Instruction Book

Navy Type ACB
1600 Frame Size

AIR CIRCUIT BREAKER

Westinghouse Type DBN-60S

Alternating Current Air Circuit Breaker

Bureau of Ships

Navy Department

February, 1955

WESTINGHOUSE ELECTRIC CORPORATION

Switchgear Division • East Pittsburgh Plant, East Pittsburgh, Pa.

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Air Circuit Breaker
Navy Type ACB (Westinghouse Type DBN 60S)
1600 Frame Size
60,000 Amp. A-c Interrupting Capacity
Basic Breaker - Westinghouse Electric Corp. Dwg. 1-JH-231
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AIR CIRCUIT BREAKER
Navy Type ACB—Westinghouse Type DBN-60S

SECTION A—INTRODUCTION

A-1. LIST OF ILLUSTRATIONS

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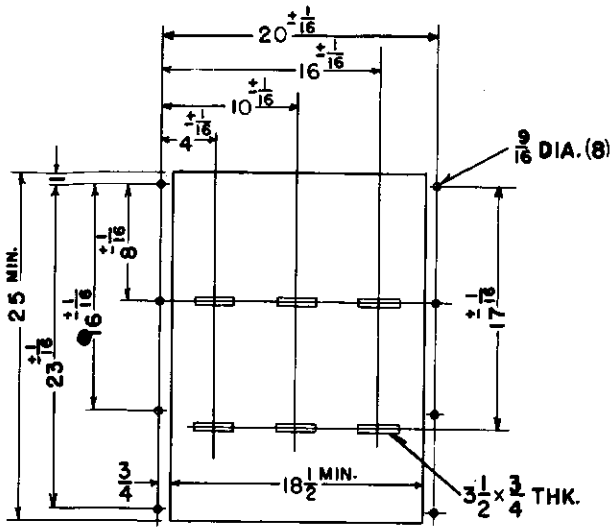
A-2. CIRCUIT BREAKER DIMENSION PLAN

Figure 1 gives outline dimensions for the Westinghouse Electric Corporation type DBN-60S alternating current air circuit breaker.



FRONT VIEW OF STUD LOCATION. CUT-OUT & DRILLING IN SWB'D FOR 3 POLE BKR. WITH 2 OVER-CURRENT TRIPS

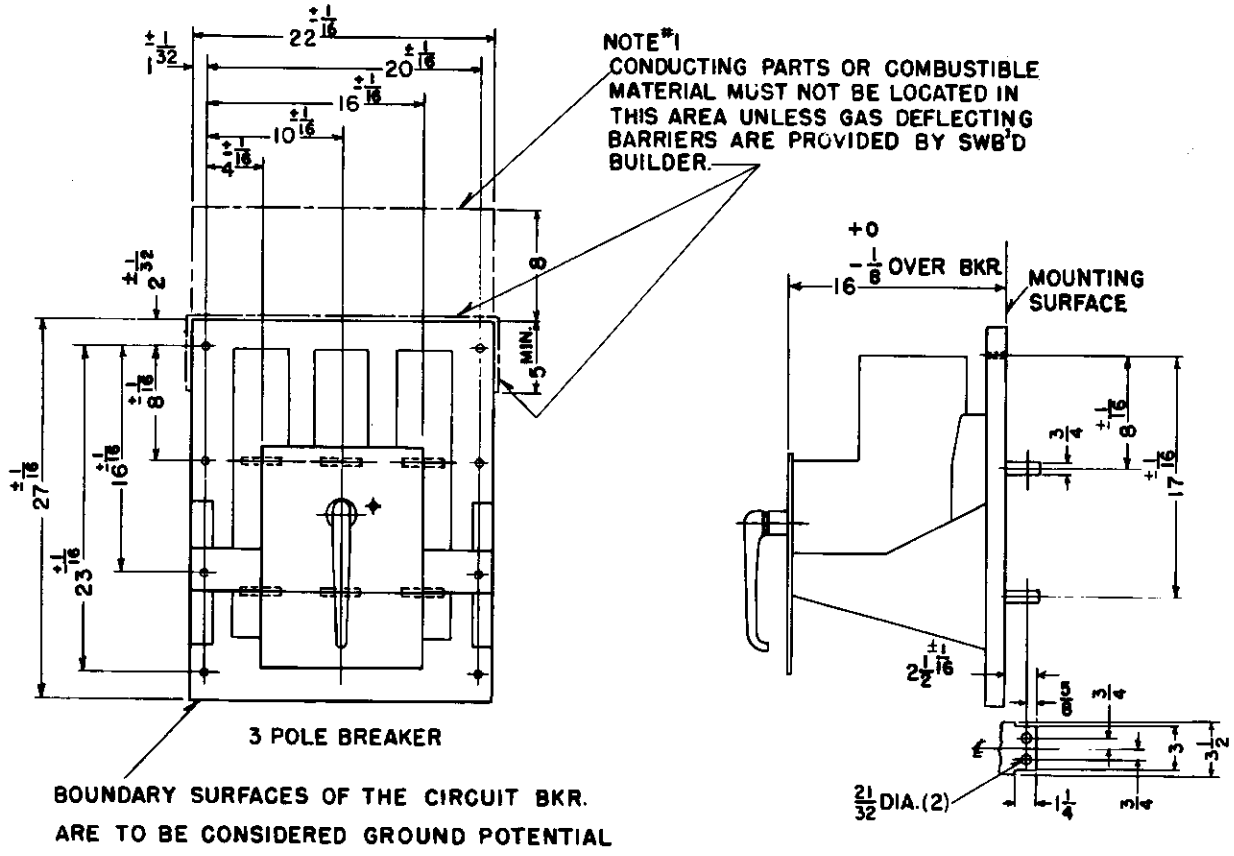


FIG. 1 — Outline Dimensions

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SECTION B—GENERAL INFORMATION

B-1. MANUALLY OPERATED CIRCUIT BREAKER

The DBN-60S air circuit breaker is a sturdy compact piece of shipboard electrical equipment consisting of a rigid steel chassis to which are bolted the several sub-assemblies which make up the complete circuit breaker. For example, the mechanism, pole units, arc chutes, overcurrent trip devices and other attachments are each complete within themselves and are readily interchangeable between breakers. They may be removed intact and replaced if necessary with minimum outage time.

The DBN-60S is a type ACB air circuit breaker of 1600 ampere frame size. Its interrupting and continuous current ratings are as outlined in the following table:

INTERRUPTING RATING

60,000 amperes R.M.S., 500 volts, 60 cycles

CONTINUOUS CURRENT RATING

Circuit Breaker Copper Rating Amperes	Overcurrent Trip Coil Ratings Amperes
1600	100
	160
	250
	320
	400
	480
	560
	640
	800
	1000
	1200
	1400
	1600

The chassis of the breaker consists of a rigid steel panel (150) Fig. 2 on the front of which is bolted a supporting frame (151) which supports shelf (152)and faceplate (155). A separate pole unit molded base (100) is bolted to the steel panel for each pole.

The base of each pole unit is molded from insulating material. When supplied the series overcurrent trip devices (400) is bolted to the lower part of the pole unit base. The moving contact assembly is pivoted at its lower end on the pole unit base and is connected to the lower stud either directly or through a series overcurrent trip device. The stationary contact assembly is connected directly to the upper stud. The moving contact assembly opens and closes the electric circuit by moving out and in from the stationary contact assembly. An arc chute is mounted above and surrounding each pair of contacts. Its purpose is to extinguish the arc drawn when the contacts separate.

The operating mechanism (200) is located on the breaker shelf (152) and transmits the force for closing the breaker from the operating handle (166) to the cross bar (168) and thence to the moving contact assembly through insulating links. The mechanism then latches and holds the contacts in the closed position. The circuit breaker is closed manually by turning the operating handle (166) 90^{o} clockwise and it may be tripped manually by turning the handle 45^{o} in the opposite direction. Handle latch (233) must be depressed when closing or tripping the circuit breaker manually. Automatic tripping is accomplished by one of the automatic devices which lift the trip bar when suitably energized. These devices consist of the shunt trip (500), the series overcurrent trip (400), any or both of which may be supplied with an individual circuit breaker.

The main power circuit through the circuit breaker consists of the lower stud, series overcurrent trip coil (if supplied), moving contact assembly, stationary contact, and upper stud, all connected in series in the order named.

B-2. ELECTRICALLY OPERATED CIRCUIT BREAKER

The electrically operated circuit breaker is basically the same equipment described in Section B-1 with the exception that it is equipped with a closing magnet and a closing relay. These two attachments plus a source of closing power and a control switch enable an operator to close the circuit breaker from a remote point.

It should be noted that the addition of a closing magnet for electrical operation does not in any way change the manual operation features of the circuit breaker and that an electrically operated circuit breaker can also be manually operated.

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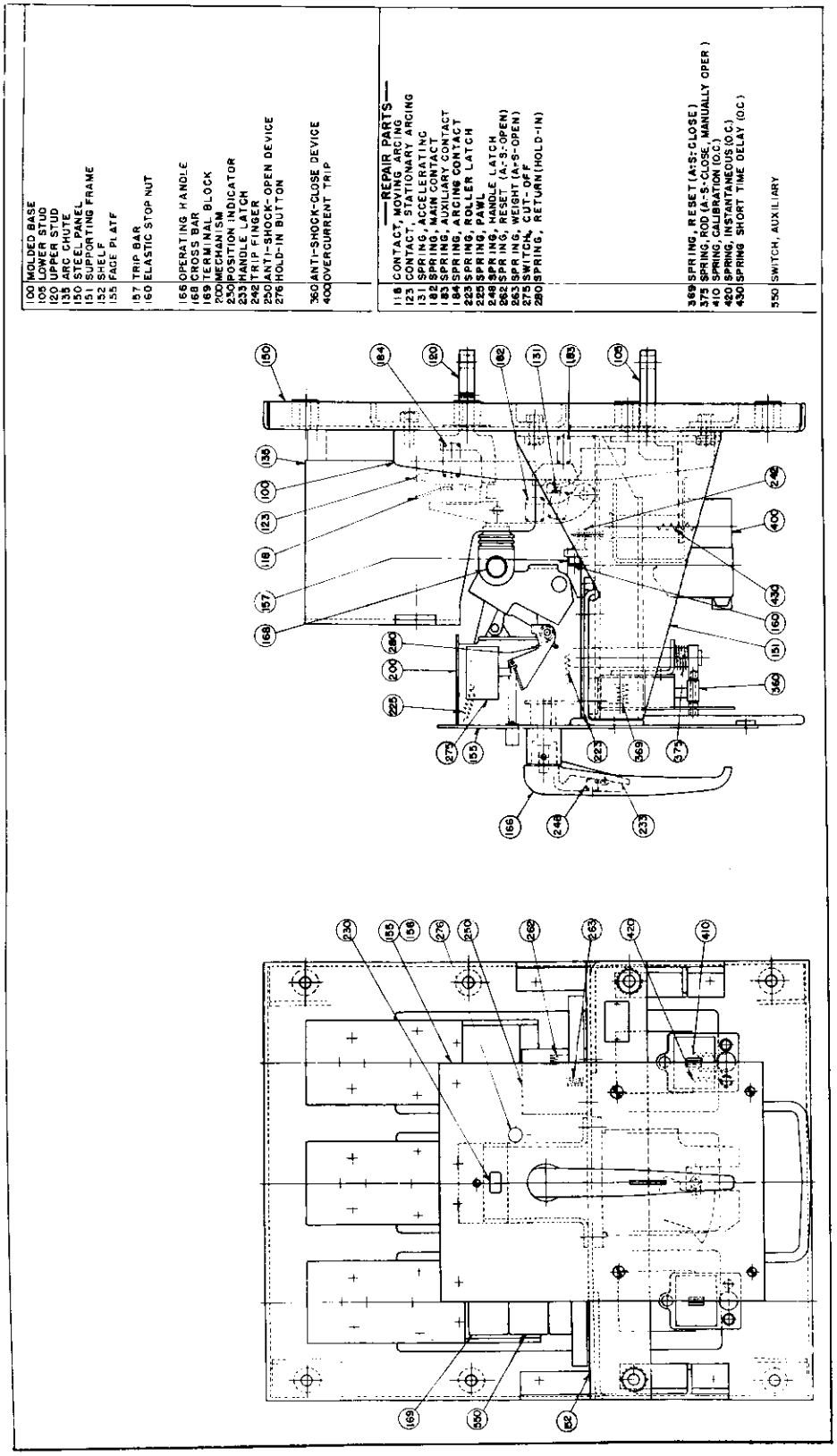


FIG. 2 — General Assembly

SECTION C—OPERATION AND MAINTENANCE

C-1. CAUTION

Before working on a circuit breaker, it must be de-energized. The breaker should be in the open position and withdrawn. It should be noted that all circuit breaker studs are not necessarily dead when circuit breaker is open, but not withdrawn.

Before putting the circuit breaker in regular operation it should be closed and tripped manually several times to see whether all parts are in proper alignment and move freely. Particular care should be taken to make sure the studs have not been forced out of alignment by the bus work. Lift the trip bar by hand with the circuit breaker open to make sure that it does not bind.

C-2. WIRING DIAGRAMS

Reference Figure 3

This figure shows typical wiring diagrams for complete details refer to applicable diagram in switchboard instruction book.

C-3. SHUNT TRIPPING

Shunt trip coils have a nominal voltage of 450 volts 60 cycles. The voltage range is 320 to 500 volts.

C-4. ELECTRIC CLOSING

The closing coils and the closing relay have a nominal voltage of 450 volts 60 cycles. The voltage range is 360 to 500 volts.

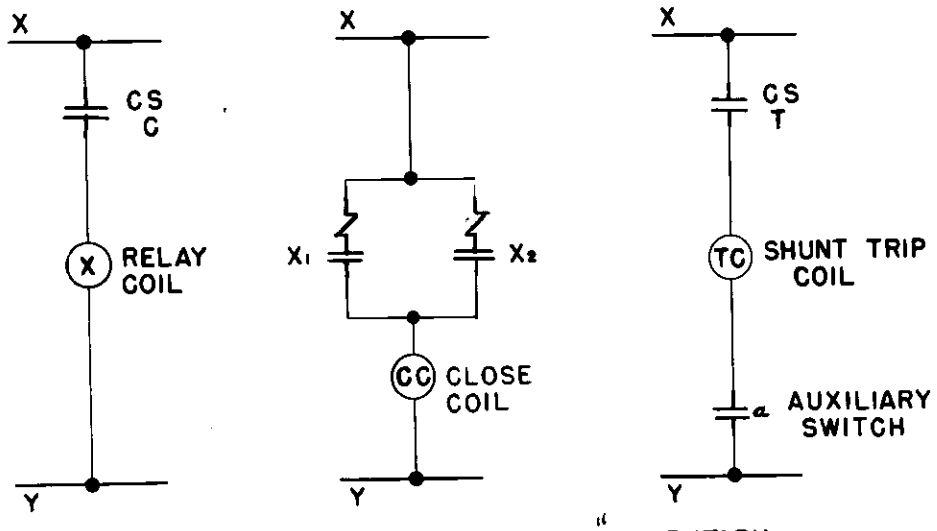
C-5. MAINTENANCE

The frequency of inspection for maintenance will depend upon local conditions but, in general, a complete inspection for preventive maintenance should be made at least once a year. It is recommended that a special inspection be given any breaker that has opened a heavy short circuit current.

If excessive heating not caused by overcurrent is observed, look for loose or corroded contacts or connections.

When inspecting the circuit breaker, examine the contact surfaces. Rough or high spots should be removed with a clean file or sandpaper. Do not use emery cloth since the dust from this material is a good conductor of electricity and is sure to cause trouble if allowed to settle on insulating surfaces.

More detailed maintenance instructions are given later on in the sections on the individual attachments.



TYPICAL WIRING DIAGRAM WITH "MOMENTARY CONTACT" CONTROL SWITCH

FIG. 3 — Wiring Diagram

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SECTION D—COMPONENTS AND ATTACHMENTS

D-1. GENERAL ASSEMBLY (MANUALLY OPERATED CIRCUIT BREAKER)

An air circuit breaker for three phase a-c service is normally provided with series overcurrent trip devices in the two outer poles only. Otherwise, all three poles are identical, each being provided with a stationary and moving contact assembly, and an arc chute.

More specific information is listed under applicable sections in this book.

D-2. GENERAL ASSEMBLY (ELECTRICALLY OPERATED CIRCUIT BREAKER)

The general assembly of the electrically operated breaker is similar to that of the manually operated breaker. The addition of a closing magnet and closing relay makes the breaker electrically operated. In addition of this, the anti-shock-close device is arranged to act on the moving core of the closing magnet rather than directly on the mechanism as in the case of manually operated breakers.

For more specific information, reference should be made to applicable sections of this book.

D-3. ARC CHUTES

Reference Fig. 4

FUNCTION

The arc chute (135) mounted above and surrounding the contact assembly of each pole, has the function of stretching and cooling the arc drawn by the separating contacts so that it may be quickly extinguished and the circuit opened in the least possible time. The arc chutes are an extremely important part of the circuit breaker and the breaker should never be energized without their being mounted in place.

DESCRIPTION

Each arc chute consists of a number of metal and asbestos plates (140) supported in a laminated case and held in place by a clamping plate (136) and insulating tube spacers (146) and two screws (147) through the insulating spacers to the molded base (100). When the arc is drawn by the separating contacts, it moves up into chute by magnetic and thermal action where it is quickly de-ionized and extinguished thus opening the circuit.

D-4. CONTACT ASSEMBLY

Reference Fig. 4

FUNCTION

The contact assembly closes and opens the electric circuit through the circuit breaker. The upper stud (120), the stationary contact (121), the series overcurrent trip device (400) (when supplied) and the lower stud (105) are stationary and are mounted rigidly on the molded base (100). The moving contact assembly is hinged on the molded base by pin (127) and is moved in and out by molded insulating link (116) which is pivoted on cross bar (168) Fig. 2.

The moving contact assembly is closed and held in the closed position against the force of the accelerating springs (131) by the insulating link (116). When the force exerted by the insulating link is released by tripping the breaker, the accelerating spring quickly moves the moving contact assembly to the open position. When the breaker interrupts high short circuit currents, magnetic forces play a large part in the rapid opening of the contacts.

When the circuit breaker is tripped, the moving contact assembly moves away, drawing the arc between the arcing contacts. This arrangement minimizes arc damage to main current carrying contacts. When the circuit breaker is closed the arcing contact surfaces touch first and then the main contacts touch and the closing operation is completed.

DESCRIPTION

The stationary contact assembly consists of the main contact extruded integral with the upper stud (120) and the arcing contact (123) held to copper section by two ~~screws (124)~~. All contact surfaces are special arc resisting silver alloy inserts.

The moving contact assembly consists of a contact arm (175) which is pivoted to the pole unit by pin (127) and which carries main moving contact (109) and moving arcing contact (118). Auxiliary contact (176) serves a bridge between main moving contact (109) and connector to the upper terminal of the series coil of the overcurrent trip device.

	100	MOLDED BASE
	105	LOWER STUD
	108	SHUNT
	109	MAIN MOVING CONTACT ASSEMBLY
	111	LINK
	112	5/16-18 X 1/2 HEX. STL. BOLT
	114	5/16-18 BRS. LOCKNUT
	115	PIN
	116	MOLDED LINK
*	118	CONTACT, MOVING ARCING
	120	UPPER STUD ASSEMBLY
	121	STATIONARY CONTACT
*	123	CONTACT, STATIONARY ARCING
	127	PIN
	129	1/2-13 X 1 1/2 HEX. STL. BOLT
*	131	SPRING, ACCELERATING
	132	1/2-13 X 3 HEX. STL. BOLT
	133	CONNECTOR
	135	ARC CHUTE
	136	CLAMPING PLATE
	146	TUBE SPACER
	147	5/16-18 X 8 1/4 PAN HD. STL. SCREW
	148	1/4-20 HEADLESS SET SCREW
	149	1/4-20 GALV STL. LOCKNUT
	158	CONTACT SHIELD
	159	ARCING CONTACT HINGE
	173	PIN
	174	MOVING CONTACT ARM HINGE
	175	MOVING CONTACT ARM
	176	AUXILIARY CONTACT
	179	1/4-20 X 1/2 HEX. STL. BOLT
	180	SHUNT CLIP
	181	1/2-13 X 2 1/2 HEX. STL. BOLT
*	182	SPRING, MAIN CONTACT
*	183	SPRING, AUXILIARY CONTACT
*	184	SPRING, ARCING CONTACT
*	400	OVERCURRENT TRIP,
	478	1/2-13 X 2 1/2 HEX. STL. BOLT

* SPARE PARTS

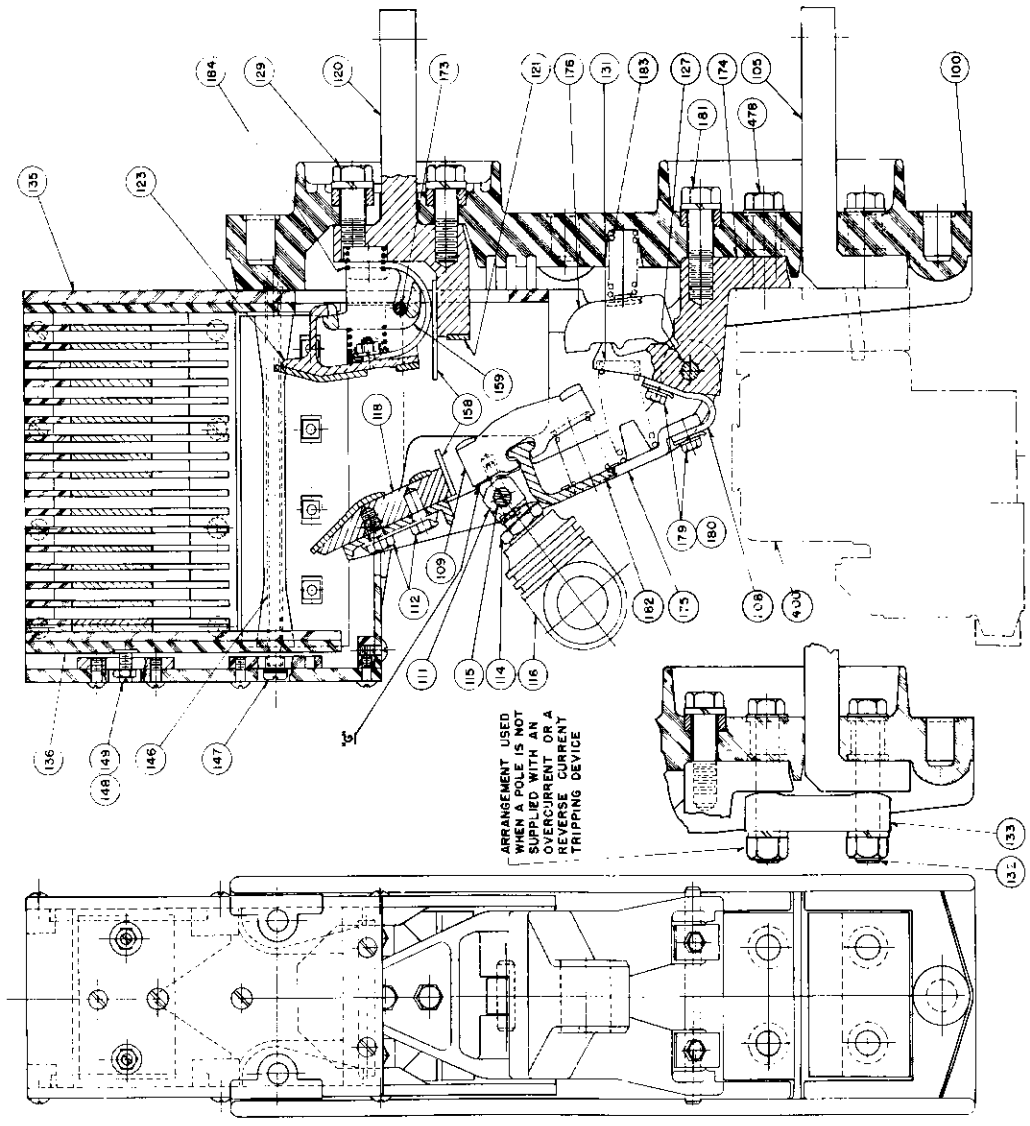

FIG. 4 — Pole Unit

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The moving contact assembly is attached to the mechanism cross bar (168) Fig. 2 by molded insulating link (116) which is screwed on metal link (111) and locked by nut (114). When the breaker is tripped all force is removed from the cross bar and accelerating spring (131) quickly snaps the moving contact assembly from the closed to the open position.

ADJUSTMENTS

The correct contact pressure is obtained when gap "G" measures .030 to .070 inch when the circuit breaker is closed. This gap may be adjusted after removing arc chute (135) by removing two screws (147) and cross bar (168). Loosen locknut (114) and turn insulating link counterclockwise if the gap is too small, and clockwise if the gap is too large. The locknut should be retightened and the cross bar and arc chutes replaced.

REPLACEMENTS

To replace stationary arcing contact (123) or spring (184):

(a) Remove arc chute (135) by removing screws (147).

(b) Remove the two bolts holding the contact assembly and replace either it or the spring as required.

To replace moving arcing contact (118):

(a) Remove arc chute (135) by removing screws (147).

(b) Removal of bolts (112) frees the contact for replacement.

To replace main contact springs (182):

(a) Remove arc chute (135) by removing screws (147).

(b) Springs are held by locking clips in contact arm (175). These clips release the springs when depressed and rotated with a screw driver or with the fingers.

To replace accelerating springs (131):

(a) Remove arc chute (135) by removing screws (147).

(b) Springs may be worked out of their sockets with a screwdriver.

To replace auxiliary contact springs (183):

(a) Remove arc chute (135) by removing screws (147).

(b) Springs may be worked out with a screwdriver and replaced. If difficulty is experienced loosen moving contact arm hinge by loosening bolts in vicinity of lower stud holding overcurrent trip and contact arm hinge.

D-5. MECHANISM

Reference Fig. 5

FUNCTION

The operating mechanism opens and closes the circuit breaker contacts by moving the cross bar (168) Fig. 2 to which the moving contact assemblies are attached by insulating links. The breaker is closed manually by turning the operating handle quickly and smoothly as far as it will go (90°) in a clockwise direction. The breaker may be tripped manually by turning the handle 45° in a counterclockwise direction. Handle latch (233) must be depressed when closing or tripping the breaker manually. The breaker is tripped automatically by one of the automatic devices described later which rotate trip lever (~~200~~ 220) about pin (224).

The mechanism is "trip free", that is, it is not possible to close the breaker if one of the automatic tripping devices moves the trip bar (157) Fig. 2 up during the closing stroke or if the trip bar is held in the raised position.

DESCRIPTION

The operating mechanism consists of a group of toggle links, and a latch attached to the operating mechanism frame on fixed pins (214), (226), (241), (216), (224), and (245). The cross bar is held by the closing lever (207). Rotating the operating handle clockwise moves the mechanism linkage from the open position shown to the closed position. This is accomplished when the roller (236) located off-center on the end of the operating handle shaft (232) forces the first toggle link (203) upward pushing second toggle link (204), third toggle link (206) and closing lever (207) ahead of it. The motion of the toggle linkages is directed by link (205) which is pivoted at its lower end on pin (217) in latch (208). Latch (208) in turn is restrained from moving by roller latch (210) which is pivoted on pin (214) and engages trigger (221) on trip lever (220). The linkage is held in the closed position by pawl (209) which latches under

166	OPERATING HANDLE
200	FRAME, MECHANISM
201	BEARING, ROLLER
203	LINK, FIRST TOGGLE
204	LINK, SECOND TOGGLE
205	LINK
206	LINK, THIRD TOGGLE
207	LEVER, CLOSING
208	LATCH
209	PAWL
210	LATCH, ROLLER
211	ROLLER
212	PIN
214	PIN
216	PIN
217	PIN
218	PIN
219	PIN
220	LEVER, TRIP
221	TRIGGER
222	STOP, SPRING
* 223	SPRING, ROLLER LATCH
224	PIN
* 225	SPRING, PAWL
226	PIN
227	PIN
228	LINK, INDICATOR
229	PIN
230	INDICATOR
231	SCREW, .138-32 X 3/8 PAN HD.
232	SHAFT
233	HANDLE LATCH
234	ANTI-BOUNCE LATCH
235	LEVER
236	ROLLER
237	BEARING, NEEDLE
238	PIN
239	COVER
241	PIN
242	FINGER, TRIP
243	SCREW, TRIP
245	PIN
246	SPACER
247	SPACER
* 248	SPRING, HANDLE LATCH

* SPARE PARTS

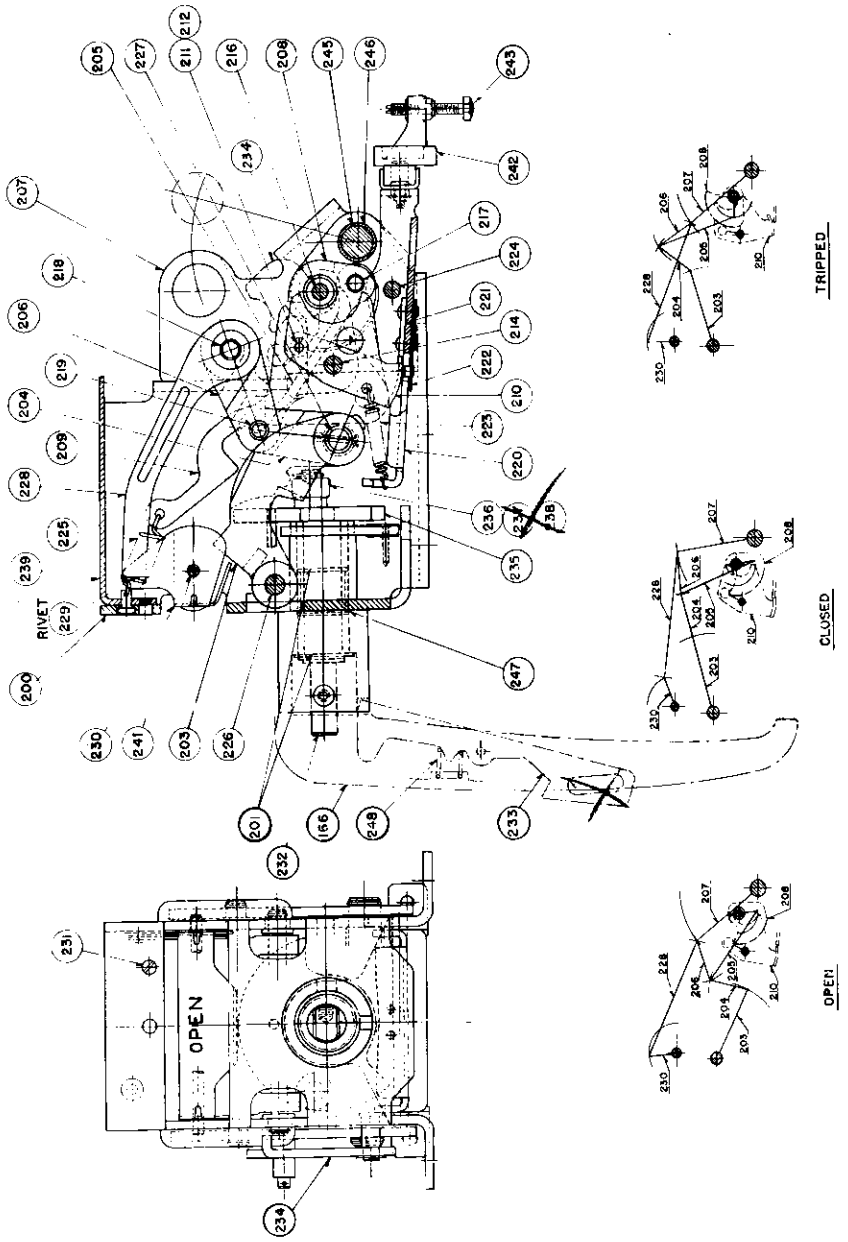

FIG. 5 — Mechanism

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pin (227). The handle shaft and lever are returned to the normal position after closing by gravity.

The mechanism is opened by rotating trip lever (220) counterclockwise. This is accomplished either by rotating handle counterclockwise, in which case roller (236) on the end of the handle shaft lever strikes the extreme left end of trip lever (220) to move it downward; or by causing the tripping attachments to strike trip finger screw or trip bar. In either case the counterclockwise rotation of the trip lever (220) moves trigger (221) out of engagement with the lower end of the roller latch (210), which in turn permits the roller latch to rotate counterclockwise out of engagement with latch (208). Latch (208) is then free to rotate in response to the pull of the latch link (205) so that the mechanism assumes the trip free position in which the contacts are open but part of the mechanism levers are in the closed position. In this position pawl (209) is disengaged from pin (227) by a lug on link (204) which pushes it up permitting the linkage to collapse to open position shown in Fig. 5.

Gravity returns the operating handle to the normal vertical position after manual tripping. Handle latch (233) engages a depression in handle shaft bearing to prevent accidental tripping by flipping of the handle.

POSITION INDICATOR

Position indicator (230) is formed from sheet metal and is pivoted on pin (241). It is visible from the front of the circuit breaker through a window in the faceplate and mechanism frame. 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 (218) of the closing lever (207) pulls indicator link (228) 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".

ANTI-BOUNCE LATCH

The anti-bounce latch (234) prevents the breaker from bouncing closed when interrupting short circuit currents. As breaker opens pin (238) strikes latch (234) pivoted on pin (237), rotating the latch until its hook is in position to hold pin (238) from bouncing to the closed position.

REPLACEMENTS

To replace roller latch spring (223):

(a) Prepare to remove mechanism by removing anti-shock-open device (250) and auxiliary switch (550) all of Fig. 2. Avoid removing any more wires than necessary. It will usually be possible to push the devices aside without removing the wiring. Tag any wires which may have to be removed.

(b) Rotate handle (166) clockwise until pin ~~(277)~~ 227 is visible through a hole in the right side of the mechanism frame. Using a small rod as a pusher, shove this pin part way through the hole until the rod of the anti-shock-close device, in the case of manually operated circuit breakers, or the operating rod of the closing magnet, in the case of electrically operated circuit breakers, drops off. Return the pin (227) to its proper location and allow linkages to fall open. This frees mechanism from anti-shock close device or the closing magnet as the case may be.

(c) Remove handle (166), faceplate (155) and cross bar (168) of Fig. 2.

(d) Remove the four bolts which hold mechanism to the shelf. This frees mechanism from shelf but frees also either anti-shock close device of manually operated breakers or closing magnet of electrically operated breakers.

These devices should be temporarily replaced while repairs are being made to the mechanism.

(e) Removal of pin (224) enables trip lever (220) to be removed and spring (223) may then be replaced.

To replace pawl spring (225):

(a) This spring may be easily replaced after removing mechanism cover (239).

To replace handle latch spring (248):

(a) This spring is easily replaced after removing handle (166) and handle latch (233).

D-6. ANTI-SHOCK-CLOSE DEVICE

Reference Fig. 6

FUNCTION

This device serves to prevent the circuit breaker contacts from closing from shock when

open. This is accomplished by an arrangement whereby a mechanical escapement device or "ticker" is operated by the closing of the breaker. Shock blows tending to close the breaker are on such short duration that the mechanical escapement device does not have time to operate and the device effectively locks the open circuit breaker in the open position under shock conditions.

DESCRIPTION

The anti-shock-close device consists of a ticker case (360) which contains the ticker assembly, bolted to the platform by two bolts (379). A rod and cam pusher assembly (363) is connected at its upper end to pin (227) Fig. 5 of the mechanism. Whenever circuit breaker is closed, rod (363) is pulled up by pin (227) and cam (361) is caused to rotate in a clockwise direction around pin (370) against the torsion of reset spring (369). As the cam rotating in this manner oscillator wheel (362) is caused to rotate clockwise around pin (372) by pin (368) mounted in cam (361). The rotation of wheel (362) is regulated by mechanical oscillator (364) which is pivoted on pin (365). This oscillator oscillates due to the engagement of its teeth of oscillator wheel (362). When the circuit breaker is tripped, rod (363) drops unimpeded and return spring (~~368~~ 369) returns cam and consequently oscillator wheel to the "breaker open" position shown in the figure.

Shock blows tending to close the circuit breaker would have to act in such a way as to raise rod (363). These blows are of such short duration that the cam is restrained long enough by the oscillator wheel and oscillator to prevent closure of the circuit breaker.

REPLACEMENTS

(Manually Operated Circuit Breaker)

To replace return spring (369):

(a) Remove handle (166) and faceplate (155) Fig. 2.

(b) Remove guide pieces (374) and (375) by removing bolt (376).

(c) Remove bolts (379) and remove case (360) from shelf.

(d) Removing truarc rings (367), (371) and (373) will allow corresponding pins to be removed. The various parts are then free to be removed and the spring may be replaced.

(e) After reassembly, be sure that the cam operates freely and that it returns freely to its starting position when pushed over.

D-7. CLOSING MAGNET (ELECTRICALLY OPERATED CIRCUIT BREAKER)

Reference Fig. 7

FUNCTION

The closing magnet is the device used to close the circuit breaker electrically and is mounted directly below the mechanism and under the shelf of the circuit breaker. It is secured to the shelf with the same four bolts that hold the mechanism in place.

Together with a control switch, a source of power, and the closing relay, the closing magnet enables an operator to close the circuit breaker from a remote point.

DESCRIPTION

The closing magnet consists of an iron frame or yoke (340) which is securely bolted to the circuit breaker shelf by 4 bolts (349), a plunger or moving core (342), an operating rod (343), and a coil (347).

The operating rod (343) connects the moving core (342) to pin (227) Fig. 5 of the mechanism. It will be observed that an upward movement of this pin will cause the mechanism to close and latch the circuit breaker.

When coil (347) of the solenoid is energized by contact of relay the moving core (342) moves upward in response to the magnetic attraction across air gap "A". About one-tenth of a second is required for the solenoid to close and latch the circuit breaker. When the moving core moves into the "breaker closed" or "closed gap" position, trip bracket (359) trips the relay mechanically, and its contacts open, thus de-energizing the closing magnet. Trip bracket (359) in moving up lifts trip tube (357) which trips the closing relay. When the moving core and operating arm have pushed the mechanism linkages to the closed and latched position, the mechanism holds the moving core in the closed gap position until the breaker is tripped.

REPLACEMENTS

To replace closing coil (347):

(a) Remove handle (166) and faceplate (155) Fig. 2.

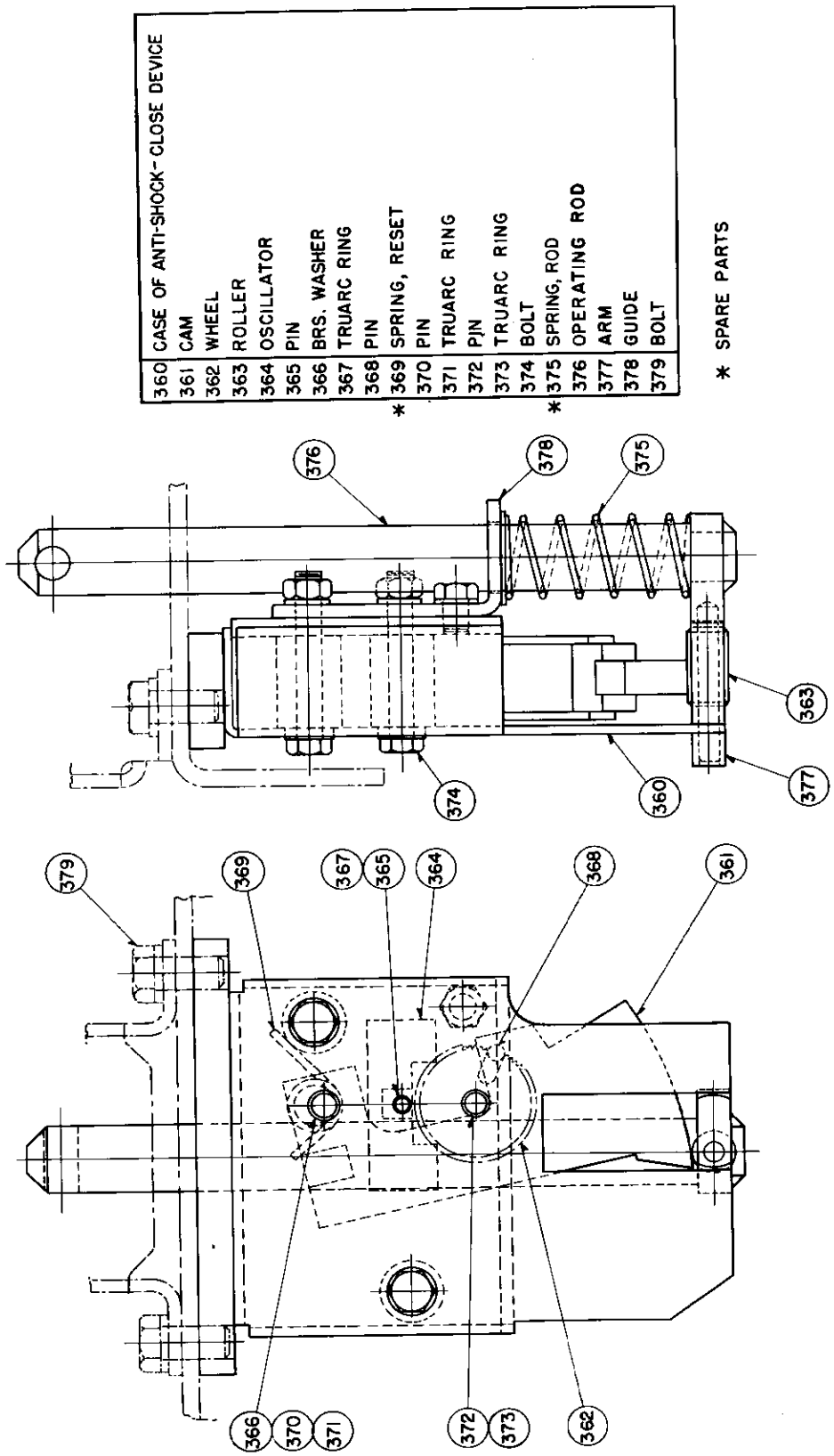

FIG. 6 — Anti-Shock-Close Device

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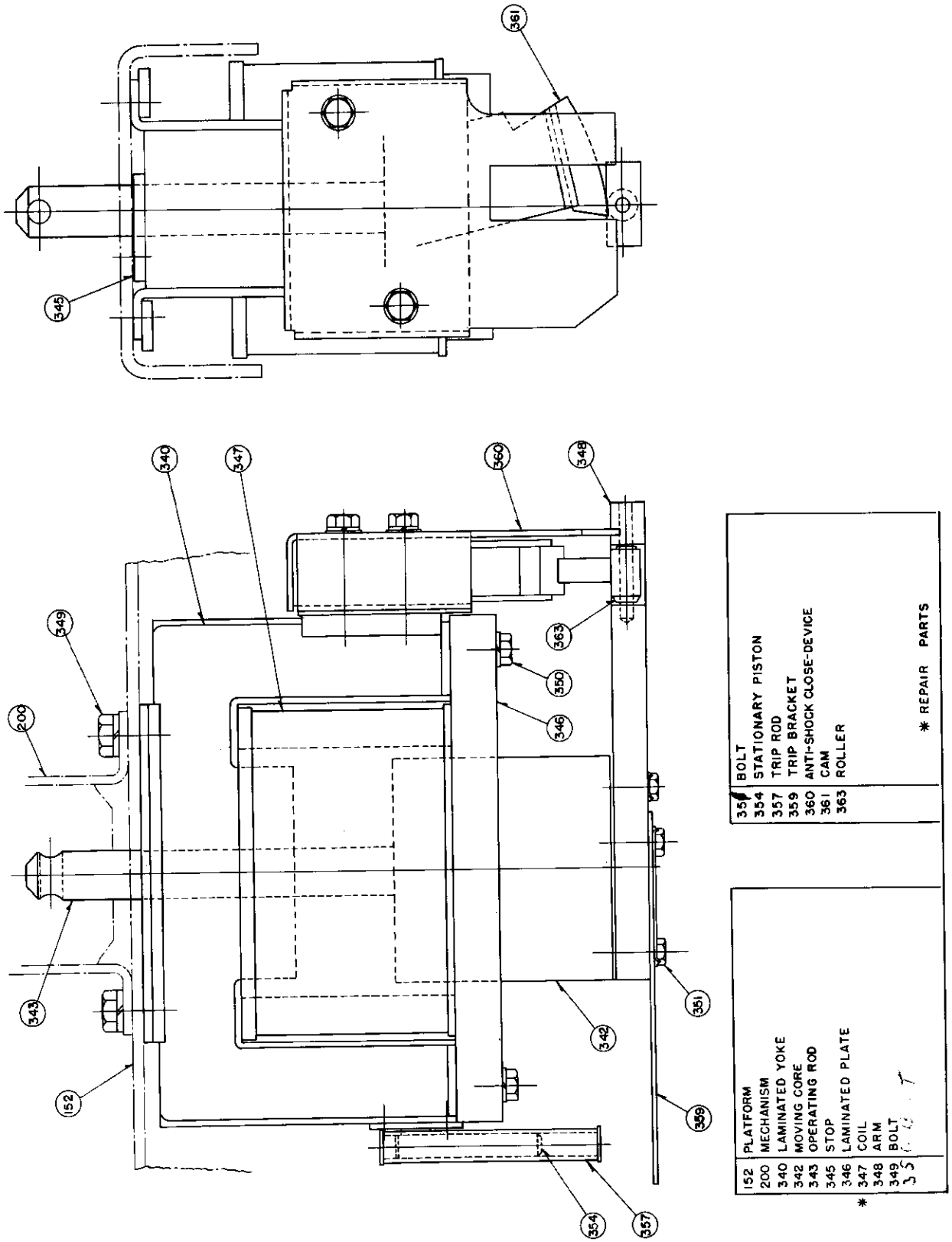


FIG. 7 — Closing Magnet

35-270-C6

(b) Remove trip bracket (359) and arm (348) by removing bolts (351).

(c) Remove anti-shock-close device (360) from side of closing magnet by removing 3 bolts.

(d) Disconnect closing coil leads after any changes have been made, arm (348) and trip bracket (359) should be checked to make sure they are not bent or loose.

(e) Remove 4 bolts (350) and plate (346). Coil is now free to be replaced.

ANTI-SHOCK-CLOSE DEVICE

On electrically operated circuit breakers, the anti-shock-close device (360) is bolted to the side of the closing magnet. Arm (348) bolted to the bottom of moving core (342) operates cam (361) of the device. Otherwise the operation is identical with device for manually operated breakers.

D-8. CLOSING RELAY

The closing relay is the same as the 600 frame A.C. breaker momentary relay (I.B. 35-224-C4) except blowout coils and arc chutes are used on both contacts and the contacts are connected in parallel as shown on wiring diagram Fig. 3, this book.

D-9. ANTI-SHOCK-OPEN DEVICE

Reference Fig. 8

FUNCTION

This device prevents tripping of the circuit breaker due to rotation of the trip lever caused by shock but allows normal rotation of the trip lever by tripping devices.

DESCRIPTION

The bracket (250) is mounted on the supporting frame shelf to the immediate right of the operating mechanism frame (200) Fig. 1 and is held to the shelf by two screws (256). Plate (252) is pivoted on pin (253) as is lever (268). Lever and plate are connected by set screw (269) in such a way that if the trip bar rises, lever (268) rotates counterclockwise around pin (253) and plate (252) is caused to rotate in the same direction. Conversely, if plate (252) is restrained from rotating, trip bar is held down by lever (268). Under shock conditions, plate (252) is restrained from moving in the following manner:

Studs (255) and (258) are suspended on pin (251) and plate (252) is fitted with a slot in its end arranged so that the plate will slide down and allow the circuit breaker to trip under normal tripping impulses. Under shock conditions, however, the two outboard studs are caused to rotate around pin (251) due to the off-center weights (257), thus jamming the plate (252) from sliding down. The middle stud is actuated by a separately pivoted weight (267) which rotates about pin (264). Spring (262) serves to hold weight in position shown during normal operation.

REPLACEMENTS

To replace reset spring (262):

(a) Remove cover by removing screws (271).

(b) Remove device from shelf by removing two screws (256).

(c) Removal of pin (253) will allow spring (262) to be replaced.

To remove weight spring (263):

(a) Repeat (a) and (b) above.

(b) Removal of pin (264) will free weight (267) and allow weight spring (262) to be replaced.

ADJUSTMENT

With the breaker closed any motion of trip bar (157) should cause plate, (252) to move down. Pushing trip bar down about 1/16 inch should cause 3/64 inch or less upward motion of slotted end of plate (252). Any adjustment should be made with breaker open by turning screw (269). Tighten locknut (270) after final adjustment.

D-10. SERIES OVERCURRENT TRIP DEVICE

The series overcurrent trip devices are the same as the 600 frame A.C. breaker series overcurrent trip devices (I.B. 35-224-C4) except the series coils and magnetic yokes are larger.

D-11. AUXILIARY SWITCH

Reference Fig. 9

FUNCTION

The auxiliary switch is used to close or open auxiliary or control circuits. The closed or open positions of its sets of contacts are

250	BRACKET, ANTI-SHOCK-OPEN	
251	PIN	
252	PLATE	
253	PIN	
255	STUD	
256	SCREW	
257	WEIGHT	
258	STUD	
259	SPACER	
260	SPACER	
261	WASHER	
* 262	SPRING, RESET	
* 263	SPRING, WEIGHT	
264	PIN	
267	WEIGHT	
268	LEVER	
269	SET SCREW, 1/4-20 X 1 1/2 HEADLESS	
270	LOCKNUT, 1/4-20	
271	SCREW, .164-32 X 3/8 PAN. SEMS	
272	RIVET	
273	SPACER	
274	RIVET	
157	TRIP BAR	

* REPAIR PARTS

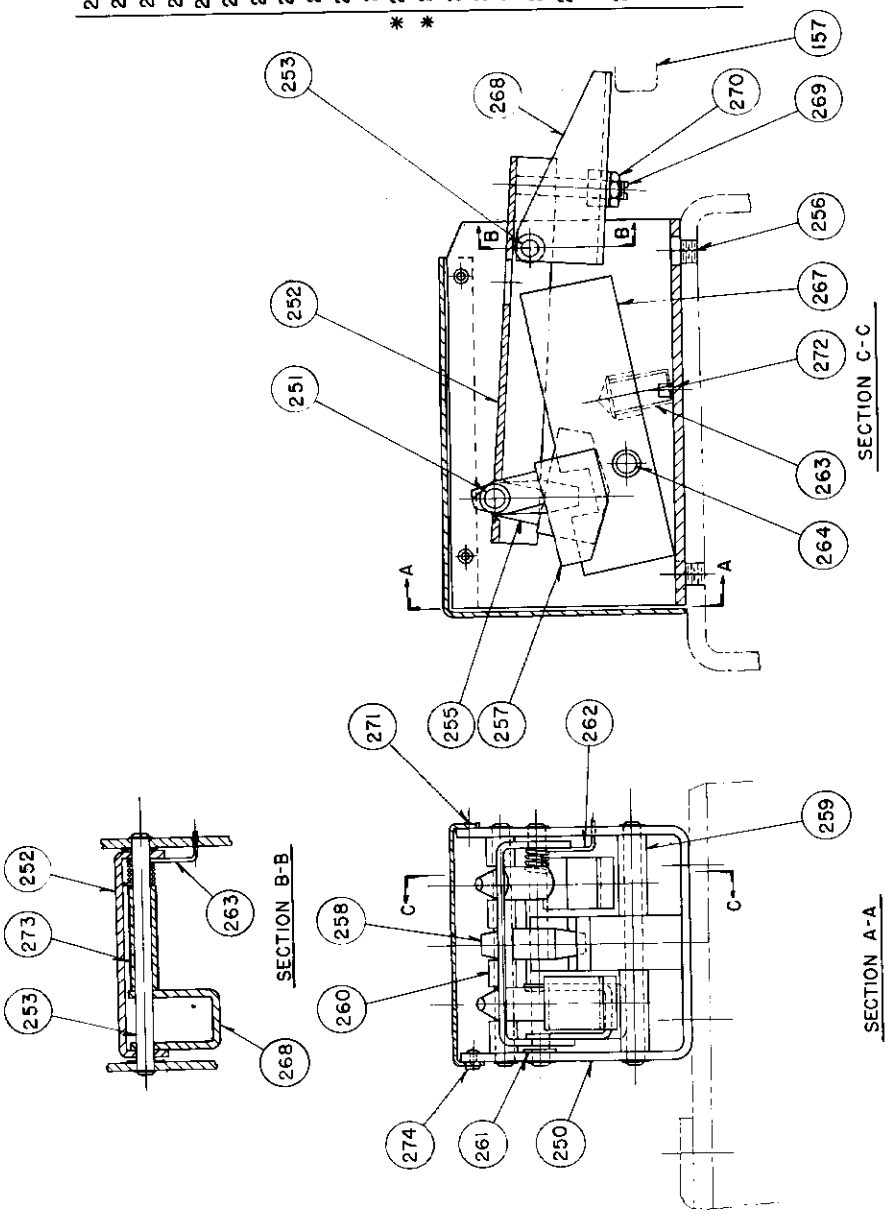


FIG. 8 — Anti-Shock-Open Device

35-270-C6

coordinated with the closed or open position of the main circuit breaker contacts.

DESCRIPTION

The four pole type RC auxiliary switch mounted on the top of the supporting frame shelf to the left of the operating mechanism. It is operated by shaft (555) and arm (557) which connects to the closing lever of the operating mechanism.

The contacts are designed to carry 15 amperes continuously or 250 amperes for three seconds.

The INTERRUPTING CAPACITIES of the auxiliary switch contacts are as follows:

Volts	Non-Inductive Circuit	Inductive Circuit
125 DC	11 Amps.	6.25 Amps.
250 DC	2 Amps.	1.75 Amps.
115 AC	75 Amps.	15.0 Amps.
450 AC	25 Amps.	5.0 Amps.

For the purposes of this table, an "inductive" circuit is considered to be a bell alarm or shunt trip circuit and a "non-inductive" circuit is considered to be a resistance type indicating light or similar circuit.

The auxiliary switch is a shaft-operated, rotary type having "a" and "b" contacts. An "a" contact is one that is open when the circuit breaker is open, and a "b" contact is one that is closed when the circuit breaker is open.

A square shaft (555) extends through the rotor sections (560) which in turn insulate and support the rotor contacts (562). The rotor assembly is clamped together into a solid unit by screw (564). The rotor contacts are set 90° apart for 90° rotation of shaft (555).

Contact fingers (553) have one end hooked into stem (551) with spring (554) maintaining pressure between the finger contact and stem. The center of the contact finger bears against a stop surface in casing (550) to position the outer end of the contact finger.

REPLACEMENT OF AUXILIARY SWITCH

(a) Remove and tag the terminal connections.

(b) Disconnect link (557) from closing lever, (207) Fig. 3, remove the two mounting bolts and remove switch.

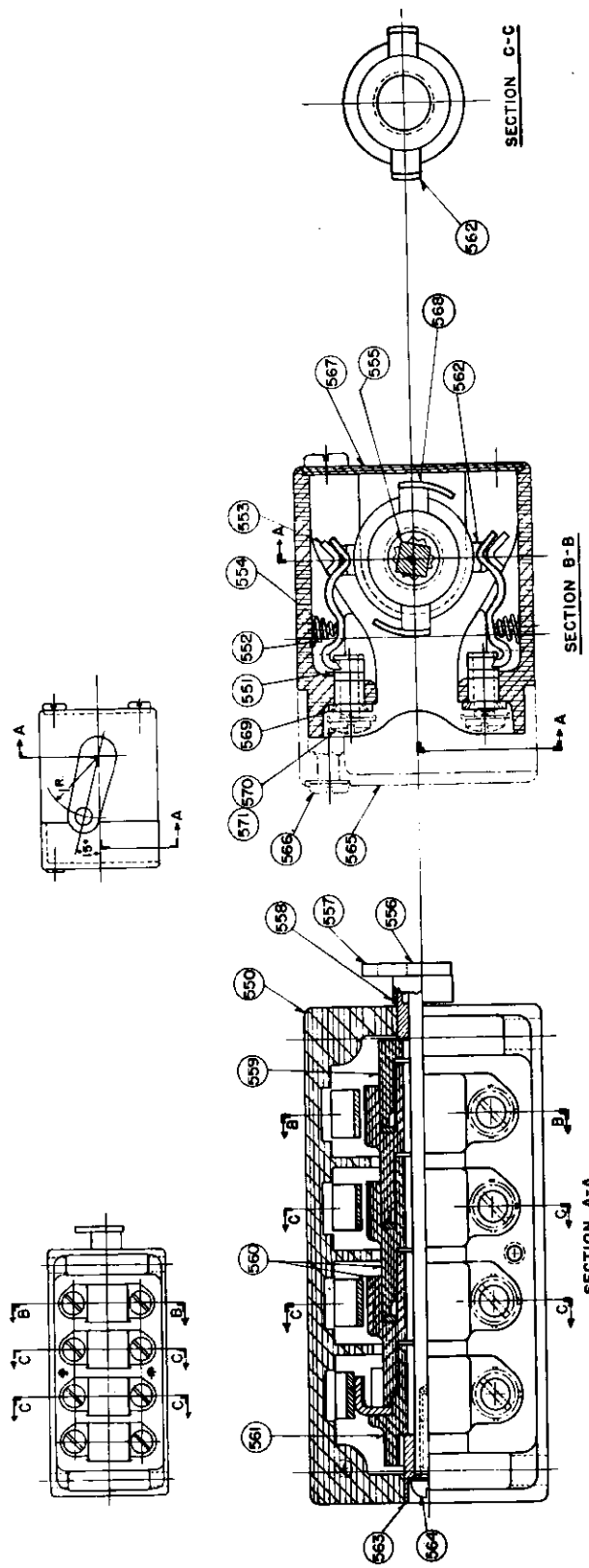
(c) Remove link (557) from old switch and add to new switch. Refer to table on Fig. 9 for correct repair part.

D-12. SHUNT TRIP DEVICE

The shunt trip device is the same as the 600 frame A.C. breaker shunt trip described in I.B. 35-224-C4.

D-13. SPARE PARTS

Potential coils, springs, arcing contacts, and auxiliary switches are supplied as spare parts. Refer to Switchboard Instruction Book for further details.



561	ROTOR END
562	CONTACT
563	BUSHING
564	.190-32 X ½ RD. T. C. SEMS MACH. SCR.
565	COVER
566	.164-32 X ¾ PAN BL. STL. SEMS MACH. SCR.
567	COVER
568	CONTACT
569	COLLAR
570	.164-32 X ½ BD. SI. BRZ. MACH. SCR.
571	CRIMP WASHER

* 550	AUXILIARY SWITCH
551	STEM
552	CONTACT SPRING
553	CONTACT FINGER
554	RIVET
555	SHAFT
556	SHAFT END
557	ARM
558	SPACER
559	ROTOR END
560	ROTOR SECTION

* SPARE PARTS

CIRCUIT BREAKER SHOP ORDER	AUXILIARY SWITCH (SHOWN WITH BREAKER OPEN) FRONT VIEW	END VIEW & STYLE NO.
SO 20-Y-9100-B2		* 1581958
SO 20-Y-9100-B9		* 1736416
SO 20-Y-9100-B10		* 1581959
SO 20-Y-9100-B11		* 1581958
SO 20-Y-9100-B12		

* REPAIR PARTS

FIG. 9 — Auxiliary Switch

35-270-C6