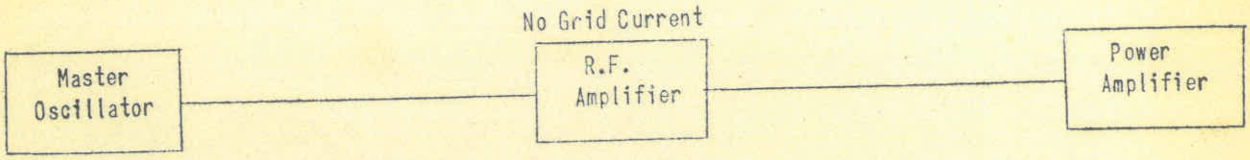
MELBOURNE TECHNICAL COLLEGE

TRANSMITTER R.F. AMPLIFIER CLASSIFICATIONS

The following gives the standard definitions used in Service and Commercial practice.



This R.F. Amplifier Stage is called an Isolating Buffer Amplifier or an Isolation Amplifier and can operate Class A, B or C.

PROVIDED:

That it does not draw grid Current.

Advantage: High frequency Stability because there is no interaction between the M.O. and the P.A. with its variable load.

Disadvantage: Low efficiency and R.F. Amplification.

This R.F. Amplifier Stage which draws grid current is called a Buffer Amplifier and is identical with the alternative method of naming shown below.

Either of the above (centre) R.F. Amplifiers can operate Class B or C provided they are driven so hard that they draw grid current during all or part of the grid positive half cycles.

Advantage: High efficiency and R.F. amplification.

Disadvantage: Lower frequency stability than the - "no grid current" method.

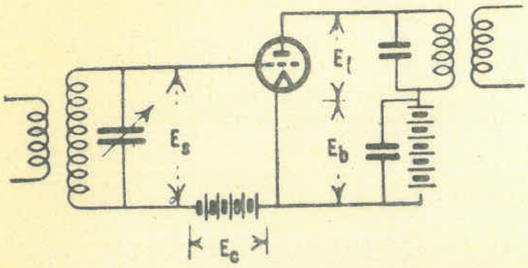


Fig. 1A - Theoretical circuit of an R.F. Power Amplifier
Es is the secondary induced voltage applied from the L.C. circuit.
E_c is the "C" bias voltage, E_L is the voltage developed across the load and Eb is the H.T. supply voltage.

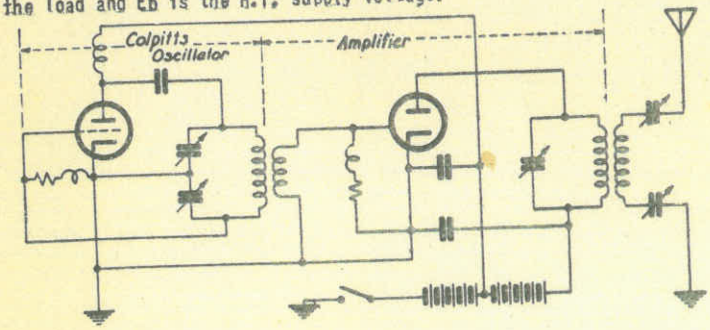


Fig. 1B - Practical example of Fig. 1A. A carefully made Colpitt's oscillator feeds E_s to the amplifier grid by induction through the coupling transformer.
NOTE that the Key breaks the negative H.T. earth return circuit.

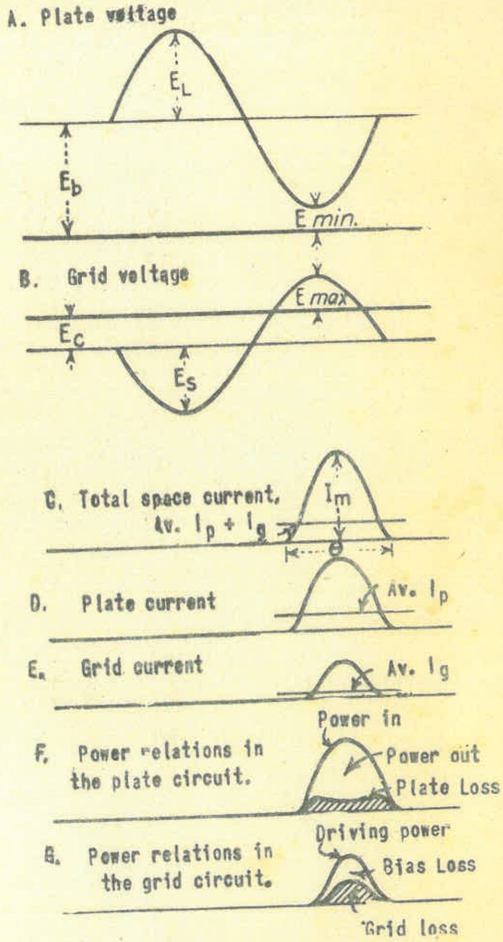


Fig. 3 - Instantaneous relations in the various circuits of a "C" class Amplifiers.

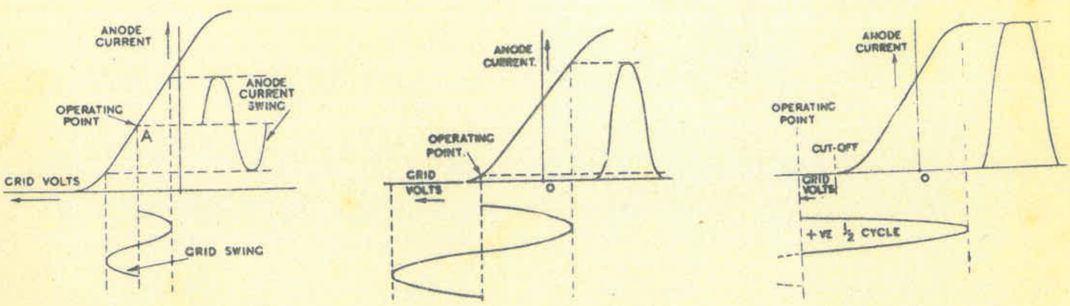


Fig. 2.

CLASS "A" OPERATION.
Operation without positive grid and only on the "straight" of the E_g/I_p curve.

CLASS "B" OPERATION.
Grid biassed back to "cut off", the grid operates positively at peaks but the "straight" is used except for the bottom bend.

CLASS "C" OPERATION.
Grid biassed to 1½ times cut off and I_p driven by the signal to saturation.

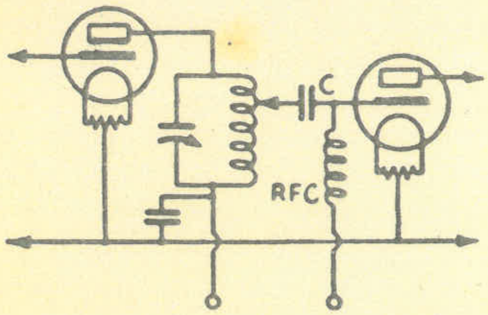


Fig. 7A - Direct pick up of Master Oscillator excitation by tapping the M.O. tank coil. The higher the tapping point the greater the voltage. The D.C. is blocked by the condenser C.

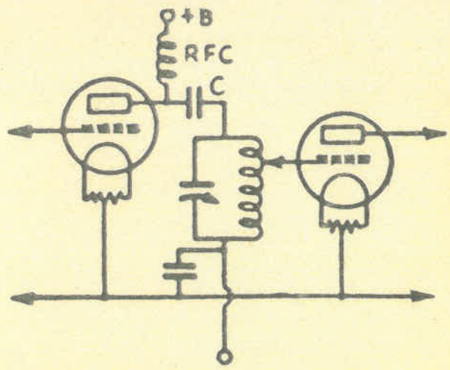


Fig. 7B - Shunt fed M.O. showing that the D.C. blocking condenser can be eliminated hed
Compare with Fig. 7A.

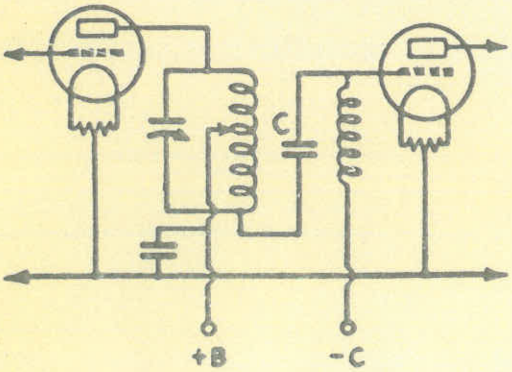


Fig. 7C - Variation of Fig. 7A. The grid tap is fixed to the earthed end of M.O. tank coil and the H.T. tap moved up provide the necessary excitation.

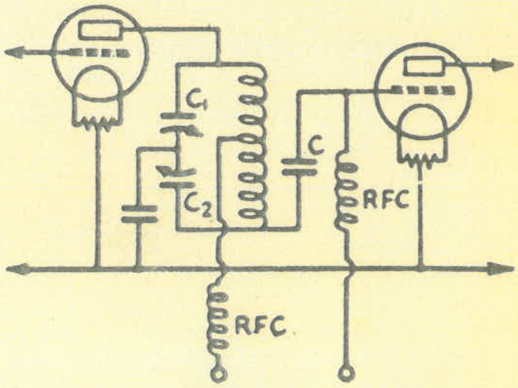


Fig. 7D - Instead of varying excitation by tapping as in Fig. 7C it is done by varying C_1 to C_2. $C_1 + C_2$ must remain constant for resonance.

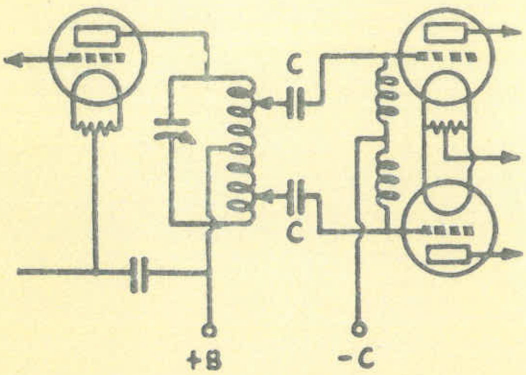


Fig. 7E - The reverse P.D. available at the bottom of 7C is used simultaneously with the top end to excite a push pull power amplifier.

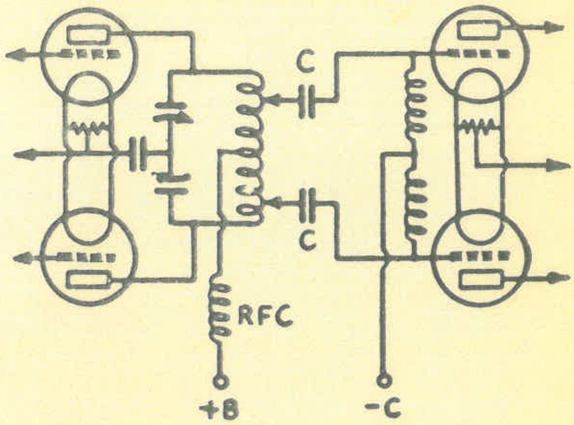


Fig. 7F - Push Pull M.O. feeding a Push Pull P.A. by capacity or direct coupling.

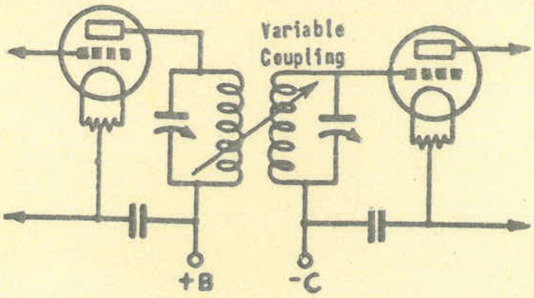


Fig. 8A - Inductive coupling from a Master oscillator to a power amplifier using tuned primary and tuned secondary coils. This method produces the greatest step up of voltage because of the Q of the circuit.

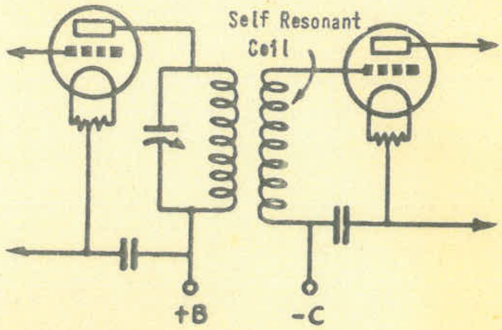


Fig. 8B - Similar to Fig. 8A but an R.F. choke on self resonant coil is used to save another tuning control.

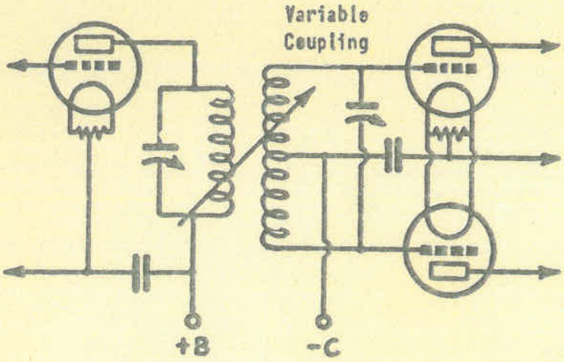


Fig. 8C - Similar to Fig. 8A but the secondary closed circuit is center tapped and half the R.F. voltage is fed to each of the push pull amplifiers.

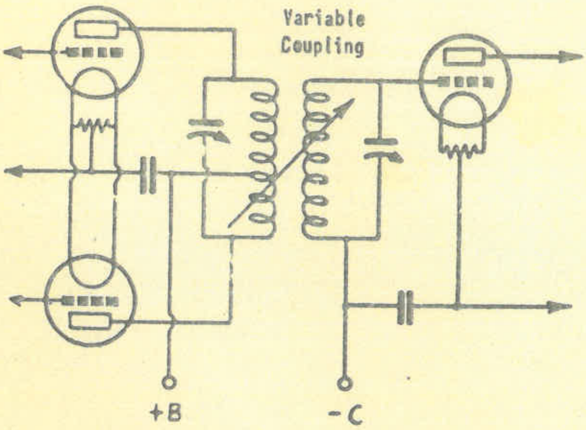


Fig. 8D - Where the driving power of one M.O. valve is insufficient a push pull unit is used to supply double power to the power amplifiers.

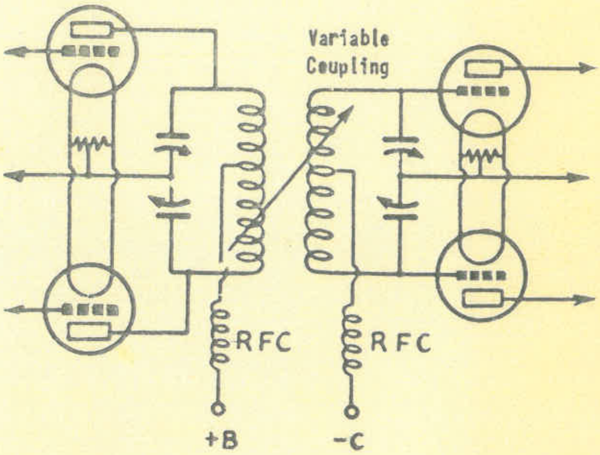


Fig. 8E - Push pull Master Oscillators driving push pull power amplifiers.

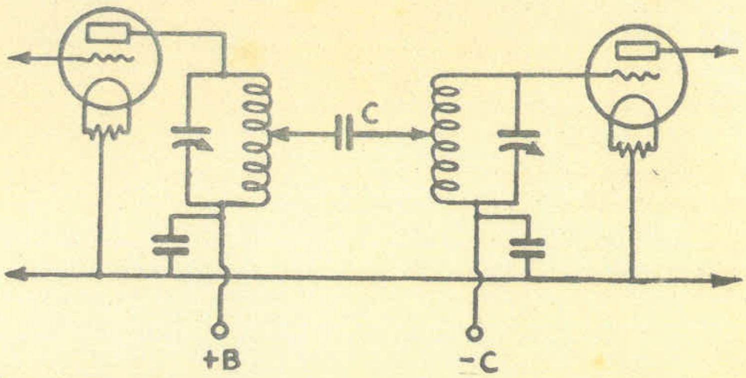


Fig. 9A - Transmission line feeding of energy from the M.O. to the P.A. Knowing that the lower ends of both coils are effectively earthed tapping up the coil of the parallel L.C. circuit taps a point having an impedance of $\left(\frac{Z_{tank}}{N^2}\right)$ ohms. The grid coils is similarly tapped and the two points are joined through a D.C. blocking condenser.

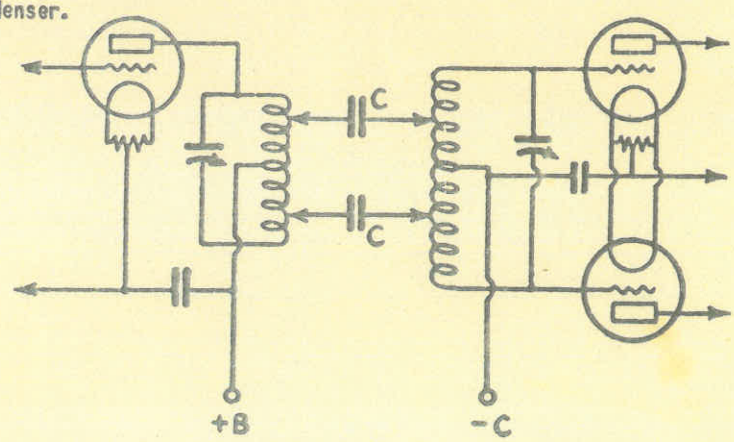


Fig. 9B - Push pull power amplifier variation of Fig. 9A. Because the circuit is balanced the center of the coil of the M.O. tank is tapped to match the center or earth point of the P.A. tank. Two transmission lines are used and both lines move out simultaneously from the center point to increase excitation.

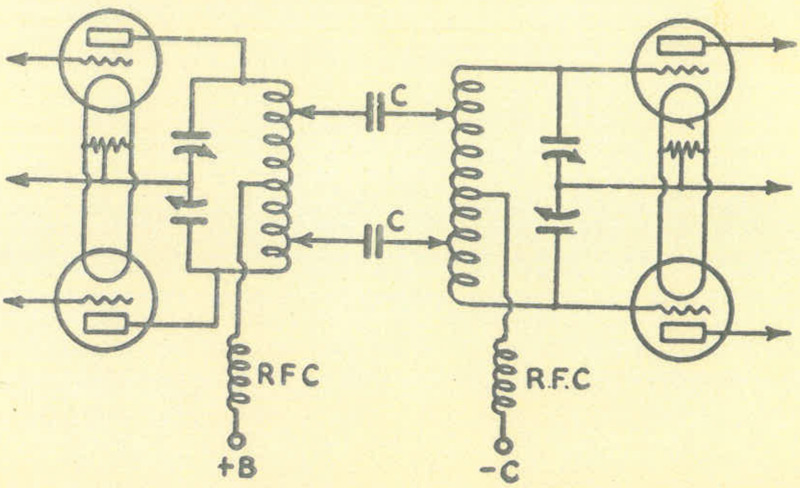


Fig. 9C - Extension of the circuit of Fig. 9B showing advantages offered by complete push pull operation.

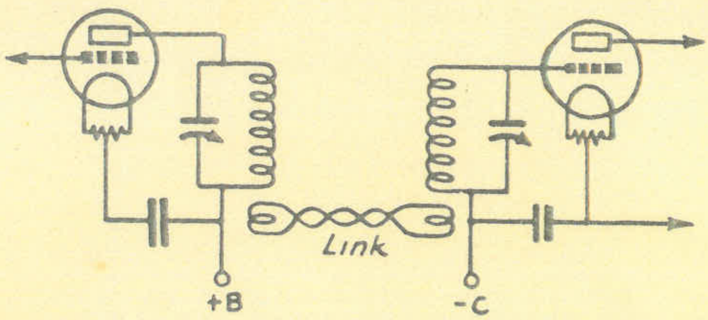


Fig. 10A - Low inpedance transmission line method of feeding energy from a M.O. to a P.A. The driver tank circuit impedance is noted then a secondary coil having a Z of 150 ohms (several turns in practice) coupled to the earthed end of the tank. A similar arrangement is made at the P.A. tank and the two small coils are joined by a short length (any length) of twisted electric light flex.

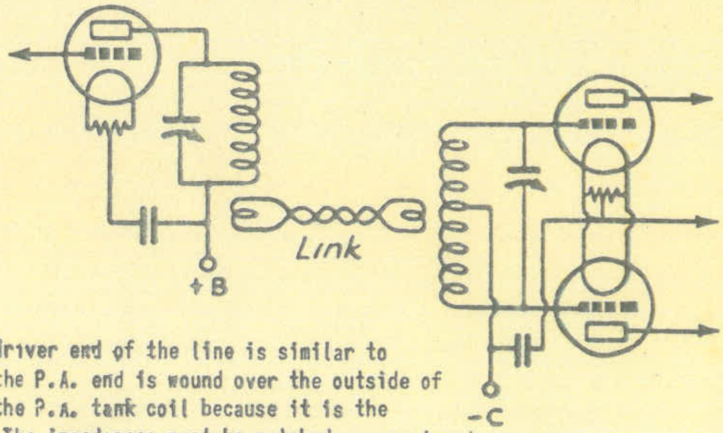


Fig. 10B - The driver end of the line is similar to Fig. 10A but the P.A. end is wound over the outside of the center of the P.A. tank coil because it is the earth point. The impedances must be matched as previously.

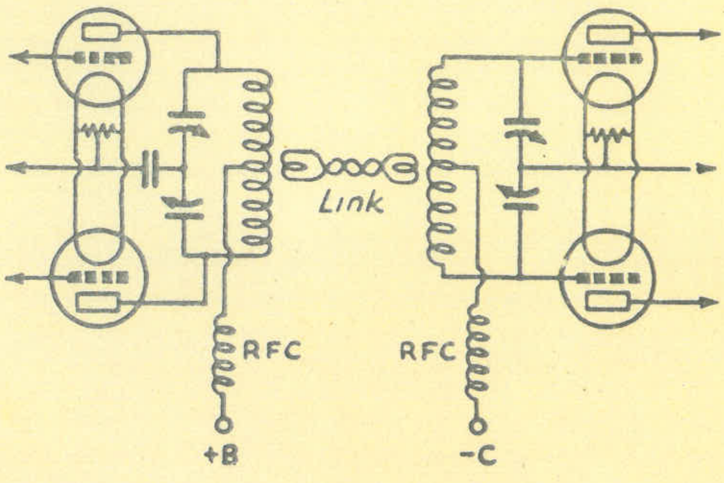
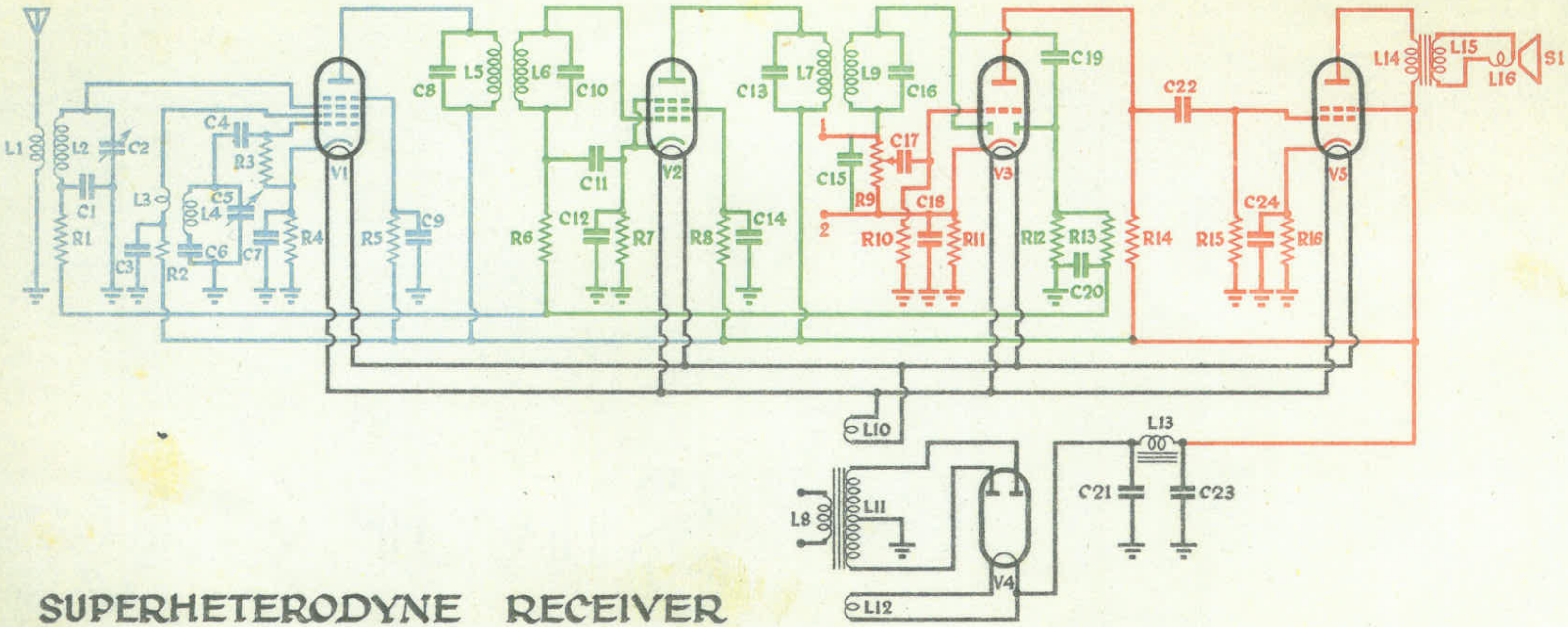


Fig. 10C - Complete push pull M.O.P.A. unit using low impedance or "Link" coupling. Because of the low impedance of the line the R.F. currents are considerable and the wire size must be checked for overheating.

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



SUPERHETERODYNE RECEIVER

Theoretical Circuit Diagram

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