Voltage Regulators

COOPER Power Systems

Service Information

QD3T350 Reversing Stationary Contact Assembly Instructions Kit 5791822A02

S225-50-43

Contents

GENERAL

The purpose of this replacement kit is to provide the parts and installation instruction for replacing the reversing stationary contacts on a QD3 Quik Drive Tap Changer. The VR and VL reversing stationary contacts are symmetrical; therefore, one stationary contact can be used either for the VR or the VL stationary.

This installation instruction is made up of four different procedures sections:

Tap Changer Removal from Voltage Regulator
QD3/T350 Tap Changer Assembly Separation
Reversing Stationary Contact Removal and Re-assembly
Tap Changer Re-assembly

PARTS SUPPLIED

Item	Part Number	Description	Qty
1	0791822A02	Reversing Stationary Contact Assembly	1

TOOLS REQUIRED

Description	Qty
Needle Nose Pliers	1
9/16 inch Deep Well Socket	1
3/8 inch Drive Ratchet Wrench	1
5/32 Allen Wrench	2
Phillips Head Screwdriver Size 1 Point	1
Diagonal Cutters	1
Phillips Head Screwdriver	1
Standard Screwdriver	1
Torque Wrench inch pounds	1
3/8 inch drive 0-200 lb-in (0-25 Nm) torque wrench	1

PRODUCT INFORMATION

Introduction

The Cooper Power Systems QD3/T350 Reversing Stationary Contact Assembly Kit and installation instructions gives customers the ability and guidance to replace the reversing stationary contacts during maintenance cycles when contact erosion has occurred to the point of needing replacement.

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 Reversing Stationary Contact Assembly 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.

Figure 1.
Part Kit.

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.

Standards

ISO 9001:2000 Certified Quality Management System

INSTALLATION PROCEDURE

TAP CHANGER REMOVAL FROM VOLTAGE REGULATOR

1. Remove the internal position indicator shaft from the tap changer indicator drive tube. See Figure 2.

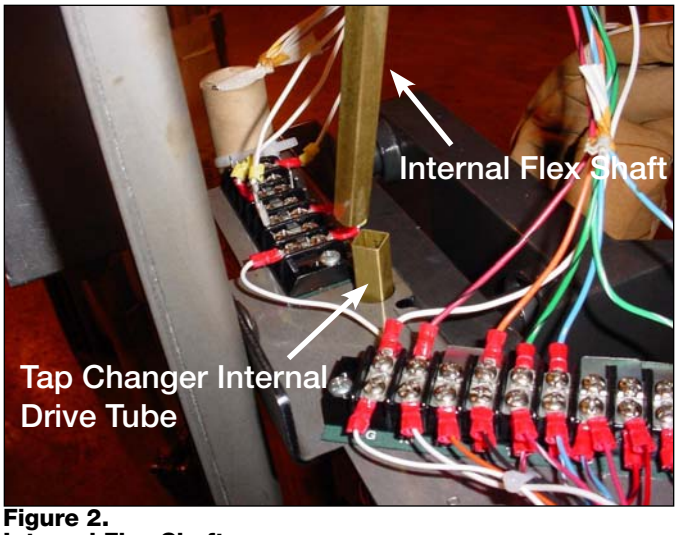

Figure 2.
Internal Flex Shaft.

2. Use a pair of diagonal side cutters to cut and remove the cable-ties from the control winding hard insulation tube and tap changer top bracket assembly. See Figure 3.
3. Use a 9/16 inch socket and ratchet to loosen and remove the nut and carriage bolt fastening the tap changer bracket to the regulator side channel. See Figure 4.

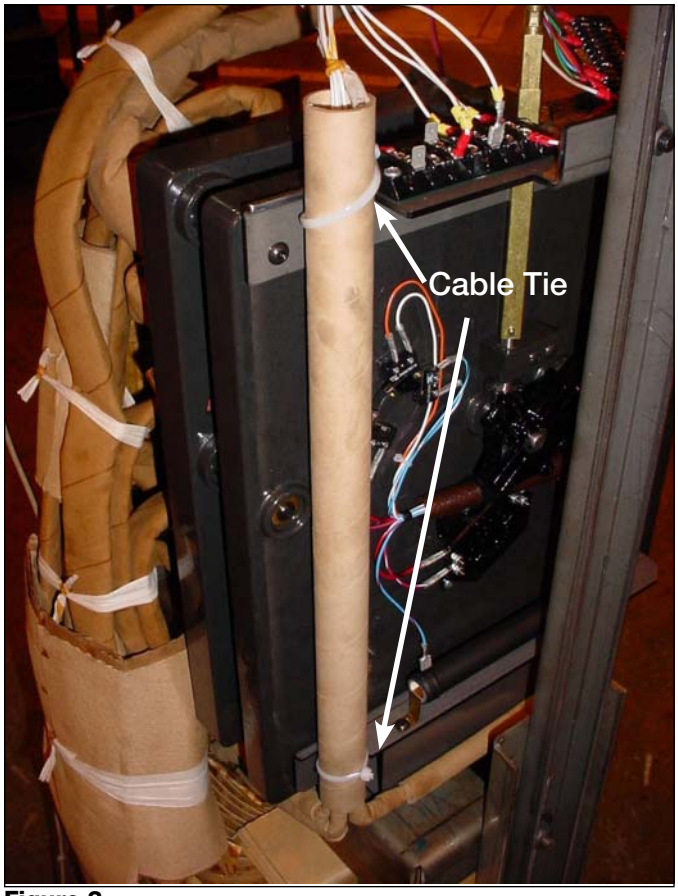

Figure 3.
Control Cable Fastening.

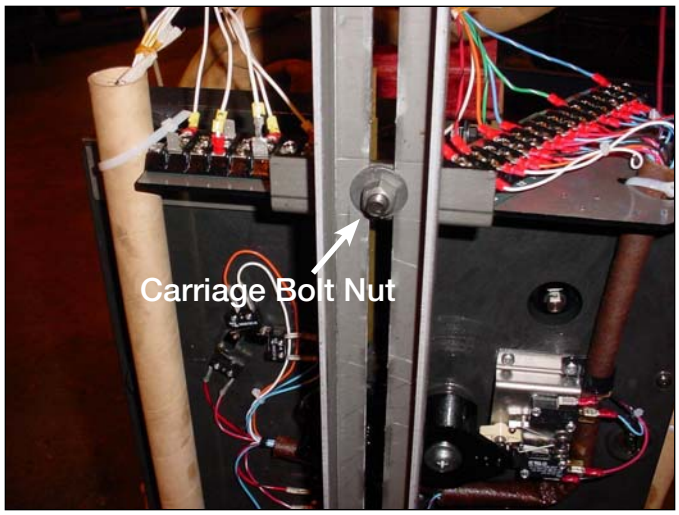

Figure 4.
Tap Changer and Side Channel Fastener.

4. Use a Phillips head screwdriver to loosen and remove the TCB terminal board leads from the 14 position terminal board located on the top right of the QD3 tap changer. See Figure 5. The lead color and termination points are as follows:

Lead Color	TCB Connection
Blue/White	1
Green/White	5
Blue	9
Green	10
Orange	11
Red/Black	13
White	G

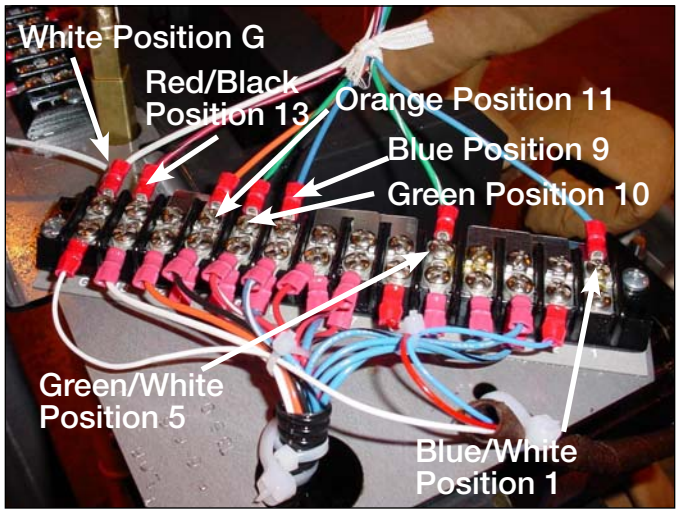

Figure 5.
TCB Lead Color and Termination Points.

5. Use a Phillips head screwdriver and needle nose pliers to disconnect the white E control winding leads, and P leads if available, from the seven position terminal board located on the left top of the tap changer. See Figure 6.

Control winding E lead and (P lead if available) Connections.

The E lead will have E lead ID markers and the P leads if available will have P lead markers.

Lead Marker	Terminal Board ID
E	Could be on either E1, E2, or E3
E1	E1
E2	E2
E3	E3
P	If available could be on either P1, P2, or P3
P1	P1
P2	P2
P3	P3

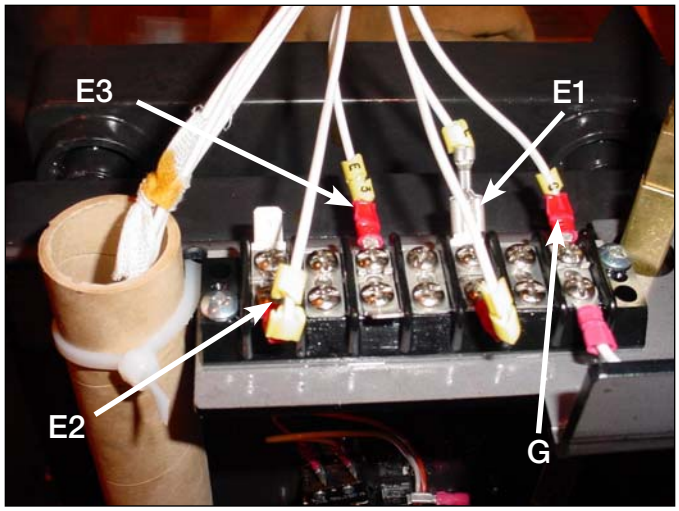

Figure 6.
E & P Lead Connections.

6. Use a deep well 9/16 inch socket with ratchet or a 9/16 inch wrench to loosen and remove all lead connections from the back of the tap changer contact board. See Figure 7.

CAUTION: Do not remove lead ties from lead bundles holding the tap leads in a certain position. Try to keep from moving the lead bundles from normal position. Doing so can result, possibly, in de-electric failures.

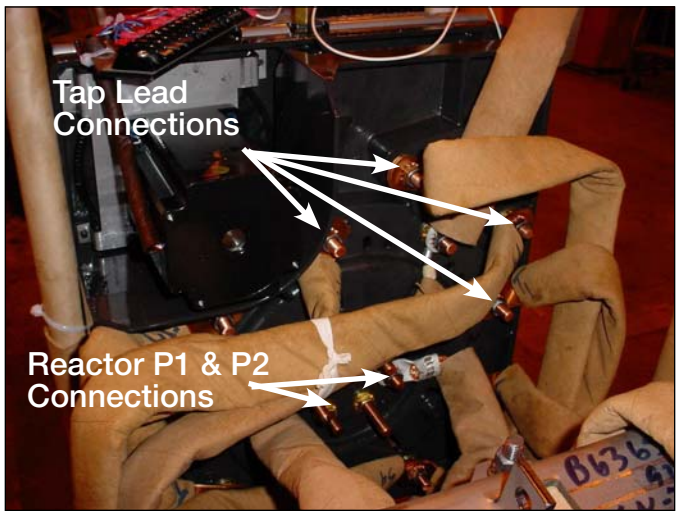

Figure 7.
Tap Leads and Reactor Connections.

7. Remove the mounting bolts fastening the tap changer-mounting bracket to the top core clamp. See Figure 8. Remove the tap changer from the regulator and place on a work surface.

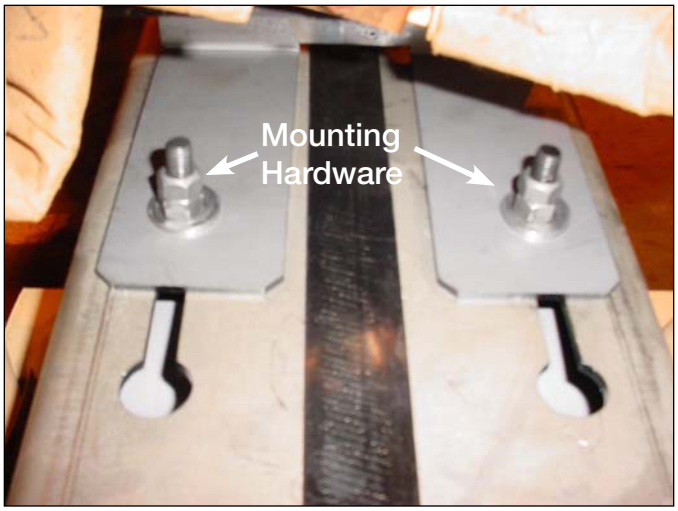

Figure 8.
Tap Change to Core Clamp Fastening Hardware.

QD3/T350 TAP CHANGER ASSEMBLY SEPARATION

1. After removing the tap changer from the regulator assembly, use a Phillips one point screwdriver to loosen and remove the six screws mounting the Reversing Lower, Raise and Neutral switch located in the upper left corner of the tap changer assembly. See Figure 9.

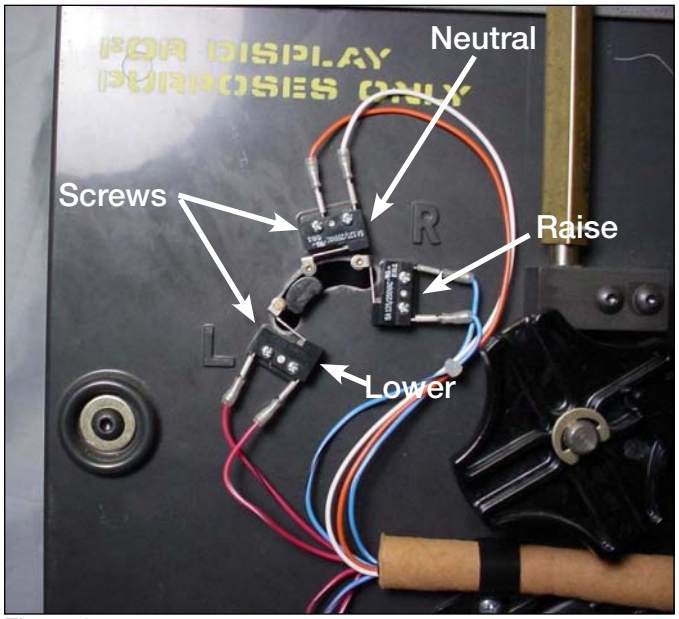

Figure 9.
Lower, Raise and Neutral Logic Switches.

2. Use a Phillips head screwdriver to loosen and remove the three mounting screws fastening the position indicator micro switch hub to the front of the tap changer assembly. See Figure 10.

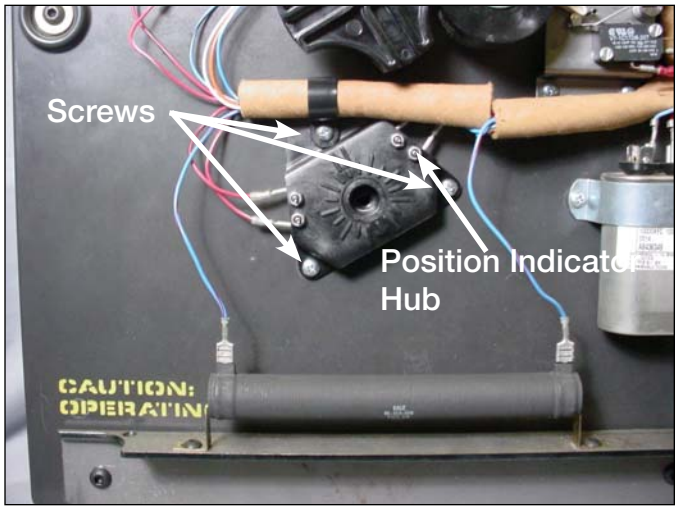

Figure 10.
Position Indicator Hub.

3. Remove the tapping indicator position lob pointer from the tap changer. The lob may have to be pried a little to be removed. See Figure 11.

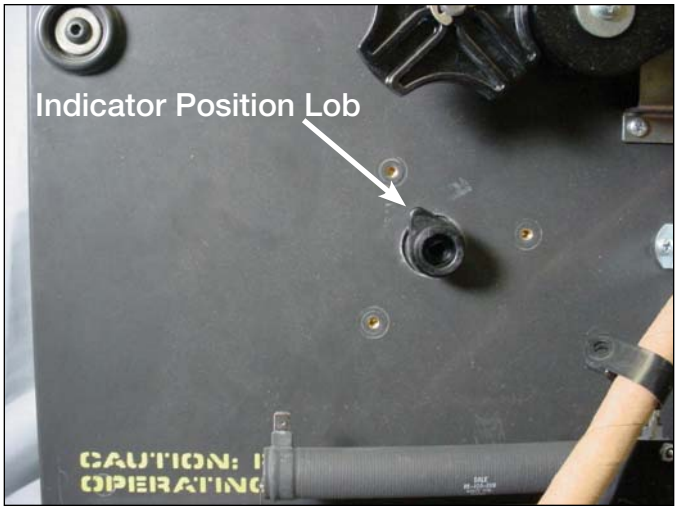

Figure 11.
Indicator Position Lob.

4. Disconnect and remove the blue and red strip leads from the 40-ohm resistor. These connections are push-on connection. See Figure 12.

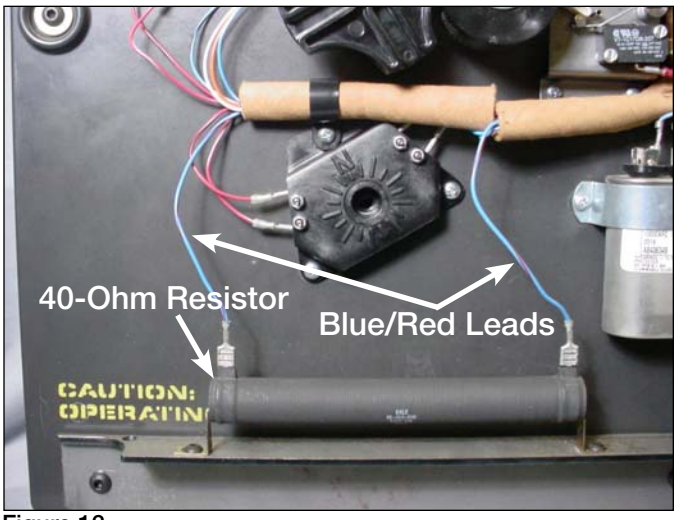

Figure 12.
40 Ohm Resistor Connections.

5. Lay the tap changer assembly flat on a work surface with the tap contact studs down on the surface.
6. Using a 5/32 Allen wrench loosen and remove the two pan head Allen screws from the tap changer-mounting bracket. See Figure 13.

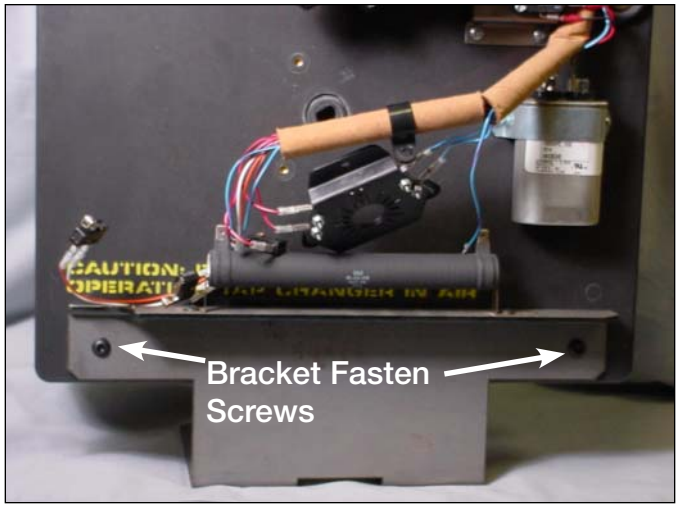

Figure 13.
Tap Changer Bracket Mounting.

7. Use a 5/32 Allen wrench to loosen and remove the pan head Allen screws fastening the front drive assembly section and the contact panel assembly section together. See Figure 14.

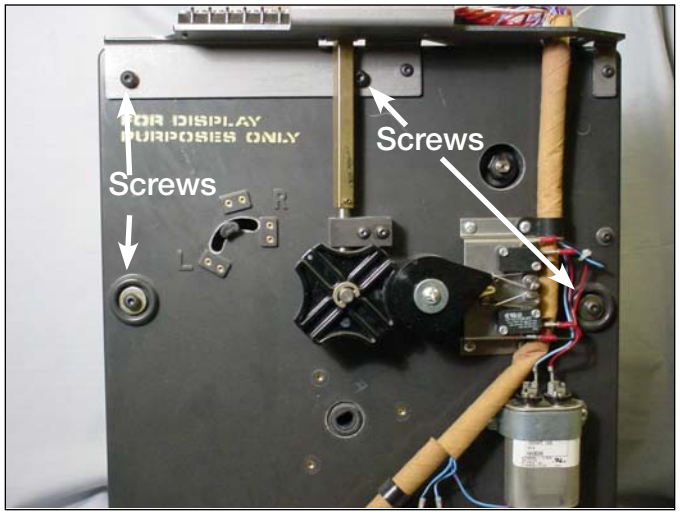

Figure 14.
Drive Panel and Contact Panel Fastening.

8. Lift the front drive assembly off of the contact assembly and set aside. See Figure 15.

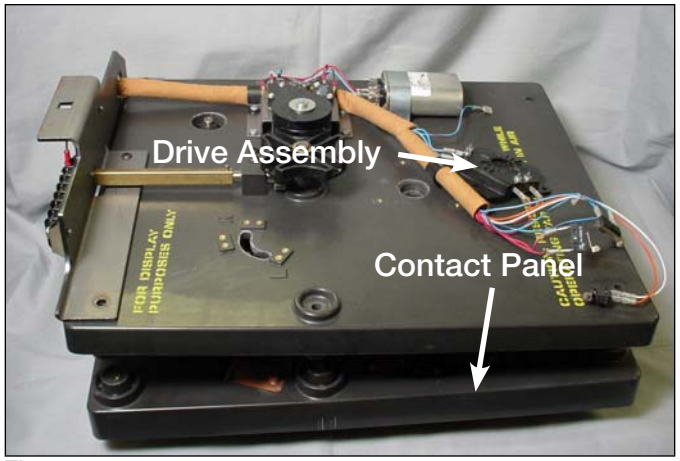

Figure 15.
Tap Changer Sections.

REVERSING STATIONARY CONTACT REMOVAL AND RE-ASSEMBLY

1. The main movable stationary contact must be located on the neutral stationary contact located under the reversing movable contact arm. The reversing movable contact buttons must be located in the center space between the VR and VL stationary contacts. See Figure 16.

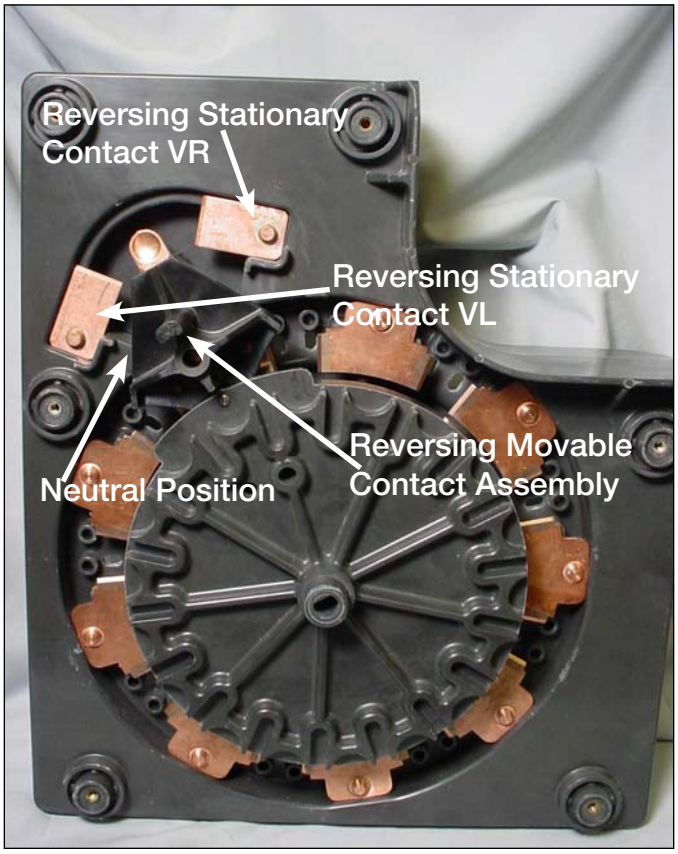

Figure 16.
Reversing Stationary and Reversing Movable.

2. If not, by hand rotate the main movable contact assembly so that statement in step one is true.
3. The VR and VL stationary contact are reversible, or one can be use for the other.
4. Using a 9/16 wrench, or 9/16 socket and ratchet loosen and remove the nut, external lock washer, and flat wash for the VR and/or VL stationary contact. See Figure 17.

Figure 17.
VL and VR Fastening Hardware.

5. Push the stationary contact stud through the contact panel removing the stationary contact from the contact panel. See Figure 18.
6. Place stationary contacts in either VR or VL position or both. See Figure 18.

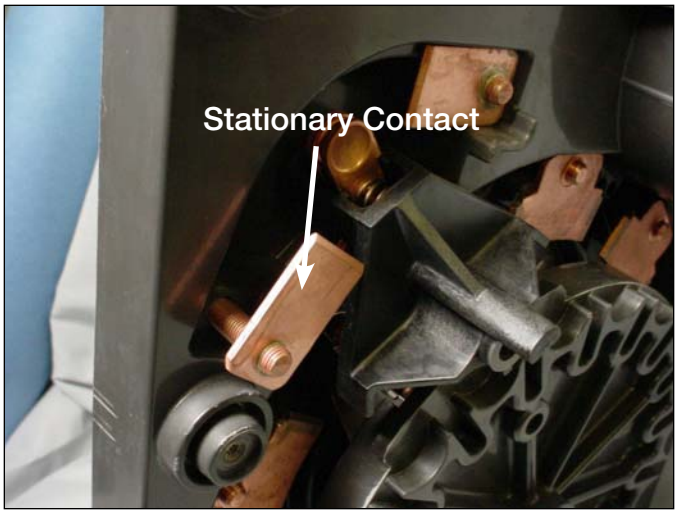

Figure 18.
Stationary Contact Removal.

7. Place a flat brass washer, external tooth lock washer, and nut on the stationary contact stud. Tighten and torque to 90 to 110 in-pounds torque (10.168-12.428 Nm).

TAP CHANGER RE-ASSEMBLY

1. Lay the contact panel assembly section flat on a table surface. See Figure 19.

Figure 19.
Stationary Contact Panel Assembly.

2. Place and align the tap changer drive assembly section on top of the contact panel assembly. See Figure 20.

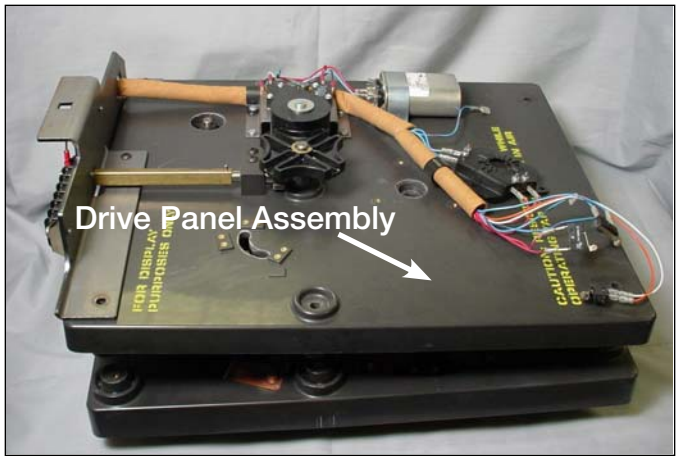

Figure 20.
Tap Changer Sections.

3. Align the center hub of the main movable contact assembly with the center hole in the tap changer drive assembly. See Figures 21 & 22.

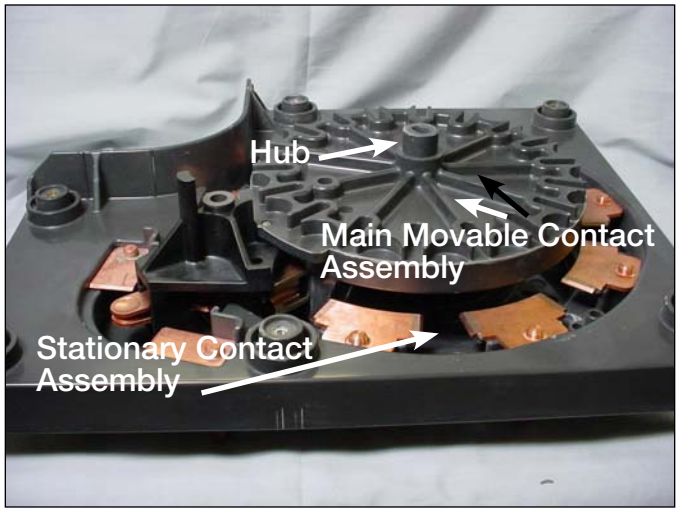

Figure 21.
Contact Assembly and Main Movable Contacts.

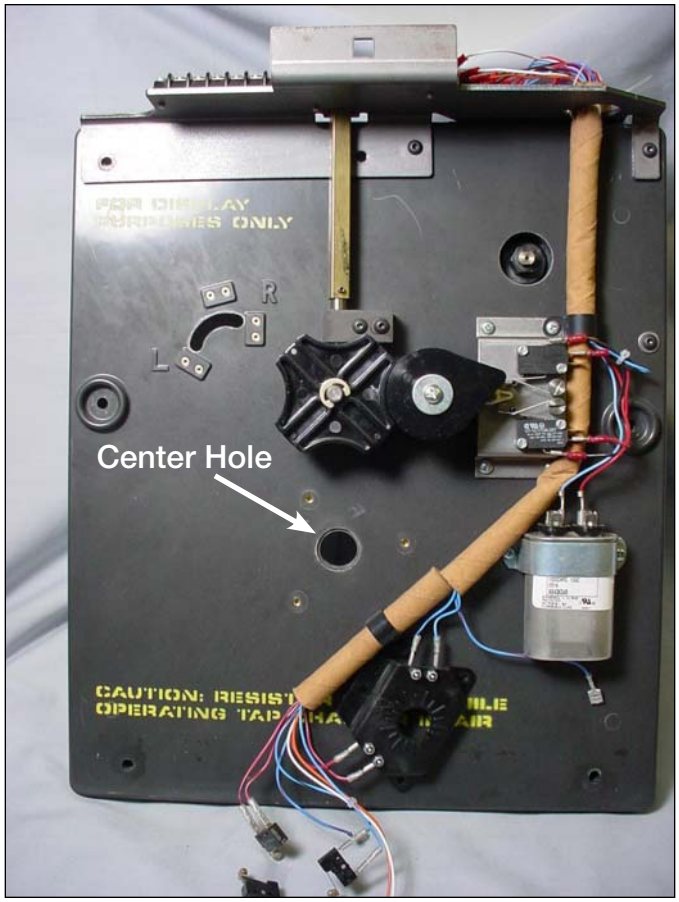

Figure 22.
Drive Assembly Panel.

4. Press both of the tap changer assembly sections together and stand up-right. See Figure 23.

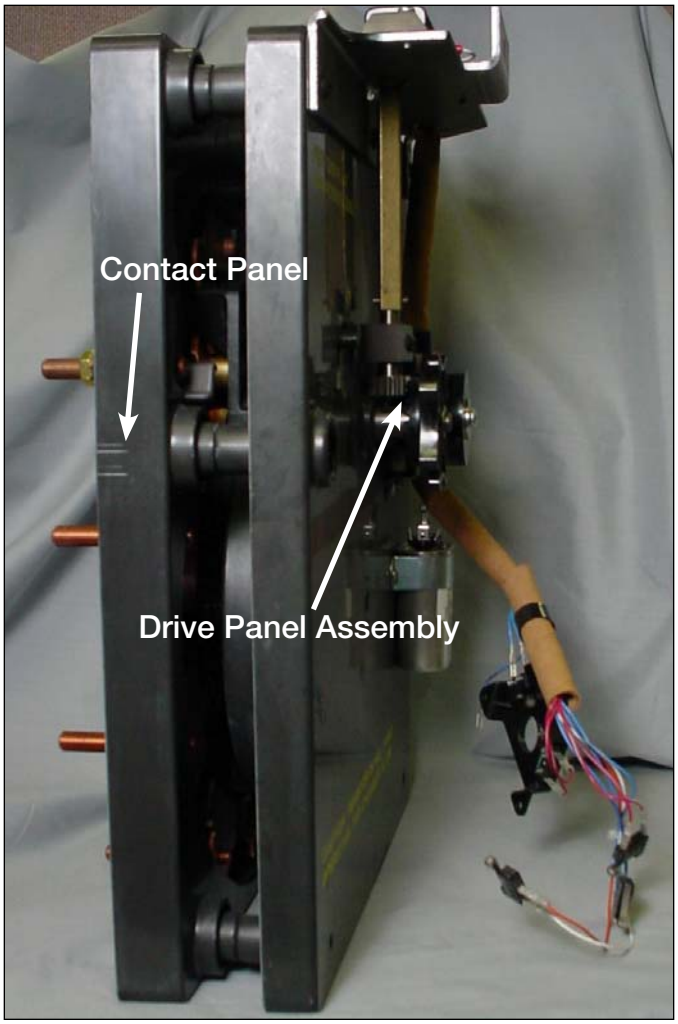

Figure 23.
View of Panel Assembly.

5. Insert four pan head Allen screws into the tap changer assemblies. Two screws will mount the two tap changer assemblies and the terminal block bracket at the top of the tap changer. The other two screws are inserted in the mounting holes along both side centers of the tap changer. See Figure 24.

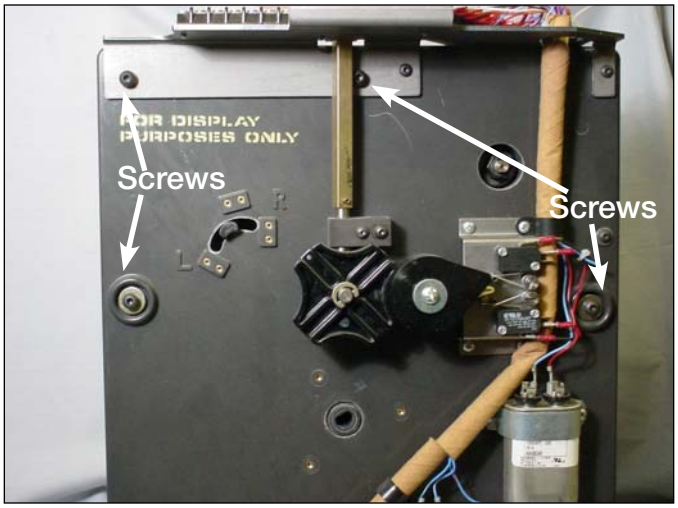

Figure 24.
Panel Assembly Fastening.

6. Place the mounting bracket, see Figure 25, to the base of the tap changer assembly and fasten with two pan head hex screw and tighten with a 5/32 Allen Wrench. See Figure 26.

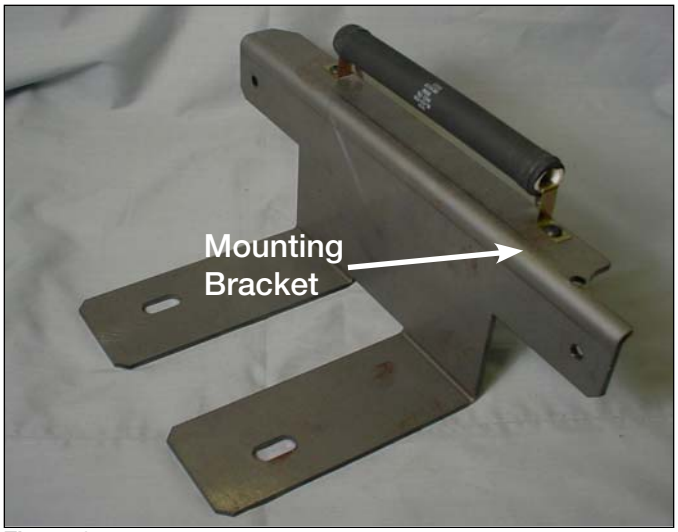

Figure 25.
Tap Changer Mounting Bracket.

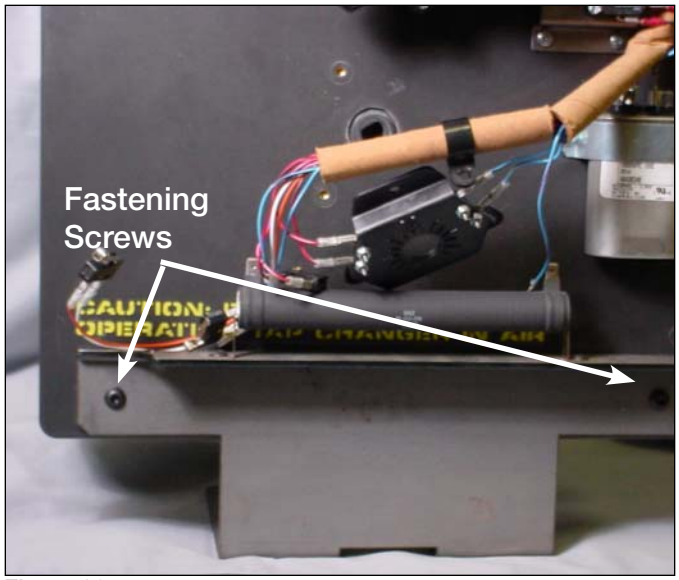

Figure 26.
Bracket Fastening.

7. Place the neutral position pointer lobe, see Figure 27, into the main movable contact hub located in the lower front center of the drive assembly panel. See Figure 28.

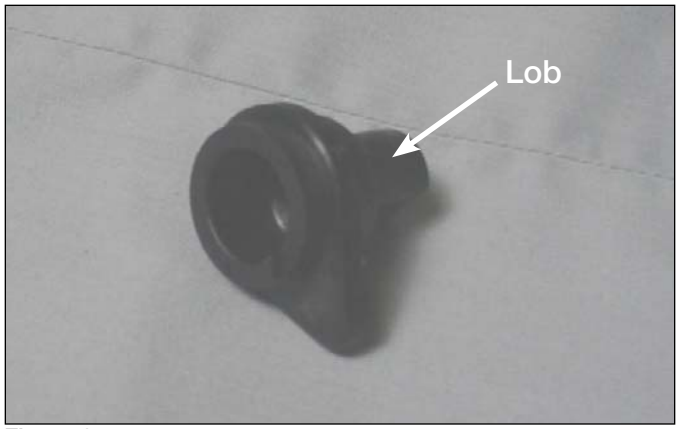

Figure 27.
Position Indicator Lob.

Figure 28.
Lob Placement.

8. Fasten the tap position switch assembly to the front of the drive panel assembly with three pan head Phillip screws. See Figure 29.
9. Fasten the tap position switch assembly to the front of the drive panel assembly with three pan head Phillip screws. See Figure 29.

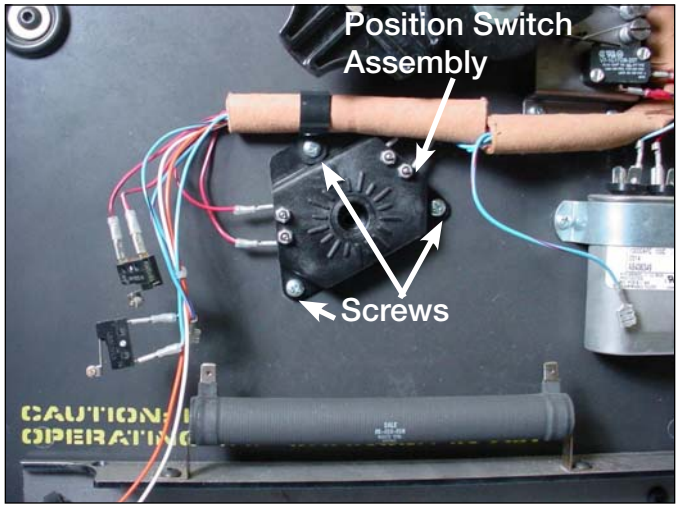

Figure 29.
Position Switch Assembly.

10. Position the position actuator arm between the center position and L by rotating the pinion counter clockwise. See Figure 30. This will allow for mounting the micro switches without interference with the micro switch arms.

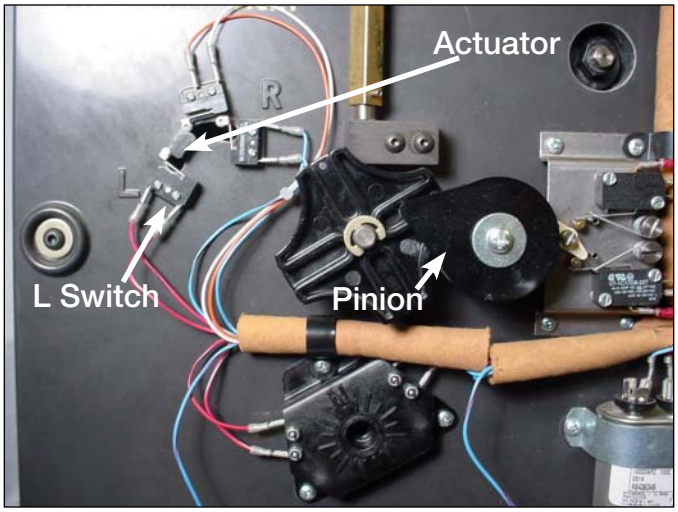

Figure 30.
Switch Actuator Position.

11. Place and fasten the reversing logic and neutral logic micro switches on the upper left of the drive assembly panel. The micro switch with a blue/white striped wire and blue/black striped wire is located on the R position. The micro switch with a red/white striped wire and red/black striped wire is located on the L position. The micro switch with an orange wire and a white wire is located on the center position between the R and L position. See Figure 31.

12. Rotate the pinion back clockwise until the arm in Figure 31 is in the center and the neutral switch is depressed.

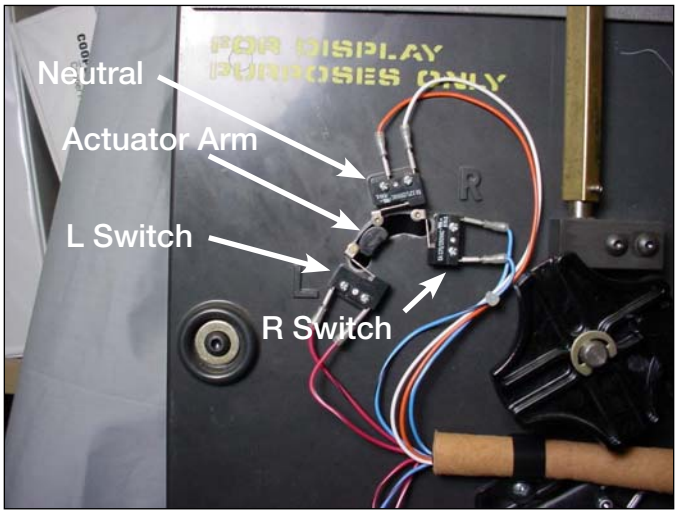

Figure 31.
Logic Switch Positioning.

13. Connect the blue wires with red strips to the 40 ohm resistor by pushing the female connector onto the resistor terminals. See Figure 32.

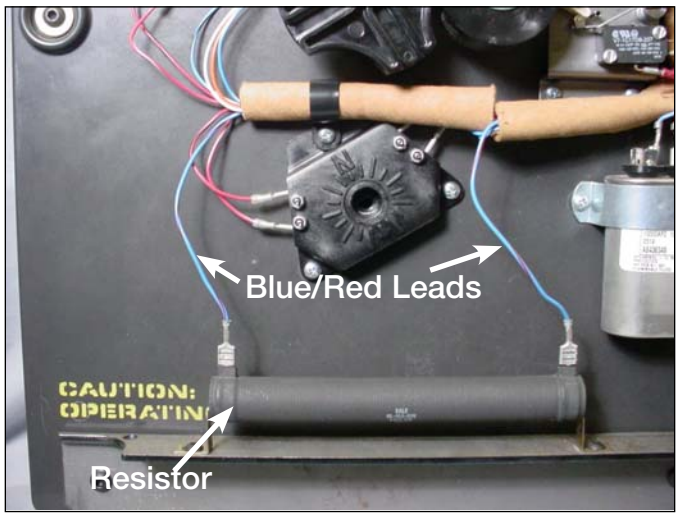

Figure 32.
Resistor Connections.

14. Check and set the tap changer for neutral position. The tap changer can be set for any tap position by rotating the pinion cam in either the clockwise or counter clockwise direction. For neutral position the reversing logic switch actuator must be in the center with the neutral switch arm depressed. The tap position lob must have the pointer pointing at N. The pinion cam point is pointing at the three o'clock position over the holding switch lever arm. The holding switch is open. See Figure 33.

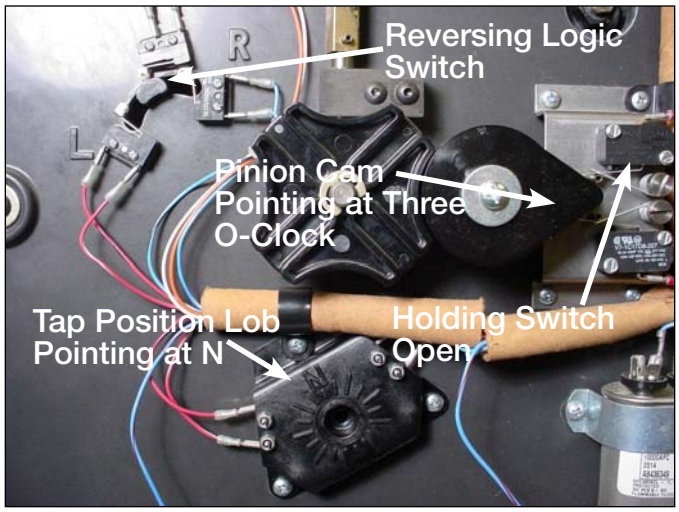

Figure 33.
Neutral Position.

RE-ASSEMBLY OF TAP CHANGER TO VOLTAGE REGULATOR ASSEMBLY

1. Once the tap changer has been re-assembled, reverse the process in the procedure titled "Tap Changer Removal from Voltage Regulator" at the beginning of this installation instruction.

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