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**SWITCHBOARD      TECHNICAL      MANUAL**

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**PART 2**

**CHAPTER 4**  
**CIRCUIT BREAKER**

**Navy Type ACB-3200HR**  
**General Electric Type AK-2-100N**

**CHAPTER 5**  
**CIRCUIT BREAKER**

**Navy Type ACB-4000HR**  
**General Electric Type AK-1-100N**

**GENERAL  ELECTRIC**  
**PHILADELPHIA, PA.**

**NOTICE:** Additional copies of this or other manuals may be obtained from the U. S. Naval Supply Depot, Mechanicsburg, Pennsylvania. Manuals requested on equipment for which a NAVSHIPS identification number is not known may be obtained by furnishing complete identification plate data, service application, and other characteristics of the equipment to aid in the identification of the applicable manual.

GEI-83901



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

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## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## CLASSIFICATION DATA

Manufacturer .....	General Electric Co., Philadelphia, Pa., U.S.A.
Types .....	Navy Type ACB-3200HR, General Electric Type AK-2-100N Navy Type ACB-4000HR, General Electric Type AK-1-100N
Continuous Current Rating	
Type ACB-3200HR .....	3200 amperes
Type ACB-4000HR .....	4000 amperes
Voltage .....	500 volts, AC
Poles .....	3
Rated Interrupting Current .....	100,000 amperes, asymmetrical
Short-time Rating .....	100,000 amperes, asymmetrical
Short-time Rating In Cycles .....	35
Mounting .....	Removable assembly
Main Connections .....	Back
Normal Closing .....	Electric
Overcurrent Coils	
Type ACB-3200HR - 2000, 2400, 2800 .....	3200 amperes
Type ACB-4000HR .....	4000 amperes
Characteristic Time Curve .....	Bands 2, 3, or 4
Temperature .....	50°C
Shock Classification .....	Class HI
Insulation Class .....	B
Accessories .....	Auxiliary Switch
Protective Functions .....	Overcurrent trip
	Long-time delay and instantaneous
	Long-time delay, short-time delay, and instantaneous
	Short-time delay and instantaneous
	Instantaneous
	Undervoltage trip, when required
	Shunt trip, when required
Master Drawings	
Type ACB-3200HR .....	G. E. No. 0122F0963 (2 sheets)
Type ACB-4000HR .....	G. E. No. 7078F30 (2 sheets)
Certification of Approval .....	
Applicable Military Specification .....	MIL-C-17587
Weights	
Complete Breaker .....	775 lb
Moving Component Only .....	650 lb



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION B-1

### General Instructions

#### GENERAL

This manual describes both the Navy Type ACB-3200 HR and the Navy Type ACB-4000 HR air circuit breakers, since they are fully interchangeable in installation and operation except for overcurrent trip ratings.

#### PURPOSE

The fundamental purpose of a circuit breaker is to isolate a circuit from the source of power. This purpose may be served by normal off-on switching operations of normal continuous current, or it may be served automatically under fault conditions. When the breaker is equipped with a shunt trip device, with the proper control wiring installed, the breaker may be opened from a location that is remote from the switchboard in which the breaker is installed.

#### WARNING

BEFORE INSPECTION, INSTALLATION, OR REMOVAL PROCEDURES, THE CIRCUIT BREAKER SHOULD BE IN THE "OPEN" POSITION, THE MOTOR POWER "OFF," AND THE BREAKER IN THE WITHDRAWN POSITION (SEE FIGURE 4). IF THE STATIONARY COMPONENT IS TO BE REMOVED, THE SWITCHBOARD SHOULD BE DE-ENERGIZED. IF THE BUS CANNOT BE DE-ENERGIZED, USE INSULATED TOOLS, RUBBER GLOVES, AND A RUBBER FLOOR MAT.

CARE MUST BE TAKEN WHEN ANY MAINTENANCE WORK IS BEING DONE SO THAT THE BREAKER IS IN THE "OPEN" POSITION AND THE CLOSING SPRINGS (1) (SEE FIGURE 1) ARE EXERTING THE LOAD ON THE SAFETY PIN (2). THE CLOSING SPRINGS SHOULD BE CHARGED WITH THE MAINTENANCE HANDLE, SO THAT THE SAFETY PIN CAN BE PLACED IN THE LOWER HOLE OF THE PUSH ROD (4). (THE UPPER HOLE IS USED IN THE INITIAL ASSEMBLY OF THE SPRINGS.) CONTINUE TO OPERATE THE MAINTENANCE HANDLE, THUS CLOSING THE BREAKER. THIS IS DONE SO THAT THE SAFETY PIN TAKES THE LOAD OFF THE SPRINGS.

FOLLOWING THE INSPECTION, THE CLOSING SPRING MUST BE RECHARGED, THE SAFETY PIN (2) REMOVED FROM THE PUSH ROD, AND THE PIN PLACED IN THE SPRING CLIP (3).

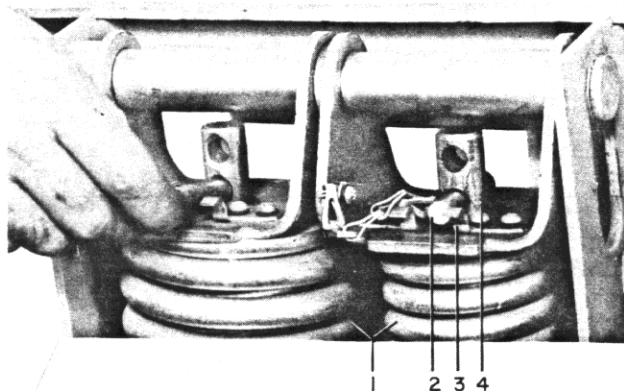
#### HANDLING

Care should be exercised in unpacking to avoid damage to breaker parts. Be sure that no loose parts are missing or left in the packaging material. Blow out any dirt or loose particles of packaging material remaining on/or in the breaker unit.

If the breaker is not to be placed in service at once, it should be stored in a clean, dry location in an upright position. It is also advisable not to cover the breaker with any material that absorbs moisture thereby resulting in the corrosion of breaker parts. A covering of kraft or other non-absorbent paper will prevent dust from settling on the breaker.

#### INSTALLING STATIONARY COMPONENT

1. Place the stationary component in the switchboard compartment and push to the rear of the enclosure. Secure the stationary component to the switchboard vertical member with six bolts and to



- |                   |                   |
|-------------------|-------------------|
| 1 Closing springs | 3 Safety pin clip |
| 2 Safety pin      | 4 Push rod        |

Figure 1. Installing safety pin in push rod



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

the switchboard front horizontal member with four bolts.

2. Bolt the switchboard bus and cables to the stationary component terminals. Provide the required bracing to the buswork and cable to prevent the transfer of stresses, caused by possible short circuits, to the assembly terminals.

3. Connect control circuit wiring as required per the specific breaker wiring diagram.

4. To remove the stationary component, reverse the installation procedure.

### INSERTING CIRCUIT BREAKER MOVING COMPONENT

#### NOTE

Before inspecting, installing, or removing the circuit breaker, refer to the preceding safety precautions.

1. Make sure the breaker contacts are open.
2. Lift the breaker to a position approximately six inches above the height of the enclosure tray.
3. Move the drawout tray out under the breaker as far as the tray will travel by moving the breaker stop pin release handle to the right and pulling the tray completely out.
4. Lower the breaker to a distance of about 1/2 inch above the dowel pins on the tray and push the breaker back into its compartment so that the rear bottom angle of the breaker is against the guides on the tray directly in back of the dowel pins.
5. Slowly lower the breaker onto the tray and at the same time guide it so that the holes in the rear angle of the breaker fit over the two dowel pins on the tray. If the breaker is correctly positioned on the dowels, its rear and side bottom frame angles will all sit firmly on the tray.
6. Insert four 3/8-inch hexagonal head bolts through the holes in the front of the side angles on the breaker and thread them part way into the tapped holes in the tray. **DO NOT TIGHTEN BOLTS FIRMLY.** This permits self-alignment of the primary disconnects during the subsequent racking operation.

7. Push the breaker back into the compartment until the housing racking pins butt against the outer surface of the racking cam. In this position, the

racking pin lifts the locking arm on the cam which allows the racking handle to be lifted enough to allow the pawl to engage the first notch on the cam.

8. When the pawl engages the first notch on the cam, push the handle down again to its normal position. This causes the cam to rotate about the racking pin. Repeat this operation five times to rack the breaker into its final "connected" position.

#### NOTE

It is imperative that each stroke be performed with a positive motion and carried to its limiting position.

Interlocks hold the breaker trip-free until it is racked into the fully "connected" position. The fifth stroke of the handle is only a partial stroke and does not result in any further movement of the breaker. However, it does serve three useful purposes:

- a. It positions the cam so that it cannot rotate and allow the breaker to back out under short circuit stresses.
- b. The partial stroke signals that the racking operation is complete.
- c. It releases the trip interlock which was engaged by the racking pin during the previous four pumps of the racking arm.

#### NOTE

Once a racking operation has been started, it should be completed because the breaker cannot be reversed until the racking operation is completed.

9. After completing the fifth racking stroke, lift the handle as high as it will go and allow it to drop to its normal position. This operation will reverse the pawl so that it is set for a racking-out operation.

#### NOTE

Any strokes beyond this point will cause the breaker to be trip-free.

Tighten the 3/8-inch hexagonal head bolts inserted in the front holes of the drawout tray. The breaker is now in the "connected" position shown in figure 3.





## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

**WITHDRAWING CIRCUIT BREAKER  
MOVING COMPONENT**

1. Trip the breaker to release the positive racking interlock and open the compartment door.

2. Lift the racking handle as far as it will go. This operation will re-engage the trip interlock to hold the breaker trip-free for the remainder of the racking operation. Note that here the cam is rotated by lifting the handle, whereas in racking the breaker in, the operation is performed as a result of pushing the handle down.

3. Reset the handle to its lowered position and lift it again. This operation must be performed five times to completely disengage the cams from their racking pins. After the fifth lifting stroke, let the handle drop to its normal position. This will reverse the racking pawl and set the mechanism for racking the breaker in again.

4. Move breaker stop pin release handle to the right and pull the breaker all the way from its compartment until the limit stop is reached.

5. Remove the four 3/8-inch hexagonal head bolts which hold the breaker on the tray.

6. Lift the breaker approximately 1/2 inch off the dowel pins on the tray and pull the breaker forward until its primary contacts clear the compartment.

7. Push the tray all the way back into the compartment. The breaker is now completely free from its compartment.

8. The breaker can now be lowered to the desired position. When lowering the breaker, make sure it is held far enough away from the front of the switchgear so that its contacts do not interfere with devices or handles on the compartments beneath it as it is lowered.

plete inspection of the breaker, including contacts and arc quenchers, should be made after the breaker has interrupted a short circuit.

At regular inspection periods, the breaker should be operated manually to observe the contact alignment and to make sure all mechanism parts move freely without binding or excessive friction.

If the breaker remains open or closed for a period of six months or more, it is recommended that arrangements be made to open and close it several times in succession, preferably under load.

If overheating, not caused by overcurrent, is observed, a complete inspection of the breaker should be made including connections, contacts, and flexible connectors. Inspect cable and bus connections for signs of overheating and tighten all loose connections. Check to ascertain that all secondary connections are secure and all control wire is intact.

A complete contact inspection, including contact wipe and pressure, should be made at regular inspection periods and always after a known short-circuit current has been interrupted to determine the condition of the contacts. It is necessary to remove the arc quenchers to properly inspect the contacts. Arcing contacts and arc quencher barriers should be replaced when they are eroded to half their original thickness.

At all times it is important that no pencil lines, paint, oil or other foreign materials remain on the insulating surfaces of the breaker as they may cause low resistance between points of different potential and result in eventual electrical breakdown.

Inspect all mounting bolts in the stationary component; tighten all bolts that appear loose.

Before replacing the breaker, check alignment of the primary disconnecting device contacts and stud.

**MAINTENANCE****NOTE**

De-energize the equipment completely by removing all sources of power, both primary and secondary. Also, be sure the breaker is in the open position before inspection or any maintenance work is done.

Inspection of the circuit breaker is recommended at least once a year. More frequent inspections are recommended if severe load conditions, dust, moisture, or other unfavorable conditions exist. A com-

**REPLACING PARTS**

Before replacing any part it is strongly recommended that the operator familiarize himself with all parts involved in making the replacement.

**Trouble Shooting**

Table 1 lists typical symptoms of breaker malfunction, together with their cause and remedy. If at any time these symptoms are observed, their cause should be determined and the necessary corrective action taken.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

TABLE 1  
TROUBLE SHOOTING

TROUBLE	CAUSE	REMEDY
Overheating	Contacts not aligned Contacts dirty, greasy or coated with dark film Contacts badly burned or pitted Current-carrying surfaces dirty Corrosive atmosphere Insufficient bus or cable capacity Bolts and nuts at terminal connections not tight Current in excess of breaker rating  Excessive ambient temperature Inductive heating	Adjust contacts. See Section D-3. Clean contacts.  Replace contacts. See Section E-1. Clean surfaces of current-carrying parts. Check enclosure Increase capacity of bus or cable. Tighten, but do not exceed, elastic limit of bolts or fittings. Check breaker application or modify circuit by decreasing load. Provide adequate ventilation. Correct bus or cable arrangement.
Failure to trip	Travel of tripping device does not provide positive release of tripping latch Worn or damaged trip unit parts Binds in overcurrent trip device  Contacts binding in arc quencher	Re-adjust. See Section D-13.  Replace trip unit. See Section E-1. Adjust overcurrent trip device. See Section D-13 Remove high spots, or align arcing contacts. Replace arc quencher. See Sections E-1 and D-3.
False tripping	Overcurrent pick-up too low  Overcurrent time setting too short  Bind in overcurrent trip device	Check application of overcurrent trip device. Check application of overcurrent trip device. Replace overcurrent trip device. See Section E-1
Failure to close and latch	Binding in attachments preventing resetting of latch Latch out of adjustment Latch return spring too weak or broken Hardened or gummy lubricant Safety pin left in push rod Motor burned out Faulty control circuit component  Control voltage low	Re-align and adjust attachments.  Adjust latch. See Section D-4. Replace spring. See Section D-4. Clean bearing and latch surfaces. Remove safety pin. See Section B-1. Replace motor. See Section E-1. Replace or adjust faulty device. See Section E-1. Increase control voltage.
Burned main contacts	Improper contact sequence (main contacts not sufficiently parted when arcing contacts part)  Short-circuit current level above interrupting rating of breaker  Loss of contact wipe or pressure	Increase arcing contact wipe. Adjust contact sequence by raising or lowering main movable contact pivot block. See Section D-3. Requires system study and possible replacement with breaker having adequate interrupting capacity. Replace stationary contact springs and dress or replace contacts. See Section E-1.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

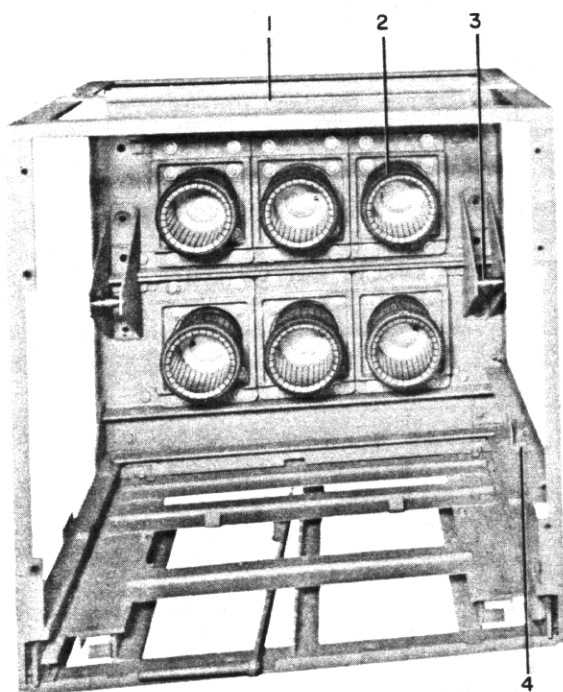
## SECTION B-2

### Description of Removable Assembly

The complete assembly of the ACB-3200HR circuit breaker and ACB-4000HR circuit breaker consists of a stationary component (see figure 2) that is mounted in the switchboard frame plus a drawout-type moving component (see figures 3 and 4).

The stationary component is a box-type unit that is bolted to the vertical members in the back and to the front horizontal member in the switchboard

frame. The stationary component contains the following parts: the six primary disconnects which serve as a separable connection between the switchboard stationary copper and the breaker moving component, the stationary portion of the secondary or control disconnects, a rollout tray which guides the circuit breaker element into the proper location, and two rollers which provide a support for the racking mechanism on the breaker.



- 1 Stationary secondary wiring disconnects
- 2 Primary disconnect (sta)
- 3 Racking pin
- 4 Drawout interlock device

Figure 2. Front view of stationary component

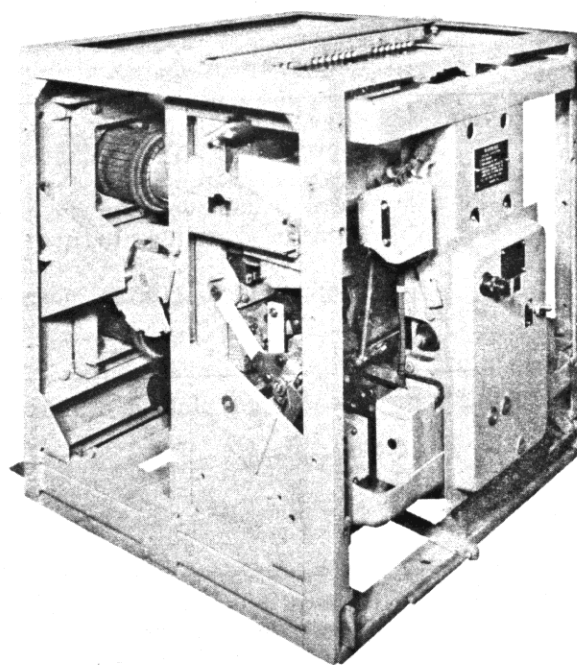


Figure 3. Removable assembly with breaker moving component shown in the connected position



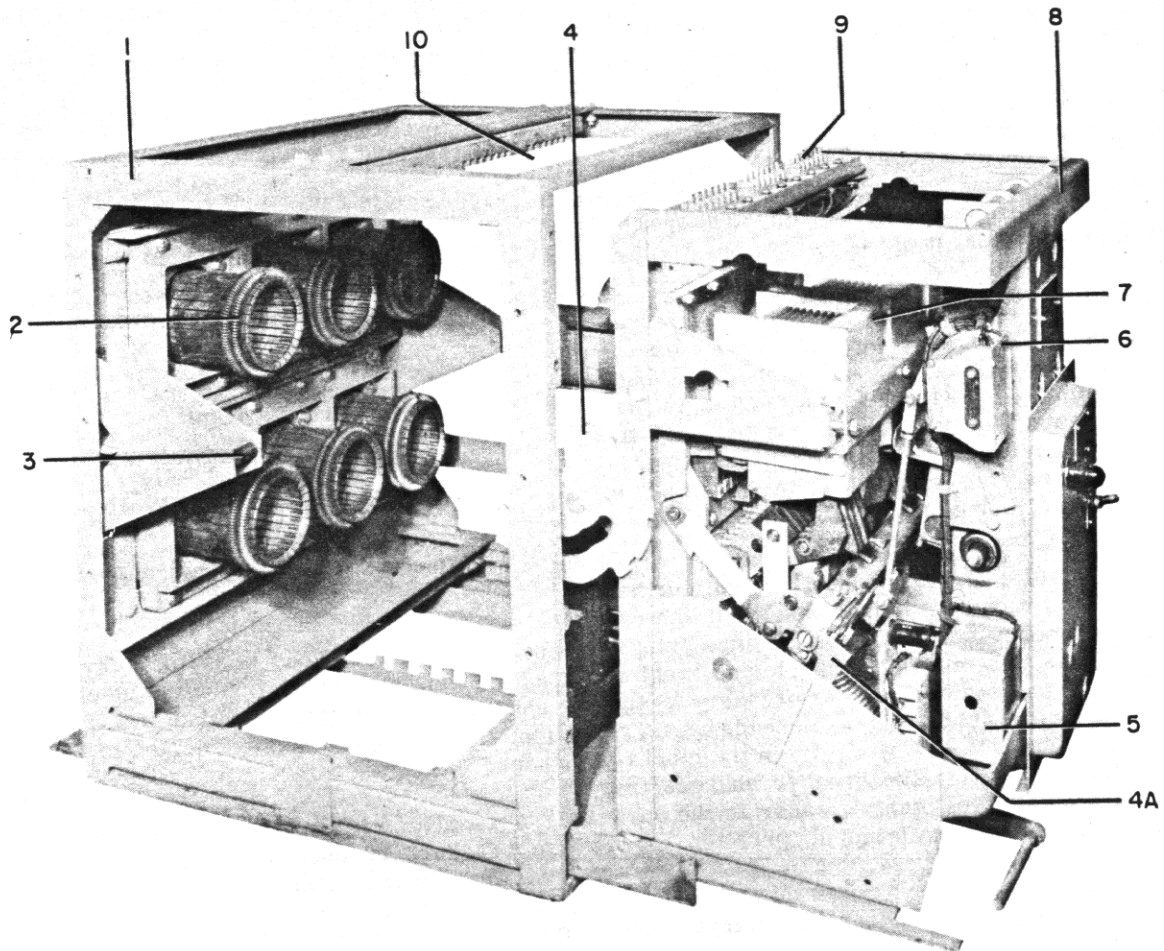
## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION B-3

### Description of Circuit Breaker

The circuit breaker moving component (see figure 5) consists of two major parts: the back frame assembly and the front frame assembly. The back frame assembly (see figure 7) contains three pole unit assemblies, each mounted on an insulated molding. These moldings isolate the main current-carrying structure from the metal supporting base of the circuit breaker.

Each pole base serves as a mounting for the upper stud, the stationary and movable main contacts (2 and 5) (see figure 7), the stationary and movable intermediate contacts (1 and 4), the stationary and movable arcing contacts (8 and 9), the lower contact block (3), and the lower stud. These components are connected in series in the order



- 1 Stationary component
- 2 Primary disconnect (sta)
- 3 Racking pin
- 4 Racking cam
- 4A Anti-rebound hook
- 5 Control relay\*

- 6 Auxiliary switch\*
- 7 Arc quencher assembly
- 8 Circuit breaker moving component
- 9 Moving secondary disconnects
- 10 Stationary secondary disconnects

\*Repair part

Figure 4. Removable assembly with breaker moving component shown in the withdrawn position



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

named except for the arcing contacts, which are in parallel with the main contact.

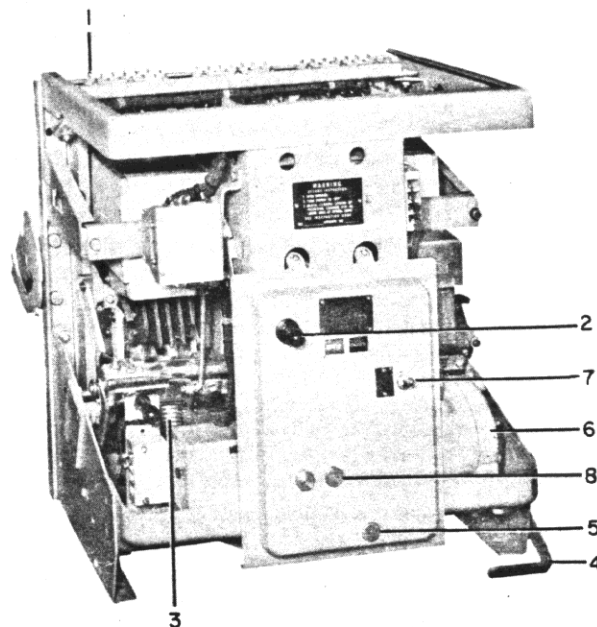
The pole base linkage is arranged in such fashion that on opening, the main contacts open first, the intermediate contacts open second, and the arcing contacts open last to draw the arc into the arc quencher where it is promptly extinguished. The linkages of the three pole base units are connected together by an insulated cross bar (6) (see figure 7) that assures simultaneous operation of the three poles.

The overcurrent trip device consists of an armature and magnet assembly mounted on the lower stud to the rear of the pole base and the calibration and timing unit mounted on the front of the pole base (see figure 7). The magnet and armature assemblies of the overcurrent trip device surround the lower stud to detect the presence of overcurrent. When an overcurrent condition exists, the movement of the armature to the closed air-gap position is transferred through the linkages to the calibration and timing unit, tripping the breaker per predetermined settings.

The front frame assembly (see figure 9) contains the operating mechanism which controls the opening and closing of the contacts on the back frame assembly. The front frame assembly also contains a motor and gear reduction unit and the closing spring assembly. The motor and gear reduction unit operates through an output crank to pre-charge the closing spring assembly.

When a closing operation is desired, further charging of the closing springs results in the release of the energy stored in the closing springs. This energy is directed into the closing mechanism to close the contacts of the breaker. As the closing springs are discharged to close the breaker, the breaker is held closed by a prop in the mechanism assembly. Closing the breaker charges the trip springs which return the breaker to the open position on any subsequent tripping operation.

The shunt trip device, mounted on the mechanism frame, provides a means for tripping the breaker without regard to load conditions on the circuit. An auxiliary switch, which contains normally open and normally closed contacts and which is operated through linkage by the breaker cross bar, is incorporated for use in protective and control circuits. Manual tripping may be accomplished by manual operation of the trip button on the breaker



- 1 Secondary disconnects (movable)
- 2 Indicating light\*
- 3 Opening springs\*
- 4 Racking handle
- 5 Close button
- 6 Gear reduction unit
- 7 Motor power switch
- 8 Trip button

\*Repair part

Figure 5. Front view of moving component

escutcheon plate. The shock lock device, mounted on the right side of the operating mechanism, prevents the circuit breaker, when in the closed position, from tripping when subjected to a mechanical shock.

A racking mechanism, permanently mounted on the breaker, is used to insert and remove the breaker into and from the connected position. The drawout interlock is co-ordinated with the racking mechanism to prevent the insertion or removal of a closed breaker into or from the connected position.

The anti-rebound hook (4A) (see figure 4) on the left side of the cross bar prevents accidental closing of the circuit breaker contacts, from the open position, when the circuit breaker is subjected to mechanical shock.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

**SECTION C-1****Operation of Circuit Breaker****CLOSING THE CIRCUIT BREAKER****Manual Operation (Maintenance Closing)**

To observe the operation of the breaker without power, with the breaker open and springs discharged, proceed as follows:

1. Place the special ratchet type maintenance handle furnished with switchgear on shaft (12) (see figure 12).
2. Charge the closing springs with the maintenance handle until the indicator (4) (see figure 11) reads charged.
3. Continue to operate the maintenance handle until the breaker closes.

**Electrical Operation (Normal Closing)**

With the breaker opened and the closing spring discharged, the cycle for electrical operation is as follows:

1. The breaker will close only when the closing mechanism is in the charged position and the breaker is in the open position as shown by their respective indicators. This is the reset position.
2. The motor and gear reducing mechanism charges the closing springs in the front frame through the linkage of the operating mechanism.

This occurs automatically whenever the breaker is opened, and the control power is still on.

3. When the closing control circuit is energized, the motor mechanism forces an over-center cam to travel past dead center. This releases the closing springs which close the breaker. The closing mechanism is now discharged, and the breaker is closed.

**TRIPPING THE CIRCUIT BREAKER**

The breaker may be tripped by using the manual trip button, the shunt trip device, or by the over-current trip unit.

To trip the breaker manually, depress the trip button on the breaker escutcheon. The breaker will trip through mechanical linkage. When the trip button is released, it will return to its normal position.

To trip the breaker electrically, turn the control switch, which is remotely located, to the TRIP position to energize the shunt trip coil. With this trip coil circuit closed, the shunt trip device will operate, causing the trip shaft to rotate in a counter-clockwise direction, displacing the trip latch and tripping the breaker.

The overcurrent trip unit will open the circuit breaker by rotating the trip shaft, through the action of the trip paddles, whenever the current exceeds the designated pickup values.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION C-2

### Typical Wiring Diagrams

Figure 23 shows a typical elementary and connection diagram for the control of electrically operated breakers. The diagram shows the breaker in the open position with the closing springs discharged. When the normal control voltage is applied to the control circuit, the motor will be energized through the normally closed contacts H(1-2), F(3-4), G(3-4), M(Z1-Z2), D(8-4), E(3-4), and M(Z3-Z4), until the pre-charging of the closing springs is completed. This occurs approximately 30 cycles before the spring-charging cam reaches the top dead-center position. The pre-charging operation is then concluded by the operation of the E, F, and G switches. Cam-switch contacts F(3-4) and G(3-4) isolate the motor from the control power source and a dynamic brake is applied by reversing the motor field M(Z1-Z2) through the contacts E(2-1), D(4-8), M(Z2-Z1), G(4-2), D(7-3), F(1-2), and M(Z3-Z4). The closing operation can then be obtained by completing circuit (12-13) by using either the push-button switch N or a remote switch. Operation of the closing switch causes relay D to pick up and seal in through contacts H(1-2), D(1-7), and

G(2-1) thus completing the motor circuit through H(1-2), D(1-7), G(2-4), M(Z1-Z2), D(8-2), F(1-2), and M(Z3-Z4). The motor carries through the spring-charging operation until the cam goes over top dead center. At this point, the springs will discharge independently of the motor and close the breaker. The motor circuit is then interrupted by the contacts of switches E, F, and G which will revert to their original positions as shown in figure 23. The pre-charging operation for the succeeding closing operation is blocked by contact D(8-4) if contact is maintained on the push-button switch N or the remote switch. If the push-button contact N or the remote switch contact has been released, the breaker will pre-charge the closing springs automatically following the breaker closing operation as long as control power is available.

The operation of the remote trip switch, with the breaker closed, will cause the shunt trip coil to be energized and trip the breaker. The trip impulse is interrupted by the "a" contact of the auxiliary switch as the breaker opens.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-1

## General Assembly of Circuit Breaker

The various components and attachments of the moving component of the ACB-3200HR and the ACB-4000HR circuit breakers are mounted on the front frame. Current-carrying parts are insulated from the breaker frame by the use of insulated bases.

The main current-carrying contacts and arc chutes are located at the top of the breaker. The series overcurrent trip devices are mounted on the bottom of the insulated bases. The operating mechanism is centrally located in the front of the breaker. A mechanical position indicator is mounted on the front escutcheon just below breaker nameplate. The shock lock for trip shaft is mounted on the right

side of the mechanism frame, and the latch is mounted on the trip shaft. The manual trip button is located on the front escutcheon under the open and close indicator.

The gear reduction unit is mounted to the right of the front channel with the motor mounted behind it. The closing relay is located on the lower left side of the front channel below the auxiliary switch. The shunt tripping device is mounted to a bracket attached to the left side of the operating mechanism, and operates in series with an auxiliary switch contact.

## SECTION D-2

## Arc Quencher

## DESCRIPTION

(See Figure 6)

The arc quencher extinguishes the arc when the circuit is interrupted. It also confines the arc products and isolates the pole units.

## OPERATION

Each arc quencher is made up of a number of inner barriers (5), two side barriers (3), and two pocket barriers (4). The inner barriers are held in place by the spacer block (9), steel back plate (8), compound support (7), and the muffler (6). The side and pocket barriers are held in place by the stud (1) and cap (2).

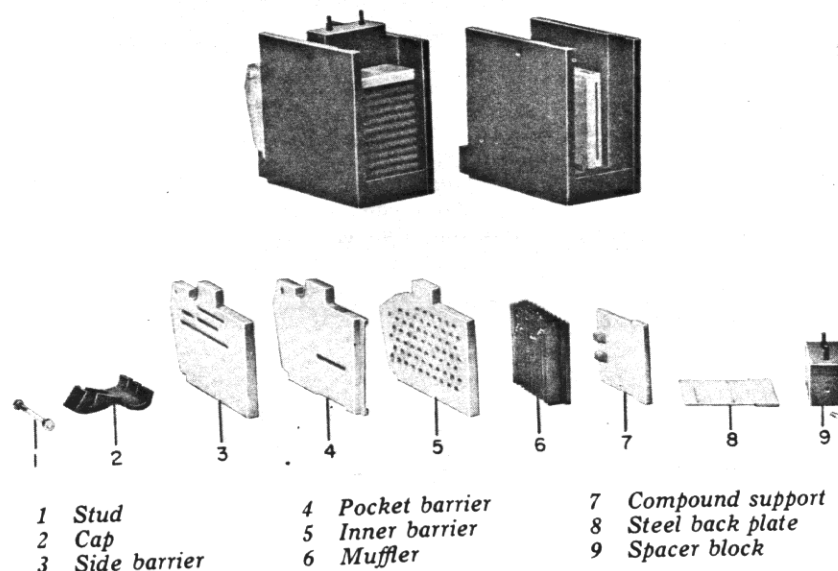
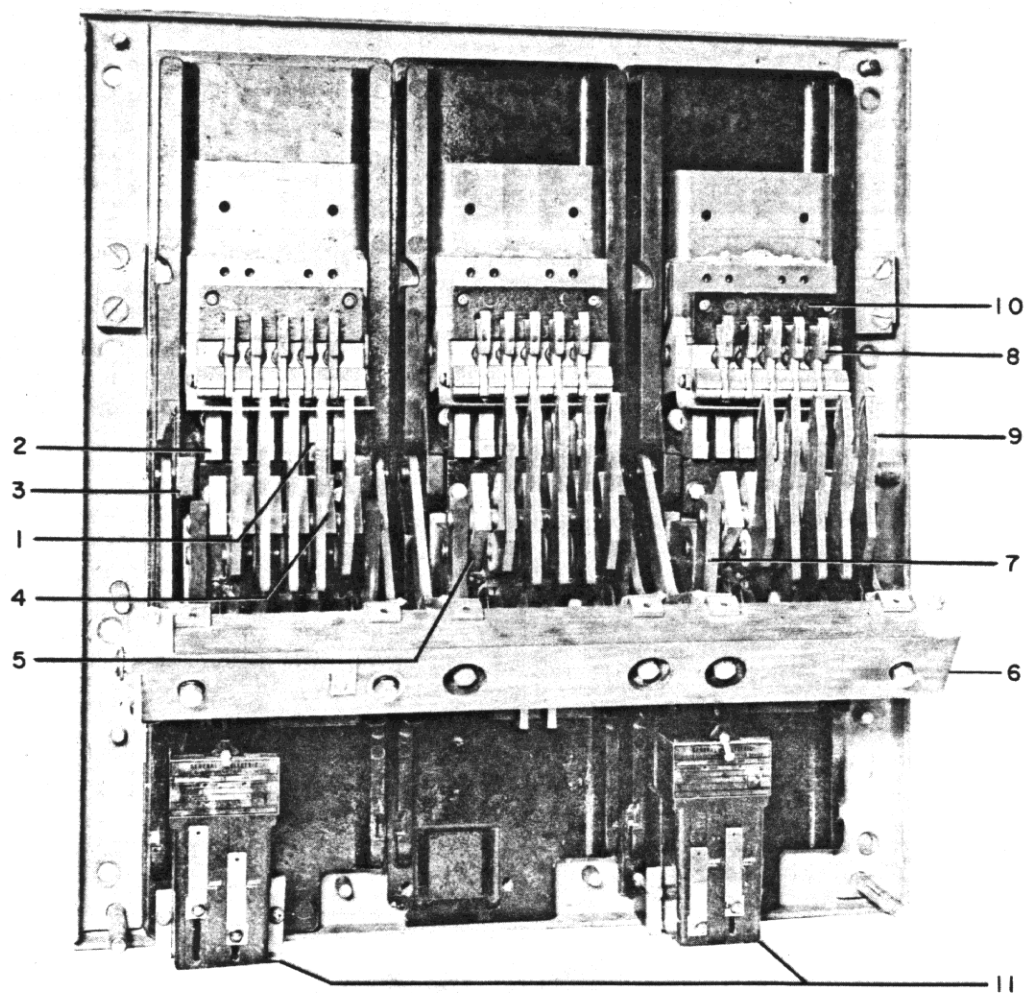


Figure 6. Disassembly of arc quenchers



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR



- 1 Stationary intermediate contact\*
- 2 Stationary main contact\*
- 3 Lower contact block
- 4 Movable intermediate contact\*
- 5 Movable main contact\*
- 6 Cross bar
- 7 Link
- 8 Stationary arcing contact\*
- 9 Movable arcing contact\*
- 10 Upper contact block
- 11 Overcurrent device

\*Repair part

Figure 7. Front view of back frame assembly, moving component



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-3

### Contact Assembly

#### DESCRIPTION (SEE FIGURE 8)

The function of the contact assembly is to open and close the circuit and to minimize the possibility of damage due to arcing.

#### OPERATION

Each pole unit assembly consists of a set of arcing contacts, a set of main contacts, the actuating linkage, and the mounting base.

The stationary arcing contact consists of a set of parallel contact fingers (1), pin (2), and compression springs (21). These springs provide continuous contact pressure for the full travel of the contacts. Flexible braid leads shunt the pivot pin to prevent possible pitting at the pivot pin when interrupting high currents.

The movable arcing contact assembly consists of parallel contact arms (4) carried on two movable pivot pins (8 and 18). The contacts interleaf and pivot with respect to the main contacts about the pin (18). This relative motion is obtained by linkages from the upper pin (6) to the breaker mechanism.

The stationary main contact assembly includes current-carrying contacts and intermediate contacts at one end of the assembly.

The movable main contacts pivot around a stationary pin (17) which holds them to the lower block. These contacts are actuated by a second pin (6), connected by an insulated link (7) to the breaker mechanism. In addition to flexible braids, which shunt the current from the contact directly to the lower contact block, a steel spring (16) forces the contacts against the pins to prevent pitting at the pivot point. The intermediate contacts are built up higher than the main contacts and consequently will make before and break after the main contacts.

To function properly, a definite amount of contact pressure must be exerted between the movable and stationary contacts and a definite amount of contact wipe must exist on all contacts. Table 2 gives the figures for contact wipe and contact pressure which should be checked during regular inspections.

#### Contact Adjustments

##### MEASURING CONTACT PRESSURE

1. Remove arc quenchers (see Section D-2).
2. Close the breaker and measure dimension "B" (see figure 8).

3. Open the breaker. Place a push-type scale against the stationary arcing contacts at a point measured in line with the break between the contact stop and the contact pivot block. Push the contact backward until dimension "B" recorded in Step 1 is reached. The scale should then be read.

4. If the pressure is not within the requirements listed in Table 2, refer to the paragraph below, "Adjusting Contact Wipe and Pressure."

##### MEASURING CONTACT WIPE

1. Remove arc quenchers (see Section D-2).
2. With the breaker open, measure the horizontal distance from the edge of the stationary contact to the stationary block behind it. ("B" dimension for arcing contacts; "C" dimension for main contacts.) (See figure 8.)
3. Close the breaker and take the measurements discussed in Step 2. The difference between the readings in Steps 2 and 3 determines the wipe of the contacts.

#### WARNING

BE EXTREMELY CAREFUL NOT TO TRIP THE BREAKER.

4. If the wipe is not within the requirements listed on Table 2, refer to the paragraph below, "Adjusting Contact Wipe and Pressure."

##### ADJUSTING CONTACT WIPE AND PRESSURE (SEE FIGURE 8)

1. To obtain proper contact wipe and pressure on the center pole, dimension "A" (see figure 8) should be increased to increase wipe and decreased to decrease wipe as necessary.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

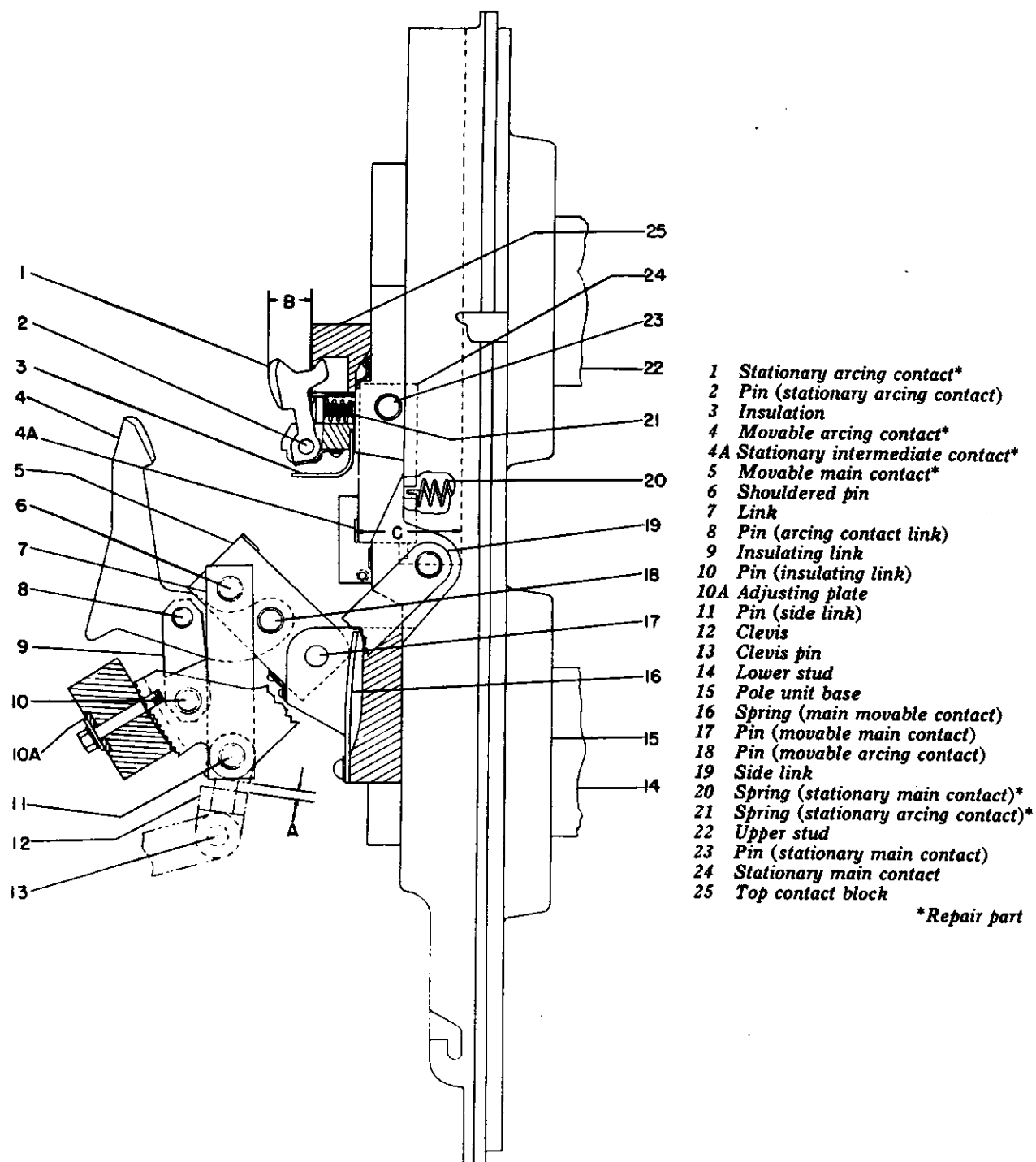


Figure 8. Pole unit assembly

**AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR**

2. To change dimension "A," remove the clevis pin (13) and rotate the clevis (12) as necessary.

3. To prevent overstressing the clevis threads (12), dimension "A" should not exceed 3/16 inch and space "A" should be filled with 0.005 shims until solid.

4. With the proper center pole wipe obtained, moving the crossbar adjusting plate on the center pole to the right will simultaneously increase the wipe on both outside poles; moving the adjusting plate to the left will have the reverse effect.

5. To increase the wipe on either outside pole individually, move the crossbar adjusting plate of that pole to the left; to decrease the wipe, move the adjusting plate to the right and at the same time move the serrated side link (19) up or down in relation to the crossbar as required.

**NOTE**

If the proper contact pressure does not exist when the contact wipe is within its limits, the stationary contact springs should be replaced.

**CONTACT SEQUENCE  
(SEE FIGURE 8)**

On the horizontal plane, the difference in the making of the arcing contacts on the same pole must be no greater than 1/32 inch; the difference between arcing contacts on separate poles must be no greater than 1/16 inch. If it is desired to advance or retard the closing of the main contacts of a pole, loosen the bolts which hold the adjustment plate of that pole and slide the plate to the left to advance contact closing and to the right to retard contact

closing. Make this adjustment on the outer poles, using the center pole as a reference. When retightening the adjustment plate bolts, make sure the locking tabs are turned up around the bolt heads to lock the bolts securely in place.

Contact sequence in the vertical plane should be such that when the arcing contacts are just touching, the intermediate contact gap should be at least 3/16 inch, the main contacts gap at least 1/4 inch.

**NOTE**

This check can best be made using the maintenance handle, with the safety pin restraining the closing springs.

If the gap is under the required minimum, it is usually possible to form the arcing contacts and obtain the required dimensions. To form the contacts, place a piece of conduit, approximately two feet long, over the contact and form the contact either forward or backward. If the proper dimensions are still not obtained, the movable arcing contacts should be replaced.

If it has been necessary to make any adjustments while obtaining proper contact sequence, the contact wipe and pressure must be checked and, if necessary, adjusted.

**CONTACT GAP**

When the breaker is open, the gap between the movable and stationary contacts should be between 2-5/8 inches and 2-3/4 inches. The gap may be adjusted, after contact wipes are maintained within tolerance, by adding or removing washers between the crossbar and the head of the buffer bolt.

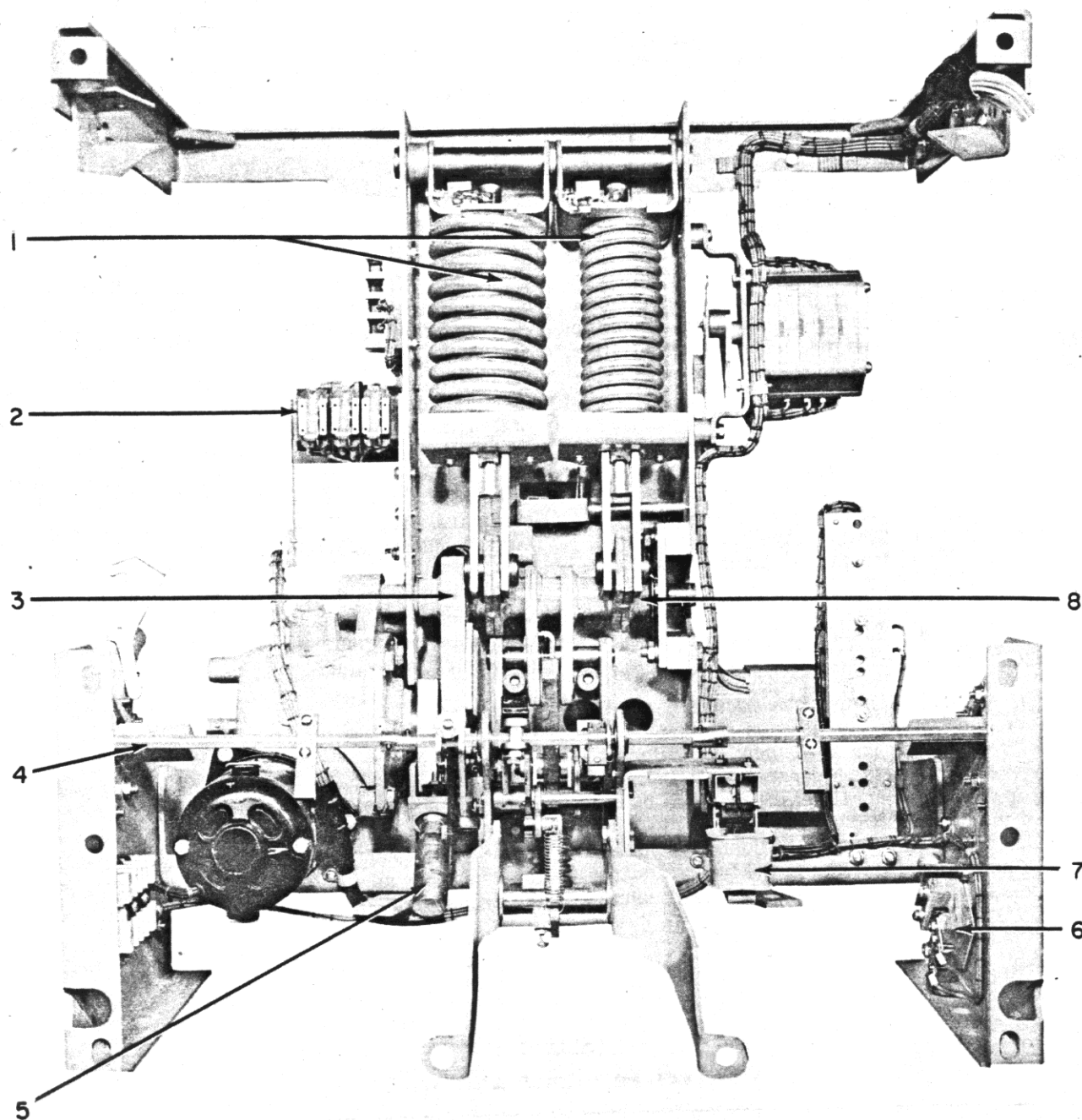
**TABLE 2  
CONTACT PRESSURES AND WIPES**

	No. of Contacts Per Pole	Pressure (Lbs)	Wipe (Inches)
Main Contacts	5	35 to 45	1/16 to 3/32
Intermediate Contacts	1	35 to 45	(1/16 inch greater than main contact wipe)
Arcing Contacts	5	31 to 43	16/64 to 23/64



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AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR



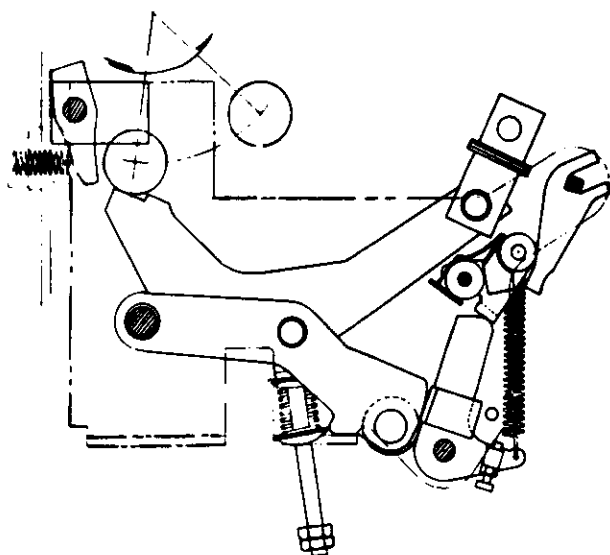
- |                     |                                       |
|---------------------|---------------------------------------|
| 1 Closing springs   | 6 Shock switch                        |
| 2 Cut-off switch*   | 7 Shunt trip device                   |
| 3 Paddle            | 8 Crankshaft and spring charging arms |
| 4 Trip shaft        |                                       |
| 5 Shock lock device |                                       |

\*Repair part

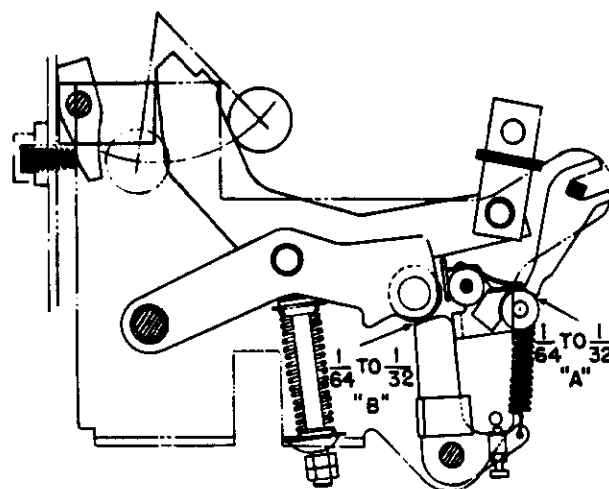
Figure 9. Rear view of front frame assembly, moving component



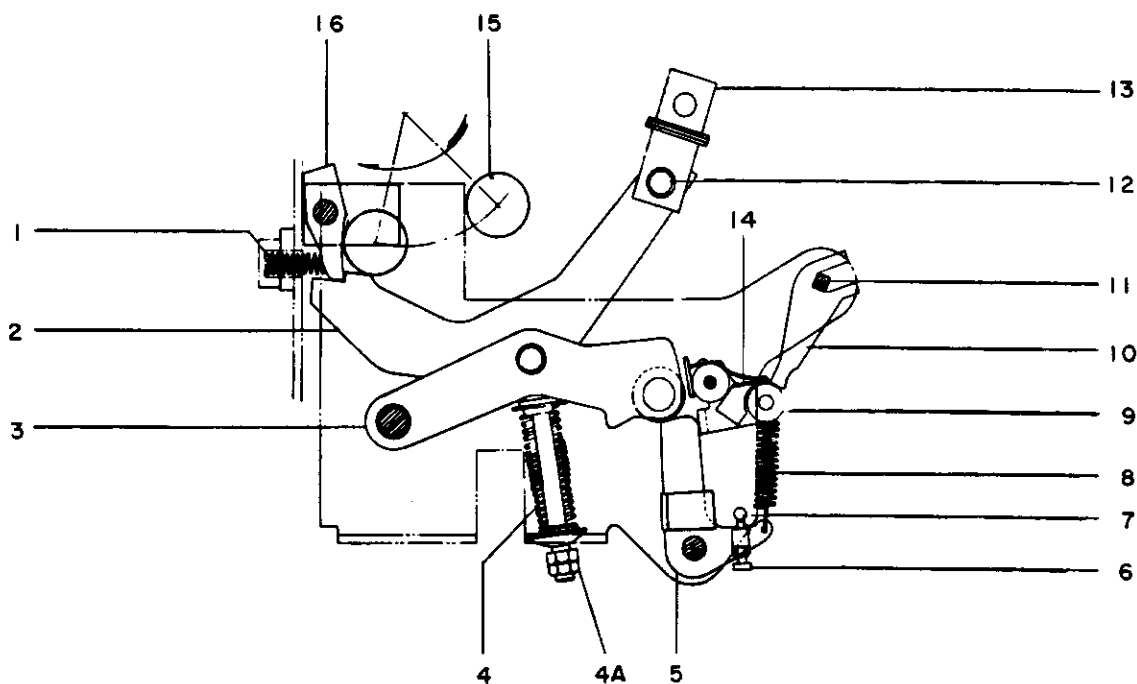
## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR



**PART A**  
MECHANISM IN MOTION BEFORE  
RESETTING



**PART B**  
MECHANISM IN RESET POSITION



**PART C**  
MECHANISM IN CLOSED POSITION  
(CLOSING SPRING DISCHARGED)

- |                 |                         |               |                    |
|-----------------|-------------------------|---------------|--------------------|
| 1 Spring*       | 5 Prop                  | 9 Roller      | 13 Clevis          |
| 2 Cam           | 6 Adjusting screw       | 10 Latch      | 14 Mechanism latch |
| 3 Link          | 7 Stop pin (adj. screw) | 11 Trip shaft | 15 Roller          |
| 4 Reset spring* | 8 Prop return spring*   | 12 Clevis pin | 16 Prop            |
| 4A Nut          |                         |               |                    |

\*Repair part

Figure 10. Operating mechanism assembly



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-4

### Electrical Operating Mechanism

#### DESCRIPTION (SEE FIGURES 10 AND 11)

The operating mechanism is used to open and close the breaker electrically.

#### OPERATION

The electrical-operated mechanism includes a motor and a gear reduction unit which charges the closing springs (16) (see figure 11) through a crankshaft (14). The crankshaft has an arm (13), with a roller (12), which rides on the closing cam (2) (see figure 10) of the operating mechanism. The position of this closing cam roller (12) is shown in figure 11. The closing cam is pinned to the center pole unit with a clevis and, through the cross bar, controls the opening and closing of the contacts. With the breaker "open" and closing springs "discharged," the sequence of operation is as follows:

#### Charging the Closing Springs (See Figures 10 and 11)

1. The mechanism is in the position shown in figure 10A.

2. The motor turns the crank (10) (see figure 11) which is mounted on the output shaft of the gear reduction unit. The charging roller (7), which is on the face of the crank, has paddle arm (11) bearing on it.

3. As the crank turns, the roller pushes the paddle arm upward, thereby charging the closing springs through the spring charging arm (15) of the crankshaft (14).

4. As the charging roller (7) approaches dead center, the cut-off switches reverse their contacts. This action applies the dynamic brake to the motor which prevents the charging mechanism from coasting to an over-center position, allowing discharge of the closing springs.

5. The mechanism is now in the reset position (figure 10B) and the breaker is ready to close when a closing signal is given.

#### Closing the Breaker (See Figures 10 and 11)

1. With the mechanism in the position described above and the closing springs charged, the application of a closing signal will cause the motor to continue to charge the closing springs. As the charging roller (7) (see figure 11) passes its top dead-center position (maximum spring charge position), the closing springs are free to discharge. Crank (10) can be overdriven independently of the motor so that roller (7) assumes its bottom dead-center position without restraint.

2. As the spring discharges, the rotation of the crankshaft (14) (see figure 11) causes roller (15) (see figure 10) to rotate cam (2) and raise clevis (13). Prop (16) holds cam (2) in this position.

3. Raising clevis (13) closes the breaker contacts through the pole base linkage.

#### Opening the Breaker (See Figure 10)

Operation of any of the trip devices rotates the trip shaft (11) (see figure 10) which allows the trip latch (10) to release the latch prop (5). This allows the forces of the contact and opening springs to reposition the operating mechanism linkage to the position shown in figure 10B, if the closing springs are pre-charged. In this position the operating cycle may be repeated. If the closing springs are not pre-charged, the operating mechanism linkage will return to the position shown in figure 10A.

#### ADJUSTMENTS

All adjustments should be made with the operating mechanism in the reset position as shown in figure 10B. (The mechanism should be reset by manual operation with the safety pin in place.)

1. The gap "A" between the trip latch (10) (see figure 10) and the roller (9) of the reset latch should be between 1/64 inch and 1/32 inch. This adjustment can be obtained by turning adjusting screw (6).

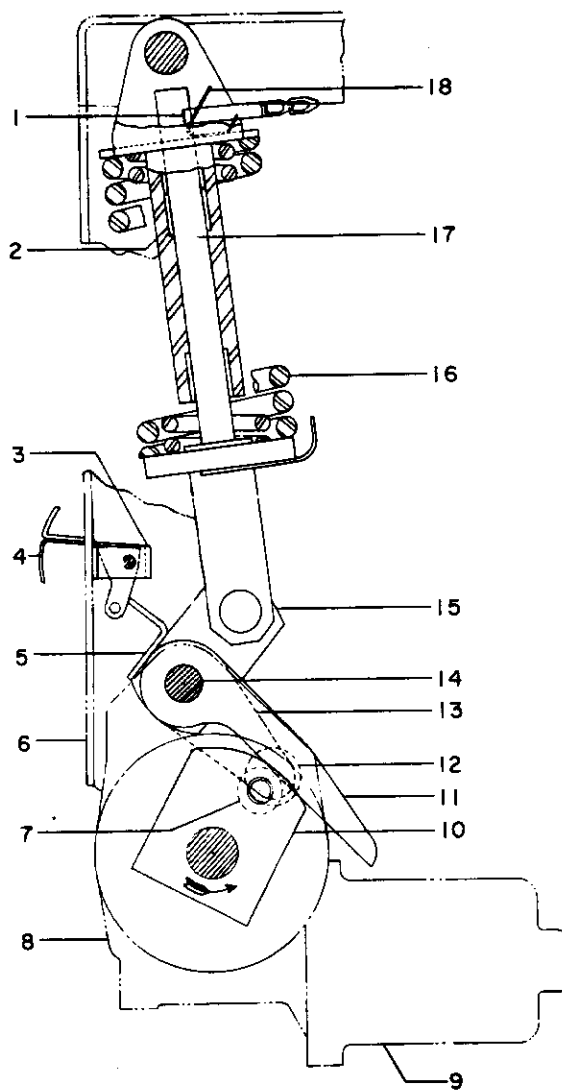
2. The center line of the trip latch (10) should pass through the center of the roller (9) to provide



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

5/32 inch + 1/32/-0 inch latch wipe. To maintain this adjustment, the latch buffer stop is on the mechanism frame, and can be adjusted by loosening the retaining screws to reposition the mechanism latch (14).

3. The distance "B" between the roller on link (3) and prop (5) should be between 1/64 inch and 1/32 inch. To obtain this gap, advance or retard the nuts (4A) on the bottom of the rod using the reset spring (4).



- 1 Pin
- 2 Bushing
- 3 Bracket
- 4 Indicator
- 5 Bracket
- 6 Frame
- 7 Charging roller
- 8 Gear reduction unit
- 9 Motor\*
- 10 Crank
- 11 Paddle
- 12 Closing cam roller
- 13 Closing cam shaft
- 14 Crankshaft
- 15 Spring charging arm
- 16 Closing spring\*
- 17 Push rod
- 18 Clip

\*Repair part

Figure 11. Closing spring and charging mechanism





## SECTION D-5

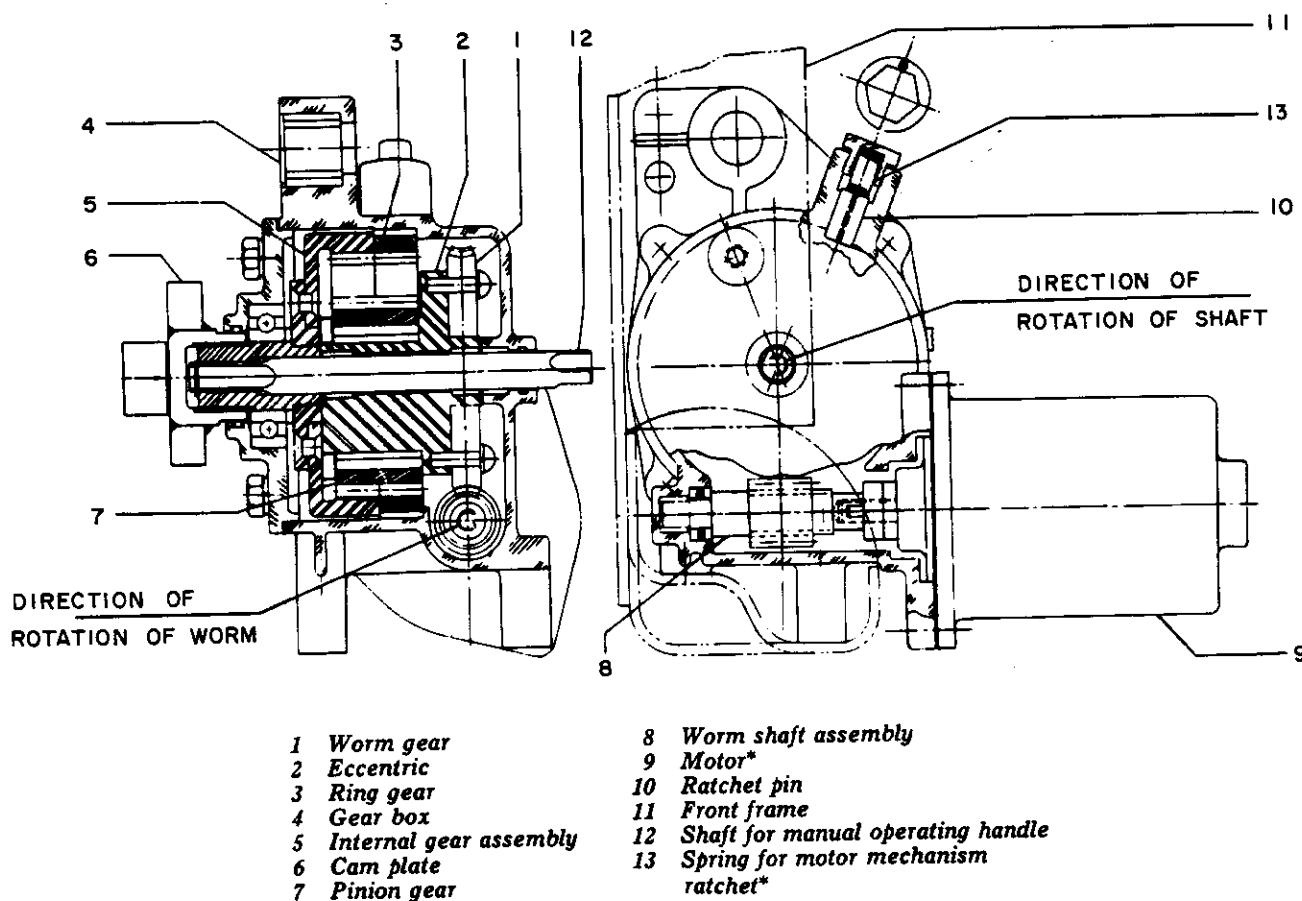
### Motor and Gear Reduction Unit

#### DESCRIPTION (SEE FIGURE 12)

The motor and gear reduction unit provides the force to close the mechanism.

#### OPERATION

The motor (9) is mounted on the side of the gear reduction unit. Through a worm gear (1) and planetary gear train, the motor drives the crank with a reduction of 1000:1 to charge the closing springs.



\*Repair part

Figure 12. Motor and gear reduction unit



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-6

### Manual Trip

#### DESCRIPTION (SEE FIGURE 5)

The manual trip is used to trip the breaker manually through mechanical linkage.

#### OPERATION

The manual trip button device protrudes through

the front escutcheon and extends through the operating mechanism frame. When the push button is pushed inward, it rotates the trip shaft counter-clockwise, thus opening the breaker. The push button, when released, is brought back to its original position by a return spring.

## SECTION D-7

### Position Indicator

#### DESCRIPTION (SEE FIGURE 13)

The position indicator shows whether the breaker is in the open or closed position.

#### OPERATION

When the breaker opens, the operating rod (5), which is tied to the cross bar (4), turns the triangular link (6) clockwise, thus moving the link (7) to the rear. The indicator target (2) is rigidly fastened to link (7), and will be in the position shown on figure 13 when the breaker is completely opened.

- 1 Frame
- 2 Open and closed indicator
- 3 Front escutcheon
- 4 Cross bar
- 5 Operating rod
- 6 Triangular link
- 7 Link
- 8 Operating shaft
- 9 Auxiliary switch\*

\*Repair part

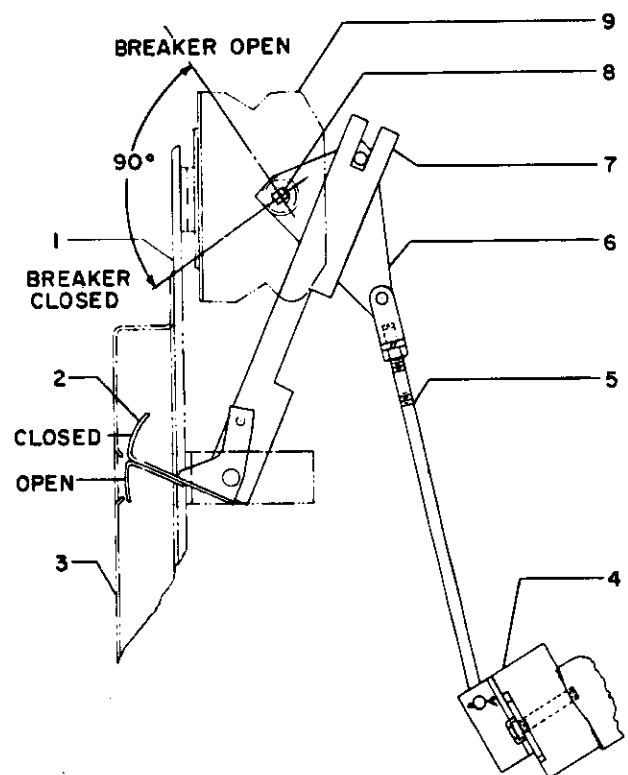


Figure 13. Open and closed indicator and auxiliary switch linkage



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-8

### Springs Charged and Discharged Indicator

#### DESCRIPTION (SEE FIGURE 11)

The charged and discharged indicator shows the position of the closing springs.

#### OPERATION

When the springs are charged, the charging

roller (7) pushes up the paddle (11) which is tied to a link. The link is fastened to the indicator target (4) which will be in the position shown in figure 11. When the springs are discharged, the indicator will move down, indicating that the springs are in the discharged position.

## SECTION D-9

### Auxiliary Switch

#### DESCRIPTION (SEE FIGURES 13 AND 14)

The auxiliary switch is used in various control circuits to make and break circuits as the circuit breaker is opened and closed.

#### OPERATION (SEE FIGURE 13)

The auxiliary switch is mounted on the left side of the front frame (looking from the front). As the cross bar (4) moves with the contacts to the open or closed position it operates, a triangular link (6) rotates the operating shaft (8) of the auxiliary switch. This shaft, through its cams, opens and closes the auxiliary switch contacts. Normally, the top terminals of the switch are "a" contacts (open when the breaker is open), and the bottom terminals are "b" contacts (open when the breaker is closed).

#### Reversal of Contacts (See Figure 14)

In order to change "a" contacts into "b" contacts or vice versa, proceed as discussed in the following paragraphs.

#### Top Contacts (Normal "a" Contacts)

1. Remove top and bottom covers (4) and (6).

2. Remove auxiliary switch from the breaker and place in position shown in figure 14A.

3. Unscrew four tie bolts (2) and remove end plate (5).

4. Remove pin (16).

#### NOTE

The pin is in parallel with the arrow on the auxiliary switch shaft (3).

5. Lift top cam (14) off the shaft (3), rotate 90 degrees, and turn it upside down.

6. Replace cam (14) on shaft (3). It should now be in the position shown in figure 14.

7. Replace all parts in the reverse order of disassembly.

#### Bottom Contacts (Normal "b" Contacts)

1. Follow Steps 1, 2, and 3 outlined for top contacts in the preceding paragraph.

2. Lift top cam (14) off the shaft (3).

3. Lift top cam follower (11) off its pivot pin.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## NOTE

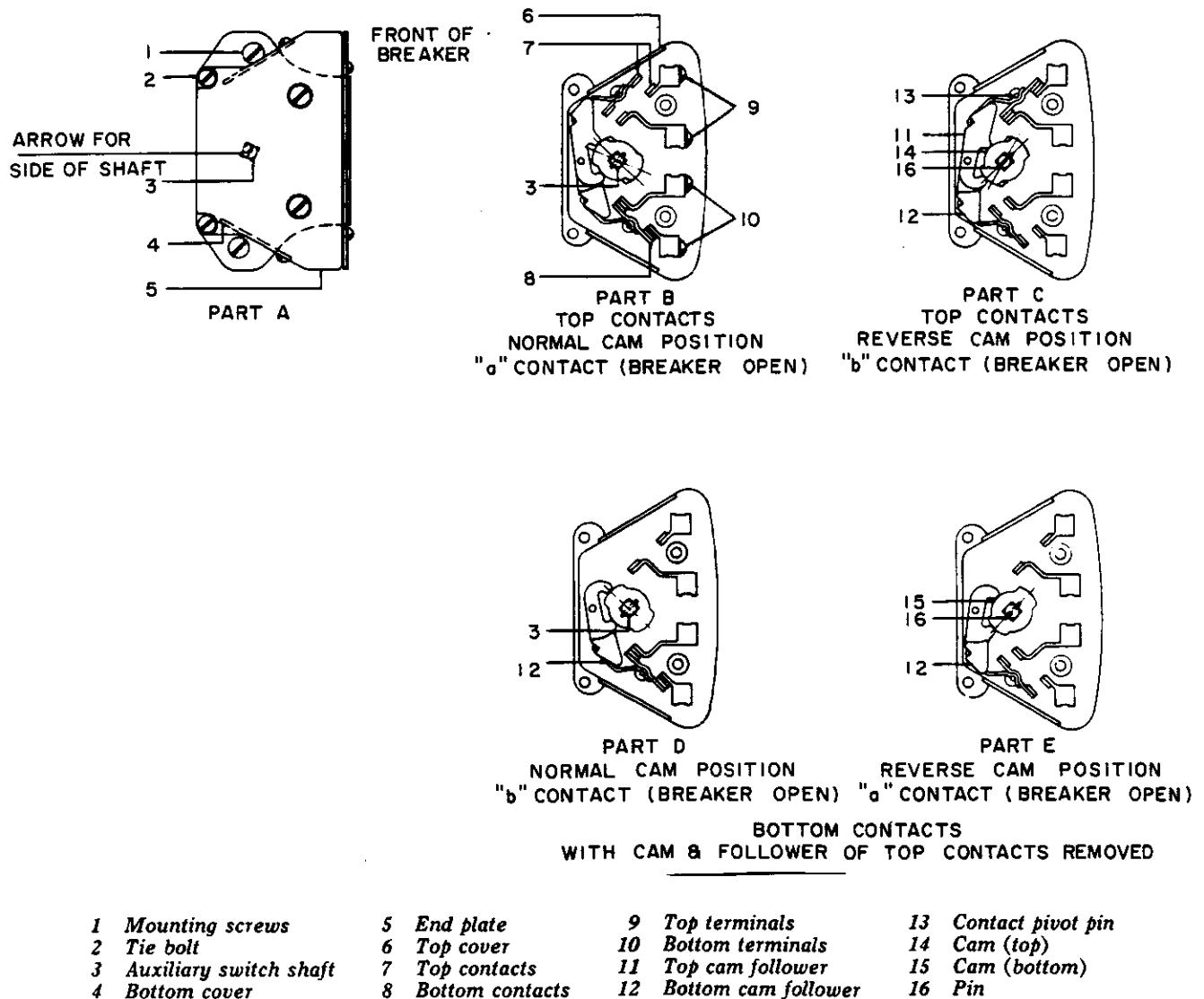
Do not allow contact pivot pin (13) to drop out.

4. Lift bottom cam (15) off the shaft (3), rotate it 90 degrees, and replace it on shaft. It should now be in the position shown in figure 14E.

5. Replace all parts in the reverse order of disassembly.

## NOTE

The adjustments described in the preceding two paragraphs can be made on any desired stage; each stage (one set of top and bottom contacts) can be individually lifted off the shaft. In replacing stages, be sure to check cam positions against the diagrammatic sketches shown in figure 14A, B, C, and D.



\*Repair part

Figure 14. Auxiliary switch\*



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-10

## Shock Lock

## DESCRIPTION (SEE FIGURE 15)

The purpose of the shock lock is to prevent the breaker from opening because of shock.

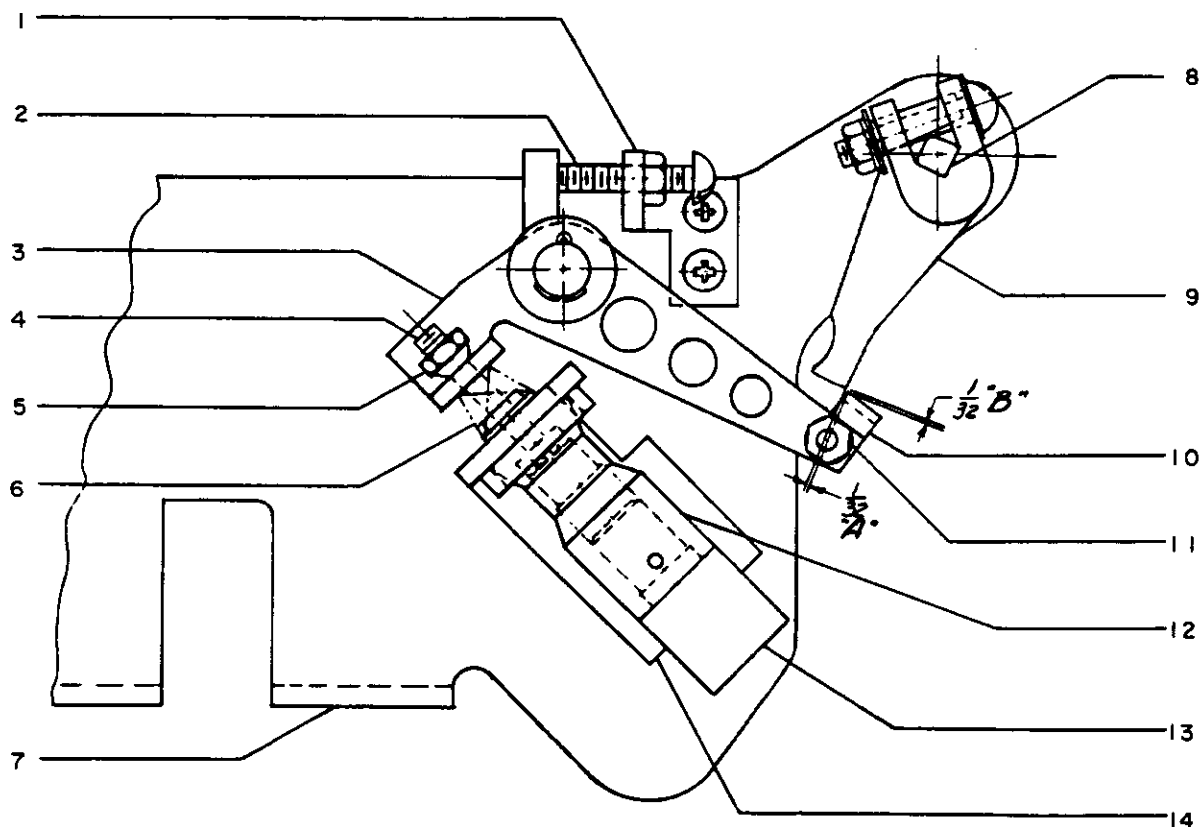
## OPERATION

The shock lock consists of weights (12 and 13), latch arm (3) and a latch (9). The weight and latch arm assembly are mounted on the right side of the mechanism frame and the latch is mounted on the trip shaft (8). When a shock occurs, the weights (12

and 13) force latch arm (3) over latch (9), thereby preventing the trip shaft (8) from rotating and tripping the breaker. After the shock subsides, the lever return spring (6) will return the latch arm (3) to its original position.

## ADJUSTMENTS

The adjusting nut (11) (see figure 15) and screw should be set on the serrated portion of the mating surface of the latch arm (3). Plate (10) should be firmly seated before tightening the adjusting nut (11).



- |                   |                   |                     |
|-------------------|-------------------|---------------------|
| 1 Bracket         | 6 Spring*         | 11 Adjusting nut    |
| 2 Adjusting screw | 7 Mechanism frame | 12 Upper weight     |
| 3 Latch arm       | 8 Trip shaft      | 13 Lower weight     |
| 4 Adjusting screw | 9 Latch           | 14 Mounting bracket |
| 5 Stop nut        | 10 Latch plate    |                     |

\*Repair part

Figure 15. Shock lock device

**AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR**

The "B" adjusting screw (2) should be set so that the "B" dimension is 1/32 inch maximum. The adjusting screw (4) is used to tighten the tension on spring (6) and to keep weights (12 and 13) taut. To check the operation of the shock lock to make sure that it will not interfere with the tripping of the breaker, proceed as follows:

**WARNING**

WHEN CHECKING THE OPERATION OF THE SHOCK LOCK, BE SURE THAT ALL MEMBERS OF THE OPERATOR'S BODY ARE CLEAR OF THE MOVING PARTS ON THE BREAKER.

1. Close breaker.
2. Hold the weight in the deflected position.
3. Push the trip button on the breaker front escutcheon.
4. Release the weight maintaining pressure on the trip button.
5. The shock lock should reset and should not prevent the breaker from opening.



## SECTION D-11

### Shock Switch

#### DESCRIPTION (SEE FIGURE 16)

The shock switch prevents the control relay from picking up and sealing in during shock.

#### OPERATION

The shock switch is located on the left side of the front frame. It consists of a weight, a set of movable contacts, and a set of stationary contacts (3). During shock, the weight is deflected and causes the movable contacts to move upward, thereby breaking the circuit. When the shock subsides, the movable contacts return to the position shown in figure 16 and close the circuit.

- |                    |                       |
|--------------------|-----------------------|
| 1 Movable contact* | 3 Stationary contact* |
| 2 Terminal         | 4 Spring*             |

\*Repair part

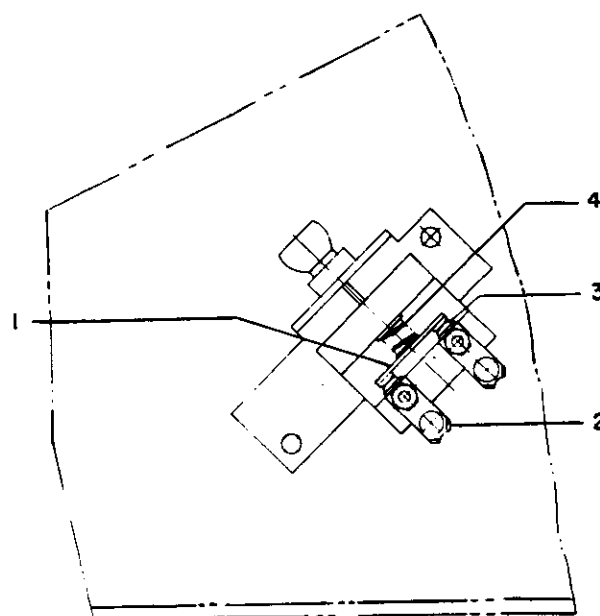


Figure 16. Shock switch

## SECTION D-12

### Electrical Closing Devices and Controls

#### OPERATION

The closing switch, relay, and motor mechanism are provided for closing the breaker electrically.

#### DESCRIPTIONS

##### Motor Power Switch

The motor power switch (7) (see figure 5) is located on the front escutcheon and is used to turn the motor power off and on.

##### Closing Switch

The closing switch is located on the bottom of the front escutcheon behind the closing button (5) (see figure 5) and mounted on the front frame.

##### Control Relay

The control relay (5) (see figure 4) is mounted on a plate to the left of the front escutcheon. It is used to open and close the motor circuit.

##### Cut-off Switches (See Figure 17)

The motor cut-off switches are mounted as shown in figure 17. In this position, the closing springs are



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

charged. When lever (8) reaches a predetermined position, the three cut-off switches operate.

**ADJUSTMENTS**

Cut-off switches E, F, and G should be adjusted so that at the end of the pre-charge operation,

switch F toggles first, followed immediately by G and then by E. The switches should be adjusted on their mounting so that the overtravel button has no more than 1/16-inch movement. Excessive overtravel of the overtravel button will damage the switch.

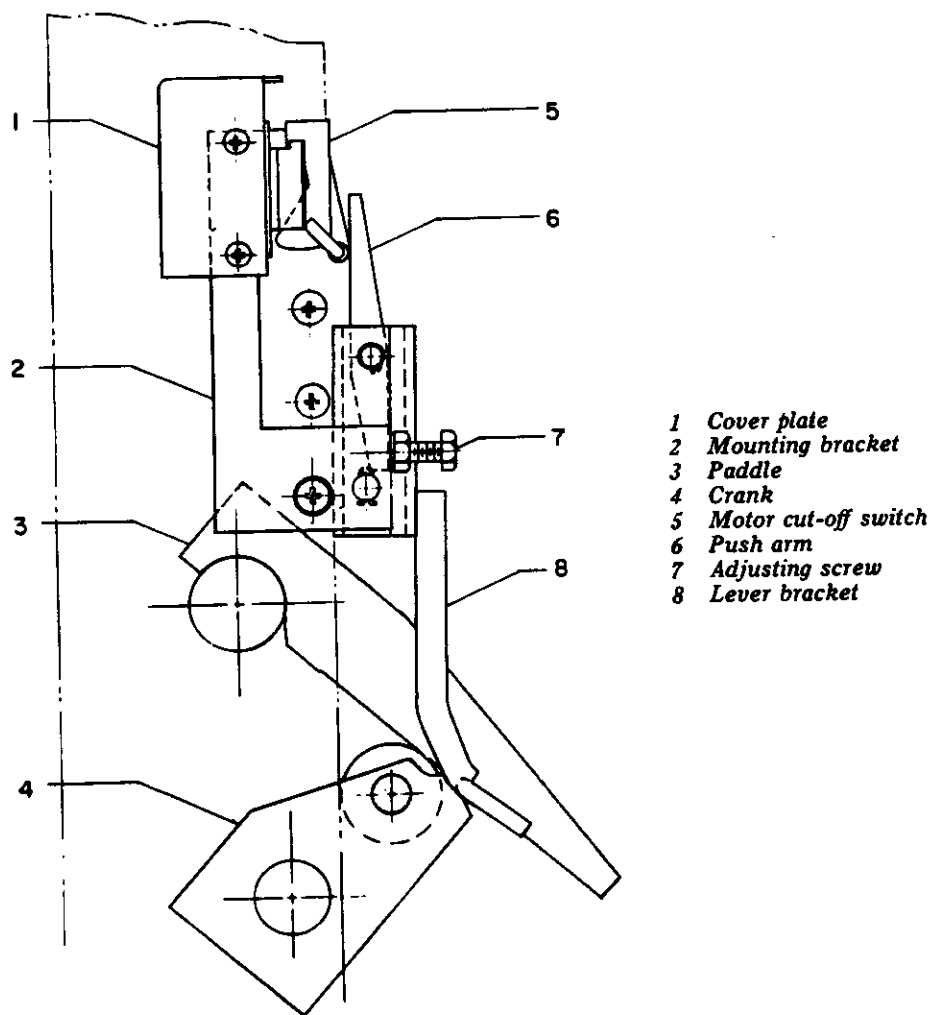


Figure 17. Cut-off switch





## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-13

## Direct-acting Overcurrent Trip Device

## DESCRIPTION

The direct-acting overcurrent trip device will cause the breaker to open within a pre-determined time range depending on the magnitude of the fault current.

## OPERATION

The direct-acting overcurrent trip device can be provided with the following tripping combinations:

1. Long-time delay, short-time delay, and instantaneous tripping
2. Long-time and short-time delay tripping
3. Long-time delay and instantaneous tripping

4. Short-time delay and instantaneous tripping
5. Short-time delay tripping only
6. Instantaneous tripping

### Short-time Delay Tripping (Factory Adjustment Only) (See Figure 18)

The armature (18) is restrained by a calibrating spring (7). After the magnetic force produced by an overcurrent condition overcomes this restraining force, the armature movement is further retarded by an escapement mechanism which produces an inverse time-delay characteristic.

### Long-time Delay Tripping (3 Settings Available)

The armature (19) (see figure 18) is restrained by a calibrating spring (13). After the magnetic

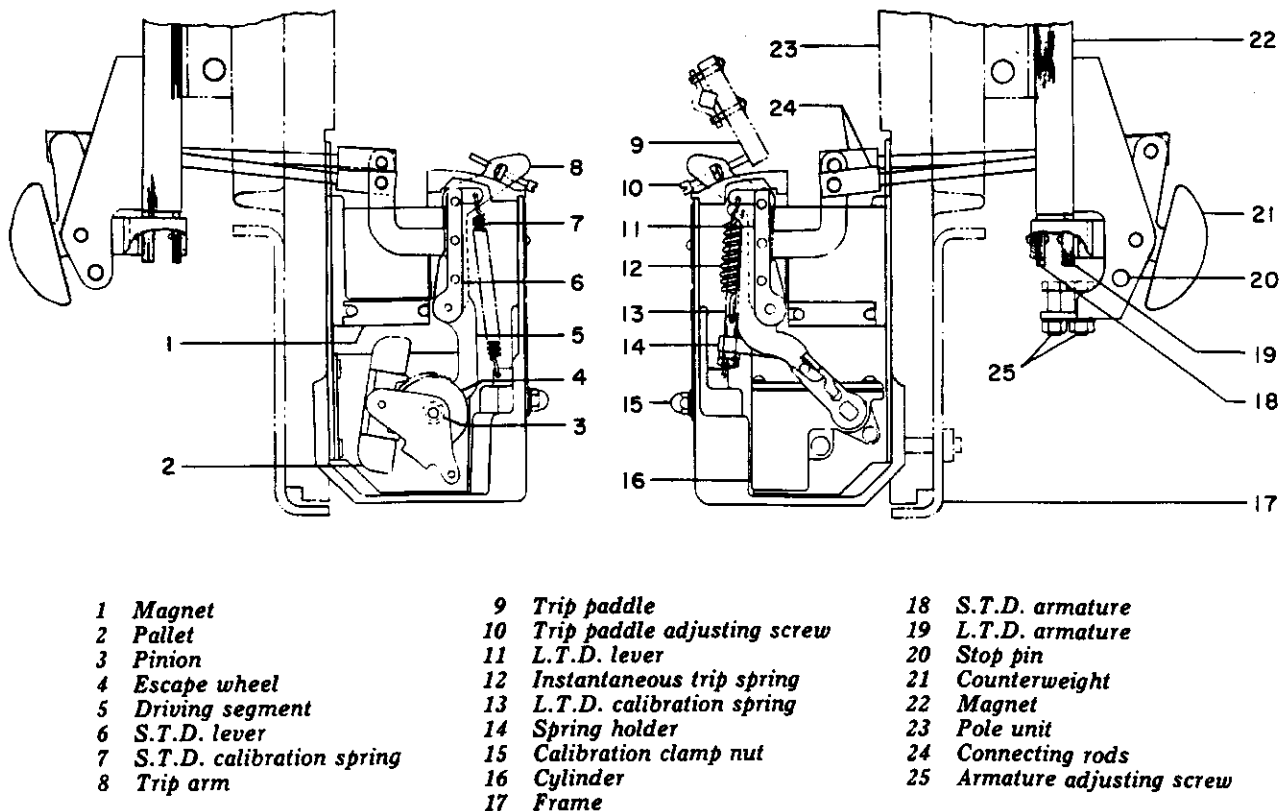


Figure 18. Direct-acting overcurrent trip device



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

force produced by an overcurrent condition overcomes this restraining force, the armature movement is further retarded by the flow of silicone oil in a cylinder (16). This mechanism produces an inverse time-delay characteristic.

### **Instantaneous Tripping (Factory Adjustment Only)**

~~Non-adjustable instantaneous tripping is accomplished when the magnetic force overcomes the~~ force of a heavy restraining spring (12) (see figure 18) connected between the armature and the support fastened to the frame of the device.

When instantaneous tripping is used in conjunction with long-time delay tripping, the heavy instantaneous spring effectively connects the armature to the dashpot for overcurrents of low magnitude. For high levels of overcurrent, the force on the magnet is sufficient to stretch the instantaneous spring and allow the armature to move to the closed air gap position independently of the long-time delay dashpot.

### **ADJUSTMENTS**

1. The air gaps between magnet (22) and armatures (18 and 19) are set by adjusting screws (25). When replacing the device, refer to the drawing which accompanies each new device for specific

gap dimensions. The gap dimension is measured from the magnet to the armature at the point where the gap is largest. Tighten the locking nuts on adjusting screws (25) after setting the proper air gaps.

2. With the air gap set as in Step 1, and the armatures (18 and 19) resting against the adjusting screws (25), move the crank, which attaches to the connecting rods (24), toward the front of the device. Adjust the connecting rods (24) to the proper length by turning them in the clevis which attaches them to the crank. Connecting rod pins should be in the left-hand direction (facing the back of the breaker) before attaching the tru-arc retainers.

3. Place a 1/32-inch gage between magnet (22) and armature (18).

4. Push the armature (18) solidly against the magnet (22) with the gage in place. The breaker should trip.

5. If the breaker does not trip, turn the adjusting screw (10), and repeat Steps 1 and 2.

6. This adjustment must be made for both armatures.

7. When the armatures are resting against the adjusting screws (25) and the breaker is reset, there should be 1/32-inch clearance between the adjusting screw (10) and trip paddle (9).



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

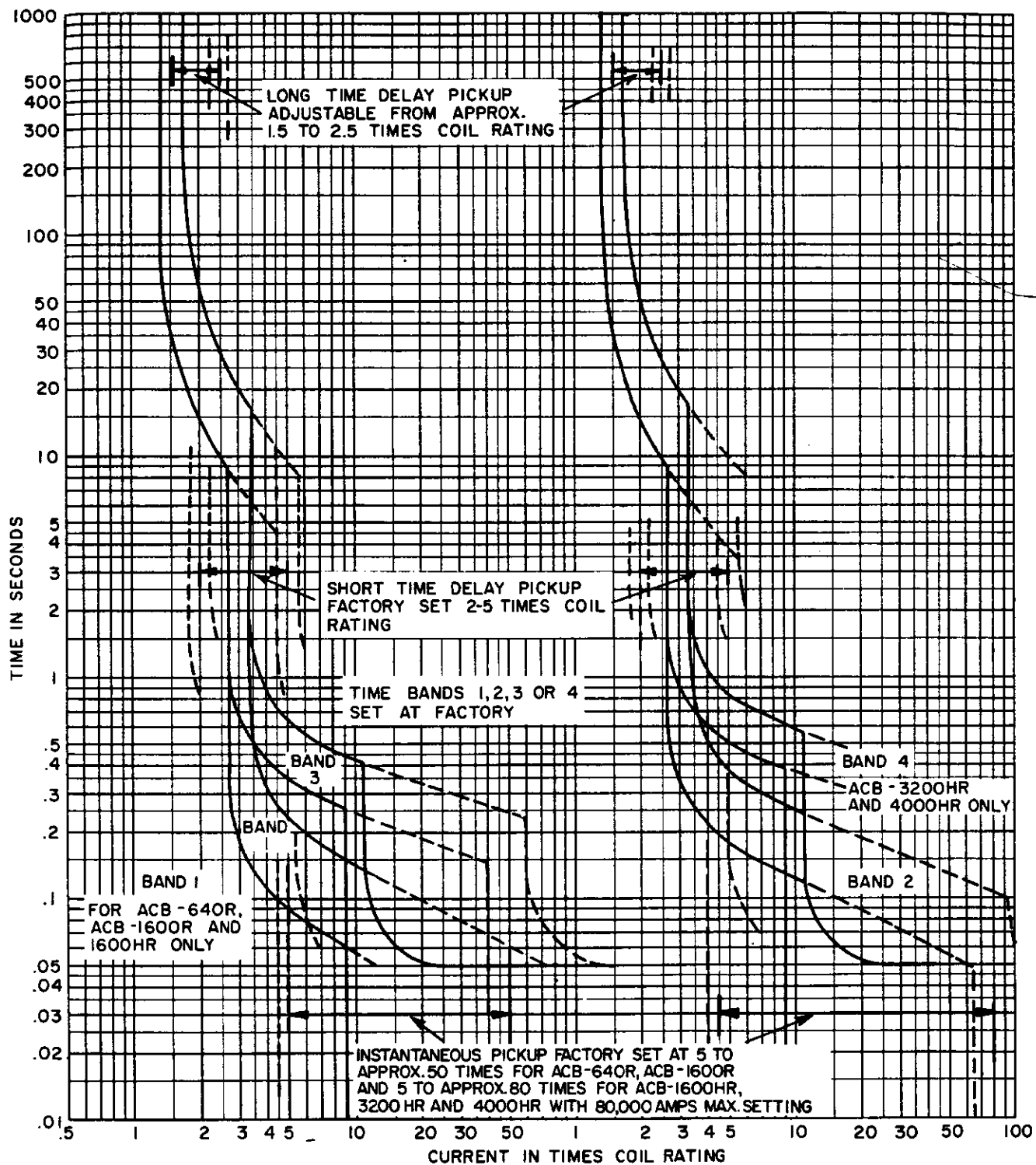


Figure 19. Line-current characteristic curve



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-14

### Shunt Tripping Device

#### DESCRIPTION

The shunt tripping device provides a means for tripping the breaker by using a remote switch or relay contacts.

#### OPERATION (SEE FIGURE 20)

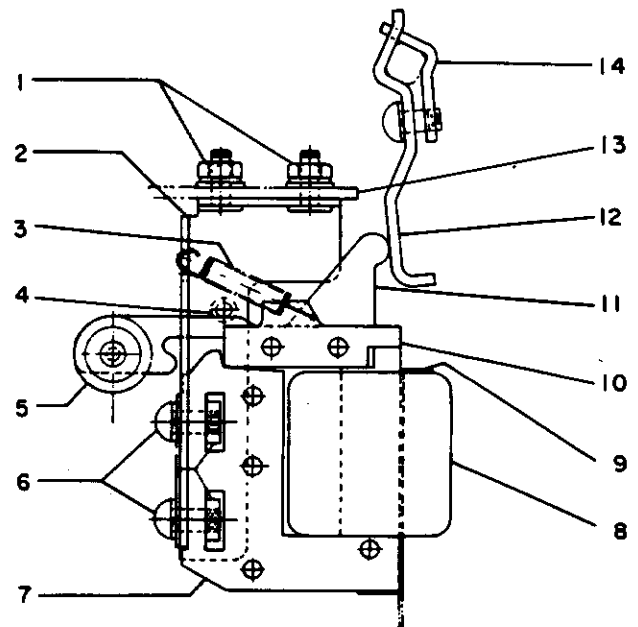
The shunt tripping device is mounted on a bracket attached to the left side of the operating mechanism (looking from the front).

A remote switch or relay contacts are used to close the circuit of the device. This causes the armature arm (11) to engage the trip paddle (12), thereby tripping the breaker. The spring (3) is used to return the armature (10) to the neutral position after the breaker trips.

To prevent overheating, the momentary rated coil (8) is cut off by contacts of the auxiliary switch which are open when the breaker is open.

#### ADJUSTMENTS

When the breaker is tripped, the armature should have 1/32-inch to 1/16-inch overtravel. If any adjustment is necessary to provide this amount of overtravel, the trip paddle (12) is formed in or out accordingly.



- |           |                    |
|-----------|--------------------|
| 1 Nut     | 9 Clamp            |
| 2 Frame   | 10 Armature        |
| 3 Spring* | 11 Armature arm    |
| 4 Rivet   | 12 Trip paddle     |
| 5 Weight  | 13 Mechanism frame |
| 6 Screws  | 14 Clamp           |
| 7 Magnet  |                    |
| 8 Coil*   |                    |
- \*Repair part

Figure 20. Shunt trip device



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-15

### Undervoltage Trip Device

#### DESCRIPTION

The function of the undervoltage trip device is to trip the breaker when the undervoltage coil is de-energized by loss of voltage.

#### OPERATION

(SEE FIGURE 21)

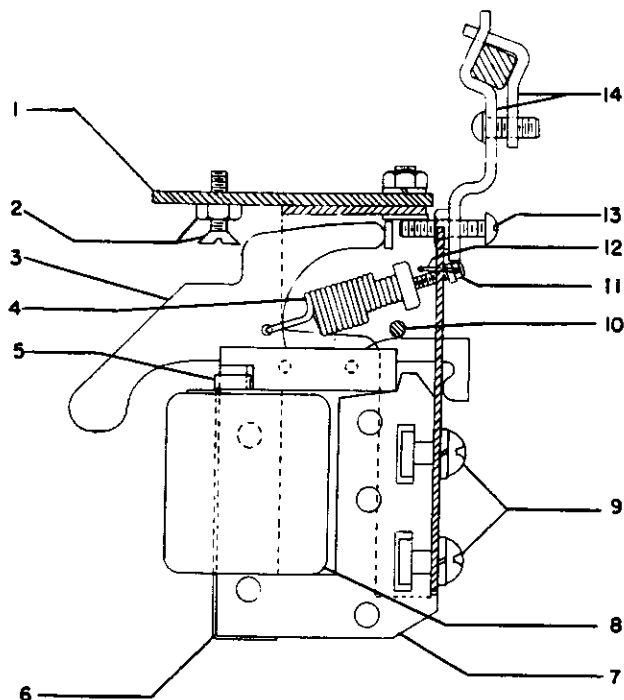
The undervoltage trip device is mounted on a bracket attached to the left side of breaker frame (looking from front).

The undervoltage trip device consists of a coil, magnet, armature, and spring. With rated voltage applied, the armature (3) is attracted to the magnet (7). If the voltage falls below the predetermined value, the magnet (7) releases the armature (3). The spring (4) then pulls the armature (3) upward, rotating the trip paddle (14), thereby tripping the breaker. This device will keep the breaker trip free until the rated voltage is applied and the coil is energized.

#### ADJUSTMENTS

An adjusting screw (13) in the trip paddle (14) is used to obtain from 1/32-inch to 1/16-inch over-travel after tripping the breaker.

Adjusting screw (2) and spring (4) are used respectively to adjust the armature so that it will pick up at 80 percent of rated voltage and drop out between 30 and 60 percent of rated voltage.



- |                           |                          |
|---------------------------|--------------------------|
| 1 Bracket                 | 8 Coil                   |
| 2 Adjusting screw and nut | 9 Screws                 |
| 3 Armature                | 10 Pin                   |
| 4 Spring                  | 11 Adjusting screw       |
| 5 Shading ring            | 12 Locking wire          |
| 6 Clamp                   | 13 Adjusting screw       |
| 7 Magnet                  | 14 Trip paddle and clamp |

Figure 21. Undervoltage trip device



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION D-16

### Drawout Interlock Device

#### DESCRIPTION

The drawout interlock prevents the breaker from being racked in or out of the "connected" position until after the breaker is tripped open.

#### OPERATION

The circuit breaker element is equipped with a positive mechanical interlock, which engages the trip interlock cam in the stationary component and prevents the breaker from being racked in or out of the "connected" position until after the breaker is tripped open. This interlock also holds the breaker trip free and prevents the breaker from being closed while it is being racked in or out of the "connected" position.

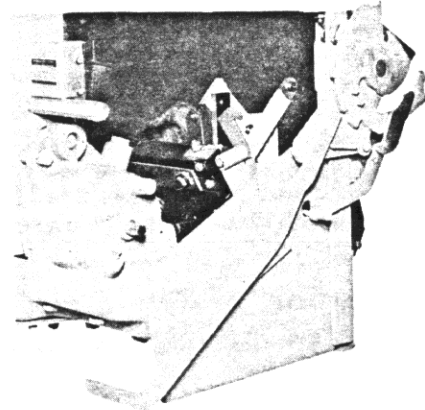


Figure 22. Drawout racking mechanism

## SECTION D-17

### Movable and Stationary Secondary Disconnect Assemblies

#### DESCRIPTION (SEE FIGURE 22A)

Secondary disconnect assemblies permit the withdrawal of a drawout-type circuit breaker to the completely disconnected position without removing secondary wiring. The secondary disconnect assembly consists of two separate assemblies; the movable assembly mounted on the breaker, and the stationary assembly mounted in the stationary component.

The movable secondary disconnect assembly consists of two molded pieces (4) bolted together which hold seven individual contacts and springs. Three assemblies to provide a total of 21 circuits

may be mounted per breaker. The stationary secondary disconnect assembly consists of a compound base with twenty-one contact strips. The contact strips are separated by a barrier wall which provides adequate creepage distance between contacts.

#### OPERATION

When the breaker is in its final "connected" position, the secondary disconnect assemblies are engaged. In this position the contact spring (5) forces the contact (3) of the movable secondary disconnect assembly against the contact strip (2) of the stationary disconnect assembly making a good electrical contact.

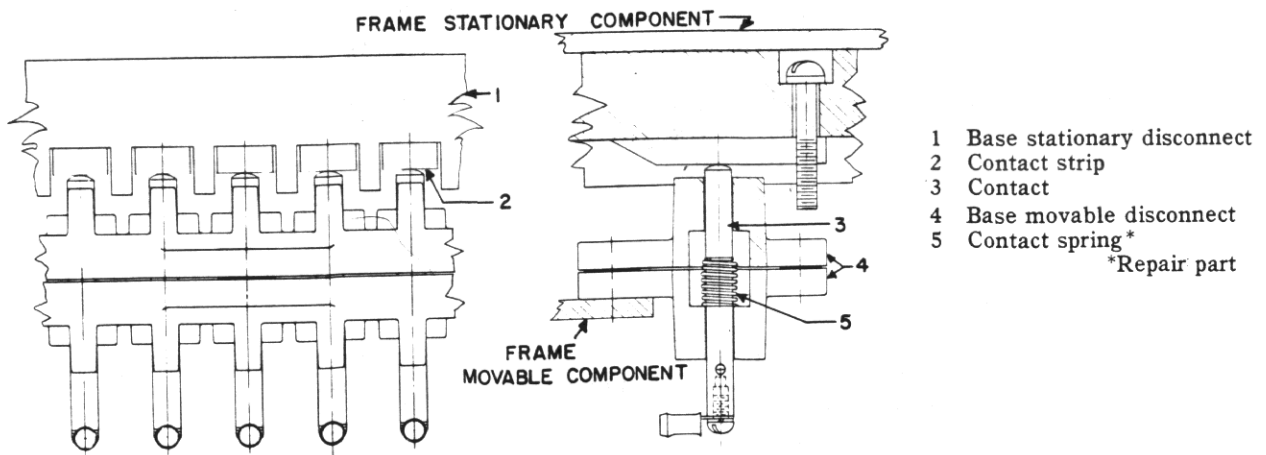


Figure 22A. Movable and stationary secondary disconnect assemblies.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION E-1

### Replacement of Repair Parts

**NOTE**

Before replacing any part it is strongly recommended that the operator familiarize himself with all parts involved in making the replacement.

#### 1. Separation of Front and Back Frames of Moving Component

In order to replace the contacts, operating mechanism, or the overcurrent devices, the front frame must be separated from the back frame. To separate the two frames proceed as follows:

- a. The breaker contacts must be open with the safety pin in place (see Section B-1).
- b. Remove the two opening springs (3) (see figure 5) (on lower part of breaker) from the outside pole units.
- c. Remove the clevis pin (13) (see figure 8) from the center pole unit.
- d. Remove the six nuts from the back frame using a socket wrench with an extension. This includes the two nuts at the top of the frame.
- e. Remove the auxiliary switch operating rod (5) (see figure 13).
- f. Check along the trip shaft for mechanical interference or connection between the overcurrent trip device and the trip paddles. Remove the mechanical connection if present; if interference exists, use extreme care when removing or reassembling the front and back frames to avoid mechanical breakage of trip devices. In reassembling the front and rear frames, the two frames should be positioned vertically so that the trip shaft is horizontally aligned.

**NOTE**

It is recommended that the breaker be fastened to a suitable mounting base with the front frame supported by a sling or hook as the bolts are being installed or removed.

**CAUTION**

CAREFULLY POSITION THE LOCATION OF CRANE HOOKS NEAR THE VERTICAL CHANNEL WHEN REMOVING OR REPLACING THE FRONT FRAME.

#### 2. Replacement of Arc Quenchers (See Figure 6)

To replace arc quenchers, remove the channel-shaped retaining bar by removing two screws and two nuts. The arc quenchers can now be removed by lifting out and up, free of the movable arcing contacts. To disassemble these arc quenchers proceed as follows:

- a. Remove screws holding spacer block (9).
- b. Remove spacer block (9), steel plate (8), and compound support (7).
- c. Rock muffler (6) slightly and remove. The inner barriers (5) can now be removed for inspection.
- d. Remove nut and withdraw stud (1).
- e. Remove cap (2). The side barriers (3) and pocket barriers (4) should be free.
- f. Reassemble and replace the arc quencher in the reverse order. Tighten the fastenings after replacement.

#### 3. Replacement of Stationary Arcing Contacts (See Figure 8)

- a. Remove arc quenchers (see Section E-1-2).
- b. Remove top contact block (25) by removing two screws. Remove insulation (3).
- c. Remove the screws retaining the braids on the arcing contact.
- d. Remove pin (2) and free the stationary contacts (1) and springs (21).
- e. Install new springs and stationary arcing contacts in the reverse order.

**AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR**

f. Adjust contact wipe and pressure. (See Section D-3.)

**4. Replacement of Movable Arcing Contacts (See Figure 8)**

The movable arcing contacts should be replaced when the stationary arcing contacts are replaced.

a. Separate the front frame from the back frame. (See Section E-1-1.)

b. Remove pins (8) and (18) and withdraw the contacts.

c. Reassemble parts in the reverse order. The arcing contacts should be spaced by adding shims between the arcing contact and the insulating link (9) to assure proper alignment. The arc quencher may be used to restrict, to a minimum, sidewise motion of the movable contact.

**5. Replacement of Stationary Intermediate and Main Contacts (See Figure 8)**

a. Remove stationary arcing contacts. (See Section E-1-3)

b. Remove lower contact block.

c. Loosen the four cap screws which hold the upper stud (22) to the pole unit base (15).

d. Remove the tru-arc retaining rings on pin (23) and remove pin. The contacts can now be lifted out.

e. Reassemble contacts in the reverse order. Be careful to replace the intermediate contact in the proper position.

**6. Replacement of Movable Intermediate and Main Contacts (See Figure 8)**

a. Remove the movable arcing contacts. (See Section E-1-4.)

b. Loosen spring (16).

c. Slide link (7) to the side and off of pin (6).

d. Slide pins (6) and (17) far enough to the side to allow the movable intermediate and main contacts to be replaced.

e. Reassemble parts in the reverse order.

**NOTE**

Always check contact wipe and pressure following contact replacement. (See Section D-3.)

**7. Replacement of Mechanism Assembly (See Figure 11)**

a. Remove the front frame from the back frame. (See Section E-1-1.)

b. Remove pins holding spring charging arm (15) to the closing spring assembly.

c. Remove two bolts underneath frame and two bolts from the front of the frame.

d. Remove any wiring which is attached to the mechanism frame.

e. Note the position of the trip paddles on the trip shaft. Remove the dowel pins from the trip shaft couplers which hold the sections of the trip shaft together. The mechanism is now free to be removed.

f. Reassemble the parts in the reverse order. Be sure to replace the trip shaft with the trip paddles in the correct position.

**8. Replacement of Motor and Gear Reduction Unit (See Figure 11)**

a. Remove the front frame from the back frame. (See Section E-1-1.)

b. Remove pins from the closing spring charging arm (15).

c. Remove the plate from the right end of crankshaft (14).

d. Slide the crankshaft to the right until the left end of the shaft clears the gear unit housing.

e. Remove the buffer stop which is mounted to the side of the frame and directly over the motor (9).

f. Open the wire connections on the motor and remove the wire attached to the gear unit housing.

g. Remove four bolts on the bottom of the front frame and the bolt at the top of the gear reduction unit. The motor and gear reduction unit can now be removed.





## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

**NOTE**

If it is desired to replace only the motor unit, disconnect the motor leads and remove only the hardware fastening the motor to the gear reduction unit. When removing the motor only, the front frame should be placed front side down to prevent the oil from escaping from the gear unit. The new motor and gasket may now be replaced in the reverse order. A gasket may be cut out of gasket material by using the gear housing as a pattern.

The gear reduction unit contains four ounces of oil similar to Atlantic Refining Company's Grade HFS No. 3. It should not be necessary to add or change oil except when the gear reduction unit and motor are disassembled.

**9. Replacement of Auxiliary Switch (See Figure 14)**

- a. Disconnect all leads to the auxiliary switch.
- b. Remove two mounting screws.
- c. Disengage auxiliary switch shaft (3) from the crank.
- d. Set arrow on new auxiliary switch as shown in figure 14A.
- e. Push auxiliary switch shaft (3) into the square hole in the crank (breaker in open position).
- f. Replace mounting hardware.

**10. Replacement of Shock Lock**

- a. Remove stop nut (5) (see figure 15).
- b. Remove weights (12 and 13) and adjusting screw (4) from mounting bracket (14).
- c. Remove spring (6) from between mounting bracket (14) and latch arm (3).
- d. Remove latch arm (3) by removing cotter pin.
- e. Replace in the reverse order and make adjustments as outlined in Section D-10.

**11. Replacement of Latch**

- a. Remove the latch bolt and remove the wedge by pushing it upward.

- b. Replace in the reverse order, making sure that wedge lock screw is tight.

**12. Replacement of Shock Switch (See Figure 16)**

To replace the shock switch proceed as follows:

- a. Remove wiring from switch.
- b. Remove holding screws.
- c. Replace shock switch and wiring.

**13. Replacement of Closing Switch**

To replace the closing switch, remove the switch from the bracket, remove wiring, and replace with a new switch.

**14. Replacement of Cut-off Switches**

If the switches do not function properly they should be replaced as follows:

- a. Disconnect the wiring.
- b. Disconnect the locking nuts which hold the switches to their brackets.
- c. Replace switches and reconnect the wiring.
- d. Be sure to adjust the switches as outlined in Section D-12.

**15. Replacement of Control Relay**

To replace the control relay, remove wiring and two holding screws located on the back of the plate. Replace relay and reconnect wiring.

**16. Replacement of Direct-acting Overcurrent Trip Device**

- a. Remove the front frame. (See Section E-1-1.)
- b. Remove retainers and pins from the connecting rods (24) (see figure 18).
- c. Remove the screws which secure the device to the breaker pole unit base. The device is now free.
- d. Remove magnet (22) and armature assemblies (18 and 19) by removing screws which secure the assemblies to the lower stud.

- e. To replace, follow the above procedure in the reverse order and adjust the device as described in Section D-13.



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**17. Replacement of Shunt Trip Coil**

- a. Disconnect leads to coil.
- b. Remove magnet (7) (see figure 20) and coil (8) from frame (2).
- c. Form lower end of clamp (9) straight and remove.
- d. Remove coil (8) and install new coil in the reverse order of disassembly.



## AIR CIRCUIT BREAKER, NAVY TYPES ACB-3200HR AND ACB-4000HR

## SECTION E-2

### Repair Parts List

Fig. No.	Index No.	Name of Part	No. Required for Breaker	Contractor's Service Part No.	Manufacturer's Service Part No.
8	1	Arcing contact (Stationary)	15		K-6203966 G-1
8	4	Arcing contact (Movable)	15		K-9921572 G-1
8	24	Main contact (Stationary)	15		K-6203979 G-1
8	4A	Intermediate contact (Stationary)	3		K-6203979 G-3
8	5	Main contact (Movable)	15		K-6203978 G-1
7	4	Intermediate contact (Movable)	3		K-6203978 G-3
8	21	Spring (Stationary Arcing Contact)	15		K-6509858
8	21	Spring (Stationary Arcing Contact)	15		K-6509859
8	20	Spring (Stationary Main Contact)	18		K-6509811
25	16	Spring (Pawl on Drawout Handle)	1		365A313
25	17	Spring (Drawout Trip Latch Return)	1		412A135
25	18	Spring (Trip Shaft Return)	1		K-6403366 P-1
5	3	Spring (Opening)	2		K-6509813
10	8	Spring (Prop to Reset Latch)	1		K-6403348 P-1
15	6	Spring (Shock Lock)	1		K-6403315
10	4	Spring (Mechanism Reset)	1		K-6403393 P-1
25	24	Spring (Manual Trip)	1		K-6509887
10	1	Spring (Cam Prop Return)	1		412A140
12	13	Spring (Motor Mechanism Ratchet)	1		K-6509871 P-1
20	3	Spring (Shunt Trip)	1		365A325
25	32	Spring (Discharge Indicator)	1		365A305
22 A	5	Spring (Secondary Disconnect)	21		K-6403331
25	33	Spring (Drawout Plunger)	1		412A124
16	4	Spring (Shock Switch)	1		K-6302791
25	38	Spring (Anti-rebound Hook)	1		K-6509272 P-1
25	7	Light 115V, 60 cycles	2		Mazda Type TS 130
25	8	Relay 115V, 60 cycles	1		12HGA11T70N
20	8	Coil (Shunt Trip) 115V, 60 cycles	1		K-6275081 G-25
-	-	Coil (Shunt Trip) 450V, 60 cycles	1		K-6275081 G-27
25	10	Auxiliary Switch (10 Contacts)	1		DL-6353562N G-5
17	5	Switch (Cut-off)	3		412A491 P-3
5	7	Switch (Motor Power)	1		127A6450 P-1
11	9	Motor	1		5P66MA9
16	1	Contact Strip (Movable) Shock Switch	1		K-3805658 G-8
16	2	Contact Terminal (Stationary) Shock Switch	2		K-3845725 G-3
-	-	Retaining Rings and Pliers	1		176L129 G-12

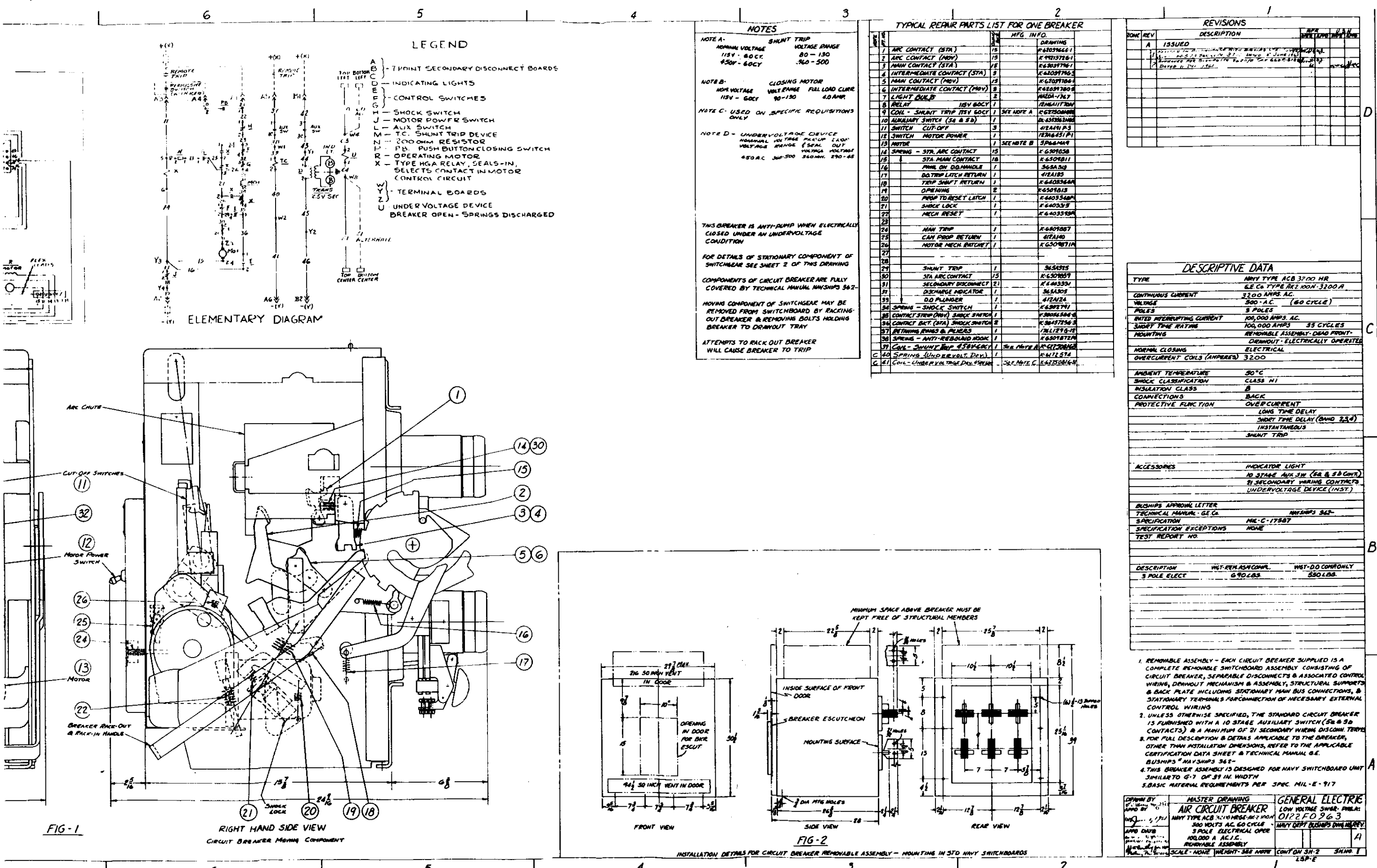


Figure 23. AK-2-100N circuit breaker master plan (sheet 1)

Figure 23  
AK-2-100N  
Master plan  
(sheet 1)  
39/40





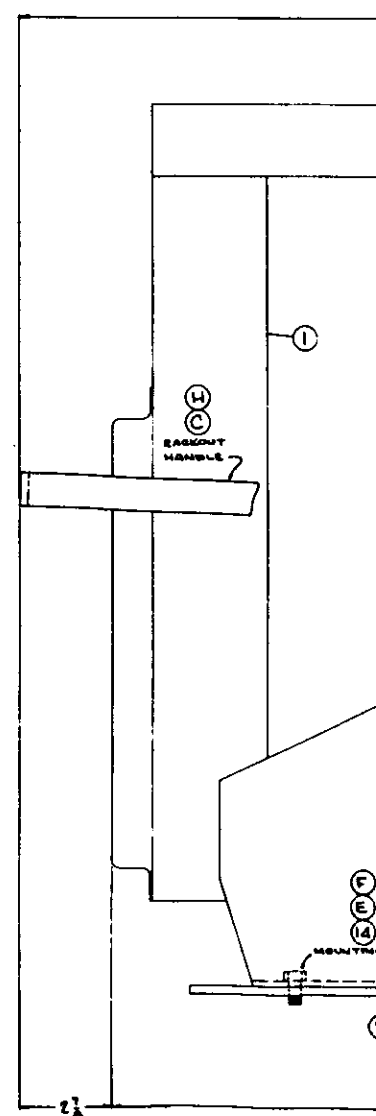
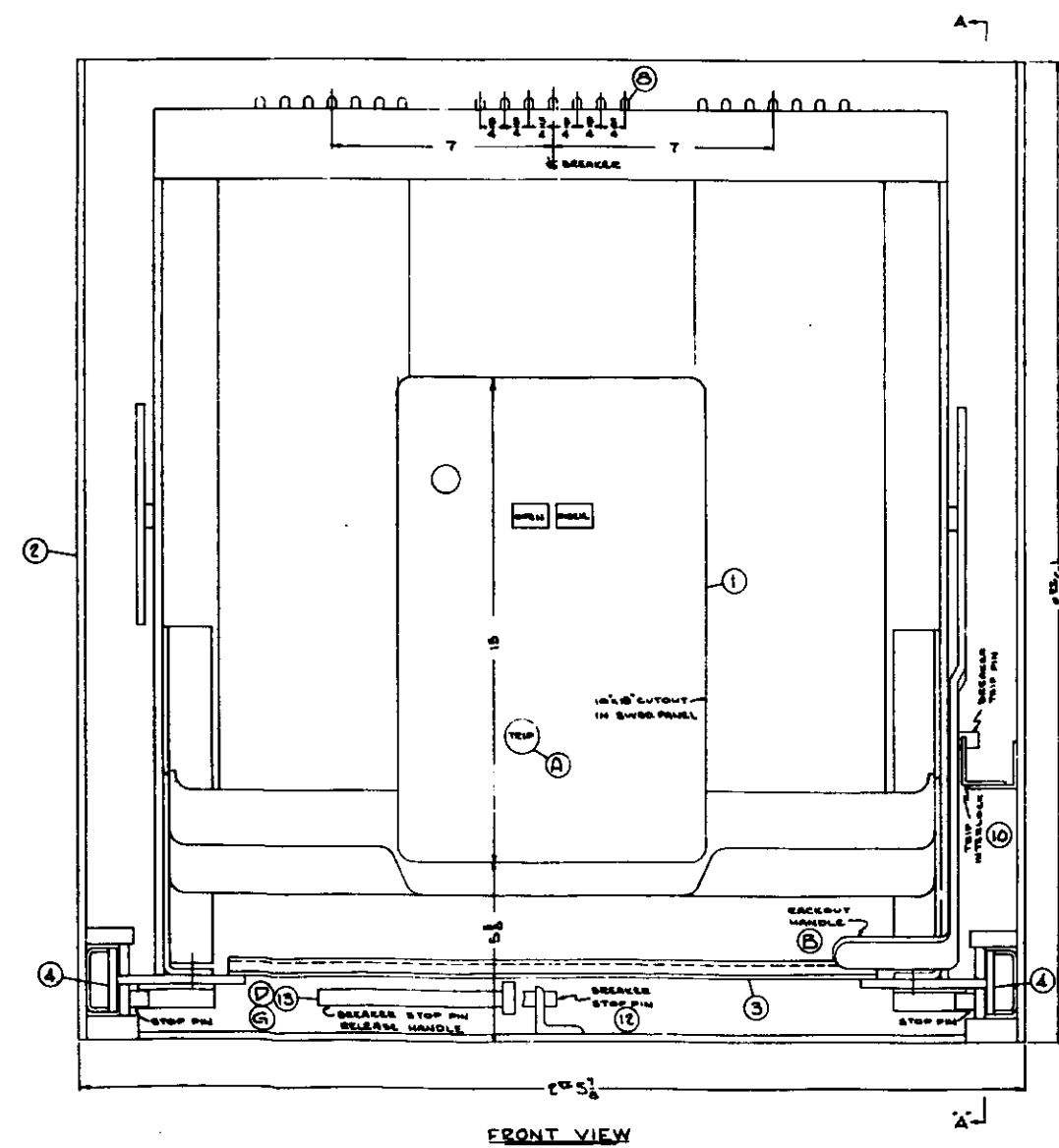
THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED WHEN REMOVING MOVING COMPONENT OF AIR CIRCUIT BREAKER FROM CONNECTED POSITION IN HOUSING.

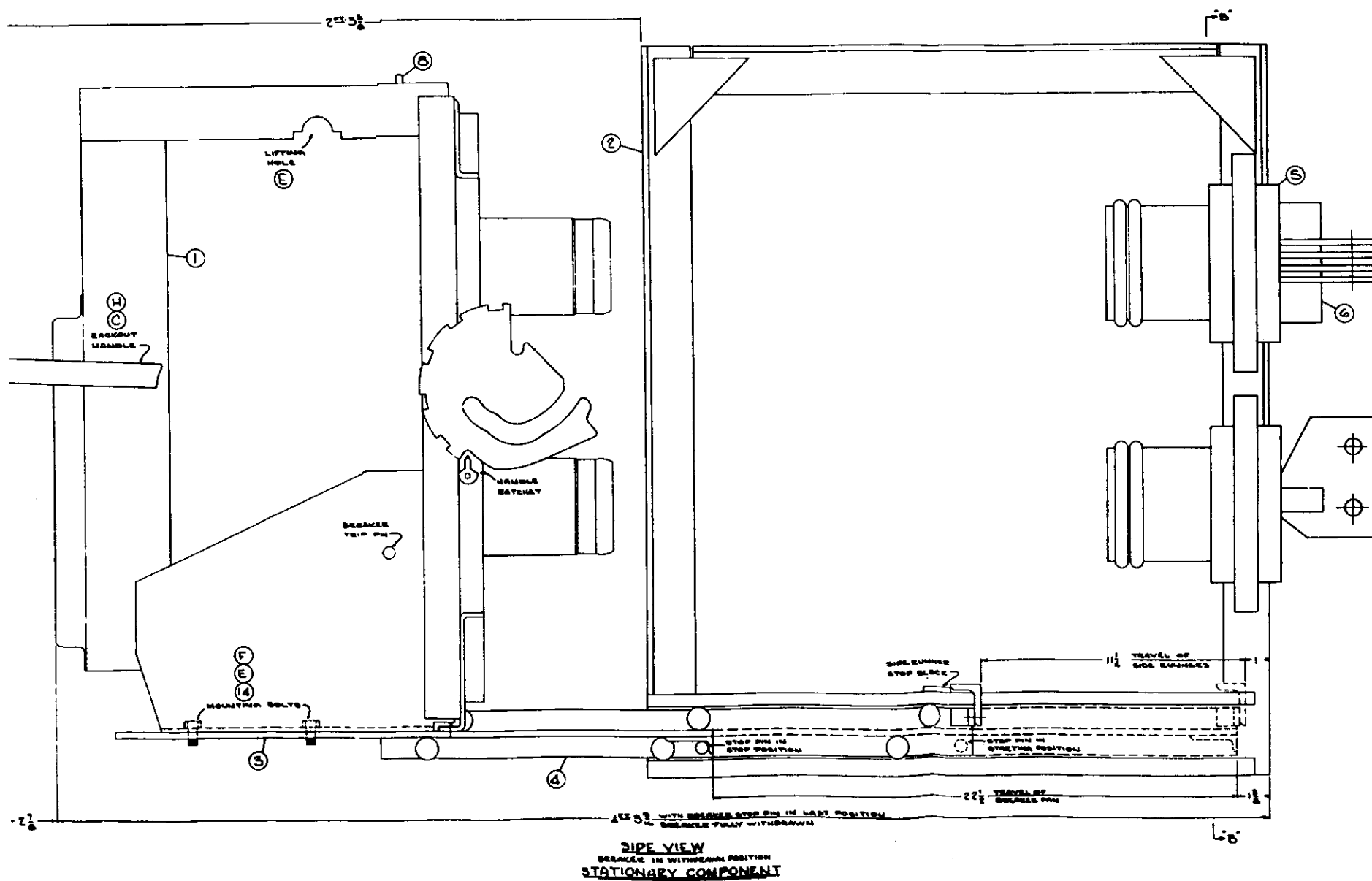
- TRIP BREAKER BY DEPRESSING TRIP BUTTON, BEFORE OPENING THE COMPARTMENT HINGED COVER.
- LIFT RACKOUT HANDLE LOCATED ON LOWER RIGHT HAND SIDE OF BREAKER. THIS WILL TRIP BREAKER IN EVENT STEP A IS OMITTED.
- PUMP THE RACKOUT HANDLE FIVE (5) TIMES & THEN RELEASE HANDLE.
- PUSH BREAKER STOP PIN RELEASE HANDLE TO RIGHT & PULL BREAKER FORWARD TO LIMIT OF ITS TRAVEL. THE BREAKER MAY BE INSPECTED AND MAINTENANCE MAY BE PERFORMED ON IT IN THIS POSITION.
- IF MAJOR MAINTENANCE IS NECESSARY IT MAY BE DESIRABLE TO REMOVE THE BREAKER FROM THE ROLLOUT TRAY. THIS IS DONE BY REMOVING THE FOUR (4) MOUNTING BOLTS ANCHORING THE BREAKER TO THE ROLLOUT TRAY, AND LIFTING BREAKER FROM TRAY USING LIFTING HOLES SHOWN.

THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED WHEN PLACING MOVING COMPONENT OF AIR CIRCUIT BREAKER IN HOUSING.

- MOUNT THE AIR CIRCUIT BREAKER ON ROLLOUT TRAY AND BODY DOWN WITH FOUR (4) MOUNTING BOLTS.
- PULL BREAKER STOP PIN RELEASE HANDLE TO RIGHT AND PUSH THE BREAKER INTO THE UNIT UNTIL IT REACHES THE RACKING POSITION AND RELEASE BREAKER STOP PIN HANDLE.
- PUMP THE RACKOUT HANDLE FIVE (5) TIMES AND THIS WILL MOVE THE BREAKER COMPLETELY IN THE UNIT. REVERSE THE RACKET BY LIFTING HANDLE, THEN RELEASE HANDLE.
- CLOSE THE COMPARTMENT FRONT HINGED COVER.

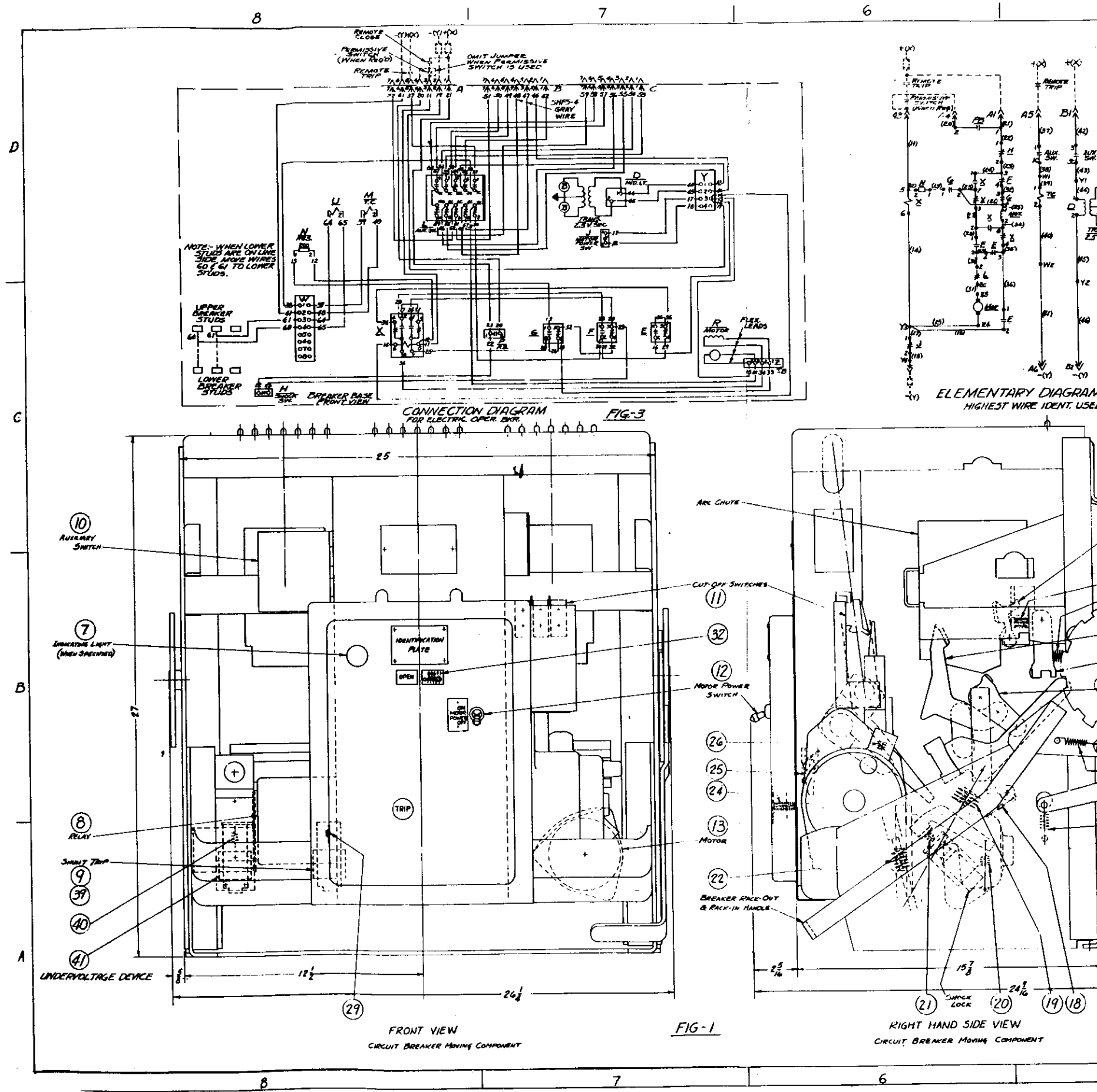
NOTE:  
THE HINGED DOOR OF THE CIRCUIT BREAKER COMPARTMENT SHOULD ALWAYS BE CLOSED WHEN OPERATING THE CIRCUIT BREAKER IN ITS CONNECTED POSITION.











**Figure 2**

REVISIONS			
NO.	REV.	DESCRIPTION	DATE
A	1	ISSUED	
B	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
C	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
D	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
E	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
F	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
G	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
H	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
I	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
J	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
K	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
L	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
M	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
N	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
O	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
P	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
Q	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
R	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
S	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
T	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
U	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
V	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
W	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
X	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
Y	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	
Z	1	REVISIONS TO DRAWING NO. 0962-073-8010-1	

FOR FUTURE REVISIONS SEE SHEET 1

LIST OF MATERIAL									
NO.	NAME	QTY.	MATERIAL	MATL. SPEC.	UNIT	QTY.	UNIT	QTY.	UNIT
1	ASSEMBLY ASSEMBLY TYPE AS-100N	1	STEEL	MIL-C-12507	7078F30 54.1				
2	STATIONARY COMPONENT	1	STEEL	MIL-S-10144	256C505				
3	ROLL OUT TRAY	1	STEEL	MIL-S-10144	256C505				
4	ROLL OUT SIDE RUNNER	2	STEEL	MIL-S-10144	256C505				
5	PRIMARY DISC DEVICE (BASE)	6	COMPOUND	MIL-P-14	256C514				
6	PRIMARY DISC DEVICE	6	COMPOUND	MIL-P-14	256C514				
7	SECONDARY DISC DEVICE (STATIONARY)	6	COMPOUND	MIL-P-14	256C514				
8	SECONDARY DISC DEVICE (MOVABLE)	6	COMPOUND	MIL-P-14	256C514				
9	SECONDARY DISC DEVICE SUPPORT	1	STEEL	MIL-S-10144	256C505				
10	TRIP INTERLOCK	1	STEEL	MIL-S-10144	256C505				
11	CAM PIN SUPPORT	1	STEEL	MIL-S-10144	256C505				
12	BREAKER STOP PIN	1	STEEL	MIL-S-10144	256C505				
13	BREAKER STOP PIN LEVER	1	STEEL	MIL-S-10144	256C505				
14	BREAKER STOP PIN BOLT	4	STEEL	MIL-S-10144	256C505				

Δ QUANTITY AS REQUIRED (3 MAX)

REFERENCES			
NO.	REFERENCE	NO.	REFERENCE
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NOTES:  
1. FOR IN-BOARD MOUNTING DATA, REPAIR PARTS, WIRING DIAGRAMS AND OTHER DETAILS SEE SHEET 1.  
2. CLEANING AND PAINTING OF ASSEMBLY TO BE IN COMPLIANCE WITH MILITARY SPECIFICATIONS, MIL-STD-1316, GRADE 2, P. 1.  
3. THE MAIN DISCONNECTS MAY BE OBSERVED WHEN THE MOVING COMPONENT IS FULLY DRAWN OUT.  
APPROX. WEIGHT:  
CALCULATED WEIGHT OF REMOVABLE ASM WITH  
BOLT 15.0 LBS.  
CALCULATED WEIGHT OF REMOVABLE ASM WITHOUT  
BOLT 14.0 LBS.

DETAILS OF CIRCUIT BREAKER STATIONARY COMPONENT

MASTER DRAWING			
NO.	REV.	DATE	BY
1	1	10/1/54	W. J. H. H.
2	1	10/1/54	W. J. H. H.
3	1	10/1/54	W. J. H. H.
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9	1	10/1/54	W. J. H. H.
10	1	10/1/54	W. J. H. H.
11	1	10/1/54	W. J. H. H.
12	1	10/1/54	W. J. H. H.
13	1	10/1/54	W. J. H. H.
14	1	10/1/54	W. J. H. H.
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30	1	10/1/54	W. J. H. H.
31	1	10/1/54	W. J. H. H.
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95	1	10/1/54	W. J. H. H.
96	1	10/1/54	W. J. H. H.
97	1	10/1/54	W. J. H. H.
98	1	10/1/54	W. J. H. H.
99	1	10/1/54	W. J. H. H.
100	1	10/1/54	W. J. H. H.

Figure 26  
AK-1-100N  
Master plan  
(sheet 2)



THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED WHEN REMOVING MOVING COMPONENT OF AIR CIRCUIT BREAKER FROM CONNECTED POSITION IN HOUSING.

- TRIP BREAKER BY DEPRESSING TRIP BUTTON, BEFORE OPENING THE COMPARTMENT HINGED COVER.
- LIFT RACKOUT HANDLE LOCATED ON LOWER RIGHT HAND SIDE OF BREAKER. THIS WILL TRIP BREAKER IN EVENT STEP A IS OBTAINED.
- PUMP THE RACKOUT HANDLE FIVE (5) TIMES & THEN RELEASE HANDLE.
- PUSH BREAKER STOP PIN RELEASE HANDLE TO RIGHT & PULL BREAKER FORWARD TO LIMIT OF ITS TRAVEL. THE BREAKER MAY BE INSPECTED AND MAINTENANCE MAY BE PERFORMED ON IT IN THIS POSITION.
- IF MAJOR MAINTENANCE IS NECESSARY IT MAY BE DESIRABLE TO REMOVE THE BREAKER FROM THE ROLLOUT TRAY. THIS IS DONE BY REMOVING THE FOUR (4) MOUNTING BOLTS ANCHORING THE BREAKER TO THE ROLLOUT TRAY, AND LIFTING BREAKER FROM TRAY USING LIFTING HOLES SHOWN.

THE FOLLOWING PROCEDURE SHOULD BE FOLLOWED WHEN PLACING MOVING COMPONENT OF AIR CIRCUIT BREAKER IN HOUSING.

- INSERT THE AIR CIRCUIT BREAKER ON ROLLOUT TRAY ATTACHED BOLT WITH FOUR (4) MOUNTING BOLTS.
- PULL BREAKER STOP PIN RELEASE HANDLE TO RIGHT AND PUSH THE BREAKER INTO THE UNIT UNTIL IT REACHES THE LOCKING POSITION AND RELEASE BREAKER STOP PIN HANDLE.
- PUMP THE RACKOUT HANDLE FIVE (5) TIMES AND THIS WILL MOVE THE BREAKER COMPLETELY IN THE UNIT. REVERSE THE RACKET BY LIFTING HANDLE, THEN RELEASE HANDLE.
- CLOSE THE COMPARTMENT FRONT HINGED COVER.

NOTE:  
THE HINGED DOOR OF THE CIRCUIT BREAKER COMPARTMENT SHOULD ALWAYS BE CLOSED WHEN OPERATING THE CIRCUIT BREAKER IN ITS CONNECTED POSITION.

