

# INSTRUCTIONS

## For Field Assembly and Installation

### TABLE OF CONTENTS

Section	Page Number	Section	Page Number
INTRODUCTION .....	1	INSPECTION SCHEDULE AND PROCEDURES .....	8
INSTALLATION .....	3		

### INTRODUCTION

#### CAUTION

The equipment covered by this publication must be selected for a specific application and it must be installed, operated, and maintained by qualified persons who are thoroughly trained and who understand any hazards that may be involved. This publication is written only for such qualified persons and is not intended to be a substitute for adequate training and experience in safety procedures for this type of equipment.

These instructions are for field assembly and installation of the S&C Grounding Switch for S&C Series 2000 Circuit-Switcher Model 2030—With Vertical Interrupters and Without Disconnect, in ratings of 69 kv through 230 kv. See Figure 1.

This accessory consists of a manual, three-pole group-operated grounding switch rated 64,000 amperes

momentary, with flexible straps for current transfer at the hinge end of the grounding-switch blades, and with blades perpendicular to the base when in open position. When furnished as original equipment with the Circuit-Switcher, inclusion of the accessory is designated by the addition of the suffix “-G6” to the Circuit-Switcher catalog number. This device grounds the lower terminal pads of the Circuit-Switcher.

Grounding switch components already installed on the Circuit-Switcher have been carefully adjusted at the factory and, under normal circumstances, readjustment should not be necessary. If the grounding switch is to be added to an *existing* Circuit-Switcher installation, the components should be assembled in accordance with the special drawings provided.

Install the grounding switch operating linkage only after the Circuit-Switcher has been completely installed.



INTRODUCTION — Continued

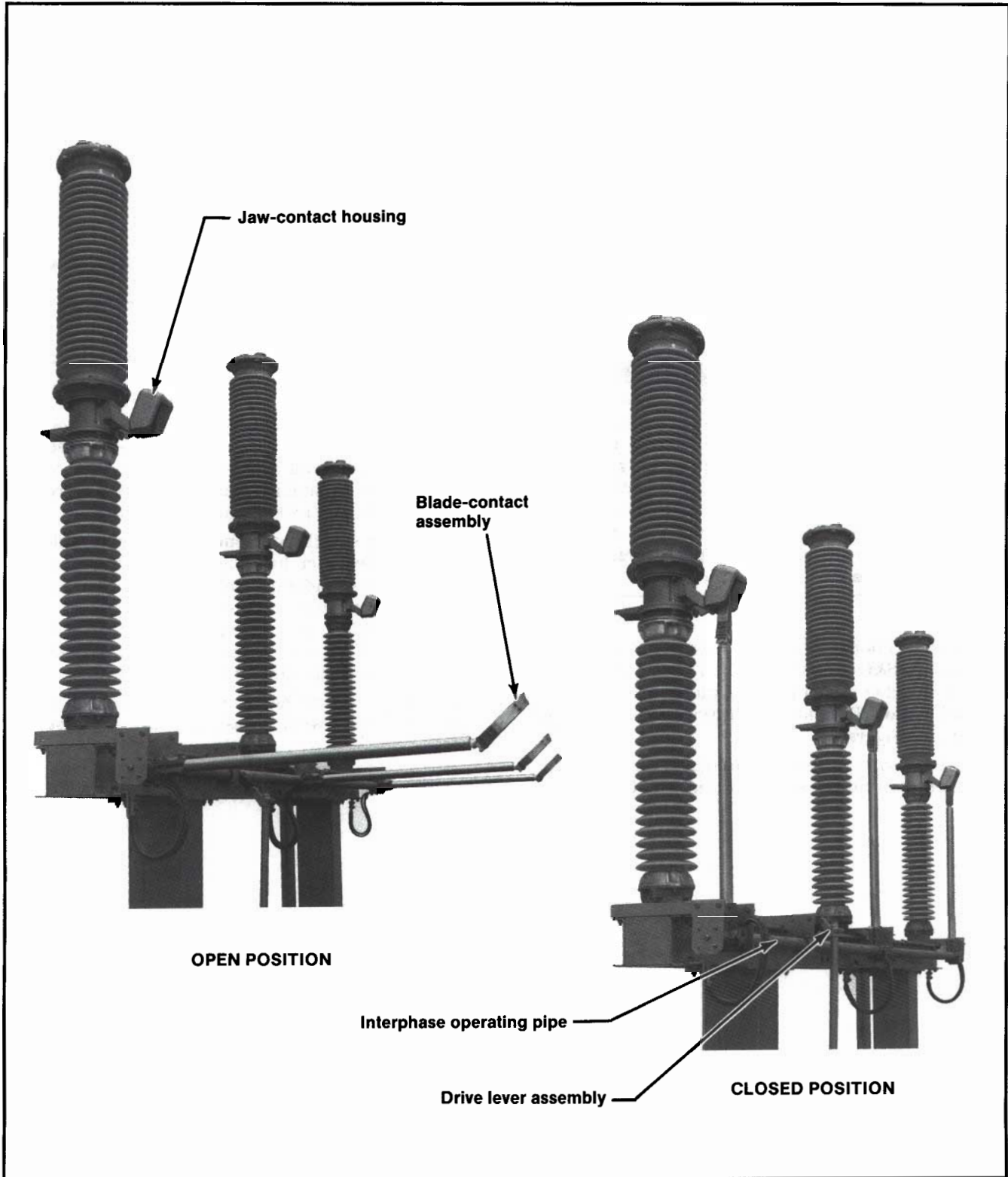


Figure 1. Grounding switch for Series 2000 Circuit-Switcher Model 2030 rated 138 kv.



## INSTALLATION

### PIERCING SET SCREWS

To assure the integrity of the operating mechanism, it is imperative that careful attention be given to the correct installation of the piercing set screws provided on operating-pipe couplings and pipe clamps. Before installing operating pipe in any coupling or clamp, make certain that the cutting tip of the piercing set screw does not protrude through the body of the coupling or clamp. Tighten each piercing set screw as directed in the step-by-step instructions that follow, but in each case, *only* after the associated clamp bolts have been torqued to final tightness.

#### Step 1

Verify that, with the grounding-switch blades tied closed, the pivot point of the drive lever assembly coupling is at a 45-degree angle, as shown in Figure 2; the centerline of the pivot point will be approximately

$\frac{3}{8}$  inch below the top surface of the support angle if the crank arm has been properly positioned, as shown. If necessary, loosen the  $\frac{1}{2}$ -inch galvanized steel hex nuts on the drive lever crank arm and rotate the crank arm to attain this angular alignment. Retighten the nuts, then turn the piercing set screw, piercing the pipe, and continue turning until a firm resistance is felt.

#### Step 2

Attach the operating-handle assembly and back-up mounting angle to the appropriate mounting pedestal using two  $\frac{1}{2}$ "-13 $\times$ 14" hex-head galvanized steel cap screws, four flat washers, and two self-locking hex nuts furnished. See Figure 3. (On 69-kv Circuit-Switchers with 48-inch phase spacing, as well as 161-kv and 230-kv Circuit-Switchers, a back-up mounting angle is not furnished. The operating-handle assembly is attached to the mounting pedestal using the same two  $\frac{1}{2}$ "-13 $\times$ 14" cap screws used to attach the operator

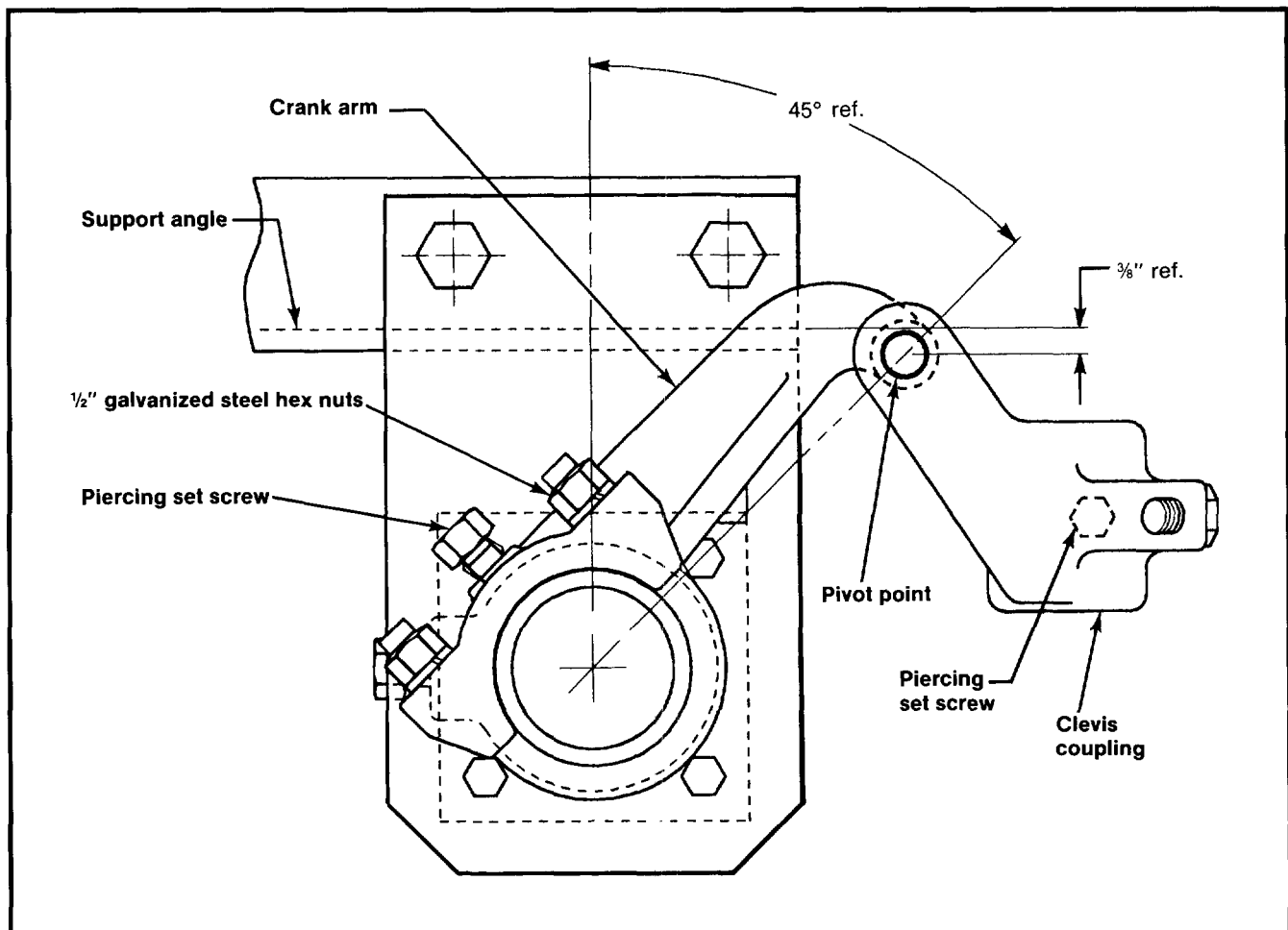


Figure 2. Drive lever assembly, shown in grounding-switch-closed position.

INSTRUCTION SHEET **716-521**

**INSTALLATION — Continued**

support angle.) For Circuit-Switchers having 96- through 144-inch mounting pedestals (Catalog Number Suffix “-E8” through “-E12”), proceed to Step 3. For Circuit-Switchers having 168- through 240-inch mounting pedestals (Catalog Number Suffix “-E14” through “-E20”), proceed to Step 5.

**Step 3**

*For Circuit-Switchers having 96- through 144-inch mounting pedestals:* Thread the lower end of the vertical operating pipe into the operating-handle pipe coupling. Approximately  $\frac{1}{4}$  inch of thread should extend through the coupling. See Figure 3. Secure with  $1\frac{1}{4}$ " galvanized steel locknut.

**Step 4**

*For Circuit-Switchers having 96- through 144-inch mounting pedestals:* Insert the upper end of the vertical operating pipe into the clevis coupling of the drive lever assembly. Make certain that the cutting tip of the

piercing set screw does not protrude through the body of the coupling clamp. Then, while holding the operating handle at a point approximately 20 degrees from the closed position, tighten the  $\frac{1}{2}$ "— $13 \times 1\frac{1}{4}$ " hex-head galvanized steel cap screw of the clevis coupling clamp. *Do not* tighten the associated piercing set screw; it will be tightened in Step 10. Proceed to Step 7.

**Step 5**

*For Circuit-Switchers having 168- through 240-inch mounting pedestals:* Attach the support bracket to the rod guide assembly using two  $\frac{1}{2}$ "— $13 \times 1\frac{1}{2}$ " hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts. See Figure 4, top view. Now attach the support bracket to the support plate welded to the Circuit-Switcher mounting pedestal using two  $\frac{1}{2}$ "— $13 \times 1\frac{1}{2}$ " hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts. See Figure 4, top view.

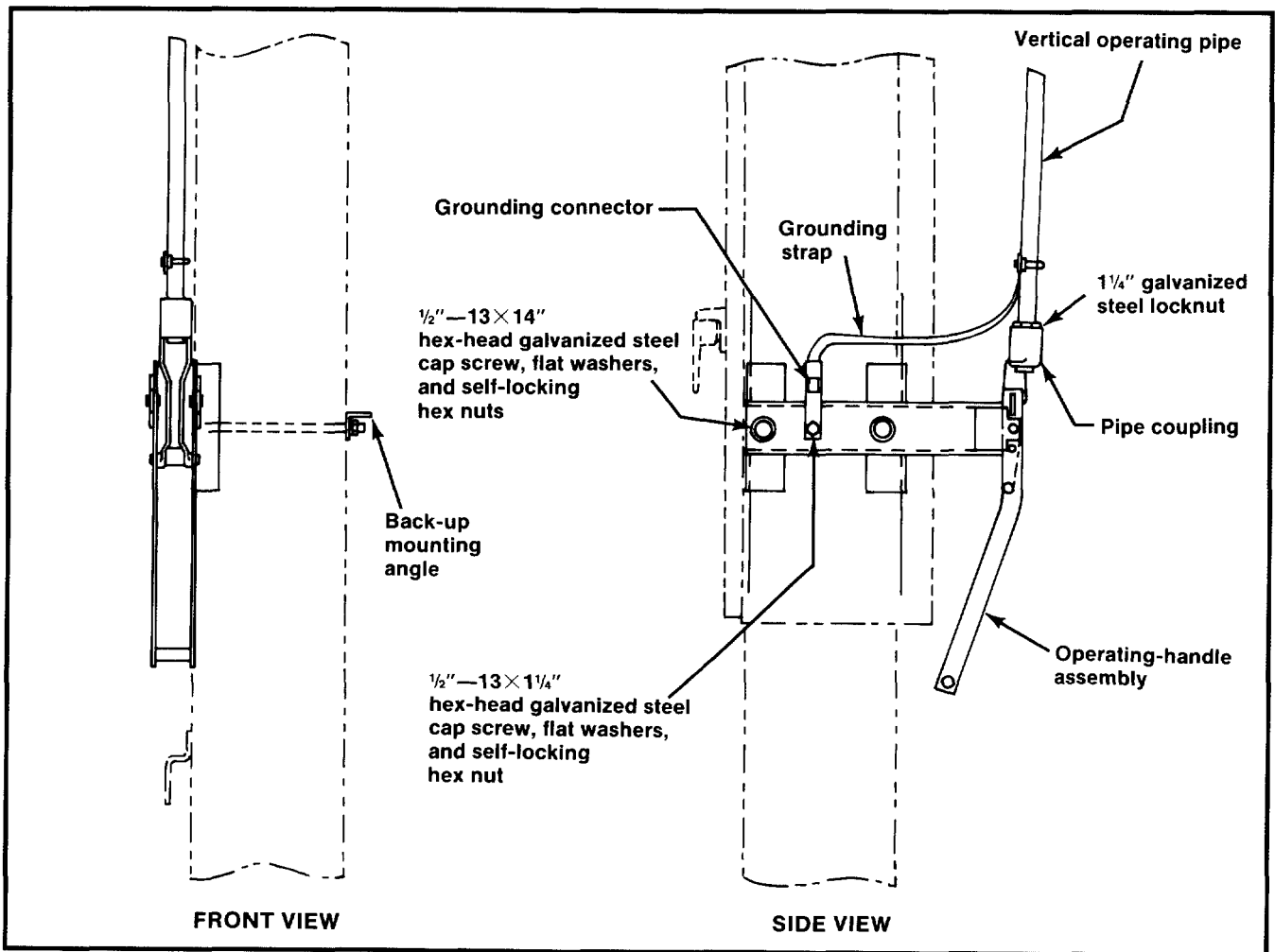
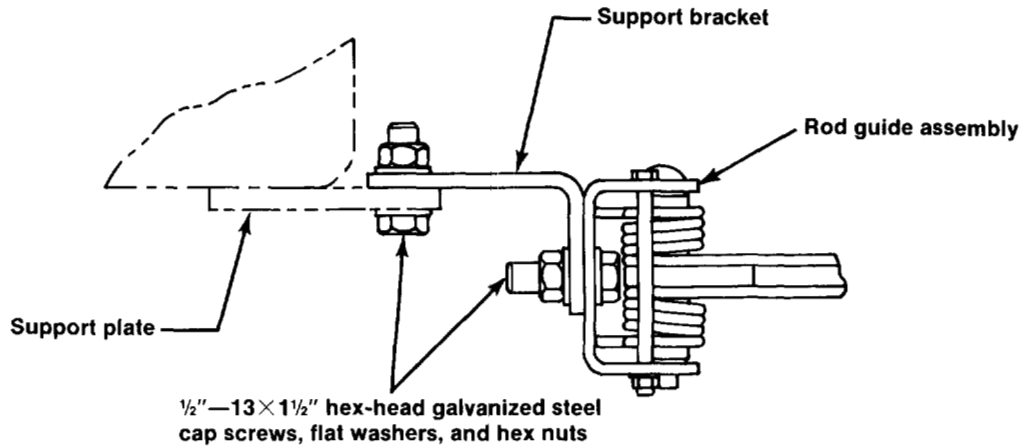
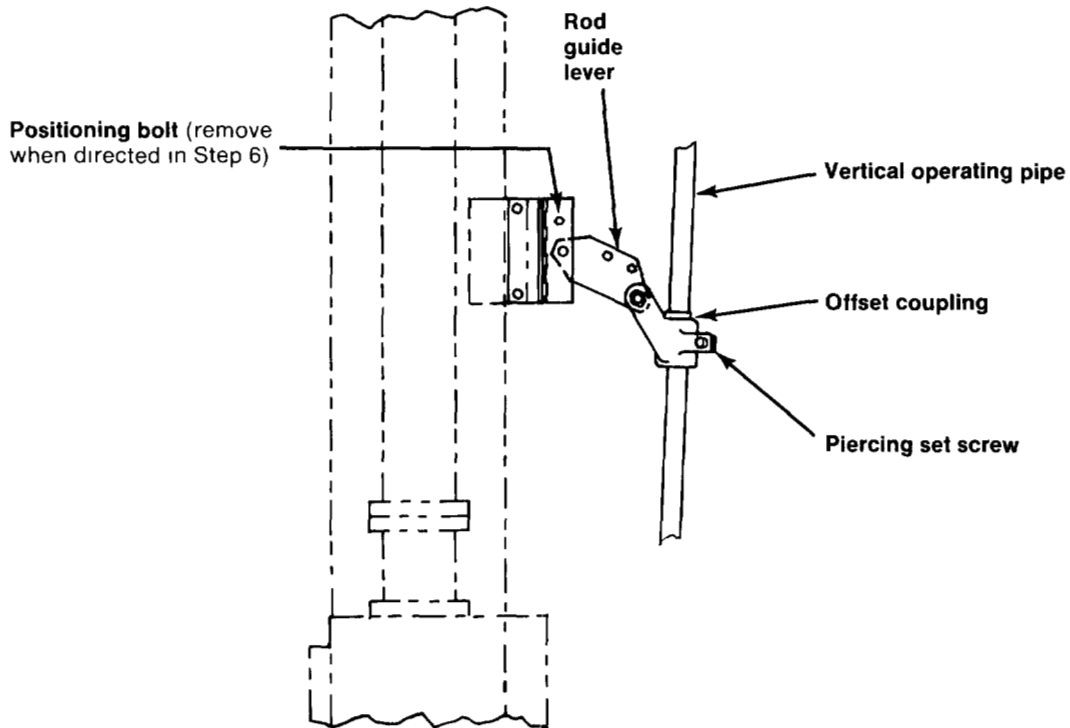


Figure 3. Operating-handle assembly, shown in grounding-switch-open position.



TOP VIEW



SIDE VIEW

Figure 4. Rod guide assembly used on Circuit-Switchers having 168- through 240-inch mounting pedestals.

**INSTALLATION — Continued**

**Step 6**

For Circuit-Switchers having 168- through 240-inch mounting pedestals: Guide the vertical operating pipe through the offset coupling of the rod guide assembly. See Figure 4, bottom view. Make certain that the cutting tip of the piercing set screw in the rod guide assembly does not protrude through the body of the offset coupling clamp. Thread the lower end of the pipe into the operating-handle pipe coupling. Approximately ¼ inch of thread should extend through the coupling. See Figure 3. Secure with 1¼" galvanized steel locknut. Tighten the ½"—13×1¼" hex-head galvanized steel cap screw of the offset coupling clamp. *Do not* tighten the associated piercing set screw at this time; it will be tightened in Step 10.

Remove the positioning bolt from the rod guide assembly. See Figure 4, bottom view.

**Step 7**

Remove the ties holding the grounding-switch blades closed. Move the handle to the fully closed position. A definite resistance should be felt at the end of the stroke, indicating that all slack in the operating linkage has been taken up.

If this is not the case, hold the operating handle at a point *more* than 20 degrees from the closed position before tightening the ½"—13×1¼" hex-head galvanized steel cap screw of the clevis coupling. Conversely, if it is necessary to use considerable force to move the handle to the fully closed position or if the operating handle does not swing 180 degrees to the fully open position, loosen the ½"—13×1¼" hex-head galvanized steel cap screw of the clevis coupling and then retighten it with the operating handle at *less* than the 20-degree position.

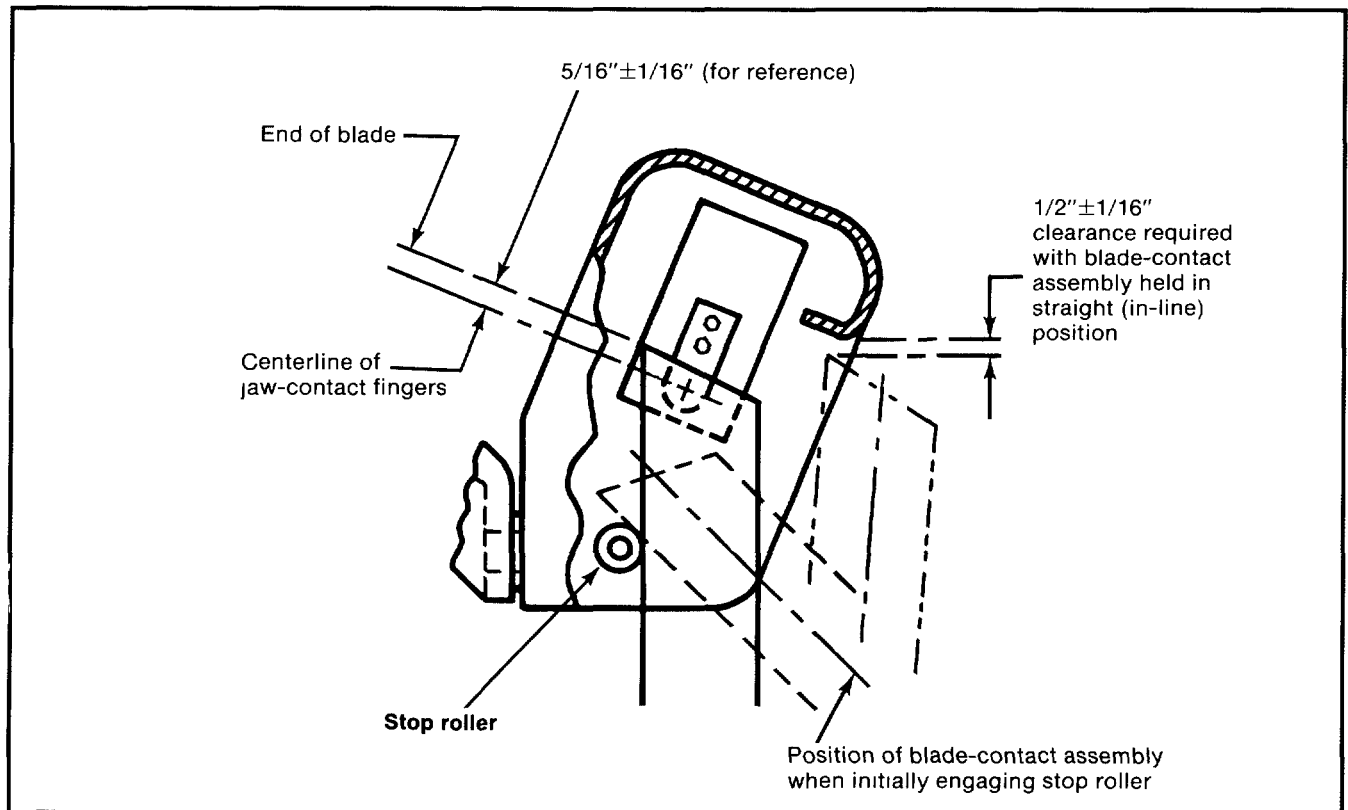


Figure 5. Jaw-contact detail.

## INSTALLATION — Continued

### Step 8

Attach the end of the grounding strap having the eye-bolt connector to the operating-handle assembly, using a  $\frac{1}{2}$ "— $13 \times 1\frac{1}{4}$ " hex-head galvanized steel cap screw, flat washers, and self-locking hex nut furnished. See Figure 3. Then attach the eye-bolt connector to a suitable earth ground.\*

Fasten the free end of the grounding strap to the vertical operating pipe a few inches above the operating-handle assembly, using the U-bolt connector provided for this purpose.

### Step 9

The grounding-switch blades have been factory-installed and adjusted. They should, however, be checked for proper positioning and readjusted if necessary. For this reason, the piercing set screws on the blade clamps have been left loose. See Figure 7.

For each blade assembly, perform the following procedure:

- (a) With the grounding switch closed, hold the spring-loaded blade-contact assembly in the straight (in-line) position shown in Figure 5 and verify that it enters the jaw contact with a  $\frac{1}{2}$ -inch clearance between the end of the blade-contact assembly and the jaw-contact housing. At the same time, verify that the sides of the blade-contact assembly are parallel to the jaw-contact fingers. If adjustment is required, loosen the clamp bolts on the section of the blade clamp which fastens the clamp to the blade assembly. Then slide the blade up or down and/or rotate the blade in the blade clamp, as necessary, to attain these conditions. Tighten the blade-clamp bolts equally so that the clamp pulls down evenly.
- (b) Verify that the blade-contact assembly enters the jaw contact on center. Further, check for proper blade closure by manually pulling the blade assembly away from its closed position as illustrated in Figure 6. With a pull-out force of approximately 40 pounds applied at the position shown, blade deflection should be no more than that indicated. If adjustment is required, loosen the clamp bolts on the section of the blade clamp which fastens the clamp to the interphase shaft. Then slide the blade left or right and/or rotate the blade, as necessary, to attain these conditions. Tighten the blade-clamp bolts equally so that the clamp pulls down evenly. Then tighten the piercing set screw, piercing the interphase shaft, and continue turning until a firm resistance is felt.

### Step 10

If any adjustments were performed in Step 9, repeat the procedure for setting the operating linkage described in Step 7. Then tighten the piercing set screw of the clevis coupling at the upper end of the vertical operating pipe, piercing the pipe, and continue turning until a firm resistance is felt. For *Circuit-Switchers having 168- through 240-inch mounting pedestals*: Also tighten the piercing set screw in the rod guide assembly, piercing the vertical operating pipe, and continue turning until a firm resistance is felt.

\* The grounding recommendations herein may differ from the standard operating and safety procedures of certain electric utility companies. Where a discrepancy exists, the operating procedures of the electric utility apply.

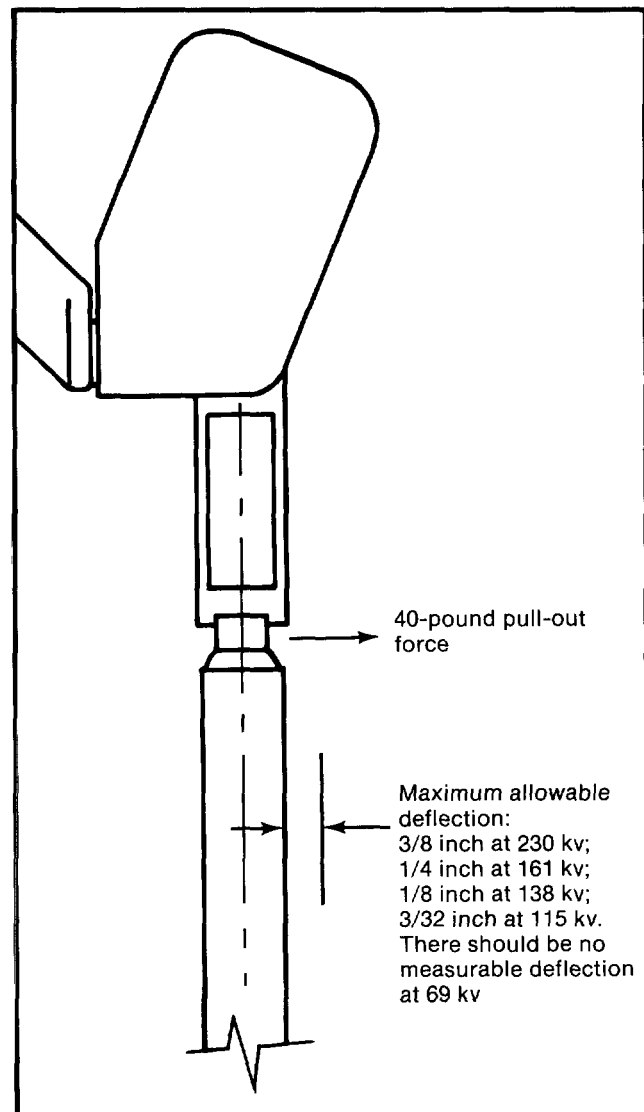


Figure 6. Blade closure verification.



**INSTALLATION — Continued****Step 11**

A flexible strap for current transfer to ground is attached to each blade clamp. See Figure 7. Unwrap the tape used to bind each flexible strap to its grounding-switch blade during shipment. Thoroughly wire-brush the current-transfer surface of the bracket at the end of each flexible strap and its mating surface on the Circuit-Switcher base, and immediately apply a liberal coating of Penetrox® A (available from Burndy Corporation) or other suitable aluminum connector compound to the brushed surfaces. Then attach the bracket to the Circuit-Switcher base, using two  $\frac{5}{8}$ "—11×2¼" hex-head galvanized steel cap screws, flat washers, and self-locking hex nuts furnished.

**Step 12**

If a key interlock for the grounding switch has been specified—as designated by the addition of the suffix "-L4" to the Circuit-Switcher catalog number—a

Superior key interlock (or equivalent) will be mounted on the operating-handle assembly. This key interlock locks the grounding switch open and works in conjunction with a key interlock located inside the Series 2000 Circuit-Switcher operator—designated by the addition of the suffix "-L1" to the Circuit-Switcher catalog number—to guard against operating the grounding switch with the interrupters closed. Verify that with the grounding switch open, the interlock bolt—when extended—engages a slot in the operating-handle assembly.

**⚠ IMPORTANT**

Key interlocks are intended for proper sequencing of switching operations; they are not intended to provide security. The operating-handle assembly includes provisions for padlocking the grounding switch in either the open or closed position.

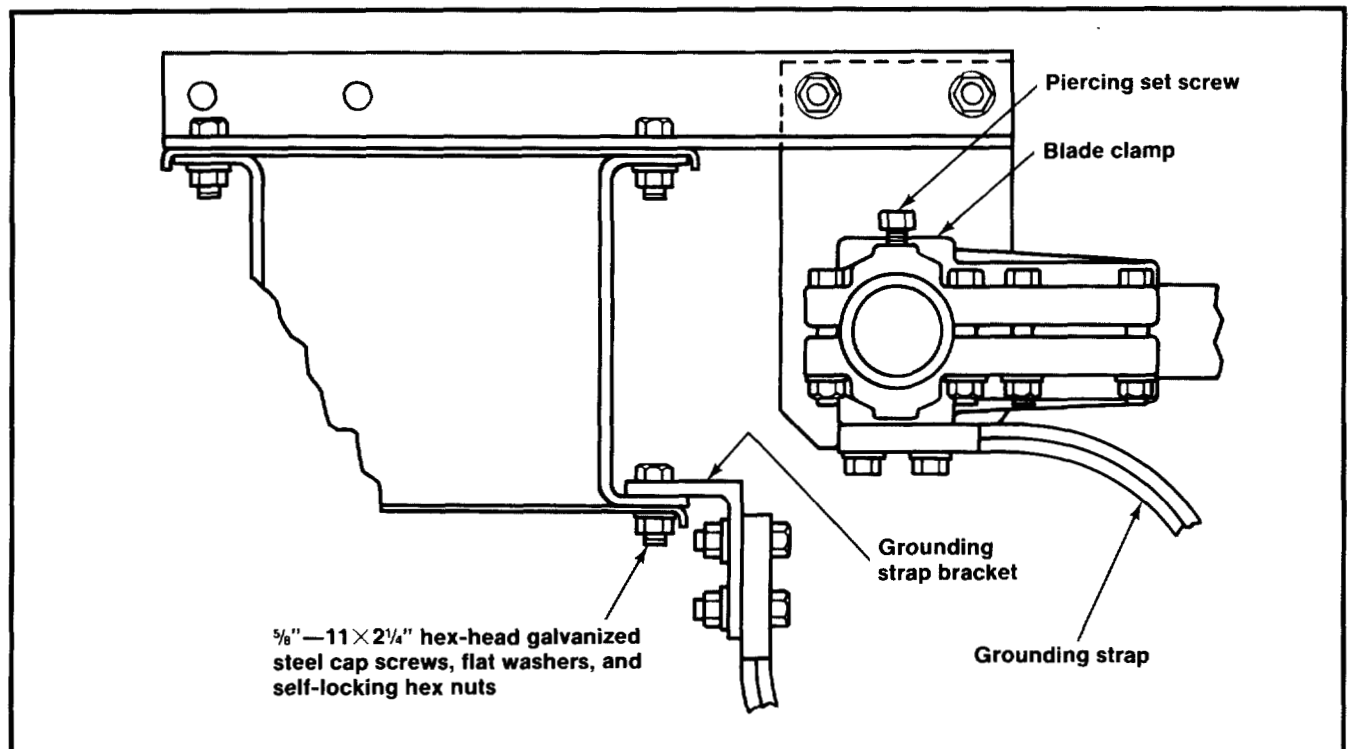


Figure 7. Attaching blade-clamp grounding strap to Circuit-Switcher base.

**INSPECTION SCHEDULE AND PROCEDURES**

To assure the grounding switch's continued proper performance, it should be inspected in accordance with

S&C's recommended schedule and procedures contained in S&C Instruction Sheet 716-590.

**716-521 INSTRUCTION SHEET**

Page 8 of 8  
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