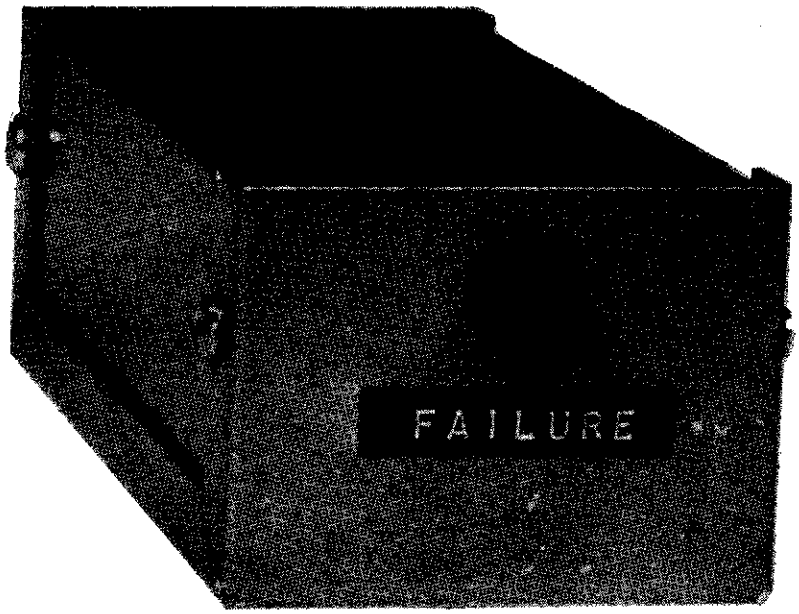


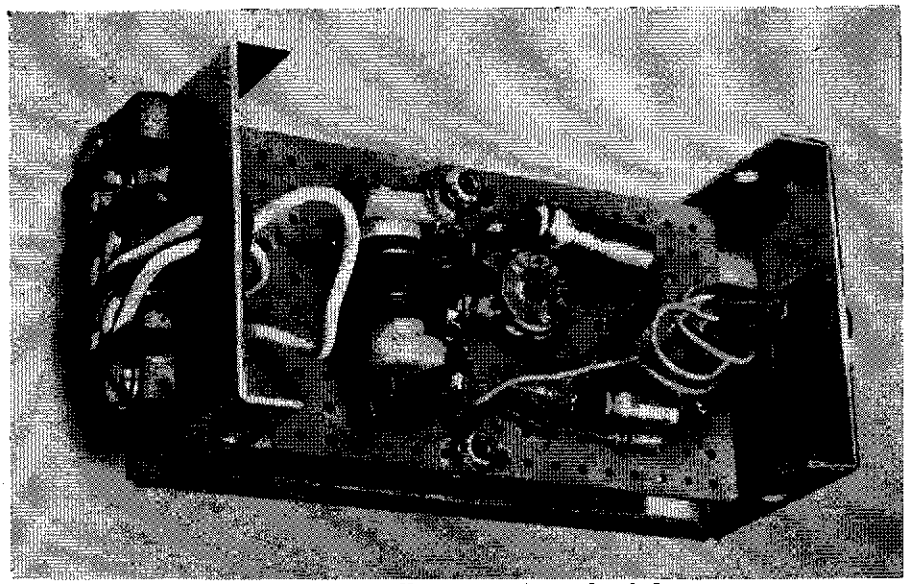
FINISHED ALARM is a little box with a red warning indicator on its front. Mount it on the dashboard of your car.

FOR YOUR CAR

Tail Light

a safety device that lets you know, immediately, if one of your brake lights burns out. Use it to make your driving a less hazardous journey

by **RUDOLF F. GRAF & GEORGE J. WHALEN**



INSIDE THE CASE you can see how all components are located on an ordinary piece of perf board. Flea clips and point-to-point wiring complete the unit.

RELIABLE AS AUTOMOTIVE LAMPS ARE, they still do burn out at unexpected moments. Perhaps the most dangerous failure is the loss of a stop light, since it robs you of two important signalling functions: it reduces the warning provided the driver behind you that your car is braking; and it sharply curtails your turn signalling capability. Of course, the degree of severity of the failure is related to the number of lamps in your car's rear end signalling system. If your car has only *one* stop light for each side, a lamp failure is an open invitation to a rear end collision!

The most insidious factor in stoplight failures is that the filament opens quietly, and in a position that cannot be seen from the driver's seat. Occasional checking at a service station with the aid of the attendant may help but it is no guarantee that a stoplight won't fail two minutes later, after you've driven away. You can watch your ammeter (if you still have one of these "old fashioned" instruments in your car) as you step on the brake, but that still doesn't tell you whether only one or all shop lights are ok.

The Brakelight Monitor gives you with a dependable indication that your stop lights are functioning properly. Should any of your lights become inoperative for any reason, a light will go on in the monitor to alert you to check your brakelights.

How it works

The most important part of the circuit is a tiny reed relay to which a second winding consisting of 6 turns of No. 14 enamelled wire has been added. This added winding is connected in series with the lead that goes from the stoplight switch to the lamps, so that full lamp current flows

Monitor

through this winding enroute to the stoplight filaments. This lamp current produces a magnetic field which is directly proportional to the current required by the filaments. In a two-lamp stoplight system, this would be from 4 to 5 amperes—a rather respectable amount of current—which produces a fairly strong magnetic field, which is *added* to the magnetic field generated by the existing winding on RY1. The latter winding's field strength is adjusted by R1, to be just enough to close the reed contacts. Hence, the magnetic field produced by the stoplight current flow though the added winding is summed with the field of the existing winding, every time you step on the brakes.

If any one of the lamps is inoperative (either because it is burned out, or because of poor electrical contact) there will be proportionately less current through the 6-turn winding, and the reed relay will not close. Now for the rest of the circuit.

Capacitor C2 and resistor R2 together with Darlington transistor Q1 form a 1-second time-delay circuit. The collector of Q1 is connected through indicator lamp LM1 to the positive 12-volt supply. At the instant the brake pedal is depressed and 12 volts is applied to R2, the delay circuit is started. After one second, indicator lamp LM1 will go on **unless** the reed relay is closed. If it closes, the base of transistor Q1 is connected to ground, the delay is cancelled and the transistor cannot turn "on". As you can see, current flow corresponding to "good lamps" automatically disarms the circuit controlling the indicator lamp.

The directional light circuit causes your lights to flash, but the delay circuit keeps the FAILURE lamp OFF during the short period of time that the circuit is open to give your blinking action. If the delay circuit were not incorporated the brakelight monitor would flash every time you signal a turn. It is possible that directional lights flash only for a very brief period of time as may be the case when you have a defective flasher or use incorrect bulbs. In either case, the OFF period would be beyond normal limits. Thus if the circuit is interrupted for more than one second, the brakelight monitor will flash regularly (or occasionally) whenever your blinker lights are on, thereby warning you of a defect in your directional light circuit.

Construction details

The unit is housed in a 4" x 2⅛" x 1⅝" aluminum miniature case. The failure indicator lamp is mounted on one face of the U-shaped channel, and the barrier terminal strip is mounted on the rear face. The leftmost terminal goes to positive 12 volts through the brake light switch. The center terminal goes to the stop lights, and the third terminal goes to chassis ground. All electronic components are mounted on one side of a 2" x 3½" piece of perf board. Flea clips are used for ease of assembly as shown on the accompanying illustration. The perf board is held in place by two ¾" screws which go through a half-inch spacer that keeps the board a proper distance from the chassis to prevent shorts.

Calibration procedure

Circuit sensitivity is adjusted only once. Step on the brakelight pedal so that the stop lights go on and simultaneously adjust potentiometer R1 from full resistance (lamp ON) until the reed relay just closes and the indicator lamp goes off. To simulate lamp failure, reach into the trunk, unplug one stoplight assembly from the frame of the car and keep it from touching the metal body of the car. Now, when you step on the brake pedal again, the indicator light will go on after one second, signalling that the lamp circuit is not operating properly. If the indicator does not go on, increase R1 slightly until LM1 just goes on. Then re-insert the lamp assembly previously removed. Pump the brake pedal once again. This time the warning lamp should not go on, indicating that all is ok. For proper operation of the monitor it is necessary that the fields of both windings *aid* each other. If it is not possible to calibrate the monitor by adjusting the potentiometer over its full range, simply reverse the lead connection to the 6-turn winding so as to reverse the direction of its magnetic field. This will solve your problems and proper adjustment will then be possible. **R-E**

PARTS LIST

R1—potentiometer, 25,000 ohms (Mallory MTC 253L4 or equal)
R2, R3—100,000 ohms, ½ watt, 10%
C1—20 μF, 50 volts (Sprague TE 1305 or equal)
C2—10 μF, 25 volts (Sprague TE 1204 or equal)
Q1—2N5306 (GE or equal)
RY—12 volts dc, 250-ohm coil reed relay (Magnacraft W101 MX-2 or equal)
LM1—pilot lamp assembly, 12 volts, 100 ma (IDI B2990D1 or equal)
Case—4" x 2⅛" x 1⅝" (Premium PMC 1002 or equal)
3-termainal barrier terminal strips (2)
2 x 3½ perf board
½-inch spacers (2)
Miscellaneous hardware