SQUARE D
Instruction Bulletin

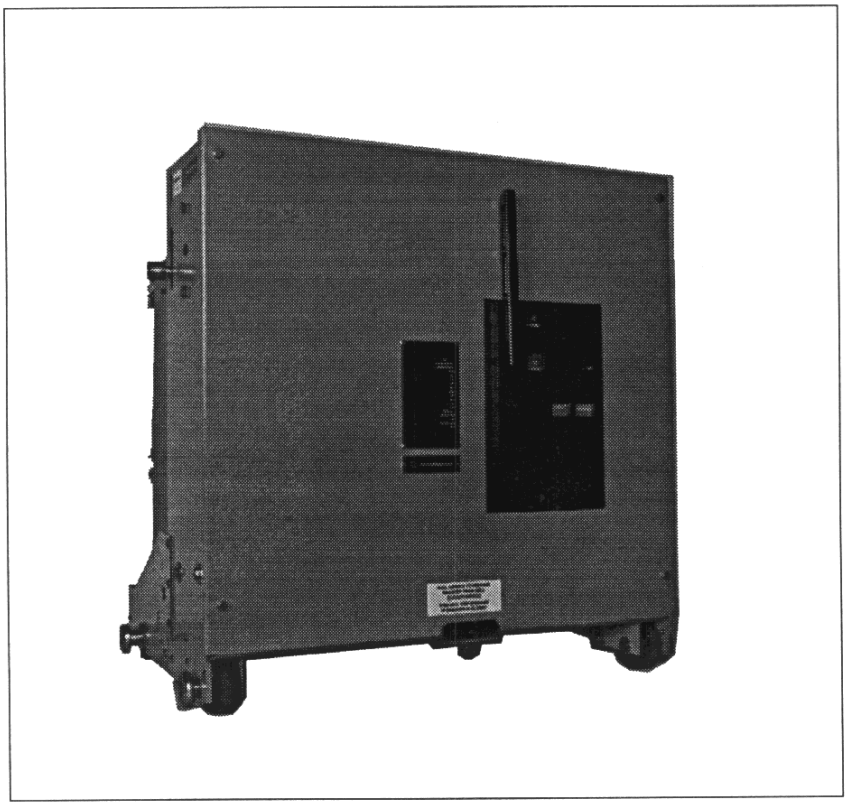
Bulletin No. 6055-31
October 1995
Smyrna, TN, USA

Type VR
Vacuum Circuit Breaker

4.76 kV, 8.25 kV, and 15 kV

1200 and 2000 A

Class 6055



PRELIMINARY

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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*** cause death or ***severe*** bodily injury.

⚠ WARNING

Used where there is a hazard of bodily injury or death. Failure to follow a "WARNING" instruction can cause death or bodily injury.

⚠ CAUTION

Used where there is a hazard of equipment damage. Failure to follow a "CAUTION" instruction can cause damage to equipment.

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SECTION 1—INTRODUCTION

This bulletin provides installation, operation, and maintenance instructions for Type VR medium voltage vacuum circuit breakers manufactured by Square D Company.

This device provides interrupting capability for medium voltage systems up to 15 kV. The Type VR vacuum circuit breaker is a horizontal drawout circuit breaker designed for use with metal-clad switchgear. The specific rating of each circuit breaker is printed on the circuit breaker nameplate.

Surge Protection For Type VR Vacuum Circuit Breakers—Statement Of Use

Circuits in which these circuit breakers are placed are capable of overvoltages. The following general guidelines will eliminate the vast majority of application concerns. However, they do not guarantee complete system protection from the occurrence of overvoltages.

- Complex medium voltage systems may require a detailed overvoltage system analysis and the addition of an RC network.
- All circuits should have at least distribution class arresters unless cable lengths exceed 300 feet (91.5 meters). In many cases, arresters are already used for other reasons.
- For dry-type transformer and motor loads, surge capacitors should be used at the terminals of the transformer or motor. (Cast resin transformers are considered dry-type transformers in this discussion.) Where there are long lengths of cable, the cable capacitance offers surge capacitor protection, provided the cable capacitance is equivalent to typical values available in surge capacitors.

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SECTION 2—SAFETY PRECAUTIONS

⚠ DANGER

HAZARD OF BODILY INJURY OR EQUIPMENT DAMAGE.

- **Only qualified personnel familiar with medium voltage circuits are to perform work described in this set of instructions. Workers must understand the hazards involved in working with or near medium voltage equipment. Perform such work only after reading this set of instructions in its entirety.**
- **For this equipment to function properly, it must be handled carefully and installed, operated, and maintained correctly. Neglecting fundamental installation and maintenance requirements may lead to personal injury, as well as damage to electrical equipment or other property.**
- **Be aware of potential hazards, wear protective equipment, and take adequate safety precautions.**
- **Do not make any modifications to the equipment or operate the system with interlocks removed. Contact your local Square D representative for additional instructions if the VR 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 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 these measures before performing maintenance or testing.

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

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. Immediately notify the carrier and Square D of any damages or shortages.

Handling

Use care when uncrating and handling the circuit breaker. Roll and maneuver the circuit breaker by grasping the top edge of the front cover. When lifting the circuit breaker by a hoist, use the two holes in the side of the frame.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE.

- **Never lift the circuit breaker by placing forklift bars beneath the circuit breaker frame.**
- **Do not use the main contacts as handles.**

Failure to observe these precautions can damage the equipment and will void the warranty.

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. Refer to "Lubrication" in section 8.

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SECTION 4—DESCRIPTION

Circuit Breaker Rating

The circuit breaker ratings are printed on the rating nameplate (figure 1).

Indicators

The operating mechanism has two indicators. The open-closed indicator (figure 1) shows whether the vacuum interrupter contacts are open or closed. The charged-discharged indicator (figure 1) shows whether the closing springs are charged or discharged.

Vacuum Interrupters

Vacuum interrupters (figure 2), which are mounted vertically on the back side of the circuit breaker frame, perform the circuit breaker interruption. Consisting of a pair of butt contacts, one movable and one fixed, the vacuum interrupters require only a short contact gap for circuit interruption.

Primary Disconnects

The primary connection to the associated switchgear is through the six primary disconnects (figure 2) mounted horizontally at the rear of the circuit breaker. **Never use the primary disconnects as handles when maneuvering the breaker.**

Operating Mechanism

The operating mechanism (figure 3) is a stored energy type mechanism. It uses charged springs to perform breaker opening and closing functions. The operating mechanism contains all necessary controls and interlocks. It is mounted at the front of the circuit breaker for easy access during inspection and maintenance.

NOTE: To remove the mechanism cover (figure 6), carefully unclip the back of the cover from the mechanism frame.

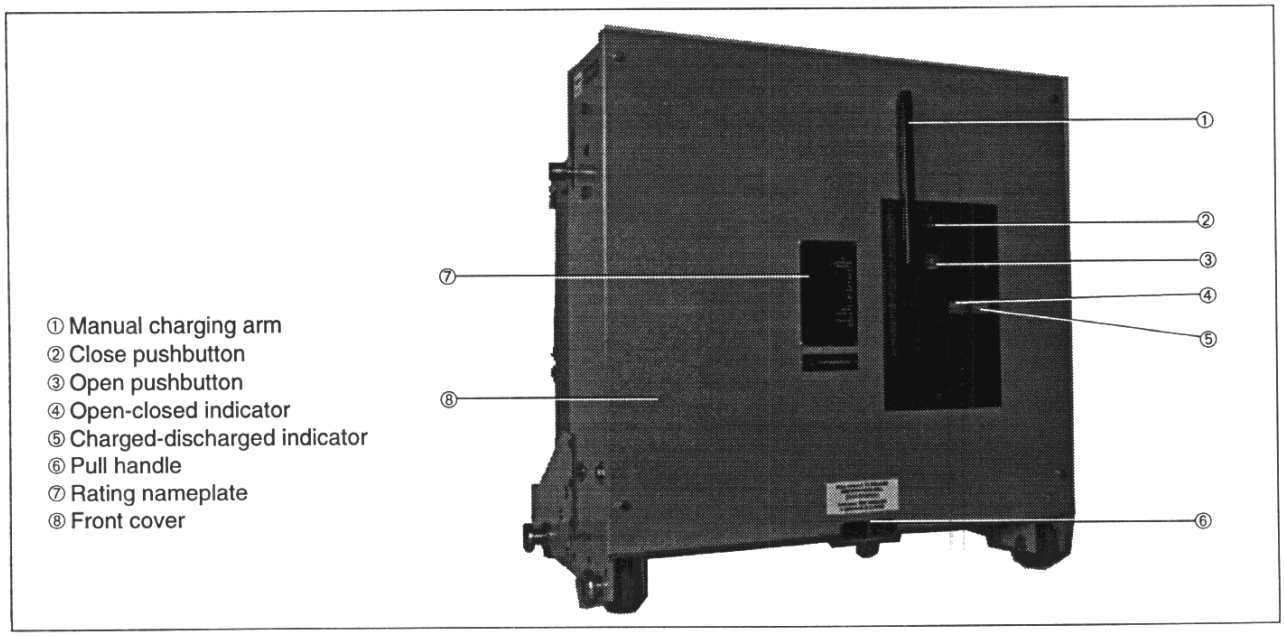


Figure 1: Circuit breaker, front view

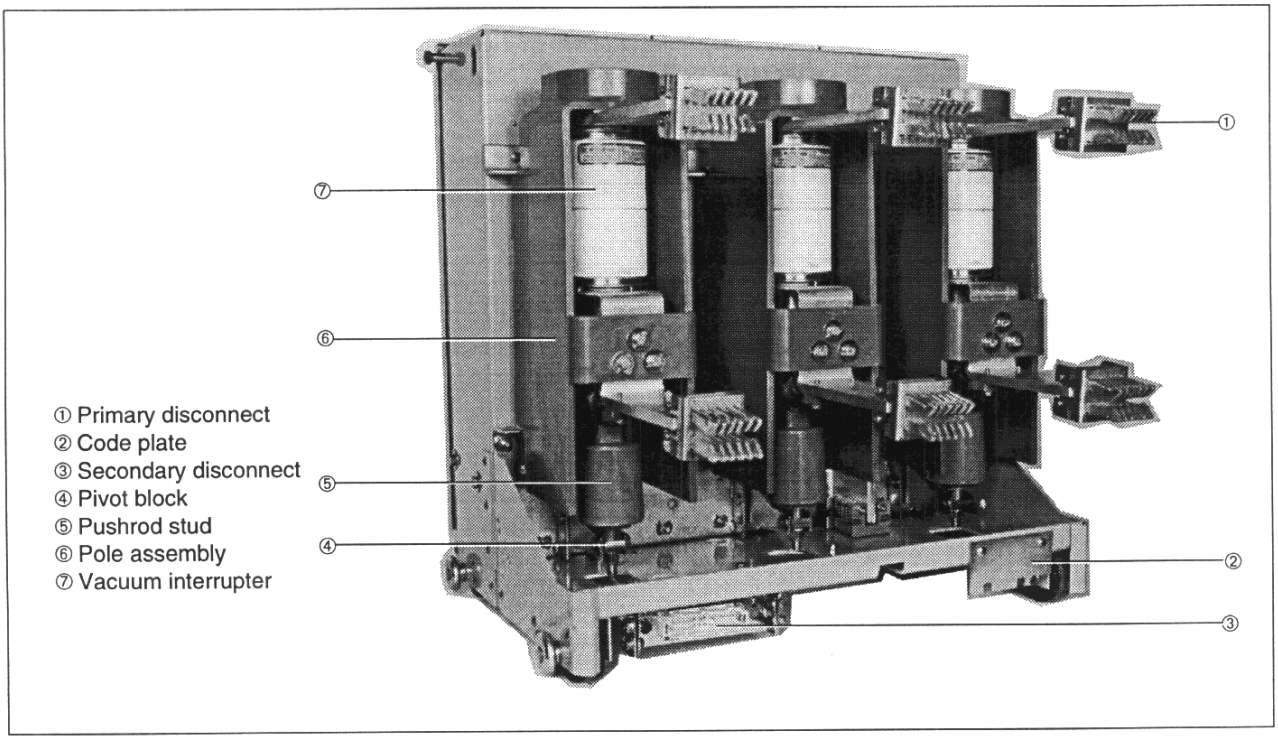


Figure 2: Circuit breaker, rear view

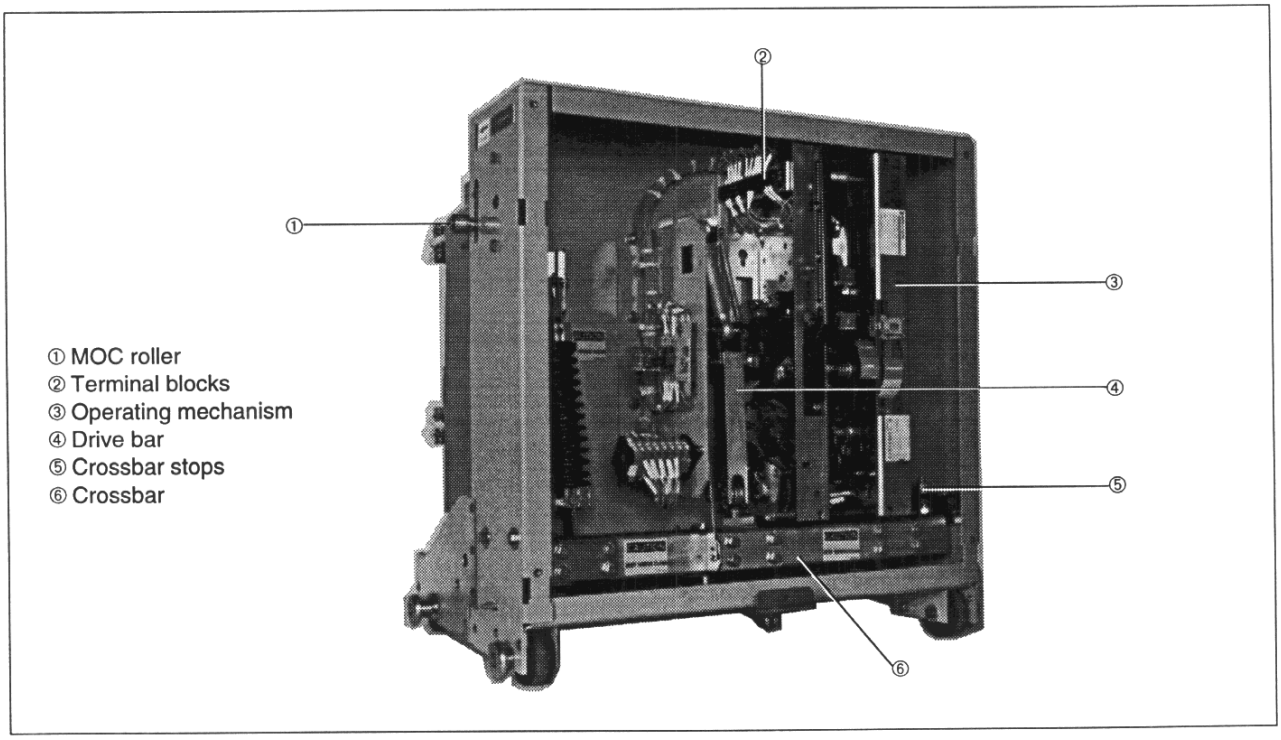


Figure 3: Circuit breaker, left front view without cover

Closing Springs

The closing springs (figure 4) close the circuit breaker when the close pushbutton is pressed or when the closing coil is energized. These springs are charged (compressed) either manually with the manual charging arm (figure 1) or electrically by the spring charging motor.

When control power is applied to the circuit breaker, the spring charging motor is energized. The charging motor turns the gear box gears which drive the ratchet assembly up and down.

The ratchet assembly rotates the drive shaft compressing the closing springs. As the springloads pass top-dead center, the drive shaft rotates a few degrees until the closing latch roller engages the closing latch. The drive shaft can rotate no further; the closing springs are held in this charged position until a closing operation is initiated by the close pushbutton or closing coil.

Opening Springs

The opening springs (figure 4) open the circuit breaker when the open pushbutton is pressed or the opening coil is energized. These springs are compressed whenever the circuit breaker is in the closed position.

Control Circuit

Figure 5 shows a typical schematic diagram for the control circuit of the Type VR circuit breaker. The following paragraphs describe the control circuit components. The control circuit design may vary, depending upon customer requirements. Always refer to the schematic diagram for the specific equipment in question.

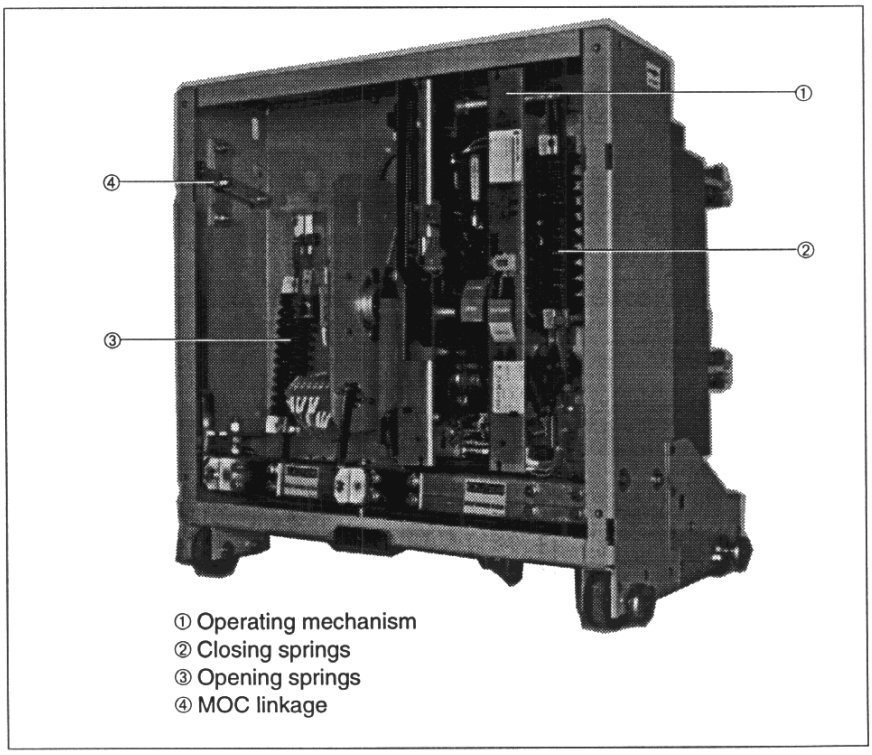
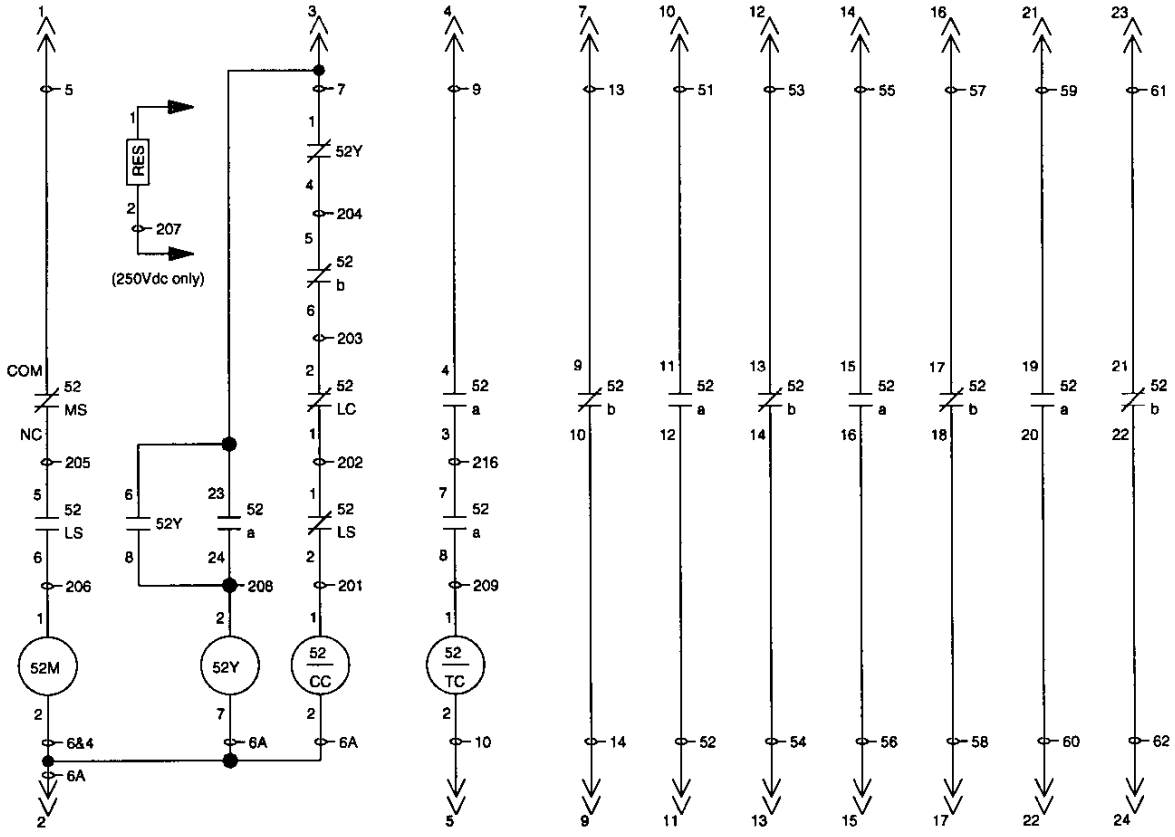
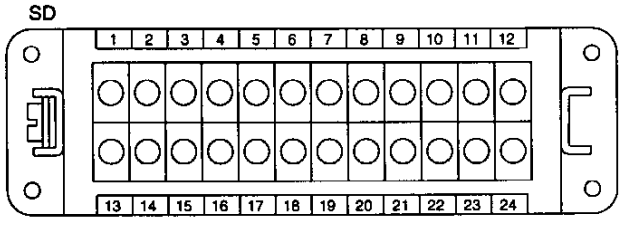


Figure 4: Circuit breaker, right front view without cover



LEGEND	
52M	Spring Charging Motor
52Y	Anti-Pump Relay
52/a	Aux. Switch, Open When Breaker Open
52/b	Aux. Switch, Closed When Breaker Open
52/CC	Close Coil
52/LC	Latch Check Switch
52/LS	Motor Limit Switch
52/MS	Motor Cutoff Switch
52/TC	Trip Coil
RES	Resistor (250Vdc Closing Only)



Rear View of Circuit Breaker Control Plug

1 = 5 (MS-COM)	9 = 14 (AS-10)	17 = 58 (AS-18)
2 = 6A (Y-7)	10 = 51 (AS-11)	18 = 28 (TBM-11)
3 = 7 (Y-1)	11 = 52 (AS-12)	19= 29 (TBM-12)
4 = 9 (AS-4)	12 = 53 (AS-13)	20 = 27 (TBM-13)
5 = 10 (TBM-10)	13 = 54 (AS-14)	21 = 59 (AS-19)
6 = 4 (TBM-4)	14 = 55 (AS-15)	22 = 60 (AS-20)
7 = 13 (AS-9)	15 = 56 (AS-16)	23 = 61 (AS-21)
8 = 8A (TBM-8)	16 = 57 (AS-17)	24 = 62 (AS-22)

Figure 5: Control circuit schematic

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Auxiliary Switch

The auxiliary switch (figure 6) is a multi-stage switch used to operate circuits that depend on the position of the circuit breaker contacts. The schematic diagram illustrates how each of the auxiliary switch contacts interconnect with the circuit breaker circuitry. The auxiliary switch functions as follows:

- Two 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 7) energizes the spring charging motor when a closing spring charging operation is required. The motor limit switch de-energizes the spring charging motor when the closing springs reach the fully charged position.

As shown in the schematic diagram, the motor limit switch is connected to the motor in the normally open position. When the closing springs are in the discharged position, the motor limit switch cam actuates the motor limit switch. This energizes the motor and disables the closing coil. Once the closing springs are fully charged, the cam allows the switch to assume the open position, de-energizing the spring charging motor.

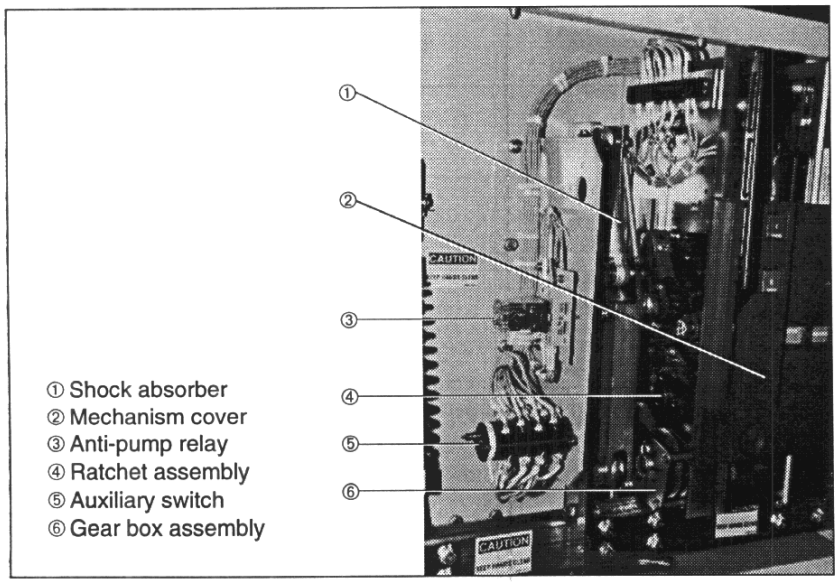

Figure 6: Left side of mechanism

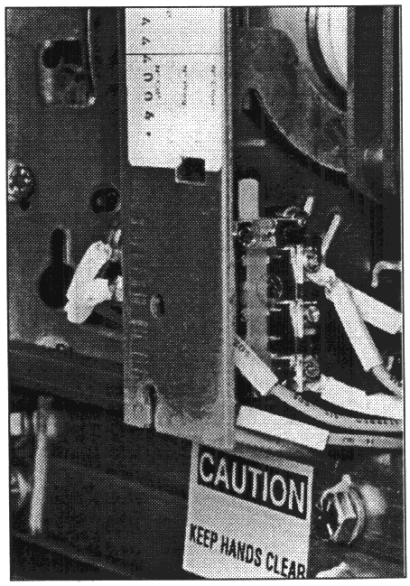

Figure 7: Motor limit switch

Spring Charging Motor

When energized by the closing of the motor limit switch, the spring charging motor (figure 8) drives the series of connected gears. These gears in turn raise and lower the ratchet assembly and rotate the drive shaft.

As the drive shaft rotates, the closing springs compress to the charged position. When the closing springs are fully charged, the motor limit switch contacts reopen, de-energizing the spring charging motor.

Anti-Pump Relay

If the closing coil circuit is continuously energized, the anti-pump relay (figure 6) 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 closing springs are fully charged, and
- the spring charging motor is de-energized

The anti-pump relay activates when the close circuit and spring charging motor are energized. If the close circuit is energized continuously, the anti-pump relay will be latched in the energized position after the motor is de-energized. 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 9) allows the circuit breaker to be used for reclosing applications. The contacts of the latch check switch connect in series with the closing coil. When the trip latch moves out of its normal position, it activates the latch check switch. The closing circuit cannot be energized until the trip latch fully returns to its normal position and the mechanism is in position to allow a close operation.

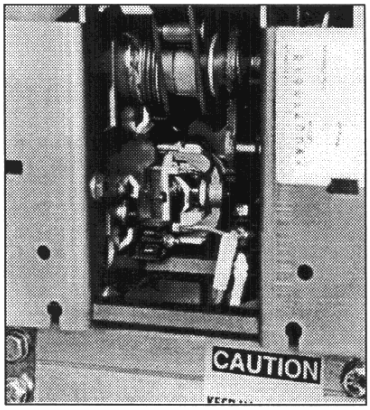

Figure 8: Spring charging motor

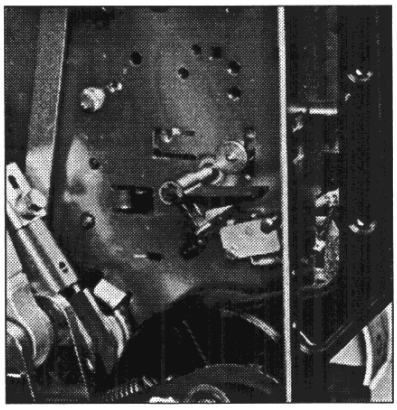

Figure 9: Latch check switch

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Motor Cutoff Switch

The motor cutoff switch (figure 10) is located under the base of the Type VR circuit breaker. The motor cutoff switch de-energizes the spring charging motor circuit during racking of the circuit breaker or removal from the cell.

Trip and Close Coils

The standard location of the trip and close coils (figure 11) is in the upper center of the operating mechanism. When energized by the switchgear or remote circuitry, these coils release the open or close latches located inside the mechanism.

NOTE: Optional tripping and closing functions could require that these coils be located on the outside of the mechanism frame.

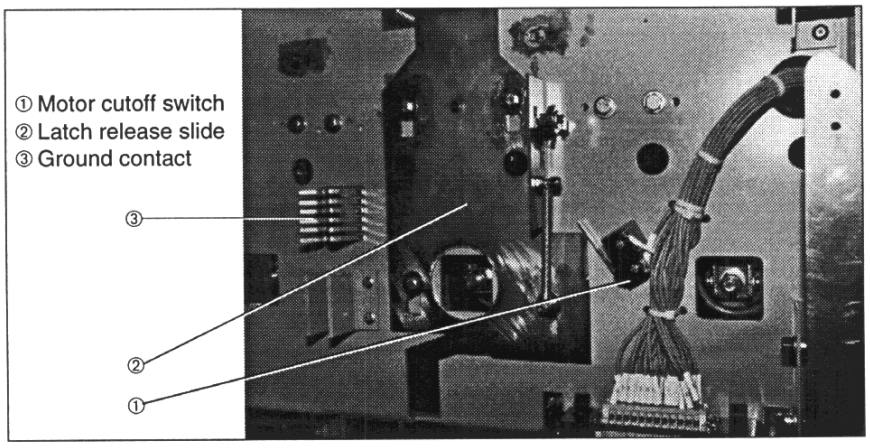

Figure 10: Circuit breaker, bottom view

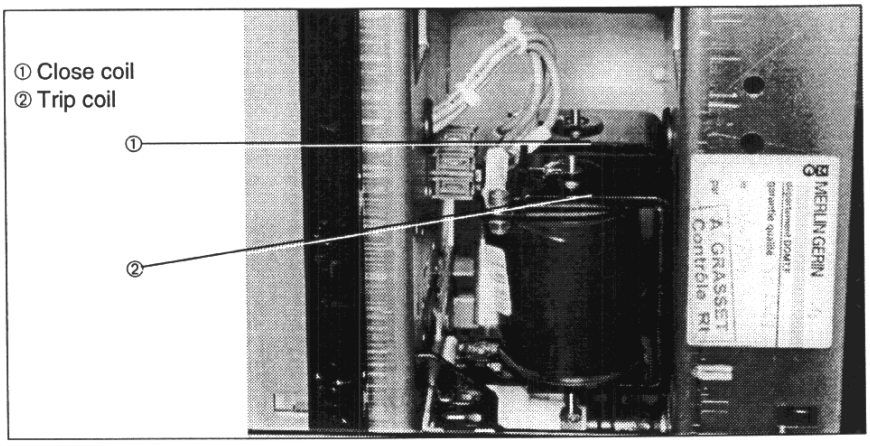

Figure 11: Trip coil and close coil

SECTION 5—INITIAL CIRCUIT BREAKER PREPARATION

Before installing the circuit breaker into the cell in the switchgear, perform the preparation and checkout procedures in this section.

Inspection

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.

Manual Open/Close

Manually open and close the circuit breaker several times to verify proper operation. Proceed as follows:

1. Check the indicators (figure 12) to verify that the circuit breaker is in the open position with all springs discharged. If it is not in this position, press the **OPEN**, **CLOSE**, and **OPEN** pushbuttons.
2. Pull the manual charging arm (figure 12) all the way down and back up to the starting position. Repeat this process until the springs are fully charged. They are fully charged when the charging arm resists any further motion and CHARGED is visible in the indicator window.
3. Press the **CLOSE** pushbutton to close the circuit breaker.
4. Press the **OPEN** pushbutton to open the circuit breaker.
5. Repeat steps 1–4 at least three times to verify proper operation.

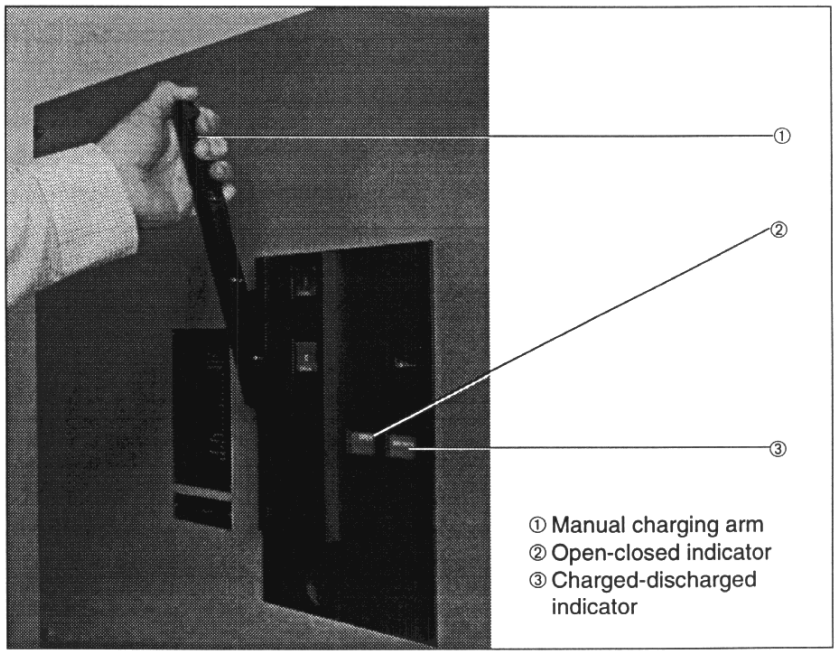

Figure 12: Charging the springs for manual open/close

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Hi-Pot test

⚠ DANGER

HAZARD OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

When performing the hi-pot test:

- **Do not exceed the voltages specified in Table 1.**
- **Keep all people at least six feet away from the circuit breaker being tested.**
- **Discharge to ground the primary disconnects and the vacuum interrupter mid band ring before handling. These areas can retain a static charge after a hi-pot test.**

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

To ensure that no damage has occurred during shipment, check the circuit breaker as follows:

1. Perform a hi-pot test across the open contacts of each vacuum interrupter.
2. With the circuit breaker in the closed position, perform a phase-to-ground and phase-to-phase hi-pot test for each pole.
3. Gradually increase the voltage to the levels indicated in Table 1.

Table 1 Hi-Pot Test Voltages

Equipment Rating	Field Test Voltage	
	AC	DC
5 kV	14 kV	20 kV
15 kV	27 kV	38 kV

4. Verify that the circuit breaker sustains the specified voltage without flashover for one minute. If it does not, inspect the insulators for leakage paths. If necessary, clean the surface of each insulator and repeat steps 1–3.
5. Discharge the primary disconnects and vacuum interrupters to ground.

SECTION 6—INSTALLATION

Site Preparation

Refer to site preparation procedures in the switchgear instruction bulletin.

Racking In Procedure

For convenience, the racking in procedure is included here. Refer to the appropriate switchgear instruction bulletin for complete details.

1. Roll the Type VR circuit breaker into the correct circuit breaker cell.
2. To operate the circuit breaker in the test position (with the primary contacts still disconnected), refer to "Test Position Operation" in section 7.
3. To move the circuit breaker into the connected position, rotate the racking shaft (located in the floor of the circuit breaker cell) clockwise using a Square D approved racking handle.

   The circuit breaker must be in the* open *position when it is racked into or out of its cubicle. The circuit breaker mechanism interlocks with the racking assembly allowing the racking shaft to rotate only when the circuit breaker is in the open position.
4. Rotate the racking shaft until the racking mechanism stops and the position indicator reads CONNECTED.

   NOTE: Do not over-torque the racking shaft.

⚠ CAUTION

HAZARD OF EQUIPMENT DAMAGE.

Verify that the Type VR circuit breaker is installed in the proper cell.

Failure to observe this precaution can cause damage to equipment.

SECTION 7—OPERATION

Test Position Operation

The secondary disconnect (figure 2) mounts on a retractable slide so that it can connect the circuit breaker to the control circuit of the cell before the primary connections are made. This provides a convenient method for electrically testing the operation of the circuit breaker mechanism.

To operate the circuit breaker in the test position:

1. Roll the circuit breaker into the test position of the cell (figure 13). Do not rack the circuit breaker into the cell.
2. Locate the secondary disconnect handle in the floor of the cell. Rotate it 90° and pull it straight out until the control plug inserts into the back of the circuit breaker.
3. The control circuit of the circuit breaker is now connected with that of the cell. If the control circuit is energized, this connection immediately activates the spring charging motor inside the circuit breaker. The circuit breaker may now be operated either electrically or manually.

Closing Spring Charging

Pull the manual charging arm (figure 12) all the way down and back up to the starting position. Repeat this process until the closing springs are fully charged. They are fully charged when the charging arm resists any further motion and CHARGED is visible in the indicator window. If the circuit breaker is connected to an energized control circuit, the spring charging motor will automatically charge the closing springs and manual charging is not necessary.

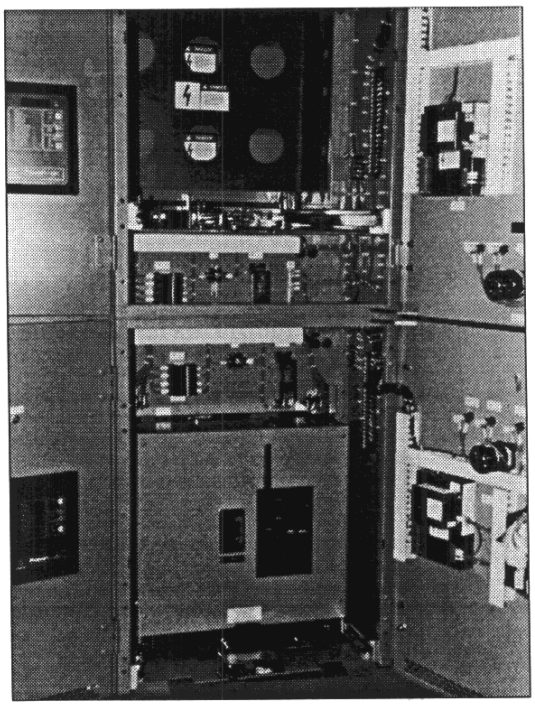

Figure 13: Type VR circuit breaker in test position

Closing Operation

After charging the closing springs, close the breaker by pressing the **CLOSE** pushbutton or energizing the closing coil. The CLOSE pushbutton releases the closing latch allowing the closing springs to discharge. The closing springs push down on the crossbar, which is connected to the vacuum interrupters, closing the vacuum interrupter contacts.

Opening Operation

If the circuit breaker is in the closed position, the opening springs will automatically be charged (compressed). If the open pushbutton is pressed or the opening coil is energized, the mechanism releases the opening latch and allowing the opening springs to discharge. The opening springs pull up on the crossbar, which is connected to the vacuum interrupters, opening the vacuum interrupter contacts.

Racking Out Procedure

1. Open and discharge all springs of the circuit breaker by pressing the **OPEN** pushbutton, the **CLOSE** pushbutton, and then the **OPEN** pushbutton.
2. Place the racking handle onto the racking shaft. Use only a Square D approved racking handle.
3. Rotate the racking handle counterclockwise until the racking mechanism stops and the position indicator reads TEST/DISCONNECTED. Do not over-torque the racking shaft.
4. To remove the circuit breaker from a lower cell, open the front door and pull the pull handle on the lower front of the circuit breaker. Roll the circuit breaker out of the cell and onto the floor.

   If the circuit breaker is in an upper cell, a Square D Series 5 lift truck must be used to remove it.

⚠ WARNING

HAZARD OF PERSONAL INJURY.

A Square D Series 5 lift truck must be used to remove the circuit breaker if it is in an upper cell.

Failure to observe this precaution can cause death or severe personal injury!

Locking Provision

The racking mechanism located in the cell floor can be locked with a padlock, as shown in figure 14.

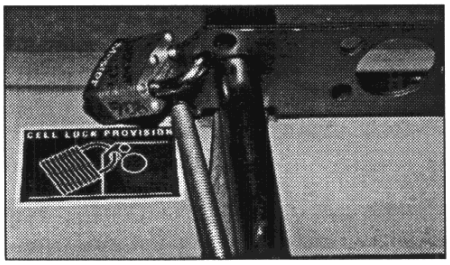

Figure 14: Padlock provision

SECTION 8 —MAINTENANCE

Because Type VR circuit breakers are used in a variety of applications and environments, maintenance schedules should be developed for the particular end use. Until then, 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 (see below). This section covers proper inspection and maintenance procedures for Type VR circuit breakers.

⚠ WARNING

HAZARD OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

Before performing any maintenance or repair work:

- **Always remove the circuit breaker completely from the cell.**
- **Press OPEN, CLOSE, and OPEN pushbuttons to discharge all springs.**

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

General Inspection

Visually inspect the entire circuit breaker and operating mechanism for obvious loose parts or connections. Examine the circuit breaker for evidence of overheating or excessive dirt or moisture.

Insulating Surfaces

Using a clean, dry cloth, remove all dirt and moisture from the outside of the vacuum interrupters and from the insulating parts.

Vacuum Interrupters

NOTE: This topic is included for information only. It is not necessary to make any adjustments on a new circuit breaker nor is it required for routine maintenance.

To measure the interruption capability of the vacuum interrupters, perform the following checks. If interrupter measurements consistently differ from the target values, it may need to be replaced as described in "Vacuum Interrupter Replacement."

1. **Contact erosion:** Contact erosion is the difference between the spring overtravel currently measured and the original factory measurement. When contact erosion exceeds 0.12 inch, the vacuum interrupter may need to be replaced as described on page 17.

   To measure spring overtravel, place the circuit breaker in the closed position. The spring overtravel (E-gap, figure 15) for a new vacuum interrupter assembly should be the distance shown in Table 2. Perform this measurement with a standard pin gauge.

Table 2
E-gap Settings

Short Circuit Current Rating	Initial E-gap	End of Life E-gap
18 kA	0.21 in.	0.09 in.
All others	0.19 in.	0.07 in.

NOTE: The spring overtravel (E-gap) is factory set and should only be adjusted when installing a new vacuum interrupter.

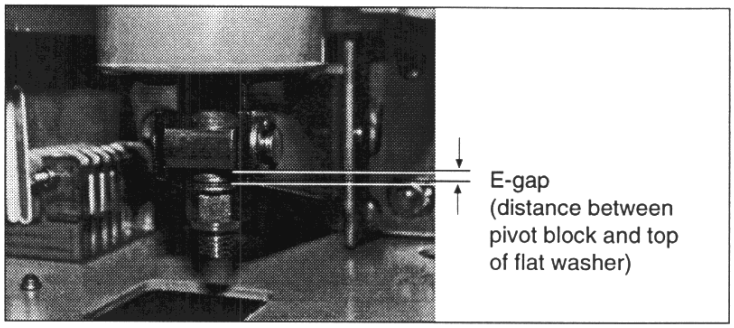

Figure 15: Spring overtravel

2. **Dielectric test**. Perform a hi-pot test on the circuit breaker according to the instructions in **Section 5—Initial Circuit Beaker Preparation.** Consistent unacceptable test results may indicate a loss of vacuum. The vacuum interrupter may need to be replaced as described in "Vacuum Interrupter Replacement" that follows.
3. **Resistance Measurement**. The resistance measurement from the upper conductor to the lower conductor on each phase of the circuit breaker should not exceed 50 micro ohms using a low-resistance ohm meter. A reading exceeding 50 micro ohms indicates that either a poor connection exists or that the vacuum interrupter has reached the end of its life cycle. The vacuum interrupter may need to be replaced as described in "Vacuum Interrupter Replacement" that follows.

Vacuum Interrupter Replacement

If a vacuum interrupter must be replaced because of severe interruptions, contact erosion, hi-pot test results, or high resistance, order an entire pole assembly. See Table 5 in section 9 for part numbers. Vacuum interrupters are sealed using metal bellows and are sensitive to excessive torque or improper handling.

To replace a pole assembly:

1. Open and discharge all springs of the circuit breaker by pressing the **OPEN** pushbutton, the **CLOSE** pushbutton, and then the **OPEN** pushbutton.
2. Remove the front cover of the circuit breaker. Using wood blocks for support, lay the circuit breaker with the mechanism facing down on a bench.

3. Remove the 1/2 - 13 nylock nut and flat washer from the bottom of the pushrod stud (figure 2).
4. Using a spanner wrench (or large pliers), turn the bias spring washer clockwise to relieve pressure on the bias spring. Turn the washer until it bottoms out.
5. Remove the four bolts and washers that fasten the molded housing to the mounting brackets. Using a crow bar, lift the molded housing up and away from the mounting brackets. Pull the pole assembly away so that the pushrod stud slides out of the pivot block (figure 2). Set the old pole assembly aside.
6. Inspect the new pole assembly to ensure that it contains the same parts as the old assembly (bias spring, threaded cylinder, washer, and spacer). Verify that the model number of the new interrupter matches the old interrupter.
7. Install the new pole assembly by first carefully sliding the pushrod stud through the pivot block. Place a standard 1/2 - 13 hex nut (not locknut) and flat washer on the end of the pushrod stud. Turn the nut clockwise to pull the stud outward through the pivot block. Turn the nut until the flat washer bottoms out on the threaded cylinder.

   NOTE: Verify that the threaded cylinder is centered inside the pivot block.
8. Fasten the molded housing to the mounting brackets with the four bolts and washers.
9. Remove the standard 1/2 - 13 hex nut and flat washer. Using the spanner wrench, rotate the bias spring washer counterclockwise three to four turns while holding the pushrod.

⚠ WARNING

HAZARD OF EQUIPMENT DAMAGE.

Hold the pushrod with a crescent wench to keep it from turning when rotating the 1/2 inch nylock nut or bias spring washer.

Failure to observe this precaution will cause damage to the vacuum interrupter.

10. Reinstall the 1/2 - 13 nylock nut and flat washer while holding the pushrod. Turn the nut clockwise until the flat washer bottoms out on the threaded cylinder.
11. Stand the circuit breaker back up on its wheels. Block the wheels to secure the circuit breaker in place. Manually charge the closing springs by moving the manual charging arm up and down. Press the **CLOSE** pushbutton to close the circuit breaker.
12. Operate the circuit breaker at least 75 times to seat the contacts.

13. Measure the E-gap of the new pole assembly as shown in figure 15. If the measurement is not within 0.03 inch of the value specified in Table 2, adjust the E-gap as follows:
    a. Open and discharge all springs of the circuit breaker by pressing the **OPEN** pushbutton, the **CLOSE** pushbutton, and then the **OPEN** pushbutton.
    b. Loosen the 1/2 - 13 nylock nut a few turns while holding the pushrod. If the E-gap is too large, turn the bias spring washer clockwise (as viewed from below) to reduce the E-gap.
    c. Retighten the 1/2 - 13 nylock nut while holding the pushrod. Cycle the circuit breaker several times and remeasure the E-gap.
    d. Repeat steps a through c until the measurement is within 0.03 inch of the value specified in Table 2.

Contact Gap

NOTE: The contact gap measurement is not required on a new circuit beaker or as part of routine maintenance. Perform the following procedure if it is necessary to set the contact gap.

1. Place the circuit breaker in the open position with the closing springs discharged.
2. At the lower end of each vacuum interrupter, measure the distance between the top of the bottle clamp and the bottom of the bottle support bracket using calipers. Record this measurement.
3. Place the circuit breaker in the closed position with the closing springs discharged.
4. Repeat step 2.
5. Determine the contact gap by taking the difference between the measurement obtained in step 2 and that obtained in step 4. If the contact gap is 0.44 ± 0.06 inch, no adjustment is required. If the contact gap is not 0.44 ± 0.06 inch, proceed to step 6.
6. Adjust contact gap as follows:
    a. Place the circuit breaker in the closed position with the closing springs discharged.
    b. Loosen locknuts and turn the crossbar stops (figure 3) clockwise (as viewed from above) to decrease the contact gap or counterclockwise to increase the contact gap. Adjust both stops equally.
7. Tighten the locknuts against the stops. Open and close the circuit breaker.
8. Repeat steps 1–7 until the contact gap is 0.44 ± 0.06 inch.

PRELIMINARY

Lubrication

The lubrication chart in Table 3 gives the location of each lubrication point and the method of lubrication required. Under normal conditions, lubricate after 3,000 operations or three years, whichever occurs first.

More adverse conditions may require more frequent lubrication intervals and different procedures. Any variations should be based on the experience of the operating company.

⚠ WARNING

HAZARD OF PERSONAL INJURY OR EQUIPMENT DAMAGE.

Disassembly and reassembly of this circuit breaker without following proper procedures can cause improper operation, resulting in damage to the circuit breaker and injury to the operator.

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

Table 3
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.*
MOC linkage	Wipe clean and apply lubricant.*
Motor eccentric and eccentric roller	Wipe clean and apply lubricant.*
Primary disconnect contacts and ground contact	Wipe clean and apply contact grease, such as Mobilux EP 1, Square D part number 1615-100790.

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

SECTION 9—REPLACEMENT PARTS

Tables 4 and 5 list factory-recommended replacement parts. Each replacement part is shipped with complete assembly and adjustment instructions.

NOTE: Standard hardware components are not listed and should be purchased locally.

Table 4
Replacement Parts

Description	Part No.	Rated Voltage
Charging Motor and Gear Box Assembly	46040-476-50	48 Vdc
	46040-476-51	125 Vdc
	46040-476-52	250 Vdc
	46040-476-51	120 Vac
	46040-476-52	240 Vac
Anti-Pump Relay	46040-477-50	48 Vdc
	46040-477-51	125 Vdc
	46040-477-52	250 Vdc
	46040-477-53	120 Vac
	46040-477-54	240 Vac
Closing Coil	46040-478-50	48 Vdc
	46040-478-51	125 Vdc
	46040-478-52	250 Vdc
	46040-478-53	120 Vac
	46040-478-54	240 Vac
Trip Coil	46040-479-50	24 Vdc
	46040-479-51	48 Vdc
	46040-479-52	125 Vdc
	46040-479-53	250 Vdc
	46040-479-54	120 Vac
	46040-479-55	240 Vac
Dual Trip Coil	46040-480-50	24 Vdc
	46040-480-51	48 Vdc
	46040-480-52	125 Vdc
	46040-480-53	250 Vdc
	46040-480-54	120 Vac
	46040-480-55	240 Vac
Undervoltage Trip Coil	46040-491-50	24 Vdc
	46040-491-51	48 Vdc
	46040-491-52	125 Vdc
	46040-491-53	250 Vdc
	46040-491-54	120 Vac
	46040-491-55	240 Vac
Contact Finger Assy (1200A)	46040-481-50	—
Contact Finger Assy (2000A)	46040-481-51	—
Ground Contact	46040-482-50	—
Latch Check Switch	46040-483-50	—
Auxiliary Switch	46040-484-50	—
Motor Limit Switch	46040-485-50	—
Motor Cutoff Switch	46040-486-50	—
Shock Absorber	46040-487-50	—
Mechanism Cover	46040-488-50	—

Table 5
Pole Assembly Replacement Parts

Circuit Breaker			Pole Assy. Part No.
4.76 kV	29 kA	1200A	46040-489-50
4.76 kV	29 kA	2000A	46040-490-50
8.25 kV	35 kA	1200A	46040-489-53
8.25 kV	35 kA	2000A	46040-490-53
15.0 kV	18 kA	1200A	46040-489-51
15.0 kV	18 kA	2000A	46040-490-51
15.0 kV	28 kA	1200A	46040-489-52
15.0 kV	28 kA	2000A	46040-490-52

PRELIMINARY

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.
- For electrical components specify operating voltage also.

PRELIMINARY

Square D Company
330 Weakley Road
Smyrna, TN 37167 USA

Order No. 6055-31

Printed in USA