



IB-51801 Remote Racking Device for PowlVac[®] DHP

Used on 5kV & 15kV Westinghouse DHP Circuit Breakers and
PowlVac[®] DHP Replacement Circuit Breakers

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Signal Words

As stated in ANSI Z535.4-2002, § 4.13-4.13.3 the signal word is a word that calls attention to the safety sign and designates a degree or level of hazard seriousness. The signal words for product safety signs are “**Danger**”, “**Warning**”, and “**Caution**”. These words are defined as:



DANGER

DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Not stated in ANSI Z535.4-2002, § 4.13-4.13.3 as a signal word but used in this manual is “**IMPORTANT**”. This is defined as:



IMPORTANT

IMPORTANT indicates a section of the manual covering a non hazardous situation, but one where Powell feels proper attention is warranted.

Qualified Person

For the purposes of this manual, a qualified person, as stated in NFPA 70®, is one familiar with the construction and operation of the equipment and the hazards involved.

In addition to the above qualifications, one must also be:

- 1) trained and authorized to energize, deenergize, clear, ground, and tag circuits and equipment in accordance with established safety practices.
- 2) trained in the proper care and use of personal protective equipment (PPE) such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.
- 3) trained in rendering first aid if necessary.



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Ch 1 General Information



WARNING

The equipment described in this document may contain high voltages and currents which can cause serious injury or death.

The equipment is designed for use, installation, and maintenance by knowledgeable users of such equipment having experience and training in the field of high voltage electricity. This document and all other documentation shall be fully read, understood, and all warnings and cautions shall be abided by. If there are any discrepancies or questions, the user shall contact Powell immediately at 1.800.480.7273.



WARNING

Before any adjustment, servicing, part replacement, or any other act is performed requiring physical contact with the electrical working components or wiring of this equipment, the power supply must be disconnected. Failure to follow this warning may result in injury or death.



IMPORTANT

The information in this instruction bulletin is not intended to explain all details or variations of the Powell equipment, nor to provide for every possible contingency or hazard to be met in connection with installation, testing, operation, and maintenance of the equipment. For additional information and instructions for particular problems, which are not presented sufficiently for the user's purposes, contact Powell at 1.800.480.7273.



IMPORTANT

Powell reserves the right to discontinue and to change specifications at any time without incurring any obligation to incorporate new features in products previously sold.

A. SCOPE

The information in this instruction bulletin describes the following Remote Racking Devices for PowlVac® DHP replacement circuit breakers:

- 51897G06 - 120VAC
- 51897G20 - 120VAC with Snap Switch

B. PURPOSE

The information in this instruction bulletin is intended to provide information required to properly operate and maintain the PowlVac DHP Remote Racking Devices described in **Ch 1 General Information, A. SCOPE**.

This instruction bulletin provides:

1. Safety guidelines
2. General descriptions on the operation of the PowlVac DHP Remote Racking Device
3. Instructions for installation
4. Illustrations, photographs, and description of the equipment described in **Ch 1 General Information, A. SCOPE**.

The illustrations contained in this document may not represent the exact construction details of each particular type of remote racking device. The illustrations in this document are provided as general information to aid in showing component locations only.

All illustrations and photos are shown using deenergized equipment.

**WARNING**

Be sure to follow the appropriate safety precaution while handling any of the equipment. Failure to do so may result in serious injury or death.

To the extent required, the products described herein meet the applicable ANSI, IEEE, and NEMA Standards; however, no such assurance is given with respect to local codes and ordinances which may vary greatly.

C. INSTRUCTION BULLETINS AVAILABLE ELECTRONICALLY

For more information visit www.powellind.com. To contact the Powell Service Division call 1.800.480.7273 or 713.944.6900, or e-mail info@powellservice.com.



Ch 2 Safety

A. SAFE WORK CONDITION

The information in Section A is quoted from *NFPA 70E 2004 - Article 120, 120.1 Establishing an Electrically Safe Work Condition*.

120.1 Process of Achieving an Electrically Safe Work Condition

1. Determine all possible sources of electrical supply to the specific equipment. Check applicable up-to-date drawings, diagrams, and identification tags.
2. After properly interrupting the load current, OPEN the disconnecting device(s) for each source.
3. Wherever possible, visually verify that all blades of the disconnecting devices are fully OPEN or that drawout type circuit breakers are withdrawn to the fully disconnected position.
4. Apply lockout/tagout devices in accordance with a documented and established policy.
5. Use an adequately rated voltage detector to test each phase conductor or circuit part to verify they are deenergized. Test each phase conductor or circuit part both phase-to-phase, and phase-to-ground. Before and after each test, determine that the voltage detector is operating satisfactorily.
6. Where the possibility of induced voltages or stored electrical energy exists, ground the phase conductors or circuit parts before touching them. Where it could be reasonably anticipated that the conductors or circuit parts being deenergized

could contact other exposed energized conductors or circuit parts, apply ground connecting devices rated for the available fault duty.

B. SAFETY GUIDELINES

Each user has the responsibility to instruct and supervise all personnel associated with usage, installation, operation, and maintenance of this equipment on all safety procedures. Furthermore, each user has the responsibility of establishing a safety program for each type of equipment encountered.

The safety rules in this instruction bulletin are not intended to be a complete safety program. The rules are intended to cover only some of the important aspects of personnel safety related to PowlVac® DHP Remote Racking Device.

C. GENERAL

1. Only supervised and qualified personnel trained in the usage, installation, operation, and maintenance of the circuit breaker shall be allowed to work on this equipment. It is mandatory that this instruction bulletin, any supplements, and service advisories be studied, understood, and followed.
2. Maintenance programs must be consistent with both customer experience and manufacturer's recommendations, including service advisories and instruction bulletin(s). A well planned and executed routine maintenance program is essential for circuit breaker's reliability and safety.

3. Service conditions and circuit breaker applications shall also be considered in the development of safety programs. Variables include ambient temperature; humidity; actual continuous current; thermal cycling; number of operations; interrupting duty; and any adverse local conditions including excessive dust, ash, corrosive atmosphere, vermin and insect infestations.

D. SPECIFIC

1. **DO NOT WORK ON AN ENERGIZED CIRCUIT BREAKER.** If work must be performed on a circuit breaker, remove it from service and remove it from the metal-clad switchgear.
2. **DO NOT WORK ON A CIRCUIT BREAKER WITH THE CONTROL CIRCUIT ENERGIZED.**
3. **EXTREME CARE MUST BE EXERCISED TO KEEP ALL PERSONNEL, TOOLS, AND OTHER OBJECTS CLEAR OF MECHANISMS WHICH ARE TO BE OPERATED, DISCHARGED, OR RELEASED.** These circuit breakers utilize stored energy mechanisms. These mechanisms must be serviced only by skilled and knowledgeable personnel capable of releasing each spring load in a controlled manner. Detailed information regarding these mechanisms is found in this instruction bulletin.
4. **DO NOT ATTEMPT TO CLOSE THE CIRCUIT BREAKER MANUALLY ON AN ENERGIZED CIRCUIT.**
5. **DO NOT USE AN OPEN CIRCUIT BREAKER AS THE SOLE MEANS OF ISOLATING A HIGH VOLTAGE CIRCUIT.** For complete isolation, the circuit breaker shall be in the disconnected position or shall be withdrawn completely.
6. **ALL COMPONENTS SHALL BE DISCONNECTED BY MEANS OF A VISIBLE BREAK AND SECURELY GROUNDED FOR SAFETY OF PERSONNEL PERFORMING MAINTENANCE OPERATIONS ON THE CIRCUIT BREAKERS.**
7. Interlocks are provided to ensure the proper operating sequences of the circuit breakers and for the safety of the user. If for any reason an interlock does not function as described, do not make any adjustments, modification, or deform the parts. **DO NOT FORCE THE PARTS INTO POSITION. CONTACT POWELL FOR INSTRUCTIONS.**

E. X-RAYS

When high voltage is applied across the contacts of a vacuum interrupter, there is the possibility of generation of X-rays. The intensity of the X-radiation is dependent on the peak voltage and the contact gap. At the normal operating voltage for this type of equipment, the radiation levels are negligible. At the voltages specified for testing, test personnel shall be in front of the circuit breaker such that the two layers of steel used in the frame and front cover construction are between the test personnel and the vacuum interrupters, and that the test personnel be no closer than one meter (3') from the front of the circuit breaker. **THE CIRCUIT BREAKER SHALL BE EITHER FULLY OPEN, OR FULLY CLOSED WHEN MAKING HIGH POTENTIAL TESTS. DO NOT TEST WITH CONTACTS PARTIALLY OPEN.**



F. SAFETY LABELS

The equipment described in this document has **DANGER, WARNING, CAUTION**, and instruction labels attached to various locations. All equipment **DANGER, WARNING, CAUTION**, and instruction labels shall be observed when the circuit breaker is handled, operated, or maintained.

 **IMPORTANT**

Warning and Caution labels are located in various places in and on the switchgear and on the circuit breaker removable element. Always observe these warnings and caution labels. Do NOT remove or deface any of these warning/caution labels.

Ch 3 Equipment Description

A. GENERAL

The PowlVac® DHP Remote Racking Device is an accessory which enables circuit breakers to be racked into and out of switchgear from a distance. The accessory consists of a motor control box (Figure 2) and electric racking device assemblies (Figure 1).

B. MOTOR CONTROL BOX

The motor control box (Figure 2) supplies power and enables the selection of operating modes for the electric racking device. The motor control box has a 30 foot long cord (Figure 1, c) which is inserted into the electric racking device. The length of the cord enables the user to move to a remote location from the circuit breaker during the racking in or racking out procedures. The motor control box power supply cord plugs into a 120VAC outlet.

C. ELECTRIC RACKING DEVICE

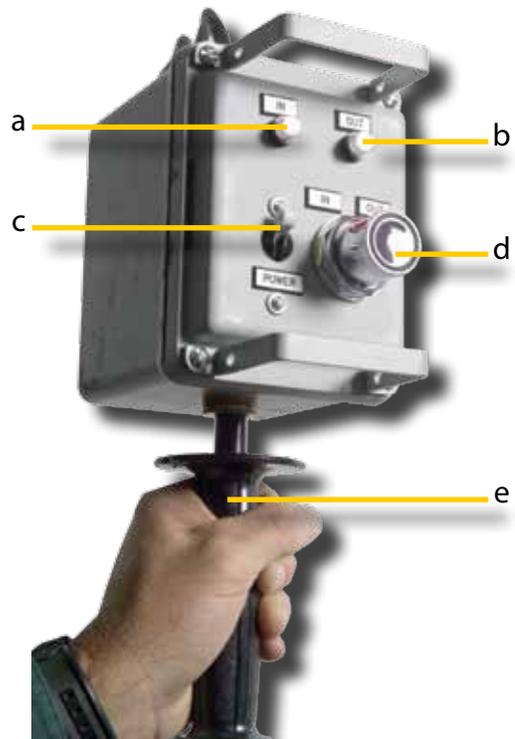
The electric racking device uses a racking shaft coupler (Figure 1, b) to connect to the front of the circuit breaker. The racking shaft coupler engages the circuit breaker racking shaft located on the circuit breaker front cover. After the racking device is installed, the motor adjustment knob (Figure 1, a) can be turned to engage the racking shaft coupler with the circuit breaker racking shaft. When the racking device is connected to the motor control box and energized, the racking shaft coupler operates the circuit breaker racking mechanism during the racking in or racking out procedures.

Figure 1 PowlVac DHP Remote Racking Device



- a. Adjustment Knob
- b. Racking Shaft Coupler
- c. Motor Control Box Cord
- d. Remote Racking Device
- e. Motor Control Box
- f. Power Supply Cord

Figure 2 Close-Up of Motor Control Box



- a. "In" Indicator Light
- b. "Out" Indicator Light
- c. Power Switch
- d. Push Button
- e. Handle



Ch 4 Installation & Operation

A. RECEIVING

Upon receipt, remove any shipping material and inspect the electric racking device for damage that may have occurred during shipment. Check the equipment received against the shipping documents to ensure receipt of the complete shipment.

B. HANDLING

The electric racking device weighs 20 lbs. and the motor control box assembly weighs 5 lbs. The preferred method for moving the electric racking device and motor control box is to place them securely on a hand operated shop cart.



CAUTION

When handling the electric racking device, personnel should use caution during movement and installation. Failure to do so may cause personal injury or damage to the equipment.



CAUTION

Protect the motor control box and the racking device from moisture. Failure to do so may cause damage to the equipment.



CAUTION

Do NOT handle or carry the racking device by the power cords. Damage to the power connections may result and cause an electrical short. The power cords should be inspected for any signs of damage before each use.

C. OPERATION



WARNING

Do NOT work on an energized circuit breaker. Follow circuit breaker safety guidelines and operating instructions provided in the specific circuit breaker instruction bulletin.

When racking in a circuit breaker, move the circuit breaker to the required switchgear location.

For more detailed information on the circuit breaker handling, see the instruction bulletin for the circuit breaker in use.

D. INSERTING THE CIRCUIT BREAKER INTO THE SWITCHGEAR EQUIPMENT



CAUTION

Before installing any circuit breaker into a compartment, the user MUST verify that the circuit breaker rating meets the metal-clad switchgear rating.

Follow the steps below to insert the circuit breaker into the switchgear compartment:



CAUTION

Prior to inserting the circuit breaker into the circuit breaker compartment, make sure that the control circuits are deenergized.



CAUTION

Prior to inserting the circuit breaker into the circuit breaker compartment, ensure that the circuit breaker is OPEN and the mechanism is discharged.

1) *Position the Circuit Breaker in Front of Cell*

- a. Use handles on front steel panel of barrier assembly to pull or push breaker straight forward or backward only. Keep hands off top edge of front barrier in moving breaker.

 2) *Push Breaker into Test Position in Cell*

- a. Line up guide channel on right hand side of breaker near floor with guide rail on right hand side of cell floor.
- b. Push breaker into cell until rail latch at front of guide channel catches in notch in guide rail and stops further movement of breaker toward rear of cell.
- c. Keep hands off top edge of front steel barrier when pushing breaker into cell.
- d. The breaker is now in the "TEST" position.

Figure 3 *Engaging the Rail Latch on Circuit Breaker*



a. *Rail Latch*

- b. Examine disconnecting finger clusters for any signs of damage. See that they are properly positioned and that the retaining bolts are in place in the end of the breaker studs. Clean off any dirt, paper, etc.
- c. Check secondary contacts to see that none are bent out of alignment.
- d. Make sure that the cell is clean and clear of anything that might interfere with breaker travel.
- e. Levering screw in cell should be clean and free from dirt or grit. There is sufficient grease packed in the levering-in nut on the breaker to lubricate the screw.

Note: *The breaker may open and its closing spring may be discharged while it is pushed into the cell, depending on whether the closing spring was left charged or discharged while the breaker was standing outside the housing.*

 3) *Engage Secondary Contacts*

- a. Lift the handle on left hand side at front of chassis to a horizontal position. Lift further to disengage notch in rod from top edge of panel and push toward rear of breaker. The small horizontal pin in the handle will engage the two slots in the lever which is pivoted immediately above the handle.
- b. Push down on the curved end of the lever as far as it will go.

Note: *As soon as the secondary contacts make up the motor will charge the closing spring if the control circuit is energized.*



4) *Rack Breaker into Cell*

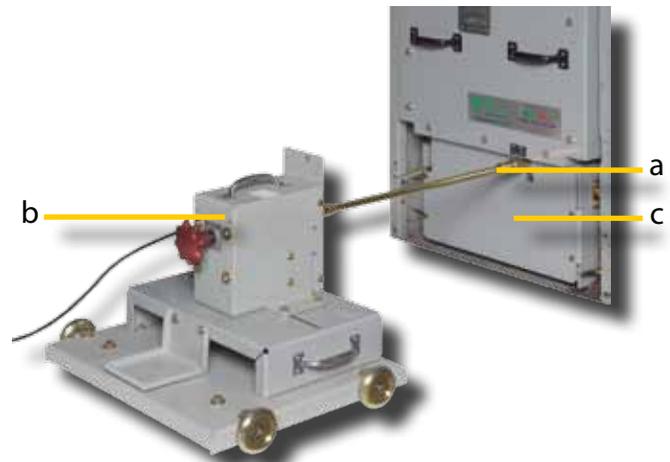
- a. Mechanical interlock prevents levering breaker into or out of the cell if breaker is closed. If excessive force is applied to the levering-in mechanism while the breaker is closed, the $\frac{3}{16}$ pin that the levering-in crank engages will shear.
- b. Press down on rail latch on right side of breaker (Figure 3, a). Push breaker toward rear of cell as far as it will go, approximately $\frac{1}{4}$ inch.
- c. Be sure breaker is pushed in until it stops. This should require only a few pounds of push. It brings the levering nut on the breaker up to the screw in the cell.

CAUTION

Prior to inserting the circuit breaker into the circuit breaker compartment, ensure that the circuit breaker is OPEN and the mechanism is discharged.

- d. Place the remote racking device directly in front of the circuit breaker so the racking shaft coupler (Figure 4, a) on the remote racking device is aligned with the racking shaft on the circuit breaker.

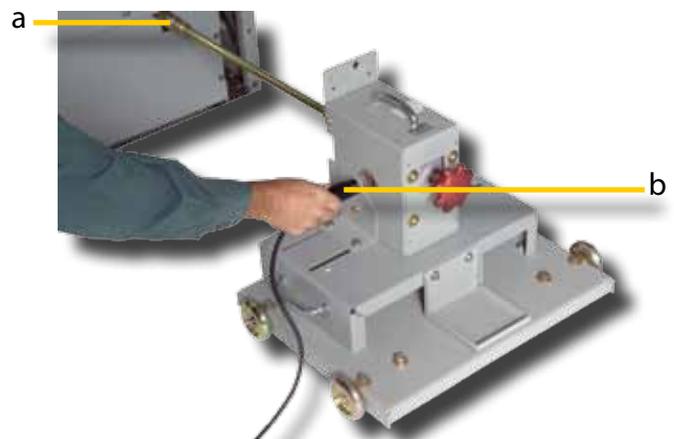
Figure 4 *Remote Racking Device Aligned with Circuit Breaker Racking Shaft*



- a. *Racking Shaft Coupler*
- b. *Remote Racking Device*
- c. *Circuit Breaker*

- e. Move the remote racking device forward so that the racking shaft coupler engages the racking shaft on the circuit breaker (Figure 4, a).
- f. Insert the cylindrical plug into the remote racking device outlet (Figure 5, b) and turn it to lock it in place.

Figure 5 *Attaching Power Cord to Remote Racking Device*



- a. *Racking Shaft Coupler*
- b. *Cylindrical Plug*

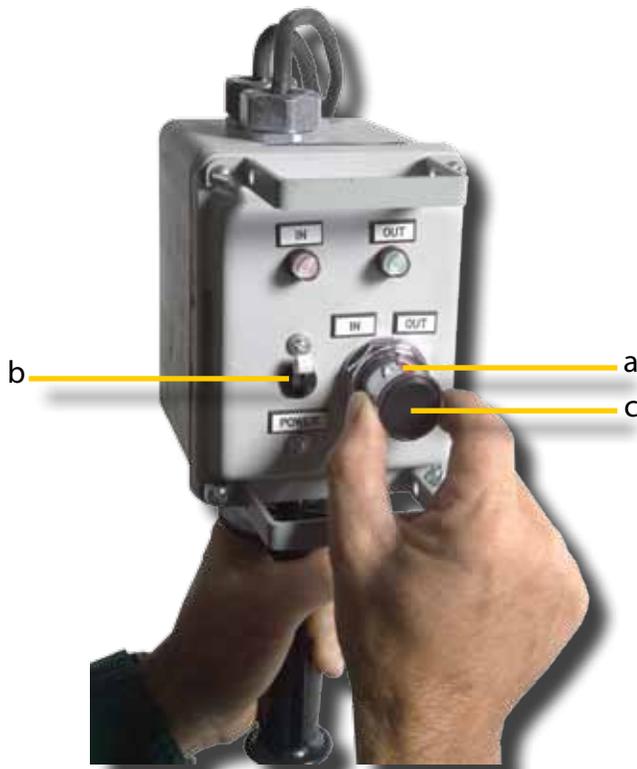
- g. Ensure that the motor control box power switch (Figure 6, b) is in the "OFF" position.
- h. Plug the device into a 120VAC power source.
- i. Turn the power switch to the "ON" position.
- j. Move the selector switch (Figure 7, c) on the push button to the "IN" position. The chrome housing on the push button is actually a switch and can be moved to either the "IN" or "OUT" positions.

Note: For Snap Switch models, turning the snap switch on the motor control box from "OFF" to "IN" will begin racking the circuit breaker IN.

- k. Press and hold the push button to begin racking the circuit breaker in (Figure 7, b). The motor will stop if the push button is released.

Note: Engage crank on levering shaft, push moderately toward rear of cell and turn crank clockwise. Breaker will move slowly toward rear of cell. After breaker starts to move it is not necessary to push. Some circuit breakers are too light and the spring loaded racking mechanism pushes the lighter breaker away from the compartment racking screw. If the circuit breaker doesn't begin racking in at this point, turn the red manual adjustment knob (Figure 1, a) ¼ turn to start the racking process. By rotating the red adjustment knob by ¼ turn the circuit breaker will engage with the racking screw in the back of the circuit breaker compartment.

Figure 6 Turning Selector Switch on Motor Control Box

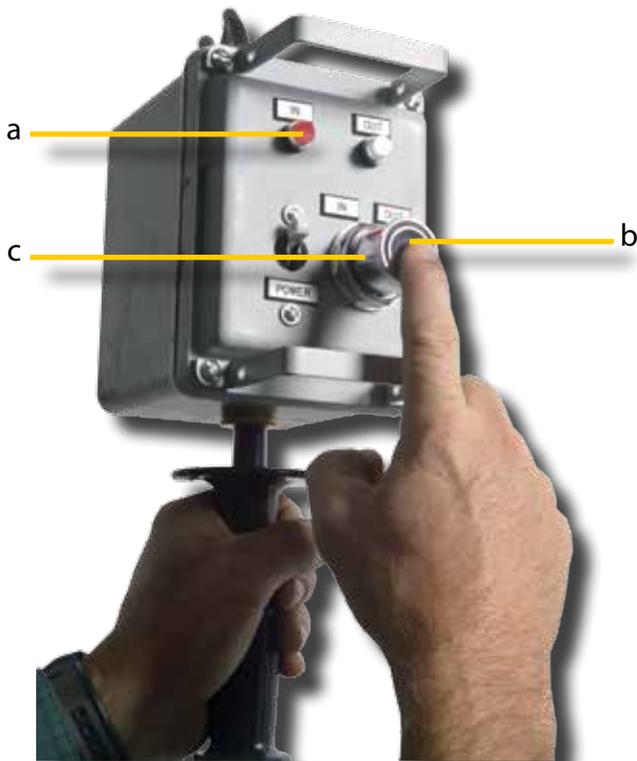


- a. Selector Switch
- b. Power Switch
- c. Push Button IN/OUT



- l. When the push button is pressed the "IN" indicating light (Figure 7, a) will be energized.

Figure 7 Pushing Button to Rack Circuit Breaker IN



- a. "IN" Indicating Light
- b. Push Button
- c. Selector Switch in "IN" Position

- m. When the circuit breaker is fully racked in, the circuit breaker's racking shaft will begin to clutch out and turn freely. At this point the operator can let go of the racking push button.
- n. This is the "OPERATE" or "ENGAGED" position.
- o. Unplug the racking device from the 120VAC power source and remove the remote racking device.

E. REMOVING THE CIRCUIT BREAKER FROM THE SWITCHGEAR EQUIPMENT

CAUTION

Prior to removing the circuit breaker from the circuit breaker compartment, make sure that the control circuits are deenergized.

CAUTION

Prior to removing the circuit breaker from the circuit breaker compartment, ensure that the circuit breaker is OPEN.

Follow the steps below to remove the circuit breaker from the switchgear equipment:

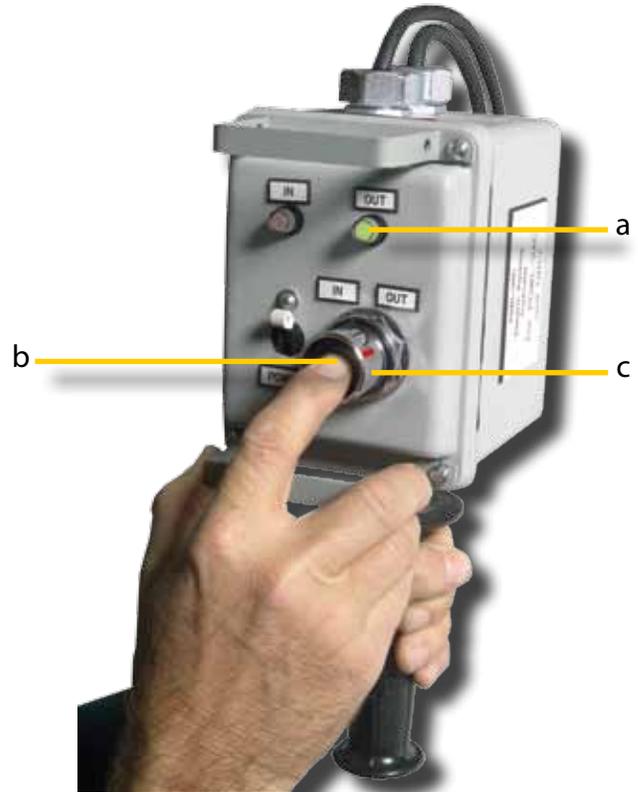
- 1) *Remove Breaker from Operate Position*
 - a. Trip breaker open. Mechanical interlock prevents levering breaker into or out of the cell if breaker is closed.
 - b. Place the remote racking device directly in front of the circuit breaker so the racking shaft coupler (Figure 4, a) on the remote racking device is aligned with the racking shaft on the circuit breaker.
 - c. Move the remote racking device forward so that the racking shaft coupler engages the racking shaft on the circuit breaker.
 - d. Insert the cylindrical plug into the remote racking device outlet (Figure 5, b) and turn it to lock it in place.
 - e. Ensure that the motor control box power switch (Figure 6, b) is in the "OFF" position.
 - f. Plug the device into a 120VAC power source.
 - g. Turn the power switch to the "ON" position.

- h. Move the selector switch (Figure 8, c) on the push button to the "OUT" position. The chrome housing on the push button is actually a switch and can be moved to either the "IN" or "OUT" positions.

Note: For Snap Switch models, turning the snap switch on the motor control box from "OFF" to "OUT" will begin racking the circuit breaker OUT.

- i. Press and hold the push button to begin racking the circuit breaker out (Figure 8, b). The motor will stop if the push button is released.
- j. When the push button is pressed the "OUT" indicating light (Figure 8, a) will be energized.

Figure 8 Pushing Button to Rack Circuit Breaker OUT



- a. "OUT" Indicating Light
- b. Push Button
- c. Selector Switch in "OUT" Position

- k. When the circuit breaker is fully racked out, the circuit breaker's racking shaft will begin to clutch out and turn freely. At this point the operator can let go of the racking push button.
- l. Pull breaker toward front of cell until rail latch engages slot in rail. Breaker is then secured in "TEST" position.
- m. Unplug the racking device from the 120VAC power source and remove the remote racking device.



2) *Remove Breaker from Cell*

- a. Once the breaker is in the "TEST" position press down on rail latch to free breaker from rail.
- b. Pull breaker out of cell using handle on front of barrier.

Note: *The breaker may open and its closing spring may be discharged as it is withdrawn from the cell depending on whether the breaker was left closed or open, or whether the spring was left charged or discharged while standing in the "TEST" position.*



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