TYPE TI RELAY INSTRUCTIONS

Application

The type TI relay is a panel mounted, single pole D.C. overload relay. It has a single spring closed contact, which trips with thermal time delay on low and medium overloads and trips instantaneously on high overloads to open the coil circuits of magnetic contactors which open the power circuit. The relay can be set to latch out after operating if desired.

Type TI relays are applied according to the rule that the minimum tripping current for the relay is approximately 120% of the continuous motor rating or 120% of the nominal current rating of the motor when it is applied on intermittent loads above its continuous rating. Time delay curves for a typical application according to this rule are shown in Fig. 1. The contacts will open D.C. magnet circuits carrying 1 amp. at 250 volts or ¼ amp. at 600 volts and will carry 5 amps. continuously.

Construction

The relay is made up of magnetic and mechanical parts mounted on a moulded base to form a unit which is common to all ratings, on which are assembled coils and heaters which vary with the rating.

The relay operates according to a combination of magnetic and thermal principles. A clapper type magnet is magnetized by a series coil and carries a horizontal armature, the free end of which may take an upper or lower position depending on the magnetic and thermal conditions. The armature is normally biased to its lower position where it is held by the magnetic attraction of a strip of nickel-iron alloy called "Invar". Under tripping conditions, the lockout effect of the Invar strip is neutralized or overpowered and the armature is drawn to its upper position by the magnetic attraction of an upper pole formed by the bent end of the rear frame. In moving upward, the armature lifts a push rod which opens a normally closed contact at the top of the relay. A spring is arranged to engage a notch in the push rod in its upper position and thus hold the contact open for "Hand Reset" operation until the latch is disengaged by depressing the Reset Push Button. If "Automatic Reset" operation is wanted the spring latch is permanently held out of engagement by depressing the Reset push button and giving it one-quarter turn clockwise.

The time delay features of the relay depend on the special physical property of Invar, by which it loses its magnetic permeability at a temperature of about 200°C. This property is utilized by connecting the Invar lockout strip or "heater" in series or parallel to the coil and passing the load current or a fraction of it through the heater. On moderate sustained overloads the internally generated heat is sufficient to raise the temperature of the heater at its demagnetization point, and the lockout effect of the heater is **neutralized** allowing the relay to trip. For overloads which exceed the "Instantaneous Trip" setting of the relay the upward pull is stronger than the downward pull at all temperatures on account of iron saturation and the lockout effect is **overpowered** instantaneously.

Adjustment

The relay has two adjustments—(1) to vary the rating and (2) to vary the instantaneous tripping current.

The adjustment for rating is made by moving a bracket carrying the armature sidewise so that the armature lockout screw registers with a hot spot (low current rating) at the right or with a cool spot (high current rating) at the left of its motion. The change of current rating which may be expected between "low" and "high" adjustments is about 12% for large current heaters and 20% for small ones. A change of this adjustment is accomplished by loosening 2 screws as shown in Fig. 2.

The adjustment for instantaneous trip operates by introducing a variable non-magnetic gap between the Invar heater and the lockout screw of the armature. This is accomplished by a special brass wheel threaded on the lockout screw and turned so that its hub projects beyond the end of the screw and holds the screw away from the heaters. The adjustment is changed by loosening a set screw which engages a notch in the edge of the wheel and screwing the wheel downward for lower trip and upward for higher trip. This adjustment is set at the factory to give instantaneous trip at 3 or 4 times full load motor current from normal running temperature but there will be a slight delay in tripping at these overloads from a cold start. See Fig. 3.

Maintenance

The heater should be kept free from dust accumulations which might interfere with proper seating of the armature. All joints must be maintained clean and tight to avoid local heating which would change the tripping range of the relay. In case it is necessary to remove the coils the front frame with armature attached can be removed by removing the core bolt and the coils and heaters are then easily removable.

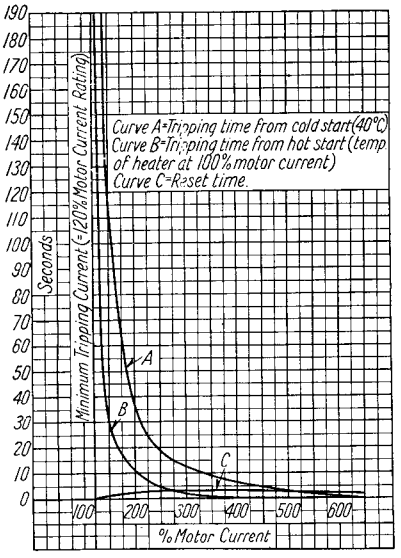


FIG 1
RATING CHARACTERISTIC

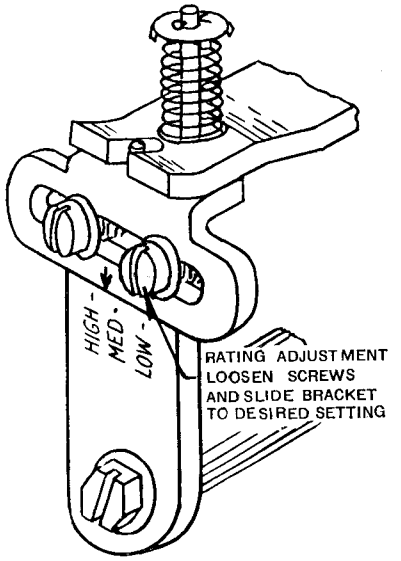


FIG. 2
RATING ADJUSTMENT

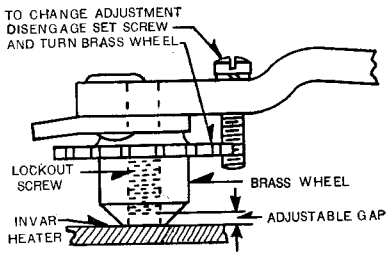
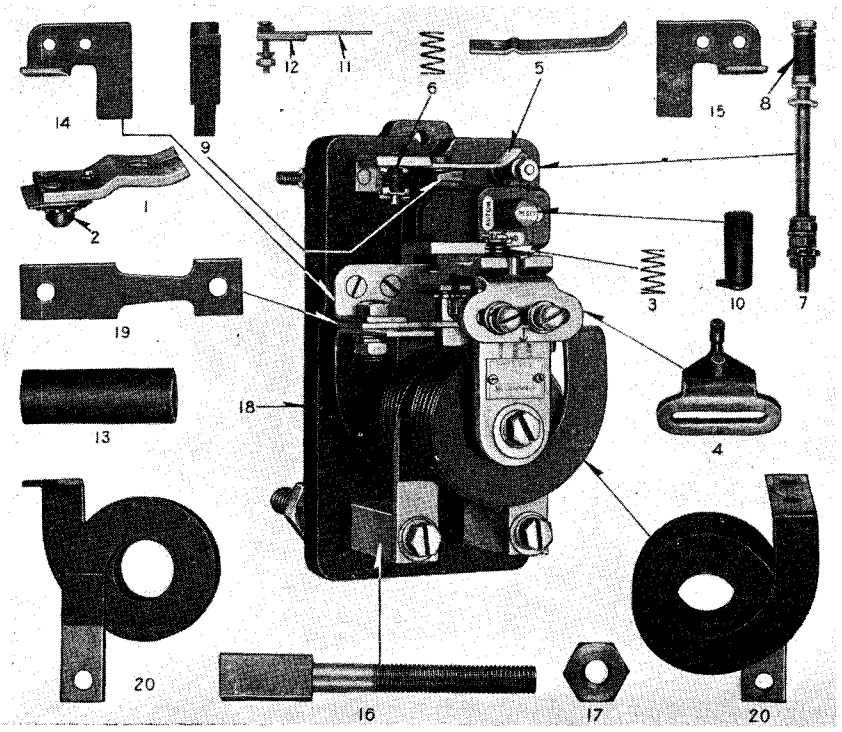


FIG. 3
INSTANTANEOUS TRIP ADJUSTMENT

*To be filed as an Instruction Leaflet and as Renewal Parts Data; for Renewal Parts Data, see reverse side of this sheet.

TYPE TI RELAY
RENEWAL PARTS DATA



Style Number of Relays				768355 and 768356
For Relays in use up to and including				1 | 5
Ref. No.	Name of Part	No. Per Relay	Recommended For Stock		Style No. of Part
1	Moving Armature	1	0	0	782686
2	Adjusting Wheel	1	0	0	782687
3	Armature Spring	1	0	1	761672
4	Adjusting Bracket	1	0	0	782688
5	Moving Contact Finger	1	1	2	782689
6	Spring for Moving Contact Finger	1	0	1	761672
7	Stationary Contact Post with Contact	1	0	0	782690
8	Stationary Contact	1	1	2	467961
9	Push Rod	1	0	0	782694
10	Reset Push Button	1	0	0	782695
11	Spring for Reset Button	1	0	1	782696
12	Reset Stop	1	0	0	782697
13	Insulating Tube for Core	1	0	0	782698
14	Heater Support Bracket. Left Hand	1	0	0	782699
15	Heater Support Bracket. Right Hand	1	0	0	782700
†16	Stud for Series Coil	2	0	0	782703
††16	Stud for Series Coil	2	0	0	782704
†17	Nut for Studs	3	0	0	7543
††17	Nut for Studs	3	0	0	12951
†18	Base	1	0	0	782701
††18	Base	1	0	0	782702
19	Heater	1	0	1	See Table
20	Coil	2	0	0	See Table

Parts indented are included in the Part under which they are indented
† Used only on Style No. 768055
†† Used only on Style No. 768056

This is a list of the Renewal Parts and the quantities of each that we recommend should be stocked by the user of this apparatus to minimize service interruptions caused by breakdowns. The parts recommended are those most subject to wear in normal operation, or to damage or breakage due to possible abnormal conditions.

This list of Renewal Parts is given only as a guide. When continuous operation is a primary consideration, additional insurance against shutdowns is desirable Under such conditions more renewal parts stock should be carried, considering the severity of service and the time required to secure replacements.

TABLE OF COILS AND HEATERS

Motor Rating Amperes	Min. Trip Amperes	Coil Style No.	Heater Style No.	Motor Rating Amperes	Min. Trip Amperes	Coil Style No.	Heater Style No.
	For Relay Style No. 768055				For Relay	Style No. 768055	
75 to 88	90 to 105	782718	768097				
88 to 100	105 to 120	782717	768096	212 to 242	255 to 290	782713 782714	768110
100 to 113	120 to 135	782716	768094	234 to 275	280 to 330	782713	768109
113 to 130	135 to 155	782715 782716	768092	275 to 300	330 to 360	782713	768108
125 to 142	150 to 170	782715	768091		For Relay	Style No. 768056	
138 to 167	165 to 200	782714 782715	765320	300 to 340	360 to 405	782719 782720	765324
167 to 188	200 to 225	782714	768112	340 to 380	405 to 455	782719 782720	765323
184 to 212	220 to 255	782713 782714	768111	380 to 417	455 to 500	782720	765322
				417 to 460	500 to 555	782720	765321

ORDERING INSTRUCTIONS

Name the part and give its style number. Give the complete name plate reading. State whether shipment is desired by express, freight or by parcel post. Send all orders or correspondence to the nearest sales office of the company. Small orders should be combined so as to amount to a value of at least one dollar, as order-handling and shipping expenses prevent us from billing a smaller amount.

*To be filed as an Instruction Leaflet and as a Renewal Parts Data; for Instructions, see reverse side of this sheet. W-30