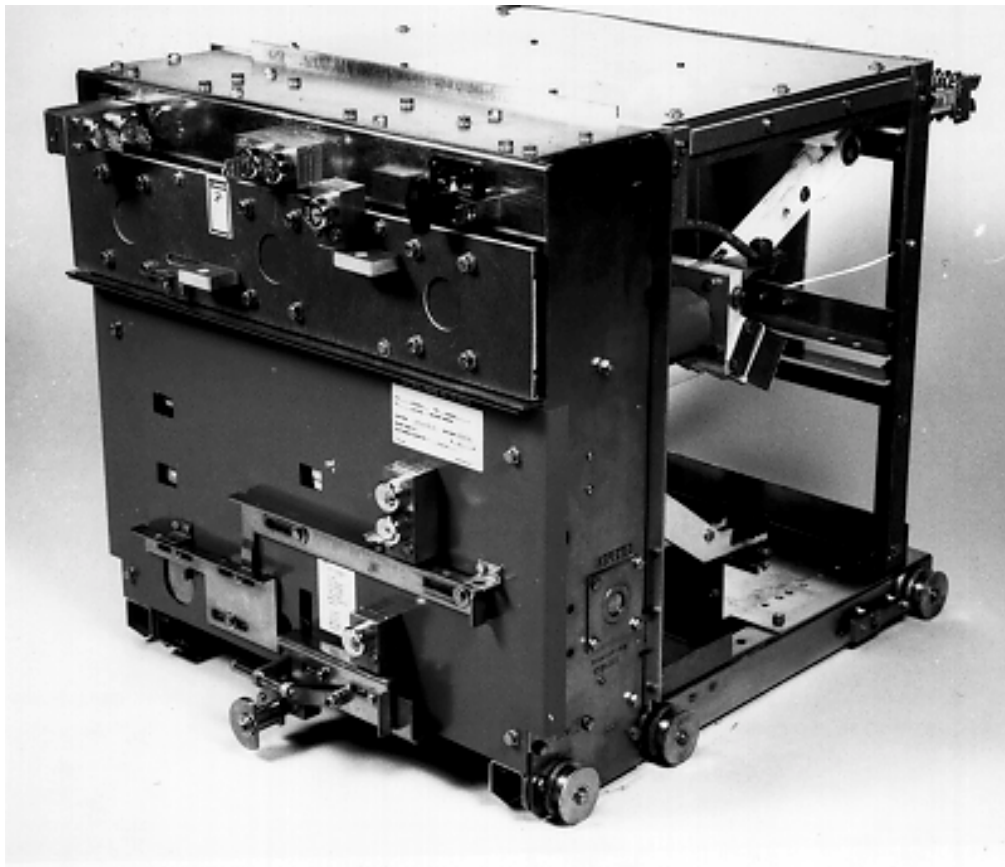


**Instructions for the Type VCP-W  
Electrical Ground and Test Device (Simple)  
Con-Edison Customer Interlocked Version  
Per Con Edison Specification EO-2022**

**I.L. 4A35310B**



---

**Cutler-Hammer, Inc.  
Cutler-Hammer Products  
Electrical Distribution Products Operations  
Coraopolis, Pa. 15108**

**Effective March 1999**

---

## **The VCP-W Electrical Ground and Test Device (Simple)**

### **Con Ed Customer Interlocked Version**

#### **Contents:**

	<b><u>Page Number</u></b>
<b>1.0 Introduction .....</b>	<b>1</b>
<b>2.0 Description .....</b>	<b>1</b>
<b>2.1 Power Grounding Switch Operation .....</b>	<b>3</b>
<b>2.1.1 Closing .....</b>	<b>3</b>
<b>2.1.2 Opening .....</b>	<b>3</b>
<b>2.2 VCP-W Interlocks and Safety Features .....</b>	<b>3</b>
<b>2.3 Con Edison Interlocks- Basic Elements Description.....</b>	<b>4</b>
<b>3.0 Operation .....</b>	<b>6</b>
<b>3.1 Safe Practices .....</b>	<b>6</b>
<b>3.2 Applying Grounds to the Incoming Feeder .....</b>	<b>7</b>
<b>3.3 Removing Grounds from the Incoming Feeder .....</b>	<b>13</b>
<b>3.4 Procedure for Testing of the Incoming Feeder .....</b>	<b>18</b>
<b>3.5 Procedure for Removing the Test Probes .....</b>	<b>27</b>
<b>Appendix A - Front View.....</b>	<b>34</b>
<b>Appendix B- Side View - Lower Terminal.....</b>	<b>35</b>
<b>Appendix C - Side View - Upper Terminal.....</b>	<b>36</b>
<b>Appendix D - Control Scheme - Power Trip.....</b>	<b>37</b>
<b>Appendix E - Switchgear Code Plate Requirements .....</b>	<b>38</b>

## **TYPE VCP-W ELECTRICAL GROUND & TEST DEVICE (SIMPLE) CON EDISON CUSTOMER INTERLOCKED VERSION**

### **1.0 INTRODUCTION**

Type Vac Clad-W switchgear assemblies are designed with all the bus work completely insulated for safety. Since the current carrying parts are not readily accessible, the type VCP-W Electrical Ground and Test Device is designed for insertion into the breaker compartment to gain access to the primary stationary contacts. It provides a convenient means to:

1. Ground the circuit for maintenance work.
2. Apply potential for cable testing.

**CAUTION: Because of the unique application and vast variety of system/user requirements, specific safe operating procedures for the use of this device must be developed by the user.**

### **2.0 DESCRIPTION**

The Electrical Ground and Test Device is a drawout element that can be inserted into a circuit breaker compartment in the same manner as a type VCP-W circuit breaker, see Figure 2.0.1. Vac Clad-W switchgear is a two-high arrangement. In the lower compartment the top terminals normally connect to the main bus and the bottom terminals normally connect to the incoming line or feeders. In an upper compartment the opposite normally holds true, i.e., the top terminals connect to the incoming line or feeders and the bottom terminals connect to the main bus. This must be verified for each application. Because of this two-high arrangement, there are two styles of the Electrical Ground and Test Device. In the lower compartment, the Electrical Ground and Test Device would normally provide connections to the bottom terminals, see Figure 2.0.2. In the upper compartment, the Electrical Ground and Test Device would normally provide connections to the top terminals, see Figures 2.0.3 and 2.0.4. Again, the bus arrangement must be verified for each application.

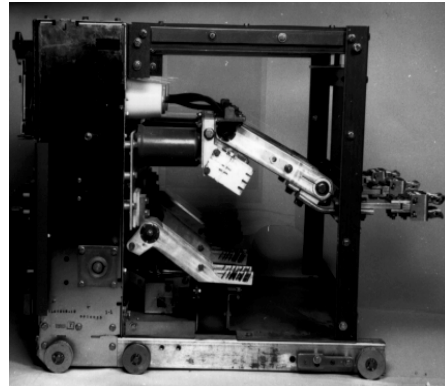
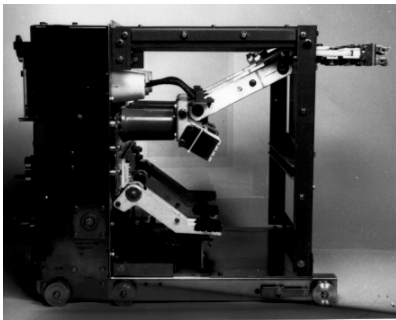
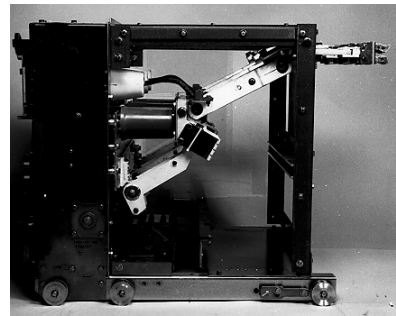
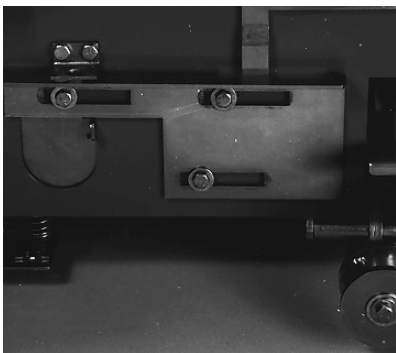
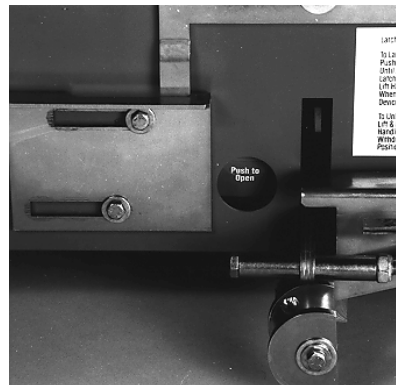
This device is longer than the standard VCP-W breaker. Therefore:

1. Electrical Ground and Test Device must be handled with extreme care while loading it on or removing it from the extension rails.
2. The extension rails cannot be engaged or disengaged with the device in the "Test" position--the device must be either removed or in the "Connected" position.
3. The device cannot be stored in a Vac Clad-W breaker compartment. It can only be stored in a storage compartment.

The stored energy closing mechanism for the power grounding switch is the same as used in type VCP-W breakers. It is capable of applying the ground against a "Live" circuit if operational errors have not cleared the circuit. However, in such a case, the relaying at the source of power is expected to cause the source interrupter to clear the circuit **as THIS DEVICE HAS NO INTERRUPTING CAPABILITY.**



FIGURE 2.0.1.G &amp; T DEVICE

FIGURE 2.0.2 LOWER COMPARTMENT  
G & T DEVICEFIGURE 2.0.3 UPPER COMPARTMENT  
G & T DEVICEFIGURE 2.0.4. GROUND SWITCH  
CLOSEDFIGURE 2.1.1.1. MANUAL "PUSH TO OPEN"  
BUTTON COVEREDFIGURE 2.1.2.1. MANUAL "PUSH TO OPEN"  
BUTTON

## **2.1 POWER GROUNDING SWITCH OPERATION:**

### **2.1.1 CLOSING**

The power grounding switch is closed by the remote operating station at the end of a 50 ft. long cable (supplied with the device). Upon depressing the "CLOSE" push-button (note that the push-button does not have to be held depressed):

1. The closing springs start to charge.
2. After the springs are fully charged, they automatically discharge to close the switch contacts.

Once the ground switch is closed, it can be locked in the "Closed" position by removing the cable from the receptacle on the device and locking the sliding cover that permits access to the manual "Push to Open" button, see Figure 2.1.1.1.

### **2.1.2 OPENING**

The grounding switch can be opened by manual operation of the "Push to Open" button, located behind the sliding cover on the device front panel, Figure 2.1.2.1. The grounding switch can be opened electrically using the remote operating station, Figure 2.1.2.2. The "OPEN" push-button must be depressed. For safety reasons, the switch is prevented from opening in less than 20 seconds after closing.

## **2.2 VCP-W INTERLOCKS AND SAFETY FEATURES**

The device is designed to provide as many interlocks and safety features as practical for the personnel performing any of the operations described earlier.

The device cannot be levered into or out of the "Connected" position unless the ground switch is open:

- Upon levering a device with a closed grounding switch into or out of the "Test" position, the switch is tripped open by the floor tripper in the compartment.
- In the "Connected" position, the levering crank is prevented from being engaged with the levering screw unless the grounding switch is tripped first.
- An indicator on the front panel shows the status of the ground switch contacts - "Open" or "Closed", See Appendix A.
- The grounding switch can be locked **closed** with a padlock. This is accomplished by locking the sliding cover on the device front panel to prevent access to the manual "Push to Open" button, See Appendix A.
- The grounding switch cannot be manually closed. The spring charging socket and manual close button are both covered by the device front panel, See Appendix A.
- The grounding switch can be closed only electrically by a remote operating station at the end of a 50 ft. cable supplied with the device. Access to the manual close button is blocked by the device front panel.
- The power to operate the grounding switch in this device is obtained through the secondary disconnect in the breaker compartment.

- The ground switch cannot be opened electrically in less than 20 seconds after closing, See Appendix D. This feature permits the source interrupter to clear a fault if the grounding switch is inadvertently closed on an energized circuit **as THIS DEVICE HAS NO INTERRUPTING CAPABILITY.**
- The control switch cable is connected to the device with a twist lock connector.

### **2.3 CON EDISON INTERLOCKS - BASIC ELEMENTS DESCRIPTION**

**Key Lock K1 (Keys KU & KB)** - The K1 interlock is a two cylinder lock used to electrically enable or disable the G & T device.

In the Cutler-Hammer Westinghouse Products E.O. G & T device design, the K1 lock is a two cylinder transfer lock with a switch associated with it. The switch is closed when Key KB is retained. When the switch is open, the G & T device is electrically disabled and key KU is retained, See Figure 2.3.1.

**Key Lock K2 (Keys KB & KC)** - The K2 interlock is a two cylinder lock used to mechanically lock the G & T device "OPEN".

In the Cutler-Hammer design, the K2 lock function is not needed. It is not possible for an operator of the G & T device to manually charge the closing springs or to manually close the device to ground. Therefore, the K2 lock will be a two cylinder transfer key lock for consistency with the Con Ed operating procedure, see Figure 2.3.2.

**Key Lock K3 (Key KC)** - The K3 interlock is a single cylinder lock that when locked, prevents the G & T device from insertion into the breaker compartment.

In the Cutler-Hammer design, the K3 lock blocks the G & T device levering latch from engaging the levering nut in the breaker compartment. In addition, the K3 lock is used to prevent operation of the levering in screw in both the Test and Connected positions. Key KC is removable with the lock bolt extended and the key normally resides in Key Lock K2, see Figure 2.3.3.

**Key Lock K4 (Keys KB & KD)** - The K4 interlock is a two cylinder lock used to mechanically lock the G & T device in the "CLOSED" position.

In the Cutler-Hammer design, the K4 interlock is a two cylinder lock used with the "Closed Locking Device" to prevent the G & T device from being opened. When the G & T device is in the "OPEN" state, the "Closed Locking Device" is disabled. Key KD is retained when the lock bolt is retracted. When the G & T device is "CLOSED", the "Closed Locking Device" is free to move to the right. The lock bolt can now be extended and the "Closed Locking Device" will be held in the secured "CLOSED" position. Key KD is now removable from lock K4. In this secured position, the "Closed Locking Device" has blocked operator access to the manual "OPEN" push-button. Also, in this secured position a position, interlock switch electrically disables the remote "OPEN" push-button. A padlock hasp is provided for securing the "CLOSED" position with a padlock, See Figure 2.3.4..

**Key Lock K5 (Key KD)** - The K5 interlock is a single cylinder lock used to open and lock the test port shutters.

In the Cutler-Hammer design, the K5 interlock is a single cylinder lock. Key KD is removable when the lock bolt is extended and the key normally resides in key lock K4. Key KD is available only when the G & T device is locked "CLOSED". Key KD is removable from the K5 interlock in two extended bolt positions. One position is when the Test Port shutters are closed. The second position is when the Test Probes are inserted in the Test Ports and they are being retained by the "detent" position of the shutter, See Figure 2.3.5.

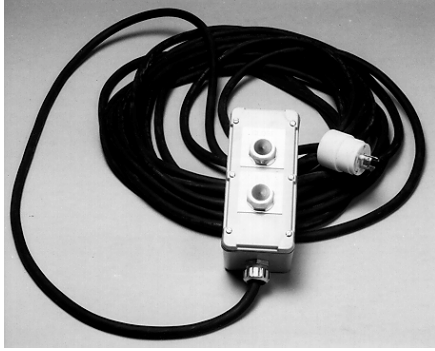


FIGURE 2.1.2.2 REMOTE OPERATING STATION



FIGURE 2.3.1 KEY LOCK K1 INTERLOCK



FIGURE 2.3.2 KEY LOCK K2 INTERLOCK

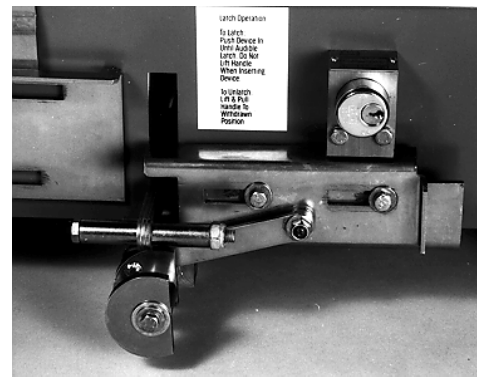


FIGURE 2.3.3 KEY LOCK K3 INTERLOCK

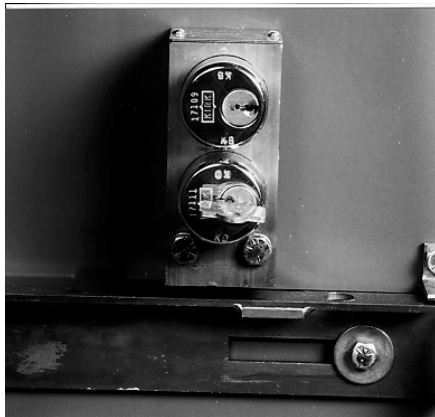


FIGURE 2.3.4 KEY LOCK K4 INTERLOCK

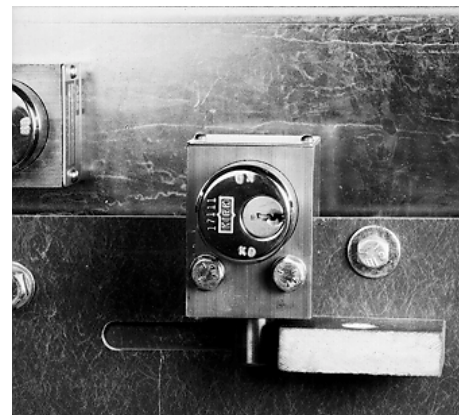


FIGURE 2.3.5 KEY LOCK K5 INTERLOCK



FIGURE 2.3.6 SELECTOR SWITCH

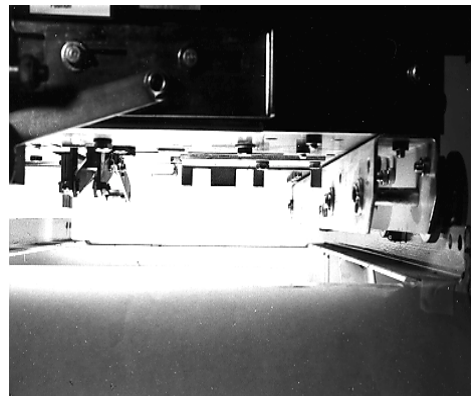


FIGURE 3.1.1 G &amp; T DEVICE CODE PLATE

**Selector Switch** - A selector switch has the "OPEN", "OFF" and "CLOSE" positions and shall operate in association with the remote "OPEN"/"CLOSE" push-button station, See Figure 2.3.6.

In the Cutler-Hammer design, the selector switch functions as described below. In the "OFF" position, the G & T device is electrically disabled. The selector switch is padlockable in the "OFF" position. This provides the padlockable function for the Key Locks K1 and K2. The selector Switch in the "CLOSE" position allows the execution of a remote "CLOSE" command. The "OPEN" function is disabled. Conversely, the selector switch in the "OPEN" position allows the execution of a remote "OPEN" command. The "CLOSE" function is disabled.

### **3.0 OPERATION**

#### **3.1 SAFE PRACTICES**

The G & T device is a safety-related device. It must be recognized that **IMPROPER USE CAN RESULT IN DEATH, SERIOUS PERSONAL INJURY, OR PROPERTY DAMAGE**. That is why it is important that the user develop specific and safe operating procedures for its use.

The following general safe practices are recommended:

1. THE DEVICE CANNOT BE STORED IN A VAC CLAD-W BREAKER COMPARTMENT. IT CAN ONLY BE STORED IN A STORAGE COMPARTMENT.
2. Store the device in a clean, dry area free from dust, dirt, moisture, etc.
3. Keep all insulating surfaces, which include primary support insulation and insulation barriers, clean and dry.
4. Check all primary circuit connections to make certain that they are clean and tight.
5. Permit only authorized trained personnel to use this device.
6. Take extreme care while using this device to avoid contacting "Live" or "Hot" (energized) terminals.
7. Do not remove the device front panel while using this device.
8. Always "CLOSE" the grounding switch electrically from the farthest distance with the remote control switch.



9. Before inserting the device into the breaker compartment, **CORRECTLY IDENTIFY LINE AND BUS TERMINALS FOR THE BREAKER COMPARTMENT** and visually make certain that the connections will be made to the Line Terminals.
10. The G & T device is coded to be non-interchangeable between upper and lower compartments, See Figure 3.1.1. Inspect switchgear cell to verify that the position coded G & T device code plate is installed (reference 8243A53H01), See Appendix E.
11. Check for dielectric integrity at 27kV AC across the terminals to ground with the grounding switch "OPEN".

Typical procedures for use of this G & T device are as follows:

### **3.2 APPLYING GROUNDS TO THE INCOMING FEEDER**

1. With the G & T device out of the breaker compartment, **CORRECTLY IDENTIFY LINE AND BUS TERMINALS FOR THE BREAKER COMPARTMENT** and visually make certain that the connections will be made to the Line Terminals.
2. The Key KU, which is used to start the grounding and testing operations, is obtained from the lock box on the premises.
3. Key KU is inserted into Key Lock K1 and is rotated, See Figure 3.2.1. The switch which is associated with Key Lock K1 opens. The G & T device's "CLOSE" circuit is electrically disabled. Key KU has electrically locked the G & T device "OPEN" and is held captive. Key KB is now available in Key Lock K1.
4. Key KB is removed from Key Lock K1 and is inserted into Key Lock K2 and Key KC is rotated, See Figure 3.2.2 and 3.2.3. (The G & T device is already mechanically locked "OPEN" by virtue of the fact that it is not possible for the operator to manually charge the closings springs and manually "CLOSE" the device to ground.) Key KB is now held captive in Key Lock K2 and Key KC is now available.
5. Key KC is removed from Key Lock K2 and is inserted into Key Lock K3 and is rotated, see Figures 3.2.4 and 3.2.5. With the lock bolt retracted, the interlock can now be moved to the right releasing the levering latch handle, See Figure 3.2.6.
6. Install the extension rails in the breaker compartment. Lift the G & T device and load it on the extension rails with extreme care, See Figure 3.2.7. Remember, the G & T device is longer than the standard VCP-W breaker.

Optional use of a ramp for the **BOTTOM** (floor level) switchgear compartment. Engage the ramp onto the fixed rails of the switchgear bottom compartment. Push the G & T device onto the ramp checking to insure the wheels of the G & T device are fully within the tracks of the ramp, See Figure 3.2.8.

7. Push the device to the "Test" position as indicated by the crisp clicking sound of the levering latch engaging the levering nut.

Continue to push the G & T device up the ramp into the switchgear compartment until the levering latch is heard engaging the levering nut.

8. Using the breaker levering crank, lever the G & T device to the "Connected" position as indicated by the red flag appearing in front of and under the levering crank., See Figure 3.2.9.
9. The K3 interlock is moved back to the left to engage the levering latch handle, See Figure 3.2.10. Key KC is rotated in Key Lock K3. The levering screw is made inoperable, locking the G & T device in the "Connected" position in the breaker compartment.

10. Key KC is removed from Key Lock K3 and is inserted into Key Lock K2 and is rotated, See Figures 3.2.11 and 3.2.12. Key KC is now held captive in Key Lock K2 and Key KB is now available.
11. Key KB is removed from Key Lock K2 and is inserted into Key Lock K1 and Key KU is rotated, See Figures 3.2.13 and 3.2.14. . The DP/ST switch which is associated with Key Lock K1 closes. The G & T device's "CLOSE" circuit is electrically enabled.
12. Verify that the three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is in the "OFF" position, See Figure 3.2.15.
13. The umbilical cord of the Remote Operating Station is inserted into the receptacle on the front of the G & T device, See Figure 3.2.16. The Remote Operating Station consists of "OPEN" and "CLOSE" push-button switches.
14. The three position "OPEN/OFF/CLOSE" Selector Switch is then moved from the "OFF" position to the "CLOSE" position, See Figure 3.2.17.
15. Use the Remote Operating Station to "CLOSE" the G & T device via the "CLOSE" push-button switch from the safest distance, See Figure 3.2.18.
16. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position. Unplug the remote operating station from the G & T device, See Figures 3.2.19 and 3.2.20.
17. Key KU is rotated in Key Lock K1 to electrically lock the G & T device in the "CLOSE" position by electrically disabling the G & T device's "OPEN" circuit. Key KB is removed from Key Lock K1 and is locked in the lock box on the premises, See Figure 3.2.21.

THIS SPACE INTENTIONALLY LEFT BLANK

### APPLYING GROUNDS TO THE INCOMING FEEDER



FIGURE 3.2.1 INSERT KEY KU IN KEY LOCK K1 AND ROTATE



FIGURE 3.2.2 REMOVE KEY KB FROM LOCK K1



FIGURE 3.2.3 INSERT KEY KB IN KEY LOCK K2 AND ROTATE KEY KC



FIGURE 3.2.4 REMOVE KEY KC FROM KEY LOCK K2

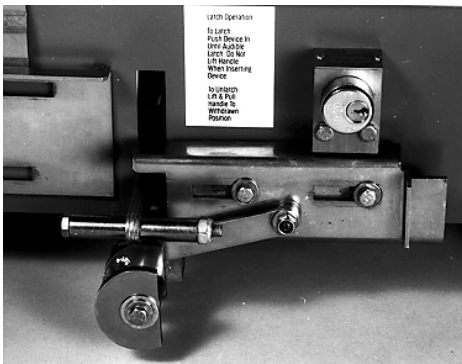


FIGURE 3.2.5 INSERT KEY KC IN KEY LOCK K3 AND ROTATE

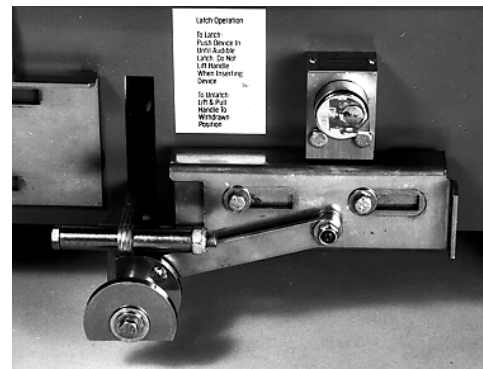


FIGURE 3.2.6 LEVERING LATCH HANDLE IS RELEASED

# APPLYING GROUNDS TO THE INCOMING FEEDER CONT.

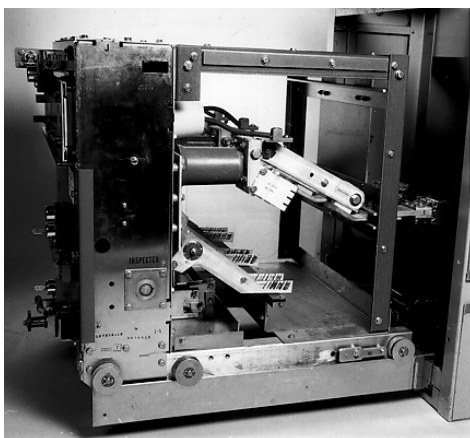


FIGURE 3.2.7 G & T DEVICE ON EXTENSION RAILS

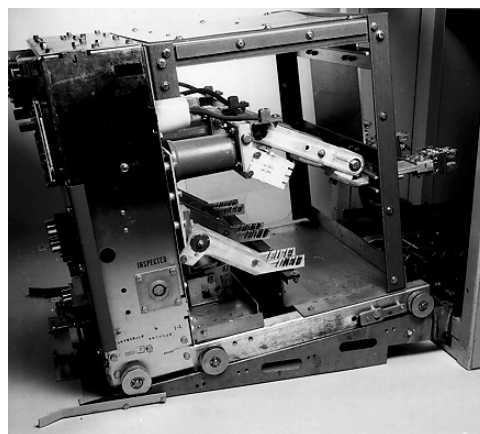


FIGURE 3.2.8 G & T DEVICE ON RAMP

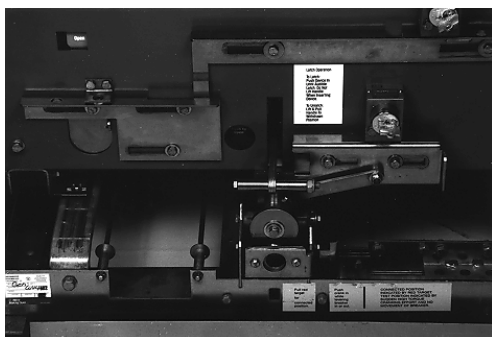


FIGURE 3.2.9 G & T DEVICE LEVERED IN TO THE CONNECT POSITION

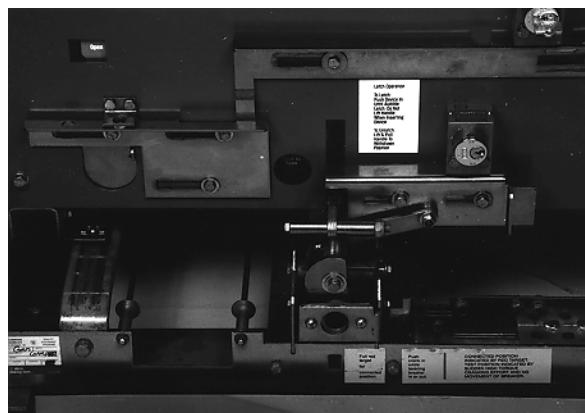


FIGURE 3.2.10 LEVERING DEVICE LOCKED

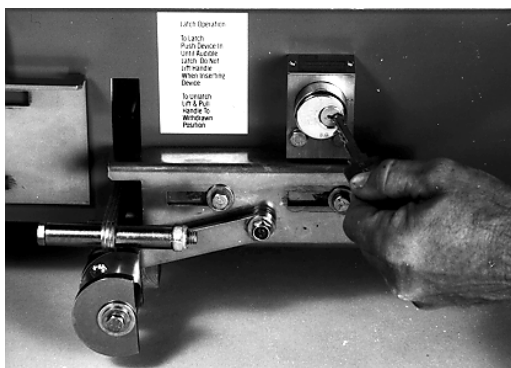


FIGURE 3.2.11 REMOVE KEY KC FROM KEY LOCK K3



FIGURE 3.2.12 INSERT KEY KC IN KEY LOCK K2 AND ROTATE.

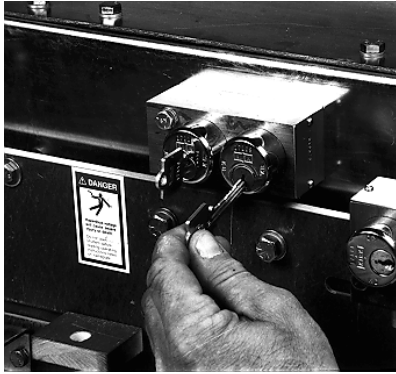
APPLYING GROUNDS TO THE INCOMING FEEDER (CONT)

FIGURE 3.2.13 REMOVE KEY KB FROM KEY LOCK K2



FIGURE 3.2.14 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU



FIGURE 3.2.15 VERIFY THAT THE SELECTOR SWITCH IS IN THE "OFF" POSITION



FIGURE 3.2.16 INSERT REMOTE OPERATING STATION PLUG



FIGURE 3.2.17 TURN SELECTOR SWITCH TO "CLOSE" POSITION



FIGURE 3.2.18 PUSH "CLOSE" PUSH-BUTTON



APPLYING GROUNDS TO THE INCOMING FEEDER CONT.

FIGURE 3.2.19 TURN SELECTOR SWITCH TO "OFF" POSITION

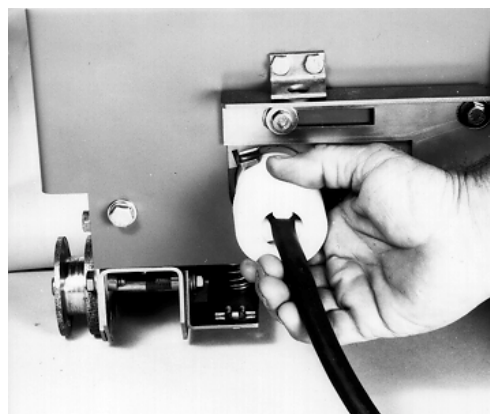


FIGURE 3.2.20 REMOVE REMOTE OPERATING STATION PLUG



FIGURE 3.2.21 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK KI

### **3.3 REMOVING GROUNDS FROM THE INCOMING FEEDER**

1. The Key KB, which is used to start the process of removing the grounds from the incoming feeder, is obtained from the lock box on the premises.
  2. Key KB is inserted into Key Lock K1 and Key KU is rotated, See Figure 3.3.1. The switch which is associated with Key Lock K1 closes. The G & T device's "OPEN" circuit is electrically enabled.
  3. Verify that the three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is in the "OFF" position, See Figure 3.3.2.
  4. The umbilical cord of the Remote Operating Station is inserted into the receptacle on the front of the G & T device, See Figure 3.3.3. The Remote Operating Station consists of "OPEN" and "CLOSE" push-button switches.
  5. The three position "OPEN/OFF/CLOSE" Selector Switch is then moved from the "OFF" position to the "OPEN" position, See Figure 3.3.4.
  6. Use the Remote Operating Station to "OPEN" the G & T device via the "OPEN" push-button switch from the safest distance, See Figure 3.3.5.
  7. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position, See Figure 3.3.6. Unplug the Remote Operating Station from the G & T device, See Figure 3.3.7.
  8. Key KU is rotated in Key Lock K1. The switch which is associated with Key Lock K1 opens. The G & T device's "CLOSE" circuit is electrically disabled. Key KU has electrically locked the G & T device "OPEN" and is held captive. Key KB is now available in Key Lock K1.
  9. Key KB is removed from Key Lock K1 and is inserted into Key Lock K2 and Key KC is rotated, See Figures 3.3.8 and 3.3.9. (The G & T device is already mechanically locked "OPEN" by virtue of the fact that it is not possible for the operator to manually charge the closings springs and manually "CLOSE" the device to ground.) Key KB is now held captive in Key Lock K2 and Key KC is now available.
  10. Key KC is removed from Key Lock K2 and is inserted into Key Lock K3 and is rotated, See Figures 3.3.10 and 3.3.11. With the lock bolt retracted, the interlock can now be moved releasing the levering latch handle and also freeing the levering in screw, see Figure 3.3.12.
  11. Install the extension rails in the breaker compartment. Using the breaker levering crank, lever the G & T device out to the "Test" position.
- Optional use of a ramp for the **BOTTOM** (floor level) switchgear compartment. Engage the ramp onto the fixed rails of the switchgear bottom compartment. Using the breaker levering crank, lever the G & T device out to the "TEST" Position.
12. Disengage the levering latch by lifting the handle on the G & T device and pulling it out onto the extension rails, see Figure 3.3.13.
- Disconnect the secondary contacts. Disengage the levering latch by lifting the handle on the G & T device and pulling the G & T device out (2-3 inches) then release the handle. Stand in front of the G & T device and pull the G & T device onto the ramp, pushing against the weight of the G & T device to prevent rapid movement and gently guiding it down the ramp onto the floor.
13. Lift the G & T device off the extension rails with extreme care.
  14. The K3 interlock is moved to engage the levering latch handle. Key KC is rotated in Key Lock K3.

15. Key KC is removed from Key Lock K3 and is inserted into Key Lock K2 and is rotated, see Figures 3.3.14 and 3.3.15. Key KC is now held captive in Key Lock K2 and Key KB is now available.
16. Key KB is removed from Key Lock K2 and is inserted into Key Lock K1 and Key KU is rotated, see Figures 3.3.16 and 3.3.17. The switch which is associated with Key Lock K1 closes.
17. Key KU is removed from Key Lock K1 and is locked in the lock box on the premises, see Figure 3.3.18.

**THIS SPACE INTENTIONALLY LEFT BLANK**



REMOVING GROUNDS FROM THE INCOMING FEEDER

FIGURE 3.3.1 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU



FIGURE 3.3.2 VERIFY THAT THE SELECTOR SWITCH IS IN THE "OFF" POSITION.



FIGURE 3.3.3 INSERT REMOTE OPERATING STATION PLUG



FIGURE 3.3.4 TURN SELECTOR SWITCH TO "OPEN" POSITION



FIGURE 3.3.5 PUSH "OPEN" PUSH-BUTTON



FIGURE 3.3.6 TURN SELECTOR SWITCH TO "OFF" POSITION

# REMOVING GROUNDS FROM THE INCOMING FEEDER CONT.

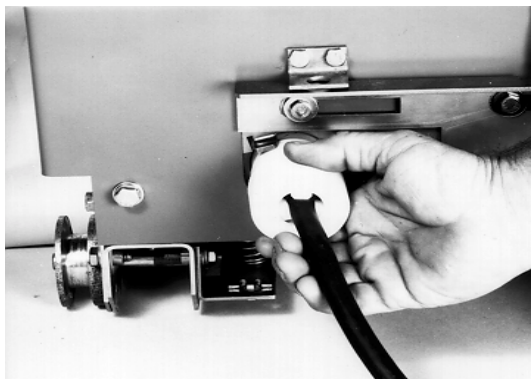


FIGURE 3.3.7 REMOVE REMOTE OPERATING STATION PLUG



FIGURE 3.3.8 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK K1



FIGURE 3.3.9 INSERT KEY KB IN KEY LOCK K2 AND ROTATE KEY KC



FIGURE 3.3.10 REMOVE KEY KC FROM KEY LOCK K2

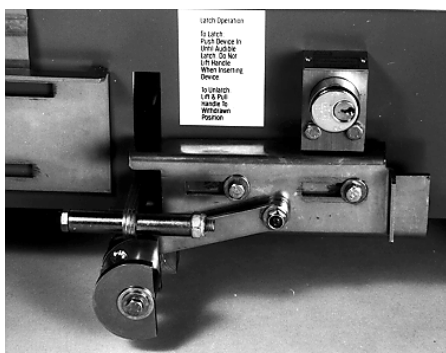


FIGURE 3.3.11 INSERT KEY KC IN KEY LOCK K3 AND ROTATE

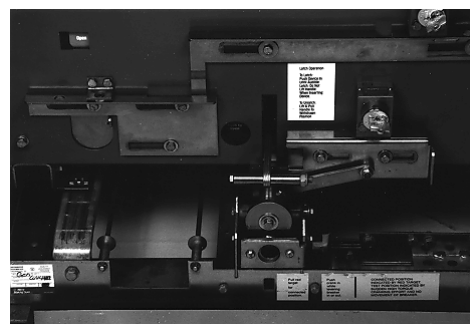


FIGURE 3.3.12 LEVERING LATCH HANDLE IS RELEASED

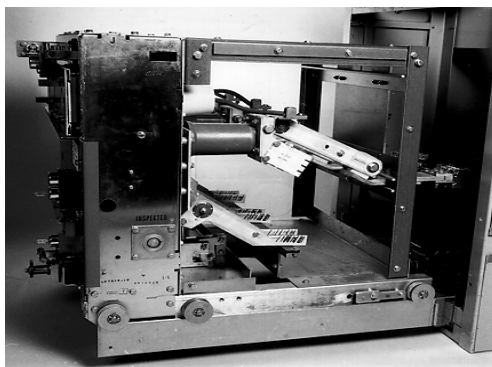


FIGURE 3.3.13 G & T DEVICE ON EXTENSION RAILS

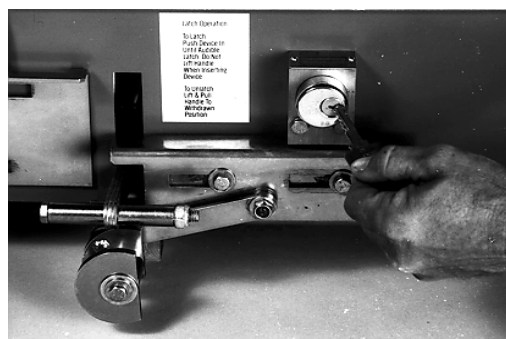


FIGURE 3.3.14 REMOVE KEY KC FROM KEY LOCK K3

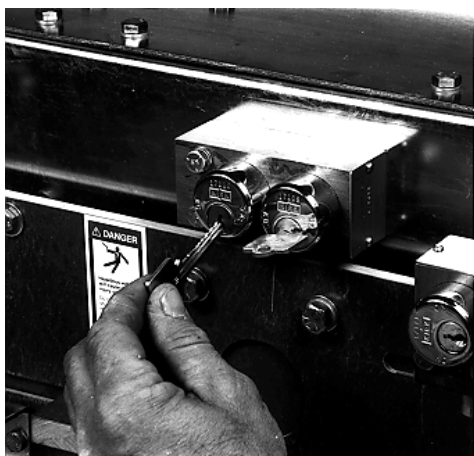


FIGURE 3.3.15 INSERT KEY KC IN KEY LOCK K2 AND ROTATE



FIGURE 3.3.16 REMOVE KEY KB FROM KEY LOCK K2



FIGURE 3.3.17 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU



FIGURE 3.3.18 REMOVE KEY KU FROM KEY LOCK K1

### **3.4 PROCEDURE FOR TESTING OF THE INCOMING FEEDER**

1. With the G & T device out of the breaker compartment, **CORRECTLY IDENTIFY LINE AND BUS TERMINALS FOR THE BREAKER COMPARTMENT** and visually make certain that the connections will be made to the Line Terminals.
2. The Key KU, which is used to start the grounding and testing operations, is obtained from the lock box on the premises.
3. Key KU is inserted into Key Lock K1 and is rotated, see Figure 3.4.1. The switch which is associated with Key Lock K1 opens. The G & T device's "CLOSE" circuit is electrically disabled. Key KU has electrically locked the G & T device "OPEN" and is held captive. Key KB is now available in Key Lock K1.
4. Key KB is removed from Key Lock K1 and is inserted into Key Lock K2 and Key KC is rotated, see Figures 3.4.2 and 3.4.3. (The G & T device is already mechanically locked "OPEN" by virtue of the fact that it is not possible for the operator to manually charge the closings springs and manually "CLOSE" the device to ground.) Key KB is now held captive in Key Lock K2 and Key KC is now available.
5. Key KC is removed from Key Lock K2 and is inserted into Key Lock K3 and is rotated, see Figures 3.4.4 and 3.4.5. With the lock bolt retracted, the interlock can now be moved to the right releasing the levering latch handle, see Figure 3.4.6.
6. Install the extension rails in the breaker compartment. Lift the G & T device and load it on the extension rails with extreme care, see Figure 3.4.7. Remember, the G & T device is longer than the standard VCP-W breaker.

Optional use of a ramp for the BOTTOM (floor level) switchgear compartment. Engage the ramp onto the fixed rails of the switchgear bottom compartment. Push the G & T device onto the ramp checking to insure the wheels of the G & T device are fully within the tracks of the ramp, see Figure 3.4.8.

7. Push the device to the "Test" position as indicated by the crisp clicking sound of the levering latch engaging the levering nut.

Continue to push the G & T device up the ramp into the switchgear compartment until the levering latch is heard engaging the levering nut.

8. Using the breaker levering crank, lever the G & T device to the "Connected" position as indicated by the red flag appearing in front of and under the levering crank, see Figure 3.4.9.
9. The K3 interlock is moved back to the left to engage the levering latch handle, see Figure 3.4.10. Key KC is rotated in Key Lock K3. The levering in screw is made inoperable, locking the G & T device in the "Connected" position in the breaker compartment.
10. Key KC is removed from Key Lock K3 and is inserted into Key Lock K2 and is rotated, see Figures 3.4.11 and 3.4.12. Key KC is now held captive in Key Lock K2 and Key KB is now available.
11. Key KB is removed from Key Lock K2 and is inserted into Key Lock K1 and Key KU is rotated, see Figures 3.4.13 and 3.4.14. The switch which is associated with Key Lock K1 closes. The G & T device's "CLOSE" circuit is electrically enabled.
12. Verify that the three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is in the "OFF" position, see Figure 3.4.15.

13. The umbilical cord of the Remote Operating Station is inserted into the receptacle on the front of the G & T device, see Figure 3.4.16. The Remote Operating Station consists of "OPEN" and "CLOSE" push-button switches.
14. The three position "OPEN/OFF/CLOSE" Selector Switch is then moved from the "OFF" position to the "CLOSE" position, see Figure 3.4.17.
15. Use the Remote Operating Station to "CLOSE" the G & T device via the "CLOSE" push-button switch from the safest distance, see Figure 3.4.18.
16. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position, see Figure 3.4.19.
17. Key KU is rotated in Key Lock K1. The G & T device is locked in the "CLOSE" position by electrically disabling the G & T device's "OPEN" circuit. Key KB is now available in Key Lock K1.
18. Key KB is removed from Key Lock K1 and is inserted into Key Lock K4, see Figures 3.4.20 and 3.4.21.
19. Since the G & T device is currently "CLOSED", the "Closed Locking Device" is free to be moved to the right. The hole in the "Closed Locking Device" is aligned with the Key Lock K4 bolt opposite it.
20. Key KD is rotated in Key Lock K4 holding the "Closed Locking Device" in the secured "CLOSED" position, see Figure 3.4.22. A position interlock switch, used with the "Closed Locking Device", has disabled the "OPEN" circuit. Access to the manual "OPEN" push-button on the front of the G & T device has been blocked by the movement of the "Closed Locking Device". Key KD is now available in Key Lock K4.
21. Key KD is removed from Key Lock K4 and is inserted into Key Lock K5 and is rotated, see Figures 3.4.23 and 3.4.24. The shutter covering the Test Ports is unlocked. Key KD is held captive when the Test Ports are open, see Figure 3.4.25.
22. The Test Probes are inserted into the Test Ports and the shutter is moved all the way to the left. The Test Probes are secured in the Test Ports by the "detent" position of the shutter, see Figure 3.4.26.
23. Key KD is rotated in Key Lock K5. The shutter is locked in place. Key KD is now available in Key Lock K5.
24. Key KD is removed from Key Lock K5 and is inserted into Key Lock K4 and is rotated, see Figures 3.4.27 and 3.4.28. The "Closed Locking Device" is released and is spring returned to its left most resting place. The position interlock switch, used with the "Closed Locking Device", has enabled the "OPEN" circuit. Key KB is now available in Key Lock K4.
25. Key KB is removed from Key Lock K4 and is inserted into Key Lock K1 and Key KU is rotated, see Figures 3.4.29 and 3.4.30. The switch which is associated with Key Lock K1 closes. The G & T device's "OPEN" circuit is electrically enabled.
26. The three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is moved from the "OFF" to the "OPEN" position, see Figure 3.4.31.
27. Use the Remote Operating Station to "OPEN" the G & T device via the "OPEN" push-button switch from the safest distance, see Figure 3.4.32.
28. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position. The Remote Operating Station is unplugged from the G & T device, see Figures 3.4.33 and 3.4.34.

29. Key KU is rotated in Key Lock K1. The G & T device is locked in the “OPEN” position by electrically disabling the G & T device’s “CLOSE” circuit. Key KB is now available in Key Lock K1.
30. Key KB is removed from Key Lock K1 and is locked in the lock box on the premises, see Figure 3.4.35
31. The G & T device is now available for testing.

THIS SPACE LEFT BLANK INTENTIONALLY



# PROCEDURE FOR TESTING OF THE INCOMING FEEDER



FIGURE 3.4.1 INSERT KEY KU IN KEY LOCK K1 AND ROTATE

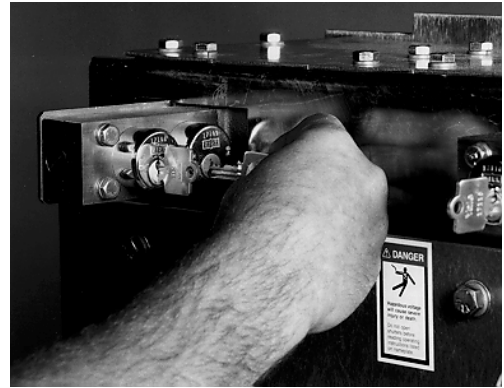


FIGURE 3.4.2 REMOVE KEY KB FROM KEY LOCK K1



FIGURE 3.4.3 I INSERT KEY KB IN KEY LOCK K2 AND ROTATE KEY KC



FIGURE 3.4.4 REMOVE KEY KC FROM KEY LOCK K2

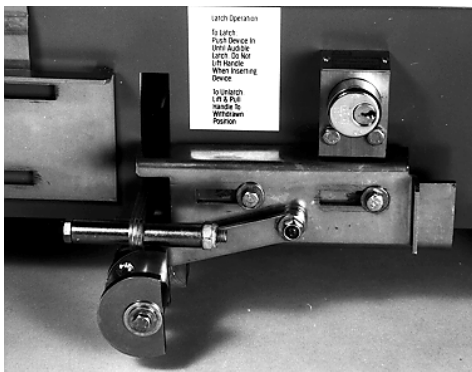


FIGURE 3.4.5 INSERT KEY KC IN KEY LOCK K3 AND ROTATE

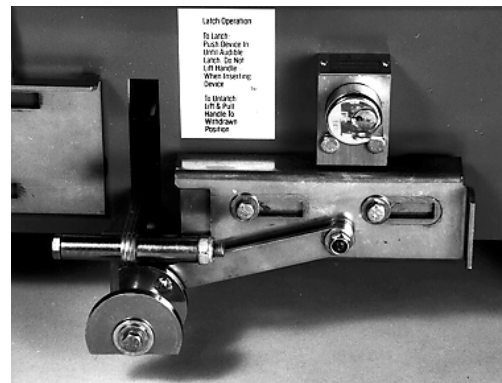


FIGURE 3.4.6 LEVERING LATCH HANDLE IS RELEASED

PROCEDURE FOR TESTING OF THE INCOMING FEEDER CONT.

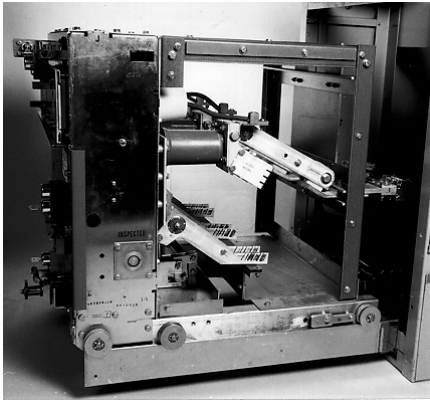


FIGURE 3.4.7 G&T DEVICE ON EXTENSION RAILS

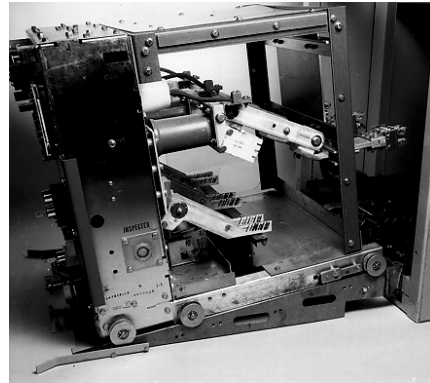


FIGURE 3.4.8 G&T DEVICE ON RAMP

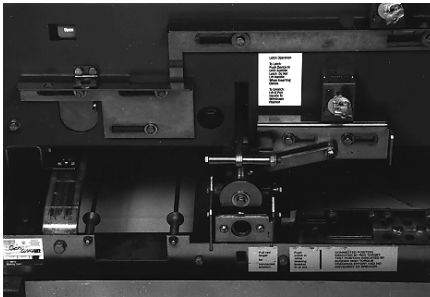


FIGURE 3.4.9 G&T DEVICE LEVERED IN TO THE CONNECT POSITION

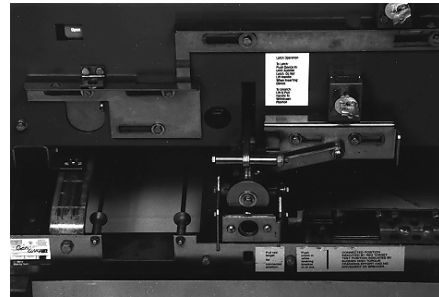


FIGURE 3.4.10 LEVERING IN DEVICE - LOCKED

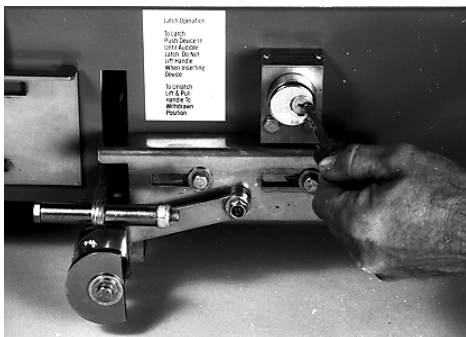


FIGURE 3.4.11 REMOVE KEY KC FROM KEY LOCK K3



FIGURE 3.4.12 INSERT KEY KC IN KEY LOCK K2 AND ROTATE



PROCEDURE FOR TESTING OF THE INCOMING FEEDER CONT.

FIGURE 3.4.13 REMOVE KEY KB FROM KEY LOCK K2.



FIGURE 3.4.14 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU.

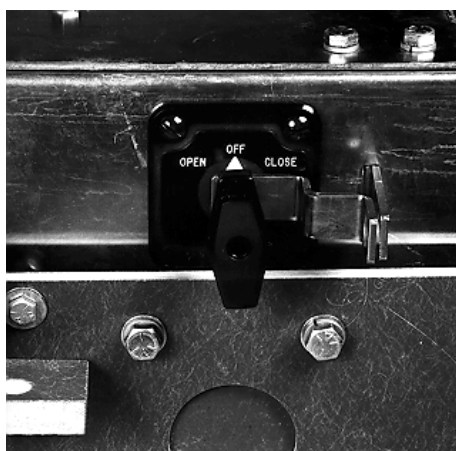


FIGURE 3.4.15 VERIFY THAT THE SELECTOR SWITCH IS THE "OFF" POSITION

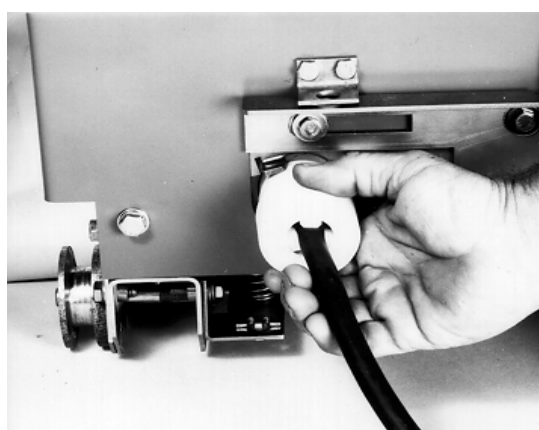


FIGURE 3.4.16 INSERT REMOTE OPERATING STATION PLUG



FIGURE 3.4.17 TURN SELECTOR SWITCH TO "CLOSE" POSITION



FIGURE 3.4.18 PUSH "CLOSE" PUSH-BUTTON

PROCEDURE FOR TESTING OF THE INCOMING FEEDER CONT.



FIGURE 3.4.19 TURN SELECTOR SWITCH TO "OFF" POSITION



FIGURE 3.4.20 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK K1



FIGURE 3.4.21 INSERT KEY KB IN KEY LOCK K4

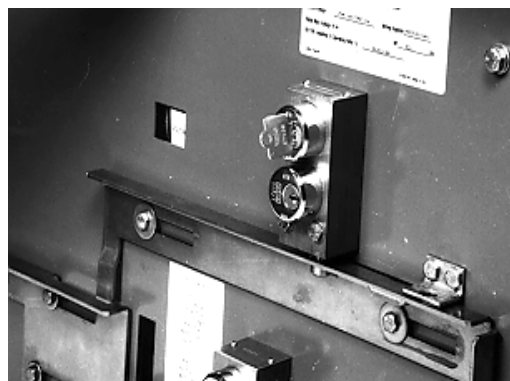


FIGURE 3.4.22 CLOSED LOCKING DEVICE MOVED TO THE RIGHT AND LOCKED BY ROTATING KEY KD



FIGURE 3.4.23 REMOVE KEY KD FROM KEY LOCK K4



FIGURE 3.4.24 INSERT KEY KD IN KEY LOCK K5 AND ROTATE

PROCEDURE FOR TESTING OF THE INCOMING FEEDER CONT.

FIGURE 3.4.25 OPEN TEST PORT SHUTTER

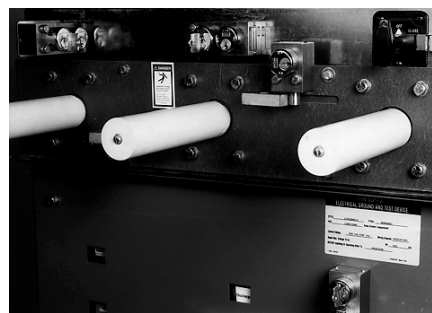
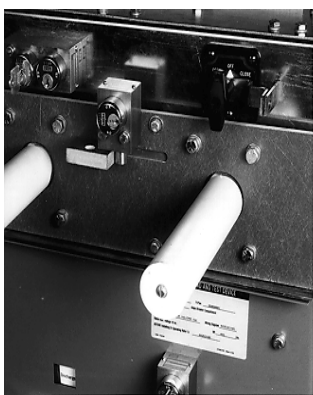


FIGURE 3.4.26 PROBES INSTALLED &amp; LOCKED IN PLACE

FIGURE 3.4.27 REMOVE KEY KD FROM  
KEY LOCK K5FIGURE 3.4.28 INSERT KEY KD IN KEY LOCK K4  
AND ROTATEFIGURE 3.4.29 REMOVE KEY KB FROM KEY  
LOCK K4FIGURE 3.4.30 INSERT KEY KB IN KEY LOCK  
K1 AND ROTATE KEY KU



**PROCEDURE FOR TESTING OF THE INCOMING FEED CONT.**

FIGURE 3.4.31 TURN SELECTOR SWITCH TO "OPEN" POSITIONS



FIGURE 3.4.32 PUSH "OPEN" PUSH-BUTTON



FIGURE 3.4.33 TURN SELECTOR TO "OFF" POSITION



FIGURE 3.4.34 REMOVE REMOTE OPERATING STATION PLUG



FIGURE 3.4.35 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK K1

### **3.5 PROCEDURE FOR REMOVING THE TEST PROBES**

1. The Key KB, which is used to start the process of removing the Test Probes, is obtained from the lock box on the premises.
2. Key KB is inserted into Key Lock K1 and Key KU is rotated, see Figure 3.5.1. The switch which is associated with Key Lock K1 closes. The G & T device's "CLOSE" circuit is electrically enabled.
3. Verify that the three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is in the "OFF" position, see Figure 3.5.2.
4. The umbilical cord of the Remote Operating Station is inserted into the receptacle on the front of the G & T device, see Figure 3.5.3. The Remote Operating Station consists of "OPEN" and "CLOSE" push-button switches.
5. The three position "OPEN/OFF/CLOSE" Selector Switch is then moved from the "OFF" position to the "CLOSE" position, see Figure 3.5.4.
6. Use the Remote Operating Station to "CLOSE" the G & T device via the "CLOSE" push-button switch from the safest distance, see Figure 3.5.5.
7. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position, see Figure 3.5.6.
8. Key KU is rotated in Key Lock K1 to electrically lock the G & T device in the "CLOSE" position by electrically disabling the G & T device's "OPEN" circuit. Key KB is now available in Key Lock K1.
9. Key KB is removed from Key Lock K1 and is inserted into Key Lock K4, see Figures 3.5.7 and 3.5.8.
10. Since the G & T device is currently "CLOSED", the "Closed Locking Device" is free to be moved to the right. The hole in the "Closed Locking Device" is aligned with the Key Lock K4 bolt opposite it.
11. Key KD is rotated in Key Lock K4 holding the "Closed Locking Device" in the secured "CLOSED" position, see Figure 3.5.9. A position interlock switch, used with the "Closed Locking Device", has electrically disabled the "OPEN" circuit. Access to the manual "OPEN" push-button on the front of the G & T device has been blocked by the movement of the "Closed Locking Device". Key KD is now available in Key Lock K4.
12. Key KD is removed from Key Lock K4 and is inserted into Key Lock K5 and is rotated, see Figures 3.5.10 and 3.5.11. The shutter securing the Test Probes in place is unlocked. Key KD is held captive when the Test Ports are open.
13. The Test Probes are removed from the Test Ports. The shutter is moved all the way to the right closing off the Test Ports.
14. Key KD is rotated in Key Lock K5 locking the shutter closed, see Figures 3.5.12. Key KD is now available in Key Lock K5.
15. Key KD is removed from Key Lock K5 and is inserted into Key Lock K4 and is rotated, see Figure 3.5.13. The "Closed Locking Device" is released and is spring returned to its left most resting place. The position interlock switch, used with the "Closed Locking Device", has electrically enabled the "OPEN" circuit. Key KB is now available in Key Lock K4.
16. Key KB is removed from Key Lock K4 and is inserted into Key Lock K1 and Key KU is rotated, see Figures 3.5.14 and 3.5.15. The switch which is associated with Key Lock K1 closes. The G & T device's "OPEN" circuit is electrically enabled.

17. The three position "OPEN/OFF/CLOSE" Selector Switch on the front of the G & T device is moved from the "OFF" to the "OPEN" position, see Figure 3.5.16.
18. Use the Remote Operating Station to "OPEN" the G & T device via the "OPEN" push-button switch from the safest distance, see Figure 3.5.17.
19. Place the "OPEN/OFF/CLOSE" Selector Switch in the "OFF" position. The Remote Operating Station is unplugged from the G & T device, see Figures 3.5.18 and 3.5.19.
20. Key KU is rotated in Key Lock K1. The G & T device is locked in the "OPEN" position by electrically disabling the G & T device's "CLOSE" circuit. Key KB is now available in Key Lock K1.
21. Key KB is removed from Key Lock K1 and is inserted into Key Lock K2 and Key KC is rotated, see Figures 3.5.20 and 3.5.21. (The G & T device is already mechanically locked "OPEN" by virtue of the fact that it is not possible for the operator to manually charge the closings springs and manually "CLOSE" the device to ground.) Key KB is now held captive in Key Lock K2 and Key KC is now available.
22. Key KC is removed from Key Lock K2 and is inserted into Key Lock K3 and is rotated, see Figures 3.5.22 and 3.5.23. With the lock bolt retracted, the interlock can now be moved to the right releasing the levering latch handle and also freeing the levering in screw, see Figure 3.5.24.
23. Install the extension rails in the breaker compartment. Using the breaker levering crank, lever the G & T device to the "Test" position.

Optional use of a ramp for the BOTTOM (floor level) switchgear compartment. Engage the ramp onto the fixed rails of the switchgear bottom compartment. Using the breaker levering crank, lever the G & T device out to the "Test" position.

24. Disengage the levering latch by lifting the handle on the G & T device and pulling it out onto the extension rails, see Figure 3.5.25.

Disconnect the secondary contacts. Disengage the levering latch by lifting the handle on the G & T device and pulling the G & T device out (2-3 inches) then release the handle. Stand in front of the G & T device and pull the G & T device onto the ramp, pushing against the weight of the G & T device to prevent rapid movement and gently guiding it down the ramp onto the floor.

25. Lift the G & T device off the extension rails with extreme care.
26. The K3 interlock is moved back to the left to engage the levering latch handle. Key KC is rotated in Key Lock K3.
27. Key KC is removed from Key Lock K3 and is inserted into Key Lock K2 and is rotated, see Figure 3.5.26 and 3.5.27. Key KC is now held captive in Key Lock K2 and Key KB is now available.
28. Key KB is removed from Key Lock K2 and is inserted into Key Lock K1 and Key KU is rotated, see Figures 3.5.28 and 3.5.29. The switch which is associated with Key Lock K1 closes.
29. Key KU is removed from Key Lock K1 and is locked in the lock box on the premises, see Figure 3.5.30.

PROCEDURE FOR REMOVING THE TEST PROBES

FIGURE 3.5.1 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU

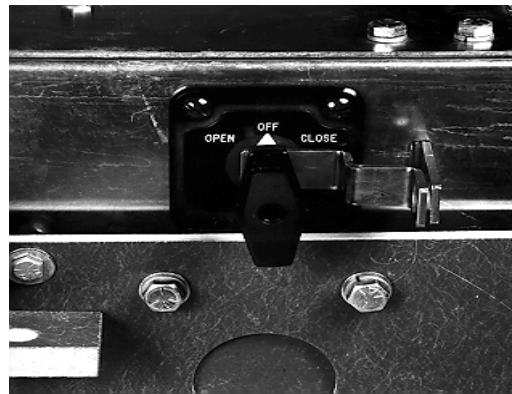


FIGURE 3.5.2 VERIFY THAT THE SELECTOR SWITCH IS IN THE "OFF" POSITION

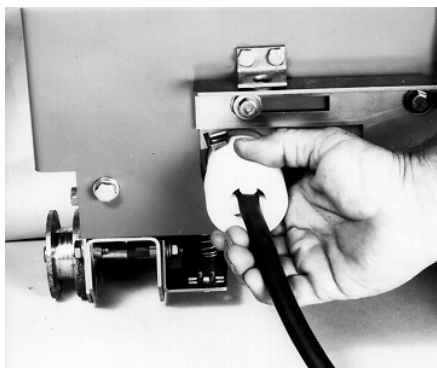


FIGURE 3.5.3 INSERT REMOTE OPERATING STATION PLUG



FIGURE 3.5.4 TURN SELECTOR SWITCH TO "CLOSE" POSITION



FIGURE 3.5.5 PUSH "CLOSE" PUSH-BUTTON



FIGURE 3.5.6 TURN SELECTOR SWITCH TO "OFF" POSITION

# **PROCEDURE FOR REMOVING THE TEST PROBES CONT.**



FIGURE 3.5.7 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK K1

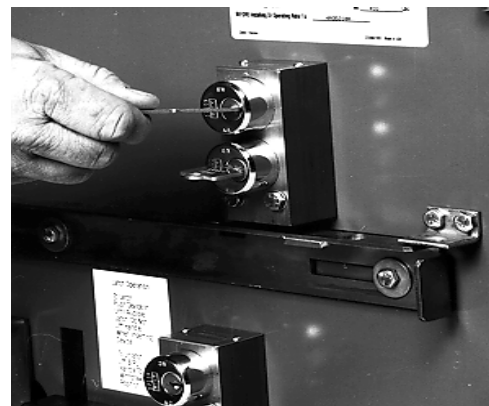


FIGURE 3.5.8 INSERT KEY KB IN KEY LOCK K4

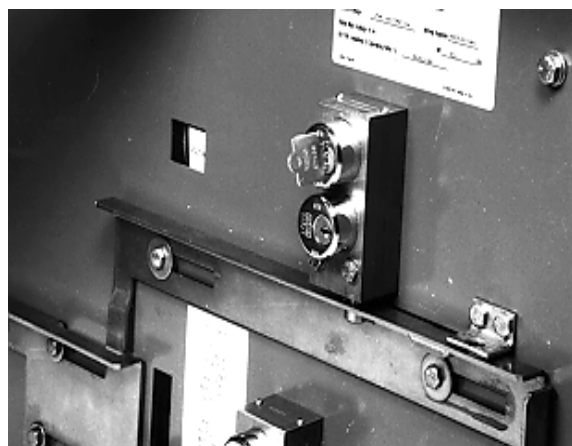


FIGURE 3.5.9 CLOSED LOCKING DEVICE MOVED TO THE RIGHT & LOCKED BY ROTATING KEY KD



FIGURE 3.5.10 REMOVE KEY KD FROM KEY LOCK K4



FIGURE 3.5.11 INSERT KEY KD IN KEY LOCK K5 AND ROTATE, REMOVE PROBES



FIGURE 3.5.12 CLOSE TEST PORT SHUTTER AND LOCK, REMOVE KEY KD



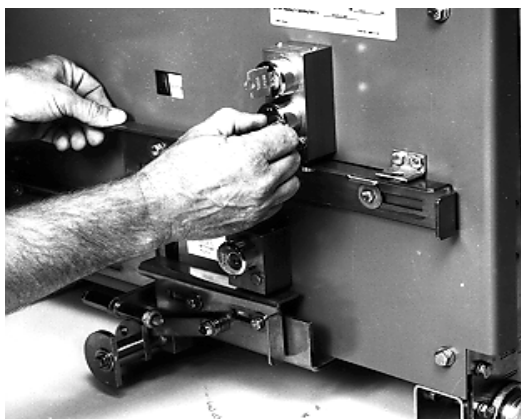
**PROCEDURE FOR REMOVING THE TEST PROBES CONT.**

FIGURE 3.5.13 INSERT KEY KD IN KEY LOCK K4 AND ROTATE

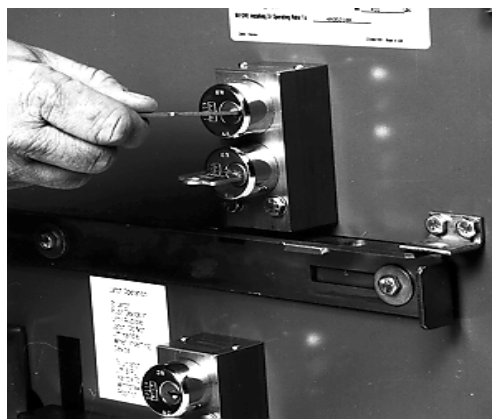


FIGURE 3.5.14 REMOVE KEY KB FROM KEY LOCK K4



FIGURE 3.5.15 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU



FIGURE 3.5.16 TURN SELECTOR SWITCH TO "OPEN" POSITION.



FIGURE 3.5.17 PUSH "OPEN" PUSH-BUTTON



FIGURE 3.5.18 TURN SELECTOR SWITCH TO "OFF" POSITION

# **PROCEDURE FOR REMOVING THE TEST PROBES CONT.**

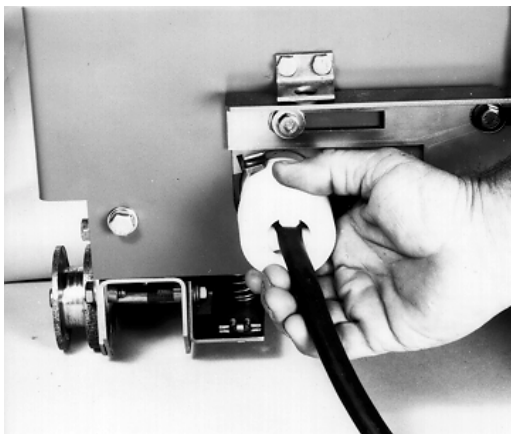


FIGURE 3.5.19 REMOVE OPERATING STATION PLUG



FIGURE 3.5.20 ROTATE KEY KU AND REMOVE KEY KB FROM KEY LOCK K1



FIGURE 3.5.21 INSERT KEY KB IN KEY LOCK K2 AND ROTATE KEY KC



FIGURE 3.5.22 REMOVE KEY KC FROM KEY LOCK K2

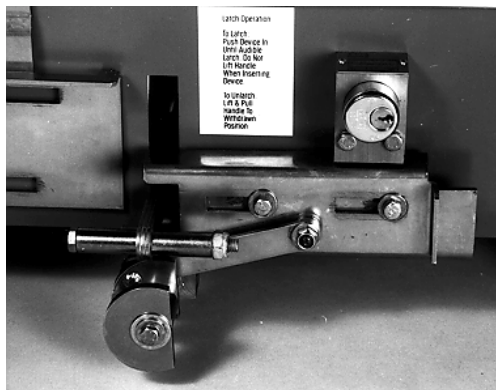


FIGURE 3.5.23 INSERT KEY KC IN KEY LOCK K3 AND ROTATE

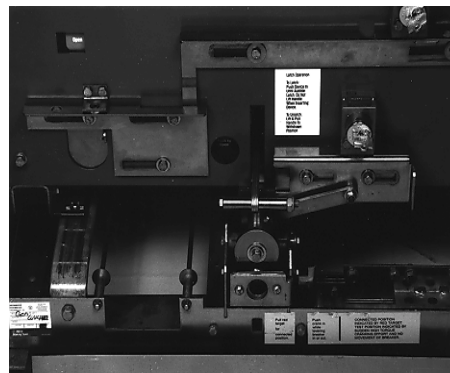


FIGURE 3.5.24 LEVERING LATCH HANDLE IS RELEASED

# PROCEDURE FOR REMOVING THE TEST PROBES CONT.

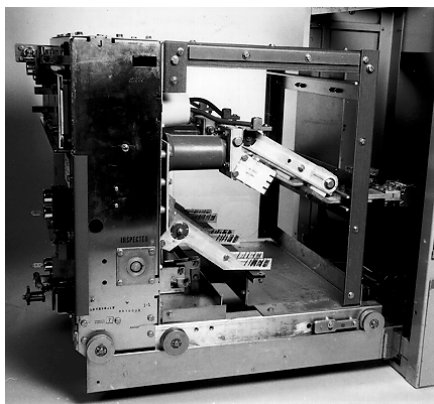


FIGURE 3.5.25 G&T DEVICE ON EXTENSION RAILS

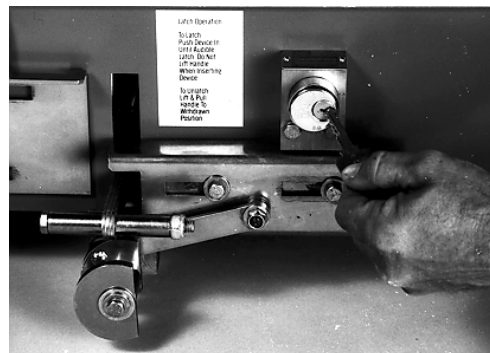


FIGURE 3.5.26 REMOVE KEY KC FROM KEY LOCK K3



FIGURE 3.5.27 INSERT KEY KC IN KEY LOCK K2 AND ROTATE



FIGURE 3.5.28 REMOVE KEY KB FROM KEY LOCK K2

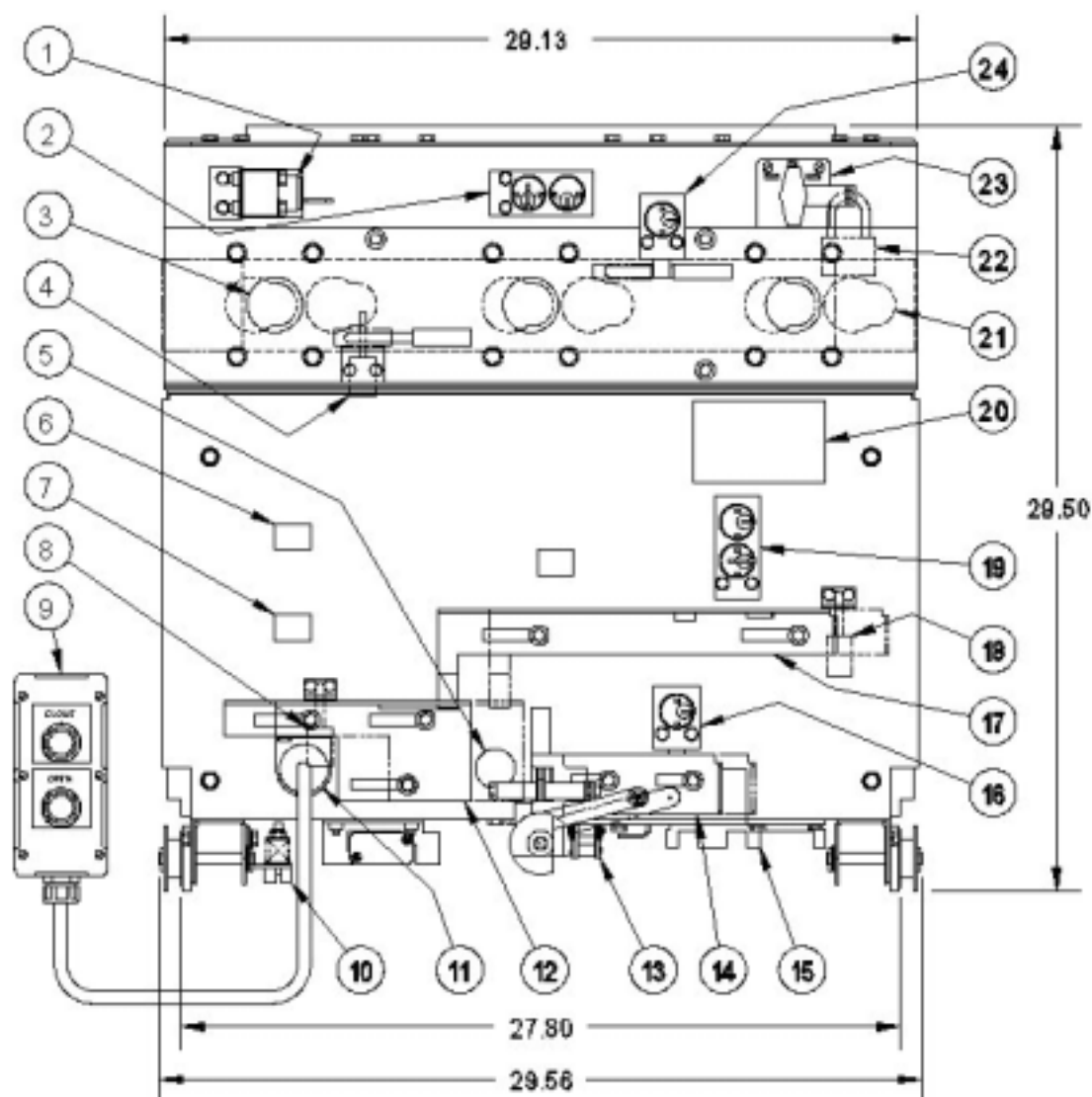


FIGURE 3.5.29 INSERT KEY KB IN KEY LOCK K1 AND ROTATE KEY KU



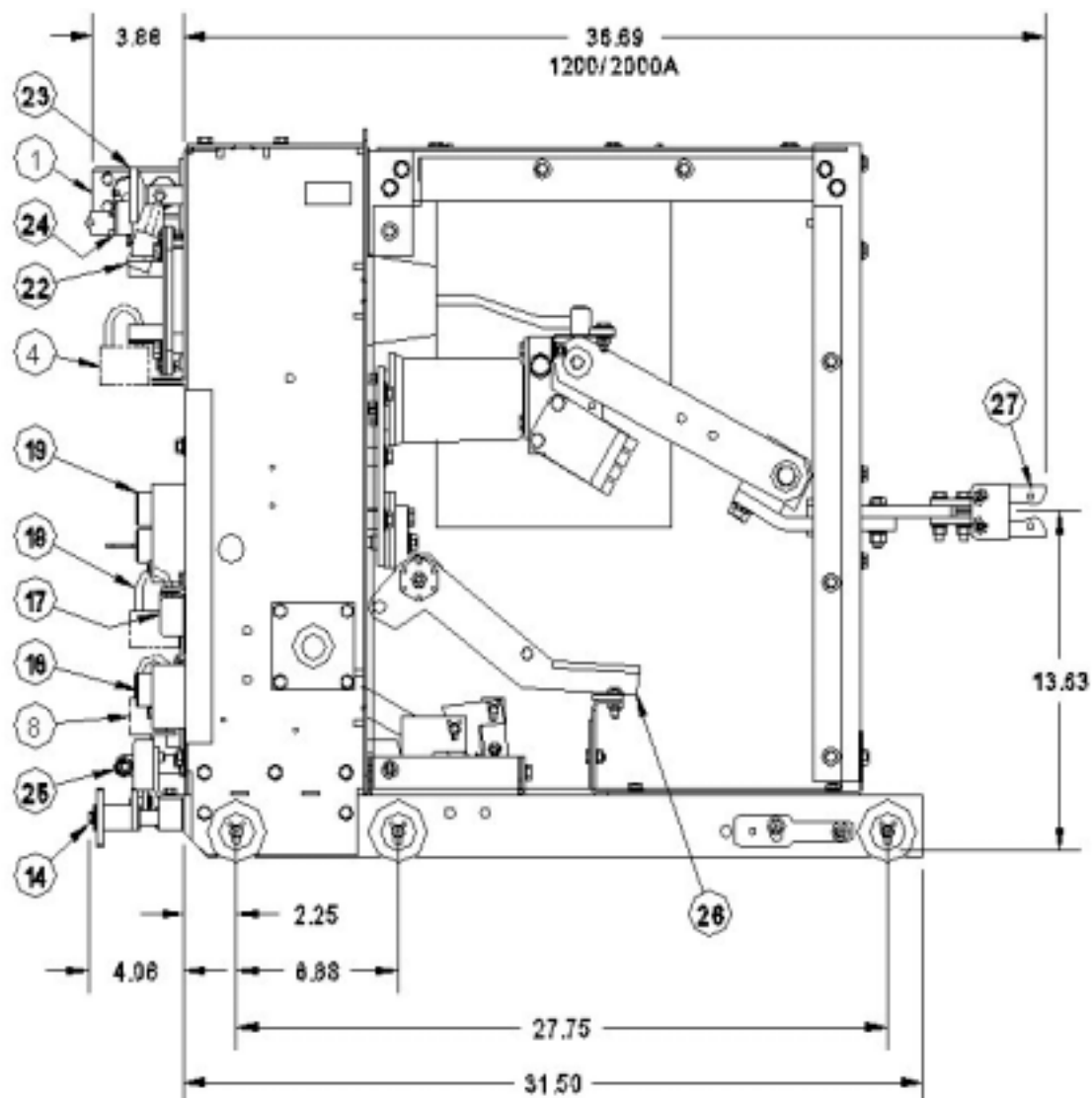
FIGURE 3.5.30 REMOVE KEY KU FROM KEY LOCK K1





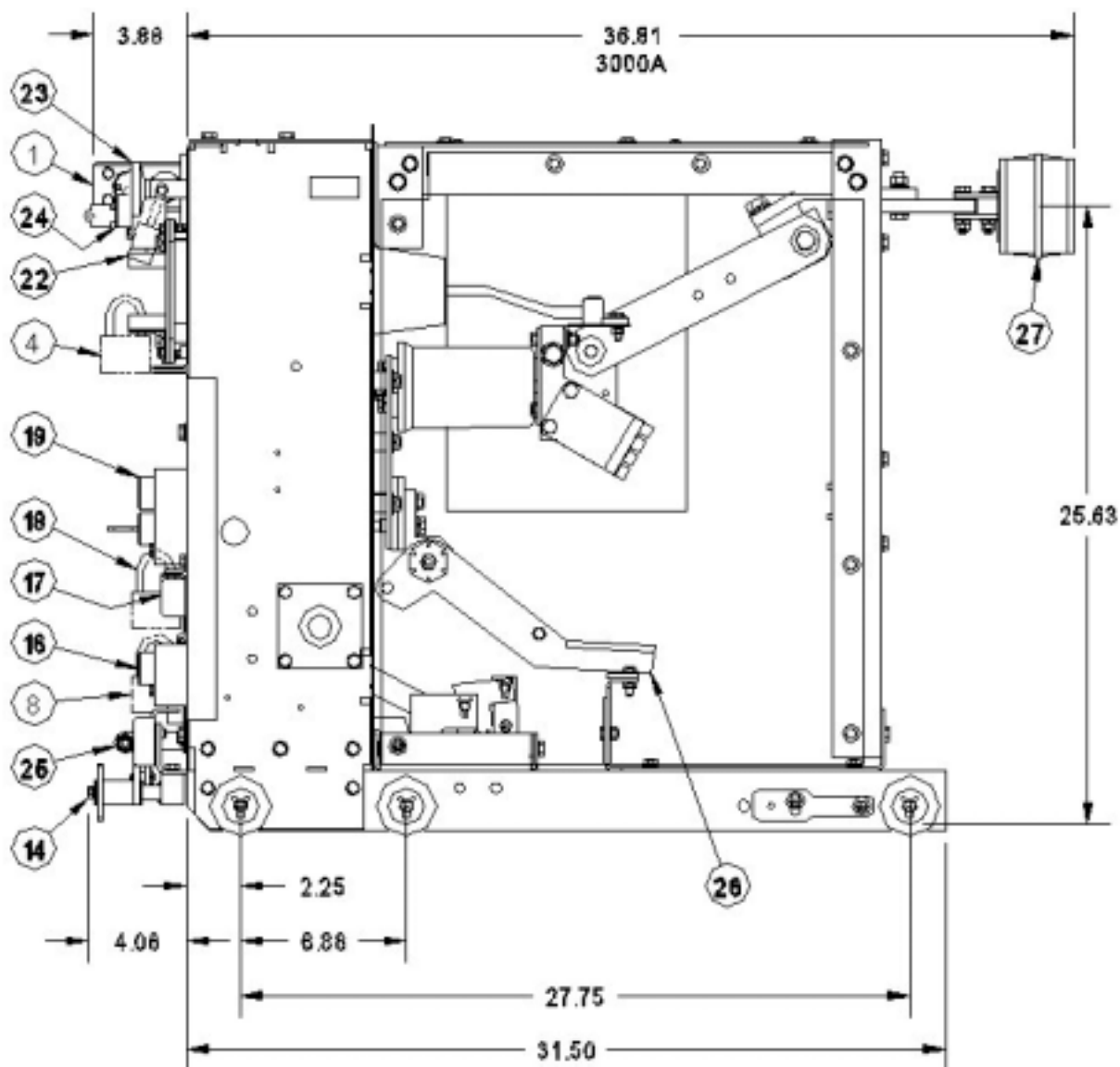
- |   |                                   |
|---|-----------------------------------|
| 1. Key Lock K1 (Keys KU and KB          | 13. Floor Tripper                 |
| 2. Key Lock K2 (Keys KB and KC)         | 14. K3 Levering Screw Interlock   |
| 3. Probe Test Port                      | 15. Code Plate                    |
| 4. Test Port Padlock (Probes Inserted)  | 16. Key Lock K3 (Key KC)          |
| 5. Manual Trip Button                   | 17. Closed Locking Device         |
| 6. Operations Counter                   | 18. Closed Locking Device Padlock |
| 7. Grounding Switch Position Indicator  | 19. Key Lock K4 (Keys KB and KD)  |
| 8. Manual Trip Prevent Padlock          | 20. Rating Plate                  |
| 9. Remote Operating Station             | 21. Test Port Shutter             |
| 10. Ground Contact                      | 22. Selector Switch Padlock       |
| 11. Remote Operating Station Receptacle | 23. Selector Switch               |
| 12. Manual Trip Prevent Panel           | 24. Key Lock K5 (Key KD)          |

**APPENDIX A - FRONT VIEW  
(Con-Edison Customer)**



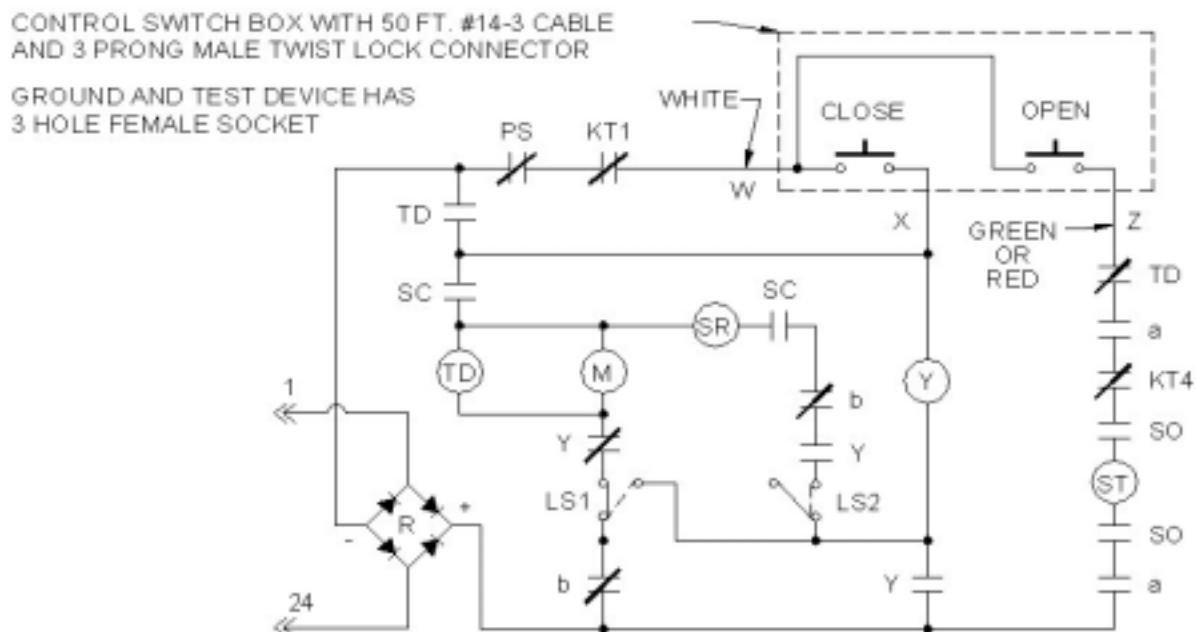
- |  |  |
|--|--|
| 1. Key Lock K1 (Keys KU and KB)        | 19. Key Lock K4 (Keys KB and KD)       |
| 4. Test Port Padlock (Probes Inserted) | 22. Selector Switch Padlock            |
| 8. Manual Trip Prevent Padlock         | 23. Selector Switch                    |
| 14. K3 Levering Screw Interlock        | 24. Key Lock K5 (Key KD)               |
| 16. Key Lock K3 (KC)                   | 25. Lever Latch Handle                 |
| 17. Closed Locking Device              | 26. Grounding Switch Blade             |
| 18. Closed Locking Device Padlock      | 27. Lower Terminals (1200/2000A Shown) |

**APPENDIX B - SIDE VIEW LOWER TERMINAL DEVICE  
(Con-Edison Customer)**



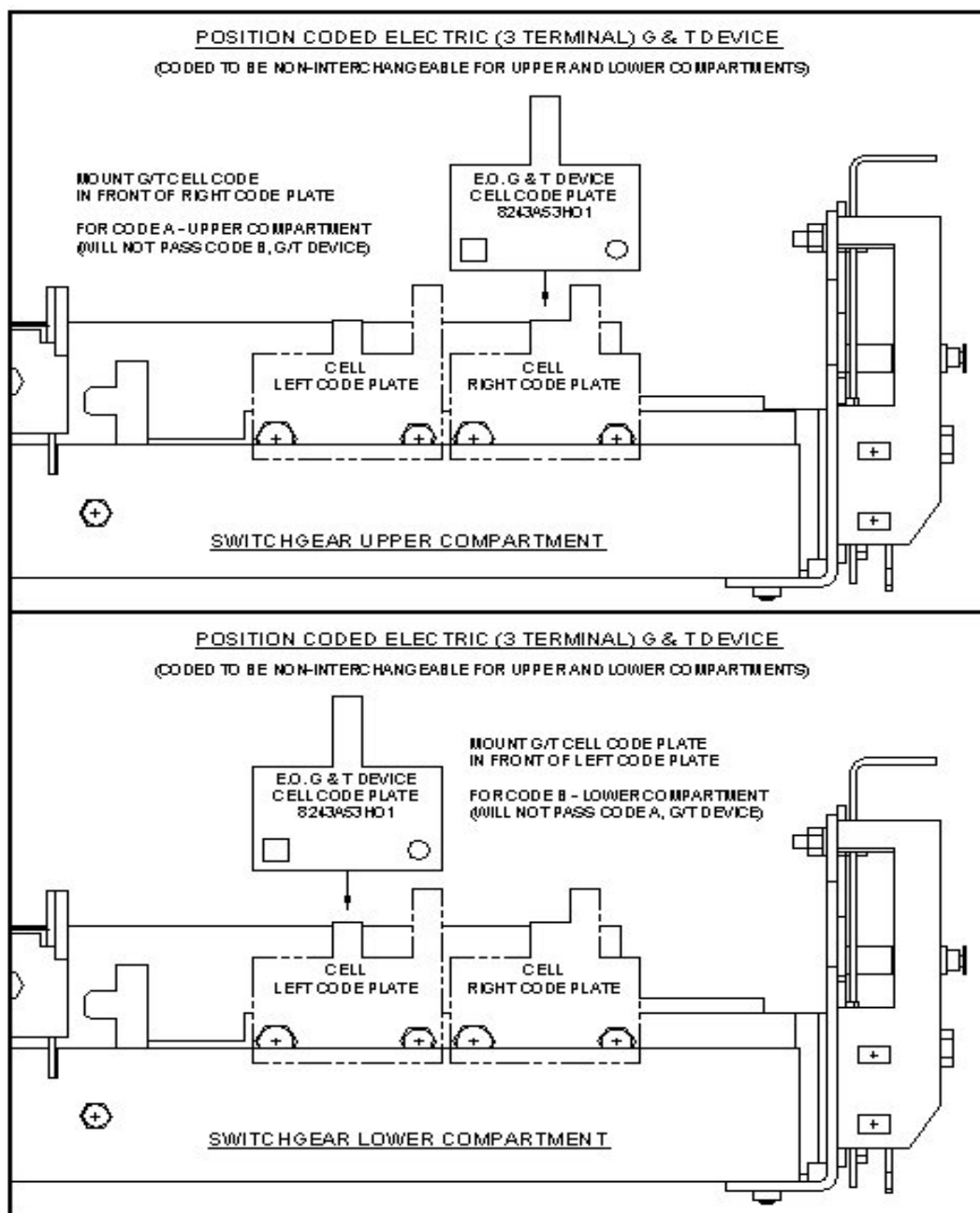
- |  |                                   |
|--|-----------------------------------|
| 1. Key Lock K1 (Keys KU and KB)        | 19. Key Lock K4 (Keys KB and KD)  |
| 4. Test Port Padlock (Probes Inserted) | 22. Selector Switch Padlock       |
| 8. Manual Trip Prevent Padlock         | 23. Selector Switch               |
| 14. K3 Levering Screw Interlock        | 24. Key Lock K5 (Key KD)          |
| 16. Key Lock K3 (KC)                   | 25. Lever Latch Handle            |
| 17. Closed Locking Device              | 26. Grounding Switch Blade        |
| 18. Closed Locking Device Padlock      | 27. Upper Terminals (3000A Shown) |

**APPENDIX C - SIDE VIEW UPPER TERMINAL DEVICE  
(Con - Edison Customer)**



- KT1 = KEY INTERLOCK CONTACT (NORMALLY CLOSED, ELECTRICALLY ENABLED)
- KT4 = CLOSED KEY INTERLOCK CONTACT (NORMALLY CLOSED, OPEN IN THE EXTENDED BOLT POSITION)
- SO = SELECT OPEN SWITCH CONTACT
- SC = SELECT CLOSE SWITCH CONTACT
- Y = ANTI PUMP RELAY
- M = CHARGING MOTOR
- LS = LIMIT SWITCH (SHOWN - SPRING DISCHARGED)
- ST = SHUNT TRIP COIL
- TD = TIME DELAY RELAY: SEALS IN TO COMPLETE CHARGING AND CLOSING, 20 SECONDS DELAY ON DROPOUT, BLOCK TRIPPING FOR 20 SECONDS AFTER CLOSING
- a = AUXILIARY SWITCH CONTACT
- b = AUXILIARY SWITCH CONTACT
- SR = SPRING RELEASE COIL
- R = BRIDGE RECTIFIER
- PS = POSITION SWITCH (PREVENTS CHARGING BETWEEN "TEST" AND "CONNECTED" POSITIONS)

#### APPENDIX D - CONTROL SCHEME - POWER TRIP (Con- Edison Customer)



## APPENDIX E - SWITCHGEAR CODE PLATE REQUIREMENTS



## **NOTES**

## **NOTES**