

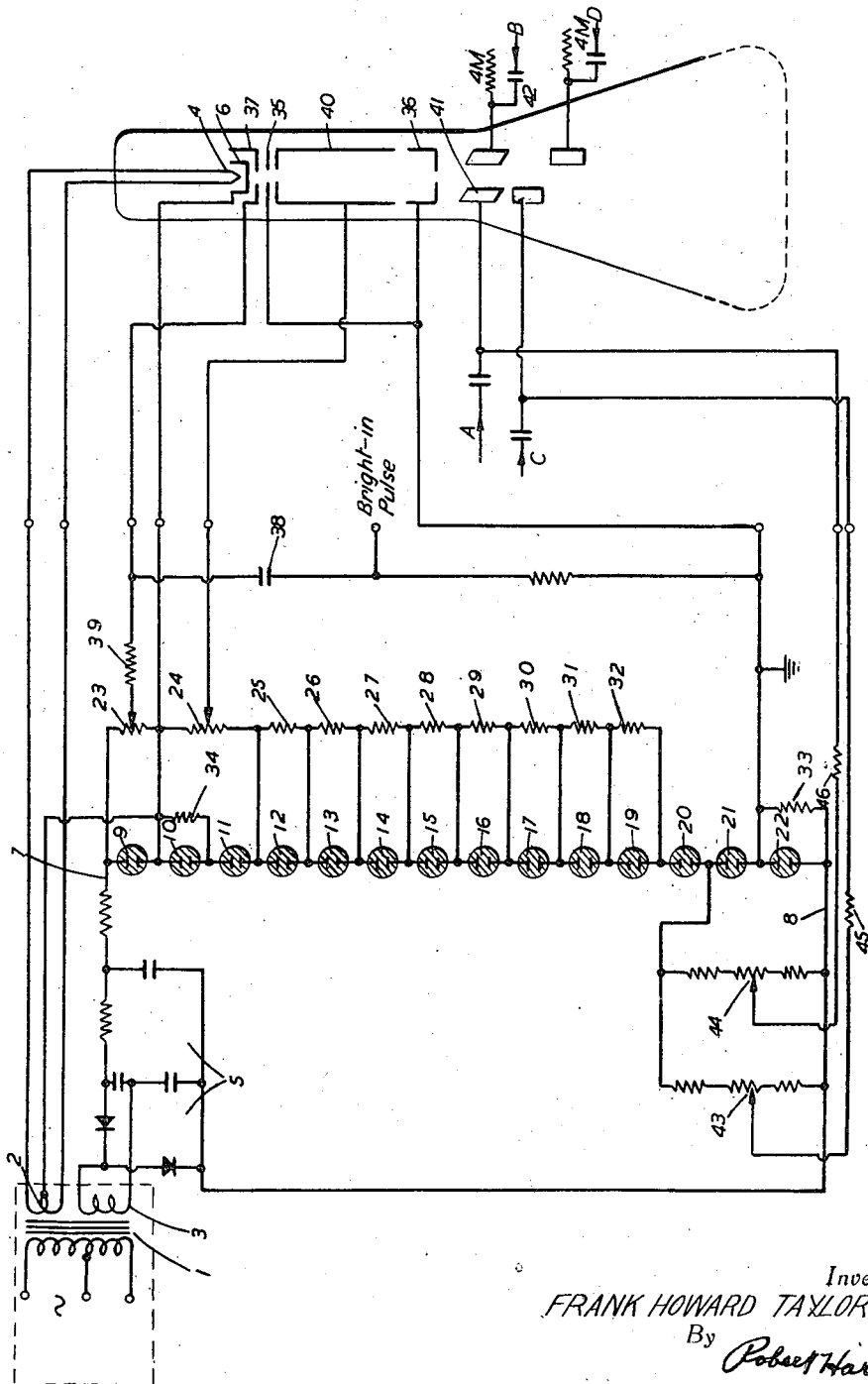
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CIRCUIT ARRANGEMENT FOR CATHODE-RAY TUBES

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CIRCUIT ARRANGEMENT FOR
CATHODE-RAY TUBES

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This invention relates to circuit arrangements for cathode ray tubes and more particularly to the power and voltage supply circuits for such tubes.

With modern aircraft navigational aids employing cathode ray tubes for providing indications, it is desirable that the equipment shall be physically small, light in weight and shall take as small a power drain from the aircraft current supply as possible. In order to reduce the size and weight of the components in radar equipment, for example, it is customary at the present time to use alternating current supply frequencies of the order of 1900 cycles. It is advisable, however, that the supply frequency for the cathode ray tube power supply should be standardised if possible at 400 cycles.

An object of the present invention is the provision of a power supply circuit which will permit efficient operation of a cathode ray tube on the standard 400 cycle frequency with a reduction in weight and size of the power supply circuit components.

According to the present invention the conventional resistance bleeder chain is replaced by a chain of gas-filled glow discharge stabiliser tubes. The current through the customary resistance chain is of the order of 8-10 ma. so that the change in the cathode ray tube beam current which is usually of the order of 50 μ amps. maximum results in very little change in the electrode voltages. By the use of the stabiliser tube chain now proposed, the bleeder current can be reduced to 500 μ amps. and the same change in beam current will not affect the electrode voltages. This, therefore, in itself results in a considerable saving in power supply drain which is reflected in a corresponding reduction in the physical dimensions of the transformer, rectifier circuit components and filter condensers. The degree of filtering can also be somewhat reduced as any ripple voltages applied to the stabiliser tube chain will not affect the voltages applied to the electrodes of the cathode ray tube. A further saving in weight and space is obtained from the fact that by-pass condensers are no longer necessary across the electrodes of the tube since the stabiliser tubes provide sufficient by-pass. Moreover the deflector shift voltages may also be obtained from

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the stabiliser chain without the provision of by-pass condensers.

The invention will be more clearly understood from the following detailed description of one embodiment of the invention taken in conjunction with the accompanying drawing which shows the circuit diagram of a cathode ray tube and the power and voltage supply therefor.

In the drawing a source of 400 cycle current derived from an oscillator is connected to the primary of a transformer 1 having two secondary windings 2 and 3. Secondary winding 2 is connected to the heater 4 of the cathode ray tube whilst secondary winding 3 is connected to a voltage doubler rectifier circuit 5 of conventional form. The centre tap of the winding 2 is connected in the usual manner to the cathode 6. Across the output leads 7 and 8 from the rectifier circuit 5 there is connected a chain of miniature stabiliser tubes 9, 10-22.

The stabiliser tubes 9, 10-22 consist of gas filled glow discharge tubes which have the well-known property that the voltages across them remain substantially constant irrespective of the amount of current flowing through them. The tubes 9 to 19 and 22 are shunted by high resistances 23 to 34 as shown. A point between the tubes 21 and 22 is connected to ground and to the first and third anodes 35 and 36 of the cathode ray tube. As is customary in the operation of cathode ray tubes the electrode to be maintained at the most positive potential with respect to the cathode is grounded and the cathode 6 and other electrodes are connected to points at negative potentials in the chain of stabiliser tubes.

The cathode 6 is connected to a point between the resistances 23 and 24. The grid 37, to which the bright-in pulse is adapted to be applied over a condenser 38, is connected over a series resistance 39 to an adjustable tap on the potentiometer resistance 23, so as to maintain this electrode at a slightly negative potential relative to the cathode 6. The focussing electrode 40 is connected to an adjustable tap on potentiometer resistance 24.

Adjustable positive or negative shift voltages for the horizontal and vertical deflector plates 41 and 42 are derived from potentiometers 43 and 44 shunted across the stabiliser tubes 21 and 22, series resistances 45 and 46 being provided in the connections to these plates. The x and y signals

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are adapted to be applied in the usual manner to the deflector plates at points A, B, and C, D respectively.

The following figures give the power drain that the circuit requires using a "7" cathode ray tube operating on 2000 volts:

	Watts
Cathode ray tube heater -----	4
Rectifier input -----	1½
Transformer losses -----	2½
Total watts input	8

It is therefore proposed that for small aircraft having D. C. supplies a small permanent magnet alternator attached to or incorporated in the rotary converter to deliver 8 watts at 400 cycles. In large aircraft a power supply is normally provided at 400 cycles.

The invention is not to be regarded as restricted to the specific circuit arrangement described and various modifications may be made without departing from the scope of the appended claims. The invention is moreover equally applicable to the power supply of all types of cathode ray tubes.

What is claimed is:

1. A cathode ray tube circuit comprising a power supply unit, positive and negative voltage leads extending from said unit, a chain of gas-filled glow discharge stabiliser tubes connected across said leads, high resistances shunted across said stabiliser tubes, and connections from electrodes of said cathode ray tube to taps on said resistances to supply completely the operating power of the tube.

2. A cathode ray tube circuit comprising a power supply unit, positive and negative leads extending from said unit, a chain of gas filled glow discharge stabiliser tubes connected across said leads, resistances shunted across said stabiliser tubes, connections from voltage taps on said resistances to one or more electrodes of said cathode ray tube, a grounded connection to a point inter-

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mediate two of said stabiliser tubes, potentiometer resistances connected across said two last-mentioned tubes, and connections from taps on said resistances to the deflecting electrodes of said cathode ray tube.

3. A power supply circuit for a cathode ray tube comprising a source of alternating current, a voltage doubler rectifier circuit, a chain of gas-filled stabiliser tubes connected across the output leads from said rectifier circuit, high resistances connected across said stabiliser tubes and taps on said resistances adapted to be connected to all the respective electrodes of a cathode ray tube.

4. A cathode ray tube circuit comprising a power supply unit, positive and negative voltage leads extending from said unit, a chain of gas-filled glow discharge stabilizer tubes connected across said leads, high resistances shunted across said stabilizer tubes, and a grounded connection from the high voltage electrodes of said cathode tube to a tap on said resistances near one end of the chain and from the cathode to a tap on the resistances near the other end of the chain.

5. A cathode ray tube circuit according to claim 1, including a further shunt across said chain comprising a capacity and resistance in series and a connection joined to a point there between for supplying a "bright-impulse."

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