INSTALLATION • OPERATION • MAINTENANCE

INSTRUCTIONS

TYPE CAM
PERCENTAGE DIFFERENTIAL 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 CAM Relay is a percentage differential relay of the induction type designed for the differential protection of a regulating transformer.

CONSTRUCTION AND OPERATION

Electromagnet

The type CAM Relay has two electromagnets in the relay acting upon a common disc. The rear electromagnet is the operating electromagnet, which tends to rotate the disc clockwise as viewed from the top and thus close the contacts. The front electromagnet furnishes restraint, tending to prevent the contacts from closing. Both electromagnets are energized from small transformers. T_O and T_R. These are saturating transformers so designed as to control the time curve as well as the percentage characteristic. Part of the magnet circuit of the right-hand transformer, T_R, has an air gap in order to properly proportion the restraint circuit with respect to the operating circuit.

Relay Element

The relay element is provided with a time lever in order that the time of operation may be varied as required to provide satisfactory operation on magnetizing inrush. Two damping magnets are provided, one on either side of the disc, to slow the operation of the relay disc.

Indicating Contactor Switch Unit (ICS)

The d-c indicating contactor switch is a small 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 front spring, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

CHARACTERISTICS

The typical operating characteristics of the relay are shown by Figures 3 and 4. As shown by Figure 3, the relay operates at a minimum of one ampere in the operating circuit when no current is flowing in the restraint circuit. At 5 amperes restraint, the operating current required is 5.75 amperes, representing a 15% unbalance. At higher restraint current values, the relay characteristic has a slight ''flare'' as indicated by the curve.

The time curve of the relay at the No. 5 time lever setting with no restraint current is shown by Figure 4. The time of operation is approximately proportional to the time lever setting.

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 mounting stud for projection mounting or by means of the four mounting holes on the flange for the semi-flush mounting. Either the 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 to the terminal stud furnished with the relay for thick panel mounting. The terminal stud may be easily removed or inserted by locking two nuts on the stud and then turning the proper nut with a wrench.

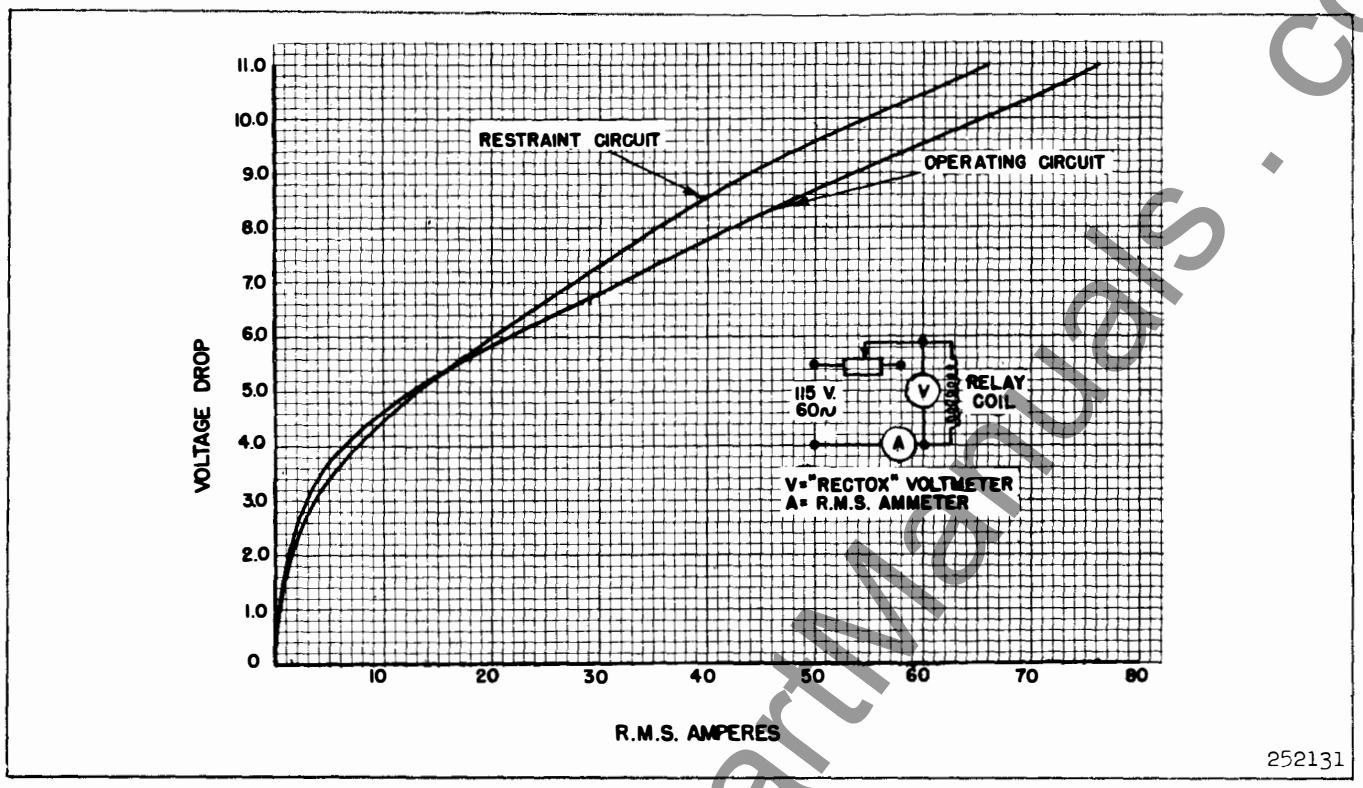

Fig. 5 - Typical Burden Curve of the Type CAM Relay.

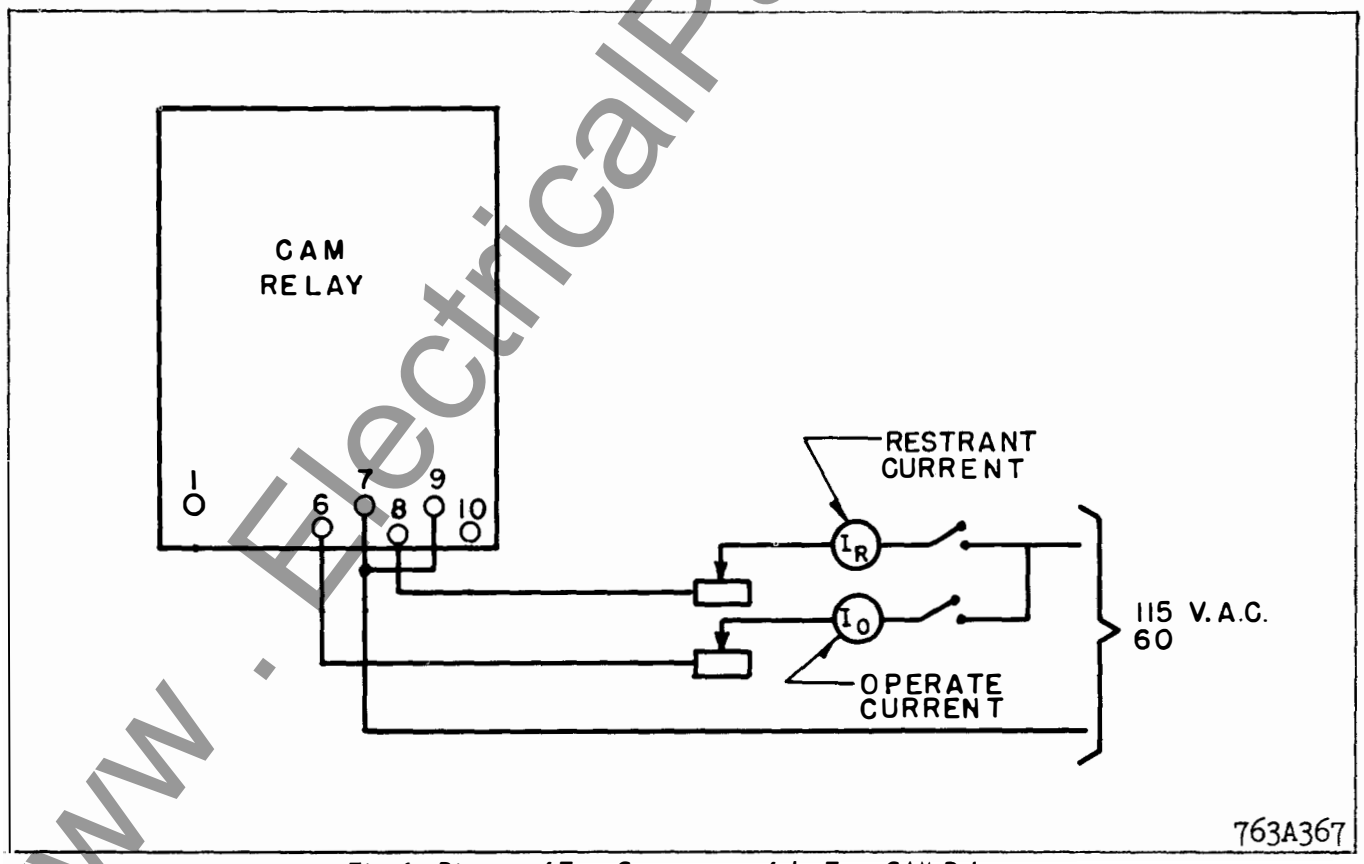

Fig. 6 - Diagram of Test Connections of the Type CAM Relay.

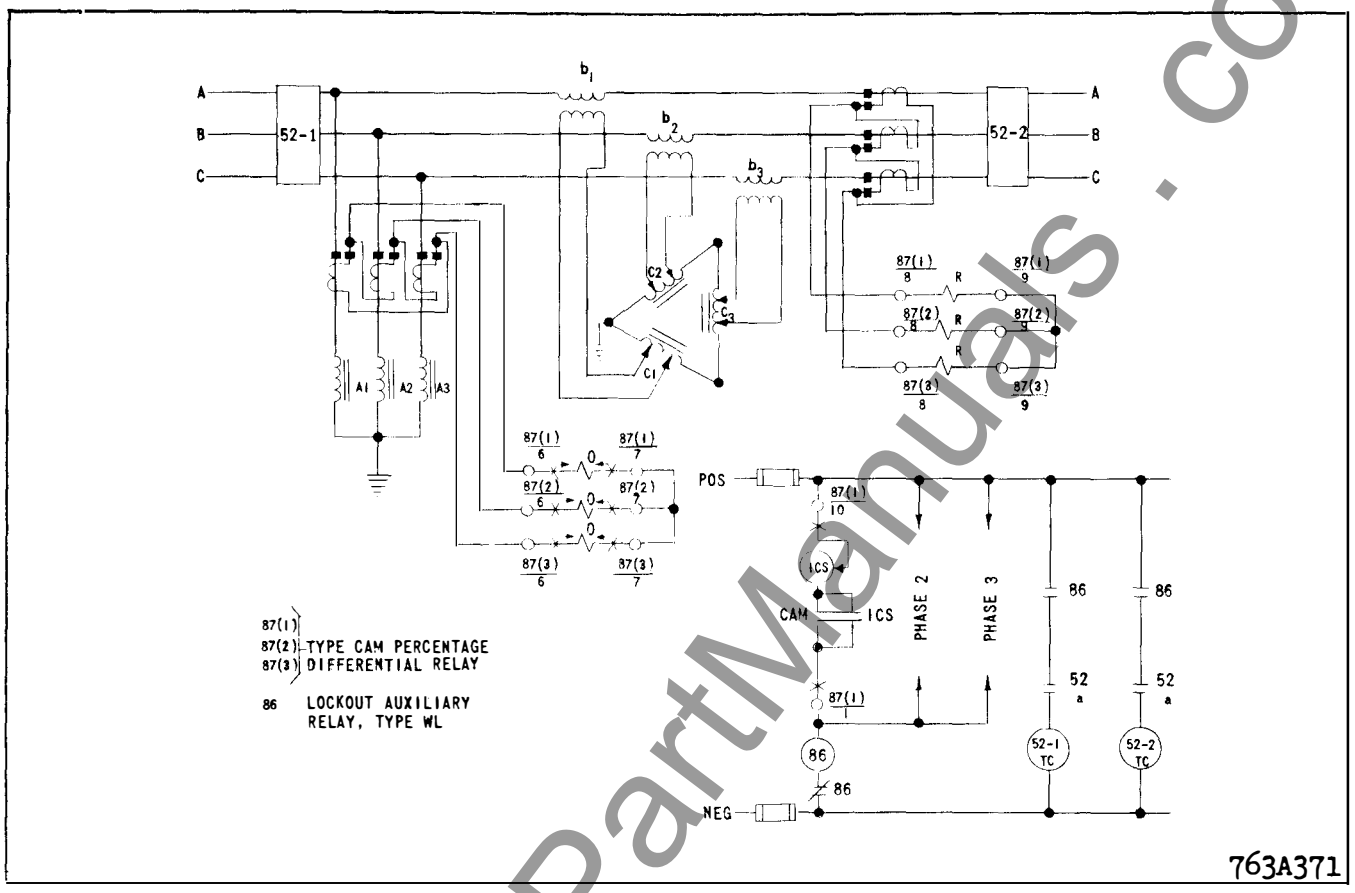

Fig. 7 - External Scheme for protection of the Exciting Wire.

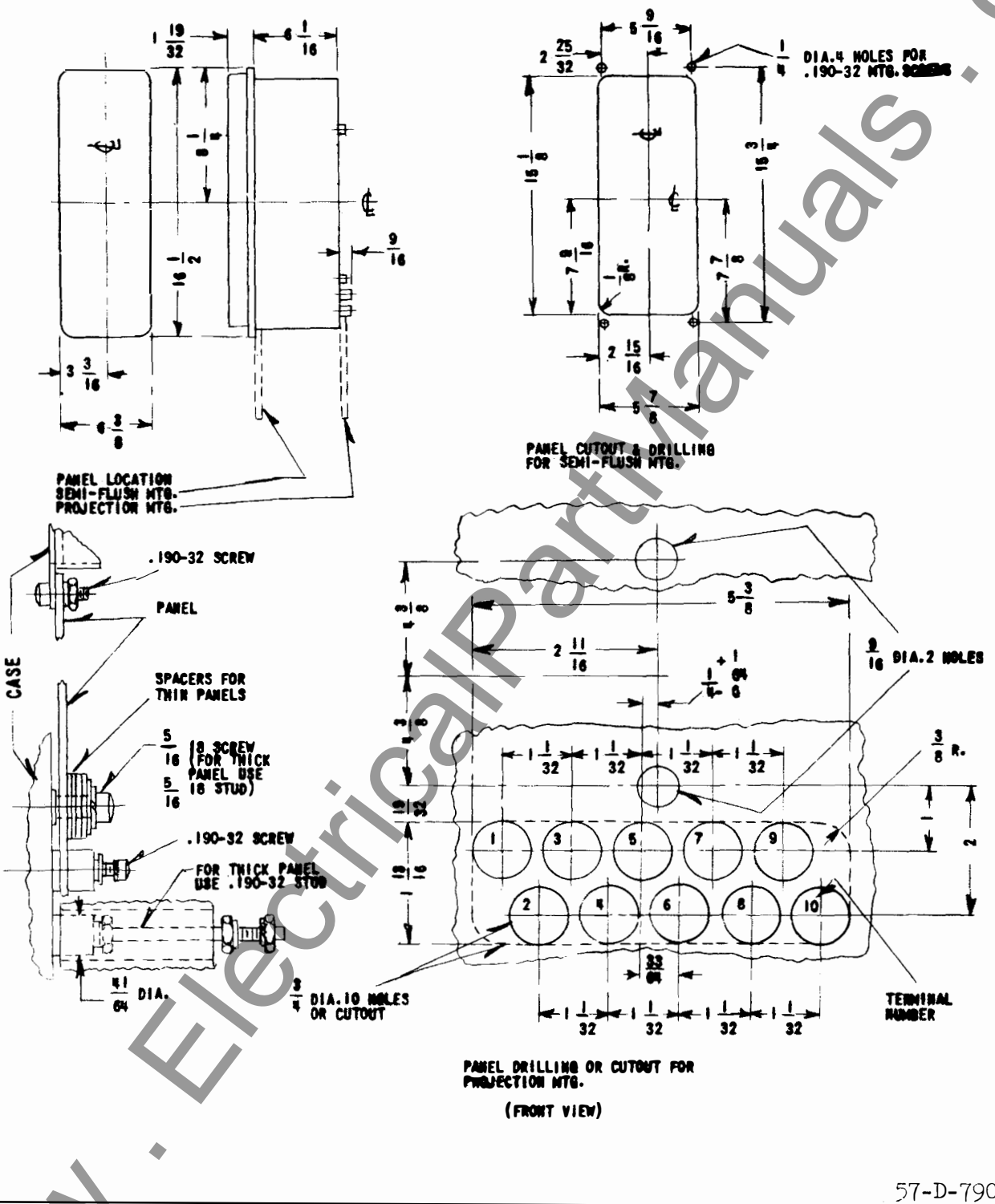

Fig. 8 - Outline and Drilling Plan for the CAM Relay in the Type Ft-31 case.

WESTINGHOUSE ELECTRIC CORPORATION
RELAY-INSTRUMENT DIVISION **NEWARK, N. J.**
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SUPERSEDES I.L. 41-338.1
*Denotes change from superseded issue.

EFFECTIVE OCTOBER 1966

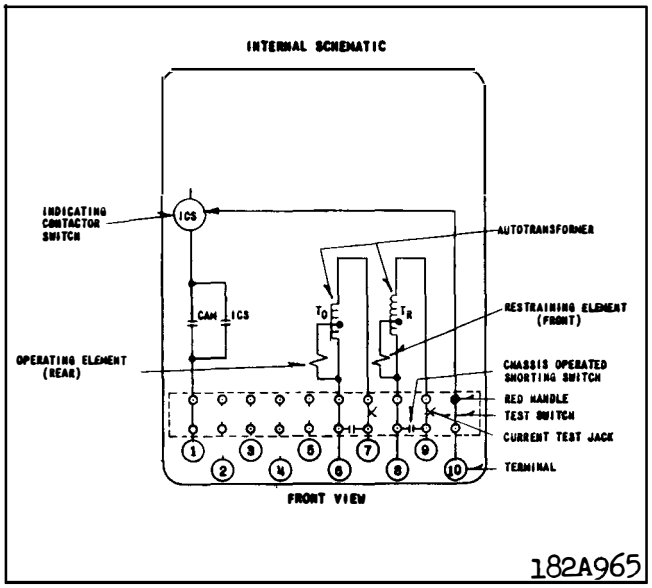


Fig. 1 - Internal Schematic of the Type CAM Relay - S.P. S.T. - in Type FT-31 case.

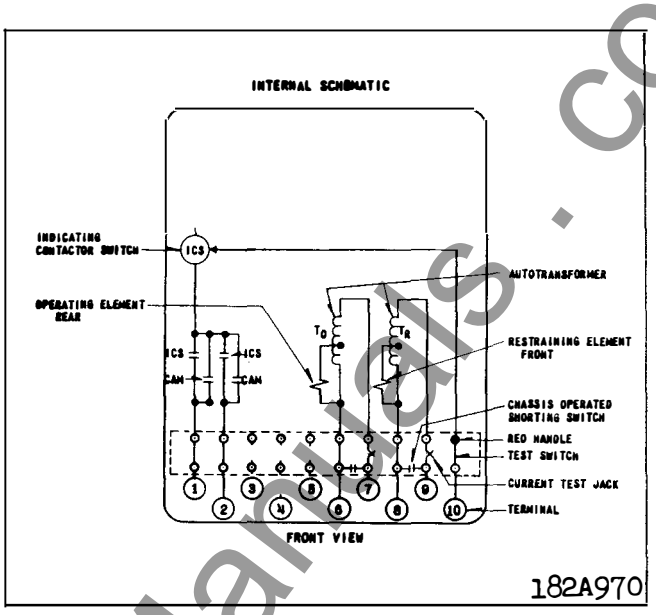


Fig. 2 - Internal Schematic of the Type CAM Relay - D.P. S.T. - in Type FT-31 case.

For detail information on the FT case refer to IL 41-076.

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, of if it is desired to check the adjustments at regular maintenance periods, the instructions below should be followed.

Relay Element

A diagram of test connections is given in Figure 6. This may be used for checking the minimum operating current as well as other points on the operating curve. The only adjustment which can be made is that for spring tension to control the minimum tripping point. The adjustment for other points on the curve has been made at the factory by varying the amount and type of punchings in the two small transformers, and should not be disturbed. In checking the minimum tripping point, see that the moving contact resets the full 180° to the No. 10 time lever position when the relay is totally deenergized. If it does not, look for foreign particles in the air gaps of the electromagnets and permanent magnets, or other sources of friction.

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 not greater than the particular ICS tap setting being used. The operation indicator target should drop freely.

The contact gap should be approximately .047'' 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.

ENERGY REQUIREMENTS

The burden of the relay is variable depending upon the amount of current flowing, and is best shown by Figure 5.

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.

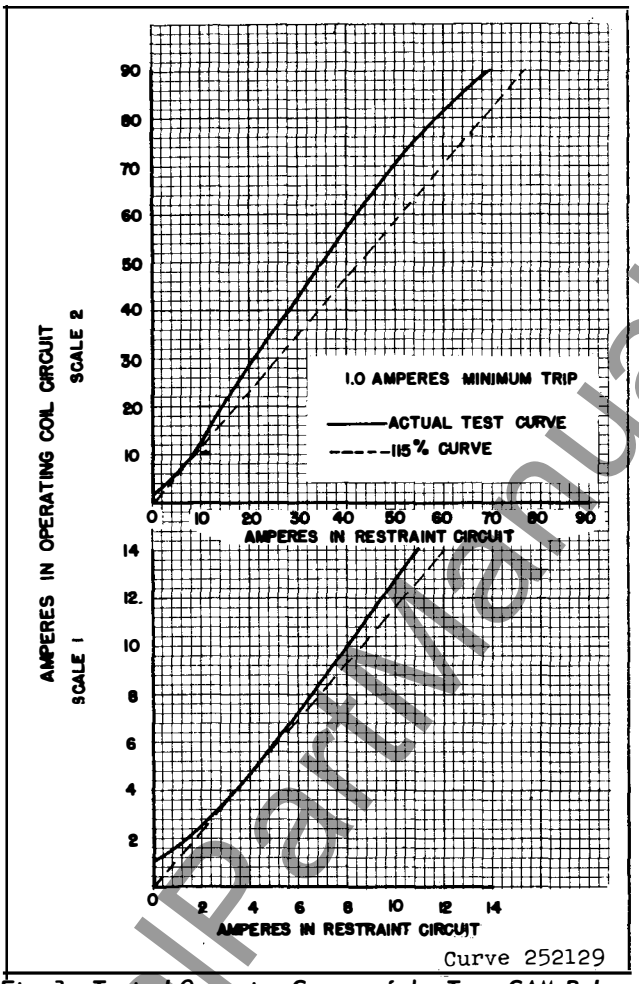


Fig. 3 - Typical Operating Curves of the Type CAM Relay.

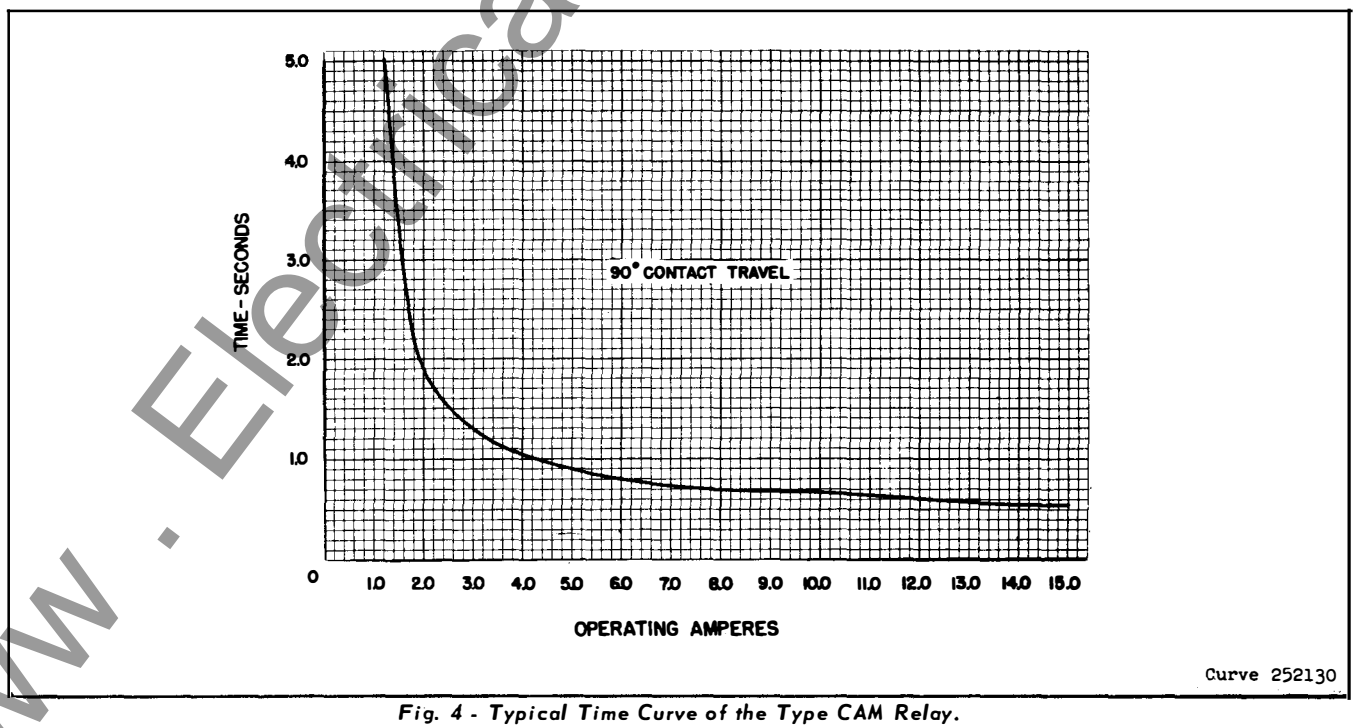
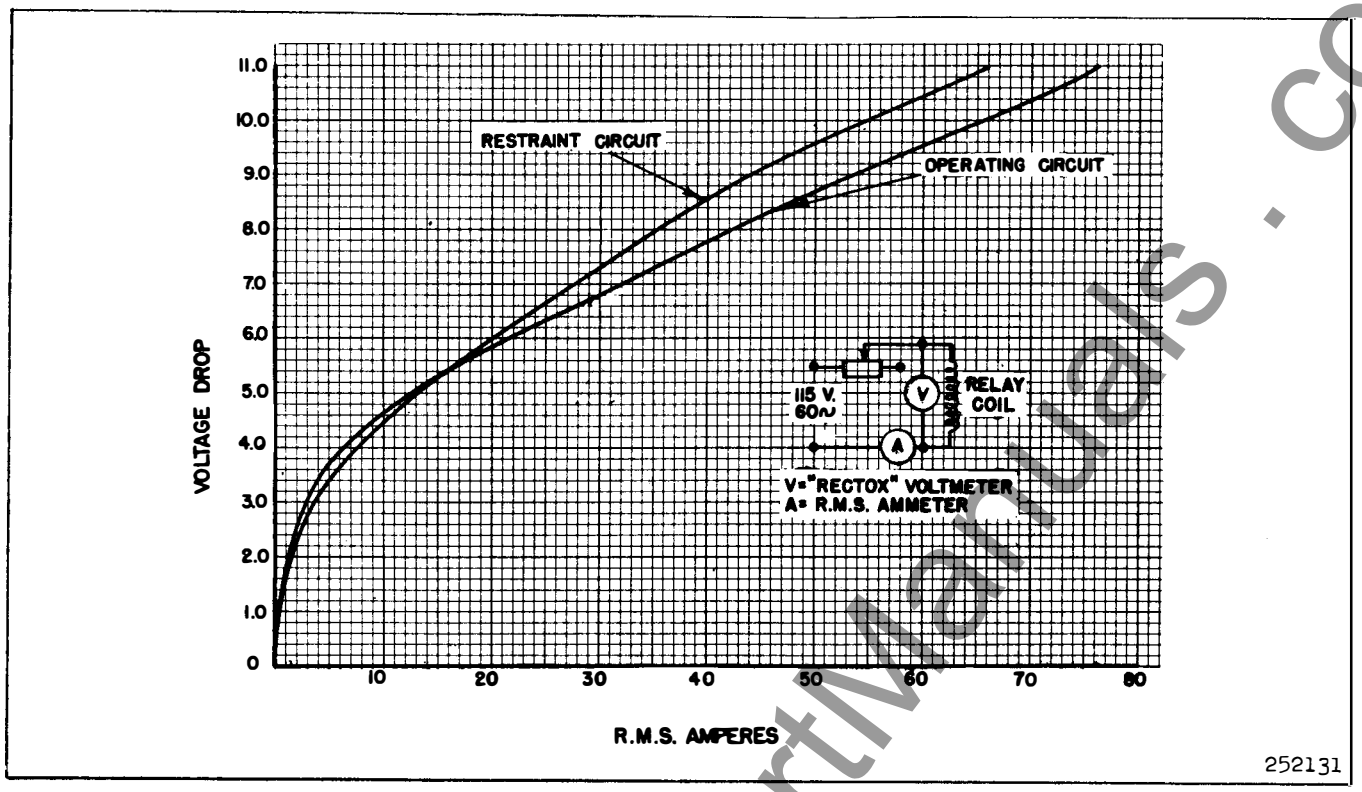


Fig. 4 - Typical Time Curve of the Type CAM Relay.



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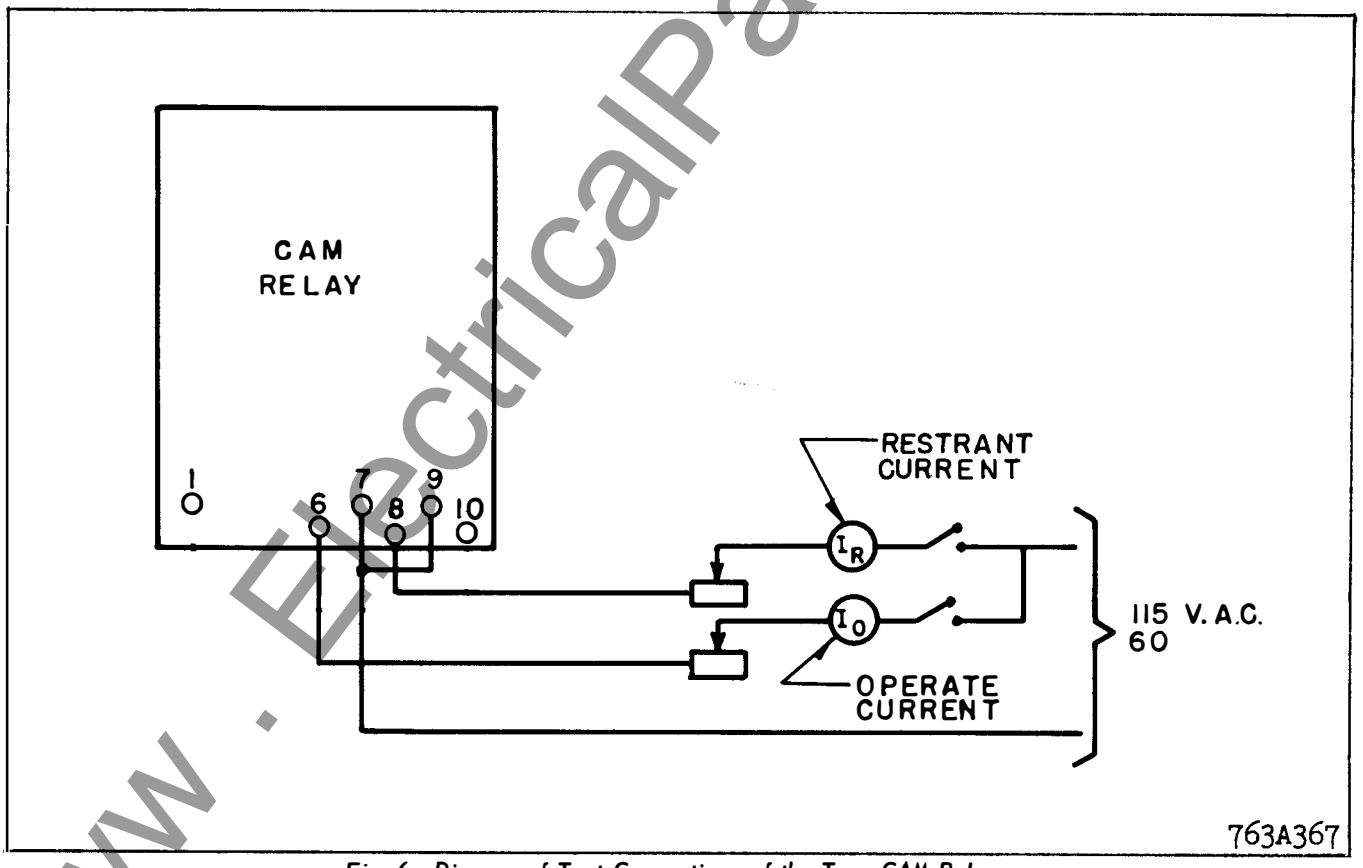

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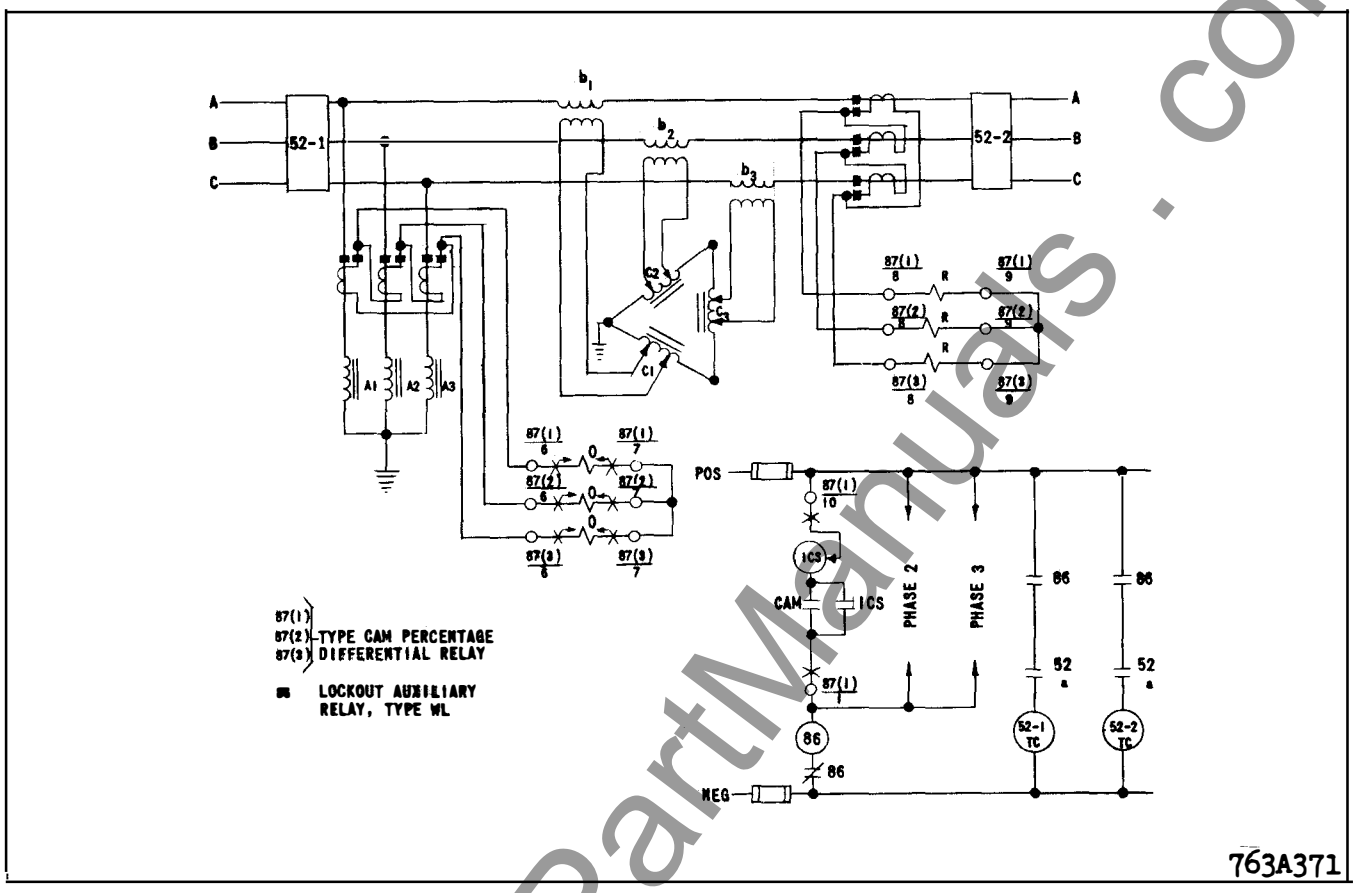
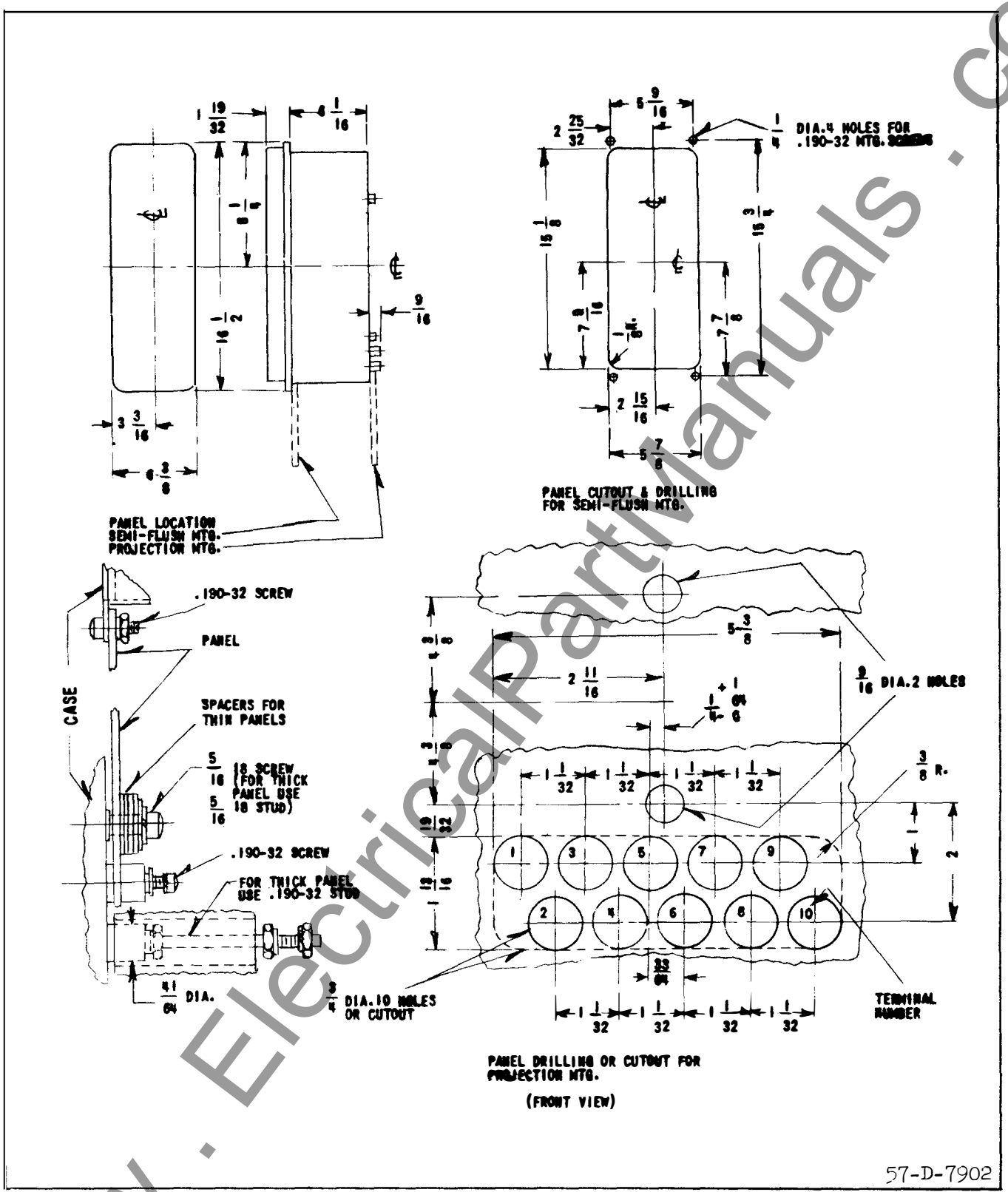


* *Fig. 7. External Scheme for Protection of the Exciting Winding.*



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