INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE TG-1 TIME DELAY RELAY

CAUTION · Before putting relays into service, remove all blocking which may have been inserted for the purpose of securing the parts during shipment, make sure that all moving parts operate freely, inspect the contacts to see that they are clean and close properly, and operate the relay to check the settings and electrical connections.

APPLICATION

The type TG-1 relay is an auxiliary d-c relay used to introduce a time delay in the tripping of a circuit breaker by audio tones over a carrier channel. The time delay is to prevent unintentional tripping caused by shock excitation of the tone receivers from any external disturbance.

CONSTRUCTION

The type TG-1 relay consists of a Type SG auxiliary relay with one normally open and one normally closed contact, a telephone type relay with a heavy copper slug on its core to slow down the operate and release time, a resistor, a seal-in contactor switch, and an operation indicator. The telephone relay has one make and one independent break contact. The make contact is not used.

OPERATION

The external connections of the Type TG-1 relay are shown in Fig. 2. The X2 telephone relay is normally energized through the SG back contact, holding the X2 back contact open. For a tripping operation, the tone-actuated relays T1 and T2 both close their contacts to energize the SG relay. When the SG relay picks up, it de-energizes the X2 element and closes a contact SG in the trip circuit. After a time delay of several cycles, the X2 element drops out closing its back contact to complete the trip circuit.

CHARACTERISTICS

The Type TG-1 relay is normally adjusted for a time delay of 10 cycles (60 cycle basis) from the time the SG element is energized until the trip circuit is completed. The time delay is adjustable from 5 to 15 cycles by changing the armature air gap of the telephone relay. The small set screw in the relay armature is for this purpose. To decrease the relay time, the air gap is increased, thus reducing the dropout time of X2, and vice versa. When the air gap is increased, the contact gap of X2 is decreased. With the relay adjusted for a 5 cycle delay, the contact gap is 10 or 11 mils.

The operating time of the TG-1 relay is substantially independent of d-c supply voltage over a range of 80 to 140 volts for a 125 volt relay. If operating times longer than 15 cycles are desired, a capacitor can be connected between relay terminals 7 and 10 in the standard case or 5 and 10 in the FT case. A 30 mfd. capacitor will increase the relay time to 30 cycles, and a 50 mfd. capacitor will give 45 cycles time delay. These values can be changed slightly by adjustment of the telephone relay armature gap and contact spring tension.

RELAYS IN TYPE FT CASE

The type FT cases are dust-proof enclosures combining relay elements and knife-blade test switches in the same case. This combination provides a compact flexible assembly easy to maintain, inspect, test and adjust. There are three main units of the type FT case: the case, cover, and chassis. The case is an all welded steel housing containing the hinge half of the knife-blade test switches and the terminals for external connections. The

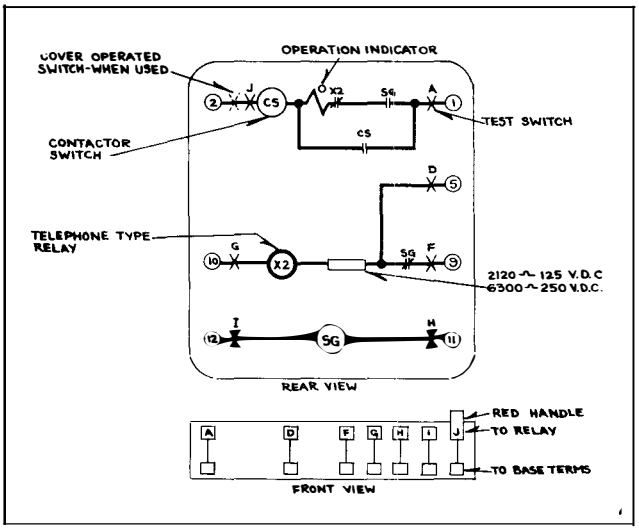

Fig. 1—Internal Schematic of the Type TG-1 Relay in the Type FT Case. The Relay in the Standard Case Has The Same Terminals Except For #5 Which Is #7 in the Standard Case, and the Test Switches Are Omitted.

cover is a drawn steel frame with a clear window which fits over the front of the case with the switches closed. The chassis is a frame that houses the relay elements and supports the contact jaw half of the test switches. This slides in and out of the case. The electrical connections between the base and chassis are completed through the closed knife-blades.

Removing Chassis

To remove the chassis, first remove the cover by unscrewing the captive nuts at the corners. This exposes the relay elements and all the test switches for inspection and testing. The next step is to open the test switches. Always open the elongated red handle switches first before opening any of the black handle switches or the cam action latches. This opens the trip circuit to prevent accidental trip out. Then open all the remaining switches. The order of opening the remaining switches is not important. In opening the test switches they should be moved all the way back against the stops. With all the switches fully opened, grasp the two cam action latch arms and pull outward. This releases the chassis from the case. Using the latch arms as handles, pull the chassis out of the case. The chassis can be set on a test bench in a normal upright position for test as well as on its back or sides for easy inspection and maintenance.

After removing the chassis a duplicate chassis may be inserted in the case or the blade portion of the switches can be closed and the cover put in place without the chassis.

When the chassis is to be put back in the case, the above procedure is to be followed in the reversed order. The elongated red handle switch should not be closed until after the chassis has been latched in place and all of the black handle switches closed.

Electrical Circuits

Each terminal in the base connects thru a test switch to the relay elements in the chassis as shown on the internal schematic diagrams. The relay terminal is identified by numbers marked on both the inside and outside of the base. The test switch positions are identified by letters marked on the top and bottom surface of the moulded blocks. These letters can be seen when the chassis is removed from the case.

The potential and control circuits thru the relay are disconnected from the external circuit by opening the associated test switches.

A cover operated switch can be supplied with its contacts wired in series with the trip circuit. This switch opens the trip circuit when the cover is removed. This switch can be added to the existing type FT cases at any time.

Testing

The relays can be tested in service, in the case but with the external circuits isolated or out of the case as follows:

Testing in Service

Voltages between the potential circuits can be measured conveniently by clamping #2 clip leads on the projecting clip lead lug on the contact jaws.

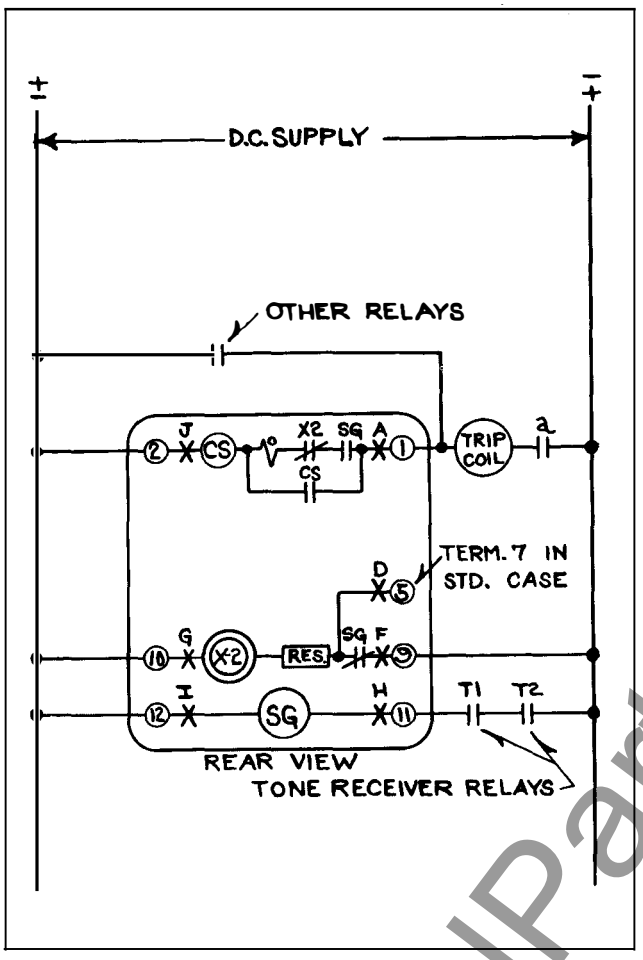

Fig. 2—External Connections of the Type TG-1 Relay.

Testing in Case

With all blades in the full open position, the ten circuit test plug can be inserted in the contact jaws. This connects the relay elements to a set of binding posts and completely isolates the relay circuits from the external connections by means of an insulating barrier on the plug. The external test circuits are connected to these binding posts. The plug is inserted in the bottom test jaws with the binding posts down.

The external test circuits may be made to the relay elements by #2 test clip leads instead of the test plug.

Testing Out of Case

With the chassis removed from the base, relay elements may be tested by using the ten circuit test plug or by #2 test clip leads as described above. The factory calibration is made with the chassis in the case and removing the chassis from the case will change the calibration values by a small percentage. It is recommended that the relay be checked in position as a final check on the calibration.

INSTALLATION

The relays should be mounted on switchboard panels or their equivalent in a location free from dirt, moisture, excessive vibration and heat. Mount the relay vertically by means of the two mounting studs. Either of these studs may be utilized for grounding the relay. The electrical connections may be made direct to the terminals by means of screws for steel panel mounting or to terminal studs furnished with the relay for ebony-asbestos or slate panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the studs and then turning the proper nut with a wrench.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory and should not be disturbed after receipt by the customer. If the adjustments have been changed, the relay taken apart for repairs, or if it is desired to check the adjustments at regular maintenance periods, the instructions below should be followed.

* All contacts should be cleaned periodically. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

SG Element

Check "Make" contact follow with armature closed. This should be 3/64" at the contact, or slightly more than 1/32" if measured between top of moulded armature block and contact finger. If contact follow is different and core length is correct, stationary contact

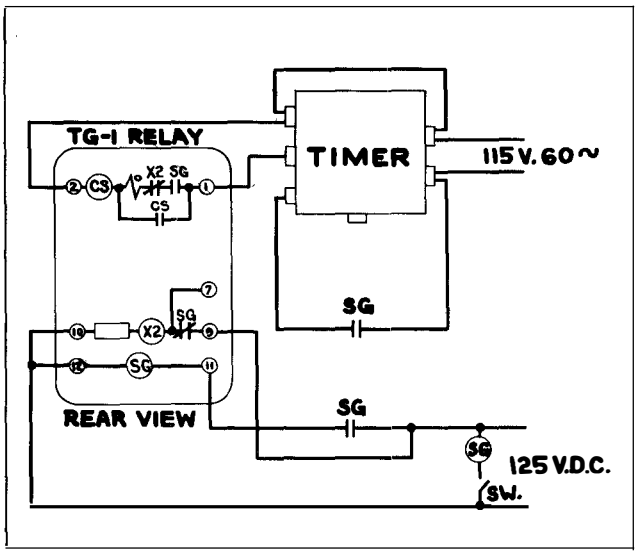

Fig. 3—Test Connections for the Type TG-1 Relay.

support may be bent slightly to obtain specified follow.

The "break" contact should have a follow of 1/32" at the contact and the contact gap with the armature closed should be 11/64". Be sure the armature stop on the yoke does not touch the armature when it is in the de-energized position.

Energize relay at 80% of rated voltage. The armature should pick up positively.

Telephone Relay

The telephone relay is adjusted for a total relay time delay (SG + X2) of 10 cycles. Any change in the armature gap or contact spring tension will change the operating time. The contact gap of the break contact should be a minimum of .010 inch with the relay armature in the operating position.

Energize the coil circuit at 80 volts d-c for a 125-volt relay or 160 volts for a 250-volt relay. The element should pick up positively. The X2 coil resistance is 2000 ohms.

Contactor Switch

Adjust the stationary core of the switch for a clearance between the stationary core and the moving core when the switch is picked up. This can be most conveniently done by turning the relay up-side-down. Screw up the core screw until the moving core starts rotating. Now, back off the core screw until the moving core stops rotating. This indicates the point where the play in the moving contact assembly is taken up, and where the moving core just separates from the stationary core screw. Back off the stationary core screw one turn beyond this point and lock in place. This prevents the moving core from striking and sticking to the stationary core because of the residual magnetism. Adjust the contact clearance for 3/32" by means of the two small nuts on either side of the Micarta disc. The switch should pick up at 1 ampere d-c. Test for sticking after 30 amperes d-c have been passed thru the coil. The coil resistance is approximately 0.85 ohm.

Operation Indicator

Adjust the indicator to operate at 1.0 ampere d-c gradually applied by loosening the two screws on the under side of the assembly and moving the bracket forward or backward. If the two helical springs which reset the armature are replaced by new springs, they should be weakened slightly by stretching to obtain the 1 ampere calibration. The coil resistance is approximately 0.16 ohm.

RENEWAL PARTS

Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

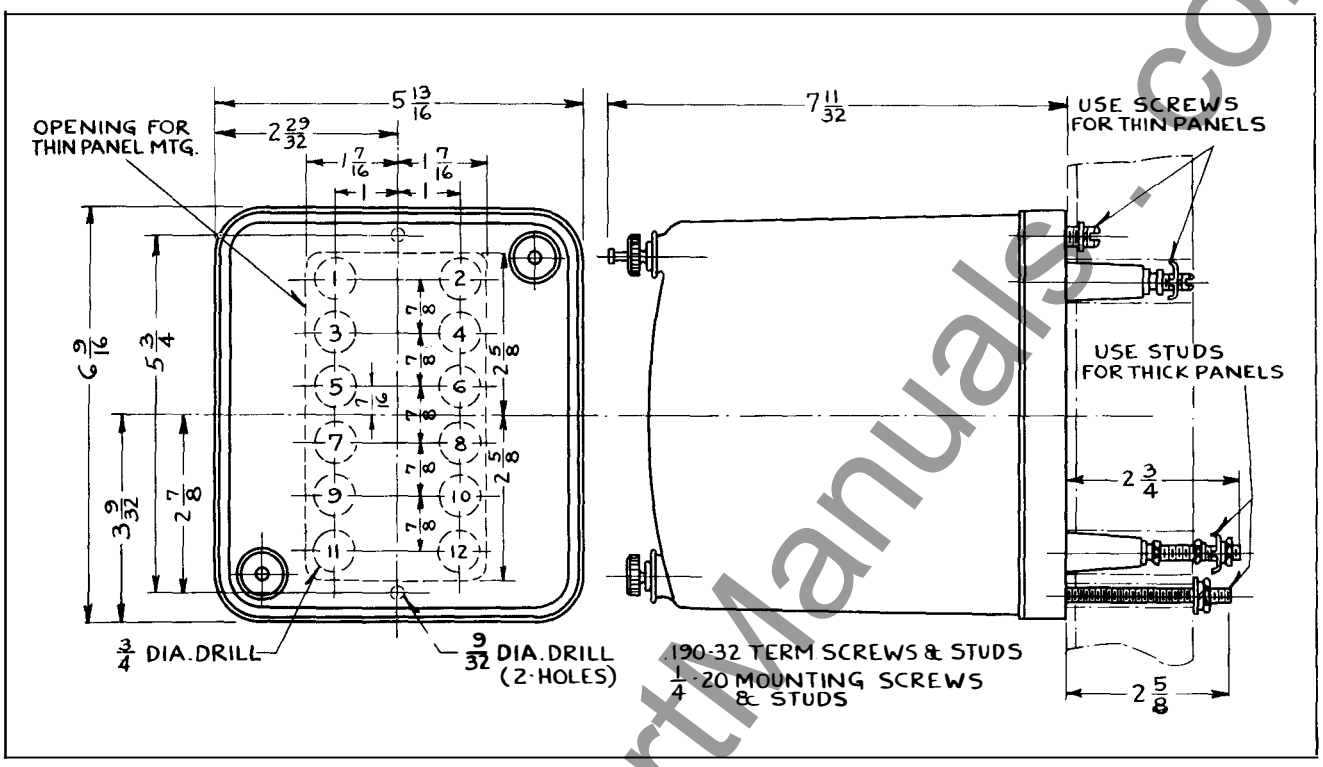

Fig. 4—Outline and Drilling Plan for the Standard Projection Case. See the Internal Schematic for the Terminals Supplied. For Reference Only.

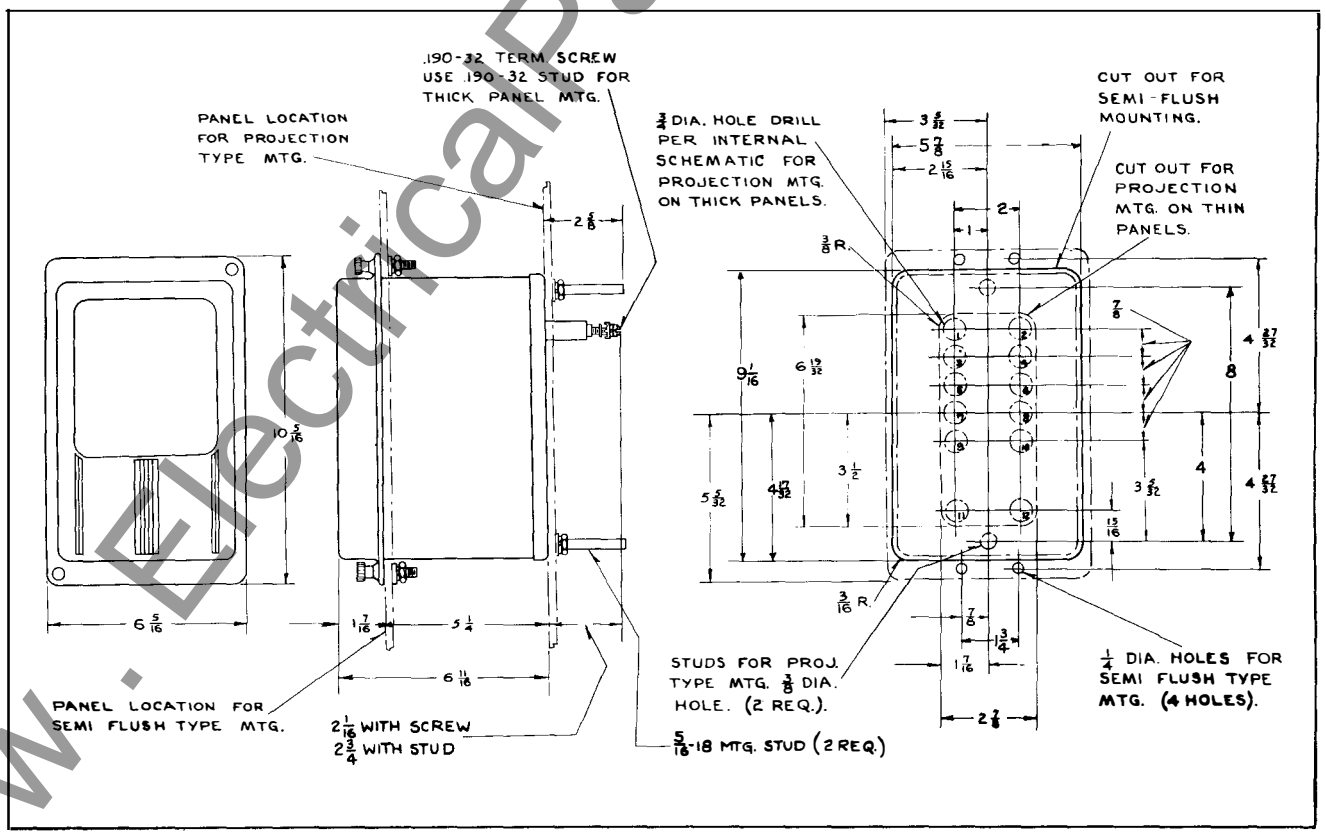

Fig. 5—Outline and Drilling Plan for the S-10 Semi-flush or Projection Type FT Case. For Reference Only.

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METER DIVISION • **NEWARK, N.J.**
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