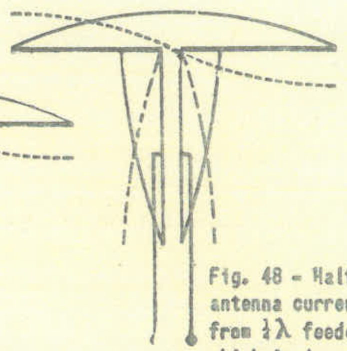


Fig. 48 - Half wave antenna current fed from $\frac{1}{4}\lambda$ feeders which in turn are fed from a 600 ohm line.

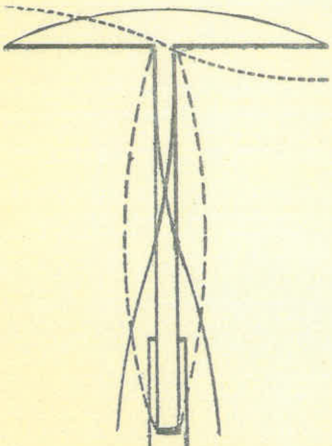


Fig. 49 - Half wave antenna current fed from two $\frac{1}{4}\lambda$ feeders which in turn are fed at one of the $\frac{1}{4}\lambda$ sections, similar to Fig. 48 used when methods of Figs. 47 and 48 are not suitable.

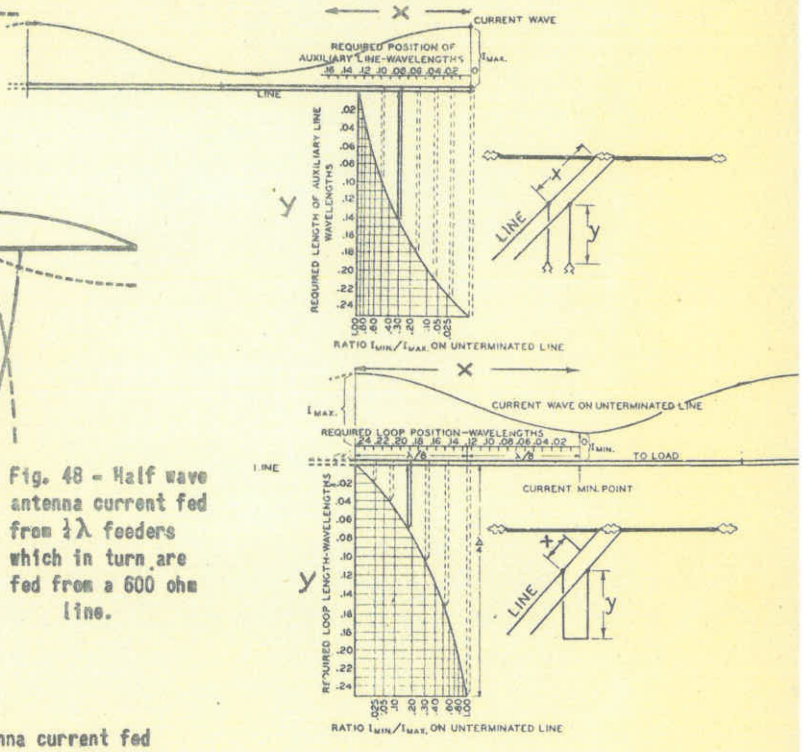


Fig. 49a - Design Chart for corrective matching stubs.

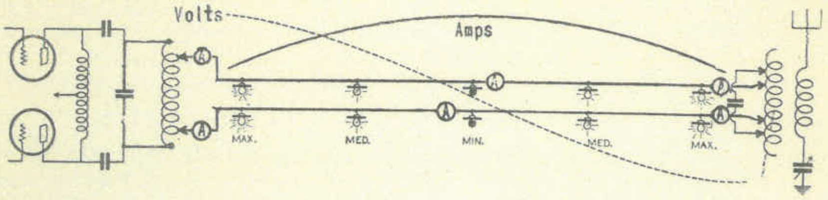


Fig. 50 - A feeder line having the same physical construction as a 600 ohm line and a length of $\frac{1}{2}\lambda$. It is fed by voltage taken from the ends of a closed circuit and feeds voltage to another closed circuit, both of which can be regarded as open circuit. Note the standing wave of voltage and the change in brilliancy of the neon test lamps. Note also the ammeter readings.

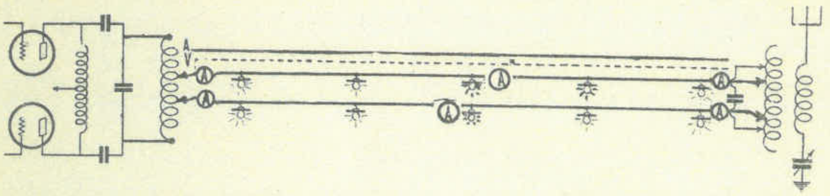


Fig. 51 - Same line as in Fig. 50, but now operating as a transmission line. The closed circuits are tapped at their 600 ohm points so that $Z_{gen} = Z_0 = Z_{load}$. Note the absence of standing waves of current and voltage indicated by the even glow on all the neon test lamps and the current in the ammeters.

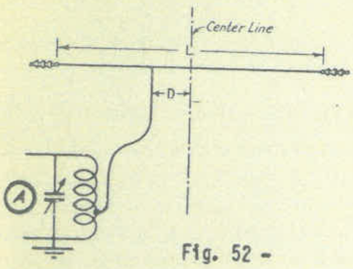


Fig. 52 -

Single wire transmission Line. The antenna tap is made at a point D from the center which will match the impedance of the line itself. The value of Z_0 for a single wire line varies between 800 to 900 Ohms depending on height and gauge of wire.

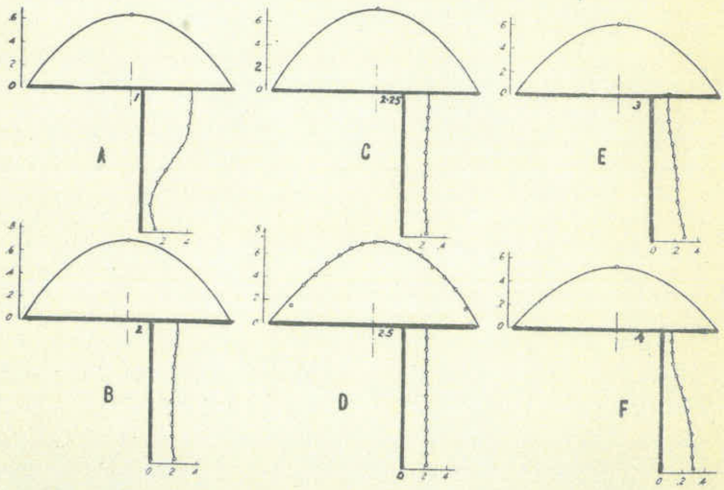


Fig. 53 - Diagrams A to F show by ammeter readings how the standing waves on the line disappear when the impedance of the line matches the antenna junction. The tapping distance D is given as .133 by L for No. 12#, .139 for No. 14# and .144 for No. 16# wires. L in this case is 18 metres.

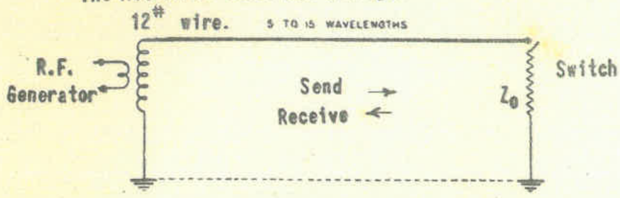


Fig. 54 - Long wire antenna terminated in its characteristic impedance of 800 ohms.

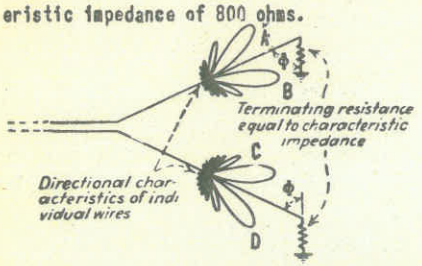


Fig. 56 - Two long wire antennas arranged at such an angle that B abd C add while A and D cancel.

Fig. 57 - B and C add while A and D cancel.

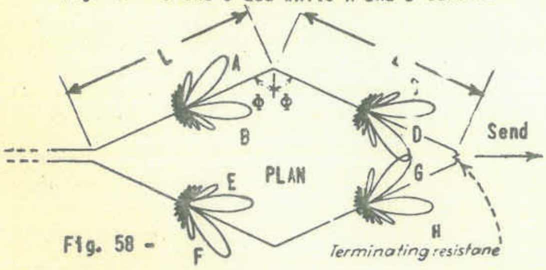
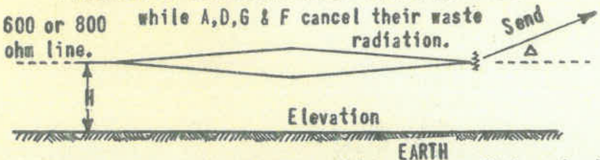


Fig. 58 - Rhombic or Diamond antenna. B,C,E and H add while A,D,G & F cancel their waste radiation.



Side elevation of a Rhombic antenna showing that each side is made up of two wires and not one as in theory. This is done to preserve a better impedance match as the 800 ohm lines fan away from each other and then return to R_0 at the end.

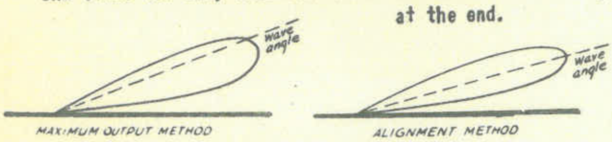
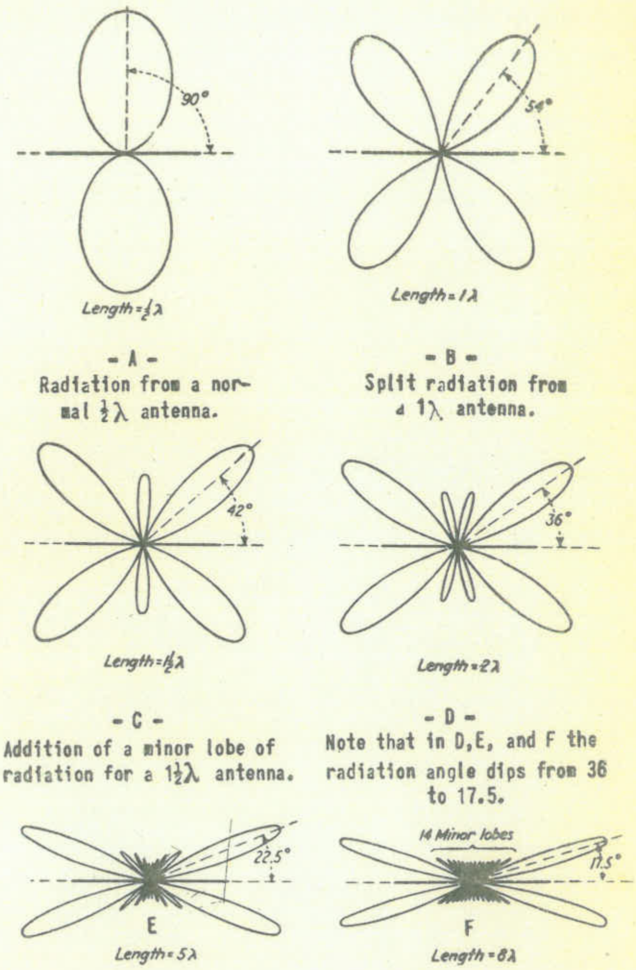


Fig. 59 - Wave angles of a Rhombic as found from the chart in Fig. 60.



- A - Radiation from a normal ½λ antenna.

- B - Split radiation from a 1λ antenna.

- C - Addition of a minor lobe of radiation for a 1½λ antenna.

- D - Note that in D,E, and F the radiation angle dips from 36 to 17.5.

Fig. 55 - Radiation patterns for horizontal antennas showing how radiation changes from broadside to end fire as the length in wavelengths increases.

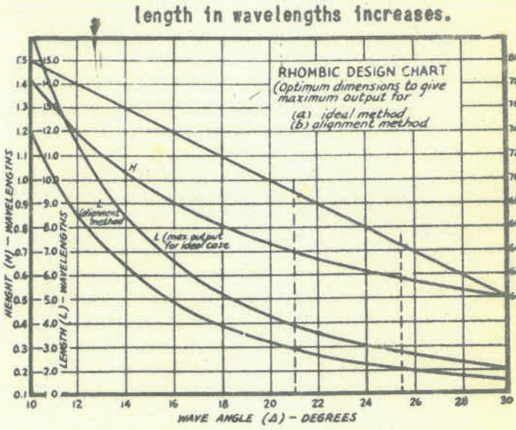


Fig. 60 - Design Chart for finding H, L and Φ in terms of Δ the propagation angle.

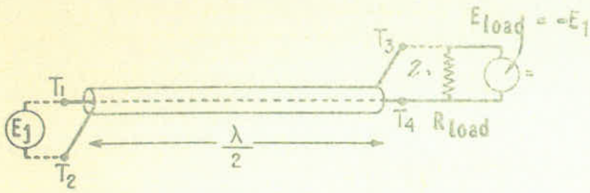


Fig. 62 - Concentric line on half wavelength long and terminated in $R_0 = Z_0$ acts as a polarity reverser. The load is not a balanced one in that one side is earthed.

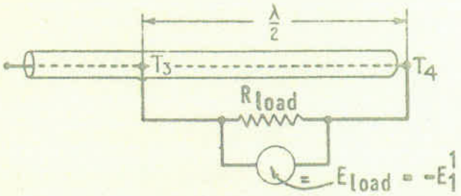


Fig. 63 - Extension of Fig. 62. By tapping the end of the line back to the same conductor one half wave back R_{load} is connected to balanced points having polarities of E+ and E-

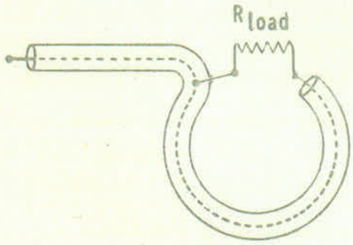


Fig. 64 - Practical use of the arrangement of Fig. 63. Here the last half wave of concentric line is bent into a circle so that R_{load} is available to pick off a balanced voltage.

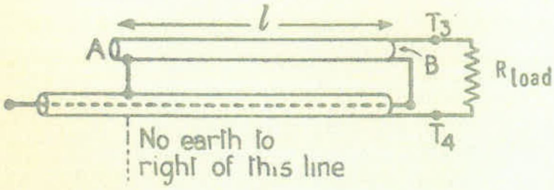


Fig. 67 - Extension of the theoretical circuit of Fig. 65 showing how the new equivalent generator of voltage E_1^1 feeds R_{load} which is balanced across the outer two tubes.

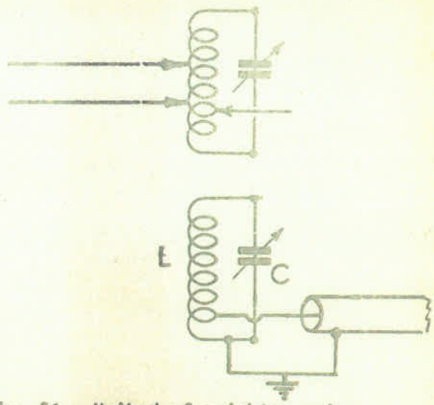


Fig. 61 - Method of matching a two balanced line to an earthed conce line by coupled closed circuits.

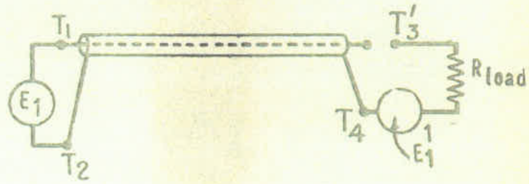


Fig. 65 - Equivalent circuit of Fig. 66 shown below.

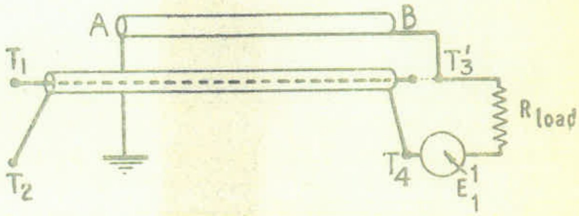


Fig. 66 - Balanced output obtained by the use of an added parallel length of outer tube.

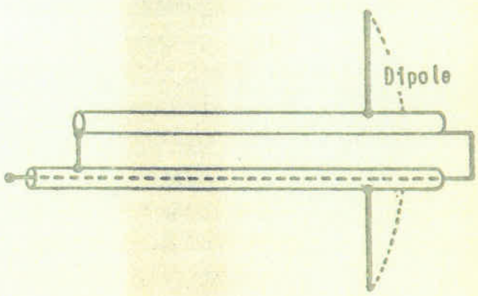


Fig. 68 - Feeding of a dipole by moving back along the half wave section to match the 72 ohm impedance of the aerial.

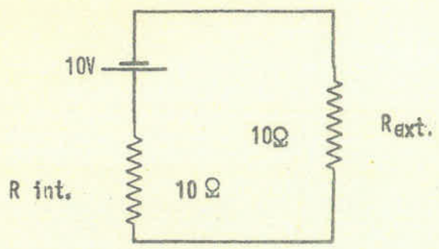


Fig. 60a -
R int. and R ext. equal Power Transfer Efficiency equals -50%.

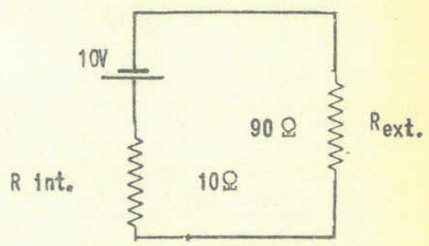


Fig. 60b -
R int. and R ext. unequal Power Transfer Efficiency equals -90%.

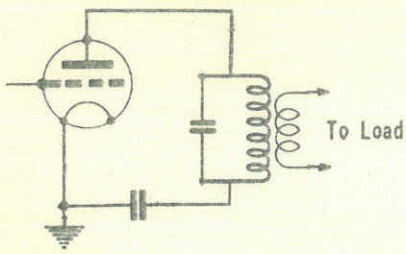


Fig. 61a -
Typical anode - antenna loading on Oscillator or class "C" amplifier.

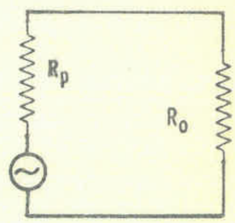
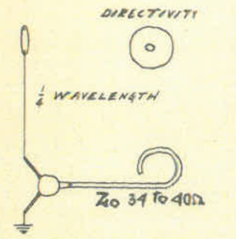
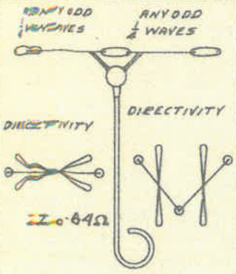


Fig. 61b -
Resolution of Fig. 61a.
NOTE: This circuit is identical with circuits of Fig. 60.

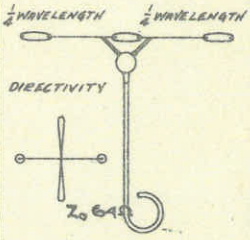
VARIOUS ANTENNA SYSTEMS AND METHODS OF FEEDING WITH ANY DESIRED LENGTH OF BASSETT CONCENTRIC FEEDER.



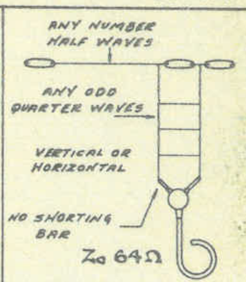
VERTICAL MOBILE OR FIXED "MARCONI" ANTENNA FED WITH TYPE; BCF 34-1000 (OF ANY LENGTH)



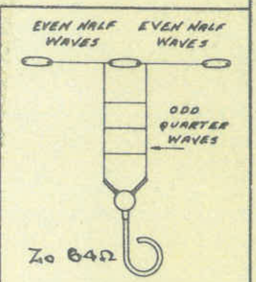
PRACTICALLY ANY LENGTH DESIRED IN LONG WIRE OR FOLDED "V" BEAM ANTENNA MAY BE FED AS ABOVE WITH ANY DESIRED LENGTH OF FOLLOWING TYPES;
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200



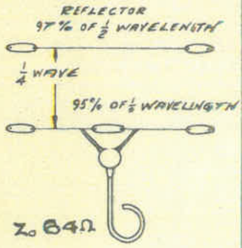
$\frac{1}{2}$ WAVELENGTH DOUBLET CENTER FED WITH ANY LENGTH OF FOLLOWING TYPE CABLES DEPENDING ON POWER USED.
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200



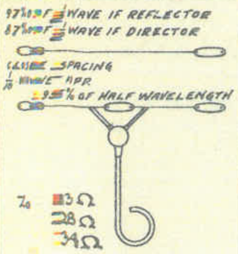
ANY EXISTING ZEPP MAY BE FED AS ABOVE WITH ANY OF FOLLOWING TYPES OF ANY LENGTH.
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200



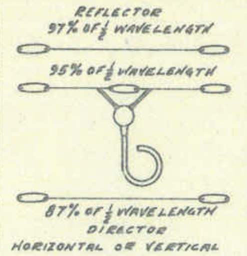
FOLDED OR STRAIGHT OR "Y" BEAM FED WITH FOLLOWING TYPES OF ANY LENGTH.
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200



ROTATABLE OR FIXED BEAM ANTENNA FED BY FOLLOWING TYPES OF ANY LENGTH.
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200



CLOSE SPACED 2 ELEMENT BEAM WHICH MAY BE ADJUSTED TO REFLECT PROPER IMPEDANCE FOR USE WITH FOLLOWING TYPES OF ANY LENGTH.
BCF 13-1000
BCF 28-1000
BCF 34-1000

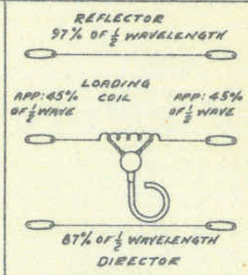


3 ELEMENT BEAM. IF CLOSE SPACING IS USED. USE FOLLOWING TYPES;

Z_0 28 & 13Ω

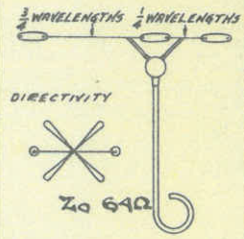
IF $\frac{1}{4}$ & $\frac{1}{8}$ WAVE SPACED, USE FOLLOWING TYPES;

Z_0 64Ω



BEAM ANTENNA WITH CLOSE SPACED ELEMENTS ONE OF WHICH MAY BE ELIMINATED IF DESIRED. FOLLOWING CABLES MAY BE USED IN ANY LENGTH AND MATCHED BY MEANS OF LOADING COIL IN RADIATOR.

Z_0 64 34 & 28Ω

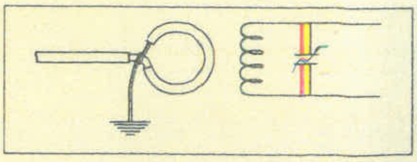


FULL WAVE ANTENNA FED $\frac{1}{4}$ WAVELENGTH FROM END WITH ANY OF FOLLOWING TYPES OF ANY DESIRED LENGTH.
BCF 64-5000
BCF 64-1000
BCF 64- 500
BCF 64- 200

FORMULA FOR DETERMINING LENGTH OF ANTENNA WHEN FED WITH BASSETT CONCENTRIC FEEDER.

$$L = \frac{(Y-.05) \times 492}{\text{FREQUENCY IN MEGACYCLES}}$$

Y = NUMBER HALFWAVES DESIRED ON ANTENNA.



ADVANTAGE MAY BE TAKEN OF THE BUILT-IN FARADAY SHIELD BY CONNECTING TO THE FINAL AMPLIFIER AS INDICATED IN THE ADJOINING SKETCH. THE OUTER TUBE IS LEFT OVER THE LINK COIL FOR APPROXIMATELY 90% OF THE TOTAL CIRCUMFERENCE AND THE SYSTEM GROUNDED AT THE POINT OF CONNECTION TO THE INNER CONDUCTOR.

NO 'Y' OR DELTA IS REQUIRED AT THE POINT OF CONNECTION OF ANY TYPE OF BASSETT CONCENTRIC FEEDER. IMPEDANCE MATCH IS "AUTOMATIC" AND AS SMALL AN INSULATOR AS IS PRACTICAL SHOULD BE USED AT THIS POINT. GENERALLY IT WILL BE FOUND THAT A STANDARD SIX INCH INSULATOR WILL HANDLE SEVERAL KILOWATTS AT THIS POINT.

ALL BASSETT CONCENTRIC FEEDERS MAY BE BURIED UNDERGROUND OR UNDER WATER, OR LEFT COILED IN ANY LENGTH IN THE TRANSMITTER ROOM WITH NO EFFECT ON THE OPERATION OF THE LINE OR THE EQUIPMENT IN USE.

LIKE ALL OTHER RADIO FREQUENCY TRANSMISSION LINES KNOWN, IF BASSETT CONCENTRIC FEEDER IS IMPROPERLY TERMINATED POOR RESULTS WILL BE OBTAINED. USE ONLY THE RECOMMENDED TYPES FOR ANY SPECIFIC APPLICATION. IF TECHNICAL ADVICE IS DESIRED ON ANTENNA TYPES AND CABLES DO NOT HESITATE TO WRITE FOR INFORMATION.

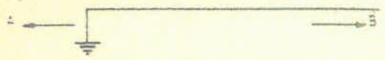


Fig. 1 - Directive Effect of L Aerial.

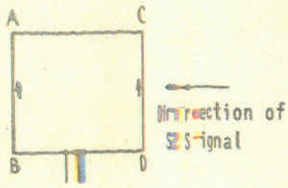


Fig. 2 — Frame Aerial

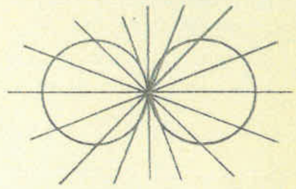


Fig. 3 - Polar diagram showing variation in Radiation from or Signal received by Frame.

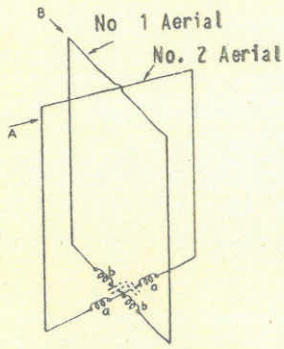


Fig. 4 - Aerial Circuit, Bellini-Tosi System.

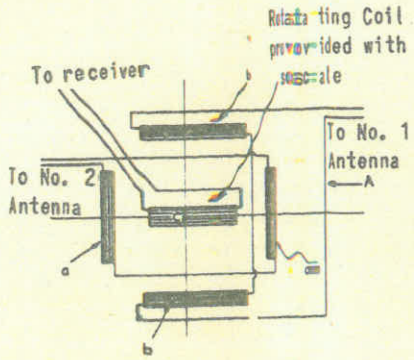


Fig. 5 - Goniometer Coils in Plan.

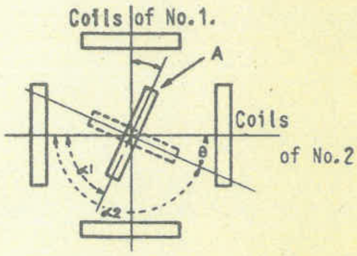


Fig. 6 - Relationship of Goniometer Coil Position and Signal Direction.

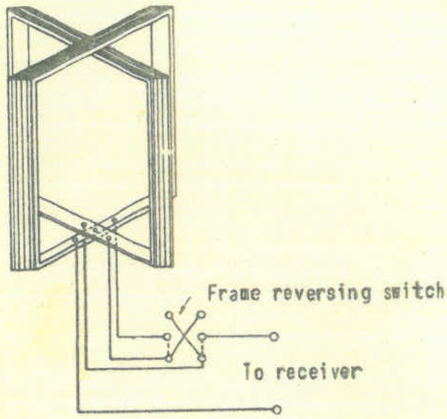


Fig. 7 - Robinson Crossed Loop System.

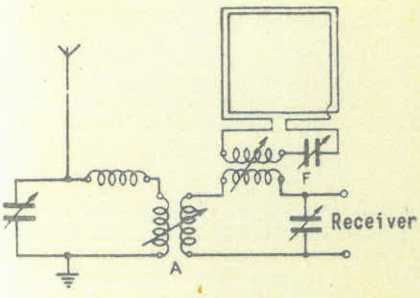


Fig. 8 - Open Aerial and Frame

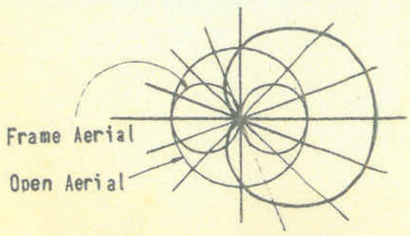


Fig. 9 - Cardioid or Heart-shaped Diagram.

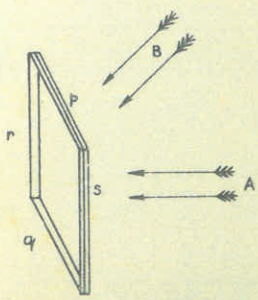


Fig. 10 - Ground Ray - A
Sky Ray - B