SWITCHBOARD
Technical Manual

PART 2

CIRCUIT BREAKERS

NAVY TYPE ACB

WESTINGHOUSE TYPE 23DHN50

800R-AMPERE FRAME SIZE—2300 VOLTS

NAVY TYPE ACB

WESTINGHOUSE TYPE 23DHN50

2000R AMPERE FRAME SIZE—2300 VOLTS

REMOVABLE ASSEMBLIES OF STANDARDIZED DIMENSIONS

TECHNICAL MANUAL 32-855-6C1

BUREAU OF SHIPS • NAVY DEPARTMENT • OCTOBER, 1960

PRELIMINARY DATA

INTERCHANGEABILITY OF CIRCUIT BREAKERS

This manual covers both the 800R and 2000R frame circuit breakers since they are both fully interchangeable in performance or as a complete removable assembly. The 800R is furnished with overcurrent coils 200, 300, 400, 600 and 800 amperes. The 2000R is furnished with 1000, 1200, 1600 and 2000 ampere overcurrent coils. Internal difference between the units is in the overcurrent trip ratings and number of main contacts.

Each circuit breaker assembly consists of two parts, the stationary component which is permanently bolted in a switchboard unit and a moving component which may be racked-out of the stationary component for accessability during maintenance and inspection.

PURPOSE

A circuit breaker has two fundamental purposes: First, to perform normal switching operations to isolate a circuit, and second, to isolate a circuit under fault conditions.

CAUTION - WARNING - THE CIRCUIT BREAKER SHOULD BE IN THE OPEN POSITION AND THE SWITCHBOARD DE-ENERGIZED BEFORE INSTALLING, ADJUSTING, INSPECTING, REPLACING PARTS, OR REMOVING THE CIRCUIT BREAKER. IF THE BUS CANNOT BE DE-ENERGIZED, USE INSULATED HANDLE TOOLS, RUBBER GLOVES, AND A RUBBER FLOOR MAT.

INSTALLATION

The movable component must be removed before stationary component can be bolted in switchboard. Normal care in handling the stationary component is sufficient.

After securing the stationary component the movable component should be lifted by hooks in the "lifting brackets".

When installing the circuit breaker, care should be taken to see that the supporting surface is even and vertical, and that all leads to be connected to the circuit breaker are de-energized. Protect the circuit breaker from dirt and possible damage.

The connections to the circuit breaker studs should be cleaned, flat and free of burrs to assure full contact area, and firmly clamped or bolted in place to prevent excessive heating. The connecting cables should be supported so that the circuit breaker studs will not be subjected to unnecessary strain.

At no time should the circuit breaker be allowed to rest upon or be supported by the current studs. This will result in unnecessary damage and stress to the studs and the insulated moldings.

Any discoloration or pitting of the circuit breaker contacts in evidence when the circuit breaker is received from the manufacturer is caused by calibrating the breaker and will in no way interfere with proper functioning of the circuit breaker.

MAINTENANCE

Periodic inspection of the breaker is recommended. An inspection should always be made after it is known that the breaker has opened on a severe short circuit. When a circuit breaker is not operated for long periods of time, a high resistance oxide or sulfide may form on the contact surfaces which results in overheating. To burn off this high resistance film, operate the circuit breaker several times under normal load at regular inspection periods.

Be sure the breaker is disconnected from all sources of power before inspecting or repairing.

If excessive heating occurs, look for loose or corroded contacts or connections.

When inspecting the breaker, examine the contacts to see if there has been any severe pittings or burning of the contact surfaces which will prevent proper contact wipe. Rough or high spots should be removed with a very fine clean file or fine clean sandpaper.

LUBRICATION

In general, the breaker mechanism requires very little lubrication which should be applied sparingly. Any excessive amount of oil on the breaker parts is apt to collect dust and is to be avoided.

The lubrication applied during manufacture should be sufficient for the life of the breaker.

REPLACING PARTS

Before replacing any part, the operator should note the position of each part before removing.

When removing or replacing tension springs with hooks, the work may be facilitated by pulling on the hooks with a cord or a wire.

TABLE OF CONTENTS

TABLE OF CONTENTS (Cont'd)

LIST OF ILLUSTRATIONS

CHAPTER 1 - GENERAL INFORMATION

SECTION 1 - INTRODUCTION

SECTION 2 - DETAILED DESCRIPTION

CHAPTER 2 - PRINCIPLES OF OPERATION

SECTION 1 - GENERAL PRINCIPLES

CHAPTER 5 - MAINTENANCE

SECTION 2 - CORRECTION MAINTENANCE

CHAPTER 7 - DRAWINGS

SECTION 1 - GENERAL

LIST OF TABLES

CHAPTER 1 - GENERAL INFORMATION

SECTION 0 - GENERAL DATA

CHAPTER 1

GENERAL INFORMATION

Section 0—General Data

1-0-1 CIRCUIT BREAKER CHARACTERISTICS

The circuit breaker classification data is listed in Table 1-0-1.

TABLE 1-0-1—CIRCUIT BREAKER CLASSIFICATION DATA

Types	Navy Type ACB-2300V WE Corp. 23DHN50
Frame Sizes (continuous rating)	800R Frame 800 Amps. 2000R Frame 2000 Amps.
Voltage	2300 Volts
Current	A-C
Frequency	60 Cycles
Poles	3
Continuous Current Rating (Trip Coil)	800R Frame - 200, 300, 400, 600, 800 2000R Frame - 1000, 1200, 1600, 2000
Interrupting Capacity	55,000 (RMS) Amperes
Short Time Rating	55,000 (RMS) Amperes
Short Time Duration	35 Cycles
Means of Closing	Electrical and Emergency, Manual
Auxiliary Switch	Stages - 12
Mounting	Removable Assembly-Dead Front
Connections	Back
Insulation Class	B
Shock Classification	Class HI
Ambient Temperature	50°C
Protective Functions	Overcurrent Long Delay Tripping Short Delay Tripping (Bands 1, 2, 3 & 4) Instantaneous Tripping Shunt Trip
Master Drawings	800R Frame - Westinghouse 900J076 (2 Sheets) 2000R Frame - Westinghouse 900J220 (2 Sheets)
Navy Test Approval - N.Y. Lab.	

Weights	Frames - 800R	2000R
Complete Removable Assembly	1290	1320 lbs
Movable Component Only	1020	1050 lbs
Stationary Component Only	270	270 lbs
Overcurrent Device	20	25 lbs

1-0-1-1 Rating of Components

The rating of the components are listed in Table 1-0-2 and 1-0-3.

TABLE 1-0-2—CURRENT RATING OF COMPONENTS

COMPONENTS	DUTY (AMPERES)	LOAD DURATION (SECONDS)	ALLOWABLE OPERATIONS PER MINUTE
115V. Closing Relay	4 Intermittent	1/5	10
450V. Closing Relay	1 Intermittent	1/5	10
115V. Closing Magnet	80 Intermittent	1/10	10
450V. Closing Magnet	20 Intermittent	1/10	10
115V. Shunt Trip	4 Intermittent	1/10	10
450V. Shunt Trip	1 Intermittent	1/10	10
Auxiliary Switch	15 Intermittent	(For interrupting ratings see table)	
Secondary Disconnects	15 Intermittent	(No interrupting rating)	
Wiring to Aux. Switch	10 Intermittent	(Unless contract specifies more)	

TABLE 1-0-3—VOLTAGE RATING OF COMPONENTS

COMPONENTS	NOMINAL RATING (VOLTS)	VOLTAGE RANGE (VOLTS)
Closing Relay and Magnet	115	90-130
	450	360-500
Shunt Trip	115	80-130
	450	360-500

1-0-1-2 Auxiliary Switch

The interrupting capacities of the auxiliary switch contacts are listed in Table 1-0-4.

TABLE 1-0-4—AUXILIARY SWITCH

VOLTS	NON-INDUCTIVE CIRCUIT	INDUCTIVE CIRCUIT
115 a-c	75 amps.	15.0 amps.
450 a-c	25 amps.	5.0 amps.

Section 1—Introduction

1-1-1 GENERAL

This manual describes the Navy Type ACB (Westinghouse Type 23DHN50) 800R and 2000R ampere frame size air circuit breakers, for 2300 Volt Naval Shipboard service.

Each circuit breaker is supplied as a complete, removable switchboard assembly consisting of circuit breaker, separable disconnects and associated control wiring and drawout mechanism and assembly structural supports and back plate including stationary main bus connections and stationary terminals for connection of the necessary external control wiring.

The general arrangement of this equipment is shown in Figures 1-1-1 and 1-1-2.

The circuit breaker is designed as an assembly including the drawout mechanism. These assemblies incorporate disconnect features for both main current connections and secondary current connections. This mounting allows easy removal and installation of the movable component when maintenance operations are required.

The circuit breaker is closed electrically from a local or remote control switch. It may be tripped from the control switch or may be tripped by depressing the "push-to-trip" button which protrudes through the face plate.

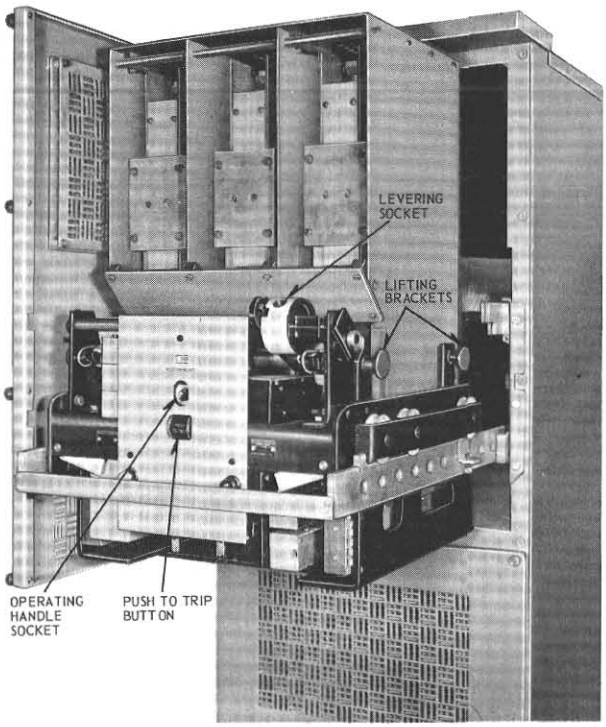
For maintenance, an emergency closing handle provides manual closing by inserting the operating handle through the face plate into the socket provided in the operating mechanism and pulling the operating handle down (down approximately 45 degrees) until the breaker latches.

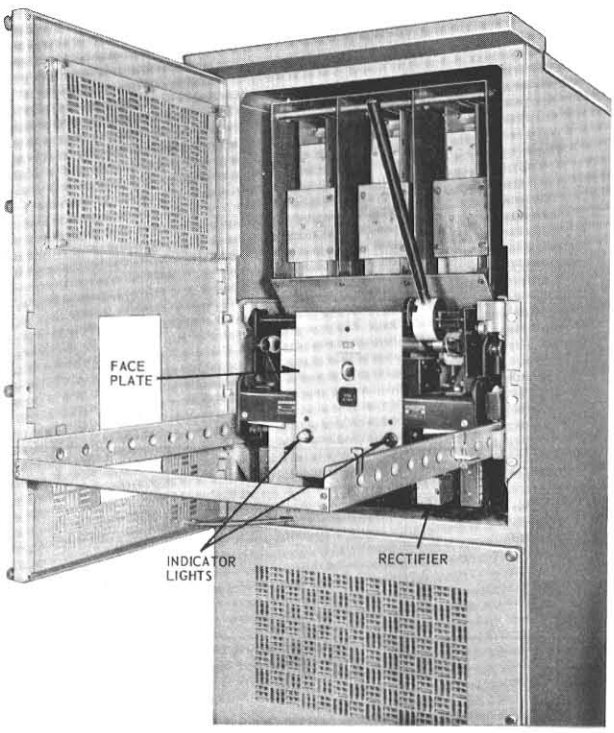
The circuit breaker is especially designed so that the stationary component which is secured inside the cell of a switchboard functions through special devices to allow withdrawal or insertion of the moving component. The special devices include the extension rails, rollers, and levering device. These units incorporate quick disconnect features for both main current connections and secondary current connections. This special mounting allows easy removal and installation when maintenance operations are required.

The moving component of the breaker consists of a rigid metal chassis to which are bolted various sub-assemblies. Each sub-assembly is a complete unit and is readily interchangeable between breakers. In addition, each sub-assembly may be removed intact and easily replaced for minimum outage time.

The sub-assemblies required in all breakers are the mechanism, pole units, arc chutes, auxiliary switch, secondary disconnects, anti-shock-closed, anti-shock-open closing relay and closing magnet. The remaining sub-assemblies that may be included are overcurrent trip devices and shunt trip device.

The circuit breaker is for three phase a-c service with series overcurrent trip devices in all three poles.





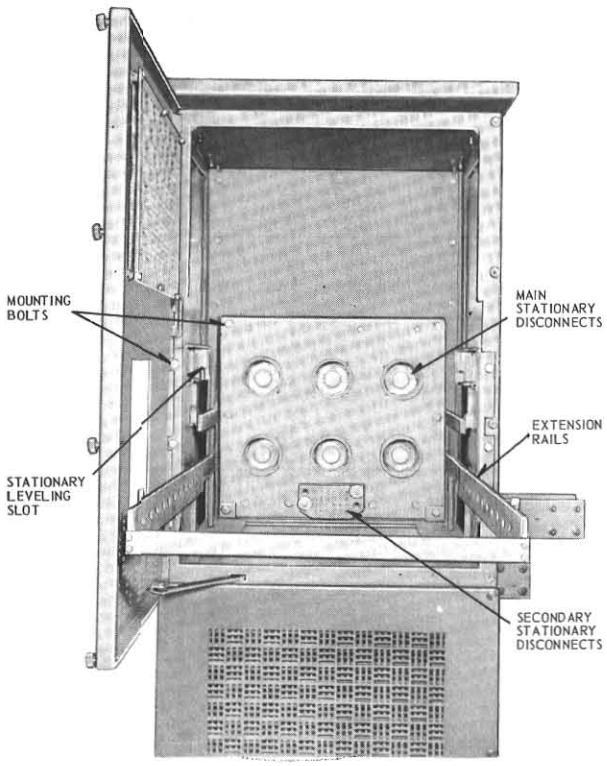


FIGURE 1-1-1 — Removable Assembly and Stationary Component

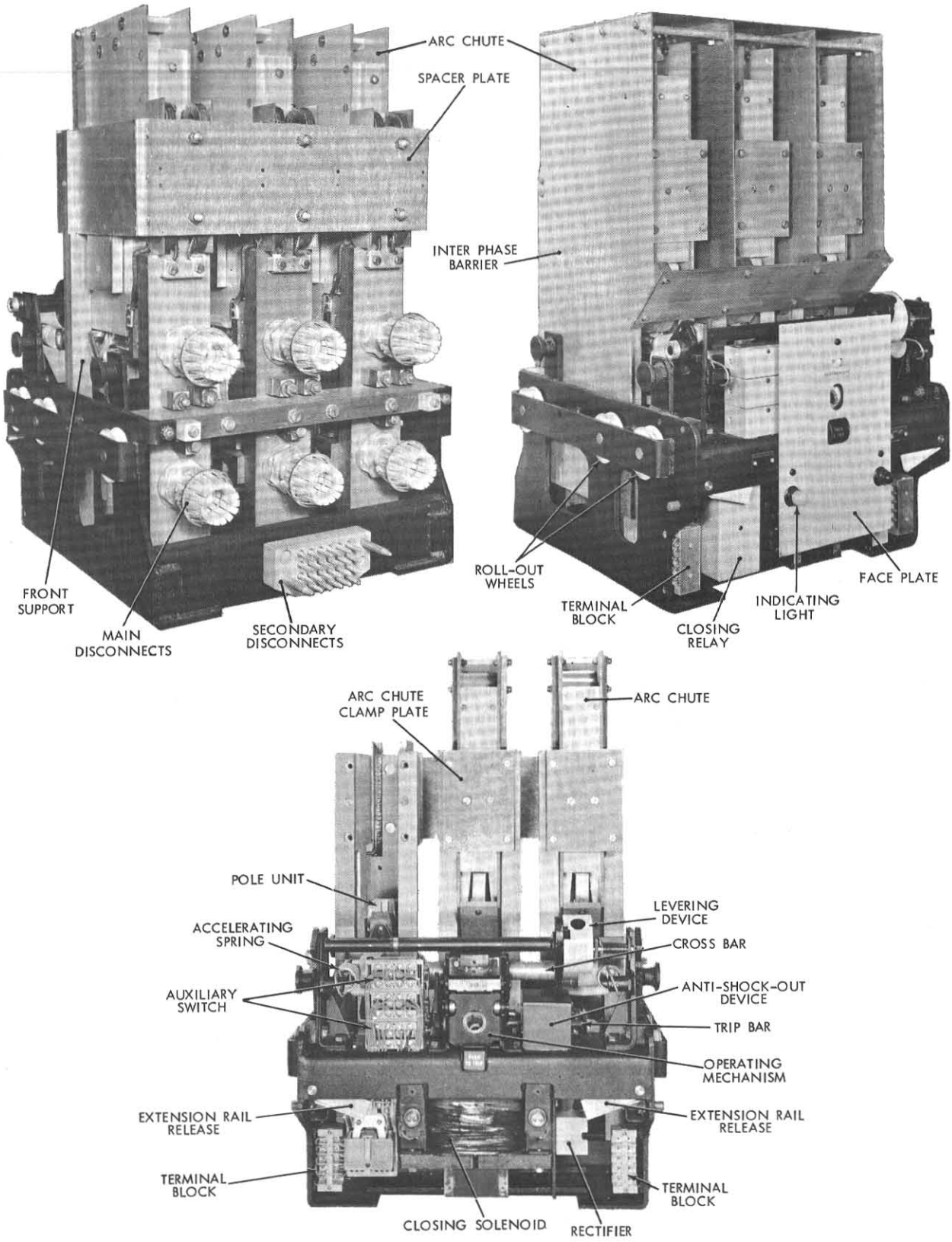


FIGURE 1-1-2 — Movable Component

Section 2—Detailed Description

1-2-1 CIRCUIT BREAKER

1-2-1-1 General

Paragraph 1-1-1 describes the general detail and subsequent paragraphs describe various sub-assemblies in detail.

1-2-1-2 Movable Component—(See Figure 1-2-1)

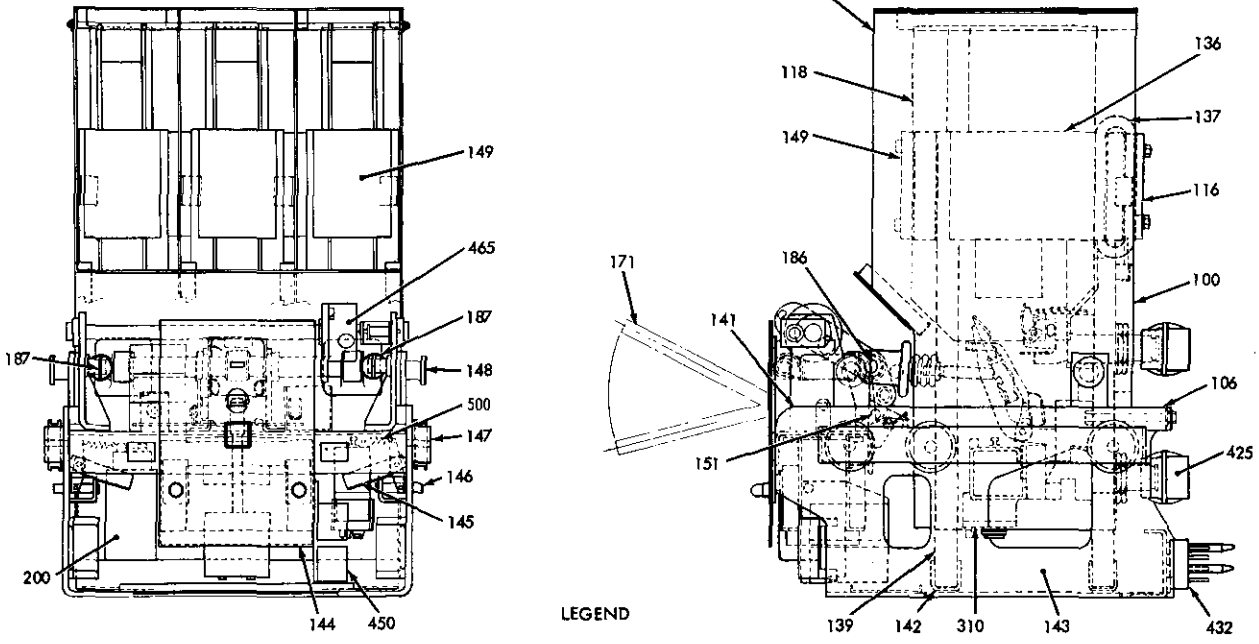
The assembly consists of two side panels (143), a shelf (141) and a cross brace which serves as the back panel. Roll out wheels (147) are attached on the bottom of the platform on each side. Two lifting brackets are secured on each side of the platform.

1-2-1-3 Pole Unit—(See Figure 1-2-2)

Three separate pole units are provided for each breaker. Each pole unit consists of a base, a stationary contact assembly, a moving contact assembly, and a magnetic blow-out assembly.

Each pole unit is rigidly secured and braced in position. The bottom of the base is set in and bolted to a section of channel iron welded to the chassis. The center of each base is bolted to an insulating tie bar and the top of each pole unit is bolted to the cross plate.

The stationary contact assembly consists of the upper stud (110) which is welded to the main stationary contact block (132), the arcing contact spring (112), the arcing contact (135), stop pin (134), pivot pin (133), and shunt. The main stationary contact (132) is bolted to the base (101) and the arcing contact is pivoted on pin (133). The main and arcing contacts are connected electrically by a shunt.

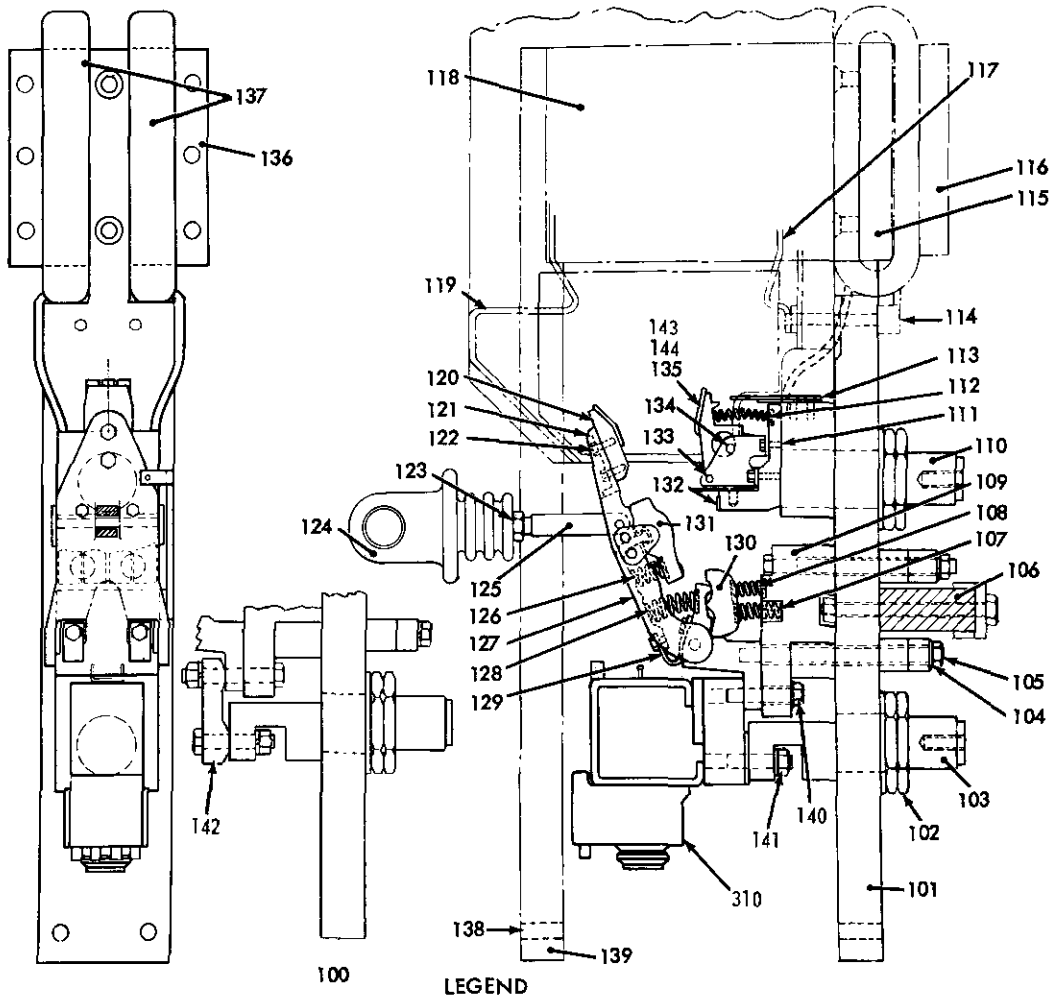


LEGEND

100	POLE UNIT	142	CHANNEL IRON	171	OPERATING HANDLE
106	CENTER BRACE	143	SIDE PANEL	186	CROSS BAR
116	CROSS PLATE	144	FACE PLATE	*187	CROSS BAR ACCELERATING SPRING
118	ARC CHUTE	145	STOP RELEASE LEVER	200	CLOSING RELAY
136	SIDE PLATE	146	STOP PIN	310	OVERCURRENT TRIP DEVICE
137	BLOW OUT COIL	147	ROLLOUT WHEELS	425	MAIN DISCONNECT
139	FRONT SUPPORT	148	LIFTING BRACKET	432	SECONDARY DISCONNECT
140	INTERPHASE BARRIER	149	CLAMPING PLATE	450	SILICON RECTIFIER
141	SHELF	151	TRIP BAR	465	LEVERING DEVICE
				*500	STOP PIN SPRING

* REPAIR PARTS

FIG. 1-2-1 — Circuit Breaker Movable Component



LEGEND

100	ARC CHUTE AND POLE UNIT
101	BASE
102	STUD NUT
103	LOWER PRIMARY STUD
104	INSULATING SPACER
105	BOLT
106	CENTER BRACE
*107	SPRING, AUXILIARY CONTACT
*108	SPRING
109	INSULATING BLOCK
110	UPPER STUD
111	SCREW
*112	SPRING, ARCING CONTACT
113	ARCING SHEID
113	ARCING SHIELD
114	TERMINAL
115	YOKE
116	CROSS PLATE
117	REAR ARC HORN
118	ARC CHUTE
119	FRONT ARC HORN
*120	MOVING ARCING CONTACT
121	LOCKPLATE
122	BOLT
123	NUT
124	INSULATING LINK
125	LINK
*126	SPRING, MAIN CONTACT
127	CONTACT ARM
*128	SPRING, ACCELERATING
129	SHUNT
130	AUXILIARY CONTACT
131	MAIN MOVING CONTACT
132	MAIN STATIONARY CONTACT
133	PIVOT PIN
134	STOP PIN
*135	STATIONARY ARCING CONTACT-LEADING
136	SIDE ARM
137	COILS
138	BOLT
139	FRONT SUPPORT
140	BOLT
141	NUT
142	CONNECTOR
*143	STATIONARY ARCING CONTACT - R.H.
*144	STATIONARY ARCING CONTACT - L.H.
310	OVERCURRENT TRIP DEVICE

* REPAIR PARTS

FIG. 1-2-2 — Arc Chute and Pole Unit Assembly

Limited rotation about pin (133) provides for arcing contact overtravel while the arcing contact spring maintains the required contact pressure. The overtravel feature permits the arcing contact to close first and remain closed until after the main contacts have separated. The contact surfaces of the arcing contact are special arc resistant alloy inserts.

The moving contact assembly consists of a contact arm (127) of copper to which is fastened arcing contact (120) by two bolts (122) which are locked by lockplate (121). The main contact (131) is secured to the contact arm through a ball joint type arrangement and has limited freedom of rotation about this joint as governed by main contact spring (126). Auxiliary contact (130) serves as a bridge between the main moving contact and the overcurrent trip device. The shunt (129) is a flexible bundle of thin copper strips that carries current from the moving contact assembly to the lower contact stud.

The moving contact assembly is attached to the mechanism cross bar (186) (Figure 1-2-1) by molded insulating link (124) which is screwed on metal link (125) and locked by nut (123). When the breaker is tripped, all force is removed from the cross bar and accelerating springs (128) in conjunction with the additional accelerating springs (187) (Figure 1-2-1) attached to each end of the cross bar quickly snaps the moving contact assembly from the closed to the open position. Special arcing shield (113), mounted above and below the stationary arcing contact prevents the arc from jumping between the arcing contact and the main contacts.

Each magnetic blow-out assembly consists of two coils (137), a yoke (115) and two side arms. The coils encircle the yoke with is secured at the top of the pole unit. The extension arms are bolted to the yoke and extend towards the front of the breaker. The forward end of the extension arms are bolted to the front support (139) which is set in and bolted to a section of channel iron welded to the chassis. The extension arms are located so the air gap of the magnetic circuit is across the arc chute and arc. At the time the contacts part and draw an arc, the arc is deflected up into the arc chute where it is extinguished due to a stretching and cooling process.

1-2-1-4 Arc Chute and Interphase Barrier—(See Figure 1-2-2)

The arc chutes (118) are mounted above and surround the contact assembly of each pole, and serve to stretch and cool the arc drawn between the separating contacts so that the arc may be extinguished and the circuit opened in the least possible time. The arc chutes are an extremely important part of the circuit breaker and a breaker should never be energized until they are mounted in place.

Each arc chute consists of a laminated case, a number of metal and asbestos plates, a front and rear arc horn (119) and (117), and three arc deflectors. The plates and arc horns are supported and held in place by the case.

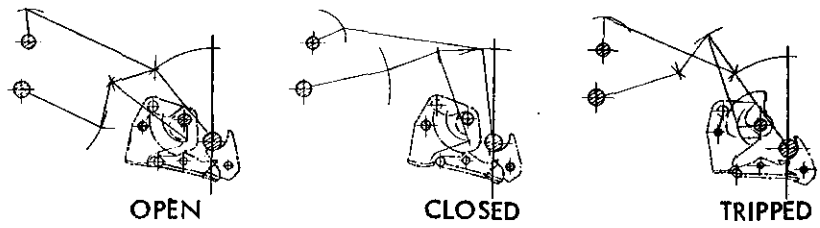
Three insulating blocks, one on each side and one at the rear, are attached to the arc chute. The two side blocks rest on the magnetic blow-out arms and the one at the rear rests on the base of the pole unit to locate the arc chute in position. An arc chute clamping plate (149), bolted to the end of the blow-out assembly arm secures the arc chute in position. When the arc is drawn by the separating consists, it is transferred to the arc horns and moves up into the arc chute due to magnetic and thermal action where it is quickly de-ionized and extinguished.

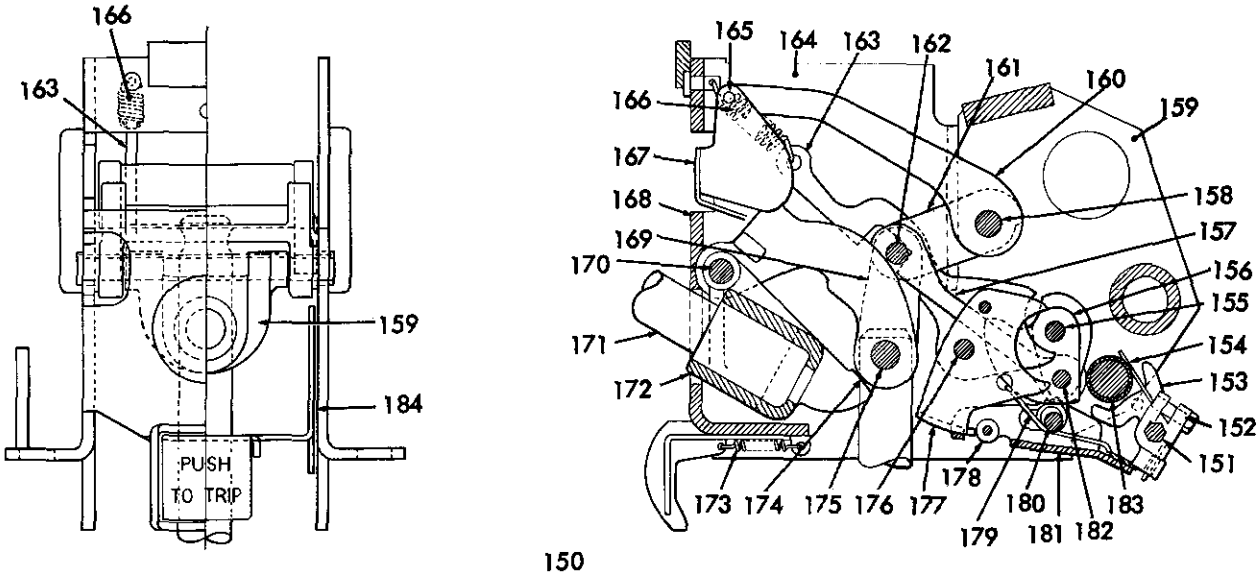
The interphase barrier (140) fits over the arc chutes and pole units so that it forms a separate compartment around each of the three pole units. This arrangement prevents the hot gases which develop around each pole unit during the arcing period from entering the space occupied by another pole unit thereby, eliminating the possibility of forming a conducting path between phases during the arcing.

1-2-1-5 Operating Mechanism—(See Figure 1-2-3)

The operating mechanism opens and closes the circuit breaker by moving the cross bar (186) (Figure 1-2-1) to which the moving contact assemblies are attached. It is mounted on the top of the shelf at the center of the circuit breaker.

The operating mechanism consists of a group of toggle links and latches attached to the operating mechanism frame on fixed pins (155), (170), (176), (180), and (183). The cross bar is held by the closing lever (159). Lowering the operating handle (171) moves the mechanism linkage from the open position to the closed position. This is accomplished when the fork-type handle socket (172) forces the first toggle link (174) upward pushing second toggle link (169), third toggle link (161) and closing lever (159) ahead of it. The motion of the toggle linkages is directed by link (157) which is pivoted at its lower end on pin (182) in latch (156).





150	OPERATING MECHANISM	168	FRAME
151	TRIP BAR	169	SECOND TOGGLE LINK
152	TRIP LATCH	170	PIN
153	TRIGGER	171	OPERATING HANDLE
*154	TRIP BAR SPRING	172	HANDLE SOCKET
155	PIN	*173	TRIP BUTTON SPRING
156	LATCH	174	FIRST TOGGLE LINK
157	LINK	175	PIN
158	PIN	176	PIN
159	CLOSING LEVER	177	ROLLER LATCH
160	INDICATOR LINK	178	ROLLER
161	THIRD TOGGLE LINK	*179	LATCH SPRING
162	PIN	180	PIN
163	PAWL	181	LATCH
164	MECHANISM COVER	182	PIN
165	PIN	183	PIN
*166	PAWL SPRING	184	MANUAL TRIP LEVER
167	POSITION INDICATOR		

* REPAIR PARTS

FIG. 1-2-3 — Operating Mechanism with Position Indicator

Latch (156) in turn, is restrained from moving by roller latch (177) which is pivoted on pin (176) and engages trigger (153) which is held by latch (152) on the trip bar. The linkage is held in the closed position by pawl (163) which latches under pin (155).

In electrical operation, the plunger rod of the closing solenoid bears on pin (175), thus engaging linkage and closing the breaker.

The mechanism is opened by rotating trip bar (151) counterclockwise. This is accomplished either by pushing the "PUSH-TO-TRIP" button; in which case the pushbutton rotates tripping latch (152), or automatically through the tripping attachments rotating the trip bar. In either case, the counterclockwise rotation of the trip bar (151) moves trigger (153) out of engagement with the lower end of the latch (181), which in turn permits the roller latch to rotate counterclockwise out of engagement with latch (156). Latch (156) is then free to rotate so that the mechanism assumes the trip free position in which the contacts are open but parts of the mechanism levers are in the closed position. In this position, pawl (163) is disengaged, permitting the linkage to collapse to the open position.

Position indicator (167) is an integral part of the closing mechanism. It is formed from sheet metal and is pivoted on pin (165). It is visible from the front of the circuit breaker through a window in the face plate and mechanism frame, see Figure 1-2-1. With the circuit breaker in the open position, the yellow face of the indicator shows through the window. The word "OPEN" is stamped on this yellow face. When the breaker closes, pin (158) of the closing lever (159) pulls indicator link (160) to the right, thus rotating the other face of the indicator up into a position visible through the window. This face is painted blue and is stamped with the word "CLOSED". The position indicator provides a positive visual indication of the operating condition of the circuit breaker.

1-2-1-6 Closing Relay—(See Figure 1-2-4)

The closing relay is mounted on the left side of the closing solenoid. This relay closes and opens the circuit of the solenoid. The relay provides a means of closing the circuit breaker electrically from a remote point through a control switch.

The relay base (238) is molded from insulating material. The contact assemblies, coil assembly and other parts are attached to the base. Frame (203) holds the coil in place and serves as part of the magnetic circuit of coil (206). The frame or yoke is secured to the molded base by three screws (208). The coil (206) is held in place by guide tube (207). The relay is enclosed by molded cover (211) which is secured by screw (239).

The moving core (204) is free to slide up and down in the guide tube (207). In moving up in response to the magnetic pull from the stationary core when the coil is energized, the moving core pulls up latch (229) which is fastened with pin (227) to the moving core. When the coil (206) is energized, spring (225) bearing against latch (229) holds the latch in such a position that it is hooked under latch pin (230), causing moving contact arm assembly to rotate counterclockwise around contact arm pin (232), thereby compressing spring (235). The moving contacts (236) are thus pulled against the stationary contacts (237) completing the circuit.

As the pin (230) is moved upward toggle links (228) and (224) are raised. Toggle link (224) pivots on pin (223) and toggle link (228) is attached to the moving contact arm (234) which pivots on pin (232). As the toggle links move upward, the contact arm is rotated counterclockwise and the relay contacts are closed. When the relay contacts close, current starts flowing through the coil (250) (Figure 1-2-5) of the closing solenoid. The moving core (245) of the solenoid moves up closing the circuit breaker. Trip bracket (257) fastened to the moving core of the solenoid forces the first trip lever (225) of the relay trip assembly up; increased spring tension rotates second trip lever (253) which strikes the relay trip pin (201) (Figure 1-2-4) forcing it upward. The trip pin rotates the trip crank (220) which engages the latch (229) and rotates it clockwise against the torque exerted by torsion spring (225). The rotation of latch (229) disengages latch pin (230), the toggle links (224) and (228) collapse and spring (235) rotates the moving contact arm (234) clockwise to snap the moving contacts (236) away from the stationary contacts (237).

The main moving contacts (236) are fastened to the contact arm (234) which is molded from insulating material. Silver alloy contact tips are brazed on the contact legs.

The main stationary contacts are made from spring material and are "U" shaped. They are secured to the base by screws (240). The "U" shape arrangement causes a slight rolling and wiping action on the spherically shaped contact surfaces, as they meet, which helps to insure a positive electrical connection.

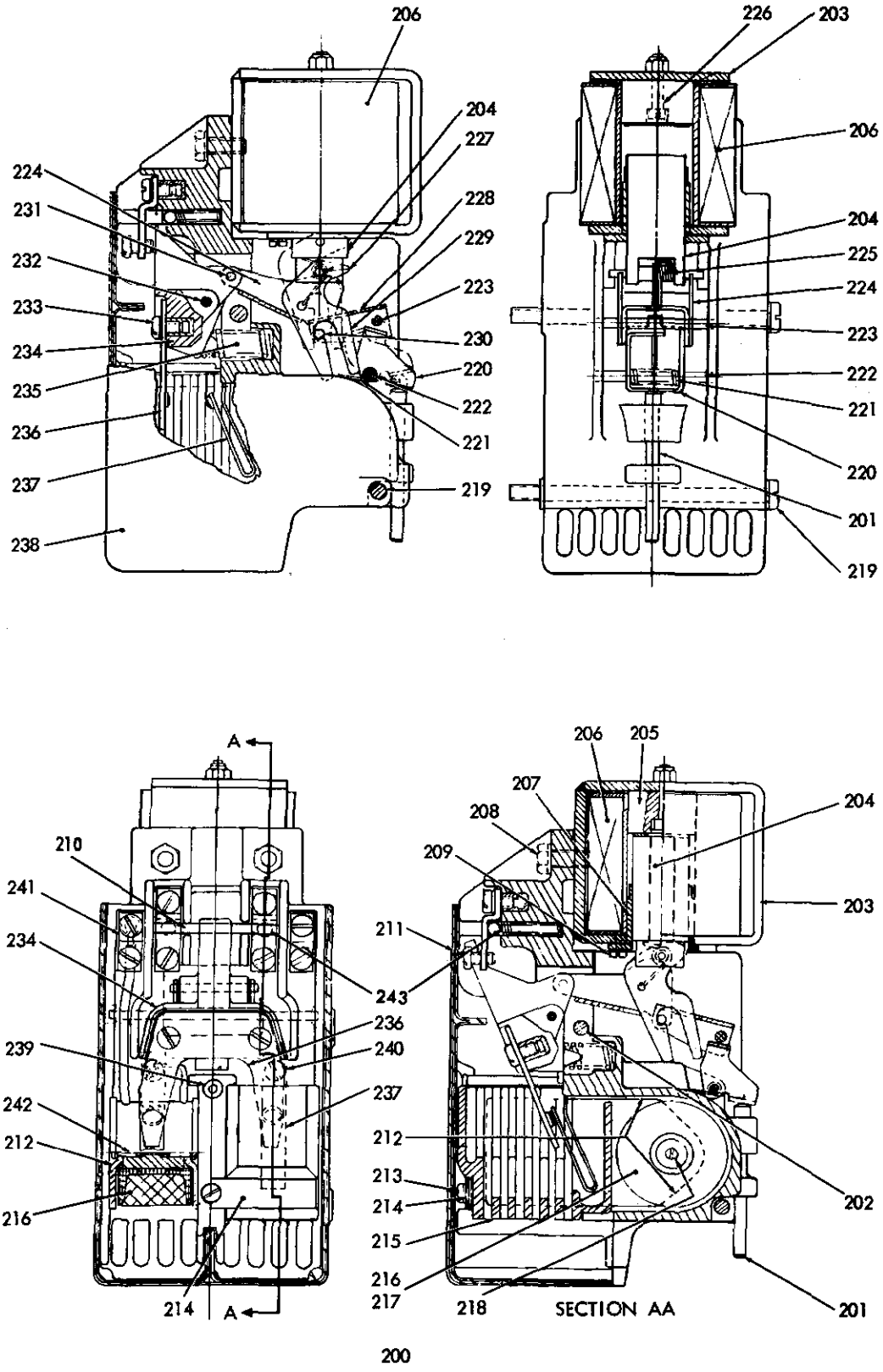


FIG. 1-2-4 — Closing Relay for Solenoid

200 Closing Relay
201 Trip Pin
202 Pin
203 Coil Frame
204 Movable Core

205 Stationary Core
*206 Control Coil
207 Bushing
208 Mounting Screw
209 Bushing Screw

210 Contact, Auxiliary
211 Cover
212 Side Plate
213 Screw
214 Arcing Chamber Retaining Strip

215 Arcing Chamber
*216 Blow-out Coil-left Hand
*217 Blow-out Coil-right Hand
218 Side Plate Screw
219 Relay Mounting Screw

220 Trip Crank
*221 Spring, Trip
222 Trip Crank Pin
223 Pin
224 Second Toggle Link

*225 Spring, Latch
226 Stationary Core Mounting Bolt
227 Drive Pin
228 First Toggle Link
229 Latch

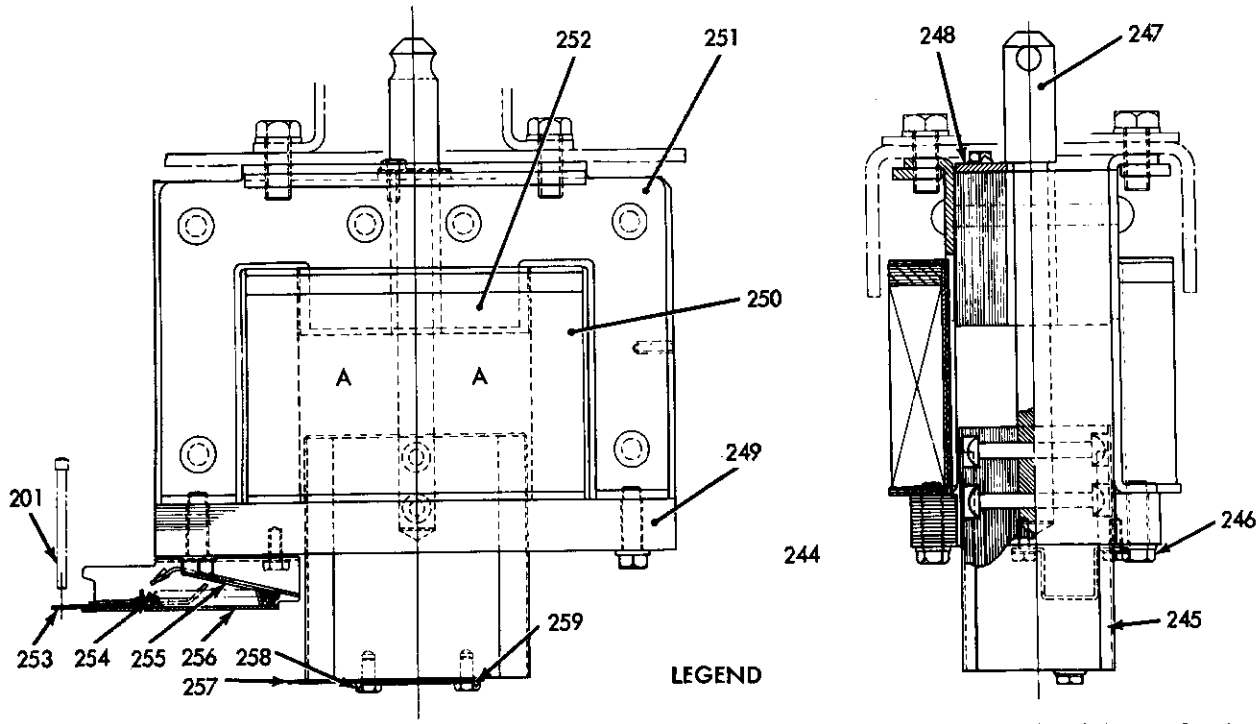
230 Pin
231 Pin
232 Pin
233 Movable Contact Screw
234 Movable Contact Arm

*235 Contact Arm Spring
*236 Movable Contact
*237 Stationary Contact
238 Base
239 Cover Screw

240 Stationary Contact Screw
241 Main Circuit Terminal
242 Magnetic Core
*243 Spring, Auxiliary Contact

*Repair Parts

FIGURE 1-2-4 — Closing Relay for Solenoid



LEGEND

244 CLOSING SOLENOID (D-C)
245 MOVING CORE
246 BOLT
247 OPERATING ROD
248 STOP
249 BOTTOM PLATE

* 250 COIL
251 FRAME
252 STATIONARY CORE
253 SECOND TRIP LEVER
* 254 SPRING, RELAY TRIP
255 FIRST TRIP LEVER

256 RELAY TRIP BRACKET
257 TRIP BRACKET
258 BOLT
259 LOCKPLATE
201 RELAY TRIP PIN

*REPAIR PARTS

FIGURE 1-2-5 — Closing Solenoid and Relay Trip Assembly— Electrically Closed Breakers

With the circuit breaker in the closed position, the trip pin (201) of the relay is held in the trip position. Therefore, even though the relay coil may be inadvertently energized when the circuit breaker is latched, the relay contacts will not close and no current can flow through the circuit breaker closing coil.

Two blow out coils (216) and (217) and two arc chambers are provided so that the arc drawn by the separating contacts may be extinguished and the circuit open in the least possible time. The blow out coils are held in place by two iron plates and secured by screws (218). The blow out magnet coil is connected in series with the contacts, which causes flux to flow through the magnetic circuit and the air gap of the blow out magnet assembly. The magnetic circuit is positioned so its air gap is across the arc chamber and the arc. At the time the contacts part and draw an arc, the arc is deflected by the magnetic force down into the arc chamber where it is extinguished due to the lengthening and cooling process.

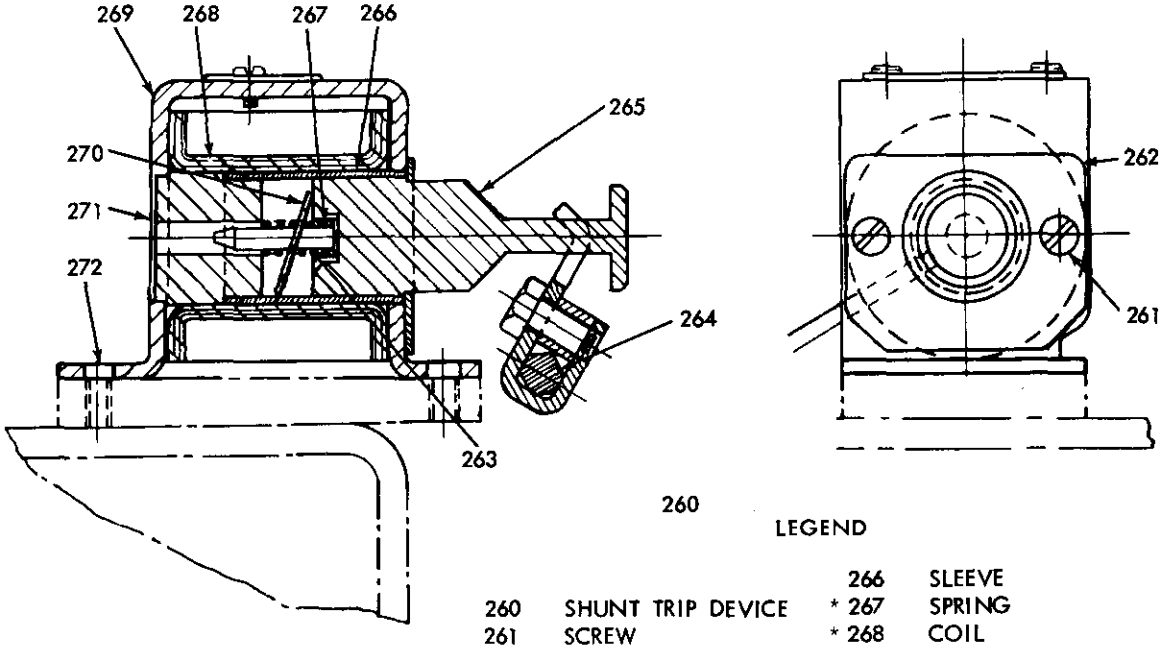
The relay is provided with a "seal-in" feature through the auxiliary contact (244) which can be connected in parallel with the control switch in the relay coil circuit. If this connection is made, once energized the relay will remain closed until breaker closing solenoid completes its stroke.

1-2-1-7 Closing Solenoid—(See Figure 1-2-5)

The closing solenoid is used to close the circuit breaker electrically and is mounted directly below the mechanism and under the platform of the circuit breaker. It is secured to the platform by the same four bolts that hold the mechanism in place.

The closing solenoid consists of an iron frame or yoke (251) which is bolted to the circuit breaker shelf, a plunger or moving core, an operating rod (247), a stationary core (252) and a coil (250).

The operating rod (247) connects the moving core (245) to pin (175) (Figure 1-2-3) of the mechanism. When coil (250) is energized through the contact of the closing coil (Refer to Paragraph 1-2-1-6), the moving core (245) moves upward in response to the magnetic attraction between the stationary and moving cores across air gap "A". About one-tenth of a second is



LEGEND

260	SHUNT TRIP DEVICE	266	SLEEVE
261	SCREW	* 267	SPRING
262	PLATE	* 268	COIL
263	PIN	269	FRAME
264	TRIP BAR	270	NON-MAGNETIC WASHER
265	MOVING CORE	271	STATIONARY CORE
		272	BOLT

*REPAIR PARTS

FIGURE 1-2-6 — Shunt Trip Device

required for the solenoid to close and latch the circuit breaker. The moving core is provided with a trip bracket (257) and when the moving core moves into the "breaker closed" or "closed gap" position, trip bracket (257) engages the first trip lever (255) of the relay trip assembly. As the first trip lever (255) is forced upward, increased tension on spring (254) rotates second trip lever (253) which engages the relay trip pin (201) (Figure 1-2-4) of the closing relay to trip the relay, the relay contacts open, de-energizing the closing solenoid. The coil of the closing solenoid is momentarily rated and serious damage will result if potential is allowed to remain on its terminals through improper adjustment of the relay trip pin (201) so that the relay does not trip and interrupt the closing coil circuit (Refer to Paragraph 1-2-1-6). When the moving core and operating arm have pushed the mechanism linkage to the closed and latched position, pin (175) (Figure 1-2-3) of the operating mechanism holds the moving core in the "closed gap" position. When the mechanism (150) is tripped, pin (175) falls allowing the operating arm and the moving core to fall to the "open gap" position.

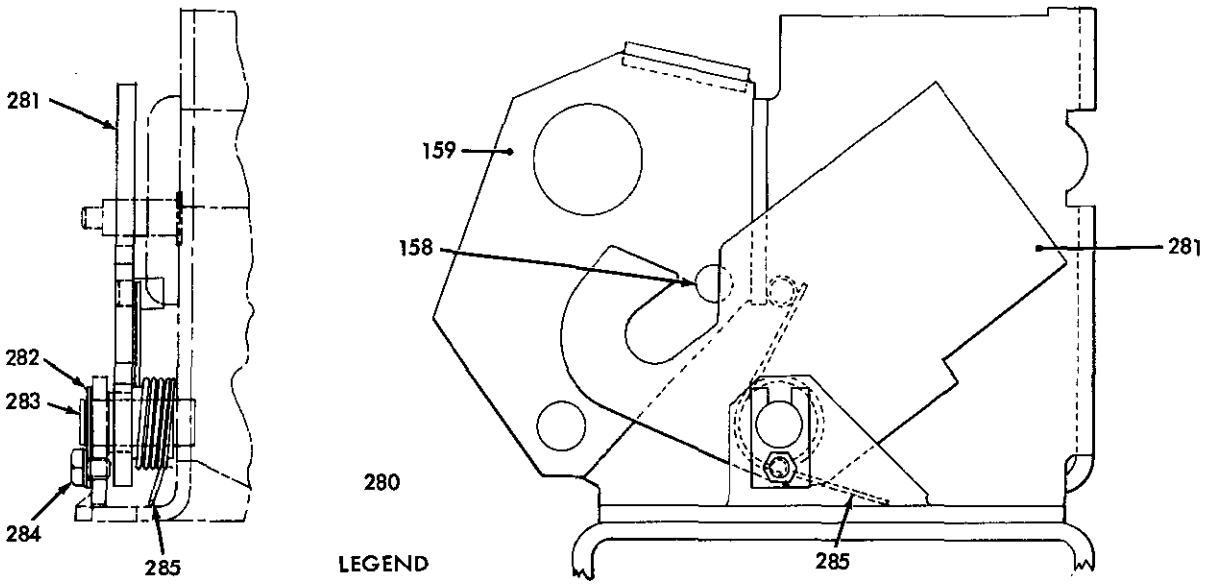
1-2-1-8 Shunt Trip Device—(See Figure 1-2-6)

The shunt trip device is used to open the electrically operated breakers and is mounted behind the auxiliary switches on the breaker shelf.

The shunt trip device consists of a frame (269), stationary core (271), moving core (265) and the trip coil (268). Energizing the trip coil (268) sets up a magnetic attraction between stationary core (271) and moving core (265). The moving core moves to the left which rotates trip bar (264) to trip the circuit breaker. The opening of the circuit breaker de-energizes the shunt trip coil through a normally open auxiliary switch contact. Spring (267) then returns the moving core (265) to its normal position. Non-magnetic washer (270) prevents residual magnetism from holding the cores together when the coil is de-energized.

1-2-1-9 Anti-Shock-Close Device—(See Figure 1-2-7)

The anti-shock-close device (280) is mounted on the side of the operating mechanism.



LEGEND

158 PIN
159 CLOSING LEVER
280 ANTI-SHOCK-CLOSE DEVICE
281 LATCH
282 CLIP
283 PIN
284 BOLT
* 285 SPRING-RETURN

* REPAIR PARTS

FIGURE 1-2-7 — Anti-Shock-Close Device and Retriever Assembly

This device prevents the circuit breaker contacts from closing from shock when the breaker is in the open position. This device also, functions as an anti-bounce latch.

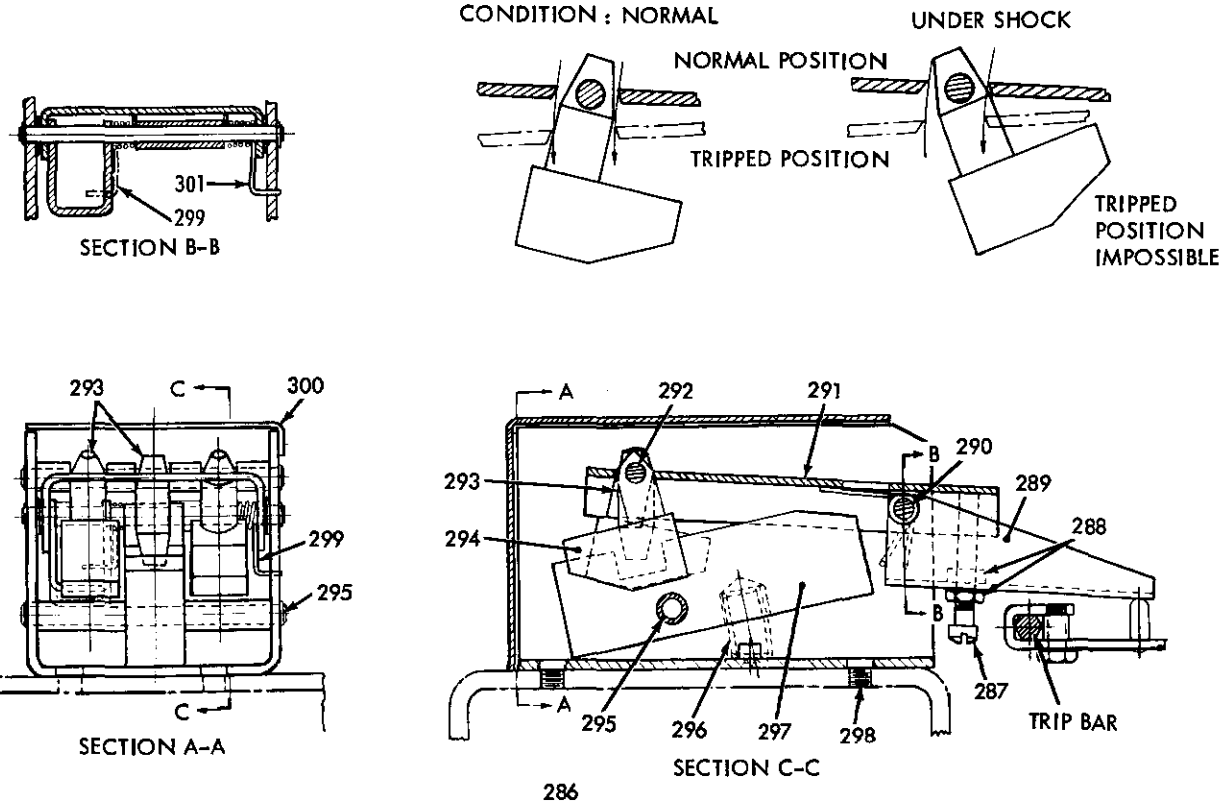
The anti-shock-close latch (281) is pivoted on the side of the mechanism. The plate is so shaped that the impact of shock rotates the device, and the hook engages pin (158) of the auxiliary switch to momentarily hold the breaker open. The anti-shock-close device also serves as an anti-bounce latch to prevent the closing lever (159) from bouncing off its stops and reclosing the circuit when the circuit breaker interrupts maximum short circuit currents. Under these conditions, the crossbar knocks the latch up, causing the latch to engage the crossbar pin to momentarily hold the breaker open. Return spring (285) returns the latch to its original position when conditions are normal.

1-2-1-10 Anti-Shock-Open Device— (See Figure 1-2-8)

The anti-shock-open device (286) prevents tripping of the circuit breaker caused by shock and is mounted on the circuit breaker shelf to the right of the operating mechanism (150) (Figure 1-2-2).

The anti-shock-open device (286) is secured to the shelf by two bolts (298). The lever (289) and plate (291) are pivoted on pin (290). Studs (293) are suspended on pin (292). Weight (297) pivots about pin (295) against spring (296).

The lever is adjusted by adjusting screw (287) which is locked in position by two nuts (288). As the lever rises due to the action of the trip bar, the adjusting screw causes the plate to rotate on pin (290) against the tension



LEGEND

286 ANTI-SHOCK-OPEN DEVICE	290 PIN	294 WEIGHT	298 MOUNTING SCREW
287 ADJUSTING SCREW	291 PLATE	295 PIN	*299 SPRING
288 NUT	292 PIN	*296 SPRING	300 COVER
289 LEVER	293 STUD	297 WEIGHT	*301 SPRING

* REPAIR PARTS

FIGURE 1-2-8 — Anti-Shock-Open Device

of spring (301). A slot in the plate allows the plate to slide freely over the conical shaped studs (293), permitting the breaker to trip.

Under shock conditions, the weights on the two outside studs (293) cause the studs to rotate and the weight (297) on the center stud (293) causes it to rotate clockwise. The ends of the studs jam against the sides of the slot in the plate preventing rotation of the plate. The breaker trip bar is held down by the lever and the circuit breaker is momentarily held closed.

The lever must be adjusted so that it does not interfere with the breaker trip bar and prevent tripping under normal conditions.

1-2-1-11 Series Overcurrent Trip Unit— (See Figures 1-2-9 and 1-2-10)

The series overcurrent trip unit provides for selective protection under three distinct conditions of overcurrent: First, low overcurrents will trip breaker after LONG DELAY; Second, moderate overcurrents will trip breaker after a SHORT DELAY; and third, high overcurrents will trip breaker INSTANTLY.

Two calibrated long delay pickup settings are marked on scaleplate (329) in amperes (at approximately 150 and 200% of coil rating). The long delay time is factory set per Figure 1-2-9. By turning dial (323) the long delay time can be approximately halved or doubled; but is locked to prevent excessive adjustment.

The short delay pickup, short delay time, and instantaneous pickup are all factory set and sealed. The pickup currents and time delay are marked on scaleplate.

Figure 1-2-9 shows a typical "Time-current curve". The upper line of a given band shows the MAXIMUM time for breaker to clear the circuit for any given overcurrent. The lower line shows the MINIMUM time an overcurrent can exist before turning to normal without tripping breaker.

The series coil (311) is connected between the lower stud and moving contact arm of the breaker. Current flow in coil creates a magnetic attraction between stationary core (312) and moving core (314) with yoke (316) and ring (315) completing the magnetic circuit. When moving core moves up, spring (317) transmits force to stem assembly (313). The top end of the stem assembly actuates the balanced trip crank (349) which moves link (457) to trip the breaker.

The long delay pickup is adjusted by turning screw (321) which moves pointer (320) and lower end of springs (319). Spring (319) via lever (318) holds down stem assembly (313) unless overcurrent exceeds calibrated pickup. The rate at which the stem will rise depends on the vacuum drag on the diaphragm (327). The diaphragm is part of stem assembly (313). Valve (324) controls the amount of air which can flow into the vacuum chamber. Turning dial (323) clockwise closes the tapered long delay orifice shown in Section "D". Spring (322) and clip (326) prevent accidental change in adjustment and screw (325) prevents excessive intentional adjustment.

The instantaneous pickup is factory set by turning screw (334) which moves pointer (332) and lower end of spring (331). Spring (331) will hold down armature (330) until magnetic attraction of yoke (316) lifts armature. When the armature rises it will lift valve (336) and allow unlimited air to flow thru port to vacuum chamber. This releases (diaphragm) stem assembly to trip breaker instantly. Clip (333) is cemented to screw (334) to protect factory setting.

The short delay pickup is factory set by turning screw (342) which moves pointer (340) and lower end of spring (339). Spring (339) will hold down armature (338) until magnetic attraction of yoke (316) lifts armature. When the armature rises it will lift valve (344) and allow a controlled amount of air to flow thru port to vacuum chamber. Turning screw (346) moves bracket (345) which limits motion of armature (338). This adjustment controls air flow around valve (344) and predetermines short delay time required for stem to trip breaker. Two clips (341) are cemented to screws (342) and (346) to protect factory setting.

These overcurrent trip units have two additional features that insure good performance. First, if a unit has partially or completely reacted to an overcurrent condition and then the current subsides to zero or normal, a quick reset is desirable. As stem assembly (313) comes down, air is expelled thru port to bottom of long delay valve (324). Pressure moves disc (347) down providing a large opening for the expelled air. Spring (348) returns the disc to the sealed position after reset is completed. Second, during a tripping operation the breaker trip load should have a negligible affect on the time delay. Shortly after breaker trip load is engaged, lever (318) lifts quick release stem (337). This opens instantaneous valve (336) and allows stem assembly (313) to complete the tripping stroke instantly.

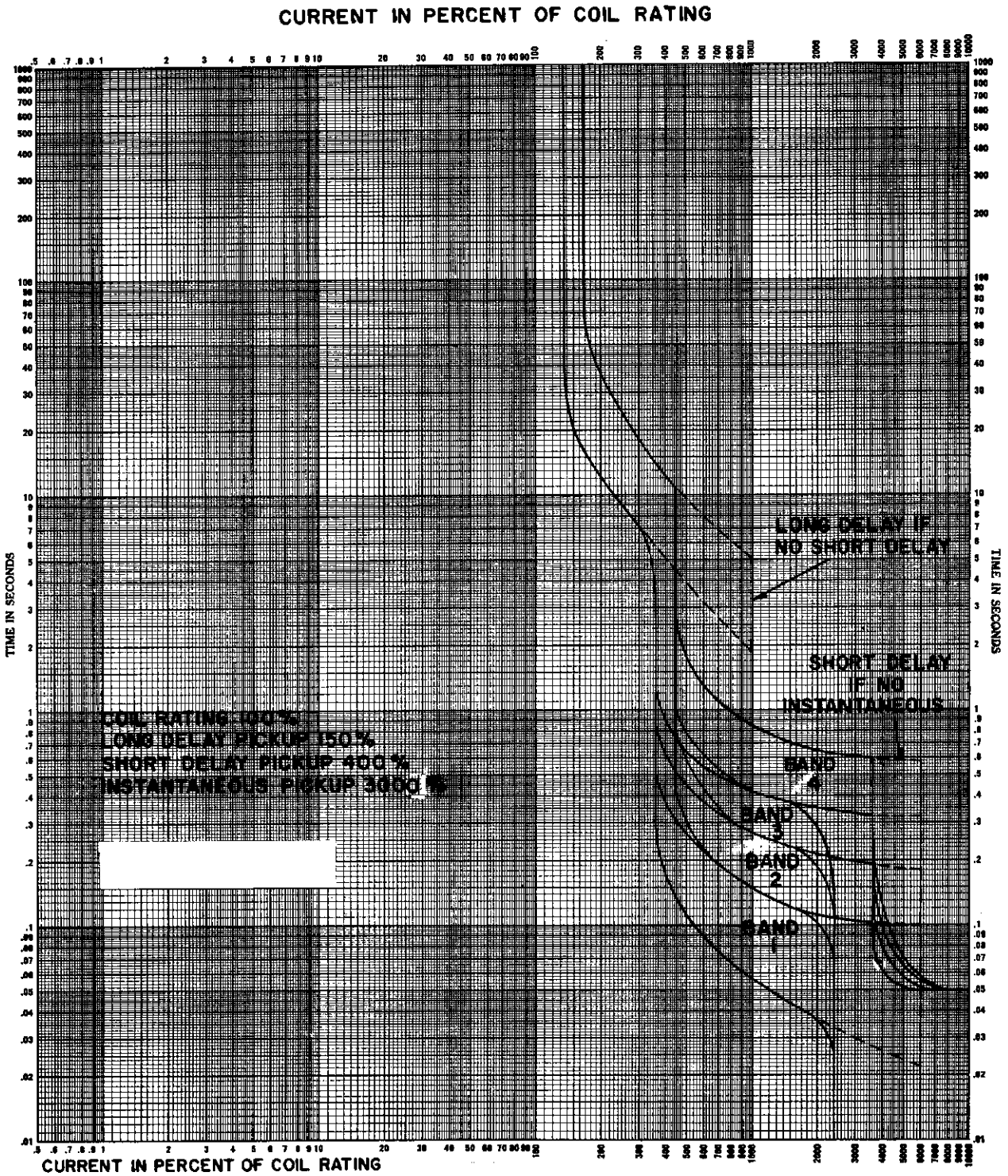
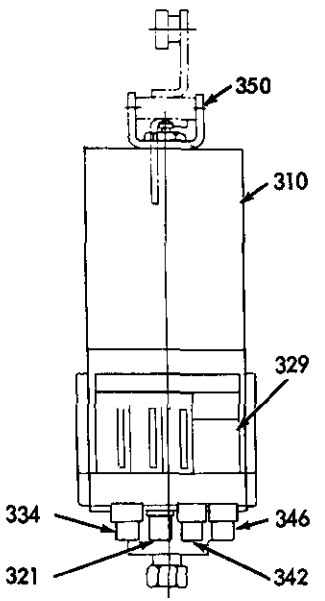
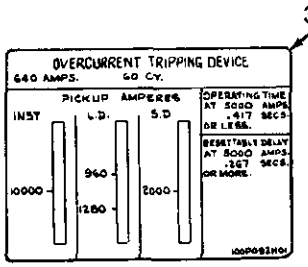


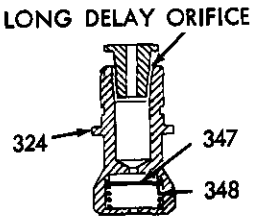
FIGURE 1-2-9 — Typical Time Current Curves



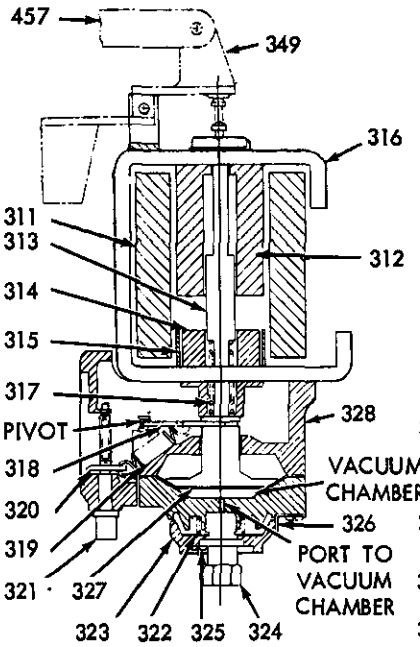
FRONT VIEW



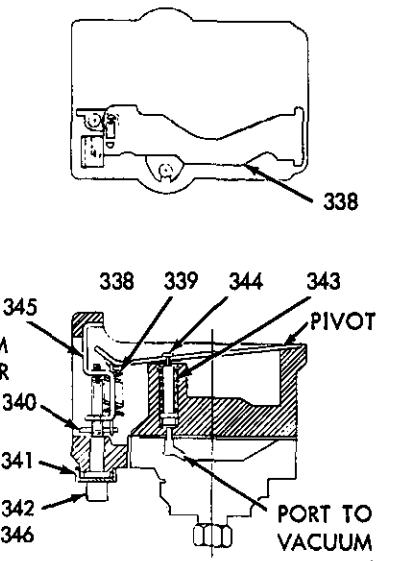
TYPICAL SCALEPLATE MARKING



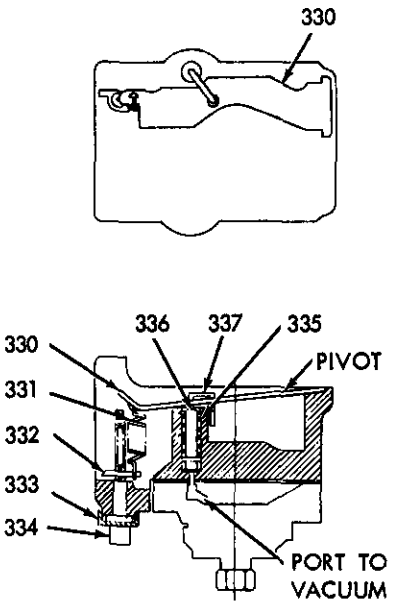
LONG DELAY VALVE
SECTION "D"



SECTION "A"



SECTION "B"

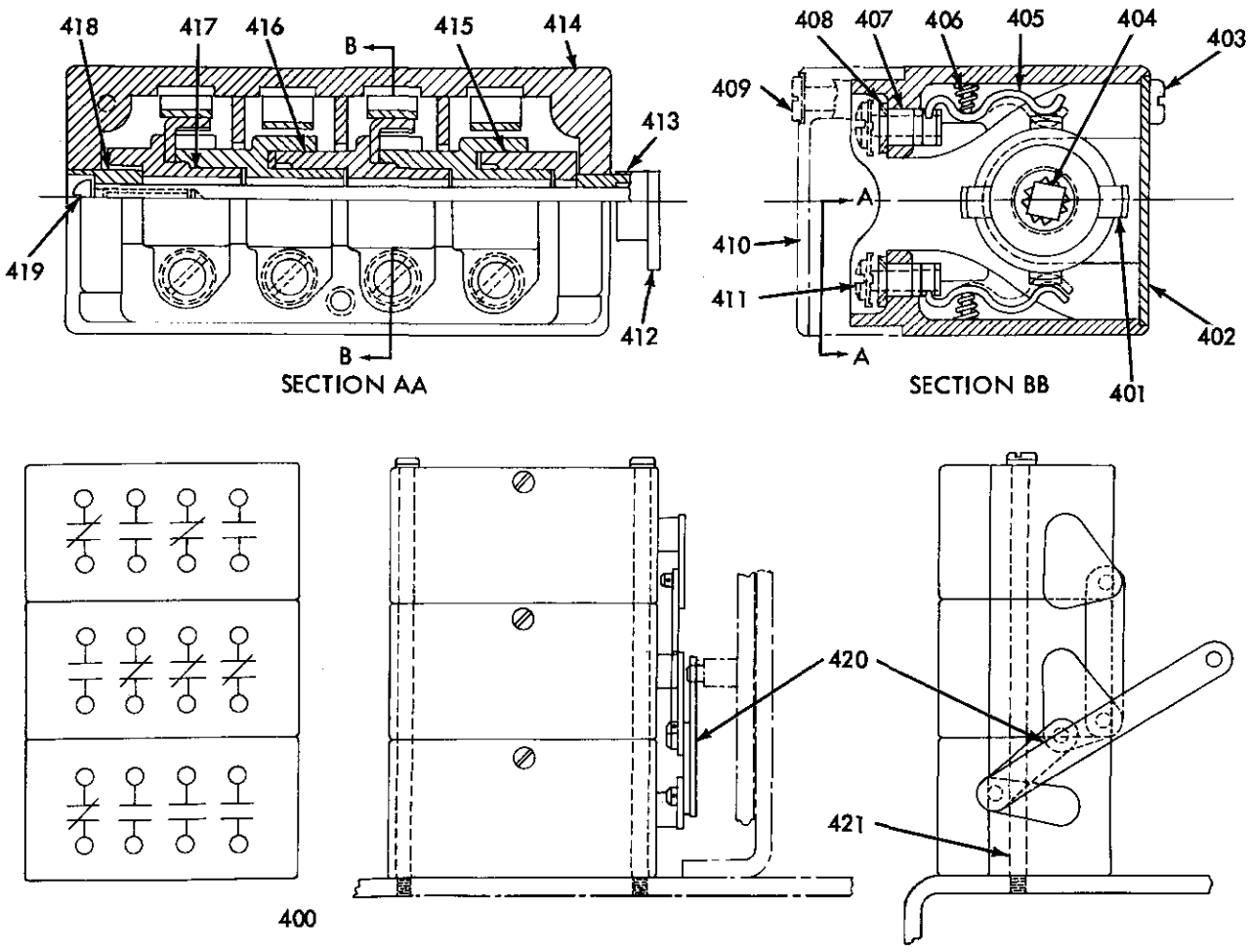


SECTION "C"

310	OVERCURRENT TRIP DEVICE	324	VALVE (L.D. TIME)	336	VALVE (INSTANTANEOUS)
311	SERIES COIL	325	SCREW	337	QUICK RELEASE STEM
312	STATIONARY CORE	326	CLIP	338	ARMATURE (S.D.)
313	STEM ASSEMBLY	327	DIAPHRAGM (PART OF 313)	* 339	SPRING (S.D. PICKUP)
314	MOVING CORE	328	MOULDED CASE	340	POINTER (S.D. PICKUP)
315	RING	329	SCALEPLATE	341	CLIP
316	YOKE	330	ARMATURE (INSTANTANEOUS)	342	SCREW (S.D. PICKUP)
* 317	SPRING (LIMIT)	* 331	SPRING (INSTANTANEOUS)	* 343	SPRING (S.D. VALVE)
318	LEVER	332	PAINTER(	344	VALVE (S.D.)
* 319	SPRING (L.D. PICKUP)	332	PAINTER (INSTANTANEOUS)	345	BRACKET
320	POINTER (L.D. PICKUP)	333	CLIP	346	SCREW (S.D. TIME)
321	SCREW (L.D. PICKUP)	334	SCREW (INSTANTANEOUS)	347	DISC (RESET)
* 322	SPRING (L.D. DIAL)	* 335	SPRING (INST. VALVE)	* 348	SPRING (DISC)
323	DIAL (L.D.)			349	TRIP CRANK
				350	BRACKET
				457	TIE LINK

* REPAIR PARTS

FIGURE 1-2-10 — Series Overcurrent Trip Device



LEGEND

*400	AUXILIARY SWITCH	411	TERMINAL SCREW
401	CONTACT	412	ARM
402	BOTTOM COVER	413	SPACER
403	SCREW	414	CASE
404	SHAFT	415	ROTOR END
405	CONTACT FINGER	416	ROTOR SECTION
406	CONTACT SPRING	417	ROTOR END
407	STEM	418	BUSHING
408	COLLAR	419	MACHINE SCREW
409	MACHINE SCREW	420	CONNECTION LINK
410	COVER	421	MACHINE BOLT

*REPAIR PARTS

FIGURE 1-2-11 — Auxiliary Switch

1-2-1-12 Auxiliary Switch—(See Figure 1-2-11)

The auxiliary switch is mounted on top of the circuit breaker shelf to the left of the operating mechanism.

The twelve pole auxiliary switch (400) consists of three four-pole switches; one mounted over the other.

Each auxiliary switch is a shaft-operated, four pole, rotary type containing both normally open or normally closed contacts or a combination of normally open and normally closed contacts. The normally open or "a" contacts are open when the circuit breaker is in the open position and the normally closed contacts or "b" contacts are closed when the circuit breaker is open.

The rotor assembly consists of a square shaft (404), rotor ends (415) and (417), three rotor sections (416), moving contacts (401), arm (412), bushing (418) and screw (419) which clamps together the rotor assembly.

Each contact finger (405) backed by spring (406), is secured by a rivet and is attached to stem (407), which is secured to the case by collar (408). Screws (411) and a crimp washer provide the terminal connections.

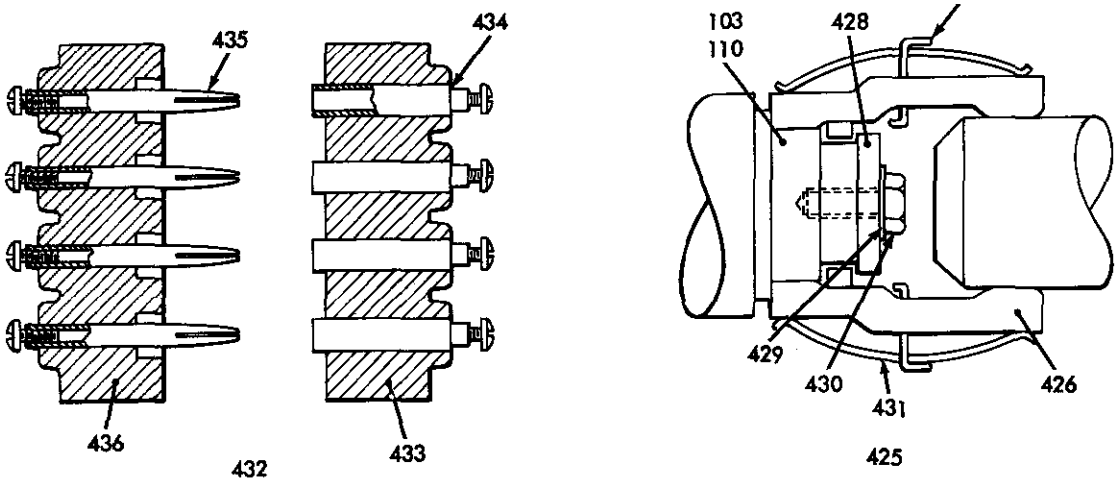
Link (420) is attached to the breaker lever of the operating mechanism. As the link is rotated by the action of the operation mechanism, arm (412) rotates the shaft (404) to re-position the moving contacts.

The moving contacts are set 90 degrees apart for a 90 degree rotation of the shaft. The contacts can be converted in the field to either normally open or normally closed by rotating the appropriate rotor section 90 degrees on the shaft.

1-2-1-13 Main Disconnects—(See Figure 1-2-12)

The main disconnects are mounted on the studs of the circuit breaker one on each of the six breaker studs.

Each main disconnect consists of a finger retainer ring (427), the finger (426) and the finger springs (431). The assembly is held on the studs by a protrusion on the finger cluster which fits over the end of the stud and is secured by retaining washer (428) and bolt (430). Each finger is held captive by a leaf type



LEGEND

103 LOWER PRIMARY STUD	430 BOLT
110 UPPER STUD	431 SPRING
*425 MAIN DISCONNECT	*432 SECONDARY DISCONNECT
426 FINGER	433 BASE, STATIONARY ASSEMBLY
427 RING	434 RECEPTACLE
428 RETAINING WASHER	435 PIN CONTACT
429 LOCKWASHER	436 BASE, MOVING ASSEMBLY

* REPAIR PARTS

FIGURE 1-2-12 — Main and Secondary Disconects

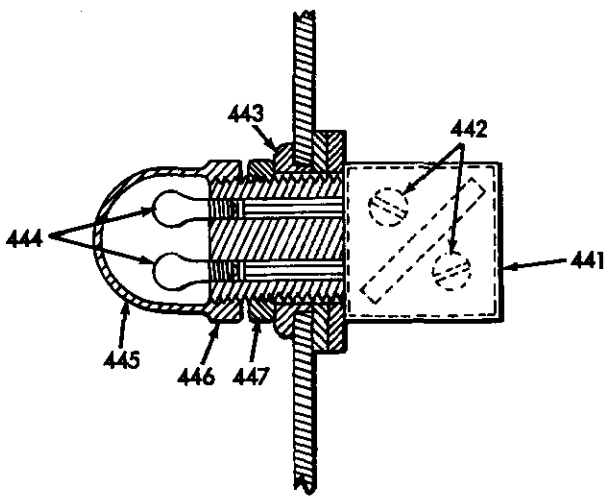
spring which is partially compressed in its normal position. When the mating stud of the stationary component enters the contact assembly, the fingers are forced open for additional spring compressing which exerts a double acting force on the contact fingers. The assembly, although secure on the studs is free to move up and down to rectify any slight misalignment of the two components. Dowel pins mounted on the stationary component which mate with holes in the breaker panel prevent misalignment that would result from twisting or tilting of the circuit breaker.

1-2-1-14 Secondary Disconnects— (See Figure 1-2-12)

The secondary disconnects are of a quick disconnect type and consist of two assemblies, the moving assembly, which is mounted on the rear panel and the stationary receptacle assembly, which is mounted within the stationary component. The secondary contacts provide a means of connecting the breaker control circuit to external wiring.

The moving assembly consists of twenty-four pin contacts (435) cemented into a molded base (436). The front end of each pin is split to provide flexibility when making contact with the mating contacts. The shank end of each pin is threaded to facilitate the wiring connection. Two guide pins which extend beyond the contact pins are provided to assure proper pin alignment.

The stationary receptacle assembly consists of twenty-four receptacles cemented into a molded block. The front end of the receptacles mate with the pins of the movable assembly to assure a good electrical connection and the shank end of each receptacle is threaded to facilitate the wiring connection. The stationary block is secured to the stationary component on a floating type mount to assure proper alignment.



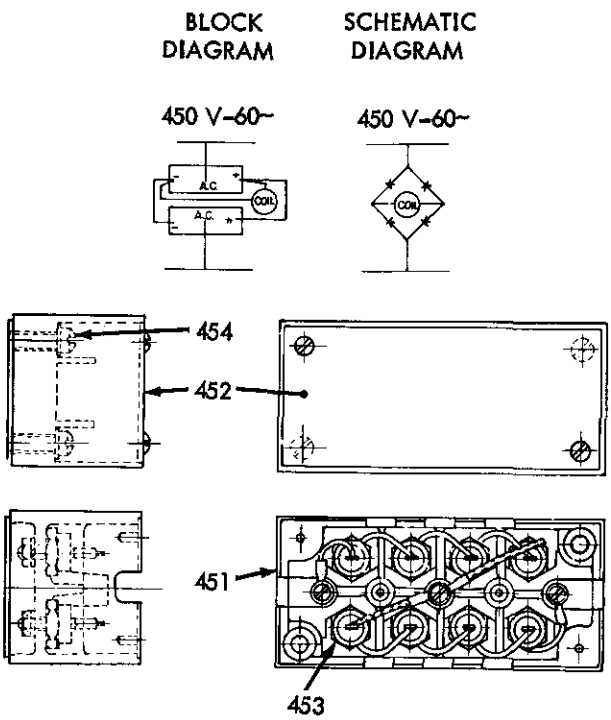
440

LEGEND

*440 INDICATOR LIGHT ASSEMBLY
441 TRANSFORMER ASSEMBLY
442 TERMINAL SCREW
443 TRIM PLATE
444 LAMP
445 GLOBE
446 KNURLED NUT
447 LOCK NUT

* REPAIR PARTS

FIGURE 1-2-13 — Indicator Light



450

LEGEND

*450 SILICON RECTIFIER
451 CASE
452 COVER
453 RECTIFIER ELEMENT
454 MOUNTING SCREWS

* REPAIR PARTS

FIGURE 1-2-14 — Silicon Rectifier

The terminal blocks (Figure 1-1-2) are mounted at the front and near the bottom of the circuit breaker. These terminal blocks provide a convenient place for making the control wiring connection between the secondary disconnects and the various sub-assemblies.

1-2-1-15 Indicator Lights—(See Figure 1-2-13)

The a-c indicator lights when specified are mounted on the face plate and are used to indicate the operating state of the circuit breaker. The white indicating lamp is lighted whenever control power is available and the blue indicator light is lighted whenever the circuit breaker is closed.

Each indicator light consists of a transformer assembly (441) and two lamps (Type TS-159, 2.5 volts). The lamps are connected in parallel as a safety precaution to insure visual indication of the signaled condition in the event of a lamp failure.

Two types of indicator lights are available. One is used in 450 volt, 60 cycle circuits; the other is used in 117 volt, 60 cycle circuits. The indicator lights are type B-27F or B27G as covered by Navy standard drawing #9000-S6202-F-73907.

1-2-1-16 Silicon Rectifier—(See Figure 1-2-14)

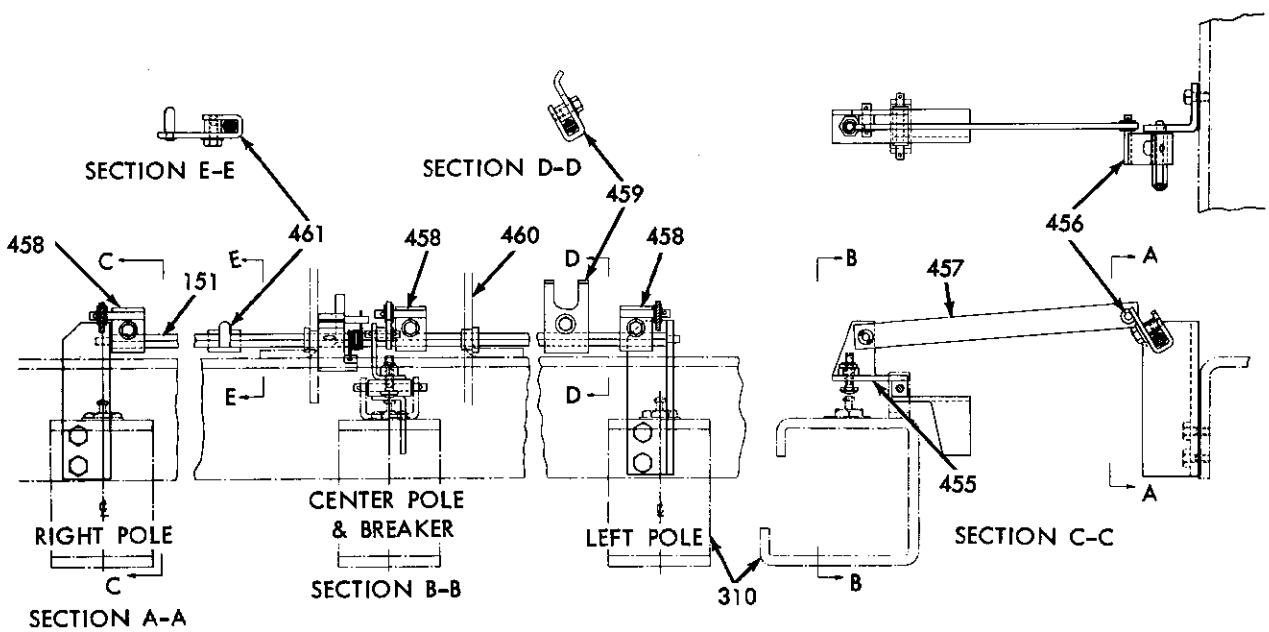
The silicon rectifier assembly converts alternating current (a-c) to direct current (d-c) for energizing the dc electric closing solenoid.

All breakers are supplied with silicon rectifiers mounted on right side of closing solenoid.

The rectifier is composed of two units. Each consists of case (451) and cover (452) which encloses eight rectifier elements (453). The rectifier units are wired in a bridge type arrangement as shown in Figure 1-2-14.

1-2-1-17 Trip Bar—(See Figure 1-2-15)

Rotation of the trip bar moves the trigger of the operating mechanism out of engagement with the roller latch assembly which causes the circuit breaker to trip. The trip bar is supported on brackets (460) that are welded to the mechanism frame and it extends beyond the



151	TRIP BAR	458	OVERCURRENT TRIP ELEMENT
310	OVERCURRENT TRIP DEVICE	459	SHUNT TRIP ELEMENT
455	BRACKET LEVER	460	BRACKET
456	PIN	461	ANTI-SHOCK-OPEN ELEMENT
457	TIE LINK		

FIG. 1-2-15 — Trip Bar and Tripping Attachments

center of the two outer pole units. Several trip brackets or tripping attachments are secured to the trip bar. These tripping attachments (458) and (459) cause rotation of the trip bar when they are acted upon by either of the overcurrent devices or the shunt trip device. Attachment (461) is associated with the anti-shock-open device and prevents rotation of the trip bar (151) under shock conditions, refer to Paragraph 1-2-1-10. It is extremely important to have the tripping attachments properly located on and securely attached to the trip bar. Improper alignment could result in failure of proper rotation of the trip bar in response to the overcurrent trip devices which undoubtedly would result in serious damage to the circuit breaker. Whenever the tripping attachments are moved or the trip bar disturbed, check for proper alignment upon reassembly, refer to Chapter 5, paragraph 5-2-1-17.

1-2-1-18 Extension Rails—(See Figure 1-1-1)

The extension rails are an integral part of the stationary component on which the moving compartment rolls in and out of position. The rails are pivoted on the rail pivot pin and may be lowered by loosening two thumbscrews and pulling the rails down.

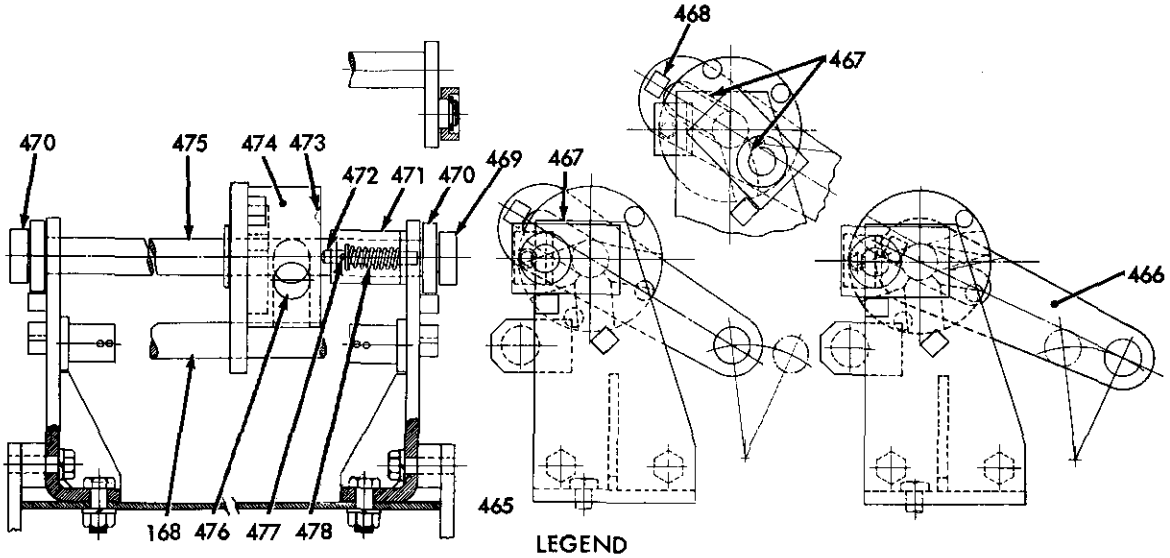
1-2-1-19 Levering Device—(See Figure 1-2-16)

The levering device is required to engage or disengage the main and secondary disconnects. When the moving component is being levered - in the roller wheels (469) are engaged in the levering-in slots within the stationary component. Rotation of the levering-in interlock wheel (474) causes the roller wheel to exert pressure on the side of the levering-in slot and the breaker is forced into position.

The levering device consists of interlock wheel (474), two levers (470) and the shaft (475) to which the above parts are securely attached.

The interlock wheel is provided with three holes (476) for the operating handle, two grooves (467) for the interlock block (468), and three tapered slots in which the locking pin (472) catches.

Levering-in is accomplished by inserting the operating handle in the upper-most hole and rotating the operating handle counterclockwise. The locking pin (472) will be forced out of the tapered slot (473) and the breaker will move in. Before the operating handle has been moved to the full extent of travel the second tapered slot will be brought in line with pin (472) and the



LEGEND

168	CROSS BAR	472	LOCKING PIN
465	LEVERING DEVICE	473	TAPERED SLOT
466	LEVER	474	INTERLOCK WHEEL
467	INTERLOCK GROOVE	475	SHAFT
468	INTERLOCK BLOCK	476	LEVERING SOCKET
469	ROLLER WHEEL	477	COTTER PIN
470	LEVERING-IN LEVERS	*478	SPRING
471	LOCKING PIN BRACKET		

* REPAIR PARTS

FIG. 1-2-16 — Levering Device

pin will snap into the slot as indicated by a sharp "click". The operating handle can now be removed for insertion into a more advanced hole (476). Repeat this process until the levering-in operation is completed.

The interlock block fits into the grooves (467) on the interlock lever (466) when the breaker is closed. One groove is located so that it aligns with the interlock block (468) when the main and secondary contacts are fully engaged. The other groove is aligned with the interlock block when the main and secondary contacts are completely disengaged. When the breaker closes, the interlock lever (466) moves forward and the interlock block slides into the groove (467). This arrangement prevents the breaker from being levered-in or out unless the breaker is open. It also prevents the breaker from being closed unless the main and secondary disconnects are fully engaged or fully disengaged.

1-2-1-20 Stop—(See Figure 1-2-1)

The stop pins (146) prevent the movable component from rolling when on the rails of the stationary component. Two assemblies are mounted, one on each side of the platform.

A stop assembly consists of spring (500) and stop lever (145) which when raised moves stop pins (146) out of their locking position. The stop pins fall into holes in the extension rails when released. The stop lever must be raised whenever removing the movable component from or installing it on the rails.

CHAPTER 2
PRINCIPLES OF OPERATION
Section 1—General Principles

2-1-1 GENERAL

2-1-1-1 Description

The breakers are furnished with 3 pole construction for removable assembly type mounting. Each pole unit is mounted on individual insulated blocks. These blocks isolate the main current carrying from the metal supporting base of the circuit breaker. The main power circuit consists of the upper stud, stationary contact, moving contact assembly and lower stud, all connected in series in the order named.

The operating mechanism simultaneously actuates the moving contact of all poles. It is a complete, removable unit in which are housed the closing toggles and latches.

The closing force is transmitted through the toggles and links to the contact bar on which the moving contact assemblies are bolted. At the end of the closing sequence, the mechanism latches and holds the contacts closed. The closing solenoid supplies the closing force. The closing relay regulates the amount of current drawn by the solenoid closing coil. A manual operating handle is also provided for test purposes or for emergency use.

The moving contacts make or break a main circuit by moving in or out from the stationary contacts. The contacts are quick break, under all conditions of operation. Arc chutes are installed to split, lengthen, cool, and extinguish the arc that is drawn when the contacts open.

The circuit breaker is mechanically trip free, that is, the tripping mechanism can trip even though:

1. The emergency handle is held in closed position or

2. The closing control circuit is energized. The closing mechanism will not reclose it after tripping until the closing control switch is opened and again closed.

The shunt trip device provides an electrical means for tripping the breaker without regard to the load conditions in the circuit. An auxiliary switch is incorporated to open or close contacts for use in protective and control circuits. Shunt trip and indicating lamp circuits are connected through the auxiliary switch. Manual tripping may be accomplished by depressing button on face plate.

The overcurrent device is a calibrated unit which offers protection to the equipment in the circuit when the current reaches limits in excess of the predetermined settings. It will cause the breaker to open by direct action on the trip bar.

2-1-1-2 Closing

Manual closing is accomplished by rotating the operating handle downward. The closing motion should be smooth and quick. After closing the circuit breaker, remove the operating handle.

The closing solenoid provides the normal means for closing the circuit breaker. To close the breaker electrically, turn the control switch to the "CLOSE" position to energize the pickup coil of the closing relay.

This closing relay controls the supply of current necessary to energize the solenoid closing coil. When the closing coil is energized the plunger push rod in the closing solenoid rises to close the circuit breaker.

2-1-1-3 Tripping

Tripping of the circuit breaker can be accomplished by means of the manual button, the shunt trip device, or the overcurrent trip unit.

To trip the circuit breaker manually, depress button as indicated on the face plate. When released, the button will return to its normal position.

To trip the circuit breaker electrically, turn the control switch, which is remotely located, to the "TRIP" position in order to energize the shunt trip coil. With this trip coil circuit closed, the shunt trip device will operate to rotate the trip bar and trip the circuit breaker.

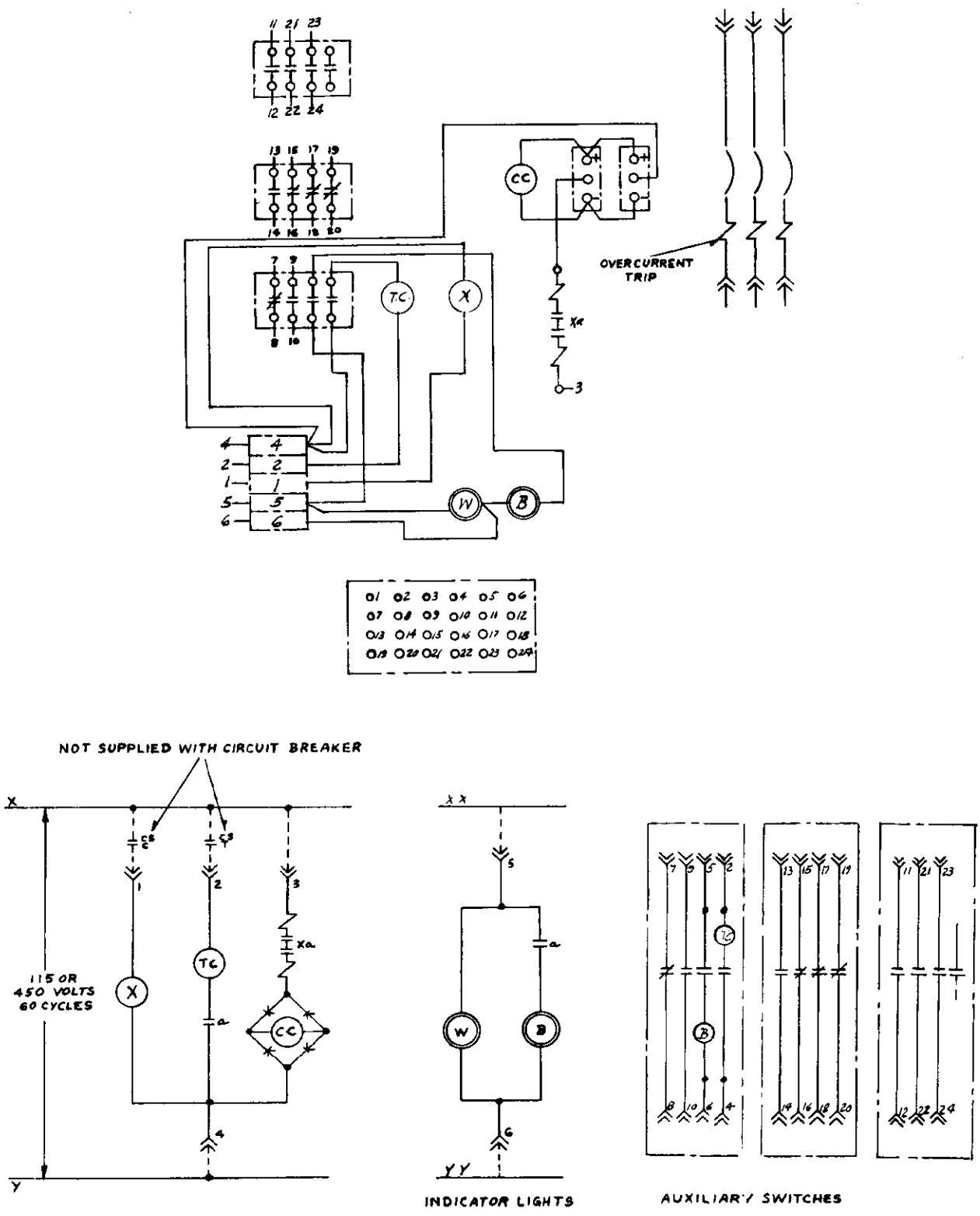


FIGURE 2-1-1 — Wiring Diagram

The overcurrent trip unit will also cause the circuit breaker to open by direct action on the trip bar whenever the current exceeds the designated pickup values.

2-1-1-4 Electrical Operation

Figure 2-1-1 shows the wiring diagram and the schematic diagram for an electrically operated circuit breaker. When the close switch (CSC) is closed, the closing relay is actuated which closes contacts Xa to energize the closing solenoid.

The closing solenoid closes the breaker as described in Chapter 1, Section 2. When the breaker is closed the normally open circuit breaker contact "a" closes to set up the shunt trip circuit. Closing the circuit breaker trip switch (CST) energizes the trip coil to trip the circuit breaker as described in Chapter 1, Section 2.

This figure also includes a schematic diagram of the indicating light circuit. The white lamp is energized whenever control power is available. When the circuit breaker is closed, auxiliary contact "a" closes to energize the blue indicating lamp. These indicating lamps provide a convenient means of observing the operating state of the circuit breaker.

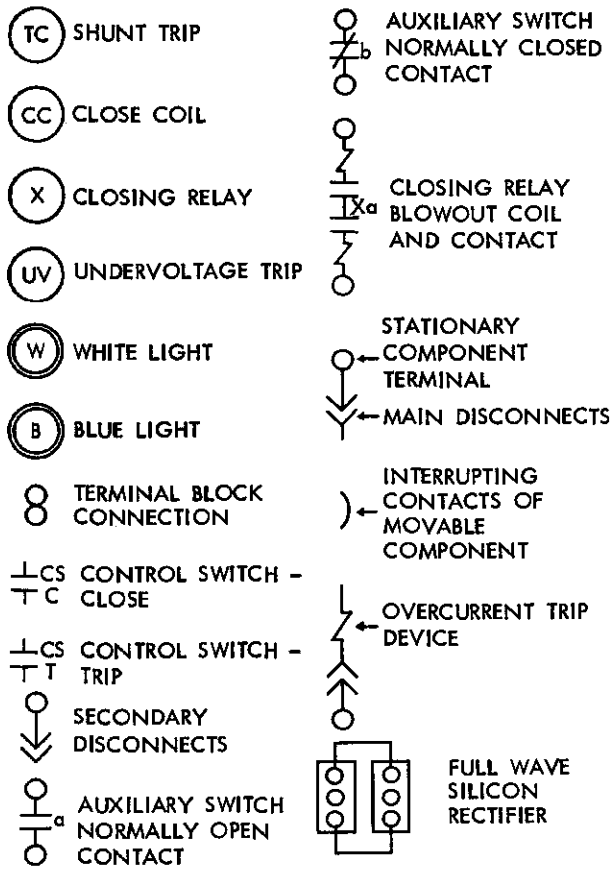


FIGURE 2-1-2 — Schematic Symbols

CHAPTER 3
OPERATING INSTRUCTIONS
Section 1—Precautions

3-1-1 SAFETY PRECAUTIONS

3-1-1-1 When operating or working on the circuit breaker at any time, the following safety precautions are to be adhered to:

(a) Never attempt any maintenance operation unless breaker is open and in a withdrawn position.

(b) Never use kerosene, gasoline or other combustible solvents to clean the circuit breaker as their use is dangerous and may result in an explosion.

(c) Never clean or dress contacts with emery cloth since the abrasive dust is a good conductor and may cause trouble if allowed to settle on insulating surfaces. Rough or high spots should be removed with a fine file or sandpaper.

CHAPTER 4
INSTALLATION
Section 1—Installation Instructions

4-1-1 GENERAL

4-1-1-1 For information in regard to unpacking and handling see preliminary data on page iii. Refer to figures 7-1-1 and 7-1-2 for outline and mounting dimensions.

4-1-1-2 To install the stationary component:

(a) If the movable component is in the stationary component, remove it following instructions in paragraph 4-1-1-3 part (a), and paragraph 4-1-1-4 part (b), raise the stop lever and move the movable component to the end of the rail extensions, then lift the movable component off the rail extensions.

CAUTION

Care must be taken so the complete removable assembly is placed on a surface large enough to support the extension rails when lowered to a horizontal position. If such a surface is not available care must be taken so the assembly does not tilt forward when removing the removable components.

(b) Insert the stationary component into the switchboard compartment making certain that it moves all the way in so that it is tight against the structural members at the rear of the compartment.

(c) Secure the stationary component to the switchboard structure by means of: (1) six 1/2-13 hex-head bolts inserted from the inside through the stationary component and switchboard structure and secured with nuts from the rear, and (2) six 1/2-13 hex-head bolts through front edge of stationary component and into tapped holes in the switchboard structure.

(d) Make the necessary control wiring connections to the stationary secondary disconnect fingers.

(e) Connect the switchboard bus work to the primary breaker studs following Navy accepted practices.

4-1-1-3 To install the movable component into the stationary component:

(a) Turn the two captive bolts that secure the rail extensions in a vertical position counterclockwise, and lower the extension rails to a horizontal position.

(b) Prepare the movable component by inserting handle into the levering socket and rotating it upward until lever (470) reaches its stop.

CAUTION

Handle will not move levering socket unless breaker is open.

(c) Lift the movable component by means of suitable hooks placed in the lifting brackets, and place it on the rail extension. During this operation the stop levers must be raised so the stop pins clear the vertical flange of the extension rails.

NOTE

After the wheels of the movable component rest on the extension rail the movable component can be moved to any desired position on the extension rails and held in place by the stop pins which engage in the holes in the extension rails when the stop levers are released.

(d) Raise the stop levers and push the movable component into the stationary component until the levering rollers stop against the stationary component guides.

(e) Insert handle into the levering socket and rotate downward 225° in three steps of 75° each.

(f) Remove the handle, raise the extension rails to the vertical position and turn the two captive bolts clockwise until tight. These captive bolts prevent the rail extensions from dropping to the horizontal position when the switchboard panel or cover is open.

(g) The movable component is now in the operating position.

4-1-1-4 To withdraw the movable component:

(a) Perform step in paragraph 4-1-1-3 (a).

(b) Insert handle into the levering socket and rotate upward 225° in three steps of 75° each.

CAUTION

Handle will not move levering socket unless breaker is open.

(c) To operate the movable component with the maintenance handle, it must be pulled out to the first stop or any other position between the first stop and the end of the extension rails.

4-1-1-5 To insert the movable component follow the instructions in paragraph 4-1-1-3 parts (d), (e), (f) and (g).

4-1-1-6 To install replacement movable component:

(a) Follow instructions in paragraph 4-1-1-3 parts (b), (c), (d), (e), (f) and (g).

CHAPTER 5
MAINTENANCE

Section 1—Preventive Maintenance

5-1-1 PERIODIC PROCEDURES

5-1-1-1 General

The circuit breaker should be completely inspected as a preventive maintenance procedure at least once a year. However, any circuit breaker that has been opened under a heavy short-circuit current should be inspected as soon as possible.

When inspecting a circuit breaker, examine the contact surfaces; rough or high spots should be removed. Refer to corrective maintenance procedure. Arc chutes that are badly burned or corroded should be cleaned or replaced.

If excessive heating not caused by overcurrent is observed, look for loose or corroded contacts or connections. Examine the internal wiring for damage or breaks and make the necessary repairs.

Keep the components clean and free of dust, dirt, oil and foreign matter; if allowed to accumulate it could contaminate the insulation and lead to circuit breakdown. Accumulated dirt and dust should be removed. Vacuum cleaning or hand dusting is satisfactory. If used, compressed air must be clean and free of condensation.

Section 2—Corrective Maintenance

5-2-1 GENERAL INSTRUCTIONS

5-2-1-1 General

The need for corrective maintenance can be considerably reduced by performing the preventive maintenance procedure. Should any of the sub-assemblies require repair or replacment, refer to the appropriate paragraph in Section 5-2 for detailed instructions.

5-2-1-2 Chassis

Refer to Paragraph 1-2-1-2 for description of the chassis of the air circuit breaker. The chassis will require no maintenance other than keeping it clean, free of dirt, dust and other foreign matter.

5-2-1-3 Pole Units—(See Figures 1-2-2 and 5-2-1)

Refer to Paragraph 1-2-1-3 for description and operation of the pole units. The correct contact pressure is obtained when the gap between the hinge and the auxiliary contact is 3/32 to 1/8 inch, with the circuit breaker closed, see Figure 5-2-1. The gap may be adjusted after removing the arc chute (118) and crossbar (186) Figure 1-2-1. Replacement of any defective or worn part of the pole unit requires prior removal of the arc chute (118), refer to Paragraph 5-2-1-4. Loosen locknut and turn insulating link counterclockwise if the gap is too small and clockwise if the gap is too large. The locknut must be retightened after the adjustment has been completed. Then replace crossbar and arc chutes, Paragraphs 5-2-1-4 and 5-2-1-5.

The arcing contacts are expendable and must be replaced if they are severely pitted or when they are excessively worn. To replace a moving arcing contact (120), remove interphase barrier (140) and arc chute (118). Bend down locking clips (121) and remove two bolts (122). Remove arcing contact and replace with new arcing contact. Reassemble in reverse order of disassembly, making sure to relock bolts by bending up locking clips.

To replace a stationary arcing contact (135) remove truarc ring from stop pin (134) and slide pin out. Remove stationary arcing contact spring (112). Remove bolt securing shunt to the main contact (132). Remove cotter pin from pivot pin (133) and drive out pivot pin. Lift stationary arcing contact clear of pole unit and remove bolt securing shunt to arcing contact. Replace worn parts and reassemble.

The main contact springs are held by locking clips in the contact arm (127). To replace the main contact spring (126), depress and rotate the locking clip, then compress and remove spring (126). Reassemble in reverse order to disassembly procedure making sure the springs are securely locked in place.

To replace the accelerating spring (128), compress the spring with a screwdriver and remove. Replace new or serviceable spring in similar manner.

To replace auxiliary contact springs (107) and (108), compress springs with screwdriver and remove. If any difficulty is experienced, loosen moving contact arm hinge by loosening bolts in vicinity of lower stud, holding the overcurrent trip and contact arm hinge. Replace new or serviceable spring in similar manner. Securely tighten all loose bolts.

5-2-1-4 Arc Chute—(See Figure 1-2-2)

Refer to Paragraph 1-2-1-4 for description of the arc chute. The arc chute requires no maintenance other than keeping clean and free of foreign matter. When inspection shows that the plates of the arc chute are badly burned, it should be replaced.

To replace the arc chute, remove the interphase barrier and four bolts securing the arc chute clamping plate (149) (Figure 1-2-1) to front support (139). Replace arc chute and reassemble.

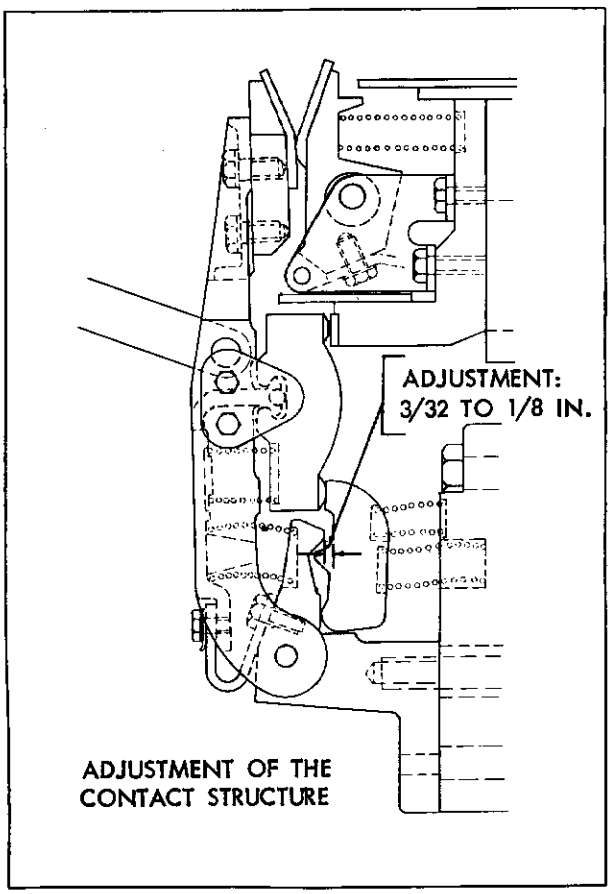


FIGURE 5-2-1 — Pole Unit Contact Adjustment

5-2-1-5 Operating Mechanism—(See Figure 1-2-3)

Refer to Paragraph 1-2-1-5 for description and operation of the operating mechanism. The only maintenance required other than keeping the operating mechanism clean and free of foreign material will be the replacement or a broken or defective spring.

To replace trip bar spring (154), remove one outboard bearings of trip bar (151) from the supporting platform. Carefully note position of each attachment and remove them. Loosen latch (152) and slide trip bar from mechanism leaving spring free to be replaced. Reassemble with replacement spring by following the reverse of the disassembly procedure.

To replace pawl spring (166), first remove mechanism cover. Slide hook end of spring from pawl (163) and remove spring. Install new spring on pawl and reassemble mechanism cover and face plate.

To replace the trip button or latch springs, the operating mechanism must be removed from the breaker. Block up the solenoid (244) (Figure 1-2-1) to prevent its moving or falling. Remove the arc chutes, crossbar, trip bar support brackets and auxiliary switches.

With the operating handle in place lower it until the pin (175) is in position to be driven out through the hole in the side of the mechanism. Remove the four bolts securing the operating mechanism and remove it.

To replace the trip button spring (173) unhook it at both ends and install a new one. In order to replace the latch spring (179), remove the pin (182) and spring and install a new one. Install the operating mechanism in the reverse order given for removal.

5-2-1-6 Closing Relay—(See Figure 1-2-4)

Refer to Paragraph 1-2-1-6 for description and operation of the closing relay. The re-

quired maintenance will consist of replacing a broken or defective spring and repairing or replacing the contacts.

Remove the closing relay (200) from the circuit breaker before attempting any disassembly. To remove the closing relay from the circuit breaker, remove the cover screw (239) and lift off molded cover (211) to expose the terminal connections. Tag, then remove the terminal connections by loosening the terminal screws (210). Remove the cover of the terminal block and disconnect relay coil leads. Remove the two screws (219) securing the closing relay in position. Remove relay from circuit breaker.

To replace a defective relay coil (206), remove screws (208) securing coil frame (203) and the coil to molded base (238) and remove frame and coil assembly base. Remove screw (209) and slide out bushing (207). Remove bolt (226) to remove stationary core (205). Slide coil sideways to remove from frame. Reassemble, using new coil in reverse order to disassembly procedure.

To replace a defective or broken latch spring (225), remove screw (208) securing coil frame (203) and coil to molded base (238) and remove frame and coil assembly from base. Lift movable core (204) and latch assembly out of base. Pull pin (227) out far enough to allow spring (225) to drop out. Replace spring and reposition pin (227). Lower movable core (204) and latch assembly into base making sure latch (229) slides over pin (230). Reassemble in reverse order to disassembly procedure.

To replace a defective or broken trip spring (221), remove ring from the end of the trip crank pin (222). Push out trip crank pin with soft rod and lift out trip spring. Reassemble in reverse order to disassembly procedure.

To replace moving contact arm spring (235), remove arcing chamber retaining strip (214) and both arcing chambers (215) by removing screw (213). Remove contact (236) by removing screw (233). Depress movable contact arm (234) at the upper end and hold. Compress spring with screw driver and remove. Reassemble in reverse order to disassembly procedure.

To replace blow out magnet coil (216) or (217), remove arcing chamber retaining strip (214) and both arcing chambers (215) by removing screw (213). Remove contact (236) by removing screw (233). Remove stationary contacts (237) by removing stationary contact screw (240). The assembly consisting of coil (216) and (217), core (242), screw (218) and side plates (212) can be lifted out. Remove side plate screw (218) to detach side plates from core and side coil off core. Reassemble in reverse order to disassembly procedure.

To replace stationary contact, remove arcing chamber contact strip (214) and both arcing chambers (215) by removing screw (213). Remove moving contact (236) by removing screw (233). Remove stationary contact (237) by removing stationary contact screw (240). Reassemble in reverse order to disassembly procedure.

After replacing the stationary contact, check the contact for proper adjustment. Figure 5-2-2 shows an enlarged view of the relay contacts and clearly indicates the proper measurements. Measure distance "A" with the contacts open, measure the distance "B" with contacts closed. The difference between "A" and "B" is distance "D". If this dimension is greater than required bend the longer arm slightly in and then, bend the short arm slightly forward. Bending the arms in the opposite direction will decrease dimensions "D". Repeat this procedure until satisfactory adjustment is obtained.

5-2-1-7 Closing Solenoid—(See Figure 1-2-5)

Refer to Paragraph 1-2-1-7 for description and operation of the closing solenoid (244). The solenoid closing coil or the relay trip spring (254) are the only parts which may require replacement.

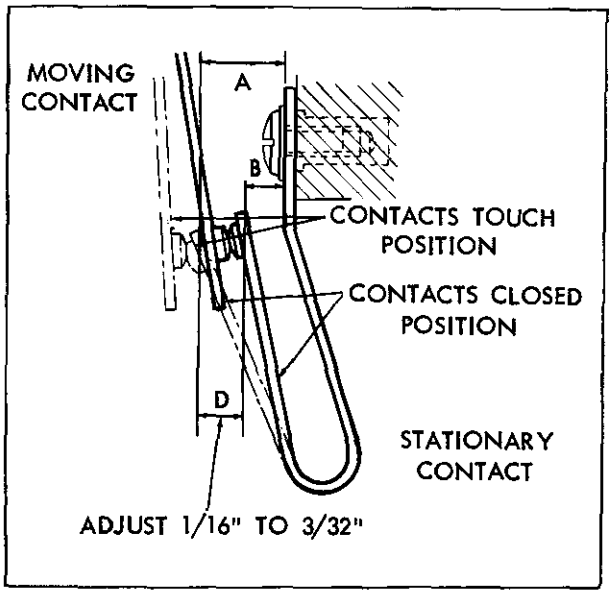


FIGURE 5-2-2 — Relay Contact Adjustment

To replace a defective closing coil (250), first tag, then remove wire connections from indicating light (440) (Figure 1-2-13) terminals. Remove face plate (143) (Figure 1-2-1) by removing the three screws (146). Remove relay trip bracket (257) (Figure 1-2-5) by removing two bolts (258). Tag, then disconnect the closing coil leads from the silicon rectifier. Retract the moving core (245) into the stationary core (252) by closing and latching the circuit breaker. Remove bottom plate (249) by removing screws (246) and allow coil to slide out. Reassemble in reverse order to disassembly procedure, making sure that the relay trip assembly is functioning as described in paragraph 1-2-1-7.

To replace relay trip spring (254), remove face plate as described above. Remove relay trip bracket (256) by removing two bolts. Slide the trip levers (253) and (255) off their hinges and unhook spring (254). Reassemble in reverse order to disassembly procedure.

5-2-1-8 Shunt Trip Device—(See Figure 1-2-6)

Refer to Paragraph 1-2-1-8 for description and operation of the shunt trip device (260). The shunt trip device requires no maintenance other than the cleaning procedures. If a trip coil or spring becomes defective, it must be replaced.

To replace a defective coil (268), disconnect the shunt trip coil leads from the auxiliary switch. Remove two bolts (272) and remove shunt trip device from shelf. Remove plate (262) by removing two screws (261). Slide out the moving core (265), stationary core (271), spring (267), pin (263), washer (270), and sleeve (266). Lift out coil (268). Reassemble the shunt trip device with new or serviceable coil in reverse order to disassembly procedure.

To replace a defective or broken reset spring (267), follow above disassembly instructions until spring is removed. Replace spring and reassemble in reverse order to disassembly instructions.

5-2-1-9 Anti-Shock-Close Device—(See Figure 1-2-7)

Refer to Paragraph 1-2-1-9 for description and operation of the anti-shock-close device. Maintenance procedures consist of replacing a broken or defective return spring.

Replacement of a defective return spring (285) requires the removal of the operating mechanism from the circuit breaker. Refer to Paragraph 5-2-1-5. With the operating mechanism removed from the circuit breaker, remove bolt (284) and clip (282) from end of pin (283) and slide off latch plate (281) and return spring (285). Renew spring and reassemble in reverse order to disassembly instructions making sure spring ends are properly located.

5-2-1-10 Anti-Shock-Open Device—(See Figure 1-2-8)

Refer to Paragraph 1-2-1-10 for description and operation of the anti-shock-open device. Maintenance procedure consists of replacement of a broken or defective plate spring (299) or (301) or weight spring (296).

To replace a defective plate spring, remove cover (300). Remove screws (298) and remove anti-shock-open device from circuit breaker. Remove right hand truarc ring from pin (290) and withdraw pin far enough to free spring (299) or (300). Remove spring. Reassemble in reverse order of disassembly procedure.

To replace a defective weight spring (296), remove anti-shock-open device from circuit breaker as described above. Remove right hand truarc ring from pin (295) and withdraw pin to free weight spring (297). Remove spring. Reassemble in reverse order to disassembly procedure.

5-2-1-11 Overcurrent Trip Device—(See Figure 1-2-10)

Refer to Paragraph 1-2-1-11 for description and operation of the overcurrent trip device. No corrective maintenance should be attempted on the overcurrent trip device, since the proper operation of this unit is dependent not only on the characteristics of a replaced part but also is related to the combined characteristics of all associated springs or valves. If the overcurrent trip device fails to function properly or should it be accidentally damaged, the unit must be returned to the manufacturer for repairs and recalibration.

The long time delay pick up adjustment is the only field adjustment that should be made. To change the pick-up current setting of the long time delay unit, turn the adjusting screw (321) until the indicator points at the desired setting. Adjusting screws (334), (342), and (346) are sealed so they cannot be turned accidentally.

Repair springs are included with on board repair parts, however they should be used only under supervision of manufacturer's representative.

To replace overcurrent trip device with copper connector, remove overcurrent trip by removing bolts (140) and nuts (141) (Figure 1-2-2). Bolt copper connector (142) in place as shown in Figure 1-2-2.

5-2-1-12 Auxiliary Switch—(See Figure 1-2-11)

Refer to Paragraph 1-2-1-12 for description and operation of the auxiliary switch. At least once each year, the auxiliary switch should be inspected and cleaned. Any parts showing obvious wear or damage should be replaced.

The auxiliary switch is not adjustable. However, the contacts can be converted to either normally open or normally closed by rotating the appropriate rotor section 90 degrees on the shaft. To convert a normally open or normally closed contact; tag, then remove the terminal connections. Disconnect link (420) from closing lever. Remove the two mounting bolts (421) and remove switch from breaker. For identical reassembly, note the exact position of the rotating contacts with respect to the stationary contacts with the exception of the contact that is to be converted. Remove screw (419) and bushing (418), withdraw shaft (404) completely. Lift the rotor assembly out of case. Pull the rotor apart slightly at the contact to be changed to disengage positioning lugs. Rotate the contact 90 degrees clockwise to convert a normally open contact to a normally closed contact when affected contact is in the lower switch and counterclockwise to convert a normally open contact to a normally closed contact when the affected contact is in the two top switches. Reverse this procedure when converting a normally closed contact to a normally open contact. Push the rotor assembly together to lock in place. Reassemble in reverse order to disassembly instructions making certain the rotor assembly is in its identical original position. This precaution is required since it is possible to insert shaft with the rotor rotated 30 degrees either direction.

To replace an auxiliary switch; tag, then remove the terminal connections. Disconnect link (420) from closing lever and disconnect arm (412) from link of switch to be replaced. Remove two mounting bolts (421) and remove switch. Tag and disconnect terminal connections between terminal block and auxiliary switch to be replaced. Replace with new switch making sure that contacts of new switch are positioned identical with contacts of switch being replaced. Refer above for instructions regarding positioning of contacts. Reassemble auxiliary switch in reverse order of disassembly procedure.

5-2-1-13 Main Disconnects—(See Figure 1-2-12)

Refer to paragraph 1-2-1-13 for description and operation of the main disconnects. The main disconnects require no maintenance except to keep the contacts clean. If the contacts become badly pitted or worn, the entire assembly must be replaced.

To remove a finger cluster, remove bolt (430) and slide cluster off. Reassemble, using new assembly in reverse order to disassembly procedure.

5-2-1-14 Secondary Disconnects—(See Figure 1-2-12)

Refer to paragraph 1-2-1-14 for description and operation of the secondary disconnects.

The disconnect contacts should be inspected and cleaned occasionally. Note that stationary contacts may be energized even though breaker is withdrawn.

Since these are not interrupting contacts, corrective maintenance will be required only if moving contact assemblies are damaged by handling. In this case complete moving contact assembly must be replaced.

To replace the secondary disconnect assemblies; tag, then remove all wiring at the terminal connections. Remove the two mounting screws from each assembly and remove the assembly. Replace new assembly in reverse order to disassembly procedures.

5-2-1-15 Indicator Lights—(See Figure 1-2-13)

Refer to paragraph 1-2-1-15 for description and operation of the indicating lights. Maintenance procedure consists of replacing a defective lamp.

To replace a defective lamp, remove globe (445) by turning knurled ring (446) counterclockwise and turn defective lamp out. Reassemble in reverse order to disassembly procedure.

5-2-1-16 Silicon Rectifier—(See Figure 1-2-14)

Refer to paragraph 1-2-1-16 for description and operation of the silicon rectifier. The rectifier requires no maintenance other than the normal cleaning procedures and checking of connections. If the silicon rectifier becomes defective, it must be replaced.

To replace a rectifier, first remove the front cover (452) of each case by removing the

screws. Tag and disconnect the incoming leads. Remove the screws (454) securing the rectifier to the mounting plate on the closing solenoid. To install the replacement rectifier, use the reverse of the removal procedure.

5-2-1-17 Trip Bar—(See Figure 1-2-15)

Refer to paragraph 1-2-1-17 for description and operation of the trip bar. The trip bar requires no maintenance other than keeping it clean. However, if the trip bar (151) is removed or the tripping attachments disturbed it is essential to relocate them in their identical original positions.

After the trip bar has been replaced and the tripping attachments located in their approximate positions as shown on Figure 1-2-15, check for the proper location by actually tripping the breaker by manually lifting the overcurrent trip bracket lever (455) with a screwdriver or small rod inserted through the opening in the side of the moving component. A similar check can be made by moving the core of the shunt trip device. The anti-shock-open tripping element (461) is properly located when the tripping element forces the lever up as the trip bar is rotated.

5-2-1-18 Extension Rails—(See Figure 1-1-1)

Refer to paragraph 1-2-1-18 for description and operation of the extension rails. The extension rails require no maintenance other than keeping clean.

5-2-1-19 Levering Device—(See Figure 1-2-16)

Refer to paragraph 1-2-1-19 for description and operation of the levering device. The only maintenance procedure that may be required is replacement of the locking pin spring (478).

To replace the locking pin spring, remove the cotter pin (477) from the locking pin (472) and slide the pin out of the locking pin bracket (471). Reassemble in reverse order to disassembly procedure.

CHAPTER 6
PARTS LIST
Section 1—Parts List Introduction

6-1-1 REPAIR PARTS IDENTIFICATION

6-1-1-1 Circuit Breaker

Each sub-assembly of the movable component is a complete unit which is readily replaceable. Certain types of parts within the various sub-assemblies have been shown by years of Naval experience to be the most subject to wear and breakage. Repair parts are normally provided for these in accordance with Navy specifications.

The sub-assemblies, as well as the replaceable parts within the various sub-assemblies, are listed in Section 2, Repair Parts Tabulation. This repair parts list provides the manufacturer's service part number, part name and indicates the figure number of the drawing on which it is identified.

Refer to the ship's allowance list or to the certification data to determine the actual number of repair parts for a specific installation.

6-1-1-2 Repair Part Ordering

When ordering a part not identified by manufacturer's part number, be sure to state S.O. (shop order) number that appears on front of breaker platform on "Breaker Identification Plate".

Section 2—Repair Parts Tabulation

6-2-1 REPAIR PARTS TABULATION

6-2-1-1 Repair Parts

See Paragraph 6-1-1-1 for explanation of the following tabulation.

Identified on Figure No.	Repair Part No.	Name of Repair Part	Mfr. Part No.	No. of Spares Supplied Per Breaker
1-2-2	100	POLE UNIT	-------	-
1-2-2	120	Contact, Moving Arcing	407D789G05	3
1-2-2	107	Spring, Auxiliary Contact	1584469	3
1-2-2	112	Spring, Stationary Arcing Contact	126A927H01	2
1-2-2	108	Spring, Auxiliary Contact	126A927H02	3
1-2-2	128	Spring, Accelerating	1584468	2
1-2-2	126	Spring, Main Contact	1584470	3
1-2-2	143	Contact, Stationary Arcing - R.H.	407D789H19	3
1-2-2	135	Contact, Stationary Arcing - Leading	407D789H20	3
1-2-2	144	Contact, Stationary Arcing - L.H.	407D789H21	3
1-2-2	142	Connector	1611365	0
1-2-3	150	OPERATING MECHANISM	-------	-
1-2-3	166	Spring, Pawl	1581956	1
1-2-3	173	Spring, Trip Button	300P049H01	1
1-2-3	179	Spring, Latch	1799968	1
1-2-3	154	Spring, Trip Bar	1809524	1
1-2-1	187	Spring, Cross Bar	126A457H01	1
1-2-1	500	Spring, Stop Pin	126A592H05	1

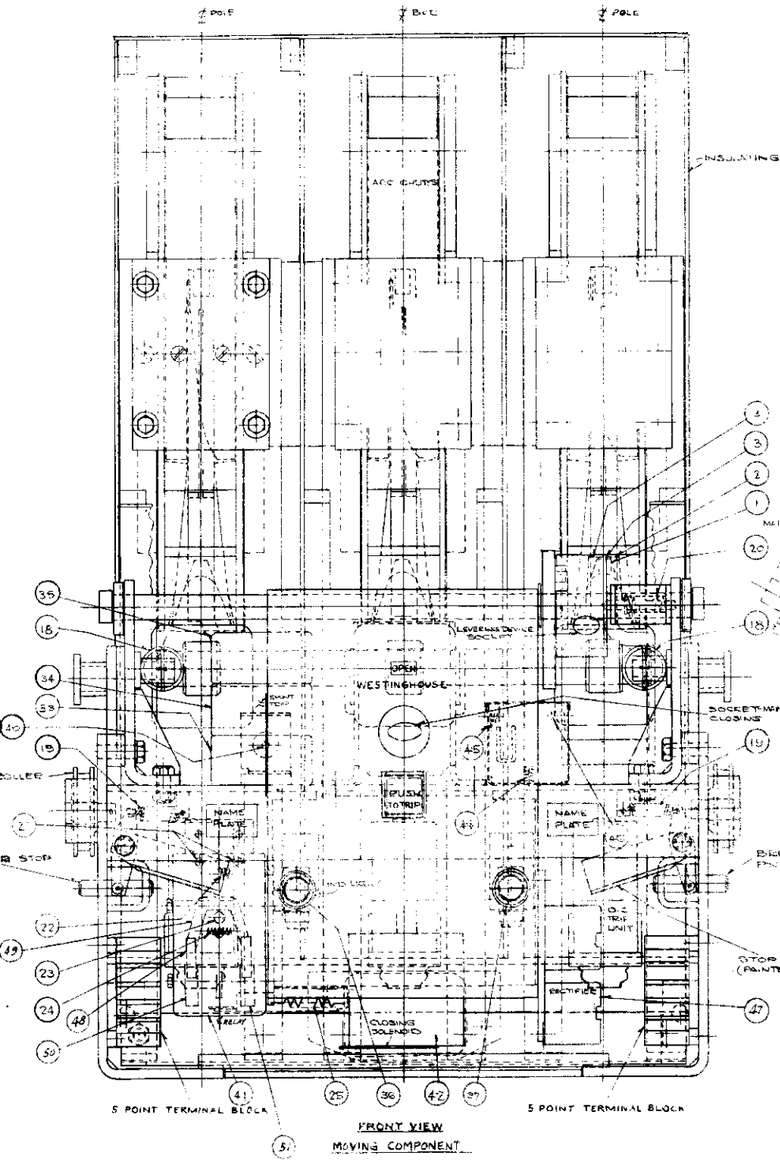
Identified on Figure No.	Repair Part No.	Name of Repair Part	Mfr. Part No.	No. of Spares Supplied Per Breaker
1-2-4	200	Closing Relay	-------	0
1-2-4	221	Spring, Trip	1802923	1
1-2-4	235	Spring, Contact Arm	30D9774H12	1
1-2-4	206	Coil	*	1
1-2-4	225	Spring, Latch	1802924	1
1-2-4	236	Contact, Moving	1802917	1
1-2-4	237	Contact, Stationary	1802916	2
1-2-4	217	Coil, Blowout (R.H.)	300P275G01	1
1-2-4	216	Coil, Blowout (L.H.)	300P274G01	1
1-2-4	243	Spring Auxiliary Contact	1802939	1
1-2-5	244	Closing Solenoid	-------	0
1-2-5	250	Coil, Closing	*	1
1-2-5	254	Spring, Relay Trip	1802968	1
1-2-6	260	Shunt Trip	-------	0
1-2-6	268	Coil	*	1
1-2-6	267	Spring, Reset	1802869	1
1-2-7	285	Spring Return	126-A-172H01	1
1-2-8	286	Anti-Shock-Open Device	-------	0
1-2-8	296	Spring Weight	300P276H16	1
1-2-8	299	Spring, Reset	1581955	1
1-2-8	301	Spring, Reset	1584521	1
1-2-10	310	Overcurrent Trip Unit	-------	0
1-2-10	317	Spring, Limit	*	1
1-2-10	319	Spring, L.D. Pickup	*	1
1-2-10	322	Spring, Dial	*	1
1-2-10	331	Spring, Instantaneous	*	1
1-2-10	335	Spring, Inst. Valve	*	1
1-2-10	339	Spring, S.D. Pickup	*	1
1-2-10	343	Spring, S.D. Valve	*	1
1-2-10	348	Spring, Disc	*	1
1-2-11	400	Auxiliary Switch	*	1
1-2-12	425	Main Disconnects	1300588	2
1-2-12	432	Secondary Disconnect	410D439G02	1
1-2-13	440	Indicator Light	*	1
1-2-13	441	Transformer	*	0
1-2-13	444	Lamp (2.5V)	Type TS-159	0
1-2-13	445	Globe	*	0
1-2-14	450	Silicon Rectifier	*	1
1-2-16	478	Spring, Levering	1808240	1
-	-	Truarc Kit	*	1

* See Certification Data Sheet for Correct MFR. PART NO.

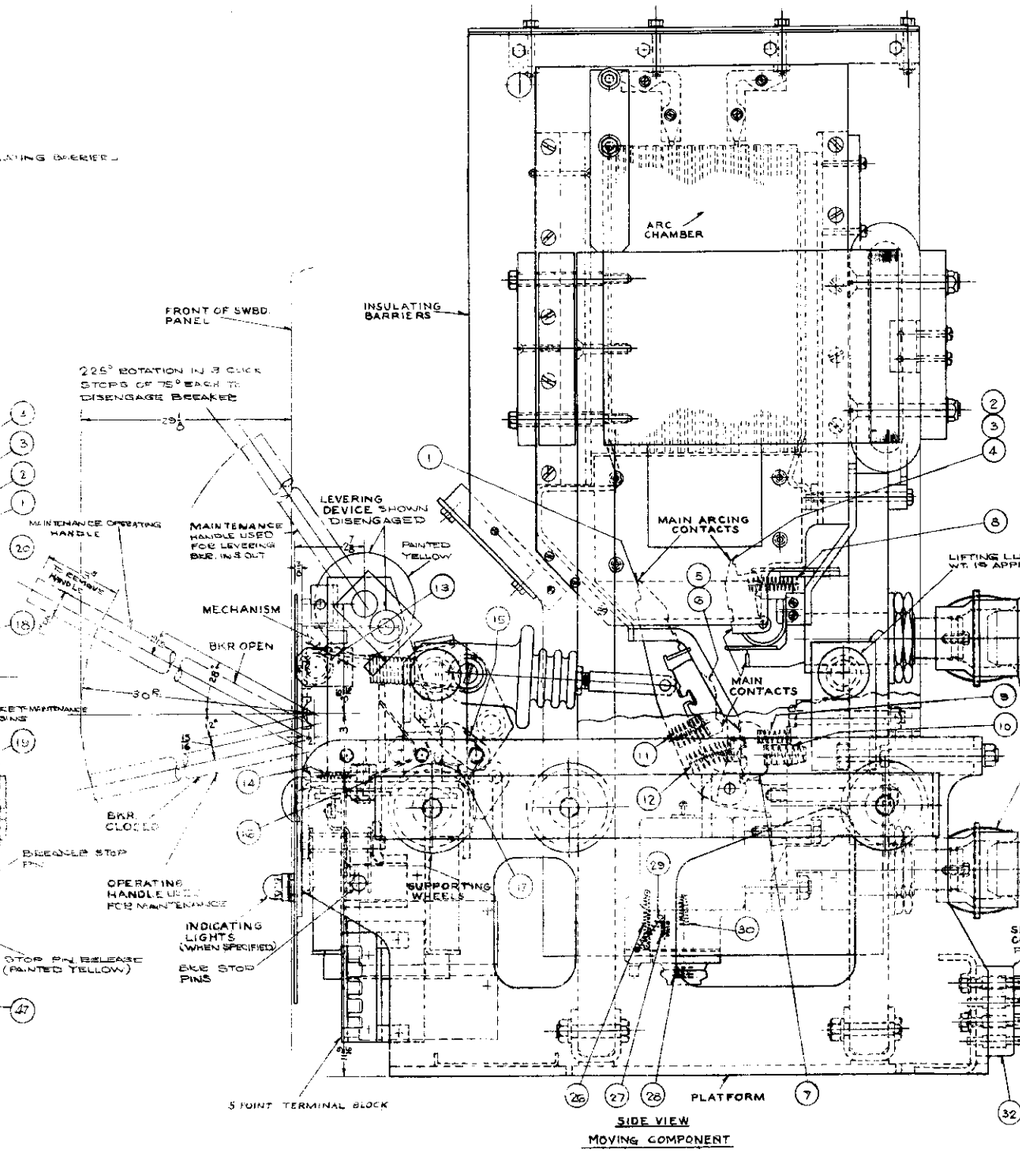
CHAPTER 7

DRAWINGS

Section 1—General

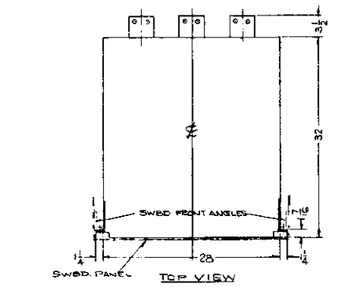


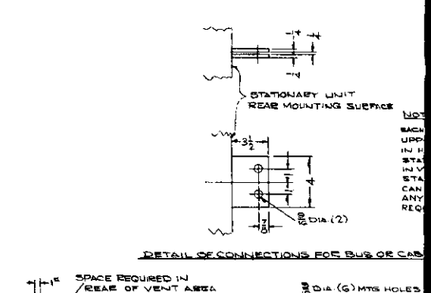
FRONT VIEW
MOVING COMPONENT



SIDE VIEW
MOVING COMPONENT

FIGURE NO. 1

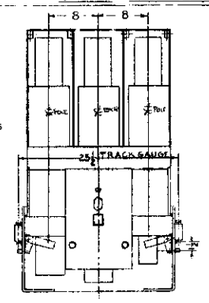


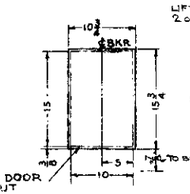


DETAIL OF CONNECTIONS FOR BUS OR CA

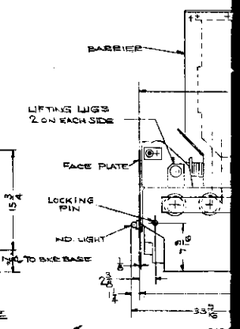
FIGURE NO 2

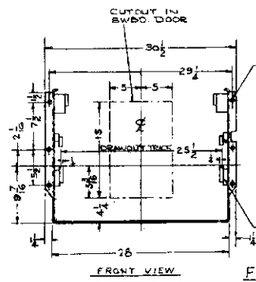
DIMENSIONS OF STATIONARY COMPONENT REQUIRED FOR MOUNTING IN SWITCHBOARD





MOVING COMPONENT





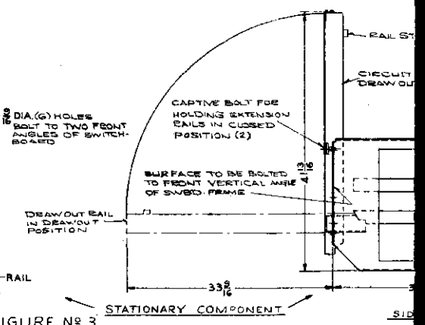
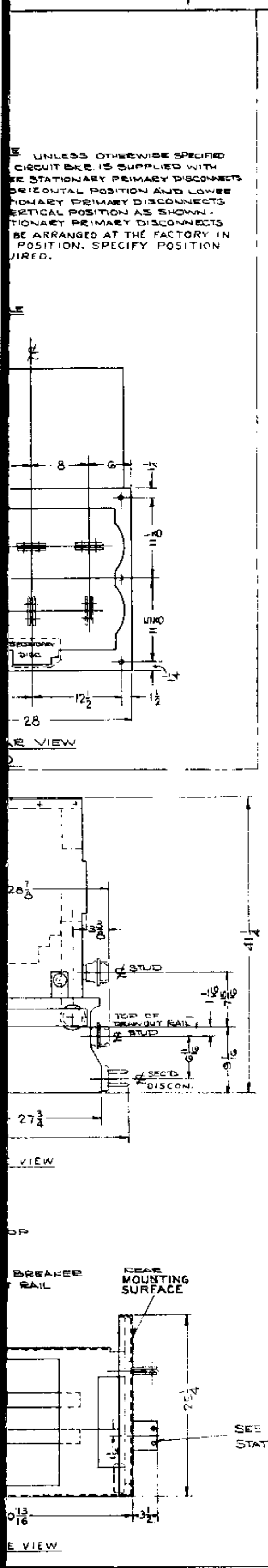
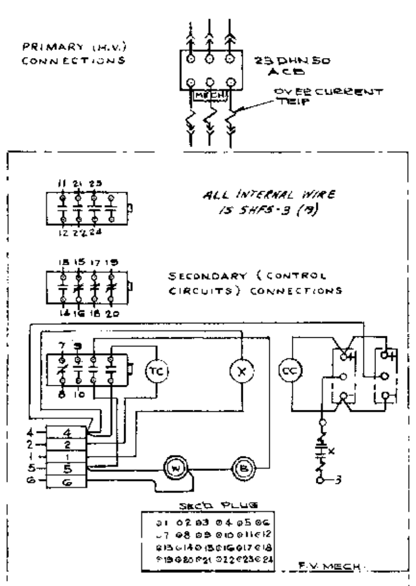


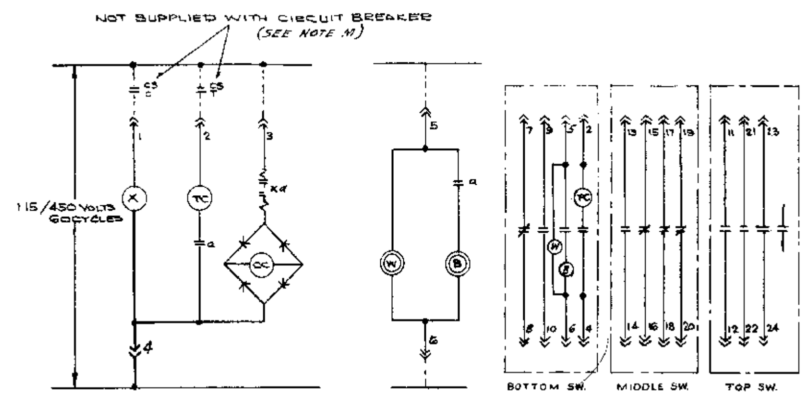
FIGURE NO 3





CONNECTION DIAGRAM

NUMBERS IN THIS DIAGRAM INDICATE CONNECTIONS TO THE SECONDARY CONTACT BLOCK PIN OF THE INDICATED NUMBER. THE PIN NUMBERS ARE READ FROM LEFT TO RIGHT WHEN LOOKING AT THE WIRE SIDE OF THE SECONDARY PLUG.



CIRCUIT BREAKER CONTROL — INDICATOR LIGHTS — AUXILIARY SWITCHES (SEE NOTE "P")

SCHEMATIC DIAGRAMS

FIGURE Nº 4

WIRING NOTES

NOTE	SYM.	DESCRIPTION
M	CS-C	CONTROL SWITCH (OPEN EXCEPT DURING CLOSING)
M	CS-T	CONTROL SWITCH (OPEN EXCEPT DURING REMOTE ELECTRICAL TRIPPING)
	a	BKR. AUX. CONTACT (OPEN WHEN BKR. IS OPEN)
	b	BKR. AUX. CONTACT (CLOSED WHEN BKR. IS OPEN)
	(X)	CLOSING RELAY COIL (INTERMITTENT DUTY ONLY)
	X4	CLOSING RELAY CONTACTS (CLOSES WHEN X COIL IS ENERGIZED AND MECHANICALLY TRIPPED BY BKR. DURING CLOSING STROKE. CAN NOT BE RECLOSED UNTILL CS-C IS OPENED AND RECLOSED)
	TC	SHUNT TRIP COIL
N	(W)	WHITE LIGHT (ON-INDICATES SOURCE IS ENERGIZED)
N	(B)	BLUE LIGHT (ON-INDICATES BKR. IS CLOSED)
	CC	CLOSING COIL
	⧫	INDICATES TERMINAL BLOCK POINT

M - TO BE SUPPLIED BY SWITCHBOARD MANUFACTURER

N - TO BE SUPPLIED ONLY WHEN SPECIFIED IN CONTRACT

P - 12 AUXILIARY SWITCH CONTACTS SUPPLIED AS SHOWN BUT MAY BE CONNECTED DIFFERENTLY TO MODIFY CONTROL. CONTACTS ARE INTERCHANGEABLE TO a OR b

NOTES

NOTE A - FOR IDENTIFICATION SEE CERTIFICATION DATA SHEET

NOTE B -

	NORMAL VOLTAGE	VOLTAGE RANGE
CLOSE COIL & RELAY	115 AC	90-130
	450 AC	360-500

NOTE C -

	NORMAL VOLTAGE	VOLTAGE RANGE
SHUNT TRIP	115 AC	80-130
	450 AC	330-500

NOTE D - REPAIR PART AUXILIARY SWITCH SUPPLIED WITH *THREE* MAKE AND *ONE* BREAK CONTACTS WHEN REPLACING SWITCH ON BREAKER REFER TO CERTIFICATION DATA SHEET FOR CORRECT CONTACT ARRANGEMENT. CONTACTS MAY BE CHANGED FROM OPEN TO CLOSED IN FIELD

NOTE E - SUPPLIED ONLY WHEN SPECIFIED IN CONTRACT

NOTE F - SUPPLIED WITH 115V OR 450V. CLOSE COIL S# 303C741G13 FOR 115V. 60CY. - REQ. 1 S# 303C741G12 FOR 450 V. 60 CY. - REQ. 2

1. - FOR ADDITIONAL DETAILS OF THE CIRCUIT BREAKER STATIONARY UNIT ASSEMBLY *SEE SHEET 2 THIS DWG*

2. - THE METAL PARTS OF THE CIRCUIT BREAKER ASSEMBLY ARE PAINTED NAVY GREY

3. - THE GENERAL REQUIREMENTS OF SPECIFICATION MIL-E-917 ARE APPLICABLE

4. - A MAINTENANCE HANDLE IS FURNISHED AS PART OF EACH CIRCUIT BREAKER FOR LEVERING THE BKR. IN OR OUT AND FOR MAINTENANCE CLOSING. THE HANDLE MUST BE STORED *SEPARATELY* AT THE SWITCHBOARD

5. - THE CLOSING RECTIFIER IS MOUNTED ON THE REMOVABLE UNIT OF THE CIRCUIT BREAKER

6. - CIRCUIT BREAKER REMOVABLE UNIT CAN BE REMOVED FROM THE SWITCHBOARD BY THE FOLLOWING PROCEDURE:
   - a - TRIP BREAKER
   - b - DISENGAGE THE EXTENSION RAIL CAPTIVE BOLTS AND LOWER RAILS TO HORIZONTAL POSITION
   - c - PLACE MAINTENANCE OPERATING HANDLE IN LEVERING DEVICE SOCKET AND ROTATE WITH *AN UPWARD* MOTION FOR 225° IN 3 CLICK STOPS OF 75° EACH WARNING: LEVERING DEVICE WILL NOT ROTATE IF BKR. IS CLOSED
   - d - BREAKER IS NOW IN POSITION TO BE DRAWNOUT. PRESS BREAKER STOP PIN RELEASES AND PULL BREAKER FORWARD. HOLES IN EXTENSION RAILS RECEIVE STOP PINS UPON REMOVING PRESSURE FROM STOP PIN RELEASES. THIS PERMITS BKR. TO BE STOPPED IN INTERMEDIATE POSITIONS.
   - e - BKR. MUST BE IN CONTACT WITH RAIL STOP BEFORE IT CAN BE LIFTED FROM EXTENSION RAILS
   - f - BREAKER IS RETURNED TO SWITCHBOARD BY REVERSING THE ABOVE OUTLINED PROCEDURE. WARNING: BKR. MUST REMAIN IN TRIPPED POSITION

TYPICAL REPAIR PARTS LIST

NOTES	ITEM NO.	NAME OF PART OR TOOL	NO. REQ.	MFG. INF. STYLE	MFG. INF. DWG.
	1	CONTACT-MOVING ARCING	3	407D789G05	407D789
	2	CONTACT-STATIONARY ARCING	3	407D789H19	407D789
	3	CONTACT-STATIONARY ARCING	3	407D789H20	407D789
	4	CONTACT-STATIONARY ARCING	3	407D789H21	407D789
	5	CONTACT-MOVING MAIN	—	407D789H17	407D789
	6	CONTACT-MOVING MAIN	—	407D789H18	407D789
	7	CONTACT-STATIONARY MAIN	—	407D789H16	407D789
	8	SPRING } STATIONARY ARCING	2	126A927H01	126A927
	9	SPRING } STATIONARY ARCING	3	126A927H02	126A927
	10	SPRING } CONTACT PARTS	3	1584469	18D6383
	11	SPRING } MOVING MAIN	2	1584470	18D6383
	12	SPRING } CONTACT PARTS	2	1584468	18D6383
	13	SPRING } MECHANISM PARTS	1	1581956	8D3981
	14	SPRING } MECHANISM PARTS	1	300P049H01	8D3981
	15	SPRING } MECHANISM PARTS	1	1809524	21C5135
	16	SPRING } MECHANISM PARTS	1	126A172H01	126A172
	17	SPRING } MECHANISM PARTS	1	1799968	21C5135
	18	SPRING - MECH. CROSSBAR	1	126A457H01	126A457
	19	SPRING - STOP PIN HANDLES	1	125A592H05	125A592
	20	SPRING - LEVEROUT DEVICE	1	1808240-A	26D2165
	21	SPRING } RELAY PARTS		1802939	30D9774
	22	SPRING } RELAY PARTS	1	1802924	31D6422
	23	SPRING } RELAY PARTS	1	30D9774 H12	30D9774
	24	SPRING } RELAY PARTS	1	1802923	31D6422
	25	SPRING } RELAY PARTS	1	1802968	18D9178
	26	SPRING } OVERCURRENT TRIP PARTS	1	NOTE A	
	27	SPRING } OVERCURRENT TRIP PARTS	1	NOTE A	
	28	SPRING } OVERCURRENT TRIP PARTS	1	NOTE A	
	29	SPRING } OVERCURRENT TRIP PARTS	1	NOTE A	
	30	SPRING } OVERCURRENT TRIP PARTS	1	NOTE A	
	31	DISCONNECTS - MAIN	2	1300E88	14A5930
	32	DISCONNECTS - SECONDARY	1	410D439G02	410D439
D	33	SWITCH - AUXILIARY - LOWER	1	NOTE A	
D	34	SWITCH - AUXILIARY - CENTER		NOTE A	
D	35	SWITCH - AUXILIARY - UPPER		NOTE A	
E	36	LIGHT - BLUE INDICATOR		NOTE A	
E	37	LIGHT - WHITE INDICATOR		NOTE A	
	39	SPRING - SHUNT TRIP	1	1802869	26D4911
AC	40	COIL - SHUNT TRIP	1		
AB	41	COIL - RELAY	1		
AB	42	COIL - CLOSING SOLENOID	1		
	43	TRU-ARC FASTENERS & PLIERS	1	125A205G01	125A203
	44	SPRING } ANTI-SHOCKOUT PARTS	1	300P276H16	9D9236
	45	SPRING } ANTI-SHOCKOUT PARTS	1	1581955	21D4345
	46	SPRING } ANTI-SHOCKOUT PARTS	1	1584521	21D4345
	47	*RECTIFIER - SILICON*		*NOTE F*	
	48	*CONTACT - STAT. - RELAY*	2	*1802916*	*52B8700*
	49	*CONTACT - MOV. - RELAY*	1	*1802917*	*52B8700*
	50	*BLOWOUT COIL - L.H. - RELAY*	1	*300P274*	*L-547150*
	51	*BLOWOUT COIL - R.H. - RELAY*	1	*300P275*	*L-547151*

(REFER TO APPLICABLE C.D. SHEET FOR EACH BREAKER)

REVISIONS

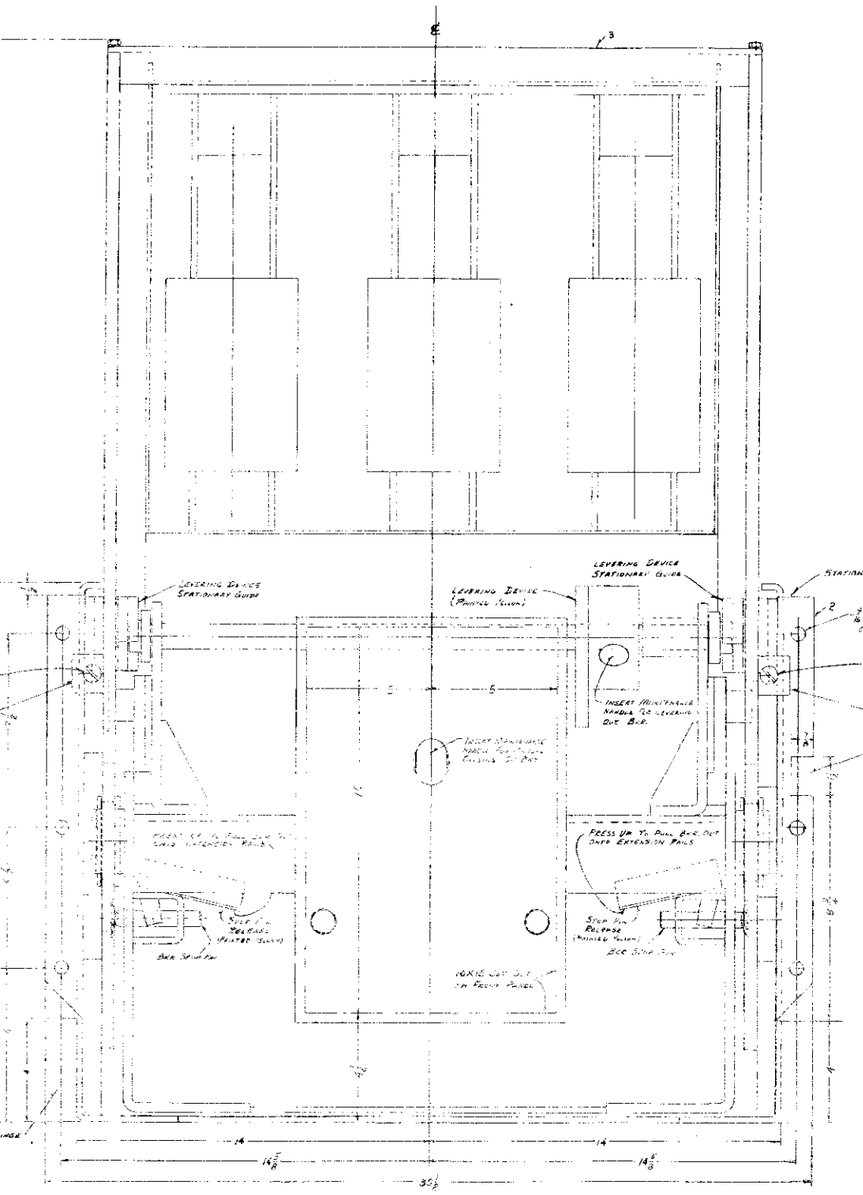
REV.	ZONE	DESCRIPTION	MFG. DATE	MFG. APP'D	U.S.N. DATE	U.S.N. APP'D
A		MODIFIED PER BUSHIPS LETTER NOBS-72158 (560K) SEE 560-37511 DATED 15 MAY 1957	[illegible]	[illegible]	[illegible]	[illegible]
B		APPROVED PER BUSHIPS LTR. NOBS-72158 (560K) SEE 560-45145 DATED 13 SEPT 1957	[illegible]	[illegible]	[illegible]	[illegible]
C		APPROVED PER BUSHIPS LETTER NOBS 72158 SEE 660K-1710 DATED 17 FEB. 1960	[illegible]	[illegible]	[illegible]	[illegible]

CLASSIFICATION DATA

FRAME: 2000 R	TYPE: NAVY-ACB *W.E. CORP.* 23 DHN-50
CONTINUOUS CURRENT (COPPER)	2000 AMPERES
VOLTAGE	2300 VOLTS (60 CYCLES) A.C.
POLES	3 (OVERCURRENT COIL ON EACH OF 3 POLE
RATED INTERRUPTING CURRENT	55,000 AMPERES (3 PHASE AVG. RMS AT ½ CYCL
SHORT TIME RATING	55,000 AMPERES (35 CYCLES DURATION)
MOUNTING	REMOVABLE ASSEMBLY
MAIN CONNECTIONS	AT THE REAR
PROTECTIVE FUNCTION:	OVERCURRENT TRIP DEVICE
	LONG DELAY
	SHORT DELAY-BAND 1, 2, 3 OR 4
	INSTANTANEOUS
OVERCURRENT COILS:	1000, 1200, 1600 & 2000 AMPERES
NORMAL CLOSING	ELECTRIC 115 OR 450 V. A.C.
SHOCK	CLASS HI
INSULATION CLASS	B FEATURE: ANTI PUMP
INSULATION TEST	7200 VOLTS (60 CYCLES)
AMBIENT TEMPERATURE	50°C. OUTSIDE
BREAKER ASSEMBLY WEIGHT: *1320* LBS (COMPLETE WITH STATIONARY UN	
ATTACHMENTS	
	SHUNT TRIP - 115 V. OR 450 V. AC
	AUXILIARY SWITCH 12 CONTACTS
BUREAU QUALIFICATION LETTER:	
SPECIFICATION:	
TECHNICAL MANUAL: WE CORP#	BUSHIPS#
WEIGHT REMOVABLE UNIT *1050* LBS.	
WEIGHT STATIONARY UNIT *270* LBS.	

NAME / DATE	MASTER PLAN	WESTINGHOUSE ELECTRIC CORP. EAST PITTSBURGH PA. U.S.A.
[illegible]	AIR CIRCUIT BREAKER REMOVABLE ASSEMBLY	900J076 SHEET 1 OF 2
APPD. / DATE: SEE REV. BLOCK FOR REV. A	NAVY TYPE ACB - WE CORP. 23DHN50 FRAME: 2000 R VOLTS 2300, 60 CYCLES POLES: 3 O.C. COILS 1000-2000 A. CLOSING: ELECTRIC INT. CAP. 55,000 A.	NAVY DEPT. BUSHIPS DWG. NO. 3304498 REV. C
	SCALE WT. CALC. ACTUAL	*SHEET 1 OF 2*

FIG. 7-1-1 — Air Circuit Breaker Removable Assem



FRONT VIEW

NOTE:

THE CIRCUIT BREAKER CAN BE REMOVED FROM THE SWITCHBOARD BY THE FOLLOWING PROCEDURE:

A - TRIP BREAKER

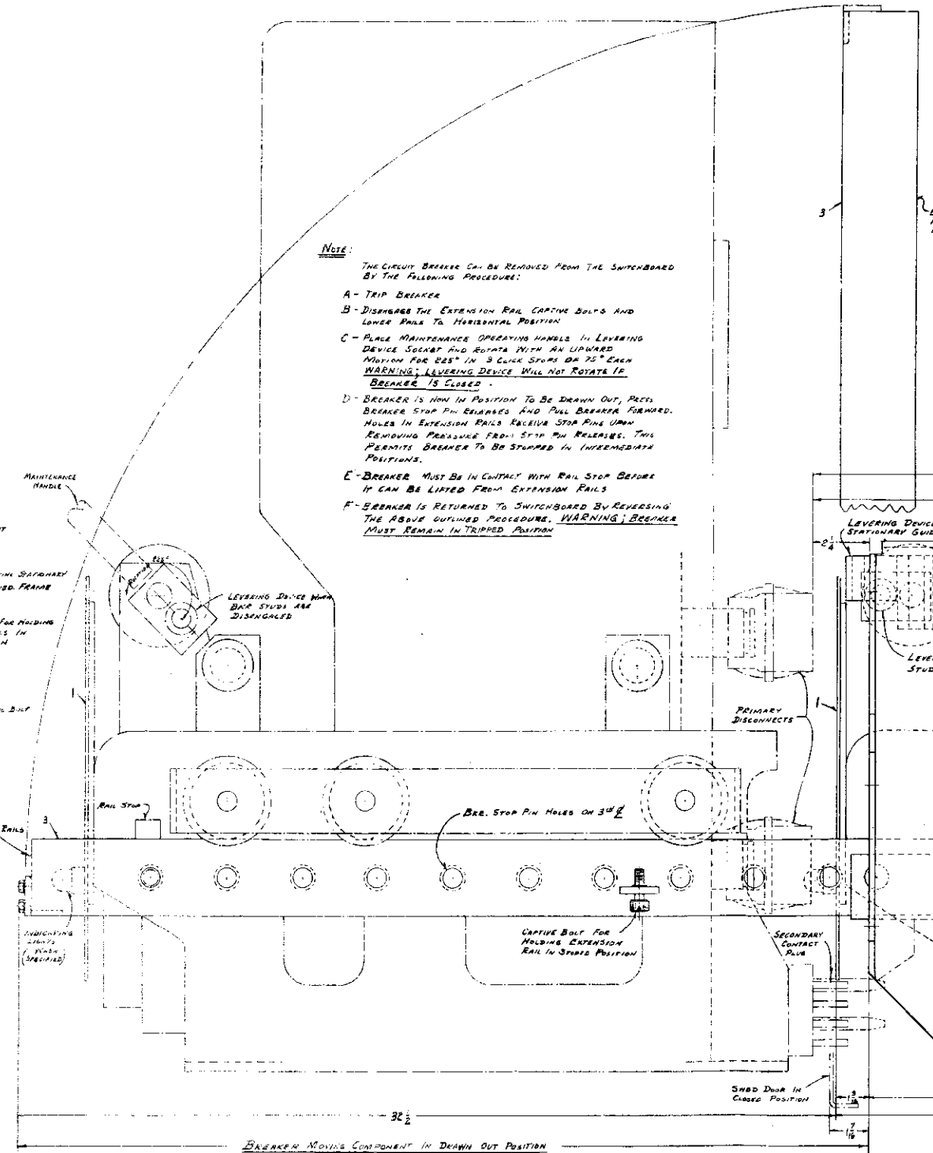
B - DISENGAGE THE EXTENSION RAIL CAPTIVE BOLTS AND LOWER RAILS TO HORIZONTAL POSITION

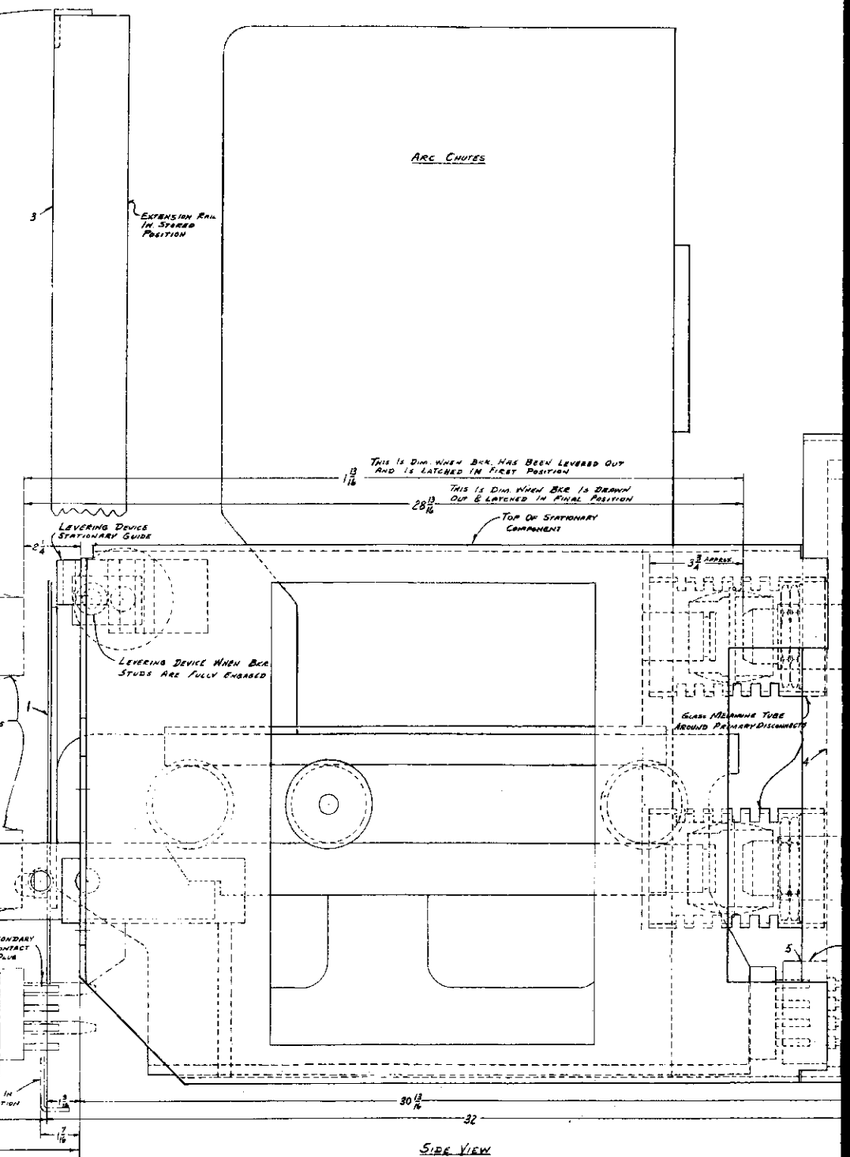
C - PLACE MAINTENANCE OPERATING HANDLE IN LEVERING DEVICE SOCKET AND ROTATE WITH AN UPWARD MOTION FOR 225° IN 3 CLICK STOPS OR 75° EACH. WARNING: LEVERING DEVICE WILL NOT ROTATE IF BREAKER IS CLOSED.

D - BREAKER IS NOW IN POSITION TO BE DRAWN OUT. PRESS BREAKER STOP PIN RELEASED AND PULL BREAKER FORWARD. HOLES IN EXTENSION RAILS RECEIVE STOP PINS UPON REMOVING PRESSURE FROM STOP PIN RELEASES. THIS PERMITS BREAKER TO BE STOPPED IN INTERMEDIATE POSITIONS.

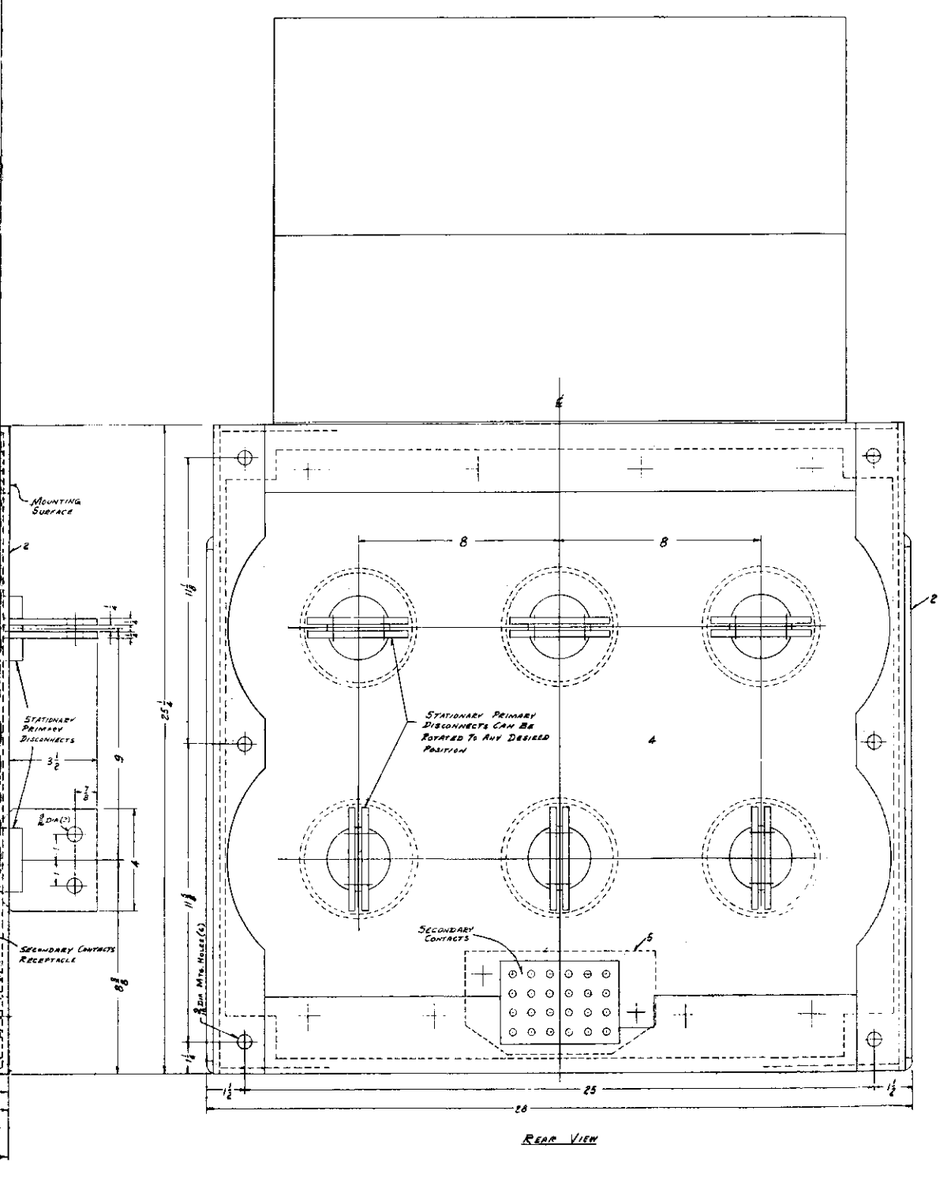
E - BREAKER MUST BE IN CONTACT WITH RAIL STOP BEFORE IT CAN BE LIFTED FROM EXTENSION RAILS

F - BREAKER IS RETURNED TO SWITCHBOARD BY REVERSING THE ABOVE OUTLINED PROCEDURE. WARNING: BREAKER MUST REMAIN IN TRIPPED POSITION





SIDE VIEW
BREAKER SHOWN IN STATIONARY COMPONENT



LIST OF MATERIAL QUANTITIES FOR ONE UNIT

PC NO	NAME	NO REQD	MATERIAL	MATL SPEC	CONTRACTOR DWG NO	CONTRACTOR PART NO	MANUFACTURER NAME	MANUFACTURER PART OR DWG NO	BUSHIPS DWG NO	UNIT WT LB	STD NAVY STOCK NO	REMARKS
1	CIR. BKR. TYPE AB DRW 60 2000 AMPS	1			900J076	SHEET 1			3304498			
2	STEEL ENCLOSURE	1	STEEL	00-S-698	501F113	GR. 1						
3	EXTENSION RAIL ASSY	1	STEEL	00-S-698	302C484	GR. 3						
4	CONTACT BASE ASSY	1			407D812	GR. 1						
5	SEC. CONT. RECPT. 24 PCS W/HOUSING	REF			410D498	GR. 1						

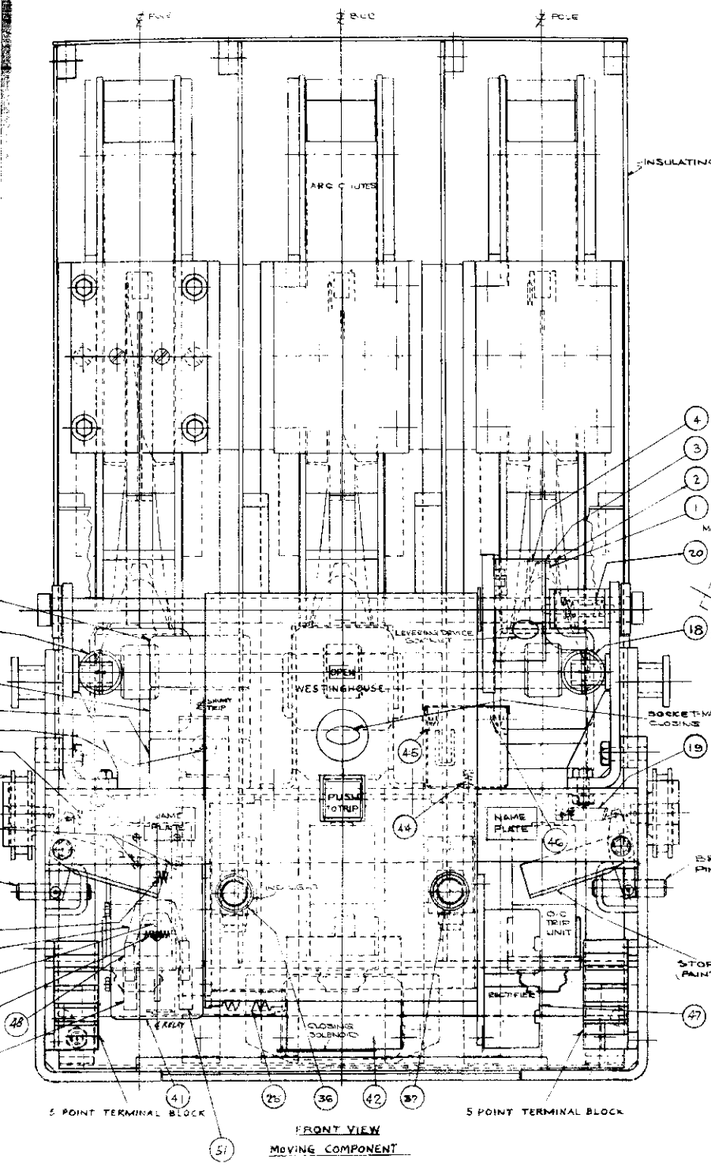
REVISIONS

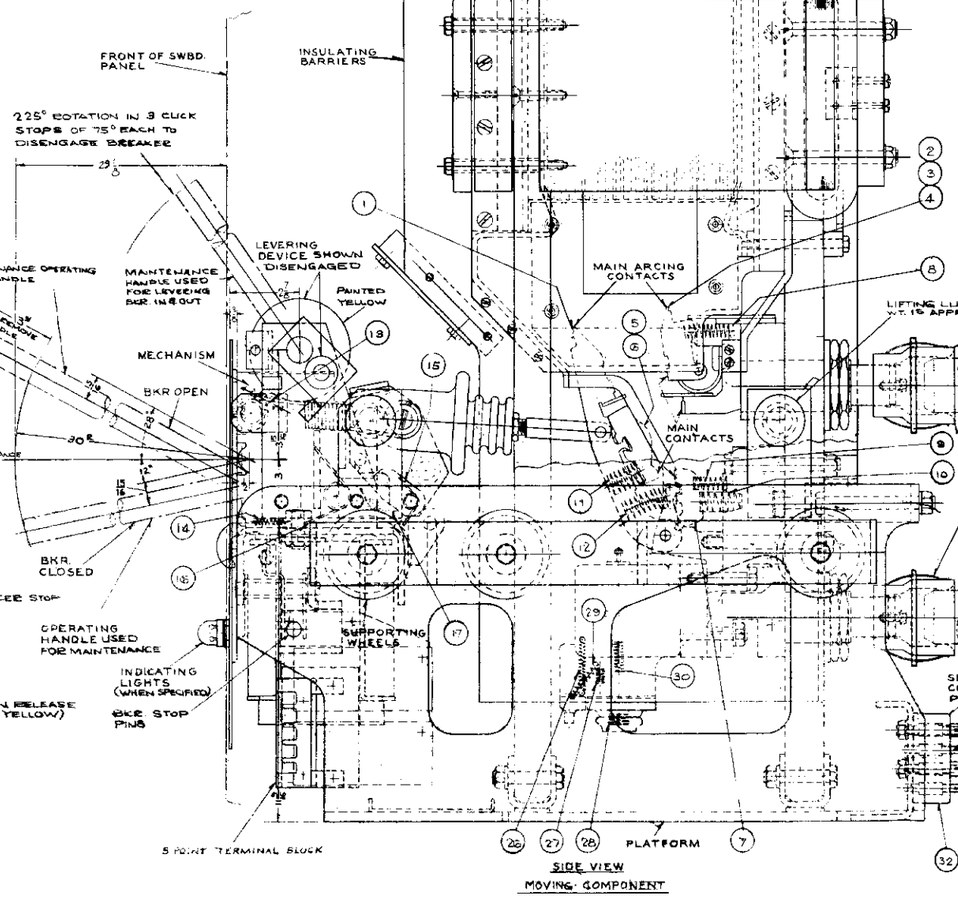
REV.	ZONE	DESCRIPTION	MFR DATE	MFR APPD	USN DATE	USN APPD
C		SEE SHEET 1				

NOTES:
SEE WESTINGHOUSE ELECTRIC DWG. NO 900J076 SH 1
BUSHIPS NO. 3304498 FOR CIRCUIT BREAKER AND MOVING COMPONENT ASSEMBLY

NAME	DATE	MASTER PLAN	WESTINGHOUSE ELEC. CORP. EAST PITTSBURGH PA.	USN C
ERICKSON		AIR CIRCUIT BREAKER STATIONARY COMPONENT NAVY TYPE: ACB W.E. CORP. 230HK50 2000 R FRAME 3 POLE 230 V. A.C.	900J076	SHEET 2 OF 2
APPD.	DATE		NAVY DEPT BUSHIPS DWG NO	REV.
			3304498	C
		SCALE:	SHEET 2 OF 2	

FIG. 7-1-2 — Air Circuit Breaker Stationary Assembly





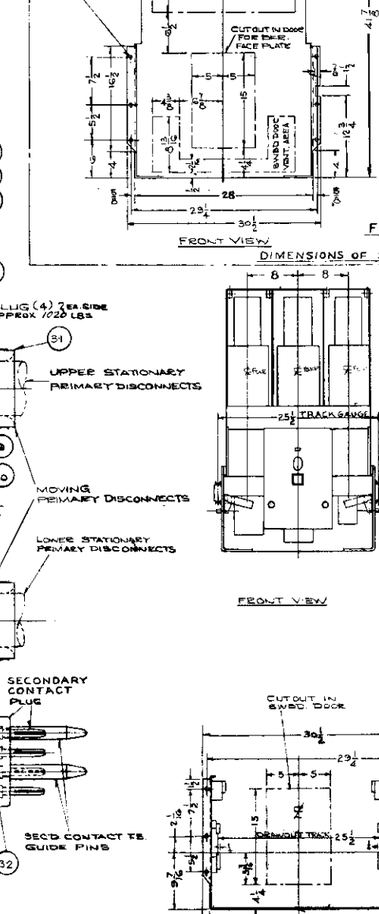
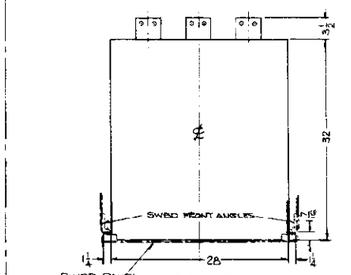


FIGURE NO.1



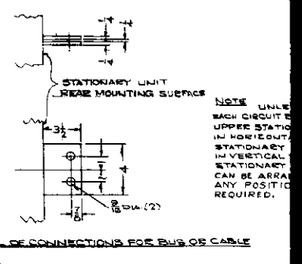
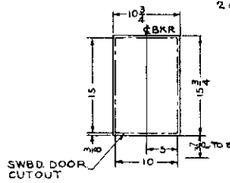
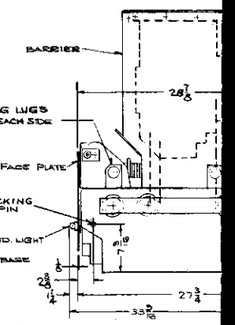


FIGURE Nº 2

DIMENSIONS OF STATIONARY COMPONENT REQUIRED FOR MOUNTING IN SWITCHBOARD





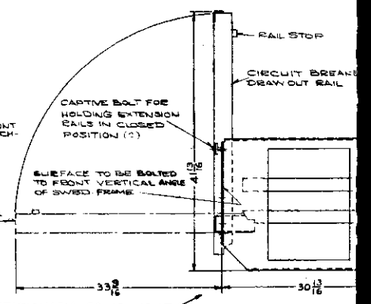
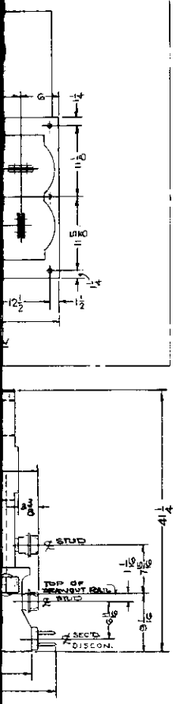
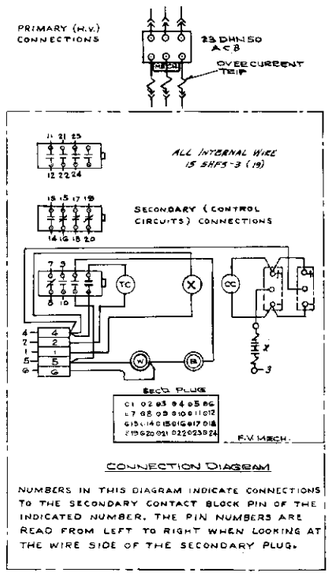


FIGURE Nº 3

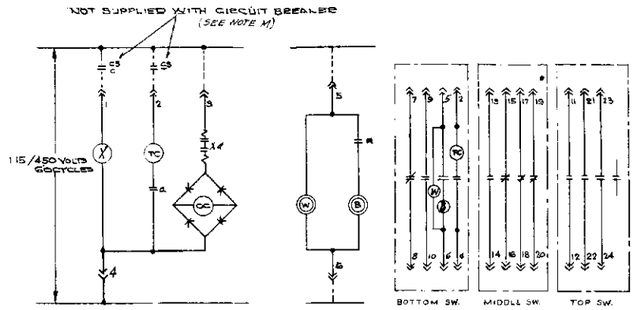
…S OTHERWISE SPECIFIED
…KE. IS SUPPLIED WITH
…NARY PRIMARY DISCONNECTS
…LL POSITION AND LOWER
…PRIMARY DISCONNECTS
…OSITION AS SHOWN.
…PRIMARY DISCONNECTS
…IRED AT THE FACTORY IN
…N. SPECIFY POSITION





CONNECTION DIAGRAM

NUMBERS IN THIS DIAGRAM INDICATE CONNECTIONS TO THE SECONDARY CONTACT BLOCK PIN OF THE INDICATED NUMBER. THE PIN NUMBERS ARE READ FROM LEFT TO RIGHT WHEN LOOKING AT THE WIRE SIDE OF THE SECONDARY PLUG.



SCHEMATIC DIAGRAMS

SUBE No 4

WIRING NOTES

NOTE	SYM.	DESCRIPTION
M		CS-C - CONTROL SWITCH (OPEN EXCEPT DURING CLOSING)
M		CS-T - CONTROL SWITCH (OPEN EXCEPT DURING REMOTE ELECTRICAL TRIPPING)
		a - BKR. AUX. CONTACT (OPEN WHEN BKR. IS OPEN)
		b - BKR. AUX. CONTACT (CLOSED WHEN BKR IS OPEN)
	(X)	- CLOSING RELAY COIL (INTERMITTENT DUTY ONLY)
	X#	- CLOSING RELAY CONTACTS (CLOSES WHEN X COIL IS ENERGIZED AND MECHANICALLY TRIPPED BY BKR DURING CLOSING STROKE. CAN NOT BE RECLOSED UNTIL CS-C IS OPENED AND RECLOSED)
	TC	- SHUNT TRIP COIL
N	(W)	- WHITE LIGHT (ON-INDICATES SOURCE IS ENERGIZED
N	(B)	- BLUE LIGHT (ON-INDICATES BKR. IS CLOSED)
	CC	- CLOSING COIL
	⊢	- INDICATES TERMINAL BLOCK POINT

M - TO BE SUPPLIED BY SWITCHBOARD MANUFACTUREE
N - TO BE SUPPLIED ONLY WHEN SPECIFIED IN CONTRACT
P - 12 AUXILIARY SWITCH CONTACTS SUPPLIED AS SHOWN BUT MAY BE CONNECTED DIFFERENTLY TO MODIFY CONTROL. CONTACTS ARE INTERCHANGEABLE TO a OR b

NOTES

NOTE A - FOR IDENTIFICATION SEE CERTIFICATION DATA SHEET

NOTE B - NORMAL VOLTAGE / VOLTAGE RANGE

	NORMAL VOLTAGE	VOLTAGE RANGE
CLOSE COIL & RELAY	115 A.C 450 A.C	90 - 130 360 - 500

NOTE C - NORMAL VOLTAGE / VOLTAGE RANGE

	NORMAL VOLTAGE	VOLTAGE RANGE
SHUNT TRIP	115 A.C 450 A.C	80 - 130 320 - 500

NOTE D - REPAIR PART AUXILIARY SWITCH SUPPLIED WITH *THREE* MAKE AND *ONE* BREAK CONTACTS WHEN REPLACING SWITCH ON BREAKER REFER TO CERTIFICATION DATA SHEET FOR CORRECT CONTACT ARRANGEMENT. CONTACTS MAY BE CHANGED FROM OPEN TO CLOSED IN FIELD.

NOTE E - SUPPLIED ONLY WHEN SPECIFIED IN CONTRACT

NOTE F - *SUPPLIED WITH 115 V. OR 450 V. CLOSE COIL*
5# 303 C 741 G 18 FOR 115 V. 60 CY - REQ 1
5# 303 C 741 G 12 FOR 450 V. 60 CY - REQ 2

1. - FOR ADDITIONAL DETAILS OF THE CIRCUIT BREAKER STATIONARY UNIT ASSEM. *SEE SHEET 2 THIS DWG.*
2. - THE METAL PARTS OF THE CIRCUIT BREAKER ASSEMBLY ARE PAINTED NAVY GREY
3. - THE GENERAL REQUIREMENTS OF SPECIFICATION MIL-E-917 ARE APPLICABLE
4. - A MAINTENANCE HANDLE IS FURNISHED AS PART OF EACH CIRCUIT BREAKER FOR LEVERING THE BKR IN OR OUT AND FOR MAINTENANCE CLOSING. THE HANDLE MUST BE STORED SEPARATELY AT THE SWITCHBOARD
5. - THE CLOSING RECTIFIER IS MOUNTED ON THE REMOVABLE UNIT OF THE CIRCUIT BREAKER
6. - CIRCUIT BREAKER REMOVABLE UNIT CAN BE REMOVED FROM THE SWITCHBOARD BY THE FOLLOWING PROCEDURE.
   a - TRIP BREAKER
   b - DISENGAGE THE EXTENSION RAIL CAPTIVE BOLTS AND LOWER RAILS TO HORIZONTAL POSITION
   c - PLACE MAINTENANCE OPERATING HANDLE IN LEVERING DEVICE SOCKET AND ROTATE WITH *AN UPWARD* MOTION FOR 22½° IN 3 CLICK STOPS OF 7½° EACH. WARNING: LEVERING DEVICE WILL NOT ROTATE IF BKR. IS CLOSED
   d - BREAKER IS NOW IN POSITION TO BE DRAWN OUT. PRESS BREAKER STOP PIN RELEASE AND PULL BREAKER FORWARD. HOLES IN EXTENSION RAILS RECEIVE STOP PINS. UPON REMOVING PRESSURE FROM STOP PIN RELEASE, THIS PERMITS BKR. TO BE STOPPED IN INTERMEDIATE POSITIONS
   e - BKR. MUST BE IN CONTACT WITH RAIL STOP BEFORE IT CAN BE LIFTED FROM EXTENSION RAILS
   f - BREAKER IS RETURNED TO SWITCHBOARD BY REVERSING THE ABOVE OUTLINED PROCEDURE. WARNING: BKR. MUST REMAIN IN TRIPPED POSITION

TYPICAL REPAIR PARTS LIST

NOTES	ITEM NO.	NAME OF PART OR TOOL	QUAN. PER BKR.	MFG. INF. STYLE	MFG. INF. DWG.
	1	CONTACT-MOVING ARCING	3	407D785G06	407D785
	2	CONTACT-STATIONARY ARCING	3	407D785H19	407D785
	3	CONTACT-STATIONARY ARCING	3	407D785H34	407D785
	4	CONTACT-STATIONARY ARCING	3	407D785H01	407D785
	5	CONTACT-MOVING MAIN	—	407D785H17	407D785
	6	CONTACT-MOVING MAIN	—	407D785H18	407D785
	7	CONTACT-STATIONARY MAIN	—	407D785H16	407D785
	8	SPRING	2	126A927H01	126A927
	9	SPRING - STATIONARY ARCING	3	126A927H02	126A927
	10	SPRING - CONTACT PARTS	3	1584469	180D385
	11	SPRING - MOVING MAIN	2	1584470	180D385
	12	SPRING - CONTACT PARTS	2	1584468	180D385
	13	SPRING	1	1581356	803981
	14	SPRING	1	300P48H01	803981
	15	SPRING - MECHANISM PARTS	1	1508524	210C135
	16	SPRING	1	126A972H01	126A172
	17	SPRING	1	799965	210C135
	18	SPRING - MECH-CROSSBAR	1	126A457H01	126A457
	19	SPRING - STOP PIN HANDLES	1	125A592H08	125A592
	20	SPRING - LEVER-OUT DEVICE	1	180A240-A	26D2165
	21	SPRING	1	1802933	803D774
	22	SPRING	1	1802924	31D6422
	23	SPRING - RELAY PARTS	1	[illegible]	803D774
	24	SPRING	1	1802923	31D6422
	25	SPRING	1	1802968	18D3178
	26	SPRING	1	*NOTE A*	
	27	SPRING - OVERCURRENT TRIP PARTS	1	*NOTE A*	
	28	SPRING	1	*NOTE A*	
	29	SPRING	1	*NOTE A*	
	30	SPRING	1	*NOTE A*	
	31	DISCONNECTS - MAIN	2	1500586	1445930
	32	DISCONNECTS - SECONDARY	1	410D439G02	410D439
D	33	SWITCH - AUXILIARY - LOWER	1	*NOTE A*	
D	34	SWITCH - AUXILIARY - CENTER	1	*NOTE A*	
D	35	SWITCH - AUXILIARY - UPPER	1	*NOTE A*	
E	36	LIGHT - BLUE INDICATOR	1	*NOTE A*	
E	37	LIGHT - WHITE INDICATOR	1	*NOTE A*	
	39	SPRING - SHUNT TRIP	1	1802863	76D4911
AC	40	COIL - SHUNT TRIP	1		
AB	41	COIL - RELAY	1		
AB	42	COIL - CLOSING SOLENOID	1		
	43	TRI-ARC FASTENERS & PLIERS	1	125A2030	125A203
	44	SPRING	1	300P275H16	91D9230
	45	SPRING - ANTI-SHOCK OUT	1	1581955	21D4345
	46	SPRING - PARTS	1	1584521	21D4345
F	47	RECTIFIER - SILICON			
	48	CONTACT - STAT - RELAY	2	1802916	528B780
	49	CONTACT - MOV - RELAY	1	1802917	528B780
	50	BLOWOUT COIL - L.H. - RELAY	1	300P274	L-54716D
	51	BLOWOUT COIL - R.H. - RELAY	1	300P275	L-54716J

(REFER TO APPLICABLE C.D. SHEET FOR EACH BREAKER)

REVISIONS

REVISION	DESCRIPTION	MFG. DATE	MFG. APP'D	U.S.N. DATE	U.S.N. APP'D
A	APPROVED PER BUSHIPS LETTER, NOBS 72178 SER 6682-1116 DATED 15 FEB 1960	5/16	ECE	1/60	MCC

CLASSIFICATION DATA

FRAME: 800 A	TYPE: NAVY-ACB, WE CORP. 23 DHN 50
CONTINUOUS CURRENT (COPPER)	800 AMPERES
VOLTAGE	230 VOLTS (60 CYCLES) A.C
POLES	3 (OVERCURRENT COIL ON EACH OF 3 POLES)
RATED INTERRUPTING CURRENT	55,000 AMPERES (3 PHASE AVG RMS AT 1 CYCLE)
SHORT TIME RATING	55,000 AMPERES (30 CYCLES DURATION)
MOUNTING	REMOVABLE ASSEMBLY
MAIN CONNECTIONS	AT THE REAR
PROTECTIVE FUNCTION:	OVERCURRENT TRIP DEVICE
	LONG DELAY
	SHORT DELAY - BAND 1, 2, 3 OR 4
	INSTANTANEOUS
OVERCURRENT COILS:	200-300-400-600-800 AMPERES
NORMAL CLOSING	ELECTRIC 115 OR 450 V. A.C.
SHOCK	CLASS H I
INSULATION CLASS	B FEATURE: ANTI PUMP
INSULATION TEST	7200 VOLTS (60 CYCLES)
AMBIENT TEMPERATURE	50°C. OUTSIDE
BREAKER ASSEMBLY WEIGHT: 1290 LBS. (COMPLETE WITH STATIONARY UNIT)	
ATTACHMENTS	SHUNT TRIP - 115 V. OR 450 V. A.C. AUXILIARY SWITCH 12 CONTACTS
BUREAU QUALIFICATION LETTER:	
SPECIFICATION:	
TECHNICAL MANUAL: WE CORP.	BUSHIPS
WEIGHT REMOVABLE UNIT 1020 LBS.	
WEIGHT STATIONARY UNIT 270 LBS.	

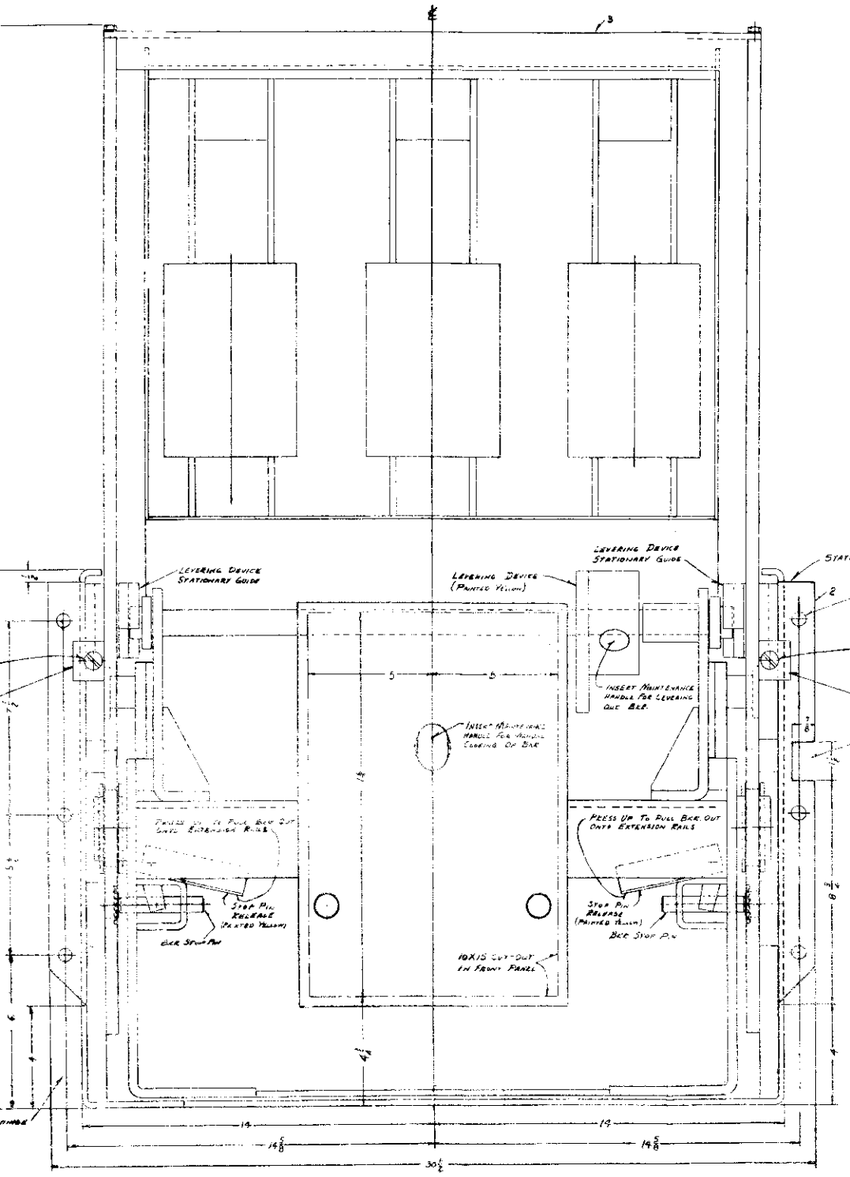
NAME	DATE
HERRMAN 7-28-60	
APPD.	DATE
SEE REV. BLOCK	

MASTER PLAN

AIR CIRCUIT BREAKER REMOVABLE ASSEMBLY
NAVY TYPE ACB - WE CORP. 23 DHN 50
FRAME: 800 A. VOLTS 230 & 600 CYCLES
POLES: 3 D.C. COILS 200-800 A.
CLOSING: ELECTRIC INT. CAP. 55,000 A.

WESTINGHOUSE ELEC. CORP. EAST PITTSBURGH PA. U.S.A.
900J220 SHEET 1 OF 2
NAVY DEPT. BUSHIPS DWG. NO. REV. A
SCALE: NOT CAD. AS USED
SHEET 1 OF 2

FIG. 7-1-3 — Air Circuit Breaker Removable Assembly



NOTE

THE CIRCUIT BREAKER CAN BE REMOVED FROM THE SWITCHBOARD BY THE FOLLOWING PROCEDURE:

A - TRIP BREAKER

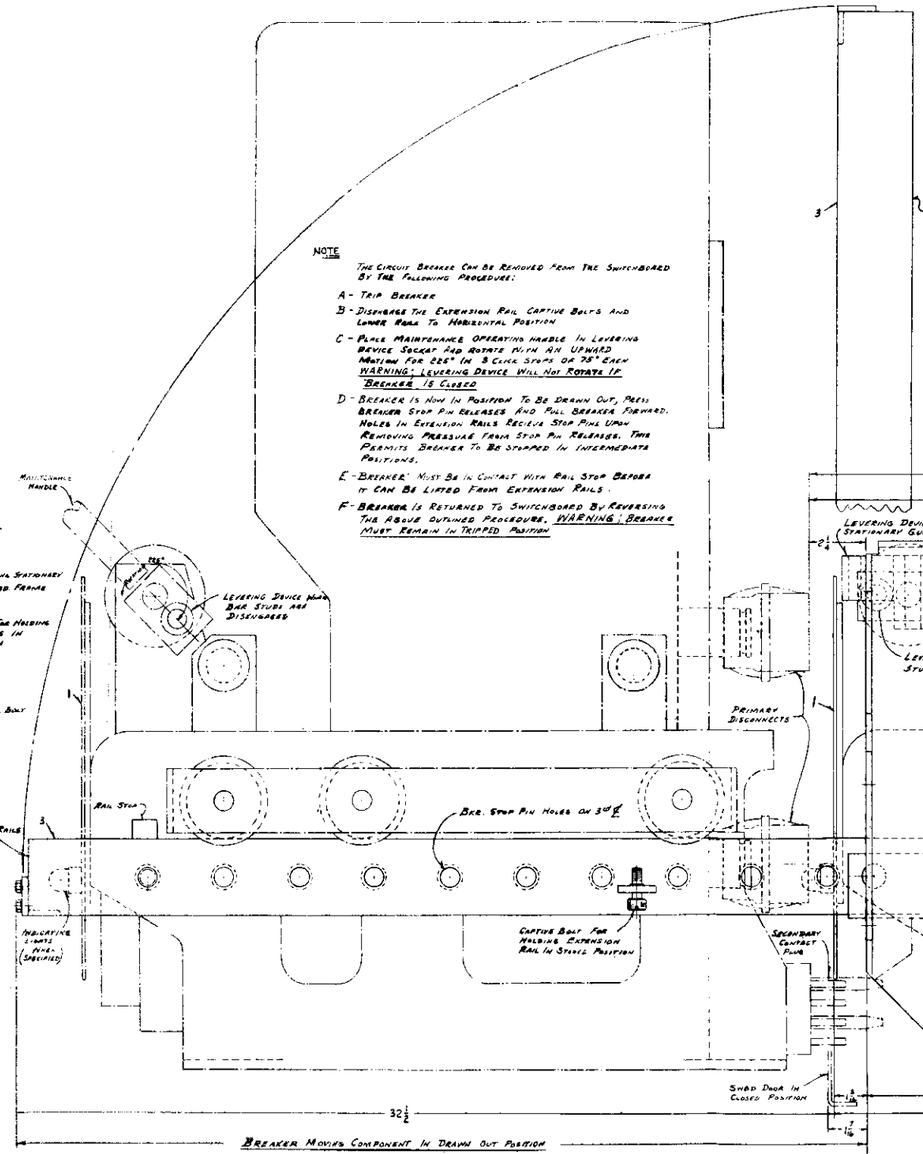
B - DISENGAGE THE EXTENSION RAIL CAPTIVE BOLTS AND LOWER RAILS TO HORIZONTAL POSITION

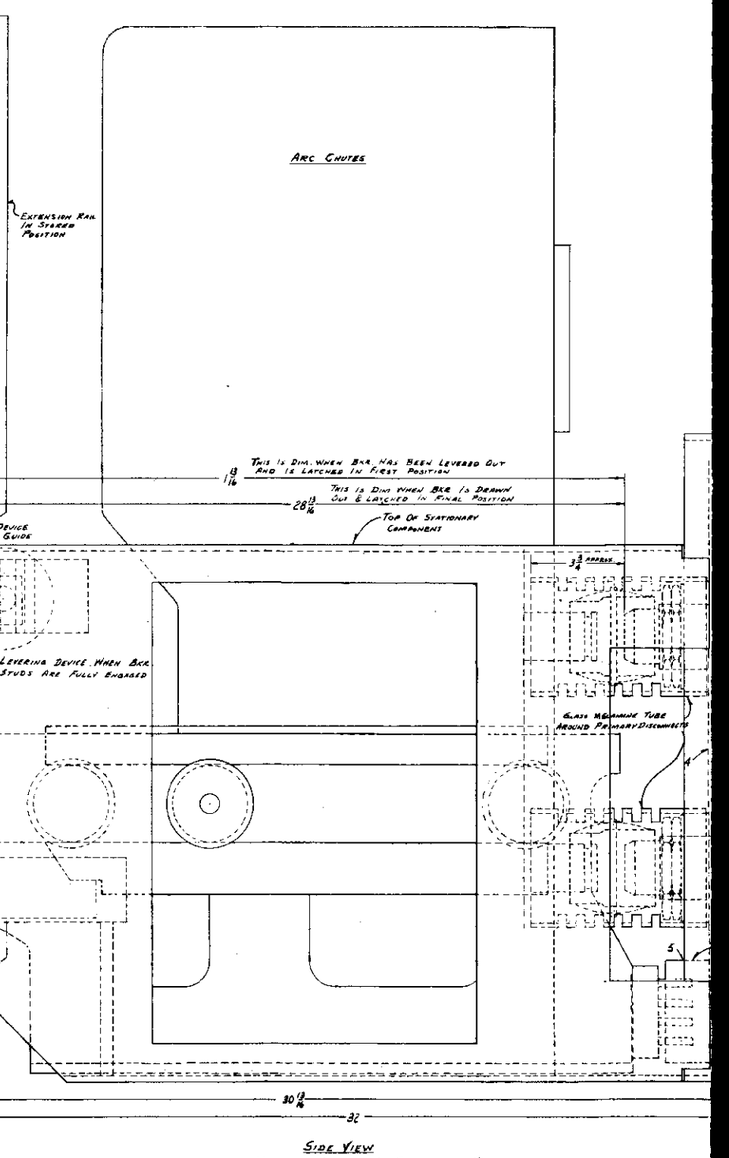
C - PLACE MAINTENANCE OPERATING HANDLE IN LEVERING DEVICE SOCKET AND ROTATE WITH AN UPWARD MOTION FOR 225° IN 3 CLICK STOPS OR 75° EACH
WARNING: LEVERING DEVICE WILL NOT ROTATE IF BREAKER IS CLOSED

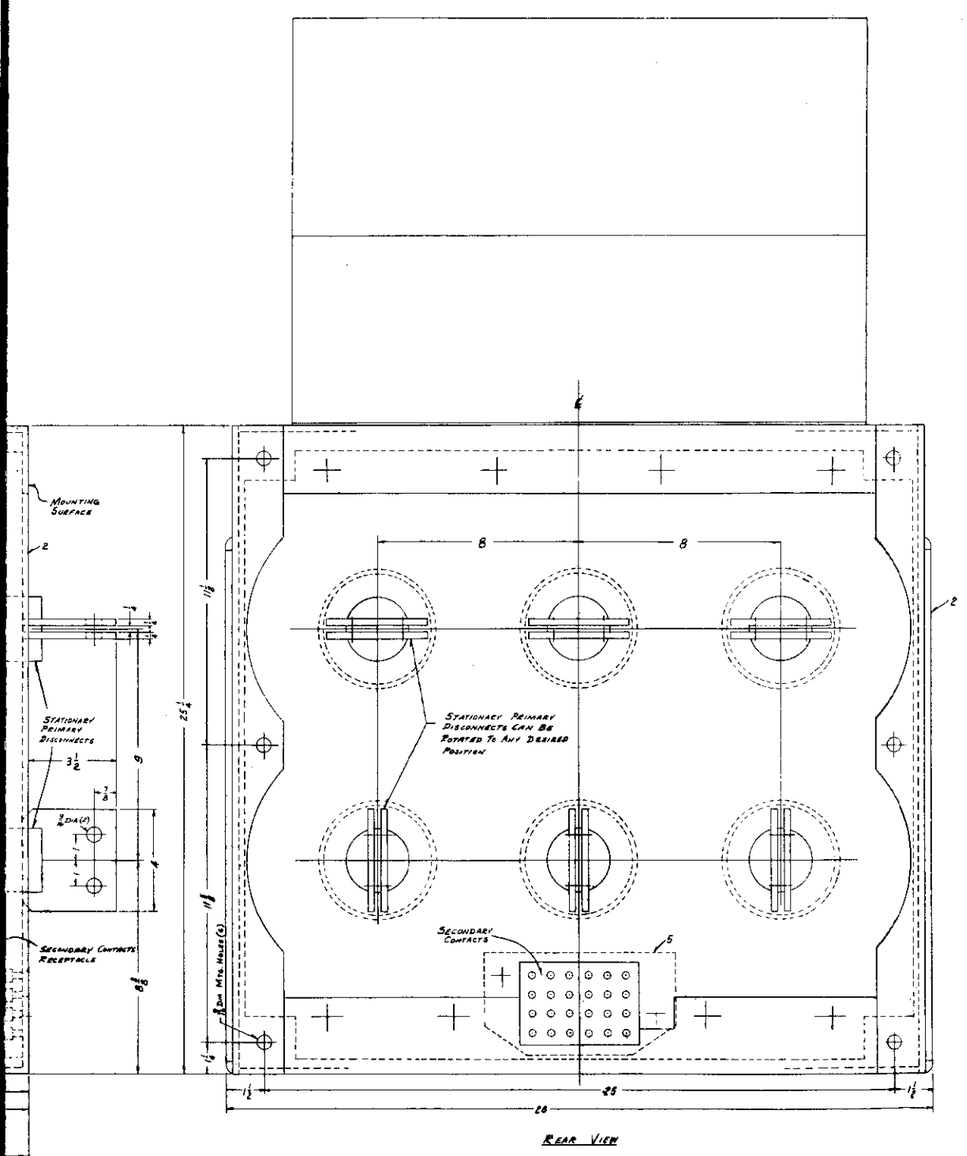
D - BREAKER IS NOW IN POSITION TO BE DRAWN OUT, PRESS BREAKER STOP PIN RELEASES AND PULL BREAKER FORWARD. HOLES IN EXTENSION RAILS RECEIVE STOP PINS UPON REMOVING PRESSURE FROM STOP PIN RELEASES. THIS PERMITS BREAKER TO BE STOPPED IN INTERMEDIATE POSITIONS.

E - BREAKER MUST BE IN CONTACT WITH RAIL STOP BEFORE IT CAN BE LIFTED FROM EXTENSION RAILS.

F - BREAKER IS RETURNED TO SWITCHBOARD BY REVERSING THE ABOVE OUTLINED PROCEDURE. WARNING: BREAKER MUST REMAIN IN TRIPPED POSITION







REAR VIEW

LIST OF MATERIAL QUANTITIES FOR ONE UNIT

PC NO.	NAME	NO. REQD	MATERIAL	MATL SPEC.	CONTRACTOR DWG NO.	CONTRACTOR PART OR IDENT. NO.	MANUFACTURER NAME	MANUFACTURER PART OR IDENT. NO.	BUSHIPS DWG NO.	UNIT WT. LBS	STD MAT'L STOCK NO.	REMARKS
1	CIR. BRK. TYPE 23 ARM. 50-800 AMPS.	1			900J220	SHEET 1						
2	STEEL REINFORCER	1	STEEL	QQ-S-698	501C118	GR. 1						
3	LOCATING PIN ASSY.	1	STEEL	QQ-S-698	302C434	GR. 2						
4	CONTACT BANK ASSY.	1			497D812	GR. 1						
5	SEC. CONT. PROT. 24 PC STATIONARY	REF			410D439	GR. 1						

REVISIONS

REV.	ZONE	DESCRIPTION	DR'N	CHK'D	APP'D	DATE
A		SEE SHEET 1				

NOTES:
SEE WESTINGHOUSE ELECTRIC DWG. NO 900J220 SH.1
BUSHIPS NO. FOR CIRCUIT BREAKER AND MOVING COMPONENT ASSEMBLY

NAME / DATE: ASSEMBLY 2-23-48	MASTER PLAN	WESTINGHOUSE ELEC. CORP. EAST PITTSBURGH PA. U.S.A.	
APPD: SEE REF. BLOCK	AIR CIRCUIT BREAKER STATIONARY COMPONENT NAVY TYPE AC B W.E. CORP. 230HNSO 800 R FRAME-3 POLE-230 V D.C.	900J220	SHEET 2 OF 2
	SCALE 1/2	NAVY DEPT. BUSHIPS DWG. NO.	REV. A
		SHEET 2 OF 2	

FIG. 7-1-4 — Air Circuit Breaker Stationary Assembly