

Voltage Regulators

QD8 Movable Contact Board Replacement Procedure Kit 5742895B01

S225-50-38

Contents

General	1
Parts Supplied	1
Kit Parts	1
Tools Required	1
Product Information	1
Safety Information	2
Installation Procedure	3

GENERAL

The purpose of this replacement procedure is to provide the instructions for replacing the QD8 Movable Contact Board.

PARTS SUPPLIED

Item	Part Number	Description	Qty
1	5742895B01	QD8 Movable Contact Board Kit	1

KIT PARTS

Part Number	Description	Qty
0740785801	T875 TC-Main Contact Assembly	1
2242895B02	T875 TC-FPL-Steel Shaft	1
0800073768Z	Screw #8-32x1.125 Sock HD Cap*SS*	1
2242895B01	T875 TC-FPL-G10 Shaft	1
A5212941	Net Lock: 1/2-13 (Hex-Top/Lock)*MS* GR-A	1
S2255038	T875 TC-G10 Shaft-Main Cont Instruction	1
0791646A04	T875 TC-Main Stat CNTCT Assy	1
0800005001Z	Nut Hex 1/2-13 (Jam) *Brass*	1

TOOLS REQUIRED

Description	Qty
1/2 inch drive ratchet wrench	1
1/2 inch drive - 3/4 inch deep well socket	1
1/2 inch drive - 3/4 inch socket	1
1/2 inch drive ratchet wrench extensions - 12 inch	1
3/8 inch drive ratchet wrench	1
3/8 inch drive 7/16 inch socket	1
3/8 inch drive - 9/16 inch socket	1
1-1/8 inch open end wrench	1
3/4 inch open end wrench	1
5/8 inch open end wrench	1
Channel Lock pliers	1
1/2 inch drive 0-600 lb-in (0-75Nm) torque wrench	1
3/8 inch drive 0-200 lb-in (0-25 Nm) torque wrench	1
1/2 inch drive 0-180 ft-lb (0-250 Nm) torque wrench	1
3/8 inch drive 0-180 ft-lb (0-250 Nm) torque wrench	1
Long flat bladed screwdriver	1

9/64 inch hex head socket - 3/8 inch drive	1
3/8 inch drive ratchet wrench extension - 12 inch	1
Rubber Mallet	1
Spreader bar	1
Loctite® 243	1
Portable pump	1
Vacuum pump	1
Hi-pot tester	1
Teflon tape	1

PRODUCT INFORMATION

Introduction

The new, improved QD8 Movable Contact Board design adds to the reliability of Cooper Power System's QD8 tap changer. The QD8 Movable Contact Board prevents the possibility of high voltage tracking between the movable contact and ground.

Read This Manual First

Read and understand the contents of this manual and follow all locally approved procedures and safety practices before installing or operating this equipment.

Additional Information

These instructions cannot cover all details or variations in the equipment, procedures, or process described nor provide directions for meeting every possible contingency during installation, operation, or maintenance. For additional information, contact your representative.

Acceptance and Initial Inspection

Each movable contact board is in good condition when accepted by the carrier for shipment. Upon receipt, inspect the shipping container for signs of damage. Unpack the movable contact board and inspect it thoroughly for damage incurred during shipment. If damage is discovered, file a claim with the carrier immediately.

Handling and Storage

Be careful during handling and storage of the movable contact board to minimize the possibility of damage. If the movable contact board is to be stored for any length of time prior to installation, provide a clean, dry storage area.

Standards

ISO 9001:2000 Certified Quality Management System



SAFETY FOR LIFE



Cooper Power Systems products meet or exceed all applicable industry standards relating to product safety. We actively promote safe practices in the use and maintenance of our products through our service literature, instructional training programs, and the continuous efforts of all Cooper Power Systems employees involved in product design, manufacture, marketing and service.

We strongly urge that you always follow all locally approved safety procedures and safety instructions when working around high-voltage lines and equipment and support our "Safety For Life" mission.

SAFETY INFORMATION

The instructions in this manual are not intended as a substitute for proper training or adequate experience in the safe operation of the equipment described. Only competent technicians, who are familiar with this equipment should install, operate and service it.


A competent technician has these qualifications:


- *Is thoroughly familiar with these instructions.*
- *Is trained in industry-accepted high- and low-voltage safe operating practices and procedures.*
- *Is trained and authorized to energize, de-energize, clear, and ground power distribution equipment.*
- *Is trained in the care and use of protective equipment such as flash clothing, safety glasses, face shield, hard hat, rubber gloves, hotstick, etc.*


Following is important safety information. For safe installation and operation of this equipment, be sure to read and understand all cautions and warnings.

Hazard Statement Definitions

This manual may contain four types of hazard statements:

 **DANGER:** Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.


 **WARNING:** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.


 **CAUTION:** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.


CAUTION: Indicates a potentially hazardous situation which, if not avoided, may result in equipment damage only.


Safety Instructions

Following are general caution and warning statements that apply to this equipment. Additional statements, related to specific tasks and procedures, are located throughout the manual.

 **DANGER:** Hazardous voltage. Contact with high voltage will cause death or severe personal injury. Follow all locally approved safety procedures when working around high- and low-voltage lines and equipment.

 **WARNING:** Before installing, operating, maintaining, or testing this equipment, carefully read and understand the contents of this manual. Improper operation, handling or maintenance can result in death, severe personal injury, and equipment damage.

 **WARNING:** This equipment is not intended to protect human life. Follow all locally approved procedures and safety practices when installing or operating this equipment. Failure to comply may result in death, severe personal injury and equipment damage.

 **WARNING:** Power distribution equipment must be selected for the intended application. It must be installed and serviced by competent personnel who have been trained and understand proper safety procedures. These instructions are written for such personnel and are not a substitute for adequate training and experience in safety procedures. Failure to properly select, install or maintain this equipment can result in death, severe personal injury, and equipment damage.

INSTALLATION PROCEDURE

1. Manually run the tap changer to neutral.
2. Disconnect the control cable from the bottom of the junction box (refer to Figure 1).

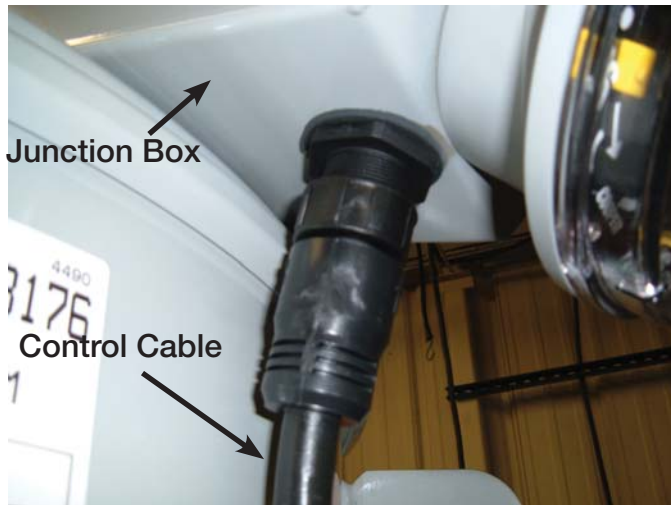


Figure 1.

3. Remove the series arrester. Release the internal pressure by using the pressure relief device on the side of the regulator.

Note: If the regulator tank is round and has a thermometer, the thermometer needs to be removed. Lower the oil level below the thermometer well and remove the thermometer well before un tanking the regulator.

4. Disconnect the cover grounding strap. Free the cover by removing the cover bolts.
5. Attach a sling or hooks with a spreader bar to the lifting eyes and raise the cover, with the core and coil assembly, until the top of the coil is approximately one inch under oil (ensure the capacity ratings of the lifting equipment are sufficient). As a safety precaution, blocking between the cover and the tank should be used. Lower assembly just enough to engage the blocking.
6. Remove the nuts from the 2-raise stationary contact posts using a 3/4 inch deep well socket. Remove the 2-raise stationary contact lead and jumper bar from the 2-raise stationary contact posts. Remove the 2-raise stationary contact from the phenolic panel (refer to Figure 2). Save the nuts for re-assembly.

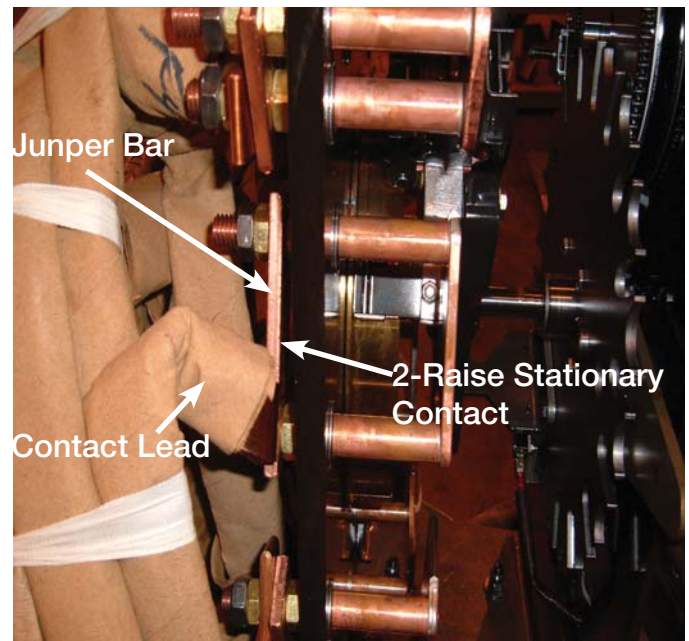


Figure 2.

7. Remove the two bolts that mount the actuator finger with a 7/16 inch socket wrench. Remove the actuator finger (refer to Figure 3). Save the bolts for re-assembly.

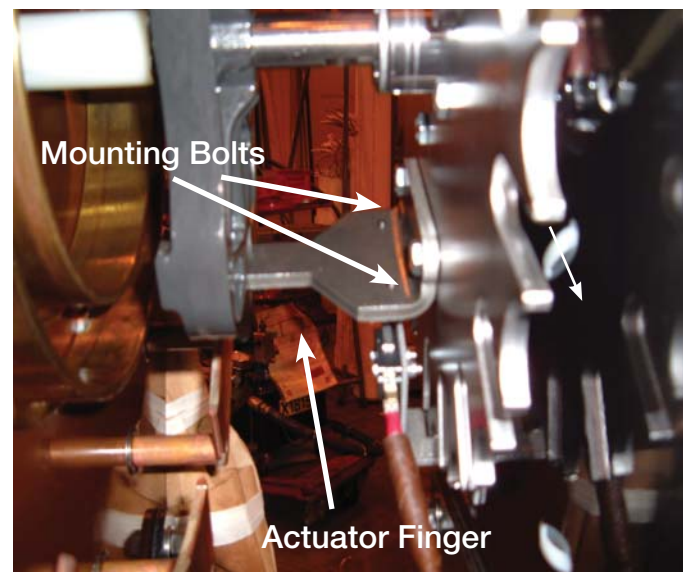


Figure 3.

8. Remove the nut from the end of the main shaft with a 3/4 inch socket wrench. While removing the nut, the shaft will have to be prevented from turning. Use a 5/8 inch open end wrench if the tap changer has a molded movable contact board (the shaft has two flats for the wrench engagement). Use a channel lock pliers if the tap changer has a phenolic movable contact board (the shaft does not have any flats to engage) (refer to Figure 4).

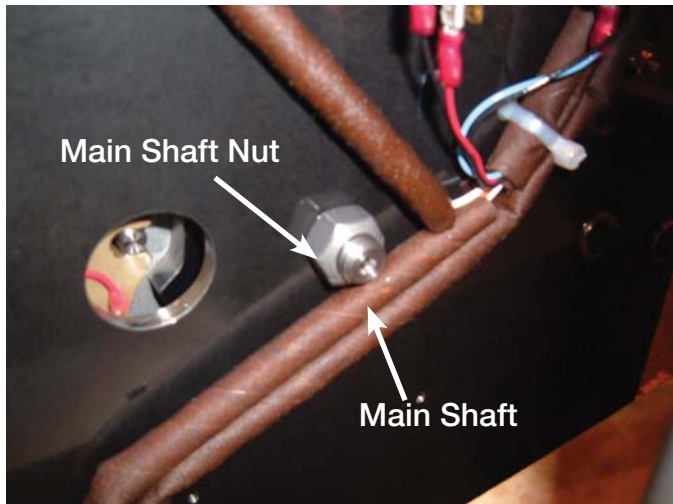


Figure 4.

9. Pull the main shaft out about 1 inch from the phenolic panel side of the tap changer. Use a rubber mallet to tap the main shaft through the metal panel if necessary. Now remove the E-clip from the main shaft with a pliers so the main shaft can be pulled out through the phenolic panel. To prevent the washer from falling off the shaft while removing the geneva gear, slide the washer toward the movable contact board (refer to Figure 5). Hold the geneva gear and pull the shaft out of the geneva gear hub only as far as needed to remove the geneva gear. Remove the geneva gear. Remove the washer from the shaft and then remove the shaft completely. If the shaft can not be pulled out completely because it is bumping into the reactor coils, unscrew and remove the white cap from the shaft to allow for shaft removal.

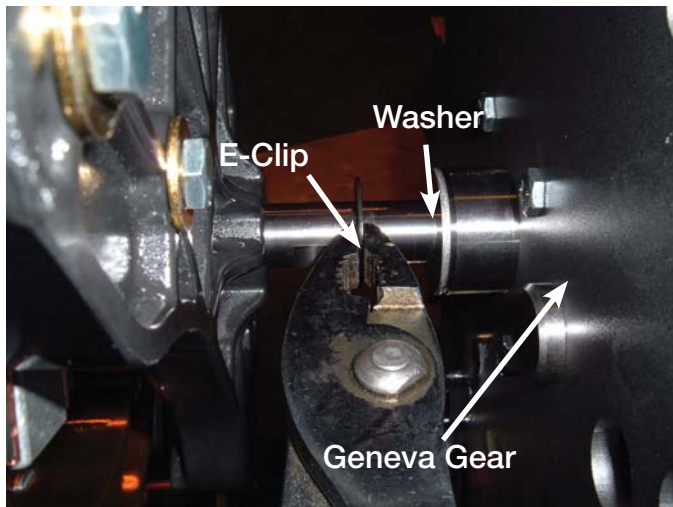


Figure 5.

10. Slide the movable contacts off the neutral stationary contact into the open space created by the removal of the 2-raise stationary contact. Disengage the ring contacts from the rings by pulling the movable contact board toward the steel panel. Remove the movable contact board (refer to Figures 6 and 7.)

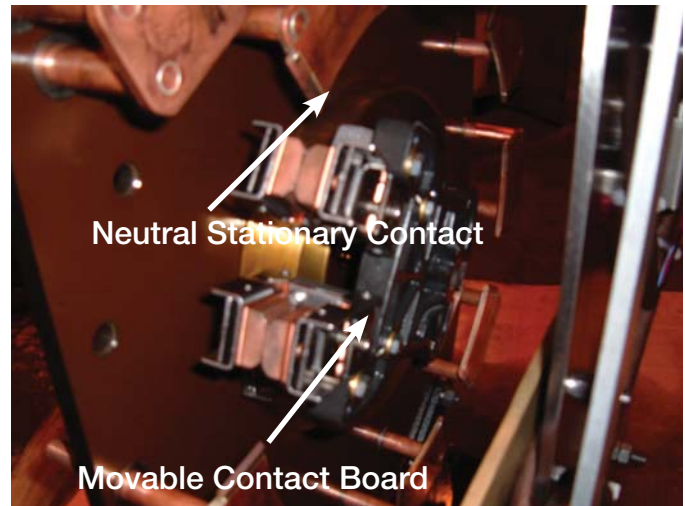


Figure 6.

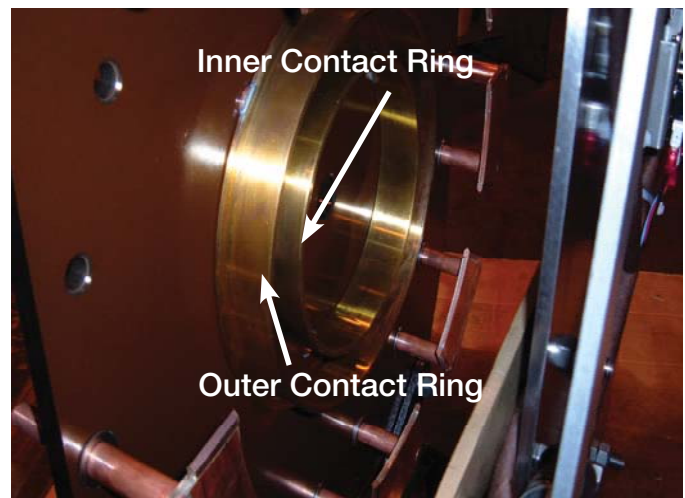


Figure 7.

11. The new shaft consist of two parts, a thermoset composite shaft and a steel shaft (refer to Figure 8).

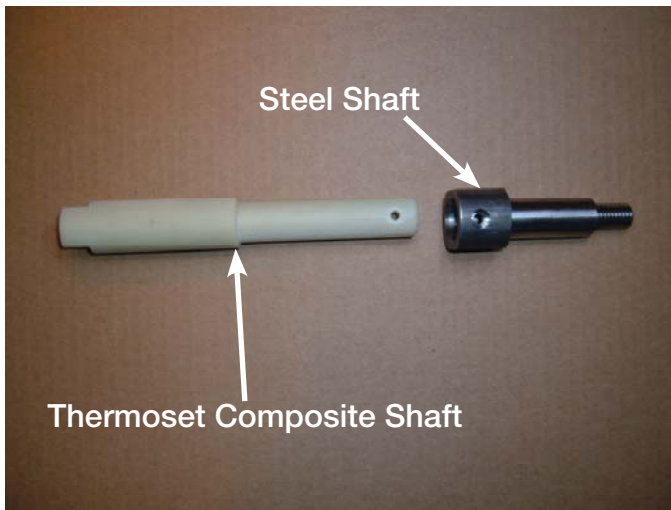


Figure 8.

To install the geneva gear, insert the steel shaft into the front of the geneva gear and then insert the threaded end of the steel shaft into the mounting hole in the steel panel. The pin on the back of the geneva gear must line up with the slot in the geneva section and the half-moon shaped groove on the outer edge of the geneva gear must line up with the half-moon shaped drive on the sprocket. Secure the steel shaft to the steel panel using the nut removed in Step 8. Use a 1-1/8 inch open end wrench to hold the steel shaft while securing the nut on the threaded end of the shaft with a 3/4 inch socket wrench. Torque the nut to 180 to 400 in-lbs (20.33 to 45.19 Nm) (refer to Figures 9 and 10). Insure the geneva pin is engaged with the geneva section by checking the viewing hole in the steel panel (refer to Figure 11).

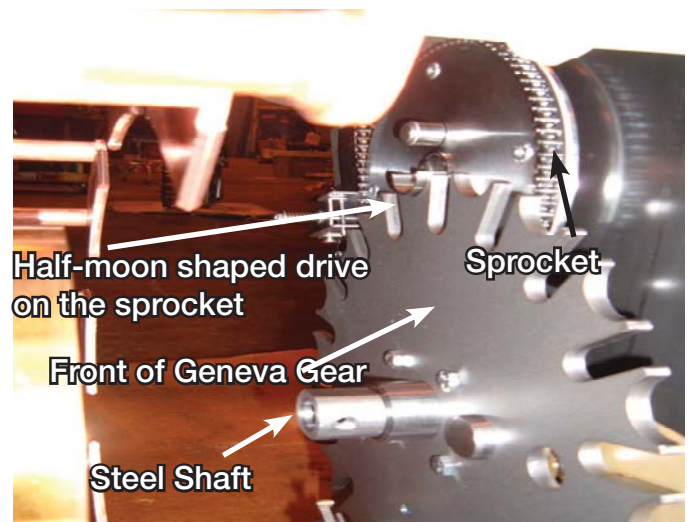


Figure 10.

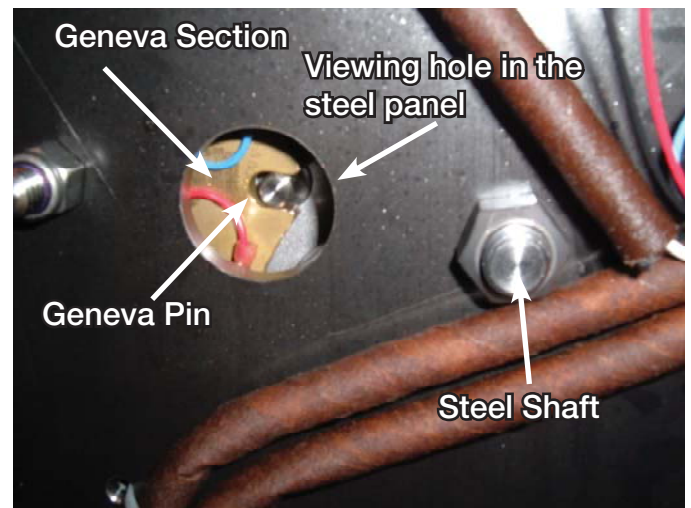


Figure 11.

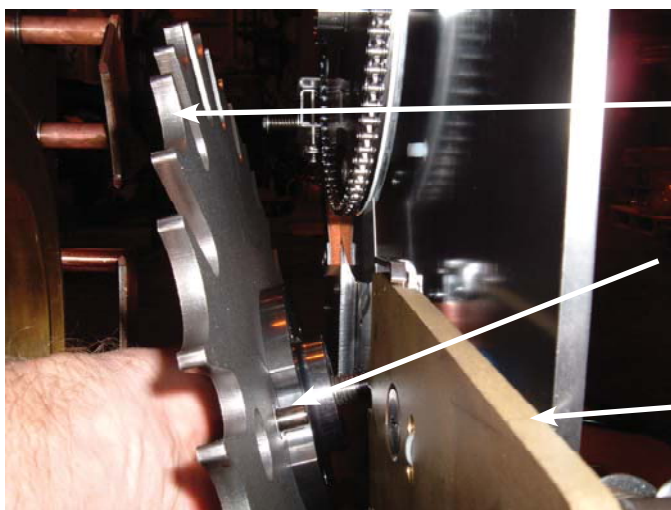


Figure 9.

Half-moon shaped slots on the outer edge of the geneva gear

Geneva Gear Pin

Geneva Section

12. Hold the movable contact board so that the movable contacts are located in the space created after the 2-raise stationary contact was removed. Align the ring contacts with the rings. While holding the movable contact board in place, take a long blade screw driver and pry the buttons on one of the ring contacts apart.

Push the contact onto the ring while the contact buttons are spread apart. Repeat this process on the other ring contact (refer to Figure 12).

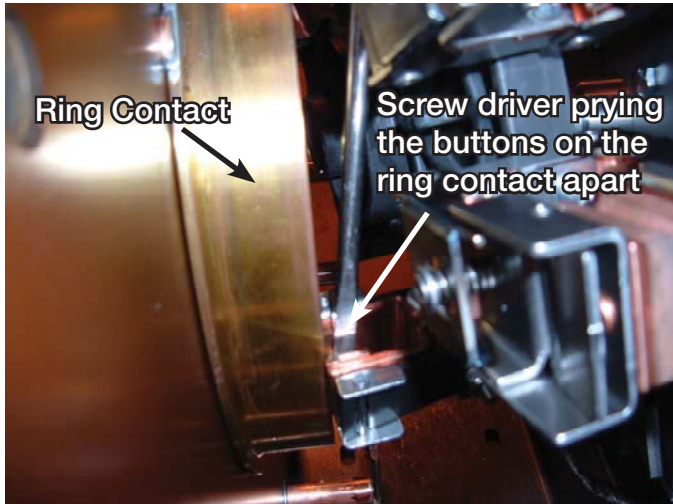


Figure 12.

Slide the main contacts on to the neutral stationary contact (refer to Figure 13).



Figure 13.

13. Insert the small end of the thermoset composite shaft through the hole of the phenolic panel, then through the hole in the movable contact board, and into the end of the steel shaft. Use a rubber mallet to lightly tap the back end of the thermoset composite shaft to ensure the shaft is inserted all the way into the steel shaft. Apply a drop of Loctite 243 on the last 1/4 inch of the coupling screw threads. Insert the screw into the side of the steel shaft with the countersunk hole. The thermoset composite shaft can be turned using a 3/4 inch open end wrench on the back end of the shaft to align the holes of the two shafts. Torque the coupling screw with a 9/64 hex wrench (Allen Wrench) to 10 to 15 in-lbs (1.12 to 1.69 Nm) (refer to Figure 14).

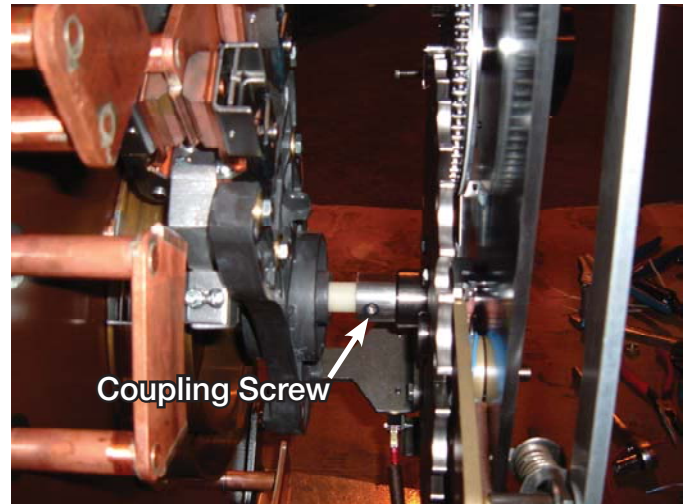


Figure 14.

14. Use the nuts that were removed in Step 6 to reinstall the 2-raise stationary contact and reconnect the jumper bar and contact lead. Torque the nuts for the stationary contact, jumper bar and lead to 180 to 192 in-lbs (20.33 to 21.69 Nm).
15. Reinstall the actuator finger to the geneva gear using the bolts removed in Step 7. The actuator finger should extend into the movable contact board actuator pocket. Torque the bolts to 30 to 40 in-lbs (3.38 to 4.51 Nm).
16. Lift the core and coil slightly and remove the safety blocking. Lower the assembly until the cover is 6 inches above the tank.
17. Wipe the outer edge of the cover and the tank lip so they are clean and free of debris. Replace the cover gasket on the tank lip and align the gasket bolt holes to the tank bolt holes.
18. Lower the cover until the cover is seated on the gasket, making sure the gasket bolt holes align with the cover bolt holes. If the cover does not seat on the gasket, remove the hand hole cover and loosen the horizontal side channels to ensure proper seating of the regulator in the tank and proper cover seal.

19. Replace the rubber bolt gaskets and lock washers and secure the cover to the tank using the cover bolts removed earlier (Note: the lock washers need to be stainless steel). Re-apply anti-seize to the bolts if needed. Torque the nuts to 26 to 28 ft-lbs (35.25 to 37.96 Nm). After all the nuts have been tightened once, torque them again. Torque the horizontal side channel bolts to 35 to 40 ft-lbs. (47.45 to 54.23 Nm) and replace hand hole cover. Torque the hand hole cover bolts to 26 to 28 ft-lbs (35.25 to 37.96).

Note: If the regulator has a thermometer and is a round tank, re-install the thermometer well and replace the oil.

20. Pressurize the tank to 4 psi with nitrogen and check for leaks and reconnect the control cable.
21. After the unit has been re-assembled, perform the following test:
 - 1) Run the regulator to 16 Raise using the automatic operation mode. This operation can be done by changing function code 1 to a value that causes the regulator control to see an out of band low indicator. Recommend setting function code 1 to 130 volts for this operation. This test should be done using an external power source to power the



CAUTION: When applying external voltage to the control, a true AC wave power source must be used and the polarity checked before connections are applied to the external source connections on the control panel.

control and tap changer.

Return the Auto/Remote/Manual Control Function Switch to the Manual Position, use the Lower Switch and tap the regulator back to **Neutral**.

Reprogram function code 1 back to the original set voltage value.

- 2) Apply 2 torr vacuum 25 minutes.
- 3) Allow 4 hours soak time before energizing.
- 4) After completing steps 1-3, perform a hipot test using the following guide.

If the regulator is a new unit and has not been energized on a Utilities Electrical System, use the following AC voltage for hipot values for one minute:

150 BIL Regulators 50 kV AC
200 BIL Regulators 70 kV AC

if the regulators are used or have been energized on a Utilities Electrical System, use the following AC voltages for hipot values for one minute:

150 BIL Regulators 30 kV AC
200 BIL Regulators 42 kV AC

