

# Power Break® II Circuit Breaker Accessories

## Motor Operator Mechanism

### Introduction

The Motor Operator Mechanism, shown in Figure 1, can be installed in 800–4000 A frame Power Break® II circuit breakers. It provides a means of remotely or automatically charging the springs that close the breaker. Table 1 lists the catalog numbers and corresponding electrical data for the available models. Note that the Remote Close and Shunt Trip accessories are not included with the Motor Operator Mechanism; they must be ordered separately.

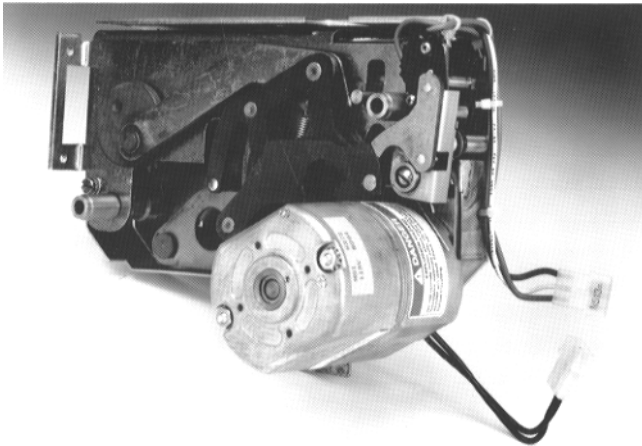


Figure 1. Motor Operator Mechanism.

### Remote Operation

The circuit breaker closing springs can be charged remotely by shorting terminals 17 and 35 on the terminal block on the right side of the breaker, with a push button or similar device, for a minimum of five seconds. Power for the Motor Operator must also be applied to terminals 18 and 36, as shown in the wiring diagram in Figure 6.

### Automatic Operation

Connect terminals 17 and 35 on the terminal block on the right side of the breaker with a jumper wire. The Motor Operator will automatically recharge the breaker closing springs whenever the breaker closes.

**CAUTION:** Do not wire breakers for both automatic charge and automatic close.

**ATTENTION:** Ne pas câbler les disjoncteurs pour tous les deux l'armement automatique et la fermeture automatique.

Rated Voltage (50–60 Hz)	Control				Charge Time (sec) ①	Recommended Fuse (Slo-Blo)
	Voltage Rating	Peak Inrush Current, A	Peak Full-Load Current, A	Average Current, A		
24 Vdc	21–27 Vdc	30.0	14.0	11.0	3.0 (nom)	12 A, 125 V
48 Vdc	41–53 Vdc	18.0	7.0	4.5	3.0 (nom)	7 A, 125 V
72 Vdc	62–80 Vdc	10.0	4.5	3.0	3.0 (nom)	5 A, 125 V
120 Vac	102–132 Vac	7.5	4.0	2.0	3.0 (nom)	4 A, 125 V
125 Vdc	106–137 Vdc	8.0	2.5	1.8	3.0 (nom)	2.5 A, 125 V
240 Vac	204–264 Vac	6.0	2.5	1.0	3.0 (nom)	2.5 A, 250 V

① Charging times apply to nominal voltage only; times may vary at maximum and minimum voltages.

Table 1. Electrical data for the Motor Operator Mechanism.

## Installation in 800–4000 A Stationary Breaker

**WARNING :** Before installing any accessories, turn the breaker off, disconnect it from all voltage sources, and discharge the closing springs.

**AVERTISSEMENT:** Avant d'installer tout accessoire, mettre le disjoncteur en position OFF, le déconnecter de toute tension d'alimentation, et décharger les ressorts d'armement.

Use the following procedure to install the Motor Operator Mechanism onto a stationary circuit breaker.

1. Verify that the rating on the Motor Operator Mechanism identification plate matches the voltage rating required for the application, as listed in Table 1.
2. Check that the package contains all the parts listed in Table 2. If any components are missing, contact the Customer Support Center at 800-843-3742. Note that the Remote Close and Shunt Trip accessories are not included with the Motor Operator Mechanism; they must be ordered separately.

Description	Quantity
Motor Operator Assembly	1
1/4 -20 x 3-inch Flat-Head Screw	2
1/4 -inch Conical Lock Washer	2
Mounting Bracket	1
#10-32 x 1/4 inch Screw	6
#10 Lock Washer	6
Labels	2

Table 2. Parts list for the Motor Operator Mechanism.

3. Verify that the charge arms of the Motor Operator Mechanism are in the discharged position, as illustrated in Figure 2.
4. Turn the breaker off and discharge the closing spring by depressing the OFF and ON buttons in the sequence OFF-ON-OFF. Verify that the breaker OFF-ON indicator shows OFF on a green background and that the charge indicator shows DISCHARGED on a white background.
5. Loosen the four #8-32 screws on the trim-plate assembly and remove the trim plate.
6. Loosen the four screws at the corners of the breaker cover. Crank the operating handle one time and hold it extended to remove the cover from the breaker face, as illustrated in Figure 3. The Motor Operator can be safely installed with such a partially charged mechanism.

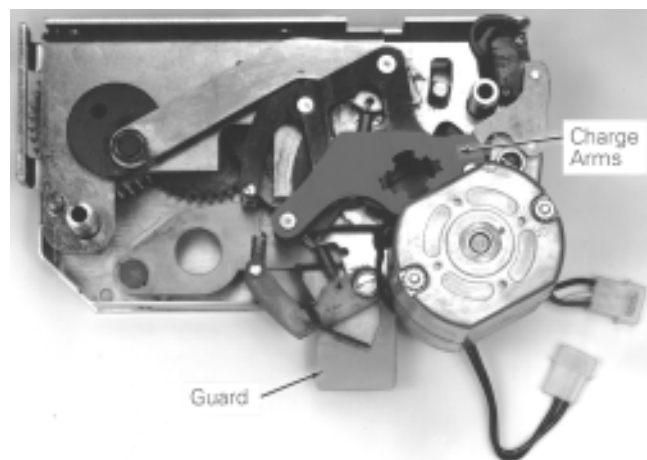


Figure 2. Motor Operator Mechanism charge arms in the discharged position.



Figure 3. Removal of the breaker top cover.

7. Remove the screw holding the left secondary terminal block to the midcover and lift the terminal block up and away from its mounting ridge on the midcover.
8. Install the Remote Close accessory at this time if the breaker is to be equipped with this option.
9. **Remove and discard the bottom screw, shown in Figure 4, that attaches the stop block to the spring frame.**
10. Position the charge interlock rod of the breaker down against the midcover.
11. While holding the charge arm of the Motor Operator Mechanism in the discharged position, align the splined closing shaft of the breaker with the splined cutout in the hub of the charge arm, as shown in Figure 4. Tilt the right end of the mechanism up so that the guard (see Figure 2) clears the lip on the side of the breaker, as shown in Figure 5. Push the Motor Operator Mechanism in past the lip, rotate it back down, then push it onto the breaker until the spacers engage the spring frame and the stop block.

12. Attach the Mounting Bracket to the four holes opposite the stop block on the spring frame with #10-32 screws tightened to 32 in-lb torque. The bend of the bracket must be outward from the spring frame.
13. Align the two holes in the Mounting Bracket with the two holes in the Motor Operator Mechanism and attach with two #10-32 screws tightened to 32 in-lb torque.
14. Thread a 1/4-20 flat-head screw and conical lock washer through the spacer and into the stop block, as illustrated in Figure 4. Thread the other 1/4-20 flat-head screw and conical lock washer through the spacer into the captive nut in the spring frame. Tighten both screws to 70 in-lb.
15. Plug the color-coded, numbered Motor Operator Mechanism wires into the corresponding numbered sockets, as illustrated in Figure 6. Mating connector wires are installed at the factory and are located in the gray-painted channel, shown in Figure 5.
16. Dress the wires and install cable ties as shown in the illustration in Figure 7. Ensure that wires are clear of all moving parts.
17. Reinstall the secondary terminal block onto the breaker midcover terminal block mounting ridge and fasten with the screw previously removed.
18. Crank the operating handle once and hold the handle extended to reinstall the breaker top cover. Tighten the four #10-32 mounting screws to 15 in-lb.
19. Replace the trim plate and tighten the four #8-32 screws to 20 in-lb.
20. Affix the accessory rating label to the breaker cover above the right-side secondary terminal block.
21. Affix the "Electrically Operated" label to the top cover over the knock-out space above the ON-OFF indicator flag.
22. Crank the operating handle until the closing springs are completely charged.
23. Close and trip the breaker.
24. Test the Motor Operator Mechanism electrically according to Table 1.

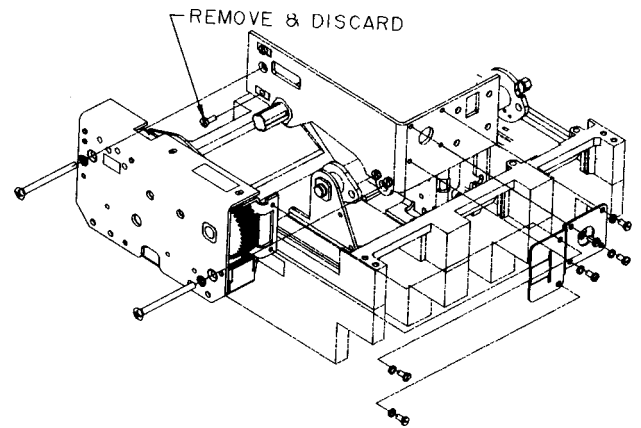


Figure 4. Installing the Motor Operator Mechanism onto the breaker.

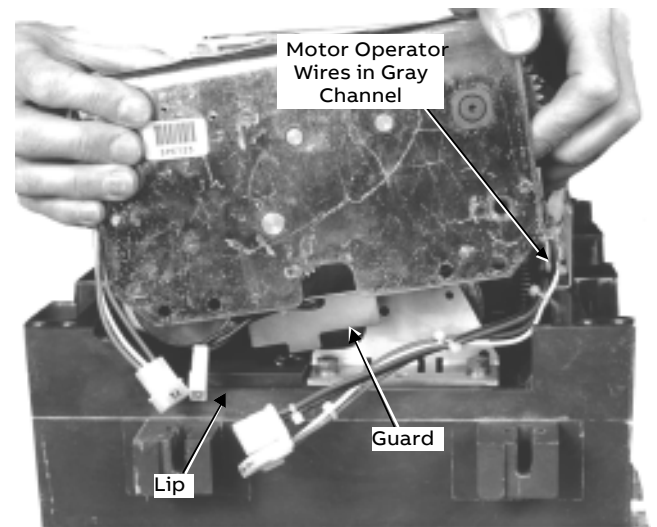


Figure 5. Rotating the Motor Operator Mechanism so that the guard clears the lip on the side of the circuit breaker.

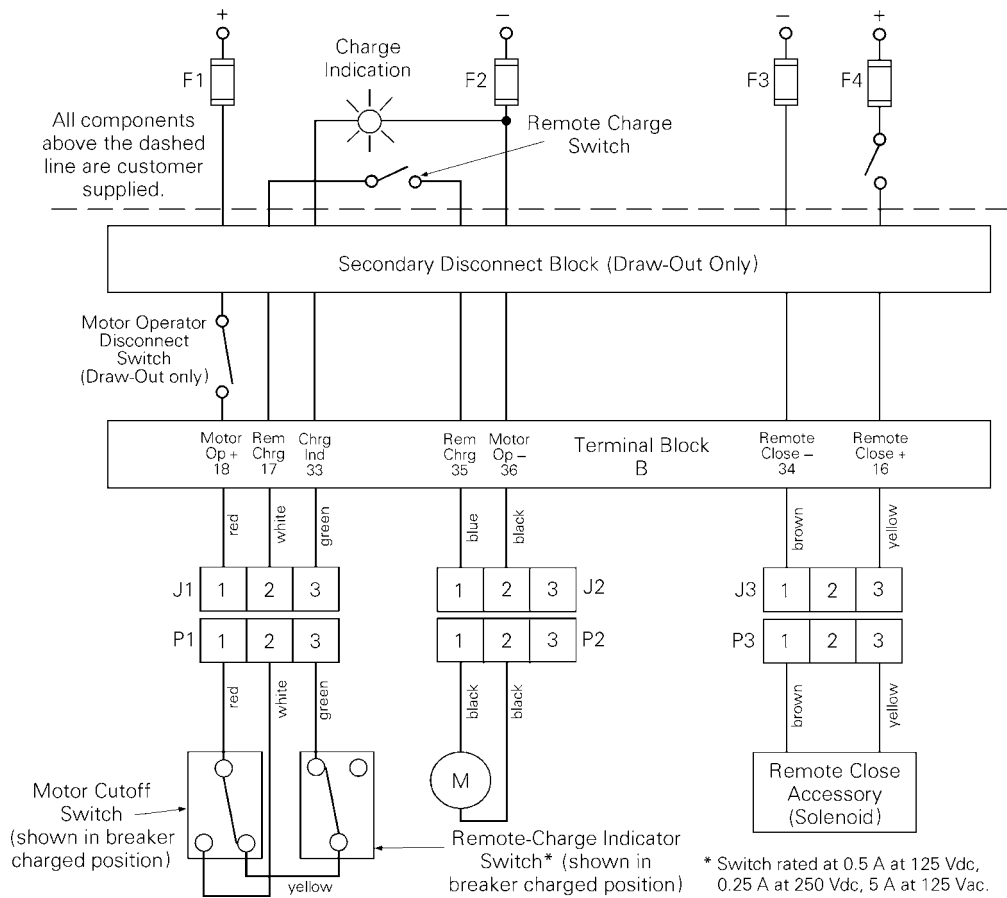


Figure 6. Wiring diagram of the Motor Operator Mechanism and Remote Close accessories.

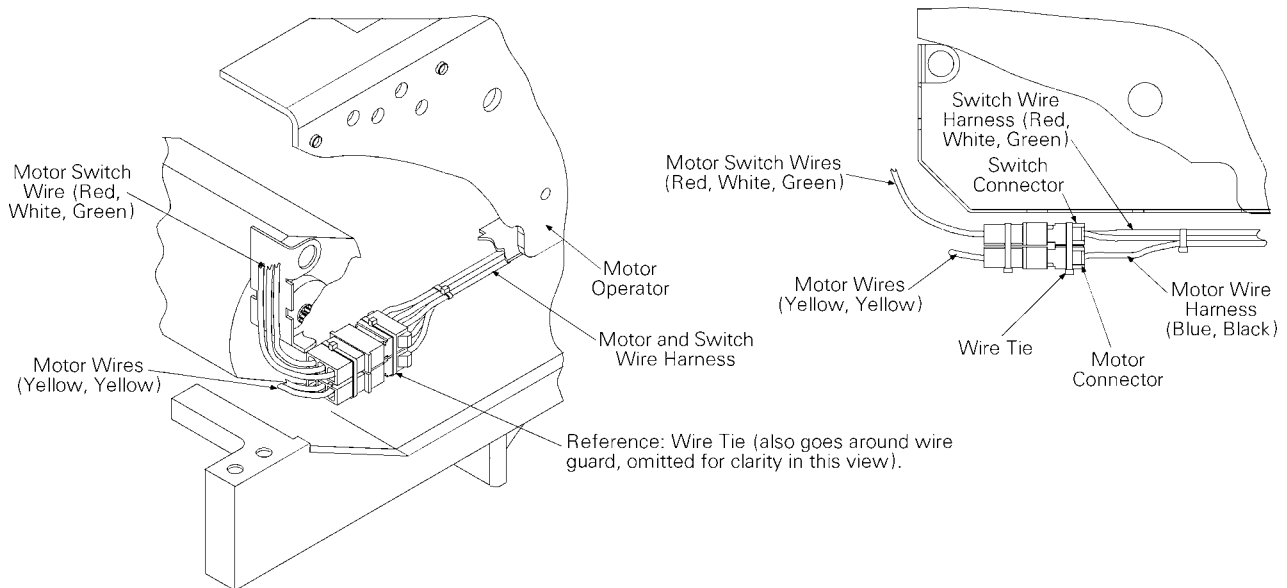


Figure 7. Installing the Motor Operator wires.

## Installation in 800–2000 A Draw-Out Breaker

**WARNING:** Before installing any accessories, turn the breaker off, disconnect it from all voltage sources, and discharge the closing springs.

**AVERTISSEMENT:** Avant d'installer tout accessoire, mettre le disjoncteur en position OFF, le déconnecter de toute tension d'alimentation, et décharger les ressorts d'armement.

Use the following procedure to install the Motor Operator Mechanism onto an 800–2000 A draw-out circuit breaker.

1. Verify that the rating on the Motor Operator Mechanism identification plate matches the voltage rating required for the application, as listed in Table 1.
2. Check that the package contains all the parts listed in Table 2. If any components are missing, contact the Customer Support Center at 800-843-3742. Note that the Remote Close and Shunt Trip accessories are not included with the Motor Operator Mechanism; they must be ordered separately.
3. Verify that the charge arms of the Motor Operator Mechanism are in the discharged position, as illustrated in Figure 2.
4. Turn the breaker off and discharge the closing spring by depressing the OFF and ON buttons in the sequence OFF-ON-OFF. Verify that the breaker OFF-ON indicator shows OFF on a green background and that the charge indicator shows DISCHARGED on a white background.
5. Engage the ½-inch square end of the racking shaft with the supplied wrench, catalog number TDORT, as illustrated in Figure 8, and rotate the shaft counter-clockwise to withdraw the breaker to the DISCONNECTED position.
6. Pull the substructure rails out as far as possible until they drop into the horizontal locked position, as illustrated in Figure 9.
7. From the DISCONNECTED position, pull the breaker out on the rails until the front rollers fall into the detent.
8. Attach the Lifting Bar, catalog number TDOLB, by locating the hooks on the bar beneath the shoulder studs on the breaker, as illustrated in Figures 10 and 11.
9. Remove the breaker from the draw-out substructure and place it on a suitable work surface.
10. Loosen the four #8-32 screws on the trim plate assembly, if so equipped, and remove the trim plate. If stand-offs are also installed, remove those as well.

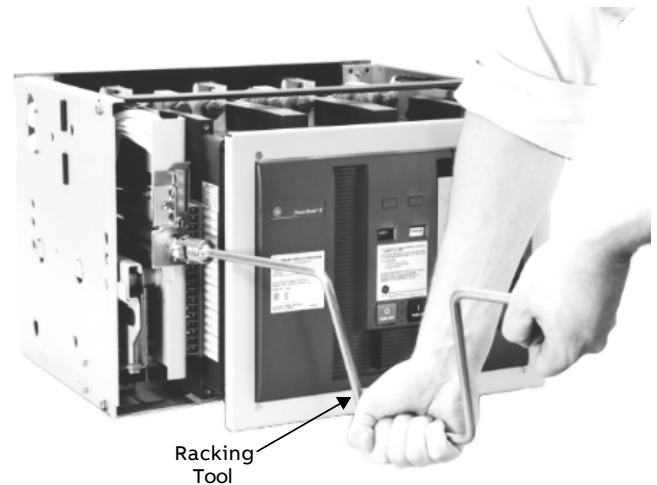


Figure 8. Wrench attached to the breaker racking shaft.



Figure 9. Withdrawing the substructure rails.

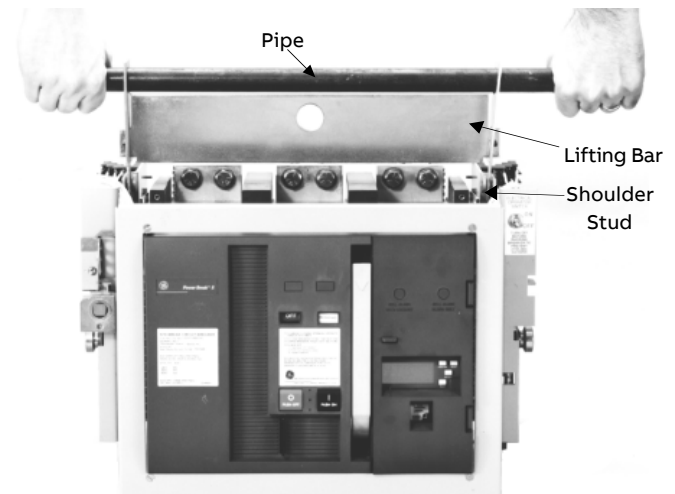


Figure 10. Lifting Bar attached to the breaker for manual lifting.

11. Loosen the four screws at the corners of the breaker cover. Crank the operating handle one time and hold it extended to remove the cover from the breaker face, as illustrated in Figure 3. The Motor Operator can be safely installed with such a partially charged mechanism.
12. Remove the retaining screw and snap ring (using an appropriate snap ring pliers) that hold the chain guard in place on the rear of the breaker, as shown in Figure 12, then remove the guard.
13. Remove the two screws holding the breaker side plate in place, as shown in Figure 13.
14. Tilt the side plate away from the breaker, then remove the racking chain from the gear, as shown in Figure 14.
15. Remove the screw holding the secondary terminal block to the midcover, as illustrated in Figure 15, and lift the terminal block up and away from its mounting ridge.
16. Turn the breaker so that it is resting on the primary disconnects, as illustrated in Figure 16. Be careful not to lose the white nylon plunger that will fall out from the back of the breaker, as it must be reinstalled when the breaker is reassembled.
17. Follow steps 8 to 17 in the installation procedure for the stationary breaker.
18. Turn the breaker to its original position, carefully reinserting the nylon plunger in the rear of the breaker.
19. Replace the chain on the gear, then tilt the side plate back into place. Replace the two mounting screws, tightening them to 70 in-lb.
20. Replace the chain guard and fasten it in place with the retaining screw and snap ring removed earlier.
21. Crank the operating handle once and hold the handle extended to reinstall the breaker top cover. Tighten the four #10-32 mounting screws to 15 in-lb.
22. Replace the trim plate and tighten the four #8-32 screws to 20 in-lb.
23. Affix the accessory rating label to the breaker cover above the right-side secondary terminal block.
24. Affix the "Electrically Operated" label to the top cover over the knock-out space above the ON-OFF indicator flag.
25. Crank the operating handle until the closing springs are completely charged.
26. Close and trip the breaker.
27. Test the Motor Operator Mechanism electrically according to Table 1.



Figure 11. Lifting Bar attached to the breaker for lifting with a hoist.

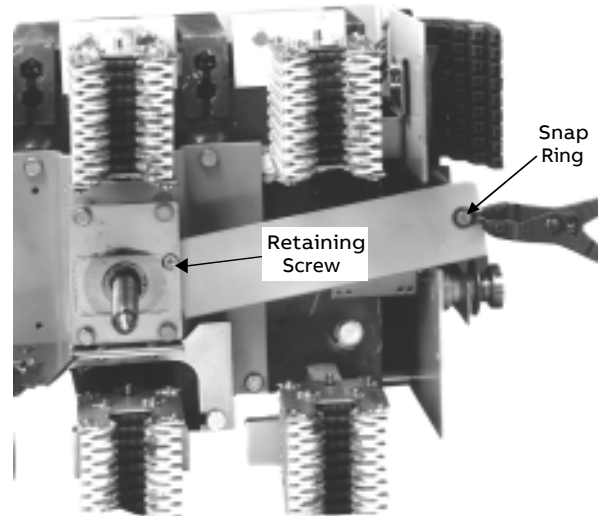


Figure 12. Locations of the retaining screw and snap ring on the chain guard.

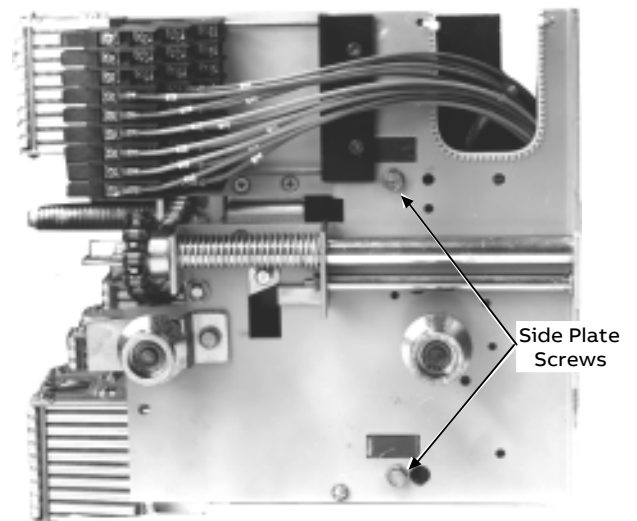


Figure 13. Two screws to be removed from the breaker side plate.

28. Reattach the breaker lifting bar, as illustrated in Figures 10 and 11.
29. Pull out the substructure rails until they drop into the horizontal locked position. Lower the breaker so that the grooves in the rollers drop over the rails.
30. Ensure that the grooves in all rollers straddle the rails, then remove the Lifting Bar and push the breaker into the substructure until it stops in the DISCONNECTED position. Then lift the rails and push them into the stored position.
31. Engage the  $\frac{1}{2}$ -inch square end of the racking shaft with the supplied wrench and rotate the shaft clockwise to draw the breaker into the TEST or CONNECTED position, as illustrated in Figure 8.

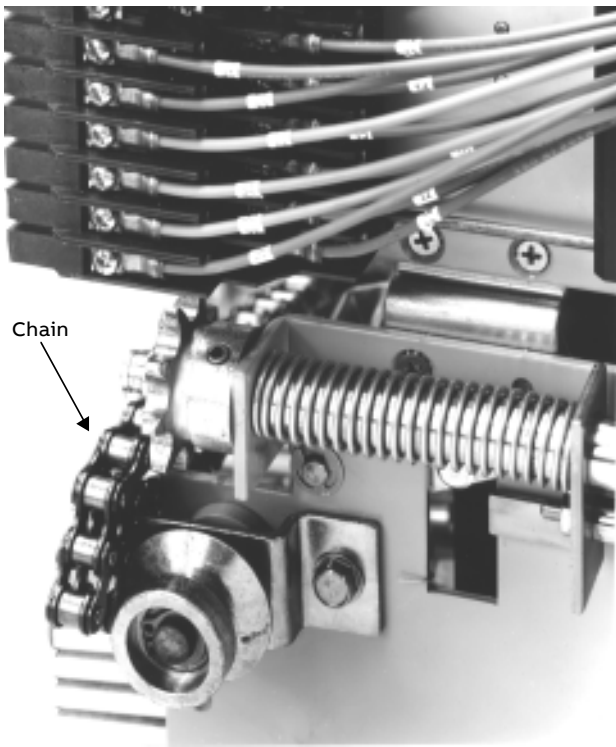


Figure 14. Racking chain removed from the gear.

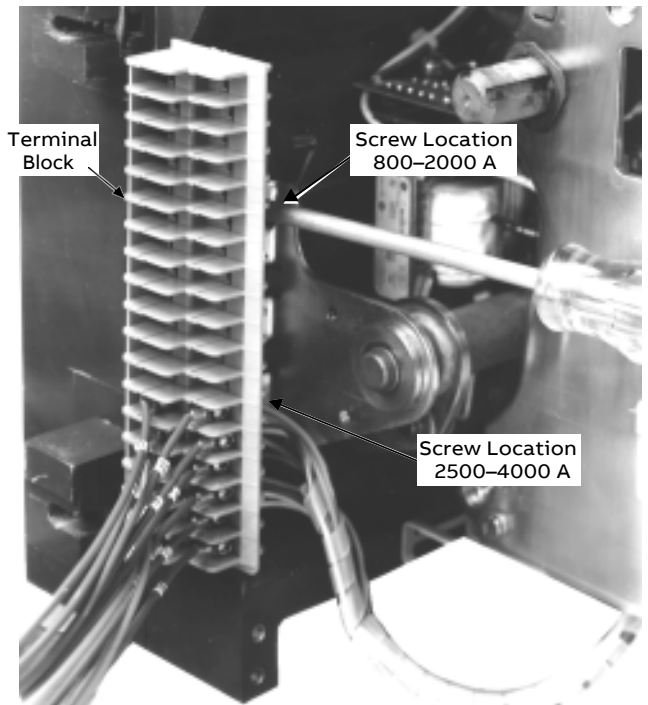


Figure 15. Removing the screw holding the secondary terminal block in place.

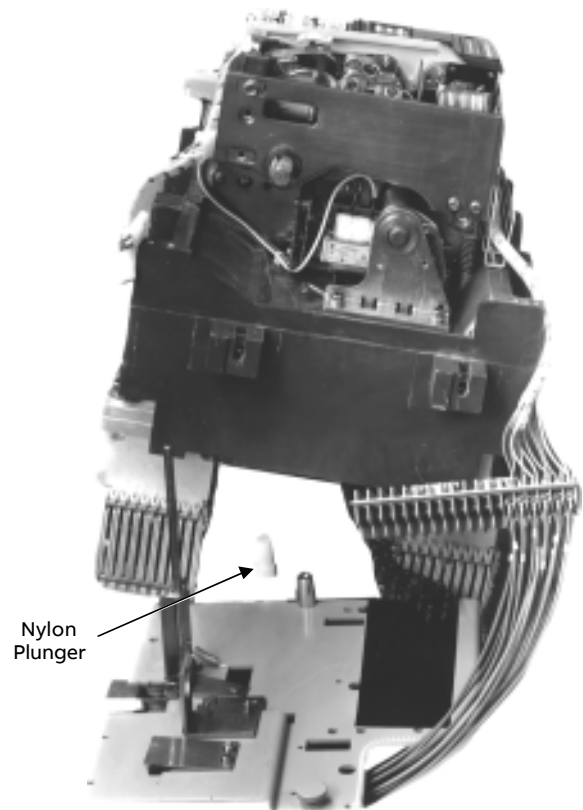


Figure 16. Breaker resting on its back, ready for installation of the Motor Operator Mechanism.

## Installation in 2500–4000 A Draw-Out Breaker

**WARNING:** Before installing any accessories, turn the breaker off, disconnect it from all voltage sources, and discharge the closing springs.

**AVERTISSEMENT:** Avant d'installer tout accessoire, mettre le disjoncteur en position OFF, le déconnecter de toute tension d'alimentation, et décharger les ressorts d'armement.

Use the following procedure to install the Motor Operator Mechanism onto a 2500–4000 A draw-out circuit breaker.

1. Verify that the rating on the Motor Operator Mechanism identification plate matches the voltage rating required for the application, as listed in Table 1.
2. Check that the package contains all the parts listed in Table 2. If any components are missing, contact the Customer Support Center at 800-843-3742. Note that the Remote Close and Shunt Trip accessories are not included with the Motor Operator Mechanism; they must be ordered separately.
3. Verify that the charge arms of the Motor Operator Mechanism are in the discharged position, as illustrated in Figure 2.
4. Turn the breaker off and discharge the closing spring by depressing the OFF and ON buttons in the sequence OFF-ON-OFF. Verify that the breaker OFF-ON indicator shows OFF on a green background and that the charge indicator shows DISCHARGED on a white background.
5. Engage the  $\frac{1}{2}$ -inch square end of the racking shaft with the supplied wrench, catalog number TDORT, as illustrated in Figure 8, and rotate the shaft counter clockwise to withdraw the breaker to the DISCONNECTED position.
6. Attach a Lifting Bar, catalog number TDOLB, by locating the hooks on the bar beneath the shoulder studs on the breaker, as illustrated in Figure 11.
7. Remove the breaker from the draw-out substructure and place it on a suitable work surface. Place the breaker on supports so that the weight of the breaker is not supported by the side plates, as shown in Figure 17.
8. Loosen the four #8-32 screws on the trim-plate assembly, if so equipped, and remove the trim plate. If stand-offs are also installed, remove those as well.
9. Loosen the four screws at the corners of the breaker cover. Crank the operating handle one time and hold it extended to remove the cover from the breaker face, as illustrated in Figure 3. The Motor Operator can be safely installed with such a partially charged mechanism.

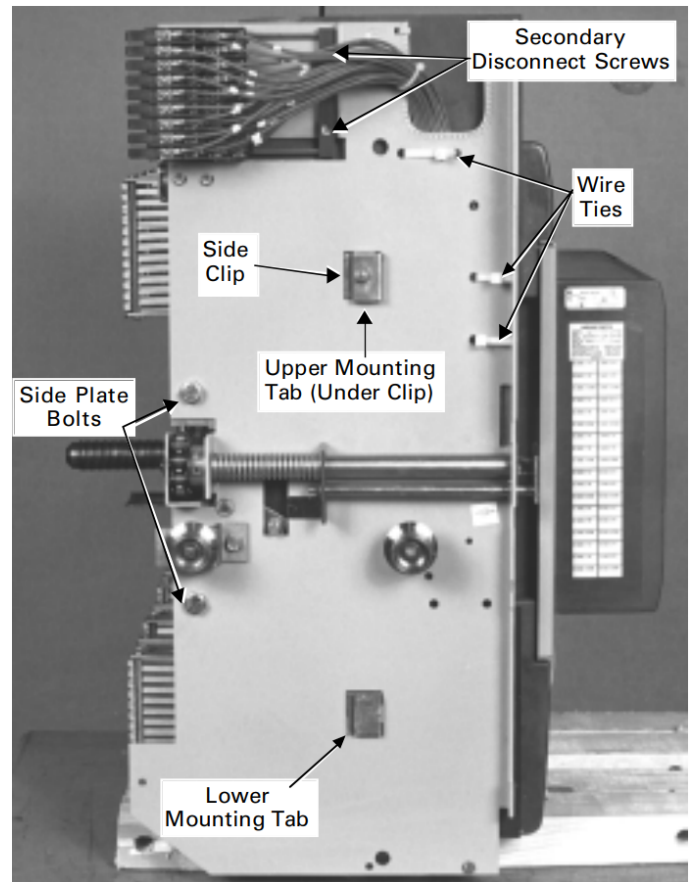


Figure 17. 2500–4000 A draw-out breaker side panel, showing the wire ties, bolts, and clip to be removed.

10. Remove the retaining screw and snap ring (using an appropriate snap ring pliers) that hold the chain guard in place on the rear of the breaker, as shown in Figure 12, then remove the guard. Be careful not to lose the white nylon interlock plunger that may fall out of the back of the breaker, as it must be reinstalled when the breaker is reassembled.
11. Rotate the chain until the removable link, shown in Figure 18, is accessible on the chain drive sprocket. Slide a screwdriver blade into the retaining clip and pry one side up, as shown, then remove the clip by sliding the clip off the pins. Remove the two parts of the link, then remove the chain from the drive sprocket.
12. Remove the wire ties that hold the wire bundle connected from the secondary disconnect to the breaker side plate, shown in Figure 17. Remove the screw and clip, also shown in Figure 17. Remove the two  $\frac{3}{8}$ -16 bolts directly above and below the chain drive sprocket.
13. Remove the two screws in the secondary disconnect mounting bar indicated in Figure 17, then slide the secondary disconnect and the two rods toward the front of the breaker and lift them out and away from the side plate.

14. Remove the screw holding the secondary terminal block to the midcover, as illustrated in Figure 15. Lift the terminal block off its mounting ridge.
15. Push the bottom rear of the side plate away from the breaker, then hit the lip at the front of the side plate (toward the front of the breaker) with a rubber mallet until the bottom mounting tab is free from its retainer. The top mounting tab should then come off easily. Set the side plate aside.
16. Install the Remote Close accessory at this time, if the breaker is to be equipped with this option.
17. **Remove and discard the bottom screw that attaches the stop block to the spring frame, shown in Figure 4.**
18. Attach the mounting bracket, as shown in Figures 4 and 19, with four #10-32 screws tightened to 32 in-lb torque. The bend of the bracket must be outward from the spring frame
19. Align the splined closing shaft of the breaker with the splined cutout in the hub of the Motor Operator Mechanism charge arm, as shown in Figure 20.
20. Push the Motor Operator Mechanism into the breaker until the spacers engage the spring frame and the stop block.
21. Align the two holes in the mounting bracket with the two holes in the Motor Operator Mechanism and attach with two #10-32 screws tightened to 32 in-lb torque.
22. Thread a 1/4-20 flat-head screw and conical lock washer through the spacer and into the stop block, as illustrated in Figure 4. Thread the other 1/4-20 flat-head screw and conical lock washer through the spacer into the captive nut in the spring frame. Tighten both screws to 70 in-lb.
23. Plug the color-coded, numbered Motor Operator Mechanism wires into the corresponding numbered sockets on the wires coming from the secondary terminal block, as illustrated in Figure 6.
24. Reinstall the secondary terminal block onto the breaker midcover and fasten with the screw previously removed.
25. Replace the cable ties holding the secondary disconnect wires to the side plate, as shown in Figure 21.

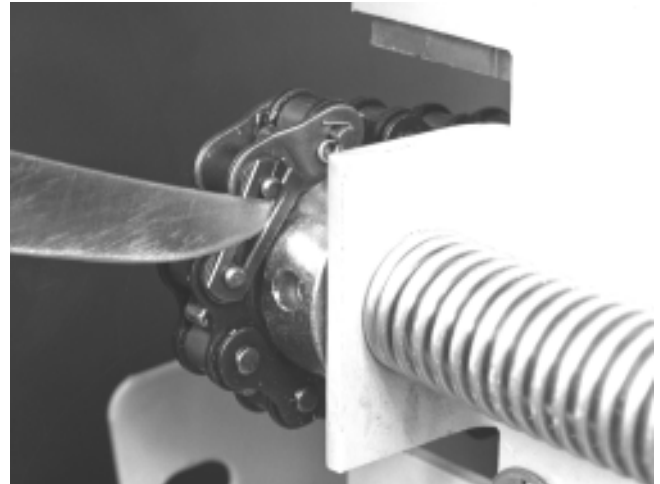


Figure 18. Use a screwdriver blade to pry off the clip holding the removable chain link in place.

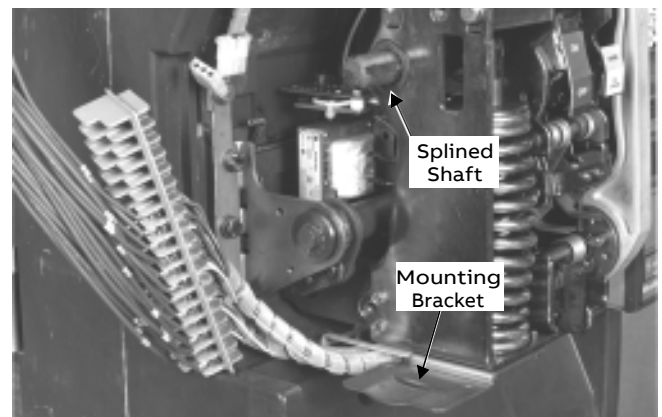


Figure 19. Mounting bracket attached to the stop block on the spring frame.

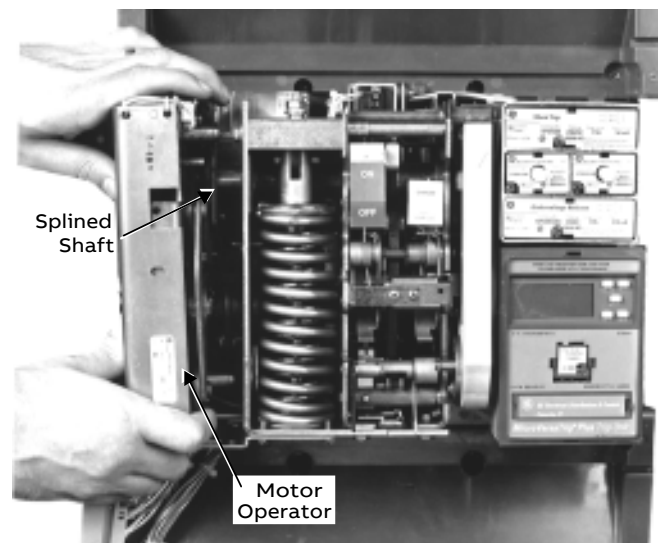


Figure 20. Motor Operator Mechanism aligned with the splined shaft in the breaker.

26. Line up the bottom mounting tab on the breaker side plate with the raised retainer on the side of the breaker, then hit the bottom of the lip at the front of the side plate with a rubber mallet to seat the tab. Line up the upper tab with its retainer and hit the top of the side plate lip with the mallet to seat the tab.
27. Attach the two bolts, nuts, and lock washers holding the side frame to the breaker and tighten to 300 in-lb.
28. Attach the clip to the upper mounting tab retainer with the screw removed earlier.
29. Put the chain back on its drive gear and hold it in place with the two parts of the removable link. With a screwdriver blade, pry the retaining clip apart and slide it over the two exposed pins, as shown in Figure 18 (the reverse of removal).
30. Ensure that the white nylon interlock plunger is properly installed in the rear of the breaker. Replace the chain guard and fasten it in place with the retaining screw and snap ring removed earlier.
31. Slide the two steel rods through the holes in the secondary disconnect and into the mounting holes in the side frame. Insert the other ends of the rods into the mounting bar and attach the bar to the side plate with the two screws removed earlier.
32. Crank the operating handle once and hold the handle extended to reinstall the breaker top cover. Tighten the four #10-32 mounting screws to 15 in-lb.
33. Replace the trim plate and tighten the four #8-32 screws to 20 in-lb.
34. Affix the accessory rating label to the breaker cover above the right-side secondary terminal block.
35. Affix the "Electrically Operated" label to the top cover over the knock-out space above the ON-OFF indicator flag.
36. Crank the operating handle until the closing springs are completely charged.
37. Close and trip the breaker.
38. Test the Motor Operator Mechanism electrically according to Table 1.

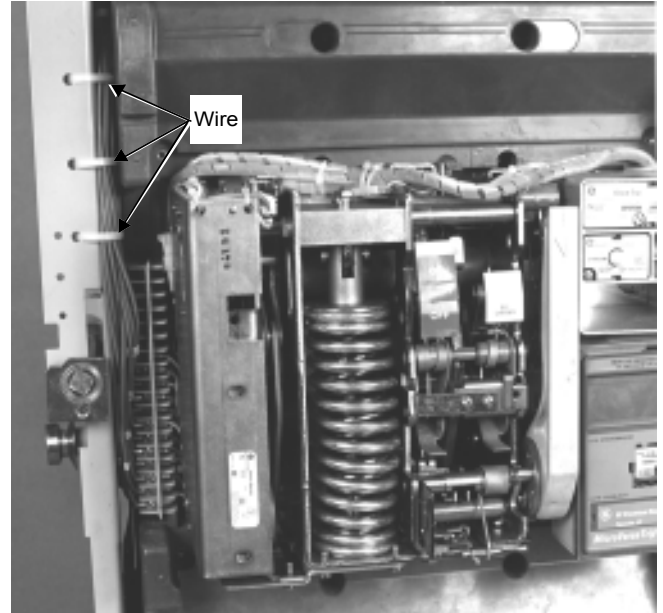


Figure 21. Motor Operator Mechanism installed in the breaker, showing the side panel reattached and the cable ties replaced on the wires connecting the terminal block to the secondary disconnect.

## ***Trouble-Shooting***

The following guide is provided for trouble-shooting and isolating common problems. It does not cover every possible situation. Contact the Customer Support Center at 800-843-3742 if any problem is not resolved by these procedures.

<b>Symptom</b>	<b>Possible Cause</b>	<b>Corrective Action</b>
The breaker does not charge.	The breaker is already charged.	None.
	Power is not available to the Motor Operator Mechanism.	Check that the Motor Operator Mechanism is wired correctly, as shown in Figure 5. Check that all connectors are properly seated. Check that the voltage applied to the Motor Operator Mechanism is within the specified range.
	The breaker was partially charged manually	Complete the manual charging cycle until the breaker's charge indicator shows CHARGED.