



CLASS 8110 TYPE V3540E MEDIUM VOLTAGE VACUUM CONTACTOR

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PRECAUTIONS

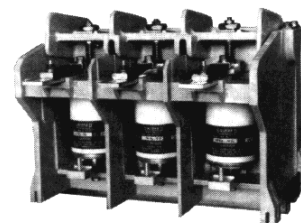
DANGER
HAZARD OF ELECTRICAL SHOCK OR BURN
POWER MUST BE DISCONNECTED FROM THE CONTROLLER AND CONTACTOR PRIOR TO PERFORMING ANY INSTALLATION OR MAINTENANCE. THE EQUIPMENT HAS BEEN DESIGNED TO PERMIT MAINTENANCE AND/OR TESTING ON THOSE COMPONENTS THAT ARE DISCONNECTED FROM THE MAIN POWER. WHEN PERFORMING THIS WORK, EXTREME CAUTION MUST BE EXERCISED IN VIEW OF THE PRESENCE OF HAZARDOUS VOLTAGE.

Medium voltage controllers are provided with many safety features. Nevertheless, they control power circuits with high voltage and high fault capacity which can result in a risk of severe electrical shock or burn. The following list of "PRECAUTIONS" must be studied and followed during installation, operation and servicing of the equipment.

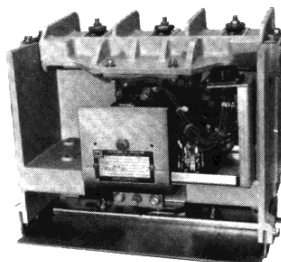
1. Read this service bulletin prior to installing or operating the equipment.
2. If motor controllers and/or contactors are to be stored prior to installation, they must be protected from the weather and be kept free of condensation and dust.
3. Use extreme care when moving or positioning contactors (even if crated) as they contain devices and mechanisms which may be damaged by rough handling.
4. Be sure all barriers are in place before operating controllers.
5. Only *authorized personnel* should be permitted to operate or service the contactors and controllers.

INTRODUCTION

This manual covers the description, installation, operation and maintenance of Square D Class 8110



Rear View



Front View

Type V3540E vacuum contactors. These instructions apply primarily to contactors as used with controllers. For other applications contact your local Square D representative.

NOTE: READ ALL INSTRUCTIONS BEFORE WORKING ON THIS EQUIPMENT.

GENERAL DESCRIPTION

The Class 8110 Type V3540E contactor is a three pole device available only in a bolted design. The contactor is rated at 5,000 volts, 360 amperes (enclosed), 60 KV BIL, with an interrupting rating of 6,000 amperes symmetrical.

The basic contactor contains three vacuum bottles, dc operating coil with rectifier circuit and auxiliary contacts. This basic contactor is used as the main (M) contactor on:

- Full voltage, non-reversing controllers
- Reduced voltage, autotransformer controllers
- Wound rotor motor controllers

The device is also used as the start (S) and run (R) contactors on reduced voltage, primary reactor controllers.

Two contactors (2 pole or 3 pole) can be mechanically interlocked in a horizontal arrangement by changing the slider mechanism of each contactor.

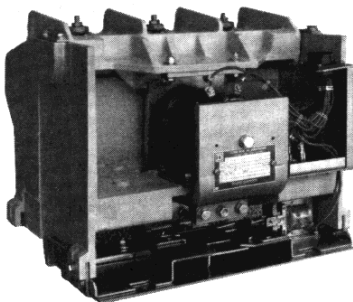
Three pole mechanically interlocked devices are used as forward (F) and reverse (R) contactors on full voltage reversing controllers; and two pole mechanically interlocked devices are used as start (S) and run (R) contactors on reduced voltage autotransformer controllers.

A mechanical latching mechanism may be added to a basic contactor to lock the contactor closed. The Class 8110 Type V3540M mechanically latched contactor is used primarily for:

Transformer feeder circuits

Transfer schemes

Applications where it is desirable to have the contactor remain closed, should the voltage dip or fail.



Class 8110 Type V3540M mechanically latched contactor.
Electrical release solenoid mounted on right side
of latching mechanism is optional

NOTE: The basic Type V3540E vacuum contactor assembly for Model 3 Series B Class 8198 and Class 8196 controllers are the same and can be interchanged with no modifications required.

Class 8110 Type V3540E vacuum contactors are interchangeable with Class 8110 Type A3540E air break contactors after completing appropriate controller modifications. Refer to POWER FUSE COORDINATION section in the appropriate controller service bulletin for further information.

UNCRATING

When supplied for use with Class 8196 and Class 8198 controllers, the Class 8110 contactor is shipped installed in the controller section. If the contactor is installed in the controller section, proceed with the steps outlined under "Inspection". However, some contactors (i.e. spare contactors) are shipped separately. In these cases, the following steps should be taken.

1. Check packing list against the order to make sure shipment is complete and the correct components are received.
2. Examine shipping crate before unpacking the contactor to make sure it has not been damaged in transit. If shipping crate is damaged, pay particular attention when unpacking to see if contents are also damaged. Notify carrier if damage is found. Also, notify your local Square D field sales office of damage.

3. Take care when unpacking not to damage contents by inserting tools into crates. Use a nail puller and wire cutter. Do not insert pry bar in crate to force open.

INSPECTION

1. Check the contactor visually for good condition. Inspect all parts for secure mounting and good electrical connections.
2. Check to be sure that the armature assembly operates freely. (Refer to CONTACTOR OPERATION section.)
3. Check to be sure that all connections are secure.
4. Inspect control circuit receptacle for possible damage.

CAUTION

DO NOT USE CONTACTOR LINE BUS TO MOVE OR LIFT CONTACTOR. LIFTING BY BUS MAY CAUSE MISALIGNMENT.

MAKE SURE, FOLLOWING ANY INSPECTION, THAT ALL CONNECTIONS ARE TIGHT. ALSO, MAKE SURE VACUUM BOTTLE ASSEMBLIES ARE NOT DAMAGED AND ARE PROPERLY INSTALLED BEFORE ENERGIZING THE CONTACTOR.

ROUTINE INSPECTION

The contactor should be inspected at intervals determined by the service conditions. Ensure that surfaces of the molded parts are clean to prevent tracking.

NOTE: If problem is found during inspection, repairs should be made immediately.

CONTACTOR OPERATION

For maintenance or test purposes the contactor can be operated either manually per instructions listed in Manual Contactor Operation section, or electrically by connecting a separate 120V ac source of control power to the contactor through use of contactor test cord (Square D part number 51034-241-50).

INSTALLATION

Check that contactor nameplate information (class, type and form) matches contactor information on label located on inside of controller medium voltage compartment door.

Follow contactor installation instructions which are found in the controller service bulletin.

MAINTENANCE AND TESTING

DANGER
HAZARD OF ELECTRICAL SHOCK OR BURN
 ALL POWER SHOULD BE DISCONNECTED FROM THE CONTROLLER EQUIPMENT PRIOR TO PERFORMING ANY TROUBLESHOOTING OR MAINTENANCE WORK ON THE CONTACTOR. HOWEVER, THE EQUIPMENT HAS BEEN DESIGNED TO PERMIT MAINTENANCE AND/OR TESTING ON THE CONTACTOR AFTER IT HAS BEEN ISOLATED FROM THE MAIN POWER. WHEN PERFORMING THIS WORK, *EXTREME CAUTION* MUST BE EXERCISED IN VIEW OF THE PRESENCE OF HAZARDOUS VOLTAGE.

1. CLEANING

Clean all dirt from the contactor. Pay particular attention to molded parts and tracking surfaces. Foreign materials on these surfaces should be removed.

2. CONTACT TIP GAP MEASUREMENT

The contact tip gap measurement must be taken with the contactor fully closed. The armature plate must be positioned against the magnet frame for the contactor to be fully closed. (Refer to CONTACTOR OPERATION section.)

Measure gap from bottom of gap adjustment nut (A) (see Figure 1) to the top of metal pivot plate (B). DO NOT CHANGE ADJUSTMENT OF NUT. This measurement must be .035 inches minimum. If measurement is less than .035 inches, the contact tips have worn beyond acceptable tolerances and a new bottle assembly is required.

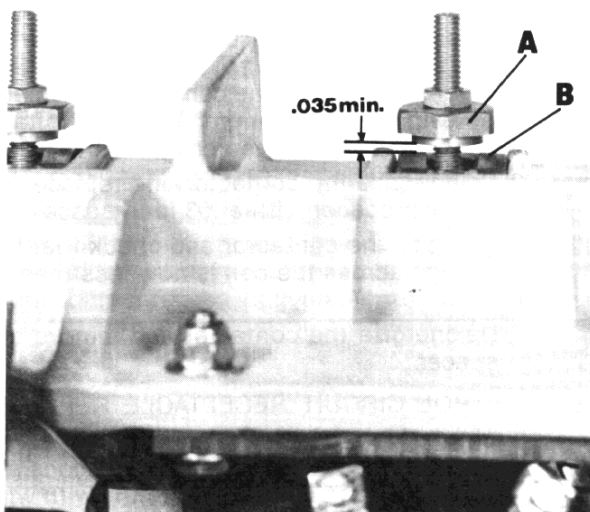


FIGURE 1

3. MAGNET COIL REPLACEMENT

NOTE: Coil resistance may be measured to determine if the coil is defective. Under normal operating conditions the coil resistance will vary from 19 to

30 ohms. If the coil measures open or less than 19 ohms, it is defective and must be replaced. If coil resistance exceeds 30 ohms and the coil is hot, overheating is indicated. Refer to TROUBLESHOOTING chart.

Disconnect coil wires from the coil. Remove bolt (A) (See Figure 2) from magnet frame and slide magnet assembly to the left for removal of coil. (Do not remove spring washer from core.) Install new coil on magnet assembly and reinstall magnet assembly (items 33, 34 and 31) to contactor. Reattach coil wires.

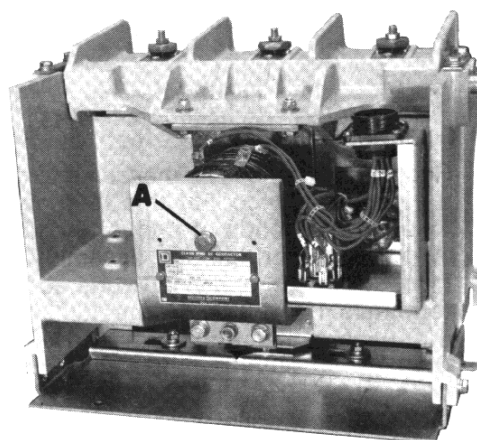


FIGURE 2

4. REACTOR/RECTIFIER/ELECTRICAL INTERLOCK REPLACEMENT

DANGER
HAZARD OF ELECTRICAL SHOCK OR BURN
 CONTACTOR CONTROL CABLE MUST BE DISCONNECTED TO PREVENT POSSIBLE BACKFEEDING OF THE CONTROL TRANSFORMER AND GENERATION OF HAZARDOUS VOLTAGE ON THE PRIMARY SIDE.

To replace these components, the contactor control assembly must be removed. Access to the control assembly mounting hardware is achieved after removing the magnet assembly (See MAGNET COIL REPLACEMENT section). Remove bolts (A) (See Figure 3) and remove control assembly from contactor. After servicing assembly, reinstall contactor control assembly. Before tightening bolts (A) ensure that operator tab (B) is centered between control assembly flanges (C) (See Figure 3).

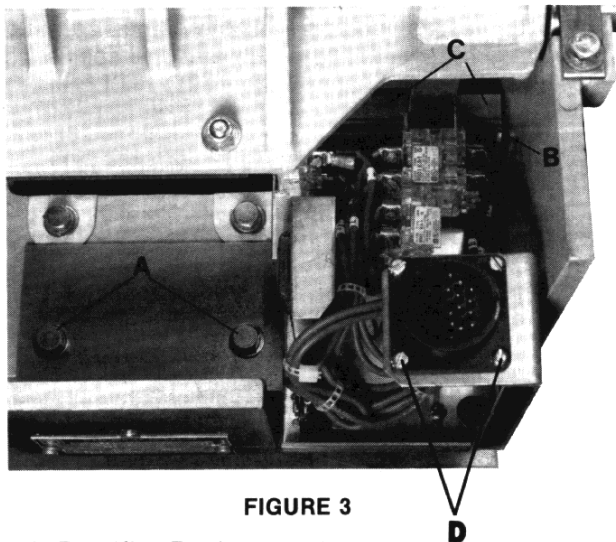


FIGURE 3

A. Rectifier Replacement

Rectifier output can be measured to determine a defective device. For this test, use tape to insulate bare ends of coil connecting leads. With contactor control assembly removed from contactor, apply 120 volts ac to control terminals 1 & 4 (See Figure 16). Measure dc output across rectifier terminals "+" and "-". Rectifier output should be 108 ± 5 volts dc if the supply voltage is 120 volts ac. (Rectifier dc output should equal 90% of ac input ± 5.0 volt dc.) If rectifier is defective, replace with a new one.

An alternate test not requiring an ac power source can be made with an ohmmeter set on the 1000 ohm scale and probes connected to rectifier terminals as follows:

POSITIVE PROBE	NEGATIVE PROBE	REQUIRED OHMIC VALUE
AC1	+	less than 100
AC1	-	infinity
AC2	+	less than 100
AC2	-	infinity
+	AC1	infinity
+	AC2	infinity
-	AC1	less than 100
-	AC2	less than 100

B. Reactor (choke) Replacement

Check reactor resistance. DC resistance should be 11 ± 3 ohms.

NOTE: The normally closed contact in parallel with the reactor must be isolated. Replace if resistance is not within these values.

C. Electrical Interlock Contact Block Replacement

To replace an electrical interlock contact block, remove the contactor control assembly. Individual contact blocks may be replaced as required. The control contact block to which the coil is connected is mounted on the left and separate from all other contact blocks. (See Figure 4.)

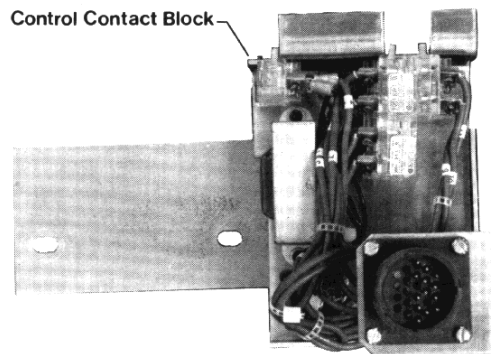


FIGURE 4

D. Control Contact Block Adjustment

After the control contact block is factory adjusted, bolt (A) (See Figure 5) is sealed with TORQ-SEAL and field adjustment is normally not required. Adjustment of the control contact block may be checked as follows:

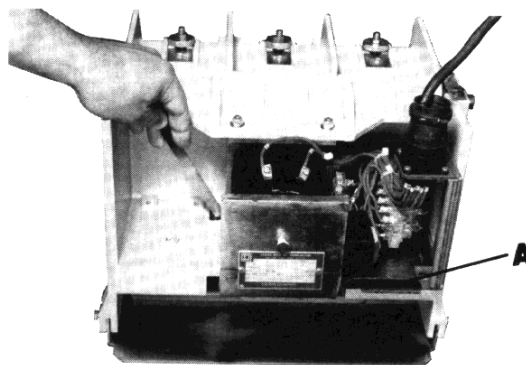


FIGURE 5

- 1) Insert a .05 inch spacer between the armature and the lower leg of magnet frame (See Figure 5). Energize the contactor and check by using a dc voltmeter that the voltage across the coil is greater than 90 volts dc.
- 2) De-energize the contactor and replace the .05 inch spacer with a .03 inch spacer.
- 3) Energize the contactor and check that the voltage across the coil is now less than 18 volts dc.
- 4) De-energize the contactor and remove the spacer.

5. CONTROL CIRCUIT RECEPTACLE REPLACEMENT

The receptacle for the control circuit plug consists of a plug housing and male contact pins with wire leads inserted from the rear. No tool is required for inserting contact pins but extraction tool (Square D Part Number 29904-08400) is required for pin removal. This tool, inserted into the receptacle from front, compresses retention springs allowing the lead and pin to be withdrawn from plug housing.

The complete receptacle can be removed from the contactor control module by removing hardware (D) (See Figure 3) and sliding receptacle out of mounting slot.

6. ARMATURE SPRING REPLACEMENT

Before removing armature spring (A) (See Figure 6), evenly loosen bolts (C) and allow spring guide bracket (D) to release spring pressure. Remove bolts (C), spring guide bracket (D) and spring (A) without disturbing spring guide bolt (B).

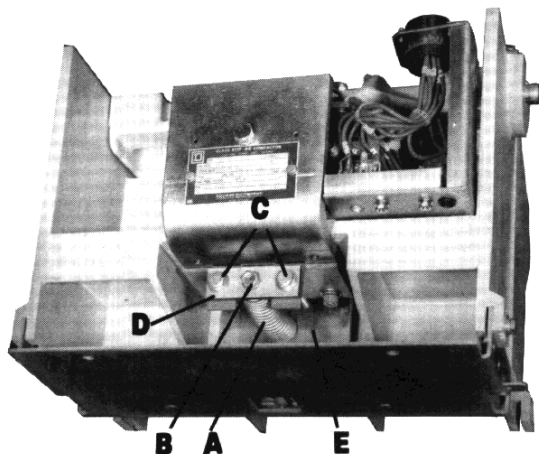


FIGURE 6

To install spring, seat the spring on guide located on armature extension (E). Position front spring guide bracket onto spring, and fasten the spring guide bracket to the spring bracket by evenly tightening bolts (C).

7. CONTACT SPRING REPLACEMENT

The vacuum bottle assembly must be removed from the contactor to replace the contact spring (item 22). Prior to removing the vacuum bottle assembly, the contact tip gap measurement (refer to MAINTENANCE, item 2) must be recorded for use when reinstalling the bottle.

Reinstallation of vacuum bottle assembly is covered in 10C below. Follow these instructions and insure that the contact tip gap measurement is adjusted to the value recorded prior to vacuum bottle assembly removal. This is to insure accuracy of future contact tip wear measurements.

8. MANUAL CONTACTOR OPERATION

To operate the contactor manually, the armature spring must be removed. (Refer to MAINTENANCE, item 6).

With the armature spring removed the contacts are closed but the armature is not sealed against the magnet frame.

To fully close the contactor and seal the armature, avoid the threaded shaft of the vacuum bottles and push down on the contactor shaft insulator (item 11). Approximately 20 pounds of force is required.

Reinstall armature spring before proceeding.

9. CONDITION OF VACUUM BOTTLE ASSEMBLIES

If contactor has been exposed to fault conditions as indicated by blown motor fuses, the following checks must be made for the vacuum bottle assemblies.

- A. Physical evidence of stress (distorted, discolored, or cracked bottles).
- B. Contact wear measurement (refer to MAINTENANCE, item 2).
- C. Dielectric test.

Remove contactor from controller to perform the inspections and tests.

DANGER
POSSIBILITY OF X-RAY EXPOSURE
PERSONNEL SHOULD BE NO CLOSER THAN 10 FEET AND PREFERABLY BEHIND A METAL BARRIER. TEST TIMES SHOULD BE KEPT TO A MINIMUM. THIS IS A PRECAUTION UNTIL SUCH TIME AS THE POSSIBLE HAZARD IS BETTER UNDERSTOOD AND STANDARDS ARE PUBLISHED.

Good vacuum bottle assemblies will withstand a 16.0 KV rms, 60 Hz test voltage for 10 seconds across the open gap.

If unit fails test, replace bottle assembly with new unit.

10. REPLACEMENT OF VACUUM BOTTLE ASSEMBLIES

Three major operations are required to replace vacuum bottle assembly. These operations are 1) removing existing bottle assembly, 2) preparing new bottle assembly for installation and 3) installing bottle assembly. Each of these operations consists of several steps which will be described below.

CAUTION

DO NOT ALLOW SHAFT OF THE VACUUM BOTTLE ASSEMBLY TO TURN. TURNING THE SHAFT WILL DAMAGE THE BOTTLE.

A. REMOVING EXISTING BOTTLE ASSEMBLY

- 1) Remove bolt and washer (A) (See Figure 7) holding flexible shunt to the contactor line bus. DO NOT REMOVE THE BOLT HOLDING THE SHUNT TO THE BOTTLE ASSEMBLY.

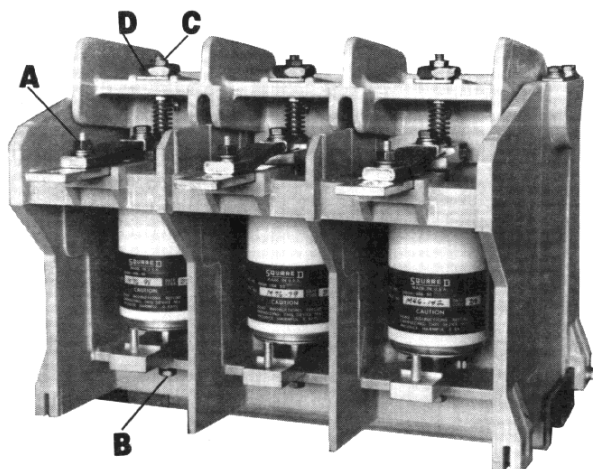


FIGURE 7

- 2) Remove bottom bolt (B) holding vacuum bottle assembly to the contactor.
- 3) Remove the lock nut (C) and gap adjustment nut (D) from the top of the bottle assembly.
- 4) Lift up on the vacuum bottle assembly. (See Figure 8) Pull out then down on the bottom portion of the bottle assembly to remove it from the contactor.

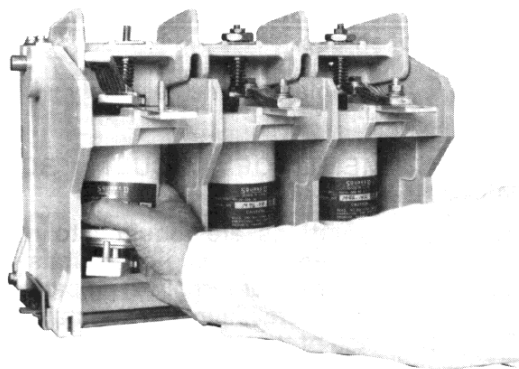


FIGURE 8

B. PREPARING NEW BOTTLE ASSEMBLY

- 1) Remove bolt and washer (A) (See Figure 9) from the bottom of the bottle assembly.
Note: This is special bolt (5/16-24 UNF-2A X 1"). Do not misplace this bolt.

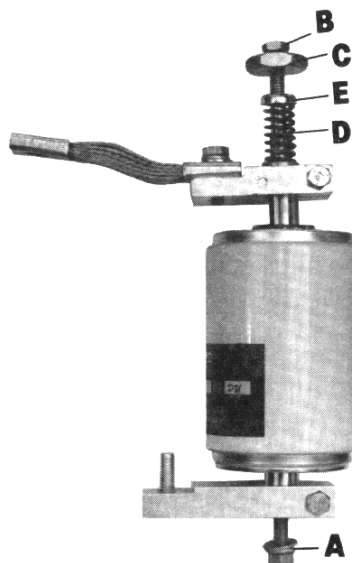


FIGURE 9

CAUTION

DO NOT ALLOW SHAFT OF THE VACUUM BOTTLE ASSEMBLY TO TURN. TURNING THE SHAFT WILL DAMAGE THE BOTTLE.

- 2) Remove the lock nut (B) and gap adjustment nut (C) from top of bottle assembly.
- 3) Do not remove spring (D) and spring cup (E) from the bottle assembly.
- 4) Bottle assembly is now ready to install in contactor.

C. INSTALLING BOTTLE ASSEMBLY

- 1) Place bottle assembly into contactor by putting top of bottle assembly behind the line bus (See Figure 10). Seat spring cup in recess at top of contactor.

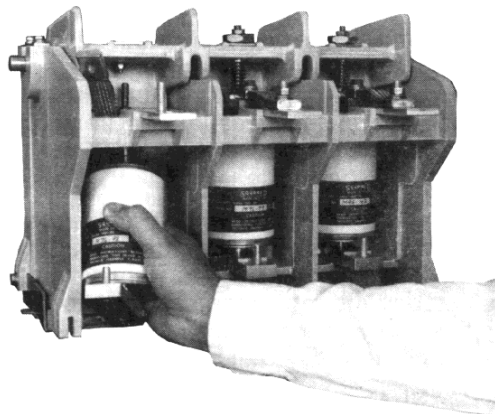


FIGURE 10

- 2) Place bottom of the bottle assembly into contactor.
- 3) Gently rotate COMPLETE ASSEMBLY until the flexible shunt lines up with the contactor line bus (See Figure 11). DO NOT ROTATE SHAFT OF BOTTLE ASSEMBLY.

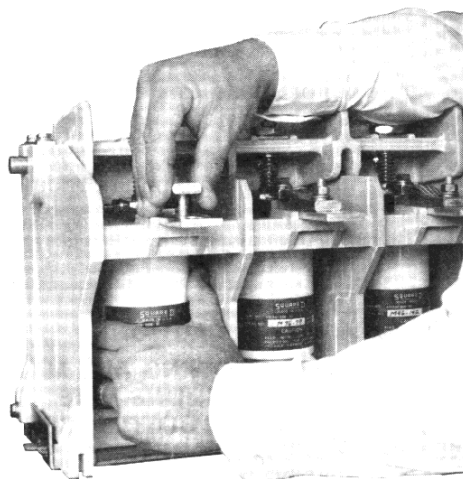


FIGURE 11

- 4) Install bolt and washer (A) connecting shunt to line bus (See Figure 12).

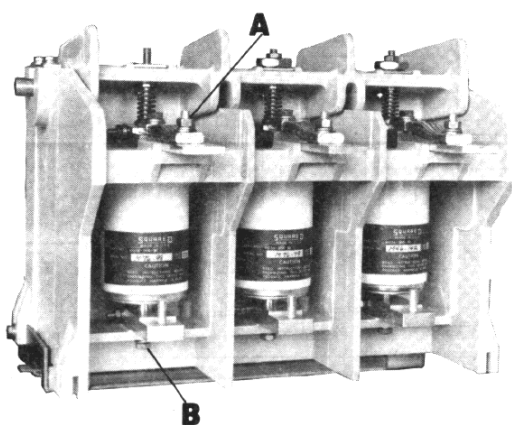


FIGURE 12

- 5) Install bolt (B) into bottom of bottle assembly (See Figure 12).
- 6) Install gap adjustment nut (A) on top of bottle assembly and turn nut until it rests about halfway down the shaft (See Figure 13). Install lock nut (B) until it rests above the adjusting nut, but not touching the adjusting nut.

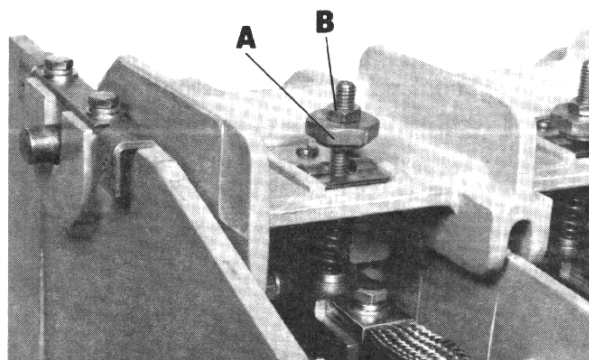


FIGURE 13

- 7) Close contactor by energizing main coil with contactor test cord (Square D part number 51034-241-50).

DANGER
HAZARD OF ELECTRICAL SHOCK
VOLTAGE IS PRESENT AT TERMINALS OF
COIL, RECTIFIER AND ELECTRICAL
INTERLOCKS.

- 8) For a new bottle assembly place .075 inch gauge (A) (See Figure 14) between contactor pivot plate (B) and gap adjustment nut (C).

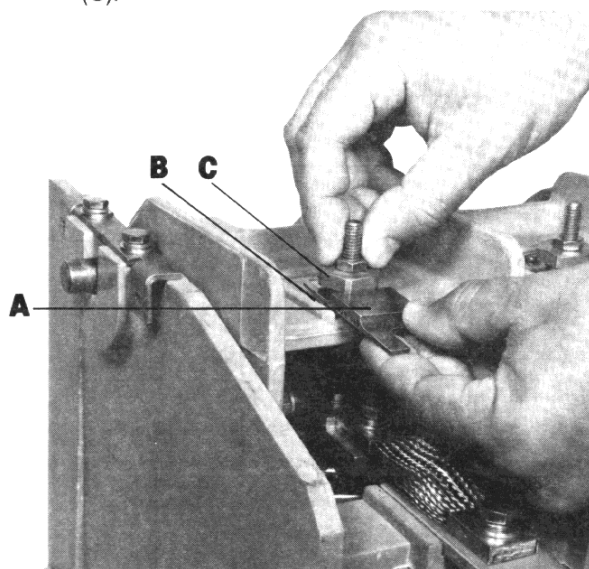


FIGURE 14

For reinstallation of a used bottle assembly insure that the contact tip gap measurement is adjusted to the value recorded prior to removal.

- 9) Tighten gap adjustment nut until it touches the gauge. DO NOT TIGHTEN OR TORQUE DOWN THIS NUT.

- 10) Hold gap adjustment nut with a wrench. Do not allow the nut and shaft to rotate. Tighten lock nut (A) down on gap adjustment nut (See Figure 15).

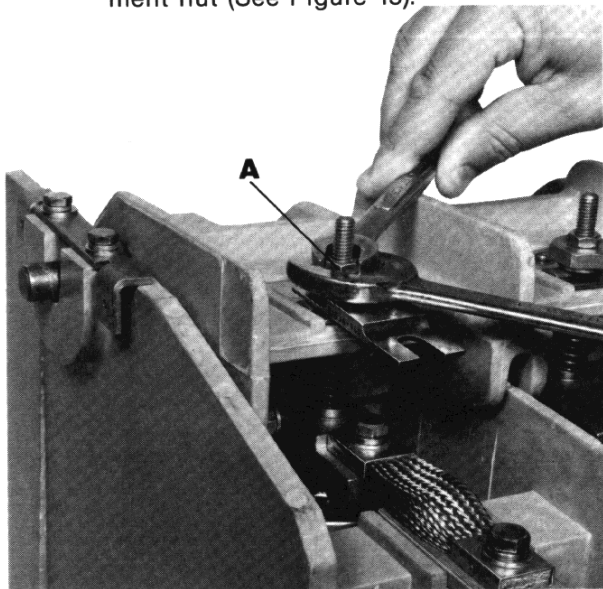


FIGURE 15

CAUTION

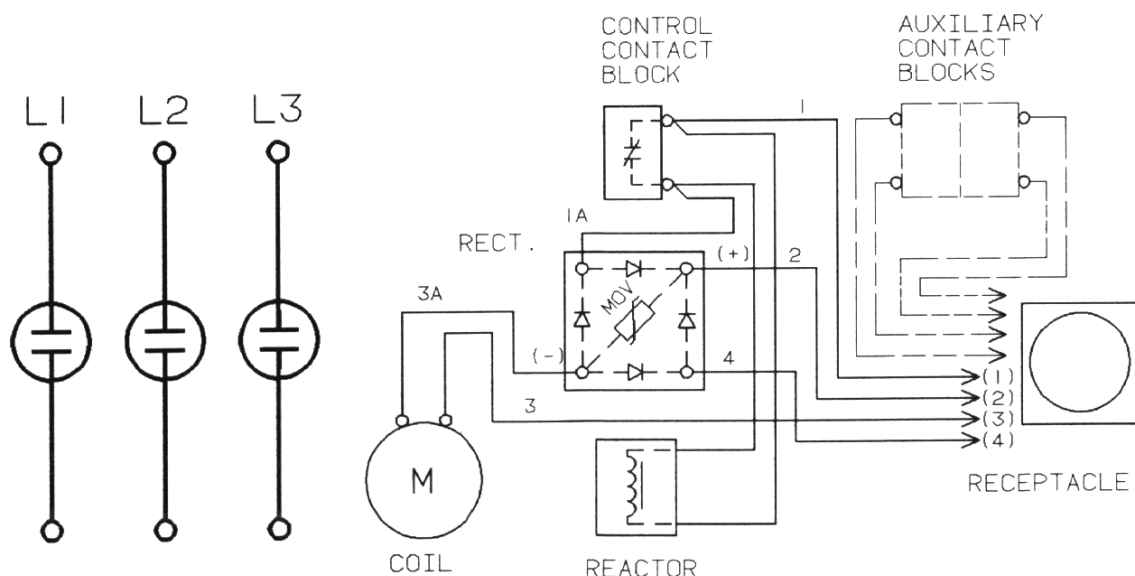
DO NOT ALLOW SHAFT OF THE VACUUM BOTTLE ASSEMBLY TO TURN. TURNING THE SHAFT WILL DAMAGE THE BOTTLE.

- 11) Remove gauge.
- 12) Open contactor by de-energizing main coil.
- 13) Do not make any adjustments to bottle assemblies not changed.
- 14) It is recommended that condition of vacuum bottle assemblies be checked as indicated in MAINTENANCE, item 9.

CAUTION

MAKE SURE, FOLLOWING ANY MAINTENANCE, THAT ALL CONNECTIONS ARE TIGHT. ALSO, MAKE SURE VACUUM BOTTLE ASSEMBLIES ARE NOT DAMAGED AND ARE PROPERLY INSTALLED BEFORE ENERGIZING CONTACTOR.

WIRING DIAGRAM



- 1) MAXIMUM OF NINE AUXILIARY CONTACT BLOCKS MAY BE INSTALLED.
- 2) PIN & WIRE NUMBERS ARE ASSIGNED BY THE FOLLOWING RULE:
 - A) N.O. BLOCKS USE PAIRS OF CONSECUTIVE, ASCENDING NUMBERS STARTING WITH #7.
 - B) N.C. BLOCKS USE PAIRS OF CONSECUTIVE, DESCENDING NUMBERS STARTING WITH #24.
- 3) SEE CONTROLLER W/D FOR AUXILIARY CONTACT BLOCK CONFIGURATION.

FIGURE 16

TROUBLESHOOTING

DANGER
HAZARD OF ELECTRICAL SHOCK OR BURN

ALL POWER SHOULD BE DISCONNECTED FROM THE CONTROLLER EQUIPMENT PRIOR TO PERFORMING ANY TROUBLESHOOTING OR MAINTENANCE WORK ON THE CONTACTOR. HOWEVER, THE EQUIPMENT HAS BEEN DESIGNED TO PERMIT MAINTENANCE AND/OR TESTING ON THE CONTACTOR AFTER IT HAS BEEN ISOLATED FROM THE MAIN POWER. WHEN PERFORMING THIS WORK, EXTREME CAUTION MUST BE EXERCISED IN VIEW OF THE PRESENCE OF HAZARDOUS VOLTAGE.

Since many operating problems are traced to loose circuit connections, wiring and the control circuit receptacle should be inspected before proceeding.

If a separate source of 120V ac control power is available, troubleshooting can be performed using either the contactor control circuit receptacle and a contactor test cord (Square D part number 51034-241-50) or the controller service plug supplied on some controllers (refer to controller service bulletin). When either is used, the control transformer is disconnected from the control voltage. **DANGER — If separate control power is applied to the contactor by other means, the control cable must be disconnected from contactor to prevent possible backfeeding of the control transformer and generation of hazardous voltage on the primary side.**

TROUBLESHOOTING CHART

TROUBLE	POSSIBLE CAUSE	ACTION
Contactor does not close	1) Low control voltage 2) External control interlock open 3) Interference with mechanical interlocks 4) Control rectifier defective 5) Operating coil defective 6) Control electrical interlock defective or out of adjustment	1) Check that voltage to control terminals 1 & 4 is 102 to 120V ac (See Figure 16). Refer to controller service bulletin TROUBLESHOOTING section if control voltage is low 2) Check that voltage at terminals 2 & 3 is zero V dc (See Figure 16). Refer to controller service bulletin TROUBLESHOOTING section if voltage is present 3) Refer to controller service bulletin Interlock Check section and check mechanical interlocks 4) Refer to MAINTENANCE, item 4, and check control rectifier 5) Refer to MAINTENANCE, item 3, and check operating coil 6) Refer to MAINTENANCE, item 4, and check control interlock
Magnet/armature chatters	1) Low control voltage 2) Control electrical interlock out of adjustment 3) Reactor defective 4) Operating coil defective	1) Check that voltage to control terminals 1 & 4 is 102 to 120V ac (See Figure 16). Refer to controller service bulletin TROUBLESHOOTING section if control voltage is low 2) Refer to MAINTENANCE, item 4, and check control interlock 3) Refer to MAINTENANCE, item 4, and check reactor 4) Refer to MAINTENANCE, item 3, and check operating coil
Sluggish contactor operation	1) Low control voltage 2) Operating coil hot 3) Contactor moving parts binding 4) Vacuum bottle assembly out of adjustment or defective	1) Check that voltage to control terminals 1 & 4 is 102 to 120V ac (See Figure 16). Refer to controller service bulletin TROUBLESHOOTING section if control voltage is low 2) See "operating coil hot" below 3) Refer to MAINTENANCE, item 8, and check mechanical operation of contactor for free opening and closing 4) Refer to MAINTENANCE, item 9, and check vacuum bottle assemblies
Operating coil hot	1) Control electrical interlock out of adjustment 2) Reactor defective 3) Operating coil defective	1) Refer to MAINTENANCE, item 4, and check control interlock 2) Refer to MAINTENANCE, item 4, and check reactor 3) Refer to MAINTENANCE, item 3, and check operating coil
Vacuum bottle assembly and/or associated power connectors overheat	1) Contact spring defective 2) Loose connections 3) Vacuum bottle assembly defective	1) Check contact spring. If broken, refer to MAINTENANCE, item 7 2) Check and tighten as necessary 3) Refer to MAINTENANCE, item 9, and check vacuum bottle assemblies

CLASS 8110 TYPE V3540B VACUUM CONTACTOR PARTS LIST

Item No.	Part Number	Description	Item No.	Part Number	Description
† 1		5/16 - 18 Jam Nut	37	22903-25480	3/8 - 24 x 1 1/2 Set Screw
2	51034-036-01	Gap Adjustment Nut	†38		3/8 - 18 x 1 1/4 Hex Head Screw
3	51034-238-50	Line Bus	39	51034-231-01	C.C.C. Operator
4	23903-32002	5/16 Spring Washer	40	51034-234-01	Armature Stop
† 5		5/16 Lock Washer	41	50502-602-31	Armature Spring
† 6		5/16 Plain Washer	42	51034-227-50	Spring Bracket
7	23201-00200	5/16 - 20 Nylok Nut	43	51034-228-01	Spring Guide
† 8		5/16 Plain Washer	†44		5/16 Lock Washer
9	51034-038-01	Pivot Plate	†45		1/4 - 20 x 3/4 Hex Head Screw
†10		#10 - 32 x 1 Hex Head Screw	†46		3/16 - 24 x 1 Cap Screw
11	51034-002-50	Shaft Insulator	†47		3/16 - 18 x 2 1/2 Hex Head Screw
12	51034-219-50	Mounting Base	48a	51034-218-50	Control Assembly for Basic Contactor (Includes items 50 thru 55)
†13		1/4 - 20 x 3/4 Hex Head Screw	48b	51034-218-51	Control Assembly for Mechanically Latched Contactor (Includes items 51 thru 54)
†14		5/16 Lock Washer	49	52911-064-50	Reactor
15	51034-035-01	Bearing Retainer	50	27907-34101	Rectifier
16	51034-001-50	Contactor Frame	51	25410-03738	Plug Housing
†17		#10 Plain Washer	52	25410-06089	Male Contact Pin
18	23201-00170	#10 - 32 Nylok Nut	53	51034-239-50	MOV Assembly
19	23002-54000	Bearing	54	9001 KA5	Control Contact Block
†20		3/16 - 18 Hex Nut	55a	51034-240-50	N.O. Electrical Interlock Contact Block Assembly (Includes 9001 KA2 contact block, wire and male contact pins, item 53)
21	51034-039-01	Spring Cup	55b	51034-240-51	N.C. Electrical Interlock Contact Block Assembly (Includes 9001 KA3 contact block, wire and male contact pins, item 53)
22	50502-601-42	Contact Spring	56	51034-212-61	Mechanical Latch Attachment (Includes item 57)
23	51034-217-50	Vacuum Bottle Assembly	57	50502-651-07	Extension Spring
†24		3/16 - 18 x 1 1/4 Hex Head Screw	58	52927-127-01	S-Hook
†25		1/4 - 28 x 3/4 Hex Head Screw	†59		3/8 x 1 Cotter Pin
†26		3/16 - 18 x 1 1/4 Hex Head Screw	60		Electric Release Solenoid (Refer to wiring diagram supplied with specific equipment.)
†27		3/16 - 18 x 1 Hex Head Screw	†61		#6 Plain Washer
28	51034-232-01	Armature Plate	†62		#6 Lock Washer
†29		1/4 - 20 x 1 1/4 Hex Head Screw	†63		#6 - 32 Hex Nut
30	51034-233-01	Roller Angle			
31	51034-230-01	Magnet Core			
32	23002-21600	Bearing			
33	51034-059-50	Coil			
34	51020-041-01	Spring Washer			
35	51034-229-01	Magnet Frame			
†36		3/8 - 24 Jam Nut			

† Standard hardware, listed without a Square D part number, should be obtained from a local hardware supplier.

