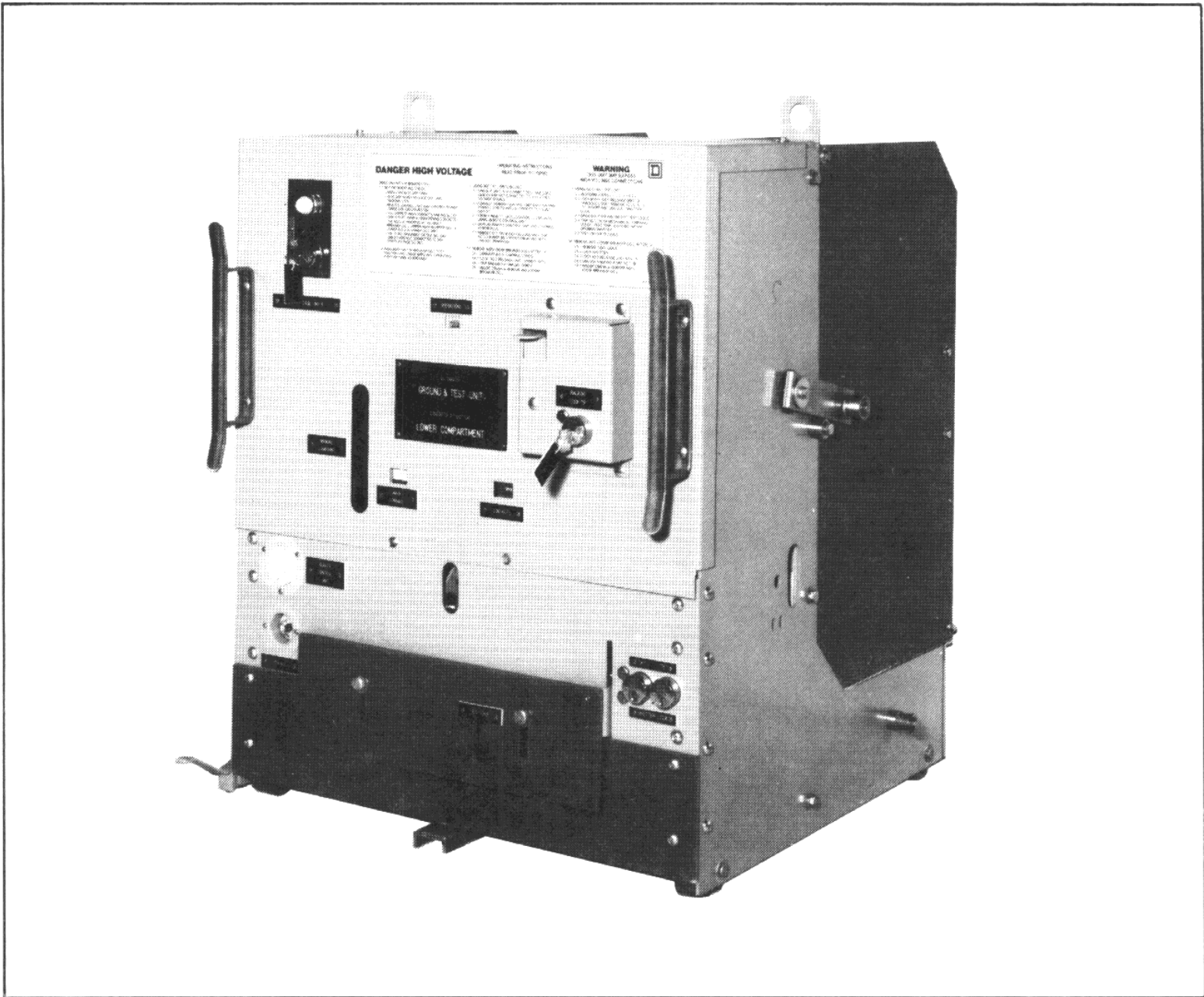


Operating Instructions

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



SQUARE D COMPANY

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

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

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1.0 INTRODUCTION

The Automatic Ground and Test Unit is an auxiliary device for use with 5 and 15kV metal-clad switchgear during initial installation and normal maintenance. The function of the unit is to provide a convenient means for grounding the cables or the bus in order to safeguard personnel who may be working on the cables or the equipment. The unit can be used for applying power for high potential test or for fault location. It can be used to measure insulation resistance and for phasing out cables.

A different ground and test device is required for the upper and the lower breaker cell. The Ground and Test Unit can be used for 1200A or for 2000A and 3000A breaker cells with the exchange of the main contacts. One set is suitable for 1200A and the other for 2000A and 3000A. Electrical insulation of the device has been designed to include ratings from 5kV to 15kV.

The following components are furnished with the automatic ground and test device:

1. The basic Ground and Test Unit with 1200A main contacts.
2. Three high voltage test cables.
3. Control power cord 115V, 60 cycle.
4. Control cable with close and trip push button station.
5. Three 2000/3000A main contact stubs (if required).
6. Set of spare keys (not shown).

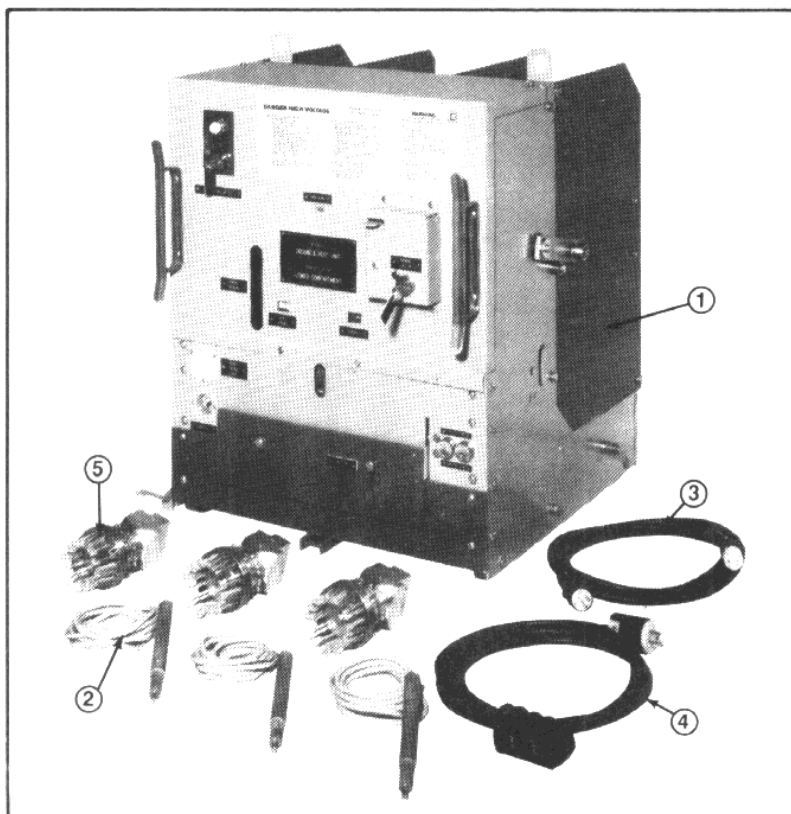


Figure 1
Furnished Components

2.0 SAFETY PRECAUTIONS

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

The Automatic 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 receptacles which are covered with an interlocked shutter to the front of the unit and makes them accessible to the operator for testing. Under certain conditions, these terminals may be at a high potential.

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.



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3.0 RECEIVING, HANDLING AND STORAGE

The Automatic 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 to the Automatic Ground and Test Unit as to the breaker as outlined in the breaker maintenance and instruction manuals supplied with this equipment.

Since the Automatic Ground and Test Unit is not used over a long period of time, special care has to be taken for storage. The device always has to 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 (See Maintenance, Section 7).

4.0 DESCRIPTION

The Automatic Ground and Test Unit consists of a modified vacuum circuit breaker. Separate units are required for the upper breaker cell and the lower breaker cell. The upper unit has main contacts at the top and the lower unit has the main contacts at the bottom. The units are interlocked so that they can only be inserted in the right compartment. If the feeders consist of 1200A, 2000A and 3000A breakers, two sets of contact stubs are furnished with each unit, one for 1200A and one for 2000A and 3000A. The three phases of the load side of the unit are tied together with a solid copper bar and connected to the ground contact. In order to use this device for high potential or other tests, the three phases are brought up to the front connected to three receptacles. A connector with cable attached can be inserted in this plug for high potential tests or measurements.

An interlocked shutter is provided over the contact ports which can be opened only when the unit is locked in the operating position and the contacts are closed. A plug and an extension cord are provided for remote 115V, 60 cycle control power. A control cable with close and trip push buttons is furnished to operate the unit from a remote, safe position. A timing relay is connected in the trip circuit which prevents the breaker from tripping within 3 seconds after the closing.

5.0 INTERLOCKS

The load connections are normally located at the bottom in the lower and at the top in the upper cell. For this purpose two units will be furnished, one with the main contacts at the top for the upper and one with the main contacts at the bottom for the lower unit. Each breaker cell has a permanent interlock block welded on its floor which allows only the correct Ground and Test Unit to be inserted. The cell interlock blocks are furnished only on orders where the Ground and Test Unit is included.

The shutter interlock locks the shutter in the close position which prevents access to the high voltage receptacles. Both the key release and the racking lock key are needed to open the shutter. The key release unit is a solenoid operated interlock unit which allows the key to be removed only when the solenoid is energized. The solenoid is energized when the breaker is closed.

The racking lock is an interlock which covers the racking port and prevents the unit from being moved.

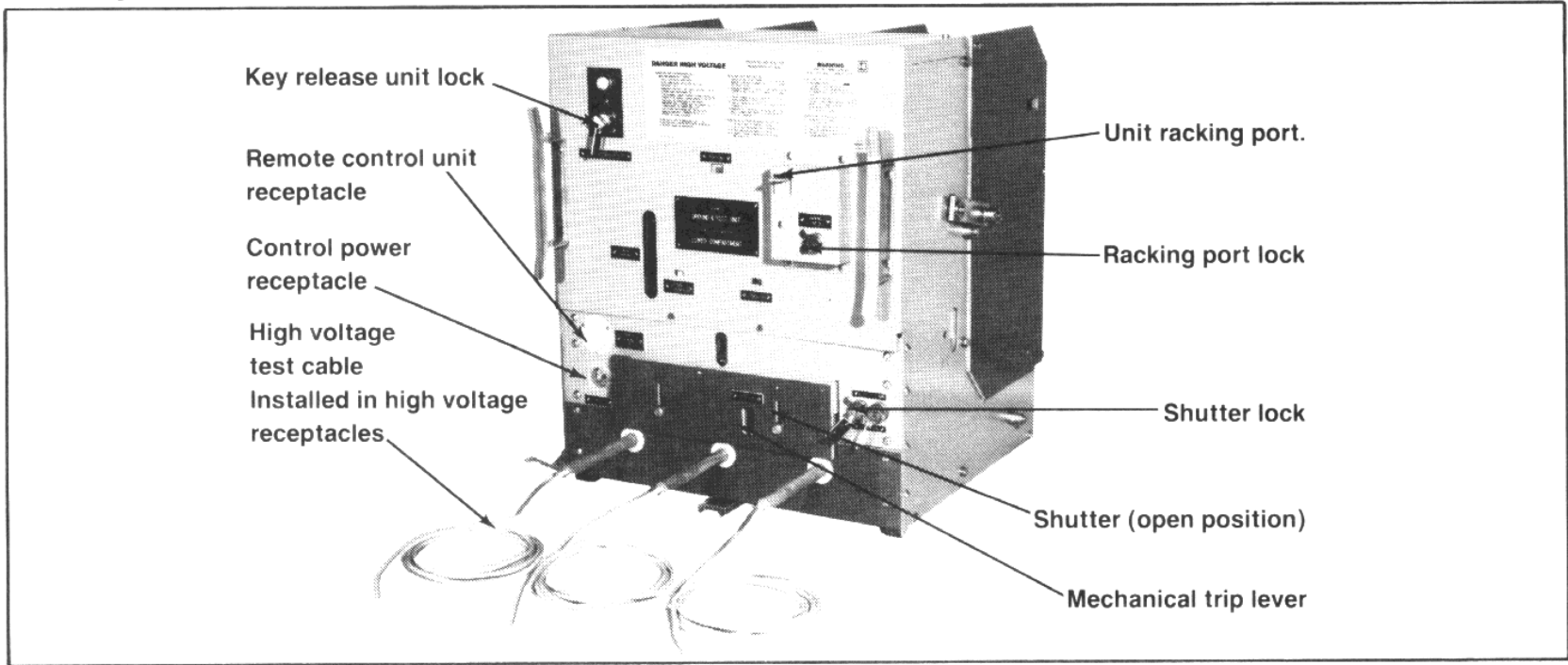


Figure 2
Miscellaneous Features



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

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6.0 OPERATING INSTRUCTIONS

WARNING

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

6.1 Inserting the Unit in the Breaker Cell

A. Before inserting the unit into a breaker cell, check all of the following conditions carefully:

- 1) Check the rating of the breaker cell and make sure that the Ground and Test Unit has a corresponding main contact installed. The 1200A contacts are flat, and the 2000/3000A contacts are round.
- 2) Make sure that the unit is inserted in the proper breaker cell. Check the diagram and the assembly drawings and confirm that the load cable is connected to the lower terminal in the lower cell or to the upper terminals in the upper cell.
- 3) Check the breaker cell nameplate before inserting the unit.
- 4) Check applicable drawings to ensure that load cables to be grounded or tested are not connected to any other voltage source.
- 5) The main contacts of the Ground and Test Unit have to be open; check the contact indicator on the face of the unit.
- 6) The keys for the interlock have to be in the key release unit A and in the racking lock B. No keys should be in the shutter lock.
- 7) The remote control unit and the control power cords have to be disconnected and removed from the unit.

B. Push the test unit in the breaker cell test position and crank the unit into the operating position the same as the breaker. Refer to Manual 6055-3 for details.

6.2 Using the Unit as a Grounding Unit

- 1) Before proceeding, check again if the unit is in the correct cell and the load cables are not connected to any other voltage source.
- 2) Connect the control power cords to the automatic ground and test unit and plug it into a 115V AC outlet. By doing so the breaker springs will be charged.
- 3) Connect the remote control unit to the test unit and from a remote safe location, close the test unit. The load cables are now grounded.
- 4) Remove the key from the key release unit. With this key removed the test unit cannot be tripped or moved.
- 5) Unplug the remote control unit and the control power cord from the unit.

6.2.1 REMOVE AUTOMATIC GROUND AND TEST UNIT FROM BREAKER CELL AFTER 6.2

A. If the unit is only used for grounding purposes it can be removed in the reverse order after the work on the cable has been completed.

- 1) Connect both the control cable and the control power cable to the unit.
- 2) Lock the key release unit with key "A."
- 3) Trip the unit and unplug both cords.
- 4) Insert crank and remove the unit from the breaker cell.

6.3 Using the Unit As a Test Unit

A. If the unit should be used for high potential test or to take measurements of the cables the following steps should be followed:

- 1) Before proceeding, check again if the unit is in the correct cell and the load cables are not connected to any other voltage source.
- 2) Connect the control power cords to the automatic ground and test unit and plug it into a 115V AC outlet. By doing so the breaker springs will be charged.



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

- 3) Connect the remote control unit to the test unit and from a remote safe location, close the test unit. The load cables are now grounded.
- 4) Lock the key release unit with key "A" and insert it in shutter lock, position "A." Lock the racking port, remove the key and insert the key in the shutter lock position "B."
- 5) Unplug the remote control unit and the control power cord from the unit.
- 6) Open the interlock with the keys, open the shutter and insert the test cables.
- 7) Opening the shutter will give access to the mechanical tripping lever.
- 8) If the high pot tester or the measuring unit is ready to be used, trip the unit with the mechanical tripping lever "Test Trip."
- 9) The cables are now ready to be tested.

6.3.1 REMOVE AUTOMATIC GROUND AND TEST UNIT FROM BREAKER CELL

- A. After the testing of the cable is complete, the following steps remove the unit from the breaker cell:
- 1) Remove the test cables.
 - 2) Lock the shutter.
 - 3) Remove the key "A" and lock key release unit "A."
 - 4) Remove the key "B" and unlock racking port "B."
 - 5) Insert crank and remove Automatic Ground and Test Unit from breaker cell.

7.0 MAINTENANCE

Proper maintenance of the Automatic 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 contaminants.

If the Automatic Ground and Test Unit has been stored a long period of time the following tests should be performed before using the unit:

Check the operation of the breaker. Connect both the control power cord and the control cable and operate the unit a few times. To assure that damage has not occurred, perform a hi-pot test across the open contacts of each vacuum interrupter. With the breaker in the closed position, perform a phase-to-ground and phase-to-phase hi-pot test for each pole. Gradually raise the voltage to 27kV RMS and sustain this potential for one minute.

The control cable and the control power cord can be wrapped around the test unit handles for storage.

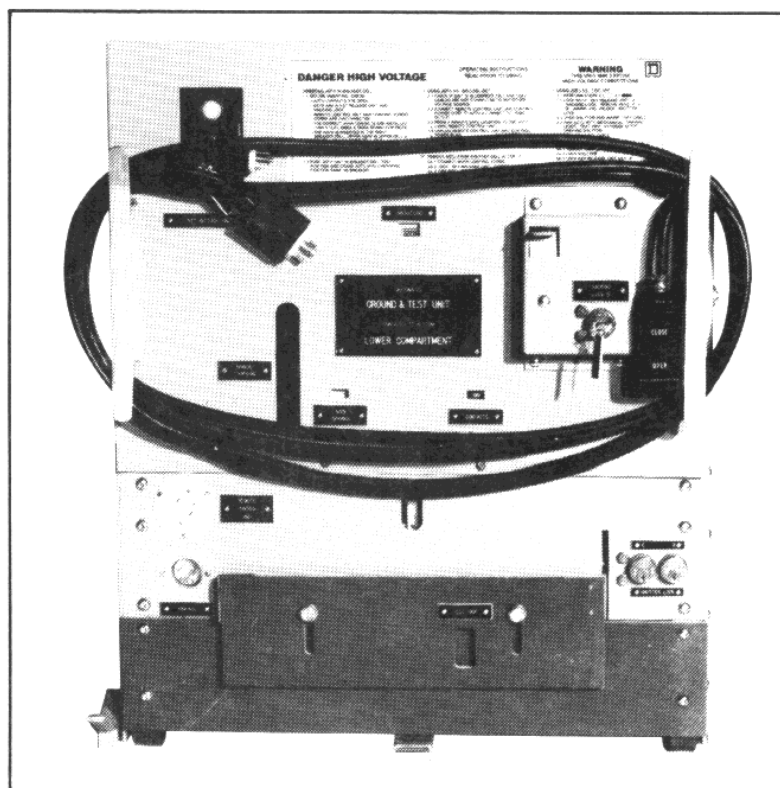


Figure 3
Storage Capability



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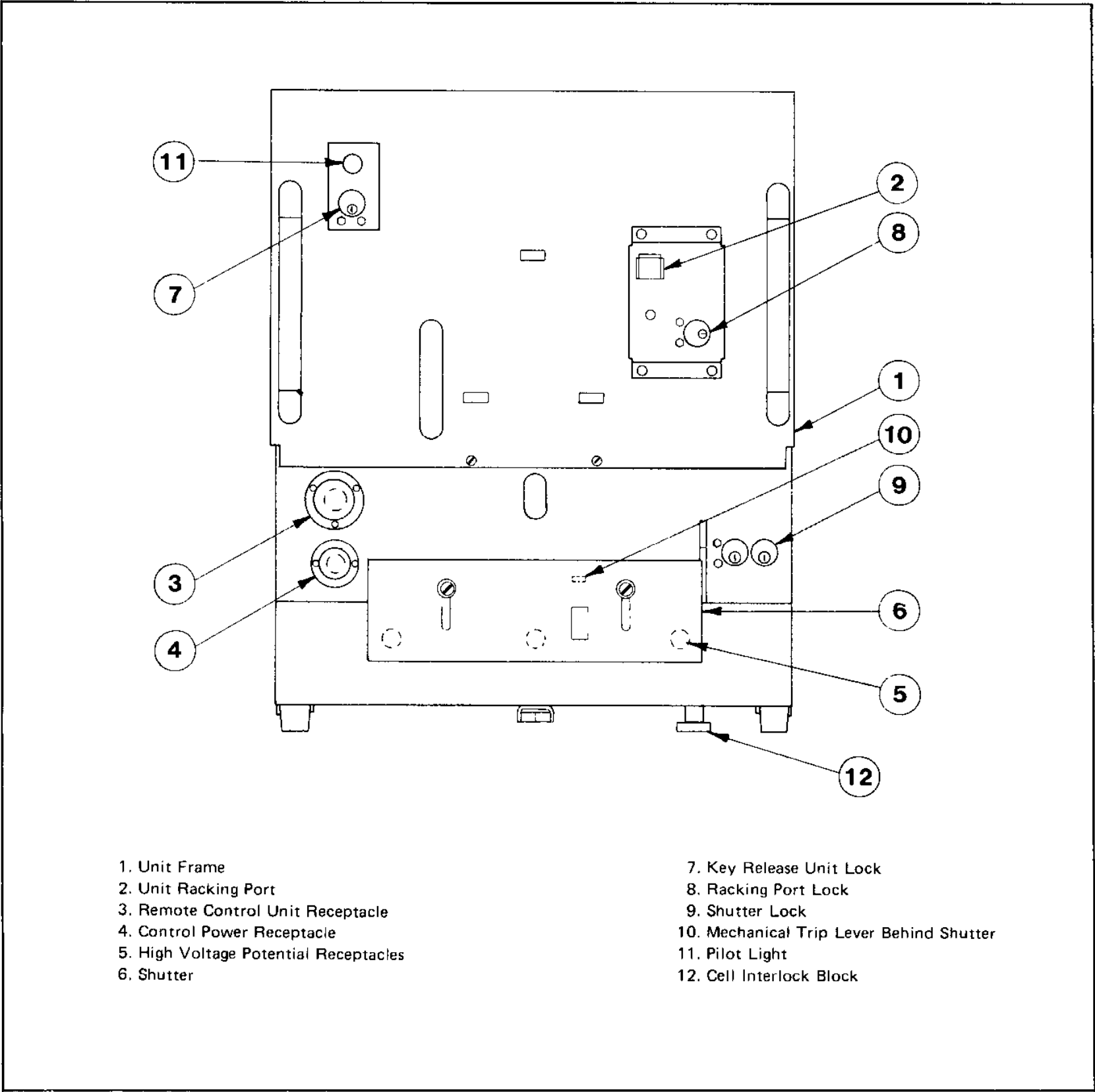
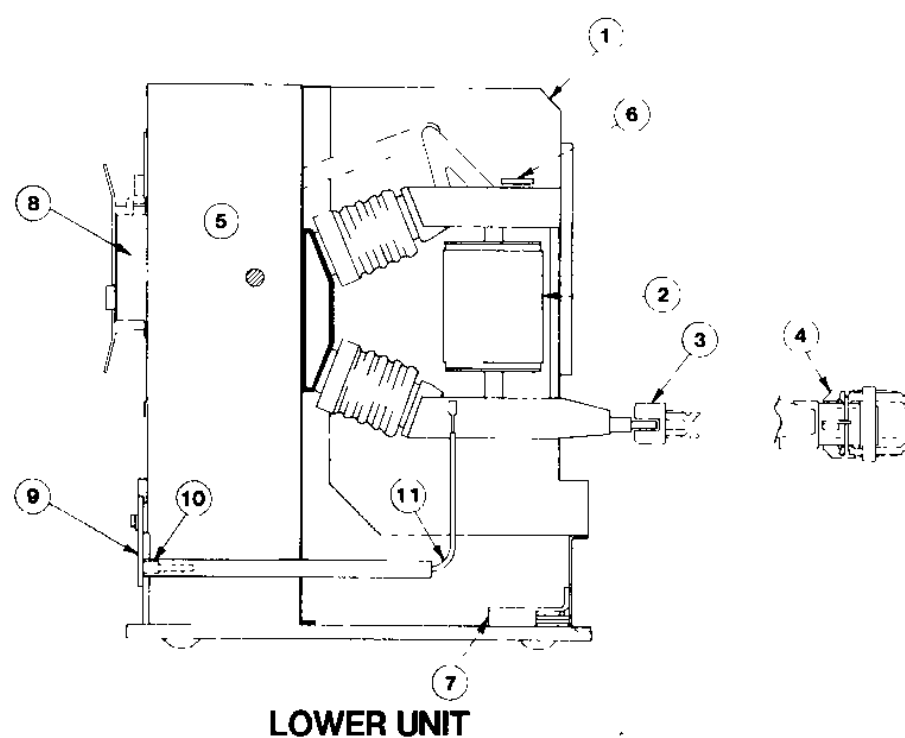
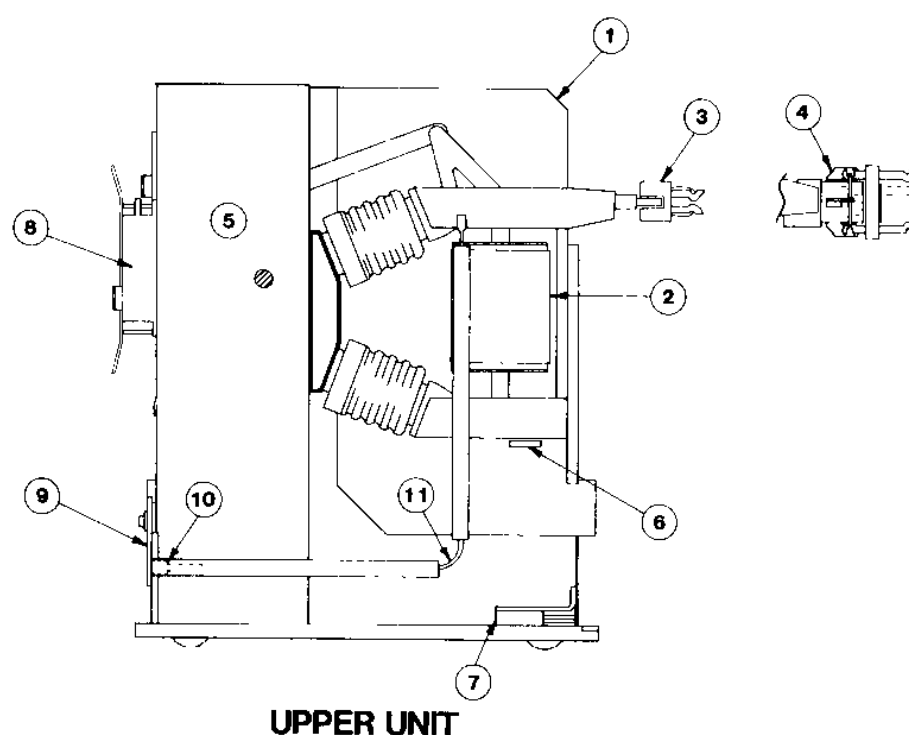


Figure 4
A.G.T.U. – Front View



AUTOMATIC GROUND AND TEST UNIT 5-15KV METAL-CLAD SWITCHGEAR

INSTRUCTION
MANUAL 6055-5



- 1. Unit Frame
- 2. Vacuum Bottle
- 3. Main Contact 1200A
- 4. Main Contact 2000/3000A
- 5. Operating Mechanism
- 6. Ground Bar

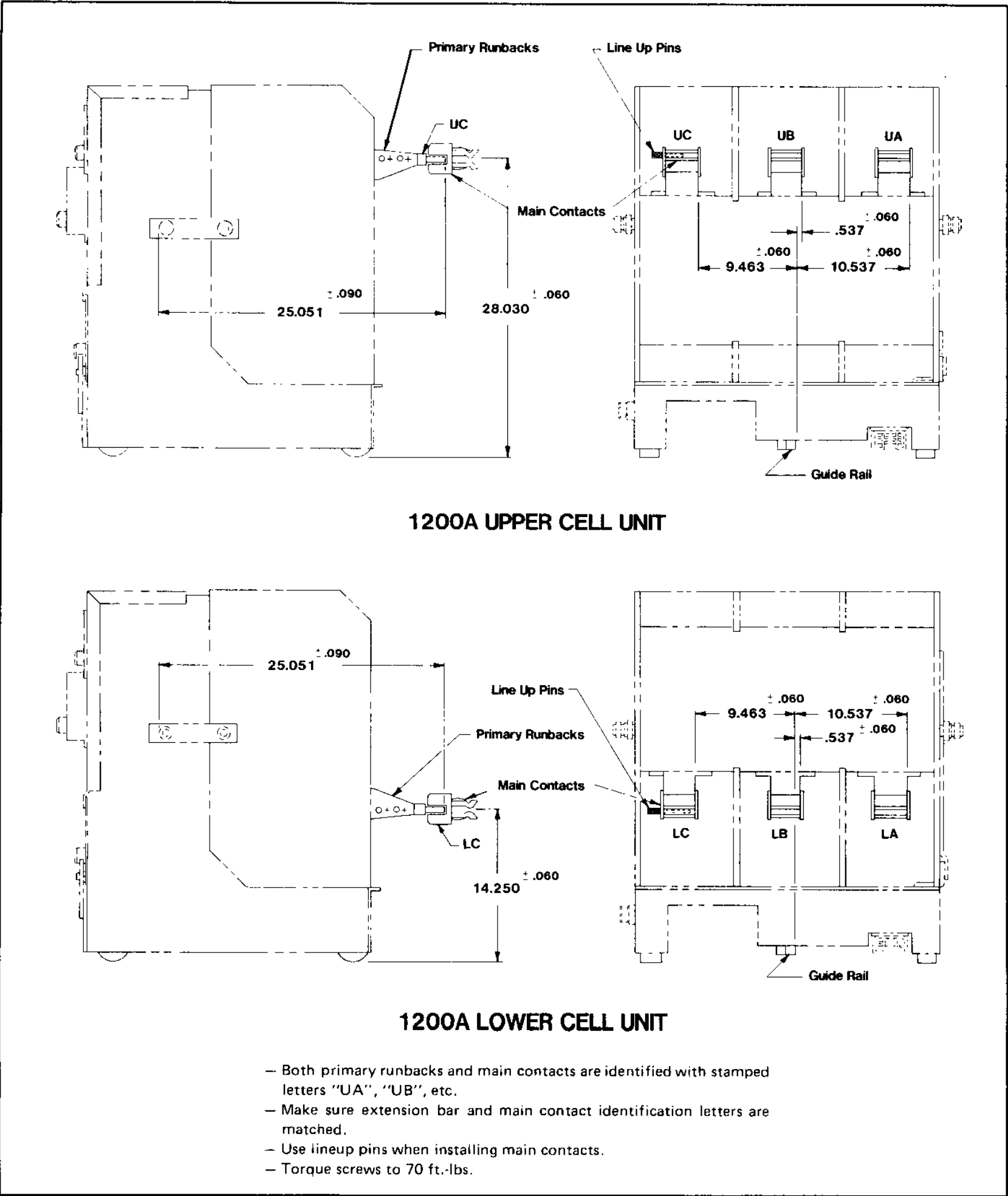
- 7. Ground Shoe
- 8. Racking Port Lock
- 9. Shutter
- 10. High Potential Receptacles
- 11. Receptacle High Voltage Cable Connections

Figure 5
A.G.T.U. — Side View



**AUTOMATIC GROUND AND TEST UNIT
5-15kV METAL-CLAD SWITCHGEAR**

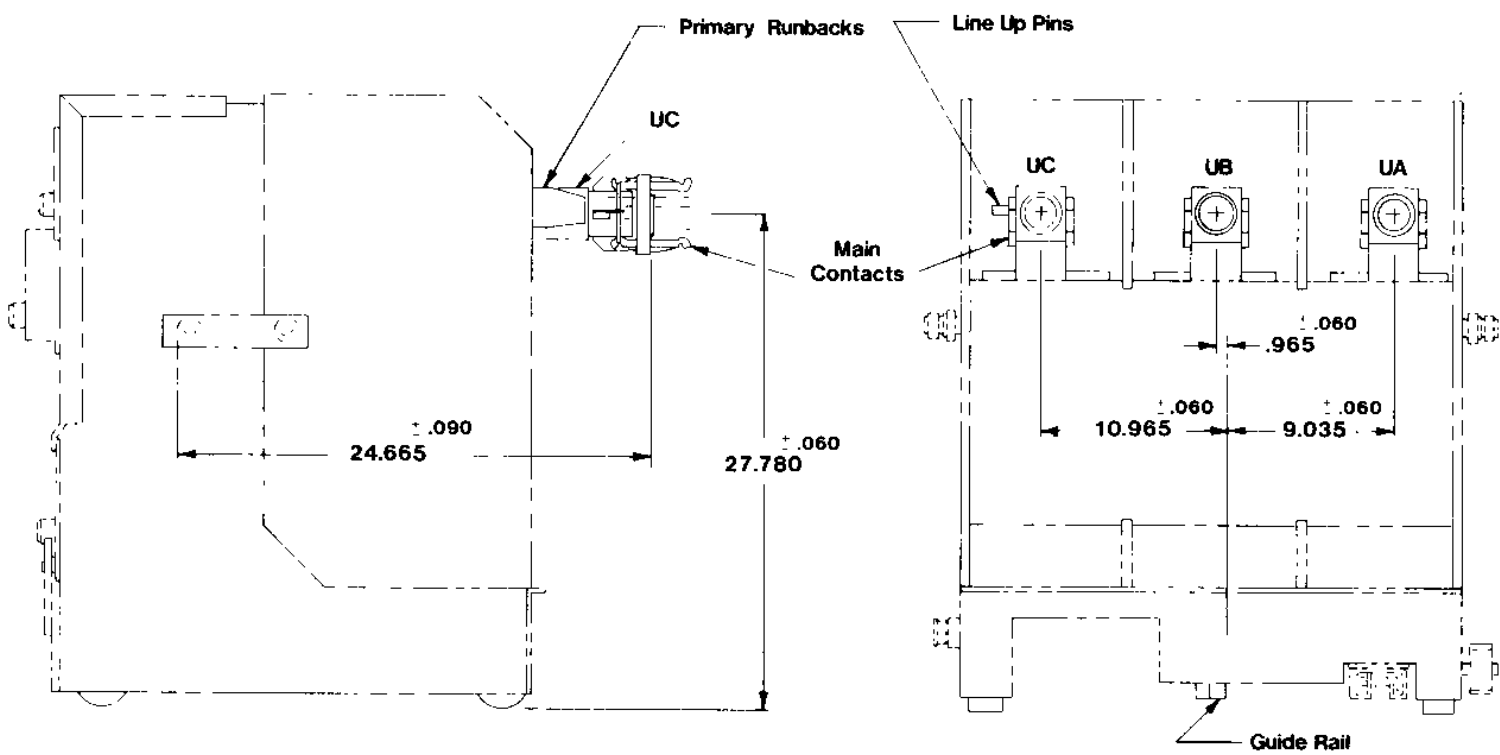
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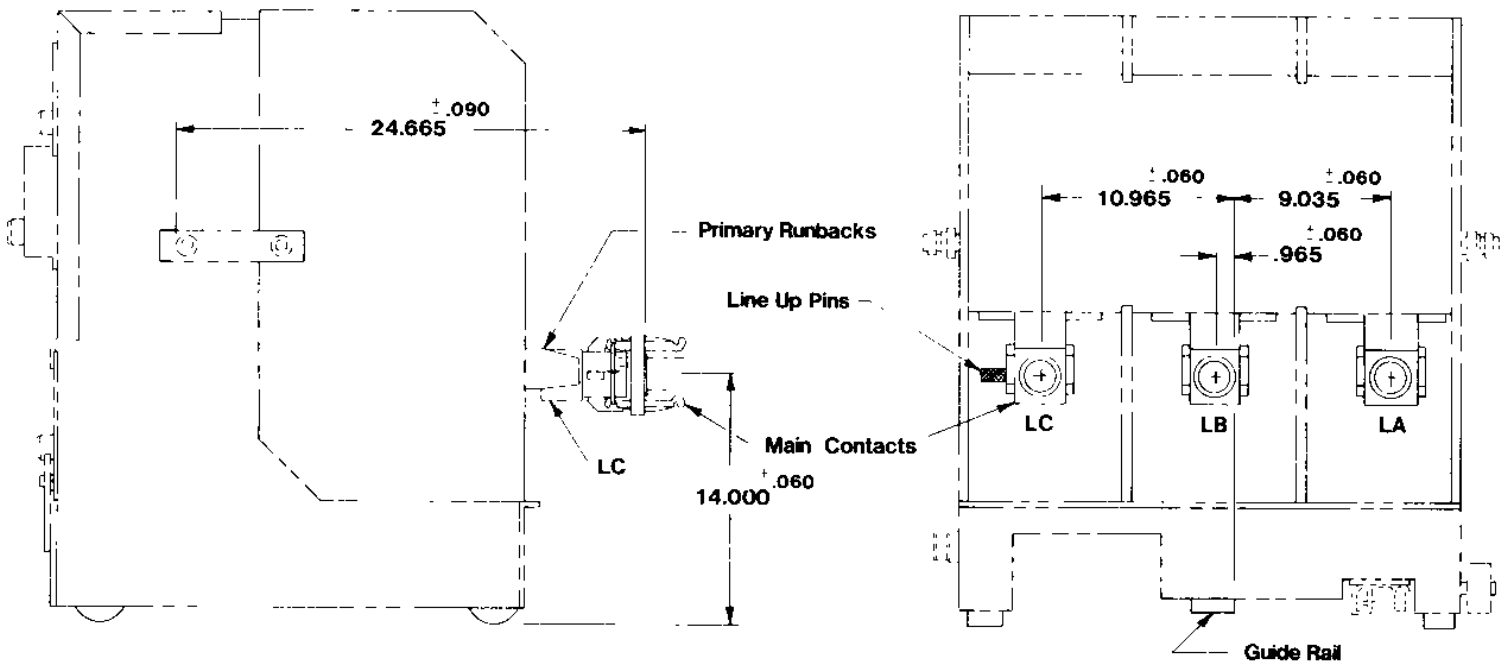
**Figure 6
Procedure To Exchange
To 1200A Main Contacts**



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2000A UPPER CELL UNIT



2000A LOWER CELL UNIT

- Both primary runbacks and main contacts are identified with stamped letters "UA", "UB", etc.
- Make sure extension bar and main contact identification letters are matched.
- Use lineup pins when installing main contacts.
- Torque screws to 70 ft.-lbs.

**Figure 7
Procedure To Exchange
To 2000A Main Contacts**



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

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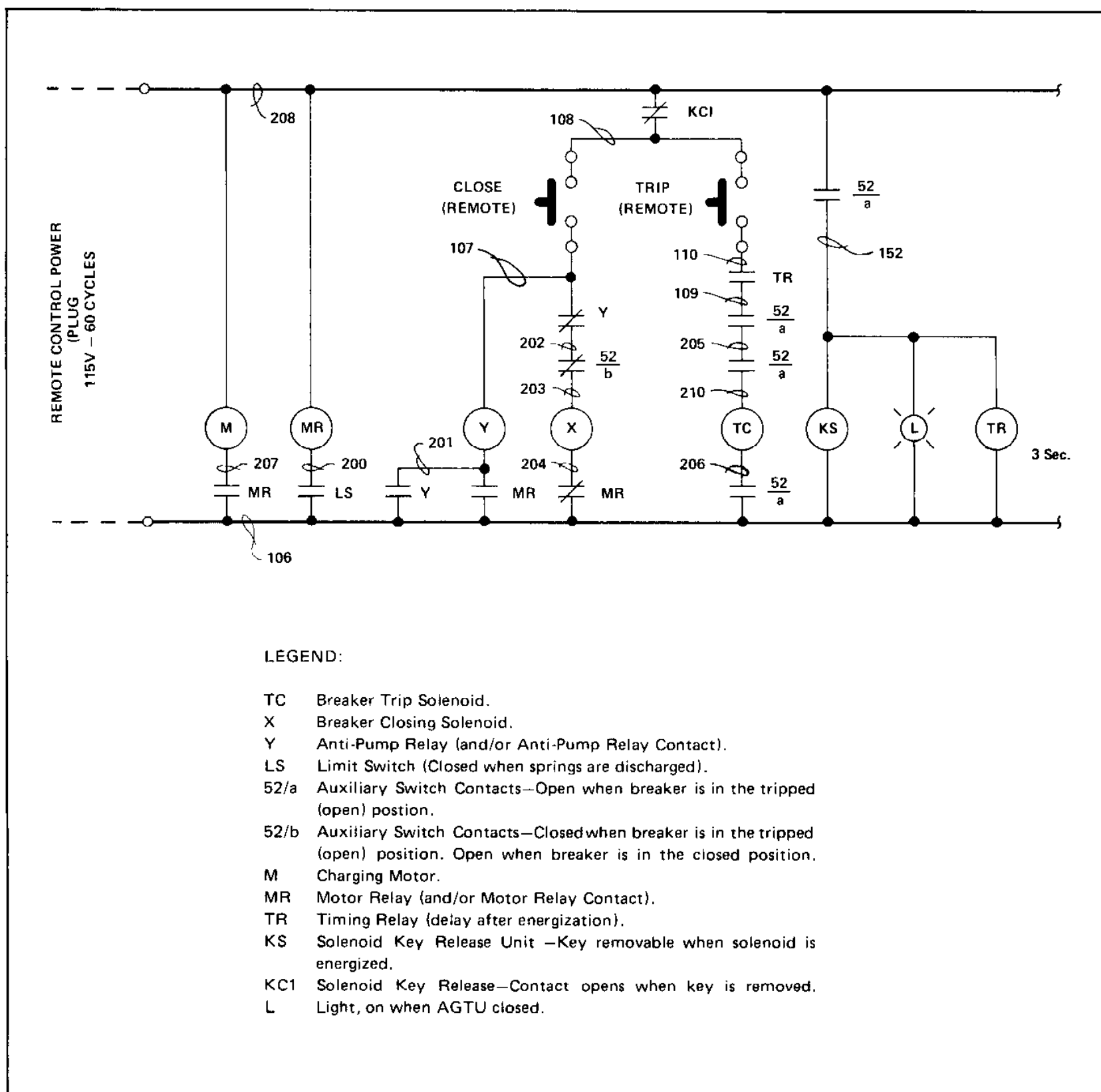


Figure 8
Schematic Diagram



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