

A STARTING AND OPERATING CIRCUIT FOR A FLUORESCENT LIGHT

This invention relates to a starting and operating circuit for a fluorescent light in which a gas discharge tube is adapted to emit light by the stimulation of vapour within the tube. The operation of a gas discharge tube to emit light in this way is well known.

Known fluorescent light systems use a ballast coupled with a starter switch in order to generate a sufficient voltage to strike an arc in the gas discharge tube to initiate stimulation of the vapour therein. Once initiated, the stimulation of the vapour can be sustained by a lower voltage. This known system normally results in the tube flashing a few times before emitting continuous light, which flashing is itself disadvantageous as it reduces the effective life of the tube. A variety of ballast designs have been proposed, each having advantages and disadvantages. However, each has a common problem in that it fails to operate at all when the supply voltage drops substantially, for example, by around 20%. This renders the system unsuitable for regions where a reliable mains supply is not available.

A system has been proposed which does not require the use of a starter switch, and in which upon connection of the mains supply, the light emitted from the tube grows gradually, and without flashing. While this system avoids

the reduced life of the tube consequential upon flashing, the lamp will nevertheless fail to operate upon a substantial fall in the supply voltage.

According to the present invention, there is
5 provided a circuit for starting and operating a fluorescent gas discharge tube, the gas discharge tube having first and second filament electrodes at first and second ends of the tube, respectively, the circuit comprising:

a capacitor;
10 an inductor having first and second taps;
one end of the first filament being connected to one end of the inductor, the opposite end of the inductor being connected to one side of the AC supply, and the other end of the first filament
15 being connected to the first tap on the inductor which is adjacent to the said one end thereof, and one end of the second filament being directly connected to the other side of the AC supply, the other end of the second filament being connected
20 to the capacitor which in turn is directly connected to the second tap on the inductor;
such that the main discharge path in the tube between the filament electrodes is connected in series with the inductor across the AC supply,

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and upon connection to an AC electric supply a peak voltage sufficient to strike an arc in the tube is established across the two filament electrodes of the tube.

5 By appropriate selection of the number of turns in the inductor, the capacitor, and the position of the taps on the inductor, a circuit according to the invention can be adapted to operate over a broad range of supply voltages, for example, from as low as 140 volts to as high
10 as 250 volts. In a typical circuit according to the invention, a 20 to 40 watt fluorescent tube is connected to a mains supply through a ballast comprising an inductor of around 1,000 turns, the taps being spaced by around 600 turns adjacent one end of the coil.

15 An embodiment of the invention will now be described, by way of example, with reference to the accompanying schematic drawing, which shows a circuit incorporating a fluorescent gas discharge tube for coupling to an AC mains supply.

20 The circuit illustrated shows a discharge tube 2 having two filament electrodes 4 and 6 connected via a switch (not shown) to an AC mains supply 8 through a ballast 10. The ballast 10 comprises an inductor coil 12 connected in series with the tube 2, and has two taps 14
25 and 16 at points b and c, respectively, which are intermediate the ends a and b of the coil 12. Tap 14 is

joined to the inductor coil 12 through a capacitor 18, the taps 14 and 16 are themselves also coupled respectively to the electrodes 4 and 6 of the tube 2.

The circuit shown is suitable for powering a 20
5 to 40 watt fluorescent tube from an AC mains supply of 200 volts. The inductor consists of a coil of 1,005 turns around a 6.5 sq cm core with a 0.26 mm gap on the magnetic path. The tapping points b and c are spaced by 600 turns, equivalent to an inductance of 0.45 Henries. The tapping
10 point b is spaced from the end a of the coil by 400 turns (approximately 0.22 Henries) and tapping point c is spaced from the other end d of the coil by 5 turns. The capacitance of the capacitor 18 is 7.6 μ fd. The disposition of the tapping points a and b may be adjusted
15 for different mains supply voltages.

In the arrangement shown, the connection of a 200 volt AC supply 8 will generate a peak voltage of around 400 volts at tap 14, and a surge voltage as a spike of around 800 volts at tap 16. These voltages are in phase and the
20 resulting peak voltage across the electrodes 4 and 6 of the tube 2 will be higher than 1,200 volts, resulting in the immediate striking of the arc therein. Once the arc is struck, the voltage across the electrodes will drop to around 100 volts RMS, sustaining the arc and maintaining
25 the tube illuminated.

It will be appreciated that in the event of the mains supply falling by 20%, the surge voltage which will be generated across the electrodes 4 and 6 will still be in excess of 1,000 volts, which is quite sufficient to strike an arc in the tube. Further, in each case, the arc will be struck immediately the circuit is connected to the mains supply, and preliminary flashing is avoided.

Circuits powering fluorescent lamps according to the invention can be effectively used in regions where the AC mains supply varies over a relatively wide range. The system illustrated can be connected to supply voltages which vary between 140 and 250 volts, and remain effective, whereas comparable previous systems would cease to function at voltages below around 170 volts. It will be appreciated also that fluorescent lamps may be adapted to be operated by circuits according to the invention in conjunction with supply voltages other than those referred above.

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C L A I M S:

1. A circuit for starting and operating a
fluorescent gas discharge tube, the gas discharge tube
having first and second filament electrodes at first and
5 second ends of the tube, respectively, the circuit
comprising:
 - a capacitor;
 - an inductor having first and second taps;
 - one end of the first filament being connected to
 - 10 one end of the inductor, the opposite end of the
inductor being connected to one side of the AC
supply, and the other end of the first filament
being connected to the first tap on the inductor
which is adjacent to the said one end thereof,
 - 15 and one end of the second filament being directly
connected to the other side of the AC supply, the
other end of the second filament being connected
to the capacitor which in turn is directly
connected to the second tap on the inductor;
 - 20 such that the main discharge path in the tube
between the filament electrodes is connected in
series with the inductor across the AC supply,
and upon connection to an AC electric supply a
peak voltage sufficient to strike an arc in the
 - 25 tube is established across the two filament
electrodes of the tube.



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2. A circuit as claimed in Claim 1 in which the disposition of the first and second taps on the inductor is adjustable.

3. A circuit as claimed in Claim 1 or Claim 2 in
5 which the inductor and capacitor are included in a single ballast unit.

4. A circuit for starting and operating a fluorescent gas discharge tube, substantially as described herein with reference to the accompanying drawing.

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