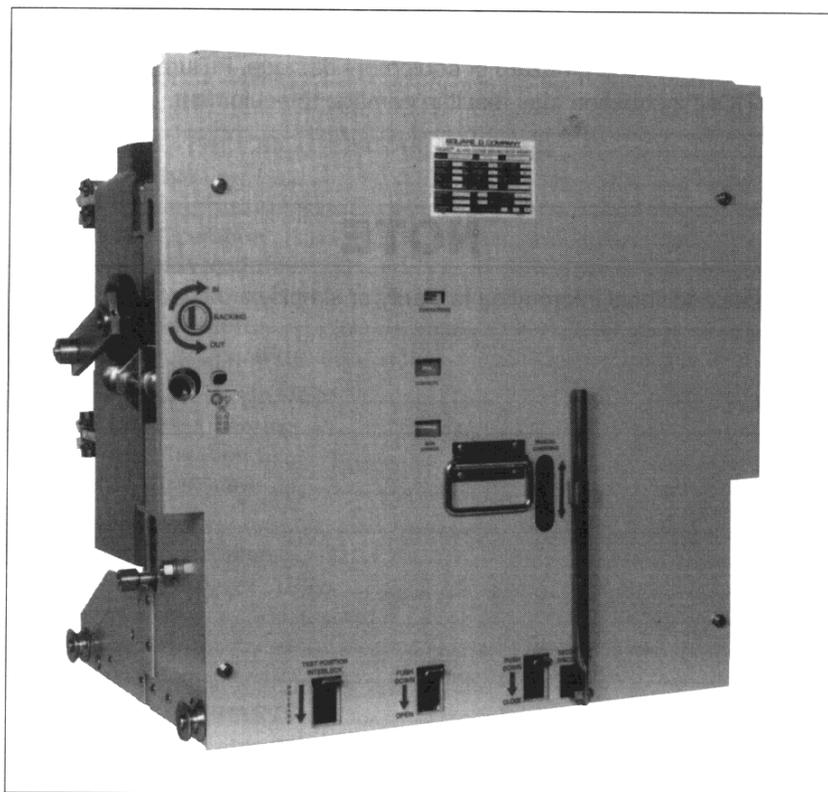


Vacuum Circuit Breaker Type VAD-3

- 4.76 kV, 29 kA (250 MVA) 1200A & 2000A
- 4.76 kV, 41 kA (350 MVA) 1200A & 2000A
- 8.25 kV, 33 kA (500 MVA) 1200A & 2000A
- 15.0 kV, 18 kA (500 MVA) 1200A & 2000A
- 15.0 kV, 28 kA (750 MVA) 1200A & 2000A
- 15,0 kV, 37 kA (1000 MVA) 1200A & 2000A



NOTICE

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this bulletin to warn of potential hazards and to call attention to additional information which clarifies or simplifies a procedure.



DANGER

Used where there is a hazard of severe bodily injury or death. Failure to follow a "DANGER" instruction *will* result in *severe* bodily injury or death.



WARNING

Used where there is a hazard of bodily injury or death. Failure to follow a "WARNING" instruction may result in bodily injury or death.



CAUTION

Used where there is a hazard of equipment damage. Failure to follow a "CAUTION" instruction may result in damage to equipment.

NOTE

Provides additional information to clarify or simplify a procedure.

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SECTION 1—INTRODUCTION

Surge Protection For VAD-3 Circuit Breakers— Statement Of Use

This manual provides installation, operation, and maintenance instructions for the type VAD-3 series of horizontal drawout vacuum circuit breakers.

VAD-3 medium voltage vacuum circuit breakers are designed and tested in accordance with ANSI/IEEE C37.04, .06, and .09. Used in conjunction with switchgear designed and tested to ANSI/IEEE C37.20.2, circuit breakers can be applied as general purpose devices.

VAD-3 circuit breakers may be installed over a wide range of applications and system parameters. Several IEEE publications are available to provide guidance for use in industry practices (IEEE Color Book Series).

Distribution systems can be exposed to lightning or switching surges. Older systems, with aging insulation or out-of-date standards, may be more susceptible to damage.

For this reason, consider adding metal oxide surge arrestors to the circuitry on the load side of the terminals of VAD-3 circuit breakers used in retro-fit applications. Place the surge protection in the switchgear or at the equipment being protected, but not on the circuit breaker.

Metal oxide arrestors limit the magnitude of prospective overvoltages, but do not affect the rate of rise (di/dt) of surge transients. Consider using surge capacitors for this additional protection.

SECTION 2—SAFETY PRECAUTIONS



DANGER

HAZARD OF ELECTRICAL SHOCK OR BURN.

- Only qualified electrical workers with training and experience on high voltage circuits should perform work described in this set of instructions. These workers must understand the hazards involved in working with or near high voltage equipment. Perform such work only after reading this complete set of instructions.
- The successful operation of circuit breakers depends upon proper handling, installation, operation, and maintenance. Neglecting fundamental installation and maintenance requirements may lead to personal injury, as well as damage to electrical equipment or other property.
- VAD-3 circuit breakers have features designed to direct proper operation, but it is not possible to eliminate every hazard with these features. Therefore, the person using this device is responsible for recognizing the potential hazards, wearing protective equipment, and taking adequate safety precautions.
- Do not make any modifications to the equipment or operate the system with safety features removed. Contact your local Square D representative for additional instructions if the VAD-3 circuit breaker does not function as described in this manual.
- Before performing visual inspections, tests, or maintenance on this device, disconnect all sources of electric power. Assume all circuits are live until they are completely de-energized, tested, grounded, and tagged. Pay particular attention to the design of the power system. Consider all sources of power, including the possibility of backfeeding.
- Before replacing covers, carefully inspect the circuit breaker work area for tools and objects left inside the equipment.
- All maintenance must be performed by qualified personnel in accordance with local codes and ordinances, and under the following conditions:
 - The circuit breaker must be removed from its cell and isolated from the high voltage.
 - Control voltage must be removed from the controls.
 - The circuit breaker must be in the *open* position.
 - All circuit breaker springs must be discharged.

All instructions in this manual assume the customer has taken the above steps to obtain safe conditions before performing maintenance or testing.

Failure to observe these precautions will result in severe personal injury or death!

SECTION 3—RECEIVING, HANDLING, AND STORAGE

Receiving

Upon receipt, inspect the entire circuit breaker for damage that may have occurred in transit. Check all items against the packing list provided. Notify the transportation company and Square D immediately if there are damages or shortages.

Handling

Use care when uncrating and handling the circuit breaker. Roll and maneuver the circuit breaker by the handle on the front mechanism cover or by grasping the top edge of the front mechanism cover. When using a hoist, lift the circuit breaker by the holes in the frame to prevent damage.



CAUTION

HAZARD OF EQUIPMENT DAMAGE.

Never lift the circuit breaker by placing forklift bars beneath the circuit breaker frame. Never use racking arms or primary disconnects as handles.

Failure to observe this precaution can result in equipment damage.

Storage

If the circuit breaker must be stored before it is put into operation, keep it in a clean, dry, corrosion-free area where it is protected from damage. Place the circuit breaker in its permanent location as soon as possible. If the circuit breaker will be used in switchgear employing space heaters, install it only after the heaters are operating.

When circuit breakers are stored for prolonged periods, inspect them regularly for rusting and overall condition. Lubricate when necessary.

SECTION 4—INITIAL CIRCUIT BREAKER PREPARATION

Follow these steps to prepare the circuit breaker for installation in its enclosure:

- 1) Examine the entire circuit breaker for damage, dirt, and moisture.
- 2) Use a clean, dry cloth to remove dirt and moisture that may have collected on the insulating parts.
- 3) Operate the circuit breaker several times to check for proper operation.
- 4) To ensure no damage has occurred during shipment, perform a hi-pot test across the open contacts of each vacuum interrupter. Then, with the circuit breaker in the closed position, perform a phase-to-ground and phase-to-phase hi-pot test for each pole. Gradually increase the voltage to the proper level. The hi-pot test voltage should be 27 kV rms or 38 kVdc for 15.0 kV, and 14 kV rms or 20 kVdc for 4.76 kV switchgear. The circuit breaker should sustain this potential for one minute.

Performing A Hi-Pot Test



WARNING

HAZARD OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

Observe the following instructions when performing the hi-pot test:

- Do not exceed the voltages specified in step 4 above.
- Keep all people at least six feet away from the circuit breaker being tested.
- Perform tests only after all insulating parts are installed.
- Discharge to ground the primary disconnects before handling. These areas can retain a static charge after a hi-pot test.

Failure to observe these precautions can result in severe personal injury or death!

- 5) To insert the circuit breaker into its enclosure, follow the applicable directions provided in the switchgear instruction manual.
- 6) With the main power off, cycle the circuit breaker several times and check for proper operation.

The circuit breaker is now ready for normal operation.

SECTION 5— INSTALLATION

Site Preparation And Circuit Breaker Installation

Refer to the metal-enclosed switchgear instruction bulletin that was shipped with your equipment; follow the site preparation and installation instructions found in that manual.

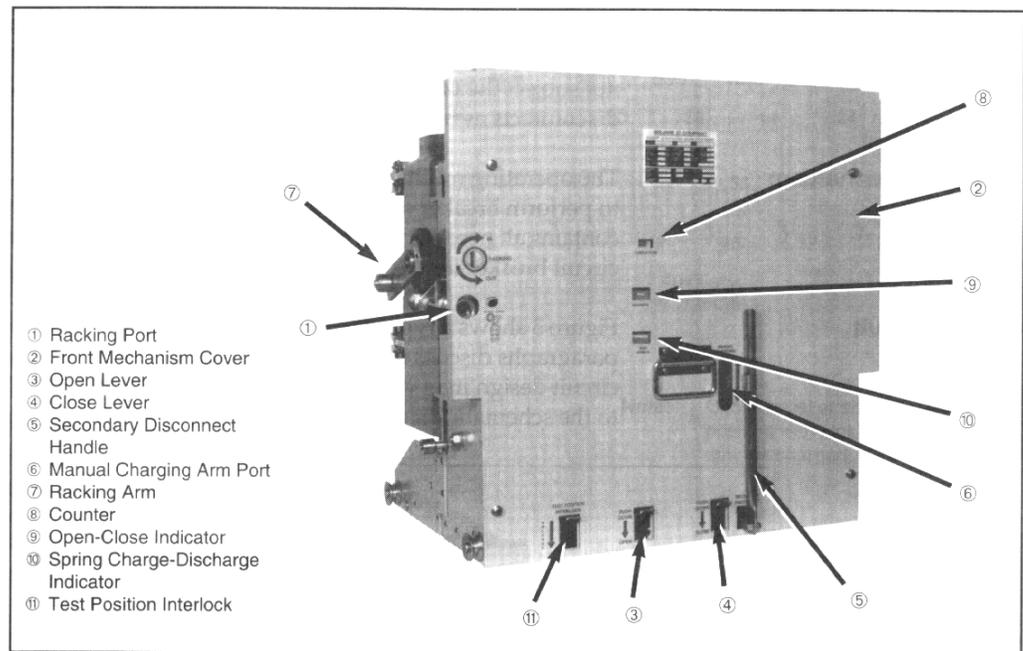


Figure 1: Circuit breaker, front view

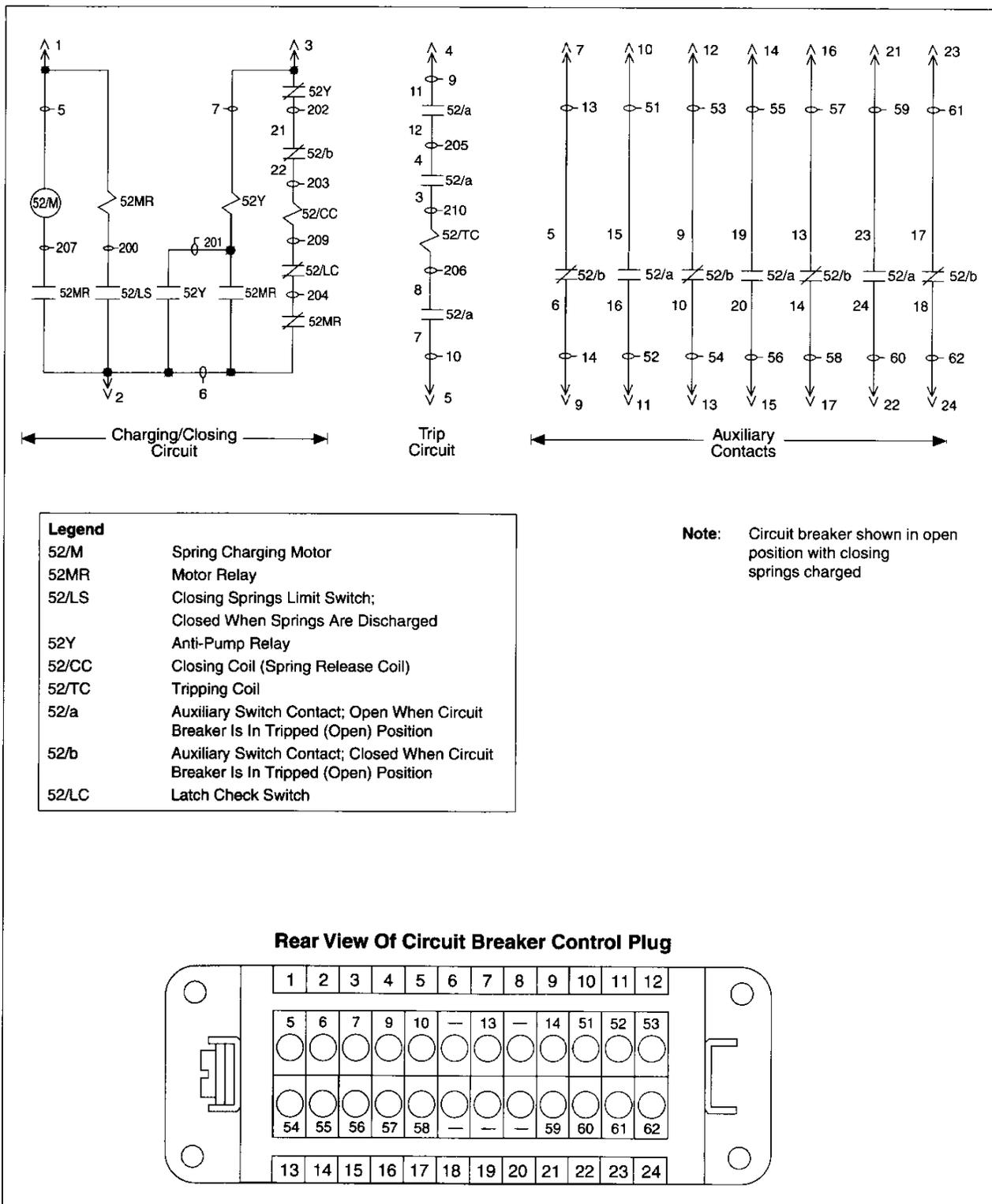


Figure 3: Control circuit schematic

Auxiliary Switch

The auxiliary switch (figure 4) is a multi-stage switch used to operate circuits that depend on the position of the circuit breaker contacts. The schematic diagram in figure 3 (page 7) illustrates how each auxiliary switch stage interconnects with the circuit breaker circuitry. The stages function as follows:

- Three a-type auxiliary contacts connect in series with the trip coil. Because these stages are open when the circuit breaker is in the open position, the auxiliary contacts de-energize the trip coil when the breaker is in the open position.
- The b-type contact, connected in series with the closing coil, de-energizes the closing coil when the circuit breaker contacts are in the closed position.
- As shown, several a-type and b-type contacts are provided for optional use.

Motor Limit Switch

The motor limit switch (figure 4) energizes the motor relay (figure 4) when a drive spring charging operation is required. The motor limit switch de-energizes the motor relay when the drive springs (figure 5) reach the fully charged position. As shown in the schematic diagram (figure 3), the motor limit switch is connected in the normally open position. When the drive springs are not in the fully charged position, the motor limit switch is closed.

Motor Relay

When energized by the closing of the motor limit switch, the motor relay energizes the spring charging motor (figure 4) through a pair of normally open contacts. The motor relay disables the closing coil (figure 5) through a pair of normally closed contacts.

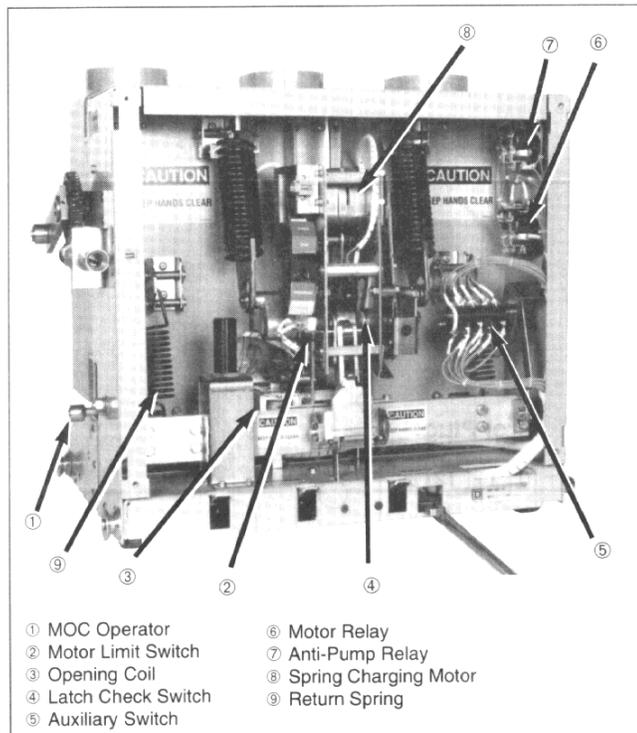


Figure 4: Circuit breaker, left front view without cover (18 kA, 28 kA, and 29 kA)

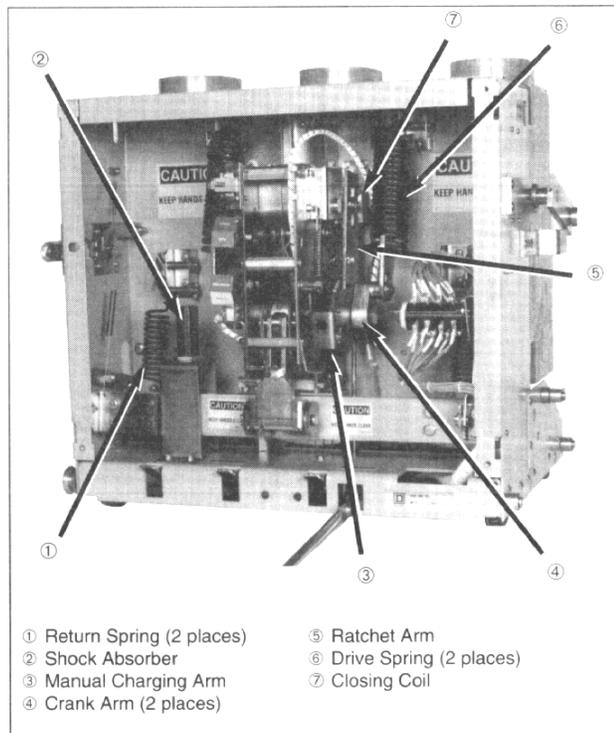


Figure 5: Circuit breaker, right front view without cover (18 kA, 28 kA, and 29 kA)

Anti-Pump Relay

If the closing coil circuit (52/CC, figure 3, page 7) is continuously energized, the anti-pump relay (figure 4) ensures that the circuit breaker does not "pump" open and closed in the event that a trip signal is also present. The anti-pump relay performs this function by allowing the closing coil to activate only if:

- the circuit is energized
- the drive springs are fully charged, and
- the motor relay is de-energized

The anti-pump relay activates when the close circuit and motor relay are energized. If the close circuit is energized continuously, the anti-pump relay will be latched in the energized position after the motor relay is de-energized by a pair of its own normally open contacts. When the anti-pump relay is energized, a pair of its normally closed contacts, in series with the closing coil, ensure that the closing coil cannot be energized. The closing coil activates only when the closing circuit is de-energized (de-energizing the anti-pump relay), then closed again.

Latch Check Switch

The latch check switch (figure 4) allows the circuit breaker to be used for instantaneous reclosing. The contacts of the latch check switch connect in series with the closing coil. When the guide cam moves out of its normal position, it activates the latch check switch. The closing circuit cannot be energized until the guide cam fully returns to its normal position and the mechanism is in position to allow a close operation.

Closing Spring Interlock

An interlock located between the manual trip and close lever at the bottom of the circuit breaker prevents the closing springs from "dumping" when the circuit breaker is closed. An interlock bar slides under the closing lever after the circuit breaker closes and prevents the closing lever from being pushed down.

Indicators

There are two indicators on the operating mechanism. The open-close indicator (figure 7) designates whether the vacuum interrupter contacts are open or closed. The charge-discharge indicator (figure 7) displays the state (charged or discharged) of the drive springs.

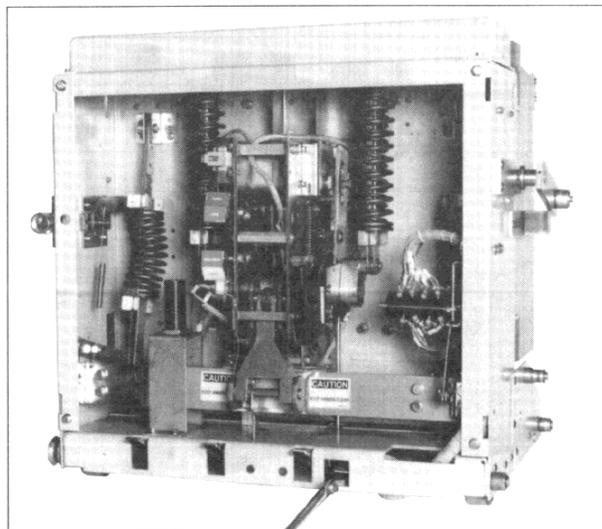


Figure 6: Circuit breaker, front view without cover (37 kA and 41 kA)

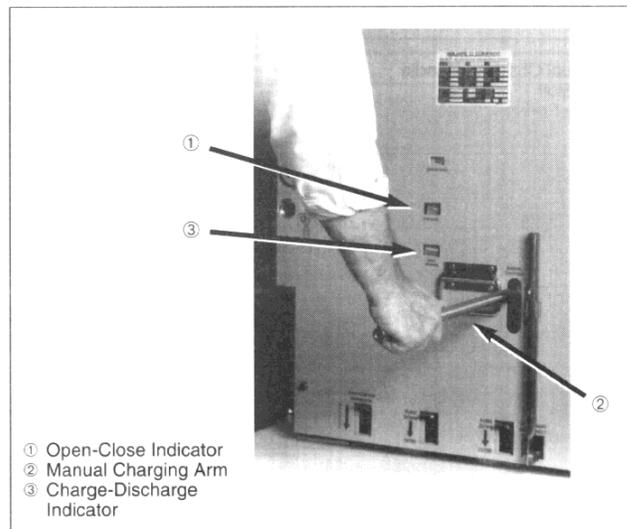


Figure 7: Charging the drive springs

SECTION 7—OPERATING THE CIRCUIT BREAKER

Manual Charging

To manually charge the drive springs (figure 7, page 9), use the handle supplied with the circuit breaker to move the manual charging arm (figure 7) up and down until the drive springs are fully charged. The drive springs are fully charged when the charge-discharge indicator (figure 7) reads *charged* and the manual charging arm no longer advances the gear.

Slow Closing Feature

Occasionally, it may be necessary to manually slow close the circuit breaker. The operating mechanism has a built-in feature for this purpose. Follow the steps below to manually slow close.



WARNING

HAZARD OF BODILY INJURY.

Only qualified personnel should perform this operation. Stored energy in springs and sudden operation of mechanisms can cause serious bodily injury if a person touches or comes in close proximity of the mechanism.

Failure to observe this precaution can result in personal injury!

1. With the circuit breaker in the open position and the drive springs discharged, slide the manual charging handle onto one of the drive spring brackets (figure 8). Press up on the manual charging handle just enough to off-load the drive spring; remove the upper 1/2" bolt (figure 8). Release the drive spring pressure; remove the spring. Repeat with the other drive spring.
2. Using the manual charging handle as described in the **Manual Charging** section above, advance the gear until the drive pawl (figure 13, page 13) rides up on the lift cam. Remove the manual charging handle.

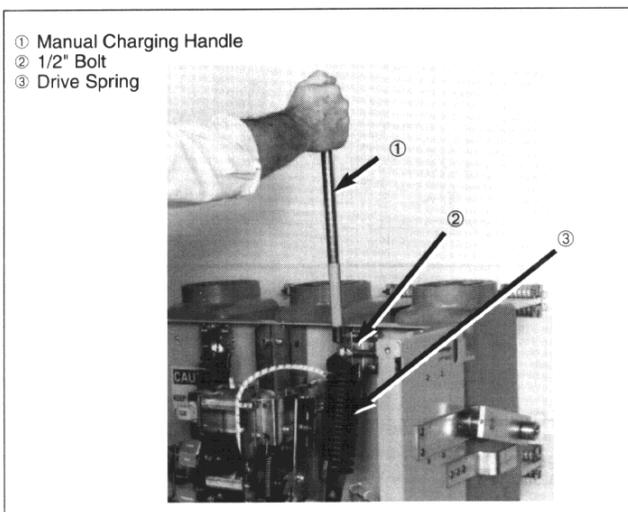


Figure 8: Removing the closing spring

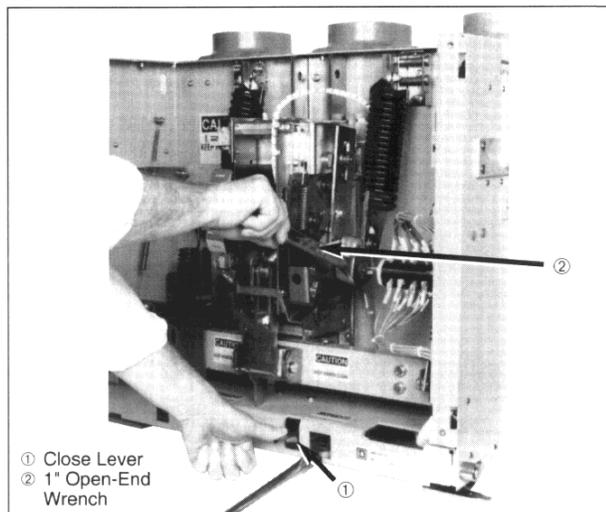


Figure 9: Slow close feature

Slow Closing Feature (cont.)

3. While pressing down on the close lever (figure 9), use a 1" open-end wrench to rotate the drive shaft until the drive pawl clears the lift cam and once again engages the gear. See figure 9 for use of the wrench. Press down on the wrench to achieve the correct direction of rotation.
4. Release the close lever. Remove the 1" wrench.
5. Continue using the manual charging handle to perform manual charging. The circuit breaker slowly closes with each advance of the gear.

Drawout Operation

The circuit breaker must be in the open position when it is racked in or out of its cubicle. The racking mechanism (figures 10 and 11) interlocks with the circuit breaker mechanism. This prevents the racking shaft from being turned when the circuit breaker is in the closed position.

Racking In Procedure

1. The racking arms (figure 10) must be in the drawout position before inserting the breaker into the cell. In the drawout position, the racking arms extend toward the rear of the breaker and are just below the horizontal.
2. If required, move the racking arms to the drawout position. Follow these steps:
 - a. Open the circuit breaker.
 - b. Insert the racking handle into the racking port (figure 10).
 - c. Rotate the racking handle counterclockwise until the racking mechanism comes to a stop. Do not over-torque.

WARNING

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE.

When the switchgear is energized, always open and close the circuit breaker and rack the circuit breaker from one position to another with the door closed. Never use force to move the circuit breaker inside the circuit breaker cell.

Failure to observe these precautions can result in severe personal injury or death!

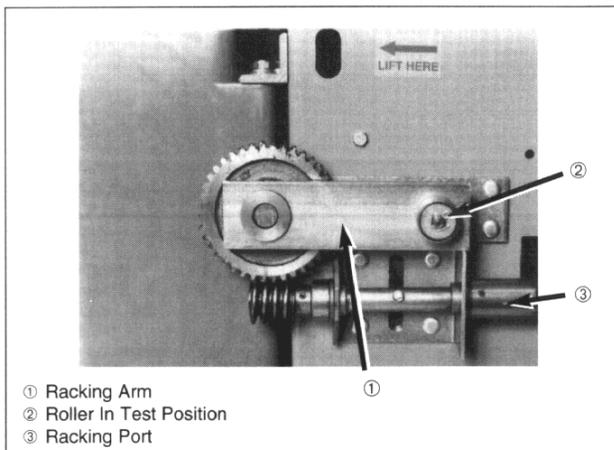


Figure 10: Racking mechanism in test position

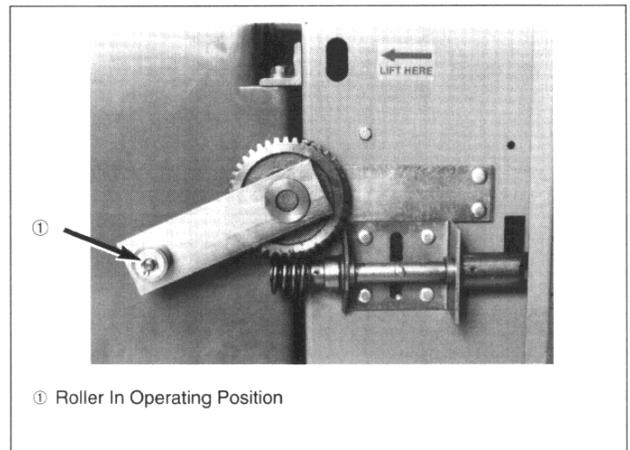


Figure 11: Racking mechanism in operating (connected) position

Racking In Procedure (cont.)

3. Insert the circuit breaker into the cell until the rollers on the racking arms come into contact with the channels on the sides of the cell.
4. Rotate the racking handle clockwise until the racking mechanism stops. Do not over-torque.

Racking Out Procedure

1. Open the circuit breaker.
2. Insert the racking handle into the racking port.
3. Rotate the racking handle counterclockwise until the racking mechanism stops. Do not over-torque.
4. Press down on the test position interlock (figure 1, page 5) at the lower left front of the circuit breaker; roll the circuit breaker out of the cell.

Locking Provision

The racking mechanism of the circuit breaker can be locked in either the test or the operating position with a multiple padlock hasp and a padlock, as shown in figure 12.

Test Position Operation

The secondary disconnect (figure 2, page 6) mounts on a retractable slide so that it can connect to the control circuit of the cell while the cell shutters are down and the primary connections have not been made. This provides a convenient and safe method for electrically testing the operation of the circuit breaker mechanism and control circuit. *Test* position operation is achieved by following these steps:

1. Insert the circuit breaker into the test position of the cell by following steps 1 through 3 of the **Racking In Procedure** section on page 11. (Do not rack the circuit breaker into the cell.)
2. Pull the secondary disconnect handle (figure 2, page 6) out of its retaining clip; rotate it down so that it protrudes straight out from the circuit breaker.
3. Lift slightly on the secondary disconnect handle and push it into the circuit breaker until the control circuits connect.
4. The control circuit of the circuit breaker is now connected with that of the cell.
5. Retract the secondary disconnect by reversing the above procedure.

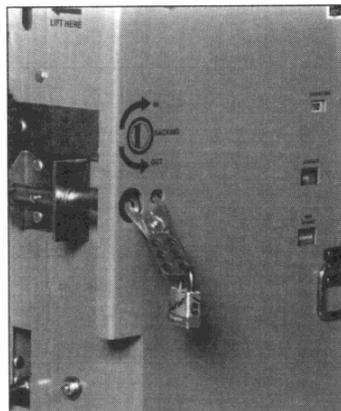


Figure 12: Racking mechanism padlock provision

SECTION 8—OPERATING MECHANISM

Drive Spring Charging

Place the interrupter contacts in the open position; ensure that the drive springs (figure 13) and return springs (figure 5, page 8) are discharged. When power is supplied to the circuit breaker control circuit, the charging motor (figure 13) is energized. The eccentric, mounted on the charging motor shaft, drives the ratchet arm (figure 13) backward and forward.

With each forward stroke of the ratchet arm, the spring-loaded drive pawl (figure 13) mounted on the ratchet arm engages a tooth on the gear (figure 13). The gear advances a few degrees clockwise. The drive pawl (figure 13) holds the gear in position while the drive pawl makes its reverse stroke to engage another tooth. The gear is free to rotate on the drive shaft (figure 13).

As the gear advances, the drive pin mounted on the gear face engages and rotates the lift cam (figure 13). Because the lift cam is keyed to the drive shaft, the drive shaft rotates with the lift cam.

The crank arms (figure 13) rotate with the drive shaft and pull the drive springs to the charged position. As the springloads pass top dead center and attempt to discharge, the closing roller on the drive cam contacts the close cam (figure 14, page 14). The drive springs stay in this charged position until closing is initiated.

When the drive springs are fully charged, the charging motor limit switch contacts open, de-energizing the charging motor. Simultaneously, the raised

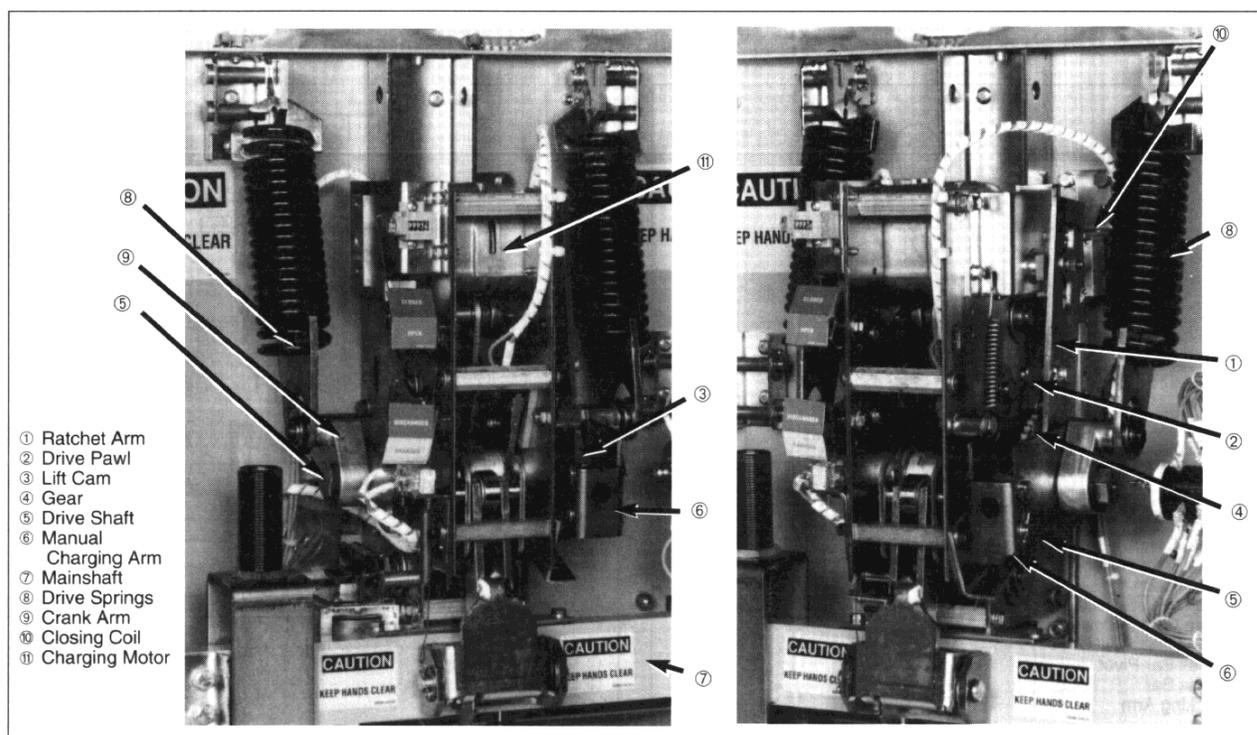


Figure 13: Circuit breaker mechanism, two views

Drive Spring Charging (cont.)

surface on the lift cam lifts the drive pawl above the gear. This allows the charging motor and ratchet arm to coast smoothly to a stop.

Closing Operation

Once the drive springs are charged, close the circuit breaker by energizing the closing coil (figure 13) or by manually pressing the close lever (figure 9, page 10).

! WARNING

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE.

The manual closing lever should be used only in the test position, or if the power to the circuit breaker has been removed.

Failure to observe this precaution can result in personal injury or equipment damage!

This disengages the close cam (figure 14) from the closing roller and allows the drive springs to discharge. The discharging drive springs rotate the drive shaft (figure 13) counterclockwise. This rotation also gives the drive cam (figure 14) a counterclockwise rotation.

The rotation of the drive cam pushes the drive cam follower (figure 14) down. Linkage with the mainshaft (figure 13) causes a downward motion of the racking arms (figure 14). The resulting upward motion of the rear of the racking arms closes the vacuum interrupter contacts and charges the bias springs (figure 15).

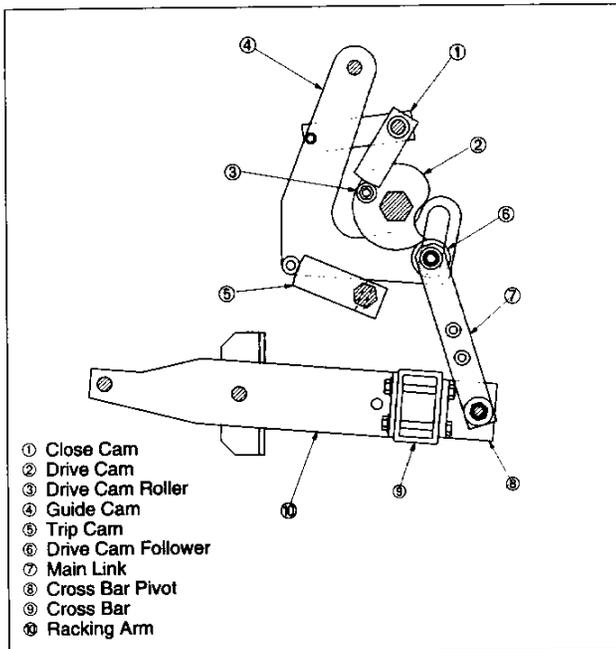


Figure 14: Mainshaft mechanism

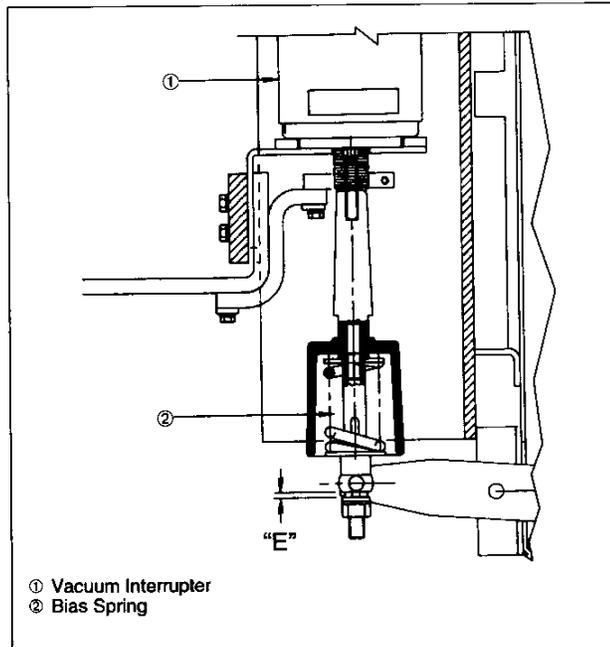


Figure 15: Contact erosion measurement

Closing Operation (cont.)

The counterclockwise rotation of the drive shaft also rotates the lift cam out of contact with the drive pin. Because the gear rotates freely on the drive shaft, the gear remains stationary. The rotation of the lift cam allows the drive pawl to engage the gear. The motor limit switch (figure 4, page 8) energizes the charging motor which once again charges the drive springs.

Opening Operation

With the return springs charged and the circuit breaker closed, the operating mechanism is ready to perform an opening operation. If the open lever (figure 1, page 5) is pushed or if the opening coil (figure 4, page 8) is energized, the trip cam rotates counterclockwise away from the guide cam (figure 14). The force of the charged return springs pulling up on the mainshaft causes the guide cam to move out toward the front of the mechanism. This allows the drive cam follower to collapse off the top of the drive cam. The mainshaft is pulled up, pulling the front of the racking arms up. The resulting downward motion of the rear of the racking arms opens the vacuum interrupter contacts (figure 15).

SECTION 9 — MAINTENANCE

Because of wide variations in operating uses and environments, each operating company should develop a maintenance schedule, based on operating experience, which will ensure proper circuit breaker condition. Until such a schedule is determined, inspect circuit breakers after three years or every 3,000 operations, whichever occurs first.

Also inspect circuit breakers after severe fault operations and record any contact erosion. The following paragraphs discuss proper inspection and maintenance procedures.



WARNING

HAZARD OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

Always remove the circuit breaker from its cubicle, and discharge the drive springs and return springs, before performing any maintenance or repair work.

Failure to observe these precautions could result in personal injury or death, or equipment damage!

Vacuum Interrupters

To ensure reliable interruption, perform the following two checks:

1. **Contact erosion:** Any contact erosion results in a reduction of spring overtravel. Contact erosion can be determined by closing the circuit breaker and measuring spring overtravel. Spring overtravel is represented by dimension "E" in figure 15. The difference between this measurement and the original spring overtravel, measured when the interrupter was first put into service, represents contact erosion.

Spring overtravel is factory set at 0.210" (5.3 mm) for a new circuit breaker rated 23 kA or less maximum interrupting. For a new circuit breaker rated above 23 kA maximum interrupting, spring overtravel is 0.188" (4.8 mm). The vacuum interrupter reaches the end of its life when spring overtravel has been reduced to 0.085" (2.2 mm) on a circuit breaker rated 23 kA or less maximum interrupting, or 0.060" (1.5 mm) on a circuit breaker rated above 23 kA maximum interrupting.

2. **Hi-pot test:** Hi-pot test the circuit breaker in accordance with the instructions provided in the **Initial Breaker Preparation** section, page 4, item 4.

If, because of contact erosion or hi-pot test failure, a vacuum bottle must be replaced, order a complete pole assembly (see table 3 on page 16). Vacuum interrupter contacts are sealed using fragile metal bellows and are sensitive to excessive torque and handling. See the caution on page 16.

Insulating Surfaces

Using a clean, dry cloth, remove all dirt and moisture from insulating parts.

Mechanism

Inspect the entire circuit breaker and operating mechanism for loose hardware and worn or broken parts. Check all wiring for loose connections and damaged insulation. Inspect all bearings and contact surfaces for damage or excessive wear.

Lubrication

All ball and roller bearings used in these circuit breakers are sealed; they do not require lubrication.

The lubrication chart in table 1 gives the location of each lubrication point and the method of lubrication required. Lubricate after 3,000 operations or three years, whichever occurs first.

Severe operating conditions may warrant different lubrication intervals and procedures. Variations should be based on the experience of the operating company.

Electrical

Ensure that all electrical connections are tight and clean.



WARNING

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE.

Work which requires disassembly of the mechanism or pole assembly must be performed by qualified electrical workers who have access to appropriate adjustment instructions. See section 10 of this manual for these adjustment instructions.

When not following these instructions, disassembly and reassembly of this circuit breaker can cause improper operation, resulting in damage to the circuit breaker and injury to the operator. If you have questions, contact the Square D Company, Smyrna service department, at (615) 459-5026.

Failure to observe this precaution can result in personal injury or equipment damage!

**Table 1
Lubrication Chart**

| Lubrication Point | Method of Lubrication During Maintenance Period |
|--|--|
| Gear teeth | Wipe clean and apply lubricant.* |
| Contact surfaces on guide cams and trip latch | Wipe clean and apply lubricant.* |
| Motor eccentric and eccentric roller | Wipe clean and apply lubricant to the slot in the ratchet arm.* |
| Silver-plated primary disconnect contacts and grounding contacts | Wipe clean and apply an extreme pressure grease, such as Mobilux EP 1, Square D part number 1615-100790. |

* Use Mobilgrease 28, Square D part number 1615-100950, or equivalent.

SECTION 10—REPLACEMENT PARTS

Minimum Requirements

Maintain sufficient replacement parts in stock to ensure prompt replacement of worn, broken, or damaged parts.

Tables 2 and 3 list factory-recommended replacement parts. Each replacement part is shipped with complete assembly and adjustment instructions.

Because of wide variation in operating uses and environments, the recommended parts are presented only as a minimum requirement. Each operating company should develop its own parts stock, based on operating experience, to maintain proper circuit breaker condition.

Ordering Instructions

When ordering replacement parts:

- Always specify the complete rating information and circuit breaker serial number.
- Specify part number, description of part, and the catalog from which this information is taken.

**Table 2
 Replacement Parts**

| Description | Part No. | Rated Voltage |
|-----------------------------|--------------|---------------|
| Charging Motor | 44068-505-50 | 48 Vdc |
| | 44068-505-51 | 125 Vdc |
| | 44068-505-52 | 250 Vdc |
| | 44068-505-51 | 120 Vac |
| | 44068-505-52 | 240 Vac |
| Motor Relay | 44068-506-50 | 48 Vdc |
| | 44068-506-51 | 125 Vdc |
| | 44068-506-52 | 250 Vdc |
| | 44068-506-53 | 120 Vac |
| | 44068-506-54 | 240 Vac |
| Anti-Pump Relay | 44068-507-50 | 48 Vdc |
| | 44068-507-51 | 125 Vdc |
| | 44068-507-52 | 250 Vdc |
| | 44068-507-53 | 120 Vac |
| | 44068-507-54 | 240 Vac |
| Closing Solenoid | 44068-508-50 | 48 Vdc |
| | 44068-508-51 | 125 Vdc |
| | 44068-508-52 | 250 Vdc |
| | 44068-508-53 | 120 Vac |
| | 44068-508-54 | 240 Vac |
| Trip Solenoid | 44068-509-50 | 24 Vdc |
| | 44068-509-51 | 48 Vdc |
| | 44068-509-52 | 125 Vdc |
| | 44068-509-53 | 250 Vdc |
| | 44068-509-54 | 120 Vac |
| | 44068-509-55 | 240 Vac |
| Main Contact (1200A) | 44068-516-50 | — |
| Main Contact (2000A) | 44068-516-51 | — |
| Ground Contact | 44068-510-50 | — |
| Latch Check Switch | 44068-511-50 | — |
| Control Power Plug Ass'y | 44068-503-50 | — |
| Auxiliary Switch | 44068-512-50 | — |
| Closing Spring Limit Switch | 44068-513-50 | — |

**Table 3
 Pole Assembly Replacement Parts**

| Circuit Breaker | Part No. |
|----------------------|--------------|
| 4.76 kV 29 kA 1200 A | 44068-514-50 |
| 4.76 kV 29 kA 2000A | 44068-515-50 |
| 4.76 kV 41 kA 1200A | 44068-514-51 |
| 4.76 kV 41 kA 2000A | 44068-515-51 |
| 8.25 kV 33 kA 1200A | 44068-514-52 |
| 8.25 kV 33 kA 2000A | 44068-515-52 |
| 15.0 kV 18 kA 1200A | 44068-514-53 |
| 15.0 kV 18 kA 2000A | 44068-515-53 |
| 15.0 kV 28 kA 1200A | 44068-514-54 |
| 15.0 kV 28 kA 2000A | 44068-515-54 |
| 15.0 kV 37 kA 1200A | 44068-514-55 |
| 15.0 kV 37 kA 2000A | 44068-515-55 |

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