Instructions for Replacing Vacuum Bottle Subassemblies on Type SJA, SJS and SJO 360 Amp Contactors

This I.L. includes illustrations and instructions for replacing vacuum bottle subassemblies on 360 Amp SJS, SJA and SJO contactors (Pages 2 and 3), and on 720 Amp SJA and SJO contactors (Pages 4 and 5). Each replacement kit listed in Table 1 includes three vacuum bottle subassemblies complete with shunts and load terminals, as it is required that all bottle subassemblies on a contactor be replaced at the same time. Please refer to the appropriate section of this I.L. for the replacement kit being installed.

CONTACTOR OPERATION

Type SJ contactors have their main contacts sealed inside ceramic tubes from which all air has been evacuated, i.e., the contacts are in vacuum. No arcboxes are required, because any arc formed between opening contacts in a vacuum has no ionized air to sustain it. The arc simply stops when the current goes through zero as it alternates at line frequency. The arc usually does not survive beyond the first half cycle after the contacts begin to separate. The ceramic tube with the moving and stationary contacts enclosed is called a vacuum interrupter or a bottle, and there is one such bottle for each pole of the contactor. A two pole contactor has two vacuum bottles, and a three pole contactor has three vacuum bottles. A metal bellows (like a small, circular accordion) allows the moving contact to be closed and pulled open from the outside without letting air into the vacuum chamber of the bottle.

TABLE 1 — REPLACEMENT BOTTLE SUBASSEMBLIES

<table>
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<th>Contactor</th>
<th>Type</th>
<th>Bottles Per Kit</th>
<th>Replacement Kit Part Number</th>
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<td>360 Amp</td>
<td>SJA</td>
<td>3</td>
<td>2147A47G03</td>
<td>2 &amp; 3</td>
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<td></td>
<td>SJO</td>
<td>3</td>
<td>2147A47G13</td>
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<td>SJS</td>
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<td>2147A47G13</td>
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<td>720 Amp</td>
<td>SJA</td>
<td>3</td>
<td>2147A87G03</td>
<td>4 &amp; 5</td>
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<td></td>
<td>SJO</td>
<td>3</td>
<td>2147A87G13</td>
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</table>

TOOLS REQUIRED

The following tools are needed when replacing vacuum bottle subassemblies:

1. 8 inch-long common screwdriver.
2. ½" socket wrench with driver and extension.
3. Three voltmeter meters or three low voltage test lights.
4. ½" Allen wrench.
5. ½" open-end wrench.

Fig. 1 Bottle Nut Locking/Unlocking
360 Amp vacuum bottle subassemblies provided in the replacement kits listed in Table 1 may come assembled with either of two interchangeable vacuum bottles, 5259C33 or 5259C21. These subassemblies are equivalent, and the following replacement instructions apply in either case. Due to internal force differences in these bottles, however, the kickout spring seat must be assembled differently depending on which bottles are used in the contactor. Please note that the kickout spring seat may need to be turned over, as shown in Figures 2 and 3, in order to be properly set for the bottles provided in this kit.

CAUTION: CONTACTORS MUST NOT BE ASSEMBLED WITH MIXED VACUUM BOTTLE STYLES. ALL BOTTLES IN A SINGLE UNIT MUST BE THE SAME.

To replace the vacuum bottle subassemblies proceed as follows:

0. Assemble the proper tools and sufficient vacuum bottle subassemblies to renew all poles. All bottle styles must be the same.
1. Deenergize the contactor. Remove to a workbench. Remove barriers.
2. Unbolt the shunts at the line side.
3. Remove control transformer primary fuses, if so equipped.
4. Remove the bottle nuts from the top stems, using a screwdriver, as shown in Figure 1, to unlock.
5. Remove the two 5/16” mounting bolts attaching each bottle subassembly. See Figure 2 or 3. Set bolts aside.
6. Withdraw the bottle subassemblies from the contactor chassis, pulling the bottom end out first so that the top stud clears the rear frame of the chassis. The bottle subassembly is the heavy outline shown in Figures 2 and 3.
7. The used vacuum bottle subassemblies should be destroyed. Destroying the vacuum bottles will insure that they are not later considered new and installed in another contactor.

Next, proceed to install the replacement subassemblies:

a. Loosen but do not remove the bottle bolt.
b. Preset the shunt by bending the free end in a smooth curve to touch the stud, then release.
c. Remove the bottle nuts and two flat washers from the bottle stud. Set aside.
d. Insert bottle subassemblies into chassis, putting top end in first and guiding the bottle stud into the slot in the crossbar. Check to make certain that the spring and cup washers are between the bottle and the crossbar.
e. Bolt the subassemblies into the chassis, using the 5/16” mounting bolts, two per pole.
f. Align the bottle on the bottle mounting (the bottle bolt is loose) until the stud does not rub or touch the slot in the crossbar. Tighten the bottle bolt. See Figure 2 or 3. Check alignment again to make sure it was maintained while tightening.
g. Attach shunts to line side.
h. Recheck to make sure that the bottle studs remain clear of crossbar slots. In particular, make certain that the shunts have a slight bow downward and do not push the bottle studs against the crossbar slots. If they do push the studs, loosen the shunts from the line terminals and repeat "b" before refastening.
i. Close the contactor by applying rated voltage through an extension cord from an isolated power source, using adequate care against electrical shock. The contactor can also be closed mechanically by hand, using the yoke interlock or shaft extension.
j. Install two bottle nuts, plus the two flatwashers previously removed, onto the center pole bottle stud. Both bottle nuts MUST have their threaded flanges facing UP, on TOP.
k. Turn the center pole bottle nuts clockwise until they are 0.080 ± .005 inch from the pivot plate on the crossbar. This is the OVERTRAVEL GAP setting. Lock the bottle nuts with a screwdriver inserted from the front of the frame molding, turning the screwdriver counterclockwise with the blade fitted from a notch in one bottle nut across to a notch of the other bottle nut. See Figure 1.
l. De-energize the coil and remove the extension cord.
m. Note and record the length of the kickout spring. Loosen the setscrew that locks the kickout spring adjusting screw, then loosen the kickout spring adjusting screw until the contacts on the center pole barely touch, using a volt-ohmmeter or a low voltage test light as an indicator of touch and open. Note: Whenever adjusting the kickout spring lever, put your free hand over the kickout spring as a precaution.

n. With the contactor in this position, install and adjust the bottle nuts (and spacing washers) on the two other poles so that these two poles make contact (touch) simultaneously with the center pole when checked with a volt-ohmmeter or test lamp circuit. Lock the bottle nuts with a screwdriver as before.
o. Tighten the kickout spring adjusting screw back to its original position to the original compressed length of the kickout spring. Check that the armature rests firmly against its stop on the molded frame. When a screwdriver is pushed against the bottom end of the armature in the open position, the armature must not move. If it does, the kickout spring should be tightened further to push the armature to a solid position. Re-tighten set-screw, BUT NOT TOO TIGHT.
p. Install control transformer primary fuses, BUT NOT TOO TIGHT.
q. Install all barriers removed.
Fig. 4 720 Amp Type SJA Contactor

Fig. 5 720 Amp Type SJO Contactor
720 AMP CONTACTOR VACUUM BOTTLE SUBASSEMBLY REPLACEMENT

To replace the vacuum bottle subassemblies proceed as follows:

0. Assemble the proper tools and sufficient bottle subassemblies to renew all poles. Note that all bottle subassemblies must be replaced at the same time.

1. Deenergize the contactor. Remove to a workbench. Remove the top barrier assembly (4 hex-head bolts).

2. Unbolt the shunts on the line side of the bottles.

3. Remove control transformer primary fuses.

4. Remove the hollow screw above each bottle.

5. Remove the bottle nuts from the top stems, using a screwdriver, as shown in Figure 1 to unlock. Set aside the screws, nuts and washers.

6. Remove the two 5/8” mounting bolts attaching each bottle subassembly. See Figure 4 or 5. Set bolts aside.

7. Withdraw the bottle subassemblies from the contactor chassis, pulling the bottom end out first so that the top stud clears and are captured and stored before they are lost. The bottle subassembly consists of the bottle, shunt and related hardware. See Figure 4 or 5.

8. Loosen and remove the bottle bolt that holds the copper conductor to the bottle. Retain the shim from under the copper conductor and the copper spacer.

CAUTION: At no time during the installation of the new bottle should torque be applied to the movable end of the vacuum bottle. Internal damage may result if this occurs. The used vacuum bottles should be destroyed. Destroying the vacuum bottles will assure that they are not later considered new and installed in another contactor.

Next, proceed to install the replacement subassemblies:

a. Fasten the previously removed copper conductor to the bottle with the shim between the mold frame and copper conductor and the bottle spacer between the bottle and the copper conductor. Do not tighten the bolt at this time.

b. Preset the shunt by bending the free end in a smooth curve to touch the stud, then release.

c. Install contact springs and cups onto the top stems, with cup on top, flange down.

d. Insert bottle subassemblies into chassis, putting top end in first and guiding the bottle stud into the slot in the crossbar. Check to make certain that the spring and cup are between the bottle and the crossbar.

e. Bolt the subassemblies into the chassis, using the 5/8” bolts, two per pole.

f. Align the bottle on the bottle mounting (the bottle bolt is loose) until the stud does not rub or touch the slot in the crossbar. Tighten the bottle bolt. See Figure 4. Check alignment again to make sure it was maintained while tightening.

g. Attach shunts to line side.

h. Recheck to make sure that the bottle studs remain clear of crossbar slots. In particular, make certain that the shunts have a slight bow downward and do not push the bottle studs against the crossbar slots. If they do push the studs, loosen the shunts from the line terminals and repeat "b" before re-fastening.

i. Close the contactor by applying rated voltage from an isolated power source, using adequate care against electrical shock. The contactor can also be closed mechanically by hand, using the yoke interlock.

j. Install two bottle nuts, plus the two flatwashers previously removed, onto the center pole bottle stud. Both bottle nuts MUST have their threaded flanges facing UP on TOP.

k. Turn the center pole bottle nuts clockwise until they are .120 + .005 inch from the pivot plate. This is the OVERTRAVEL GAP setting. See Figure 4 or 5. Lock the bottle nuts with a screwdriver inserted from the front of the frame molding, turning the screwdriver counterclockwise with the blade fitted from a notch in one bottle nut across to a notch of the other bottle nut. See Figure 1.

l. De-energize the coil and remove the extension cord.

m. Note and record the length of the kickout springs. Loosen the setscrew that locks the kickout spring adjusting screw, then loosen the kickout spring adjusting screw until the contacts on the center pole barely touch, using a volt-ohmmeter or a low voltage test light as an indicator of touch and open.

Note: Whenever adjusting the kickout spring lever, put your free hand over the kickout springs as a precaution.

n. With the contactor in this position, install and adjust the bottle nuts (and spacing washers) on the other poles so that these two poles make contact (touch) simultaneously with the center pole when checked with a volt-ohmmeter or test lamp circuit. Lock the bottle nuts with a screwdriver as before. Install the hollow screws through the guide bar onto the bottle studs.

o. Tighten the kickout spring adjusting screw back to its original position to the original compressed length of the kickout springs. Check that the armature rests firmly against its stop on the molded frame. When a screwdriver is pushed against the bottom end of the armature in the open position, the armature must not move. If it does, the kickout springs should be tightened further to push the armature to a solid position. Retighten setscrew, BUT NOT TOO TIGHT.

p. Install control transformer primary fuses.

q. Install the top barrier assembly.

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