

# Deadbreak Apparatus Connectors

## 600 A U-OP Visible Break Connector System Installation Instructions

# S600-14-2

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## PRODUCT INFORMATION

### Introduction

The Cooper Power Systems U-OP Connector System is used to provide a visible break and visible ground on 600 A distribution systems without having to move the heavy cable. The U-OP Connector is a deadbreak system rated for operation on 15 or 25 kV class equipment, including transformers, switches, switchgear, and other apparatus.

Many configurations are possible with the U-OP connector system. Figure 1 shows a typical configuration of the U-OP connector applied on deadfront pad-mounted switchgear. Under normal operating conditions, the current path is through the apparatus bushing, through the U connector, through a two-way 600 A deadbreak junction, and through a T-OP II 600 A connector (sold separately) to the underground cable. When isolating underground cable, a grounded standoff bushing can be put in the parking stand (with the system de-energized). The U connector can then be removed, rotated 90°, and re-installed over the apparatus bushing and grounded standoff bushing to ground the apparatus bushing. A grounding elbow can be installed on the 200 A interface of the T-OP II connector to ground the cable. A 600 A U-OP protective cap can then be put on the upper bushing of the deadbreak junction to insulate that bushing. Since all bushings of the connector system are then insulated or grounded, and if the cable is grounded on the other end, it is safe to perform work on the underground cable.



### Read This Manual First

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

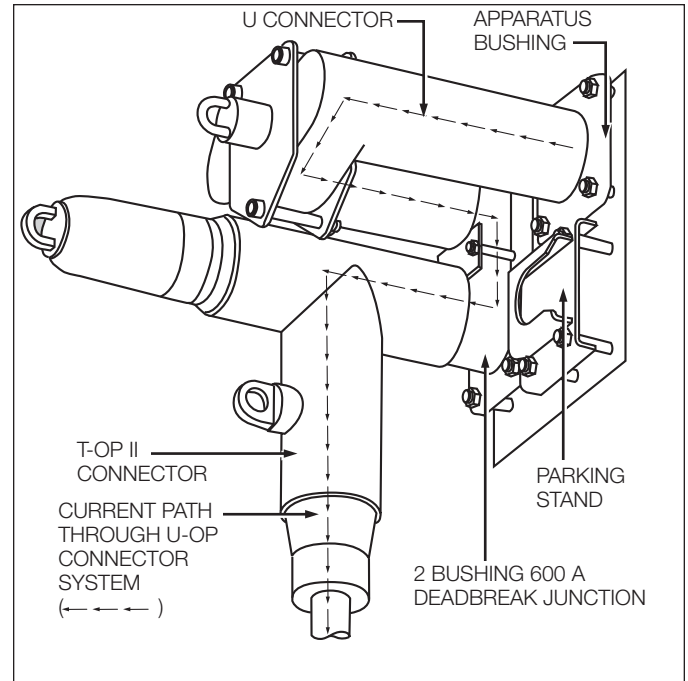


Figure 1. Illustration of typical U-OP connector configuration.

### Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your Cooper Power Systems Representative.

### Acceptance and Initial Inspection

Each U-OP connector is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the U-OP connector and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

### Handling and Storage

Be careful during handling and storage of the U-OP connector to minimize the possibility of damage. If the U-OP connector is to be stored for any length of time prior to installation, provide a clean, dry storage area.

### Standards

ISO 9001:2008 Certified Quality Management System



## SAFETY FOR LIFE



Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our “Safety For Life” mission.

## SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate and service it.

*A competent technician has these qualifications:*

- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*

Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

### Hazard Statement Definitions

This manual may contain four types of hazard statements:

#### **⚠ DANGER:**

Indicates a hazardous situation which, if not avoided, will result in death or serious injury.

#### **⚠ WARNING:**

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

#### **⚠ CAUTION:**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

**CAUTION:** Indicates a hazardous situation which, if not avoided, could result in equipment damage only.

### Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

#### **⚠ DANGER:**

Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

#### **⚠ WARNING:**

Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

#### **⚠ WARNING:**

This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage.

#### **⚠ WARNING:**

Power distribution and transmission equipment must be properly selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain power distribution and transmission equipment can result in death, severe personal injury, and equipment damage.

## INSTALLATION INSTRUCTIONS



Figure 2.  
Left-hand and right-hand U-OP connector installations.

### EQUIPMENT REQUIRED

U-OP Connector Kit including:

- Molded Rubber U Connector
- 2-Way 600 A Deadbreak Junction with U-OP Stud
- Parking Stand
- Hardware Kit
- Silicone Lubricant
- Installation Instruction Sheet
- Operation Instruction Sheet

Other equipment needed for installation includes:

- Grounded 600 A, 15/25 kV standoff bushing (Catalog Number GSB625U) or Insulated 600 A, 15/25 kV Standoff Bushing (Catalog Number ISB625U)
- T-Wrench (Catalog Number TWRENCH)
- U-OP stud (Catalog Number STUD-U)
- Alignment gauges (Catalog Numbers UOPGL and UOPGR)

### INSTALLATION NOTE

Because many different configurations are possible with the U-OP connector system, these instructions cannot cover every installation. Therefore, these instructions only provide details for installing the U-OP connector in the configurations shown in Figure 2, which will be referred to as the right hand (if the deadbreak junction is on the right) and left hand (if the deadbreak junction is on the left) configurations. The U connector has an aluminum (copper optional) casting encased in molded rubber. One leg of the U connector is 3" longer than the other. This allows the U-OP connector to be used with different 600 A bushings, which do not all protrude the same distance from the frontplate of the apparatus. To ensure that the U connector is fully seated in its mating contacts, the deadbreak junction and the parking stand are not mounted flush to the frontplate. They are instead mounted on studs welded to the tank and need to be adjusted during installation to the correct height off of the frontplate. Alignment gauges, available from Cooper Power Systems, are recommended to make this adjustment. Alignment gauges for left-hand and right-hand configurations are shown in Figure 3.

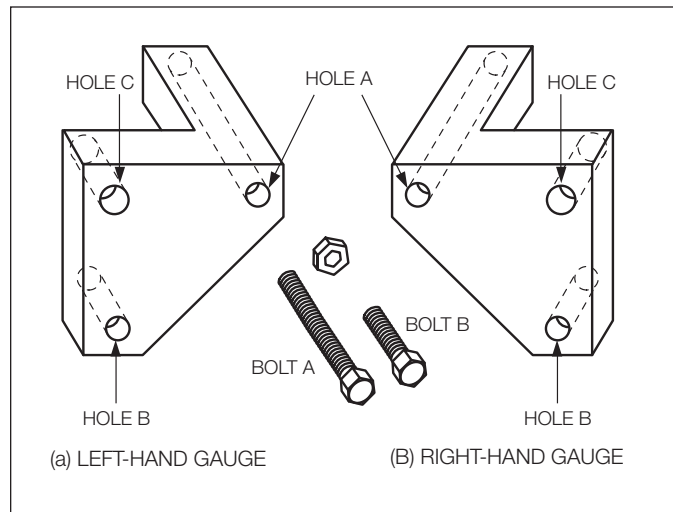
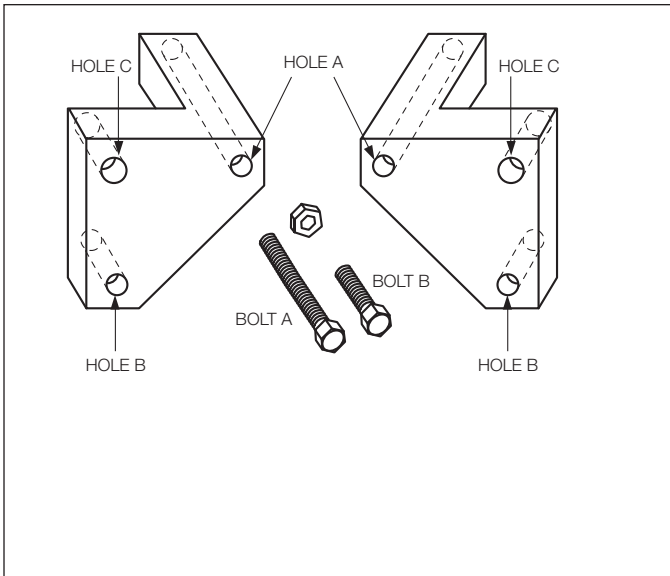
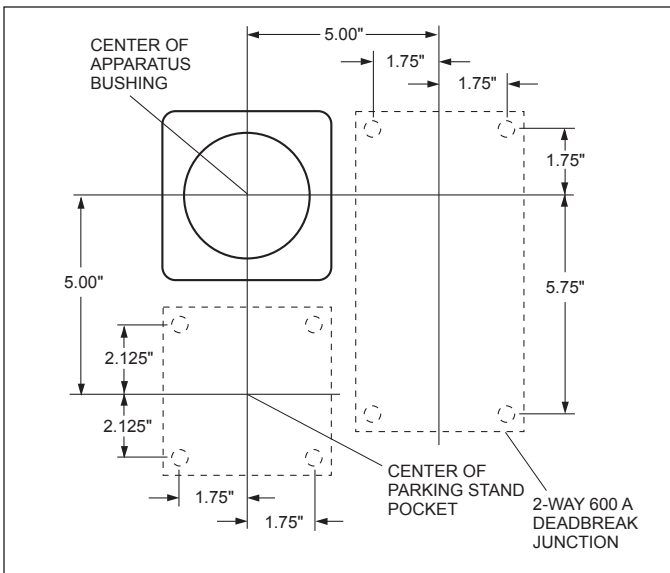


Figure 3.  
Alignment gauges.



**Figure 4A.**  
Left-hand configuration stud positions.

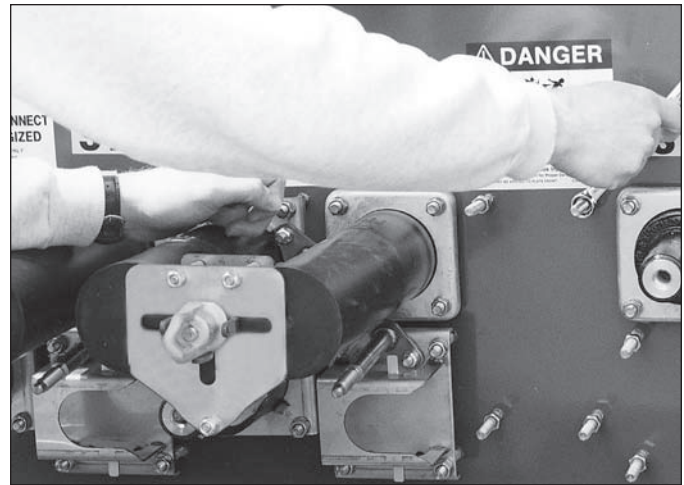


**Figure 4B.**  
Right-hand configuration of stud positions.

### Installing Studs on the Apparatus

Eight 2.5" long 3/8"-16 threaded studs need to be welded to the frontplate to allow for installation of the deadbreak junction and parking stand. These studs are not included in the U-OP connector kit. The position of the studs in relation to the apparatus bushing should be as shown in Figure 4A for a left hand configuration and 4B for a right hand configuration.

Remove eight 3/8"-16 hex nuts from the hardware kit and install one of them on each of the eight welded studs until they are approximately 1" from the frontplate. See Figure 5.



**Figure 5.**  
Installing hex nuts onto welded studs.

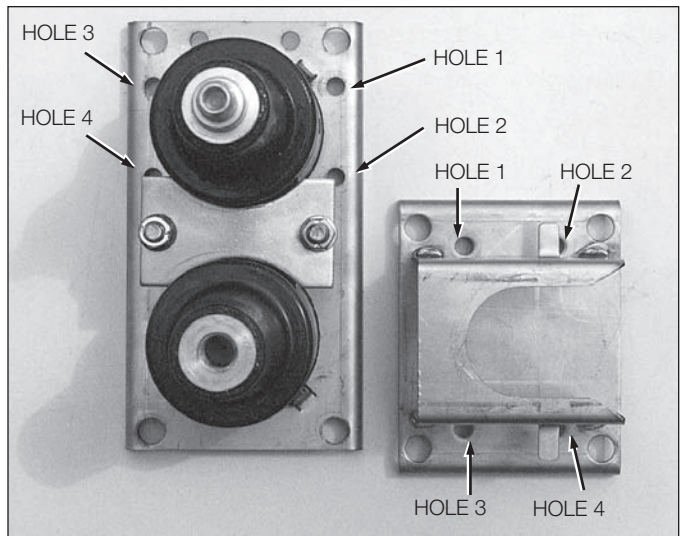
### Installing Hold-Down Studs

The U-OP connector is held to the bushings by a threaded connection between the U connector's shaft and a threaded hold-down stud. The current interchange within the U connector uses finger contacts.

Hold-down studs need to be installed to both the deadbreak junction plate and the parking stand. Once installed, the hold-down studs remain somewhat loose. The looseness allows for the rubber legs of the U connector to flex slightly while the U connector is being installed, minimizing forces placed on the U connector and the mating bushings.

The hold-down studs should be secured to Holes 1 and 2 of the parking stand and of the deadbreak junction if the U-OP connector is used in the left hand configuration and to Holes 3 and 4 of the parking stand and junction if the U-OP connector is used in the right hand configuration. See Figure 6.

Follow Steps 1 through 5 to install a hold-down stud to the parking stand (and deadbreak junction). See Figure 7.



**Figure 6.**  
Locations for hold-down studs.



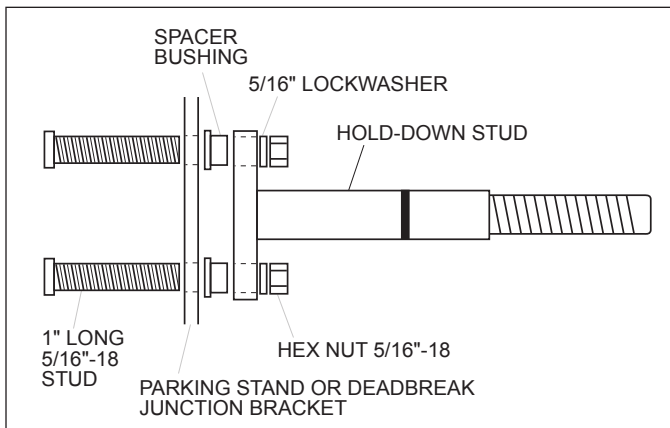


Figure 7.  
Floating stud assembly.

### STEP 1

Insert the 5/16"-18, 1" long studs (from the hardware kit) from behind the parking stand (deadbreak junction) through the appropriate holes (as discussed in the previous paragraph) depending on the configuration.

### STEP 2

Place a spacer bushing (from hardware kit) onto each 1" long stud.

### STEP 3

Place the hold-down stud onto the 1" long studs so that the spacer bushings are inside the holes in the hold-down stud.

### STEP 4

Install 5/16" lockwashers and 5/16"-18 nuts from the hardware kit onto the 1" long studs and tighten until bottomed.

**NOTE:** Hold-down stud will be loose on spacer bushings.

### STEP 5

Apply thread lubricant to the threads on the hold-down stud.

Repeat Steps 1 through 5 to install a hold-down stud to the deadbreak junction.

## ⚠ CAUTION:

The thread lubricant is in the silver packaging with black lettering. Use one package of the lubricant per hold-down stud. Do not apply thread lubricant to bushing interfaces. Also, do not apply silicone lubricant to hold-down studs. Failure to comply could result in equipment failure.



Figure 8.  
Installation of the parking stand.

## Installing the Parking Stand to the Apparatus

### STEP 1

Install the parking stand onto the four welded studs, with the opening in the parking pocket facing to the right for left-hand configuration, as shown in Figure 7. For right-hand configuration, the opening in the parking pocket should face to the left.

### STEP 2

Install the grounded or insulated standoff bushing into the parking stand, but do not tighten down the eyebolt. See Figure 9.



Figure 9.  
Installation of the standoff bushing.

**STEP 3**

Place Hole C (refer to Figure 3) of the gauge over the U-OP connector stud installed in the standoff bushing, and place Hole A of the gauge against the hole in the apparatus bushing. Install Bolt A (longer bolt) through Hole A and tighten the bolt into the apparatus bushing using a 15/16" wrench. See Figure 10.



Figure 10.  
Using gauge to align parking stand.

**STEP 4**

Using the 15/16" wrench, tighten the alignment gauge's hex nut to the U-OP connector stud protruding through Hole C of the gauge.

**STEP 5**

Using your finger, back the nuts off that were previously installed on the parking stand's welded studs until the nuts are within approximately 1/4" of the parking stand.

**STEP 6**

Apply Loctite® to the welded studs in the location between the nuts and the back of the parking stand. Back each nut off further until each nut is flush against the back of the parking stand.

**STEP 7**

Install four of the 3/8" lock washers and four of the 3/8"-16 hex nuts from the hardware kit onto the welded studs and tighten the nuts/washers against the parking stand, applying a torque of 15 ft-lbs. See Figure 11.

**STEP 8**

Remove the alignment gauge's Bolt A and hex nut, and remove the alignment gauge.

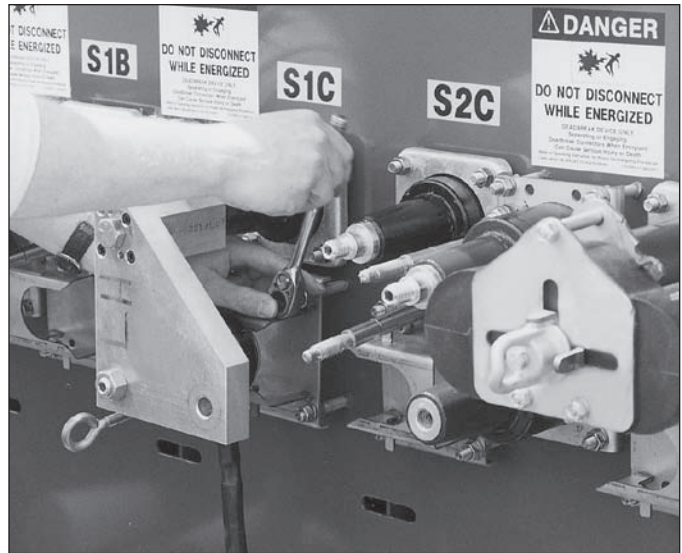


Figure 11.  
Installation of lockwasher and nuts.

## Installing the Deadbreak Junction to the Apparatus

**STEP 1**

Remove the red shipping caps from both bushings of the deadbreak junction.

**STEP 2**

Install the deadbreak junction onto the four welded studs, with the top bushing having the U-OP connector stud installed in it. See Figure 12.

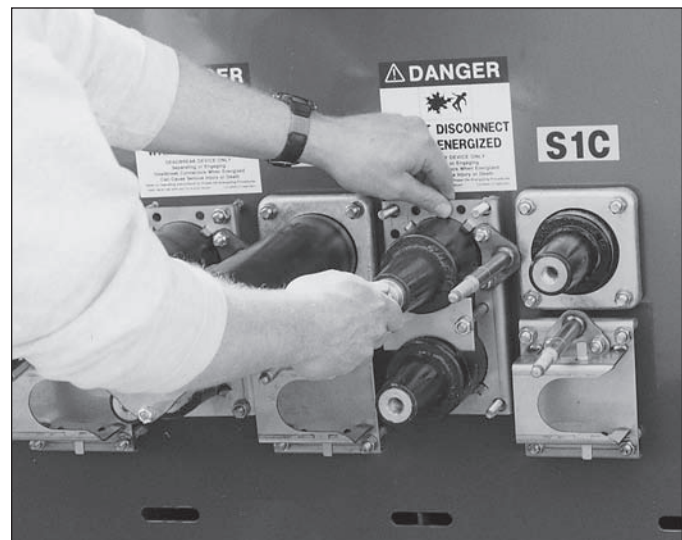


Figure 12.  
Installation of deadbreak junction.

**STEP 3**

Place Hole C of the gauge over the U-OP connector stud installed in the upper bushing of the deadbreak junction, Hole A against the hole in the apparatus bushing, and Hole B against the hole in the lower bushing of the deadbreak junction. Tighten Bolt A (longer bolt) through the gauge into the apparatus bushing and Bolt B through the gauge into the lower bushing of the junction until gauge bottoms See Figure 13.

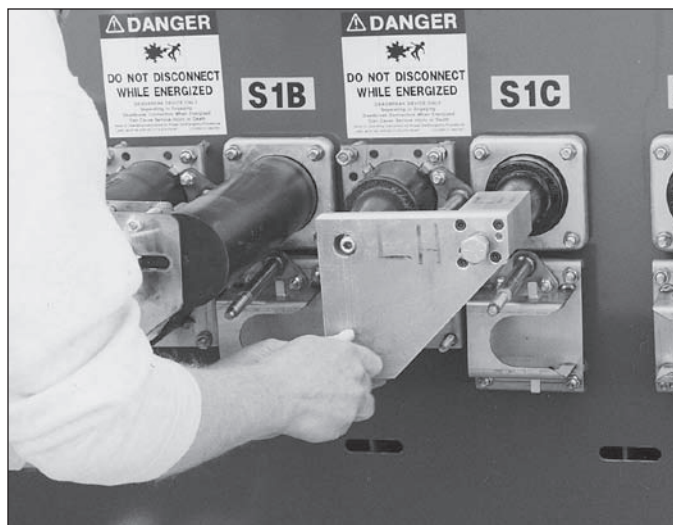


Figure 13.  
Using gauge to align deadbreak junction.

**STEP 4**

Using the 15/16" wrench, tighten the hex nut to the U-OP connector stud protruding through Hole C of the gauge.

**STEP 5**

Back the nuts off that were previously installed on the welded studs for the deadbreak junction until they are within approximately 1/4" of the back of the junction.

**STEP 6**

Apply Loctite® to the welded studs in the location between the nuts and the back of the junction. Back the nuts off further until they are flush against the back of the junction.

**STEP 7**

Install the remaining four 3/8" lock washers and 3/8"-16 hex nuts from the hardware kit onto the welded studs and tighten the nuts/washers against the parking stand, applying a torque of 15 ft-lbs.

**STEP 8**

Remove the alignment gauge's bolts and hex nut, and remove the alignment gauge.

**Verify Alignment of Deadbreak Junction and Parking Stand****STEP 1**

Hand-tighten the U-OP connector stud into the apparatus bushing.

**STEP 2**

Clean and lubricate (using the silicone lubricant, not the anti-seize lubricant. The anti-seize lubricant is in the silver packaging with black lettering) the upper bushing of the deadbreak junction, the apparatus bushing, and the standoff bushing.

**STEP 3**

Orientate the U connector so that the shorter leg of the U connector is over the upper deadbreak junction bushing, the longer leg of the U connector is over the apparatus bushing, and the U connector's shaft slides over the floating stud mounted on the deadbreak junction. See Figure 14.

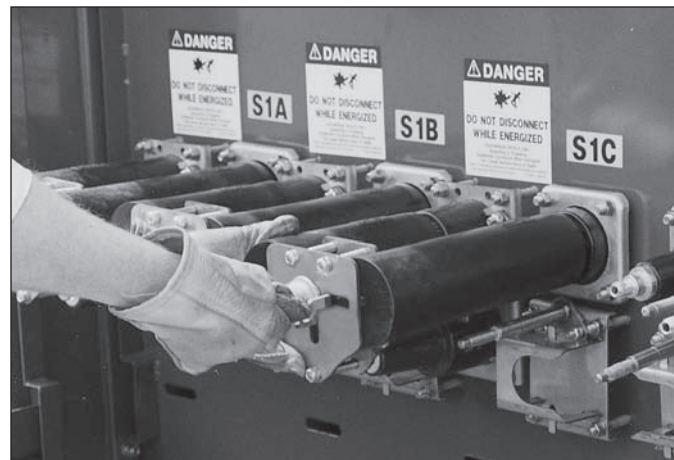


Figure 14.  
Installation of U connector on deadbreak junction to verify alignment.

**STEP 4**

Rotate the handle on the U connector until the shaft is completely seated on the hold-down stud.

**STEP 5**

Verify that alignment is correct by ensuring that the shaft is on far enough to cover the indentation in the hold-down stud. See Figure 15.

**STEP 6**

If alignment is good, remove the U connector. If alignment is not good, remove the deadbreak junction from the apparatus and repeat the section "Installing the Deadbreak Junction to the Apparatus".

**STEP 7**

Orientate the U connector so that the shorter leg of the U connector is over the standoff bushing, the longer leg of the U connector is over the apparatus bushing, and the shaft slides over the floating stud mounted to the parking stand. See Figure 16.



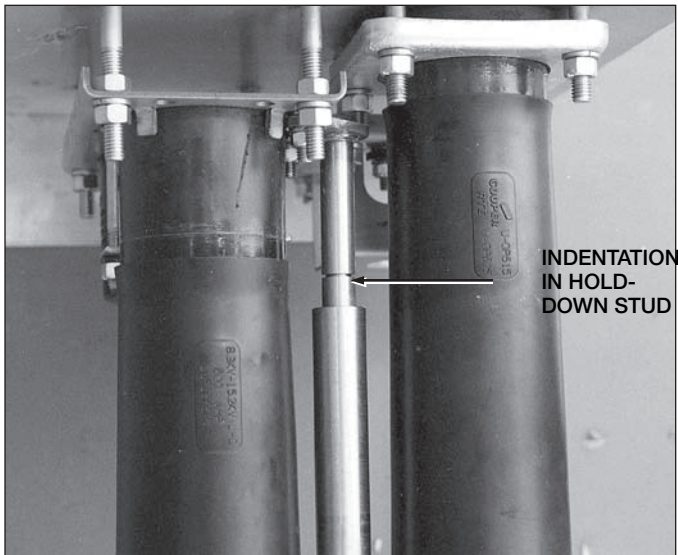


Figure 15. Checking if the U connector is fully seated.

**STEP 8**

Verify that alignment is correct by ensuring that the shaft is on far enough to cover the indentation in the hold-down stud.

**STEP 9**

If alignment is good, remove the U connector. If alignment is not good, remove the parking stand from the apparatus and repeat the section “Installing the Parking Stand to the Apparatus”.

**STEP 10**

When alignment for both the deadbreak junction and the parking stand is completed, tighten the U-OP connector stud into the apparatus bushing to 20-25 ft-lbs.

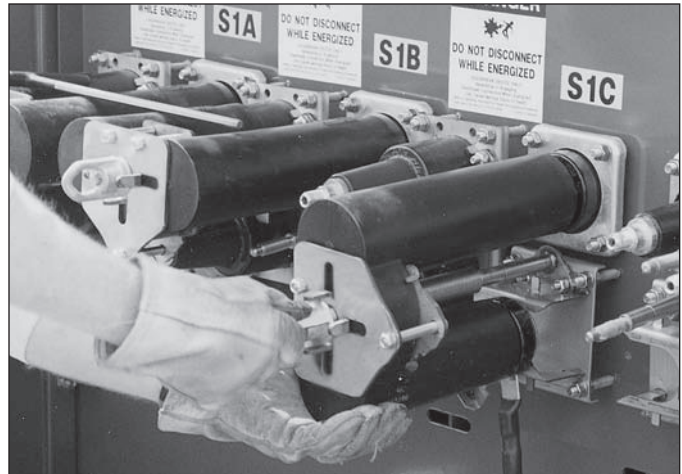


Figure 16. Verifying alignment of parking stand.

**Final Installation Steps**

**STEP 1**

Remove the standoff bushing from the parking stand.

**STEP 2**

Install the U connector from the apparatus bushing to the upper bushing of the deadbreak junction, ensuring that the shaft is fully seated onto the hold-down stud.

**STEP 3**

Install the red shipping cap on the lower bushing of the deadbreak junction.

**STEP 4**

Ensure that the U-OP connector Operation Instructions (S600-14-1) are included with the apparatus before shipment.

**⚠ CAUTION:**  
 High Voltage. The device should not be energized with the red shipping cap installed. Failure to comply may result in severe personal injury and equipment damage.

