

EMERGENCY POWER SOURCE FOR AN ION VACUUM PUMP*

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This note describes a simple high voltage DC generator which serves as an emergency power source for an ion vacuum pump during power interruptions, or failure of the main supply.

The circuit of Figure 1 is current limited to supply about 100 micro-amperes at 3.5 kilovolts, although the output voltage may be increased to suit the ion pump requirements by using more stages of the Cockroft-Walton type multiplier. It may be powered by a 24 VDC rechargeable stand-by supply and allowed to be in continuous oscillation, or a dry cell source can be switched on by a power failure. A stack of D cells can maintain high vacuum for several days. At this input voltage, the oscillator runs at about 25 kHz.

A method of coupling to a typical ion pump is shown. This will indicate the pump current on the meter, whether it comes from the normal source, or from the emergency supply. The high voltage diode can be located within the controller box.

The performance of the circuit with 24 VDC input is shown in Table 1. In the short circuit condition, all of the power is being dissipated in the large output resistor, while the efficiency of the DC converter itself is about 70%. The large resistor is required here to decouple the oscillator from the load.

INPUT	OUTPUT	
I	V	I
27 mA	3.6 kV	0
30 mA	3.5 kV	17 μ A
40 mA	3.0 kV	100 μ A
100 mA (limit)	0	600 μ A

TABLE 1

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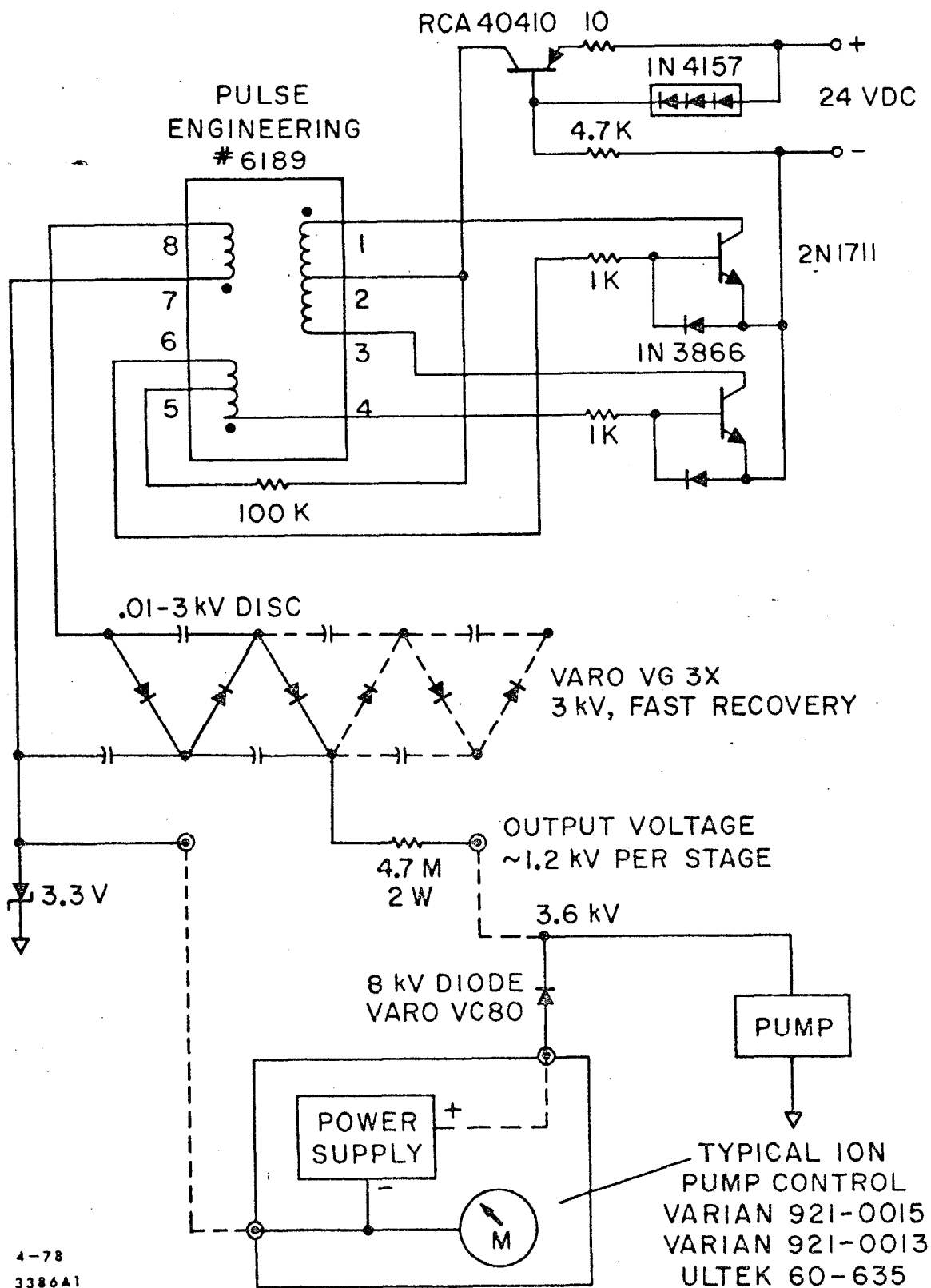


Figure 1. Schematic of Emergency Ion Pump supply. With the exception of the transformer, none of the components is critical.