Westinghouse

Type SAF-2 Operating Mechanism

for

Type F-122, 400, 600 & 800 Amp. 2 & 3 P. S. T.

and

Type F-124 600 & 1200 Amp. 2 & 3 P. S. T.

Oil Circuit Breakers

Fig. 1—Type F-122, Solenoid-Operated Breaker

Westinghouse Electric Corporation
East Pittsburgh, Pa.
Condenser bushings of high dielectric and mechanical strength. Bushings are given special treatment and finish to prevent moisture absorption.

Undervoltage release attachment (Supplied only when specified)

Mechanically trip-free mechanism

Latch checking switch (supplied only when specified)

Tripping attachment with space for 4 coils

Corrosion-resisting pins throughout

Terminal block for control wiring

**Fig. 2—Type P-124-A, 600 or 1200-Ampere, Solenoid-Operated Breaker with Tank Removed from the Breaker and Cover Removed from the Type SAF-2 Solenoid**
Fig. 3—Circuit Breaker—Oil-Type "SAP-2" Mechanism Assembly
**Installation**

Before attempting to install the breaker, ensure all necessary equipment is available and that the installation location is suitable for the intended use. Follow the manufacturer's instructions carefully to avoid damage to the breaker or the installation site.

**Handling**

When handling the breaker, ensure it is placed on a sturdy surface to avoid any damage. Be careful when lifting the breaker, as it can be heavy.

**Shipment**

When shipping the breaker, use proper packaging materials to protect it from damage during transit. Ensure the shipping company is experienced in handling equipment of this type.

**Introduction**

This breaker is designed for use in industrial and commercial applications. It is equipped with advanced features such as overcurrent protection and a high degree of reliability. The installation guide will provide step-by-step instructions to help ensure a safe and efficient installation.
Westinghouse Type SAF-2 Operating Mechanism

Fig. 6—Undervoltage Operating Assembly
8. With operation #7 completed, the main moving contact of the breaker should be \(\frac{7}{8}\)" below the lift rod end as described in I.B. 5746 or 5767.

9. Mount the control panel in a convenient location.

10. Wire the control panel to the mechanism in accordance with one of the typical diagrams Figs. 8 and 9, or in accordance with the diagram covering the complete installation. (The control panel is not wired at the factory; all wiring must be done at the time of installation.)

11. Operate the attachments to make sure they are functioning properly, as described under adjustments.

12. Apply voltage to the closing coil and check the electrical operation of the solenoid. The mechanism should operate satisfactorily with 72% of normal voltage applied, measured at the coil.

**ADJUSTMENTS**

**Mechanism Operation:**
Ref. Fig. 2.

Energizing the closing coil forces the moving core and push rod upwards against the push rod roller (located at the junction of the breaker lever links and the mechanism links). This upward force straightens the toggle formed by the breaker lever links and the mechanism links which in turn rotates the breaker lever counter-clockwise, as the trigger roller (which is fastened to the mechanism links) is held stationary by the trigger. Just before the moving core strikes the top plate, the main latch is forced under the push rod roller by the main latch spring, thus locking the mechanism in the closed position. The toggle formed by the breaker lever links and the mechanism links is prevented from going over center by the push rod roller pin striking the top of the frame.

Energizing the trip coil rotates the tripping lever counter-clockwise to break the tripping toggle, and pull the trigger out of engagement with the trigger roller. This permits the entire linkage (mechanism links, breaker lever links and breaker lever) to slide horizontally off the main latch, thus permitting the mechanism to open. As the push

**Fig. 7—LATCH CHECKING SWITCH ASSEMBLY**

**Fig. 8—Diagram of Control Panel Connections**
Westinghouse Type SAF-2 Operating Mechanism

rod roller slides off the main latch, the retrieving springs pull the push rod roller downwards to reset the mechanism.

The mechanism tripping toggle should be set either on toggle or slightly over toggle to prevent trigger failure when closing on maximum voltage.

**Four Coil Attachment**
Ref. Fig. 5 and Fig. 2

The four coil attachment bolts to the mechanism frame, in place of the single coil shunt trip attachment. In bolting the attachment in place it is only necessary to observe that the coil plungers push the tripping lever upwards sufficiently to trip the mechanism. A tripping lever with suitable extensions must be used with the four coil attachment.

**Overload Release**
See I.C. 1488.

**AUXILIARY SWITCH**
Ref. Fig. 3.

The adjustable linkage between the mechanism breaker lever and the switch arm should be adjusted so that the switch arm travels equally on either side of a line thru the switch arm shaft.

The length of the switch arm should be adjusted so that the contact segments make good contact with the contact fingers in both the opened and closed positions of the mechanism. Make certain the operating arm of the auxiliary switch is not in dead center, otherwise damaged parts will result.

**UNDERVOLTAGE RELEASE**
Ref. Fig. 6, 2 and 11.

The undervoltage mounts on the left hand side of the mechanism frame.
with the two mounting screws shown. The undervoltage reset extension of the breaker lever should operate between the undervoltage reset spring and the undervoltage hold in latch. As the mechanism closes, the reset extension of the breaker lever strikes the undervoltage hold in lever, which frees the undervoltage armature for operation on voltage failure. As the mechanism opens, the reset extension of the breaker lever strikes the undervoltage reset spring, retrieving the armature to its fully closed position; failure to reset the undervoltage armature properly will result in improper operation, as the coil is not capable of picking up the armature.

The adjustable trip rod should be set to secure 3/8" clearance between the end of the slot in the mechanism tripping lever and the trip rod, with the armature in the closed position.

The drop out voltage is influenced by the small brass pin in the armature, which controls the air gap in the magnetic circuit.

**LATCH CHECKING SWITCH**

Ref. Fig. 7.

The latch checking switch block mounts on the two screws shown. The switch operates directly from the tripping lever and makes contact when the tripping lever is in the normal position, and breaks contact when the tripping lever is raised.

**CUT OFF SWITCH**

Ref. Fig. 10.

The single pole cut off switch mounts on the right side of the mechanism behind the rotary auxiliary switch. It is a normally closed contact switch but is held in the open position by means of a spring-biased operating lever. During the last portion of the closing stroke the mechanism roller pin strikes the switch operating lever which rotates the switch lever to release the switch push button and permit the switch to make contact.

**OPERATION COUNTER**

Ref. Fig. 3.

The operation counter mounts on the upper rotary auxiliary switch bracket. After mounting in place and connecting to the auxiliary switch extension of the breaker lever the operation counter arm should be loosened and set so that only one number is recorded for each operation of the mechanism. This setting should be checked for both manual and electrical operation.

**MAINTENANCE**

Arrange for regular inspection to see that the apparatus is in good adjustment and functions as required.

Thoroughly inspect all bolts and nuts—and tighten if necessary. Inspect all pins, links and bearings for excessive wear. Check all cotter pins.
Fig. 11—Type SAF-2 Oil Circuit Breaker Closing Mechanism Wiring Diagram
## Westinghouse Type SAF-2 Operating Mechanism

### RENEWAL PARTS DATA

**Type SAF-2 Solenoid-operated Mechanism**

*For Oil Circuit Breakers*

<table>
<thead>
<tr>
<th>Ref. No.</th>
<th>Name of Part</th>
<th>Number Per Unit</th>
<th>Recommended for Stock</th>
<th>Style No. of Part</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mechanism Complete</td>
<td>1</td>
<td>0</td>
<td>1 021 011</td>
</tr>
<tr>
<td>1</td>
<td>Breaker Lever (Vertical-Push—F-122)</td>
<td>1</td>
<td>0</td>
<td>1 021 015</td>
</tr>
<tr>
<td>1</td>
<td>Breaker Lever (Horizontal-Push—F-124)</td>
<td>1</td>
<td>0</td>
<td>1 021 012</td>
</tr>
<tr>
<td>1</td>
<td>Breaker Lever (Vertical-Push—F-124)</td>
<td>1</td>
<td>0</td>
<td>1 021 055</td>
</tr>
<tr>
<td>2</td>
<td>Breaker Lever Link</td>
<td>2</td>
<td>0</td>
<td>1 020 999</td>
</tr>
<tr>
<td>2</td>
<td>Mechanism Lever</td>
<td>2</td>
<td>0</td>
<td>1 020 991</td>
</tr>
<tr>
<td>4</td>
<td>Mechanism Lever Retrieving Spring</td>
<td>1</td>
<td>0</td>
<td>1 020 988</td>
</tr>
<tr>
<td>5</td>
<td>Moving Core and Push Rod</td>
<td>1</td>
<td>0</td>
<td>970 132</td>
</tr>
<tr>
<td>6</td>
<td>Moving Core Push Rod Roller</td>
<td>1</td>
<td>0</td>
<td>1 020 900</td>
</tr>
<tr>
<td>7</td>
<td>Moving Core Push Rod Roller Pin</td>
<td>1</td>
<td>0</td>
<td>1 021 005</td>
</tr>
<tr>
<td>8</td>
<td>Moving Core Guide Tube</td>
<td>1</td>
<td>0</td>
<td>1 021 007</td>
</tr>
<tr>
<td>9</td>
<td>Tripping Lever (P-122)</td>
<td>1</td>
<td>0</td>
<td>1 021 072</td>
</tr>
<tr>
<td>10</td>
<td>Bumper Spring (F-122)</td>
<td>1</td>
<td>0</td>
<td>1 035 810</td>
</tr>
<tr>
<td>10</td>
<td>Tripping Lever (P-124)</td>
<td>1</td>
<td>0</td>
<td>1 020 996</td>
</tr>
<tr>
<td>11</td>
<td>Bumper Spring (P-124)</td>
<td>1</td>
<td>0</td>
<td>1 035 809</td>
</tr>
<tr>
<td>12</td>
<td>Tripping Lever Link</td>
<td>1</td>
<td>0</td>
<td>1 020 992</td>
</tr>
<tr>
<td>13</td>
<td>Tripping Lever Spring</td>
<td>1</td>
<td>0</td>
<td>1 020 999</td>
</tr>
<tr>
<td>14</td>
<td>Main Latch</td>
<td>1</td>
<td>0</td>
<td>1 020 989</td>
</tr>
<tr>
<td>15</td>
<td>Main Latch Pin</td>
<td>1</td>
<td>0</td>
<td>673 870</td>
</tr>
<tr>
<td>16</td>
<td>Main Latch Spring</td>
<td>1</td>
<td>0</td>
<td>1 020 986</td>
</tr>
<tr>
<td>17</td>
<td>Trigger</td>
<td>1</td>
<td>0</td>
<td>1 017 949</td>
</tr>
<tr>
<td>18</td>
<td>Trigger Link</td>
<td>1</td>
<td>0</td>
<td>1 016 906</td>
</tr>
<tr>
<td>19</td>
<td>Hand Closing Lever</td>
<td>1</td>
<td>0</td>
<td>1 020 993</td>
</tr>
<tr>
<td>20</td>
<td>Hand Closing Lever Spring</td>
<td>1</td>
<td>0</td>
<td>1 021 003</td>
</tr>
<tr>
<td>21*</td>
<td>Type W Auxiliary Switch—6 Pole</td>
<td>1</td>
<td>0</td>
<td>1 020 008</td>
</tr>
<tr>
<td>21*</td>
<td>Type W Auxiliary Switch—10 Pole</td>
<td>1</td>
<td>0</td>
<td>501 821</td>
</tr>
<tr>
<td>22</td>
<td>Operation Counter</td>
<td>1</td>
<td>0</td>
<td>1 021 004</td>
</tr>
<tr>
<td>23†</td>
<td>Closing Coil</td>
<td>1</td>
<td>1</td>
<td>++</td>
</tr>
<tr>
<td>24†</td>
<td>Trip Coil</td>
<td>1</td>
<td>1</td>
<td>++</td>
</tr>
<tr>
<td>25†</td>
<td>Overload Trip Coil</td>
<td>1</td>
<td>1</td>
<td>++</td>
</tr>
<tr>
<td>26†</td>
<td>Undervoltage Trip Coil</td>
<td>1</td>
<td>1</td>
<td>++</td>
</tr>
</tbody>
</table>

* Not Illustrated.

‡ When ordering, specify identification number stamped on coil.

Parts indented are included in the part under which they are indented.

### ORDERING INSTRUCTIONS

When ordering Renewal Parts, always specify the name of the part wanted as shown on the illustrations in this Instruction Book, giving Shop Order Number, and the type of Mechanism as shown on the nameplate. For example: One tripping lever for Type SAF-2 solenoid operated mechanism, SO-31-F-187, shown in Instruction Book 5790.

To avoid delays and misunderstandings, note carefully the following points:

1. Send all correspondence and orders to the nearest Sales Office of the Company.
2. State whether shipment is to be made by freight, express or parcel post. In the absence of instructions, goods will be shipped at our discretion. Parcel post shipments will be insured only on request. All shipments are at purchaser's risk.
3. Small orders should be combined so as to amount to a value of at least $1.00 net. Where the total of the sale is less than this, the material will be invoiced at $1.00.