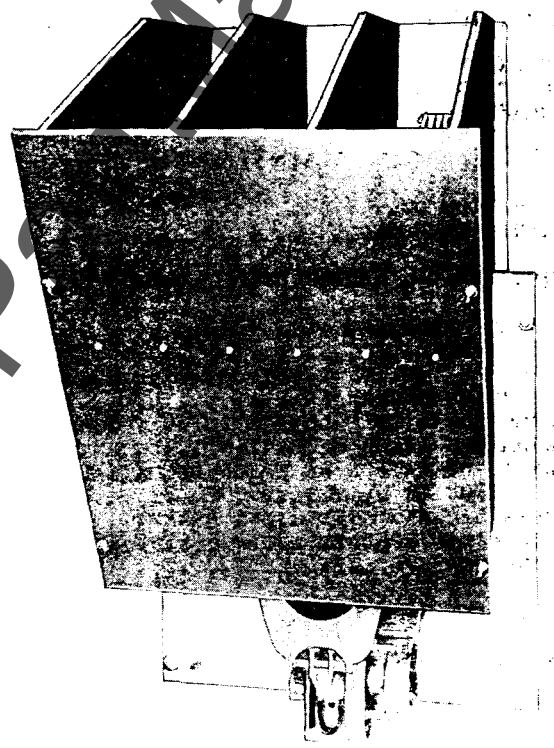
INSTRUCTIONS

GEI-21934

AIR CIRCUIT BREAKERS



Type AG-3

LOW VOLTAGE SWITCHGEAR DEPARTMENT

GENERAL ELECTRIC

PHILADELPHIA, PA.

CONTENTS

ILLUSTRATIONS

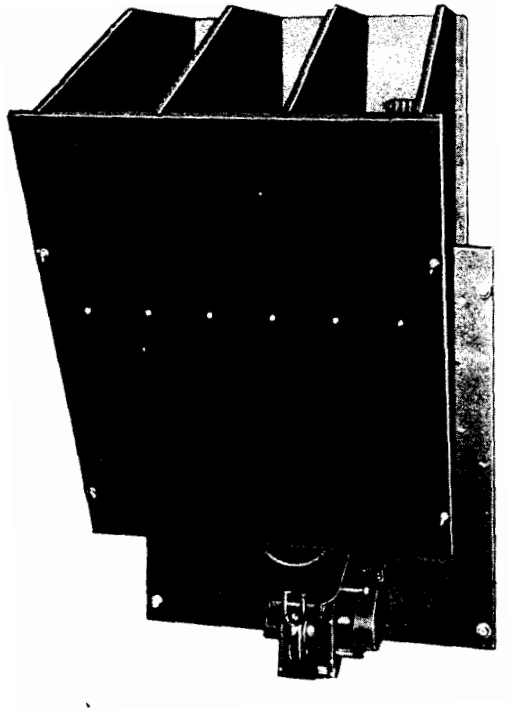


FIG. 1
TYPE AG-3 AIR CIRCUIT BREAKER-ABLIQUE FRONT VIEW FROM LEFT

3001142

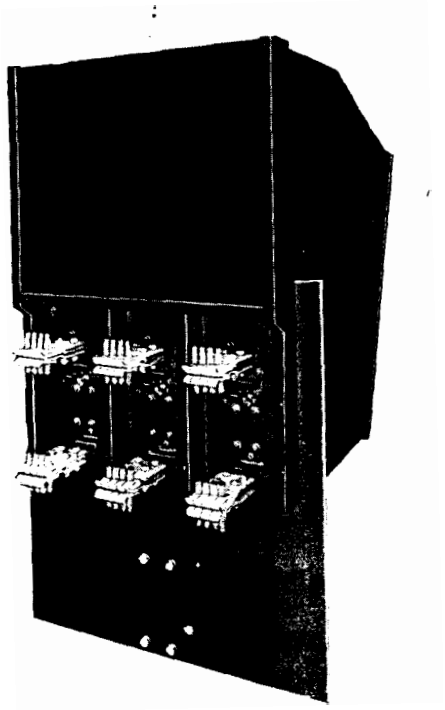


FIG. 2
TYPE AG-3 AIR CIRCUIT BREAKER-REAR VIEW

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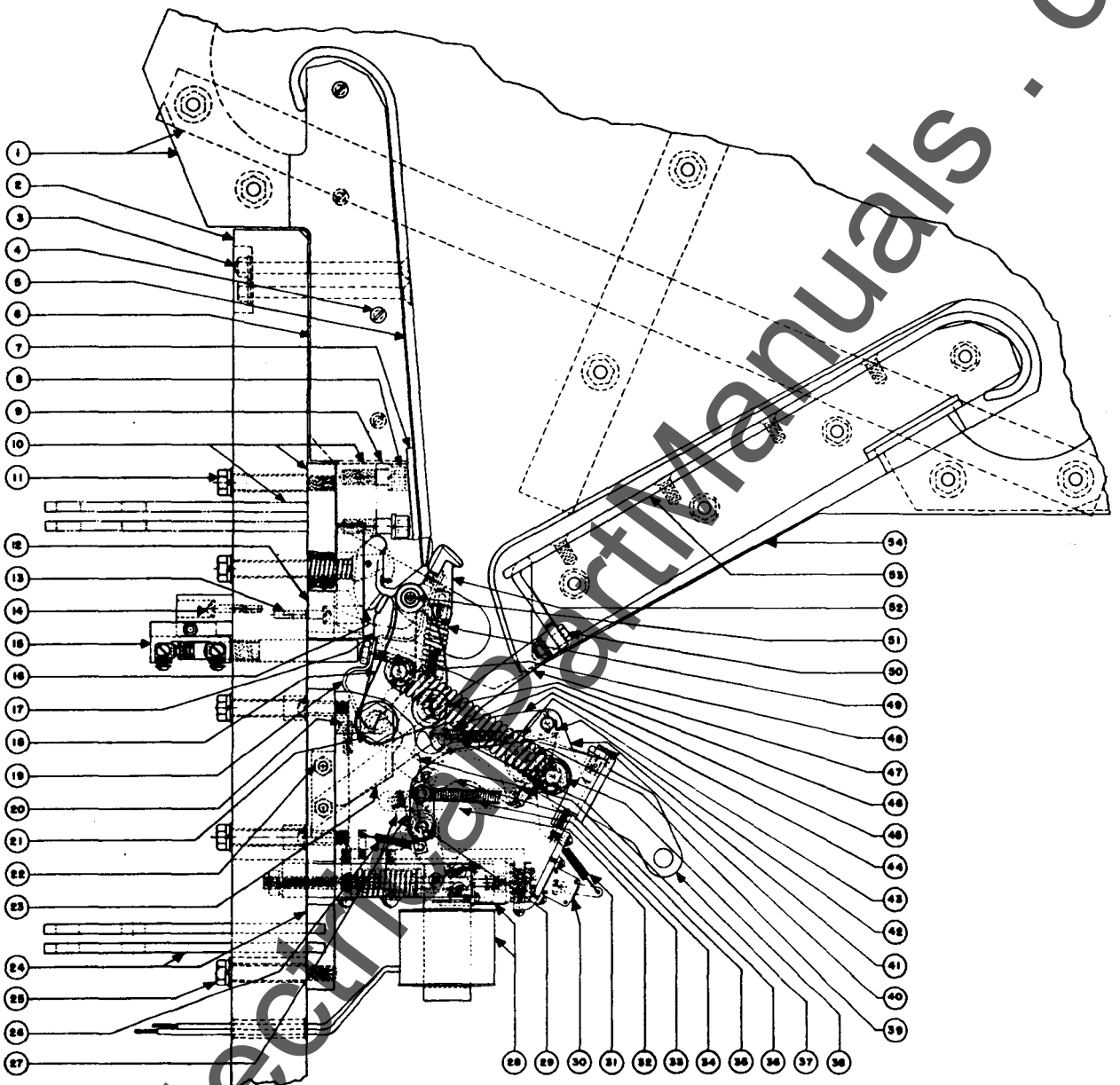

1. SIDE, SPACER AND SUPPORT OF ARC CHUTE. SEE FIG. 5
2. MOUNTING BASE
3. SCREWS
4. SCREWS
5. VERTICAL ARC RUNNER
6. FILLER BLOCKS
7. FILLER PLATE
8. SCREWS
9. SECONDARY CONTACT CARRIER. SEE FIG. 4
10. UPPER STUD. SEE FIG. 4
11. SCREW. SEE FIG. 4
12. ARC CHUTE MOUNTING BLOCK
13. SCREW
14. SCREWS
15. AUXILIARY SWITCH. SEE FIG. 12
16. MAIN STATIONARY CONTACTS. SEE FIG. 4
17. MAIN CONTACT LEVER. SEE FIG. 4
18. CONTACT LEVER CARRIERS. SEE FIG. 4
19. FLEXIBLE BRAID. SEE FIG. 4
20. SCREW
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22. SCREWS
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24. LOWER STUD. SEE FIG. 4
25. SCREWS
26. SPRING FOR PROP LATCH. SEE FIG. 8, 9, 10
27. PROP LATCH. SEE FIG. 8, 9, 10
28. DIRECTIONAL TRIP DEVICE. SEE FIG. 11
29. PIN IN FRAME
30. VEEDER COUNTER
31. SPRING FOR VEEDER COUNTER
32. LINK. SEE FIG. 8, 9, 10
33. CAM SPRING. SEE FIG. 8, 9, 10
34. CAM. SEE FIG. 8, 9, 10
35. HOOK LATCH. SEE FIG. 4, 8, 9, 10
36. SPRING FOR HOOK LATCH
37. OPERATING LEVER. SEE FIG. 5, 9, 10
38. OPENING SPRING POST
39. PIN IN FRAME
40. ADJUSTING SCREW IN OPERATING LEVER
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43. OPENING SPRING
44. LINK
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46. ROLLER IN CONTACT LEVER CARRIERS. SEE FIG. 4, 8, 9, 10
47. CONNECTOR BAR
48. PIN IN CONTACT LEVER. SEE FIG. 4
49. SPRING FOR MOVABLE ARCING CONTACT ARM. SEE FIG. 4
50. SCREW
51. PIN IN CONTACT LEVER AND CONTACT LEVER CARRIERS. SEE FIG. 4
52. MOVABLE ARCING CONTACT ARM. SEE FIG. 4
53. FRONT ARC RUNNER
54. ARC CHUTE. SEE FIG. 5

FIG. 3
LEFT SIDE VIEW OF POLE UNIT

AIR CIRCUIT BREAKER

TYPE AG-3

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 General Electric Company.

GENERAL INFORMATION

Before unpacking installing or attempting to operate the circuit breaker described herein, these instructions should be thoroughly and carefully read.

APPLICATION

These instructions apply to General Electric Type AG-3 air circuit breaker for use with six phase mercury arc rectifiers for the protection against the reversal of current flow in one or more rectifier elements independently, commonly referred to as "arc-back". It is a three pole circuit breaker and two breakers are used to control the six phase circuit. Both circuit breakers are simultaneously operated by the closing switch and one tripping switch. It is designed for very high speed tripping and is installed between the power transformers and the anode terminals of the rectifier units.

RATINGS

1600 Amperes
850 Volts D.C.

OPERATING CHARACTERISTICS AND CONSTRUCTION

The circuit breaker is furnished with studs for back connections and mounted either live front or in a steel enclosure. It is motor operated but provision is made for manual closing with a maintenance handle. Each pole is provided with a complete operating mechanism and a directional trip device. A cross bar is operated either by the motor or by the maintenance closing handle which will close all poles that may be open, but each pole will trip automatically due to reversed current in that pole without disturbing operation in the other poles as described under "Operating Mechanism" and "Directional Trip Device". No other automatic tripping is provided. All poles may be opened simultaneously by opening the tripping switch which will de-energize all potential coils of the directional trip devices.

The path of the current through the circuit breaker is through the upper stud and contact support block, the stationary and moving contacts and the lower stud.

The arcing contacts close before the main contacts close, and open after the main contacts separate as described under "Contact Assembly."

Arcing, after the contacts separate, is quickly extinguished by transferring the arcs to the arc runners attached to the upper contact support block and to the arc chute, as described under "Arc Chutes". Barriers are provided between the arc chutes, also in front and in the rear of the arc chutes as described under "Barriers".

SHIPPING - UNPACKING - STORAGE

TRANSPORTATION DAMAGE

Immediately upon receipt of the circuit breaker, an examination should be made for any damage or loss sustained during transportation. If injury or rough handling is evident a damage claim should be filed at once with the transportation company and the nearest General Electric Sales Office should be notified.

UNPACKING

The circuit breakers should be unpacked as soon as possible after being received, otherwise difficulty may be experienced in making claims for damage or shortage. Care should be used in unpacking in order to avoid damaging any of the circuit breaker parts. Be sure that no detached parts are missing, or left in the packing material and report shortages at once. Blow out any dirt or particles of packing material that may be accumulated on the circuit breaker parts. The arc chutes and barriers are disassembled and packed separately in excelsior.

STORAGE

If the circuit breakers are not to be installed in their permanent location at once they should be carefully inspected for loose or damaged parts and stored in a clean dry place. They should be placed in an upright position to avoid damage to circuit breaker parts. A covering of paper will prevent dust from settling on the circuit breaker parts and is preferred to packing or other materials that are apt to absorb moisture.

The barriers and arc chutes are susceptable to the absorbtion of moisture to a certain extent and every care should be

used to store the disassembled parts in a dry place after all excelsior packing has been blown from them.

INSTALLATION

LOCATION

The Type AG-3 circuit breaker should be installed in a clean dry place where it will be readily accessible for convenient operation inspection and maintenance. When mounted on a switchboard it is obvious that no equipment should be placed above it. No grounds should be allowed within an area 85" above the top of the mounting base, 75" in front and 24" to the rear of the mounting base and 30" to the right and left of the outside pole units on a level with the top of the barrier. If these horizontal clearances cannot be provided the rear vertical composition board, side barriers or front cover should be extended.

MOUNTING

If not shipped in a permanent steel enclosure the circuit breaker is shipped on a permanent base in a vertical position on a skid and with temporary supports. The barriers and arc chutes with front arc runners are disassembled and packed separately.

Be sure that the circuit breaker is in the open position before attempting to install it.

If the circuit breaker is received in a permanent steel enclosure installation consists simply of placing it in permanent location, levelling it, installing the arc chutes and barriers, as described under description of these items, and connecting the power cables and control wires. If it is shipped on skids with temporary supports, installation will further involve mounting it on permanent supporting framework or mounting in an enclosed structure. Care should be used in erecting the structure that all supports are properly aligned. Otherwise, the mounting base may be warped when the mounting bolts are tightened resulting in misalignment of parts and incorrect operation.

BREAKER CONNECTIONS

Before connecting current carrying parts, bus bars or cables or secondary control wiring, every precaution must be taken to be sure that all leads to be connected to the circuit breaker are de-energized.

The connections to the circuit breaker should be clean, flat and free from burrs to assure full contact area, and should be firmly clamped or bolted in place to prevent excessive heating. The connecting bus bars or cables should have adequate current carrying capacity, otherwise, heat will be conducted from them to the circuit breaker, resulting in possible excessive temperature rise.

Connecting bus bars or cables must be supported so that the circuit breaker studs may not be subjected to unnecessary strain.

OPERATION AND MAINTENANCE

OPERATION

After the circuit breaker has been installed, slowly operate it manually, and then electrically, several times as described below. Observe that the contacts line up properly and make sure that all parts move freely and in a proper manner without binding or excessive friction.

The circuit breakers are shipped in the reset position as in Fig. 9, except that the armature (18) Fig. 12, of the directional trip device has been forced away from the magnet by a spring (13) Fig. 12. The cam (11) rests against rollers (5), and roller (34) is pushed back out of sight behind roller (5). The operating lever (26) and the closing lever (25) are lifted as far as they will go.

From this position the circuit breaker can be closed by first closing the tripping switch, see Wiring Diagram Fig. 20, then inserting the maintenance closing handle in socket (16) Fig. 13 of the motor operating mechanism and lowering it once to reset the armature, as described under "Directional Trip Device", and then lifting and lowering it the second time until the circuit breaker is latched closed.

If the operating levers are not in the lifted position the knurled wheel of the motor will have to be turned clockwise (looking down) until the levers are in the lifted position. Do not turn the wheel counterclockwise. Be sure that the operating lever has been lifted a little higher that the closing lever and is free of it. Now close the tripping switch, insert the maintenance closing handle, lower it, then lift it and lower it the second time until the circuit breaker is latched closed.

The circuit breaker is tripped by opening the tripping switch, which de-energizes all the directional trip devices, as described under description of that device, and not by lifting the handle.

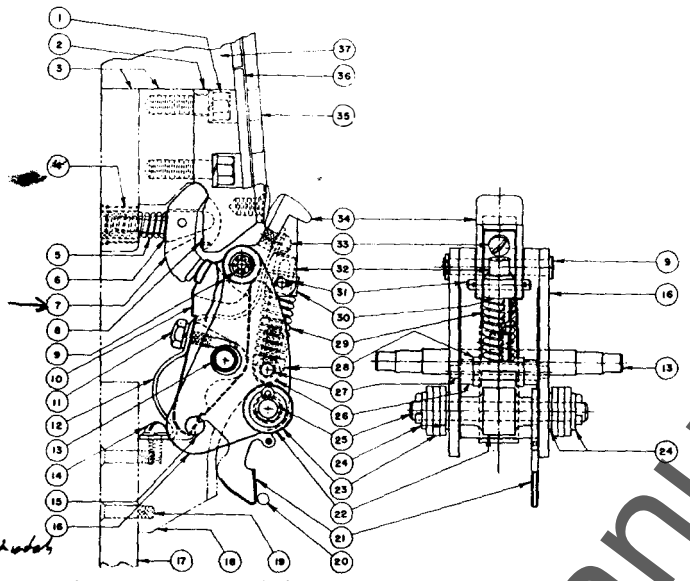
After checking for manual operation and mechanical condition it should be closed electrically several times by closing the tripping switch and then the closing switch. In motor closing the resetting movement is automatic. The motor will complete any uncompleted resetting movement and then continue to revolve through a complete closing cycle, as described under "Motor Operating Mechanism."

Reasonable care should be exercised when testing to avoid overheating of the motor by repeated operations as it is rated for intermittent service.

Main contact wipe
1/16" - 1/8"
not to Exceed 1/8"
To change wipe Raise or lower
Pole asm as required

maint. Recommend (5) year
- ck Rec-curr Trip Values
- Put coil drop out volts
- Remove pole from Bkr complete disassemble
- ck spring force
- clean Bkr with Trie
- Lubricate to Bkr & mechanical linkage
- Reasm Bkr, Install shims to Increase drop out if required
- Retest

5

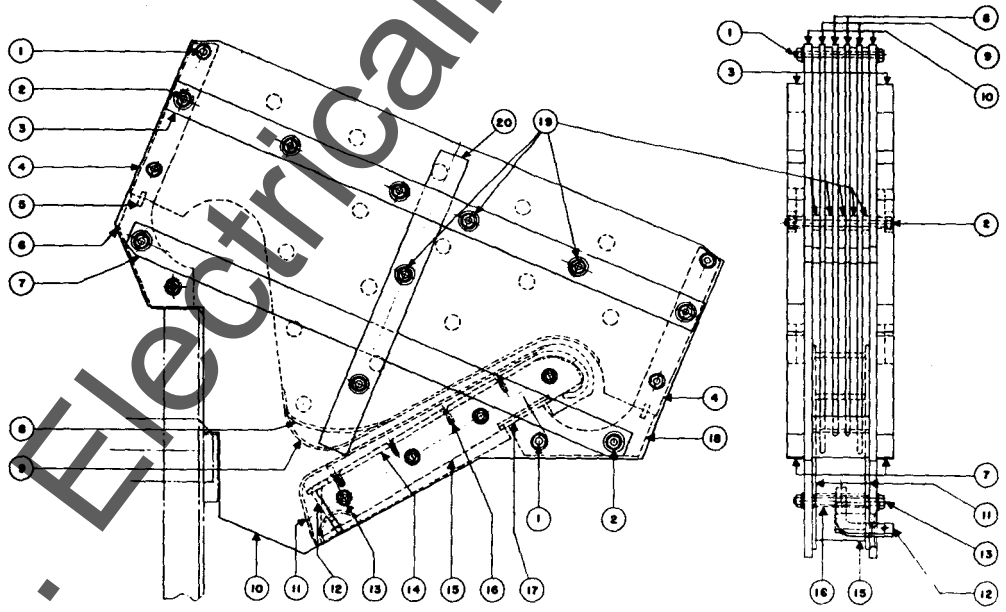


1. SCREW
2. SECONDARY CONTACT CARRIER
3. UPPER STUD
4. INSULATOR BUSHING
5. COMPRESSION SPRING
6. SPRING SUPPORT
7. MAIN STATIONARY CONTACTS
8. STOP PLATE
9. PIN
10. MAIN CONTACT LEVER
11. SCREW
12. FLEXIBLE BRAID
13. PIN IN MAIN CONTACT LEVER
14. SCREW
15. RETAINING SCREW IN FRAME WITH NUT AND LOCKWASHER
16. CONTACT CARRIERS
17. LOWER STUD
18. CONTACT BLOCK, BRAZED TO (PT.17)
19. FLATHEAD SCREWS
20. PIN (SEE PT. FIG.8)
21. HOOK LATCH
22. ROLLER
23. BUFFER WASHERS
24. WASHERS
25. PIN AND COTTER PINS
26. SPACERS
27. PIN
28. LOWER SPRING GUIDE
29. COMPRESSION SPRING
30. SPRING RETAINER
31. PIN AND COTTER PINS
32. UPPER SPRING GUIDE
33. SCREW
34. MOVABLE ARCING CONTACT
35. VERTICAL ARC RUNNER
36. FILLER PLATE
37. FILLER BLOCKS

FIG. 4
CONTACT ASSEMBLY

P 6490442 SKETCH

T-64903



1. SCREW
2. SCREW
3. SUPPORT
4. SPACER
5. SEAL
6. SPACER
7. SUPPORT
8. PERFORATED SPLITTER BAFFLES
9. PERFORATED SPLITTER BAFFLES
10. SIDES
11. INSULATION PLATE
12. COPPER BAR BRAZED TO ARC RUNNER
13. SCREW
14. FRONT ARC RUNNER
15. ARC RUNNER SUPPORT
16. SCREWS
17. INSULATION
18. SPACER
19. SPACERS
20. SUPPORT

FIG. 5
ARC CHUTES

MAINTENANCE

Before inspecting or repairing be sure that the circuit breaker and accessories are disconnected from all electric power, both primary and control voltages.

Periodic inspection of the circuit breaker is recommended at least once a year or more frequently if load conditions, dust, moisture and other unfavorable conditions are severe. An inspection of contacts and arc runners should always be made after the circuit breaker has opened a severe overcurrent.

Contact surfaces should be kept clean and smooth. If rough surfaces develop, high spots should be removed with a clean fine file or very fine sandpaper. Slightly curved surfaces should be maintained on main and arcing contacts.

If overheating, not caused by overcurrent, is observed look for damaged contacts or loose connections.

If the circuit breaker remains open or closed for a long period of time, arrangements should be made to open and close it several times in succession, preferably while carrying load, clean and lubricate where necessary, to keep moving parts and contacts in good working condition.

In general the circuit breaker mechanism requires very little lubrication. Any excess amount of oil on the circuit breaker parts is apt to collect dust and is to be avoided. Bearings for prop latch and cam should be lubricated with "Univis" #40 (Standard Oil Co.) applied with a clean brush. Other plain bearings and spring posts of the circuit breaker mechanism (except bearings of movable arcing contact arm) and plain bearings of the motor driven mechanism should be lubricated with a coating of G.E. Lubricating Compound D50H1C (Lubriplate #110, Fiske Brothers Refining Co.). The entire external surface of the circuit breaker cam and rollers, and the motor driven mechanism gears, cam and cam following roller should be given a coating of G.E. Lubricating Compound D50H1D (Lubriplate 130-A)

The level of the lubricant (600W or automobile transmission lubricant) in the worm and gear housing for motor closing should be maintained even with, or slightly below, the plug.

The commutator surfaces of the starting motor should be kept clean with a cloth slightly moistened with kerosene.

In order to assure rapid tripping with very light weight parts it is important that a lighter weight oil be used on moving parts when the breaker is exposed to low temperatures.

DESCRIPTION OF COMPONENTS AND ATTACHMENTS

Although under this heading the description and adjustment features of the AG-3 circuit breaker and attachments are given, it should be understood that the circuit breaker has already been adjusted, inspected and tested at the factory before shipment in accordance with the information given below. However, it is recognized that unusually rough handling, transportation and operating conditions after installation may have resulted in some loosening or disturbance of the equipment that re-adjustments may be necessary.

CONTACT ASSEMBLY. FIG. 4

The contact assembly is of the hinged type with stationary contacts attached to the upper stud (3) and movable contacts attached to the upper end of a main contact lever (10). This contact lever is actuated by the operating mechanism Figs. 8, 9 and 10, and the lower end is maintained at all times against a curved bearing surface of a contact block (18) of the lower stud (17) under tension of heavy opening springs (35) Figs. 8, 9 and 10, attached to each end of pin (13). High conductivety, arc resisting silver alloy contacts are brazed to the current carrying parts and all other copper to copper surfaces are silver plated.

The stationary contact assembly consists of three main contacts (7) per pole mounted in a recess below and between the front part of upper stud (3) and the secondary contact carrier (2) which supports the vertical arc runner (35) and the stationary arcing contact. The secondary contact carrier is attached to the upper stud by screws (1). Filler blocks (37) and filler plate (36), of insulating material, support the vertical arc runner against the mounting base and the secondary carrier block. Each main contact (7) is normally held against stop plate (8) on the rear surface of the secondary contact carrier, when the circuit breaker is open, by compression spring (5). This spring sits in an insulating bushing (4) within the upper stud. Each spring is backed up against the mounting base and is held in place by spring guide (6) which is pivoted to the main contact (7). A silver alloy contact is brazed to the lower front part of each main contact which engages a silver alloy strip which is brazed to the rear of the main movable contact lever (10). The main contacts are so formed and placed in the recess between the upper stud and the secondary contact carrier (2) that a magnetic field is formed which causes a supplemental contact pressure to vary in proportion to the current flow through the circuit breaker.

The movable contact assembly consists of primarily of two parts, namely, a main contact

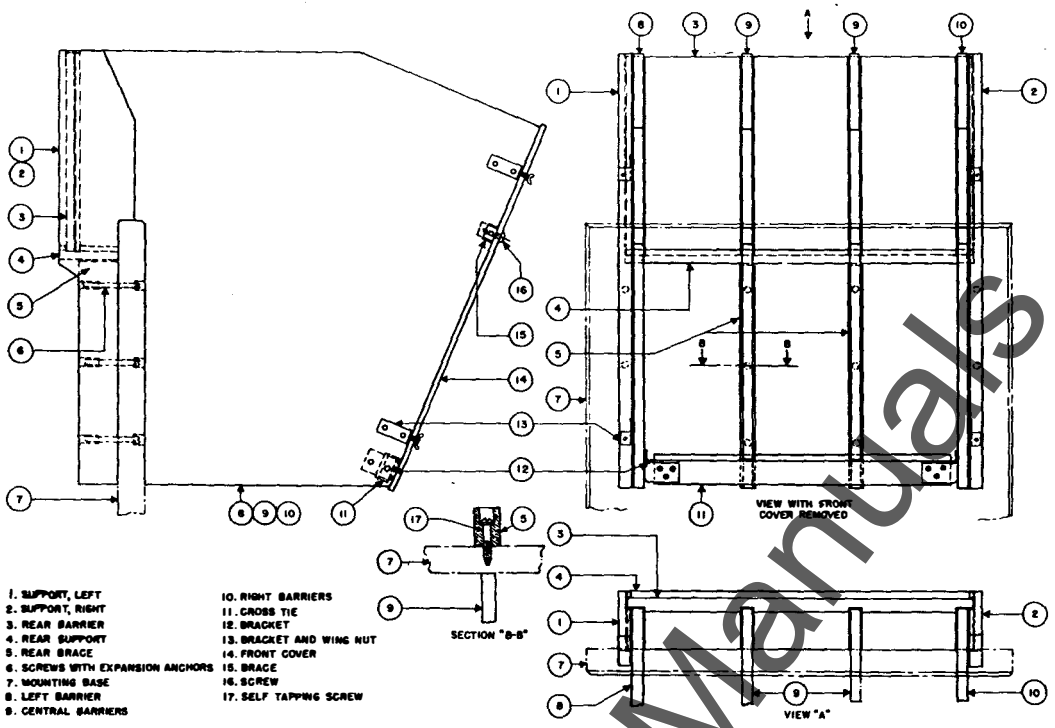


FIG. 6
BARRIERS

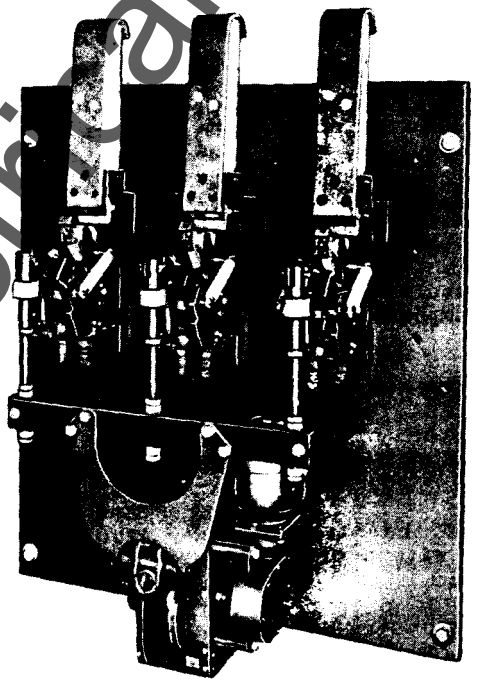


FIG. 7
FRONT VIEW-ARC CHUTES AND BARRIERS REMOVED SHOWING OPERATING MECHANISM

lever (10), which carries the circuit breaker current, and two contact carriers (16). The right and left hand contact carriers are pivoted on separate retaining screws (15) in the frame of the operating mechanism. The main contact lever (10) is pivoted at the top between these contact carriers on pin (9) which allows it to move freely between the contact carriers. Opening springs, (35) Fig. 8, 9 and 10 attached to the ends of pin (13), hold the lower end of the contact lever firmly against the curved surface of contact block (18) which is attached to the top of the lower stud assembly by flat screws (19) and then brazed. The contact surface is directly in line with the two retaining screws (15), as shown in Fig. 4. Buffer washers (23) on each end of pin (25) in the contact carriers (16) act as stops and rest in recesses in the frame when the circuit breaker opens. In the closing operation a roller (22) between the contact carriers (16) and on pin (25) is engaged by rollers (34) Fig. 10, as described under "Operating Mechanism." This revolves the contact carriers counter-clockwise (looking from the left) on retaining screws (15) causing pin (9) in the top of the carriers to move the upper end of the main contact lever to the rear to close the contacts of the circuit breaker. This extends the opening springs, (35) Fig. 10, which still hold the lower end of the contact lever against the curved contact surface of contact block (18), and supplies the power to open the circuit breaker when a latch is released, as described under "Operating Mechanism."

The movable arcing contact (34) is attached to the top of the main contact lever on pin (9) and engages the stationary arcing contact on the vertical arc runner (35). Compression spring (29) mounted over lower and upper spring guides (28) and (32), bears against spring retainer (30) on pin (31) at the upper end and is backed up against pin (27) at the bottom in the contact carriers to provide the proper contact pressure. Pin (31), in the arcing contact, moves through a slot in the spring guide (32) which allows proper travel of the arcing contact which assures that the arcing contacts close before the main contacts close, and open after the main contacts separate. When the circuit breaker is open the pin rests in the top of the slot. Flexible braid (12) is connected by screws to the arcing contact, the main contact lever and to the contact block (18) of the lower stud. After the arcing contact closes the main contact lever (10) travels farther to the rear to engage the main stationary contacts (7) which are pushed to the rear against springs (5) to provide contact pressure.

Hook latch (21) prevents rebounding of the main contact lever (10) after the circuit breaker opens. It is suspended from pin (25) and is located between roller (22) and the right hand side frame. The hook end is drawn forward by spring (31) Fig. 8. When the circuit breaker opens the hook latch is lowered and the spring (31) Fig. 9, forces the hook under the pin (20) attached to the right hand side frame. This is pin (10) Fig. 8. This prevents the contact carriers from revolving about retaining screws (15) until the hook is pushed off the pin as described under "Reset Position" of "Operating Mechanism."

ARC CHUTES. FIG. 5

An arc chute is placed above and in front of the circuit breaker contacts of each pole unit and, together with the vertical arc runner (35) Fig. 4, attached to the stationary contact assembly, acts to extinguish the arc after the contacts separate and the movable arcing contacts (34) Fig. 4, passes under the front arc runner. It fits over the top of the vertical arc runner and rests on the top of the mounting base. The sides set in block (12) Fig. 3 attached to the front of the mounting base by screws (13) Fig. 3.

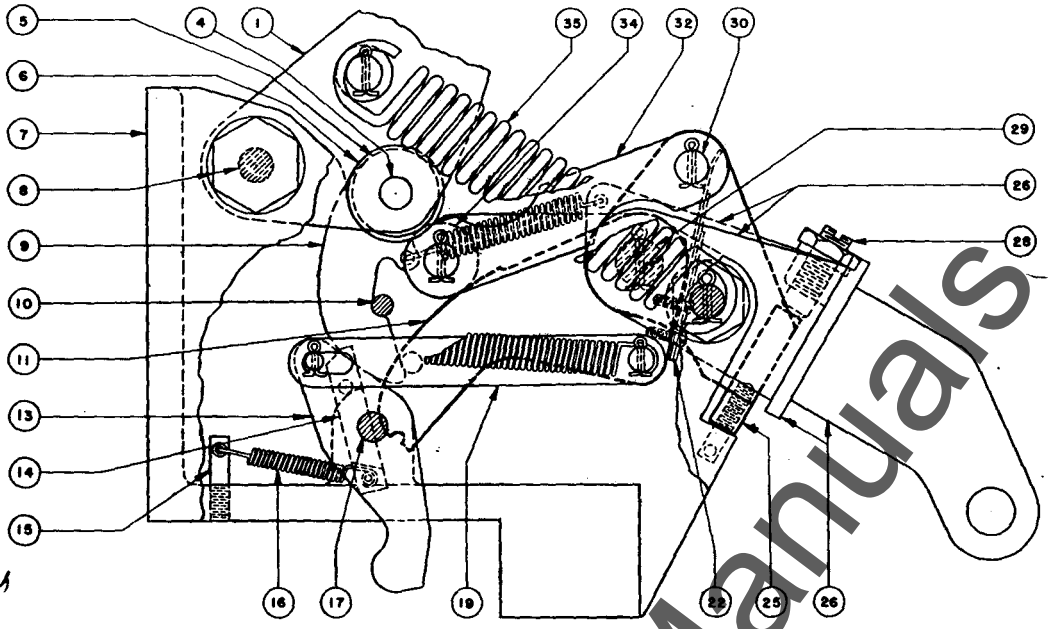
The arc chute consists of right and left hand composition sides (10), reinforced by composition supports (3), (7) and (20) between which are mounted the front arc runner and splitter baffles (8) and (9). The steel arc runner (14) is mounted on arc runner support (15) by four screws (16) and the arc runner support is attached between insulation plates (11) and sides (10) by four screws (13). The connector bar, (47) Fig. 3, is attached by screw, (50) Fig. 3, to a copper bar (12) which is brazed to front arc runner. Splitter baffles (8) and (9) are spaced vertically between the sides on screws (1) and (2) and separated by rectangular spacers (4), (6) and (18) in rear and front and tubular spacers (19) on screws within the arc chute.

BARRIERS. FIG. 6 (also Figs. 1 and 2)

The barriers consist of large plates of composition materials that are shipped disassembled and packed by themselves in excelsior. They are carefully drilled, grooved and shaped so that they can be readily assembled in the field as shown in Fig. 6 and as described below.

The barriers enclose the arc chutes and isolate them from each other. The assembly of barriers is open at the top and is provided with a removable front cover attached to the front of the barriers.

Outside supports (1) and (2) are bolted to the back of the mounting base (7) by screws and expansion anchors (6). The rear support (4) slides horizontally into slots in supports (1) and (2). Two vertical braces (5) are attached to the back of mounting base (7) and below the support (4), by self-tapping screws (17). Rear barrier (3) is lowered vertically in slots in supports (1) and



FOR DESCRIPTION OF PARTS SEE FIG. 9

FIG. 8
TRIPPED POSITION

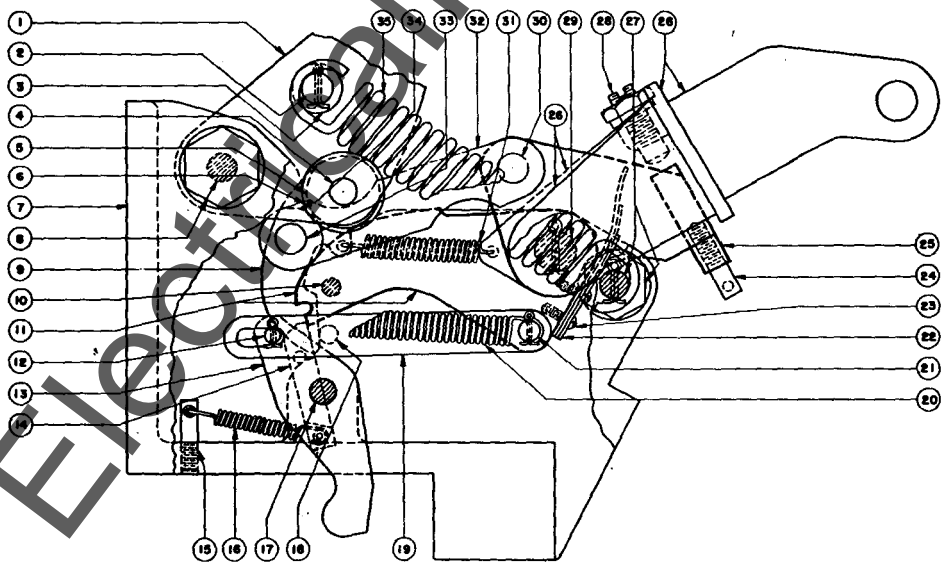
match (1979)

Lubrication
D30H15
Mobil 2B - first choice
Atlantic 62
Univis 40

Avoid using excessive amount of grease as this will slow down the trip movement

T-6490317

T-6490318



1. CONTACT LEVER CARRIERS
2. PIN IN CONTACT LEVER 10 (FIG. 4)
3. ENLARGED HOLE IN PT. 1
4. PIN
5. ROLLER
6. BUFFER WASHERS
7. FRAME
8. RETAINING SCREW IN FRAME
9. HOOK LATCH
10. PIN
11. CAM
12. PIN IN PT. 13
13. PROP LATCH
14. LATCH BLOCK IN PT. 13
15. SPRING POST
16. SPRING
17. PIN IN FRAME
18. PIN IN PT. 19
19. LINK
20. SPRING
21. PIN IN CAM
22. FLAT SPRING
23. SCREWS
24. SPRING POST
25. CLOSING LEVER
26. OPERATING LEVER
27. OPENING SPRING POST IN FRAME
28. ADJUSTING SCREW
29. PIN IN FRAME
30. PIN IN CLOSING LEVER
31. SPRING
32. LINK
33. PIN
34. ROLLER
35. OPENING SPRING

FIG. 9
RESET POSITION

(2) and fits into slot in rear support (4) to lock it in place. Four barriers (8), (9) and (10) are lowered vertically in slots in rear barrier (3) to a position to hook them behind the top of the mounting base, and the fronts are properly spaced by cross tie (11). The cross tie is attached to barriers (8) and (10) by bracket (12) and has slots into which barriers (9) fit. Front cover (12) is attached to the front of barriers (8) and (10) by brackets and wing nuts (13). Brace (15) is attached to the rear of the front cover by screws (16) and fits into slots in the front of the barriers (8), (9) and (10).

OPERATING MECHANISM FIGS. 8, 9 and 10

Each pole unit is closed by first lifting and then lowering the operating lever (26), as described below, by the closing motor, or, manually, by the maintenance closing handle, when the operating lever is in the lowered position. However, as described under "Operation", the circuit breaker is shipped in the reset position with the operating levers up, which requires that the levers must be lowered, then lifted and lowered a second time for a complete closing cycle as described under "Operation" and "Directional Trip Device."

Lifting the operating lever allows roller (34) to be pushed out of the way, to the rear, so that cam (11) will be lifted to rest against roller (5) and the latch block (14) of the prop latch (13) will be under the rear end of the cam in position for the next closing operation. This is described under "Reset Position."

Lowering the operating lever causes roller (34) to be drawn forward and ride over the upper curved surface of cam (11) and accomplishes two functions that may be required. First, if armature (18) Fig. 12, of the directional trip device is not reset against its magnet, it will force the cam down again and reset the armature as described under "Directional Trip Device." Then the operating lever will have to be lifted to reset the cam on latch block (14) and again lowered to lift the roller (5) to close the pole unit as described under "Closed Position." Second, if the armature is already reset and the latch block (14) is under the rear end of cam (11), the roller (5) will be lifted when roller (34) is drawn forward over the cam and the pole unit will be closed.

The circuit breaker is tripped by opening the tripping switch as described under "Directional Trip Device" and not by the maintenance closing handle. Individual pole units are automatically tripped by reverse current in the pole units. Either method of tripping removes the latch block (14) from under the rear end of cam (11) and allows opening springs (35) to contract and collapse cam (11), roller (5), and roller (34) to take positions as shown in "Tripped Position" Fig. 8.

The operating mechanism consists of a group of levers, and light weight moving parts such as cam, links, rollers springs and other parts designed for rapid tripping. They are mounted within the operating mechanism frame on retaining screws (8), and pins (17), (27) and (29). Parts move otherwise on floating pins.

Operating lever (26) and closing lever (25) are mounted on pin (29) in the frame. Flat spring (22), attached to the front of cam (11) by screws (23), bears against pin (30) in the closing lever (25) only in the tripped position Fig. 8, to hold the closing lever against adjusting screw (28) in the operating lever and to give an initial resetting motion to the roller (34) to the rear when the closing lever is lifted as described under "Reset Position." When operating lever is lowered, the adjusting screw (28) bears against the closing lever to pull the roller (34) forward in the closing operation.

The front end of cam (11) is pivoted on pin (29) in the frame and the rear engages latch block (14) in prop latch (13) in the closed position but takes a position below the latch block in the tripped position. Springs (20) attached at the rear to the inside of the frame, tend to lift the rear end of the cam.

Opening springs (35) are attached to spring posts (27) in the frame in front and to pin (2) in the main contact lever (10) Fig. 4. When the contacts close these springs are extended which supplies the power to open the pole units when the prop latch (13) is disengaged from the rear end of the cam by tripping of the directional trip device.

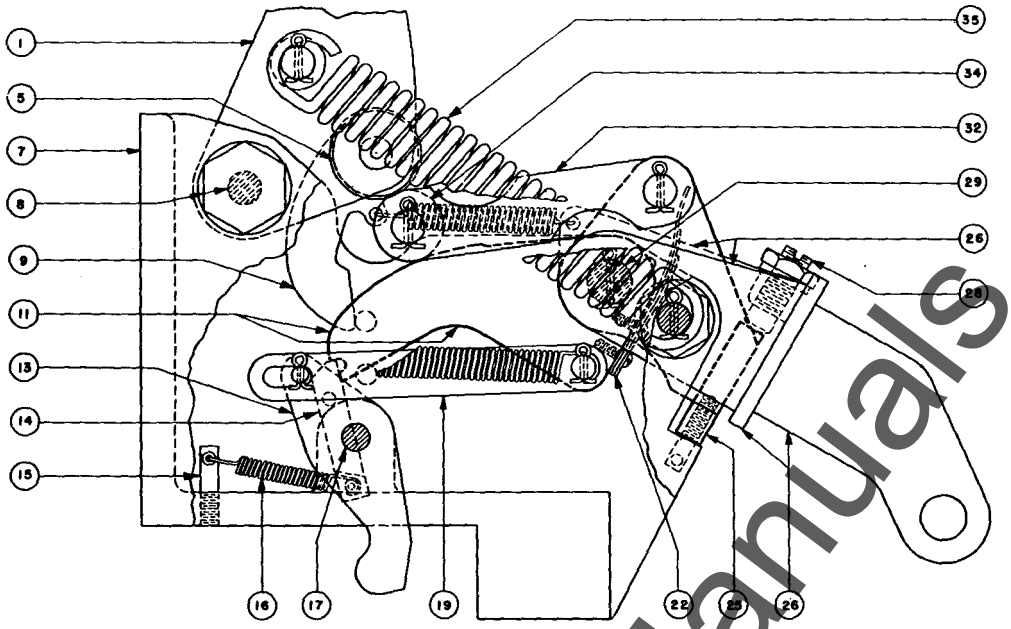
Spring (31), attached to the operating lever and the hook latch (9) normally holds the hook latch against the rear surface of pin (10) in the reset and closed position, but forces it under the pin in the tripped position to prevent rebounding when the pole unit opens as described under "Contact Assembly."

A Veeder counter (30) Fig. 3 is attached to the front of the frame on a bracket. It is operated by spring (31) Fig. 3, attached to spring post (25) in the lower part of closing lever (25).

In a cycle operation the operating mechanism takes three positions as follows:-

TRIPPED POSITION FIG. 8

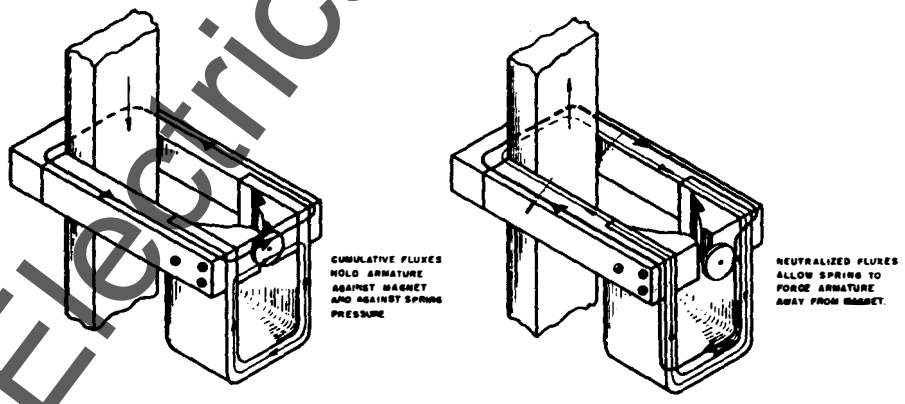
In the tripping operation the latch block (14) of prop latch (13) has been drawn to the rear, momentarily, to disengage it from the rear end of the cam, (11), which is forced by the contraction of the opening springs (35) to a position below the latch block. However, as soon as the cam is lowered, it pulls the prop latch forward to the position ready for resetting as described



FOR DESCRIPTION OF PARTS SEE FIG. 9

FIG. 10
CLOSED POSITION

HEAVY ARROWS DESIGNATE LOAD CURRENT FLUX.
LIGHT ARROWS DESIGNATE POTENTIAL CURRENT FLUX.



CUMULATIVE FLUXES HOLD ARMATURE AGAINST MAGNET AND AGAINST SPRING PRESSURE

NEUTRALIZED FLUXES ALLOW SPRING TO FORCE ARMATURE AWAY FROM MAGNET.

NORMAL DIRECTION OF CIRCUIT BREAKER CURRENT IN LOWER STUD.

REVERSED DIRECTION OF CIRCUIT BREAKER CURRENT IN LOWER STUD.

NOTE. SPRING (NOT SHOWN) WITHIN THE HORIZONTAL MAGNET PROVIDES A SPRING BIAS TO THE RIGHT.

FIG. 11
DIAGRAMATIC MAGNETIC CIRCUITS
OF DIRECTIONAL TRIP DEVICE

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under "Tripping Operation", and where it will be held by armature (18) Fig. 12, if the potential coils (16) Fig. 12, are energized.

Hook latch (9) is hooked under pin (10), mounted in a block which is attached within the right hand side frame. Buffer washers (6), on the ends of pin (4), which carries roller (5), rest in recesses in the frames and limit the lowered position of roller (5). Roller (34) is between the roller (5) and the lowered position of cam (11). The operating lever (26) and the closing lever (25) are in the lowered position and other parts take positions as shown in Fig. 8.

RESET POSITION FIG. 9

In electrical operation, this is a momentary position when the operating lever (26) reaches the lifted position in the resetting operation and before being lowered to the closed position. In manual operation this position may be held.

When the operating lever (26) and closing lever (25) are lifted either in motor or by turning the motor clockwise by hand, the roller (34) on link (32) is pushed to the rear. This allows springs (20) to lift the cam which snaps past the latch block (14) and rests against roller (5) in position for the next closing operation. Pin (18) in link (19) attached to the front end of cam (11), has pushed the lower end of hook latch (9) to the rear to free it from pin (10). Roller (5) and the contact assembly remain in the same position as in Fig. 8. Other parts take positions as shown in Fig. 9.

CLOSED POSITION FIG. 10

When the operating lever (26) is lowered, either by motor or by the maintenance closing handle, the closing lever (25) is revolved clockwise on common pin (29) by pressure of adjusting screw (28) against the closing lever. This pulls link and roller (34) forward over the top curved surface of cam (11) and pushes roller (5) upwards which closes the circuit breaker contacts and extends the opening springs (35) as described under "Contact Assembly."

TRIPPING OPERATION

When reverse current through the circuit breaker, or the opening of the tripping switch, operates the directional trip device, as described under "Directional Trip Device", the prop latch (13) is revolved counter-clockwise momentarily about pin (17) in the frame and is desengaged from the rear end of the cam (11). This allows the opening springs (35) to contract and pull pin (2) in the contact lever (10) Fig. 4, and open the pole unit contacts as described under "Contact Assembly." The opening motion of the contacts places the contact lever carriers, the rollers (5) and (34) and cam (11) in position as shown in the "Tripped Position", Fig. 8. However, as soon as the cam (11) rotates counter-clockwise about pin (29) it pulls link (19) forward and moves the upper end of the prop latch forward in position to engage the rear end of the cam when it is lifted during the resetting operation. At the same time the lower end of the prop latch draws the armature (18) Fig. 12 against its magnet where it will be held if the potential coils (16) are energized. If the potential coils are not energized the prop latch will return to the unlatched position.

The Type AG-3 air circuit breaker is trip free from the operating mechanism because the circuit breaker cannot be maintained closed as long as the prop latch is in the unlatch position due to reversed current or the open position of the tripping switch. Even if an attempt is made to close the circuit breaker by motor or the maintenance closing handle, the cam will drop to the tripped position as soon as roller (34) is drawn forward over the upper curved surface of the cam and the contact lever carriers cannot be revolved counter-clockwise to close the contacts.

DIRECTIONAL TRIP DEVICE FIGS. 11 and 12

A directional trip device is provided for each pole unit of the Type AG-3 circuit breaker and its function is to trip the pole unit in the event of reversal of current flow in that pole. Also all pole units can be simultaneously tripped, at the will of the operator, by opening the tripping switch which de-energizes the potential holding coils of all directional trip devices. It is attached to the bottom of the operating mechanism frame and fits over the lower ends of prop latch as shown in Fig. 12. Moving parts are light in weight to facilitate rapid tripping.

The device is provided with an armature (18) which slides horizontally over the front end of an armature guide rod (14) and which is actuated by two magnetic circuits. A horizontal magnet is assembled around a reduced section of the vertical member of the lower stud (9). Vertical screws (10) attach the long members (5) to the bottom of the operating frame (4) and nut (7) on the rear end of stud (8) holds the rear member (6) behind the lower stud and against the long members. The forward ends of the long magnet members are bridged by a yoke (17) which has a vertical magnetic gap, and is attached to the long members by two screws (27) on each side. A vertical U shaped magnet (15) with two coils (16) is suspended from the forward ends of the long members of the horizontal magnet by screw (28) and the two screws (27) on each side. The horizontal magnet provides a magnetic flux in proportion to, and in a direction determined by, the current flow in the pole unit. The vertical magnet provides a magnetic flux due to direct current potential excitation. See

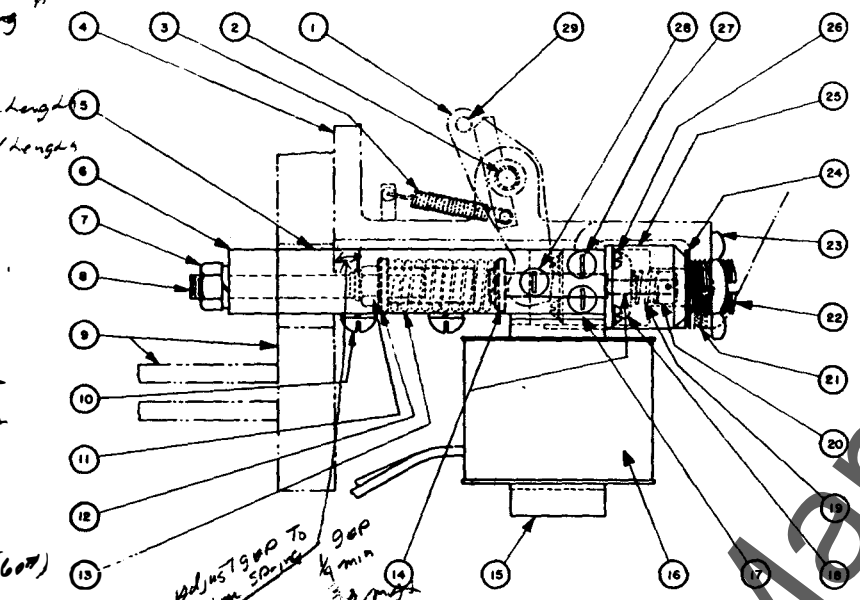


FIG. 12
DIRECTIONAL TRIP DEVICE

Fig. 11. The armature is drawn to the rear against its seat on the magnet by link (19) Figs. 8, 9 and 10, in the opening operation of the pole unit as described under "Tripped Position" and "Tripping Operation". It is held there by the potential coil flux alone. At the same time armature guide rod (14) is pushed to the rear and compresses spring (13), which rides over collar (12) and is backed up by locknut (11) on stud (8). When the armature is held magnetically against its seat and the mechanism is in the reset position, the prop latch is restrained by spring (3) which causes the prop latch to rotate about pin (2) clockwise (looking from left) into a position where its upper end is in the engaged position with cam (11) Figs. 9 and 10.

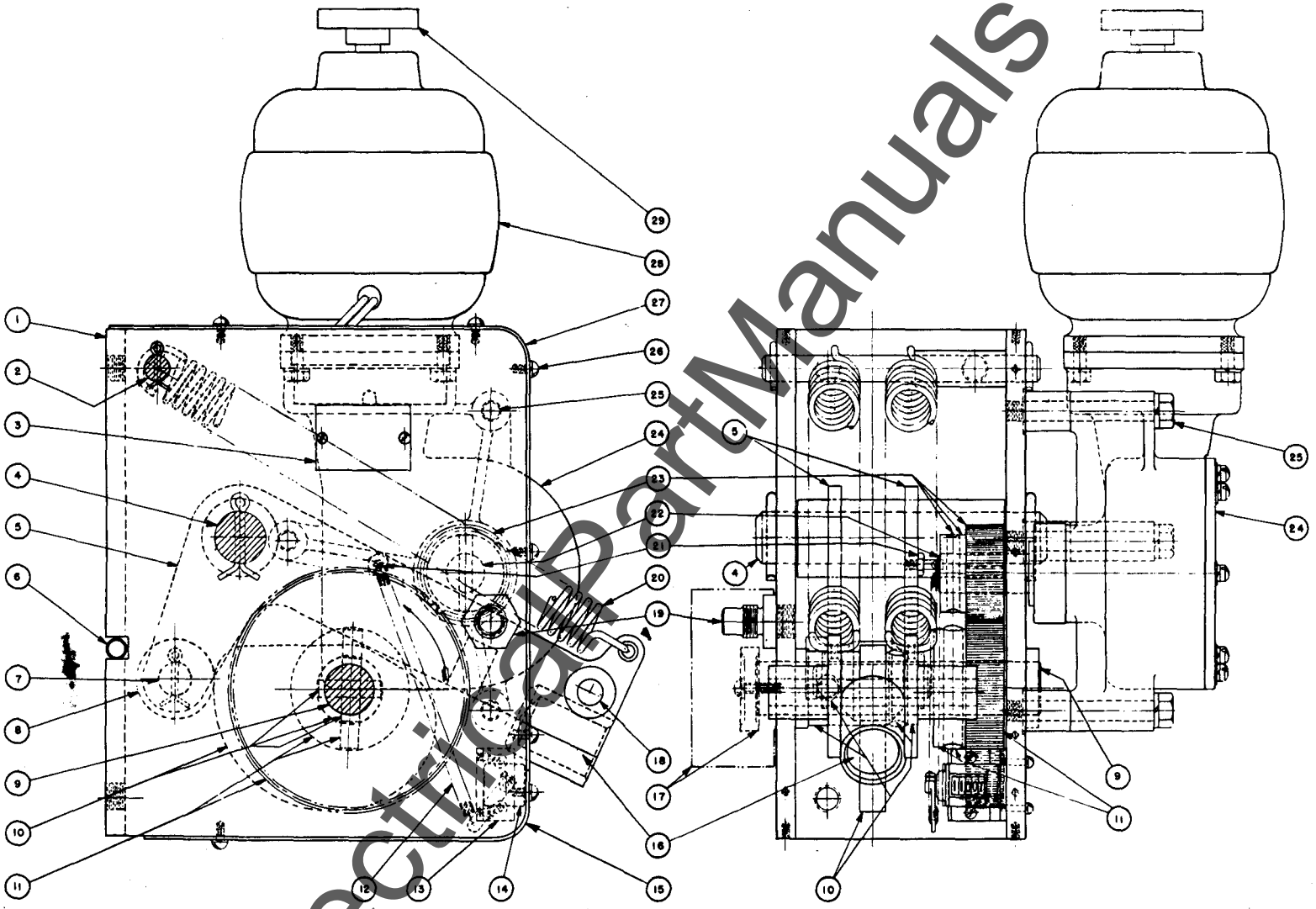
When current flows through the lower stud in the normal direction the two fluxes are cumulative and the armature is more firmly held against the magnet. But reversed flux, caused by reversed current through the pole unit, reduces the flux through the armature to a point where spring (13) overbalances the reduced magnetic pull and forces the armature guide rod and armature forward. At the same time the flange on guide rod forces the prop latch to revolve counterclockwise about pin (2) to disengage cam (11) Fig. 8, and trip the pole unit. This position of the directional trip unit, however, is only momentary because, as soon as the cam takes the position as shown in Fig. 8, the link (19) Fig. 8, pulls pin (29) forward and revolves the prop latch clockwise. This causes the lower ends to be moved to the rear and forces the armature against the magnet and causes the guide rod to compress spring (13). It is necessary for the armature to be reset mechanically against the magnet in this manner as the pull of the vertical magnet is not sufficient to reset the armature from the de-energized position. The prop latch is now in a position to be engaged by the cam during the resetting operation as shown in Fig. 9.

Fig. 12 shows the guide rod end (20) screwed over the front end of the armature guide rod (14), against which spring (19) is backed to force the armature against the magnet when the armature guide rod is in the reset position.

A brass dust cover (25) is attached to the yoke by screws (26). An externally threaded cap screw (22) is inserted through the front frame and sets against spacer washers (24) which fit over the front of the dust cover.

MOTOR OPERATING MECHANISM FIGS. 13 and 14

As shown in Fig. 13 the motor (28) and gear reducer (24) are mounted in a vertical position on the right side of the frame (1) by three screws (25). The frame is mounted on the front of the mounting base by four screws from the rear.



1. FRAME
2. PIN IN FRAME
3. NAME PLATE
4. PIN IN FRAME
5. OPERATING LEVER AND HUBS
6. INSULATION TUBE
7. PIN IN OPERATING LEVER
8. ROLLER
9. CAM SHAFT
10. CAM, HUBS AND GROOV PINS
11. GEAR, HUB AND GROOV PIN
12. SPRING FOR VEEDER COUNTER
13. BRACKET
14. VEEDER COUNTER
15. BOTTOM COVER
16. SOCKET IN OPERATING LEVER
17. MOTOR CUT-OFF SWITCH AND HOUSING, (SEE FIG. 18).
18. PIN IN OPERATING LEVER
19. STOP PIN
20. RESETTING SPRING
21. SPRING POST IN OPERATING LEVER
22. GEAR SHAFT
23. GEAR, HUB AND GROOV PIN
24. GEAR REDUCER (SEE FIG. 14)
25. SCREWS
26. SCREWS
27. TOP COVER
28. MOTOR
29. KNURLED WHEEL

FIG. 13
MOTOR OPERATING MECHANISM

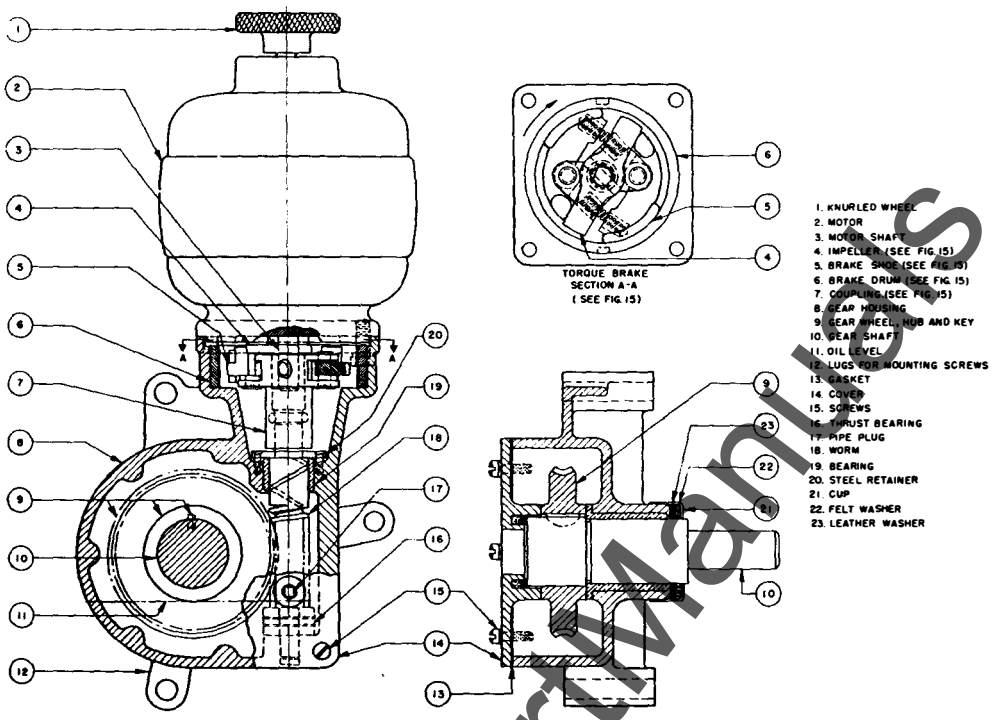


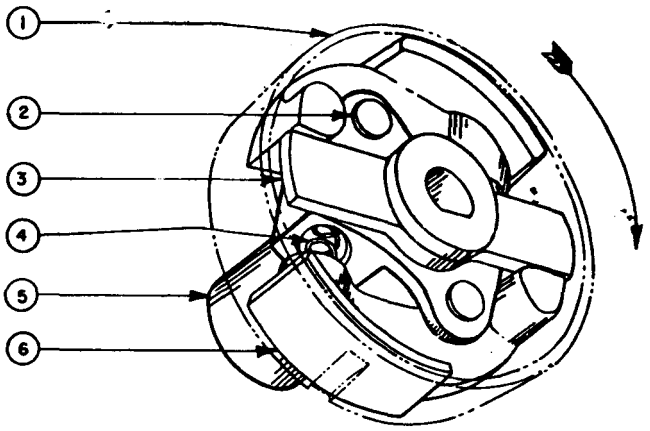
FIG. 14
GEAR REDUCER

Referring to Fig. 14, the lower end of the motor shaft (3) fits into the impeller (4) of the torque brake and the upper square end of the worm (18) fits into the bottom of coupling (7) of the torque brake. The torque brake is detailed in Fig. 15. The worm is mounted in bearing (19) and rests on thrust bearing (16) and engages worm wheel (9) which is keyed to the solid gear shaft (10). The lower part of the worm wheel is immersed in oil which should be kept to oil level (11) as determined by pipe plug (17). The cover (14) is attached to the right side of the gear reducer housing by screws (15). Gasket (13), cap (21), felt washers (22) and cork washers (23) make the housing oil tight.

Referring to Fig. 13, again, the gear shaft (22) is shaft (10) Fig. 14 which extends into the operating mechanism frame and carries gear (23) attached to it by groov pin through the gear hub. Gear (23) engages gear (11) which is attached to cam shaft (9) by a groov pin through the gear hub. The main closing cam (10) is welded to a hub which is attached to the cam shaft by two groov pins. The cam engages roller (8) on the lower rear end of the operating lever (5) which is pivoted to the frame by pin (4). The front end of the operating lever (5) is connected to the lower end of cross bar and connecting frame, Fig. 16, by pin (18) which is pin (12) Fig. 16.

Rotation of the motor causes cam (10) to revolve counter-clockwise (looking from the left) and causes roller (8) to ride over the cam surface. When the circuit breaker is in the tripped or closed position, with the operating lever down, the roller rests on the cam surface at a point of maximum radius. This places the operating levers (26) Fig. 8, of all pole unit operating mechanism in the lowered position, as shown in Figs. 8 and 10. When the motor is started the cam (10) is revolved and allows the roller (8) to fall to a point of minimum radius of the cam under the pull of resetting springs (20) which are attached to the front ends of the operating lever and to pin (2) in the rear upper corners of the frame. This lifts the operating levers and constitutes the resetting operation as described under "Reset Position" Fig. 9. The motor continues to rotate and roller (8) is lifted as the cam is turned with the point of maximum radius under the roller. This lowers the front end of the operating levers (5) and (26) Fig. 8, to close all pole units that may be open. This constitutes the closing operation as described under "Closed Position" Fig. 10. At this point the motor is stopped as described under "Motor Cut-Off Switch", Fig. 18.

Stop pin (19), in the position shown, has no function but, when removed and screwed into the frame from the inside, will prevent the movement of operating lever (5) so that the contacts of the pole units cannot be closed.



(SECTION "A-A" FIG. 14)

1. BRAKE DRUM
2. PINS
3. IMPELLER
4. SPRING
5. BRONZE COUPLING
6. BRAKE SHOES

FIG. 15

TORQUE BRAKE.

A Veeder counter (14) is mounted on bracket (13) which is attached to the inside of the right hand frame. It is operated by spring (12) which is attached to spring post (21) on the operating lever (5).

MANUAL OPERATION OF MOTOR OPERATING MECHANISM FIG. 13

In the resetting operation the operating lever and cross bar cannot be lifted manually by the maintenance closing handle inserted in the socket (16) in the front end of operating lever (5) until the motor cam has been rotated to the proper position. If motor power is not available the cam must be rotated by turning the knurled motor wheel (29) on the top of the motor, by hand, clockwise (looking down) until the operating lever (26) Fig. 8 is lifted high enough to be clear of the closing lever (25) Fig. 8. Close the tripping switch to energize the potential coils (16) Fig. 12 of the directional trip device. Insert the maintenance closing handle in the socket (16) of the operating lever. Lift the handle as far as it will go, which will be a little beyond the point where the closing lever will stop, then lower it to reset the armature of the directional trip device. Then lift the lever again and lower it the second time to latch the pole in the closed position.

TORQUE BRAKE FIG. 15

The torque brake of the AG-3 air circuit breaker is the coupling assembly between the high speed starting motor and the worm gear that allows rapid closing of the circuit breaker and quick stopping of the motor.

It consists of a bronze coupling (5) into the top of which is inserted a freely revolving impeller (3) and into the bottom of which fits the square shaft of the worm (18) Fig. 14. The motor shaft has a flat on it and fits into a hole of the same contour in the impeller. Two brake shoes (6) are pivoted to the coupling by pin (2). The curved end of each brake shoe normally engages the inner surface of the brake drum (1) under pressure of a spring (4) to provide friction against the brake drum. This drum is ridgidly keyed to the inside of the housing that encloses the torque brake and supports the motor as shown in section A-A, Fig. 14. The other end of the brake shoe has a lug which is engaged by the impeller (3) in such a manner that when the motor drives the impeller in the clockwise direction (looking down) the curved bearing end is forced free of the brake drum, allowing the motor to freely drive the coupling and the worm shaft.

When the motor is de-energized, the impeller no longer imposes pressure against the lugs of the brake shoes. The springs (4) then force the curved ends of the brake shoes against the brake drum so that friction quickly brings the motor and gears to a standstill. The gear reduction is so great,

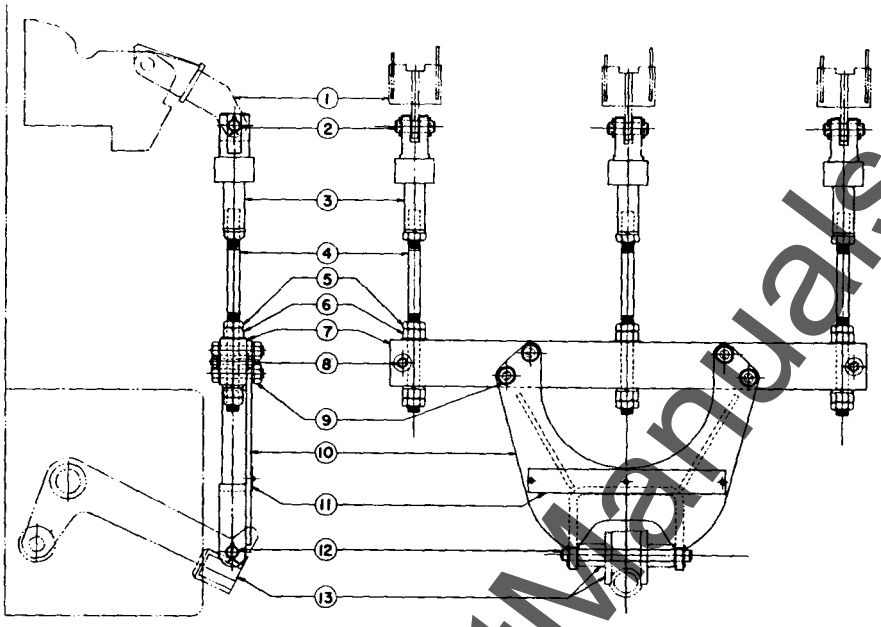


FIG. 16
CROSS BAR AND CONNECTING FRAME

that a few revolutions of the motor will cause a very small movement of the closing cam (10) Fig. 13, which stops in the correct position for prompt closing of the circuit breaker in the following cycle of operation.

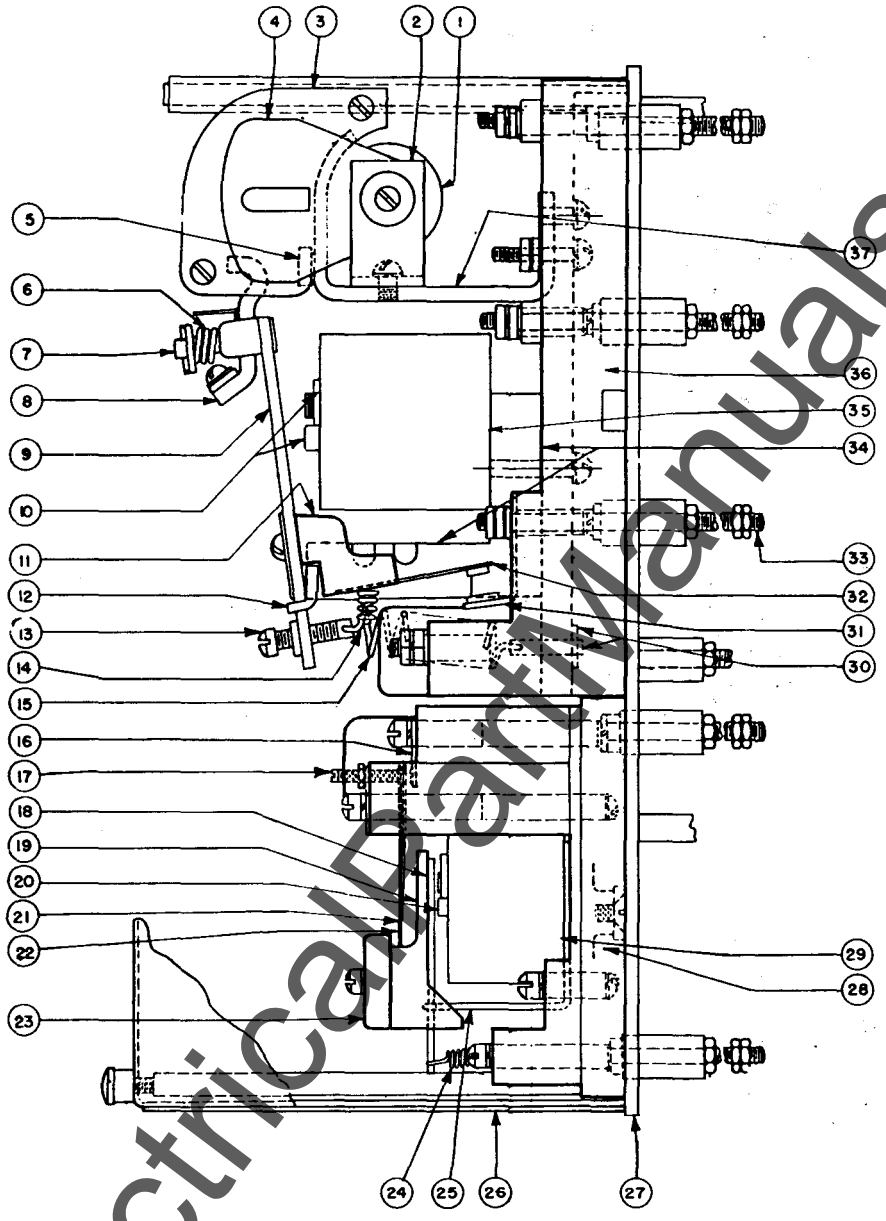
CROSS BAR AND CONNECTING FRAME FIG. 16

This assembly is the connection between the operating lever (5) Fig. 13 of the motor operating mechanism and the operating lever (26) Figs. 8, 9, and 10 of the pole unit operating mechanism. It consists of a reinforced steel frame (10) connected by pin (12) to the operating lever (13) and by screws (9) to the cross bar (7). The cross bar carries three connecting rods (4) which are connected to the cross bar by nuts and washers (6) and to the operating levers (1) of the three pole units by insulating couplings (3) and pins (2).

ELECTRICAL OPERATION

The circuit breaker is closed by the operation of a high speed motor mounted vertically above the worm gear housing of the motor operating mechanism, Figs. 13 and 14, and controlled by motor control relay, Fig. 17, and a motor cut-off switch Fig. 18. In enclosed installations the motor control relay is not installed on the mounting base. The motor cut-off switch is mounted on the left side of the motor operating mechanism.

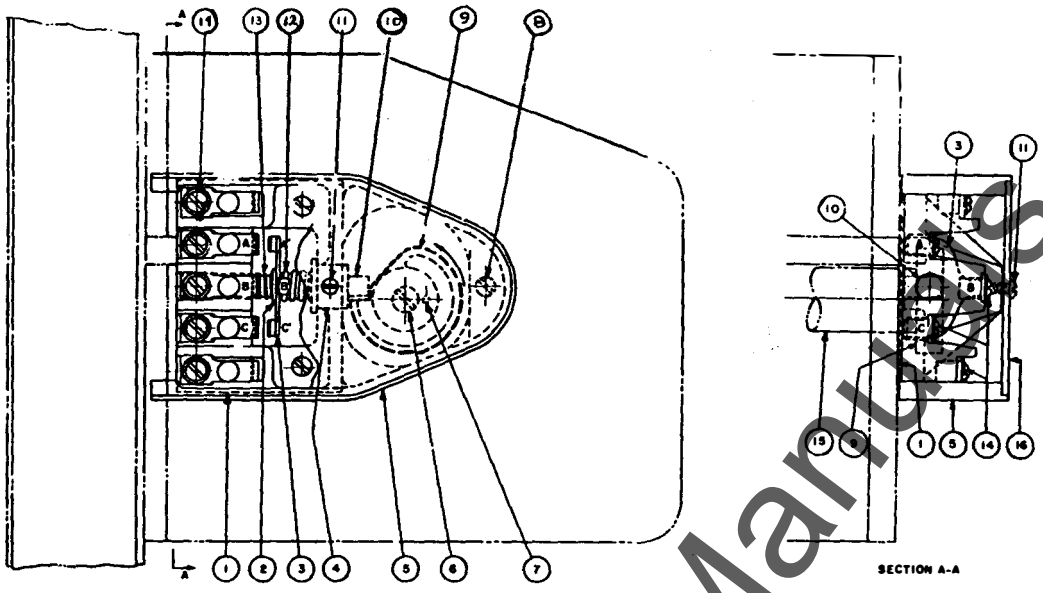
Referring to wiring diagram Fig. 20, the closing of the closing switch at some remote point energizes the upper element of the motor control relay, Fig. 17, through normally closed contacts (21) (17) Fig. 17 of the lower element. The upper unit picks up and closes both normally open main and auxuliary switches. The main switch (8) (5) constitutes switch 1-2 of wiring diagram and connects the motor directly across the control power line. The auxiliary switch (31) (32) constitutes switch 5-7 of the wiring diagram and is in parallel with the closing switch to maintain voltage on the coil of the upper element to insure a complete closing cycle, even though the closing switch is opened before the closing cycle is completed. As the main closing cam, (10) Fig. 13, rotates to close the circuit breaker the auxiliary cam (9) Fig. 18 closes contact M_1 and then contact M_2 of the wiring diagram as described under "Cut-Off Switch" Fig. 18. Contact M_1 is in parallel with the normally closed contacts (21) (17) Fig. 17 of the lower element to maintain voltage on the coil of the upper element after the normally closed switch (21) (17) opens. Contacts M_2 energizes the lower element which then picks up and opens the normally closed switch (21) (17) and closes the normally open switch (22) (16). Switch (22)(16) is in parallel with contacts M_2 and maintains voltage on the lower element coil, either as long as the closing switch is held closed or as long as the upper element is energized. When the circuit breaker is latched closed, as described under "Motor Operating Mechanism",



1. PERMANENT MAGNET BLOWOUT
2. ARC CHUTE SUPPORT
3. ARC CHUTE
4. POLE PIECES
5. STATIONARY CONTACT STUD
6. SPRING
7. PIN, SPRING SEAT AND COTTER PIN
8. MOVABLE CONTACT CLIP
9. ARMATURE
10. MAGNET CORE AND SHADING RING
11. COMPOSITION CONTACT BLOCK
12. BRACKET WITH STOP, RIVETED TO MAGNET
13. SCREW FOR ADJUSTING SPRING PT. 15
14. SPRING FOR MOVABLE CONTACT ARM, PT. 32
15. SPRING FOR ARMATURE
16. REAR STATIONARY CONTACT
17. FRONT STATIONARY CONTACT AND ADJUSTING SCREW
18. ARMATURE
19. COMPOSITION CONTACT SUPPORT
20. MAGNET CORE AND SHADING RING
21. LEFT MOVABLE CONTACT, NORMALLY CLOSED
22. RIGHT MOVABLE CONTACT, NORMALLY OPEN
23. COMPOSITION CONTACT BLOCK AND COVER
24. SPRING FOR ARMATURE
25. MAGNET
26. COVER
27. STEEL MOUNTING PLATE
28. COMPOSITION BASE
29. COIL
30. SPRING POST AND CLIP
31. STATIONARY CONTACT
32. MOVABLE CONTACT ARM
33. TERMINALS AND NUTS
34. MAGNET
35. COIL
36. COMPOSITION BASE
37. CONTACT TRIP SUPPORT

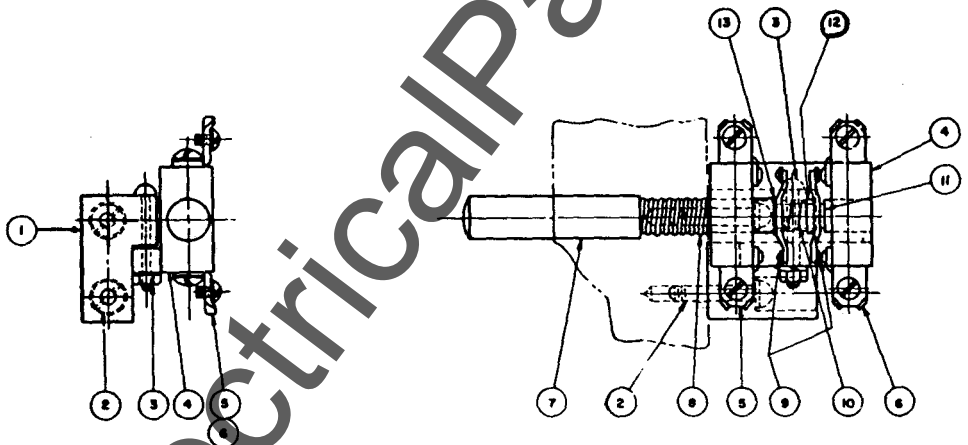
FIG. 17

MOTOR CONTROL RELAY



1. BOTTOM COVER
2. SLEEVE
3. BRIDGING CONTACT WITH THREE CONTACT POINTS
4. MOLDED SUPPORT FOR SHAFT AND FRONT COVER
5. BASE OF MOULDED COMPOUND
6. SCREW WITH LOCKWASHER
7. GROOV PIN
8. SCREW AND LOCKWASHER
9. CAM OF MOLDED COMPOUND
10. SHAFT OF SWITCH
11. SCOVILLE SELF TAPPING SCREW
12. CONTACT PRESSURE SPRING
13. OPENING SPRING
14. BINDING SCREW AND STATIONARY CONTACTS
15. CLOSING CAM SHAFT
16. TOP COVER, PARTLY CUT AWAY

FIG. 18
MOTOR CUT-OFF SWITCH



1. MOLDED BRACKET
2. SCREW R.H. SELF TAPPING AND LOCKWASHER
3. SCREW R.H. WITH LOCKWASHER AND NUT
4. MOLDED BASE
5. CONTACT BRACKET WITH STATIONARY CONTACT AND BINDING SCREW
6. CONTACT BRACKET WITH STATIONARY CONTACT AND BINDING SCREW
7. COMPOSITION PLUNGER
8. COMPRESSION SPRING FOR PLUNGER
9. MOVEABLE CONTACT STRIPS
10. CONTACT SPRING
11. GUIDE
12. INSULATION WASHER
13. INSULATION WASHER

FIG. 19

PUSH TYPE AUXILIARY SWITCH
SHOWN IN CLOSED POSITION OF BREAKER

both contacts M_1 and M_2 are opened quickly by the auxiliary cam (9) Fig. 18, as described under "Motor Cut-Off Switch" Fig. 18. The opening of contact M_1 de-energizes the upper element of the motor closing relay, which, in turn, opens its contacts and de-energizes the motor. Should the circuit breaker trip free during the closing cycle, the motor will not pump or attempt to reclose even if the closing switch is held in the closed position. After the completion of one closing cycle the lower element remains energized and keeps the upper element and the motor de-energized as long as the closing switch is kept closed. If the circuit breaker has tripped during the closing cycle, open the closing switch to de-energize the lower element and to close its normally-closed contacts. This will permit another closing cycle when the closing switch is closed.

MOTOR CONTROL SWITCH FIG. 17

The motor control relay of the Type AG-3 air circuit breaker consists of two elements with molded composition bases mounted on a common steel plate (27) and the entire assembly is mounted in a vertical position on the front of the mounting base, except when the circuit breaker is installed in an enclosed structure. The upper element is the motor control relay and the lower element is the cut-off relay.

The upper element consists of coil (35) and magnet (34) which operate an armature (9) supported on a bracket (12) which is riveted to the lower horizontal member of the magnet. The armature is normally held in the open position by spring (15). Attached to the upper end of the armature is a movable contact clip (8) which engages the stationary contact stud (5) on a brass contact support (37), constituting the contact switch 1-2 of wiring diagram Fig. 20, which makes and breaks the motor circuit. A permanent magnet blowout coil (1) and pole piece (4) are mounted around the contacts which quickly blow out the arc to open the motor circuit. The lower end of the armature supports a composition block (11) to which is attached a movable contact arm (32) which engages a stationary contact (31), constituting the contact switch 5-7 of wiring diagram Fig. 20. Spring (14) holds the movable contact (23) against the composition contact block (11) when in the open position.

The lower element consists of a coil (29), a magnet (25) and armature (18). The armature is supported between extensions of the lower front end of the magnet, and is held in the open position by spring (24). To the armature is attached a composition contact support (19) to which are attached normally closed movable contact (21) and normally open movable contact (22). These, with corresponding stationary contacts (17) and (16) constitute contact swtiches 4-15 and 9-15 of wiring diagram Fig. 20. Springs, within the composition contact support and its composition cover, hold the movable contacts against the cover and support respectively.

A common cover (26) attached to the steelplate (27) completely encloses both units.

MOTOR CUT-OFF SWITCH FIG. 18

The motor cut-off switch is enclosed in a molded composition box shaped base (5) on the left side of the frame which supports the cam shaft and main closing cam of the motor operating mechanism. Three round head screws (8) fasten the base to the frame. On the end of the cam shaft (15), which extends through the switch base, is fastened an auxiliary cam (9) of molded composition, by screw (6) and groov pin (7). The cam engages switch shaft (10) which moves a three pointed bridging contact (3) against stationary contacts A, B and C in the following manner:- It will be noticed that the contact surfaces of stationary contacts A, B, and C are in a vertical plane at right angles to the base, but contact faces of A', B' and C' are in another plane not parallel with the plane of A, B and C and not at right angles to the base. Contact B is farther from the base than contacts A and C. As the cam revolves counter-clockwise (looking from the left) it moves the switch shaft to the left and forces the bridging contact (3) to bridge contacts A and A', also C and C', which constitutes contacts M_1 of wiring diagram Fig. 20. As the switch shaft is advanced farther to the left it tilts the bridging contact (3) to close B and B' also, which constitutes contact switch M_2 of the wiring diagram. This assures that M_1 closes before M_2.

When the main closing cam advances far enough to close the circuit breaker, the auxiliary cam of this device reaches the trip point and allows the opening spring (12) to open all contacts which de-energizes the motor control relay to open the motor circuit.

The cover (16) is attached by screw (11) to the molded composition support which supports the switch shaft.

AUXILIARY SWITCH FIG. 19

An auxiliary switch is provided for each pole unit to give red or green light indication of closed or open position of the circuit breaker. The switches are mounted on the rear of the mounting base between the upper and lower studs and are operated by plungers of insulating material which pass through the mounting base and engage heads of screws in the rear of the main contact levers, (10) Fig. 4, of each unit. Similar contacts of each auxiliary switch are con-

nected in series in order that the red indicator lamp shows only when all six pole units of both circuit breakers which control the six phase rectifier are closed, or green shows when all six pole units are open. (See Fig. 20) If some pole units are open and others are closed neither red nor green light is shown.

The contact brackets (5) and (6) with stationary contacts and binding posts are mounted on a molded base (4). A plunger (7) of insulating material passes through the front part of the base (4). A guide (11), which is attached to the rear end of plunger (7), passes through the rear part of base (4). Two movable contact strips (9) move over the square section of the guide and are separated by contact spring (10) which maintains proper contact pressure. Spring (8) normally holds the front contacts closed and the plunger moves forward to indicate the open position of the circuit breaker.

The molded base (4) is attached to the bracket (1) by screw (3) and the bracket is attached to the mounting base of the circuit breaker by screws (2).

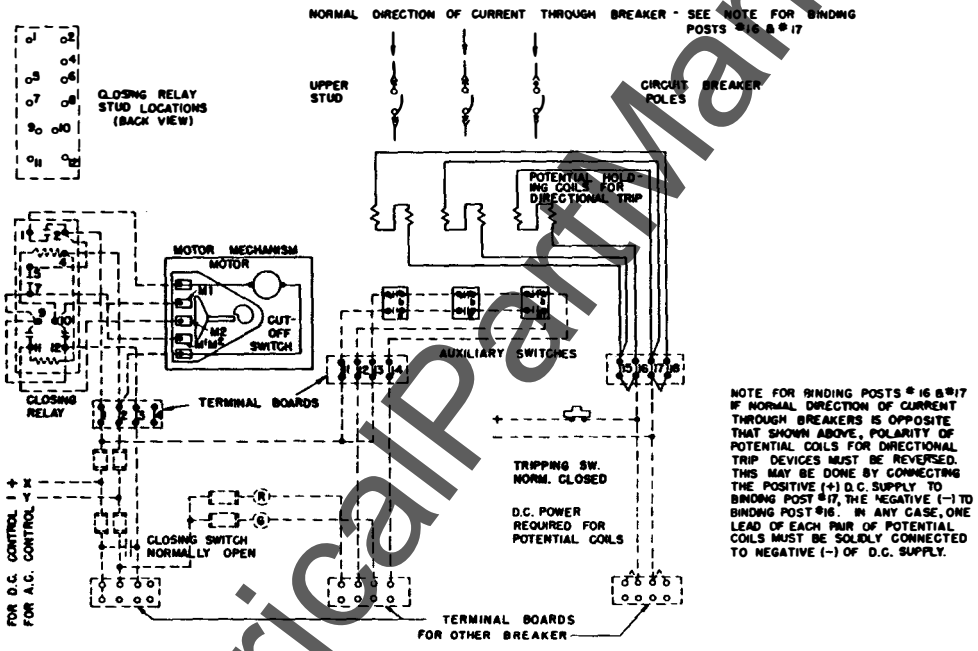


FIG.20
WIRING DIAGRAM
FOR ONE OF A PAIR OF
AIR CIRCUIT BREAKERS.

WIRING DIAGRAM

Fig. 20 shows a typical wiring diagram for one Type AG-3 air circuit breaker of the pair required for operation with a six phase rectifier. It will be noticed that three terminal boards are shown for similar wiring to the second circuit breaker. One closing switch and one tripping switch simultaneously operate both circuit breakers. The closing relay is shown dotted as in some installations it is not installed on the circuit breaker mounting base.

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When ordering renewal parts address the nearest Sales Office of the General Electric Company, specifying the quantity required and describing the parts by catalogue numbers as shown in Renewal Parts Bulletin.

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If several parts are desired as an assembly, reference should be made to each part with instructions to ship assembled. If a part has not been given a part number in any of the figures in the instruction book, it should be referred to as being between or adjacent to parts with numbers. A sketch giving approximate size and shape would be helpful in some cases.

Spare parts which are furnished may not be identical with the original parts since changes and improvements are made from time to time. However, parts which are furnished will be interchangeable with the original parts with no extra work for replacement beyond that required to install parts identical. If additional work or caution is required, complete instructions will accompany the parts. If identical parts to the original parts are required the order must state that they are to be identical.

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