



INSTALLATION • OPERATION • MAINTENANCE INSTRUCTIONS

TYPE CVN CONTACT MAKING VOLTMETER FOR MARINE SERVICE

CAUTION Before putting relays into service, remove all blocking 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 contact making voltmeter is used to initiate switching or control operations when the voltage impressed on the relay rises above a preset value, or falls below a preset value.

CONSTRUCTION AND OPERATION

The relay element is of the non-g geared induction disc type. 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, which is held by a screw mounted on the main movement frame.

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 an 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.

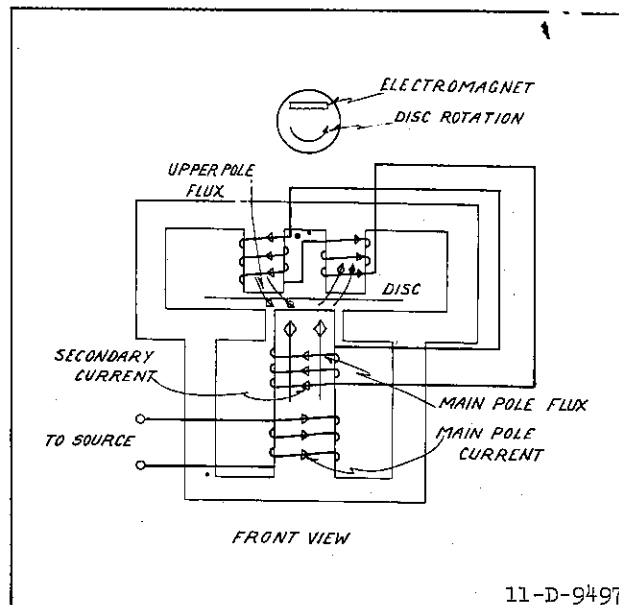


Fig. 1 — Flux And Current Relations In An Induction Type Relay.

The front and back stationary contact assemblies are both adjustable. Each mounts on a lever which can be set anywhere about the periphery of a calibrated scale. Once set, the adjustable stationary contacts may then be clamped in place. The micarta 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 micarta contact supports pivoted to the positions required for correct tracking of both contact assemblies on the calibrated scale.

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

TYPE CVN VOLTMETER

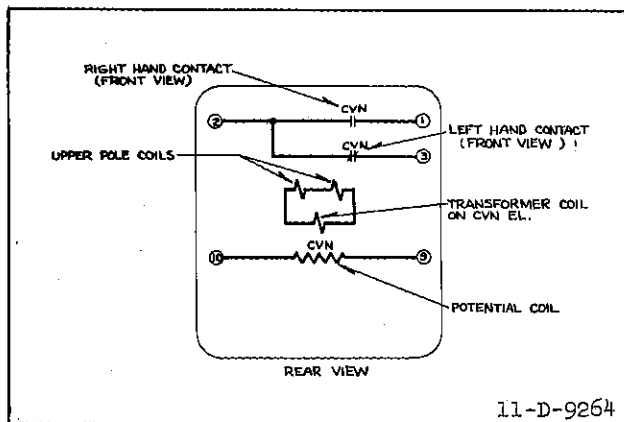


Fig. 2—Internal Schematic Of The Type CVN Contact Making Voltmeter.

two side screws and between the magnet clamp and the movement frame, are two adjusting hex-head screws. With the mounting screws loose, the hex-head screws are used to adjust the position of the permanent magnet so that the disc rides midway in the air gap. The locking nuts 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.

The operating torque is obtained by the electromagnet construction shown in Figure 1. The main pole coil of the element is energized by a line voltage. This coil acts as a primary of a transformer and induces a voltage in a secondary coil. Current from this secondary coil flows through the upper pole coils and thus produces torque on the disc by the reaction between the fluxes of the upper and lower poles. The relay moving contact position is determined by the voltage across the relay potential coil. When this potential rises above the high voltage setting, the relay contacts close to the right (front view), and when it falls below the low voltage setting, the contacts close to the left (front view). For voltages intermediate to the high and low settings, the moving contact assumes a position between the front and back adjustable stationary contacts.

Mechanical Balance

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

CHARACTERISTICS

The relay has a nominal rating of 115 volts. The continuous rating is 110% of this figure, or 127 volts.

The voltage scale is calibrated from 55 to 110 volts in 5 volt steps. Typical over-and-undervoltage time curves for several contact adjustments are shown in Figures 3 and 5.

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.

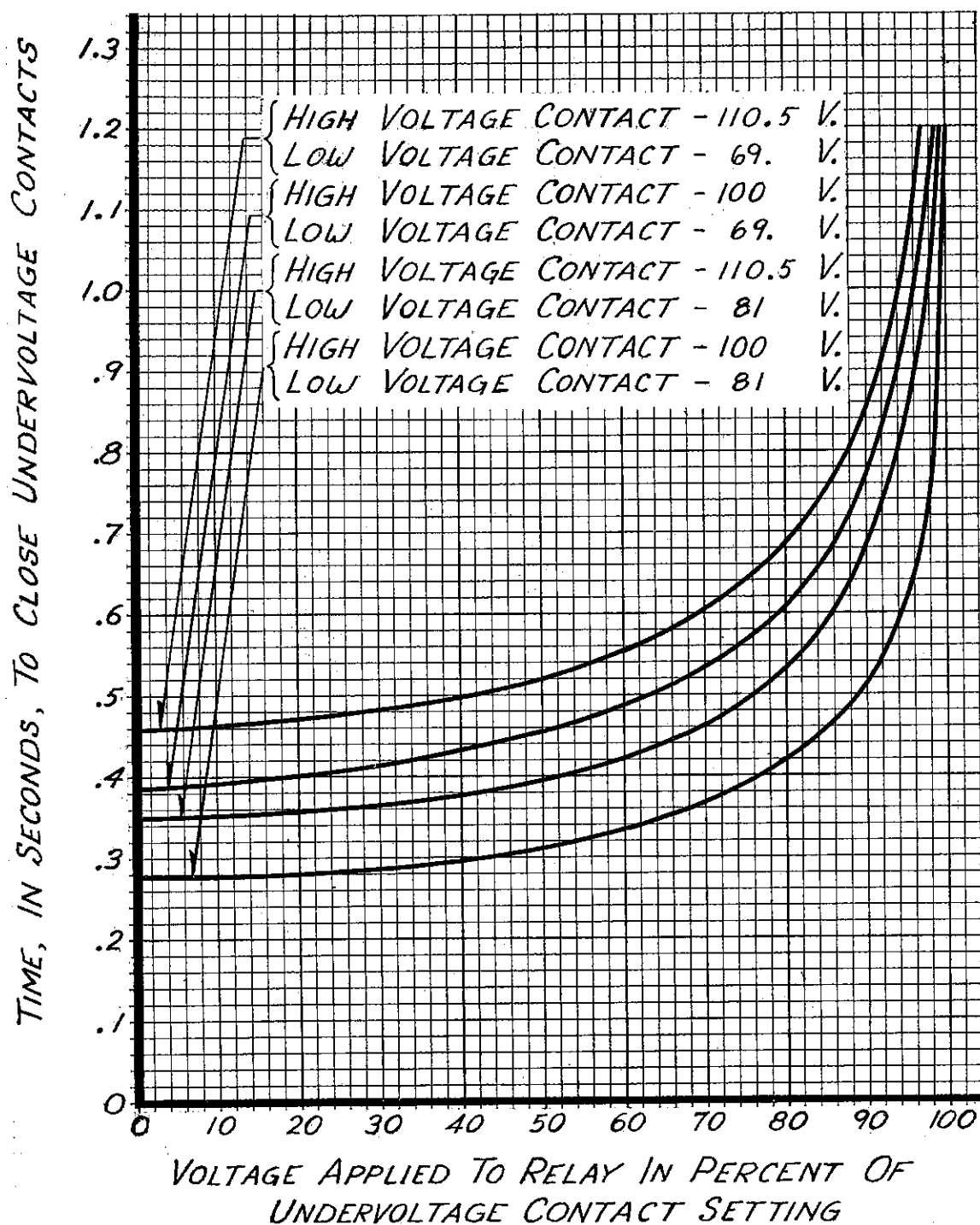
Figure 5 shows a typical diagram of external connections.

SETTINGS

The left hand adjustable stationary contact (front view) should be set for the low voltage just required to trip. The right hand (front view) adjustable stationary contact should be set for the high voltage just required to trip. To make these adjustments, the contact lever arm locking clamps should be loosened, and the levers moved to the desired voltage positions. After the settings are made, the clamps should be securely tightened. Curves, Figures 3 and 5, shown the time delays obtained with several typical settings.

ADJUSTMENTS AND MAINTENANCE

The proper adjustments to insure correct



Curve #282196

Fig. 3—Typical Undervoltage Time Curves For The Type CVN Contact Making Voltmeter.

TYPE CVN VOLTMETER

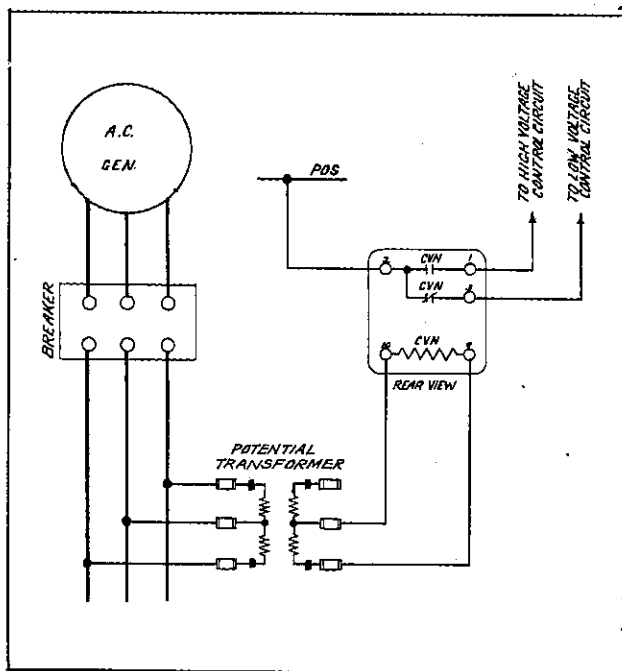


Fig. 4—External Connections For The Type CVN Contact Making Voltmeter.

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 that because the moving element 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. File S#1002110 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.

Each upper bearing screw should be screwed down until there is four to five thousandths inch clearance between it and the shaft, and then securely locked in position with the lock nut. This adjustment can be made best by carefully screwing down the top bearing screw

until the shaft fails to turn freely and then backing up a fraction of a turn. Great care must be taken in making this adjustment to prevent damage to the bearings.

To align the stationary contacts for proper tracking, adjust the applied voltage to 80 volts. Set the left hand (front view) lever pointer at the 80 volt scale mark, and by loosening the two screws at the top of the lever, pivot the contact assembly until the moving and stationary contacts just close. After the two screws are tightened securely, the left hand (front view) contact assembly should be moved well to the low end of the scale, and the above procedure repeated for the right hand (front view) contact. Calibration points may be checked by setting either contact at the required scale marking and then determining the voltage at which the contacts just close by means of an indicating lamp.

The damping magnet shunt should be adjusted with the high voltage contact set at 100 volts, and the low voltage contact set at 69 volts. The applied voltage is then suddenly dropped from 115 volts to 65 percent of the low voltage setting, ($65 \times 69 = 45$ volts) and the time for the low voltage contact circuit to close under these conditions should be 0.5 seconds. This timing, as well as the complete undervoltage time curve for various contact settings, may be checked by means of Figure 6. Overvoltage time curves may be checked using the circuit of Figure 7.

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 of the CVN contact making voltmeter at 115 volts, 60 cycles is as follows:

Volt Amperes	12.8
Watts	8.4
Power Factor Angle (current lagging)	49°

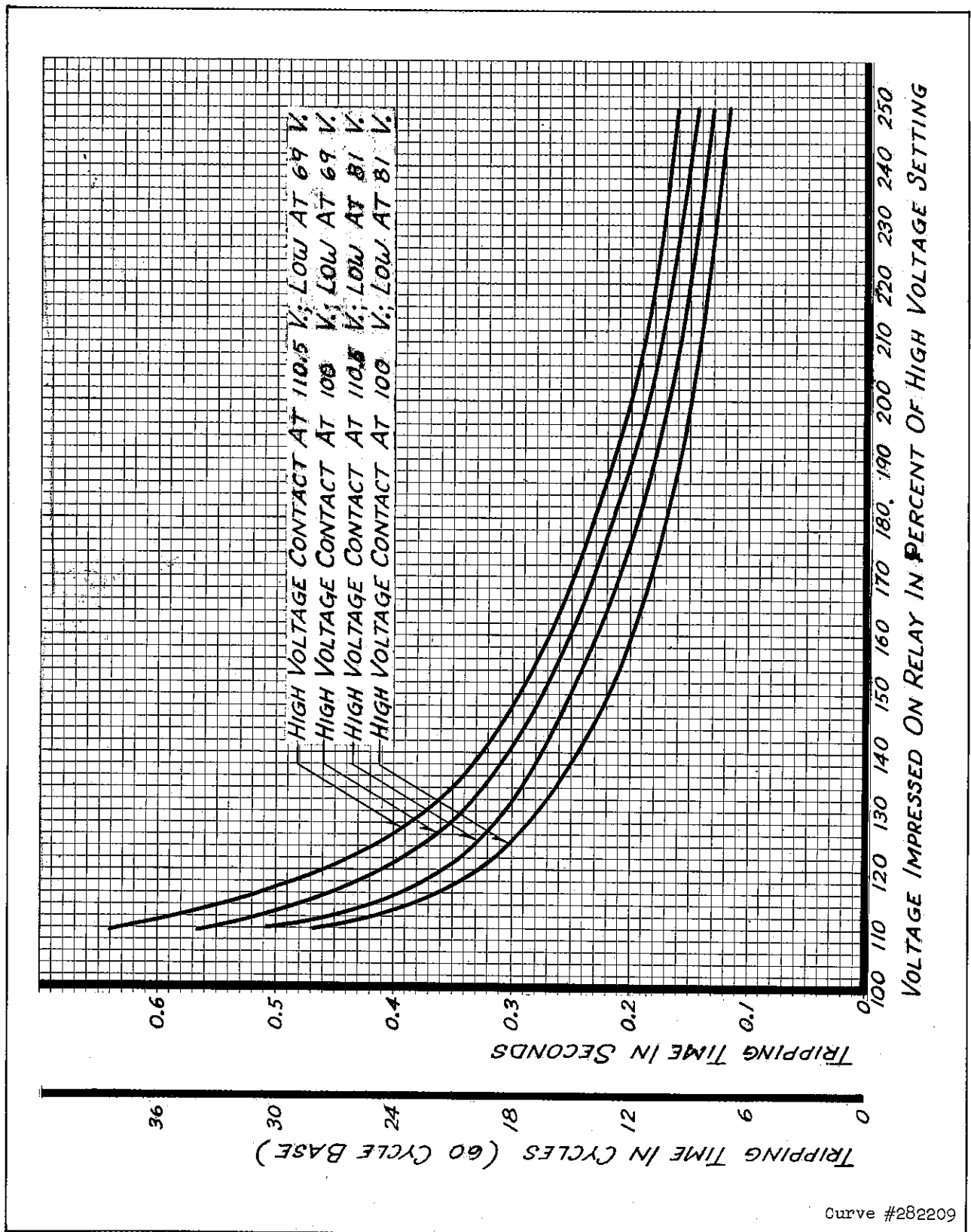


Fig. 5—Typical Overvoltage Time Curves For The Type CVN Contact Making Voltmeter.

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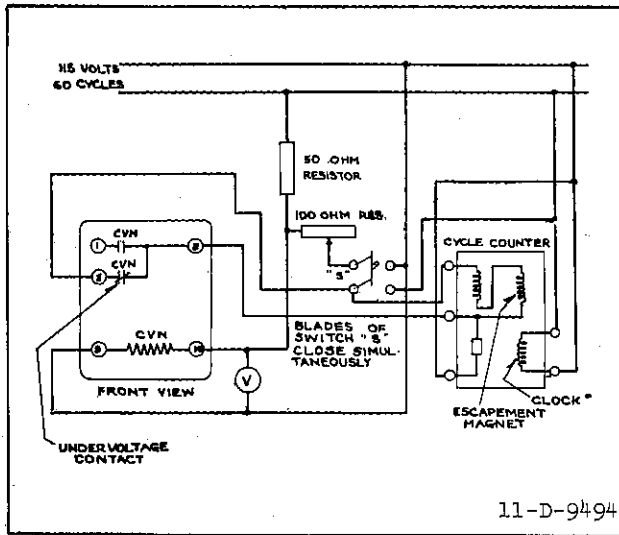


Fig. 6—Diagram of Test Connections For Obtaining Undervoltage Time Curves For The Type CVN Contact Making Voltmeter.

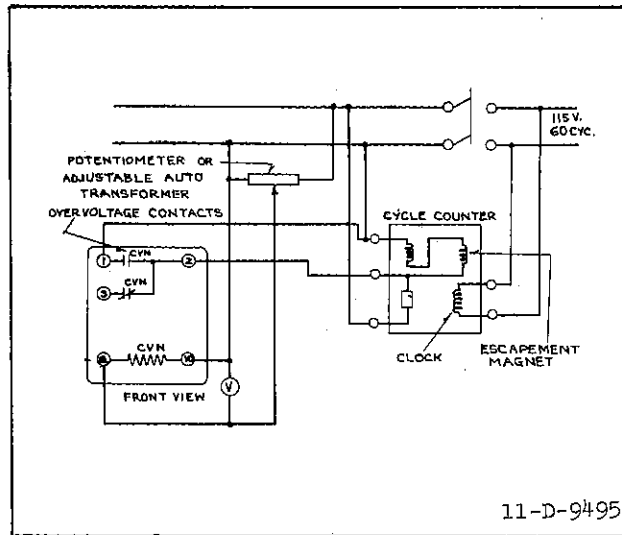


Fig. 7—Diagram Of Test Connections For Obtaining Overvoltage Time Curves For The Type CVN Contact Making Voltmeter.

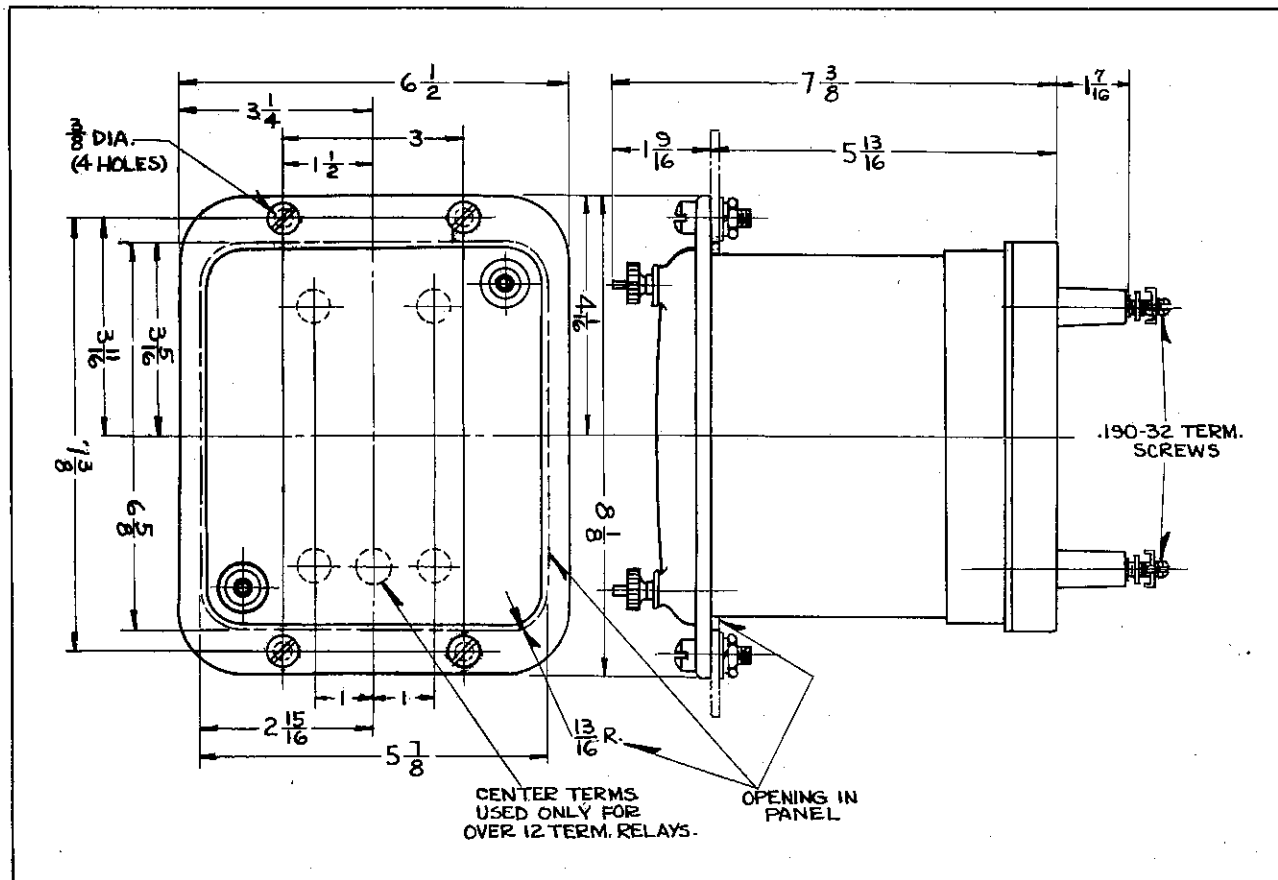


Fig. 8—Outline And Drilling Plan For The Type HI Shockproof Semi-Flush Non-Detachable Case. For Reference Only.



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