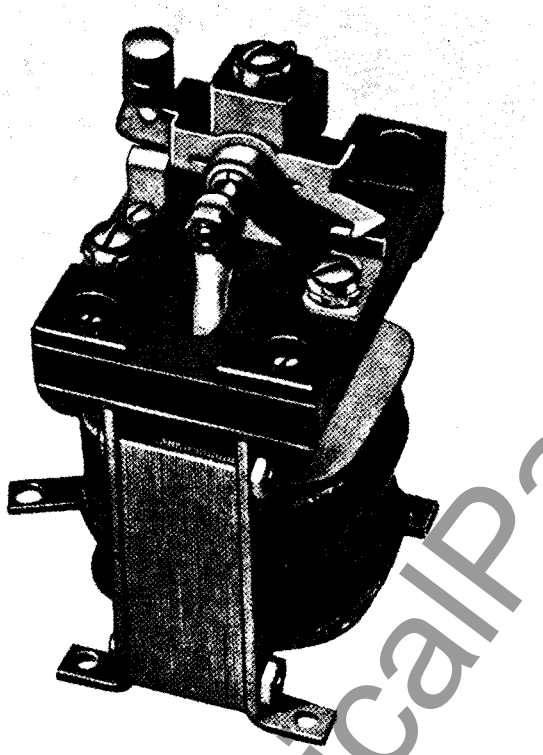
Westinghouse

DAMPER PROTECTIVE RELAY
Type DP



DAMPER PROTECTIVE RELAY, Type DP, is used to protect the damper windings of synchronous motors against stalled conditions. It is designed for connection in the field circuit of the motor, in series with the discharge resistor, during starting.

Initially, induced current of line frequency circulates in this circuit. As the motor increases speed the frequency decreases, and the current remains fairly constant until the motor approaches synchronism. The relay, responsive to the changing frequency trips quickly if the motor fails to start, but does not trip if the motor accelerates.

DESCRIPTION

Electrically, the relay consists of a transformer, with primary coil connected in the field discharge circuit, and secondary coil connected to a thermal trip element. The trip element consists of a hollow nichrome shaft, heated by the secondary current, and a helical bimetal strip which resiliently grips the shaft.

The bimetal helix has one end attached to a hub which journals in a post. The hub carries a transfer contact, arranged to break one circuit and make another. The shaft is tapered, and its mounting in the post may be adjusted at the factory by moving it in or out, thereby increasing or decreasing the grip of the bimetal helix. A spring biases the contact clockwise, but this tightens the grip of the bimetal on the shaft.

However, when the shaft heats, the bimetal helix expands, suddenly releases its grip, and the contact trips. Manually reset, the contact with hub and helix assembly is turned counter-clockwise. The helix does not grip against rotation in this direction, but it tightens and regrips the shaft to prevent return when the reset force is removed.

In order to prevent accidental damage due to forcing the contact open against the grip of the bimetal, the contact is frictionally mounted on the hub, so that it will slip before the force is excessive. In order to avoid possible loosening of the contact on the hub, it is not desirable to force the contacts open repeatedly.

APPLICATION

The relays are set at the factory to trip between 4 and 10 seconds at rated frequency with the current which is induced in the field circuit at full voltage. This will usually give protection either for full voltage or reduced voltage starting, and (because the transformer saturates quickly at reduced frequency) will allow sufficient time for acceleration.

The relay may be checked for friction by depressing the reset button. The moving contact should rebound freely for the short distance required for the bimetal helix to regrip the shaft.

Owing to the fact that the relay is not responsive to low frequency currents, it cannot be used to protect against failure to synchronize, nor against loss

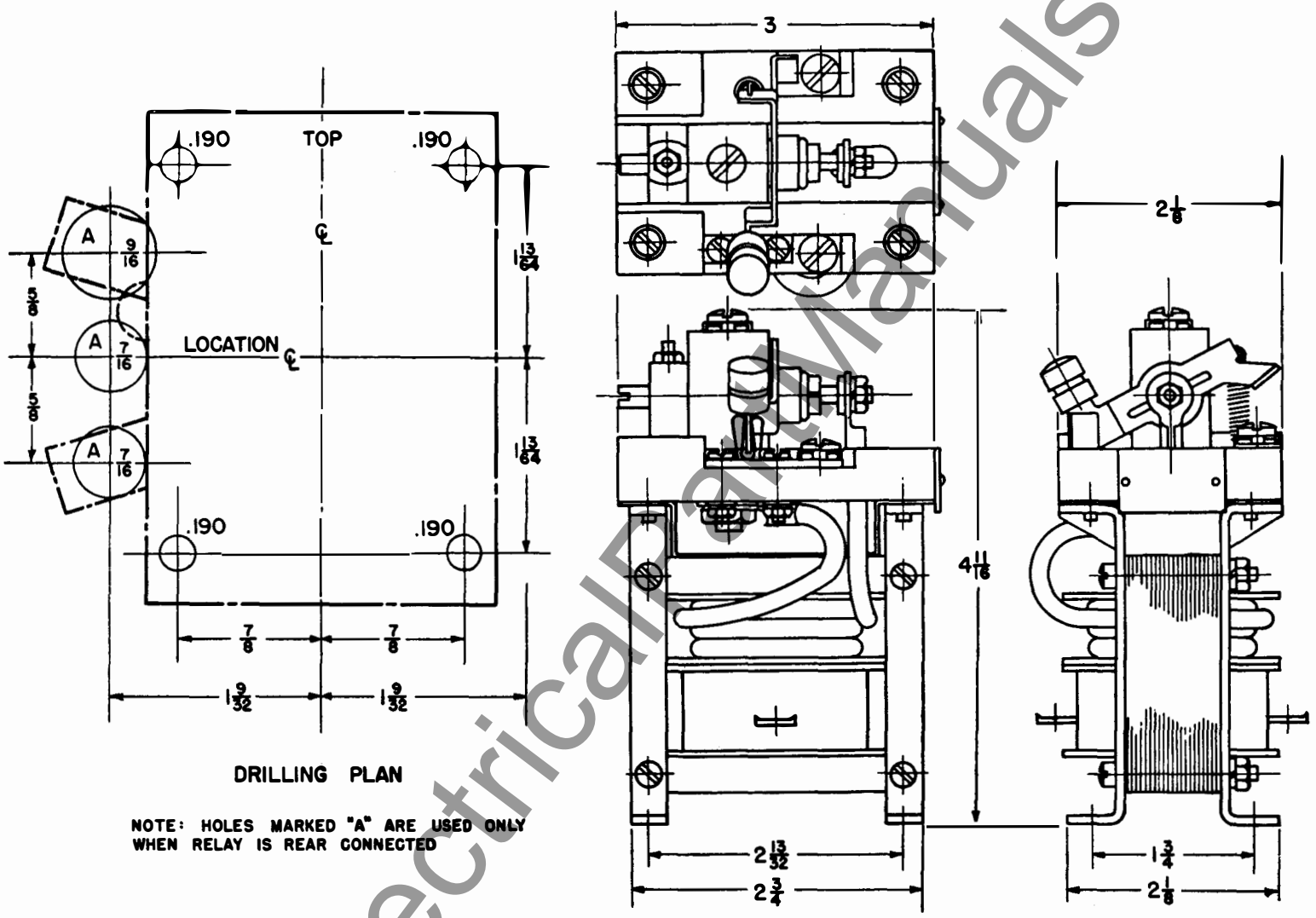


FIG. 1. Outline Dimensions in Inches and Drilling Plan for Type DP Damper Protective Relay.

of field. Either a field failure relay or the primary overload relay, is ordinarily relied upon for this purpose.

For application, the engineer needs the following data:

1. Line frequency.

2. Percent starting voltage taps, time on each acceleration step, and percent speed at each transfer point.

3. Maximum time damper winding will withstand locked conditions without damage on starting voltage, and on full voltage.

4. Current induced in field discharge circuit on each accelerating step.

The following application data table is based on a relay trip time of 4 to 10 seconds. The "Induced Field Amperes" column is the field discharge current at full voltage with rotor locked. For 50-cycle applications the 60-cycle relay table may be used by assuming an induced current equal to 5/6 of the actual value.

The relay complete with secondary coil but not including primary coil is S#1320764 for 60 cycles, and S#1399220 for 25-cycle applications.

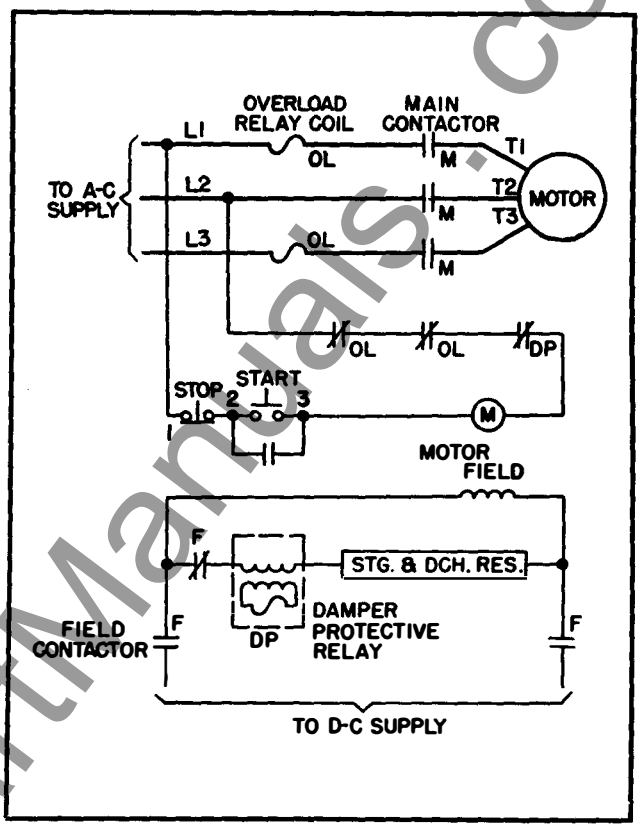


FIG. 2. Typical Circuit Using Damper Protective Relay.

TABLE OF APPLICATION DATA

INDUCED FIELD AMPERES		PRIMARY COIL TURNS	PRIMARY COIL STYLE NO.
60-CYCLE RELAY	25-CYCLE RELAY		
2.94 to 4.33	4.75 to 6.89	215	1399 306
4.34 to 6.54	6.90 to 10.3	145	1367 873
6.55 to 8.74	10.4 to 13.9	96	1344 021
8.75 to 10.4	14.0 to 16.6	72	1344 030
10.5 to 13.0	16.7 to 20.9	60	1367 887
13.1 to 19.6	21.0 to 31.1	48	1344 020
19.7 to 26.1	31.2 to 41.4	32	1320 623
26.2 to 39.3	41.5 to 62.4	24	1344 019
39.4 to 57.1	62.5 to 89.9	16	1320 624
57.2 to 89	90.0 to 139	11	1399 005
90 to 125	140 to 199	7	1399 004
126 to 190	200 to 260	5	1399 006

Ten turn secondary coil (for 25-cycle relay) Style No. 1367 886
Six turn secondary coil (for 60-cycle relay) Style No. 1344 022