

INSTALLATION • OPERATION • MAINTENANCE I N S T R U C T I O N S

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 settings and electrical connections.

APPLICATION

* The type SGR-12 Reclosing relay provides an 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. The SGR-12 relay is also available with two timing units for applications where it is desired to delay reclosing.

CONSTRUCTION AND OPERATION

The type SGR-12 relay consists of one or two synchronous motor operated time-delay unit and a toggle 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 re-setting 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 consists of two electromagnets, with a common armature having two pins resting in a groove in the molded base. The other end of the armature is held in one of two positions by means of a toggle spring which produces the toggle action. The spring is protected by a lock pin which may be left in after installation. The moving contacts are mounted at one end of the armature and the stationary contacts are mounted on either side.

* The operation of the relay and related control equipment may be followed by reference to Fig. 3 or 4. 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 contact) open. Fig. 6 shows the external connections when using the two timer SGR-12.

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-O 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 open. The breaker closes and the toggle unit front contacts 79/X1 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 79/X2 back contact in preparation for an immediate reclosure should a subsequent fault

SUPERSEDES I.L. 41-663.2

*Denotes Changes From Superseded Issue

EFFECTIVE NOVEMBER 1965

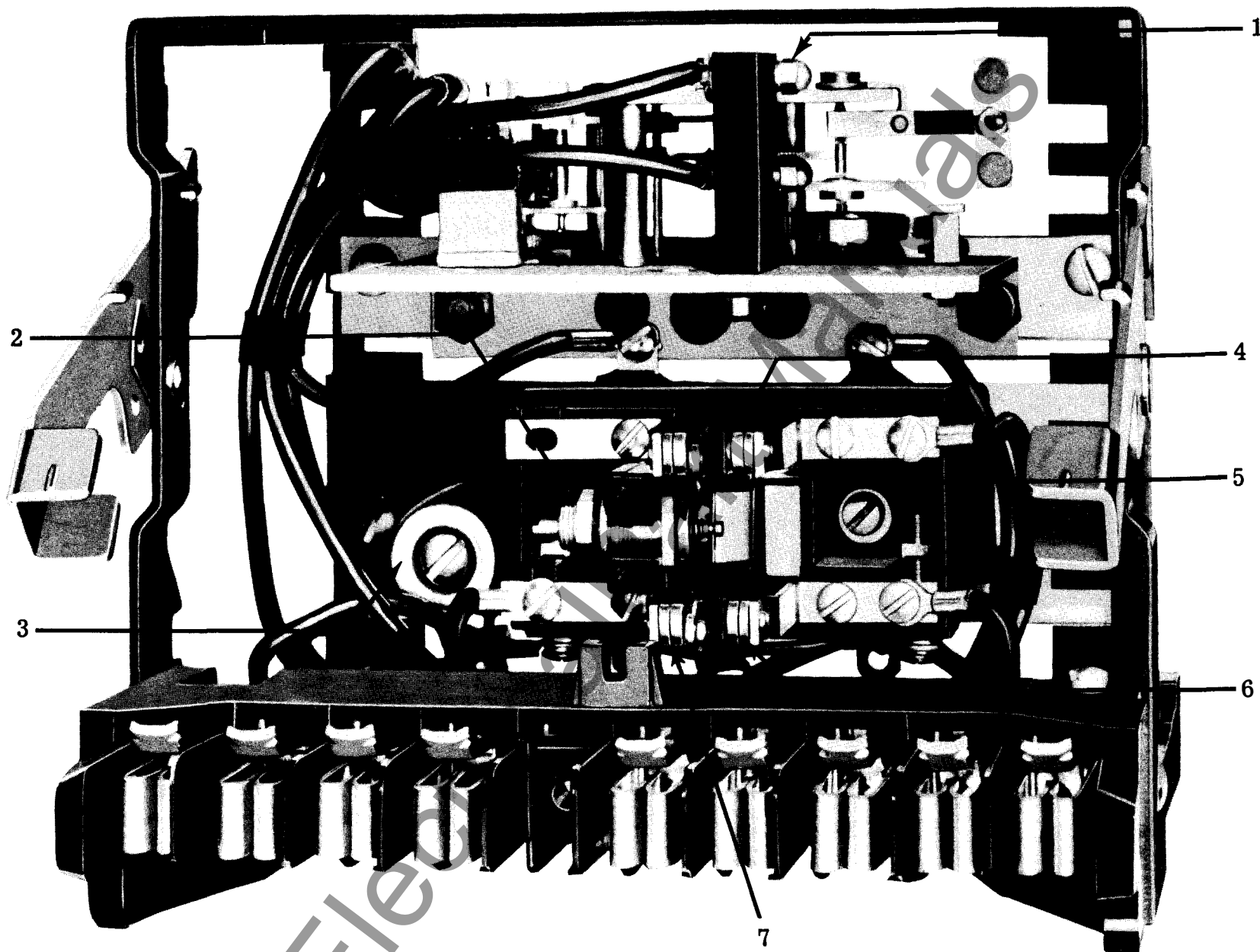


Fig. 1. Type SGR-12 Reclosing Relay Without Case. 1 - Timer Contacts. 2 - Reset Coil. 3 - Motor Resistor. 4 - X1 Contact. 5 - Operating Coil. 6 - X3 Contact. 7 - X2 Contact.

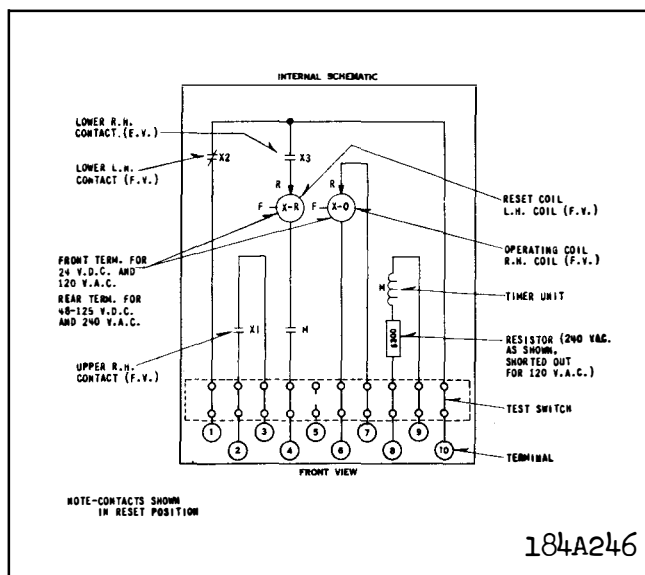


Fig. 2. Internal Schematic of the Type SGR-12 Relay in the Type FT11 Case.

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 79/X2 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 79/X2 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 79/X2 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

There are two type SGR-12 Reclosing relays which are rated as follows:

Toggle Unit Δ

Motor

120-240 V 60 cycles or 24-125 v.d.c.

250 v.d.c. 120/240 V 60 cycles \dagger

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

Δ The toggle unit is supplied with tapped coils. For 24 v.d.c. and 120 V 60 cycles, the upper terminals and lower front terminals are used (F.V.). For 48-125 v.d.c. and 240 V 60 cycles, the upper terminals and lower rear terminals are used (F.V.).

* 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).

A timer is available where a reset time of less than 10 seconds but more than 1 second is required.

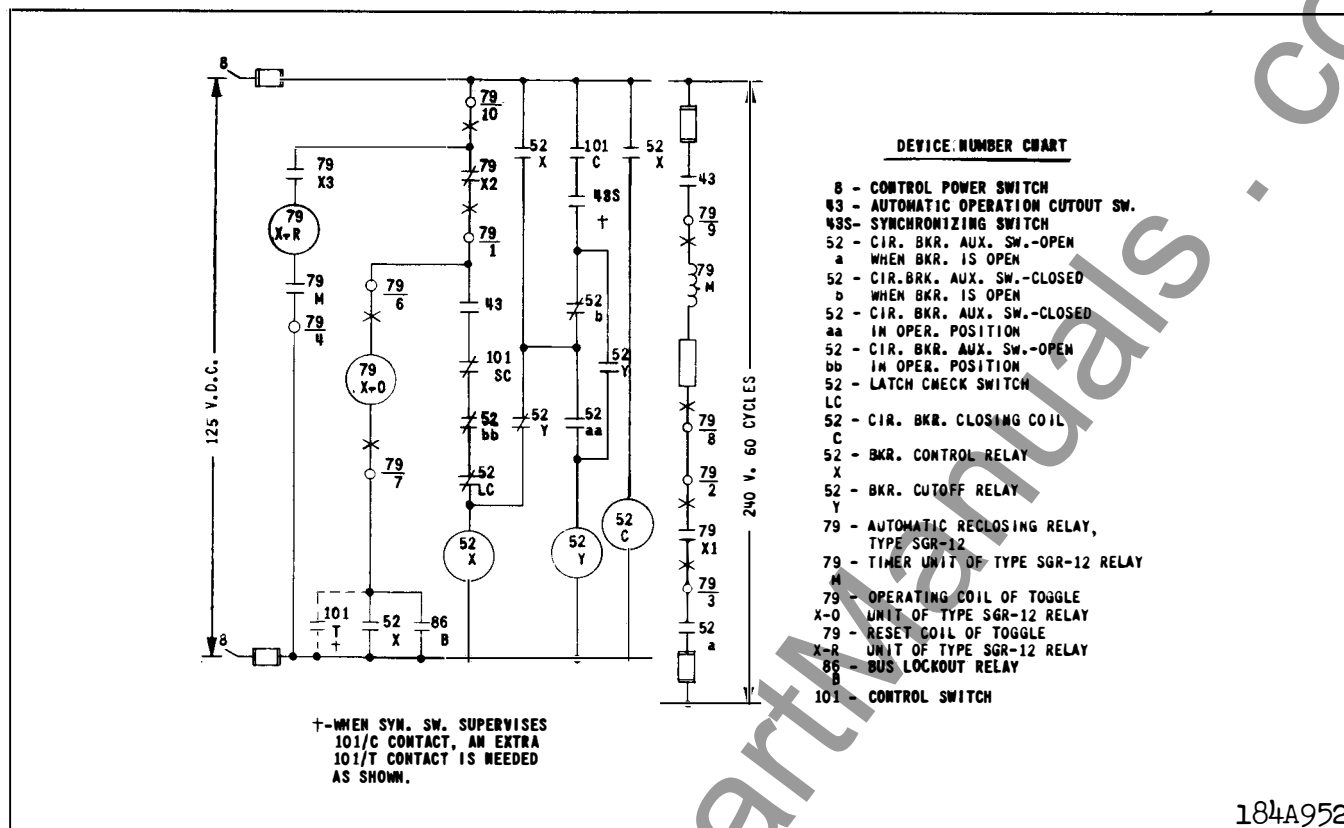
Each of the 10 small scale divisions represents approximately 1 second. Where a very accurate setting is desired, the time interval should be checked with an electronic timer and the position of the back-stop adjusted for the exact time required.

The time for the contact arm to return to its initial position after an operation is approximately 20% or less of the closing time, with the higher per cent applying to settings of one to two scale divisions.

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



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

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 resistor should be shorted out when using 120 volt source.

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. Also, check toggle unit coil connections as described under "Characteristics."

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 screwholes 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

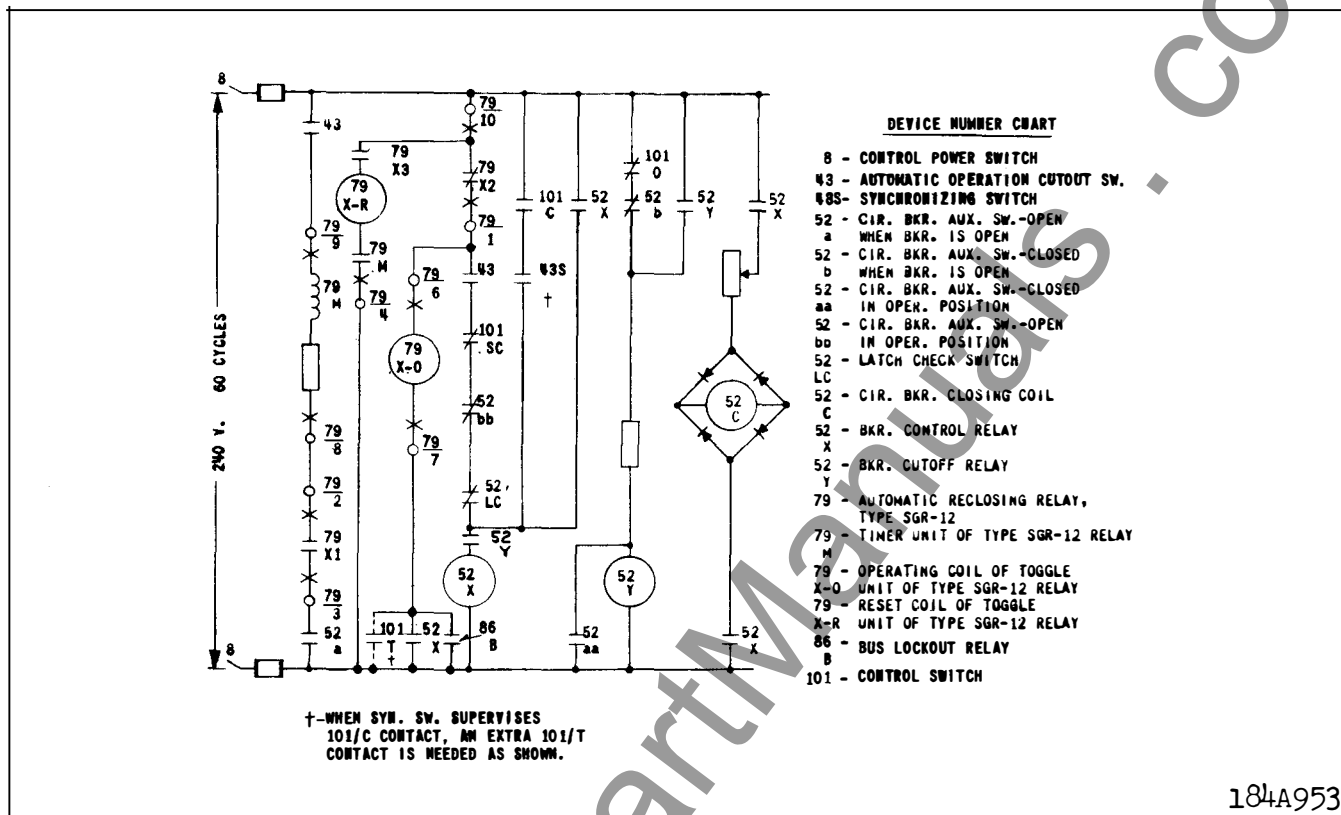


Fig. 4. External Schematic of the Type SGR-12 Relay for Immediate Reclosure of a Breaker with AC Control.

repair, or a complete replacement motor should be installed.

If the SX Toggle Unit has been dismantled, it is necessary to check the toggle action and the contact follow after reassembling it. Set the gap between the lower pole pieces at $11/64''$. The contact follow should be set at $.037''$. This may be obtained by adjusting the stationary contacts to just make when there is an $.020''$ gap between the residual pin in the armature, and the upper pole pieces. The adjusting screw assembly should be pushed down until there is enough tension to cause the residual pin to rest against the pole piece. With the lock nut tightened, adjust the adjusting screw until there is equal toggle pressure on each side. This may be done mechanically with a gram gage and should be 58 grams when measured between the rivets of the moving contact. This may also be done electrically by energizing the coils. If correctly adjusted, the unit will operate without chattering at 80% rated voltage.

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.

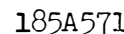
ENERGY REQUIREMENTS

The timer motor current is approximately 23 milliamperes at rated voltage, and at 120 volts the burden is 2.75 v.a. The toggle unit coils of the recloser rated at 120-240 v.a.c. and 24-125 v.d.c. have the following burdens:

24 VDC	12.5 watts
48 VDC	15 watts
125 VDC	100 watts
120 VAC	140 VA open gap - 130 closed
240 VAC	80 VA open gap - 65 closed



* Fig. 6 External Schematic of the Type SGR-12 Relay with time delay on reclosing.







WESTINGHOUSE ELECTRIC CORPORATION
RELAY-INSTRUMENT DIVISION

NEWARK, N. J.

Printed in U.S.A.



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APPLICATION

The type SGR-12 Reclosing relay provides an 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 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 consists of two electromagnets, with a common armature having two pins resting in a groove in the molded base. The other end of the armature is held in one of two positions by means of a toggle spring which produces the toggle action. The spring is protected by a lock pin which may be left in after installation. The moving contacts are mounted at one end of the armature and the stationary contacts are mounted on either side.

The operation of the relay and related control equipment may be followed by reference to Figs. 3 or 4. 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-O 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 open. The breaker closes and the toggle unit front contacts 79/X1 close, starting the 79M timer. If the breaker has not been closed on a fault, the 79M timer contact

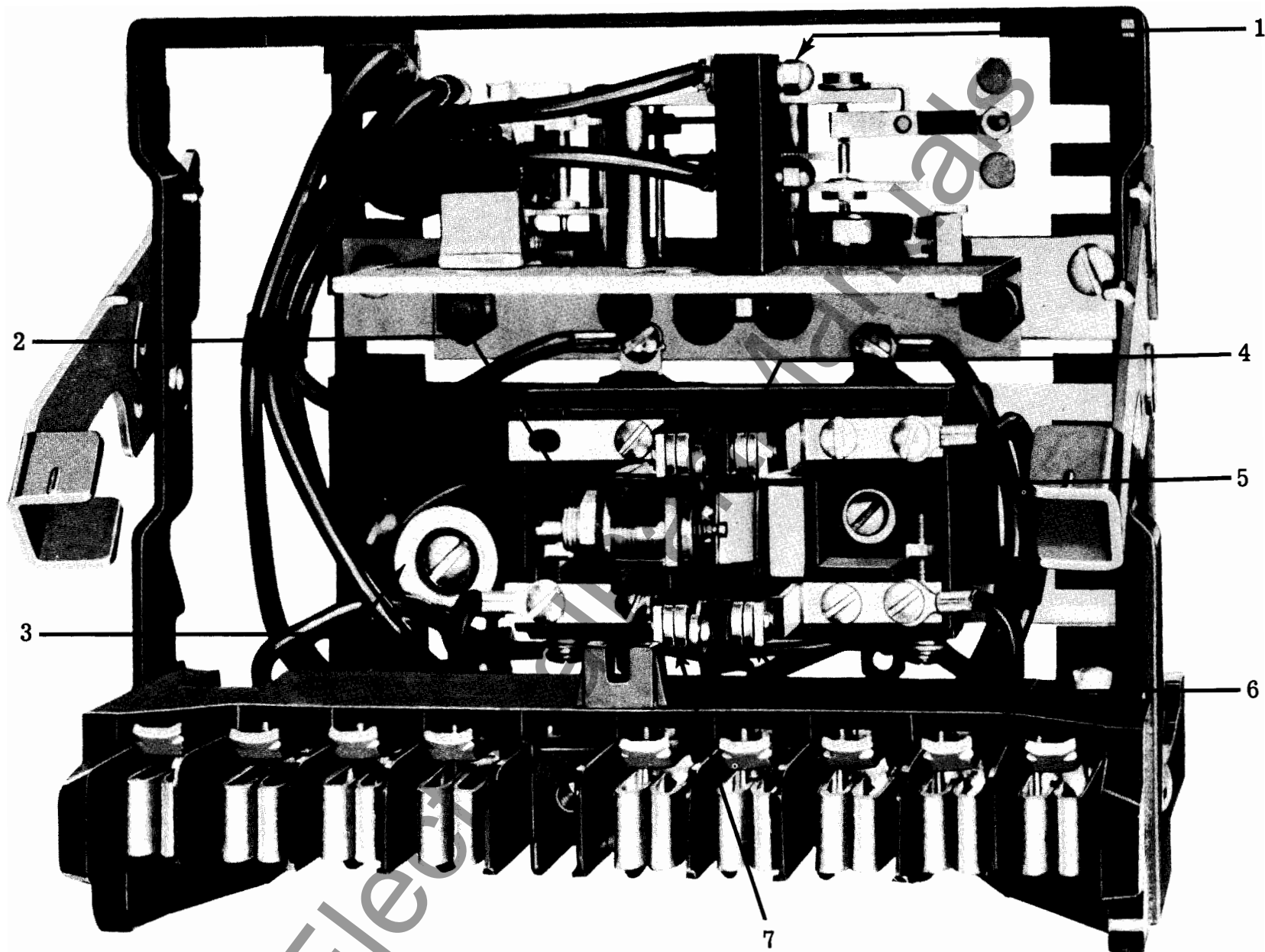


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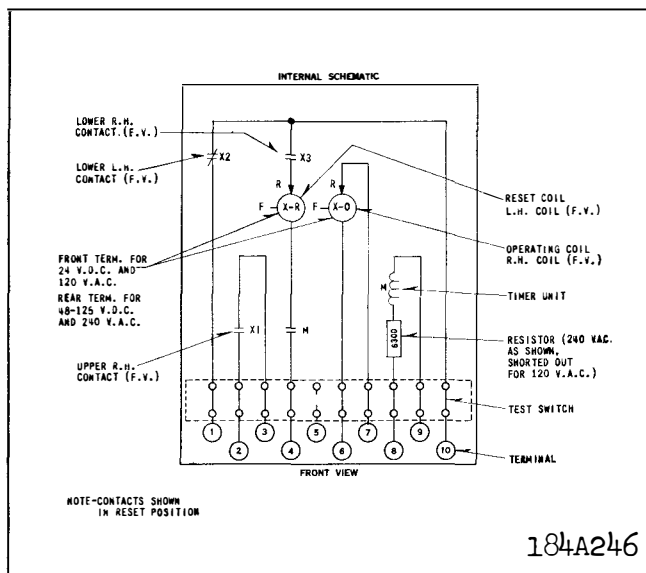


Fig. 2. Internal Schematic of the Type SGR-12 Relay in the Type FT11 Case.

will close and the reset coil 79X-R will operate, which closes the 79/X2 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 79/X2 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 79/X2 contact to 52X is open. To close the breaker it is necessary to use the control switch 101-C.

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CHARACTERISTICS

There are two type SGR-12 Reclosing relays which are rated as follows:

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

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

Δ The toggle unit is supplied with tapped coils. For 24 v.d.c. and 120 V 60 cycles, the upper terminals and lower front terminals are used (F.V.). For 48-125 v.d.c. and 240 V 60 cycles, the upper terminals and lower rear terminals are used (F.V.).

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

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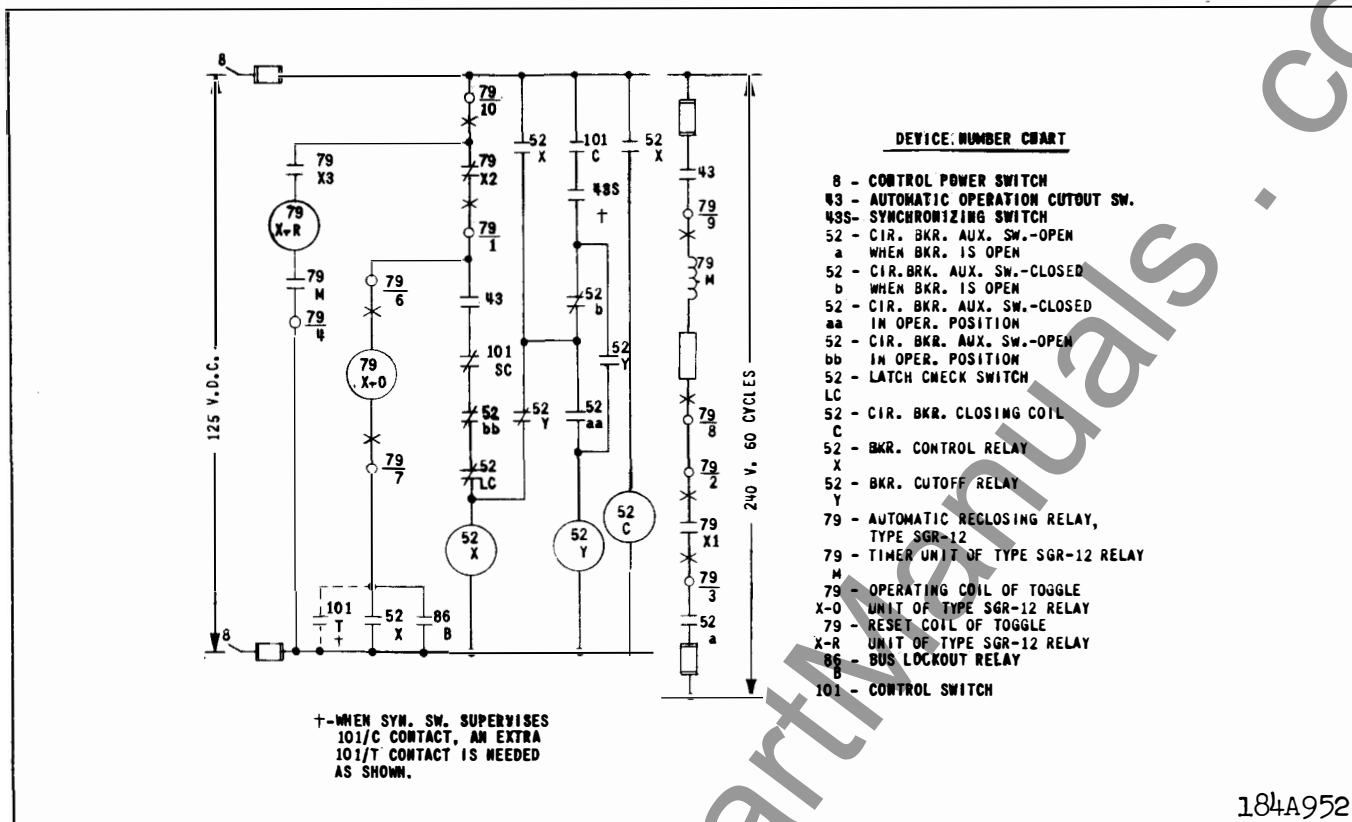


Fig. 3. External Schematic of the Type SGR-12 Relay for Immediate Reclosure of a Breaker with DC Control.

Before placing the relay in service, the motor coil resistor should be shorted out when using 120 volt source.

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. Also, check toggle unit coil connections as described under "Characteristics."

The contact travel of the timing unit determines the time delay, which must be adjusted to meet the requirements of the particular application. The bear-

ing 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.

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If the SX Toggle Unit has been dismantled, it is necessary to check the toggle action and the contact follow after reassembling it. Set the gap between the lower pole pieces at 11/64". The contact follow should be set at .037". This may be obtained by adjusting the stationary contacts to just make when

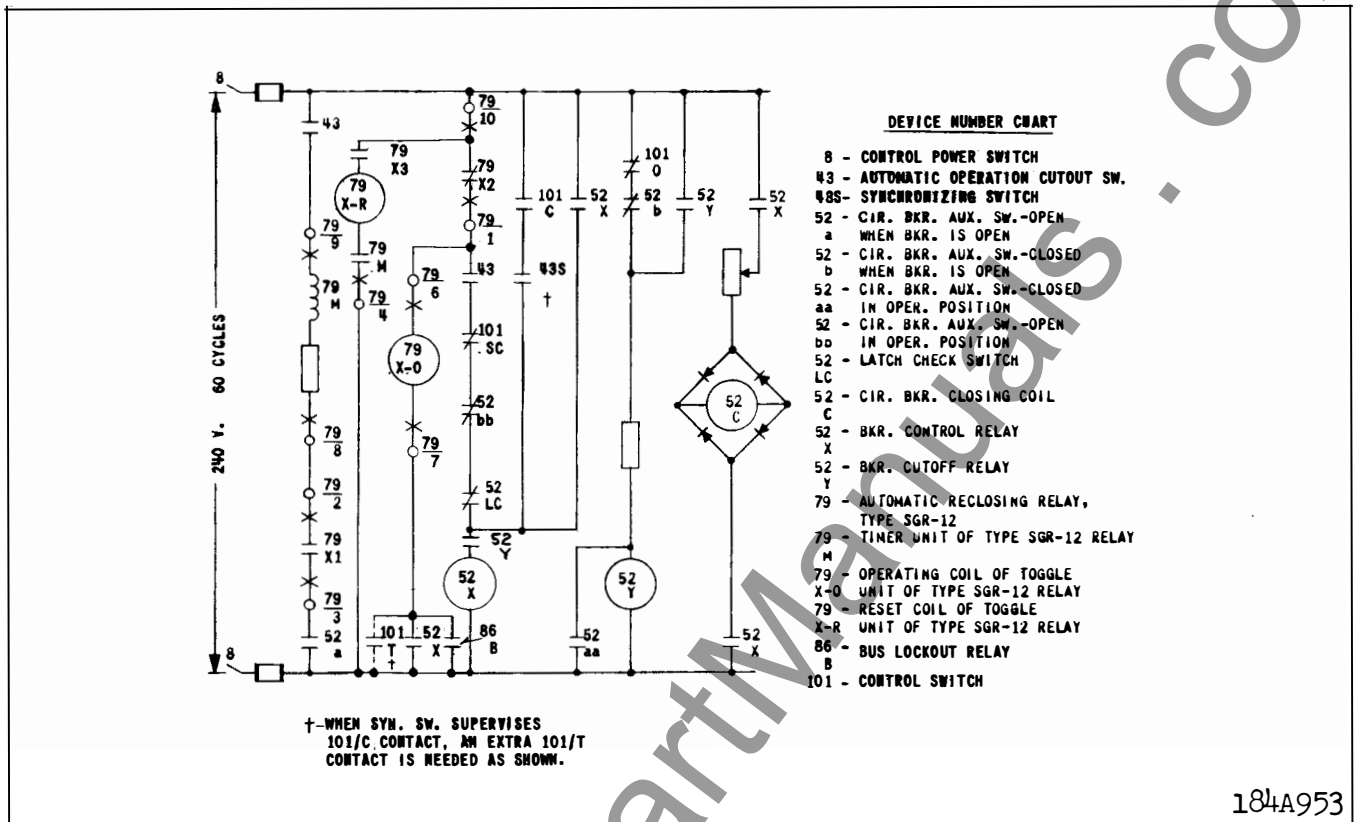


Fig. 4. External Schematic of the Type SGR-12 Relay for Immediate Reclosure of a Breaker with AC Control.

there is an .020" gap between the residual pin in the armature, and the upper pole pieces. The adjusting screw assembly should be pushed down until there is enough tension to cause the residual pin to rest against the pole piece. With the lock nut tightened, adjust the adjusting screw until there is equal toggle pressure on each side. This may be done mechanically with a gram gage and should be 58 grams when measured between the rivets of the moving contact. This may also be done electrically by energizing the coils. If correctly adjusted, the unit will operate without chattering at 80% rated voltage.

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 unit coils of the recloser rated at 120-240 v.a.c. and 24-125 v.d.c. have the following burdens:

24 VDC	12.5 watts
48 VDC	15 watts
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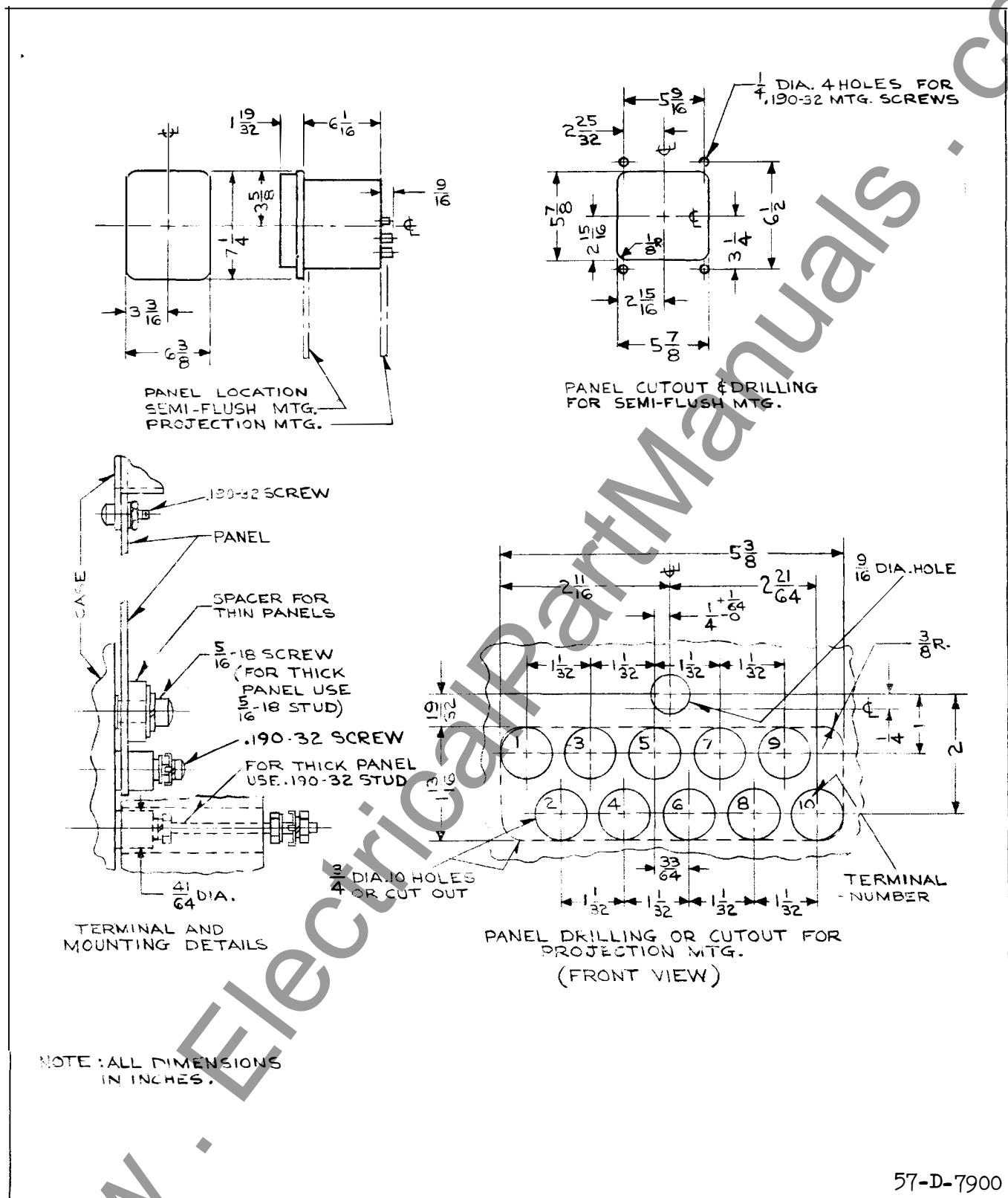


Fig. 5. Outline and Drilling Plan for the Type SGR-12 Relay in the Type FT11 Case.

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RELAY DEPARTMENT

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