

# A-04

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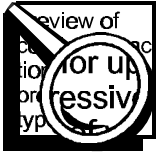
## ELECTRICIAN TRAINING

### SKILL DEVELOPMENT GUIDE

**Duty A: Power Distribution (above 600V)**

**A-04: Connect Tie Breakers**

Issued 01/01/99



## Task Preview

### Connect Tie Breakers

This procedure is performed when one half of a double-ended 13.8kv to 4160v substation must be connected to the other half because its normal supply is down. Typically, a tie breaker must be closed when the power supplier's 35kv to 13.8kv equipment must be de-energized for service. In some cases, one of the 13.8kv to 4160 substation transformers, or associated equipment, must be isolated for service.

To keep all equipment powered during a power outage on one side of a double-ended supply, the Journeyman Electrician performs this task at the double-ended main supply substation.

You must know how to replace breakers. A high voltage hazard exists; therefore, exercise caution when working with the breakers.

The Journeyman Electrician racks out the main breaker on the de-energized side of a double-ended substation. You will open the disconnect to the primary of the transformer on the same side. Finally, close the tie breaker to feed both sides from the other, energized, side of the substation.

### How your skills will be checked

The Skill Check will require you to connect the tie breakers. All tools, materials, and resources will be available. The Evaluator will verify that your demonstration meets the skill objective by observing or measuring each task standard. You must demonstrate safe work practices during the Skill Check. Contact your Evaluator when you are ready for the Skill Check.



## Skill Objective

Given a request to restore electrical power to the de-energized side of a double-ended substation, connect the tie breakers.

### Task Standards

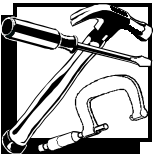
1. The main breaker on the de-energized side must be opened.
2. The disconnect to the primary transformer on the de-energized side must be opened.
3. The tie breaker must be closed.
4. All required safe practices must be demonstrated.

## What You Will Need

This section contains the safety information, tools, and resources you will need before connecting the tie breakers.



- Follow all Caterpillar facility safety standards when performing this task.
- A key and locking mechanism is built into the main circuit breaker. The same key unlocks the primary side disconnect and locks it open.



- crank for racking out the main circuit breaker
- key from the main breaker
- rod for operating the primary disconnect



- power system Electrician

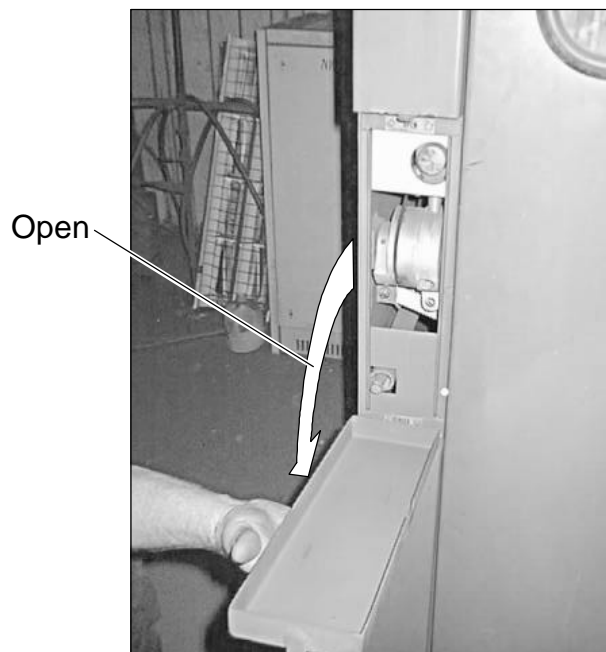


## Task Steps

### Connect Tie Breakers

**Note:** In the following steps, assume that the Side A power supply is out. Side A must be disconnected from its normal supply and connected, through the tie breaker, to Side B.

1. Rack out the main breaker of the Side A distribution system.
  - See the outlined procedures for replacing a breaker.
  - Ensure that the breaker is OPEN, disconnected from the buses behind it, and locked in the racked-out position.
2. Open the cover on the Side A primary side disconnect. See the figure below.



Primary Side Disconnect

3. Unlock the Side A primary side disconnect with the key from the Side A main breaker locking mechanism.
4. Open the Side A primary disconnect.
  - Withdraw the operating rod from its pocket.
  - Insert the operating rod in the hole in the bottom of the disconnect operator.
  - Raise the handle to open the primary side disconnect.
  - Visually check (through the window) that the knives are disconnected.
5. Close the Side A to Side B tie breaker.
  - Push in the operating control handle of the tie breaker and rotate it to the CLOSE position.
6. Verify that the Side A distribution system is energized.

Note: When normal Side A power becomes available proceed to step 7.

7. Restore Side A to normal operation.
  - Open the Side A to Side B tie breaker.
  - Close the Side A primary disconnect.
  - Rack in the Side A main breaker.
  - Engage the Side A main breaker.



## Concept Check

### Connect Tie Breakers

Answer the following questions to check your understanding of connecting the tie breakers. Circle the correct answer in each question. Then compare your responses with the answers at the bottom of this page. Some of the questions may have more than one correct answer. If you have difficulty answering a question, review the Skill Development Guide or ask your Trainer for assistance.

1. When racking out the main breaker:
  - a. ensure that the it is OPEN.
  - b. disconnect it from the buses behind it.
  - c. lock it in the racked-out position.
2. Which of the following is the first step you perform when connecting tie breakers?
  - a. Open the Side A primary disconnect.
  - b. Open the cover on the Side A primary side disconnect.
  - c. Rack out the main breaker of the Side A distribution system.
3. Insulating gloves are worn when working with high voltage equipment.
  - a. True
  - b. False

Answers: (1. a 2. c 3. a)

## Next Step

The following practice will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.





## Practice

The following practices will help prepare you for the Skill Check. Ask your Trainer to set up the practice for you. After you complete a practice, ask your Trainer to check your work.

### Practice 1

Rack out the main breaker on one side of a double-ended substation.

#### Practice Objective 1

The main breaker on the de-energized side must be racked out and locked.

### Practice 2

Disconnect the primary of one transformer of a double-ended substation and close the tie breaker.

#### Practice Objective 2

The disconnect to the primary transformer on the de-energized side must be unlocked, opened, and re-locked open.

### Practice 3

Restore a tied double-ended substation to normal operation.

#### Practice Objective 3

The tie breaker must be closed.

## Next Step

Continue to practice until you are ready for the Skill Check. When you are ready to demonstrate the task, ask your Evaluator or Trainer to schedule the Skill Check.

