

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

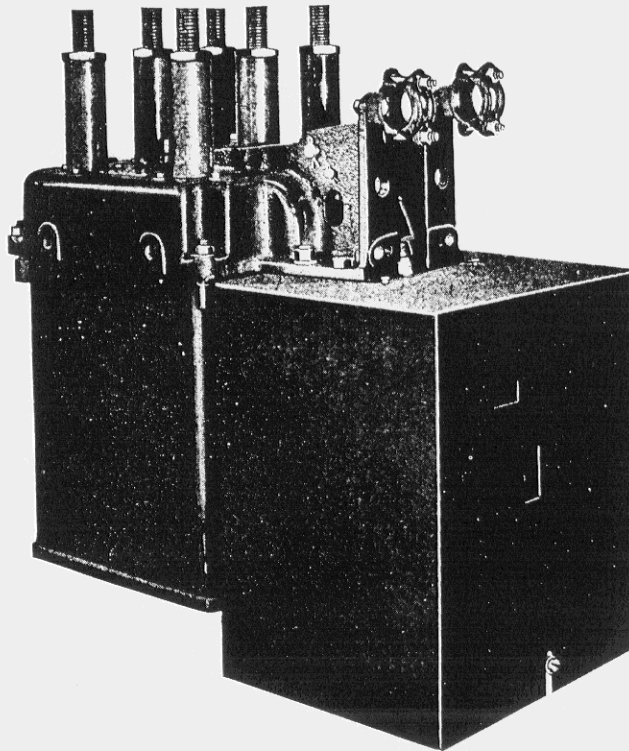


FIG. 1---TYPE F-122, SOLENOID-OPERATED BREAKER

Westinghouse Electric Corporation
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I. B. 33-216 ★
(Filing No. 33-000)

Westinghouse Type SAF-2 Operating Mechanism

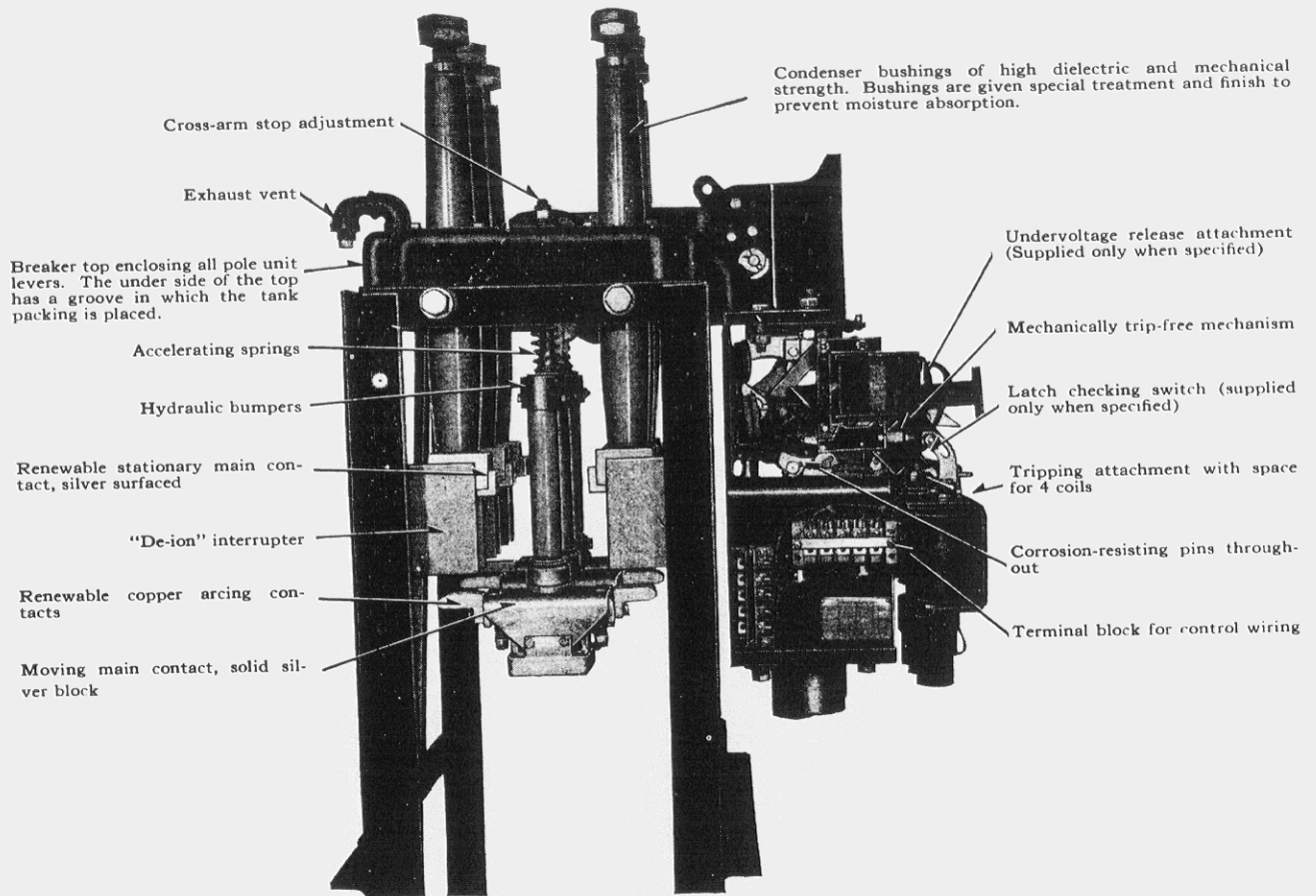


FIG. 2—TYPE F-124-A, 600 OR 1200-AMPERE, SOLENOID-OPERATED BREAKER WITH TANK REMOVED FROM THE BREAKER AND COVER REMOVED FROM THE TYPE SAF-2 SOLENOID

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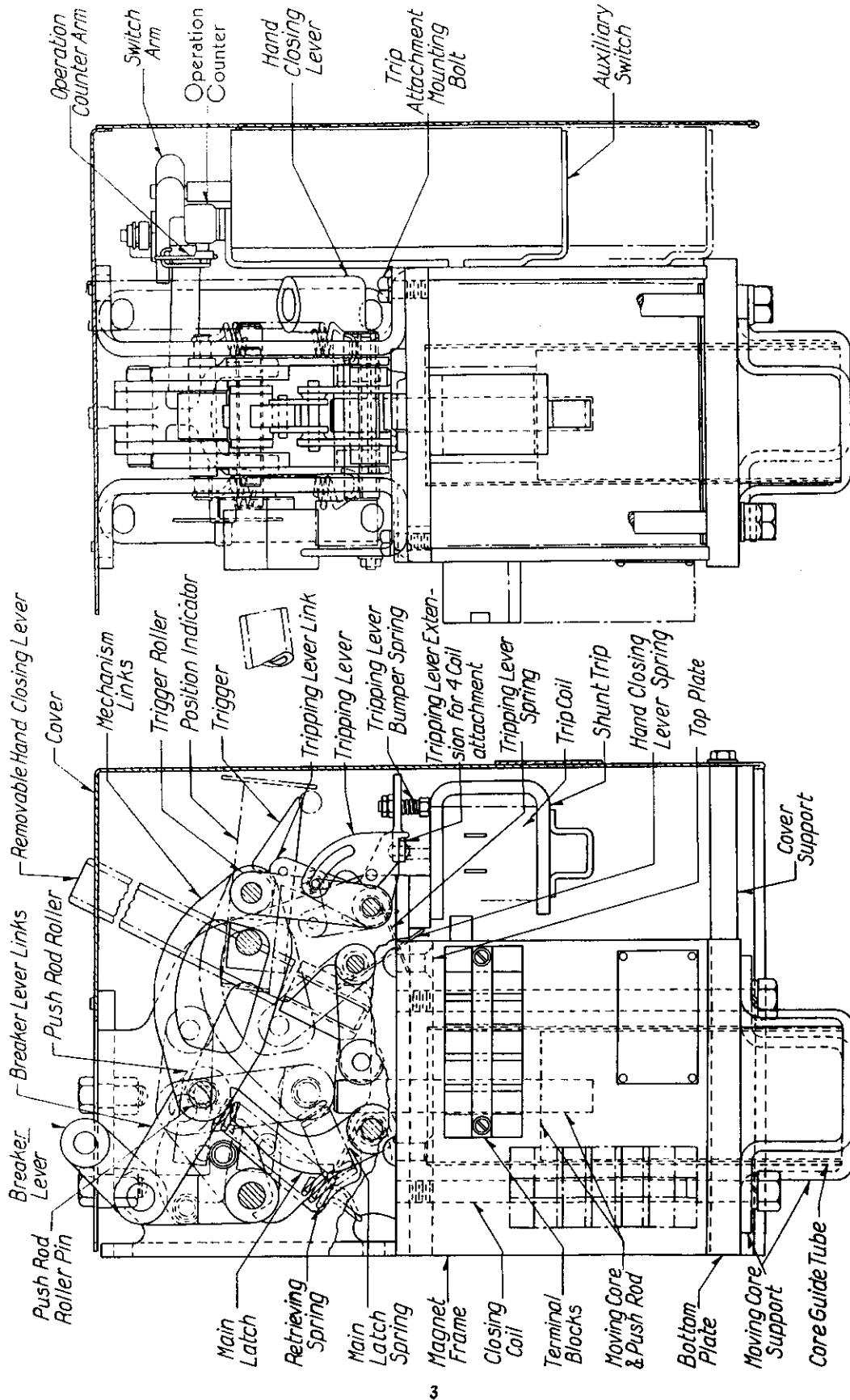


FIG. 3—CIRCUIT BREAKER—OIL-TYPE "SAF-2" MECHANISM ASSEMBLY

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Type SAF-2 Operating Mechanism

INTRODUCTION

This mechanism is the direct-current solenoid type. It operates on standard direct-current control voltages or when equipped with a rectox unit, on alternating-current. It is a mechanically full automatic mechanism, trip free in all positions.

This mechanism is used principally to electrically operate the 400, 600 and 800 ampere type F122 and the 600 and 1200 ampere type F124 oil circuit breakers. This instruction book applies to the mechanism only. Instructions on adjustments and maintenance of the type F122 and F124 breakers can be found in Instruction Books 33-216-1 and 33-226-2 respectively.

The standard mechanism is supplied with a single shunt trip coil, a 6 pole auxiliary switch, cover, position indicator and control relay. The mechanism can be equipped with additional attachments, such as, operation counter, latch checking switch, four coil tripping attachments (in place of single shunt trip coil), a 10 pole auxiliary switch instead of a 6 pole, an undervoltage

tripping attachment and a single pole cut off switch.

SHIPMENT

Ordinarily the mechanism will be mounted on the breaker unit, with all adjustments complete, ready for installation as described in I.B. 33-216-1 or 33-226-2A. Occasionally, however, the mechanism will be shipped separately, fastened in the closed position.

HANDLING

Do not attempt to lift the mechanism by its attachments or levers; or to move the attachments by the coil leads. Always grasp the frame, which is designed to withstand handling.

INSTALLATION

1. When the mechanism is mounted on the breaker before shipment, it is only necessary to follow the installation procedure outlined in the breaker Instruction Books and operations 8 to 12 of this book.
2. When the mechanism is shipped separately, however, it is necessary to first mount the breaker unit as described in the above Instruction Books

and then mount the mechanism to the breaker as shown in Fig. 4, or the outline supplied with the breaker.

3. Bolt the mechanism to the breaker frame, floor or wall with four bolts. If the mechanism is for wall or floor mounting, structural steel members should be inserted between the mechanism and wall or floor to prevent disintegration of the wall by the closing shock.

4. Remove the rod end from breaker lever of the mechanism; remove the fulcrum pin from the toggle lever of the breaker, and the pin from the operation rod end of the breaker.

5. Screw the operating rod into the operation rod end, with the lock nut and lock washer in place as shown.

6. Replace the rod end assembly and pins, and check the operation of the mechanism.

7. Operations #4, 5 and 6 should be repeated until the length of the operating rod assembly is such, that, with the mechanism in the closed position, the breaker toggle lever links will be $\frac{1}{8}$ " away from the breaker stop pin.

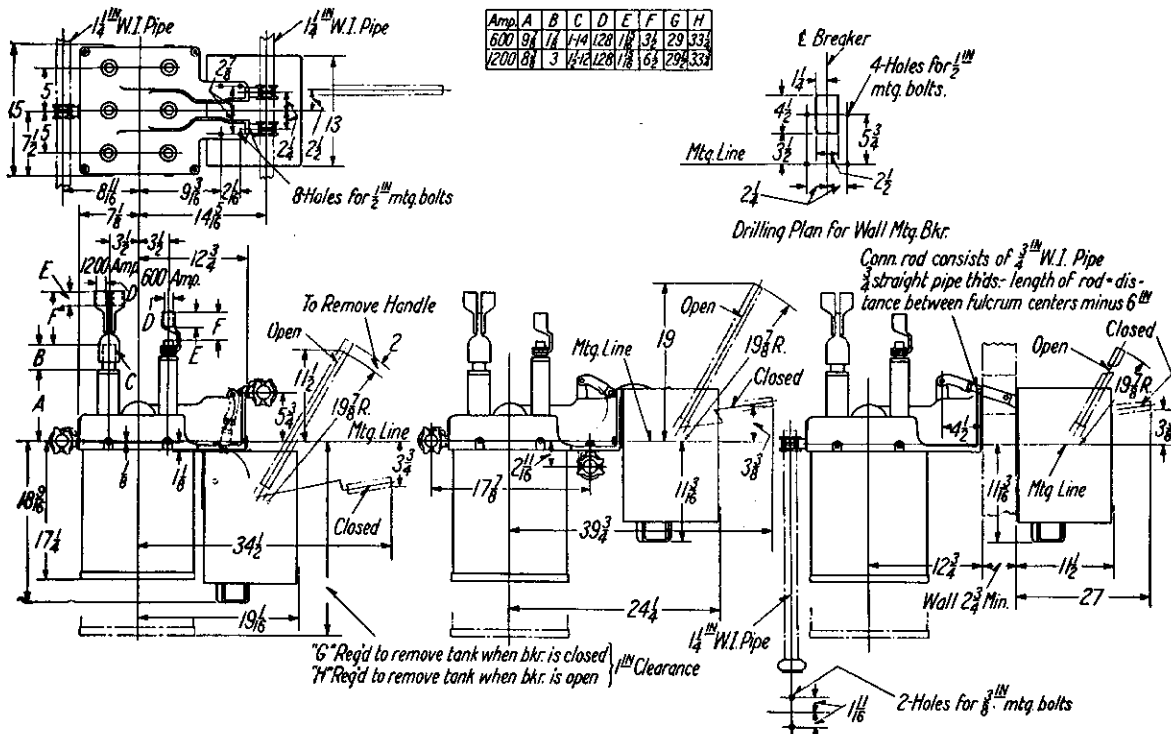


FIG. 4—STANDARD TYPE F-122, 400 AND 600-A—7500 VOLTS., 800 AMPERES, 5000 VOLTS—OUTLINE

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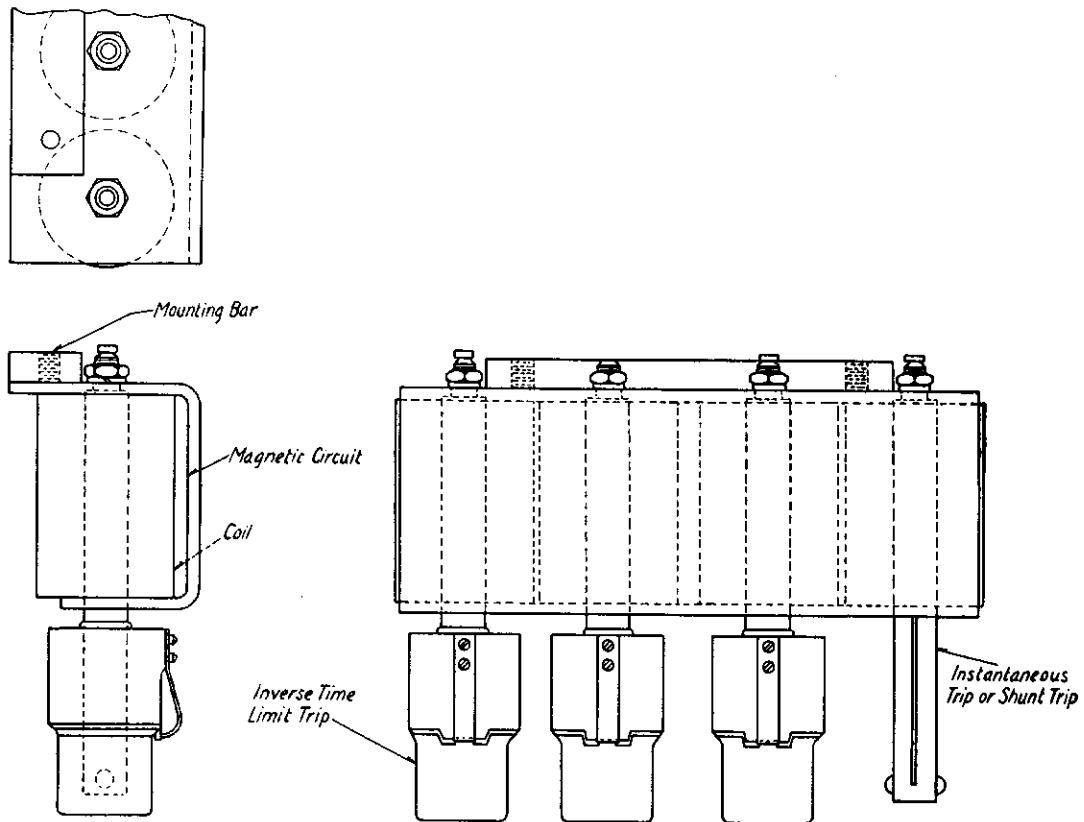


FIG. 5— INVERSE TIME LIMIT ASSEMBLY

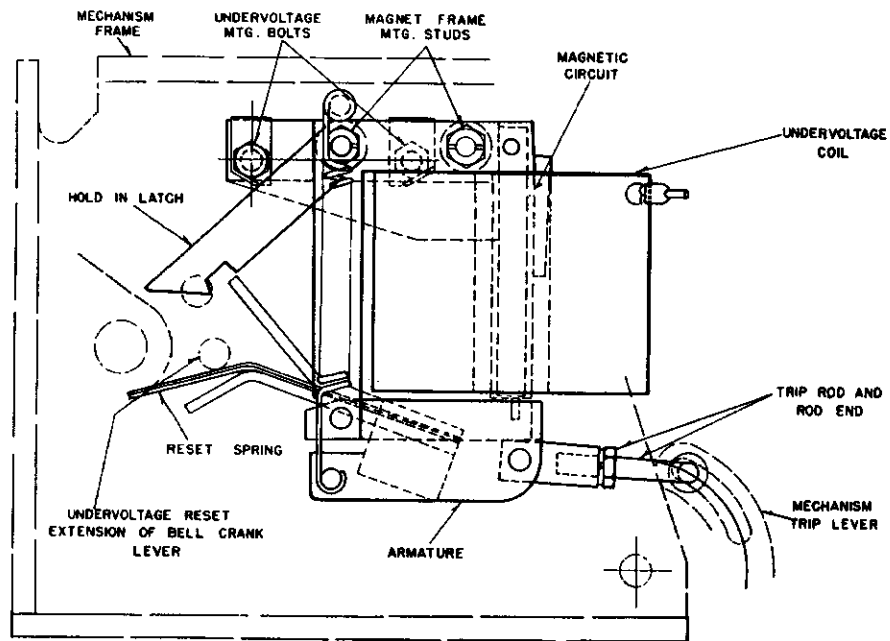


FIG. 6—UNDervOLTAGE OPERATING ASSEMBLY

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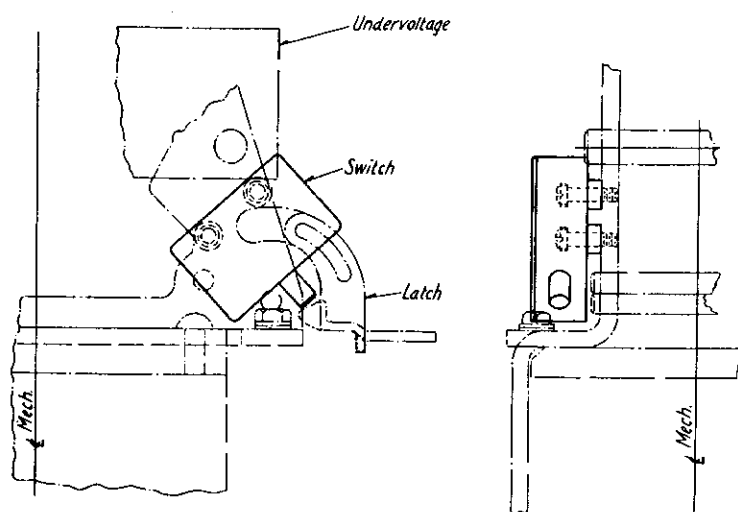


FIG. 7—LATCH CHECKING SWITCH ASSEMBLY

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

8. With operation #7 completed, the main moving contact of the breaker should be $\frac{1}{4}$ " below the lift rod end as described in I.B. 33-216-1 or 33-226-2.

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

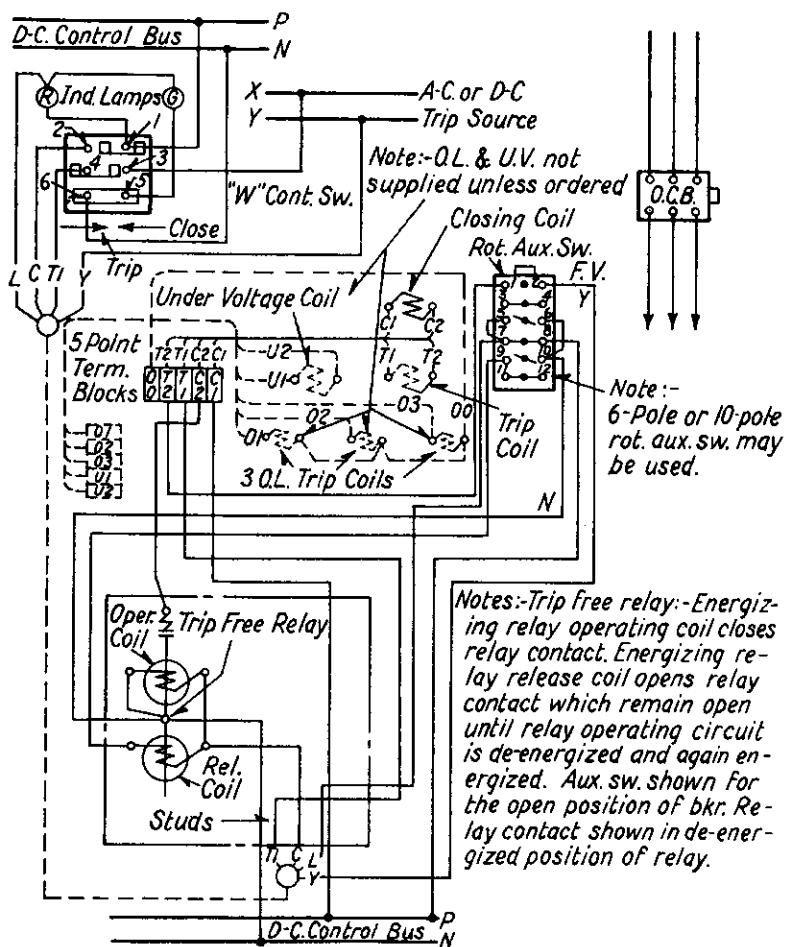


FIG. 8—DIAGRAM OF CONTROL PANEL CONNECTIONS

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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

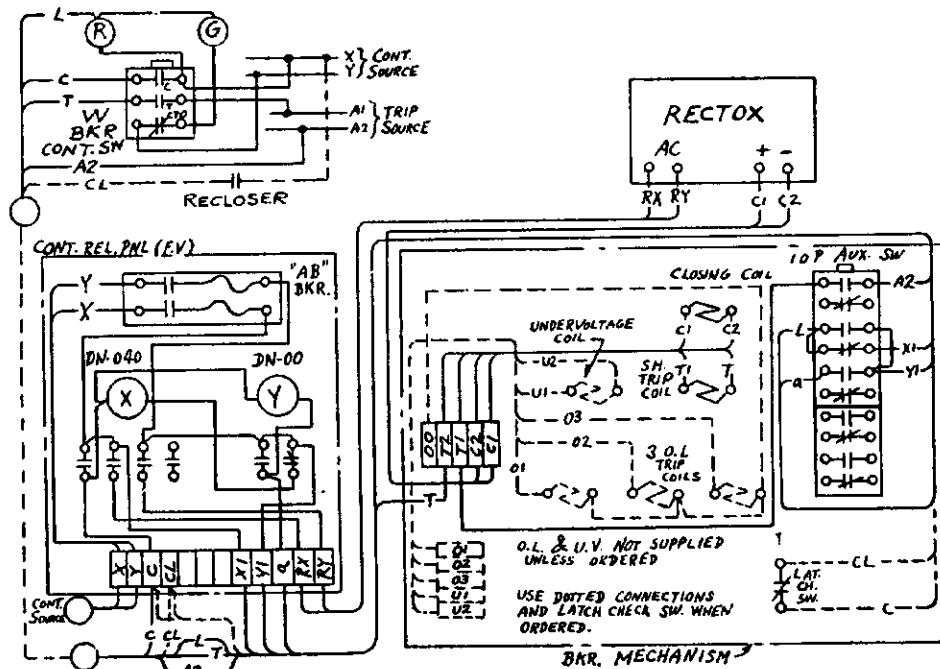
switch arm travels equally on either side of a line thru the switch arm shaft.

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 position 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



NOTE:- ALL DEVICES SHOWN IN OPEN OR DE-ENERGIZED POSITION.

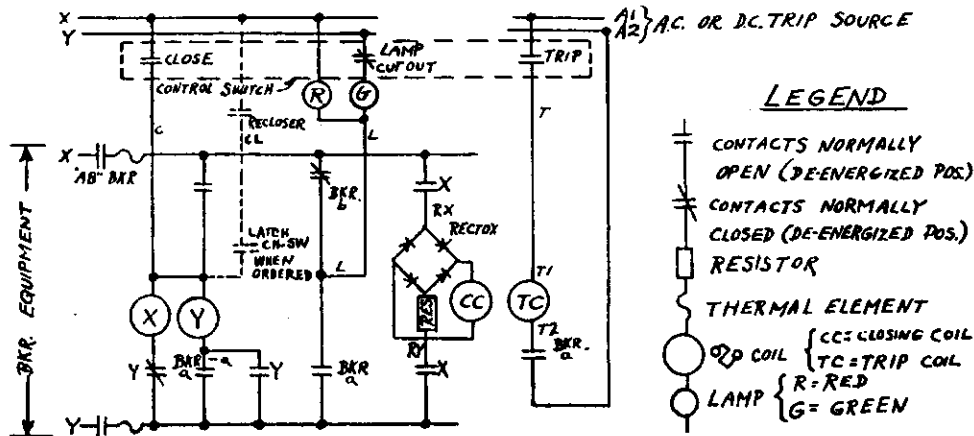


FIG. 9—RECTOX CLOSING SCHEME FOR SAF-2 MECHANISM

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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 $\frac{1}{8}$ " 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.

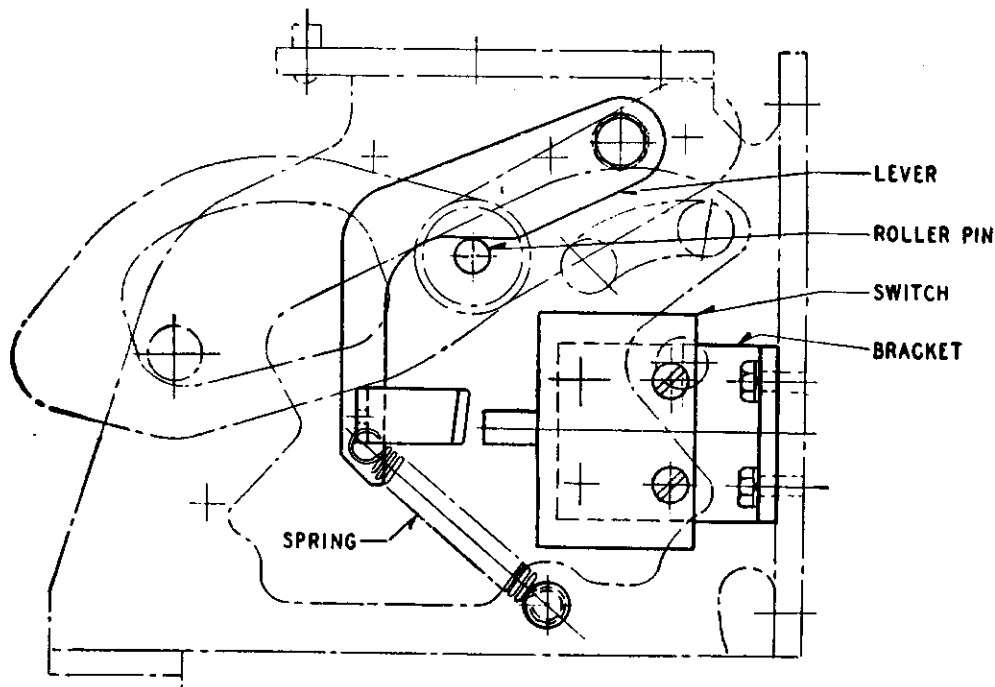


FIG. 10—CUT OFF SWITCH

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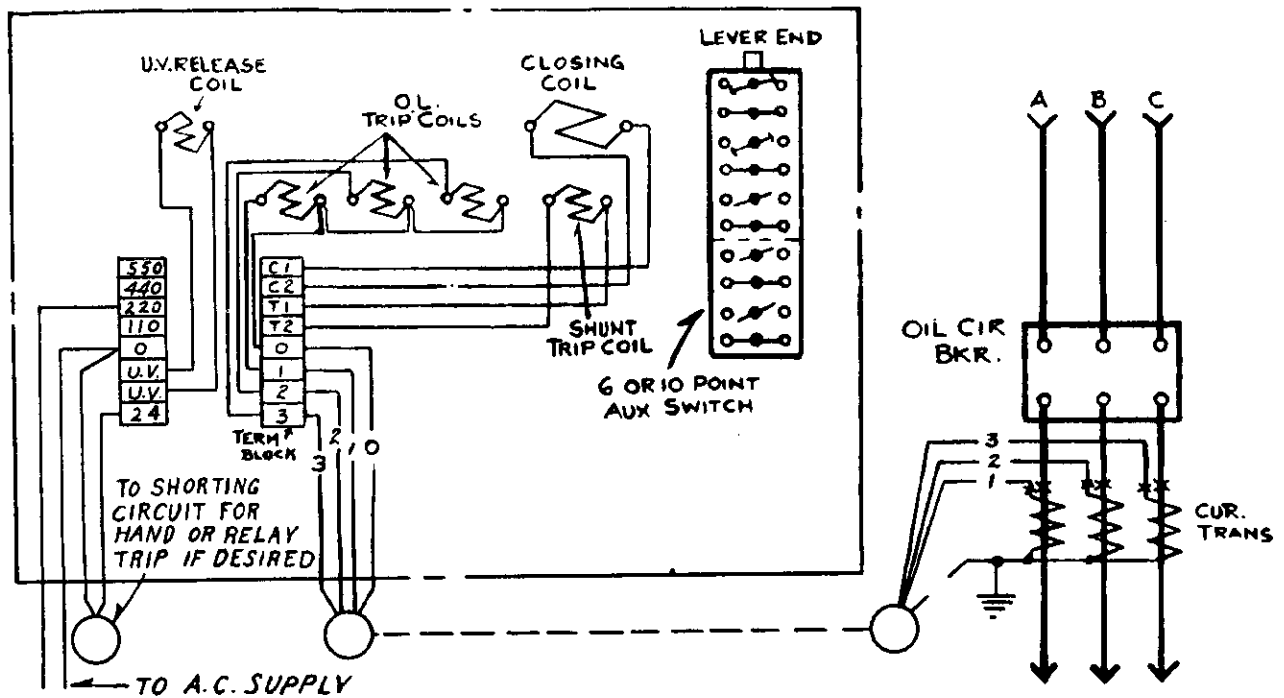


FIG. 11—TYPE SAF-2 OIL CIRCUIT BREAKER CLOSING MECHANISM WIRING DIAGRAM