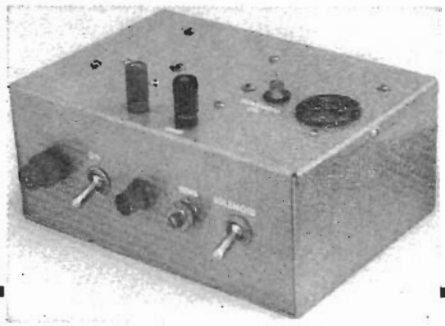


Sensor controls liquid levels

Two-transistor unit maintains the level of any conductive liquid

By S. A. ERCEG and N. J. CHERVENAK

Used with a sensing probe and a solenoid-operated valve, this device automatically regulates the level of a liquid in a container, prevents the accumulation of excess foam in a vat or performs any number of similar regulating jobs. Upon sensing a predetermined level of liquid or foam, the device applies 117 volts ac to the valve solenoid. Depending upon the particular application, the valve may be rigged to close when solenoid is energized and shut off the incoming flow of liquid to a container, or the valve may be rigged to open and allow the flow of an antifoam agent into a vat.

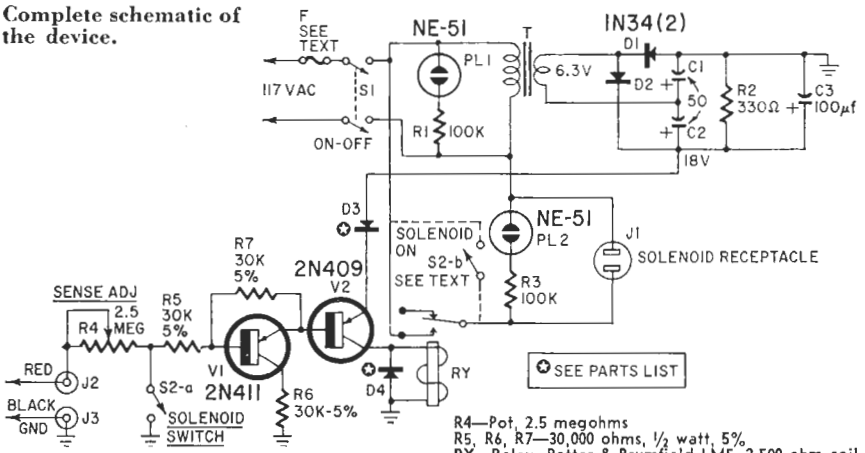
The sensing unit was developed for use in a pilot-plant operation to control the level of foam in a tall cylindrical tank. The contents of the tank are agitated by introducing compressed air at the bottom. Considerable foam is thus created and the height to which it rises must be controlled with a liquid antifoam material. The sensing unit is connected to a probe in the tank which detects the foam level when the probe contacts it. If the foam reaches the probe, the sensor causes a solenoid valve on a container of antifoam material to open so the material can flow into the tank. As soon as the material reduces the foam below the probe, contact is broken and the solenoid valve shuts off.

It was desired to start the entire operation several hours before personnel arrived in the morning. A timing system could turn on air to agitate the tank contents, but control of the foaming with minimal amounts of antifoam material was a problem until the sensing unit was installed.

How it operates

The schematic is self-explanatory for the most part. The B-plus supply is noncritical. The approximate 18 volts dc provided by the filament transformer and simple voltage doubler does the job. When power switch S1 is closed, 117 volts ac energizes the power supply and is applied to an open contact on the relay and to one side of receptacle J1. A neon lamp indicates power on. The solenoid is plugged into receptacle J1. Black sensing jack J3 is connected to the liquid container which should be grounded. A sensing probe, insulated

Complete schematic of the device.



C1, C2—50 μf, 12 volts, electrolytic
C3—100 μf, 25 volts, electrolytic
D1, D2—IN34
D3, D4—General-purpose germanium diodes, IN34 or equivalent
F—Fuse. See text.
J1—Chassis-mounted 125-volt ac receptacle
J2, J3—Binding posts
R1, R3—100,000 ohms, ½ watt
R2—330 ohms, 2 watt
R4—Pot, 2.5 megohms
R5, R6, R7—30,000 ohms, ½ watt, 5%
RY—Relay, Potter & Brumfield LM5, 2,500-ohm coil
S1, S2—Dpst toggles (see text)
T—6.3-volt filament transformer
V1—2N411
V2—2N409
PL1, PL2—neon lamps—NE-51
Terminal strip, as needed
Chassis to suit
Miscellaneous hardware
Circuit board, 10 terminals for power supply
Circuit board, 12 terminals for amplifier