INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE SGR-1 RECLOSING RELAY — HAND RESET

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 SGR-1 reclosing relay is designed to provide one immediate automatic reclosure of an electrically-operated circuit breaker in an attended substation. Because a large percentage of faults are of a transient nature, it has been found that immediate reclosure of a breaker is usually successful and avoids service interruption to customers if the protective devices for this equipment are provided with a slight time delay.

The type SGR-1 reclosing relay consists of a simple mechanically-latched type of contactor suitable for switchboard panel mounting. It must be reset manually, and therefore is applicable for use only in attended substations.

CONSTRUCTION AND OPERATION

The type SGR-1 reclosing relay is similar in appearance to the type SG auxiliary relay. It has been modified by the addition of a mechanical latch to hold the armature in its energized position after the coil has been deenergized, and by the provision of means extending through the cover by which the latch can be lifted manually to allow the armature to reset. The operating element consists of a core, coil, yoke, and armature. The core for the A-C type has a copper shading loop assembled in its pole face, and a thin bronze washer is assembled between the core and the yoke to prevent the armature from sticking in the closed position due to residual magnetism. The core for the D-C type has no shading loop and there is no washer between core and yoke, but a bronze pin in the pole face serves as an anti-residual spacer.

The armature assembly carries the two moving contacts and a metal tongue or arm which engages the hinged latch arm, mounted on the upper side of the yoke, to hold the armature in the energized position. The two stationary contacts can be assembled as either "make" or "break" contacts. However the relay is shipped with the contacts assembled one "make" and one "break", because in the reclosing circuit one contact must be a "break" contact and the other is ordinarily used as a "make" contact to energize an alarm.

The type SGR-1 reclosing relay is available in a projection-mounted molded base and cover, in the standard relay case for projection mounting, or in the type FT Flexitest case for flush or projection mounting, as indicated in the figures showing internal schematic connections and outline dimensions.

The external schematic diagrams show the electrical connections for using the type SGR-1 reclosing relay in both A-C and D-C breaker control circuits. These diagrams show the conditions previous to the initial closing of the breaker by means of the control switch and with the breaker deenergized and unlatched.

When the control switch is closed, the normal functioning of the control relays closes the breaker. Any subsequent automatic opening of the circuit breaker will start the

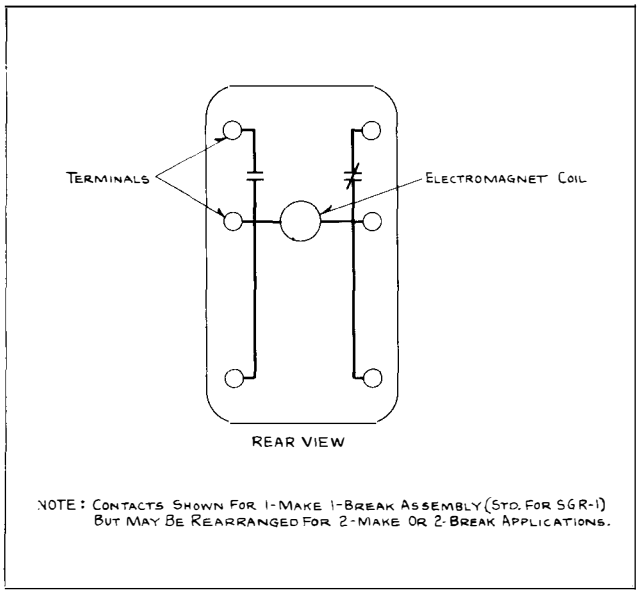

Fig. 1—Internal Schematic of the Type SGR-1 Reclosing Relay in the Molded Case.

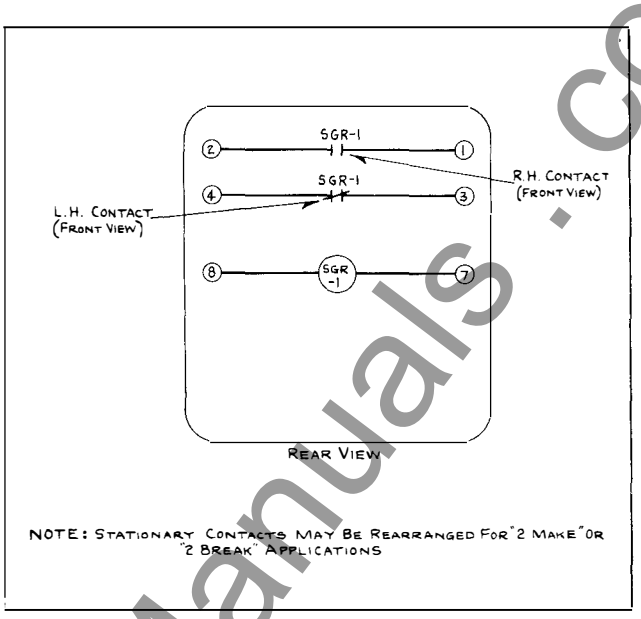

Fig. 2—Internal Schematic of the Type SGR-1 Reclosing Relay in the Standard Case.

reclosing cycle immediately upon the latching of the breaker operating mechanism. It will be seen that this is accomplished by the circuit consisting of the 179 back contact, the breaker mechanism switch contact 152bb, the 152 X coil, the 152 Y back contact and the breaker latch checking switch contact 152 LC. This circuit is completed as soon as the breaker has fully opened and is ready to respond to energization of the closing coil. Contacts of the control relay 152 X close the circuit to the closing coil 152C and to the reclosing relay coil 179. In the closed position of the type SGR-1 reclosing relay, the back contact is opened preventing any subsequent reclosure and the front contact may be used to make connection to an alarm if this is desired. It is necessary to reset the reclosing relay before any further automatic action can be obtained. However, if the breaker fails to stay in on this first reclosure it can be closed again manually through control switch contact CS-C. In order to prevent the reclosing of the circuit breaker if it is tripped manually when the reclosing relay is unlatched, the reclosing connection is opened through the use of the control switch slip contact CS-SC.

In general, it should be noted that for mechanically non-trip-free mechanisms the control relay cutoff must have enough time delay so that the breaker is completely latched before the energy is removed from the closing coil. For mechanically trip-free breakers, particularly under the condition of immediate reclosing, in addition to the above it is necessary to insure that the closing mechanism is securely latched to the breaker operating rod before energy is applied to the closing coil. Otherwise, it is possible for the reclosing relay to energize the closing mechanism without closing the breaker. This can be accomplished most positively through use of a latch-check switch 152 LC.

In applying automatic reclosing equipment it is necessary also to check the protective relays to be sure that their contacts will open within 10 cycles or less after the breaker is tripped in order to assure opening of the trip circuit before the reclosure takes place.

CHARACTERISTICS

The SGR-1 reclosing relay is available in standard ratings of 115 volts 60 cycles, 230 volts 60 cycles, and 125 volts d.c. The relay will operate at 80% or less of its rated operating value. The contacts will carry 12 amperes continuously or 30 amperes for one minute.

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 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.

The order of opening the 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 as well as on its top, back or sides for easy inspection, maintenance and test.

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.

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 diagram. 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.

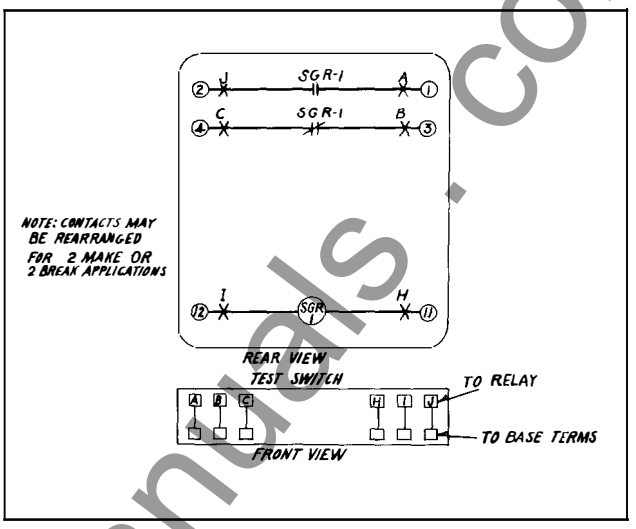

Fig. 3—Internal Schematic of the Type SGR-1 Reclosing Relay in the Type FT Flexitest Case.

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

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

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

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

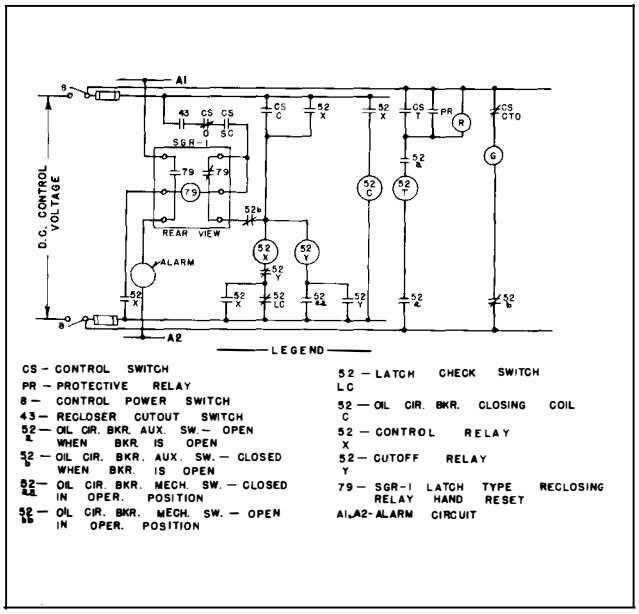

Fig. 4—Typical External Connections of the Type SGR-1 Reclosing Relay in the Type FT Case For Instantaneous Reclosing of a Breaker with D.C. Control.

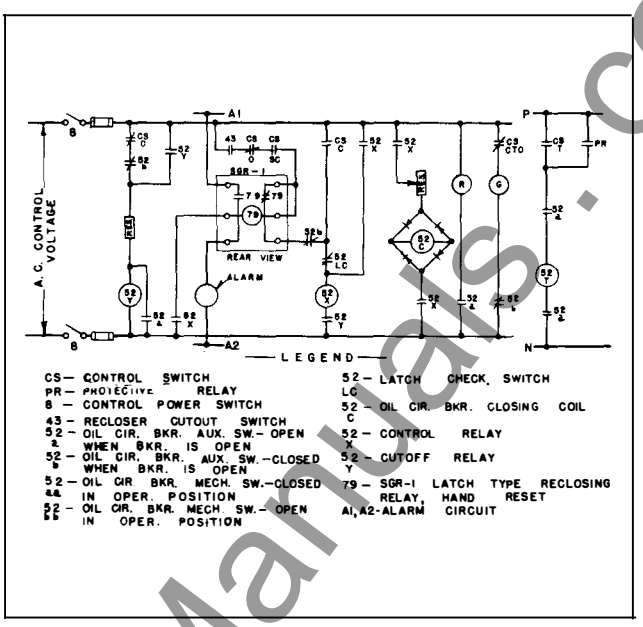

Fig. 5—Typical External Connections of the Type SGR-1 Reclosing Relay in the Type FT Case For Instantaneous Reclosure of a Breaker with A.C. Control.

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 up.

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.

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 single screw or stud for the moulded case, the two mounting studs for the standard case and the type FT projection case, or by means of the four mounting holes on the flange for the semi-flush type FT case. Either of the studs of the mounting screws 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.

The "make" contact follow should be 3/64" at the contact, or slightly more than 1/32" if measured between top of the molded armature block and the contact finger. If the follow differs appreciably, the stationary contact support may be bent slightly to obtain the specified value. The stationary "break" contact should act as the stop for the armature in its deenergized position, and the tongue on the yoke which projects through the lower end

of the armature should not touch the armature at any position of its travel. The stationary "break" contact should be bent (if necessary) so that the "break" contact gap is approximately 11/64" when the armature is in its energized position.

With the armature held firmly against its core and the latch dropped as far as possible, there should be .005 to .015 inch clearance between the back of the armature latch member and the corner of the latch arm which holds the armature in the latched position. The arm which is rivetted to the armature may be bent slightly if adjustment is found to be necessary.

The latch arm should move freely on its bearing, with only slight side-play. The working surfaces of both the latch arm and the end of the arm rivetted to the armature should be smooth.

All contacts should be periodically cleaned with a fine file. S#1002110 file 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.

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.

ENERGY REQUIREMENTS

The volt-ampere burden at rated voltage (60 cycles) is 10, at a power factor of approximately 50%. The watt consumption at rated d.c. voltage is 3.5

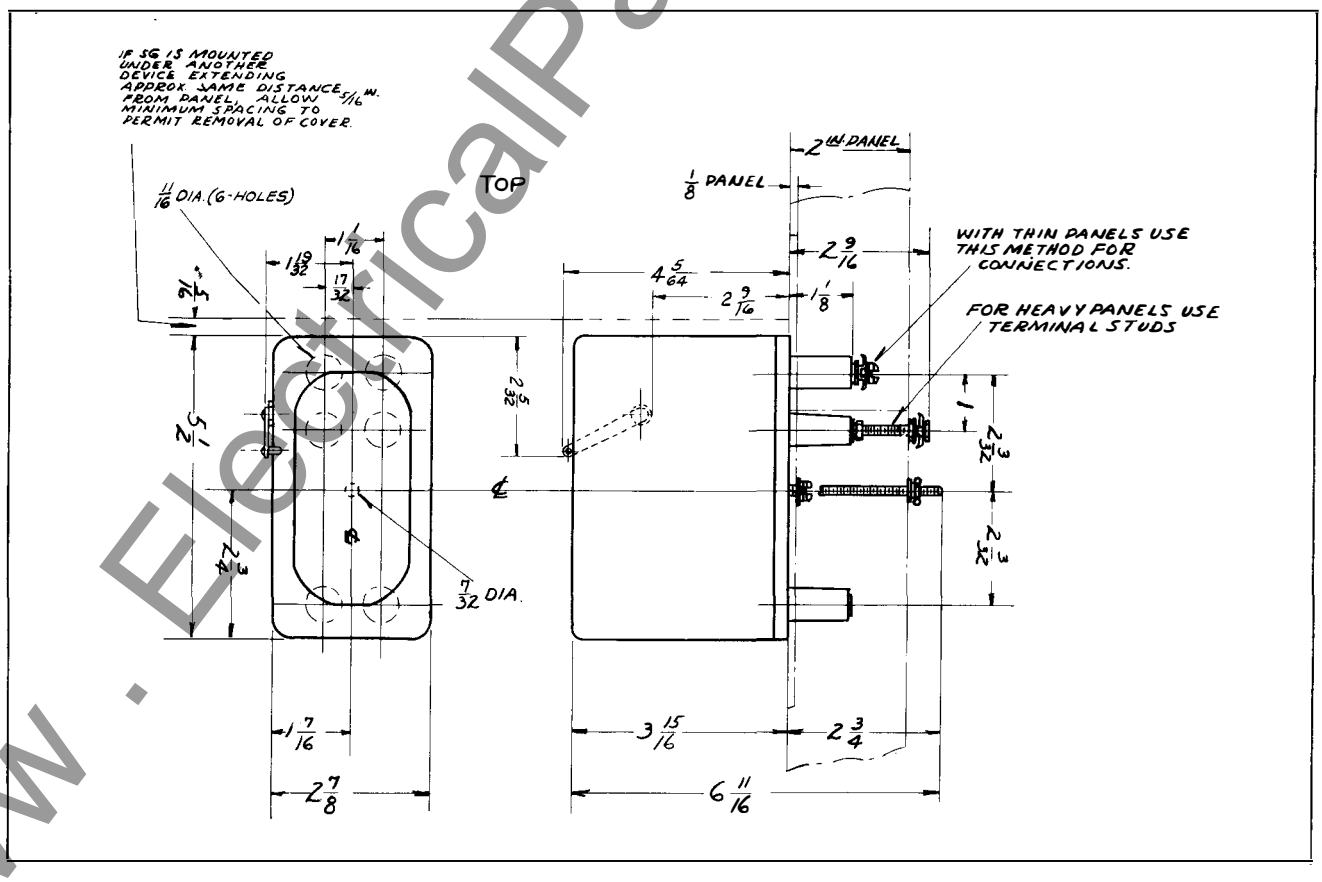

Fig. 6—Outline and Drilling Plan for the Molded Case. For Reference Only.

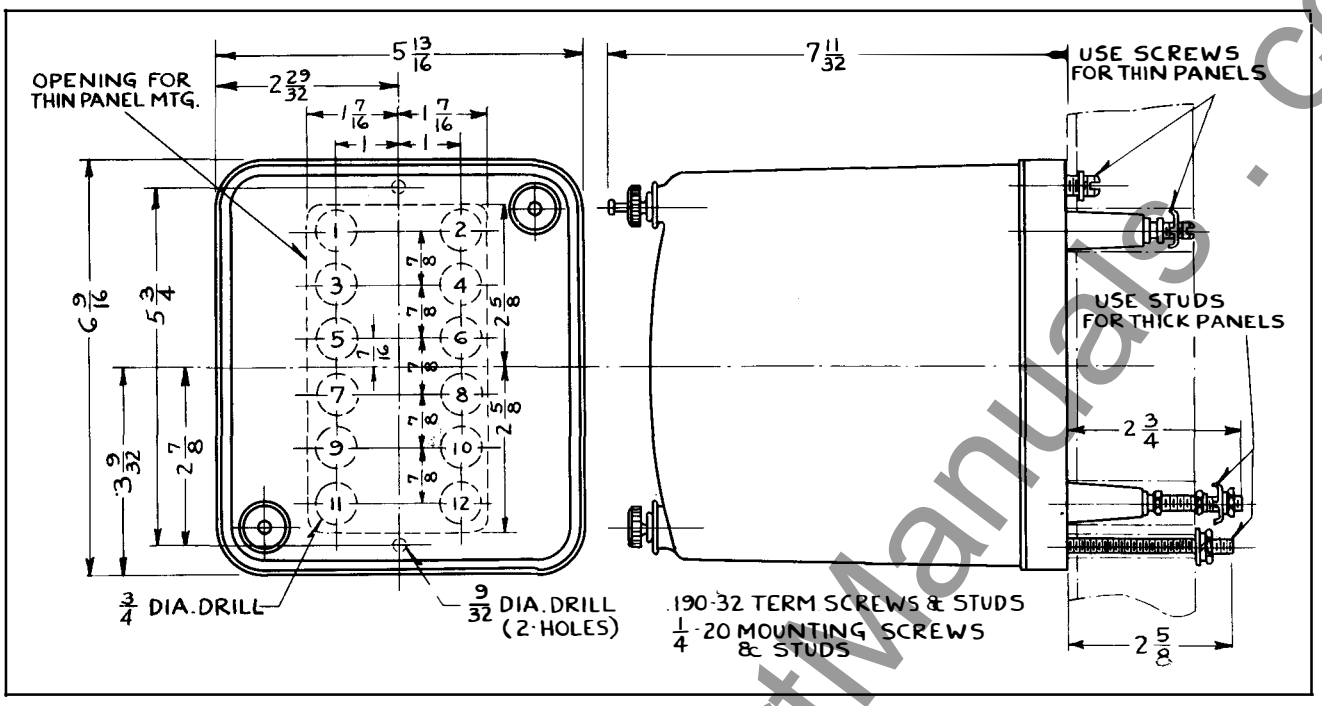

Fig. 7—Outline and Drilling Plan for the Standard Projection Case. See the Internal Schematics for the Terminals Supplied. For Reference Only.

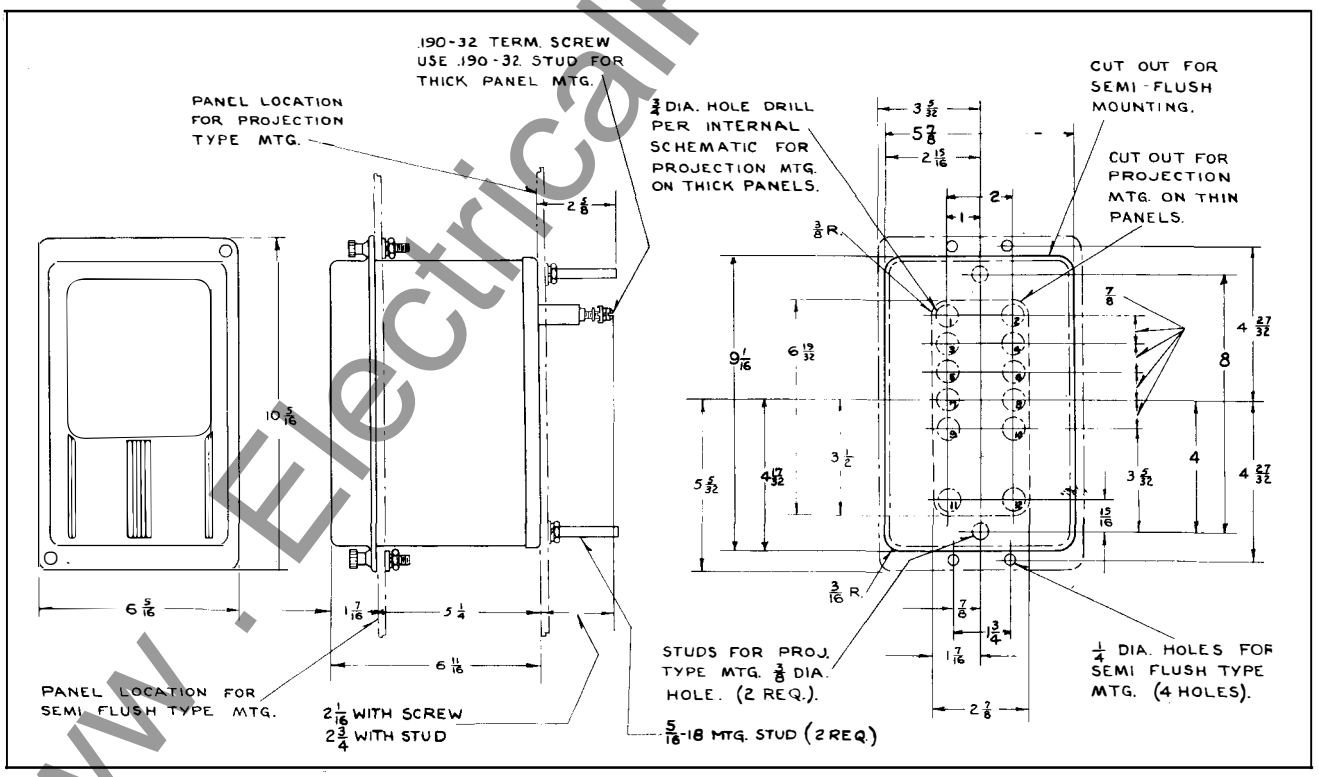

Fig. 8—Outline and Drilling Plan for the S10 Projections or Semi-flush Type FT Flexitest Case. See the Internal Schematics for the Terminals Supplied. For Reference Only.

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