INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE CJ-2 CAPACITOR SWITCHING 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 CJ-2 relay is a complete automatic single step voltage control device for capacitor switching. The relay is primarily intended for applications on circuits where close voltage settings are not required or where voltage changes with load are gradual and not accompanied by repetitive voltage fluctuations of high magnitude. When applying the type CJ-2 relay a graphic record of the voltage at the proposed location should be taken. By comparing the operating time of the relay for its contemplated settings and the voltage changes recorded on the graph, the expected number of operations can be estimated.

CONSTRUCTION AND OPERATION

The relay consists of a voltage operated induction disc element, a reactor, a type SG auxiliary relay and a resistor.

The operating element is an induction disc type element operating on voltage. The induction disc is a thin four-inch diameter conducting disc mounted on a vertical shaft. The shaft is supported on the lower end by a steel ball bearing riding between concave sapphire jewel surfaces, and on the upper end by a stainless steel pin.

The moving contact is a small silver rod hemispherically shaped at either end to form a double throw arrangement. It is fastened on the end of a conducting arm. The other end of this arm is clamped to an insulating tube on the disc shaft. The electrical connection is made from the moving contact thru the arm and a spiral spring. One end of the spring is fastened to the arm, and the other to a slotted spring adjuster disc which in turn fastens to the moulded insulation block mounted on the element.

The front and back stationary contacts assemblies are both adjustable. Each mounts on a lever which can be set anywhere about the periphery of a calibrated scale. The moulded brackets, upon which the stationary contact leaf springs are mounted, are each secured to their respective lever arms by two screws. These screws may be loosened and the moulded contact supports pivoted to the positions required for correct tracking of both contact assemblies on the calibrated scale.

The moving disc is rotated by an electromagnet in the rear and damped by a permanent magnet in the front.

The reactor is connected in series with the operating element potential coil to minimize ambient temperature error.

The upper pole coils of the operating element electromagnet has auxiliary windings to increase the torque of the relay during the time the high voltage and seal-in contacts, of the auxiliary relay, are closed. This action is to insure positive drop out of the auxiliary relay.

The auxiliary type SG relay is provided with

SUPERSEDES I. L. 41-299. 2A
(New I. L. Number—No Changes)

EFFECTIVE FEBRUARY 1955

two main contacts, one make and one brake, and a seal-in contact. The operating element low voltage contact closes to energize the SG element which seals in through the flexible seal-in contact, and remains energized until the operating element high voltage contact short circuits the SG potential coil through the current limiting resistor.

The relay elements are mounted in a detachable socket type case similar to the standard socket type watthour case. The base of the case is equipped with a disconnect link to isolate the main SG contacts for separate source tripping of the capacitor switch.

CHARACTERISTICS

The type CJ-2 relay has adjustable high and low voltage contacts that can be set around a calibrated scale between the limits of 105 and 135 volts. The moving contacts will assume a position corresponding to the voltage applied to the relay and will stay in that position until the voltage changes. If the voltage changes either gradually or suddenly, the contact will assume a new position corresponding to the change unless the travel is limited by the setting of the adjustable contacts. If the contacts are set to close for a particular value of voltage, and if a voltage of that exact amount is applied, then the relay is operating at its minimum trip point and the times on repeated operations are not repetitive within close tolerances. However, voltage appreciably greater than the overvoltage setting, or appreciably less than the undervoltage setting, result in relay timing operations which are consistent for repeated trials.

The relay has inverse timing; that is the greater the increase in voltage the faster the relay contact will travel.

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 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.

The relay has front and back adjustable stationary contacts; to adjust these properly, set the two levers so they both point to the same calibration point at approximately mid-scale. The contact leaf spring of the operating element should be positioned such that they are just free of the contact hook bracket to insure no initial tension in the leaf spring. Then adjust the position of the front and back contacts so they both just touch on either side of the moving contact. This is done by loosening the two screws at the top of each lever and rotating the adjustable contact assembly slightly until the desired contact positions are obtained. The screws should be tightened securely.

To calibrate the relay, it should be connected to a suitable 60-cycle voltage source. Voltage corresponding to the various values marked on the semi-circular scale plate should be applied to the relay and the position of the adjustable contacts checked for the various values. Re-adjustments can be made by rotating the notched spring adjuster with a screw driver blade inserted in one of the notches.

The flexible seal-in contact of the SG element should be adjusted by bending the associated back plate, such that there is a contact gap of approximately 1/16 inch when the element is de-energized.

ENERGY REQUIREMENTS

The 60 cycle burdens of the type CJ-2 relay are as follows:

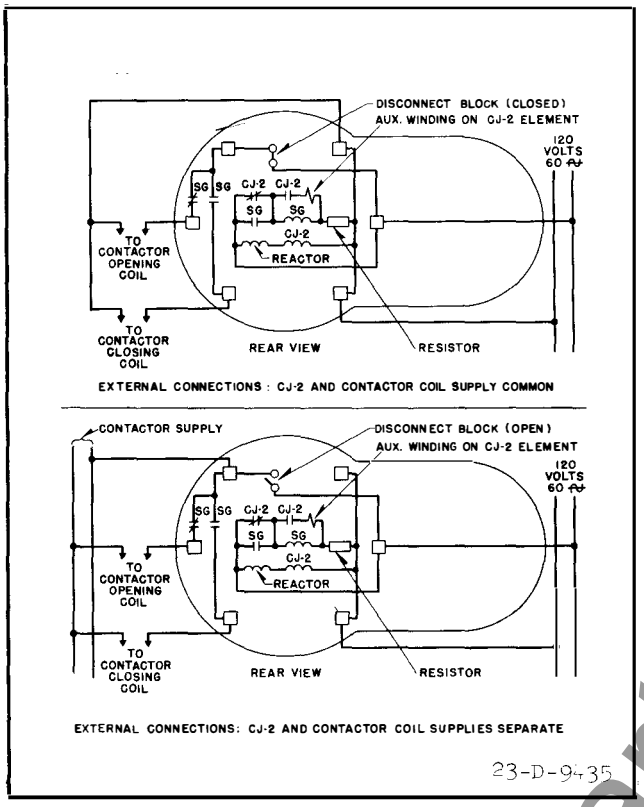


Fig. 1—Internal and External Schematic of type CJ-2 Relay. For Reference Only.

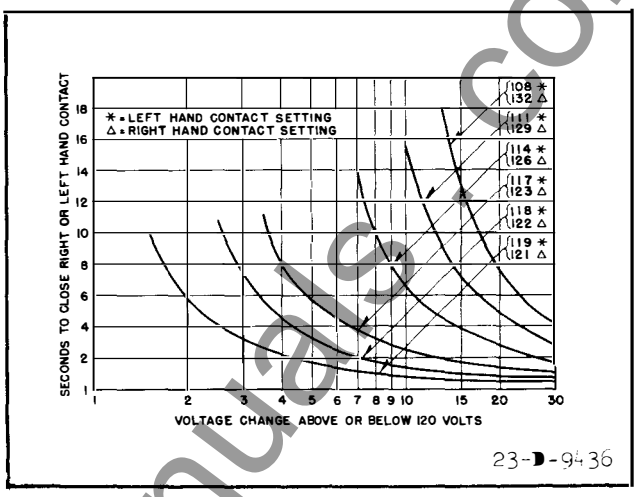


Fig. 2—Typical Time Curve for type CJ-2 Relay.

Operating element potential coil plus reactor, VA = 8.2 ∠72° lag at 120 volts. SG element plus resistor, VA = 11 ∠60° lag at 120 volts.

Compounding circuit = 144 watts at 120 volts (This is not a continuously energized or rated circuit).

Contact Rating

The main SG element contacts will carry 12 amperes continuous and 30 amperes for one second and will interrupt 30 amps non-inductive load at 105 to 135 volts 60 cycles. For d.c. the interrupting ratings for non-inductive circuit are given in the table that follows:

Volts	Amps
24	15
48	8
115	2.4
230	0.75
550	0.25

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.

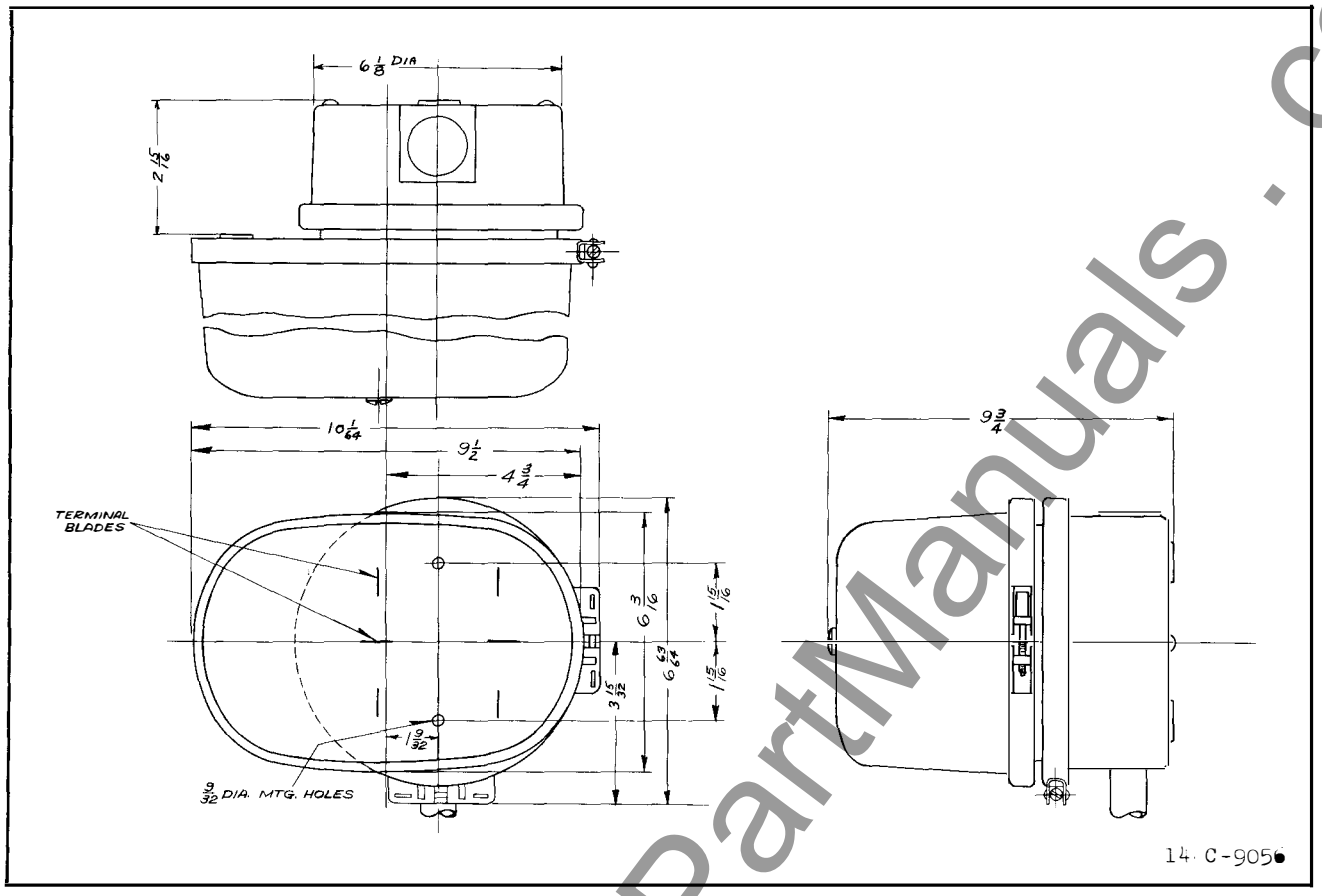


Fig. 3— Outline for type CJ-2 Relay . For Reference Only.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE CJ-2 CAPACITOR SWITCHING 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 CJ-2 relay is a complete automatic single step voltage control device for capacitor switching. The relay is primarily intended for applications on circuits where close voltage settings are not required or where voltage changes with load are gradual and not accompanied by repetitive voltage fluctuations of high magnitude. When applying the type CJ-2 relay a graphic record of the voltage at the proposed location should be taken. By comparing the operating time of the relay for its contemplated settings and the voltage changes recorded on the graph, the expected number of operations can be estimated.

CONSTRUCTION AND OPERATION

The relay consists of a voltage operated induction disc element, a reactor, a type SG auxiliary relay and a resistor.

The operating element is an induction disc type element operating on voltage. The induction disc is a thin four-inch diameter conducting disc mounted on a vertical shaft. The shaft is supported on the lower end by a steel ball bearing riding between concave sapphire jewel surfaces, and on the upper end by a stainless steel pin.

The moving contact is a small silver rod hemispherically shaped at either end to form a double throw arrangement. It is fastened on the end of a conducting arm. The other end of this arm is clamped to an insulating tube on the disc shaft. The electrical connection is made from the moving contact thru the arm and a spiral spring. One end of the spring is fastened to the arm, and the other to a slotted spring adjuster disc which in turn fastens to the moulded insulation block mounted on the element.

The front and back stationary contacts assemblies are both adjustable. Each mounts on a lever which can be set anywhere about the periphery of a calibrated scale. The moulded brackets, upon which the stationary contact leaf springs are mounted, are each secured to their respective lever arms by two screws. These screws may be loosened and the moulded contact supports pivoted to the positions required for correct tracking of both contact assemblies on the calibrated scale.

The moving disc is rotated by an electromagnet in the rear and damped by a permanent magnet in the front.

The reactor is connected in series with the operating element potential coil to minimize ambient temperature error.

The upper pole coils of the operating element electromagnet has auxiliary windings to increase the torque of the relay during the time the high voltage and seal-in contacts, of the auxiliary relay, are closed. This action is to insure positive drop out of the auxiliary relay.

The auxiliary type SG relay is provided with

two main contacts, one make and one brake, and a seal-in contact. The operating element low voltage contact closes to energize the SG element which seals in through the flexible seal-in contact, and remains energized until the operating element high voltage contact short circuits the SG potential coil through the current limiting resistor.

The relay elements are mounted in a detachable socket type case similar to the standard socket type watthour case. The base of the case is equipped with a disconnect link to isolate the main SG contacts for separate source tripping of the capacitor switch.

CHARACTERISTICS

The type CJ-2 relay has adjustable high and low voltage contacts that can be set around a calibrated scale between the limits of 105 and 135 volts. The moving contacts will assume a position corresponding to the voltage applied to the relay and will stay in that position until the voltage changes. If the voltage changes either gradually or suddenly, the contact will assume a new position corresponding to the change unless the travel is limited by the setting of the adjustable contacts. If the contacts are set to close for a particular value of voltage, and if a voltage of that exact amount is applied, then the relay is operating at its minimum trip point and the times on repeated operations are not repetitive within close tolerances. However, voltage appreciably greater than the overvoltage setting, or appreciably less than the undervoltage setting, result in relay timing operations which are consistent for repeated trials.

The relay has inverse timing; that is the greater the increase in voltage the faster the relay contact will travel.

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 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.

The relay has front and back adjustable stationary contacts; to adjust these properly, set the two levers so they both point to the same calibration point at approximately mid-scale. The contact leaf spring of the operating element should be positioned such that they are just free of the contact hook bracket to insure no initial tension in the leaf spring. Then adjust the position of the front and back contacts so they both just touch on either side of the moving contact. This is done by loosening the two screws at the top of each lever and rotating the adjustable contact assembly slightly until the desired contact positions are obtained. The screws should be tightened securely.

To calibrate the relay, it should be connected to a suitable 60-cycle voltage source. Voltage corresponding to the various values marked on the semi-circular scale plate should be applied to the relay and the position of the adjustable contacts checked for the various values. Re-adjustments can be made by rotating the notched spring adjuster with a screw driver blade inserted in one of the notches.

The flexible seal-in contact of the SG element should be adjusted by bending the associated back plate, such that there is a contact gap of approximately 1/16 inch when the element is de-energized.

ENERGY REQUIREMENTS

The 60 cycle burdens of the type CJ-2 relay are as follows:

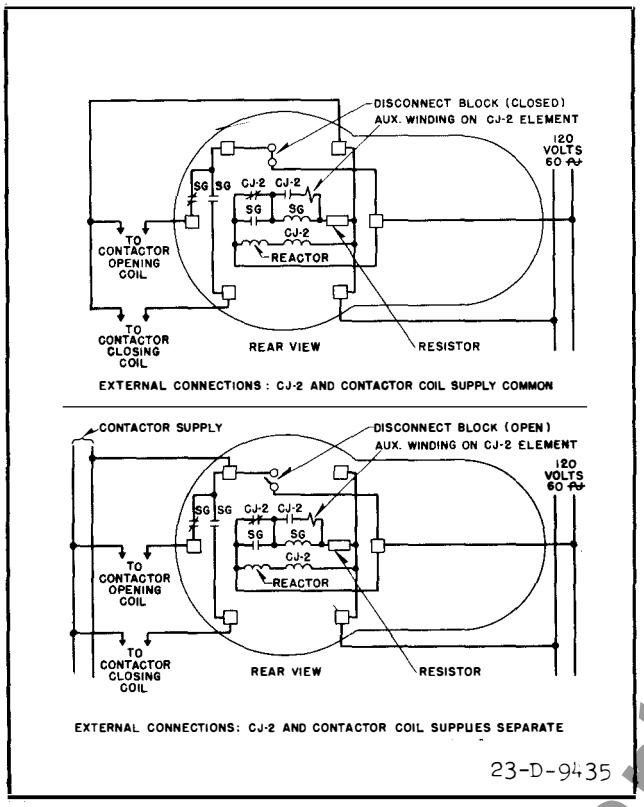


Fig. 1—Internal and External Schematic of type CJ-2 Relay. For Reference Only.

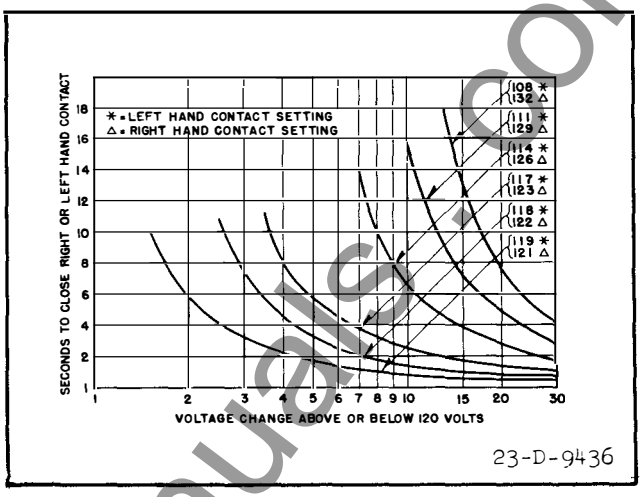


Fig. 2—Typical Time Curve for type CJ-2 Relay.

Operating element potential coil plus reactor, VA = 8.2 ∠72° lag at 120 volts. SG element plus resistor, VA = 11 ∠60° lag at 120 volts.

Compounding circuit = 144 watts at 120 volts (This is not a continuously energized or rated circuit).

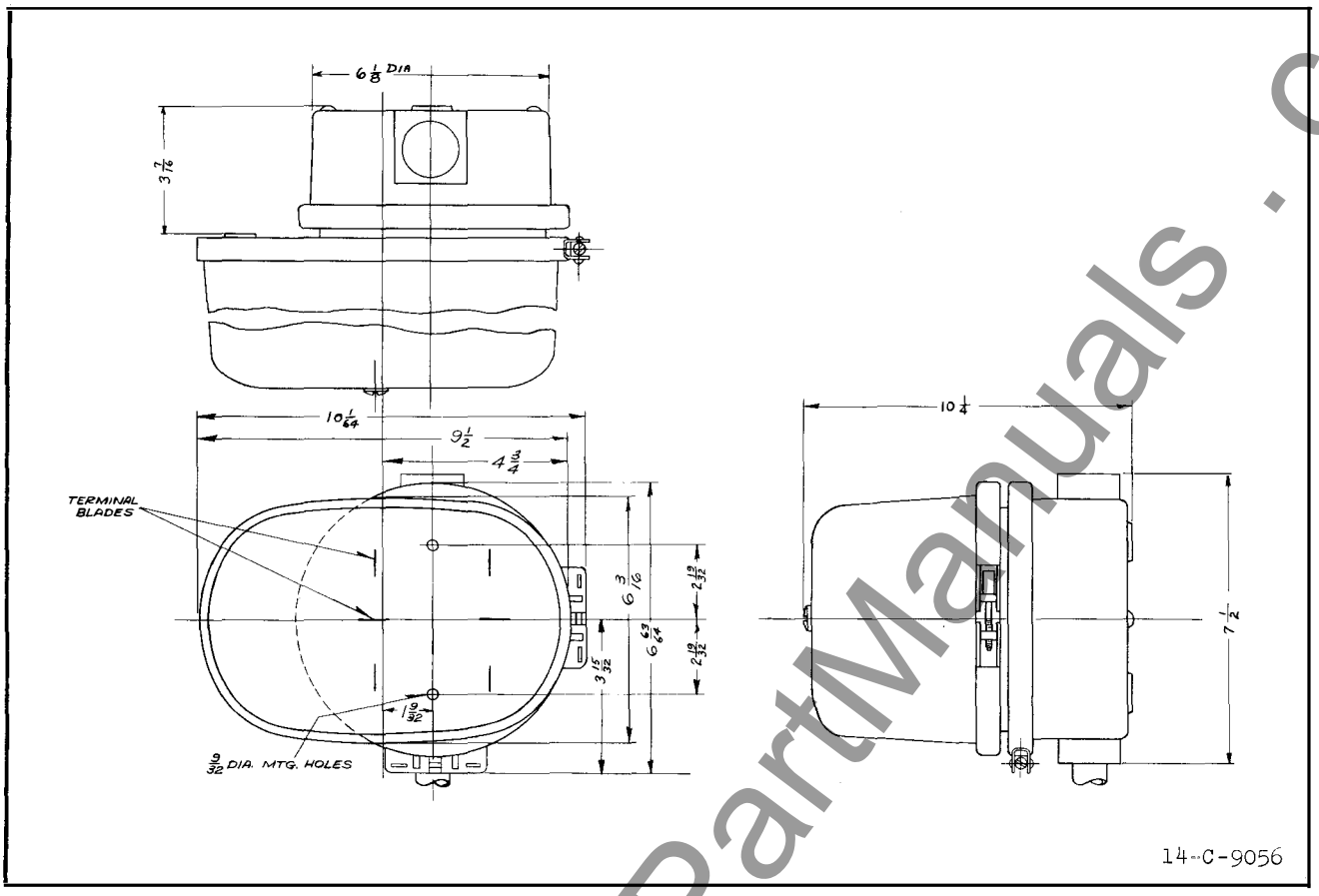
Contact Rating

The main SG element contacts will carry 12 amperes continuous and 30 amperes for one second and will interrupt 30 amps non-inductive load at 105 to 135 volts 60 cycles. For d.c. the interrupting ratings for non-inductive circuit are given in the table that follows:

Volts	Amps
24	15
48	8
115	2.4
230	0.75
550	0.25

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. 3— Outline for type CJ-2 Relay . For Reference Only.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE CJ-2 CAPACITOR SWITCHING 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 CJ-2 relay is a complete automatic single step voltage control device for capacitor switching. The relay is primarily intended for applications on circuits where close voltage settings are not required or where voltage changes with load are gradual and not accompanied by repetitive voltage fluctuations of high magnitude. When applying the type CJ-2 relay a graphic record of the voltage at the proposed location should be taken. By comparing the operating time of the relay for its contemplated settings and the voltage changes recorded on the graph, the expected number of operations can be estimated.

CONSTRUCTION AND OPERATION

The relay consists of a voltage operated induction disc element, a reactor, a type SG auxiliary relay and a resistor.

The operating element is an induction disc type element operating on voltage. The induction disc is a thin four-inch diameter conducting disc mounted on a vertical shaft. The shaft is supported on the lower end by a steel ball bearing riding between concave sapphire jewel surfaces, and on the upper end by a stainless steel pin.

The moving contact is a small silver rod hemispherically shaped at either end to form a double throw arrangement. It is fastened on the end of a conducting arm. The other end of this arm is clamped to an insulating tube on the disc shaft. The electrical connection is made from the moving contact thru the arm and a spiral spring. One end of the spring is fastened to the arm, and the other to a slotted spring adjuster disc which in turn fastens to the moulded insulation block mounted on the element.

The front and back stationary contacts assemblies are both adjustable. Each mounts on a lever which can be set anywhere about the periphery of a calibrated scale. The moulded brackets, upon which the stationary contact leaf springs are mounted, are each secured to their respective lever arms by two screws. These screws may be loosened and the moulded contact supports pivoted to the positions required for correct tracking of both contact assemblies on the calibrated scale.

The moving disc is rotated by an electromagnet in the rear and damped by a permanent magnet in the front.

The reactor is connected in series with the operating element potential coil to minimize ambient temperature error.

The upper pole coils of the operating element electromagnet has auxiliary windings to increase the torque of the relay during the time the high voltage and seal-in contacts, of the auxiliary relay, are closed. This action is to insure positive drop out of the auxiliary relay.

The auxiliary type SG relay is provided with

SUPERSEDES I. L. 41-299. 2A
(New I. L. Number—No Changes)

EFFECTIVE FEBRUARY 1955

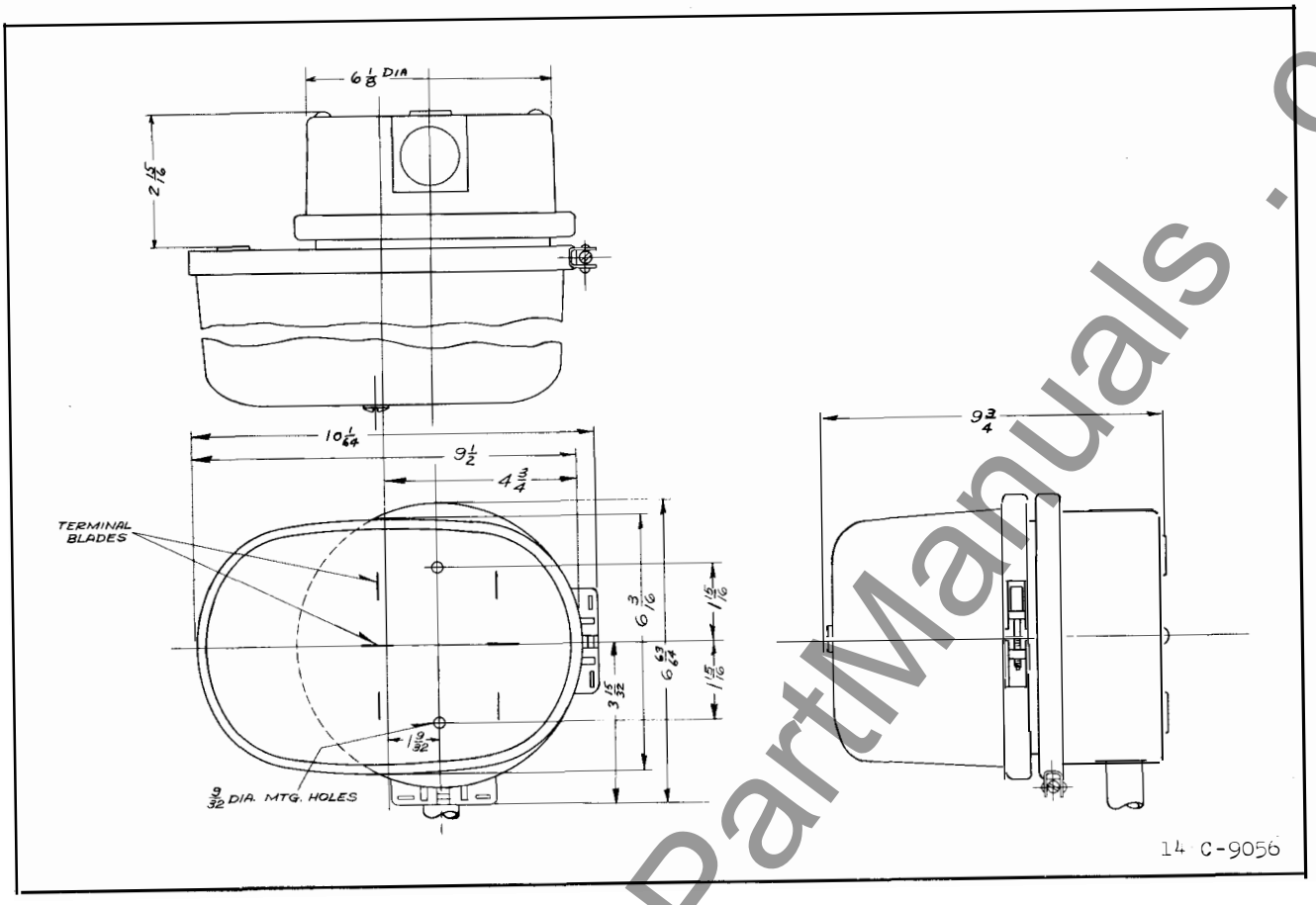


Fig. 3— Outline for type CJ-2 Relay . For Reference Only.