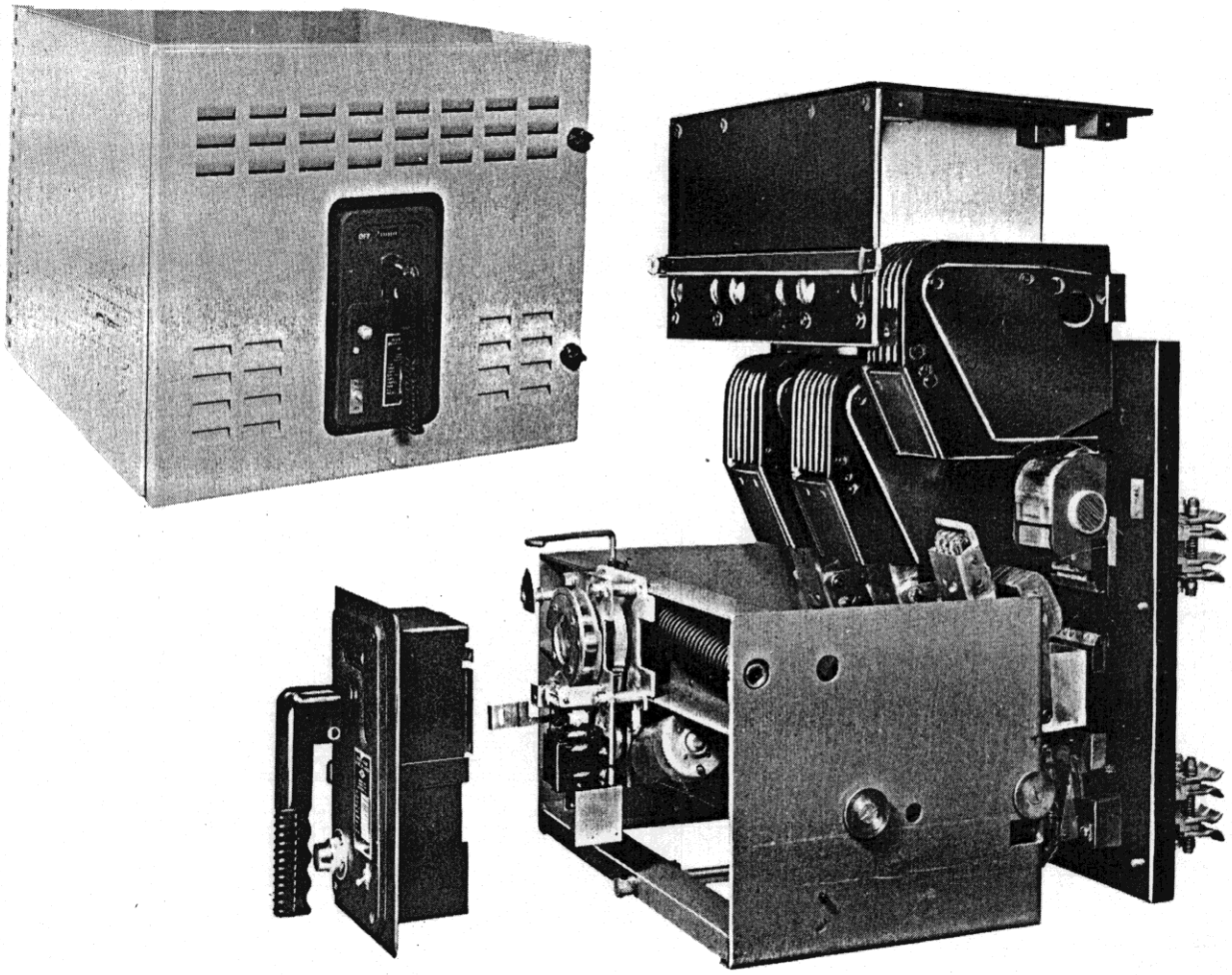
C–3–413
August, 1964

INSTRUCTIONS

FOR THE CARE AND MAINTENANCE OF

TYPE H
AIR CIRCUIT BREAKERS



FPE CANADA LTD.

FEDERAL PACIFIC ELECTRIC OF CANADA

GRANBY TORONTO VANCOUVER

TYPE H AIR CIRCUIT BREAKERS

MAINTENANCE INSTRUCTIONS

FOR

TYPE H AIR CIRCUIT BREAKERS

LIST OF CONTENTS

TYPE H AIR CIRCUIT BREAKERS

FPE

INTRODUCTION

FPE Type H low voltage power circuit breakers are designed to provide many years of reliable service even under severe conditions. The mechanism design employs high throw-off toggles to ensure tripping even after long periods of inactivity. Current carrying parts are designed for low current densities and the extremely efficient tripping relays do not require high current density coils thus realizing a low temperature rise even when the circuit breaker is loaded to its full rating.

Normal maintenance and replacement of arc control parts can be made without special tools or resetting factory adjustments and thus maintenance shut down periods can be very short.

SHIPMENT

Each circuit breaker is carefully inspected and tested before leaving the factory and then packed by workmen experienced in the proper handling and packing of electrical equipment. Every circuit breaker should be examined immediately on receipt for any damage sustained enroute. If damage is evident or if indication of rough handling is visible, a claim should be filed immediately with the transportation company. FPE should be notified immediately if replacement parts are required.

STORAGE

Air circuit breakers should be stored in their shipping crates in the upright position in a clean dry area. Should the breaker get wet it must be thoroughly dried out using forced warm air over an extended period until "infinite" readings are obtained using a 600 volt megger.

UNPACKING

Crates used for domestic shipment of air circuit breakers are of open lattice work construction so that the breaker may be readily uncrated without damage. The breaker is bolted into the crate using its normal mounting holes so it is preferable to first remove top, front and sides of the crate. The breaker may then be unbolted and removed from the remaining crate. Do not lift the breaker by the rear connecting terminals or the operating handle. Lift on the steel channel at the front and hold the base to keep the breaker steady. The steel side plates will support the breaker but care should be taken to set the breaker on a level surface to avoid damage to the relays or the interlock linkage on draw out type breakers. Check the breaker thoroughly to see that no parts of the breaker have been damaged or forced out of alignment during shipment.

LOCATION

Unless the circuit breaker enclosure is specifically designed for outdoor or unusual service conditions, circuit breakers should be installed in a clean dry place which is free from atmospheric contaminants and where good ventilation can be secured. Sufficient space should be provided to make connections and so that the breaker is readily accessible for operation and maintenance. Reference should be made to local code regulations.

MOUNTING

Circuit breakers should be enclosed in sheet steel cases in accordance with recommended dimensions and in general these cases provide the mounting for the breaker.

Fixed mounted breakers are mounted with 4-3/8" bolts through the base, (Frame size 2 & 3 use ½" bolts), while drawout type breakers will roll in or out on rails which are fixed to the enclosure. A worm and nut assembly is used to pull the breaker either on or off the disconnecting contacts.

The mounting support should be a rigid structure able to withstand the impact of breaker closing and tripping.

CONNECTIONS

Before making any electrical connections to the circuit breaker, every precaution must be taken to ensure that all cables which are to be connected to the circuit breaker are safely de-energized. Breaker terminals are silver plated for maximum joint efficiency and cable connectors should be clean and free from dents or burns and bolted securely to the breaker terminals. Poor joints lead to breaker overheating and subsequent contact deterioration and eventual breaker failure so that considerable care should be exercised in making these primary connections.

Cables or bus connections should be properly supported so that the circuit breaker terminals are not subjected to unnecessary weight or strain. Any strain which at first has no apparent affect, may cause poor contact alignment after prolonged periods of vibration or shock from normal breaker operations.

Meter shunts, resistors and similar devices which operate at relatively high temperatures should be mounted far enough away from the circuit breaker so that they do not contribute to breaker heating.

Control circuit wiring where applicable should be made in strict accordance with detailed wiring diagrams. Wiring connections are made to terminal blocks or to secondary drawout contacts and should be run in a supported and protected manner such that control wires cannot come into contact with primary connections.

TYPE H AIR CIRCUIT BREAKERS

INSPECTION

Read this instruction book completely before proceeding with inspection.

Before line side cables are energized, the breaker should be thoroughly checked and operated to ensure trouble free operation when it is placed in service. The following points should be specifically checked:

1. Make visible inspection after installation to ensure no parts have been damaged or forced out of alignment.
2. Check door interlock lever (see page 5) for freedom of movement and block in depressed position. This will allow normal breaker operation with the door open.
3. On drawout breakers check the drawout mechanism to see that the breaker rolls freely on the rails and that the worm engages the nut and pulls the breaker completely home on the contact. There should be approximately 1/8" clearance between the male stab and the contact finger spacer.
4. On drawout breakers check the drawout interlock. The interlock should be free with the breaker fully engaged or in the test position but should ride up on the wedge to trip the breaker as it moves from either position.
5. Check contacts to see that they are clean and free of foreign material.
6. Check any control wiring to ensure it has not been damaged during installation.
7. Check overload relays. Push on armature to ensure that the relay will trip the breaker. If moderate force is used the relay armature will move slowly because of the delay characteristics.

   A heavier force will extend the instantaneous springs and should trip the breaker immediately. Note that a small amount of oil seepage may occur during shipment if the breaker has not been in the upright position but the relay design employs sufficient cavities to trap ample amounts of oil for relay operation.

8. Close and trip the breaker several times to ensure correct operations. Note that interlocks should be voided or in normal released position so that the spring closing mechanism will pick up the contacts and thus avoid discharging the mechanism without its normal load. **Discharging the spring closing mechanism without load imposes severe stresses on the linkage and should be avoided.**

CLOSING THE BREAKER

As these breakers are complete stored energy as opposed to spring assisted closing, the energy for closing must be stored in the main spring before the breaker can be closed.

MANUAL CLOSING

The handle is rotated counter-clockwise to the upright position to engage the spring charging cam. Rotating the handle through 180° will then completely charge the springs. A rachet mechanism allows several short strokes instead of one 180° single stroke if preferred and also prevents any spring fly back during the charging stroke. The springs can be charged when the breaker is closed which will allow one immediate reclosure. Pressing a mechanical push button on the face plate releases the energy in the compression springs to close the breaker.

ELECTRICAL CLOSING

A universal ac/dc 120 volt ¼ H.P. motor is used to wind the spring closing mechanism and a shunt close releases the stored energy to close the breaker. Upon supplying control power with the breaker open, the motor will automatically charge the spring (time 2-4 seconds). Pressing a close button either on the face plate or at a remote location will then close the breaker. When the breaker is tripped the motor will immediately rewind the mechanism to charge the spring ready for the next close operation.

An emergency closing handle is supplied which can be used in the event of control power failure. The handle is inserted into the faceplate connection and is used in the same manner as for manual closing to store the energy in the spring. To close the breaker insert the opposite end of the handle in the small hole to the lower right as illustrated, figure 1, page 5 .

MAINTENANCE

The breakers have been manufactured and tested in accordance with NEMA standards SG-3 and to ensure the safety and the successful functioning of connected apparatus which depends upon the proper operation of the circuit breaker, the circuit breaker must have regular, systematic care and inspection.

The following points require special attention:

1. Be sure that the circuit breaker and its mechanism are disconnected from all electric power, both high voltage and control circuit: also be sure that the main closing spring is discharged before being inspected or repaired.

2. Inspect the operating mechanism periodically and keep it clean.
3. Examine the contacts frequently, see that they are aligned and that contact surfaces bear with firm uniform pressure. Replace badly pitted or burned contacts before they are burned away sufficiently to cause damage to other parts of the apparatus.
4. The contact members of all types of disconnecting or interrupting devices must be kept clean and bright to insure maximum operating efficiency. It has been found by experience that operating the circuit breaker several times at intervals of not over two weeks will remove the effects of oxidation and materially prolong the effective life of the circuit breaker. It is recommended that this practice be followed except that a circuit breaker which is operated every few days will not require much attention.
5. See that bolts, nuts, washer, clips and all terminal connections are in place and tight.
6. Clean the circuit breaker at regular intervals where abnormal conditions such as salt deposits, cement dust or acid fumes prevail to avoid flashovers as a result of the accumulation of foreign substances on the surface of the circuit breaker.
7. Always check for loose nuts and bolts after any maintenance work has been completed.

CIRCUIT BREAKER FACEPLATE

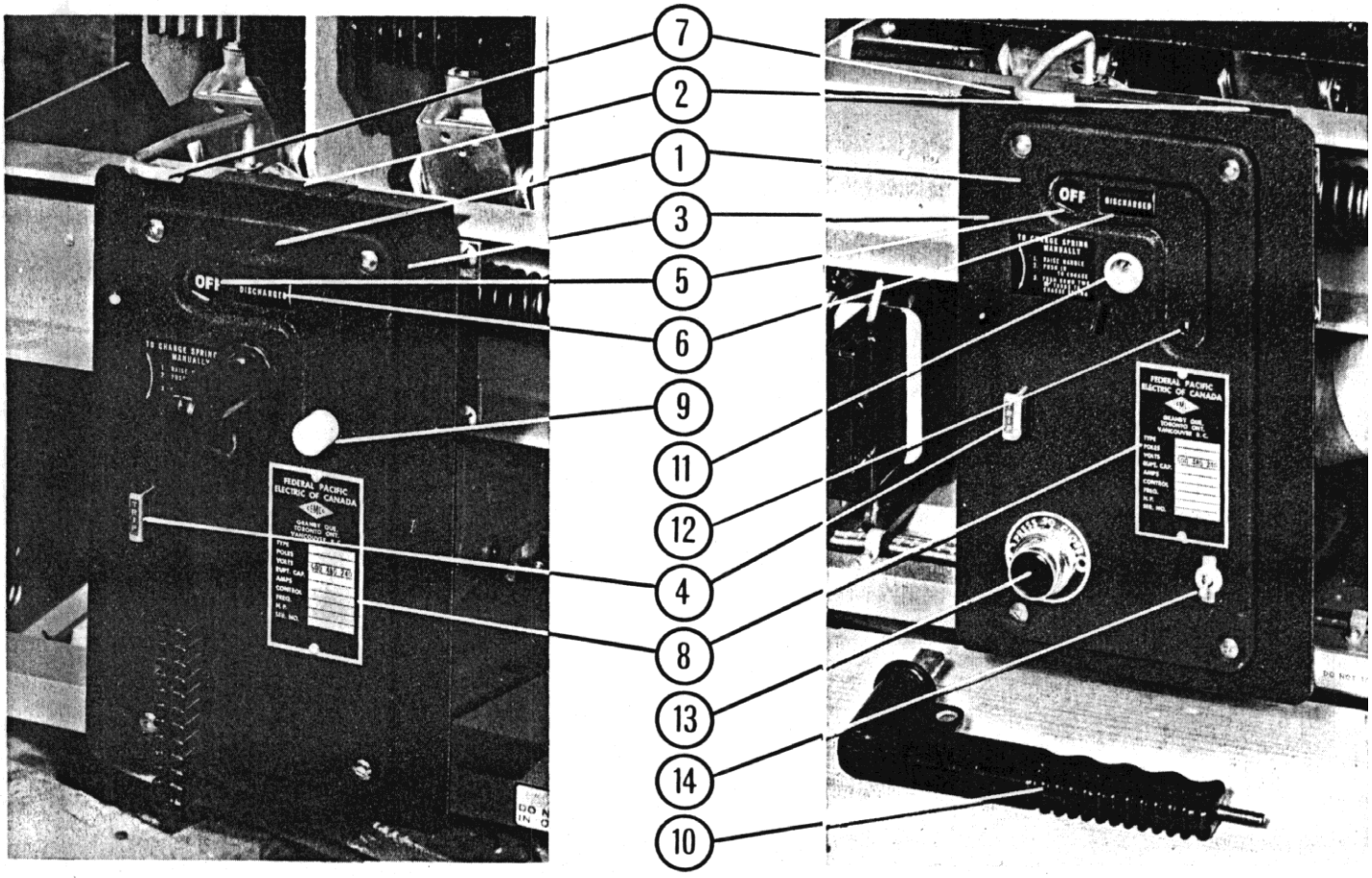


Figure 1a

Figure 1b

MANUAL

1. Front Plate
2. Frame
3. Floating Trim
4. Manual Trip
6. Spring charge indicator
7. Door Interlock lever
8. Rating plate
9. Close button

ELECTRICAL

10. Emergency close handle
11. Emergency spring charge
12. Emergency manual close
13. Local close button

REMOVING THE FACEPLATE

The faceplate assembly consists of three parts: (1) the front plate, (2) the frame and (3) the floating trim and it is mounted to the cross channel of the mechanism bracket.

To disassemble, first remove the 4 oval head screws in each corner of the front plate. In removing the front plate turn it to the left so it will slip over the "trip" lever (4). The floating trim will then be free to be removed. Note that one side of the trim is bevelled to correspond with the hinging of the front cover and it must be replaced correctly to ensure smooth action as the door closes over the faceplate.

The manual handle is captive in the front plate and may be removed by drawing out the ¼" rolpin holding the clutch to the shaft (See fig. 2).

STORED ENERGY MECHANISM

Before close inspection of the stored energy mechanism extreme care should be taken to ensure the spring is discharged. Tripping the circuit breakers DOES NOT discharge the spring. On electrically operated breakers the motor cut off switch must be used to prevent the motor from recharging the spring automatically. If the face plate indicator shows "CHARGED" closing the breaker will discharge the spring.

With the front plate and frame removed the complete mechanism is exposed and inspection and lubrication of moving parts is readily accomplished. Use a very light good quality machine grease such as lubraplate on the rachet assembly. A light machine oil can be used on parts where grease cannot be applied.

SPRING MECHANISM

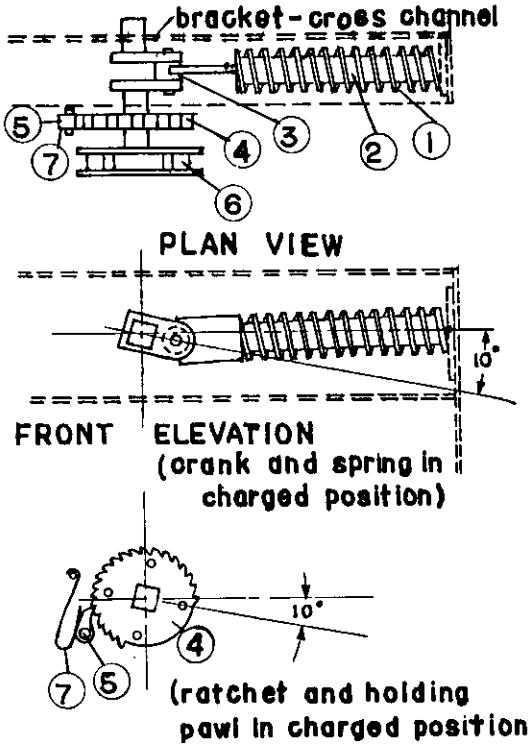
The spring mechanism is located in the steel cross channel and consists of seven parts (See fig. 2).

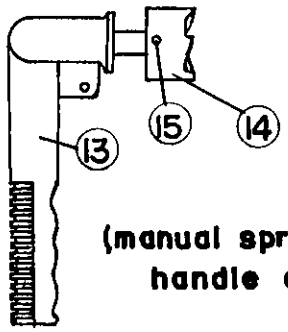
The spring is charged by turning the crank approximately 180° in a clockwise direction. The rachet and holding panel prevents any flyback during the charging stroke. The spring in the charged position is 10° over toggle and is held by a needle bearing cam.

SPRING RELEASE MECHANISM

The spring release mechanism is located behind the frontplate and below the holding cam assembly and consists of 5 parts (see Fig. 3).

When the spring is fully charged the needle bearing of the holding cam assembly is stopped by the ground steel cam (8). When the manual close button is pressed or when the shunt close is actuated, the cam is rotated which releases the charged spring mechanism.





13. Handle
14. Clutch
15. Rolpin

Figure 2 – Spring Mechanism

1. Main spring
2. Spring guide
3. Crank
5. Holding pawl
6. Holding cover
7. Holding pawl spring

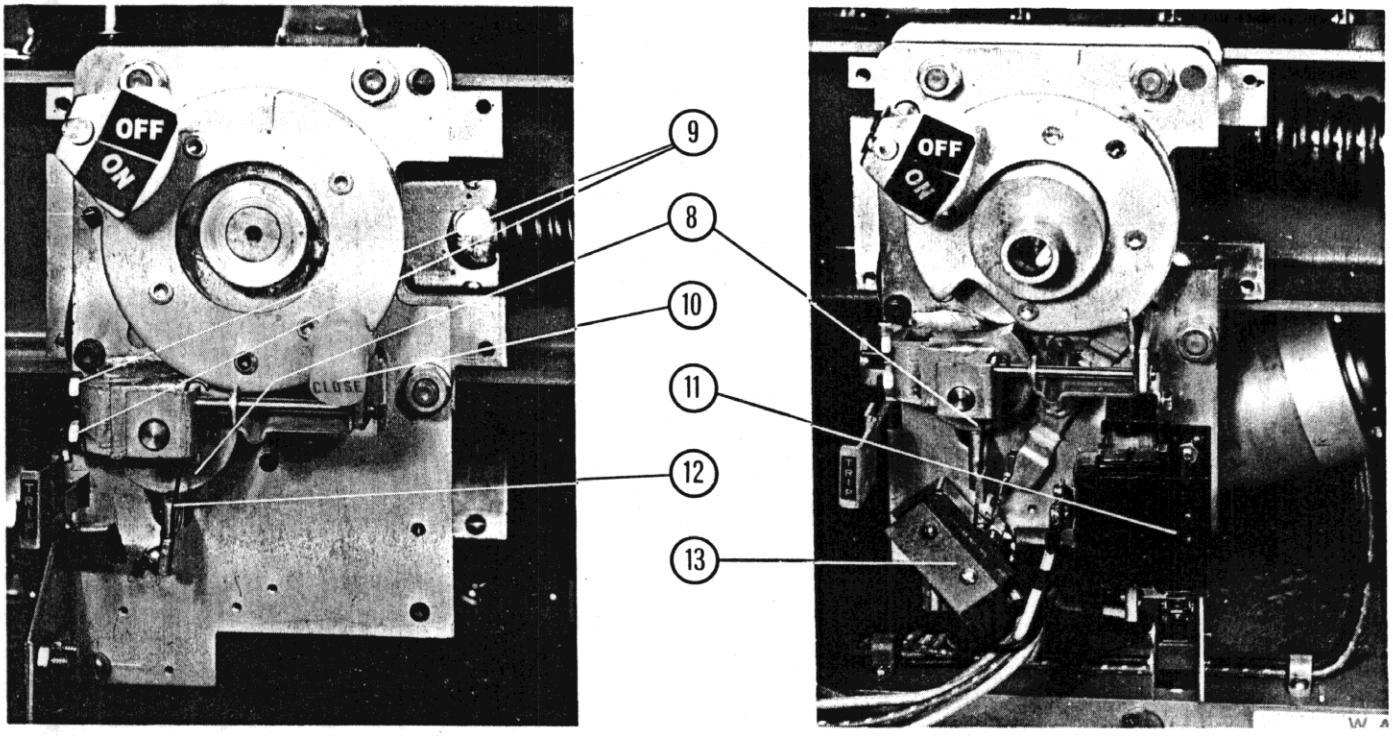


Figure 3a
Manual Mechanism – Spring Charged

SPRING RELEASE MECHANISM

Figure 3b
Electrical Mechanism – Spring Discharged

8. Ground steel cam
9. Two set screws
10. Manual close button (when used)
11. Shunt close (when used)
12. Return spring
13. Micro Limit Switch

MOTOR MECHANISM

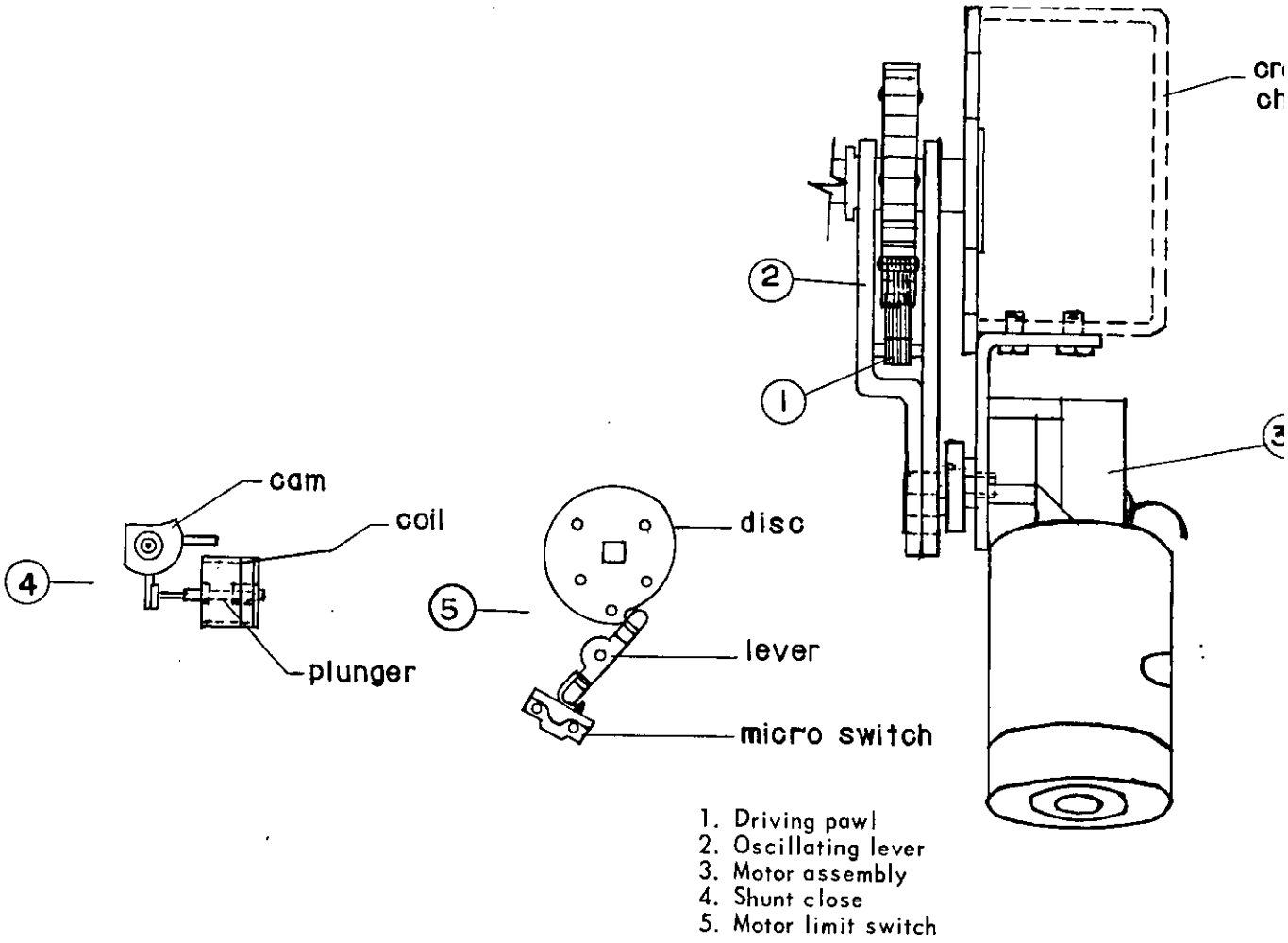
The motor mechanism consists of a ¼ h.p. universal motor with a worm gear reduction. An eccentric lever is mounted on the end of the worm gear redution and drives the oscillating lever. The driving pawl is mounted on the oscillating lever and with each stroke of the lever drives the ratchet around one tooth at a time until the spring is charged and the limit switch is actuated to cut off the motor.

To remove the motor mechanism, remove the two ¼ – 20 Allen Head screws inside the steel cross channel (see Fig. 4). Tilt the motor in to disengage it from the oscillating lever and remove the assembly from the breaker. The eccentric driving lever is threaded onto the end of the worm gear reduction of the motor. Tap lightly in a counter clockwise direction to remove the eccentric and then remove the motor mounting bolts.

A special grease is used in the worm gear reduction assembly and should not require replacement. If necessary use only Led-Plate compound 250.

The following table lists the standard ratings of motors. Note that for a.c. applications 115 volt motor is used throughout and a control transformer is supplied for voltages other than 115V.

RATED CONTROL VOLTAGE	CLOSING VOLTAGE RANGE	MAXIMUM MOTOR CURRENT AMPS	SHUNT CLOSE AMPS	TRIPPING VOLTAGE RANGE VOLTS	SHUNT TRIP AMPS
48V dc	–	–	–	28 – 60	2.4
125V dc	90 – 130	11	0.89	70 – 140	0.89
250V dc	180 – 260	6	1.10	140 – 280	1.10
115V ac	95 – 125			95 – 125	
230V ac	190 – 250	Inrush 12	1.4	190 – 250	1.4



Electrically operated breakers use a motor to rotate the crank and fully charge the spring.

Figure 4– Motor Mechanism

BREAKER MECHANISM

The breaker mechanism is attached to the spring closing mechanism by means of a closing crank (1) connected to an eccentric link (2) which pivots on a uni-ball (3). See figure 5(a)

The breaker is closed by rotating the closing crank clockwise through approximately 180°. As the crank starts to move the linkage is prevented from collapsing by the latch bearing (4) resting against the ground steel cam (5). As the crank continues to rotate the pin (6) is pushed by the closing casting (7) up to the stops (8) located on the mechanism side plates. See Figure 5 (a).

The breaker is tripped by rotating the ground steel cam backwards which releases the latch bearing allowing the linkage to collapse.

When the breaker is open and the spring charged ready for closing, the latch bearing will have a clearance of 1/64" to 1/16" above the ground steel cam. Figure 5 (b).

If there is not sufficient clearance between the cam and the latch bearing the cam cannot return to its proper position and the breaker will not latch. After one attempt, the vibration may assist the cam to its proper location and the breaker will then close.

If the clearance is excessive, the latch bearing may bounce off the ground steel cam and the breaker will not close.

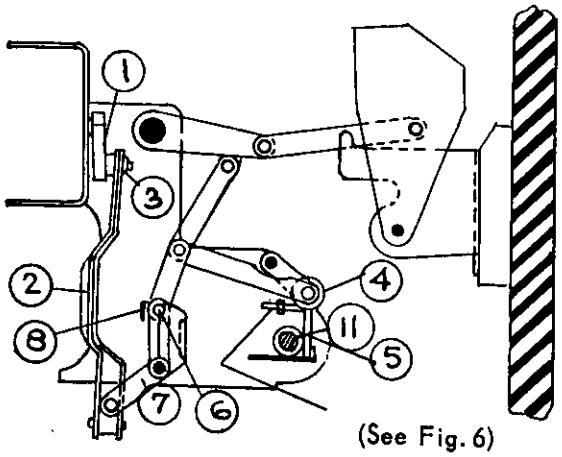


Figure 5(a)

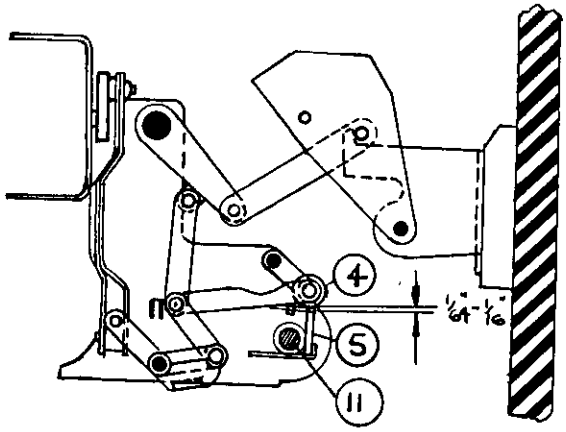


Figure 5b

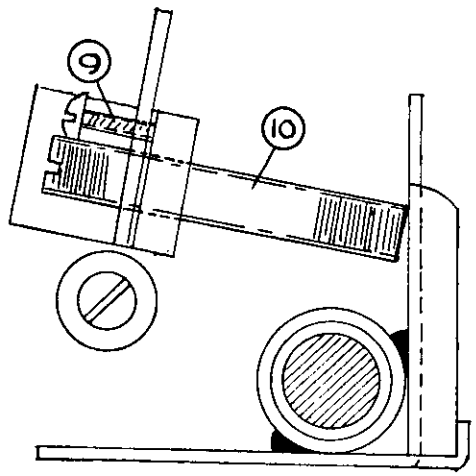


Figure 6

ADJUSTMENTS

During the course of manufacture each circuit breaker is operated up to 50 times. All adjustments are set and locked and should not require adjustment in the field. However should the breaker fail to operate correctly the following adjustments can be made.

1. Latch Adjustment

When the breaker fails to latch the spring mechanism discharges without carrying the contact assembly to the closed position. Without the inertia of the contact assembly to absorb the energy from the closing spring, severe stress is imposed on the closing mechanism and damage will result if this process is repeated.

To adjust the latch first loosen the lock screw (9). Turn the adjusting screw (10) counter-clockwise two or three turns to ensure proper latching. Close the breaker and then turn the adjusting screw clockwise slowly until the breaker trips. Then turn the adjusting screw back counter-clockwise one and one quarter turn and lock with lockscrew (9). If the breaker is subjected to severe vibration which results in nuisance tripping more latch travel is needed and one and a half turns can be used.

2. Holding Cam

If the holding cam does not reset properly it may be jarred when the closing spring is charged, the breaker will attempt to close as the closing spring is charged without pressing the close button or operating the shunt close device.

Referring to the spring mechanism shown in Figure 3, adjustments can be made as follows and should be tried one at a time.

1. The return spring (12) may require slightly more pressure. Bend the tail of the spring a little to increase the pressure.

2. The motor limit switch is operated by the holding cam and it may prevent the cam from returning against the top stop screw. Bend the operating lever of the limit switch to overcome this.

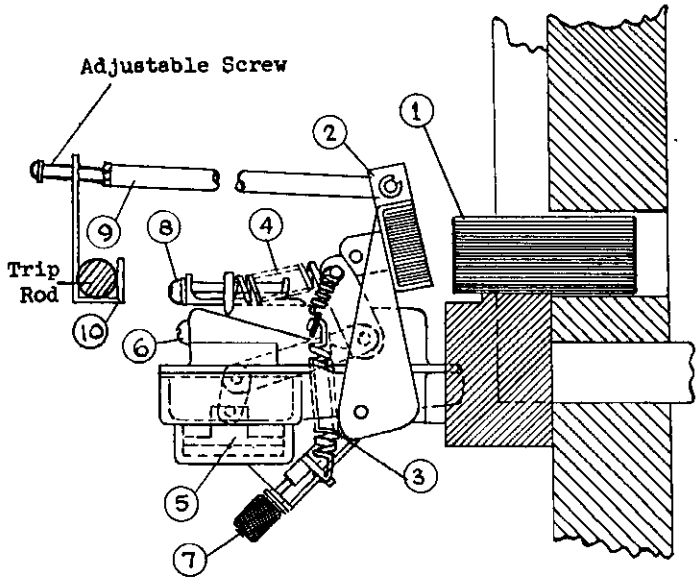
3. To adjust the holding cam itself release the lock nut on the top screw and turn counter-clockwise one quarter of a turn and relock. This increases the loading on the cam and it is important that the adjustment be made carefully to ensure that the resultant load will not be too heavy for the shunt close device.

TYPE H AIR CIRCUIT BREAKERS

OVERLOAD RELAYS

All type H breakers are supplied with the new type PA direct acting overcurrent relay. These relays are dual magnetic type consisting of long delay element and an instantaneous element.

A series coil is used on breakers below 600 amperes while a single conductor provides sufficient magnetic flux for all ratings over 600 amperes. The very efficient magnetic design permits operation of the relay at very low ampere turn values and thus the coil normally associated with air circuit breaker relays is completely eliminated for all ratings of 600 amperes and over. In addition, coils used on the lower ratings employ much lower current densities than usual for this type of device and thus will operate at much lower temperatures.



1. Fixed Yoke
2. Moving Armature
3. Long delay springs
4. Instantaneous springs
5. Delay mechanism
6. Oil filler hole
7. Long delay adjustments
8. Instantaneous adjustments

Figure 7

LONG DELAY CALIBRATION

The relays are calibrated at the factory at 80%, 100% and 160% of trip coil rating and may be adjusted in the field to these calibrated marks.

INSTANTANEOUS CALIBRATION

The relays are calibrated at the factory at 10 times the trip coil rating or for the range to suit the continuous rating of the breaker and may be adjusted in the field to these calibrated marks.

STANDARD TRIP RATINGS

Breaker Type	Overcurrent Trip Ratings (100% Calibration)	Instantaneous Trip Range (Adjustable)
25H-1	50, 70, 90, 100, 125, 150 175, 200, 225, 250, 300, 350, 400, 500, 600, 800, 1000, 1200, 1600	8 – 15 times Overcurrent Trip ratings
50H-1	200, 225, 250, 300, 350, 400, 500, 600, 800, 1000, 1200, 1600	8 – 15 times
	2000, 2500, 3000	4 – 10 times
75H-1	1200, 1600, 2000, 2500 3000, 3500, 4000	4 – 10 times
100H-1	4000, 5000, 6000	4 – 10 times

OIL FILLER HOLE

The relays are shipped from the factory filled with oil and should not require servicing. If the relays are disassembled they should be thoroughly cleaned with carbon tetrachloride and reassembled with care to ensure they are completely free of dirt or lint. Refill the relay with 20 cc of the replacement silicon oil using a squirt type oil can.

CHECKING RELAY OPERATION

Push on both sides of moving armature with gentle pressure. The armature will move slowly as the delay piston retards the movement. At a point before the armature meets the yoke, the delay action ceases abruptly and the armature should travel freely to meet the yoke. In so doing the insulated pull rod connected to the armature should pull the the lever on the trip rod to trip the breaker. Adjust the screw at the trip shaft end of the pull rod if necessary to ensure the breaker trips.

This procedure may be repeated with more severe pressure which will extend the instantaneous springs and allow the armature to touch the yoke and trip the breaker.

Reference should be made to the time current characteristic curves for proper settings to suit load conditions.

SELECTIVE TRIPPING ATTACHMENT

When a short delay is required under short circuit conditions a delay device is introduced to prevent the instantaneous action of the relay. Three calibrated delays or 5, 15 or 25 cycles at 6 times the instantaneous pickup are provided.

A mechanical escapement device is mounted on the moving armature of the relay to prevent its movement under short circuit conditions. The timing adjustment is made by the amount of extension of the escapement spindle. Release the locknut on the side and adjust to one of the calibrated marks.

MAIN CONTACTS

Main contacts are a silver alloy and should be clean, bright and free from pitting. They may be gently sanded if necessary using a fine sandpaper to remove pit marks. Avoid having particles fall into the mechanism.

If main contacts are severely damaged careful inspection of all current carrying parts should be made. Supporting pins, linkage and especially springs should be examined for damage due to excess heat. Annealed or distorted parts should be replaced.

HOOD

The hood is provided to restrict ionized gases from direct access to the steel enclosure and in addition carries interphase barriers. The hood is held in place as illustrated for the various types of breakers. The hood is an asbestos type material and will break if subjected to undue shocks, therefore, care should be used in handling.

ARC CHUTES

Where the hood does not have a front panel the arc chutes may be removed without removing the hood for inspection of contacts. A long handled screw driver is necessary to reach the mounting screws at the back of the base. The arc chute may discolour from arc interruption but will not need replacement unless heavy deposits of arc contact material are present or unless parts are distorted or cracked.

ARCING CONTACTS

Arcing contacts are subjected to burning every time the circuit breaker interrupts the current and should be inspected at regular intervals if the circuit breaker is operated frequently. They should always be inspected after the breaker has interrupted a short circuit and should be replaced if they are showing serious pitting and burning.

To remove the moving arcing contact from the breaker, remove the circlip and ¼'' dia. pin (3). Remove the braid connection by removing the ¼–20-round head machine screw. Examine the braid carefully for excessive broken strands or burned portions. Replace if necessary by disconnecting from the lower main contact bar. Replace in reverse order.

To remove the fixed arcing contact refer to Figure 8. Remove mounting bolts as indicated and replace.

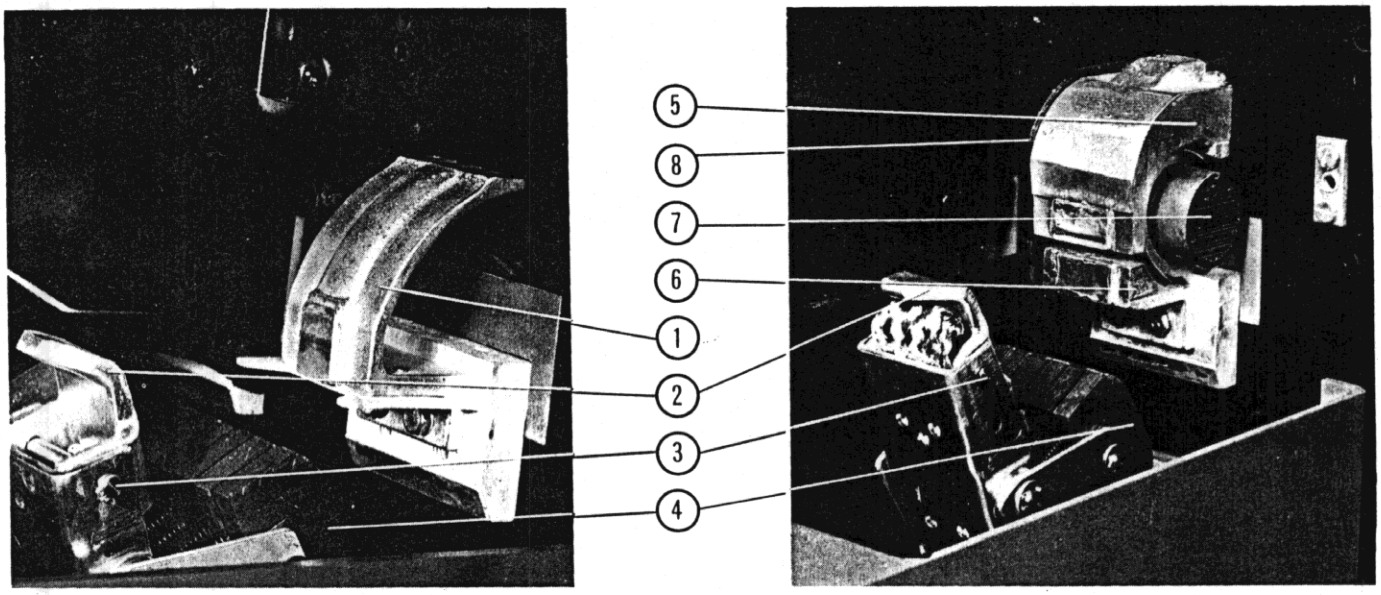


Figure 8a

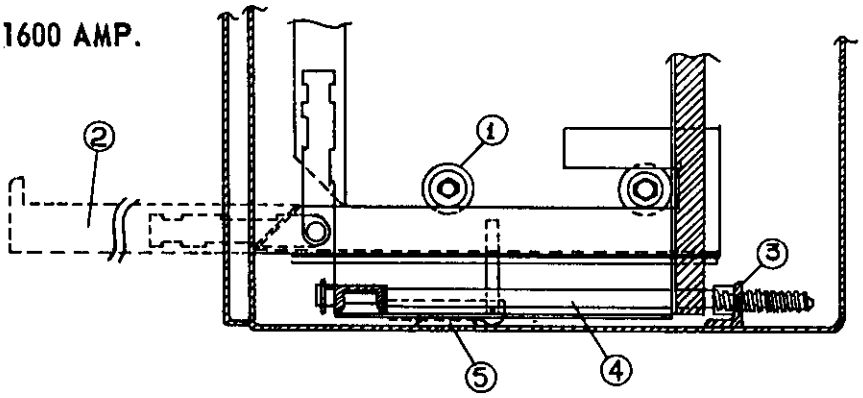
(1) Fixed Arcing Contacts 25H–1
(2) Moving Arcing Contacts
(3) Pin
(4) Main contact

Figure 8b

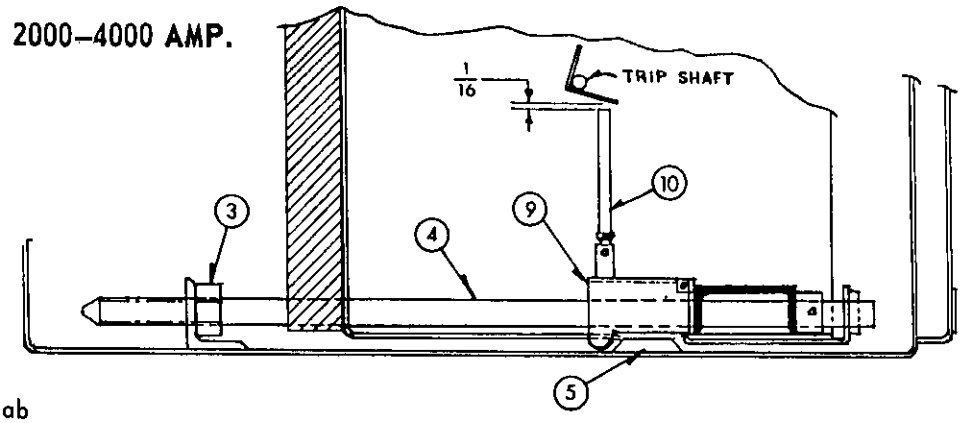
(5) Fixed Arcing Contact 50H–1
(6) Lower fixed arcing contact 50H–1
(7) Blowout coil
(8) Contact sideplate.

TYPE H AIR CIRCUIT BREAKERS

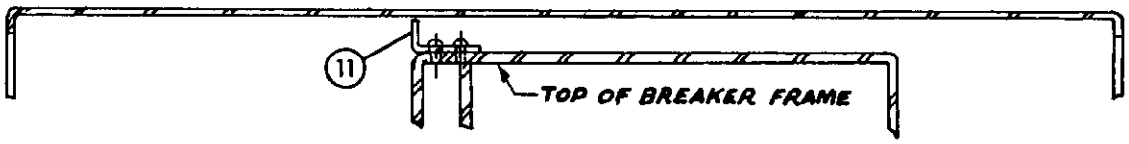
50–1600 AMP.



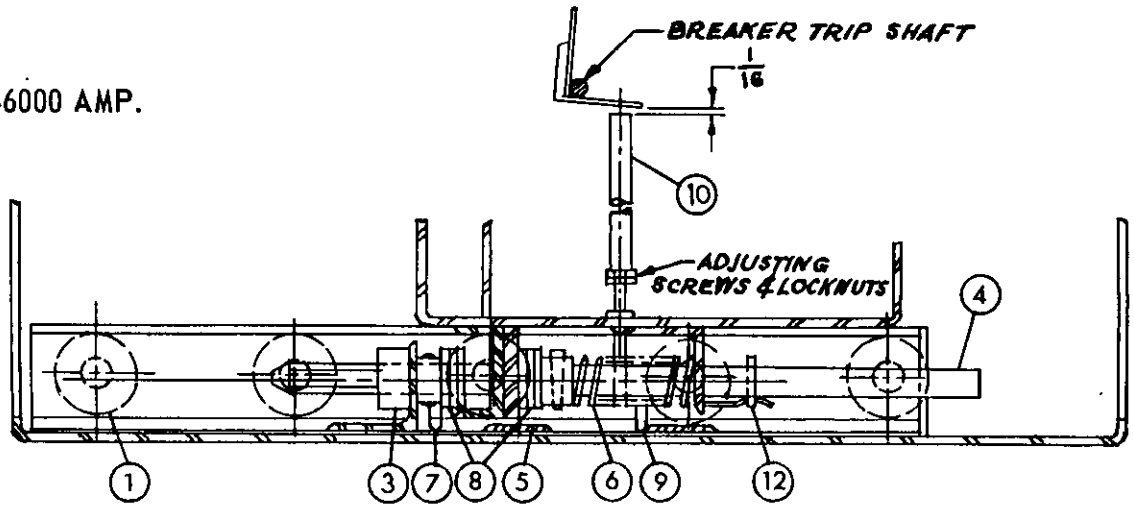
2000–4000 AMP.



(1) Roller
(2) Folding Rail
(3) Crank Nut
(4) Crankshaft
(5) Interlock cam
(6) Shock Absorber
(7) Control tab
(8) Thrust bearing
(9) Interlock lever tab
(10) Interlock trip rod
(11) Truck Stops
(12) Rolpin



5000–6000 AMP.



DRAWOUT CIRCUIT BREAKERS

All drawout circuit breakers are mounted on a three position carriage so that the breaker may be moved to any of its positions, connected, tested and withdrawn without opening the door.

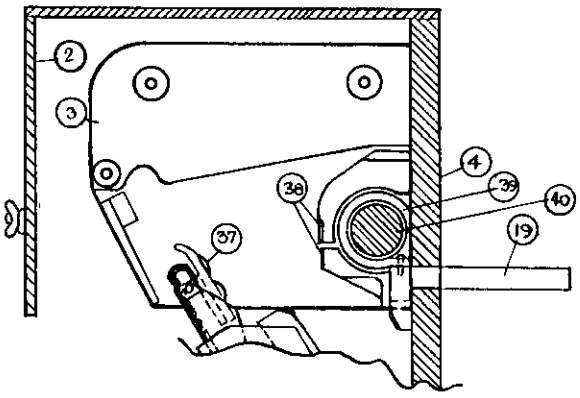
On the smaller frame breakers a folding rail assembly is used while the large frame breakers require a rigid self supporting truck. These are illustrated in Figure 9.

An interlock is provided which will ensure that the breaker is open when it is either engaging or disengaging the main contacts. The wedge is located in the bottom of the enclosure and the trip lever adjusted as shown in the diagrams above.

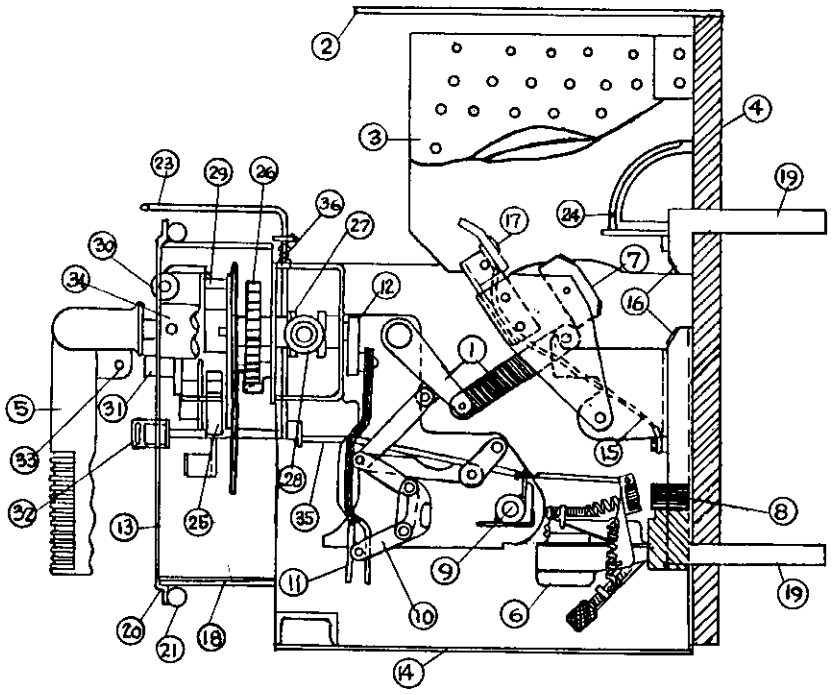
It is essential that the breaker trip after three turns of the crank when removing the breaker to ensure that the circuit is not broken on the drawout contacts.

If the breaker does not latch properly after it has been moved through this interlock position, check to see that the interlock has reset and the trip shaft has returned to its normal position and clearances are maintained as indicated.

1. Closing Link Assembly
2. Hood
3. Arc Chute
4. Base
5. Operating Handle
6. Dual Overload Relay
7. Main Moving Contact
8. Yoke
9. Trip Shaft
10. Closing Casting Link
11. Operating Eccentric Link
12. Crank Shaft
13. Faceplate
14. Spring Mechanism Frame
15. Braid
16. Main Fixed Contacts
17. Moving Arcing Contact
18. Faceplate Bracket
19. Terminals
20. Floating Trim
21. Floating Trim Springs
22. Trip Button
23. Interlock Lever
24. Fixed Arcing Contacts
25. Ground Steel Cam
26. Ratchet Wheel
27. Spring Crank
28. Main Spring
29. Holding Cam Assembly
30. Spring Charge Indicator
31. Manual Close Button
32. Provision for Padlocking Trip Button
33. Provision for Padlocking Operating Handle
34. Handle Clutch
35. Manual Trip Rod
36. Interlock Lever Spring
37. Moving Arcing Contacts
38. Fixed Arcing Contacts
39. Blowout Coil
40. Blowout Core



SECTION VIEW 25H-1

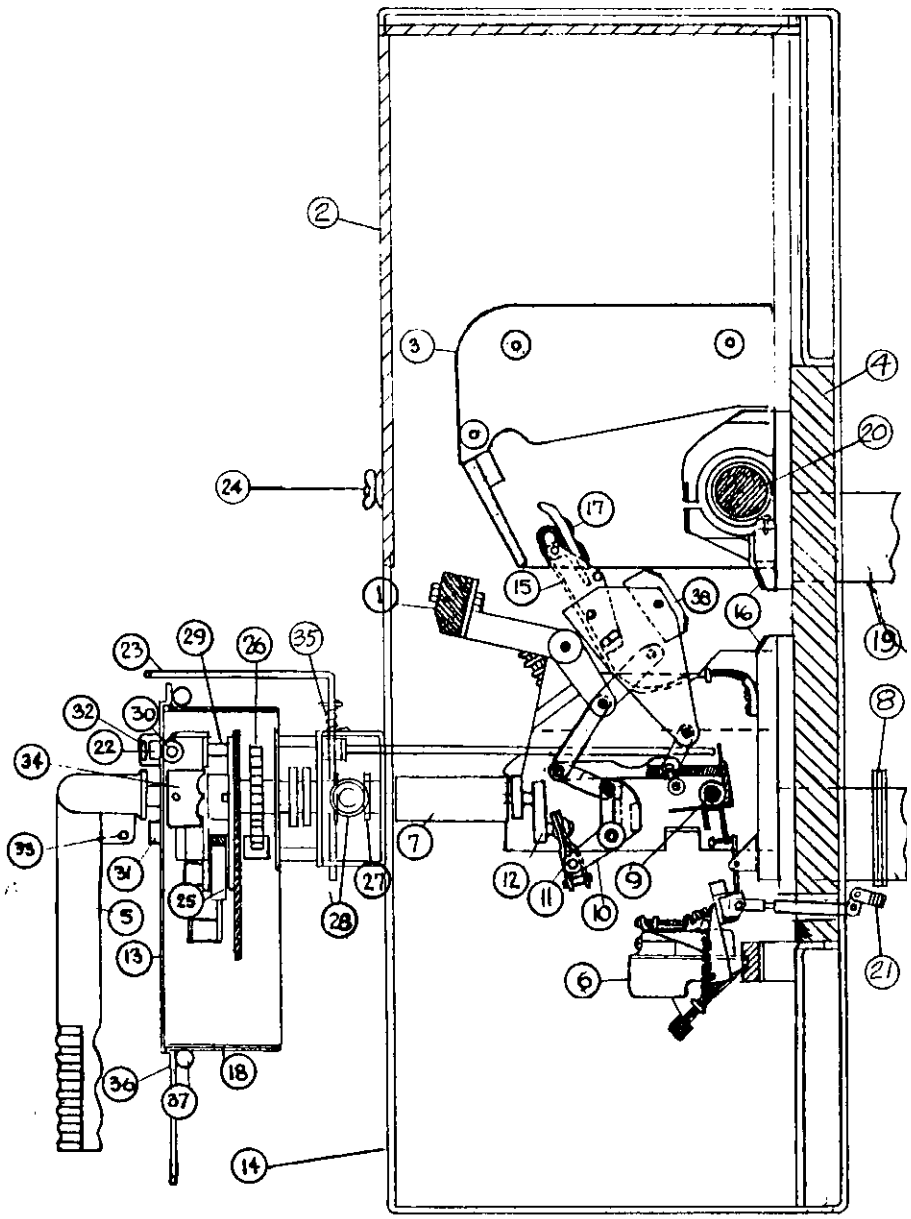


Section View 50H-1, 75H-1

TYPE H AIR CIRCUIT BREAKERS

Section View 100H-1

1. Tie Bar
2. Hood
3. Arc-chute
4. Base
5. Operating Handle
6. Overload Relay
7. Insulated Coupling
8. Yoke
9. Tripshaft
10. Operating Lever
11. Operating Link
12. Crankshaft
13. Faceplate
14. Spring Mechanism Frame
15. Braid
16. Main Contacts
17. Arcing Contacts
18. Faceplate Bracket
19. Terminals
20. Blowout Coil
21. Armature
22. Trip Button
23. Interlock Lever
24. Wing Nuts
25. Ground Steel Cam
26. Ratchet Wheel
27. Spring Crank
28. Main Spring
29. Holding Cam Assembly
30. Spring Charge Indicator
31. Manual Close Button
32. Provision for Padlocking Trip Button
33. Provision for Padlocking Operating Handle
34. Handle Clutch
35. Interlock Lever Spring
36. Floating Trim
37. Floating Trim Springs
38. Moving Main Contacts



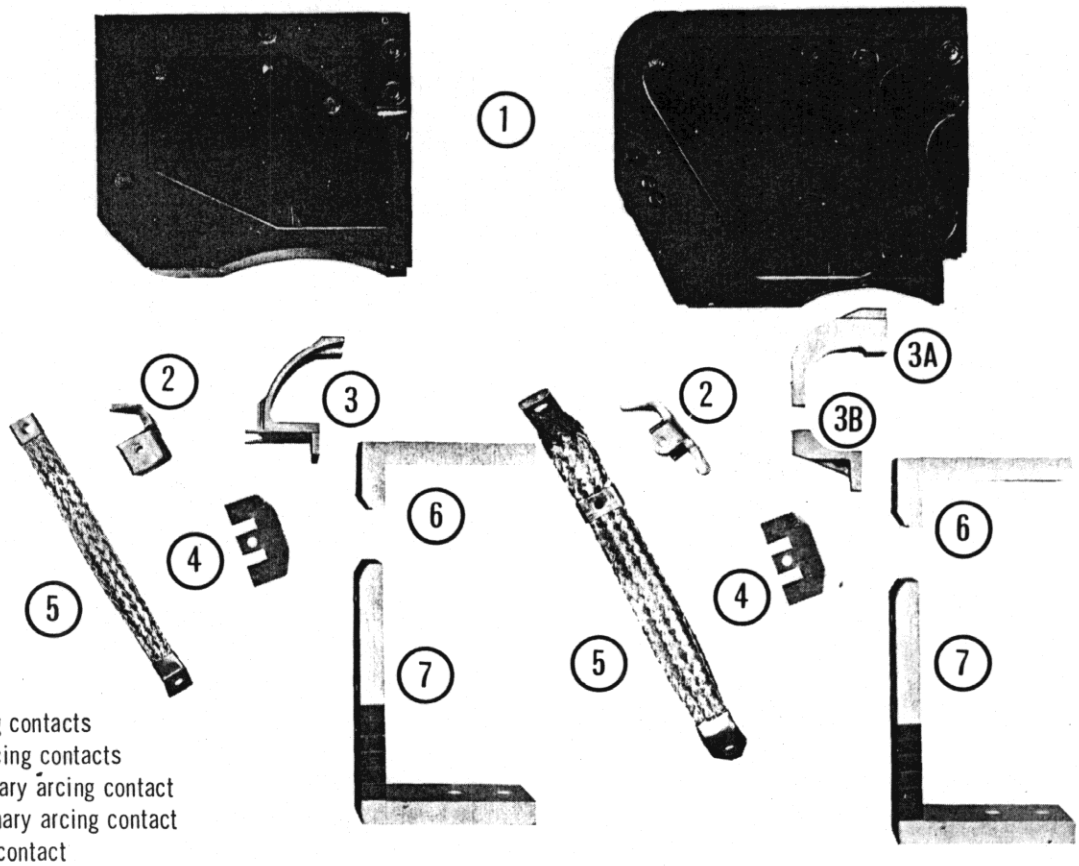
SPARE PARTS

It is recommended that sufficient spare parts be carried in stock to enable the operators of circuit breakers to promptly replace any worn, broken or damaged parts. It will be readily appreciated that a stock of parts reduces delays in service and saves time and expense. The following spare parts are recommended as minimum requirements for a breaker installation.

Quantity *(1)	DESCRIPTION	ITEM NO.	PART NUMBER FOR BREAKER TYPE				
			25H-1	50H-1 1600AMP	75H-1-3000A 50H-1-3000A	100H-1-4000A 75H-1-4000A	100H-1 6000A
3	Moving Arcing Contact	2	49B-98	49B-88	49B-89	49B-88	49B-89
3	Stationary Arcing Contact	3	49B-94	–	–	–	–
3	Upper Stationary Arc. "	3A	–	49B-9889	49B-9889	49B-9889	49B-9889
3	Lower " " "	3B	–	49B-9888	49B-9888	49B-9888	49B-9888
3	Arc Chute	1	41A-4	41A-9880B	41A-9880B	41A-8	41A-2-3
3	Main Braids	5	27A-81	27A-45A-1	27A-89	27A-45A-1	27A-58
1	Relay Oil (60cc)	–	195A-1	195A-1	195A-1	195A-1	195A-1

NOTE: When ordering spare parts specify complete nameplate data.

* (1) Quantities listed are total for a 3 pole breaker except 100H–1 which uses 6 of each arcing contact and braid for a three pole breaker.



1. Arc chutes
2. Moving arcing contacts
3. Stationary arcing contacts
3a. Upper stationary arcing contact
3b. Lower stationary arcing contact
4. Main moving contact
5. Braids
6. Upper main contact
7. Lower main contact

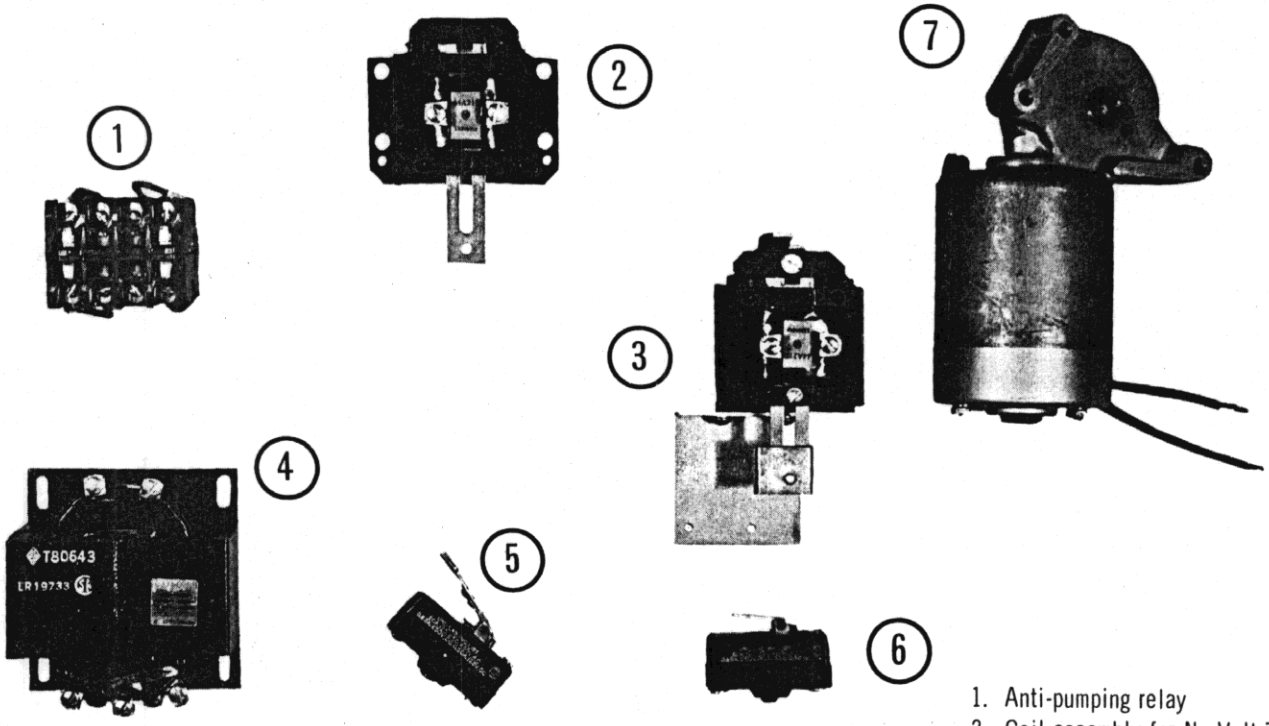
25H-1 50H-1, 75H-1, 100H-1

FPE

FOR ELECTRICALLY OPERATED BREAKERS ADD

Qty.	DESCRIPTION	VOLTAGE RATING						
		48V D.C.	125V D.C.	250V D.C.	115V A.C.	230V A.C.	460V A.C.	575V A.C.
1	Motor	183A-1A-3	183A-1A-1	183A-1A-2	183A-1A-1	183A-1A-2	–	–
1	Closing Coil	46A-9922-10B	240A-4	240A-6	240A-3	240A-4	240A-5	240A-6
1	Shunt Trip Coil	46A-9922-10B	46A-9922-10C	46A-9922-10D	46A-9922-10A	46A-9922-10B	46A-9922-10D	46A-9922-10D
1	No Volt Coil	46A-7705-J	46A-7705-K	46A-7705-L	240A-2A	240A-2B	240A-2C	240A-2D
1	Limit Switch(SLS)	49E-8	49E-8	49E-8	249E-6	249E-6	–	–
1	Limit Switch (CC)	49E-8	49E-8	49E-8	249E-8	249E-8		
1	Auxiliary Relay	219A-4	219A-5	219A-6	219A-7	219A-8	–	–
1	Control Transformer	–	–	–	–	266C-4	266C-4	266C-4

NOTE: When ordering spare parts specify complete nameplate data.



1. Anti-pumping relay
2. Coil assembly for No Volt Trip
3. Shunt Close assembly
4. Control transformer
5. Spring Limit Switch (S.L.S.)
6. Closing Coil Limit Switch (C.C.)
7. Motor