INSTRUCTIONS

Type PV-38M and PV-27M
Manually Operated
Ground and Test Devices
For use with PV System 38™ and PV System 27™
Metal-Clad Switchgear
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WARNING

THIS EQUIPMENT MAY CONTAIN HIGH VOLTAGES AND CURRENTS WHICH CAN CAUSE SERIOUS INJURY OR DEATH.

THE EQUIPMENT IS DESIGNED FOR USE, INSTALLATION, AND MAINTENANCE BY KNOWLEDGEABLE USERS OF SUCH EQUIPMENT HAVING EXPERIENCE AND TRAINING IN THE FIELD OF HIGH VOLTAGE ELECTRICITY. THIS DOCUMENT, AND ALL OTHER DOCUMENTATION SHALL BE FULLY READ, UNDERSTOOD, AND ALL WARNINGS AND CAUTIONS SHALL BE ABIDED BY. IF THERE ARE ANY DISCREPANCIES OR QUESTIONS, THE USER SHALL CONTACT POWELL ELECTRICAL MANUFACTURING COMPANY IMMEDIATELY AT 1-800-480-7273.

CAUTION

BEFORE ANY ADJUSTMENT, SERVICING, PARTS REPLACEMENT, OR ANY OTHER ACT IS PERFORMED REQUIRING PHYSICAL CONTACT WITH THE ELECTRICAL WORKING COMPONENTS OR WIRING OF THIS EQUIPMENT, THE POWER SUPPLY MUST BE DISCONNECTED. FAILURE TO FOLLOW THIS CAUTION MAY RESULT IN INJURY OR DEATH.
I. INTRODUCTION

A. GENERAL

The manually operated ground and test (G&T) device is a switchgear assembly accessory that can be inserted in place of a drawout circuit breaker. The G&T device can be used to ground the main bus and/or external circuits connected to the switchgear assembly, and test the primary circuits.

This bulletin contains instructions for the installation, operation, and maintenance of the manually operated Type PV-38M and the PV-27M G&T devices. (See Figure 1.)

NOTE: The information in this instruction bulletin is intended for both PV-38M and PV-27M G&T devices.

B. SCOPE

The information in this instruction bulletin applies to the following manually operated G&T devices:

- PV-38M –Three Poles; Three Phase, 38kV, 2000 Amp
- PV-38M –Three Poles; Three Phase, 38kV, 1200 Amp
- PV-27M –Three Poles: Three Phase, 27kV, 2000 Amp
- PV-27M –Three Poles: Three Phase, 27kV, 1200 Amp

C. PURPOSE

The information in this document is intended to provide instructions for users to properly operate and maintain the manually operated G&T devices described in Section B. SCOPE.

This instruction bulletin contains information on the following topics:

1. Safety
2. General description of the G&T devices
3. Operating instructions
4. Maintenance
5. Renewal part ordering

The manually operated G&T device enables the user to access the primary disconnect devices of the switchgear cell in order to ground the primary circuits or to conduct high-voltage tests such as, phasing out circuits or high voltage withstand (hipot).

D. INSTRUCTION BULLETINS AVAILABLE ELECTRONICALLY

Many Powell Electrical Manufacturing Company Instruction Bulletins are posted on the company Web
II. SAFETY

The user should study this instruction bulletin and all other associated documentation before uncrating the G&T device.

Each user has the responsibility to instruct and implement thorough maintenance and safety procedures for each type of equipment used. The user shall train all personnel associated with the equipment on usage, installation, operation, maintenance, and safety procedures. All safety precautions and procedures must be observed.

A. GENERAL

1. Proper use of the G&T device described in this document requires use of high-voltage testing equipment and procedures. Only supervised and qualified personnel who are trained in the usage, installation, operation, and maintenance of a manually operated ground and test device shall be allowed to work on this equipment. It is mandatory that the operator reads, understands, and complies with the information in this instruction bulletin, supplemental equipment documents, and service advisories.

2. Maintenance programs must be consistent with the customer experience and the manufacturer’s recommendations, including information available in service advisories and the instruction bulletin(s). A well-planned and executed routine maintenance program is essential for the G&T device reliability and safety.

3. Service conditions and G&T device applications shall be considered in the development of maintenance programs. Service conditions include variables such as the following: ambient temperature; humidity; and any adverse environmental conditions such as excessive dust, ash, corrosive atmosphere, vermin, and insect problems.

B. SPECIFIC

The manually operated type PV-38M and PV-27M G&T devices are designed for use in the PV-38 and PV-27 Metal-Clad Switchgear respectively, manufactured by Powell Electrical Manufacturing Company. DO NOT attempt to use this device in any other class of electrical equipment manufactured by Powell, or by any other manufacturer.

Before using the ground and test device, the operator should reference the equipment drawings and visually examine the equipment to locate the primary disconnects to be grounded or tested.

DO NOT ATTEMPT TO USE THE TYPE PV-38M AND PV-27M G&T DEVICES TO GROUND AN ENERGIZED CIRCUIT. ATTEMPTING TO USE A G&T DEVICE ON AN ENERGIZED CIRCUIT WILL CAUSE SEVERE DAMAGE TO THE DEVICE AND SWITCHGEAR IN WHICH IT IS BEING USED, AND MAY RESULT IN SERIOUS INJURY TO THE OPERATOR.

C. SAFETY LABELS

Danger, warning, and caution labels are attached to the G&T device in various locations. Personnel must observe all danger, warning, and caution labels while handling or maintaining the electrical ground and test device.

Figure 2. WARNING Label Attached to the Top, Front, Left Side of Type PV-38M (and PV-27M) G&T Devices

WARNING

DO NOT ATTEMPT TO USE THE TYPE PV-38 M GROUND AND TEST DEVICE TO GROUND AN ENERGIZED CIRCUIT. AN ATTEMPT TO DO SO WILL RESULT IN SEVERE DAMAGE TO THE DEVICE AND TO THE SWITCHGEAR IN WHICH IT IS BEING USED AND MAY RESULT IN SERIOUS INJURY TO THE OPERATOR.

READ INSTRUCTION BOOK IB-65030 BEFORE OPERATING THIS DEVICE.
Figure 3. WARNING Label Attached to All Four Access Doors of Type PV-38M and PV-27M G&T Devices

WARNING

TEST TERMINALS BEHIND THIS DOOR MAY BE ENERGIZED WITH DANGEROUS VOLTAGES. DO NOT TOUCH TEST TERMINALS UNTIL YOU HAVE DETERMINED THAT THEY ARE NOT ENERGIZED. TO DO SO MAY RESULT IN SERIOUS INJURY TO THE OPERATOR.

READ INSTRUCTION BOOK IB-65030 BEFORE OPERATING THIS DEVICE.

Figure 4. CAUTION Label Attached to the Two Top Access Doors of Type PV-38M and PV-27M G&T Devices

CAUTION

THE TEST PORTS BEHIND THIS DOOR ARE CONNECTED TO THE UPPER PRIMARY DISCONNECT STUDS OF THE GROUND AND TEST DEVICE. WHEN RACKED INTO A BREAKER CELL, THESE STABS WILL ENGAGE THE UPPER SET OF PRIMARY STABS IN THE CELL. BEFORE OPENING THIS DOOR BE SURE THAT THE CIRCUIT YOU WISH TO GROUND OR TEST IS CONNECTED TO THE UPPER PRIMARY STABS IN THE CELL.

READ INSTRUCTION BOOK IB-65030 BEFORE OPERATING THIS DEVICE.

Figure 5: CAUTION Label Attached to the Two Bottom Access Doors of Type PV-38M and PV-27M G&T Devices.

CAUTION

THE TEST PORTS BEHIND THIS DOOR ARE CONNECTED TO THE LOWER PRIMARY DISCONNECT STUDS OF THE GROUND AND TEST DEVICE. WHEN RACKED INTO A BREAKER CELL, THESE STABS WILL ENGAGE THE LOWER SET OF PRIMARY STABS IN THE CELL. BEFORE OPENING THIS DOOR BE SURE THAT THE CIRCUIT YOU WISH TO GROUND OR TEST IS CONNECTED TO THE LOWER PRIMARY STABS IN THE CELL.

READ INSTRUCTION BOOK IB-65030 BEFORE OPERATING THIS DEVICE.
III. EQUIPMENT DESCRIPTION

The Type PV-38M and PV-27M ground and test (G&T) devices are similar to the PV-38 and the PV-27 circuit breakers respectively. The G&T devices can be inserted in place of a circuit breaker in a metal-clad switchgear cell for grounding and testing purposes. The manual G&T device comes in a six-stab model. All stabs on this model can be either 1200 Amp or 2000 Amp.

The Type PV-38M and the PV-27M Ground and Test (G&T) Devices consist of a wheeled frame on which six primary disconnect stabs are mounted. (See Figure 6 and Figure 7.) The front of the device has four lockable access doors: two (2) upper doors, and two (2) lower doors. (See Figure 8.) Three upper test stabs are mounted behind the upper access doors, and three lower test stabs are located behind the lower access doors. Each of the G&T device test stabs is connected to one of the six primary disconnect stabs in the switchgear compartment. (See Figure 7.) The upper G&T device test stabs are connected to the upper disconnect stabs of the switchgear compartment. The lower device test stabs are connected to the lower disconnect stabs of the switchgear compartment. In each group of G&T device test stabs, the left, center, and right G&T device test stabs are connected to the left, center, and right disconnect stabs of the switchgear compartment. Isolation barriers between the disconnect stabs are also provided where required.

The G&T device is equipped with a ground shoe which engages the ground bus in the switchgear cell. A ground bar extends from the ground shoe to the lower front part of the G&T device (Figure 6, g). Three flexible grounding cables are supplied. In this instruction bulletin, see Section V. OPERATION A. GROUNDING for proper use of the grounding cables.

The G&T device is equipped with a racking guide which engages and disengages with the racking roller located in the circuit breaker cell. The racking mechanism is operated by the hand crank as described in the instruction bulletin of the PV-System 38 Switchgear and PV System 27 switchgear. The ground and test device is equipped with a rollout latch to prevent inadvertent removal from the cell.

The PV-38M and the PV-27M Ground and Test Devices can be supplied with the following compatibility options:

- 1200A only
- 2000A only

The 1200A G&T device is supplied with small, 1.90 inch diameter, primary disconnect stabs. The 2000A G&T device is supplied with large, 2.75 inch diameter, primary disconnect stabs.

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**Figure 6. PV-38M and PV-27M Ground and Test Device Front View**

- a. Anti-Rollout Latch
- b. Warning Label (specific for PV-38M and PV 27M)
- c. Racking Slot
- d. Nameplate
- e. Warning Label (specific for each G&T device door)
- f. Caution Label (specific for each G&T device door)
- g. Ground Bus

**Figure 7. PV-38M and PV-27M Ground and Test Device Back View**

- a. Lifting Eyes
- b. Upper Primary Disconnects
- c. Lower Primary Disconnects
- d. Shutter Operator
- e. Interference Plate
- f. Wheels
IV. RECEIVING, HANDLING, AND STORAGE

A. RECEIVING

Inspect the manually operated ground and test device when it is received. If damage is found or suspected, immediately file applicable claims with the transportation company, and notify the nearest representative of Powell Electrical Manufacturing Company.

B. HANDLING

Lifting eyes, located on each side of the frame top (Figure 6, a) are provided for using a lift crane and harness to move the G&T device. All lifting equipment including, chains, cables, hooks, and spreader bars, should be rated to at least 1000 pounds.

After the G&T device is removed from its shipping pallet and carton, the preferred method for moving and handling the device is to roll it on its own wheels on a level surface. When rolling the G&T device, it should be pushed and steered by the frame. **DO NOT HANDLE OR MOVE THE G&T DEVICE BY THE PRIMARY DISCONNECT STABS AS DAMAGE TO THE G&T DEVICE MAY OCCUR.**

C. STORAGE

Since the G&T device is an accessory that is not normally in continual use, proper storage between uses is essential to maintain the quality and usefulness of the device. The following precautions must be taken to assure the proper storage of the device.

1. Since dampness has an adverse effect on the insulating parts, the G&T device should be carefully protected against condensation. It should be stored in a warm, dry room of moderate temperature between 40-100 degrees F. Ground and test devices for outdoor metal-clad switchgear should be stored in the equipment only when power is available and anti-condensation heaters are operating.

2. The G&T device should be stored in a clean location, free from corrosive gases or fumes. Particular care should be taken to protect the equipment from moisture and cement dust, as this combination has a very corrosive effect on many parts. For long storage periods, it is recommended to place a dust cover over the device regardless of atmospheric conditions.

3. If the G&T device is stored for any length of time, it should be inspected periodically to ensure that rusting has not started and to ensure it is in good mechanical condition. When the G&T device is stored in unfavorable atmospheric conditions, it should be cleaned and dried out before use.
V. OPERATION

The manually operated ground and test device may be used with both grounding and testing functions. The procedures for these two types of operations differ; therefore, the operations are described separately in the following sections.

CAUTION

BECAUSE OF THE CONSTRUCTION OF BUS SECTIONALIZING UNITS, AND OTHER SPECIAL TYPES OF UNITS, IT IS NOT POSSIBLE TO MAKE A GENERAL STATEMENT ABOUT WHICH SET OF PRIMARY DISCONNECTS IS CONNECTED TO THE SWITCHGEAR MAIN BUS AND WHICH IS CONNECTED TO THE OUTGOING CONDUCTORS. BEFORE USING THE GROUND AND TEST DEVICE, THE OPERATOR SHOULD REFERENCE THE EQUIPMENT DRAWINGS AND VISUALLY EXAMINE THE EQUIPMENT TO LOCATE THE PRIMARY DISCONNECTS TO BE GROUNDED OR TESTED.

A. GROUNDING

To ground a circuit, perform the following steps:

1. Deenergize the circuit to be grounded. If there are power sources to this circuit other than the circuit breaker where the ground and test device is to be used, the switching devices at these alternate sources should be locked or tagged open in accordance with the user’s standard safety procedures to insure that they will not be closed during the grounding operation.

2. Remove the circuit breaker from the switchgear cell. This action will place the levering-in mechanism in the TEST/DISCONNECT position, which allows the G&T device to be racked into the switchgear cell. (See Figure 5, c - racking slot.)

3. Verify that the diameter of the primary disconnect stabs of the circuit breaker removed in step 2 match the diameter of the mechanically operated ground and test device. (See Figure 6, b).

The PV-38M and PV-27M Ground and Test Devices can be supplied with the following two (2) different compartment compatibility options: 1200A only and 2000A only.

The 1200A ground and test device is supplied with small (1.90 inch) diameter primary disconnect stabs. The 2000A G&T device is supplied with large (2.75 inch) diameter primary disconnect stabs.

4. With the grounding cables disconnected and the access doors closed, insert the ground and test device into the breaker cell, and rack it into the CONNECT position.

5. Open the access doors over the test stabs connected to the terminals to be grounded. Using a high-voltage voltmeter and test probe rated for the system voltage, or another safe voltage measuring method, verify that the three terminals to be grounded are not energized.

6. Rack the ground and test device to the DISCONNECT position.

7. Bolt the ends of the three grounding cables to the three test stabs to be grounded.

8. Bolt the three free ends of the grounding cables to the ground bus.

9. Rack the ground and test device fully into the CONNECT position. The circuit is now grounded.

10. To remove the ground, rack the device back to the DISCONNECT position and remove it from the cell.

B. TESTING

The ground and test device may be used to gain access to switchgear connections for high voltage testing. For testing, perform the following steps:

1. Remove the circuit breaker from the cell to be tested.

2. Verify that the diameter of the primary disconnect stabs of the circuit breaker removed in step 1 match the diameter of the G&T device test stabs. See Section V. OPERATION, A. GROUNDING, step 3. (See Figure 6, b.)

3. With the grounding cables disconnected and the access doors closed, insert the ground and test device into the breaker cell and rack it into the CONNECT position.
VI. MAINTENANCE

The ground and test device requires little routine maintenance. Proper storage is essential for the manually operated ground and test device when it is not in use. For more details, see Section IV, RECEIVING, HANDLING AND STORAGE, C. STORAGE.

The contact surfaces of the primary disconnect stabs and the fingers of the ground shoe should be lubricated with a thin film of Mobilgrease 28. Before use, particularly if the ground and test device has been in storage for a long period of time, wipe these surfaces with a clean, dry cloth, and apply fresh lubricant.

VII. RENEWAL PARTS

A. ORDERING

Should any part require replacement due to wear or damage, order renewal parts from Powell Apparatus Service Division. Visit the Powell Web site at www.powellservice.com, or call 1-800-480-7273.

The nameplate, which is located on the G&T device top of the right top door, contains information needed for ordering parts (Figure 6, d). Provide the following information when ordering parts:

- Name of the ultimate user
- Location of the installation
- Type of device including rated voltage and rated amps (included on nameplate)
- Serial number of the device (included on nameplate)
- Description of the part
- Photo of the device with the needed part marked will be helpful in assuring that the proper part is furnished.

4. If the testing to be done involves measurement of system voltages, such as verifying the proper phase relationship between circuits on the two sides of the device, perform the following steps:
   a. Open the necessary access doors.
   b. Using proper high voltage instrumentation and observing all safety rules, make the required measurements.

5. If the testing to be done involves application of test voltages, such as for high potential testing, perform the following steps:
   a. Insure that the circuit to be tested is deenergized. See Section, V. OPERATION, A. GROUNDING, step 1.
   b. Verify that the circuit is deenergized. See Section, V. OPERATION, A. GROUNDING, step 1.
   c. Attach the test power leads to the appropriate test stabs and conduct the tests.

6. When testing is completed, perform the following steps:
   a. Remove all test leads.
   b. Close access doors.
   c. To remove the G&T device from the cell, push down on the anti-rollout latch (Figure 6, a). The G&T device can now be racked to the DISCONNECT position and removed from the cell.
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