INSTRUCTIONS

GEK-49950A
Supersedes GEK-49950

TIME OVERCURRENT RELAYS

TYPES

IFC95AD AND IFC95BD

GENERAL ELECTRIC

CONTENTS

TIME OVERCURRENT RELAYS

TYPES IFC95AD AND IFC95BD

DESCRIPTION

The Type IFC95AD relay is an extended-range, single-phase, time overcurrent relay having a short inverse-time characteristic. The IFC95BD is similar except that it also includes a hinged-armature instantaneous-overcurrent unit. Both the time-overcurrent unit and the instantaneous-overcurrent unit are described in detail in the section on CONSTRUCTION. Both relays are equipped with a dual-rated target and seal-in unit.

In addition to the contacts that are normally provided for tripping, each of the relays is provided with contacts that may be used for alarm, remote indication, or other purposes deemed suitable by the user. Note that the contacts associated with the target and seal-in unit will operate only after the time-overcurrent-unit contacts close to draw trip current, and hence are not reliable for use as tripping contacts. For the exact contact arrangement used in each of the relays, see Figures 3 and 4 (internal-connections for IFC95AD and IFC95BD, respectively) and Figure 7 (typical external connections for both relays).

The relays are mounted in a size C1 drawout case of molded construction. The outline and panel drilling are shown in Figures 15 and 16.

When semiflush mounted on a suitable panel, these relays have a high seismic capability, including both the target/seal-in unit and the instantaneous overcurrent unit when it is supplied. Also, these relays are recognized under the Components Program of Underwriters Laboratories, Inc.

APPLICATION

The Type IFC95AD and IFC95BD relays are designed for application where a fast inverse-time characteristic in combination with a relatively low burden is required. A typical application is illustrated by Figure 7, where the relay is used to provide sensitive ground-fault protection for equipment "downstream" from a grounded transformer.

CONSTRUCTION

The IFC induction-disk relays consist of a molded case, cover, support structure assembly, and a connection plug to make up the electrical connection. See cover figure and Figures 1, 2 and 14. Figure 2 shows the indication unit mounted to the molded support structure. This disk is activated by a current operating coil mounted on a laminated U-magnet. The disk and shaft assembly carries a moving contact that completes the alarm or trip circuit when it touches a stationary contact. The disk assembly is restrained by a spiral spring to give the proper contact-closing current. The disk's rotation is retarded by a permanent magnet in a molded housing on the support structure.

The drawout connection/test system for the C1 case, shown in Figure 14, has provisions for 14 connection points, and a visible current transformer (CT) shorting bar located up front. As the connection plug is withdrawn, it clears the shorter contact fingers in the output contact circuits first. Thus, the trip circuit is opened before any other circuits are disconnected.

Next, current-circuit fingers on the case connection block engage the shorting bar (located at the lower front of the case) to short-circuit the external current-transformer secondary connections. The window provides visual confirmation of CT shorting. The connection plug then clears the current-circuit contact fingers on the case, and finally those on the relay support structure, to completely de-energize the drawout element.

A High-Seismic target and seal-in unit is mounted on the front, to the left of the shaft of the time overcurrent unit (see Figure 1). The seal-in unit has two electrically separate contacts, one of which is in series with its coil and in parallel with the contacts of the time-overcurrent unit such that when the induction-unit contacts close, the seal-in unit picks up and seals in. When the seal-in unit picks up, it raises a target into view that latches up and remains exposed until released by pressing a reset button located on the upper left side of the cover.

The IFC "BD" model relays contain, in addition to the above, a High-Seismic instantaneous unit (see Figure 1). The instantaneous unit is a small hinged-type unit with electrically separate contacts and is mounted on the front, to the right of the shaft of the time-overcurrent unit. One of its contacts is normally connected in parallel with the contacts of the time-overcurrent unit and its coil is connected in series with the time-overcurrent unit. When the instantaneous unit picks up it raises a target that latches up and remains exposed until it is released. The same reset button that releases the target seal-in unit also releases the target of the instantaneous unit.

A magnetic shield is mounted to the support structure of inverse and very inverse time-overcurrent IFC relays, to eliminate the proximity effect of external magnetic materials.

Both the High-Seismic target and seal-in unit and the High-Seismic instantaneous unit have the letters "Hi-G" molded into their target blocks to distinguish them as High-Seismic units. Seismic Fragility Level exceeds peak axial acceleration of 10g's (4g ZPA) when tested using a biaxial multifrequency input motion to produce a Required Response Spectrum (RRS) in accordance with the IEEE Guide for Seismic Testing of Relays, STD501-1978.

RATINGS

The relays are designed for operation in an ambient air temperature from -20°C to +55°C

TIME-OVERCURRENT UNIT

Ranges for the time-overcurrent unit are shown in Table I.

TABLE I

Relay	Frequency (Hertz)	Current Ranges (Amperes)
IFC95AD & BD	50 and 60	0.5 - 4.0 1.0 - 12.0

Available taps for the time-overcurrent unit are shown in Table II.

TABLE II

Range (Amperes)	Taps Available (Amperes)
0.5 - 4.0	0.5, 0.6, 0.7, 0.8, 1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0
1 - 12	1.0, 1.2, 1.5, 2.0, 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 10.0, 12.0

The one-second thermal ratings are listed in Table III.

TABLE III

Model	Time-Overcurrent Unit (Amperes)	One-Second Rating, Any Tap (Amperes)	K
IFC95	0.5 - 4.0	82	6724
	1.0 - 12.0	164	16896

Ratings less than one second may be calculated according to the formula $I = \sqrt{K/T}$, where T is the time in seconds that the current flows.

The continuous ratings for the time-overcurrent unit are shown in Tables IV and V.

TABLE IV

0.5 - 4.0 AMPERE RANGE RATINGS

Model	IFC95										
Tap	0.5	0.6	0.7	0.8	1.0	1.2	1.5	2.0	2.5	3.0	4.0
Continuous Current	1.2	1.4	1.5	1.6	1.9	2.1	2.4	2.9	3.3	3.7	4.5

TABLE V

1.0 - 12.0 AMPERE RANGE SETTINGS

Model	IFC95												
Tap	1.0	1.2	1.5	2.0	2.5	3.0	4.0	5.0	6.0	7.0	8.0	10.0	12.0
Continuous Current	2.0	2.3	2.7	3.3	3.9	4.5	5.5	6.6	7.5	8.4	9.3	10.9	12.5

HIGH-SEISMIC INSTANTANEOUS UNIT

The instantaneous coil is tapped for operation on either one of two ranges (H or L). Selection of the high or low range is determined by the position of the link location on the top of the support structure. See Figure 1 and Table VI.

TABLE VI

High-Seismic Instantaneous Unit (Amperes)	Link Position	Range (Amperes)†	Continuous Rating (Amperes)	One Second Rating (Amperes)††	K
2 - 50	L	2 - 10	3.7	130	16,900
	H	10 - 50	7.5		
6 - 150	L	6 - 30	10.2	260	67,600
	H	30 - 150	19.6		

†The range is approximate, which means that the 2-10, 10-50 may be 2-8, 8-50. There will always be at least one ampere overlap between the maximum L setting and the minimum H setting. Whenever possible, be sure to select the higher range, since it has the higher continuous rating.

††Higher currents may be applied for shorter lengths of time in accordance with the formula:

$$I = \sqrt{K/T}$$

Since the instantaneous unit coil is in series with the time-overcurrent unit coil, see Tables III, IV, V and VI to determine the current-limiting element for both continuous and short-time ratings.

HIGH-SEISMIC TARGET AND SEAL-IN UNIT

Ratings for the target and seal-in unit are shown in Table VII.

TABLE VII

RATINGS PARAMETER	Tap 0.2	Tap 2
DC Resistance, ohms (+10%)	8.0	0.24
Min. Operating Current, amperes (+0 -60%)	0.3	2.0
Carry Continuous Current, amperes	0.3	3
Carry 30 Amperes for (seconds)	0.3	4
Carry 10 Amperes for (seconds)	0.25	30
60 Hertz Impedance, ohms	68.6	0.73

If the tripping current exceeds 30 amperes, an auxiliary relay should be used and connections arranged such that the tripping current does not pass through the contacts or the target and seal-in coils of the protective relay.

CONTACTS

The current-closing rating of the contacts is 30 amperes for voltages not exceeding 250 volts. The current-carrying rating is limited by the rating of the seal-in unit.

BURDENS

Burdens for the time-overcurrent unit are given in Table VIII.

NOTE: The impedance values given in Table VIII are those for the minimum tap of each range; the impedance for other taps at pickup current (tap rating) varies inversely (approximately) as the square of the tap rating. For example an IFC95 60 hertz relay with 1 - 12 amp range has an impedance of 6.27 ohms on the 1.0 amp tap. The impedance of the 2.0 amp tap is $(1.0/2.0)^2 \times 6.27 = 1.57$ ohms.

TABLE VIII

Model	Hz	Range	Min. Tap Amps	Burdens at Minimum Pickup, Minimum Tap (Ohms)			Burdens in Ohms (Z) Times Pickup		
				R	J_x	Z	3	10	20
IFC95	60	0.5 - 4.0	0.5	6.30	24.20	25.00	21.30	9.96	6.13
		1.0 - 12.0	1.0	1.49	6.09	6.27	5.44	2.55	1.09
	50	0.5 - 4.0	0.5	5.25	20.17	20.83	17.75	8.30	5.11
		1.0 - 12.0	1.0	1.24	5.08	5.23	4.53	2.13	0.91

The High-Seismic instantaneous unit burdens are listed in Table IX.

TABLE IX

High-Seismic Instantaneous Unit (Amps)	Hz	Link Position	Range (Amps)	Min. Pickup (Amps)	Burdens at Minimum Pickup (Ohms)			Burdens In Ohms (Z) Times Pickup		
					R	J_X	Z	3	10	20
2 - 50	60	L	2-10	2	0.750	0.650	0.992	0.634	0.480	0.457
		H	10-50	10	0.070	0.024	0.074	0.072	0.071	0.070
6 - 150	60	L	6-30	6	0.110	0.078	0.135	0.095	0.081	0.079
		H	30-150	30	0.022	0.005	0.023	0.022	0.022	0.022
2 - 50	50	L	2-10	2	0.625	0.542	0.827	0.528	0.400	0.380
		H	10-50	10	0.058	0.020	0.062	0.060	0.059	0.058
6 - 150	50	L	6-30	6	0.092	0.065	0.112	0.079	0.068	0.066
		H	30-150	30	0.018	0.004	0.019	0.018	0.018	0.018

CHARACTERISTICS

TIME-OVERCURRENT UNIT

Pickup

Pickup in these relays is defined as the current required to close the contact from the 0.5 time-dial position. Current settings are made by means of two movable leads that connect to the tap block at the top of the support (see Figure 1). The tap block is marked A through M or A through N.

Example:

The two amp (2A) tap for a 1-to-12 IFC95 time-overcurrent relay requires one movable lead in position C and the other in position L.

Operating-Time Accuracy

The IFC relays should operate at the times shown in the published time curve within ±7% or plus or minus the time-dial setting times 0.010 second (± Setting x 0.010 sec.), whichever is greater. Figures 5 and 6 show the various time-current characteristics for the IFC relays. The setting of the time dial determines the length of the time required to close the contacts for a given current. The higher the time-dial setting the longer the operating time.

The contacts are just closed when the time dial is set to zero (0). The maximum time setting occurs when the time-dial is set to 10 and the disk has to travel its maximum distance to close the contacts.

Reset

The unit resets at 90% of the minimum closing current. Reset times are proportionate to the time-dial settings. The time required to reset to the number 10 time-dial position when the current is reduced to zero (0) is approximately four seconds (4 sec.) for the IFC95 relays.

HIGH-SEISMIC INSTANTANEOUS UNIT

The instantaneous unit has a 25-to-1 range with a tapped coil. There are high and low ranges, selected by means of a link located on the top of the support structure (see Figure 1). The time-current curve for the instantaneous unit is shown in Figure 9.

HIGH-SEISMIC TARGET AND SEAL-IN UNIT

The target and seal-in unit has two tap selections, located on the front of the unit (see Figure 1).

RECEIVING, HANDLING, AND STORAGE

These relays, when not included as a part of a control panel, will be shipped in cartons designed to protect them against damage. Immediately upon receipt of a relay, examine it for any damage sustained in transit. If damage resulting from rough handling is evident, file a damage claim at once with the transportation company and promptly notify the nearest General Electric Sales Office.

Reasonable care should be exercised in unpacking the relay to prevent damage to its parts or disturbing of the adjustments.

If the relays are not to be installed immediately, they should be stored in their original cartons in a place that is free from moisture, dust and metallic chips. Foreign matter collected on the outside may find its way inside when the cover is removed and cause trouble in the operation of the relay.

ACCEPTANCE TESTS

Immediately upon receipt of the relay an INSPECTION AND ACCEPTANCE TEST should be made to make sure that no damage has been sustained in shipment and that the relay calibrations have not been disturbed. If the examination or test indicates that readjustment is necessary, refer to the section on SERVICING.

These tests may be performed as acceptance tests or as part of the installation tests, at the discretion of the user. Since most operating companies use different procedures for acceptance and for installation tests, the following section includes all applicable tests that may be performed on these relays.

VISUAL INSPECTION

Check the nameplate to make sure that the model number and rating of the relay agree with the requisition.

Remove the relay from its case and check that there are no broken or cracked parts or any other signs of physical damage.

MECHANICAL INSPECTION

1. There should be no noticeable friction when the disk is rotated slowly clockwise. The disk should return by itself to its rest position.
2. Make sure the control spring is not deformed, nor its convolutions tangled or touching each other.
3. The armature and contacts of the seal-in unit, as well as the armature and contacts of the instantaneous unit, should move freely when operated by hand; there should be at least 1/64-inch wipe on the seal-in and the instantaneous contacts.
4. The targets in the seal-in unit and in the instantaneous unit must come into view and latch when the armatures are operated by hand, and should unlatch when the target release button is operated.
5. Make sure that the brushes and shorting bars agree with the internal-connections diagram.

CAUTION:	Should there be a need to tighten any screws,to prevent stripping, DO NOT OVER TIGHTEN .

DRAWOUT RELAY TESTING

IFC relays may be tested without removing them from the panel by using either the 12XCA28A1 or 12XCA11A1 test probes. The test probes make connections to both the relay and the external circuitry, which provides maximum flexibility but requires reasonable care since a CT shorting jumper is necessary when testing the relay. The test probes are different in the number of connections that can be made. The 12XCA28A1 has a full complement of 28 connections and the 12XCA11A1 has four. Refer to instruction book GEK-49803 for additional information.

POWER REQUIREMENTS, GENERAL

All devices operated on alternating current (AC) are affected by frequency. A non-sinusoidal waveform can be analyzed as a fundamental frequency plus harmonics of that fundamental frequency. AC relays (and AC devices in general) are significantly affected by the application of non-sinusoidal waveforms. Therefore, in order to test AC relays properly it is essential to use a test voltage and/or current waveform that is sinusoidal. The purity of the sine wave (i.e., its freedom from harmonics) cannot be expressed as a finite number for any particular relay; however, any relay using tuned circuits, RL or RC networks, or saturating electromagnets (such as time-overcurrent relays) would be essentially affected by non-sinusoidal waveforms. Hence a resistance-limited circuit, as shown in Figures 11-13, is recommended.

TIME-OVERCURRENT UNIT

Rotate the time dial slowly and check, by means of a lamp, that the contacts just close at the zero (0) time-dial setting.

The point at which the contacts just close can be adjusted by running the stationary-contact brush in or out by means of its adjusting screw.

With the contacts just closing at the zero (0) time setting, there should be sufficient gap between the stationary-contact brush and its metal backing strip to ensure approximately 1/32-inch wipe.

The minimum current at which the contacts will just close is determined by the tap setting in the tap block at the top of the support structure. See **CHARACTERISTICS** section.

The pickup of the time-overcurrent unit for any current-tap setting is adjusted by means of a spring-adjusting ring (see Figure 1). The spring-adjusting ring either winds or unwinds the spiral control spring. By turning the ring, the operating current of the unit may be brought into agreement with the tap setting employed, if this adjustment has been disturbed. This adjustment also permits any desired setting intermediate between the various tap settings to be obtained. If such adjustment is required, it is recommended that the higher tap be used. It should be noted that the relay will not necessarily agree with the time-current characteristics of Figures 5 and 6 if the relay has been adjusted to pick up at a value other than tap value, because the torque level of the relay will have changed.

Time Setting

The setting of the time dial determines the length of time that the unit requires to close the contacts when the current reaches a predetermined value. The contacts are just closed when the time dial is set on zero (0). When the time dial is set on 10, the disk must travel the maximum amount to close the contacts and therefore this setting gives the maximum time setting.

The primary adjustment for the time of operation of the unit is made by means of the time dial. However, further adjustment is obtained by moving the permanent magnet along its supporting shelf; moving the magnet toward the disk and shaft decreases the time, while moving it away increases the time.

Pickup Test

Set the relay at the 0.5 time-dial position and the lowest tap. With the test connections as in Figure 11, the main unit should close the contacts within ±3% of tap-value current.

Time Test

*Set the relay at the number 10 time-dial setting and the lowest tap. Using the test connection in Figure 11 apply ten (10) times tap current to the relay. The relay operating time to close its contact is listed in Table X.

TABLE X

Relay	Hz	Time (seconds)	
		Minimum	Maximum
* IFCG5	60	0.510	0.540
IFC95	50	0.565	0.640

HIGH-SEISMIC INSTANTANEOUS UNIT

Make sure that the instantaneous-unit link is in the correct position for the range in which it is to operate. See the internal connections diagram (Figure 4) and connect as indicated in the test circuit of Figure 12. Whenever possible use the higher range, since the higher range has a higher continuous rating.

Setting the High-Seismic Instantaneous Unit

The instantaneous unit has an adjustable core located at the top of the unit as shown in Figure 1. To set the instantaneous unit to a desired pickup, loosen the locknut and adjust the core. Turning the core clockwise decreases the pickup; turning the core counterclockwise increases the pickup. Bring up the current slowly until the unit picks up. It may be necessary to repeat this operation until the desired pickup value is obtained. Once the desired pickup value is reached, tighten the locknut.

CAUTION: **Refer to Table VI for the continuous and one-second ratings of the instantaneous unit. Do not exceed these ratings when applying current to the instantaneous unit.**

The range of the instantaneous unit (see Table VI) must be obtained between a core position of 1/8 of a turn of full clockwise and 20 turns counterclockwise from the full clockwise position. Do **not** leave the core in the **full** clockwise position.

HIGH-SEISMIC TARGET AND SEAL-IN

The target and seal-in unit has an operating coil tapped at 0.2 and 2.0 amperes. The relay is shipped from the factory with the tap screw in the higher ampere position (see Figure 1). The tap screw is the screw holding the right-hand stationary contact. To change the tap setting, first remove one screw from the left-hand stationary contact and place it in the desired tap. Next, remove the screw from the undesired tap and place it on the left-hand stationary contact where the first screw was removed. This procedure is necessary to prevent the right-hand stationary contact from getting out of adjustment. Screws should **never** be left in **both** taps at the same time.

*Revised since last issue

Pickup and Dropout Test

1. Connect relay studs 1 and 2 (see the test circuit of Figure 13) to a DC source, ammeter, and load box so that the current can be controlled over a range of 0.1 to 2.0 amperes.

2. Turn the time dial to the zero (0) time-dial position.

3. Increase the current slowly until the seal-in unit picks up. See Table XI for pickup current range.

4. Move the time dial away from the zero (0) position; the seal-in unit should remain in the picked-up position.

5. Decrease the current slowly until the seal-in unit drops out. See Table XI for dropout current.

TABLE XI

Tap	Pickup Current	Dropout Current
0.2	0.12 - 0.20	0.05 or more
2.0	1.2 - 2.0	0.50 or more

INSTALLATION

The relay should be installed in a clean, dry location that is free from dust and well lighted to facilitate inspection and testing.

The relay should be mounted on a vertical surface. The outline and panel drillings are shown in Figures 15 and 16. Figure 15 shows the semi-flush mounting and Figure 16 shows various methods of surface mounting.

The internal-connections diagrams for the relays are shown in Figures 3 and 4. Typical external connections are shown in Figure 7.

INSTALLATION TESTS

The following tests are to be performed at the time of installation:

Time-Overcurrent Unit

Set the tap block to the desired tap setting and the time dial to the 0.5 position. Using the test circuit in Figure 11, gradually apply current until the contacts just close. This value of current is defined as pickup and should be within 3% of tap value.

Check the operating time at some multiple of tap value and the desired time-dial setting. This multiple of tap value may be ten (10) times tap rating or the maximum fault current for which the relay must coordinate. The choice of the particular value is left to the discretion of the user.

High-Seismic Target and Seal-In Unit

1. Make sure that the tap screw is in the desired tap.

2. Perform pickup and drop-out tests as outlined in the **ACCEPTANCE TESTS** section.

High-Seismic Instantaneous Unit

1. Select the desired range by setting the link in the proper position. (See Figure 1 and the internal-connections diagram.) Whenever possible, select the higher range since it has a higher continuous rating.

2. Set the instantaneous unit to pick up at the desired current level. See Setting The High-Seismic Instantaneous Unit in the **ACCEPTANCE TESTS** section.

All tests described above under INSTALLATION TESTS must be performed at the time of installation. In addition, if the tests described under the **ACCEPTANCE TESTS** section were not performed prior to installation, it is recommended they be performed at this time.

PERIODIC CHECKS AND ROUTINE MAINTENANCE

In view of the vital role of protective relays in the operation of a power system, it is important that a periodic test program be followed. It is recognized that the interval between periodic checks will vary depending upon environment, type of relay, and the user's experience with testing. Until the user has accumulated enough experience to select the test interval best suited to his individual requirements, it is suggested that the points listed below be checked at an interval of from one to two years.

These tests are intended to ensure that the relays have not deviated from their original settings. If deviations are encountered, the relay must be retested and serviced as described in this manual.

TIME-OVERCURRENT UNIT

1. Perform the pickup test as described in the **INSTALLATION** section for the tap setting in service.

2. Perform the time test as described in the **INSTALLATION** section.

HIGH-SEISMIC INSTANTANEOUS UNIT

1. Check that the instantaneous unit picks up at the desired current level, as outlined in the **ACCEPTANCE TESTS** section.

HIGH-SEISMIC TARGET AND SEAL-IN UNIT

1. Check that the unit picks up at the values shown in Table XI.

2. Check that the unit drops out at 25% or more of tap value.

CONTACT CLEANING

For cleaning relay contacts, a flexible burnishing tool should be used. This consists of a flexible strip of metal with an etch-roughened surface resembling in effect a superfine file. The polishing action is so delicate that no scratches are left, yet it will clean off any corrosion thoroughly and rapidly. Its flexibility ensures the cleaning of the actual points of contact. Do not use knives, files, abrasive paper, or cloth of any kind to clean relay contacts.

*COVER CLEANING

The Clear Lexan® cover should be cleaned with a soft cloth and water only. No cleaning solutions should be used. Use of cleaning solutions may damage the clear cover.

SYSTEM TEST

Although this instruction book is primarily written to check and set the IFC relay, overall functional tests to check the system operation are recommended at intervals based on the customer's experience.

SERVICING

TIME-OVERCURRENT UNIT

If it is found during installation or periodic testing that the time-overcurrent unit is out of limits, the unit may be recalibrated as follows:

Pickup Tests

Rotate the time dial to the zero (0) position and check, by means of a lamp, that the contacts just close.

The point at which the contacts just close can be adjusted by running the stationary contact brush in or out by means of its adjusting screw.

With the contacts just closing at the zero (0) time-dial setting, there should be sufficient gap between the stationary contact brush and its metal backing strip to ensure approximately 1/32-inch wipe.

The pickup of the unit for any current-tap setting is adjusted by means of a spring-adjusting ring. By turning the ring the operating current of the unit may be brought into agreement with the tap setting employed if, for some reason, this adjustment has been disturbed. This adjustment also permits any desired setting intermediate between the various tap settings to be obtained. If such adjustment is required, it is recommended that the higher tap setting be used. It should be noted that the relay will not necessarily agree with the time current characteristics of Figures 5 and 6 if the relay has been adjusted to pick up at a value other than tap value, because the torque level of the relay has been changed.

Connect the operating-coil terminals to a source of the proper frequency, good waveform, and an amplitude of 110 volts or higher, using resistance load boxes for the setting current (see the test circuit in Figure 11).

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With the tap block set for the lowest tap and the time dial set where contacts are just open, adjust the control spring to just close the contacts within the limits given below. These limits are ± 1% of the tap amps. See Table XII.

TABLE XII

Tap Range	Tap	Minimum Amps	Maximum Amps
0.5-4	0.5	0.495	0.505
1.0-12.0	1.0	0.99	1.01

It should never be necessary to wind up the control spring adjuster more than 30° (one notch) or unwind it more than 120° (three notches) from the factory setting to obtain the above pickup setting.

Time Tests

*With the tap block set for the lowest tap and time dial at the number 10 setting, apply 10 times tap current to the relay.

Adjust the position of the drag magnet assembly to obtain an operating time as listed in Table XIII.

TABLE XIII

Relay	Hz	Time (Seconds)	
		Minimum	Maximum
IFC95	50	0.578	0.612
	60	0.510	0.540

Although a time between the listed Minimum and Maximum will be acceptable, it would be preferable to adjust the operating time as near as possible to 0.525 seconds for 60-hertz relays and 0.595 seconds for 50-hertz relays. The drag magnet assembly should be approximately in the middle of its travel. The drag magnet assembly is adjusted by loosening the two screws securing it to the support structure. See Figure 1. Moving the drag magnet towards the disk and shaft decreases the operating time, and moving the drag magnet away from the disk and shaft increases the operating time. The screws securing the drag magnet assembly to the support structure must be tight before proceeding with other time checks.

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Mechanical Adjustments

The disk does not have to be in the exact center of either air gap for the relay to perform correctly. Should the disk not clear all gaps, the following adjustment can be made.

1. Determine which way the disk must be aligned to clear all surfaces by 0.010 inch.
2. Remove the drag magnet assembly by **loosening** the two screws securing it to the support structure. The screws need not be removed.
3. **Loosen** the upper pivot bearing set screw (1/16-inch hex wrench) slightly, so the upper pivot can move freely. Do not remove the set screw from the support structure.
4. **Loosen** the jewel bearing set screw as in step 3 above.
5. Apply a slight downward finger pressure on the upper pivot and turn the jewel bearing screw, from the underside of the support structure, to position the disk as determined in step 1 above.
6. Turn the jewel bearing screw 1/8 turn clockwise and tighten the upper pivot set screw to 2.5-3.5 inch-pounds of torque.
7. Turn the jewel bearing screw 1/8 turn counterclockwise. This will lower the disk and shaft assembly approximately 0.005 inch and permit proper end play. The shaft must have 0.005 to 0.010 inch of end play.
8. Tighten the jewel bearing set screw to 2.5-3.5 inch-pounds of torque.
9. Rotate the disk through the electromagnet gap. The disk should clear the gap surfaces by 0.010 inch and be within 0.005 inch flatness. If the disk is not within 0.005-inch flatness the disk should be replaced.
10. Reinstall the drag assembly and check that the disk has at least 0.010-inch clearance from the drag magnet assembly surfaces.
11. Tighten the drag magnet assembly mounting screws with 7-10 inch-pounds of torque, after securely seating the assembly and positioning it according to the time test above.

HIGH-SEISMIC INSTANTANEOUS UNIT

1. Both contacts should close at the same time.
2. The backing strip should be so formed that the forked end (front) bears against the molded strip under the armature.
3. With the armature against the pole piece, the cross member of the "T" spring should be in a horizontal plane and there should be at least 1/64-inch wipe on the contacts. Check this by inserting a 0.010-inch feeler gage between the front half of the shaded pole with the armature held closed. Contacts should close with the feeler gage in place.
4. Since mechanical adjustments may affect the Seismic Fragility Level, it is advised that **no mechanical adjustments** be made if seismic capability is of concern.

HIGH-SEISMIC TARGET AND SEAL-IN UNIT

The left contact must make before the right contact does.

To check the wipe of the seal-in unit, insert a feeler gage between the residual button of the armature and the front end of the pole piece. The left contact should close with a 0.015 ±0.002 feeler gage and the right contact with a 0.010 ± 0.002 feeler gage.

Since mechanical adjustments may affect the Seismic Fragility Level, it is advised that no **mechanical adjustments** be made if seismic capability is of concern.

RENEWAL PARTS

It is recommended that sufficient quantities of renewal parts be carried in stock to enable the prompt replacement of any that are worn, broken or damaged.

When ordering renewal parts, address the nearest Sales Office of the General Electric Company and specify quantity required, name of the part wanted, and the complete model number of the relay for which the part is required.

LIST OF FIGURES

Revised since last issue

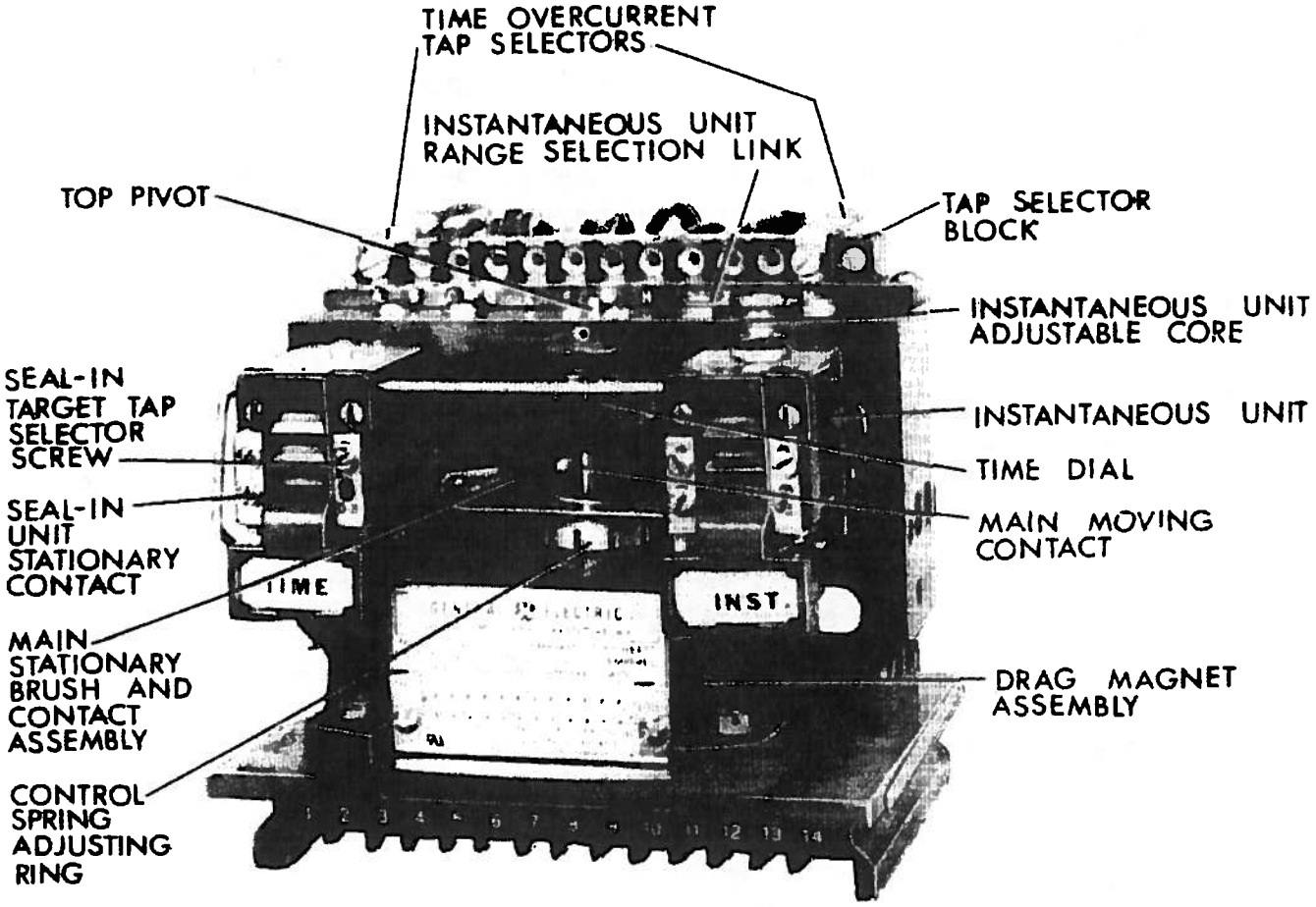


Figure 1 (8043006)Type IFC95BD Relay, Removed From Case, Front View

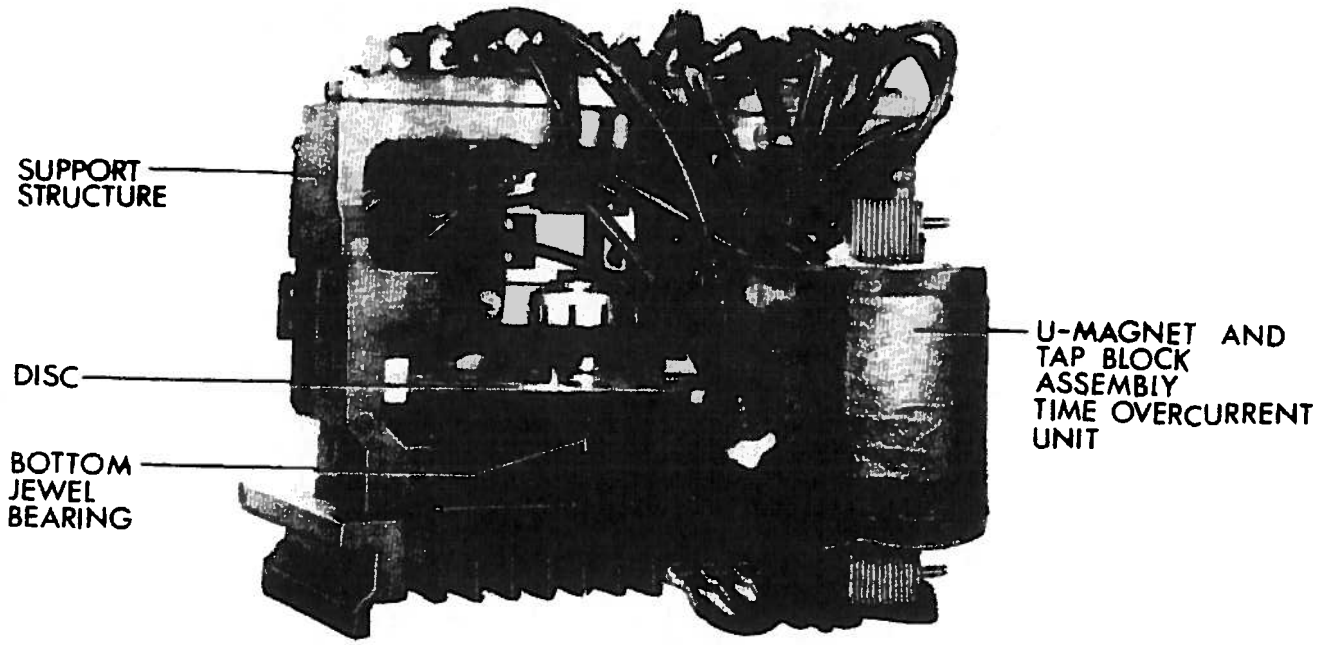


Figure 2 (8043010) Type IFC95BD Relay Removed From Case, Rear View

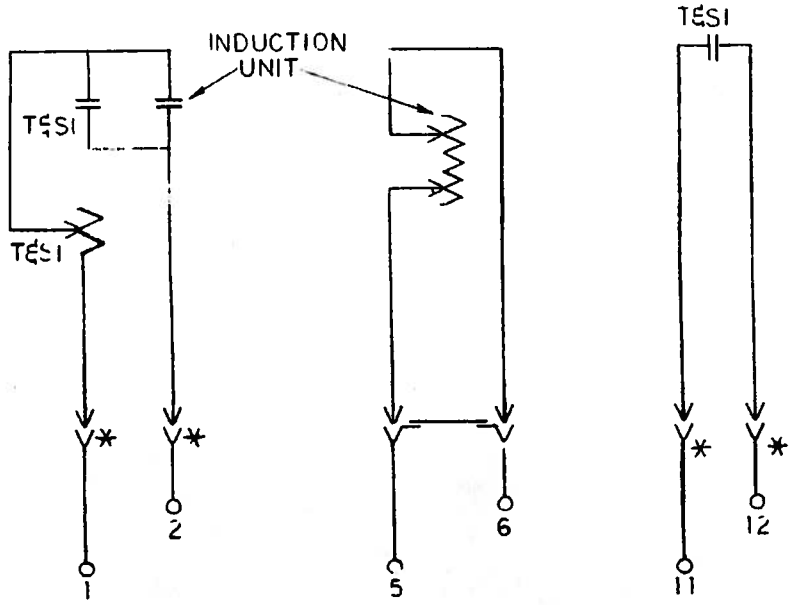


*Figure 3 (0208A8514-1) Internal Connections for Relay Type IFC95AD, Front View

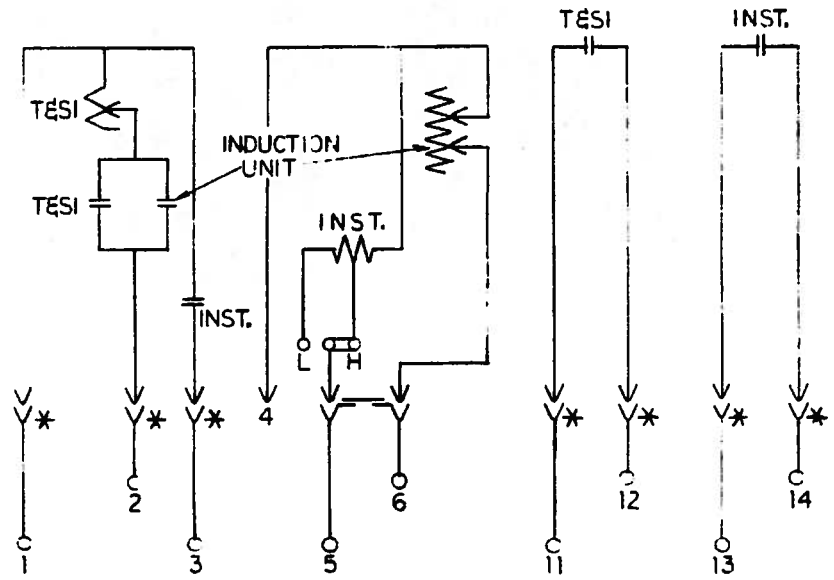


Figure 4 (0208A8515-1) Internal Connections for Relay Type IFC95BD, Front View

*Revised since last issue

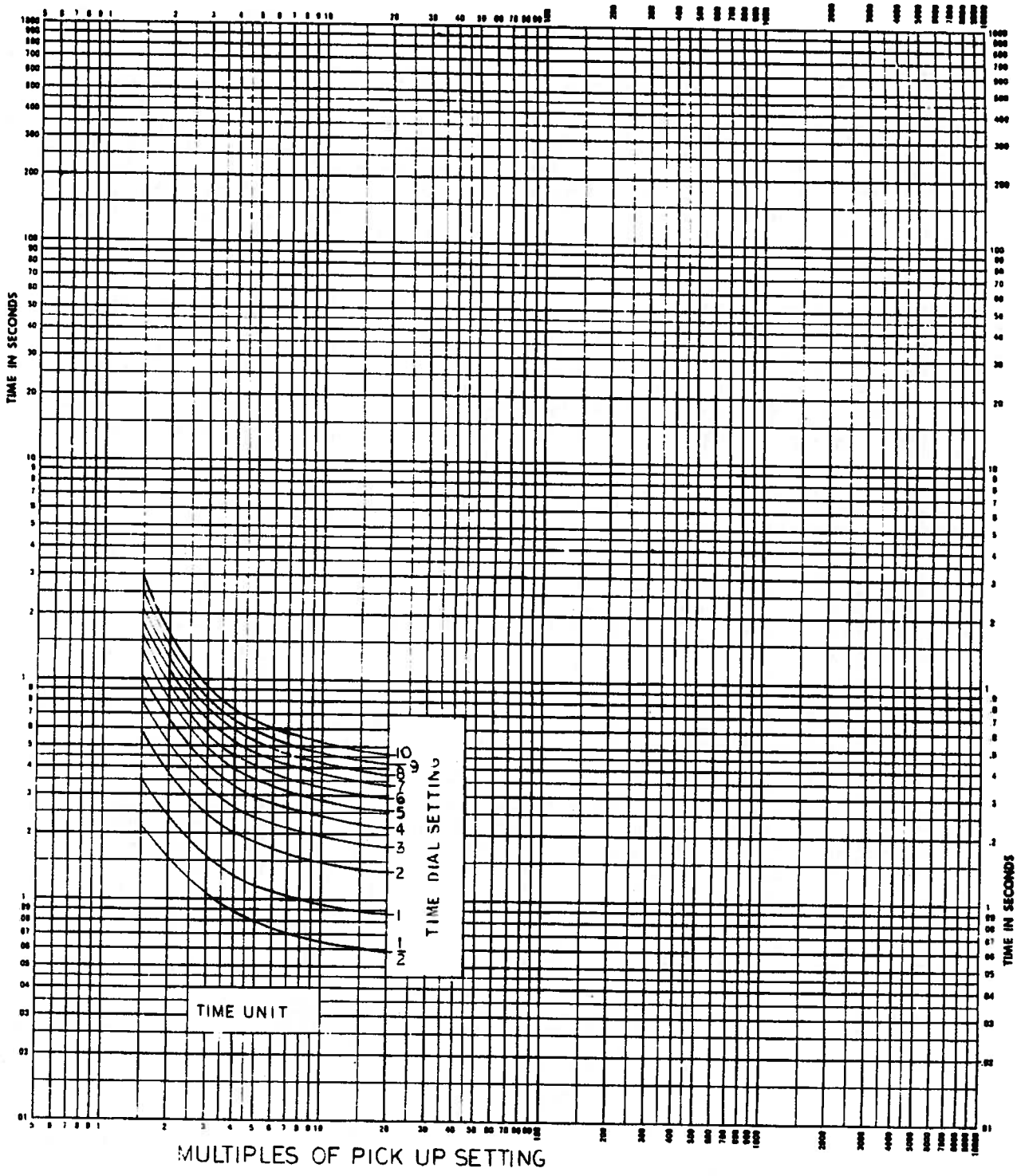


Figure 5 (0108B8966-1) 60-Hertz Time-Current Characteristics for Relay Types IFC95AD and IFC95BD

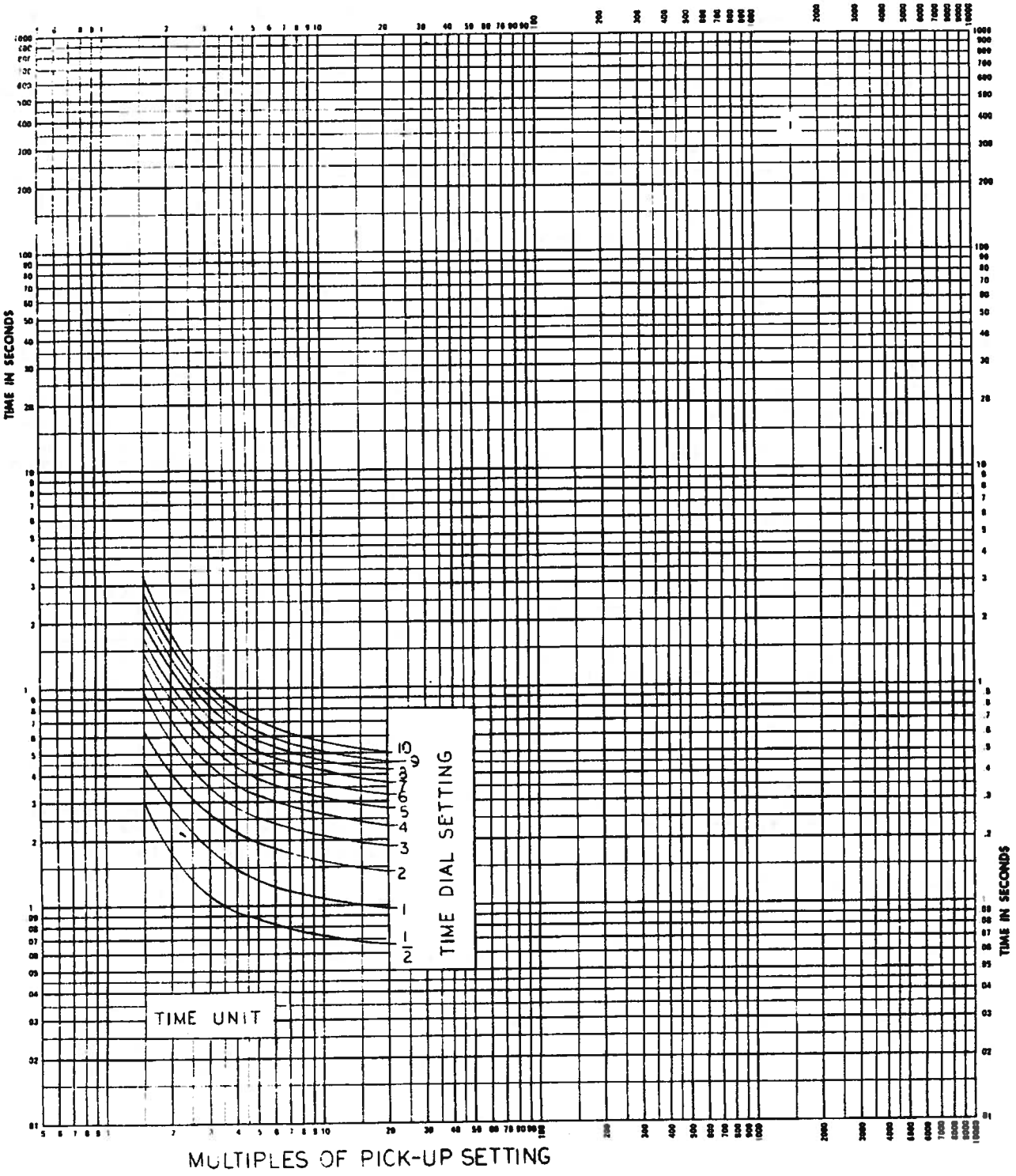


Figure 6 (0108B8965-1) 50-Hertz Time-Current Characteristics for Relay Types IFC95AD and IFC95BD

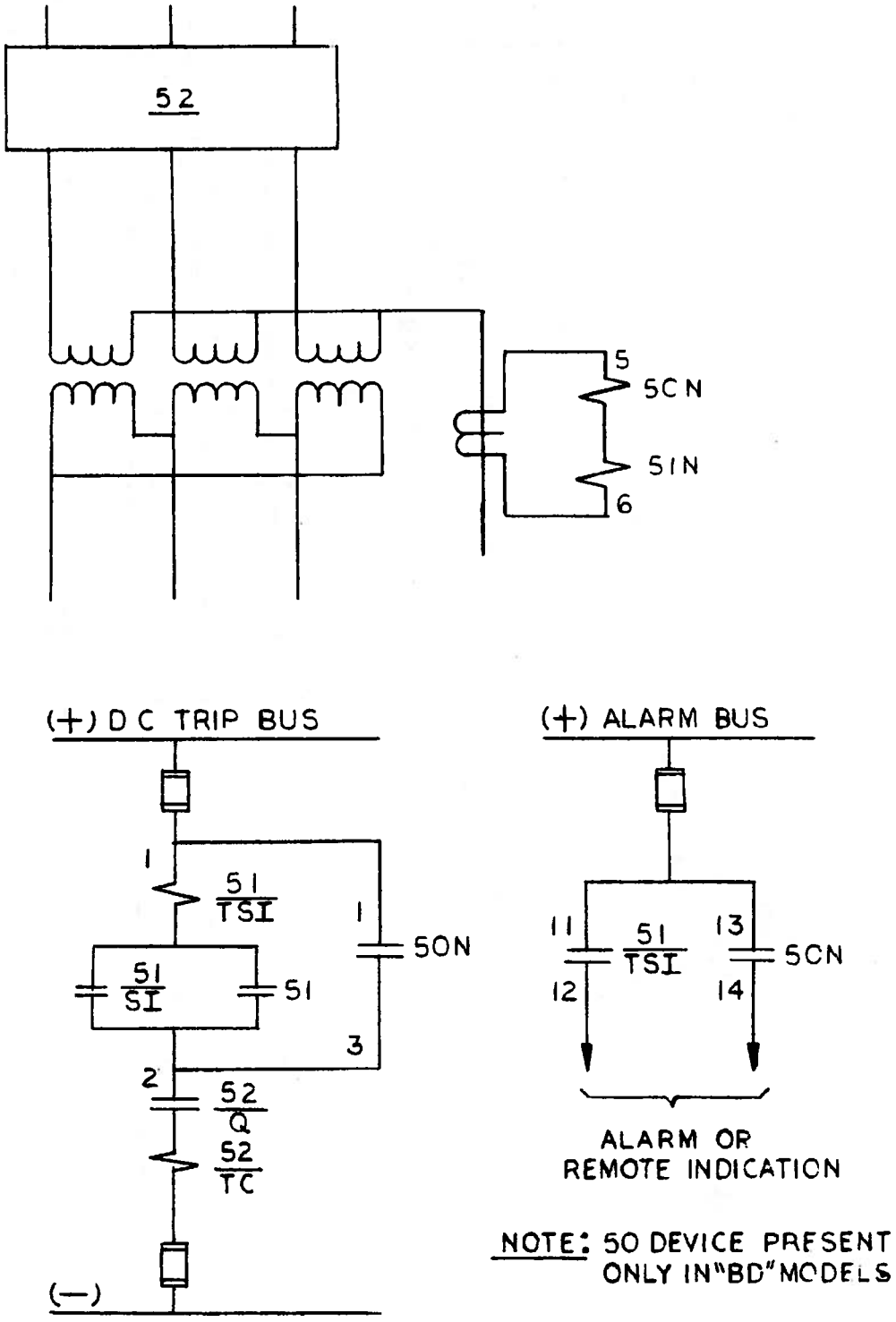


Figure 7 (0275A3836) Typical External Connections for Relay Types IFC95AD and IFC95BD

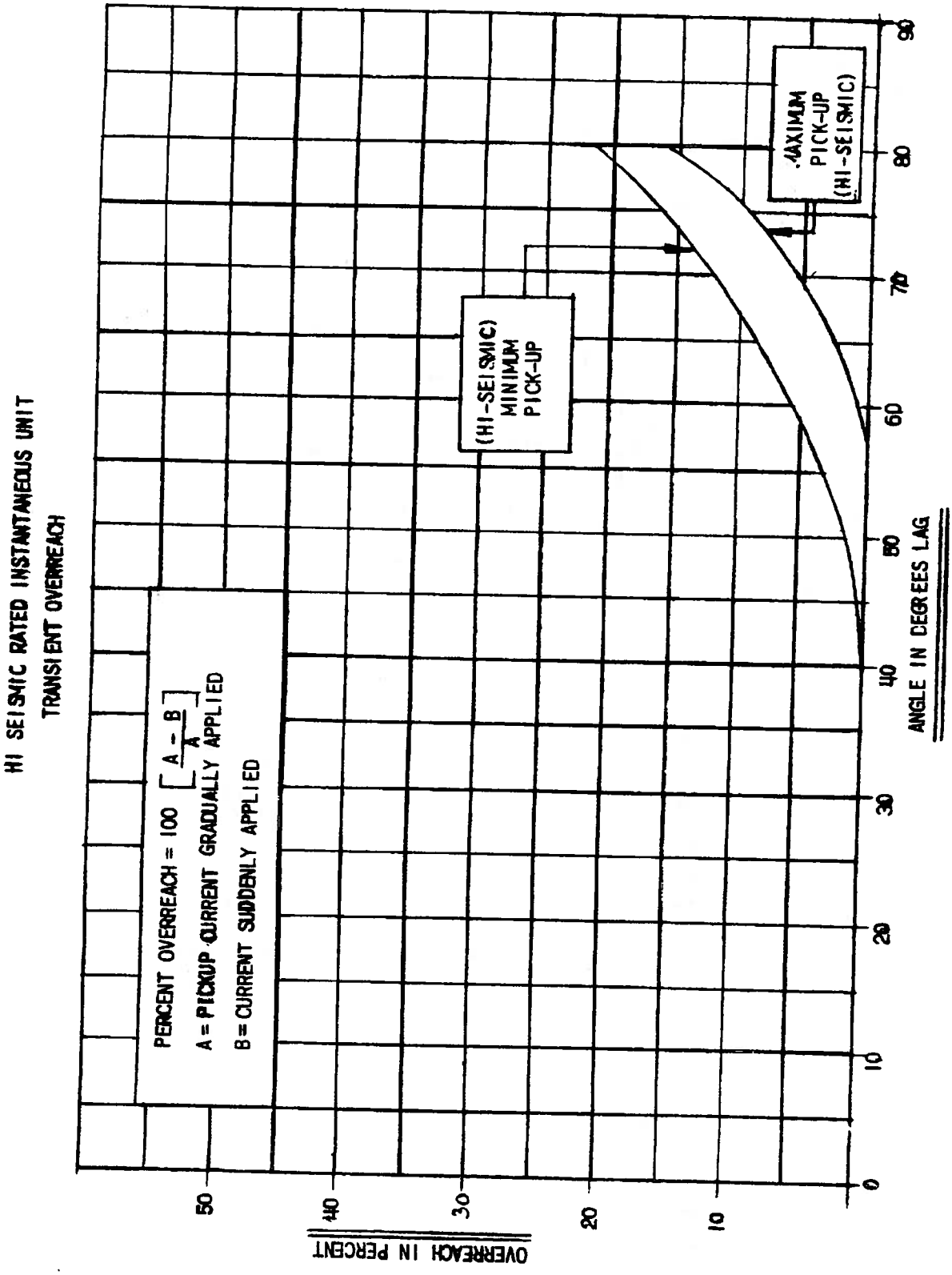


Figure 8 (0208A8694-2) Transient Overreach Characteristics of the High-Seismic Instantaneous Unit

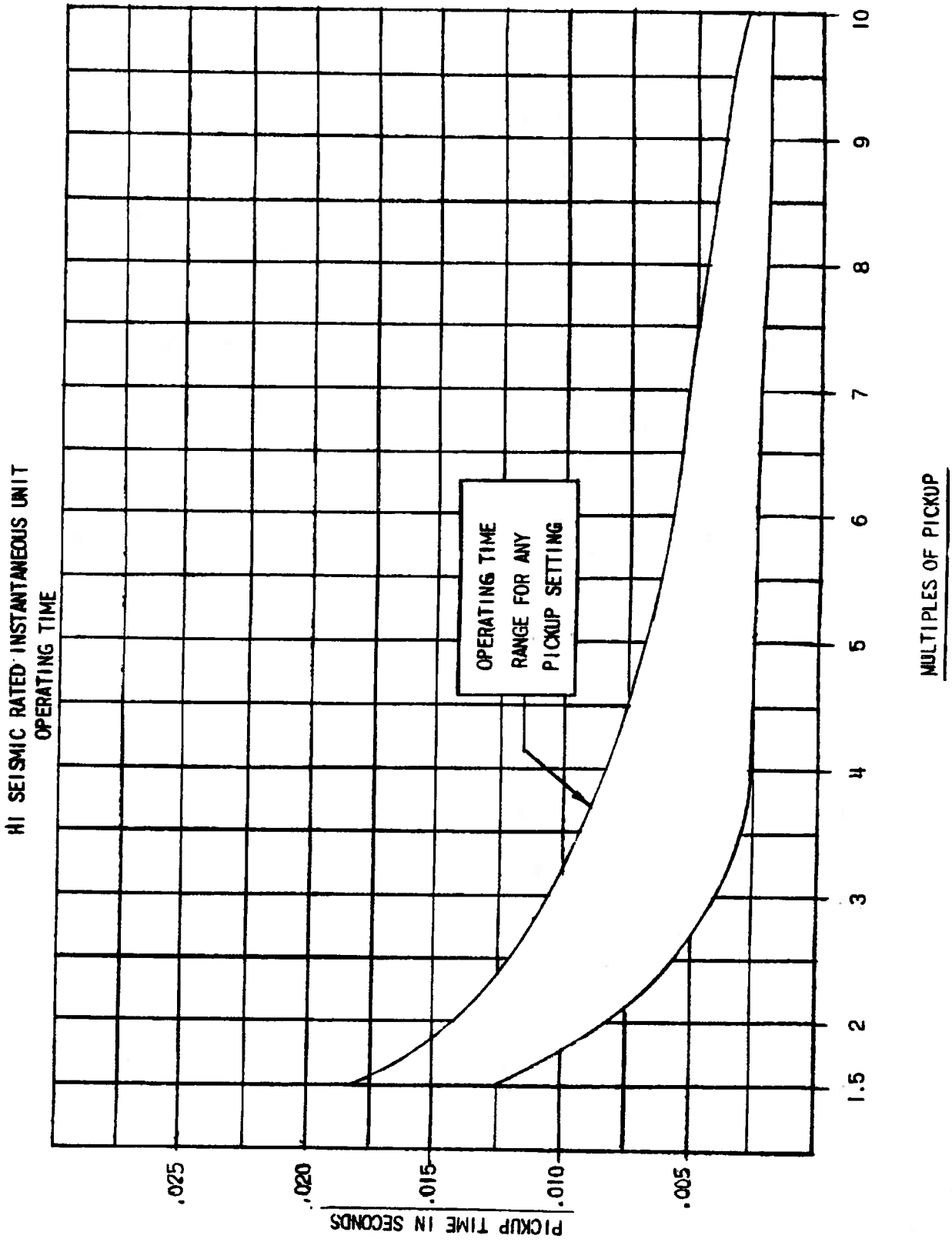
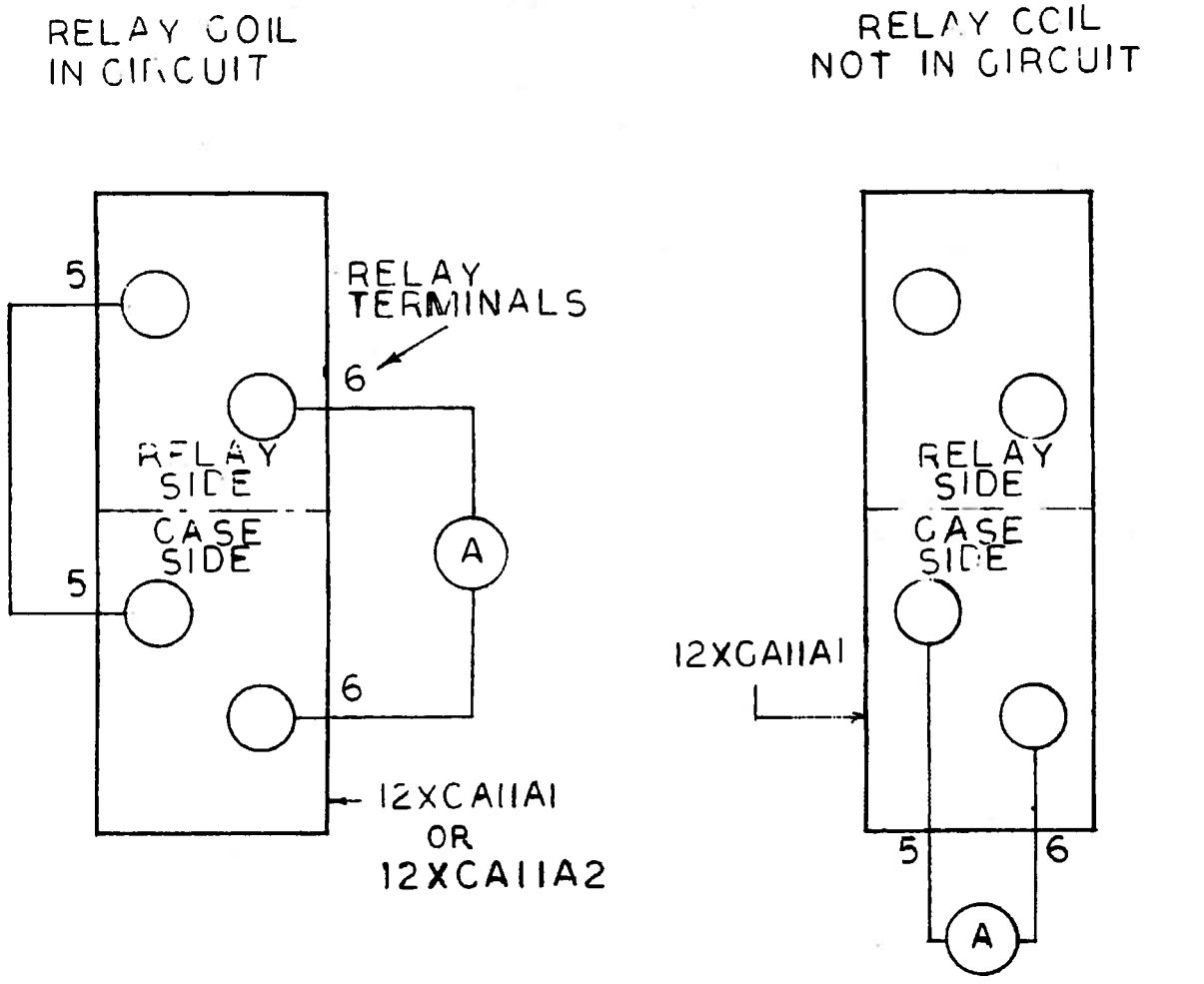


Figure 9 (0208A8695) Time-Current Characteristics of the High-Seismic Instantaneous Unit



TEST CONNECTIONS FOR TESTING CT SECONDARY USED WITH THE IFC RELAY

Figure 10 (0269A1787-1) Test Connections for Testing CT Secondary used with the IFC Relay

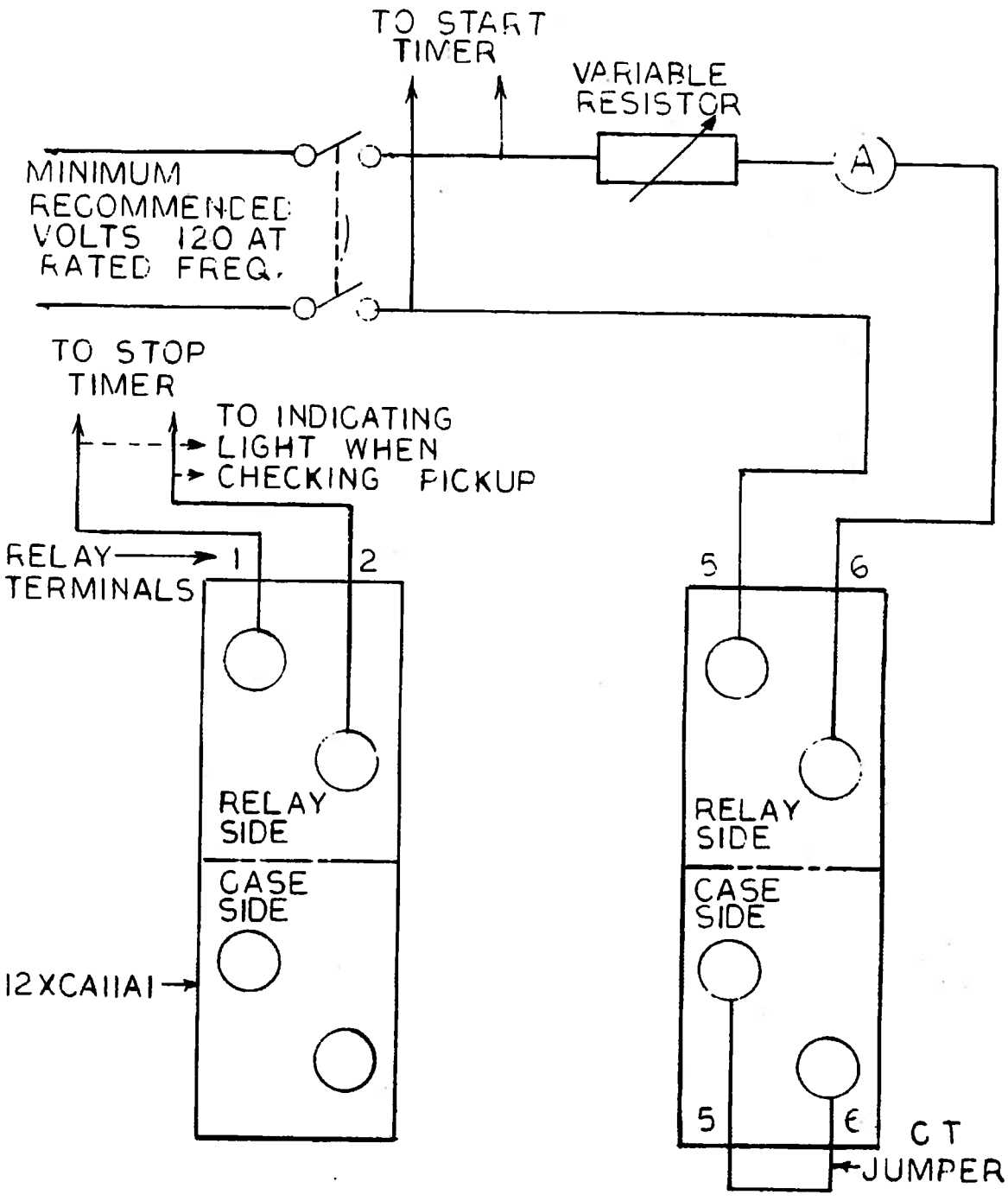


Figure 11 (0269A1789) Test Connections for Testing Pickup and Operating Times of the Time-Overcurrent Unit

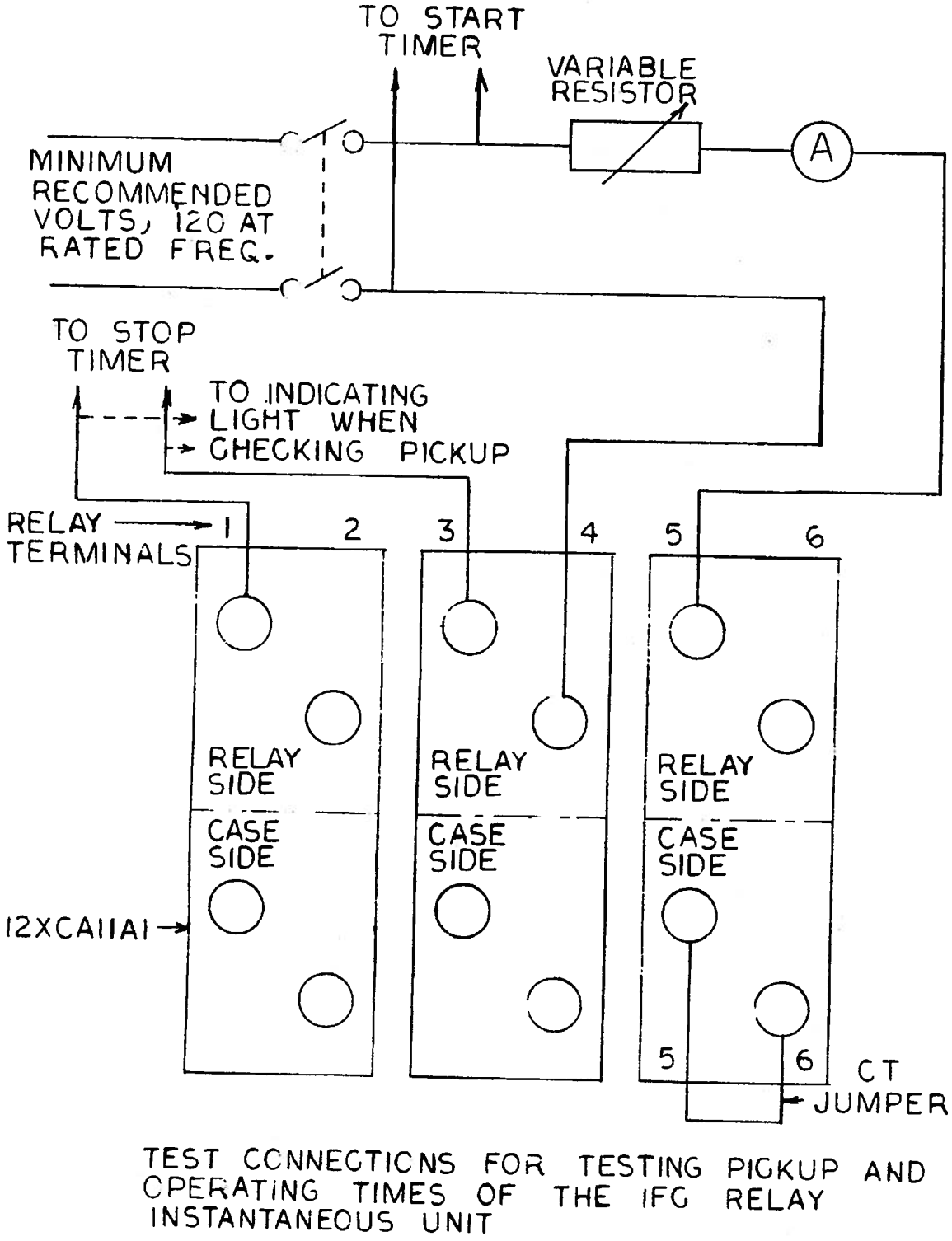
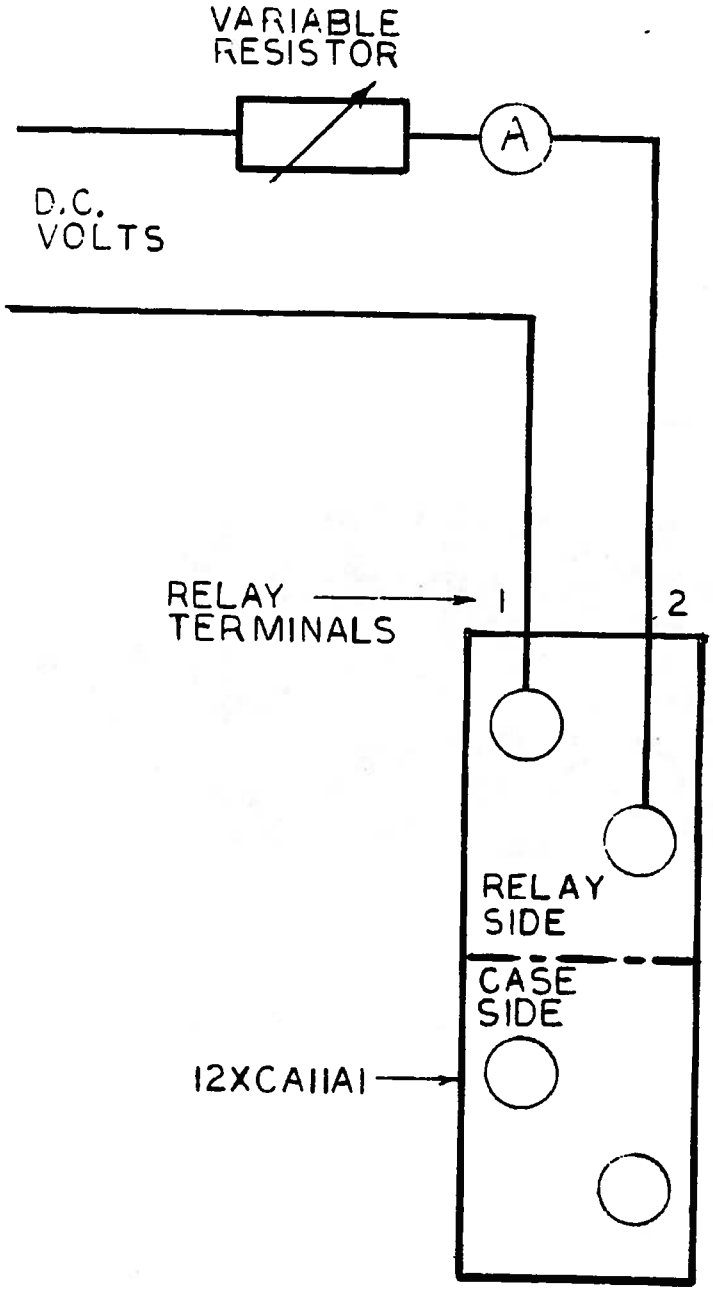


Figure 12 (0269A1788-1) Test Connections for Testing Pickup and Operating Times of the High-Seismic Instantaneous Unit



TEST CONNECTIONS FOR TESTING THE TARGET AND SEAL IN UNIT USED WITH THE IFC RELAY

Figure 13 (0269A1790) Test Connections for Testing the High-Seismic Target and Seal-In Unit

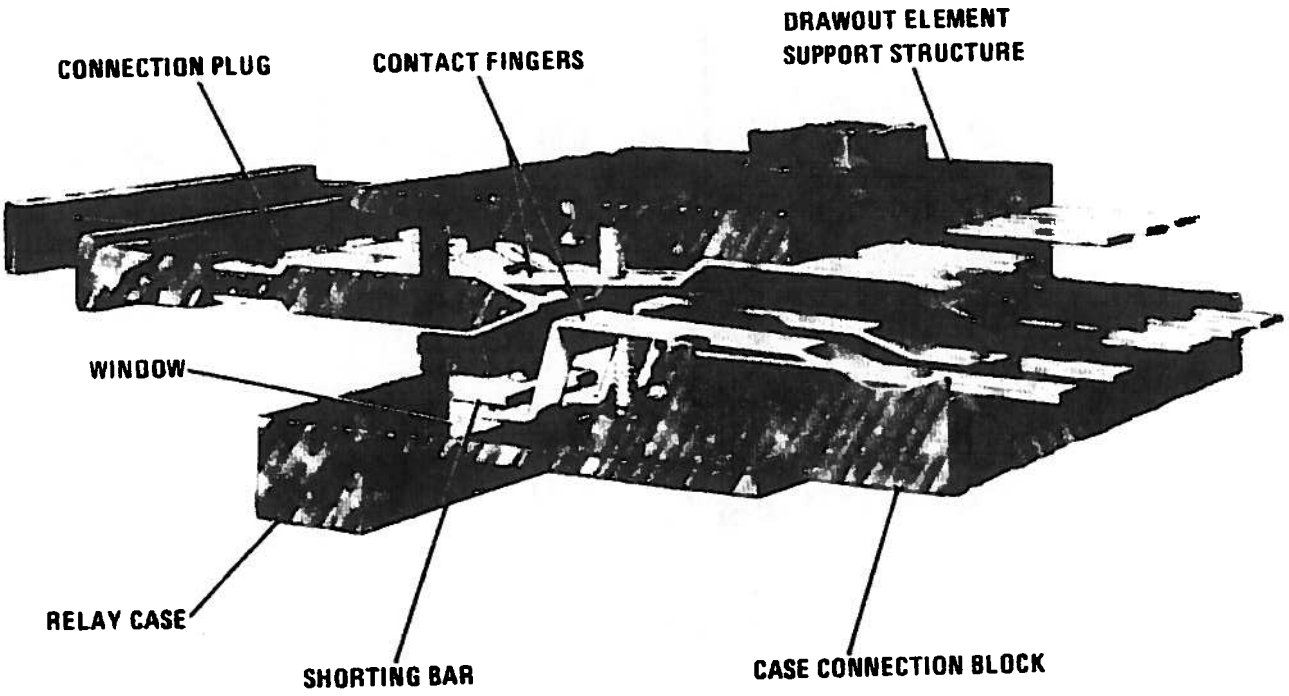


Figure 14 (8042715) Cross Section of IFC Draw-Out Case, Showing Shorting Bar

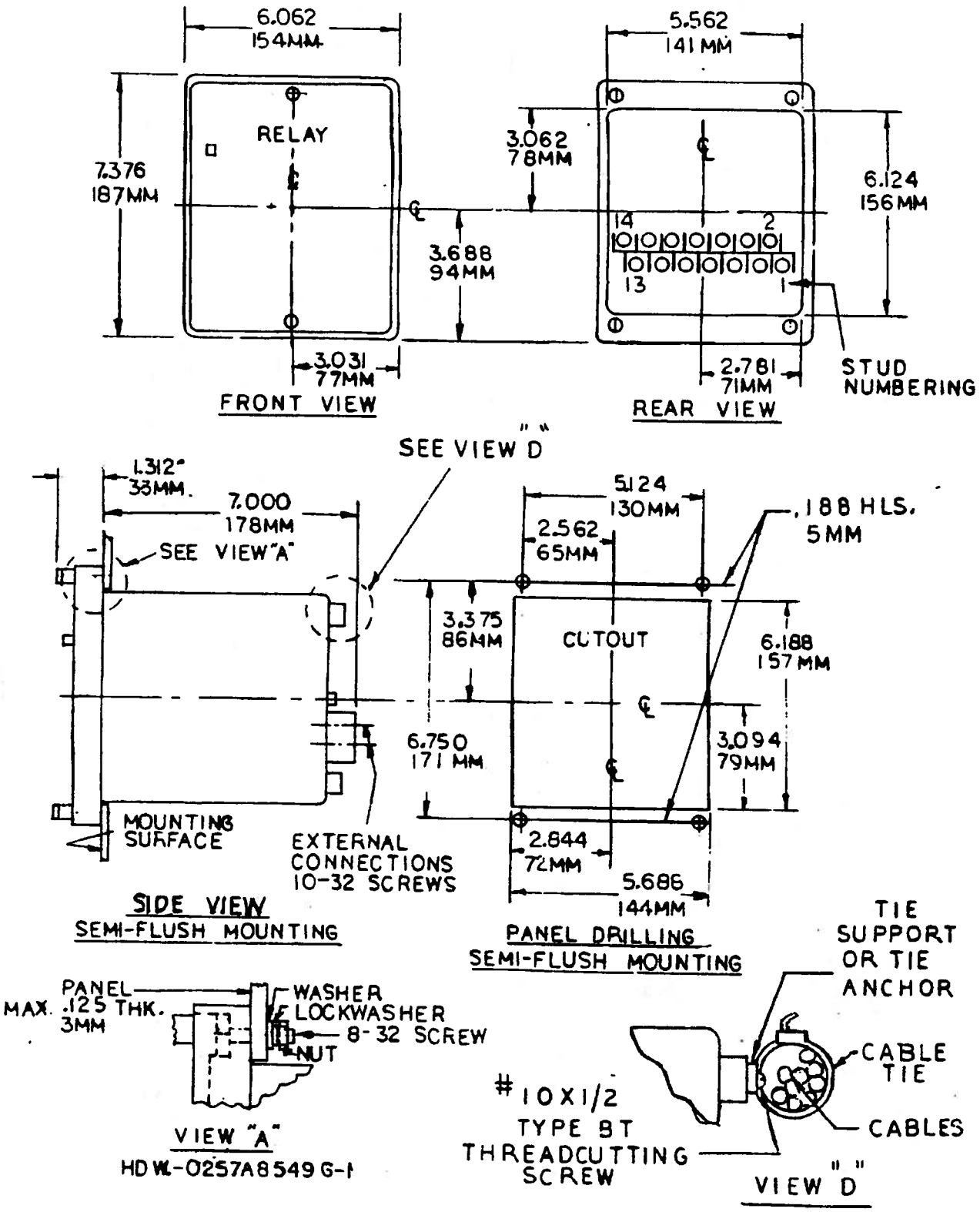


*Figure 15 (0257A8452 Sheet 1 3) Outline and Panel Drilling for Semi-Flush Mounting Relay Types IFC95

*Revised since last issue

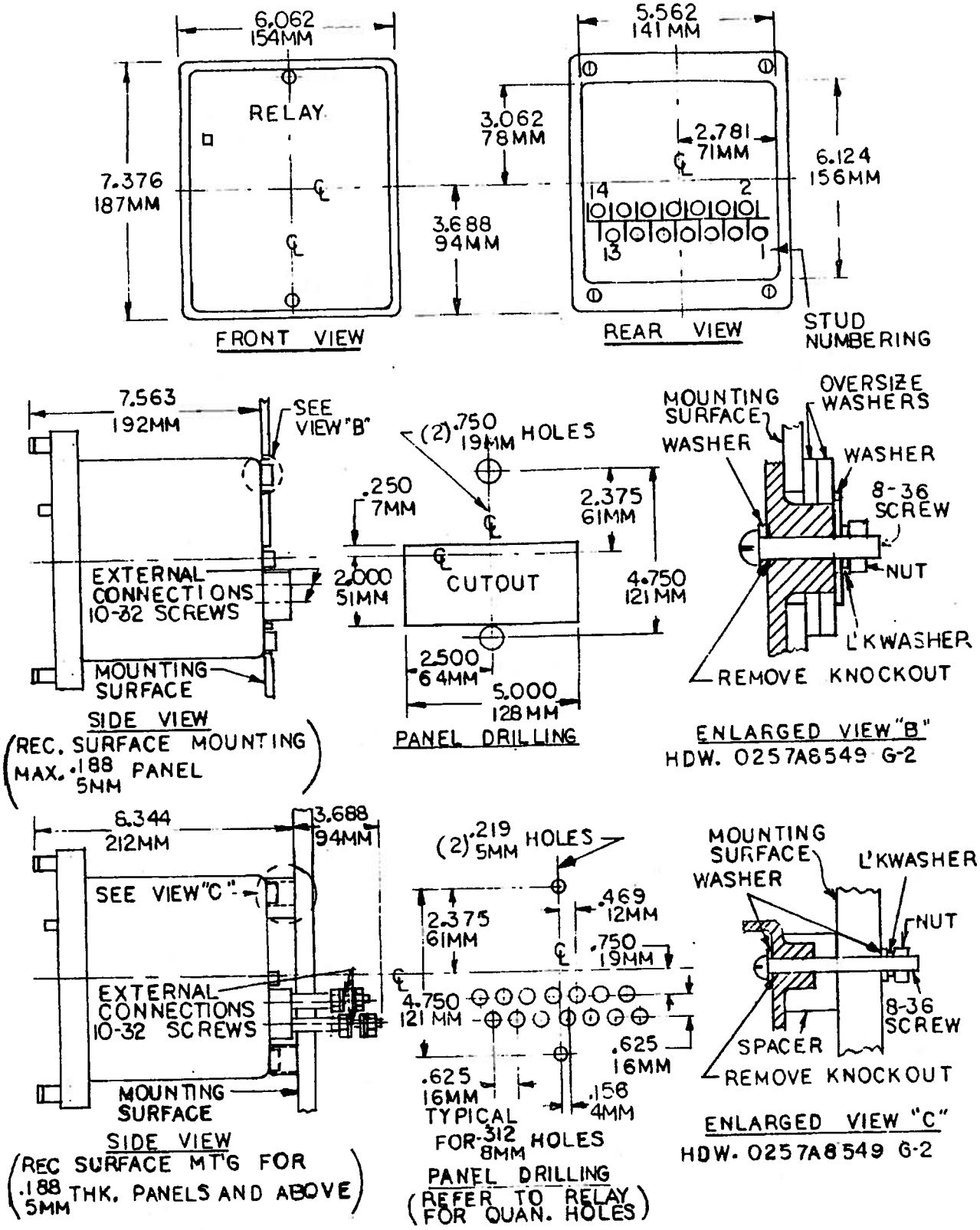


*Figure 16 (0257A8452 Sheet 2 3) Outline and Panel Drilling for Surface Mounting, Relay Types IFC95

*Revised since last issue

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