A BLOOD-LEVEL DETECTOR

DUANE AUSHERMAN* and STEPHEN R. TOPAZ, B.S.M.E.

Department of Artificial Organs

A blood-level detector is essential to assure a constant volume of blood in the heart-lung machine used in the operating room or in the small pump-oxygenator used in the emergency treatment of infants and children, and for experimental purposes. Maintenance of a constant blood volume in the apparatus is one way to maintain a stable blood volume in the patient or in the animal.

The blood-level detector described here is simple and reliable; the circuits are simpler than those of any other known to us. It monitors the level of saline solution in a side reservoir with a current of not more than 1 ma. passing through the saline mixture. Since saline and blood are separated considerably by the constriction in the vessel, the current is not passed directly through blood, thus minimizing electric damage.

The blood-level detector has two electric circuits, an electrode circuit, and a recorder circuit (*Fig. 1*); it is similar to the circuitry used automatically, in case of

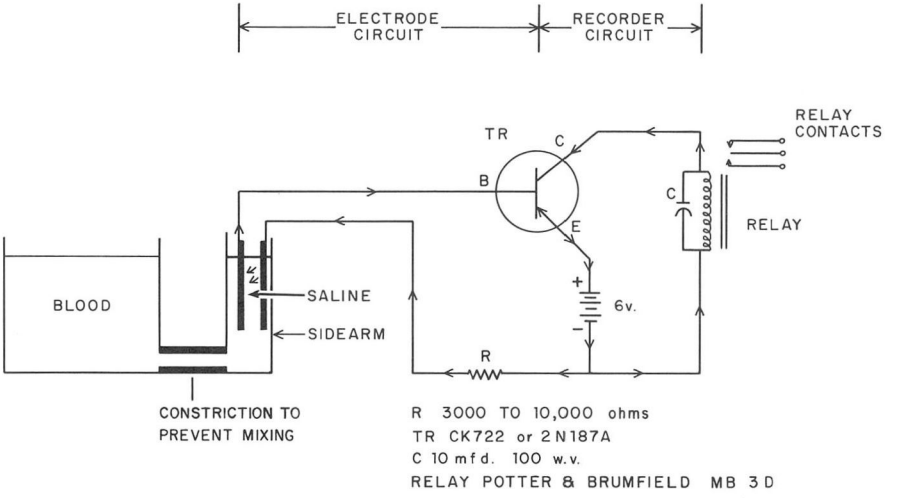

Fig. 1. Diagram of electric circuits of a blood-level detector.

rain, to trigger a mechanism to close the top of a convertible. The electrode circuit consists of an appropriate maximal resistor that allows a minimal current to pass whenever the electrodes come in contact with the saline. The resistance should be

**Formerly technician in the Department of Artificial Organs, Cleveland Clinic; present address: 341 Maybelle, Witchita, Kansas.*

as large as possible and yet retain the desired sensitivity. When the electrode circuit is closed by the saline, it triggers the transistor switch, which completes the recorder circuit. The latter contains a relay (any sensitive 6-v. type) that may operate an alarm, pump, or whatever device is desired. The condenser across the relay protects the transistor from inductive back voltage from the relay. The parts used in the present setup are listed under the diagram.