Instructions for Porcel-Line Type DH-P Circuit Breakers with Post Insulator Type Pole Units (Supplements I.B. 32-253-2)

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DESCRIPTION

This supplement in conjunction with I.B. 32-253-2 covers the description, operation and maintenance of Westinghouse Types 75DHP and 150DHP Magnetic "De-ion" air circuit breakers of post insulator design, see Figure 1.

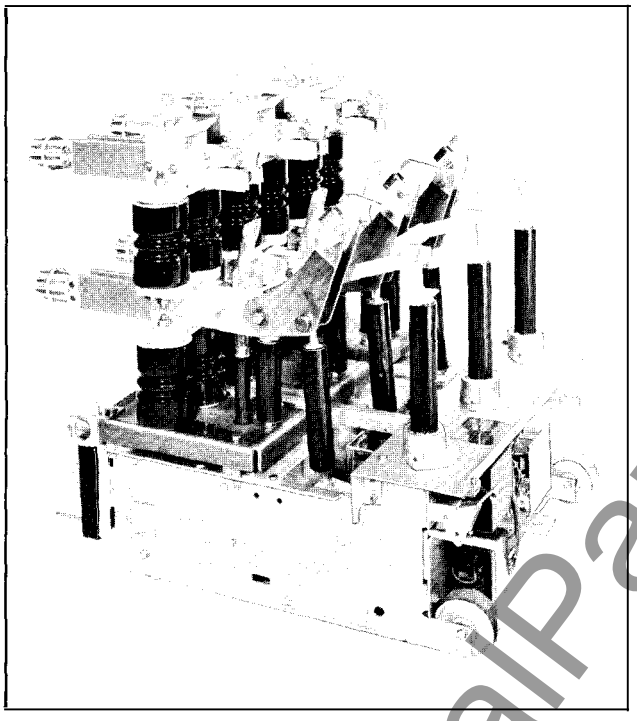

Fig. 1 *15 KV DHP Breaker with Post Insulators*

Pole units with post insulators are interchangeable with the unit porcelain poles. The "all porcelain to ground" insulation concept is maintained in the post insulator pole unit design. The post insulator design has been verified per tests outlined in ANSI C37.09 Table 1 for ratings shown in ANSI C37.06 Table 2 Lines 8, 9, and 11 through 16.

The breaker studs are comprised of multiple rectangular bars rather than of single round studs. The rectangular bars may be aluminum or copper. The coupling of the moving contact blade (copper) to the lower stud rectangular bars is made through a silver plated copper insert (.032 thick) bolted to the silver plated lower stud rectangular conductors. The hinge joint is therefore a silver plated copper to copper connection for all ratings, see Figure 2.

On the disconnecting end of the breaker, a round stud adapter is bolted securely to the rectangular stud conductors. The use of the round stud adapters permits the use of the same disconnecting "Finger Clusters" as typically shown in I.B. 32-253-2, Figure 13 Item 10, thus

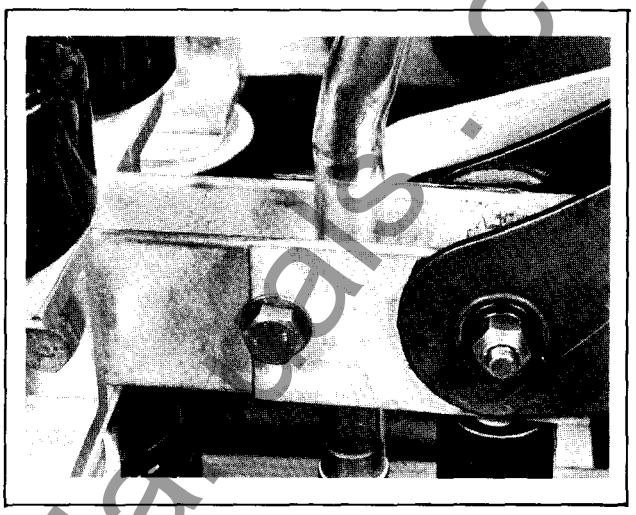

Fig. 2 *Hinged Contact Construction*

maintaining interchangeability between breakers with post insulator pole units and breakers with the unit pole design.

INTERCHANGEABILITY

The Post Insulator Design Breaker is:

a. Mechanically and electrically interchangeable with existing unit pole design breakers of the same rating.

(Note that type 150DHP750 and type 150DHP750C have different ratings and are not interchangeable with each other.)

b. Main and arcing contacts, both moving and stationary, are unchanged.

c. Contact separation in the breaker open position is unchanged. (Ref. Figure 20 I.B. 32-253-2).

d. Breaker moving contact speeds have been maintained, (Ref. I.B. 32-253-2 Pages 48 and 49).

e. Unit type porcelain poles on existing breakers can be replaced with post insulator type pole units.

INSTALLING ARC CHUTES

The 75DHP500 and 150DHP500 arc chutes must be held in position while the 0.5 diameter bolts are assembled. Figure 3 shows the recommended method of installation.

Because of its weight (225 pounds) the arc chute should be suspended from a crane or chain hoist. The center arc chute should be installed first. The 0.5 diameter bolts should not be tightened enough to interfere with raising the arc chute with the arc chute lifter, see Figure 19 I.B. 32-253-2. The arc chute SHUNT STRAP MUST BE TIGHTENED SECURELY before replacing the barrier on the breaker.

The 150DHP750C arc chute weighs 400 pounds and is secured at the rear with a 0.5 diameter pin held in place with (two) "E" rings. At the front it is secured with (two) 0.375 diameter studs. The arc chute SHUNT STRAP MUST BE TIGHTENED SECURELY before replacing the barrier on the breaker.

The 150DHP1000 arc chute weighs 440 pounds and is secured at the rear with 0.5 diameter pin held in place with (two) "E" rings. At the front it is secured with (two) 0.5 diameter bolts. The arc chute SHUNT STRAP MUST BE TIGHTENED SECURELY before replacing the barrier on the breaker.

BREAKER WITH CLOSE AND LATCH RATINGS 58000 AMPERES AND HIGHER

Pole unit operating shaft, Item 55 Figure 21 I.B. 32-253-2 has outboard supports for high close and latch ratings (58,000 to 77,000 amperes). See Figure 4 for location of supports. These supports are set at the factory and should not require adjustment in service.

ADJUSTMENTS

Adjusting the Trip Linkage

The trip linkage adjustment has been revised for this supplement. The last two paragraphs of Page 47 and the first three paragraphs of Page 48 and Figure 8 of I.B. 32-253-2 are therefore superseded and the following procedure and revised Figure 8 should be used. (Breakers manufactured and adjusted in accordance with the superseded procedures will operate satisfactorily. However if circumstances occur which require that a readjustment must be made the revised procedure should be followed.) With the breaker withdrawn from its switchgear housing remove the transparent plastic cover ("Lift plunger to trip") from in front of the trip coil. Charge the closing spring. With the breaker open and closing spring charged proceed as follows: (Ref. Figs. 8A and 8B).

1. Loosen locking nut (item 18).

2. Referring to Fig. 8B turn the tripping cam adjusting screw (Item 17) "in" - Clockwise - until the roller on the front end of the tripping latch (item 2) positively engages the latch surface of the tripping trigger (item 10) - zero clearance. Do not tighten beyond a nominal positive engagement.

3. Raise the tripping trigger approximately one inch. The trigger will be held up in this position (similar to condition shown in Fig. 8A).

4. Back the trip cam adjusting screw "out" VERY SLOWLY until the trip latch roller and tripping trigger just reset - (as shown in Fig. 8B except zero clearance). Then back the adjusting screw "out" one quarter turn additional. At this setting there will be a small but noticeable clearance between the roller and the tripping trigger.

5. Several tests may now be made to verify whether the adjustment is adequate.

a. Press down on the tripping trigger until the trigger-roller clearance is zero. Remove the pressure and the clearance should be restored freely. If not, back out the adjusting screw slightly and repeat the test.

b. After the "press down" test in 4a has been completed successfully, raise the tripping trigger about one inch and lower it slowly to its reset position. The trigger should reset freely to the previously set clearance positions.

If not, back "out" the adjusting screw an additional small amount and repeat the test.

c. After all adjustments have been made and the above tests have been successfully completed secure the adjustment by tightening the locking nut (item 18) while holding the tripping cam adjusting screw in its finally adjusted position.

d. The clearance (Fig. 8B) obtained on most breakers will be in the range .005 to .015 inches. (If a gap gage is used to check the clearance care must be taken to be sure the roller is not raised by insertion of the gage). See Par. 7 following.

6. A further check on the adequacy of the adjustment requires the breaker to be operated.

a. With the breaker open and the closing spring discharged, charge the closing spring. The tripping trigger and trip latch roller should freely assume the reset position with clearance as shown on Fig. 8B immediately after the closing spring is fully charged. If not, unlock the locking

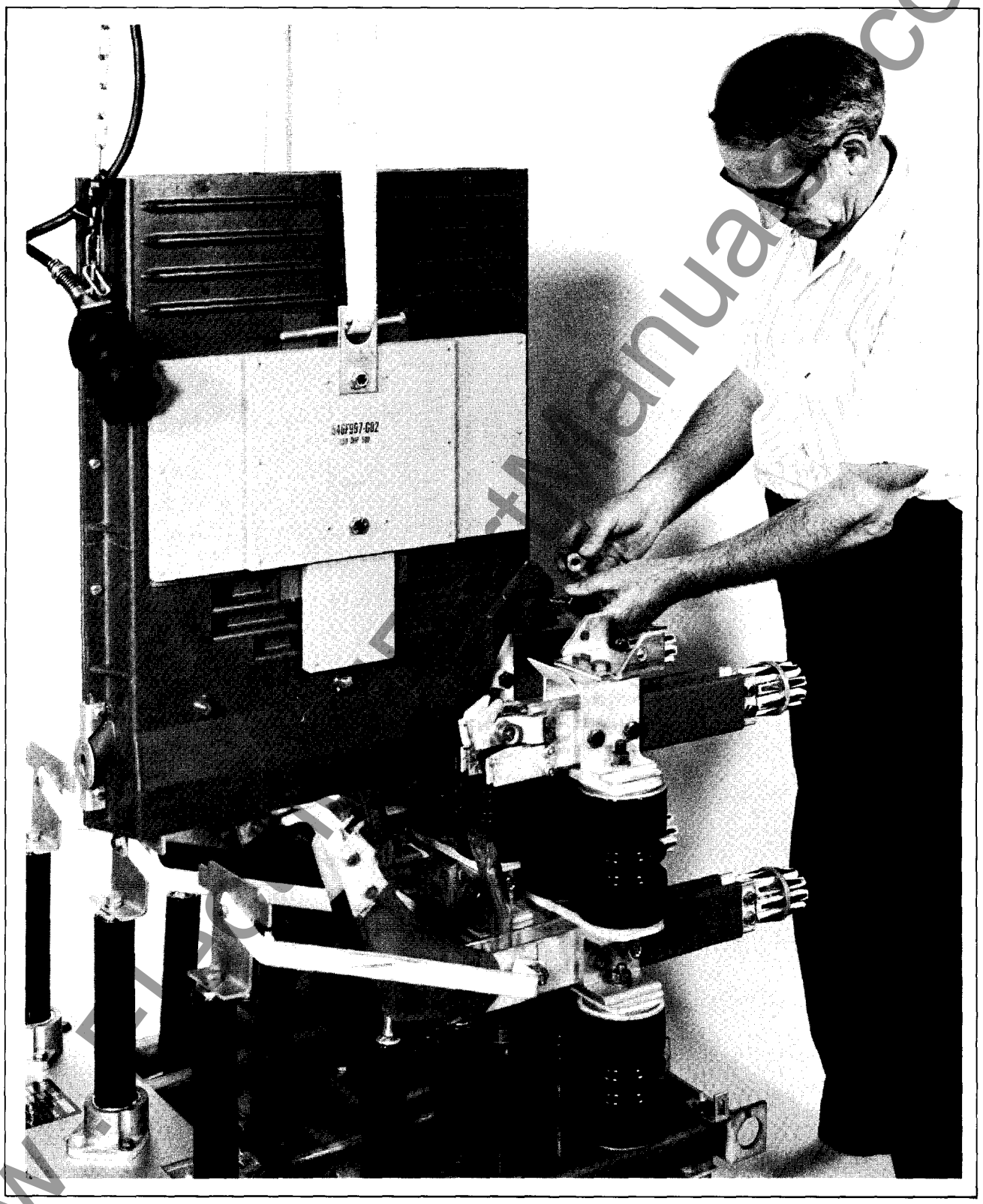

Fig. 3 *Installing 150DHP500 Arc Chute*

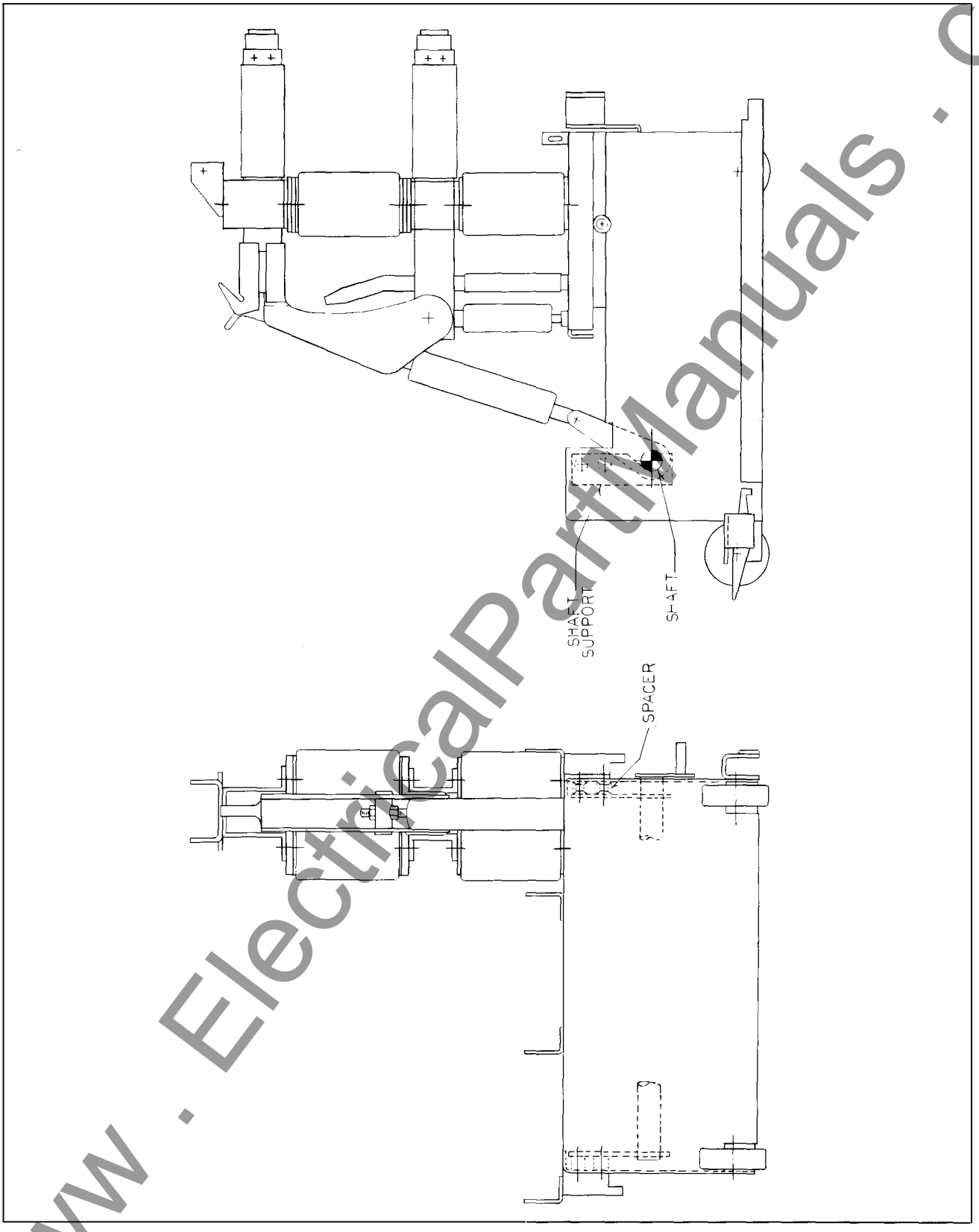

Fig. 4 *Operating Shaft Supports*

nut, increase the clearance, tighten the nut and repeat the test.

b. Close the breaker by raising the "lift to close plunger". Breaker should close and remain closed; it should not "trip free". If a "trip free" operation occurs the clearance between the tripping latch roller and the tripping trigger is too large. (Repeat Steps 2, 3, 4 and 5 to reduce the clearance).

c. For safety after the adjustment procedure has been completed, close the breaker to discharge the closing spring, then trip the breaker.

d. Replace the transparent plastic cover ("Lift plunger to trip").

7. The normal clearance between the tripping latch roller and the tripping trigger in reset position Fig. 8B will usually be in the range of .005 to .015 inches. This clearance may vary from breaker to breaker and may increase slightly as a breaker accumulates operations. It is desirable to maintain the clearance within the stated range, but breakers with clearances of .032 inches and more have successfully operated. The stated range therefore should be considered as a practical guide. It is not a mandatory precision measurement requiring frequent readjustment.

8. Although Figs. 8c and 8d have not been utilized in describing the trip latch adjustment procedure, they have been included to show the position of the mechanism parts for all breaker "closed" conditions. The revised Figure 8 may be used in conjunction with the description of the Stored Energy Mechanism on Pages 11 and 12 of I.B. 32-253-2.

Contact Adjustment

For both designs of breaker, whether the unit pole types or the post insulator types, contact penetration is accomplished by changing the effective lengths of the movable contact lift rods (Ref. I.B. 32-253-2 Figure 14 Item 6 for a typical lift rod.) The lift rod has a threaded stud at one end which passes through a hole in the movable contact lift rod pin (same figure Item 30). The lift rod is coupled to the pin by means of adjusting nuts and lockwashers (same figure items 7 and 8). The pin is retained by holes in the moving blade assembly. By changing the positions of the adjusting nuts the effective length of the lift rod can be increased or decreased.

To adjust the contacts the lift rods are loosely coupled to the moving blades and the breaker is closed and latched using the maintenance closing handle. Starting with the center pole advance the lower adjusting nut on the lift rod until the moving main contacts engage their respective stationary main contacts (Ref. I.B. 35-253-2 Figure 20). As arcing contacts and main contacts make initial engagement the moving contacts should be centered on the stationary contacts so as to touch evenly on both stationary fingers. Stationary fingers may be bent slightly with soft mallet blows if required to accomplish this. Spacings between stationary arcing fingers and stationary main fingers as shown on Figure 20 I.B. 35-253-2 must be maintained.

When moving main contacts have penetrated the stationary main contacts the appropriate amount (see below) the top adjusting nut should be hand tightened. The procedure should then be repeated on the two outer poles. When completed this will serve as an initial adjustment. Now trip the breaker and dynamically reclose it several times. (Solenoid breakers should be closed electrically. Stored energy breakers may be closed electrically or mechanically by charging and releasing the closing spring.) Check the contact penetration and readjust the effective lift rod length as required starting with the center pole first and then the outside poles. Recheck by dynamically closing the breaker again.

When a suitable adjustment of all contacts has been achieved lock the adjusting nuts by holding the lower adjusting nuts and tightening the upper adjusting nuts on the lift rods. A final closing operation to check the contact penetration after locking is desirable. Contact penetration may vary slightly from one pole to another and from one blade to another on the same pole. Such variation is acceptable if each contact is aligned within the applicable tolerance range.

For the *Unit Pole Design of Breaker only* the rear edge of the moving main contact should be in line with the front edge of the stationary main contacts as illustrated in I.B. 35-253-2 Figure 20. The adjustment tolerance range is plus or minus 0.032 inches. **CAUTION**: Do not "over-adjust"! Over-adjustment can significantly increase the stress in the pole unit.

For the *Post Insulator Design of Breaker only* the rear edge of the moving main contact should *penetrate 0.060 inches beyond* the front edge of the stationary main contact. The adjustment tolerance range is plus or minus 0.040 inches.

For additional information on contacts refer to Pages 44, 46, and 47 of I.B. 32-253-2.

RENEWAL PARTS

The 15 KV post insulator pole unit is assembled in a rigid fixture at the factory to assure correct adjustment and alignment of all parts. The complete pole unit will be supplied as a renewal part.

Refer to Figure 14 I.B. 32-253-2 for main contact fingers, items 3 and 41 and arcing contacts, items 15 and 21. Moving main contact arms are shown in Figure 15, items 7, 8, 9, and 10.

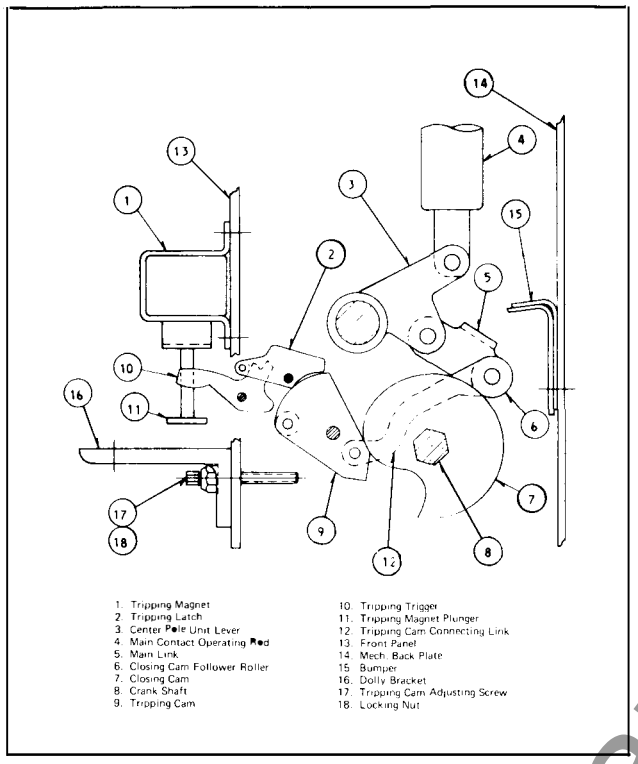

Fig. 8a *Breaker Open and Spring not Charged*

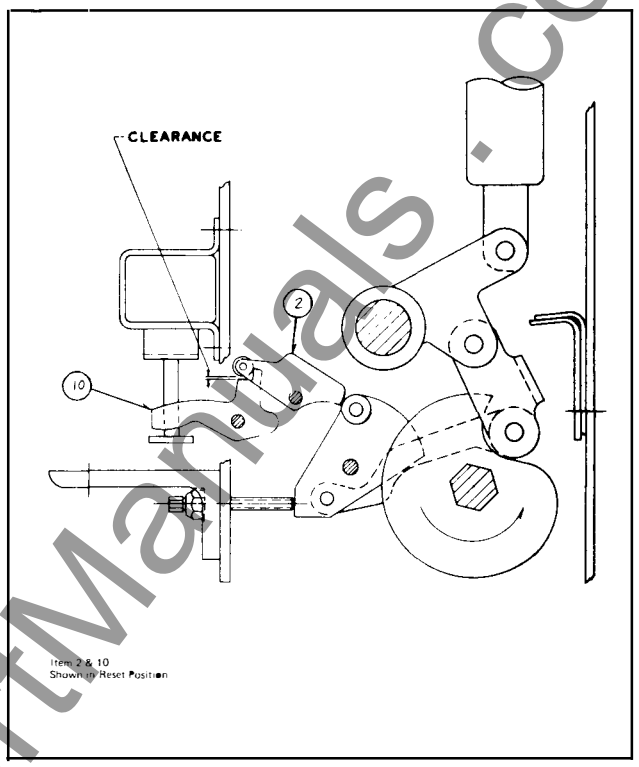

Fig. 8b *Breaker Open and Spring Charged*

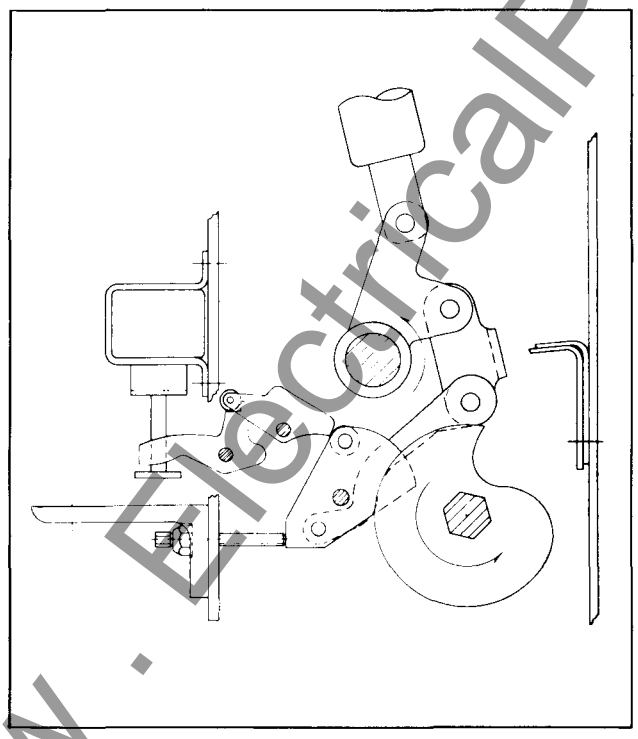

Fig. 8c *Breaker Closed and Spring Charged*

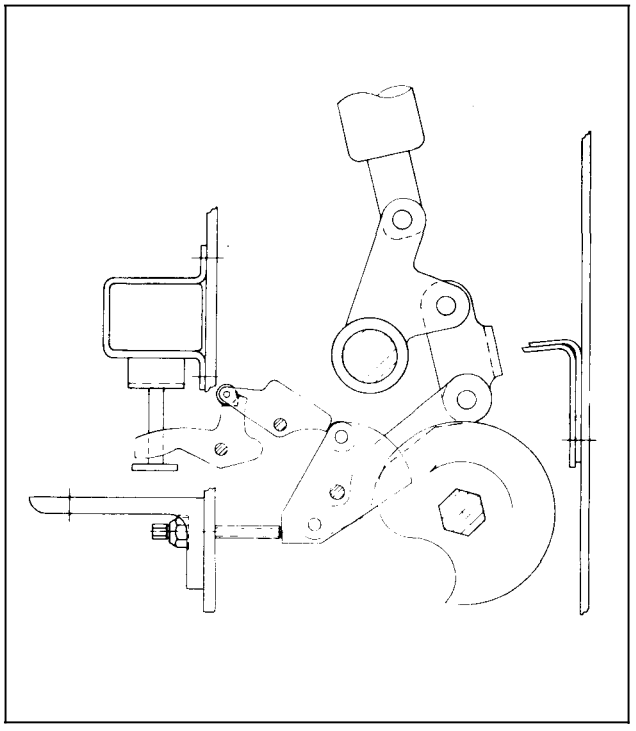

Fig. 8d *Breaker Closed and Spring not Charged*

Fig. 8 *Trip Linkage Configurations*

Memorandum

Memorandum