



engineering data service

electronic products

OA5

DESCRIPTION: Triggertube Type OA5

A new tube designed especially for electronic relay applications.

The SYLVANIA Type OA5 Triggertube is an inert-gas-filled internally-triggered cold cathode trigger tube specifically designed for electronic relay and switching service involving extremely high instantaneous peak currents—of the order of hundreds of amperes—at low average current levels. It utilizes a cathode structure similar to that of the widely-used Type 1D21/SN4 Strobotrons, but further improved for relay work. The OA5 is constructed so that it will be fired by positive grid pulses. The special design of this tube results in several important new features:

First, the use of a keep-alive grid among other techniques insures relatively stable triggering characteristics throughout live, a fact which will be of benefit in many varied types of equipment.

The time required to initiate the arc (delay time) has been reduced to a value of only a few microseconds. The deionization time has been decreased as well.

The trigger grid requirements have been reduced to a very low value (microamperes). Because of this fact, for example, it is possible, with high-intensity light flashes, to trigger the SYLVANIA OA5 directly from a phototube without intervening amplifiers. The tube directly bridges the gap between very low instantaneous current levels and very high instantaneous current levels.

This tube is rated at anode potentials up to the high level of 1000 volts.

The SYLVANIA Type OA5 measures only 1 $\frac{5}{8}$ " in overall height and 11/16" in diameter.

This tube has been designed specifically for trigger tube applications and is not intended for stroboscopic applications which utilize the light flashes produced by the arc.

Among the applications for which this tube is particularly adapted is the triggering of flash tubes in electronic photo-flash equipment. Firing may be readily controlled by a manual trip-switch, by built-in shutter synchronizing switches, or by a phototube. The use of a phototube in combination with the OA5 permits simultaneous control of any number of flash units without the use of interconnecting cables. Moreover, the extremely low trigger current requirements eliminate the possibility of shock and reduce the sparking of the switch contacts to a negligible degree. Another use of the SYLVANIA Type OA5 is in the triggering of such tubes as the 1D21 which are used for stroboscopic work. The OA5 is also used in depth recorder circuits. These are uses in which the OA5 triggers off other types of tubes which either handle higher output powers, or need more power to trigger them off than

is available in the source of the triggering impulse, or both. These applications exemplify the versatility and usefulness of the Triggertube.

Many additional applications are expected to develop for this miniature relay tube wherever precision firing, low firing delay time, low triggering current, and relatively high anode operating potentials are important.

TYPICAL CIRCUITS

Typical circuits are shown in Figures 1, 2 and 3. The circuit of Figure 1 utilizes a battery for providing the trigger pulse voltage. In Figures 2 and 3 both the trigger grid bias and pulse voltages are derived from a bleeder across the power supply.

Figure 2 is a representative circuit for firing an externally triggered electroflash tube from a shutter synchronizing switch. In Figure 3 a photocell provides the triggering pulse and permits synchronized control of a number of flash units.

It should be noted that the shield grid (G2, Pin #5) is left floating in all the circuits illustrated. The shield grid may be grounded to the cathode through a 10 megohm resistor to provide a considerable increase in hold-off voltage. However, this will also require that considerably higher trigger pulse voltages be provided, together with an appreciable increase in the grid pulse (or switch) current.

Sylvania TYPE OA-5 is licensed under the tube patents of Edgerton, Germeshausen, and Grier, but no license is implied under their circuit patents.

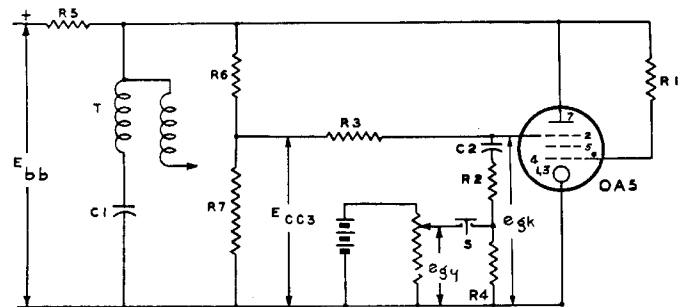
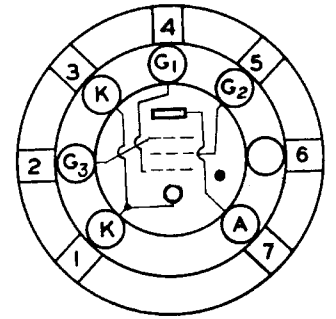
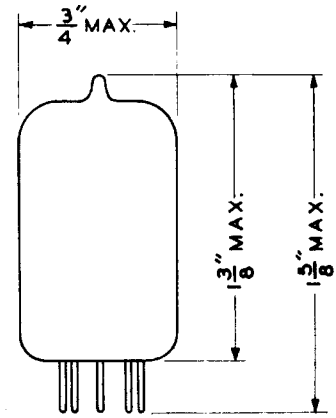


FIG. 1 Fixed Trigger Grid Bias

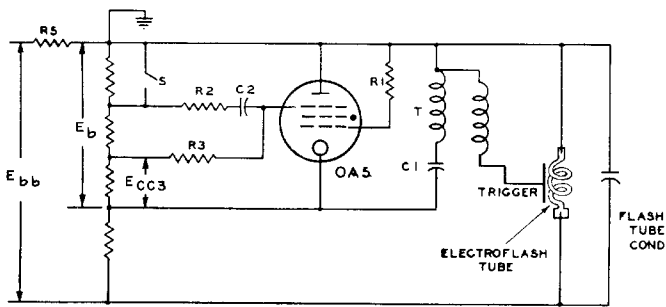


FIG. 2 Synchronous Switch Tripping Circuit

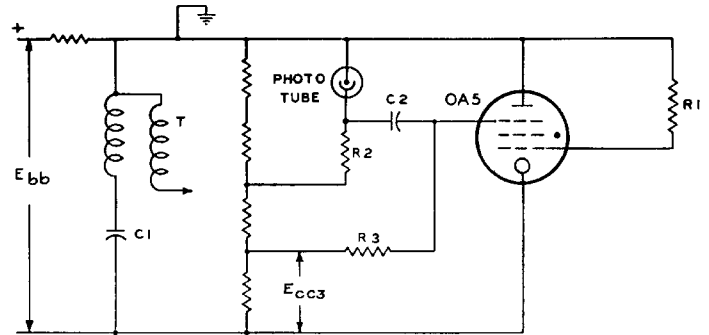


FIG. 3 Phototube Tripping Circuit

MECHANICAL SPECIFICATIONS

| | |
|---------------------------|------------------------|
| Bulb | T-51½ |
| Base | Miniature button 7-pin |
| Mounting Position | Any |
| Pin Connections | (also see diagram) |
| Pin #1 Cathode | Pin #5 Shield Grid G2 |
| Pin #2 Trigger Grid G3 | *Pin #6 no connection |
| Pin #3 Cathode | Pin #7 Anode |
| Pin #4 Keep-alive Grid G1 | |

ELECTRICAL RATINGS

| | |
|--|------------------|
| Hold-off voltage Note 1 | 1500 V.D.C. Min. |
| Keep-alive current | 100µ a. Max. |
| Anode operating voltage (Eb Max.) | 1000 V.D.C. Max. |
| Anode operating voltage (Eb Min.) Note 2 | 500 V.D.C. Min. |
| Trigger grid firing potential Note 3 (egk) | +180 V. Min. |
| Trigger grid bias voltage (Ecc3) Note 3 | +90 Max. |
| Trigger grid pulse current Note 4 | 40µa. Max. |
| Discharge capacitance | 0.5µfd. Max. |
| Power input Note 5 | 1.0 watt Max. |
| Repetition rate Note 5 | |
| Peak cathode current Note 6 | 10 A. Min. |
| Ambient Temperature | -40°C. to +60°C. |

Typical Operation (See Figures 2 and 3) :

| | |
|----------------------------------|-------------|
| Anode voltage | 750 V. |
| Trigger grid bias (Ecc3) | +90 V. |
| Trigger grid pulse voltage (egy) | 95 V. |
| Trigger grid resistance | 0.25 Megohm |
| Discharge condenser | 0.25µfd. |
| Keep-alive current | 50µa. |

*Do not use Pin #6 as tie-point terminal.

NOTE 1

Hold-off voltage is defined as the greatest anode voltage at which the tube will not fire without the application of a triggering pulse to the trigger grid. It depends on the circuit design and the voltage-current conditions. As specified above the hold-off voltage is that measured in a circuit similar to Figure 1 with a trigger grid bias voltage of 90 volts and a keep-alive current of 50µa.

NOTE 2

Operation with anode voltages as low as 350 V. is possible, but will require considerably higher trigger pulse voltages.

NOTE 3

The minimum trigger grid firing potential (egy) is defined as the minimum instantaneous grid potential required to fire the tube. This potential is the sum of the steady bias voltage (Ec3) and trigger grid pulse voltage (egy). The trigger bias voltage must have at least the value specified above, and at the same time the trigger grid pulse voltage must be such that, whatever the value chosen for the pulse voltage, the total or grid firing potential requirement of at least 180 V. total will be satisfied.

NOTE 4

As measured in a circuit similar to Figure 1 with 50µa. keep-alive current and 90 volts trigger grid bias.

NOTE 5

The maximum power input is given by $W = 1/2CV^2f$, where C is the discharge capacitance in microfarads, V is the anode voltage in kilovolts and f is the number of flashes or pulses per second. This relation also determines the maximum repetition rate.

NOTE 6

Minimum peak cathode current required to initiate arc.