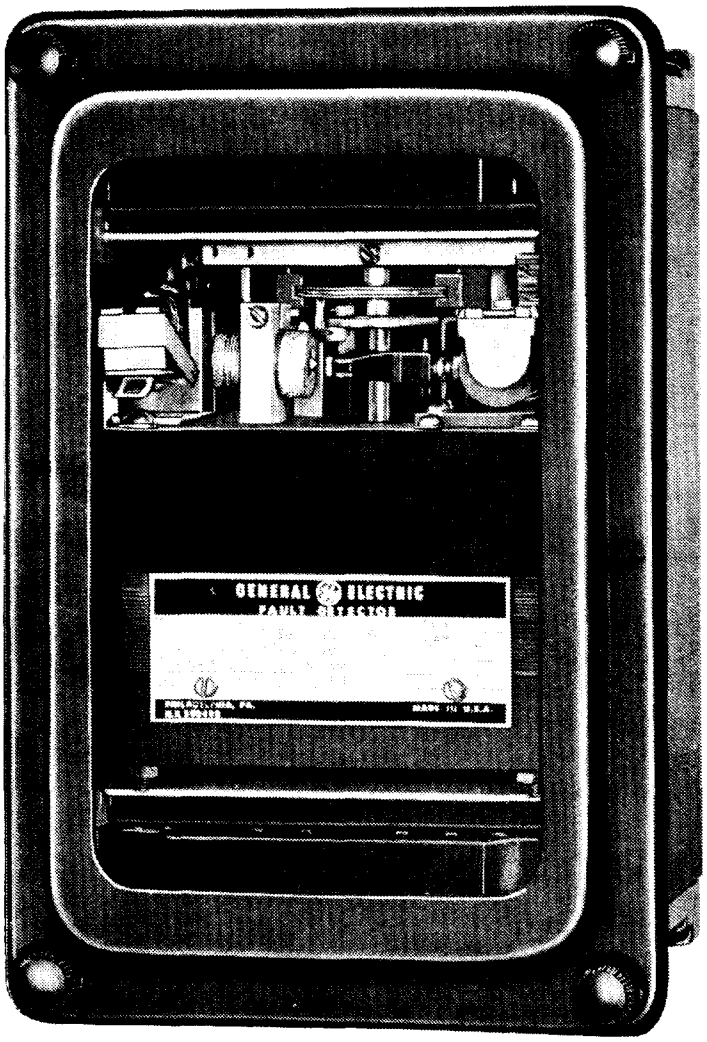
INSTRUCTIONS

GEK-1256B
Supersedes GEK-1256A
Insert Booklet GEK-1253

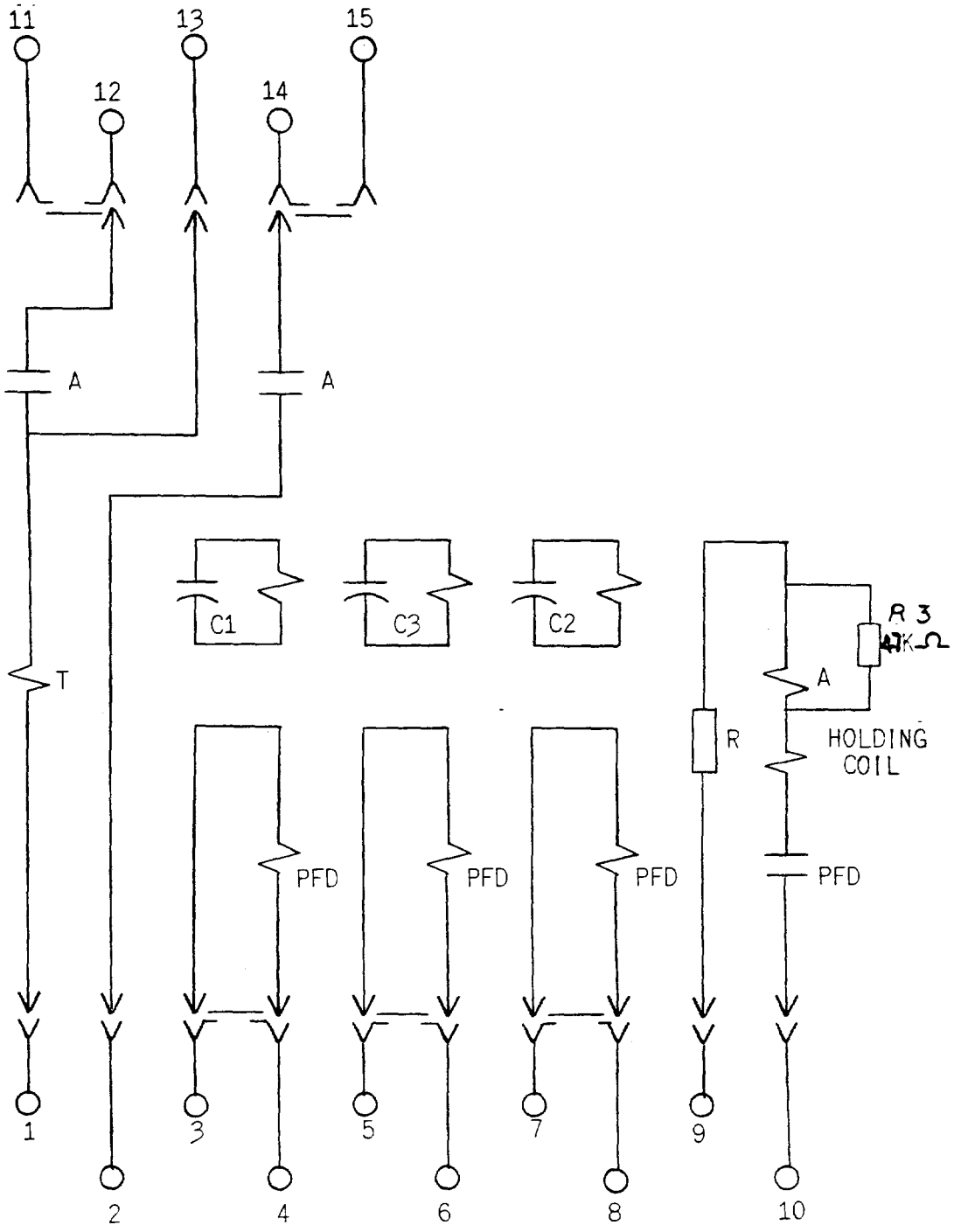
FAULT DETECTOR RELAYS

TYPE CHC13D(-)A

INTRODUCTION



GENERAL ELECTRIC



* Figure 1 (0208A2474-4) Internal Connections Diagram for Type CHC13D(-)A Relay (Front View)

FAULT DETECTOR RELAYS

* TYPE CHC13D(-)A

INTRODUCTION

This instruction book, together with insert booklet GEK-1253, forms the instructions for the Type CHC13D(-)A relays.

* The CHC13D(-)A relay includes a three phase, high-speed induction cup unit (PFD), a target (T) and a telephone-type auxiliary unit (A), mounted in an S-2 drawout case. It is similar to the CHC11A, described in instruction book GEK-1253, except that it does not have a ground fault detector.

APPLICATION

* The CHC13D relay is designed as a current fault detector, for use in conjunction with distance relays, to prevent tripping the circuit breaker or operation of the associated timer during loss of relay potential supply for reasons other than a system fault. This can occur as a result of: (1) short circuits or open circuits involving the potential supply; (2) switching (with certain configurations of power circuits); or (3) use of line-side potential supply for the relays. In the latter instance, the fault detector protects the associated timer against possible burnout when the breaker is open, and avoids false breaker retripping at the instant of reclosure.

DESCRIPTION

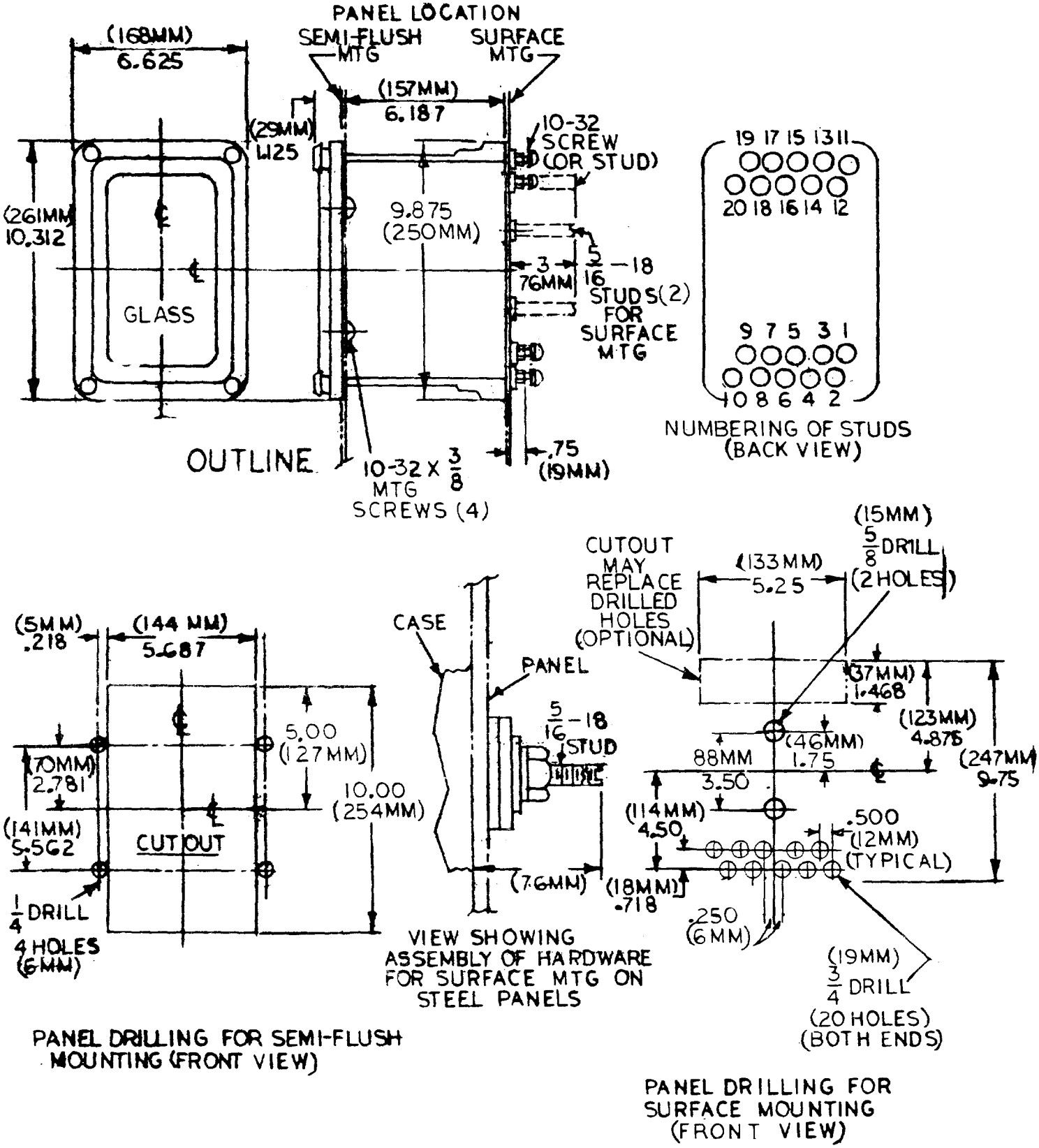
The main operating unit of this relay is similar the the CHC11A in construction, except for the moving element stop screw, which is located in the rear on the left-hand side of the relay. Its operating characteristics are the same as the PFD unit described in instruction book GEK-1253.

The holding coil assembly prevents the fault detector contact from arcing when operating near its minimum pickup value. The holding action, while sufficient to prevent arcing, does not impair the dropout value to an objectionable degree. Dropout will be in the order of 80 percent of pickup when the unit is set at the minimum value of its adjustable range, and increases when the pickup setting is raised.

The holding coil force is controlled by the air gap between the holding coil pole pieces and the armature on the moving contact, and it should not require any adjustment * from the normal factory setting. The air gap between the holding coil pole pieces and the armature should not be less than 0.015 inch.

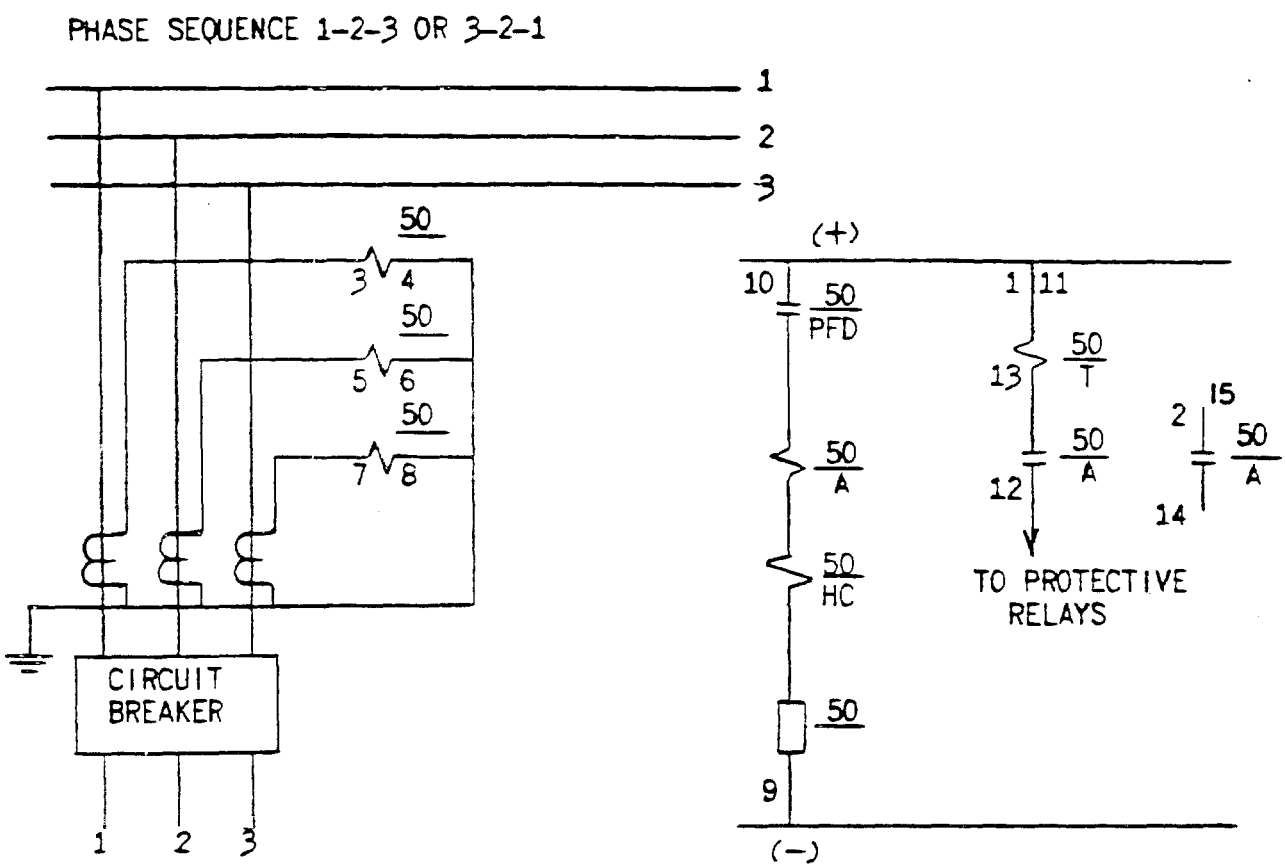
(Cover Photo 80339179)

*Indicates Revision



* Figure 2 (6209272-2) Outline and Panel Drilling Dimensions for Type CHC13D(-)A Relay

*Indicates Revision



NOTE: SHORTING BARS EXISTS BETWEEN STUDS 11 & 12 AND 14 & 15 SO THAT WHEN RELAYS ARE REMOVED FROM CASE POSITIVE POTENTIAL DIRECTLY TO THE PROTECTIVE RELAYS. IF THIS IS NOT DESIRED TO MAKE NO CONNECTION TO STUD 11 OR 15.

LEGEND

50 - CHC13D
PFD - PHASE FAULT DETECTER
A - AUXILIARY UNIT
T - TARGET
H.C.-HOLDING COIL (WHEN USED)

* Figure 3 (0285A7121-0) Typical External Connection Diagram for Type CHC13D(-)A Relay

*Indicates Revision

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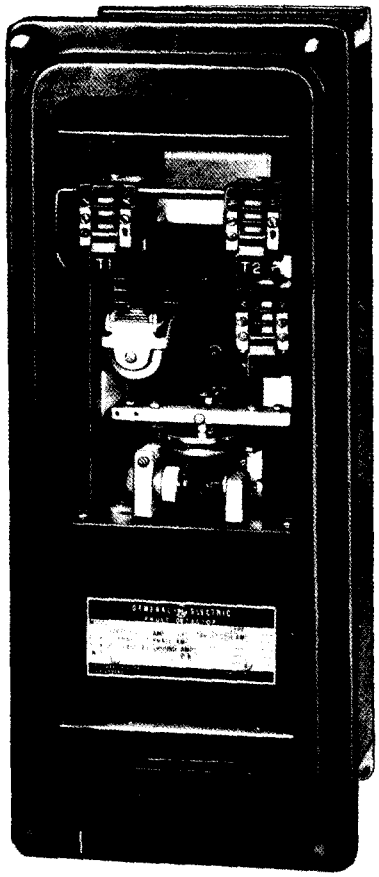
GEK-1253F

INSTRUCTIONS

FAULT DETECTOR RELAY

TYPES CHC11A21 AND UP, CHC11B11 AND UP



GENERAL ELECTRIC

TABLE OF CONTENTS

(Cover photo 8027271)

FAULT DETECTOR RELAY

TYPES CHC11A21 AND UP, CHC11B11 AND UP

INTRODUCTION

The CHC11A relay is a complete three-phase and ground, multicontact, high-speed nondirectional overcurrent relay. The relay consists of an induction-cup unit for multiphase faults and a small hinged-armature unit for ground faults. Two targets and four electrically separate contacts are available, and the stud arrangement is such that complete flexibility of application is obtainable. These units are identified in Figure 1 by nomenclature used throughout the text. Within its current-carrying capability, the induction-cup unit of THE CHC11A RELAY IS DESIGNED FOR CONTINUOUS OPERATION IN THE PICKED-UP POSITION.

The CHC11B is similar to the CHC11A except that the auxiliary telephone relay "A" unit has a dual rating. The desired rating is selected by a toggle switch mounted on the front of the relay.

APPLICATION

The CHC11A relay may be applied wherever a high-speed fault detector is required. However, because it has four electrically separate contacts and can be operated continuously in the picked-up position, it is particularly well suited for applications as a fault selector in circuit-breaker-failure back-up schemes. In these schemes, the CHC11A relay is used to detect the failed circuit breaker, and to select the back-up breakers to be tripped in order to isolate the fault.

In general, the cup unit or phase-fault detector (PFD) would be used to detect three-phase, phase-to-phase and double-phase-to-ground faults, while the hinged-armature or ground-fault detector (GFD) unit would detect single-phase-to-ground faults if desired. In this respect, the hinged-armature unit is more sensitive than the cup unit. Typical external connections for the CHC11A relay are shown in Figure 11.

When using the CHC11A relay in circuit-breaker-failure back-up schemes, the relay may be called on to carry maximum fault current for some fraction of a second before the fault is cleared. For this reason, the short-time current capability of the relay should be noted. This is particularly true of the hinged-armature unit. Figure 2 gives the capability of this unit from 0.1 to 1.0 second. The short-time rating of the cup unit is so high that it will probably never be a limiting factor.

While the 2-8 ampere cup unit is continuously rated for 5 amperes, it is capable of carrying 8 amperes continuously. This is important in multibreaker bus arrangements where bus current, which the relay may be connected to receive, can exceed 5 amperes during maximum load conditions.

In a circuit-breaker-failure scheme, the DC supply for the internal auxiliary of the CHC11A must **not** be taken through the same fuses from which the associated circuit breaker obtains its tripping current.

Pickup and dropout time curves for the two units are given under **OPERATING CHARACTERISTICS.** It is important to note that these curves represent maximum times and that dropout time is the time the normally-open contacts take to return from their picked-up state (closed) to their normally-open state.

PICKUP SETTING DETERMINATION

The cup unit (PFD) develops torque that is related to the phase currents in the following way.

$$\text{Torque} = K\,(I_1^2 + I_2^2 + I_3^2)$$

where K is a constant.

If the unit is set to pick up at 3.0 amperes, phase-to-phase, the torque is

$$T = K\,(3^2 + 3^2) = 18K$$

In order to develop the same pickup torque for a balanced three-phase fault

$$T = 18K = K\,(I^2 + I^2 + I^2)$$

$$3\,I^2 = 18$$

$$I = \frac{3\sqrt{2}}{\sqrt{3}} = 2.45 \text{ amperes}$$

Thus if the relay is adjusted to pick up for a three-ampere (3 amp) phase-to-phase fault, it will pick up for a three-phase fault of 2.44 amperes. The balanced three-phase pickup is $\sqrt{2}/\sqrt{3}$ or 0.817 times the phase-to-phase pickup.

The cup unit will also operate with current in only one phase. With a three ampere (3 amp) phase-to-phase pickup setting, the single-phase current required to operate the unit is determined as follows:

$$T = 18K = K\,(I^2)$$

$$I^2 = 18$$

$$I = 3\sqrt{2} = 4.24 \text{ amperes}$$

The single-phase pickup current is $\sqrt{2}$ or 1.414 times the phase-to-phase pickup.

From the above it is apparent that the cup unit (PFD) can detect single-phase-to-ground faults as well as multiphase faults if the fault current is large enough.

When the CHC11A relay is used as a fault detector, the cup unit should be set so that the minimum phase-to-phase fault current exceeds 1.5 times the phase-to-phase pickup. This will ensure pickup for all multiphase faults. If the minimum single-phase fault current is sufficient to operate the unit for this setting, it is not necessary to use the hinged-armature (GFD) unit. However, the GFD unit may be used for single-phase-to-ground faults if desired.

The hinged-armature unit is connected in the current transformer-circuit to receive three times the zero-sequence current. It should be set so that 3 I_0 for minimum fault conditions exceeds 1.5 times the pickup of this unit.

An external reactor is included with the relay for connection across the GFD operating circuit (see Figure 11). The purpose of this reactor is to reduce the dropout delay that may result from the decay of energy in the CT core after the primary current has been interrupted.

OPERATING CHARACTERISTICS

Table I lists the operating ranges for the cup (PFD) unit of CHC11A relay. These ranges depend upon the type of fault experienced by the relay. See the application section for details of why these pickup ranges vary with the type of fault.

TABLE I

TYPE OF FAULT	PICKUP RANGE OF CUP UNIT - AMPERES			
PFD Pickup Range	1 - 4	2 - 8	4 - 16	22 - 80
Phase-to-Phase	1 - 4	2 - 8	4 - 16	20 - 80
Three Phase	0.815 - 3.76	1.63 - 6.52	3.26 - 13.0	16.3 - 65.2
Single Phase to Ground	1.415 - 5.65	2.83 - 11.3	5.66 - 22.6	28.3 - 113

The short-time-current-capability curve for the hinged-armature (GFD) unit is shown in Figure 2.

The maximum pickup time/current characteristics of the cup unit plus auxiliary telephone unit are shown in Figure 3. The pickup time is dependent on the pickup setting of this unit. The maximum dropout time/current characteristic for the cup unit plus auxiliary telephone unit is shown in Figure 4. This curve applies to all pickup settings of this unit.

The maximum pickup and dropout time/current characteristics of the hinged-armature unit plus the auxiliary telephone unit are shown in Figures 5 and 6, respectively. These curves apply to all pickup settings of this unit.

Maximum pickup time is the total time required for the cup or hinged-armature unit to close its contacts plus the time for a normally-open contact of the auxiliary telephone unit to close. The maximum dropout time is the total time required for the cup or hinged-armature unit to open its contacts plus the time

required to re-open a picked-up (closed) normally-open contact of the auxiliary telephone unit when the current is suddenly reduced to zero (0).

RATINGS

The continuously adjustable pickup ranges, the continuous ratings, and the one-second thermal ratings for the overcurrent units are listed in Table II.

TABLE II

UNIT	PICKUP RANGE	CONTINUOUS RATING AMPERES	ONE-SECOND RATING AMPS
PFD	1 - 4	4	150
	2 - 8	8	290
	4 - 16	16	290
	20 - 80	20	325
GFD	0.5 - 2	0.65	18
	1 - 4	1.5	36
	2 - 8	3	72
	4 - 16	6	140
	10 - 40	10	290
	20 - 80	20	400

The auxiliary telephone relay is continuously rated at the nameplate DC voltage. The contact-interrupting capabilities are shown in Table III.

TABLE III
Telephone Relay Contact
Interrupting Capability

VOLTS	AMPS INDUCTIVE†
48DC	1.0
125DC	0.50
250DC	0.25

† Inductance of average trip coil. The non-inductive ratings are approximately 2.5 times the ratings shown

The contacts of the cup unit and the hinged-armature unit are capable of interrupting the auxiliary telephone-unit current.

The current-closing rating of the contacts is 30 amperes for voltages not exceeding 250 volts. The current-carrying ratings are affected by the selection of the tap on the target and seal-in coil, as indicated in the following table:

TABLE IV

		DUAL RATED			
		0.2/2.0		0.6/2.0	
		0.2	2.0	0.6	2.0
Carry 30 amps for	(sec)	0.05	2.2	0.5	3.5
Carry 10 amps for	(sec)	0.45	20	5.0	30
Carry continuously	(amp)	0.37	2.3	1.2	2.6
Minimum operating	(amp)	0.2	2.0	0.6	2.0
Minimum dropout	(amp)	0.05	0.5	0.15	0.5
DC resistance	(ohms)	8.3	0.24	0.78	0.18
60 hertz impedance	(ohms)	50	0.65	6.2	0.65
50 hertz impedance	(ohms)	42	0.54	5.1	0.54

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

BURDENS

The 60 cycle burden-per-phase of the cup (PFD) unit, with 5.0 amperes flowing in each phase, is listed in Table V.

TABLE V
Burden of PFD Unit

RANGE	VOLT-AMPS AT 5 AMPS	IMPEDANCE	POWER FACTOR LAG
1-4	20	0.8	0.5
2-8	5	0.2	0.5
4-16	1.25	0.05	0.5
20-80	0.05	0.002	0.5

Table VI lists the 60 cycle burdens of the hinged-armature (GFD) unit. These burdens were determined with the unit set at its minimum pickup value.

TABLE VI
Burdens of GFD Unit

	AT MIN. P.U. CURRENT			AT 5 AMPERES		
RANGE	Z	PF	VA	Z	PF	VA
0.5-2	11.8	0.77	2.95	7.6	0.79	19.0
1 - 4	2.95	0.77	2.95	1.9	0.79	47.5
2 - 8	0.74	0.77	2.95	0.5	0.79	11.9
4 -16	0.20	0.77	3.20	0.20	0.79	5.0
10 -40	0.032	0.77	3.20	0.033	0.79	0.83
20 -80	0.008	0.77	3.20	0.008	0.79	0.21

INSTALLATION

RECEIVING

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 the relay, an examination should be made for any damage sustained during shipment. If injury or damage resulting from rough handling is evident, a claim should be filed at once with the transportation company and the nearest Sales Office of the General Electric Company should be notified promptly.

Reasonable care should be exercised in unpacking the relay in order that none of the parts are injured nor the adjustments disturbed.

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, metallic chips. Foreign matter collected on the outside of the case may find its way inside when the cover is removed and cause trouble in the operation of the relay.

Note that an external reactor is furnished with this relay. The two leads from the reactor should be connected to studs 14 and 15, as shown in Figure 11.

INSPECTION

At the time of installation, the relay should be inspected for tarnished contacts, loose screws, or other imperfections. The end play of the cup-unit shaft assembly should be 0.016 inch. Any abnormalities should be corrected before the relay is put into service.

CAUTION

Every circuit in the drawout case has an auxiliary brush. It is especially important on current circuits and other circuits with shorting bars that the auxiliary brush be bent high enough to engage the connecting plug or test plug before the main brushes do. This will prevent CT secondary circuits from being opened. See Figure 7.

SETTINGS

Cup Unit (PFD)

* The CHC11A relay has been tested at the factory. The pickup of the cup (PFD) unit has been set at 2.0 amperes phase-to-phase. This pickup may be set at a higher value by loosening the hexagonal control-spring-locking screw and rotating the control-spring adjuster in a counterclockwise direction until the desired phase-to-phase pickup is obtained. It is only necessary to set pickup for one pair of phases. Figure 8A shows the connections necessary to do this. After the pickup has been set, make sure the spring-adjusting ring is set back as far as possible into the molded spring-adjusting-ring housing before tightening the hexagonal lock screw.

Hinged-Armature Unit (GFD)

When the relay was tested at the factory, the pickup of the hinged-armature unit was set at its minimum value; i.e., the top of the hexagonal adjustable core was lined up with the lowest calibration mark. The pickup-current levels for this unit are stamped beside each calibration mark.

To increase the current at which the hinged-armature unit picks up, loosen the locking nut and then rotate the adjustable core in a counterclockwise direction. After the top of the hexagonal head core is at the desired calibration mark, the final core adjustment may be made, using the test connections shown in Figure 8B. Tighten the locking nut, being sure not to turn the adjustable core.

If the external reactor supplied with the relay is used, as shown in Figure 11, the pickup of the GFD unit will be approximately 40% higher than indicated by the calibration points marked at the factory.

Target Units (T1 and T2)

The electrically operated target units have two taps, 0.2 and 2.0 amperes. The relay is shipped with the tap screws in the 2.0 ampere tap. The applicable tap must be selected, and the tap screw placed in that tap. Tap screws should **not** be in **both** taps at the same time.

Auxiliary Relay (A)

Connected from the auxiliary relay contacts to either terminal 19 or 20, is a red jumper lead. This lead can be connected to either terminal to obtain a normally-open or a normally-closed contact. As shipped from the factory, the red lead is connected to terminal 19, to give a normally-open contact between terminals 19 and 20.

LOCATION AND MOUNTING

The location should be clean and dry, free from dust and excessive vibration, and well lighted to facilitate inspection and testing.

* Revised since last issue

The relay should be mounted on a vertical surface. The outline and panel-drilling diagram is shown in Figure 12.

Unless mounted on a steel panel that adequately grounds the relay case, it is recommended that the case be grounded through a mounting stud or screw with a conductor not less than #12 B&S gage copper wire or its equivalent.

CONNECTIONS

The internal-wiring diagrams for the CHC11A and CHC11B relays are shown in Figures 9 and 10. A typical external-wiring diagram is shown in Figure 11.

MAINTENANCE

PERIODIC TESTING

It is recommended that a mechanical inspection and an operational test be performed at least annually, and if possible at the same time associated equipment is tested.

The interval of time may vary, depending on the relative importance of individual protective equipment, and the exposure to unfavorable conditions, such as extreme heat, moisture or fumes. Dust and dirt may contaminate the relay when the protective cover is removed.

Periodic tests consist of checking: the contacts for corrosion and pitting; the bearings for dust and dirt; the relay calibration.

SERVICING

Contact Cleaning

For cleaning fine silver 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 corroded material will be removed rapidly and thoroughly. The flexibility of the tool ensures the cleaning of the actual points of contact.

Fine silver contacts should not be cleaned with knives, files or abrasive paper. Knives or files may leave scratches, which increase arcing and deterioration of the contacts. Abrasive paper or cloth may leave minute particles of insulating abrasive material in the contacts, thus preventing closing.

The burnishing tool described above is included in the XRT relay tool kit that is obtainable from the factory.

Bearings

The lower jewel of the cup unit should be checked for dust and dirt. Clean it if necessary, but do **not** put any type of oil on this bearing. When finished, be sure to tighten the set screw, observing that the cup-unit shaft endplay is 0.016 inch.

RECALIBRATION

The relays are adjusted at the factory, and it is advisable not to disturb the adjustments except for the changes covered in the **SETTINGS** section. If for any

reason the adjustments have been disturbed, the following points should be observed in restoring them.

Cup Unit (PFD)

1. The contact gap of this unit is 0.020 inch. To obtain this gap the following procedure is recommended.

   a. Advance the right stop screw until the moving contact arm is parallel to the sides of the cup unit.

   b. Advance the stationary contact until it just touches the moving contact. A neon lamp connected across terminals 9 and 10 is best suited for identifying the moment of contact.

   c. Tighten the clamping screw so that the stationary contact is secure.

   d. Back the right stop screw off until the measured gap of 0.020 inch exists between the moving and the stationary contact. (It should be noted that 0.020 inch corresponds to approximately two-thirds of a turn of the stop screw.)

   e. Tighten the locknut so as to clamp the stop screw in this position, being careful not to disturb the contact gap adjustment.

2.* Pickup of the phase-fault detector will operate the auxiliary telephone relay. The telephone-relay current passing through the holding coil prevents the PFD contacts from arcing just at pickup. This holding action also tends to prevent contact bounce, such as can be detected if the telephone relay chatters at higher levels of operating currents.

   The holding-coil force is controlled by the air gap between the holding-coil pole pieces and the armature on the moving assembly and the level of currents as controlled by the R-1 adjustable resistor mounted at the rear of the relay.

   The factory setting of the holding-coil force is determined by the dropout value of the phase-fault detector. The relays are set to drop out between 50% and 90% of pickup when the pickup is at the lower end of the adjustable range. If readjustment is required, do not set R-1 less than 80% maximum resistance in the interest of not exceeding its watt rating.

   When the holding-coil adjustment is made, the holding-coil air gap must be at least 0.015 inch when the PFD contacts are closed and fully wiped in.

3. The pickup of the cup unit may be changed in the manner described under **SETTINGS.**

4.* With the connections of Figure 8A, the clutch should be adjusted to slip at 10 to 12 times minimum pickup current with the unit set at minimum pickup. The clutch slipping point may be changed by turning the clutch adjusting screw. Turning the screw clockwise will cause the clutch to slip at a higher value of current. For units with a minimum pickup of 10 amperes or more, tighten the clutch all the way in. Be sure to tighten the locking nut, being careful not to disturb the clutch.

* Revised since last issue

5.* **Pickup Adjustments:** With the connections of Figure 8A for a ø1-ø2 condition, set the applied current to the minimum value for the cup-unit pickup. Adjust the control spring so the contact just closes. Before tightening the locking screw to secure the control spring, make sure the spring-adjusting ring is set back as far as possible into the molded spring-adjusting-ring housing. Reduce the current to almost zero, and then increase the current until the PFD contact closes. This current should occur at the minimum value ± 2%.

Connect the relay for the ø2-ø3 connection and record the pickup.

Connect the relay for the ø3-ø1 connection and record the pickup.

The pickup of the lowest phase pair should not be below 90% of the highest phase pair.

If the lowest pickup is less than 90% of the highest pickup, the core must be re-adjusted. There is a flat portion on the inner core. This is indicated by a notch on the bottom of the core.

Loosen the core locknut and move the core as follows:

If the ø3-ø1 combination is the highest pickup, then turn the core flat to be in front of the right rear pole.

If the ø2-ø3 combination is the highest pickup, then turn the core flat to be in front of the left rear pole.

If the ø1-ø2 combination is the highest pickup, then turn the core flat to be in front of the right front pole.

Again measure the three phase-to-phase pickup combinations to ensure that the lowest pickup is not less than 90% of the highest pickup.

Hinged-Armature Unit (GFD)

1. Both contacts should close at the same time with approximately 1/32 inch wipe. When fully wiped in, at least 3/4 of each contact surface should be engaged.

2. When checking the calibration of this unit, make sure the top surface of the adjustable core is lined up with the calibration mark being checked. At each calibration mark the unit should pick up within plus or minus ten percent (± 10%) of the particular current being checked.

3. The pickup of the hinged-armature unit may be changed in the manner described under **SETTINGS.**

Auxiliary Relay (A)

1. Mechanical Adjustments

   a. There should be at least 1/32 inch clearance between the armature and the pole piece.

* Revised since last issue

b. The normally-open contacts should have a gap of 0.015 inch and the normally-closed contacts should have at least 15 grams pressure, as measured at the contact tip. The normally-open contacts should close with at least 0.005 inch wipe. The normally-closed contacts should open to a gap of 0.015 inch.

c. All normally-open contacts should make at approximately the same time.

d. The residual screw should be adjusted to give a 0.002 inch gap between the pole piece and the armature.

2. Electrical Tests

a. With DC voltage applied to relay terminals 9 and 10, and the cup-unit contacts blocked closed, the A relay should pick up at 80% or less of the CHC11A rated DC voltage. The dropout voltage should be 50% or less of the rated DC voltage.

b. With rated DC voltage applied to relay terminals 9 and 10 and the cup-unit contacts blocked closed, the pickup and dropout time should be eight milliseconds or less.

NOTE: PICKUP TIME IS THE TIME REQUIRED TO CLOSE A NORMALLY- OPEN CONTACT FROM THE INSTANT RATED VOLTAGE IS APPLIED TO THE A RELAY. DROPOUT TIME IS THE TIME REQUIRED TO RE-OPEN A PICKED-UP (CLOSED) NORMALLY-OPEN CONTACT FROM THE INSTANT RATED VOLTAGE IS REMOVED.

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, specify the quantity required and the name of the part wanted, and give complete nameplate data.

LIST OF FIGURES

* Revised since last issue

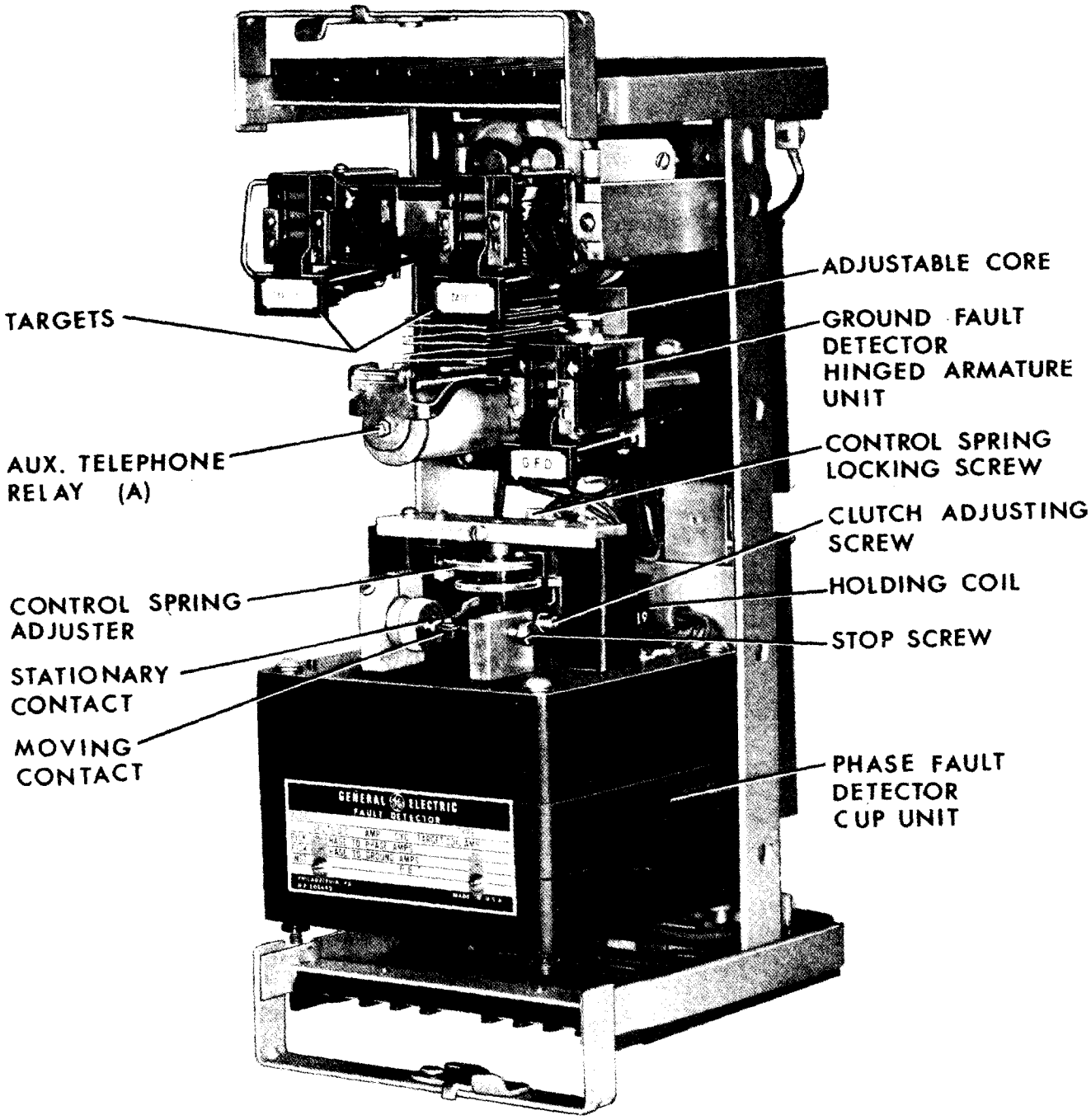


Figure 1 (8035502) Type-CHC Relay Removed from Drawout Case (Front View)

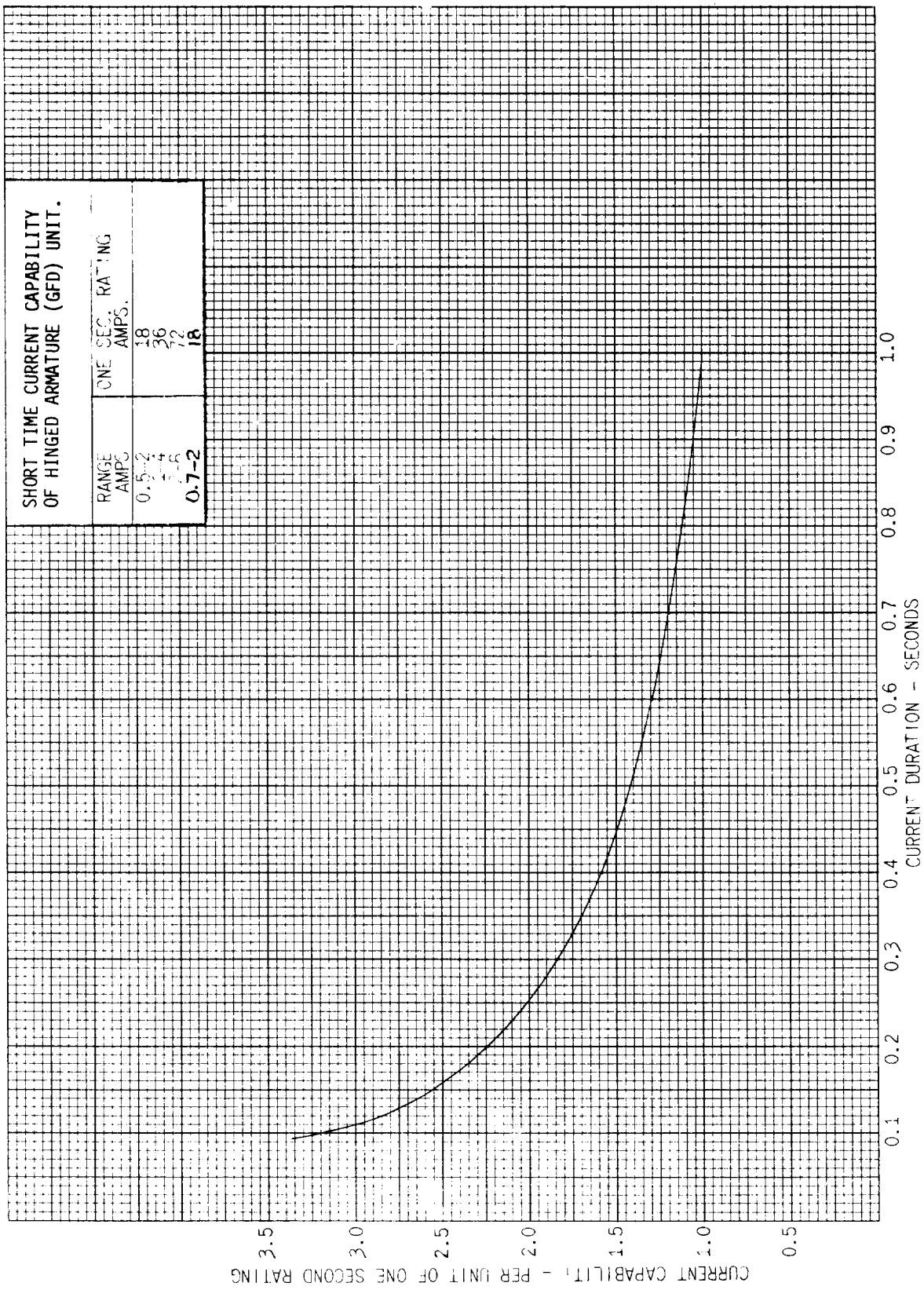
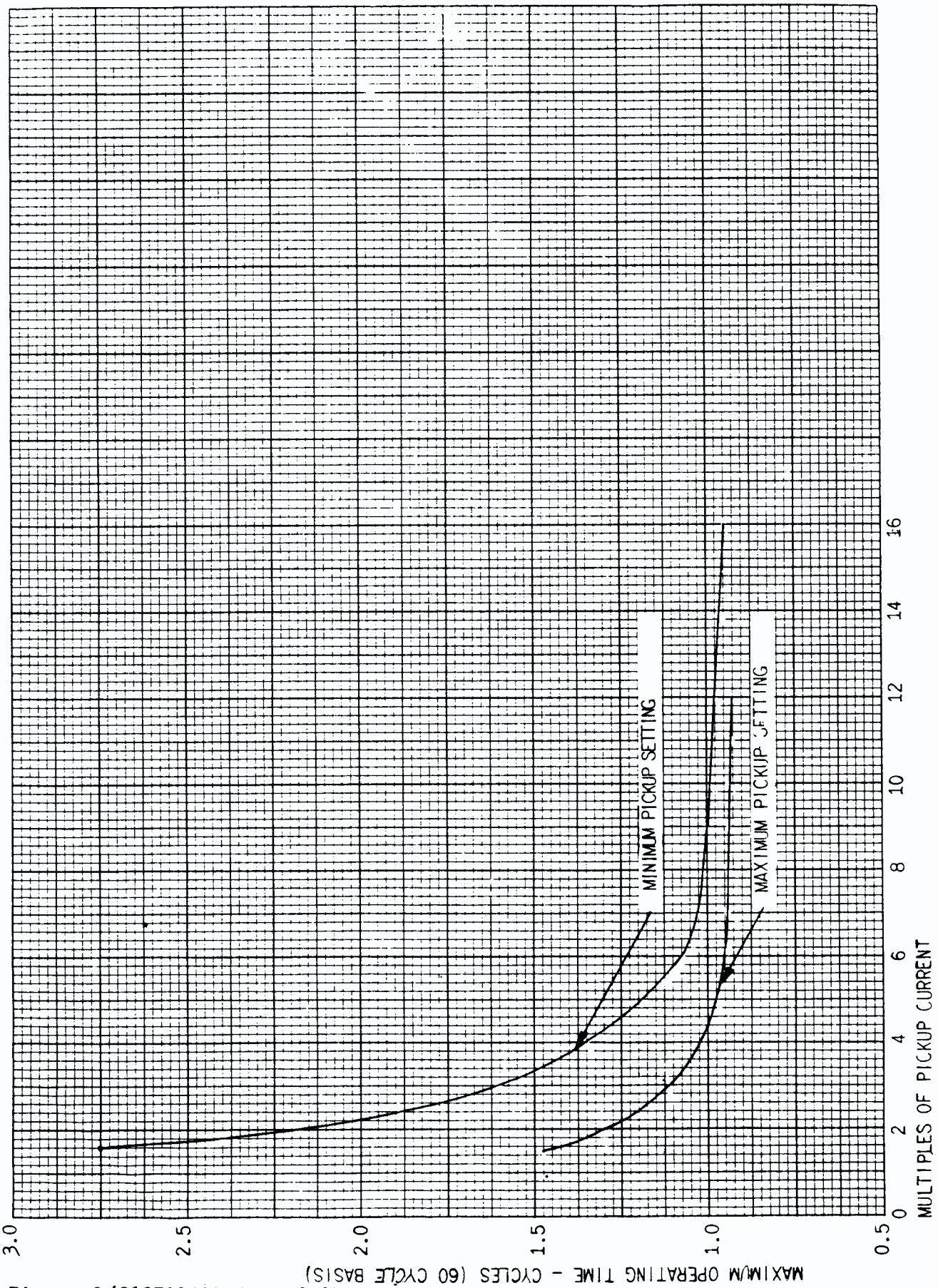


Figure 2 (0127A7901-2) Time-Current Capability Characteristic of GFD Unit



* Figure 3 (0127A9438 Sh.4 [1]) Maximum Pickup-Time Curves for Cup (PFD) Unit Plus Telephone Unit (A) of CHC11A Relay

* Revised since last issue

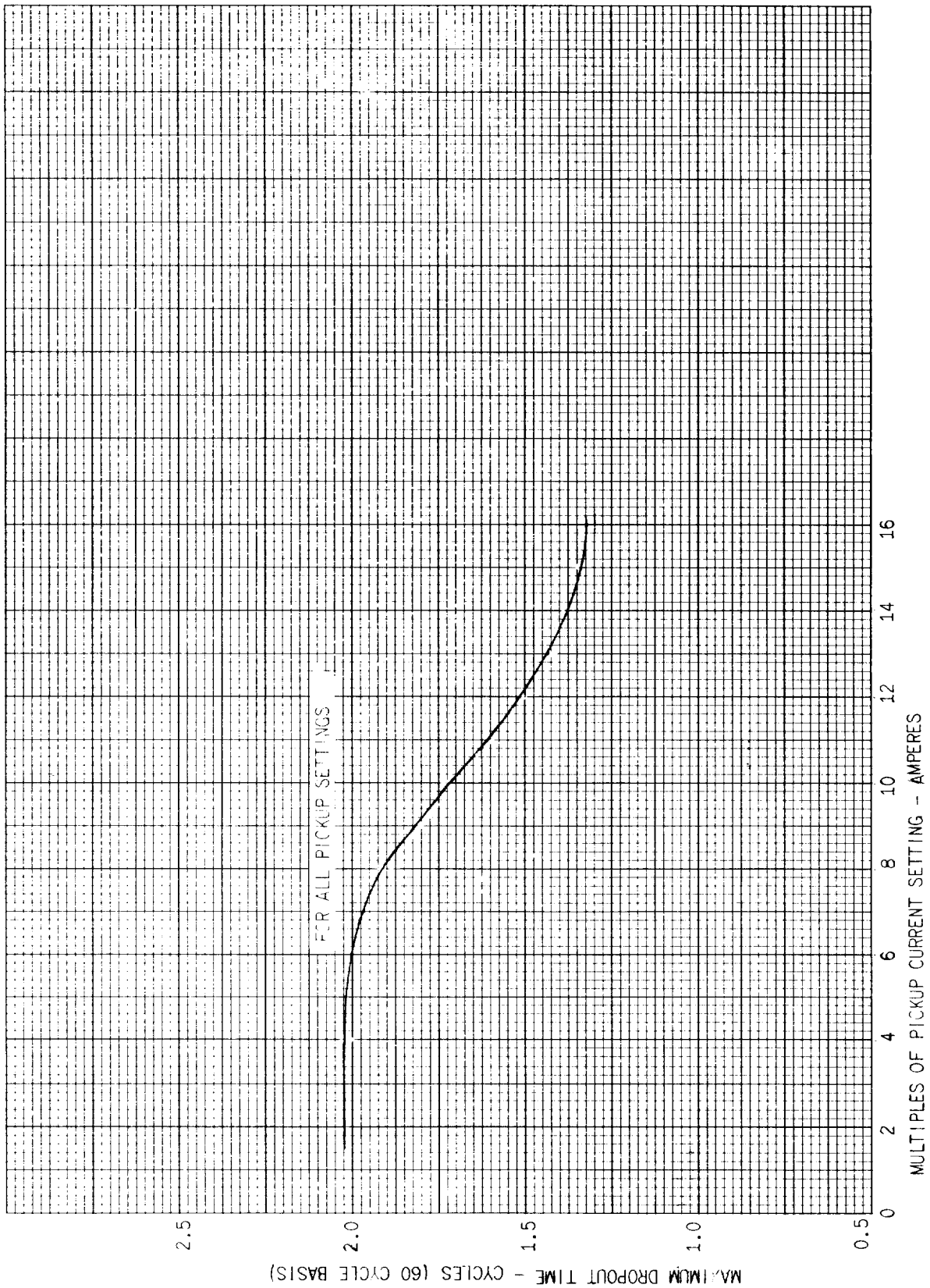


Figure 4 (0127A9438 Sh.3) Maximum Dropout-Time Curve for Cup (PFD) Unit Plus Telephone Unit (A) of CHC11A Relay

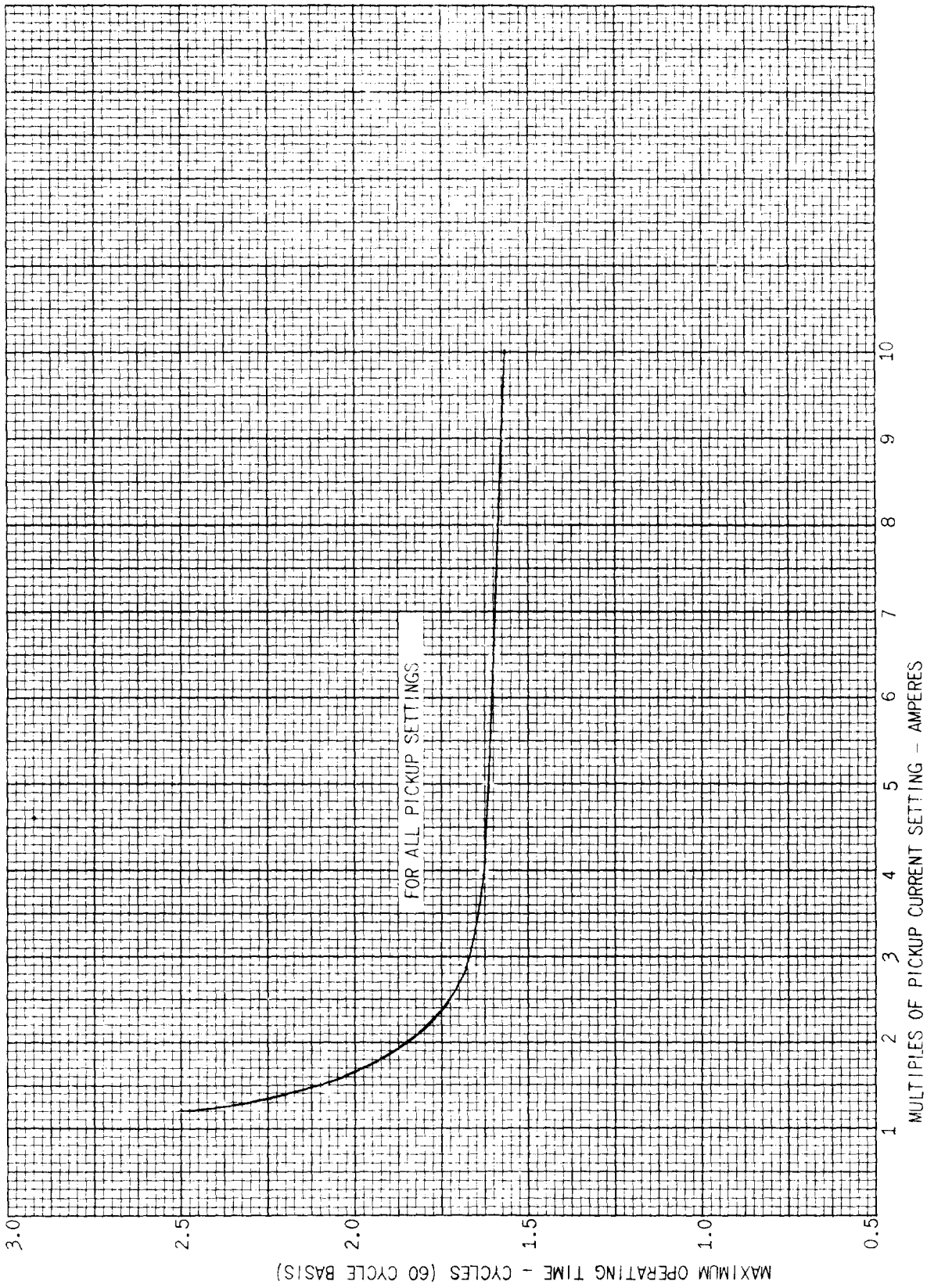
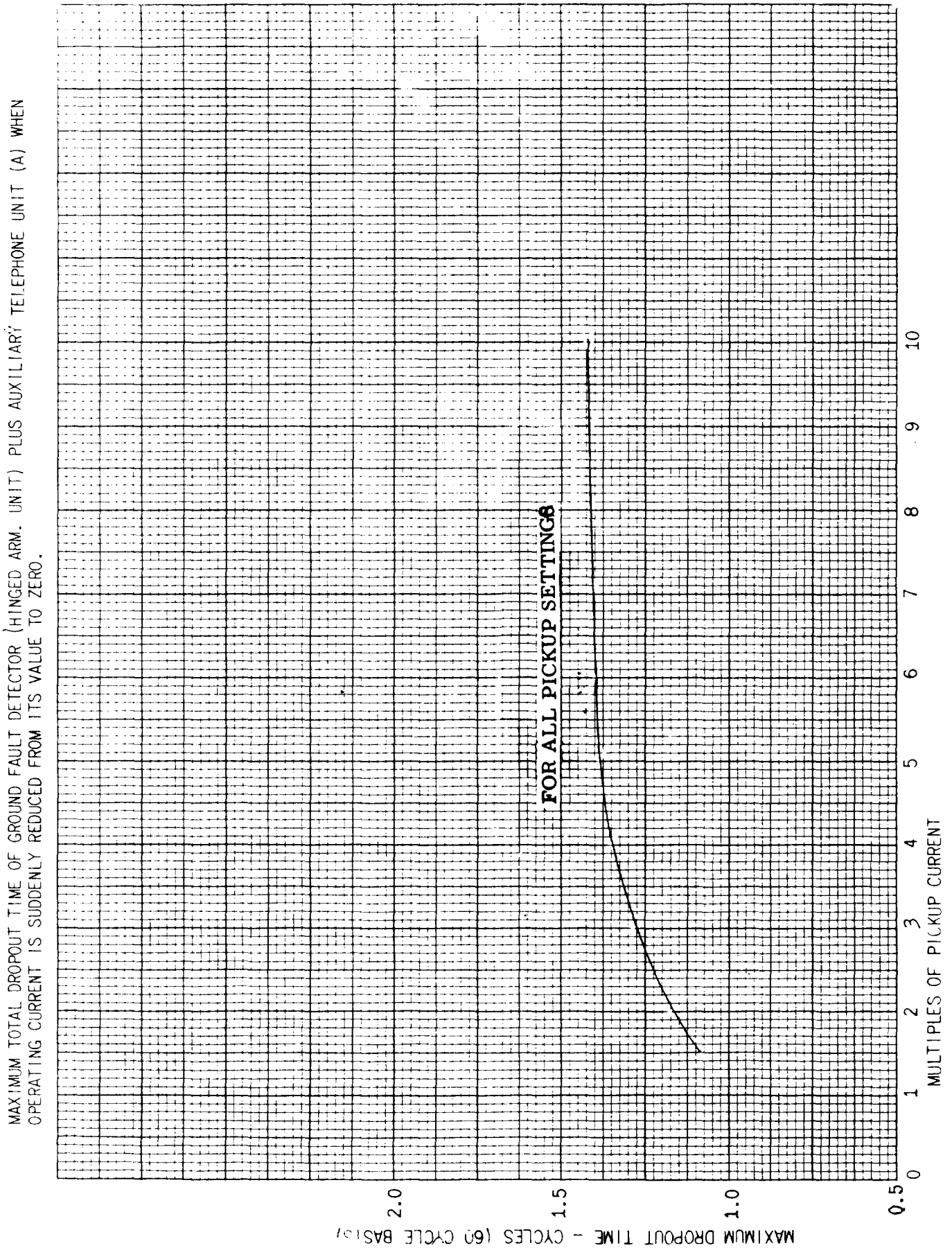
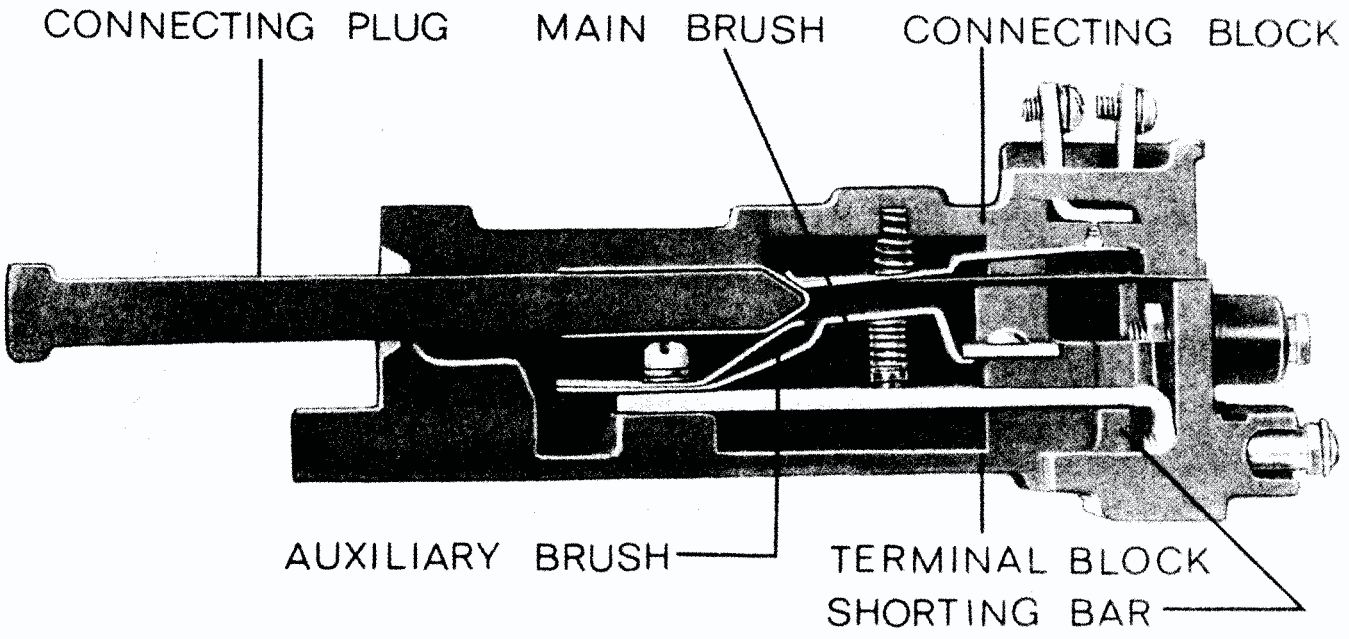


Figure 5 (0127A9438 Sh.1) Maximum Pickup-Time Curve for Hinged-Armature (GFD) Unit Plus Telephone Unit (A) of CHC11A Relay



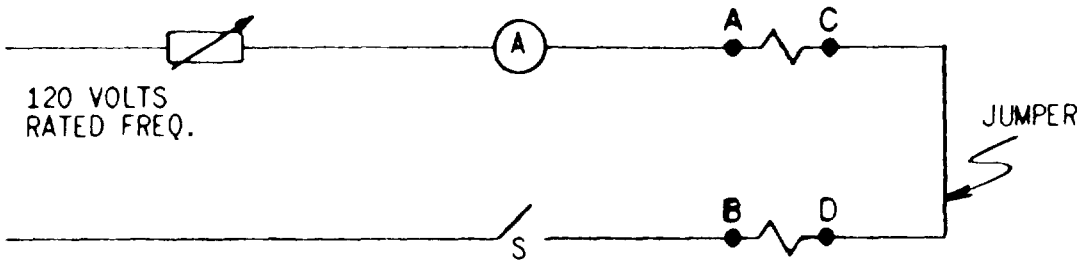
* Figure 6(0127A9438 Sh.2 [1])Maximum Dropout-Time Curve for Hinged-Armature (GFD) Unit Plus Telephone Unit of CHC11A Relay

* Revised since last issue



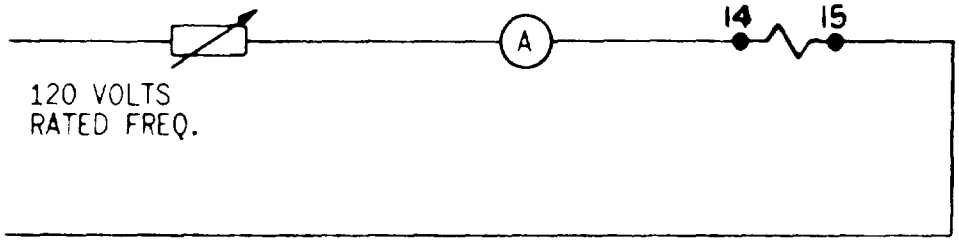
NOTE: AFTER ENGAGING AUXILIARY BRUSH CONNECTING PLUG TRAVELS 1/4 INCH BEFORE ENGAGING THE MAIN BRUSH ON THE TERMINAL BLOCK

Figure 7 (8025039) Cross Section of Drawout Case Showing Position of Auxiliary Brush and Shorting Bar



FAULT CONNECTIONS	CONNECT TO STUDS		SHORT STUDS	
	A	B	C	D
Ø1-Ø2	3	5	4	6
Ø2-Ø3	5	7	6	8
Ø3-Ø1	7	3	4	8

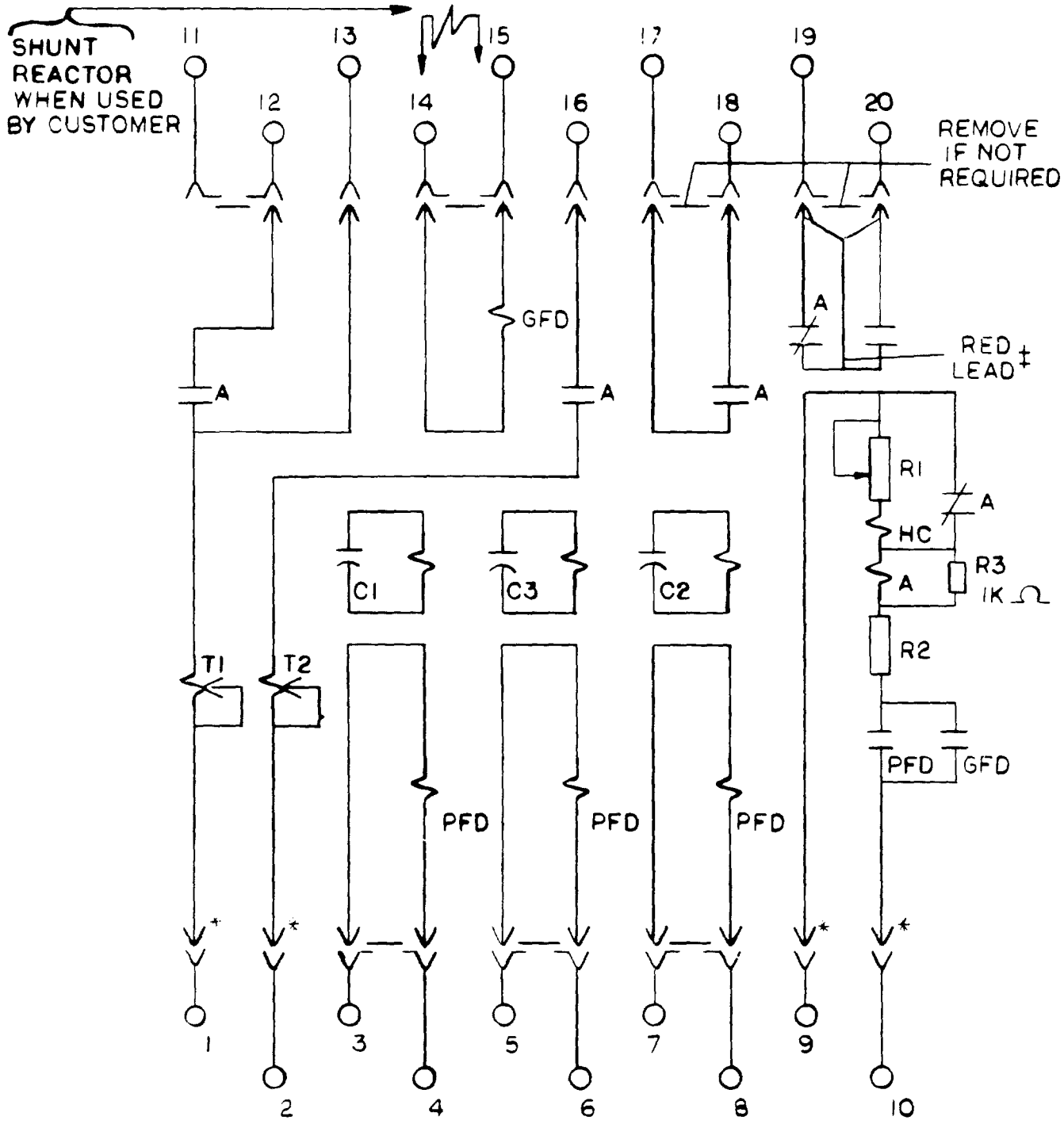
A. CONNECTIONS FOR SETTING PICKUP OF CUP (PFD) UNIT



B. CONNECTIONS FOR SETTING PICKUP OF HINGED ARMATURE (GFD) UNIT

* Figure 8 (0127A9448-1) Test Connections for Setting Pickup of PFD and GFD Units

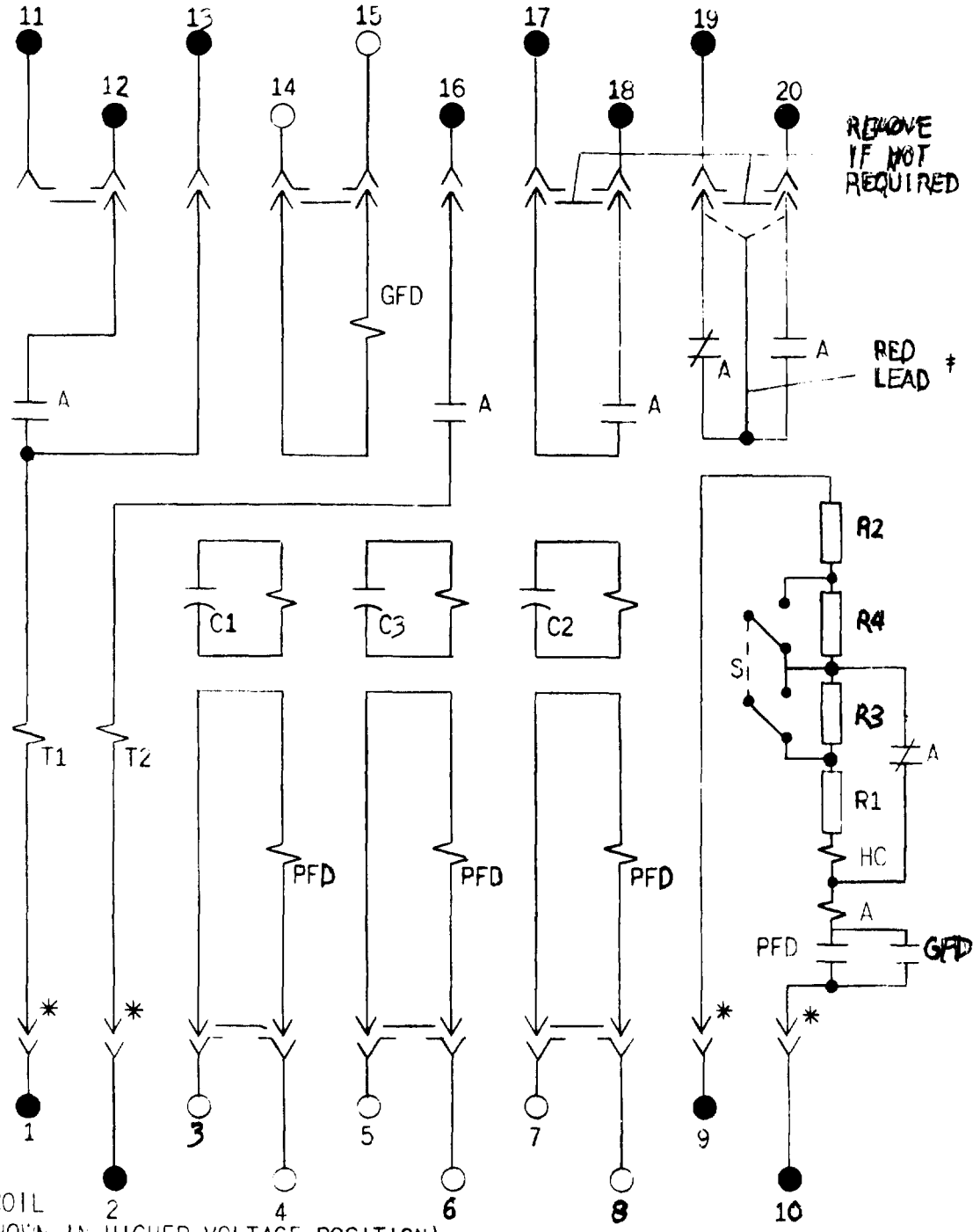
* Revised since last issue



VOLTS	R1 OHMS	R2 OHMS
250	2000	600
125	1000	300
48	300	50

* Figure 9 (0178A9066-5) Internal-Connection Diagram of CHC11A Relay (Front View)

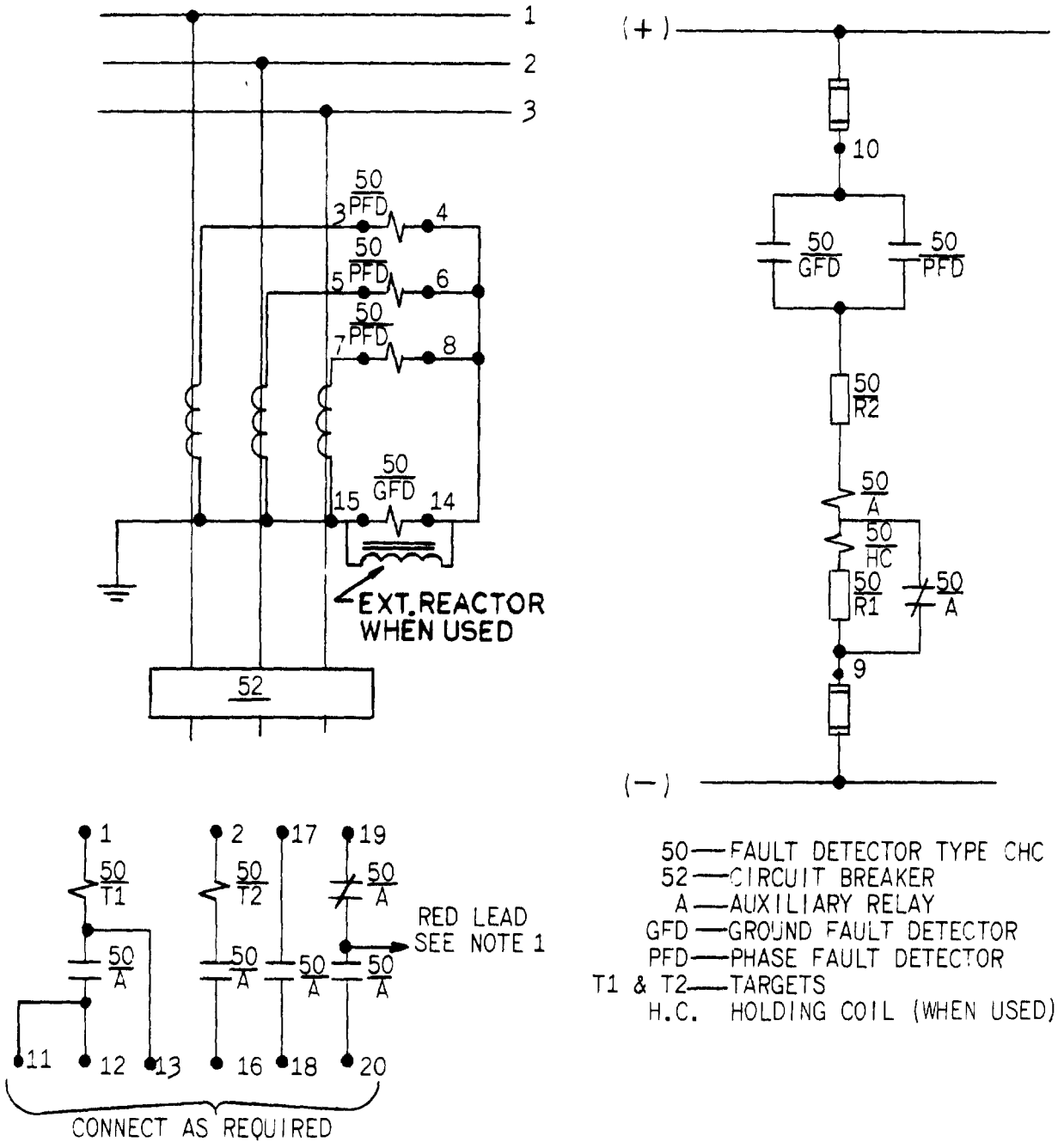
* Revised since last issue



HC = HOLDING COIL
S = SWITCH (SHOWN IN HIGHER VOLTAGE POSITION)
A = TELEPHONE RELAY
GFD = HINGED ARM UNIT
PFD = CUP UNIT
‡ CONNECT TO OBTAIN EITHER NORMALLY OPEN OR NORMALLY CLOSED CONTACT.
* = SHORT FINGER

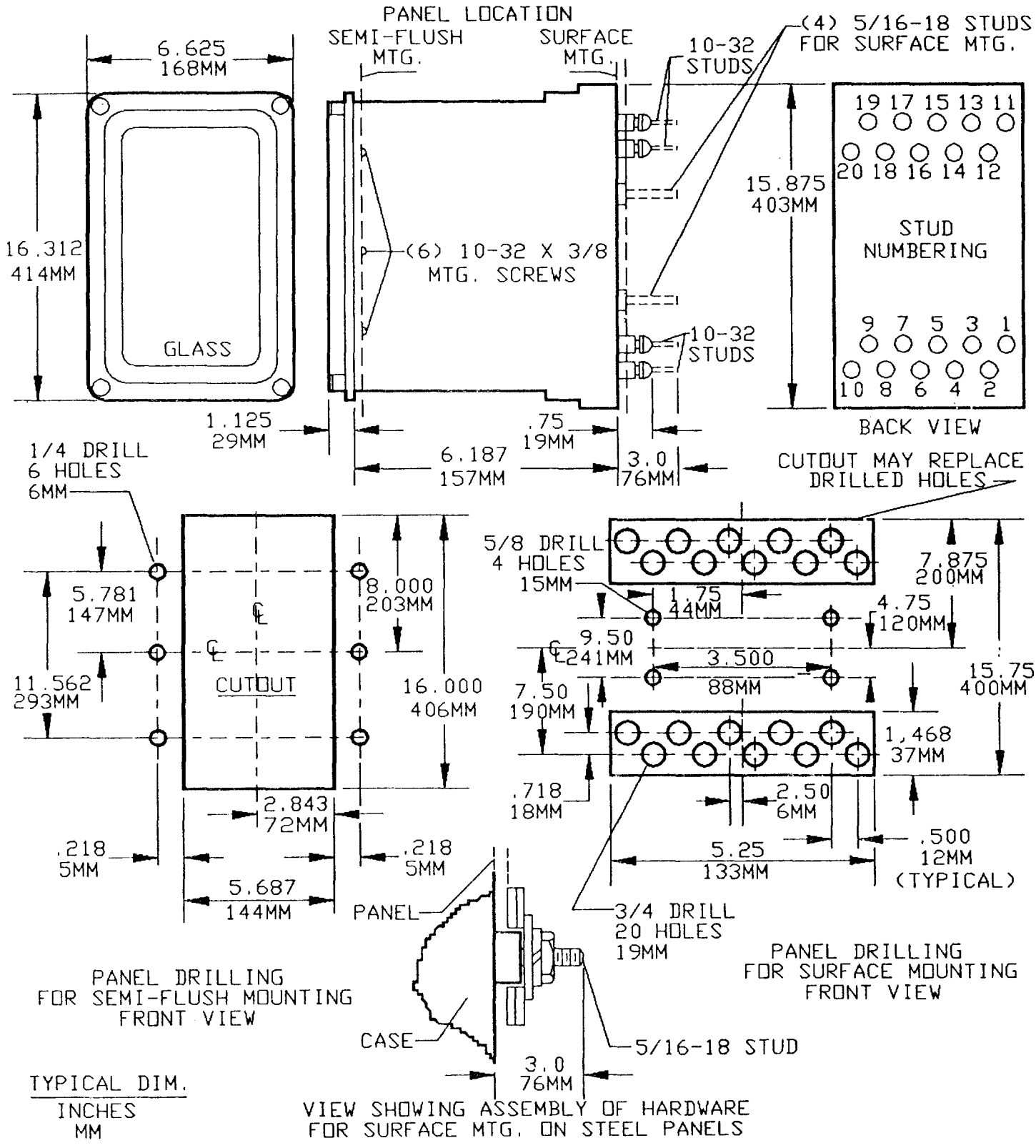
VOLTS	R1 OHMS	R2 OHMS	R3 OHMS	R4 OHMS
48/125	175	50	300	100

Figure 10 (0178A9067) Internal-Connection Diagram of CHC11B Relay (Front View)



NOTE 1 - RED LEAD AVAILABLE. WHEN CONNECTED STUD 19, CONTACT BETWEEN STUDS 19 & 20 IS NORMALLY OPEN. WHEN CONNECTED TO STUD 20, CONTACT BETWEEN STUDS 19 & 20 IS NORMALLY CLOSED.

Figure 11 (0127A9420-2) Typical External-wiring Diagram of CHC11A Relay



* Figure 12 (6209274-4) Outline and Panel-Drilling Diagram for CHC11A Relay

* Revised since last issue

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