EE-5330126

TOSHIBA

取扱説明書 INSTRUCTIONS FOR

OVERCURRENT RELAY

TYPES ICR1D
ICR1E
ICR1F

株式会社東芝
TOSHIBA CORPORATION
TOKYO JAPAN

品名記号 CODE OCR

D-L90031 (78/7)

INTRODUCTION

Type ICR1D relays consist of an induction disc type overcurrent element having long-time inverse-time characteristics with an instantaneous element or an induction element with an instantaneous element and a H.D.O element. These relays are used primarily for motor overload protection. Type ICR1E relay is equivalent to two type ICR1D relays mounted in a single case. Type ICR1F relay is equivalent to three type ICR1D relays mounted in a single case.

RATINGS

standard relays are as follows:

Type	Form	Induction Disc Elem.	Target and seal-in	Instantaneous Elem.
ICR1D	AT3H	One	Yes	Yes
	AT2H		Yes	Yes
	AT1		Yes	No
ICR1E	AT3H	Two	Yes	Yes
	AT2H		Yes	Yes
	AT1		Yes	No
ICR1D	AT2H	Three	Yes	Yes
	AT1		Yes	No

Type	Form	H.D.O Elem.	Internal connection	Case
ICR1D	AT3H	Yes	Fig.1	D-1A
	AT2H	No	Fig.2	
	AT1	No	Fig.3	
ICR1E	AT3H	Yes	Fig.4	D-3A
	AT2H	No	Fig.5	
	AT1	No	Fig.6	
ICR1F	AT2H	No	Fig.7	D-4A
	AT1	No	Fig.8	

Standard conbinations of the above elements are given in following table:

Induction Disc Elem.	**Instantaneous Elem.**	**H.D.O Elem.**	**Target and seal-in Elem.**	**Freq.**
2.5/5 A **or** **4/8 A**	**10/40 A** **or** **20/80 A** **or** **40/160 A**	**4/16 A**	0.2 **A** **or** 1 **A**	**50** Hz **or** **60** Hz
0.5/1A or 1/2A or 1.5/3A	4/16A or 10/40A	1/4A or 10/40A		

Standard coils for disc elements are as follows:

Coil Current	**Rated Current**	**Coil Tap**	**Frequency**	**VA at Rated Current**
4/8 A	**8 A**	**4-4.5-5-5.6-6.3-7.1-8A**	**60** Hz **50** Hz	**10.0** **8.5**
2.5/5 A	**5 A**	**2.5-2.8-3.1-3.5-4-4.5-5A**	**60** Hz **50** Hz	**10.0** **8.5**
1.5/3 A	**3 A**	**1.5-1.7-1.9-2.1-2.4-2.7-3 A**	**60** Hz **50** Hz	**10.0** **8.5**
1/2 A	**2 A**	**1-1.1-1.2-1.4-1.6-1.8-2 A**	**60** Hz **50** Hz	**10.0** **8.5**
0.5/1A	1A	0.5-0.55-0.6-0.7-0.8-0.9-1A	60 Hz 50 Hz	10.0 8.5

Standard coils for target and seal-in elements UE3 are as follows;

Coil Current	D.C. Resistance	Max. Trip Current	Cont. Current Capacity	Target Operating Current
0.2A	7.5 ohms	5A	0.2A	0.2A
1A	0.44 ohms	20A	1A	1A

Standard coils for instantaneous elements are given in the following table.

Coil Current	Rated Current	Frequency	VA at Rated Current
4/16A	5A	50Hz 60Hz	4VA 5VA
10/40A	5A	50Hz 60Hz	0.80VA 0.83VA
20/80A	5A	50Hz 60Hz	0.21VA 0.21VA
40/160A	5A	50Hz 60Hz	0.05VA 0.052VA

Standard coils for H.D.O. (high drop out) elements are given in the following table

Coil Current	Rated Current	Frequency	VA at Rated Current
1/4A	1A	50Hz 60Hz	7.5VA 9.0VA
2/8A	3A	50Hz 60Hz	16.5VA 20.0VA
4/16A	5A	50Hz 60Hz	4.0VA 5.0VA

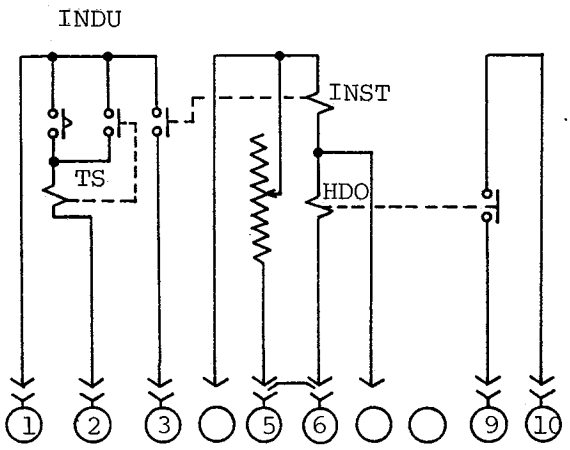


Fig.1 INTERNAL CONNECTION
TYPE ICR1D-AT3H

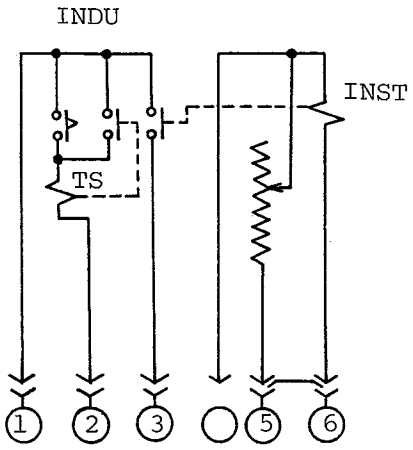


Fig.2 INTERNAL CONNECTION
TYPE ICR1D-AT2H

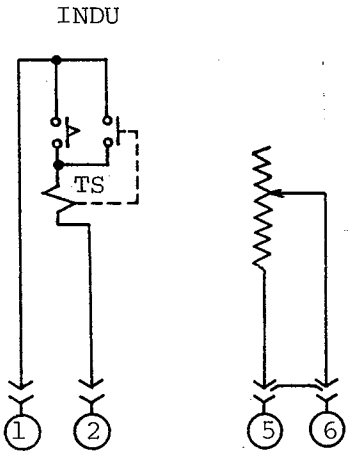


Fig.3 INTERNAL CONNECTION
TYPE ICR1D-AT1

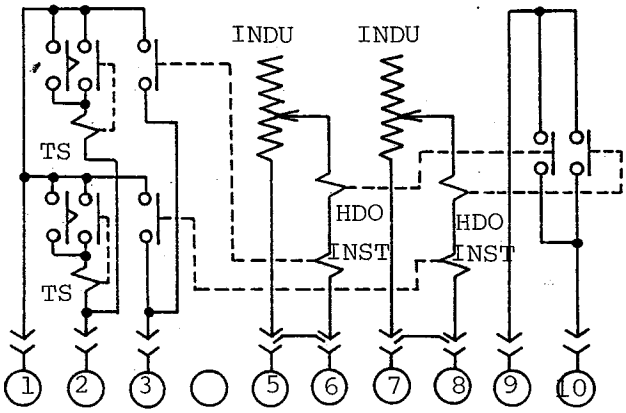


Fig.4 INTERNAL CONNECTION
TYPE ICR1E-AT3H

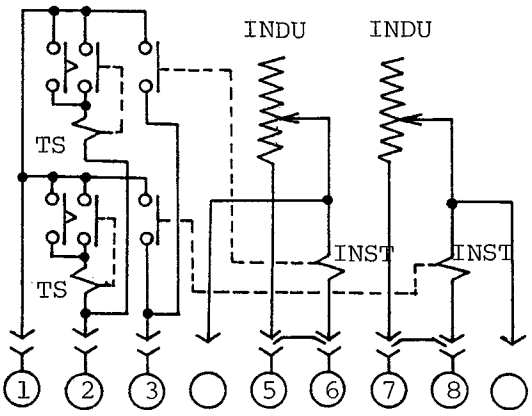


Fig.5 INTERNAL CONNECTION
TYPE ICR1E-AT2H

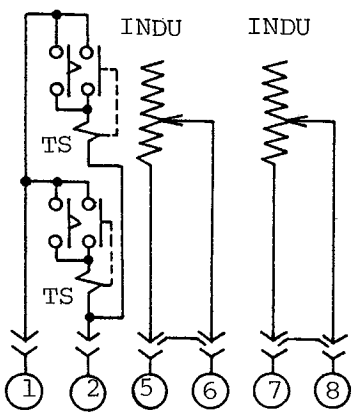


Fig.6 INTERNAL CONNECTION
TYPE ICR1E-AT1

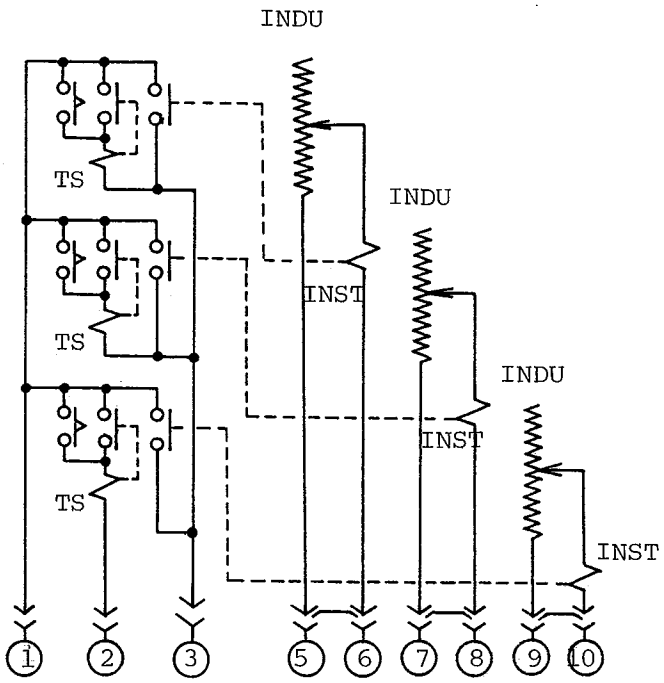


Fig.7 INTERNAL CONNECTION
TYPE ICR1F-AT2H

INDU ; INDUCTION DISC UNIT

INST : INSTANTANEOUS UNIT

TS : TARGET AND SEAL-IN UNIT

HDO : HIGH-DROP-OUT UNIT

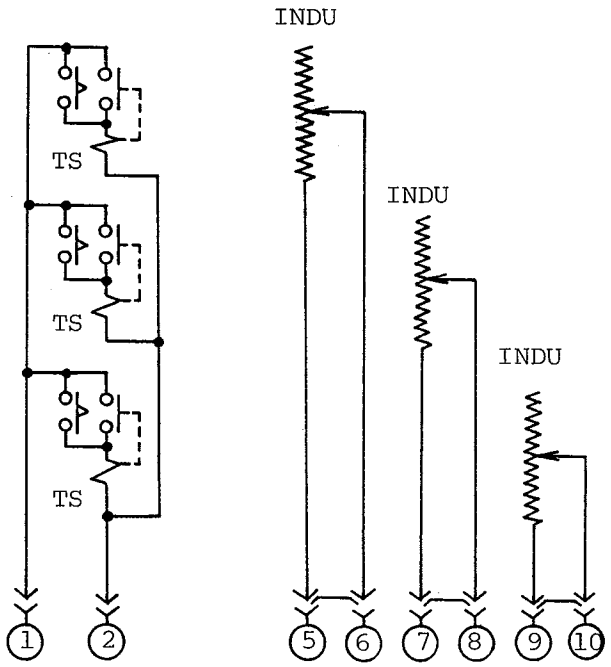


Fig.8 INTERNAL CONNECTION
TYPE ICR1F-AT1

CONTACTS

For an induction disc element, the circuit closing capacity of the contact is 20 A for voltages not exceeding 250 Volts, and the current carrying capacity is limited by the rating of the target and seal-in element. For an instantaneous element and an H.D.O. element, circuit closing capacity is 20 A and its current carrying capacity is 4 A. Breaking capacity of these contacts at non-inductive load is 0.125 A at DC 250 V and 0.25 A at DC 125 V.

CONSTRUCTION AND OPERATION

Type ICRlD comprises an induction disc type overcurrent element and accessories in a Toshiba standard drawout relay case type D-1A. The type ICRlE relay is equivalent to two type ICRlD relays mounted in a single drawout case type D-3A. The type ICRlF relay is equivalent to three type ICRlD relays mounted in a single drawout case type D-4A.

Induction Disc Element (Main Element)

This is of an induction disc type construction. A shading ring type U-shaped electromagnet with a current coil produces the operating torque and a permanent magnet supplies the retarding torque to give the correct time delay.

The time-current characteristics of this element are shown in Figure 6.

Target and Seal-in Unit (Type UE3)

There is a target and seal-in unit type UE3 on the front to the upper left of the relay. Two standard coils 0.2A and 1A are available, and the optimum value can be selected in due consideration of the resistance of the circuit breaker tripping current and tripping circuit.

When the current more than target operating current flows through the contact circuit, the target plate comes out and the main unit contacts are short-circuited for protection. The target prateis reset manually by pressing the button located at lower left part of the cover.

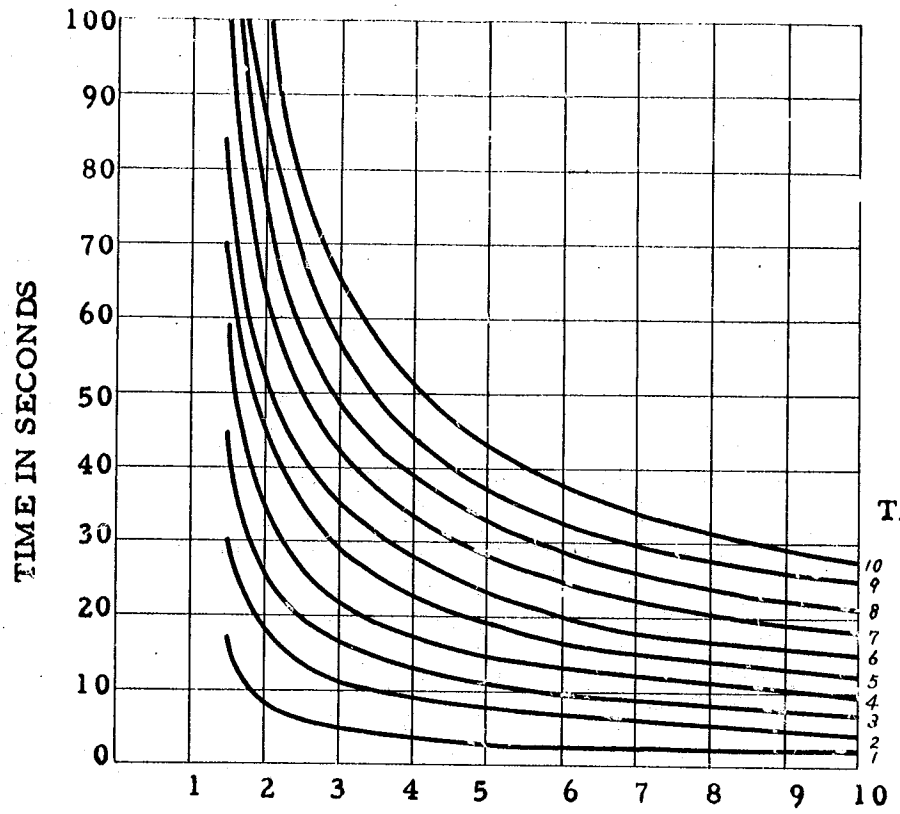


Fig. 9 TIME-CURRENT CURVE OF TYPE ICRID RELAYS (INDUCTION UNIT)

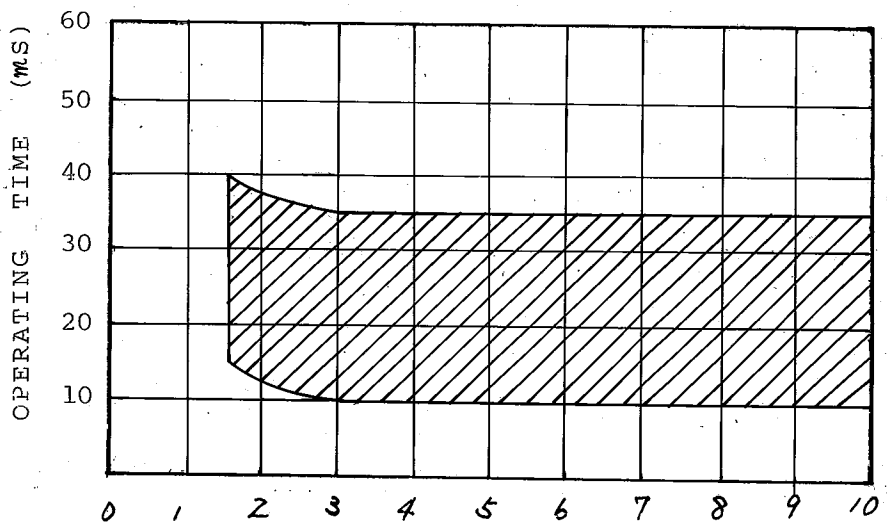


Fig. 10 TIME-CURRENT CURVE OF TYPE ICRID RELAYS (INSTANTANEOUS UNIT)

Instantaneous Element

This element is equipped on the front to the upper right of the relay. It is a small instantenous hing type element. Its coil is connected in series with the operating coil of the main element. When the current reaches a predetermined value, the instantaneous element operates, closing contacts and raising its target into view. The target latches in exposed position until released by pressing the button located at lower left part of the cover. The time-current curve is shown in Fig.10.

H.D.O. (High Drop Out) Element

This element is a special instantaneous element without a target, which may be mounted on the back side of the induction element. The element is designed to yield a high drop-out value, 75% or more of operating current value.

The pole piece is constructed and secured with a special wave washer so that it can be rotated to the most favorable position to obtain the desired drop-out, without changing the plunger position.

APPLICATION

Type ICR1□ relays are used primarily for motor over-load protection. The typical external connection diagrams are shown in Fig.11 and Fig.12.

The induction disc element has long-time inverse-time characteristics which give the proper coordination with a motor overheating (See Fig.13), and the preventing the mis-operation due to the rush current during motor starting (See Fig.14). Against the fault currents which are greater than the starting rush current, the instantaneous element protects the motor. The protection of the

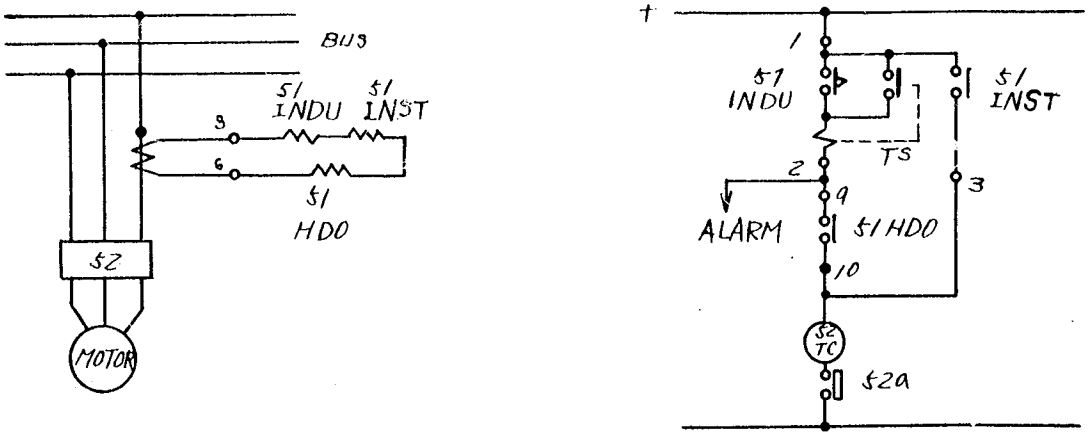


Fig.11 EXTERNAL CONNECTIONS FOR TYPE ICRID-AT3H (ONE PHASE INDICATED)

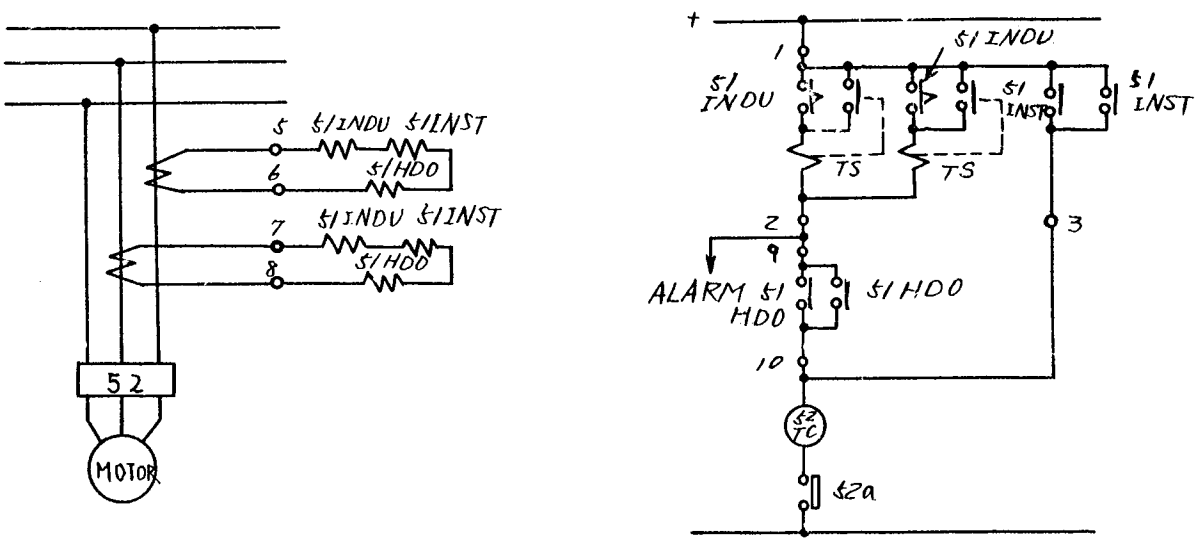


Fig.12 EXTERNAL CONNECTIONS FOR TYPE ICRIE-AT3H

51 INDU	INDUCTION UNIT
51 INST	INSTANTANEOUS UNIT
51 HDO	HIGH DROP OUT UNIT
TS	TARGET AND SEAL-IN UNIT
52	CIRCUIT BREAKER
52 TC	TRIP COIL
52 a	AUXILIARY CONTACT, CLOSED WHEN CIRCUIT BREAKER CLOSES

essential service motor is based on minimizing the possibility of unnecessary tripping the motor. In such a case, the H.D.O. element is necessary. For example, when the induction disc element is set at 115% of motor rating, H.D.O. element at 200%, and instantaneous element at 650%, the relaying gives an alarm for 115% to 200% overload, and an automatic tripping for 200% or more overload. The tripping occurs when the induction disc element and the H.D.O. element close the contacts. The H.D.O. element is of the high drop out type to be sure that it will drop out when the current return to normal after the starting inrush has subsided.

ADJUSTMENT

Testing the overcurrent relay, the current wave form should be as good as possible at rated frequency.

INDUCTION DISC ELEMENT

Current Setting

To change the operating current value of the relay, change the position of the tap plug in the tap block at the top of the relay. Screw the tap plug firmly into the tap marked desired current (below which the element is not to operate). When changing the current setting of the element, remove the relay connecting plug, or screw the spare tap plug into the desired tap before removing the old tap plug. These procedure permits tap change without open circuiting the secondary of current transformer. This element is adjusted at the factory to have the starting current within ±5% of tap current value at all positions of the time dial. By turning the spring adjusting ring, the starting current for any position of the time dial may be brought within ±5% of the tap setting employed, if for some reason this adjustment has been

distrubed. This ring may be turned by inserting a screw driver in the notches around the edge. The minimum operating current can be adjusted by turning this spring adjusting ring, but in this case it is difficult to make the starting current meet at all positions of the time dial. If necessary, Tokyo Shibaura Electric Co. should be contacted.

Time Setting

The setting of the time dial determines the length of time the element requires to close its contact when the current reaches predetermined value. At zero setting of time dial, the contacts are just closed and at 10 setting the operating time is at a maximum. If it is desired to make further change in the operating time, move the damping magnet along its supporting shelf, or move the short-circuiting iron piece in the magnet by turning the adjusting screw.

Contact Adjustment

The contacts should have approximately 0.8 mm wipe. This is made by turning the screw in the contact brush. The contacts must just be closed when the time dial is set on zero. If this is found in correct, corrections are made by changing the position of the arm attached to the shaft which is located below the time dial. In this case, loosen the screw clamping the arm to the shaft, turn the arm to the required position, and then fix it firmly to the shaft by tightening the screw.

TARGET AND SEAL-IN ELEMENT

The tap plug is screwed into the suitable tap corresponding to the magnitude of the trip current. To change this tap setting, take a spare tap plug from the left hand stationary contact and place it in the required tap on the right hand

stationary contact. Next remove the other tap plug. By this means, the adjustmen of the contact relations will not be disturbed.

If for some reason the positions of the contacts are disturbed, adjust such that contacts at left and right hand will close about the same time. To make this adjustment, move the stationary contact support up or down. The contact wipe at this time should be about 1 mm.

INSTANTANEOUS ELEMENT

Setting the operating current value of the instantaneous element, first loosen the locknut at the top of element and raise or lower the pole piece by turning its hexagon head. Select the position so that the hexagon head is even with the desired calibration on the scale and then, tighten in position. Contact adjustment is made in the same manner as for the target and seal-in element. Contact wipe of about 1 mm is suitable.

H.D. O. ELEMENT

Setting the operating current of the H.D.O. element is made in same procedure as for the instantaneous element. The small vibration before the pick up is no trouble. If the vibration remains at the pick up state, rotate the pole piece to avoid the vibration. This adjustment affects the drop out value.

Contact adjustment is made in the same procedure as for the target and seal-in element, but contact wipe of about 0.3 mm is suitable.

INSTALLATION

The relay is storngly packed for shipment. But immediately upon receipt of the relay, an examination should be made for any damage sustained during transit. If injury or damage resulting from rough handling is evident, a claim

should be filed at once with the transportation company and the nearist Sales Office of the Tokyo Shibaura Electric Co. notified promptly. In this case, care should be taken not to lose any of the small parts.

In unpacking the relay, care should be exercised not to damage the parts or to disturb the adjustments. If the relay is not to be used immediately, it should be stored in dry, dustless place without unpacking.

Location and Installation

The relay should be installed in a clean, dry place free from dust and any excessive vibration. It should be located where is daily maintenance can be performed easily. The relay should be mounted on vertical surface. For the outline and the panel drilling, refer Toshiba standard drawout case type D-1A , D-3A and D-4A drawings.

Before the relay is put into service, it should be checked to see if the factory adjustments have been disturbed. Time dial is at zero so that there is necessity of changing the time dial setting.

MAINTENANCE

PERIODIC TESTS

It is recommended that the characteristic testing of the relay is made every six months. To test the relay, first the cover is removed, and the plug drawn out. The relay unit can be easily drawn out. Shorting bars are provided in the case to short the current transformer circuit. A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel. The testing plug terminals of the CT circuit at the case side must be short-circuited. For the test, refer to Adjustments.

TROUBLES

If for any reason, the trouble arises in the relay, check the following points. And if found impossible to repair, the factory should be contacted.

Conductors

Check to see if there are any broken wires or short circuits.

Contacts

For cleaning fine silver contacts, a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etched roughed surface. Fine silver contacts should not be cleaned with knives, files, or abrasive paper or cloth. Knives or files may leavescratches with increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insullating abrasive material in the contacts and thus prevent closing.

ORDERING

When ordering, it is requested that the following information be specified.

(1) Type and form of relay.

(2) Coil current of induction disc element.

(3) Coil current of target and seal-in element.

(4) Coil current of instantaneous element.

(5) Coil current of H.D.O. element

(6) Frequency

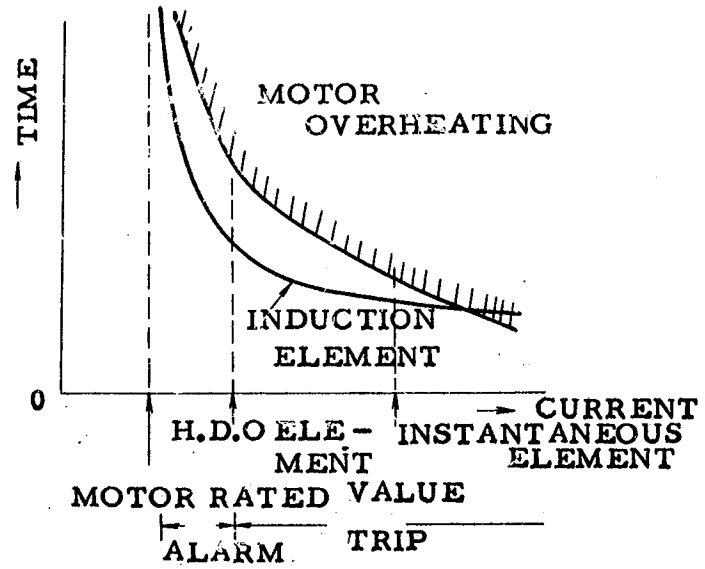


Fig.13 OVERLOAD CHARACTERISTICS AND TYPE ICRID RELAY

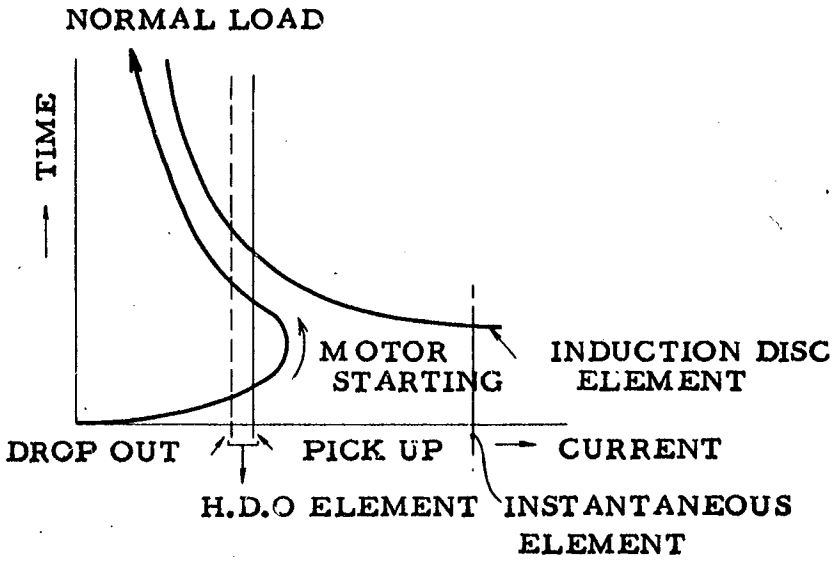


Fig.14 MOTOR STARTING CHARACTERISTICS AND TYPE ICRID RELAY

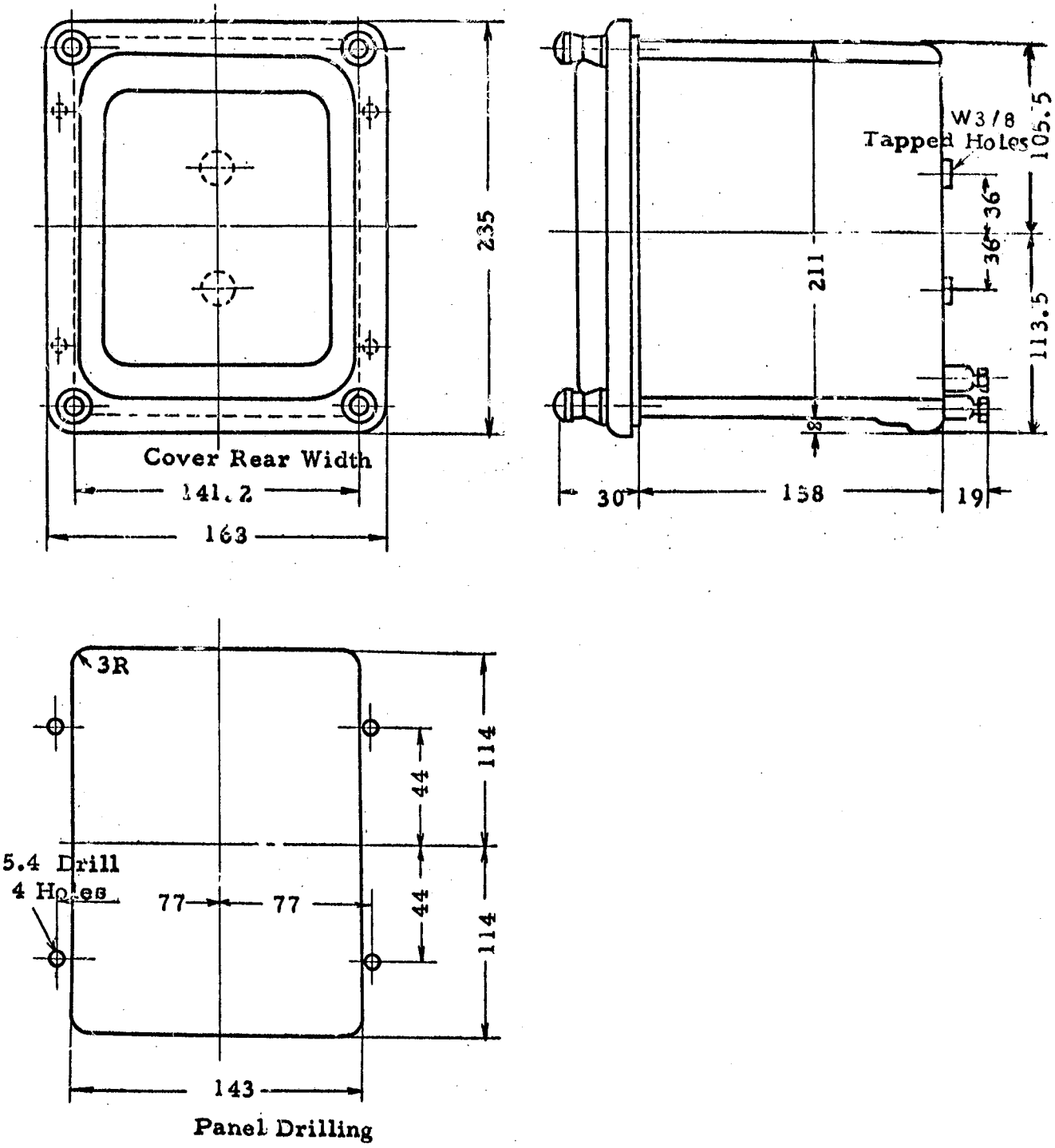
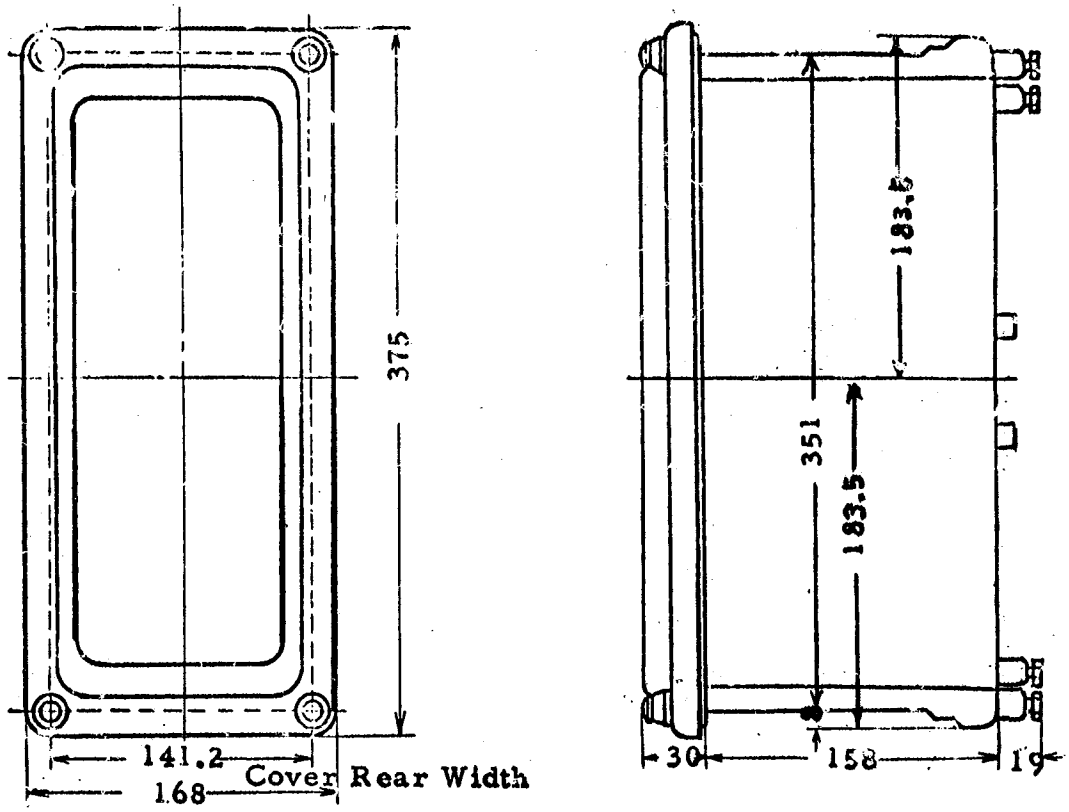
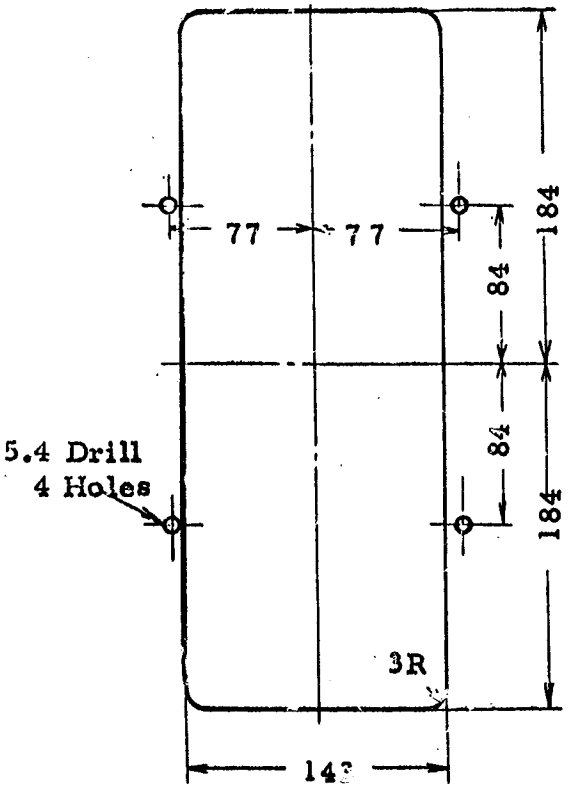


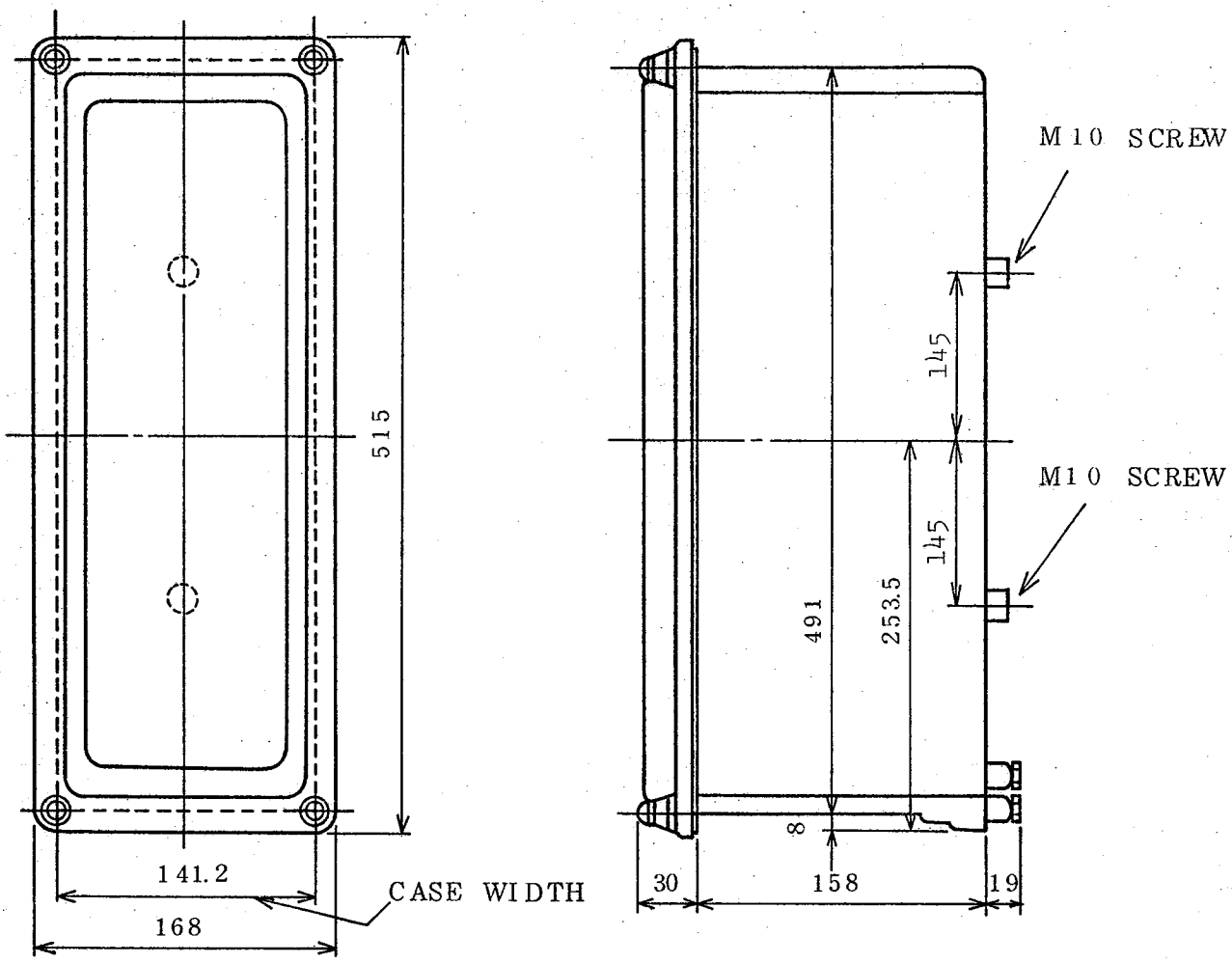
Fig.15 Outline and Panel Drilling for Type ICRID Relay





Panel Drilling

Fig. 16 Outline and Panel Drilling for Type ICRIE Relay



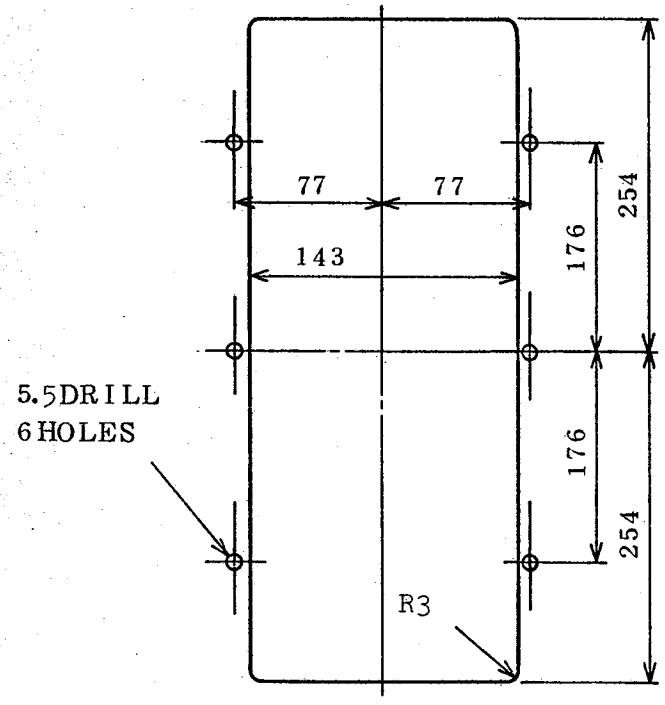


Fig.17 OUTLINE AND PANEL DRILLING FOR TYPE ICR1F RELAY

PANEL DRILLING FOR FLUSH MOUNTING (FRONT VIEW)

⑧ Mar. 15'85 P2,3 ADD DESCR S.Nakajima 1985 3. 23
⑦ Jan. 18.'85 P14 ERSD DESCR S.Nakajima 1985 1. 23
⑥ May. 15.'84 P2 ADD DESCR S,Nakajima 1984 5. 24
⑤ Feb. 2'82 P1,2,4,5,6 S,Nakajima 1983 2. 4
④ Oct. 30.'82 P7 CHG DESCR. S,Nakajima 1982 11. 11
③ Apr. 23.'81 P1,2 ADD DESCR, P5~18 CHG DESR, ADD P5 S,Nakajima 1981 4. 27
② Aug. 21.'76 ERSD DESCR T.CHIBA

APPROVED BY	CHECKED BY	DRAWN BY
B,SUDOW	S,KOBAYASHI	S,KOBAYASHI
JUL-16-'63	JUL-16-'63	JUL-16-'63
REGISTERED	'63.10.20	

MQ