



# Type IT Relay 50 and 60 Hertz

Effective April 1989  
Supersedes I.L. 41-771.1 dated May 1984

\* Denotes change since previous issue

## 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.

### 1. APPLICATION

IT relays may be utilized as overcurrent fault detectors or as instantaneous overcurrent trip units. They are particularly suitable as fault detectors because of their compact size. It is recommended that these units be used in fault detector applications only where the contacts are called upon to carry only trip coil current rather than auxiliary relay or timer current. For example, a zone 1 relay may be supervised by an IT relay, but a zone 2 relay driving a TD-5 should not (unless the TD-5 is equipped with a TX slow dropout feature to override contact bounce). They are particularly effective for use with a "doughnut-type" current transformer in protecting motors.

### 2. CONTENT

The relays consist of one or three instantaneous solenoid units with an equal number of operation indicators and one contactor switch. In single unit relay, the dc indicating contactor switch (ICS) is used in place of an operation indicator and contactor switch.

### 3. CONSTRUCTION

The construction of the individual units is as follows:

#### 3.1 The Instantaneous Trip Unit (IT)

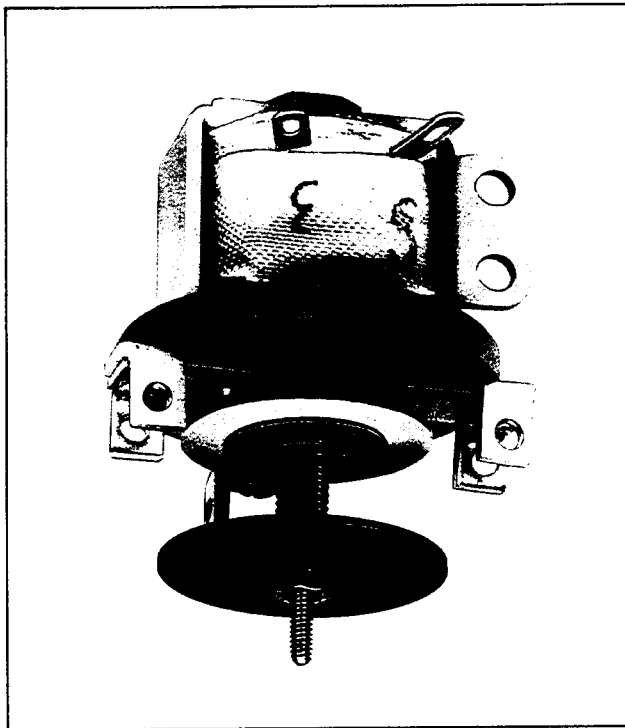
The IT unit is a small solenoid type element. A cylindrical plunger rides up and down on a vertical guide rod in the center of the solenoid coil. The guide rod is fastened to the stationary core, which in turn screws into the unit frame. A silver disc is fastened to the moving plunger through a helical spring. When the coil is energized, the plunger moves upward carrying the silver disc which bridges three conical-shaped stationary contacts. In this position, the helical spring is compressed, and the plunger is free to move while the contact remains stationary. Thus, ac vibrations of the plunger are prevented from causing contact bouncing. A Micarta disc is fastened to the bottom of the guide rod by two small nuts. The position of the disc determines the pick up current of the element.

#### 3.2 Contactor Switch

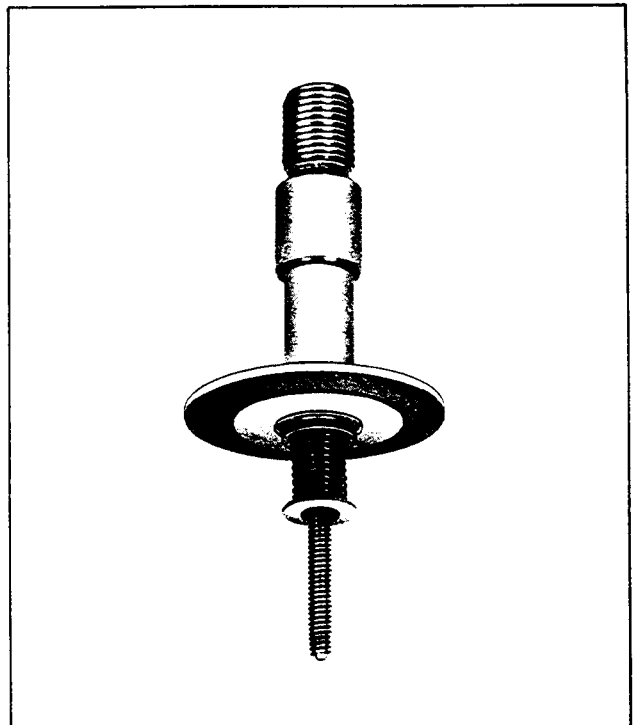
The dc contactor switch in the relay is a small solenoid type switch. A cylindrical plunger with a silver disc mounted on its lower end moves in the core of the solenoid.

As the plunger travels upward, the disc bridges three silver stationary contacts. The coil is in series with the main contacts of the relay and with the trip coil of the breaker. When the relay contacts close, the coil becomes energized and closes the switch contacts. This shunts the main relay contacts, thereby relieving them of the duty of carrying tripping current. These contacts remain closed until the trip circuit is opened by the auxiliary switch on the breaker.

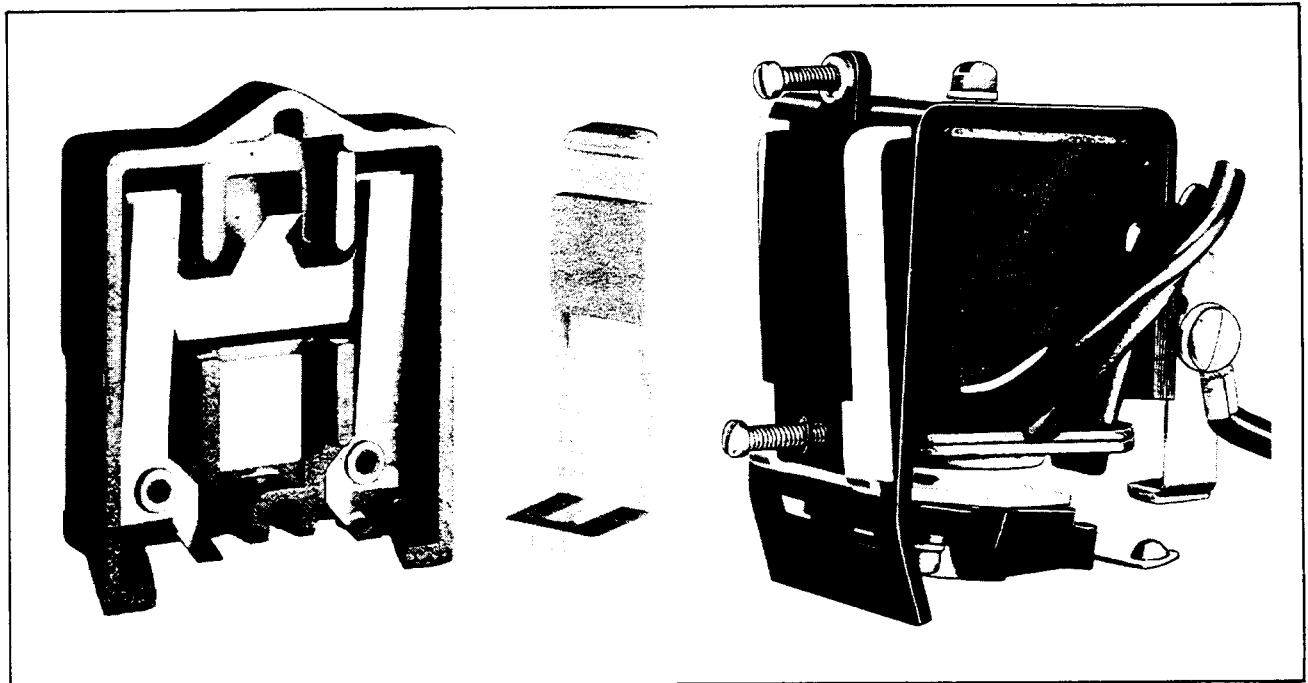
*All possible contingencies which may arise during installation, operation, or maintenance, and all details and variations of this equipment do not purport to be covered by these instructions. If further information is desired by purchaser regarding this particular installation, operation or maintenance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



*Fig 1. Instantaneous Trip Unit (IT)*



*Fig 2 Plunger Assembly for IT Unit*



*Fig 3 Indicating Contactor Switch ICS*

### 3.3 . Operation Indicator (OI)

The operation indicator is a small solenoid coil connected in the trip circuit. When the coil is energized a spring-restrained armature releases the white target which falls by gravity to indicate completion of the trip circuit. The indicator may be reset from outside of the case.

### 3.4. Indicating Contactor switch Unit (ICS)

\* The dc indicating contactor switch (ICS), is a small clapper type device. A magnetic armature, to which leafspring 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 springs, in addition to holding the target, provides restraint for the armature and thus controls the pickup value of the switch.

## 4. OPERATION

The IT unit is a current operated device and will pick-up within the range which is shown on the nameplate. The pickup current setting is determined by the position of the moving contact disc. The pickup current value will be increased by increasing the contact gap. Normally the dropout ratio is approximately 60% at the minimum pickup setting. The dropout ratio will reduce to 30% if the pickup current is set at two times the minimum pickup setting.

## 5. CHARACTERISTICS

### 5.1 IT Unit

\* The ranges available for the instantaneous units are 0.15-0.3, 0.5-1.0 and 1.0-2.0 amperes.

The burden of this unit at the minimum pick-up is 0.44 VA at 60 Hertz and 0.37 VA at 50 Hertz.

The operating times for the minimum pickup setting (not including the contact bounce) are:

- 16 to 24ms at 200% of trip value
- 8 to 12 ms at 500% of trip value
- 4 to 8 ms at 1000% of trip value

The trip time is close to the IT unit's operating time if the coil current is a sinusoidal waveform and the dc trip is 10 amperes or more. For a load current between 0.5 and 1.0 ampere, the actual trip time is the sum of the operating time and the bounce time which is between 16 and 32 milliseconds depending on the load and coil currents.

Continuous current rating of the coil is 1.5 times minimum pickup value. One second rating is approximately 44 times minimum pickup.

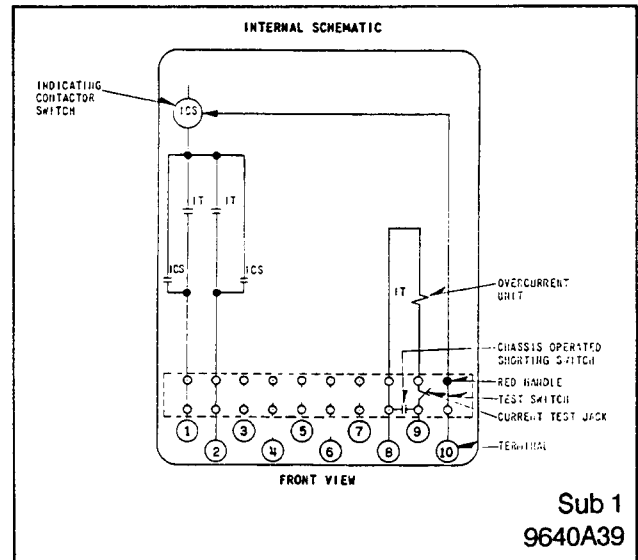


Fig. 4. Internal Schematic of Single Unit Type IT Instantaneous Overcurrent Relay

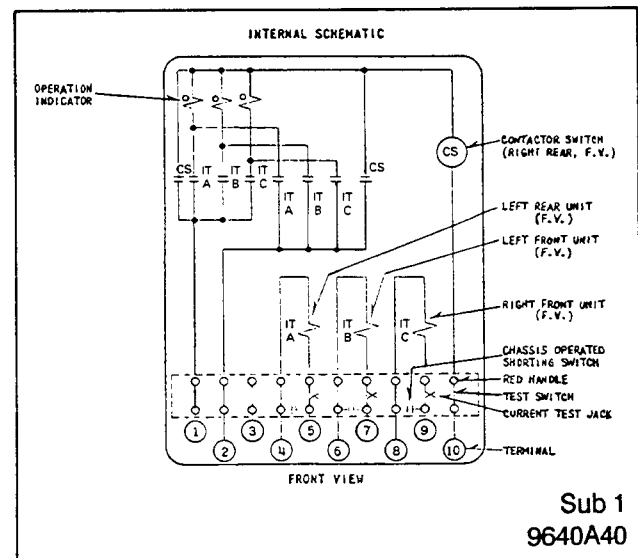


Fig. 5. Internal Schematic of the Three Unit Type IT Instantaneous Overcurrent Relay

## 5.2 Contactor Switch (CS)

The contactor switch is a dc operated switch with a pickup of 2.0 amperes.

## 5.3 Operation Indicator (OI)

The operation indicator is a dc operated switch with a pickup of 95% of its rated value. The two standard indication ranges are 0.2 and 1.0 ampere.

## 5.4 Indicating Contactor Switch (ICS)

The indicating contactor switch has two taps that provide a pickup setting of 0.2 or 2 amperes. Changing taps requires connecting the lead located in front of the tap block to the desired setting by means of a screw connection.

## 5.5 Contact Circuit Constants

	<u>dc resistance</u>
2.0 ampere Contactor Switch	0.25 ohms
1.0 ampere Target	0.16 ohms
0.2 ampere Target	2.8 ohms
0.2 ampere ICS Tap	6.5 ohms
2.0 ampere ICS Tap	0.15 ohms

## 6. INSTALLATION

The relay 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 rear mounting stud or studs for the type FT projection case or by means of the four mounting holes on the flange for the semi-flush type FT case. Either the stud or the mounting screws may be utilized for grounding the relay. External toothed washers are provided for use in the locations shown on the outline and drilling plan to facilitate making a good electrical connection between the relay case, its mounting screws or studs, and the relay panel.

Ground wires are affixed to the mounting screws or studs as required for poorly grounded or insulating panels. Other 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.

## 7. SETTINGS AND CALIBRATION

### 7.1 IT Unit

The unit, prior to shipment is adjusted for minimum pickup value, that is, the lower value marked on the nameplate. The following procedure is used when changing this setting over the indicated range. Connect the coil of the unit in series with an ammeter and adjustable load. Apply the desired pickup current and adjust the Micarta contact shield until the plunger just picks up. It is recommended that the contact gap should not be made less than 0.03 of an inch.

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 the pickup setting, should be required.

In the event the unit has to be taken apart for repair, the following instructions should be followed. Adjust the three stationary spring contacts to be level and in the same plane. Turn the whole unit or relay upside-down. Screw up the core screw to just touch the plunger. Back off the screw 2 turns and lock it. This is the adjustment of the top core screw with a gap of 0.05 inches. Then, proceed with the contact gap adjustment per the previous instructions.

### 7.2 Contactor Switch

Turn the relay up-side-down. Screw up the core screw until the contact ring starts rotating. Now back off the core until the contact ring stops rotating. Back off the core one more turn and lock in place. Adjust the two nuts at the bottom of the switch so that there is 3/32 inch clearance between the moving contact ring and the stationary contacts in the open position. The guide rod may be used as a scale as it has 56 threads per inch, therefore, 5 turns of the nut will equal approximately 3/32 inch.

### 7.3 Operation Indicator

Close the main relay contacts and pass 95% of rated indicator dc current through the trip circuit. Adjust the operation indicator by moving the flag holder such that the indicator operates with the application of the 95% current.

## 7.4 Combination Test

Pass 30 times indicator rating through the trip circuit. The contactor switch and indicator must operate with the application of the current, and the contactor switch and indicator must not stick in the operated position when the current is interrupted.

## 7.5 Indication Contactor Switch (ICS)

- \* The setting required on the ICS unit is the selection of the 0.2 or 2.0 ampere tap setting. This selection is made by connecting the lead located in front of the tap block to the desired setting by means of the connecting screw.

For proper contact adjustment, insert a .030" feeler guage between the core pin and the armature. Hold the armature closed against the core pin and guage and adjust the stationary contacts such that they just make with the moving contact. Both stationary contacts should make at approximately the same time. The contact follow will be approximately 1/64" to 3/64".

## 8. ACCEPTANCE TEST

### 8.1. IT Unit

The plunger assembly should be pick-up and seal-in within  $\pm 10\%$  of the minimum pick-up current value. The contact gap should not be less than 0.03 of an inch.

### \* 8.2. Contactor Switch and Operation Indicator

Close the main relay contacts and pass sufficient dc current through the trip circuit to close the contacts of the contactor switch. This value of current should not be greater than the rating of the contactor switch being used. The operation indicator target should drop freely.

### 8.3. Indicating Contactor Switch (ICS)

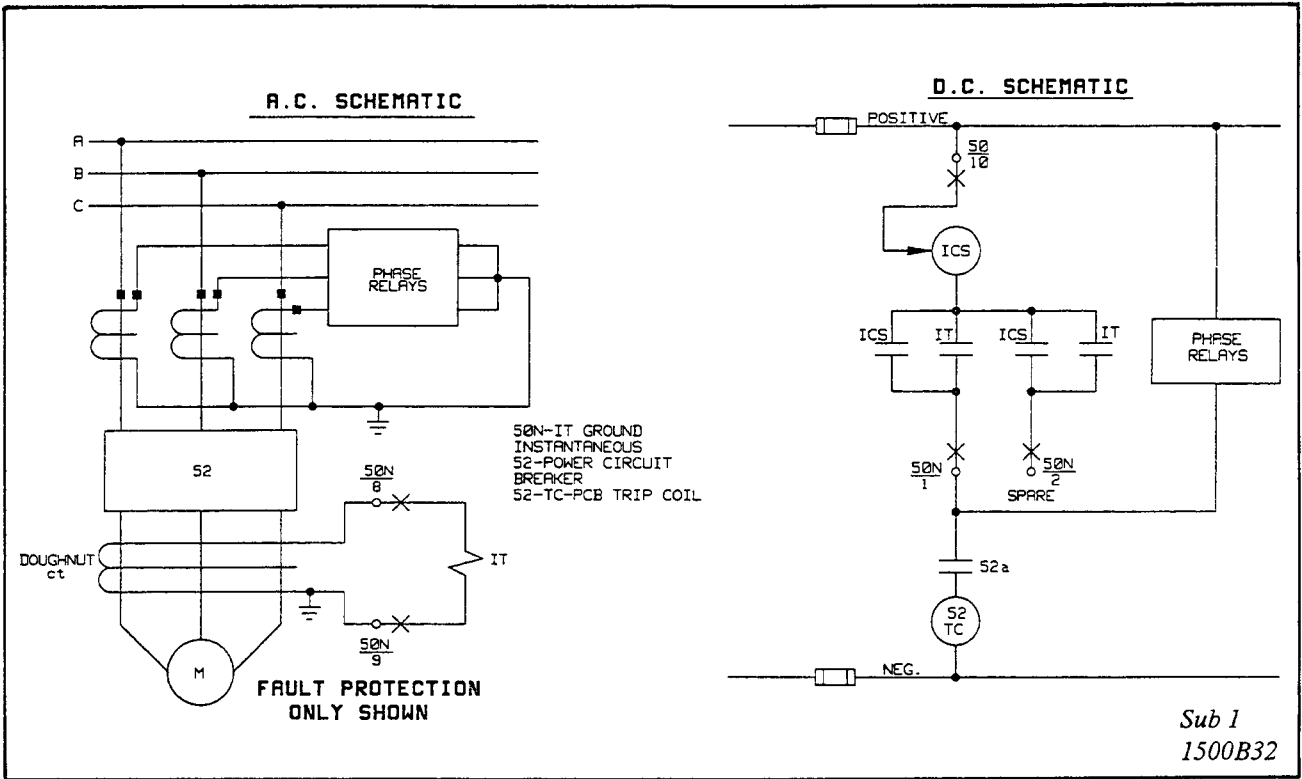
Close the main relay contacts and pass sufficient dc current through the trip circuit to close the contacts of the ICS. This value of current should not be greater than the particular ICS tap setting being used. The operation indicator target should drop freely.

## 9. MAINTENANCE

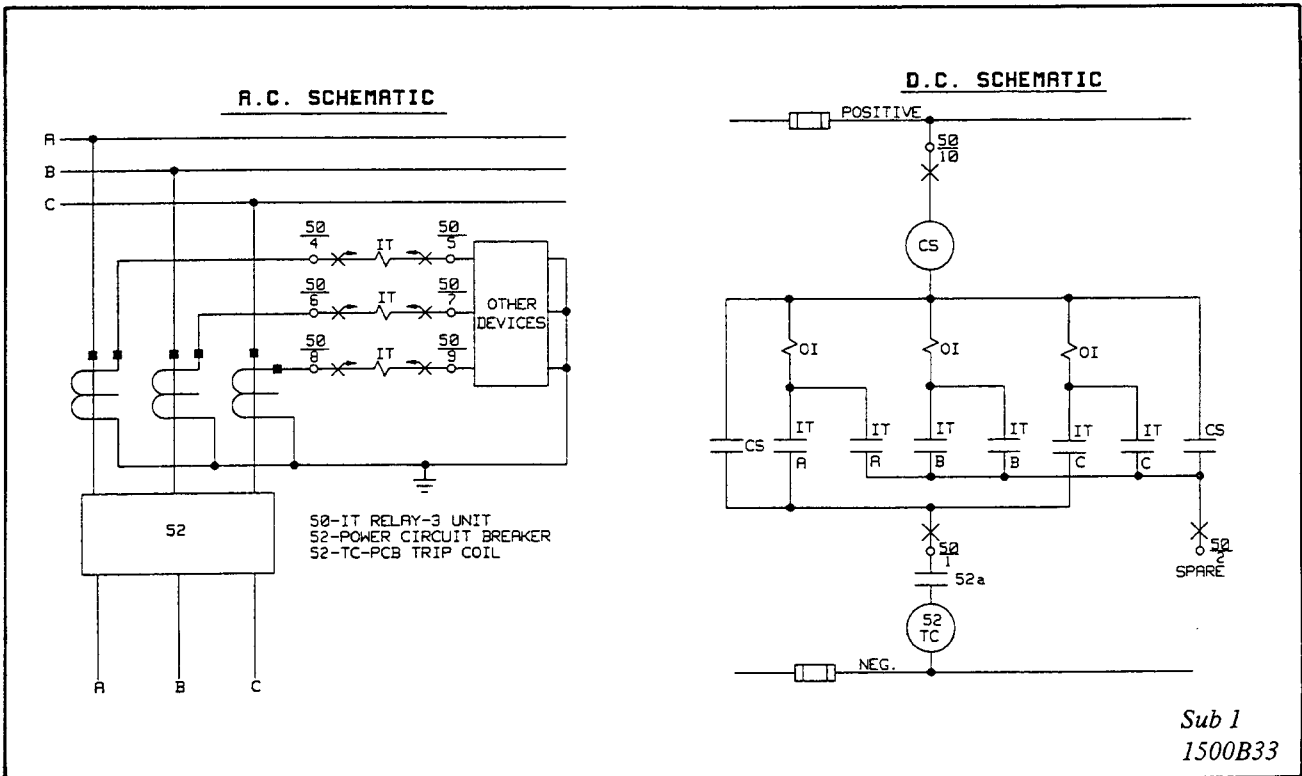
All contacts should be cleaned periodically. A contact burnisher S#182A836H01 is recommended for this purpose. The use of abrasive material for cleaning contacts is not recommended, because of the danger of embedding small particles in the face of the soft silver and thus impairing the contact.

## 10. RENEWAL PARTS

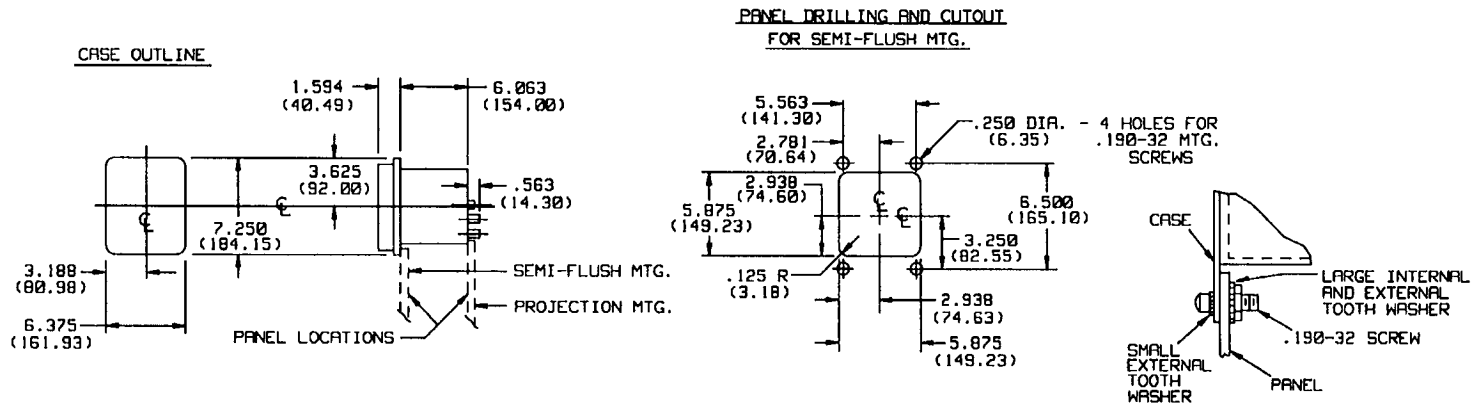
Repair work can be done most satisfactorily at the factory. However, interchangeable parts can be furnished to the customers who are equipped for doing repair work. When ordering parts, always give the complete nameplate data.



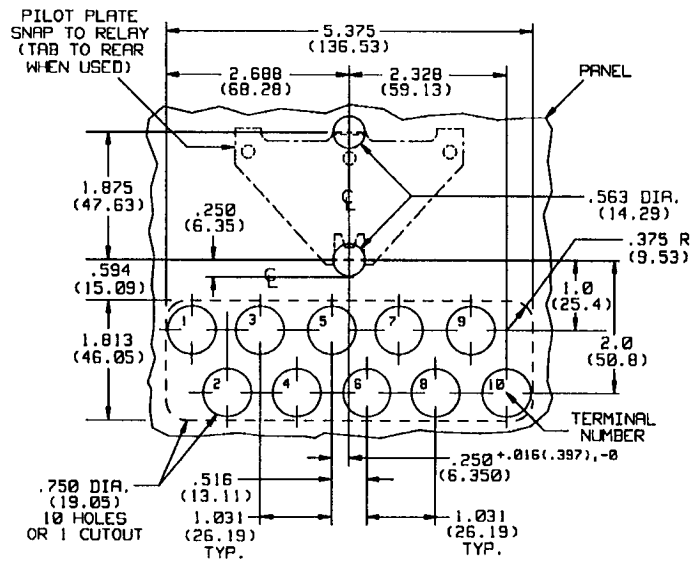
\* Fig. 6. External Schematic Motor Protection



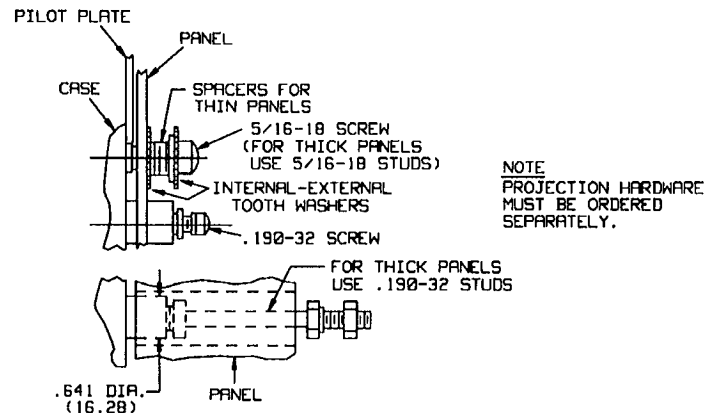
\* Fig. 7. External Schematic 3 Phase Direct Trip Application



**PANEL DRILLING OR CUTOUT FOR PROJECTION MTG. (FRONT VIEW)**



**TERMINAL AND MTG. DETAILS FOR PROJECTION MTG.**



OUTLINE AND DRILLING FOR RELAY CASE TYPE FT-11

DIMENSIONS IN INCHES  
(DIMENSIONS IN MILLIMETERS)

\* Sub 19  
57D900

Fig. 8. Outline and Drilling Diagram for Type IT Relay in the Type FT11 Case