



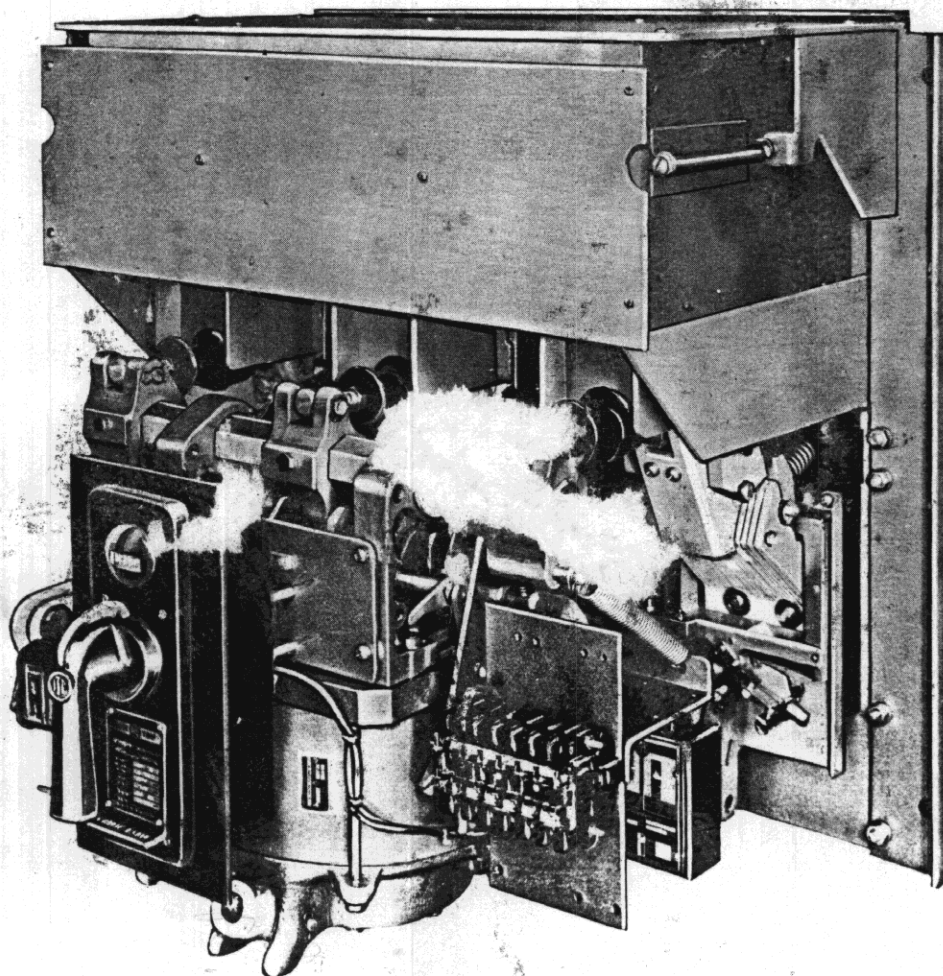
IB-5528

LOW VOLTAGE POWER SWITCHGEAR

STEVE'S COPY **INSTRUCTIONS**

MAINTENANCE OF TYPE KD AND KE CIRCUIT BREAKERS

(MODEL A)



I-T-E CIRCUIT BREAKER COMPANY

• PHILADELPHIA 30, PENNSYLVANIA

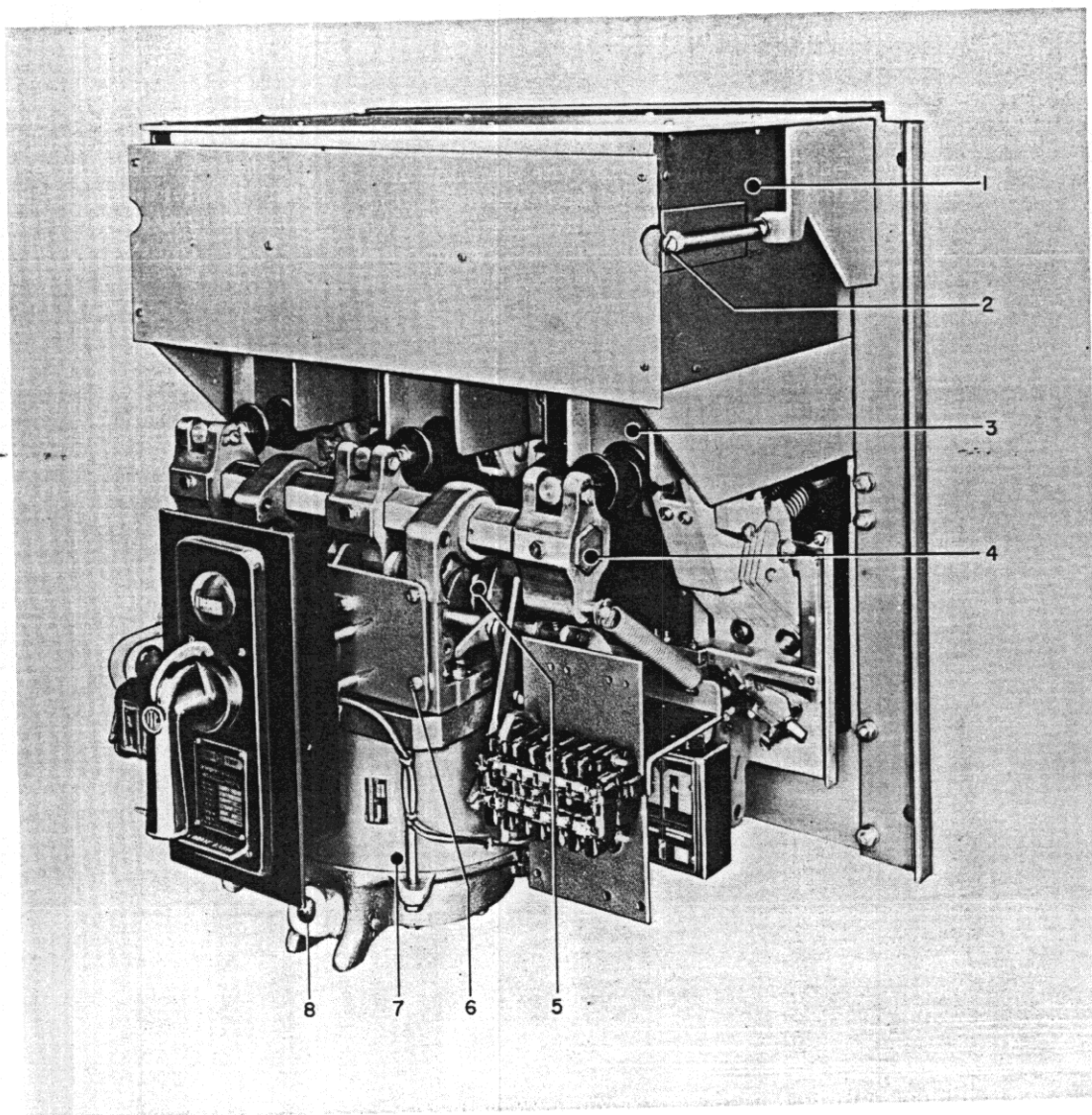


Photo 25826-R-B

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|-----------------------|-------------------------|
| 1 Hood Assembly | 5 Operating Mechanism |
| 2 Mounting Screw | 6 Screw |
| 3 Arc Chute Assembly | 7 Solenoid Assembly |
| 4 Jack Shaft Assembly | 8 Manual Closing Socket |

Fig. 1—Type KD Circuit Breaker, Front View Showing Right Side



MAINTENANCE OF TYPE KD AND KE CIRCUIT BREAKERS (MODEL A)

MAINTENANCE

The safety and successful functioning of the connected apparatus depends upon the proper operation of the circuit breaker. Therefore, it is recommended that a maintenance program be established that will provide for an inspection of the circuit breaker at least once every six months and as soon as possible after fault operation.

Circuit breakers subjected to abnormal conditions, such as acid fumes, salt deposits, or cement dust, require more frequent maintenance if flashovers resulting from accumulated substances are to be avoided.

Inspections should be made to determine the condition of the arc chutes, contacts, and electrical connections. All mounting screws, fastening assemblies such as the operating mechanism and operating accessories, should be tight against their supporting members. Insulating parts should be cleaned with carbon tetrachloride or its equivalent.

CAUTION: DE-ENERGIZE THE PRIMARY AND CONTROL CIRCUITS BEFORE MAKING ANY INSPECTIONS OR ADJUSTMENTS. RACK DRAW-OUT MOUNTED CIRCUIT BREAKERS TO THE "TEST" POSITION OR COMPLETELY WITHDRAW THE CIRCUIT BREAKER.

The hood assembly (1, Fig. 1) and arc chute assemblies (3, Fig. 1) must be removed in order to inspect, maintain or replace the contacts.

HOOD ASSEMBLY

To remove the hood assembly (1, Fig. 1) remove two mounting screws (2, Fig. 1). Lift the hood assembly up and away from the circuit breaker's metal base.

ARC CHUTES

To remove the arc chutes (3, Fig. 1), proceed as follows:

1. Loosen and remove two mounting screws, one screw located on each side of the arc chute.
2. Pull arc chute toward front of circuit breaker to remove.

Examine the arc chutes whenever they are removed for the inspection or maintenance of contact parts. Discoloration or slight eroding of the interior of the arc chute does no harm. If the arc chute runner or splitters show signs of serious burning or if the splitters or arc chute sides or ends are cracked or broken, the arc chute should be replaced as a complete unit.

When replacing the arc chutes, be sure they are held firmly in place by their mounting hardware.

CONTACTS

In general, any dirt or grease on the contacts should be removed by wiping them with a clean cloth saturated with carbon tetrachloride. A very slight pitting or discoloration of the contact surfaces is not harmful. Experience has shown that several operations of the circuit breaker, at two week intervals, will remove the effects of oxidation and materially prolong their effective life.

The hood assembly and arc chutes must be removed in order to inspect, maintain, or replace the contacts.

Main and Intermediate Contacts

A slight amount of pitting is to be expected on the main and intermediate contacts. If the contacts are badly pitted or eroded, the contacts should be replaced before other parts of the circuit breaker become damaged. Excessive pitting may be caused by badly burned arcing contacts, or the circuit breaker may be interrupting currents beyond its interrupting rating.

All flexible conductors should be inspected for broken or pinched laminations. Flexible conductors in such condition must be replaced.

Arcing Contacts

A moderate amount of pitting is to be expected and will not interfere with the operation of the arcing contacts. Occasionally it may be necessary to "dress-up" the contacts, by removing small burrs with several light wipes of a fine file. Always follow the contour of the contacts and do not attempt to entirely eliminate the pitting.

Prevent any filings from falling into the mechanism by covering it with a clean cloth. After filing the contacts, carefully remove the cloth and blow out any dust or particles that may have fallen into the mechanism with low-pressure dry air.

If the arcing contacts are severely pitted or eroded, the contacts should be replaced.

MECHANISM AND SOLENOID

At all inspections, the circuit breaker should be operated manually to see that all parts move freely in the proper manner without binding or excessive friction. After a careful inspection shows all parts



to be in proper working order, the circuit breaker may be operated electrically.

If either manual or electrical operation fails to close the circuit breaker, and if no cause for tripping is apparent, the difficulty is probably due to failure of the secondary latch to reset or to slipping of the closing roller off the prop latch. Adjustments, if required, can be made as described in sections Secondary Latch Bite and Prop Latch under ADJUSTMENTS.

ADJUSTMENTS

The type KD and KE circuit breakers were adjusted, tested, and inspected before leaving the factory.

CONTACTS

Check the contacts for proper adjustment as follows:

Refer to Fig. 2 and,

1. With the lower main contacts (5 and 6) just touching, the air gap between the arcing contacts (1 and 8) should be 5/16 inch minimum.

2. With the arcing contacts (1 and 8) just touching, the air gap between the intermediate contacts (1 and 2) should be 3/32 inch to 1/8 inch; and the air gap between the upper main contacts (3 and 4) should be 3/16 inch to 1/4 inch.

3. With the circuit breaker fully closed, the point of contact on the upper main contacts (3 and 4) should be approximately in the center. This can be checked by inserting a 0.060 to 0.070 inch feeler gauge at "B".

4. All movable arcing contacts (8) should touch their respective stationary arcing contact (1) within 0.005 inch of each other.

5. All movable intermediate contacts (2) should touch their respective stationary intermediate contact (1) within 0.015 inch of each other.

If the above check indicates that adjustment is required, proceed as follows:

Refer to Fig. 2 and,

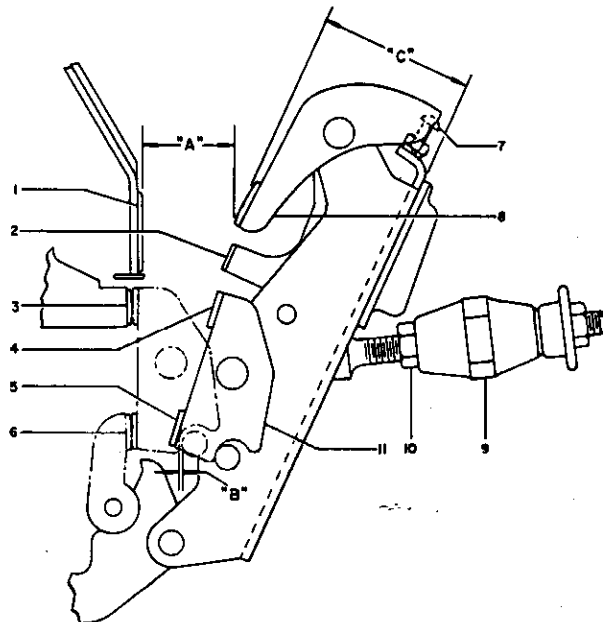
1. Loosen locknut and turn adjusting screw (7) until the dimension at "C" is 3 inches, plus or minus 1/16 inch.

2. Loosen locknut (10) and turn connecting insulator (9) slightly so that all the movable intermediate contacts (2) touch their respective stationary intermediate contact (1) within 0.015 inch of each other.

3. If required, turn the connecting insulator (9) slightly so that the movable arcing contacts (8) touch their respective stationary arcing contact (1) within 0.005 inch of each other.

4. The open air gap at "A" should not be less than 1-13/16 inches minimum. If adjustment is required, turn connecting insulator (9) in the direction required to produce the 1-13/16 inch minimum at "A".

5. Tighten all locknuts after making any of the above adjustments.



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- 1 Stationary Intermediate and Arcing Contact
- 2 Movable Intermediate Contact
- 3 Stationary Upper Main Contact
- 4 Movable Upper Main Contact
- 5 Movable Lower Main Contact
- 6 Stationary Lower Main Contact
- 7 Adjusting Screw
- 8 Movable Arcing Contact
- 9 Connecting Insulator
- 10 Locknut
- 11 Movable Main Contact Assembly

Fig. 2—Contact Adjustment

MECHANISM

The various mechanism adjustments are described in the following sections and illustrated in Figs. 3 to 6 inclusive.

Prop Latch

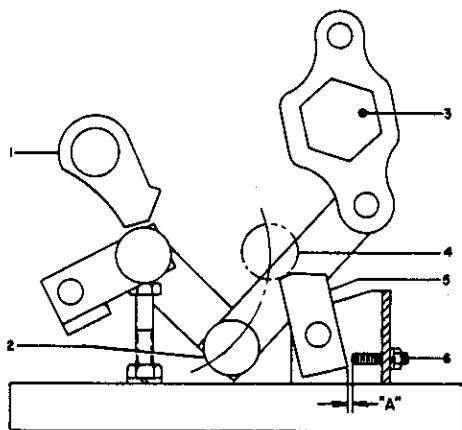
The prop latch adjusting screw is located at the front-center of the operating mechanism. It can be reached easily if the mechanism front plate is removed.

To remove the front plate and adjust the prop latch, proceed as follows:

1. Remove four screws (6, Fig. 1) and set the mechanism front plate aside.

Refer to Fig. 3 and,

2. Loosen locknut on adjusting screw (6).



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| 1 Main Latch | 4 Roller (Closed Position) |
| 2 Roller (Open Position) | 5 Prop Latch |
| 3 Jack Shaft Assembly | 6 Adjusting Screw |

Fig. 3—Prop Latch Adjustment
Left Side of Mechanism Shown

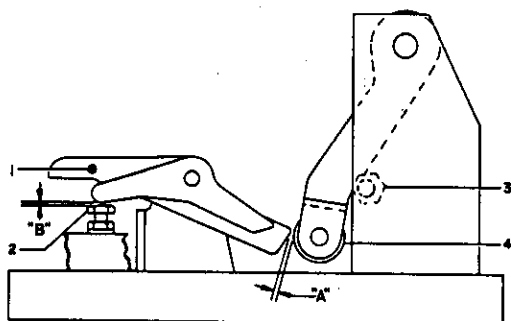
3. Adjust screw (6) so that the roller (4) slips off the prop latch (5) with a 0.093 inch feeler gauge inserted at "A"; and the roller holds with a 0.060 inch feeler gauge inserted at "A".

4. Tighten locknut on adjusting screw (6) and replace the mechanism front plate after making any adjustments.

Bearing and Secondary Latch

To adjust the bearing and secondary latch, proceed as follows:

Refer to Fig. 4 and with the circuit breaker in the "OPEN" position,



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| 1 Secondary Latch Assembly | 3 Eccentric |
| 2 Adjusting Screw | 4 Roller |

Fig. 4—Secondary Latch Adjustment
Right Side of Mechanism Shown

1. Adjust eccentric stud (3) so that the clearance at "A", between the secondary latch (1) and the roller (4), is 0.005 to 0.020 inch.

Secondary Latch Bite

To adjust the secondary latch bite, proceed as follows:

Refer to Fig. 4 and,

1. Loosen locknut on adjusting screw (2).

2. Adjust screw (2) so that the circuit breaker will close with a 0.047 inch feeler gauge at "B", but will not close with a 0.055 inch feeler gauge at "B".

3. Tighten locknut on adjusting screw (2) and recheck the adjustment.

Latch Bite

To adjust the latch bite, proceed as follows:

Refer to Fig. 5 and,

1. Insert 0.075 inch feeler gauge at "A".

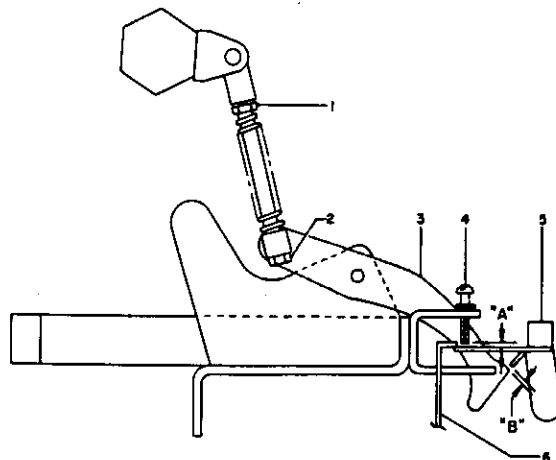
2. Close circuit breaker by means of the manual closing lever.

3. Loosen locknut on adjusting screw (4) and turn screw in until impact latch (3) slips off and circuit breaker trips.

4. Turn screw an additional one-half turn, in the same direction and tighten locknut.

5. With a 0.065 inch feeler gauge at "A", impact latch (3) should hold and the circuit breaker should remain closed.

6. Tighten locknut on adjusting screw (4) and recheck the adjustment.



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| 1 Locknut | 4 Adjusting Screw |
| 2 Adjusting Screw | 5 Tripper Bar |
| 3 Impact Latch | 6 Spring Scale Hook |

Fig. 5—Tripper Bar and Impact Latch Adjustments
Right Side of Mechanism Shown



Impact Latch

To adjust the impact latch, proceed as follows:
Refer to Fig. 5 and,

1. Loosen locknut on adjusting screw (2).
2. Turn adjusting screw (2) in the direction required to produce a gap of 0.050 to 0.070 inch at "B".
3. Tighten locknut on adjusting screw (2) and recheck gap at "B".

Tripper Bar Load

To check tripper bar load, place spring scale hook (6) as shown in Fig. 5. Spring scale readings should be as follows:

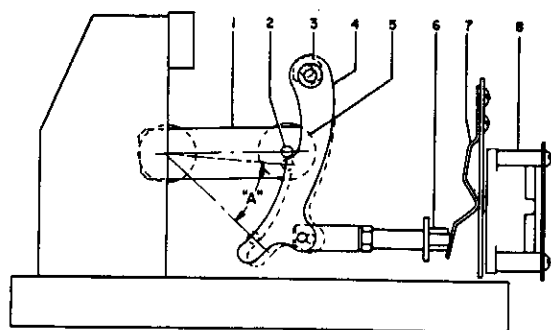
1. With the circuit breaker open, initial spring pull should be 4 to 8 ounces.
2. With the circuit breaker closed, pull to trip the circuit breaker (2, 3, or 4 pole) should be 12 to 18 ounces.

Cutout Switch (bb)

To adjust the cutout switch (bb), proceed as follows:

Refer to Fig. 6 and,

1. Adjust eccentric (3) so that, when the main toggle pin (2) is operated within the range of operation indicated by "A", the cutout switch actuator (4) does not move more than 0.010 inch in either direction.
2. Insert the maintenance closing handle into the closing socket, rotate the tripper bar to the trip position (counter-clockwise when viewed from the right-hand side of the circuit breaker) and push down on the closing handle until it is in the closed position.



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| 1 Main Toggle Link | 5 Roller (Closing) |
| 2 Pin (Main Toggle) | 6 Actuator Rod |
| 3 Eccentric | 7 Spring |
| 4 Actuator | 8 Cutout Switch |

Fig. 6—Cutout Switch Adjustment
Left Side of Mechanism Shown

3. Release the tripper bar and slowly raise the maintenance closing handle. The normally open cutout switch (8) should close (click) just before the roller (4, Fig. 4) rolls off the secondary latch (1, Fig. 4) and resets to the position shown in Fig. 4.

4. If adjustment is required, loosen locknut and adjust length of actuator rod (6) so that the cutout switch operates as stated in step 3 above.

5. Tighten locknut on actuator rod (6) after making any adjustment.

NOTE: With the circuit breaker in the "CLOSED" position, cutout switch (8, Fig. 6) must be open. The cutout switch must re-open after being closed by pushing on spring (7, Fig. 6) by hand. The cutout switch must not be open in any other position of the circuit breaker.

SHUNT TRIP DEVICE

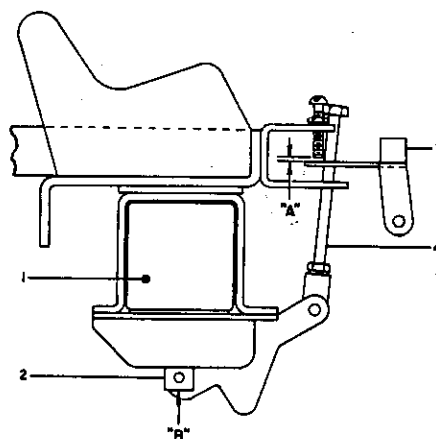
NOTE: Check for correct circuit breaker latch bite adjustment before making any changes in the shunt trip device adjustment.

Excess Trip Travel

To adjust the shunt trip excess trip travel, proceed as follows:

Refer to Fig. 7 and with the circuit breaker in the "OPEN" position,

1. Push up on armature (2) at "B" as far as the armature travel will allow.
2. Loosen locknut and adjust trip rod (4) so that the gap at "A" is 0.112 to 0.132 inch.
3. Tighten locknut on trip rod (4) and recheck the adjustment.



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| 1 Shunt Trip Device | 3 Tripper Bar |
| 2 Armature | 4 Trip Rod |

Fig. 7—Shunt Trip Device Adjustment
Right Side of Mechanism Shown

UNDervOLTAGE TRIP DEVICE

To adjust either the instantaneous or time-delay undervoltage trip device, proceed as described in the following sections:

NOTE: Check for correct circuit breaker latch bite adjustment before making any changes in the undervoltage trip device adjustments.

Anti-Noise

With the circuit breaker in the "OPEN" position and no voltage on the undervoltage coil, adjust screw (6, Fig. 8) so that the gap at "A" is 0.020 to

0.040 inch. Tighten locknut on adjusting screw (6, Fig. 8) and recheck the clearance at "A".

Operating Link

To adjust the length of the operating link, proceed as follows:

Refer to Fig. 8 and,

1. With the circuit breaker in the "OPEN" position, adjust the length of the operating link (5) so that when the circuit breaker is closed manually the de-energized undervoltage trip device will trip the circuit breaker before or at the same time that the arcing contacts touch.

2. Tighten locknut on operating link (5) and recheck the adjustment.

CAUTION: CHECK FOR CLEARANCE AT "D" AFTER MAKING ANY ADJUSTMENT TO OPERATING LINK (5). THIS CLEARANCE AT "D" MUST BE MAINTAINED WITH THE CIRCUIT BREAKER CLOSED AND THE MANUAL CLOSING LEVER HELD IN THE EXTREME CLOSED POSITION.

Excess Trip Travel

To adjust the excess trip travel, proceed as follows:

Refer to Fig. 8 and with the circuit breaker in the "OPEN" position,

1. Hold the armature (3) in the fully open position so that the armature stop is forced against the magnet at "C".

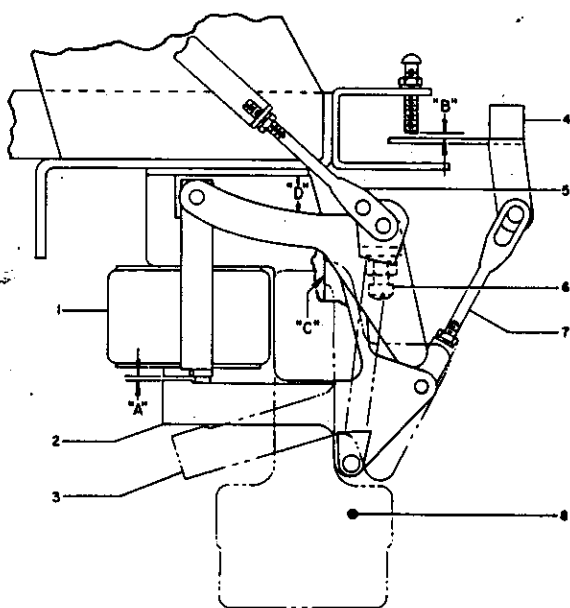
2. Loosen locknut and adjust the length of trip rod (7) so that the gap at "B" is 0.112 to 0.132 inch.

3. Tighten locknut on trip rod (7) and recheck the adjustment.

RENEWAL PARTS

It is recommended that sufficient renewal parts be stocked to facilitate proper maintenance and replacement of parts. The quantity of parts and items stocked should be based on the number of circuit breakers in service and previous operating experience.

When ordering renewal parts, address the nearest Sales Office of the I-T-E Circuit Breaker Company. Specify the complete nameplate data of the circuit breaker, description of parts and quantity required.



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| 1 Coil | 5 Operating Link |
| 2 Armature (Operating Position) | 6 Adjusting Screw |
| 3 Armature (Trip Position) | 7 Trip Rod |
| 4 Tripper Bar | 8 Time Delay Device |

Fig. 8—Undervoltage Trip Device Adjustments
Right Side of Mechanism Shown

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the I-T-E Circuit Breaker Company.

