INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE SGR-12 AUTOMATIC RECLOSING 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 the settings and electrical connections.

APPLICATION

The type SGR-12 Reclosing relay provides on instantaneous reclosure of an electrically operated circuit breaker, and automatically resets itself if the breaker remains closed for a predetermined adjustable time interval. If the breaker re-trips before the end of this interval the resetting operation of the relay is interrupted until the breaker is manually closed. Thus the reclosing relay is applicable to either attended or non-attended stations.

CONSTRUCTION AND OPERATION

The type SGR-12 relay consists of a synchronous motor operated time-delay unit and a toggle-contact unit.

The time-delay unit, consists of a 600 R.P.M. (for 60 cycles) synchronous motor driving a contact arm through a gear train. A bridging contact member on the end of the contact arm closes a circuit through two stationary contact studs at the end of the time scale. The starting position, and length of travel of the contact arm is determined by the position of an adjustable stop, which can be set with reference to a scale on the upper gear plate by loosening the upper bearing screw of the last gear shaft and moving the stop to the desired position. The time-delay for full scale travel is approximately 92 seconds, and the smallest scale division represents a delay of slightly over 9 seconds.

When the motor is energized the armature is lifted magnetically to a point where a pinion on the lower end of the armature engages a gear on the motor countershaft. When the motor is de-energized this pinion de-meshes, and by this reduction of the resetting load on the spring which is a part of the final shaft assembly much faster resetting of the contacts is obtained.

A resistor is connected in series with the motor coil for 240 volt operation and by-passed for 120 volt operation. The motor coil circuit is connected at the factory for 240 volt service.

The toggle unit, in the lower part of the case, consists of two electromagnets between which is hinged an armature carrying two moving contacts. One of these contacts closes with a stationary contact in either position of the armature. A spring which is mounted on one of the electromagnet pole pieces presses on the upper end of the armature assembly. This imparts a toggle action to the armature action and causes the armature to remain definitely against the pole piece of the electromagnet to which it is last moved, either electrically or mechanically.

The operation of the relay and related control equipment may be followed by reference to Figs. 2 or 3. This diagram shows the condition previous to the initial closing of the breaker by means of the control switch. The toggle unit 79X is shown in the reset position, with the back contact (the reclosing contact) closed and the front contact (the reset motor contact) open.

The breaker is closed by the control switch contact 101-C through the circuit consisting of the 52X coil and the cut-off relay 52Y back contact. When 52X contact closes, the closing coil 52C and the operating coil 79X-0 of the toggle element are energized. Relay 79X performs its main function of opening the circuit to relay 52X so as to prevent a second reclosure should the breaker immediately

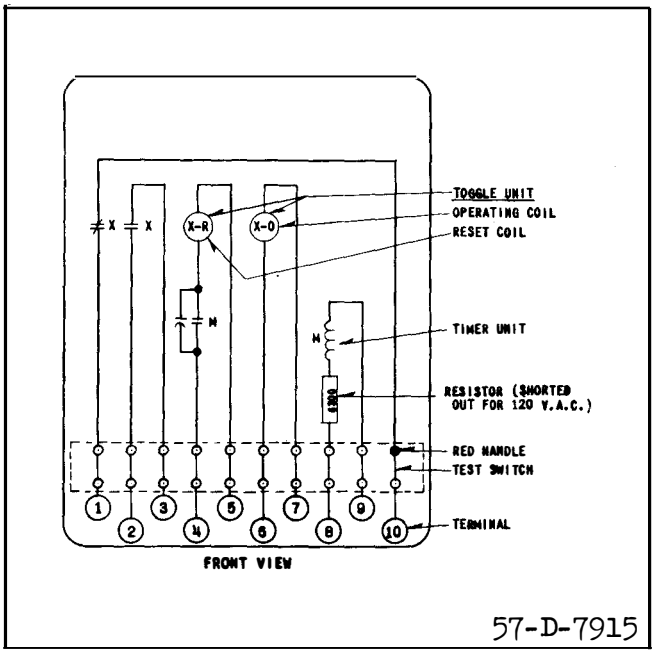


Fig. 1. Internal Schematic of the Type SGR-12 Relay in the Type FT11 Case.

open. The breaker closes and the toggle unit front contacts 79X close, starting the 79M timer. If the breaker has not been closed on a fault, the 79M timer contact will close and the reset coil 79X-R will operate, which closes the 79X back contact in preparation for an immediate reclosure should a subsequent fault occur. As in the usual X-Y scheme, the closing of the breaker through the auxiliary switch 52-aa operates the breaker cut-off relay 52Y, which disconnects the 52X coil.

The breaker is now in the closed position with the relay and control circuit de-energized. When a fault occurs the circuit breaker is tripped open, and the breaker auxiliary switches 52bb and 52LC are closed. Due to the fact that the 79X back contact is already closed, the closing cycle will take place immediately. Should the breaker fail to stay in after this one reclosure, it will have tripped out before the 79M timer has closed its contacts to reset the toggle element, because the timer is always set for a longer time than the sum of the protective relay and breaker tripping times. In this case where the toggle element is not reset, the breaker will not close again automatically because the 79X contact to 52X is open. To close the breaker it is necessary to use the control switch 101-C.

Where a 52X make contact is not available from the breaker for energizing the 79X-R coil, a separate 52X relay is required. A type MG-6 relay is recommended for this purpose. However, note that the circuit breaker must provide a contact to seal around the 79X break contact to prevent the closing circuit from being prematurely interrupted. This sealing contact should close prior to the closing of the 52X contact.

CHARACTERISTICS

The type SGR-12 Reclosing relay is rated as follows:

Toggle Unit	Motor
120/240 V 60 cycles or 24-125 v.d.c.	120/240 V 60 cycles †
250 v.d.c.	120/240 V 60 cycles †

† Motor coil resistor is by-passed for 120 volt operation.

The timer has a max. setting of 92 seconds. The small scale division is approximately 9 seconds (normal setting is usually 9 to 18 seconds).

The reclosing contacts will carry 5 amperes continuously. They will interrupt 3 amperes at 125 volts d-c in a non-inductive circuit or 30 amperes at 120 volts a-c.

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 four mounting holes on the flange for semi-flush mounting or by means of the rear mounting stud or studs for projection mounting. Either a mounting stud or the mounting screws may be utilized for grounding the relay. The electrical connections may be made directly to the terminals by means of screws for steel panel mounting or to the terminal studs furnished with the relay for thick panel mounting. The terminal studs may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

For detailed FT case information refer to I.L. 41-076.

Before placing the relay in service the motor coil

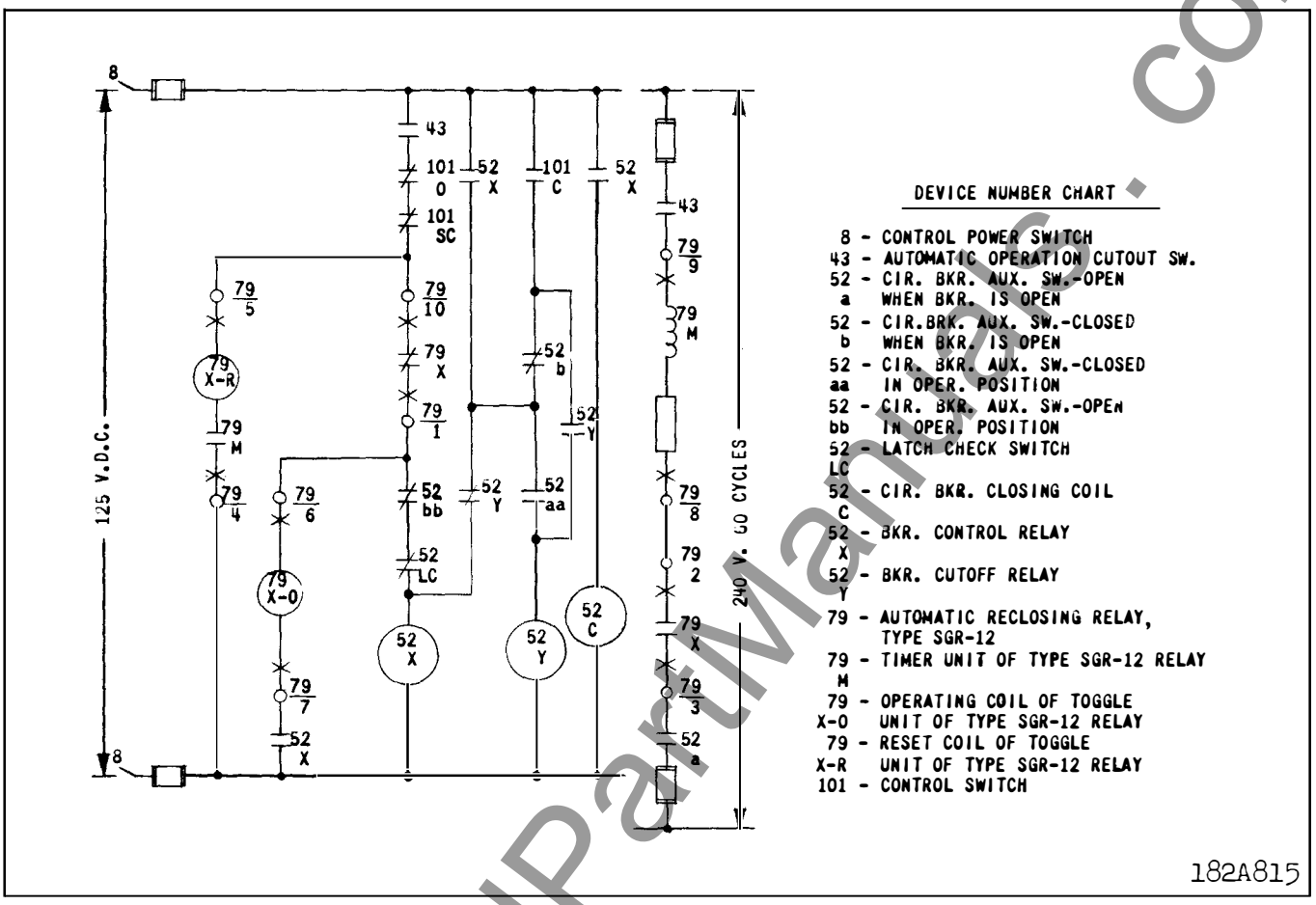


Fig. 2. External Schematic of the Type SGR-12 Relay for Immediate Reclosure of a Breaker with DC Control.

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.

CAUTION: Before energizing the motor circuit check the resistor connection. The resistor is connected at the factory for 240 volt a.c. service, and should be by-passed for 120 volt a.c. operation.

The contact travel of the timing unit determines the time delay, which must be adjusted to meet the requirements of the particular application. The bearing screw at the upper end of the last gear shaft is used to clamp a stop for the contact arm in position. The stop should be located so that the index mark on the contact arm has the desired position with reference to the scale, and the bearing screw then should be tightened securely.

In case the synchronous motor should be removed from its mounting plate, it should be reassembled so that the mesh of the motor countershaft pinion with its associated gear is about 2/3 of the depth of the gear teeth. One of the motor mounting screw holes has sufficient clearance to permit slight adjustment of the gear mesh. In case the motor should be damaged, the recloser should be returned to our Works for repair, or a complete replacement motor should be installed.

If the toggle unit has been dismantled, it will be necessary to check the toggle action and the contact follow after reassembling it. The clearance hole for the mounting screw in the pole piece under the toggle spring is large enough to permit some variation in the pole piece position. The gap between the two pole pieces should be 1/4". If necessary,

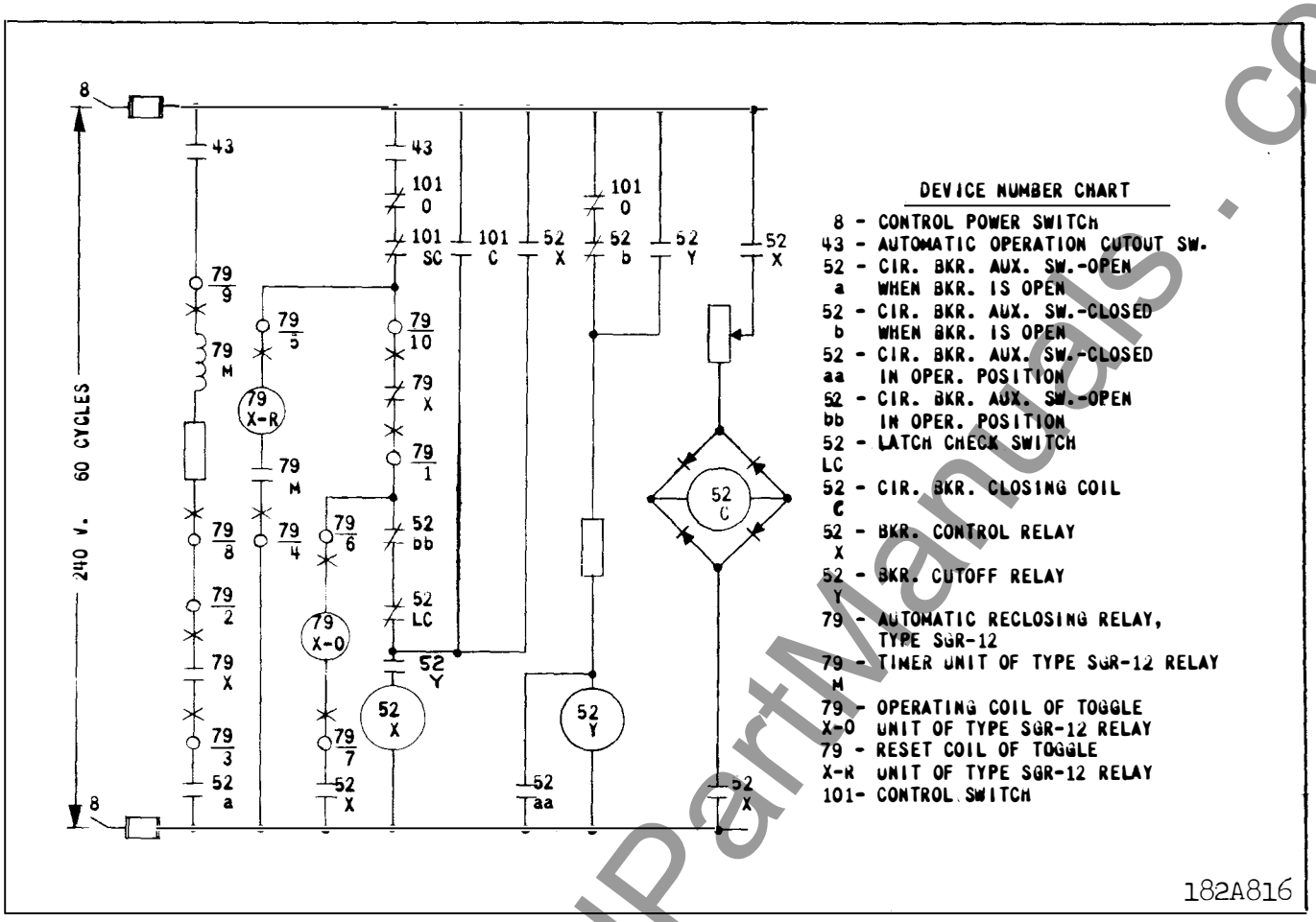


Fig. 3. External Schematic of the Type SGR-12 Relay for Immediate Reclosure of a Breaker with AC Control.

the toggle spring pressure should be adjusted so that about 3 oz. force is necessary to move the armature from one position to the other. This pressure can exceed 3 oz. but should not be great enough to prevent the relay from operating at 80% of the minimum voltage rating given on the name-plate. Because the duration of energization of the toggle unit coils is normally less than one second, the relay can be used satisfactorily on a number of different voltages. Certain styles are rated 120-240 v.a.c. and 24-125 v.d.c. For this multi-rating the coil energy is minimum when used on a 24 v.d.c. supply, and the toggle spring is adjusted at the factory to be suitable for this rating. The spring pressure will be somewhat less than 3 ounces for this adjustment. While the relay will operate at the maximum ratings without readjustment, the spring pressure can readily be increased by means of the adjusting screw. Such readjustment (a small fraction of a turn is sufficient) will increase the resistance of the relay to shock and minimize possibility of bouncing of the armature.

The contacts should make positively in either position of the armature. The contact support may be bent slightly if necessary to adjust the contact follow. The contacts should not make until the armature has passed the center position slightly.

The contact connected between terminals 1 and 2 (opened by energizing the operating coil) is not required to interrupt current when the relay is used in the circuits shown in Figs. 3 and 4, since it is by-passed by a 52X contact. However, in certain special applications it may be necessary for this contact to interrupt at 125 volts d.c. a current which would be above its normal safe capacity. To provide for such applications a small magnetized disc is assembled between the head of the stationary contact and its supporting spring to provide a magnetic blowout effect. With this construction the contact will interrupt 1-3/4 amperes at 125 v.d.c.

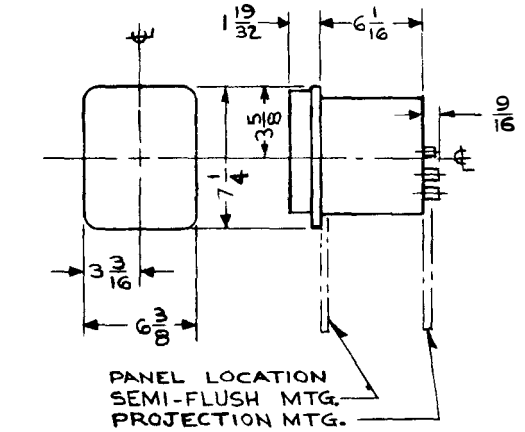
All contacts should be cleaned periodically. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

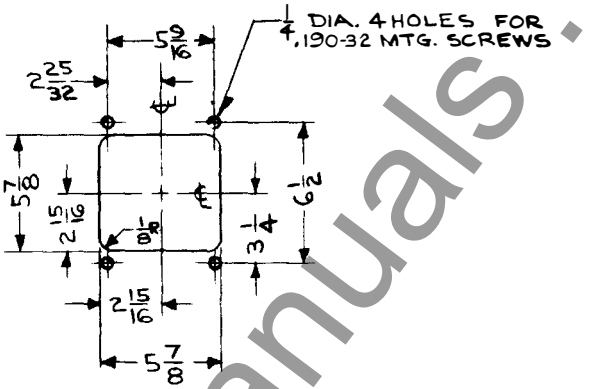
RENEWAL PARTS

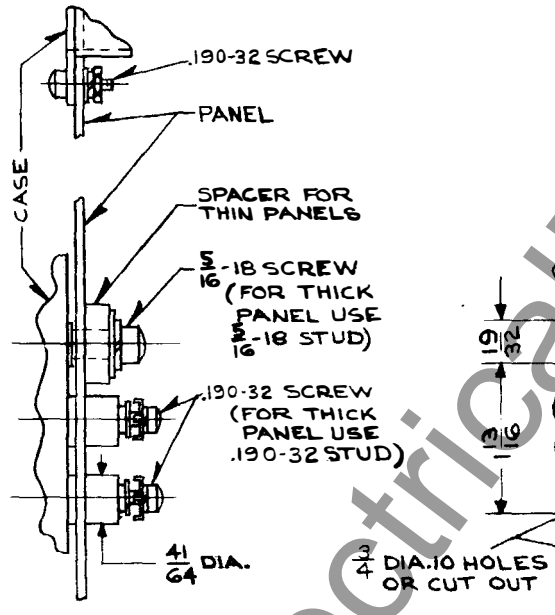
Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.

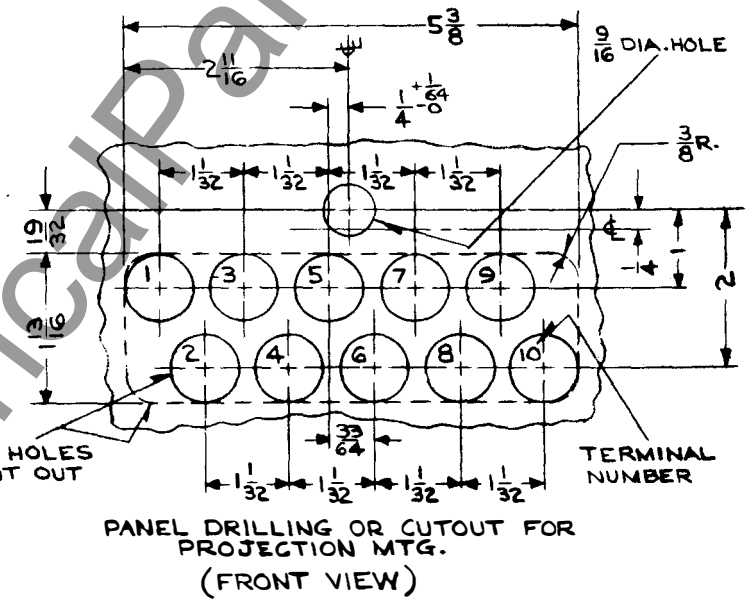
ENERGY REQUIREMENTS

The timer motor current is approximately 23 milliamperes at rated voltage, and at 120 volts the burden is 2.75 v.a. The toggle element coils of the recloser rated at 120-240 v.a.c. and 24-125 v.d.c. take approximately 58 v.a. at 120 v.a.c. or 8 watts at 24 v.d.c.









NOTE: ALL DIMENSIONS IN INCHES

57-D-7900

Fig. 4. Outline & Drilling Plan for the Type SGR-12 Relay in the Type FT11 Case.

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