August 1971

Brief 71-10275

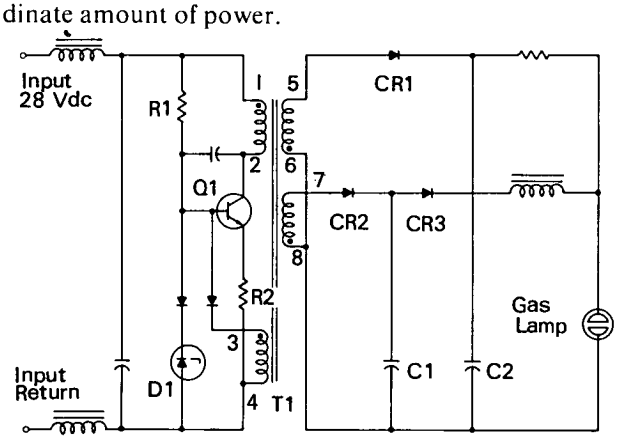
NASA TECH BRIEF

Marshall Space Flight Center

Oscillating Tank Circuit Eliminates Ballast Resistor in Lamp Control Circuit

The problem:

When a compact-arc lamp containing mercury or xenon gas is ignited, the current through the lamp increases rapidly to a potentially destructive level. In the past, a series current-limiting resistor was included to limit the lamp current to a safe operating level, but this resistor dissipated an inordinate amount of power.



The solution:

An oscillating tank circuit (see fig.), which is an integral part of the control circuit, can be used to limit the lamp current.

How it's done:

Upon application of a 28 Vdc input, the collector current of Q1 increases and its emitter goes positive due to the voltage buildup across R2. When the emitter voltage equals that across the zener diode, Q1 turns off and the "dot" ends of the transformer windings become negative. CR1 and CR2 are then forward biased, and the charge stored in T1 is transferred into capacitors C1 and C2. Winding 3-4 of T1 biases Q1 off as long as the charge transfer continues; when T1 has discharged, Q1 is again turned on and the cycle is repeated. After several cycles, C2 is charged to the firing voltage of the lamp. At the same time, C1 is charged to the lower, glow-maintaining voltage through winding 7-8 and CR2. When the lamp is ignited, the voltage across it decreases to less than the maintaining value and CR3 is forward biased. C1 then furnishes the current to the lamp. Lamp current is limited by the self-oscillating charge transfer circuit, thereby obviating the need for the series resistor.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Code A&TS-TU
Marshall Space Flight Center
Huntsville, Alabama 35812
Reference: B71-10275

Patent status:

No patent action is contemplated by NASA.

Source: L. R. Lister of
Sperry Rand Corp.
under contract to
Marshall Space Flight Center
(MFS-20891)

Category 01