INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE KV-1 UNDERVOLTAGE 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 KV-1 is a high-speed single phase undervoltage relay particularly suited for applications where high drop-out ratio is desirable.

This relay may be used for high-speed carrier tripping or carrier starting for phase fault clearing of a weak-feed terminal. In this case the trip units are supervised by the type KA carrier auxiliary relay to prevent tripping for external faults.

Hot-line reclosing is another application for this relay.

CONSTRUCTION AND OPERATION

The type KV-1 relay consists of a high speed undervoltage cylinder unit (V) with an adjustable dropout and an indicating contactor switch (ICS).

UNDERVOLTAGE UNIT (V)

The undervoltage unit is a product induction cylinder type unit. The time phase relationship of the two air gap fluxes necessary for the development of torque is achieved by means of a capacitor connected in series with one pair of pole windings.

Mechanically, the undervoltage unit is composed of four basic components: a die-cast aluminum frame, an electromagnet, a moving element assembly, and a molded bridge.

The frame serves as the mounting structure for the magnetic core. The magnetic core which houses the lower pin bearing is secured to the frame by a locking nut. The bearing can be replaced, if necessary, without having to remove the magnetic core from the frame.

The electromagnet has two pairs of coils. The coils of each pair are mounted diametrically opposite one another. In addition, there are two locating pins. The locating pins are used to accurately position the lower pin bearing, which is mounted on the frame, with respect to the upper bearing, which is threaded into the bridge. The electromagnet is secured to the frame by four mounting screws.

The bridge is secured to the electromagnet and frame by two mounting screws. In addition to holding the upper pin bearing, the bridge is used for mounting the adjustable stationary contact housing. The stationary contact housing is held in position by a spring type clamp. The spring adjuster is located on the underside of the bridge and is attached to the moving contact arm by a spiral spring. The spring adjuster is also held in place by a spring type clamp.

With the contacts closed, the electrical connection is made through the stationary contact housing clamp, to the moving contact, through the spiral spring out to the spring adjuster clamp.

The voltage at which the contact drops out can be varied by rotating the spring adjuster connected to the spiral spring.

INDICATING CONTACTOR SWITCH UNIT (ICS)

The indicating contactor switch is a small d-c operated clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes, the moving contacts bridge two stationary contacts, completing the trip circuit. Also during this operation two fingers on the armature deflect a spring located on the front of the switch, which allows the operation target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

The front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

The type KV-1 undervoltage relay has a dropout range of 80 to 100 volts a-c with a continuous rating of 132 volts.

The dropout time characteristics for the undervoltage unit is shown in Figure 2.

Trip Circuit

The main contacts will safely close 30 amperes at 250 volts d-c and the seal-in contacts of the indicating contactor switch will safely carry this current long enough to trip a circuit breaker.

The indicating contactor switch has a pickup of approximately 1 ampere. Its d-c resistance is 0.1 ohms.

Cylinder Unit Contacts

The moving contact assembly has been factory adjusted for low contact bounce performance and should not be changed.

The set screw in each stationary contact has been shop adjusted for optimum follow and this adjustment should not be disturbed.

SETTINGS

The relay as received has been factory adjusted for 100 volt dropout.

Any other dropout voltage over the range can be gotten by varying the tension of the spiral spring attached to the moving element assembly. Apply the desired dropout voltage and vary the spring tension by placing a screwdriver or similar tool into one of the notches located on the periphery of the spring adjuster and rotating it. Increased accuracy can be obtained by pre-heating the relay at normal voltage for approximately one hour before making an adjustment.

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 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 information, refer to I.L. 41-076.

ADJUSTMENT AND MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no customer adjustments, other than those covered under "SETTINGS," should be required.

Acceptance Check

The following check is recommended to insure that the relay is in proper working order:

Undervoltage Unit (V)

1. Contact Gap - The contact gap should be approximately .030".

2. Dropout Voltage - The dropout voltage of the undervoltage relay can be checked by applying 120 volts and then decreasing this voltage to approximately 100 volts. The moving contact should make with the right hand stationary contact within ± 2% of this value. Greater accuracy can be obtained by pre-heating the relay at normal line voltage for approximately one hour.

Indicating Contactor Switch (ICS)

Close the main relay contacts and pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be between 1 and 1.2 amperes. The indicator target should drop freely.

The contact gap should be approximately 5/64" between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

Routine Maintenance

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dicated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. 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.

Calibration

Use the following procedure for calibrating the relay if the relay has been taken apart for repairs or the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order. (See "Acceptance Check").

Undervoltage Unit (V)

1. The upper pin bearing should be screwed down until there is approximately .025 clearance between it and the top of the shaft bearing. The upper pin bearing should then be securely locked in position with the lock nut. The lower bearing position is fixed and cannot be adjusted.

2. The contact gap adjustment for the undervoltage unit is made with the moving contact in the reset position, i.e., against the right side of the molded bridge. Advance the right hand stationary contact until it just touches the moving contact. Then advance the stationary contact 1/4 turn. Now screw in the left hand stationary contact until it just touches the moving contact. Then back off the left hand stationary contact one turn for a gap of approximately .030." The clamp holding the stationary contact housing need not be loosened for the adjustment since the clamp utilizes a spring-type action in holding the stationary contact in position.

3. For greater accuracy pre-heat the relay by applying rated voltage for approximately one hour prior to setting the sensitivity.

   The sensitivity adjustment is made by varying the tension of the spiral spring attached to the moving element assembly. The spring is adjusted by placing a screwdriver or similar tool into one of the notches located on the periphery of the spring adjuster and rotating it. The spring adjuster is located on the underside of the bridge and is held in place by a spring type clamp that does not have to be loosened prior to making the necessary adjustments.

   Apply the desired dropout voltage to the relay and adjust the spiral spring as noted above until the moving contact just makes with the right hand stationary contact.

Indicating Contactor Switch (ICS)

Adjust the contact gap for approximately 5/64" (-1/64", +0).

Close the main relay contacts and check to see that the relay picks up and the target drops between 1 and 1.2 amperes d-c.

To increase the pickup current remove the molded cover and bend the springs out or away from the cover. To decrease the pickup current bend the springs in toward the cover.

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 burden at 120 volts 60 cycles is 4.3 volt-amperes.
The undervoltage unit has a continuous rating of 132 volts.

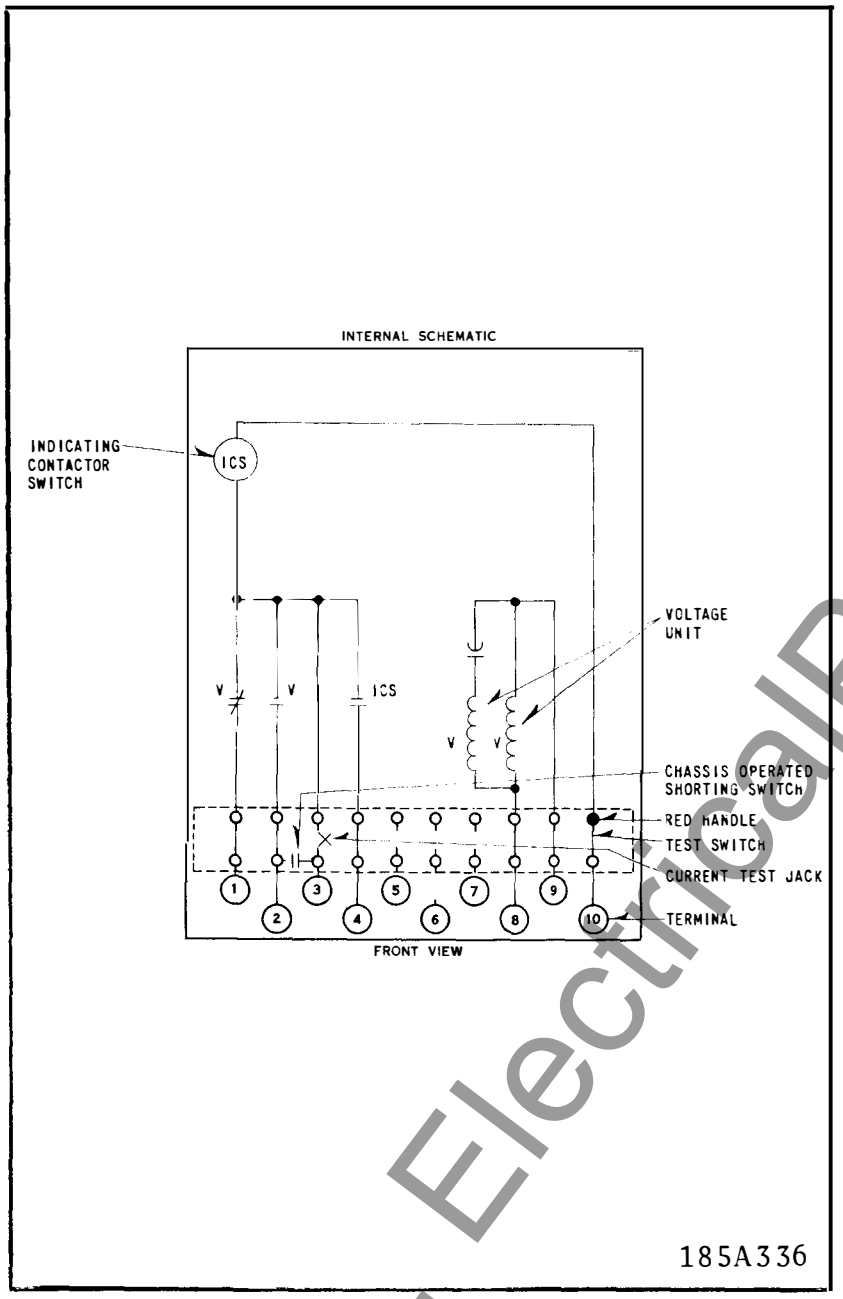


Fig. 1 Internal Schematic.

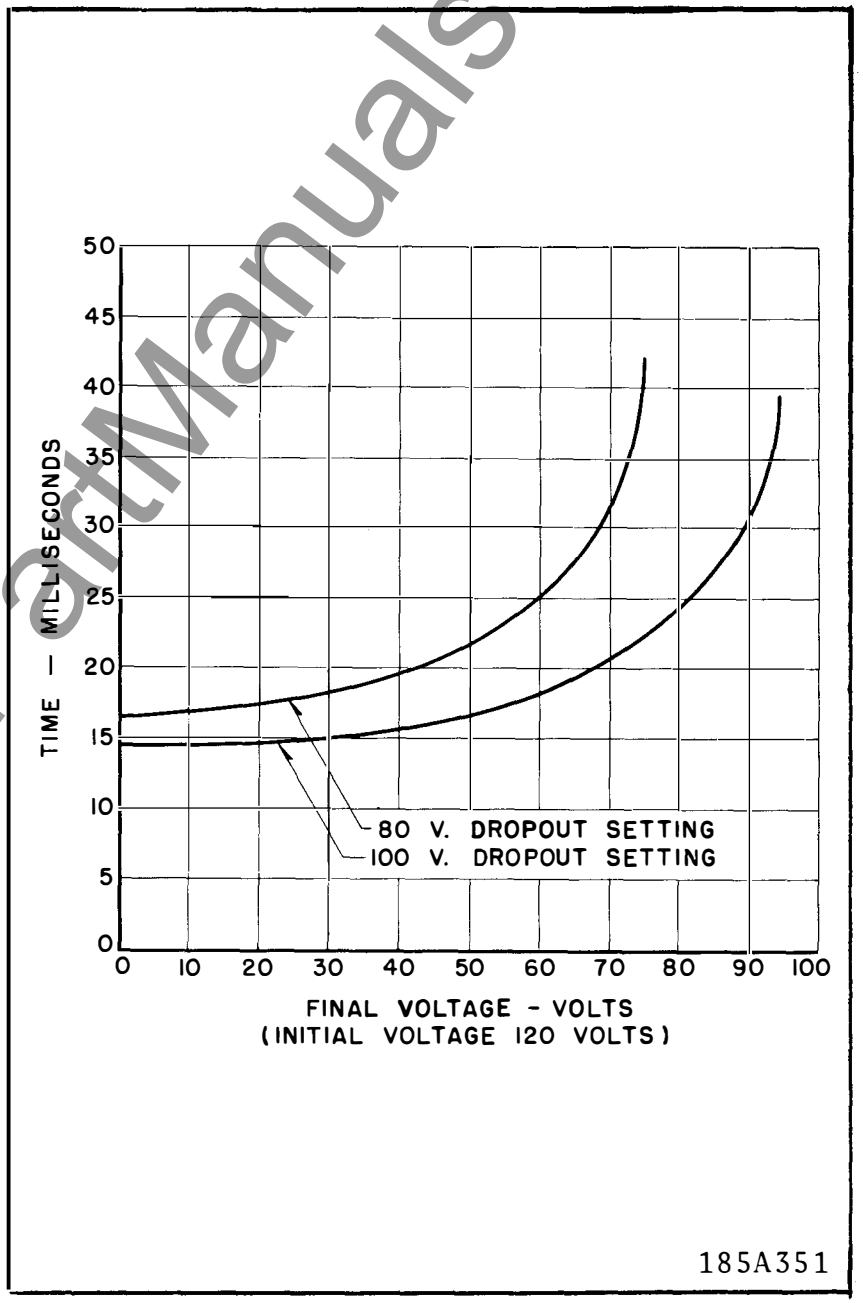


Fig. 2 Dropout Time Characteristics

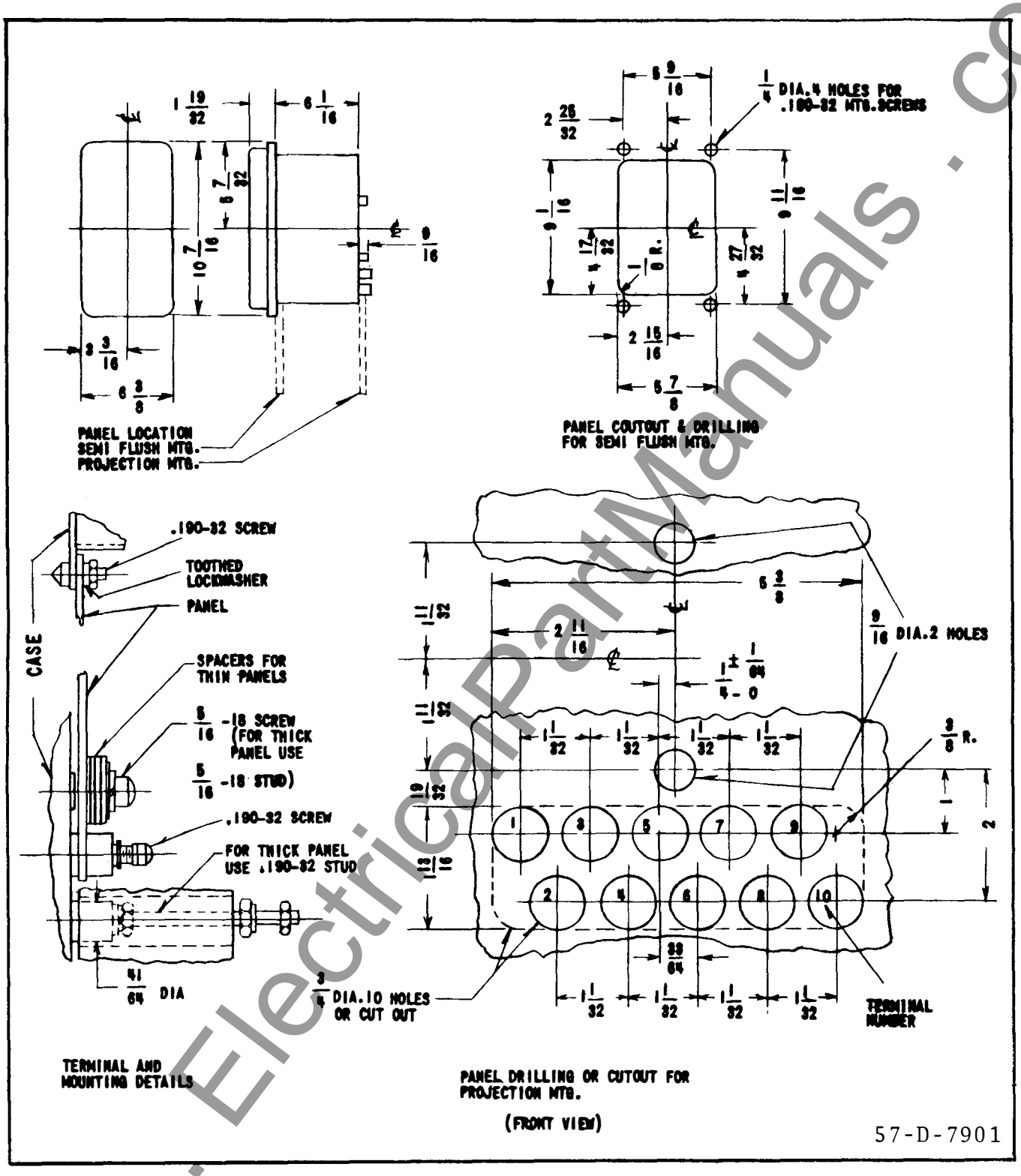


Fig. 3 Outline and Drilling (Type FT-21 Case)

WESTINGHOUSE ELECTRIC CORPORATION
RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**
Printed in U.S.A.

INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

KV-1 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 KV-1 is a high-speed single phase overvoltage relay, which may be used to start the transmission of a carrier signal or to trip a breaker for a ground fault in which the direction of power flow is not involved.

In addition the type KV-1 relay can be used to maintain carrier for a mininum of 5 cycles (60 hertz basis) and thereby block tripping which might otherwise result from transient conditions existing during the clearing of an external fault.

CONSTRUCTION AND OPERATION

The type KV-1 relay consists of a high speed overvoltage cylinder unit with an adjustable pickup and an indicating contactor switch.

OVERVOLTAGE UNIT

The overvoltage unit is a product induction cylinder type unit. The time phase relationship of the two air gap fluxes necessary for the development of torque is achieved by means of a capacitor connected in series with one pair of pole windings.

Mechanically, the overvoltage unit is composed of four basic components: a die-cast aluminum frame, an electromagnet, a moving element assembly, and a molded bridge.

The frame serves as the mounting structure for the magnetic core. The magnetic core which houses the lower pin bearing is secured to the frame by a locking nut. The bearing can be replaced, if necessary, without having to remove the magnetic core from the frame.

The electromagnet has two pairs of coils. The coils of each pair are mounted diametrically opposite one another. In addition, there are two locating pins. The locating pins are used to accurately position the lower pin bearing which is mounted on the frame, with respect to the upper pin bearing, which is threaded into the bridge. The electromagnet is secured to the frame by four mounting screws.

The moving element assembly consists of a spiral spring, contact carrying member, and an aluminum cylinder assembled to a molded hub which holds the shaft. The shaft has removable top and bottom jewel bearings. The shaft rides between the bottom pin bearing and the upper pin bearing with the cylinder rotating in an air gap formed by the electromagnet and the magnetic core.

The bridge is secured to the electromagnet and frame by two mounting screws. In addition to holding the upper pin bearing, the bridge is used for mounting the adjustable stationary contact housing. The stationary contact housing is held in position by a spring type clamp. The spring adjuster is located on the underside of the bridge and is attached to the moving contact arm by a spiral spring. The spring adjuster is also held in placd by a spring type clamp.

With the contacts closed, the electrical connection is made through the stationary contact housing clamp to the moving contact, through the spiral spring out to spring adjuster clamp.

All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding his particular installation, operation or maintenance of his equipment, the local Westinghouse Electric Corporation representative should be contacted.

SUPERSEDES I.L. 41-933.1A
*Denotes change from superseded issue.

EFFECTIVE OCTOBER 1972

The voltage at which the contact picks up can be varied by means of the adjustable resistor. The time for the moving contact to reset to the right hand stationary contact may be delayed for a minimum of 5 cycles (see section under "SETTINGS").

Indicating Contactor Switch Unit (ICS)

The indicating contactor switch is a small d-c operated clapper type device. A magnetic armature, to which leaf-spring mounted contacts are attached, is attracted to the magnetic core upon energization of the switch. When the switch closes, the moving contacts bridge two stationary contacts, completing the trip circuit. Also during this operation two fingers on the armature deflect a spring located on the front of the switch, which allows the operation indicator target to drop. The target is reset from the outside of the case by a push rod located at the bottom of the cover.

The front spring, in addition to holding the target, provide restraint for the armature and thus controls the pickup value of the switch.

Contacts

The moving contact assembly in the overvoltage unit has been factory adjusted for low contact bounce performance and should not be disturbed.

SETTINGS

Overvoltage Unit (V)

The only setting required is the pickup voltage setting which is made by means of the adjustable resistor. Increasing the resistance will increase the pickup voltage.

For the 15-45 volt unit, the relay as received has been factory adjusted to pick up at the high end of the pickup range. Pickup at the low end of the range can be achieved by merely shorting out the resistor.

The 108-132 volt unit can be adjusted from 108 to 132 volts by adjusting the resistor, and is normally set for 108 volts at the factory.

The contact gap is factory adjusted for .020". If 5 cycle minimum reset time is desired simply back off the left-hand station contact until the moving contact does not make in the picked up position.

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 relays 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 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.

ADJUSTMENTS & MAINTENANCE

The proper adjustments to insure correct operation of this relay have been made at the factory. Upon receipt of the relay, no adjustments, other than those covered under "SETTINGS," should be required.

Overvoltage Unit (V)

1. Contact Gap - The gap between the left-hand stationary and moving contacts with the relay in the de-energized position should be approximately .020".
2. For the 15-45 volt unit, the pickup of the over voltage unit can be checked by increasing the voltage to the relay to 45 volts. The relay should pickup within ± 5% of this value. The 15 volt pickup can be checked by shorting the resistor and increasing the voltage to this value. The relay should pickup within ± 5% of 15 volts.
3. For the 108-132 volt unit, the relay can be adjusted to pickup anywhere within this range with a resistor adjustment.

Indicating Contactor Switch (ICS)

Close the main relay contacts and pass sufficient d-c current through the trip circuit to close the contacts of the ICS. This value of current should be between 1 and 1.2 amperes. The indicator should drop freely.

The contact gap should be approximately 5/64" between the bridging moving contact and the adjustable stationary contacts. The bridging moving contact should touch both stationary contacts simultaneously.

ROUTINE MAINTENANCE

All relays should be inspected periodically and the operation should be checked at least once every year or at such other time intervals as may be dictated by experience to be suitable to the particular application.

All contacts should be periodically cleaned. 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.

Calibration

Use the following procedure for calibrating the relay if the relay has been taken apart for repairs or the adjustments have been disturbed. This procedure should not be used unless it is apparent that the relay is not in proper working order. (See "Acceptance Check").

Overvoltage Unit (V)

1. The upper pin bearing should be screwed down until there is approximately 1/64" clearance between it and the top of the shaft bearing. The upper pin bearing should then be securely locked in position with the lock nut. The lower bearing position is fixed and cannot be adjusted.

2. The contact gap adjustment for the overvoltage unit is made with the moving contact in the reset position, i.e., against the right side of the bridge. Advance the right hand stationary contact until the contacts make. Then advance the stationary contact and additional ¼ turn. Optimum adjustment occurs when the moving contact arm comes to rest just away from the molded bridge.

   Now move in the left-hand stationary contact until it just touches the moving contact. Then back off the stationary contact 2/3 of one turn for a contact gap of approximately .020".

   The clamp holding the stationary contact housing need not be loosened for the adjustment since the clamp utilizes a spring-type action in holding the stationary contact in position.

   With the resistor shorted out, pass 15 volts a-c through the relay terminals.

   The sensitivity adjustment is made by varying the tension of the spiral spring attached to the moving element assembly. The spring is adjusted by placing a screwdriver or similar tool into one of the notches located on the periphery of the spring adjuster and rotating it. The spring adjuster is located on the underside of the bridge and is held in place by a spring type clamp that does not have to be loosened prior to making the necessary adjustments.

   Adjust the spring until the moving contact just makes with the left hand stationary contact. With this adjustment, the dropout of the relay is approximately 98% of the pickup value.

   The adjustable clamp on the resistor can be set for any pickup to 45 volts, for the 15 to 45 volt unit, or for the 108 to 132 volt unit, it can be set for a voltage between 108 and 132 volts.

Indicating Contactor Switch (ICS)

Adjust the contact gap for approximately 5/64" (-1/64", +0).

Close the main relay contacts and check to see that the relay picks up and the target drops between 1 and 1.2 amperes d-c.

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 awlays give the complete nameplate data.

RATINGS (60 CYCLE)

	RELAY VOLTAGE SETTING	APPLIED VOLTAGE	BURDEN VOLT-AMPS	POWER FACTOR ANGLE LAGGING
15-45 Volt Units	15	15	.25	28°
	15	120	.20	48°
	45	45	.75	9°
	45	120	5.4	10°
108-132 Volt Units	108	108	2.23	3.7°
	108	120	1.25	3.7°
	132	132	1.55	3°

The type KV-1 overvoltage relay has a continuous rating of 120 V.A.C., and 208 V.A.C. for 30 seconds.

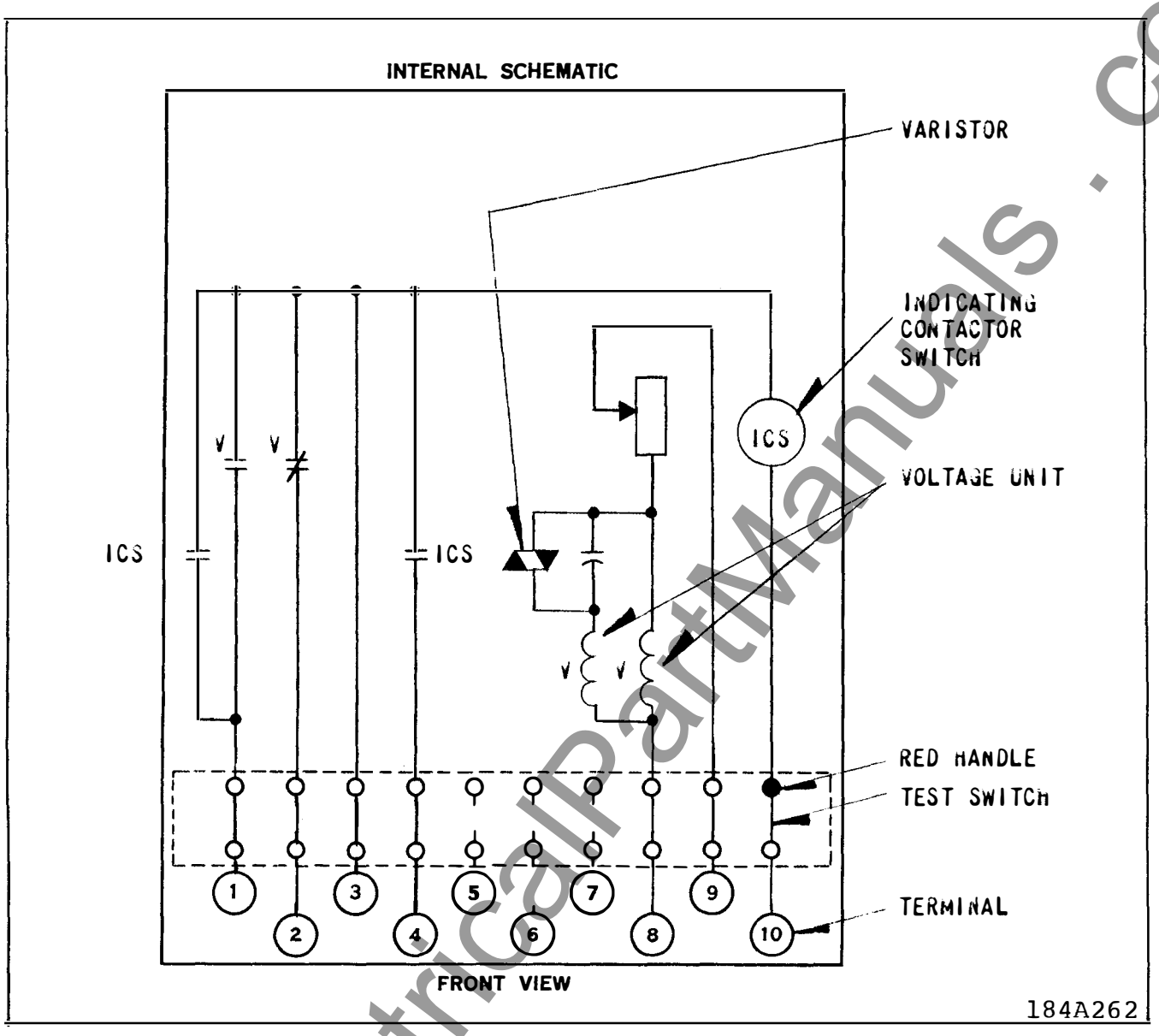
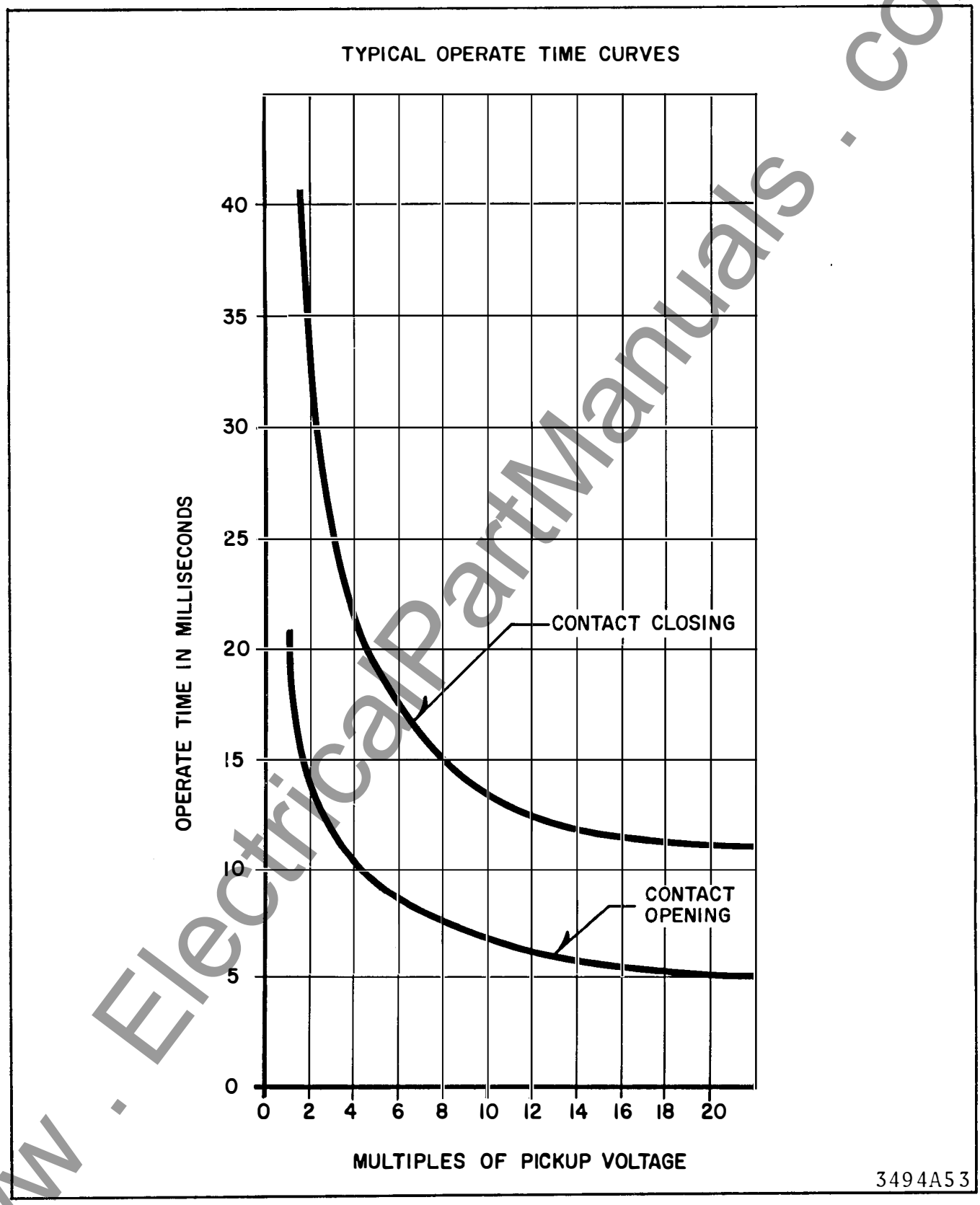


Fig. 1 Internal Schematic



* *Fig. 2 Typical Operate Time Curves*

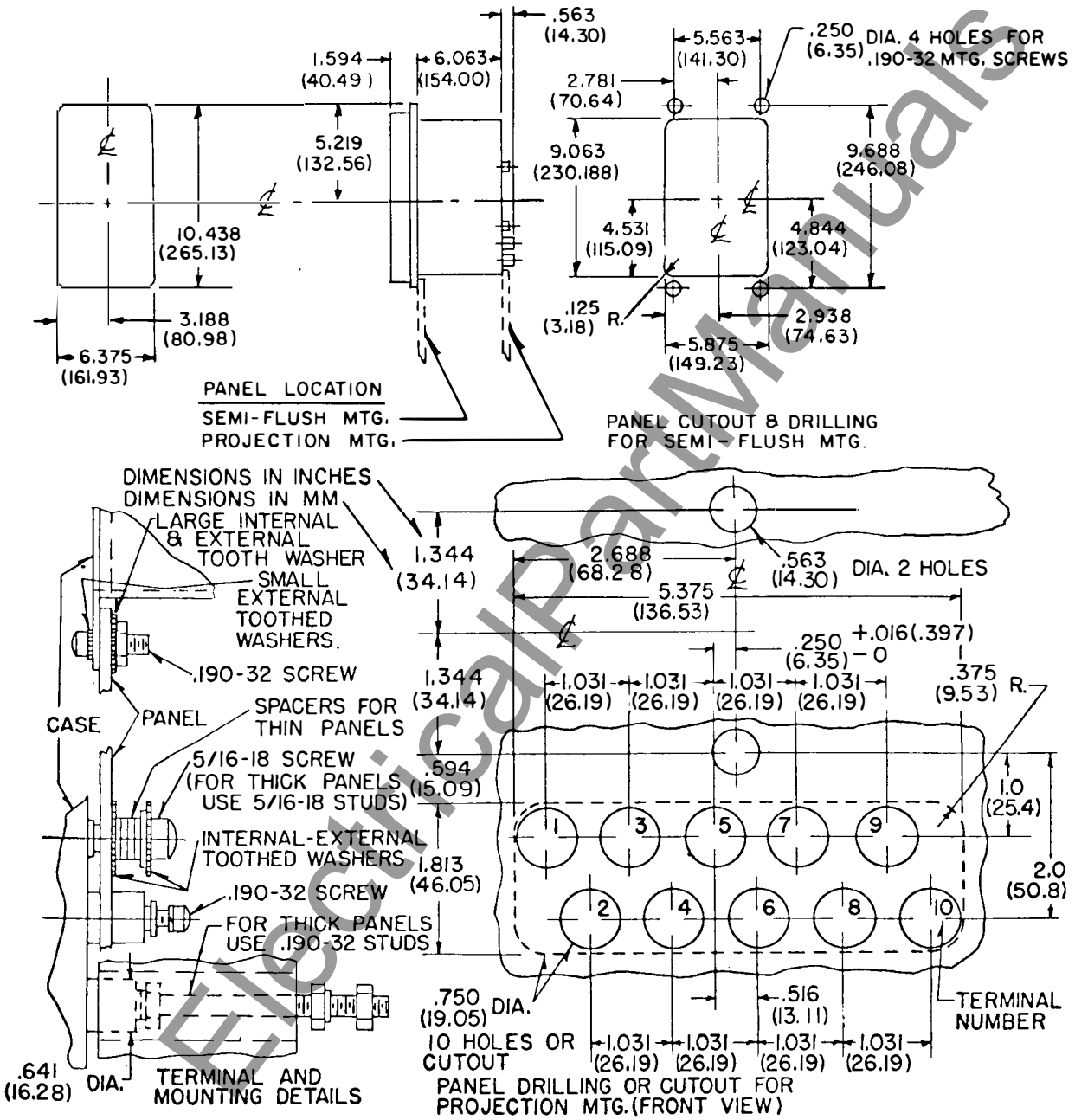


Fig. 3 Outline & Drilling (Type FT-21 Case)

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RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**

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