MECHANICAL DATA
Mounting Position . . . . . . . . Any (Count is Read from Top of Tube
Zero Position (Cathode No. 10) . . . . Aligned with Pin 12 ±10°

ELECTRICAL DATA
RATINGS (Absolute Values)
Total Anode Current . . . . . . . . 0.60 Ma. Max.
Voltage Between Electrodes
(Other Than Anode) . . . . . . . . 140 Volts Max.
Supply Voltage (Anode to Cathode) . . . . . . 350 Volts Min.
Input Frequency . . . . . . . . . . 4,000 P.P.S. Max.

TYPICAL OPERATION
D.C. Supply Voltage . . . . . . . . 400 Volts
Anode Resistor . . . . . . . . . . 0.47 Megohm
Nominal Tube Drop
(Under These Conditions) . . . . . 191 Volts
Cathode Resistor . . . . . . . . . . 68,000 Ohms
Output Voltage
(Developed Across Cathode Resistor) . . . 28 Volts

APPLICATION DATA
The Sylvania Type 6476 is a cold cathode, bidirectional decade counter tube. It is
designed for use in medium speed decimal counting apparatus such as scalers, computers
and dividers. The count is determined by noting the position of the glow on any one of
the ten radially spaced cathodes around an axially positioned anode. The multiple output
cathode arrangement allows the selection of pre-set conditions with the addition of suit-
able external circuitry.

PRINCIPLES OF OPERATION
General Principles
The 6476 operates on the principle that the ionization or starting voltage of gas
filled tubes is lowered if ions or electrons are already present in the anode-cathode
gap. Under these conditions, a glow discharge can then be made to move from one
cathode to an adjacent one by means of a relatively small negative voltage pulse on
the new cathode, provided that electrons or ions are able to diffuse into this new
anode-cathode gap. If a series of cathodes are present about a common anode, the
discharge can be made to move in succession along the cathode series by a successive
application of voltage pulses to each cathode.

Details of Operation
The 6476 has 30 cathodes equally spaced on a circle about a central anode disc.
The cathodes are divided into 10 main or output cathodes and 20 intermediate guide
cathodes — two of which are located between every main cathode interval, see Fig. 1.

(Continued on reverse)
PRINCIPLES OF OPERATION (cont'd.)

FIG. 1 — ELECTRODE ARRANGEMENT

The two guide cathodes are necessary to make certain that the glow always moves in the desired direction and does not return to the original cathode upon removal of the voltage from the new cathode. A description of the transfer mechanism from one main cathode to the next adjacent one will make this clearer. Assuming that a glow is present on $K_1$, a negative pulse on the $G'_2$ (Fig. 2) will move the glow to $G'_2$. At the end of this pulse, a second negative pulse is applied to $G''_2$ moving the glow on to $G''_2$. Because the guide cathodes are normally biased above the main cathodes, (Fig. 2), removal of the negative pulse from $G''$ means that the glow will go to a main cathode. The preferential influence of the ionization near $K_2$ causes the glow to settle on $K_2$ rather than return to $K_1$. The glow will remain on $K_2$ until the sequence is repeated for the next set of cathodes. In practice, all of the $G'$ electrodes are connected together as are also all of the $G''$ electrodes, Fig. 3. Although the negative transfer pulse is applied to all ten guide cathodes simultaneously, the priming influence of the discharge moves the glow to the guide cathode which is closest to the discharge.

FIG. 2 — VOLTAGE-TIME CHARACTERISTICS
FIG. 3 — ELECTRODE ARRANGEMENT WITH CIRCUIT CONNECTIONS

An output pulse can be obtained from each main cathode as the glow moves onto it. If preferred, an output can be derived from selective cathodes only. It should also be noted that reversal of the pulse sequence applied to G’ and G” will reverse the direction of the glow transfer.

The glow is restricted to one main cathode only when the anode voltage is first applied by the action of the anode resistor (Fig. 3) which immediately lowers the voltage across the anode-cathode gap to the maintaining value. This is below the starting voltage of the other main cathodes or the transfer voltage of the guide cathodes.

The driving circuit given below offers certain advantages over the previously published circuits.

TYPICAL DRIVING CIRCUIT

The important feature of the new circuit is that it provides an essentially square wave pulse to the guide pins. A square wave driving pulse assures stable operation throughout the life of the 6476 in spite of small changes which may occur in the guide voltages.

NOTE: The B+ of the driver is obtained through the guide to anode capacity of the counter tube.
OUTLINE DRAWING

BASE CONNECTIONS

CATHODE 8  CATHODE 7  CATHODE 9  CATHODE 6
CATHODE 10  CATHODE 5  CATHODE 4
GUIDE 1  CATHODE 3
GUIDE 2  CATHODE 2

(CENTER POST) ANODE