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CAUSES OF RADIO INTERFERENCE FROM SERIES STREET LIGHTING SYSTEMS

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TELECOMMUNICATION REGULATORY SERVICE

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SUPPRESSION OF RADIO INDUCTIVE INTERFERENCE

CAUSES OF RADIO INTERFERENCE FROM SERIES STREET LIGHTING SYSTEMS

1. Interference Carries Far:

   (a) Surges which cause radio interference are usually carried farther on series street lighting circuits than on distribution systems and thus a single source of interference, whether it originates on the circuit in question or is induced on to this circuit from outside sources, will affect a wide area. This is due to the fact that a series street lighting line has less capacitance to ground than the average distribution lines and therefore, a single source of interference will frequently affect the broadcast receivers whose antennae are near the line at a distance of many kilometres from the source.

   (b) The distance interfering surges carry along a series line may be reduced by adding capacitance from line to ground. This may most conveniently be done by grounding any fixtures on this line such as frames of transformers, switches, or other apparatus connected to the circuit. It is not generally convenient to ground all lamp fixtures connected to a circuit, but considerable improvement may be obtained if fixtures are grounded on poles which are already equipped with a ground wire for other circuits.

2. Discharge to Ungrounded Hardware:

   (a) In the design and construction of a series street lighting system it is necessary to consider electric potential from a different point of view than the standard practice used in dealing with power problems, in order to ensure against excessive electric potential gradients which might cause radio interference. The matter of electric potential may best be understood by reference to a typical diagram.

Fig. 1

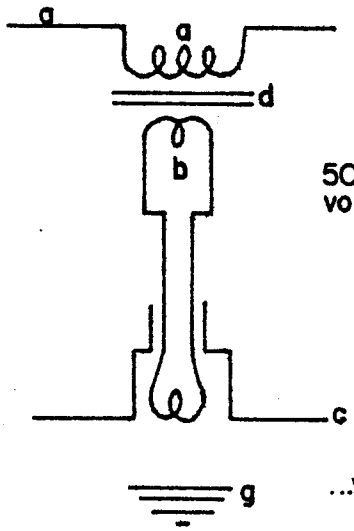
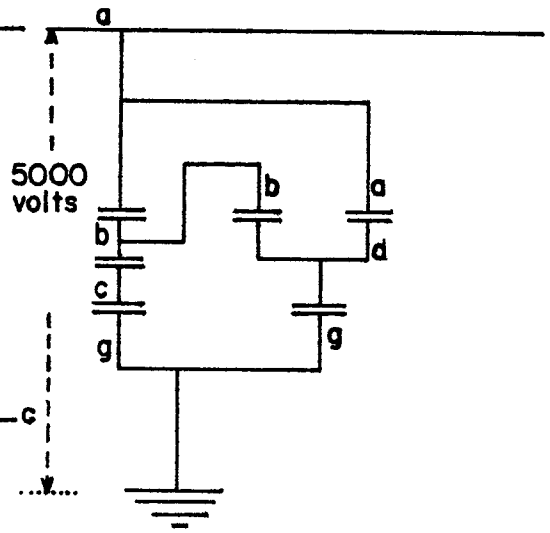


Fig. 2



a - represents the series circuit which may be at any voltage to ground up to the maximum voltage of the system, dependent on the point of the circuit under consideration with regard to ground. If the system is ungrounded, there is bound to be a certain leakage which might cause the electric potential at any one point to vary from day to day. For this purpose, assume that this part of the circuit is 5 000 volts above ground.

d - represents the individual lamp transformer core and frame.

b - represents the low voltage circuit to the lamp which is ungrounded and insulated from the line.

c - represents the lamp fixture including the gooseneck or other metal in close proximity to the secondary wiring.

g - represents ground.

Figure 2 - schematically represents the capacitances between these various circuits.

(b) If the metal of the street light fixture is grounded the capacitor cg is short-circuited.

(c) From Figure 2 it is seen that the low voltage circuit to the lamp should be considered at high voltage above ground. If, therefore, the insulation on the wire of this circuit is designed to withstand only low voltage required for the lamp it is possible that it may be broken down due to charging current from the low voltage wiring (b) to the hardware of the lamp fixture (c). If this breakdown occurred it would not interfere with the operation of the lamp as the current would be very small and there would not be sufficient heat at the point of breakdown to cause any material damage.

(d) This electric discharge, however, would cause a surge to be set up on the system which would produce severe radio interference affecting all receivers within a distance of many kilometres from the source.

3. Means of Preventing Electric Discharge:

It is recommended that the entire low voltage circuit be insulated from all hardware or other circuit, whether grounded or ungrounded, so that it will withstand a voltage test of 25% above the maximum operating voltage of the system. Insulation which will withstand this test will probably stand up under normal operation as it is seen from the diagrams above that the voltage from the secondary circuit to hardware will never be as great as the maximum voltage from line to ground although under some conditions it may approach this value.

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