

INSTRUCTIONS

CURRENT BALANCE RELAYS

TYPES

IJC11A IJC11D

IJC11B IJC11E

IJC11C IJC12A

IJC13A

IN

DRAWOUT CASE

GENERAL  ELECTRIC
SCHENECTADY, N. Y.

CURRENT-BALANCE RELAYS

TYPES IJC11A, IJC11B, IJC11C

IJC11D, IJC11E, IJC12A, IJC13A

The Type IJC induction disk relays consist of one, two or three mechanically separated similar units. Each unit operates on two currents and is responsive when these currents differ by a predetermined amount.

The IJC11A relay has one unit with one operating and one restraint coil. It has single-circuit closing contacts.

The IJC11B relay has two units with electrically interconnected operating and restraining coils and single-circuit contacts connected to independent terminals. They are principally used for the protection of parallel lines against phase and ground faults.

The IJC11C relay has three units with electrically interconnected operating and restraining coils and single-circuit contacts which are connected in multiple to the same terminals. They are principally used to protect three-phase lines against conditions that lead to an unbalance of the three-phase currents.

The IJC11D relay has three units with electrically interconnected operating coils and separately connected restraining coils, and single-circuit contacts which are connected in multiple to the same terminals. They are used for protecting regulating transformers against internal faults.

The IJC11E relay has three units with all coil leads brought out to separate terminals, and single-circuit contacts connected in multiple.

The IJC12A differs from the IJC11D only in that it has two circuit closing contacts.

The IJC13A differs from the IJC11C only in that it has two circuit closing contacts.

DRAWOUT CASE

This instruction book is written to cover the above type relays mounted in the drawout case. The drawout cases are made in three major sizes each of which has studs for external connections at both ends or at the bottom only. These are respectively referred to as "double-end" and "single-end" cases. In either construction, the electrical connections between the relay units and the case are made through stationary molded inner and outer blocks between which nests a removable connecting plug which completes the circuits. The outer block attached to the case has the studs for external connections and the inner block has terminals for the internal connections.

The relay mechanism is mounted in the steel framework called the cradle and is a complete unit with all leads being terminated at the inner block. This cradle is held firmly in the case with a latch at both top and bottom and by a guide pin at the back of the case. The connecting plug, besides making the electrical connections between the respective blocks of the cradle and case, also locks the latch in place. The cover, which is drawn to the cradle by thumbscrews, holds the connecting plug in place.

To draw out the cradle, the cover must first be removed. Then, the connecting plug can be drawn out. In so doing, the trip circuit is first opened, then the current transformer circuits are shorted and then disconnected from the relay elements, and finally the voltage circuits are opened. After the plug has been removed, the latch can be released and the cradle easily drawn out. To replace the cradle, the reverse order is followed.

Note: Care must be taken to insert the connecting plug slowly on relays that have contacts which are closed when de-energized but open under normal operating conditions.

A separate testing plug can be inserted in place of the connecting plug to test the relay in place on the panel either from its own source of current and voltage, or from other sources. Or, the cradle can be drawn out and replaced by another which has been tested in the laboratory.

Contacts and Coil Rating

The coils of Type IJC relays will carry continuously currents equivalent to the relay rating.

The current-closing rating of the contacts is 30 amperes for voltages not exceeding 250 volts. The current-carrying ratings are limited by the two different ratings of target and holding coils as indicated in the following table.

Function	AMPERES, AC OR DC	
	1-amp (0.25 ohm) Target and Hold. Coil	0.2 amp (7 ohm) Target and Hold. Coil
Tripping Duty	30	5
Carry Continuously	4	0.8

The 0.2 ampere coil is for use with trip coils that operate on currents ranging from 0.2 up to 1.0 ampere at the minimum control voltage. If this coil is used with trip coils that take 1.0 ampere or more, there is a possibility that the 7-ohms resistance will reduce the tripping current to so low a value that the breaker will not be tripped. This coil can safely carry tripping currents as high as 5 amperes.

The 1.0 ampere coil should be used with trip coils that take 1.0 ampere or more at the minimum control voltage, provided the tripping current does not exceed 30 amperes at the maximum control voltage. If the tripping current exceeds 30 amperes, an auxiliary relay must be used to control the trip-coil circuit, the connections being such that the tripping current does not pass through the contacts or the target and holding coil of the protective relay.

When it is desirable to adopt one type of relay as standard to be used anywhere on a system, relays with the 1.0 ampere coil should be chosen. These relays should also be used when it is impossible to obtain trip coil data, but attention is called to the fact that the target may not operate if used with trip coils taking less than 1.0 ampere.

Burdens

	<u>Amp.</u>	<u>Cyc.</u>	<u>Min. P.U.</u>	<u>%Slope</u>	<u>Watts</u>	<u>Vars</u>	<u>V-A</u>
IJC11A	5	60	1.0	125	6.6	14.5	15.4
IJC11B	5	60	7	125	0.8	0.9	1.2
	5	60	1	125	12	34	36
IJC11C	5	60	1.0	125	6.6	13.9	15.4
IJC11D	5	60	8	150	1.0	2.0	2.2 Oper.
					1.6	4.3	4.6 Rest.
IJC12A	5	60	8	150	1.0	2.0	2.2 Oper.
					1.6	4.3	4.6 Rest.

INSTALLATION

Install the relay in a place that is clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

The relay should be mounted on a vertical surface by means of the mounting studs or screws. A diagram of the panel drilling required will be found in this book.

The diagrams indicate the proper studs for the various connections. Permanently ground one of the steel supporting studs or screws with a copper conductor of not less than No. 12 B & S gauge or its equivalent.

Before the relay is placed in service inspect the moving parts for any undue friction or other injury which may have occurred during shipment.

The lower jewel bearings have been oiled at the factory, and the top bearing filled with vaseline; no further lubrication of any part of the relay should be attempted.

Time Lever Settings

The time lever, if provided, is usually set on T.L.S. "1" on the scale, since an unbalance represents a serious fault and quick operation of the relay is required. When it is desired to introduce time in the relay operation, move the time lever toward the larger numbers on the scale.

ADJUSTMENT AND CARE

The relays are properly adjusted at the factory and it is advisable not to disturb the adjustments. If, for any reason, they have been disturbed, the following points should be observed in restoring them.

Disk and Bearings

The lower jewel may be tested for cracks by exploring its surface with the point of a fine needle. If it is necessary to replace a jewel, a new pivot should be screwed into the bottom end of the shaft at the same time. A very small drop of General Electric meter-jewel oil or fine watch oil should be placed on the new jewel before it is inserted.

The jewel should be turned up until the disk is centered in the air gaps, after which it should be locked in position by the set-screw provided for that purpose.

The upper bearing pin should be adjusted so that the disk shaft has about $1/64$ inch end clearance.

Disk Travel and Gear Mesh

Relays which do not have time levers should have the gears and pinion meshed so that about 1 inch disk edge movement is required to close the contacts from the position where the stop pin is against the pole.

In all relays the mesh should be as deep as possible without binding in any position when the disk is rotated. This adjustment is correct when a slight back-lash can be felt in all disk positions. The two screws holding the contact mechanism assembly to the relay frame should be tightened securely after adjustment is made.

Contacts

If the contacts become dirty or pitted slightly, they should be cleaned by scraping the surface lightly with a sharp knife or by using a fine clean file. Under no circumstances should emery or crocus cloth be used on fine-silver relay contacts. Finish by wiping the contacts with a clean soft cloth and avoid touching them with the fingers.

With the contacts just closed, there should be enough space between the contact-holding armature and the poles of the holding magnet to permit the fixed contact tips to be deflected about $1/32$ inch when the armature is finally pushed against the poles. The tips should lie in the same vertical plane. These adjustments are readily obtained by moving each contact brush by means of the screw in the front of the brush block which pushes against

it near the center. The lock nuts should be turned up firmly before the adjustment is finally checked.

Minimum Operating Current

This is the first electrical adjustment to be made. Place the operating poles in the maximum-torque position (position where shading coil slot is radial with respect to the disk, and the shaded portion is toward the front of the relay).

Adjust the tension of the spring on the disk shaft, or contact shaft, so that the least current required in the operating coil to rotate the disk very slowly and close the contacts is within 5 per cent of the value marked on the nameplate. Its tension may be varied by slipping the collar on the shaft, but care should be taken against spreading this collar and thereby weakening its grip on the shaft.

Operating Characteristics

The operating (slope) characteristic as marked on the nameplate is obtained next by applying the test currents given below and turning the restraining poles away from the maximum-torque position just enough to allow the disk to move very slowly and close the contacts.

Relay	Ampere Rating	Minimum Pick-up	Oper. Characteristics		Test Current	
			%	Slope	Rest.	Oper.
IJC11A	5	1.0		125	20	25
IJC11B	5	7		125	40	50
	5	1.0		125	20	25
IJC11C	5	1.0		125	20	25
IJC11D	5	8		150	40	60
IJC11E	5	1.0		125	20	25
IJC12A	5	8		150	40	60
IJC13A	5	1.0		125	20	25

Turn the lower pole in the counterclockwise direction by means of the adjusting screw, and leave the upper pole in its maximum-torque position. However, if more than 30 degrees change is required, it is advisable to turn the upper pole also in order to keep both upper and lower poles within 30 degrees of maximum torque.

Periodic Tests

An operation test and inspection of the relay and its connections at least once every six months is recommended.

Renewal Parts

When ordering renewal parts, refer to the nearest Sales Office of the Company; describe the required part in detail and give the model number and rating of the relay as they appear on the nameplate.

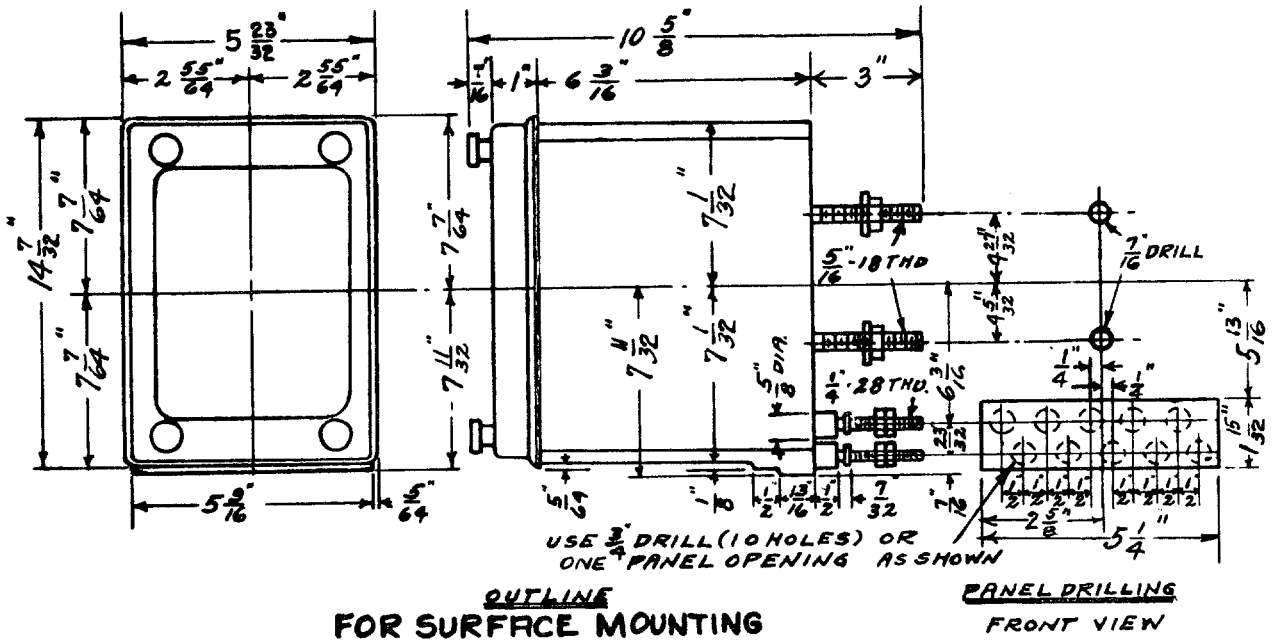
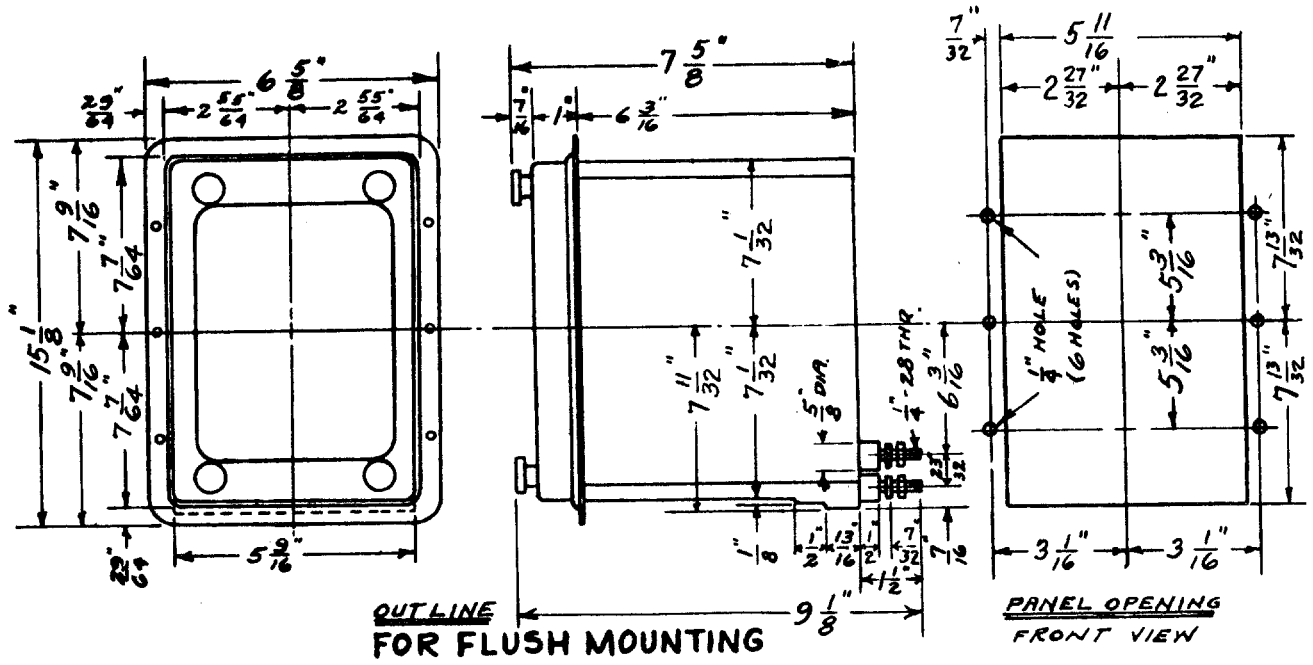


FIG. 2 OUTLINE AND PANEL DRILLING FOR DRAWOUT CASE. TWO UNIT-SINGLE END (K-6174673)

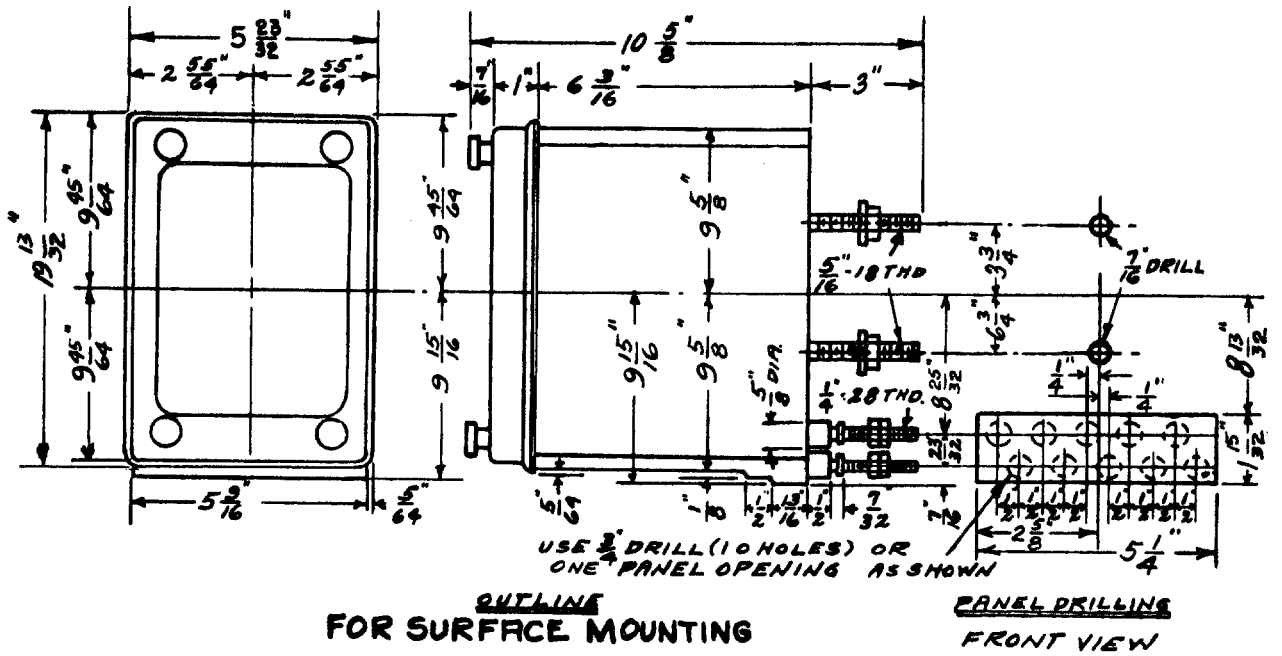
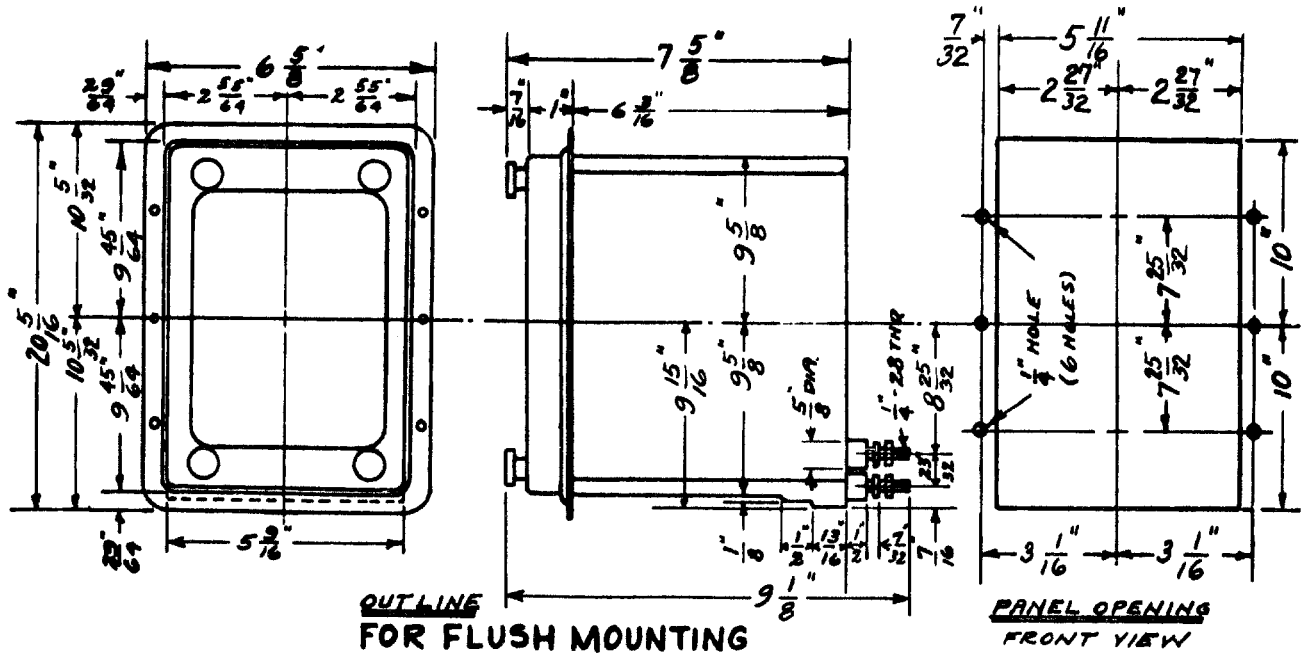


FIG. 3 OUTLINE AND PANEL DRILLING FOR DRAWOUT CASE, THREE UNIT-SINGLE END. (K-6174675)

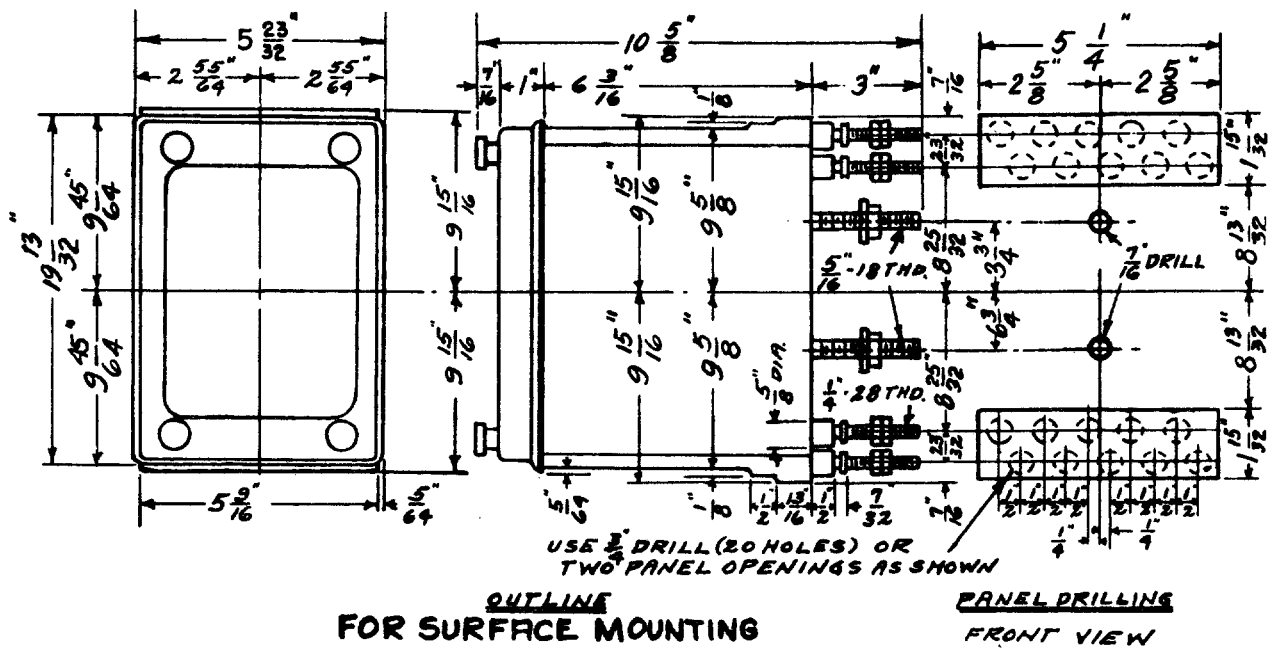
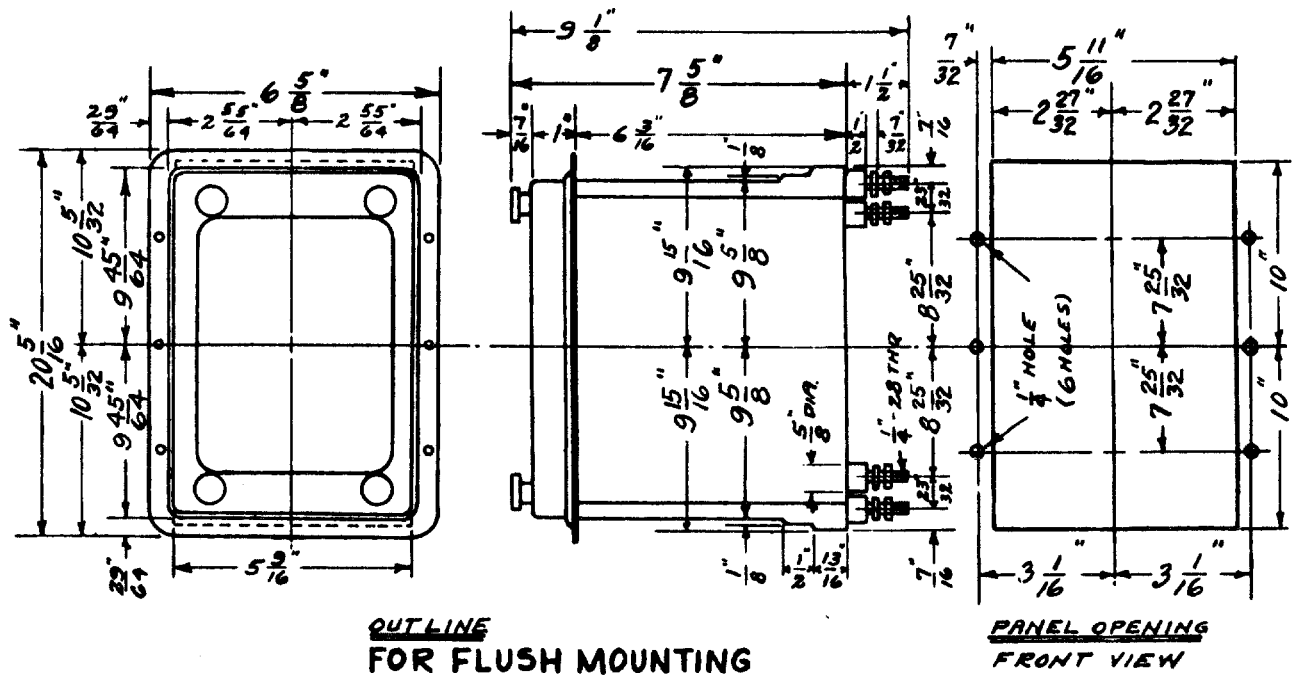


FIG. 4 OUTLINE AND PANEL DRILLING FOR DRAWOUT CASE, THREE-UNIT-DOUBLE END. (K-6174676)

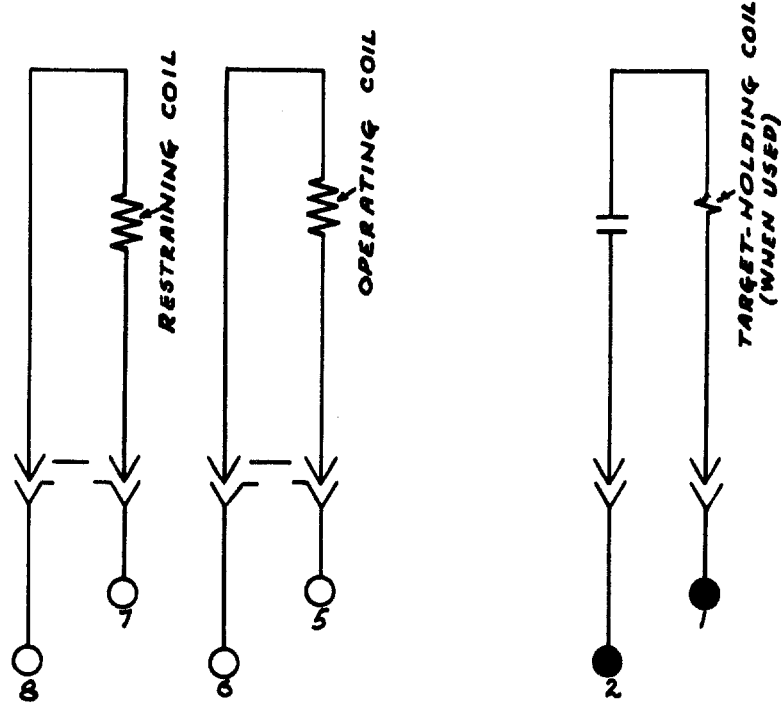


FIG. 5 RELAYS IJC11A. INTERNAL CONNECTIONS
DRAWOUT CASE. BACK VIEW. (K-6154128)

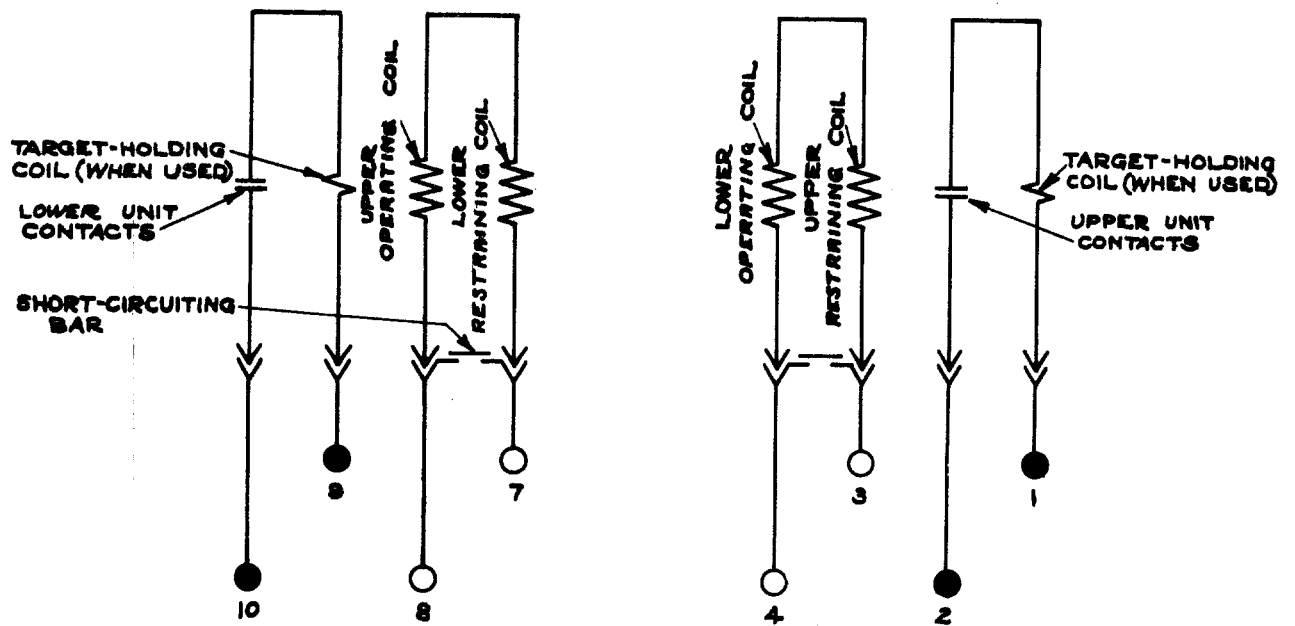


FIG. 6 RELAYS IJC11B. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6174692)

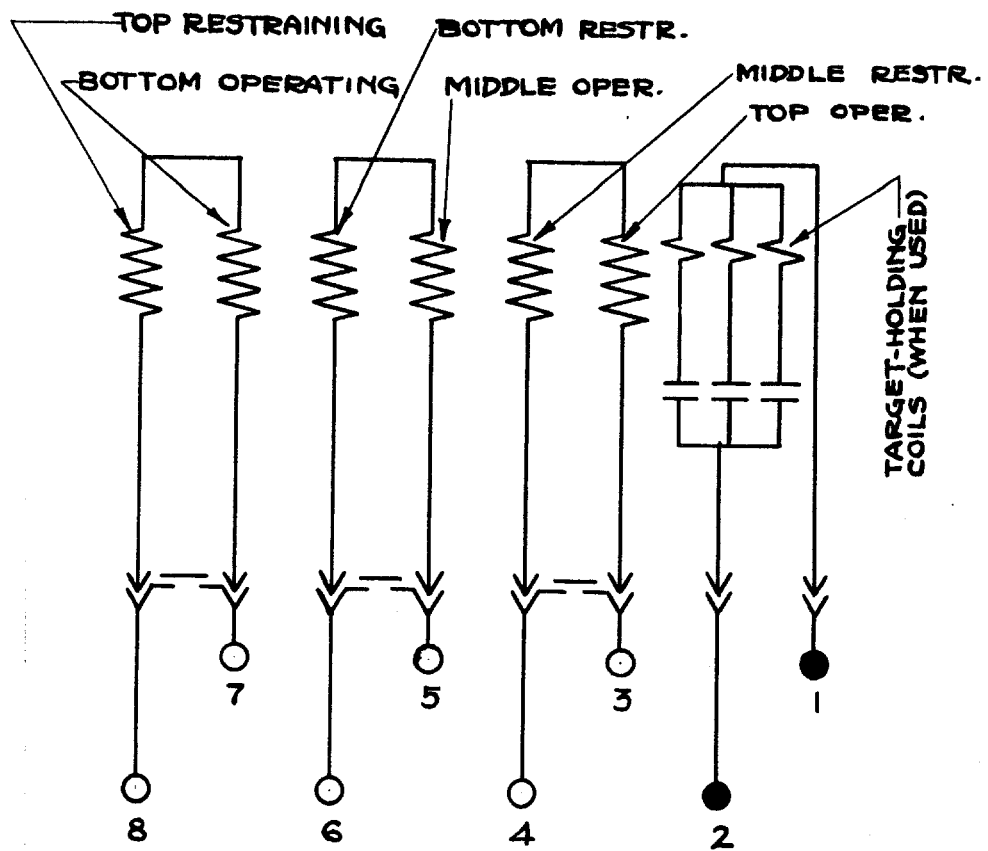


FIG. 7 RELAYS IJC11C. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6154108)

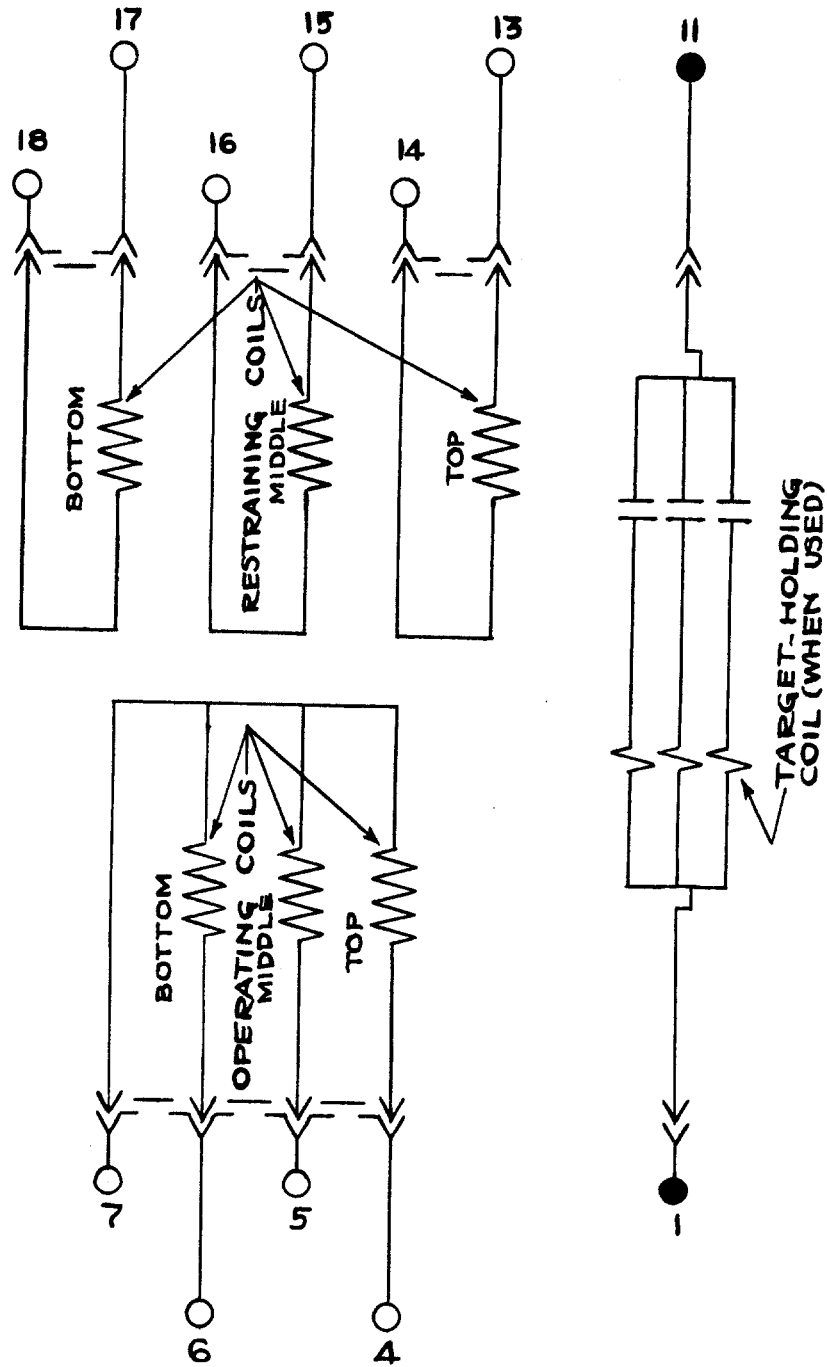


FIG. 8 RELAYS IJC11D. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6154025)

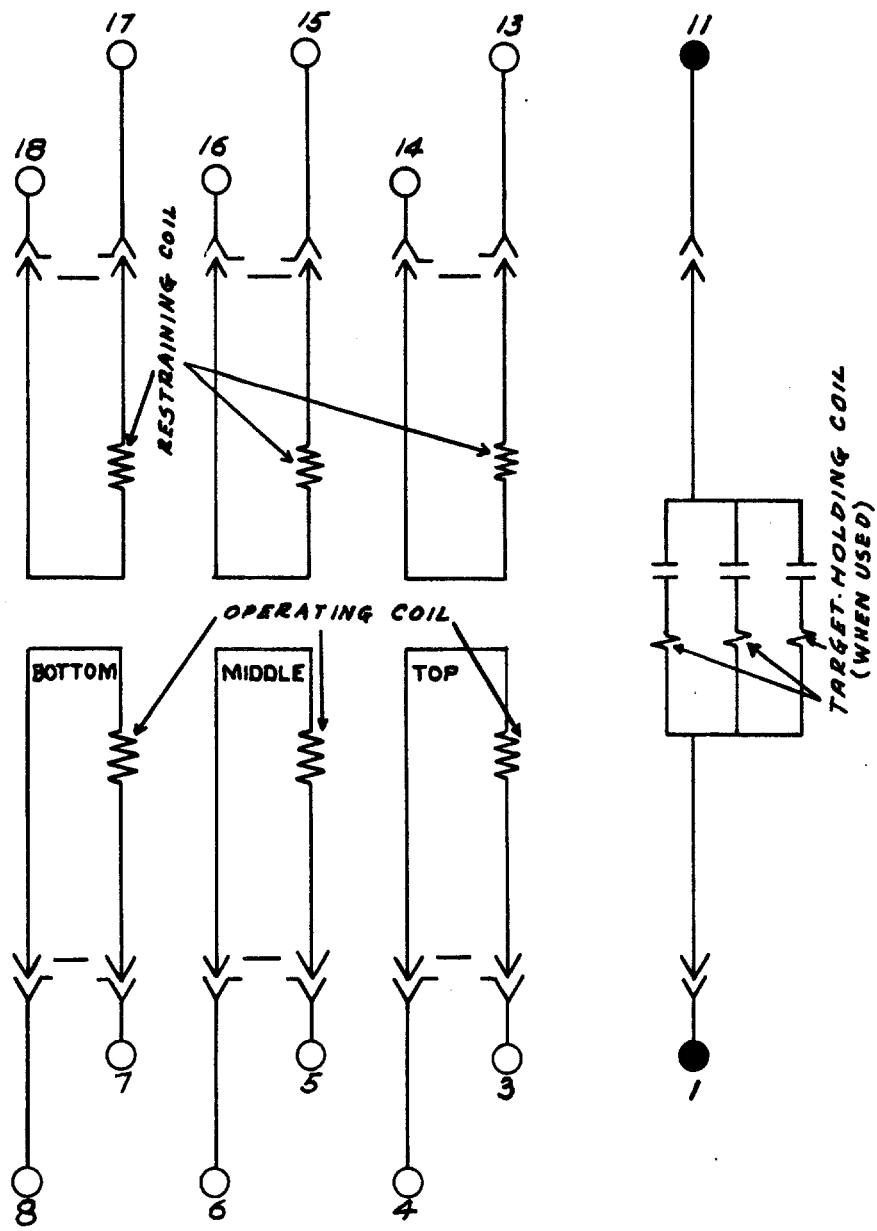


FIG. 9 RELAYS IJC11E. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6154029)

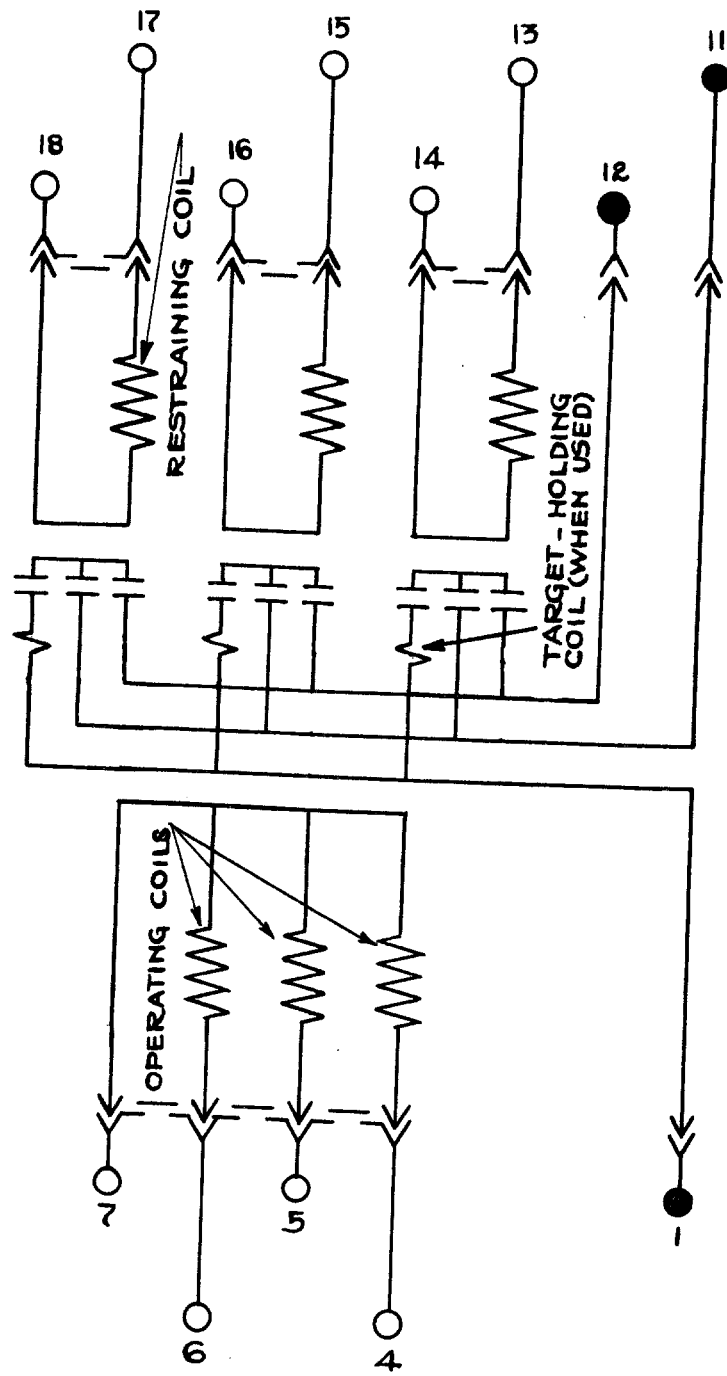


FIG. 10 RELAYS IJC12A. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6154041)

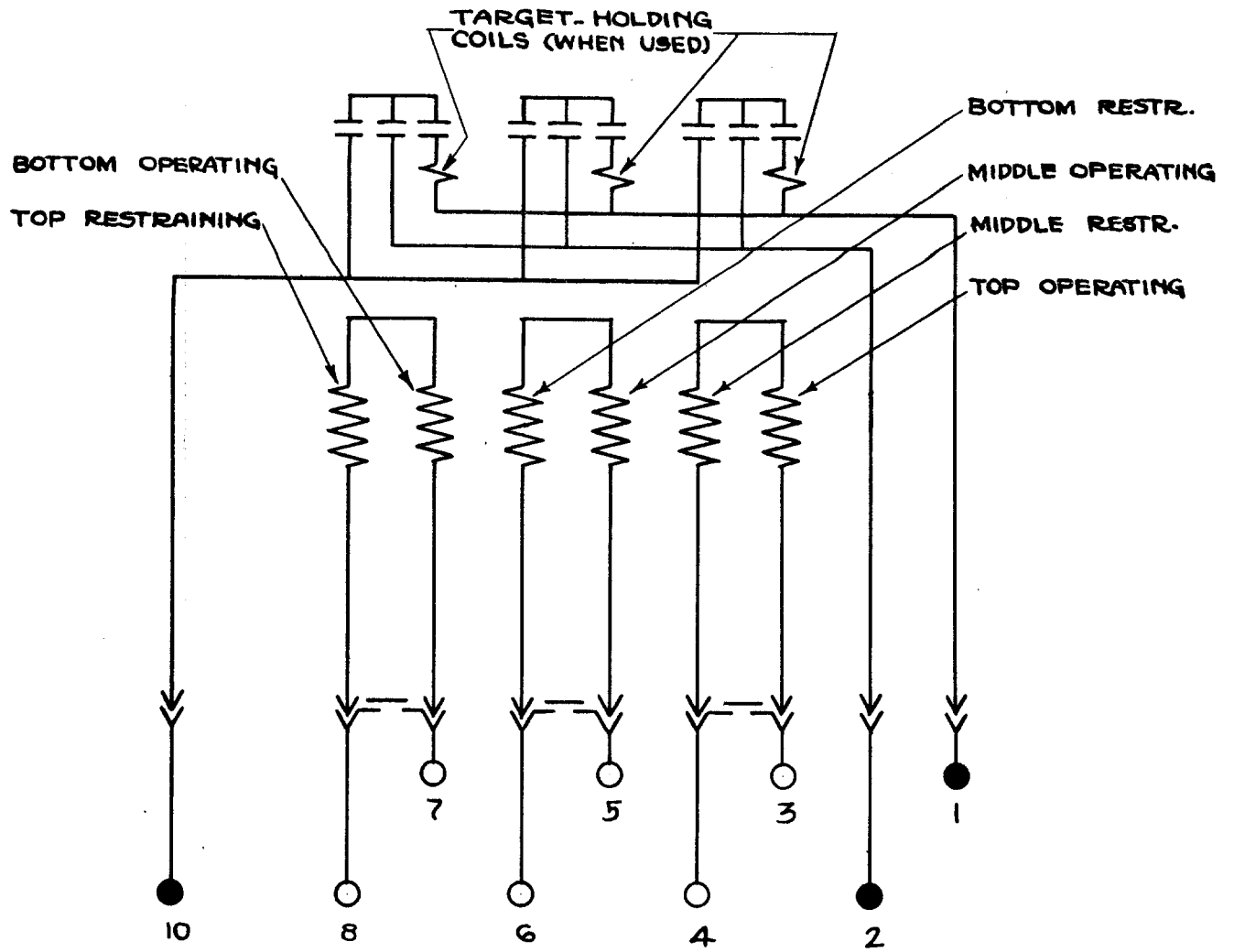


FIG. 11 RELAYS IJC13A. INTERNAL CONNECTIONS
DRAWOUT CASE, BACK VIEW. (K-6154111)

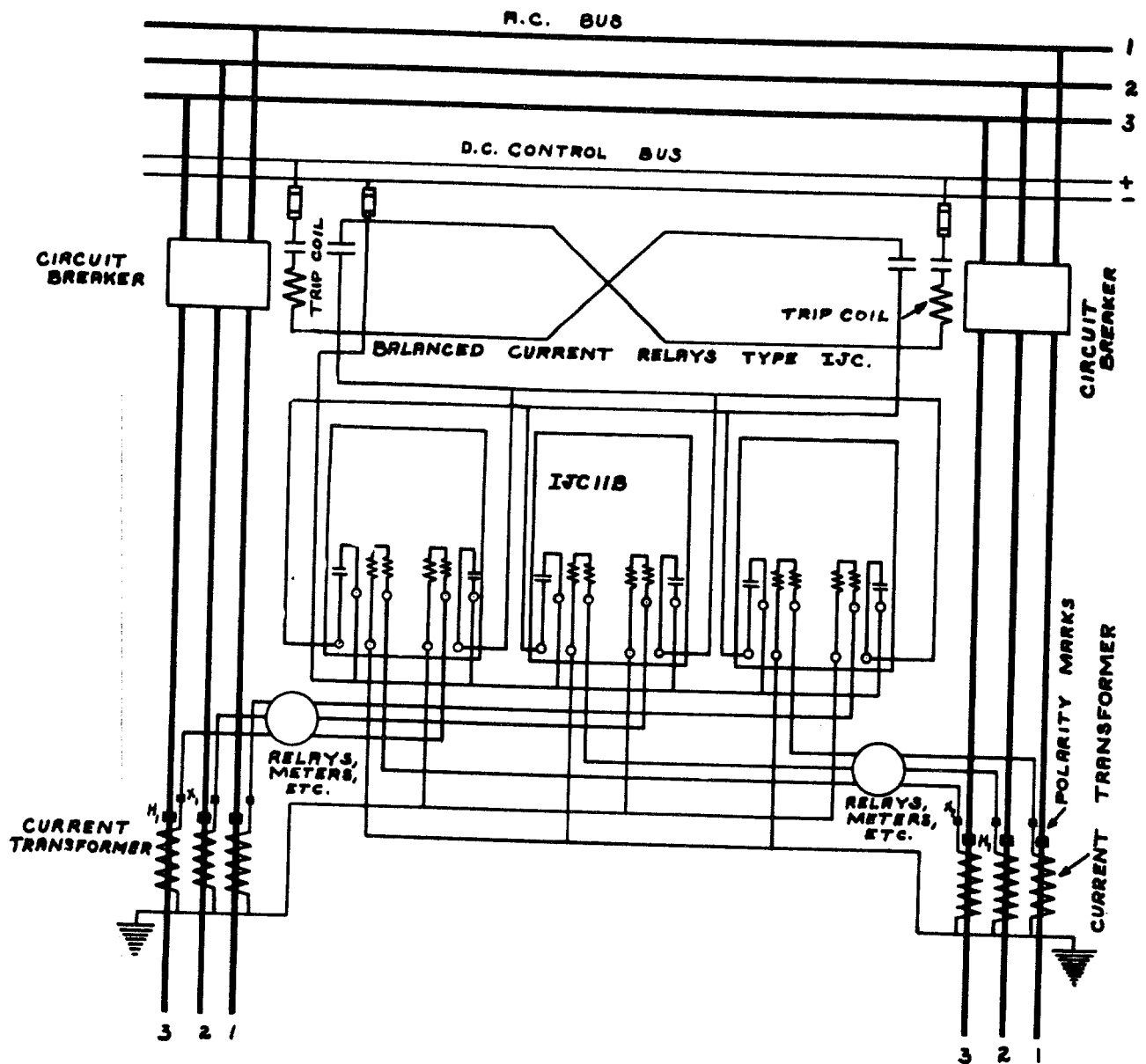


FIG. 12 BALANCED CURRENT PROTECTION OF PARALLEL LINES. EXTERNAL CONNECTIONS DRAWOUT CASE. BACK VIEW. (K-6154178)

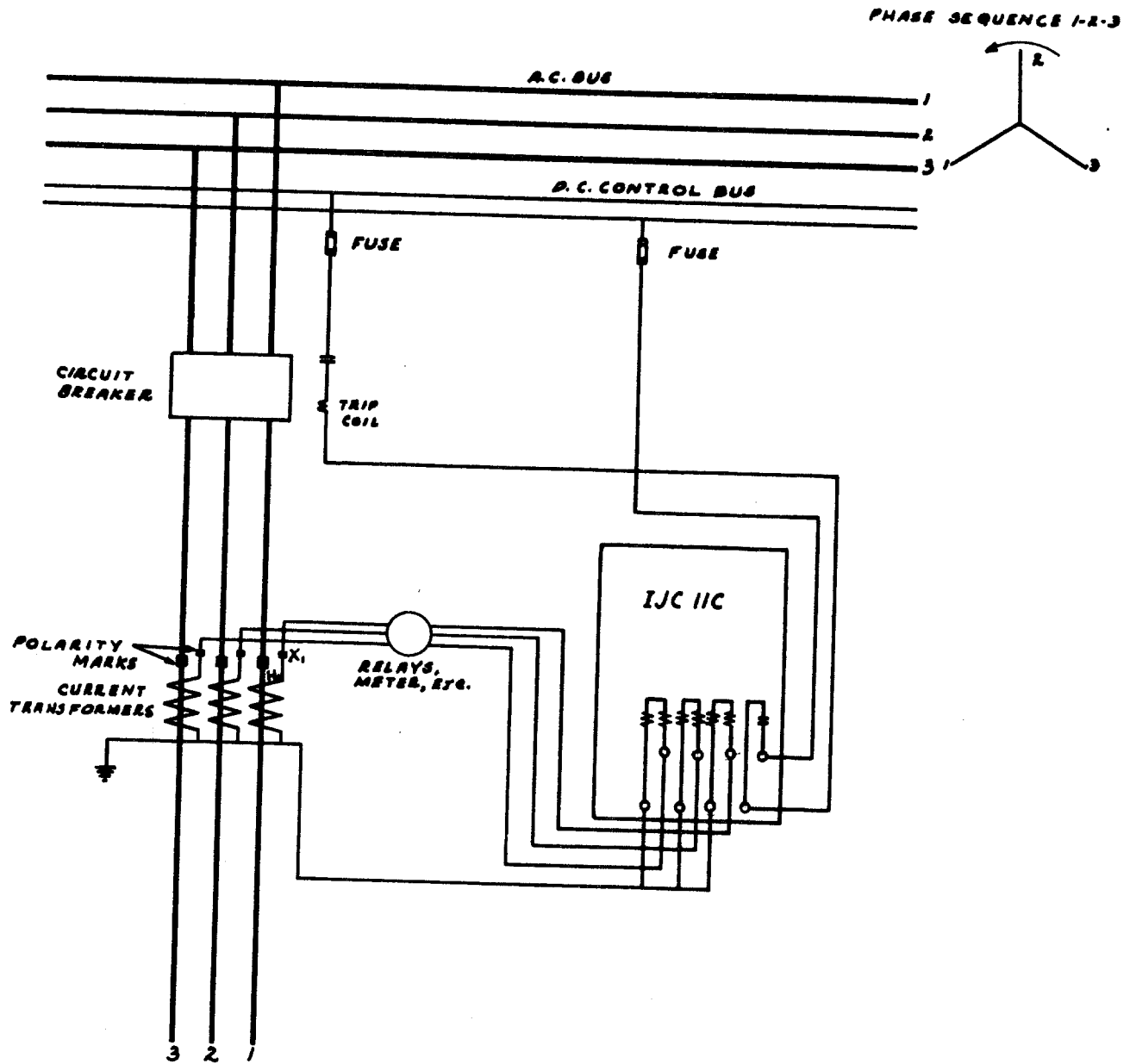


FIG. 13 FOR TYPE IJC BALANCED CURRENT RELAY FOR PROTECTION AGAINST PHASE UNBALANCE OF 3-PHASE LINE. EXTERNAL CONNECTION. DRAWOUT CASE, BACK VIEW (K-6154177)

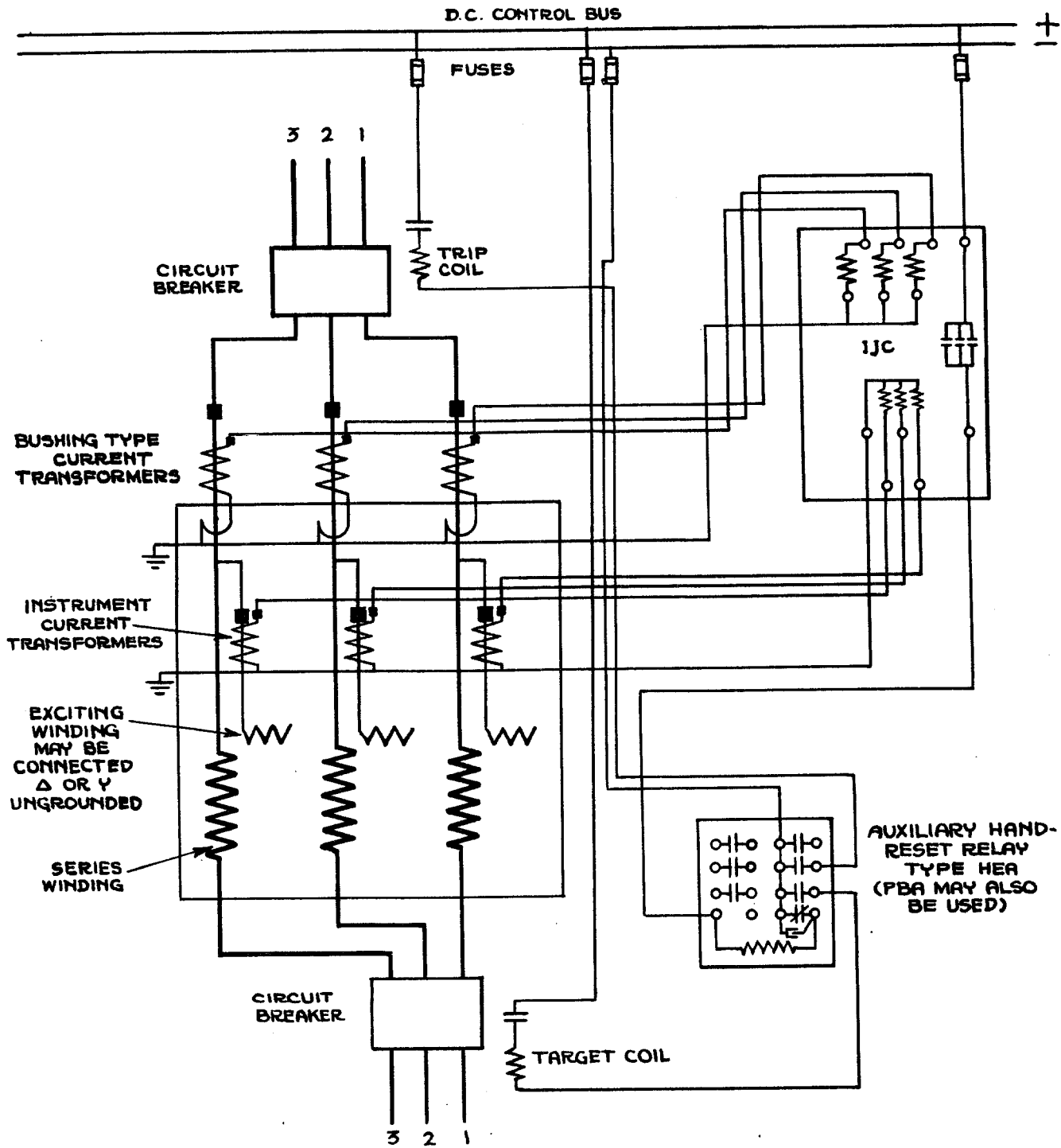


FIG. 14 TYPE IJC RELAY FOR PARTIAL PROTECTION OF A REGULATING TRANSFORMER. ADD IJD RELAY FOR COMPLETE PROTECTION. EXTERNAL CONNECTIONS. DRAWOUT CASE, BACK VIEW. (K-6154233)

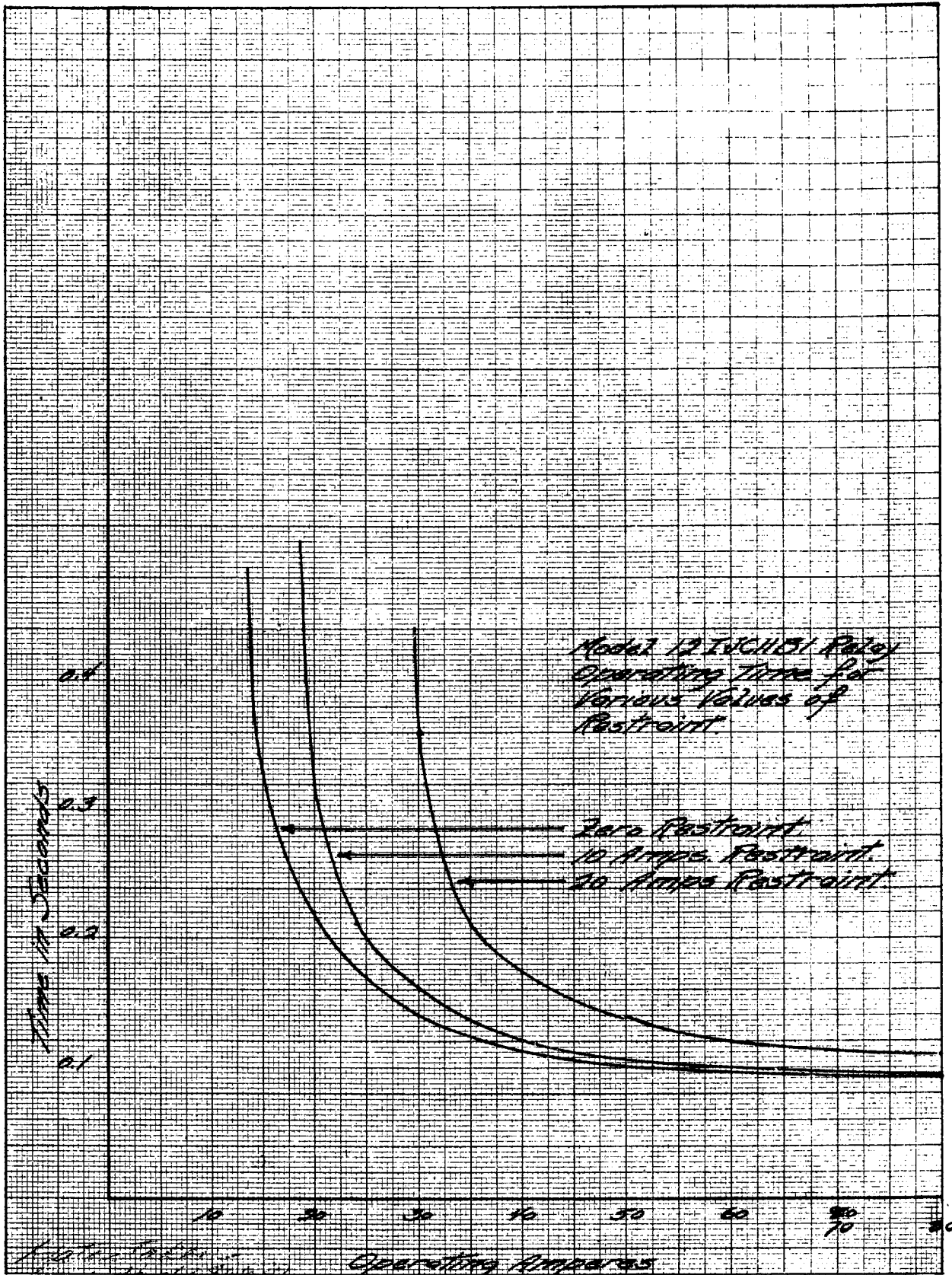


FIG. 15 (H-6087742)

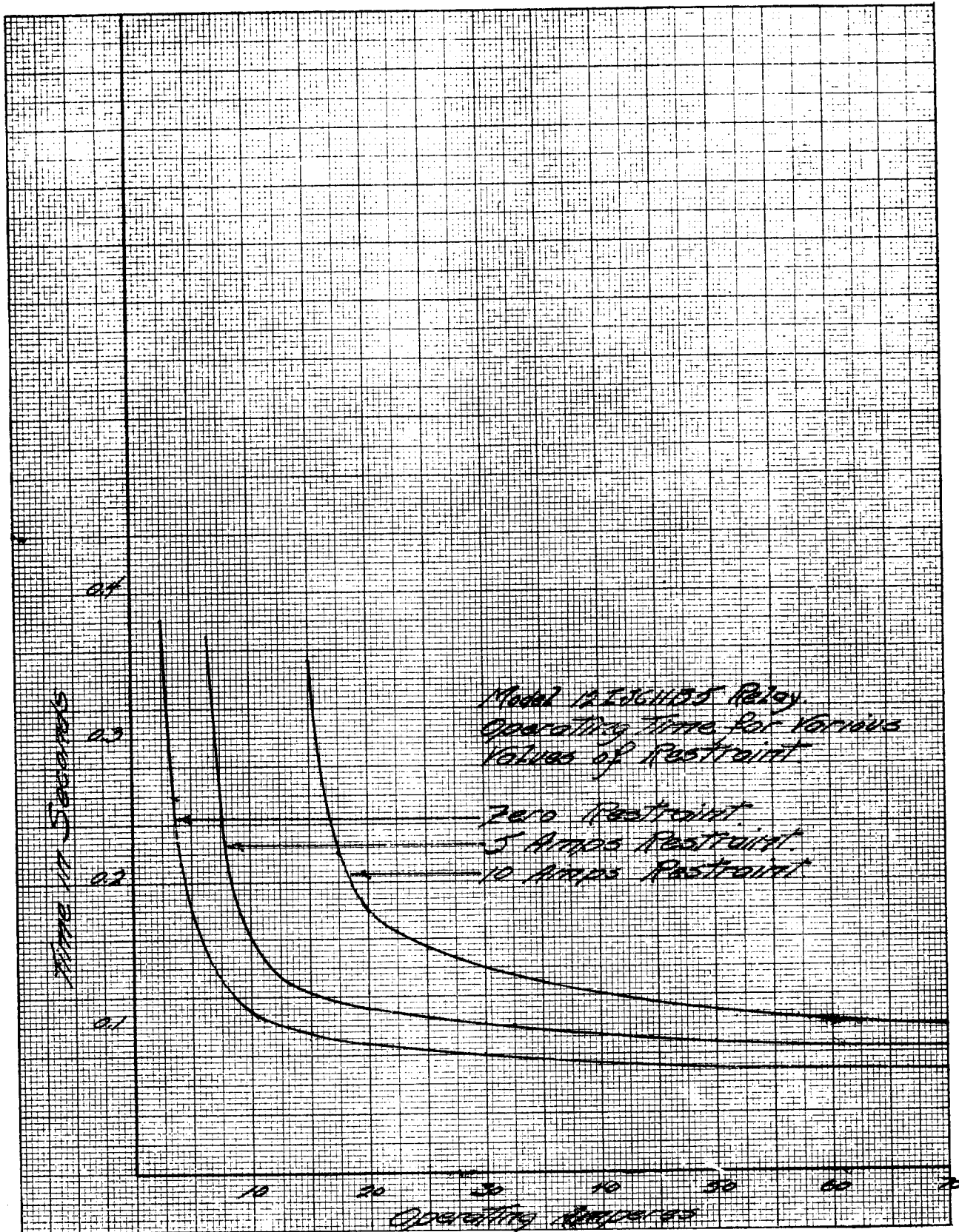


FIG. 16 (H-6087741)

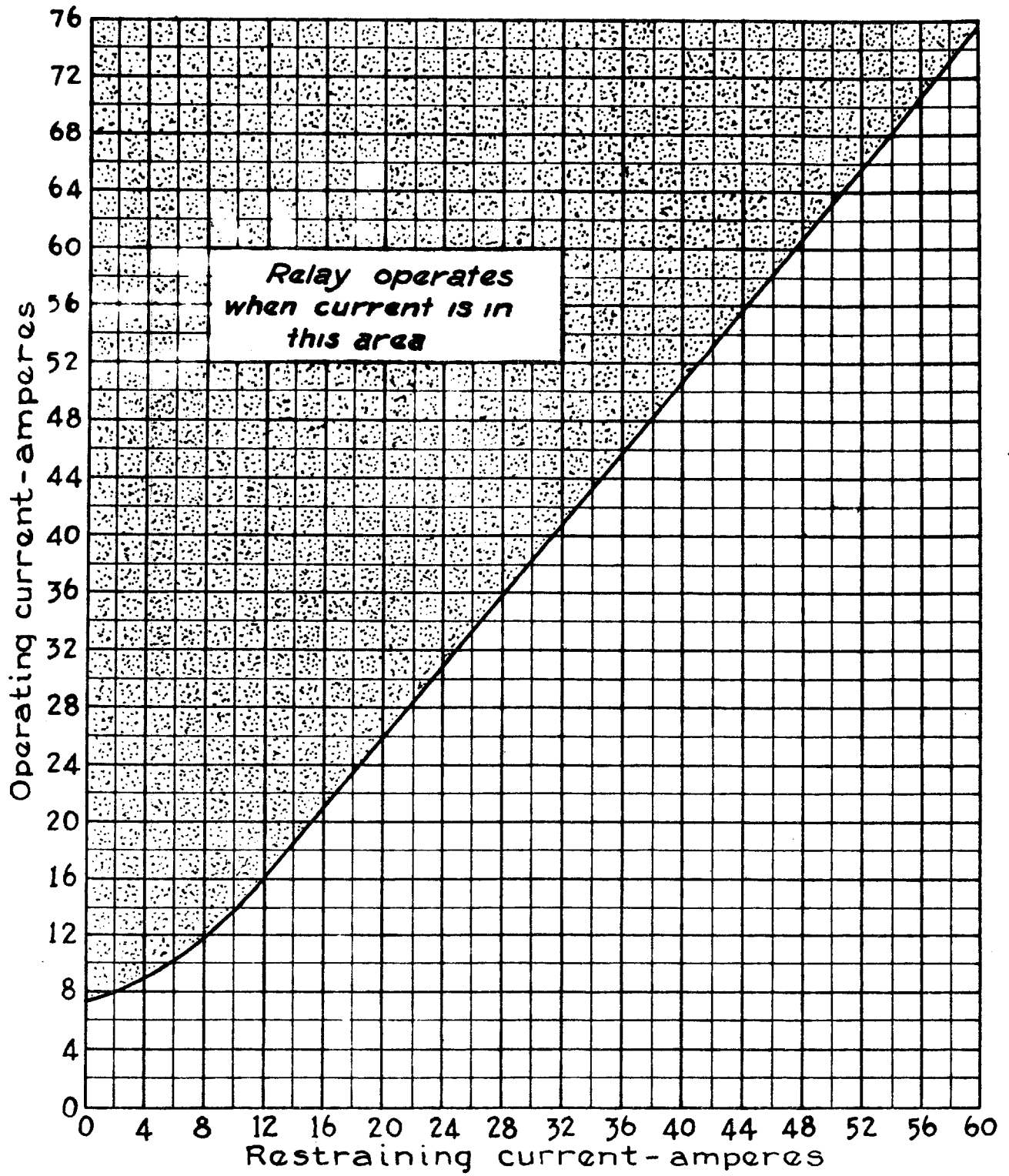


FIG. 17 OPERATING RESTRAINING AMP. CHARACTERISTIC CURVE FOR IJC11B RELAY - 5 AMP, 125% SLOPE 7 AMP. MINIMUM OPERATING CURRENT. (K-6174245)

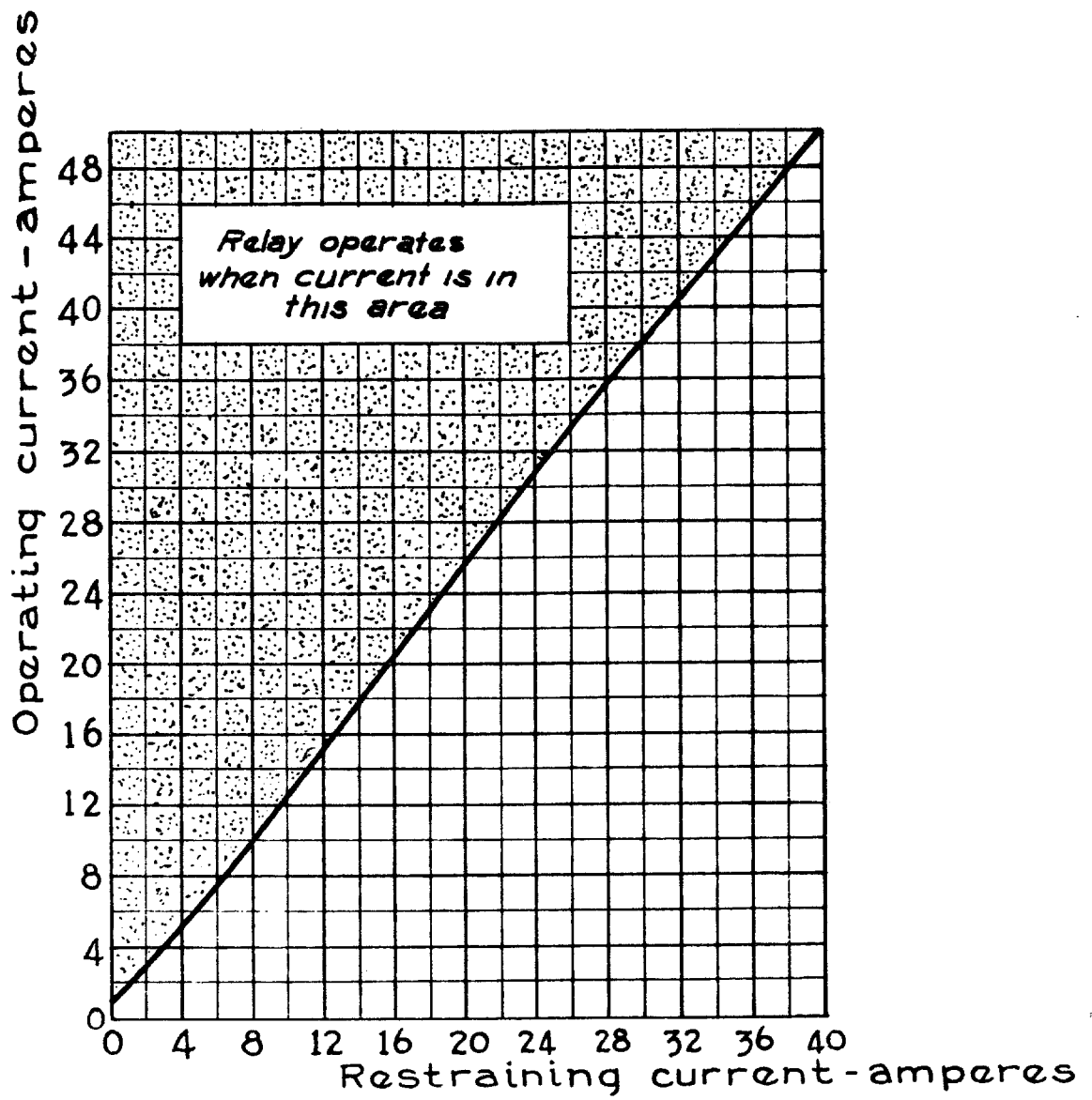


FIG. 18 OPERATING RESTRAINING AMP. CHARACTERISTIC CURVE FOR IJCLIC RELAY - 5 AMP. 125% SLOPE 1 AMP. MINIMUM OPERATING CURRENT. (K-6174244)

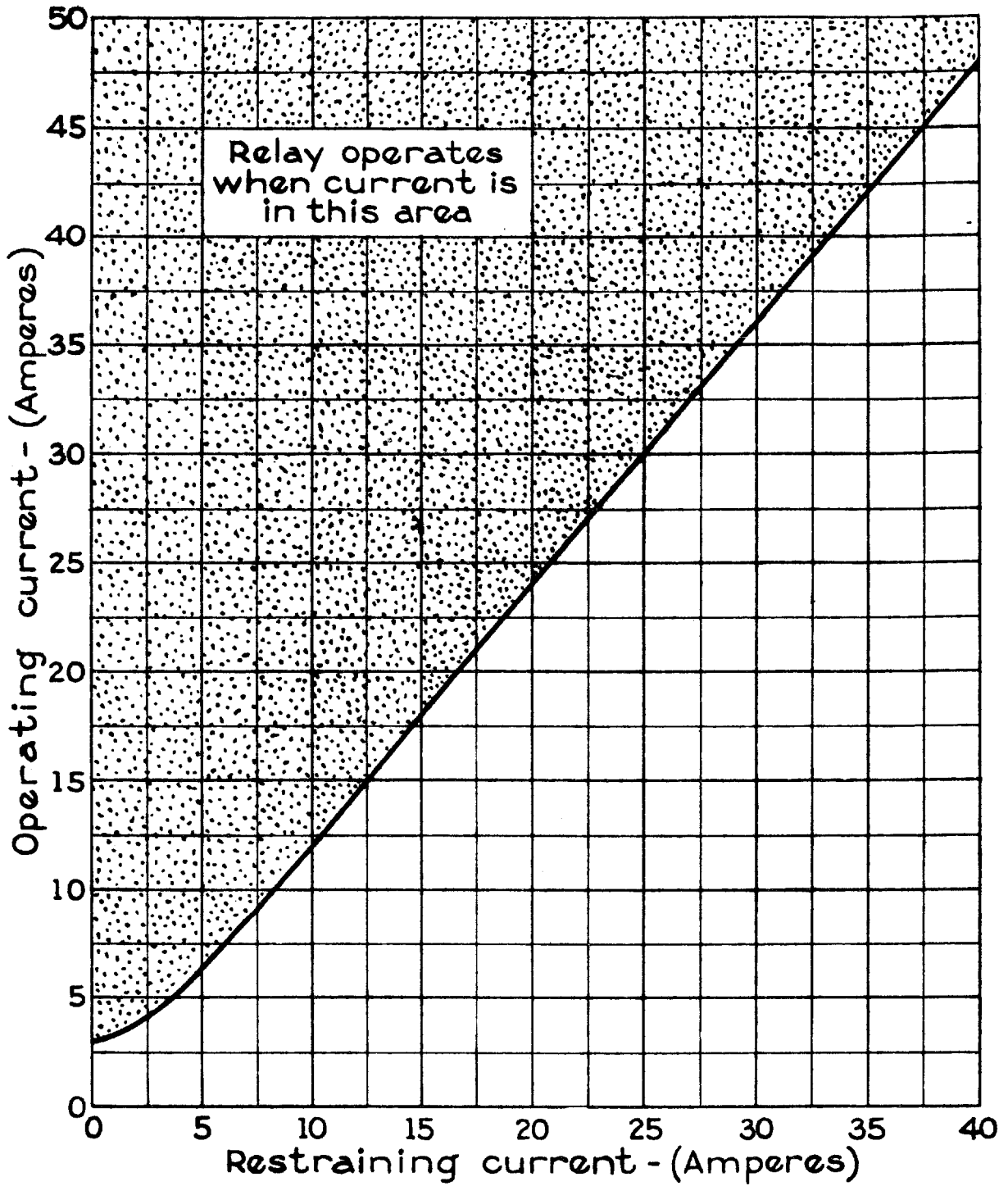


FIG. 19 RESTRAINING CURRENT AMP. CHARACTERISTIC CURVE OF IJC12A RELAYS, 5 AMP. WITH 120 PERCENT SLOPE AND 3 AMPERE MINIMUM PICK-UP. (K-6174648)