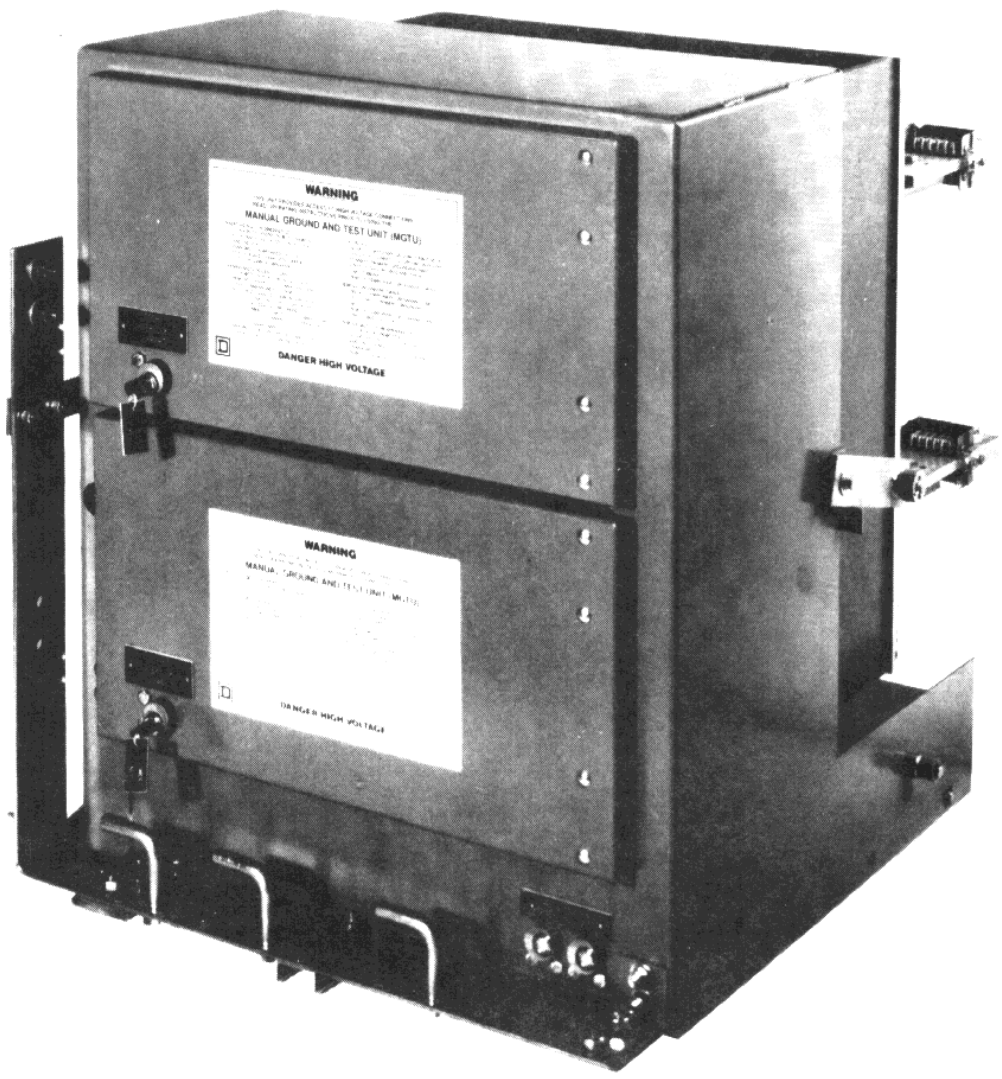
October, 1987

Manual 6055-4

Operating Instructions

Manual Ground and Test Unit 5-15kV Metal-Clad Switchgear



SQUARE D COMPANY

MANUAL GROUND AND TEST UNIT
5-15kV METAL-CLAD SWITCHGEAR

CONTENTS

MANUAL GROUND AND TEST UNIT 5-15kV METAL-CLAD SWITCHGEAR

1.0 INTRODUCTION

The Manual Ground and Test Unit is an auxiliary device used with 5-15kV metal-clad switchgear. The function of the device is to solidly ground the load cable manually as well as permit various types of tests. A convenient means of grounding the system is provided to safeguard personnel who may be working on the equipment. Exposed terminals can also be used for applying high potential test, measuring insulation resistance to ground and phasing out cables. The ground and test unit can be used for 1200A or 2000A and 3000A breaker cells with the exchange of main contacts. One set is suitable for 1200A and the other for 2000A and 3000A. The same unit can be used for 5kV and 15kV switchgear.

The following components are furnished with the ground and test unit:

1. The basic ground and test unit.
2. Temporary ground cable equipped with eye bolt for use with the hot stick.
3. One hot stick to connect the temporary ground cable to the grounding bails.
4. Primary grounding bars.
5. Three 2000/3000A main contact stubs (if required).
6. Spare keys for upper and lower door interlocks (not shown).

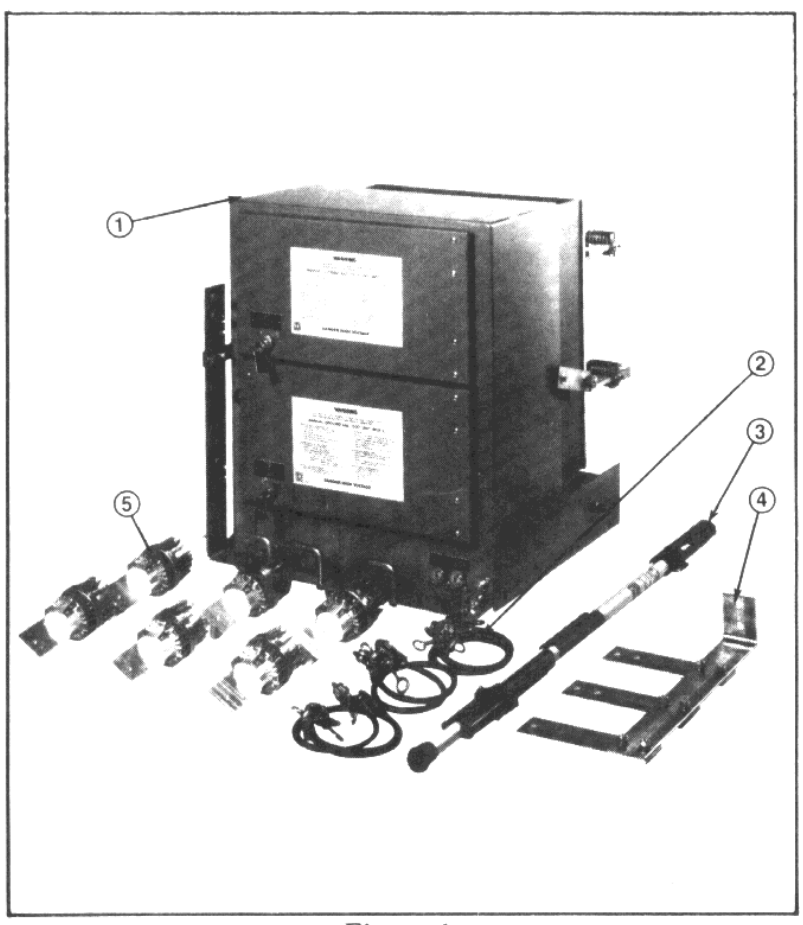


Figure 1
Furnished Components

2.0 SAFETY PRECAUTIONS

The interlocks of the Manual Ground and Test Unit and the switchgear are coordinated at the factory for each individual line-up and special interlock provisions are made to each breaker cell in this line-up. The Manual Ground and Test Unit should under no circumstances be used with another switchgear line-up.

The Manual Ground and Test Unit and 5-15kV metal-clad switchgear have interlocks to prevent unsafe operation, but since this unit is used for grounding as well as testing during the initial installation it is not possible to eliminate every hazard with interlocks. Therefore, it will be the responsibility of the person using this device to recognize the potential hazards while working on the equipment and take adequate precautions. The instructions outlined in these procedures have to be followed accurately and diligently to insure the safety of the operator at all times. This Ground and Test Unit extends the primary terminals of the switchgear through the front doors of the Ground and Test Unit and makes them accessible to the operator for grounding and testing. Under certain conditions these terminals may be at a high potential. The operator should always check the contacts with the hot line indicator to assure that they are not energized.

CAUTION

UNDER NO CIRCUMSTANCES MAKE ANY ADJUSTMENTS TO THE UNIT OR FORCE THE DEVICE INTO POSITION. CONTACT THE NEAREST SQUARE D REPRESENTATIVE FOR ADDITIONAL INSTRUCTIONS IF THE DEVICE DOES NOT FUNCTION AS DESCRIBED IN THIS BOOKLET.

PRINTED IN U.S.A.

3.0 RECEIVING, HANDLING AND STORAGE

The Manual Ground and Test Unit is as sensitive to rough handling and improper storage as the breaker. The same precautions for receiving and handling should be applied as to the breaker as outlined in the breaker maintenance and instruction manuals supplied with this equipment.

Since the Manual Ground and Test Unit is not used over a long period of time, special care has to be taken for storage. The device has to always be kept in a clean, dry, well ventilated area. Before using, the unit should be cleaned thoroughly and checked for any damage which it may have received.

4.0 DESCRIPTION

The Manual Ground and Test Unit consists of the basic circuit breaker frame with the same overall dimensions, wheels and racking mechanism. The main contacts are the same as for the breaker. 1200A and/or 2000/3000A contacts are furnished with the unit depending on the requirement of the line-up and units to be grounded. Both the upper and the lower primary extensions are brought forward in each unit. The primary extension bars have provisions for connecting the primary grounding bars and grounding bails for connecting the temporary ground cables. The ground bus in front of the unit is connected through the ground shoe to the cell ground bus and also has provisions for connecting the primary ground cables and grounding bails for the temporary ground cables.

The temporary ground cables are to be installed in front with a hot stick for personal safety. The primary grounding bars have to be installed immediately and securely to give the unit its short circuit capability. The Ground and Test Unit does not have its full short circuit rating with only the temporary ground cables in place.

Two doors are covering the primary extension bars. They are lockable with a keylock which provides the interlocking feature with the cell and have padlock provisions.

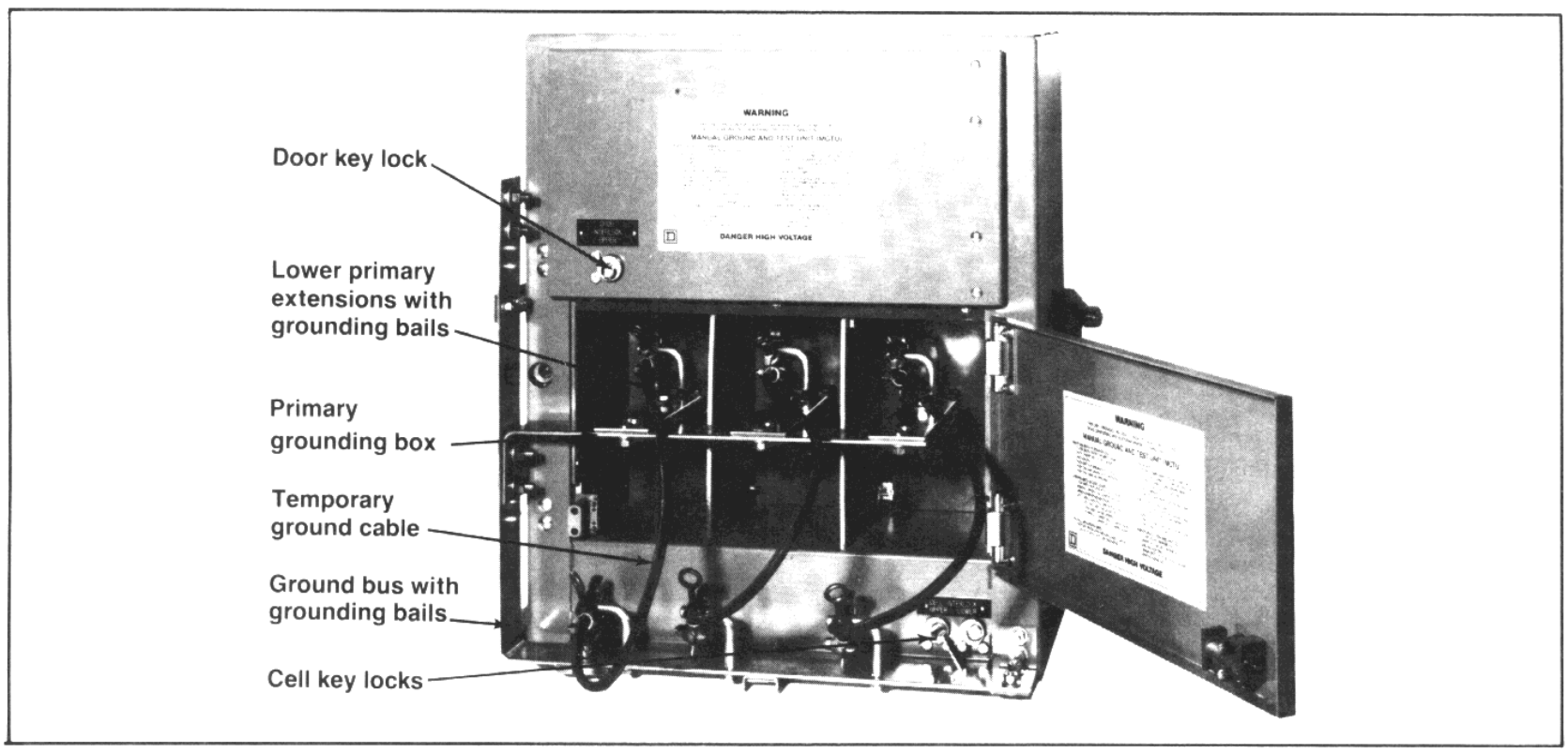


Figure 2
Front View – Lower Door Open

5.0 INTERLOCK

The Manual Ground and Test Unit is provided with interlocks that only the upper or the lower door can be opened depending if the load connections are at the top or at the bottom. The load side of the breaker in the lower cell is normally at the bottom and in the upper cell, normally at the top. The ground and test unit is interlocked so that only the door covering the load connections can be opened. If the unit is inserted in the lower cell, only the lower door can be opened and in the upper cell, on the upper door can be opened.

The tie breaker and main breaker cells are normally interlocked so that no door of the ground and test unit can be opened.

CAUTION

BEFORE USING THE MANUAL GROUND AND TEST UNIT, MAKE SURE THAT ONLY TWO KEYS—ONE FOR EACH DOOR—ARE AT THE UNIT.

For certain applications, a Ground and Test Unit may be furnished with only the upper or the lower primary extensions and main contacts. In this case only one key lock is furnished and if all breakers have the same function, no key lock may be required.

6.0 MAINTENANCE

Proper maintenance of the Manual Ground and Test Unit is necessary to insure satisfactory operation. The following items should be checked each time before the device is used:

1. Make certain all primary and grounded connections are tightly connected.
2. Contact surfaces and primary contact fingers should be lightly coated with contact grease.
3. The cranking mechanism should be operating freely. Insert the crank and turn the cranking mechanism through the full cycle.
4. Make certain insulation parts are free from dust and contaminates.
5. If the Manual Ground and Test Unit has been stored a long period of time or exposed to high humidity, it is recommended that the insulation be checked before it is placed in service. A standard 60 cycle high potential test at 27kV RMS will normally indicate whether the device is satisfactory for service. Apply the voltage to each phase individually for one minute with the other two phases and the frame grounded.

7.0 OPERATING INSTRUCTIONS

WARNING

THIS MANUAL GROUND AND TEST UNIT PROVIDES ACCESS TO HIGH VOLTAGE AND HIGH POWER CONDUCTORS. USE EXTREME CARE WHEN USING THIS DEVICE. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN SERIOUS INJURY OR DEATH.

7.1 Using the Ground and Test Unit for Grounding

1. Inserting the Manual Ground and Test Unit in the breaker cell.
   a) Before inserting the unit into the cell, check that the current rating of the main contact matches the current rating of the cell. Make sure that the right 1200A or 2000/3000A contacts are mounted on the unit.
   b) Disconnect and remove both primary and temporary ground cables from the unit.
   c) Close both doors and lock them with the key interlock.
   d) Remove keys and insert them in the cell interlock at the bottom of the unit and unlock both locks.
   e) Push Ground and Test Unit in the breaker cell test position and crank into the operating position, same as the breaker.
2. Opening Ground and Test Unit access doors.
   a) Lock test device in place with the upper or lower cell interlock. Only one of the keys can be removed from the cell interlock.
   b) If the breaker is in the lower cell, the unit can only be locked with the "lower" interlock and the key can be removed. The "upper" interlock is inoperative in this position and the key cannot be removed.
   c) If the unit is in the upper cell, the same conditions apply and the key can only be removed from the upper lock.
   d) Insert the key into the corresponding door and open it to get access to the primary extension bars.

CAUTION

AFTER THE DOOR IS OPENED CHECK THE CONTACT WITH THE HOT LINE INDICATOR BEFORE PROCEEDING. IF THE MEASURED VOLTAGE DOES NOT DECAY RAPIDLY WHEN MEASURED, DO NOT GROUND THE CIRCUIT UNDER ANY CIRCUMSTANCES. REMOVE THE SOURCE OF THE VOLTAGE BEFORE PROCEEDING. DO NOT GROUND ANY CIRCUIT THAT HAS NOT BEEN METERED.

3. Installation of grounding cable.
   a) Install the temporary ground cable with a hot stick. Connect them to the ground bus first before connecting them to the primary extension bars.
   b) Connect the primary grounding bars to the ground bus and to the line terminal. Make sure that all bolts are properly torqued.
   c) Remove temporary grounding cable.
   d) The load side is now properly grounded and it is safe to work on the equipment.

4. Remove grounding bars.

   To remove grounding bars proceed in reverse order:
   a) Connect the temporary grounding cable in parallel to the primary grounding bars.
   b) Disconnect the primary grounding bars and after bolts and cable are removed, remove the temporary grounding cable. Make sure that the line disconnect is disconnected first.

5. Remove Manual Ground and Test Unit from breaker cell
   a) Close the door, lock it with the interlock, and remove the key.
   b) Insert key in the cell interlock and unlock the ground and test device.
   c) Crank the Ground and Test Unit to test position and remove it from the cell.

7.2 Using the Manual Ground and Test Unit for Phasing and Testing.

Phasing and testing of the unit can only be done when the voltage source from the switchgear is removed.

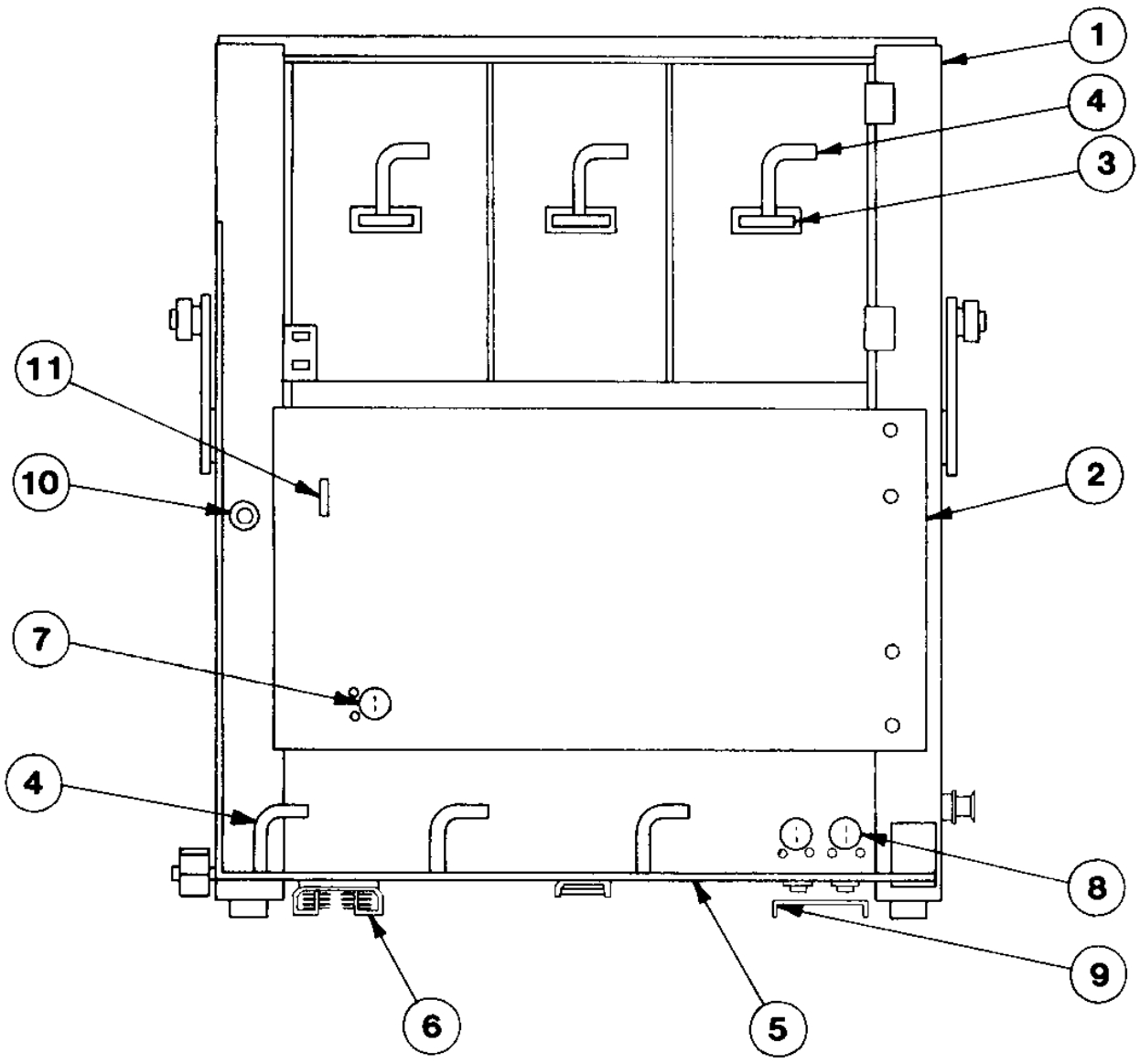
1. Insert the ground and test device in the same manner outlined under grounding.
2. If access to the load side of the breaker is required, open the door with the interlock key the same as described before.
3. If access to both the load and the line side is required, the line side door can only be opened with a spare key.

CAUTION

THE SPARE KEY SHOULD ALWAYS BE LOCKED SAFELY IN A REMOTE AREA FROM THE GEAR AND SHOULD ONLY BE USED BY AUTHORIZED PERSONS.

4. After phasing, lock both doors, unlock the breaker from the cell and remove the unit from the cell as described before.

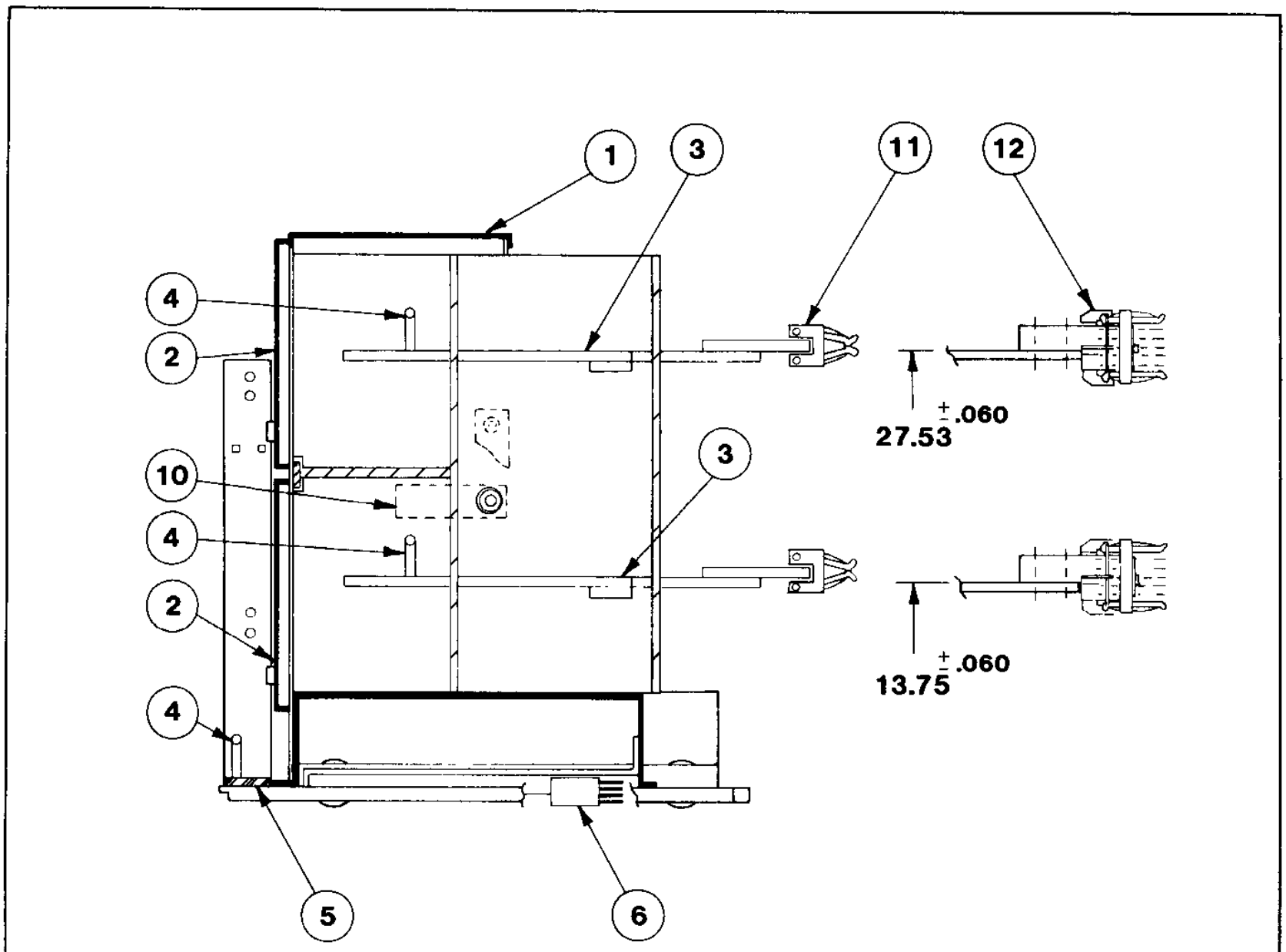
MANUAL GROUND AND TEST UNIT
5-15kV METAL-CLAD SWITCHGEAR



1. Unit Frame
2. Access Door—Lower
   (Upper Not Shown)
3. Primary Extension Bars—Upper
   (Lower Bars Behind Door)
4. Ground Bails
5. Ground Bar
6. Ground Shoe
7. Door Key Interlock—Lower
   (Upper Not Shown)
8. Cell Key Interlock
9. Cell Interlock (Stationary)
10. Cranking Port
11. Door Padlock Provision

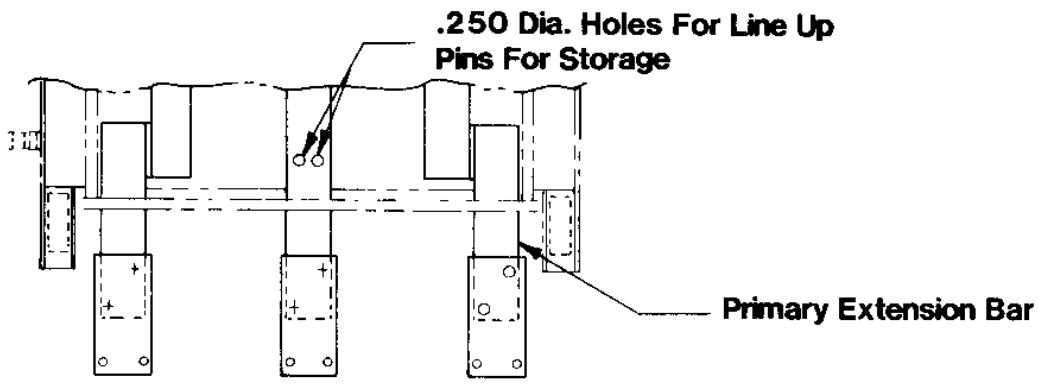
Figure 3
Front View – Upper Door Removed

MANUAL GROUND AND TEST UNIT
5-15kV METAL-CLAD SWITCHGEAR

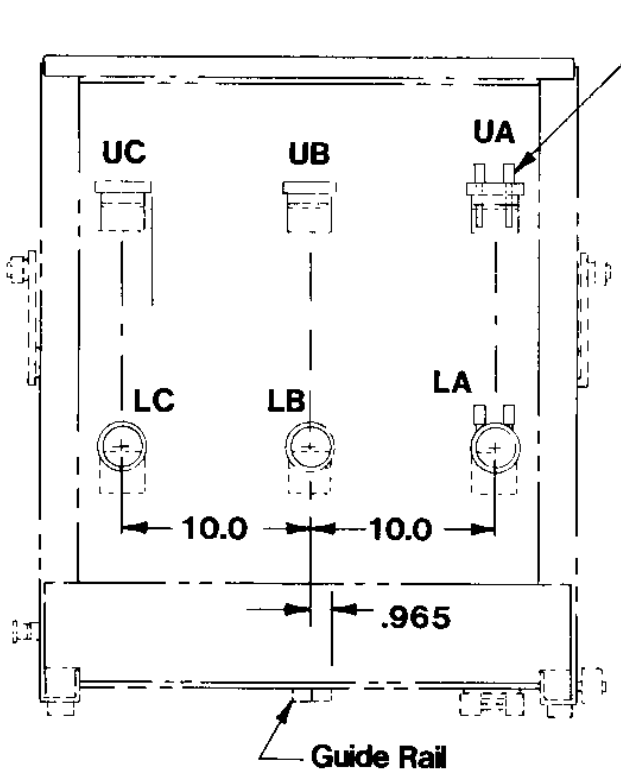


1. Unit Frame
2. Access Doors
3. Primary Extension Bars
4. Grounding Bail
5. Ground Shoe
6. Ground Bus
10. Racking Mechanism
11. Main Contact 1200A
12. Main Contact 2000A/3000A

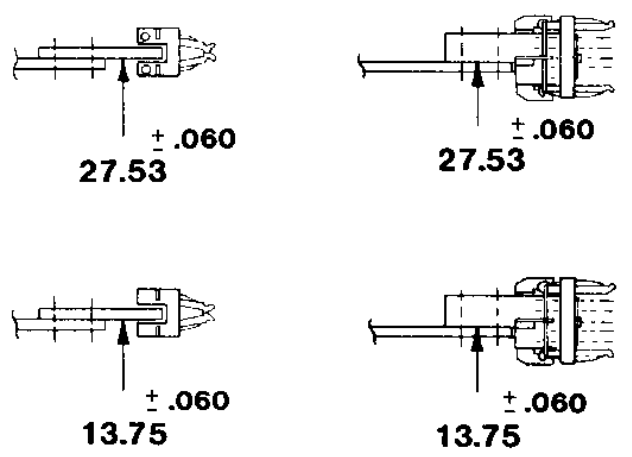
Figure 4
Sectional Side View



Partial Top View



MAIN CONTACTS



1200A **2000/3000A**

- Both the primary runbacks and main contacts are identified with stamped letters "UA", "UB", "UC", etc.
- Make sure that runbacks and main contacts identification are matched.
- Use line-up pins when installing main contacts.

Figure 5
Procedure To Exchange
1200A & 2000A/3000A Main Contacts

SQUARE D COMPANY
330 Weakley Rd., Smyrna, Tenn. 37167

Manual 6055-4

Printed in U.S.A.