INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE CVN VOLTAGE RELAY FOR MARINE SERVICE

CAUTION: Before putting protective relays into service, remove all blocking material 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. Operate the relay to check the settings and electrical connections.

APPLICATION

The type CVN relay is a single-phase induction-disc type relay operating on voltage. This relay is applied as a voltage fault detector operating in conjunction with other protective relays. The relay is also used as a timing device for various automatic operations. Either geared or non-geared type relays are available. The non-geared relay gives short time operation with quick reset. The geared relay gives longer time of operation with longer reset. The contacts are single-pole, double-throw operating on both over and under voltages. The relay is designed to withstand the 2000 ft. lb. class HI shock test.

CONSTRUCTION AND OPERATION

The relay element is an induction-disc type voltage element. The induction disc is four inches in diameter, mounted on a vertical shaft. A steel bearing pin at the bottom of the shaft is supported by a steel ball bearing. This ball is spring mounted. The upper end of the shaft has a phosphor bronze olive jewel, and this rides on a steel bearing pin, held by a screw mounted on the main movement frame.

The moving contact is a small silver hemispnere fastened on the end of an arm. The other end of this arm is clamped to an insulating shaft geared to 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 frame.

The stationary contact assembly consists of a silver contact attached to the free end of a leaf spring. This spring is fastened to the moulded block. A small set screw provides adjustment of the contact follow.

Torque is produced to rotate the disc by an electromagnet in the rear of the relay. A permanent damping magnet is mounted in the front. In the non-geared relay the disc rotates only a fraction of a revolution and has graduated perforations in the disc which gives the relay a constant pick-up value regardless of the time lever setting. The lower pole of the electromagnet is energized by voltage. In order to produce torque the upper pole circuit is energized with the voltage induced across a few secondary turns wound on the lower pole as shown in Figure 1.

The permanent magnet is mounted on the movement frame by means of four mounting screws — two at the front and two at the under side of the magnet mounting clamp. Above the two side screws and between the magnet clamp and the movement frame, are two adjusting hex-headed screws. With the mounting screws loose, by means of the hex-head screws the position of the permanent magnet is adjusted so that the disc rides midway in the air gap. The locking nut on the hex-headed screws are screwed down first and then the four mounting screws securely tightened.

The magnetic shunt in the center of the permanent magnet assembly can be rotated up or down to calibrate the timer element. It is locked in place by a small set screw.

Mechanical Balance

The moving element of the Type CVN relay is balanced in the factory. This insures proper operation of the relay in tilted positions up to 45 degrees from the vertical.

SUPERSEDES I.L. 41-284
*Denotes change from superseded issue.

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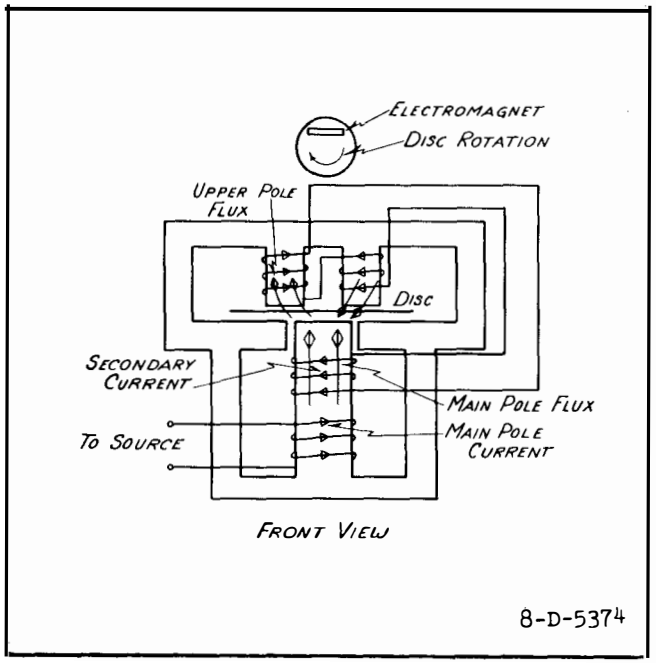


Fig. 1—Flux and Current Relations in a Non-Geared Type Voltage Element. For the Geared Voltage Elements the Upper Pole Connections and Disc Rotation are Reversed.

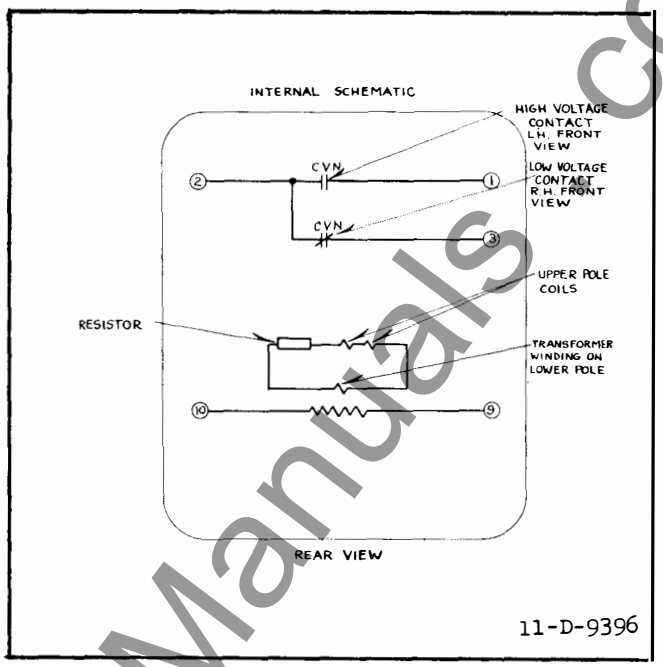


Fig. 2—Internal Schematic of the Single Pole Double Throw Type CVN Relay.

CHARACTERISTICS

The timer element is rated at 115 volts, 60 cycles. The minimum trip value is 80 volts, or 70 percent of rated voltage. The continuous rating is 127 volts, or 110 percent of rated voltage. The characteristic time curves are shown in Figures 3 to 6 for various voltage and time-lever settings.

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 at top and bottom of the case flange. One of the mounting screws may be utilized for grounding the relay case. The electrical connections may be made direct to the terminals by means of screws. Typical external connections are shown in Figure 7.

Trip Circuit

The contacts will safely close 30 amperes at 250 volts d-c., and will safely carry this current long enough to trip a breaker. Preferred practice is to use a contact of the energized device, to seal around the relay contacts, and relieve them of further duty.

The time for the contacts to break after operation can be decreased by eliminating the follow. This is done by screwing in the small set screw on the stationary contact assembly until the contact rivet rests solidly on the moulded support. When this is done, the position of the contact stop on the time level should be shifted so that the moving and stationary contacts just touch when the time lever is set on zero. The stop screw in the time lever scale should be temporarily removed for this adjustment.

Voltage Element Connections

Connect the relay coil directly to the potential transformer. For phase-to-phase operation, either delta or star voltages may be used as desired. For phase-to-ground operation, the broken delta secondary of a grounded star connected potential transformer primary will provide the required residual voltage.

SETTINGS

There is only one setting to be determined. This is the time delay of the voltage element, and it is adjusted by the position of the time lever along the time lever scale. This scale has ten divisions, and Figures 3 to 6 give a curve of time

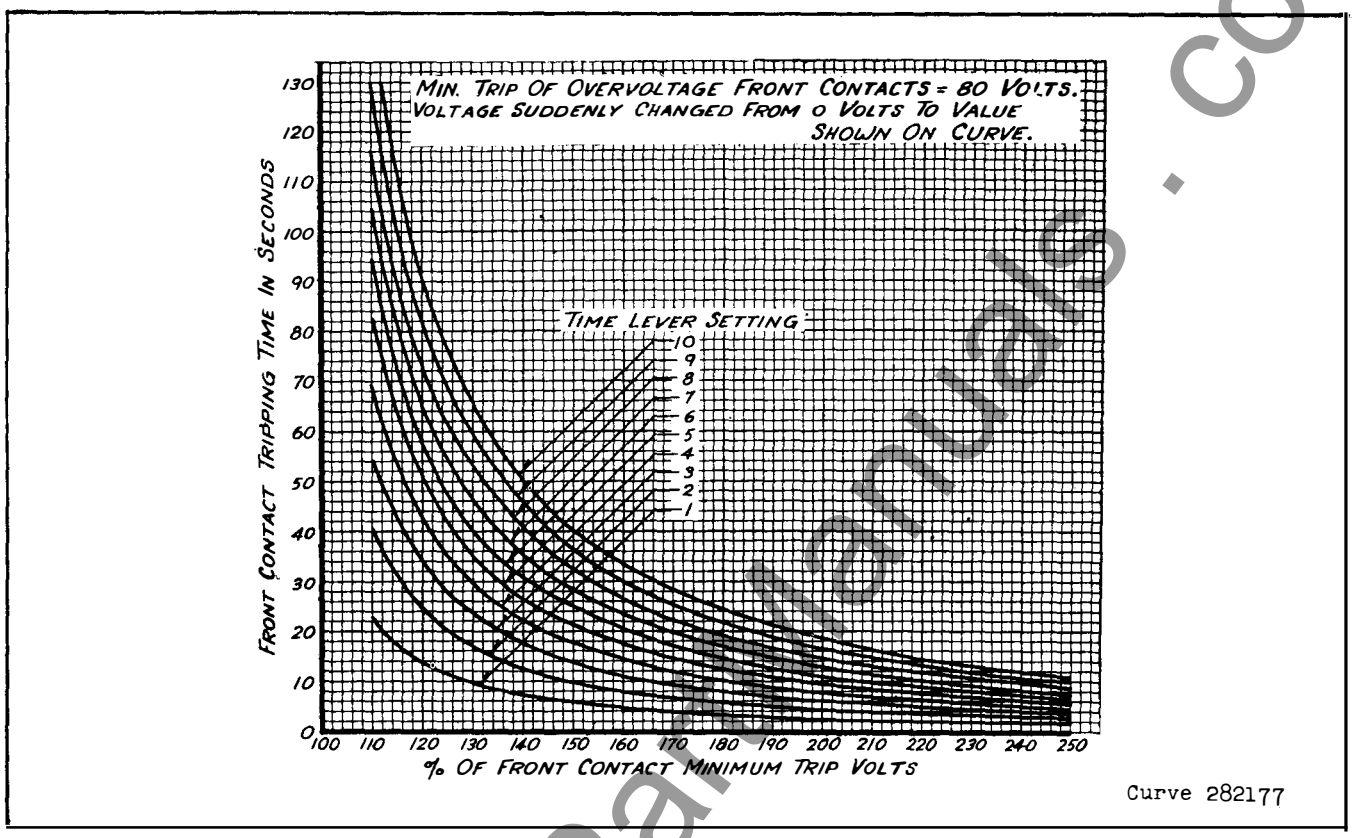


Fig. 3 — Typical Overvoltage Time Curves for the Geared Type CVN Relay.

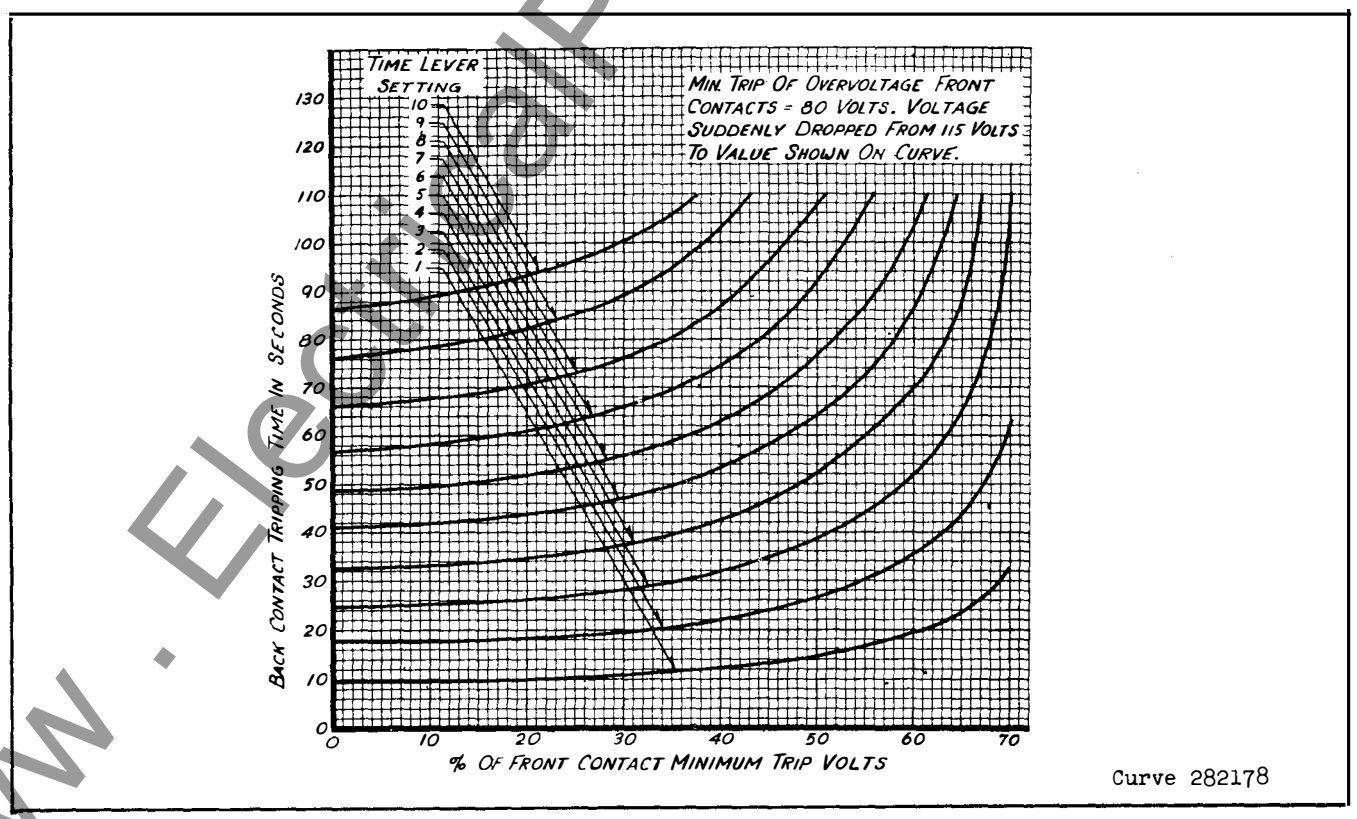


Fig. 4 — Typical Undervoltage Time Curves for the Geared Type CVN Relay.

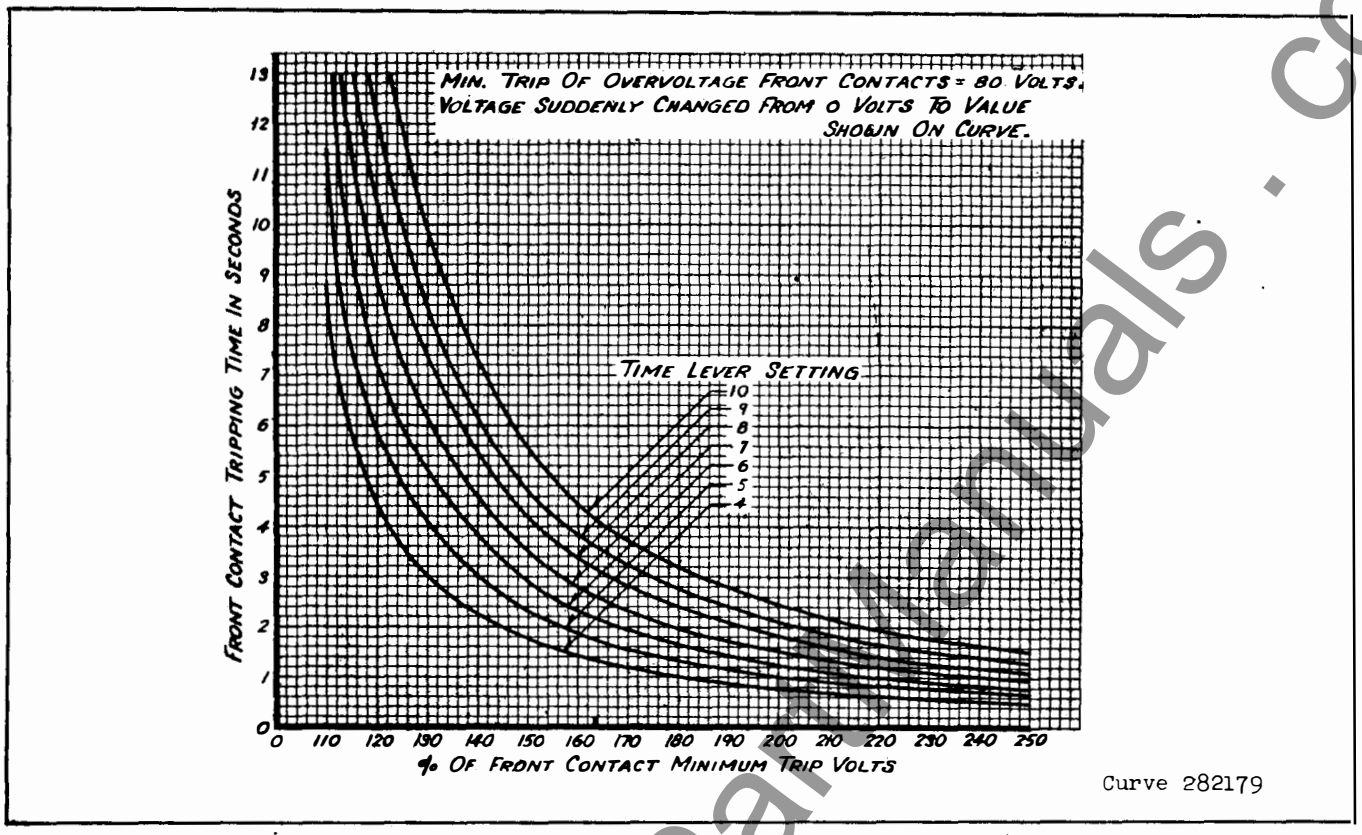


Fig. 5 — Typical Overvoltage Time Curves for the Non-Geared Type CVN Relay.

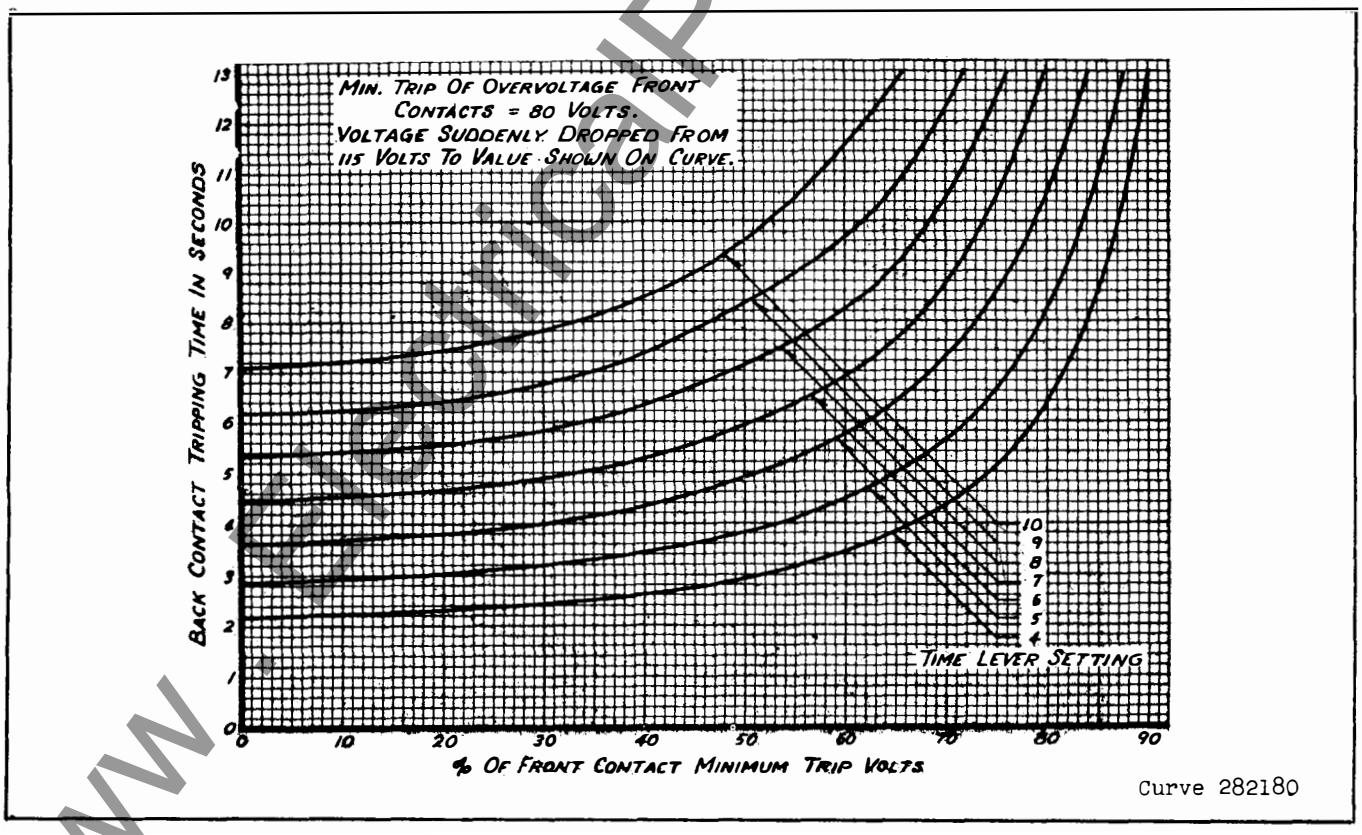


Fig. 6 — Typical Undervoltage Time Curves for the Non-Geared Type CVN Relay.

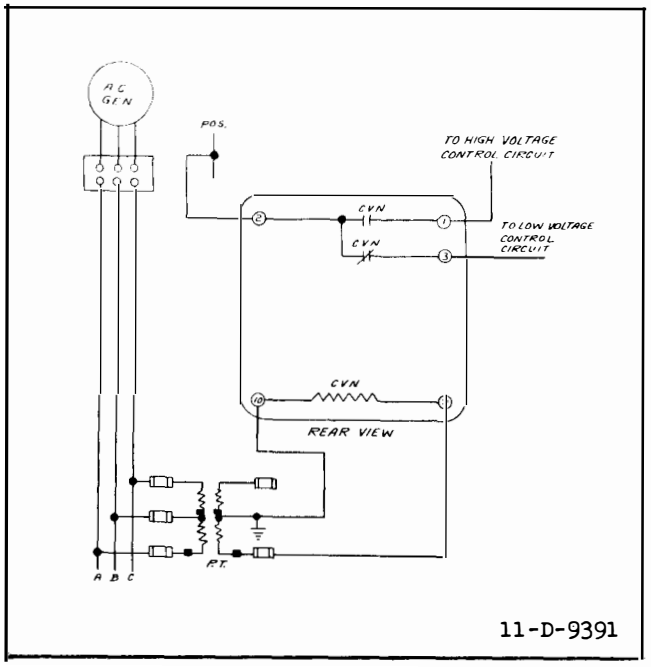


Fig. 7 — External Connections for Type CVN Relay.

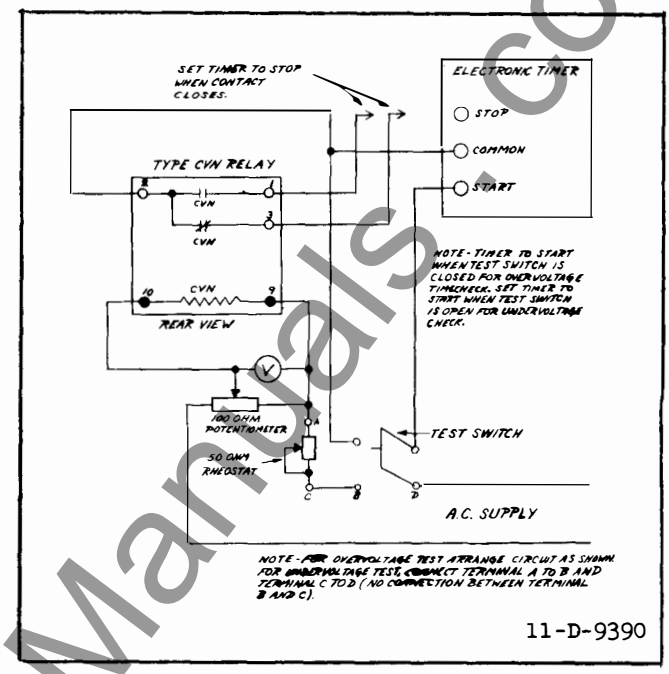


Fig. 8 — Diagram of Test Connections for the Type CVN Relay.

delay vs. lever setting for various impressed voltages. Time is approximately proportional to lever setting.

In order to prevent operation of the relay during shock, the minimum setting of the time lever is limited by a screw in the scale to the #1 time lever setting on the geared relay. The non-geared relay has the stop in the scale to limit the minimum setting to the #4 time lever setting.

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 the relay is received 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.

NOTE: Since the moving element of the non-geared relay is balanced, no parts in this assembly can be replaced separately. The complete element, including spring, spring adjuster, moving contact, shaft, disc, and lower bearing pinholder must be replaced as a complete unit.

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 time of operation can be checked with a timer using the test diagram of Figure 8.

The upper bearing screws of the timer element should be screwed down until there is four to five thousandths inch clearance between the end of the bearing screw and the top of the shaft. The bearing screw should then be locked in place by tightening the locknut.

Voltage Element

Adjust the back stop on the time lever so that the moving contact just touches the stationary contact when the time lever is in the zero position. The stop screw on the time lever scale may be temporarily removed for this purpose. The small adjustment screw on the stationary contact should not be screwed in far enough to limit the follow of the stationary contact.

The spiral spring should have approximately 1¼ turns initial tension with the moving contact in the #10 time lever position. The convolutions of the spring should not touch each other for any position of the moving contacts. Adjust the tension of the

spiral spring so that the contacts will just close at 80 volts. Adjust the position of the damping magnet shunt, so that the time characteristics of the relay, as shown by test with a cycle counter, are the same as shown on the calibration curve.

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

Burdens of the relays at 115 volts, 60 cycles are as follows:

	Volt Amperes	Watts	Power Factor (Current Lagging)
Geared	8.6	4.5	.52
Non-Geared	8.5	4.6	.54

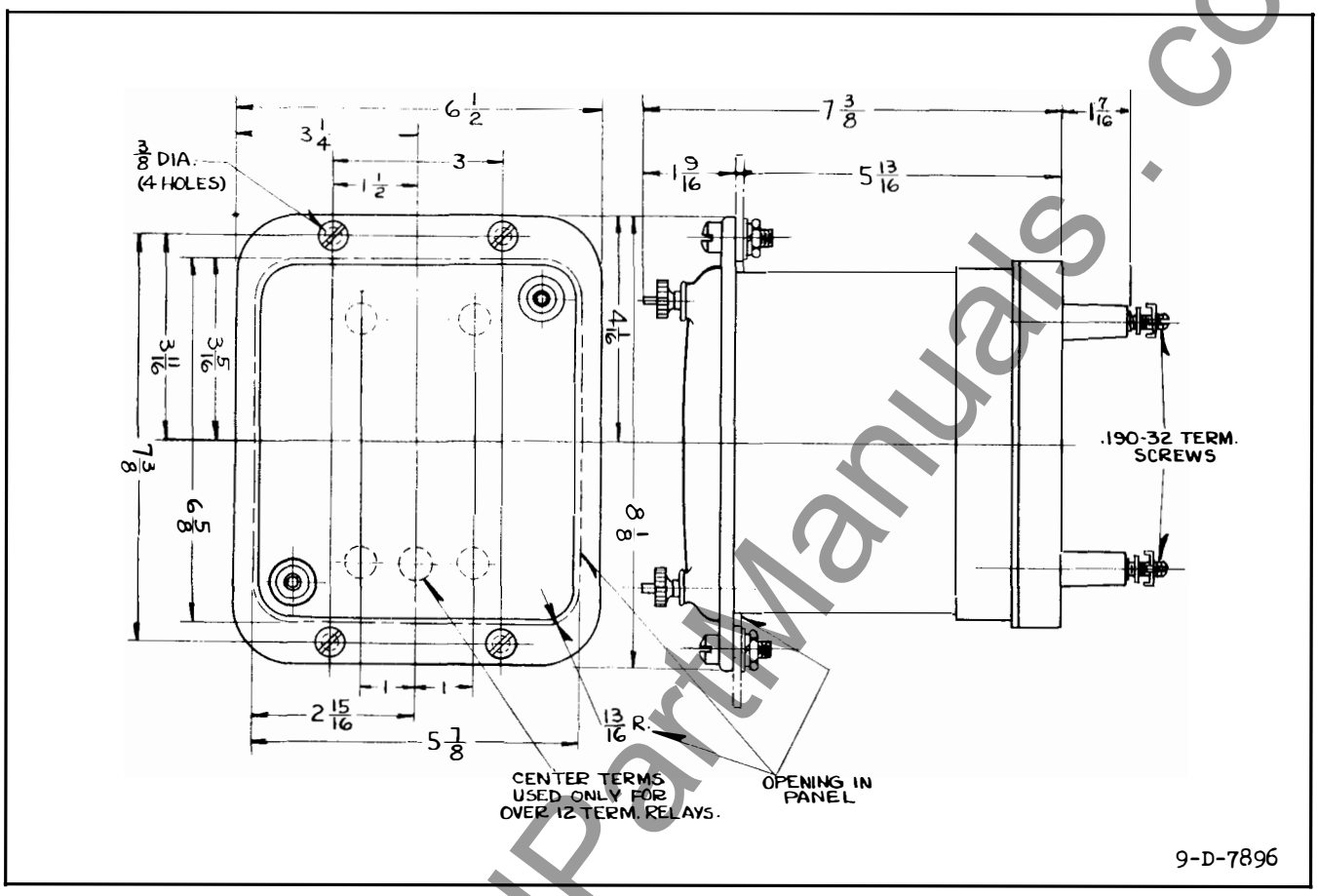
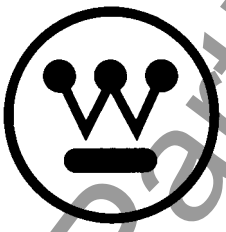


Fig. 9—Outline and Drilling Plan for the Type HI Shockproof Semi-Flush Non-Detachable Case.



WESTINGHOUSE ELECTRIC CORPORATION

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

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