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Circuits are presented for two devices designed to prevent overheating or freezing of *Drosophila* incubators resulting from failures of refrigeration units, heating units, or controls. The devices are independent of the incubators and need have only a sensing unit within the incu-

bator. Parts for each unit built here cost about twenty-three dollars and each unit requires about three hours to build.

In case of failure (the limits for which the thermostats are set being exceeded) the power to the incubator is turned off, and a warning light is turned on. This state is maintained until a reset button is pressed; if the temperature still does not fall within the set limits, the unit will again turn off the power to the incubator and illuminate the warning light. A receptacle for an alternate warning device is included so that such a device can be attached to the unit; it will be given power whenever the warning lamp is on.

The circuits below include a switch for turning off the power to the safety unit and the incubator, and for removing the safety unit from the circuit without requiring unplugging and reconnecting of power lines.

The first circuit is the one used here, and is preferred because of its greater simplicity and fewer components. However, it requires two different types of thermostats: one opening on temperature rise and one opening on temperature fall. If trouble is had in acquiring one of each type (for each unit), the second circuit may be used; it uses thermostats which both open with temperature rise (such as thermostats commonly used for regulating home heating systems) or which open with temperature fall.

If possible, adjustable thermostats should be used, unless fixed ones are available set at the correct temperatures, and other temperatures are not likely to be wanted later. For our incubators, set at 25°C., the thermostats are set for limits of 20°C. and 30°C.

All parts except the thermostats are readily available through electronic parts distributors. The thermostats we used were obtained from Herbach and Rademan, Inc. (1204 Arch Street, Philadelphia, Pennsylvania, 19107). For each unit, one of their catalog number TM12K580 and one of their catalog number TM16K745 were used. (The latter, factory set at 45°F. was reset for 30°C. and the former, set at about 400°F. was reset at 20°C.)

Component placement is not critical. Only the thermostats should be placed within the incubator.

Note: With both of these circuits, if the power is turned off, when it is turned on again, the units will have been tripped and will have to be reset.

Parts list for circuit 1 (in addition to the thermostats, listed above).

Quantity	Description
1	Potter & Brumfield relay, PR 11 AY, 120V, DPDT
1	Pushbutton Switch (NO), H. H. Smith 992
1	Center-off Switch, Cutler-Hammer 7581K6
1	Pilot Light Assembly, Dialco 502-3214-0431-302
1	Pilot Lamp, type 6S6
2	Amphenol 160-2 Socket, F. Flange
1*	Cinch-Jones plug, P-302-CCT
1*	Cinch-Jones Socket, S-302-AB
1	8 foot three wire cable and plug, Belden 17408
1	Miniature Box, Bud CU-3009A (for control unit)
1	Plastic Case, Waldom BC-140B1 (for thermostats)
1	Panel for above, Waldom BP-138
1	Fuseholder, Buss HKP
1	20 Amp Slow-blow Fuse, Buss ABC 20
*	A length of "zip" cord to connect the control unit and the thermostat (approx. 10 feet)

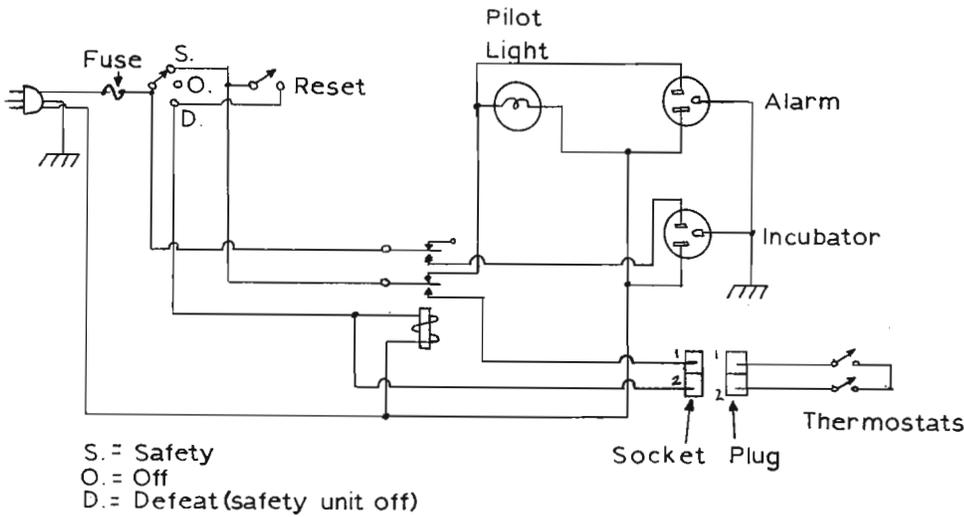
Parts list for circuit 2.

The same parts as above, minus those marked with an asterisk, and also:

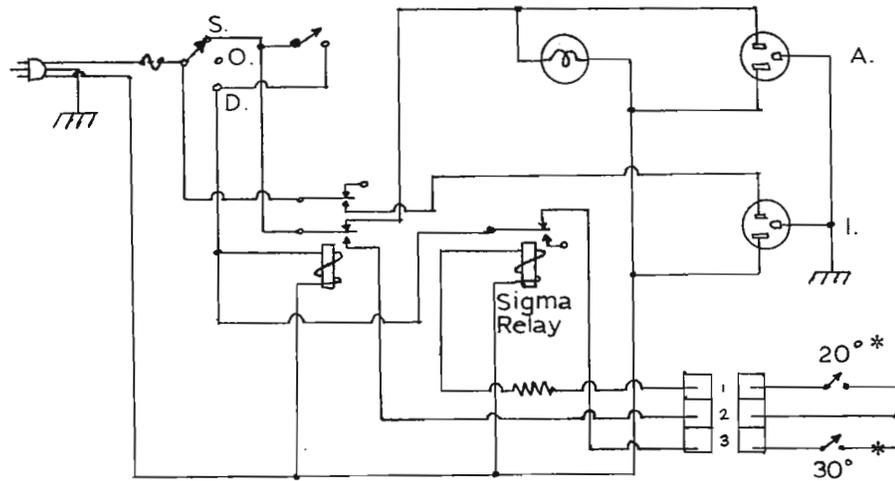
- 1 Relay, Sigma type 11FZ-9000-ACS-SIL
- 1 1500 ohm Resistor, 2 Watt
- 1 Cinch-Jones Plug, P-303-CCT
- 1 Cinch-Jones Socket, S-303-AB

A length of 3-wire cable to connect the control unit and the thermostats (approx. 10 feet), Belden 8443

Note: The 1500 ohm resistor may be unnecessary if another type of relay is used (rather than the Sigma relay as above).



Circuit 1.



\* Thermostat settings should be reversed if thermostats open with temperature fall.

Circuit 2.