INSTRUCTIONS

for the Installation, Care and Operation of Circuit Breakers and Accessories

TYPE "D" MOVABLE PORTION
MA-350B (1200 AMP)
RUPTAIR MAGNETIC
POWER CIRCUIT BREAKER
AND AUXILIARY EQUIPMENT
(STORED ENERGY OPERATOR)

BOOK BWX-6679

These instructions are not intended to cover all details or variations that may be encountered in connection with the installation, operation, and maintenance of this equipment.
Should additional information be desired contact the Allis-Chalmers Mfg. Company.

ALLIS-CHALMERS MFG. CO.
BOSTON WORKS · BOSTON · MASS.

ALLIS-CHALMERS MANUFACTURING COMPAN

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FOR
INSTRUCTION BOOK BWX-6672

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SECTION - S

CAUTIONS TO BE OBSERVED IN THE INSTALLATION, OPERATION, AND MAINTENANCE OF AIR MAGNETIC CIRCUIT BREAKERS

1. Examine breaker when delivered and report any SHIPPING DAMAGE.
2. Breaker shipped TIED in CLOSED POSITION.
3. Remove SHIPPING BRACES and FASTENINGS.
4. Hoist breaker only with SPREADER - avoid SHORT HITCHES.
5. Store to keep breaker and barrier stacks CLEAN and DRY.
6. Operating power LEADS must be large enough to avoid VOLTAGE DROP.
7. Before adjusting or repairing, disconnect breaker from all sources of POWER and see that breaker is OPEN and springs are DISCHARGED.
8. Unbolt BLOW-OUT COILS AND ARC CHUTE SUPPORTS before tilting arc chutes.
9. Avoid CLEANING FLUIDS detrimental to insulation or paint.
10. Keep GRAPHITE off insulation under penalty of replacement.
11. Do not dress Silver Contact Surfaces.
12. During SLOW-CLOSE operation, prevent jamming mechanism by PULLING LANYARD when lead is picked up.
13. Reconnect BLOW-OUT COILS AND ARC CHUTE SUPPORTS before ENERGIZING breaker.
14. Remove SPRING CHARGING HANDLE before energizing breaker control bus.
15. Remove MECHANISM LOCKING PIN before energizing breaker control bus.

PART 1 - INTRODUCTION

1.1 GENERAL

Allis-Chalmers power circuit breakers are the products of advanced research and design. They are precision electrical equipment, tested to current ASA, EEI, and NEMA Standards, and manufactured in accordance with highest standards.

1.2 PROPER CARE IS ESSENTIAL TO GOOD SERVICE

The successful operation of this circuit breaker depends on proper installation and maintenance as a complement to quality design and fabrication.

The information and instructions included in this book are to aid you in installing and maintaining these units so that you will obtain the highly satisfactory service of which they are capable.

The following numbering system has been adopted for ready reference in this instruction book:

1.2 - Refers to Section #2 of Part 1

4-220 - Refers to Item #220 on illustration marked Figure 4

Please pass this information along to your engineers, erection personnel, and servicemen who will then be better able to aid you in realizing the best service from this equipment.

1.3 INSPECTION AND SHIPPING

During assembly and when circuit breakers are completed, they are subjected to a series of tests and inspections. Packing is expertly done to assure maximum protection during shipment.

1.4 RECEIPT

Upon receipt of the circuit breaker remove all packing traces and examine the breaker and auxiliary equipment carefully to see that no damage has occurred during transit. If any injury is disclosed, a claim for damages should be filed at once with the transportation company and the Allis-Chalmers Manufacturing Company notified.

1.5 STORAGE

If the breaker cannot be set up immediately in its permanent location, and it is necessary to store the equipment, it should be kept in a clean dry place and protected from dust, the action of corrosive gases, from coal combustion products, etc., and from mechanical injury.

1.6 REMOVE SHIPPING SUPPORTS

This circuit breaker has been shipped locked in the closed position. Packing braces that were installed to hold moving parts stationary in transit, must be removed. Fastenings installed to hold moving components of auxiliaries in closed position during transit must be removed.

1.7 HANDLING

In moving a circuit breaker after shipping crates or supports have been removed, and in handling the breaker with a crane or hoist, hooks should be attached only to special supports provided for the purpose and a spreader used where necessary to prevent distortion of frame members. Avoid short hitches which could place too much strain on parts of the breaker such as bushings, insulating parts, fittings, etc., which are not designed primarily for structural strength.

1.8 PRE-INSTALLATION SERVICE

Circuit breakers are completely set up, adjusted, and tested at the factory. However, since there are possibilities that adjustments or fastenings may have become loosened during shipment, storage, and installation, they should be checked thoroughly and corrected where necessary as described hereinafter before energization. The breaker should be operated several times manually at first, and then electrically, prior to and after installation in position before the breaker is ready for service.

Bushings and other insulating parts should be clean and dry. All contact surfaces should be inspected to see if they are clean and smooth. (Do not dress silver surfaces.)

PART 2 - INSTALLATION

2.1 GENERAL

Although the circuit breaker was completely adjusted, tested and packed for maximum protection in transit, it is necessary that adequate steps be taken to prepare the unit for installation.

2.2 REMOVE SHIPPING BRACES

Breaker is shipped in closed position. Remove all shipping braces and fastenings used to hold trip latch (4-27)* and other moving parts of breaker and auxiliaries.

2.3 PREPARE BREAKER FOR INSPECTION

Prepare breaker for installation inspection and servicing outside of cubicle. Remove phase barriers (see Section 6.3a) and tilt back arc chutes to expose interior of breaker (see Section 6.3b).

2.4 INSPECT AND CHECK BREAKER

Examine for any moisture, dirt and other foreign material, which could impair optimum breaker performance.

Manually slow-close the breaker (see Section 3.5). Carefully watch the operation of the operator linkages and the contacts. Contacts should mate properly but need not make at the same time on all phases.

Operate breaker several times electrically to check for smooth operation and to check adjustment of motor cut-off switch. (See Section 4.2).

Tilt arc chutes back to upright position (see Section 6.3b) and replace barriers (see Section 6.3a & b). Make certain all hardware is securely fastened, especially the six blowout coil connections.

2.5 INSERTION MECHANISM

The breaker insertion mechanism should be checked and lubricated if necessary for proper operation to prevent jamming during insertion. The breaker should be moved into position so that it can be rolled straight into the cubicle with a minimum of friction on the wheels and guides in the cubicle. (see Section 2.6

2.6 MECHANICAL INTERLOCK SWITCH

The mechanical interlock switch opens the spring charging motor circuit before the breaker can be moved within the cubicle. Screw (1-9) must be rotated one quarter turn allowing the switch (1-24) to open. This action removes the prop under foot lever (1-20) permitting it to be depressed so as to move the breaker in the cubicle.

This switch must be locked in the closed position before operating the breaker electrically.

2.7 GROUNDING CONTACTS

Check to see that grounding fingers (1-12) on bottom of breaker will make proper contact with stationary ground bar in cubicle. Check for proper grounding contact when breaker is moved into cubicle.

2.8 MECHANICAL INTERLOCKS

Test mechanical interlock plunger (1-18) and make sure that it operates freely and has no binds nor interference. Screw (1-9) must be rotated to allow switch (1-24) to open before foot lever (1-20) can be depressed.

2.9 POSITION IN CUBICLE

Move the breaker into each of its three positions in the cubicle; disconnected position, test position, and operating position. Test to make sure that breaker can be closed electrically only in its test position and in its operating position. Note that switch (1-24) must be in its closed position to energize the meter circuit. When a switchboard has more than one of this type of the same size and rating of circuit breaker, each circuit breaker should be tried in each of the three positions in several cubicles to assure interchangeability.

2.10 OPERATE IN TEST POSITION

The breaker should be operated several times electrically in its test position to see that all parts work correctly in final preparation for its operating position. Make sure that secondary contacts of breaker are in alignment with secondary contacts in the cubicle.

Move the breaker slowly to its operating position. Check alignment of all six breaker contacts for proper engagement with the cubicle primary studs. The alignment of breaker and cubicle primary contacts should be close enough so that the contact fingers on the breaker will mesh with the studs in the cubicle without jamming. Check to see that all secondary fingers are making contact with the secondary bus.

PART 3 - BREAKER OPERATION

3.1 DESCRIPTION OF OPERATOR (Fig. 4)

The stored energy operator consists of three systems: (a) the driving system, (b) the spring linkage, and (c) the closing linkage. The systems are disengaged from each other except while performing their specific function; thus, the driving system and spring linkage are completely free of each other expect when the spring linkage is reset and ready to be charged. Similarly the spring linkage and closing linkage are free of each other except during a closing operation.

3.1a DRIVING SYSTEM

The driving system consists of a gearmotor driving a pinion (4-2) which, in turn, drives two spur gears (4-3). A free-swinging crank (4-4) is mounted on each spur gear shaft; it is driven by a pin (4-5) fastened to the spur gear; and it drives the spring linkage.

3.1b SPRING LINKAGE

This system consists of four closing springs (4-6), two links (4-7), two links (4-9), one link (4-10), two links (4-11) and crank (4-12).

When the linkage is reset, the springs can be charged by cranks (4-4) driving the rolls (4-24) fastened to link (4-10) until links (4-9 & 4-10) go over toggle. At the start of this operation, links (4-9) will be in tension, allowing a gap between latch (4-13) and its roll (4-19). However, part way through the charging operation, as the springs are being charged, the action of roll (4-19) coming against latch (4-13) will be heard. The action of links (4-9 & 4-10) going over toggle will be heard at the end of the charging operation.

Releasing closing latch (4-13) will free the closing springs to drive the breaker closing linkage (see below). During this operation, the spring charging linkage remains over toggle until near the end of its stroke when the toggle is broken by crank (4-12) striking the kick-off screw (4-32). The spring linkage immediately resets allowing the breaker closing linkage room to reset when tripped.

3.1c BREAKER CLOSING LINKAGE

This system consists of two links (4-20), two links (4-21) and arm (4-22). It is always free to operate in any of its functions as it is not secured to the spring charging linkage.

In the closing operation the spring charging linkage drives toggle roll (4-15) over toggle against stop (4-59), thus closing the breaker through arm (4-23). Depressing latch (4-27) during a closing operation prevents the breaker from closing, thereby making it trip free.

3.2 CHARGING SPRINGS

The closing springs (4-6) will charge as soon as the breaker control bus is energized. Should the springs not charge, check the motor cutoff adjustment (see Section 4.2).

The springs can be manually charged by inserting the charging handle down guide tube (1-27) to engage the gearmotor. Rotate the handle in the direction shown until the spring linkage is heard to go over toggle (see Section 3.1b).

REMOVE CHARGING HANDLE FROM BREAKER BEFORE ENERGIZING BREAKER CONTROL CIRCUIT.

3.3 CLOSING BREAKER

When the springs are fully charged, the breaker can be closed manually by pulling lanyard (1-26) or electrically by energizing the closing circuit. This rotates latch (4-13) allowing the springs (4-6) to close the breaker.

3.4 OPENING BREAKER

The breaker can be tripped manually by depressing trip rod (1-43) or electrically by energizing the trip circuit. This rotates latch (4-27) allowing the closing linkage to collapse and reset.

The tripping action described above can take place at any time during a closing operation, either manual or electrical, and regardless of whether or not the armature is energized. Thus the mechanism is electrically and mechanically trip-free in any position.

3.5 MANUALLY SLOW-CLOSING BREAKER

In order to check and make contact adjustments, the breaker can be closed slowly and mechanically held in any position of the closing stroke. The following procedure should be followed.

a) Remove breaker from cubicle and tilt arc chutes back.

b) Be certain that control circuit is open and closing springs are discharged.

c) Insert mechanism locking pin into hole (1-28). It will be necessary to rotate lever (1-29) to allow pin to pass through hole. The pin should pass behind crank (1-30) and through hole in opposite side of operator frame.

d) Insert spring charging handle into guide tube (1-27) and engage with gearmotor. Turn handle in direction opposite to direction indicated on shield until resistance is felt. Pull manual closing lanyard (1-26) and continue turning handle. The breaker contacts will slowly close.

3.5 MANUALLY SLOW-CLOSING BREAKER (continued)

CAUTION: As the contacts approach the breaker closed position, observe the position of cranks (4-4) on rolls (4-24). Care should be taken that the cranks do not pass by the rolls, allowing the contacts to snap open.

Since the motor gears are self-locking, the contacts can be cranked to any position and held for adjustment checks.

e.) To prepare for normal operation:

Trip breaker open.

Remove spring charging handle.

Remove mechanism locking pin.

PART 4 - ADJUSTMENTS

4.1 GENERAL

The breaker has been completely set up, adjusted, and tested at the factory. However, adjustments or fastenings may be changed or become loosened during shipment, storage, or installation, and should be checked and corrected, if necessary, before breaker is operated electrically. Manual operation of breaker should be used for preliminary operation to see that all parts are free and work smoothly. The bushings and other insulating parts should be clean and dry. All contact surfaces should be inspected to see that they are clean and smooth. (Do not dress silver surfaces). Removal of all phase barriers and removal or raising of arc chute assemblies gives access to breaker for checking adjustments.

The paragraphs immediately following give the proper adjustments and methods of making same on the Allis-Chalmers RUPTAIR Air Magnetic Power Circuit Breaker. Adjustment values are all tabulated in Appendix B attached..

4.2 MOTOR COAST (Fig. 4)

The motor cut-off switch (4-18) should open the motor circuit to allow the driving cranks (4-4) to coast after the spring links go over toggle. Adjustment is made by means of screw (4-33). With springs charged, adjust screw to just touch switch roll.

4.3 CLOSING LATCH (Fig. 4)

The closing latch (4-13) should engage its roll (4-19) approximately 5/32 above the lower edge of the latch face. Adjustment is made by screw (4-28). If unstable increase bite. If hard to trip, decrease bite.

4.4 TRIP LATCH (Fig. 4)

The trip latch (4-27) should engage its roll (4-14) approximately 5/32 above the lower edge of the latch face. Adjustment is made by screw (4-65).

When the breaker is "open", the trip latch (4-27) should clear its latch roll (4-14) by 1/32± 1/64. Adjustment is made by screw (4-75).

4.5 CLOSING SOLENOID (4-37)

The armature should move freely and have no binds. There should be clearance between the trip pin and latch when the solenoid is de-energized. The travel of the armature should be such that slow manual actuation will trip the latch and have a 1/8 to 3/16 aftertravel. Adjustment is made by shimming the solenoid.

4.6 TRIP SOLENOID (4-36)

Action and adjustment are identical to closing solenoid (see Section 4.5).

4.7 SPRING POSITION SWITCH (4-34)

The spring position switch (4-34), which is mounted on top of the operator frame, indicates when the springs are charged. Its contacts should close just before the springs are completely charged. Adjustment is made by screw (4-35).

4.8 LATCH CHECK SWITCH (4-1)

The latch check switch, which is mounted on the front of the operator, opens the closing circuit when the trip latch is not set. Proper adjustment has been made and should require no change.

4.9 AUXILIARY SWITCH (Fig. 11)

The auxiliary switch (1-15) has been adjusted at the factory and should normally not require further adjustment. However, before the breaker is placed in service a check should be made to see that the crank arm (11-10) throws approximately equal distances on either side of a vertical center line. The adjustment for throw of crank arm is made by positioning the clevis on the auxiliary switch connecting rod. After correct adjustment is made, make sure all fastenings and locknuts are secure. Each roter (11-3) can be adjusted individually in steps of 15 degrees merely by pressing the contact to one side against the spring and rotating it within its insulated roter housing until it snaps into the desired position.

4.10 INTERLOCK PLUNGER (Fig. 1)

The foot lever (1-20) operates the interlock plunger (1-18) as well as the trip latch. Depressing the lever trips the breaker and raises plunger (1-18) sufficiently to release the breaker allowing it to be moved in the cubicle. The interlock is in proper adjustment when the plunger (1-18) is positioned to 1-3/4±1/16 above the floor line, and causes tripping of breaker contacts when it is raised to a level not more than 2-1/16 above the floor line. The latch tripping rod associated with the foot lever should be clear of the trip latch (4-27).

4.11 ARCING CONTACT HINGE JOINT (Fig. 3)

The arcing contact joint is in proper adjustment when each spring washer is deflected approximately 0.015 inches.

This adjustment is obtained by tightening nut (3-4) until all parts are snug fit; then tighten the nut 3/4 to 1 turn more.

4.12 CONTACT PRESSURE OF HINGE JOINT (Fig. 3)

When the hinge joint contact pressure is in proper adjustment, a pull of from 7 to 9 lbs is required to move the disconnect toward the open position. This pull is measured as follows:

Remove pin (1-46) and detach link (1-47) from the disconnect arms (3-18) and (3-19). Move the disconnect to a position just short of "contact make".

Attach a spring scale to the disconnect eight inches above screw (3-24) and in a direction perpendicular to the longest edge of the disconnect arm. A pull of from 7 to 9 lbs. should be required to move the disconnect toward the open position.

Adjustment is made by tightening (or loosening) nut (3-14).

Before attaching link (1-47) to disconnect arms (3-18) and (3-19), check contact alignment (Section 4.13) and contact lead (Section 4.14).

4.13 CONTACT ALIGNMENT (Fig, 3)

The horizontal pairs of main contact fingers should "make" with the moving contact simultaneously. (Note: Contact on different phases should not necessarily "make" simultaneously).

If not already detached, remove pin (1-46) and detach link (1-47) from disconnect arms (3-18) and (3-19) of two phases only. With the maintenance closing device move the disconnect of the remaining phase toward the closed position until a main contact finger is touched. Dimension c should then be no greater than .010 inches.

Adjustment is made by loosening two nuts (3-22) and rotating the contact assembly. Alignment (dimension c) should be checked after tightening nuts (3-22).

Alignment is checked and adjusted on each phase separately. Be sure there are no binds between contacts (3-11) preventing proper wiping action with the disconnect arms.

Check contact lead (section 4.12), before attaching link (1-47) to disconnect arms (3-18) and (3-19).

4.14 CONTACT LEAD (Fig. 3)

Contact lead should be checked and adjusted only when the contacts are in alignment (see Section 4.13).

The arcing contacts (3-9, 10, 27, 28) should "make" before the main contacts. Measure and adjust each phase separately as follows:

If not already detached, remove pin (1-46) to detach link (1-47) from disconnect arms (3-18) and (3-19). Move the disconnect toward the closed position until the arcing contacts just touch (See Fig. 3, View A-A, arcing contacts engaging).

The shortest gap between the bottom contact fingers (3-11) and the disconnect arms (3-18) and (3-19) should be 1/4 inch plus 0, - 1/32. (Dimension b in View A-A of Fig. 3). Adjustment is made by loosening or tightening nut (3-1).

Reconnect link (1-47) to disconnect arms (3-18) and (3-19) using pin (1-46).

4.15 CONTACT STROKE (Fig. 3)

Contact stroke should be checked and adjusted only when the contacts are in proper alignment (See Section 4.13).

In order to insure proper wiping action and contact pressure, the stroke of the disconnect must be maintained in proper adjustment. Check and adjust as follows:

With breaker in closed position, dimension a (View A-A of Fig. 3) on the top pair of fingers should be 1/16 plus 1/16 -0. Adjustment is made with the breaker in the open position by increasing or decreasing the effective length of link (1-47) by means of nuts (1-10). Each phase is adjusted individually.

After making the above adjustments, on all three phases, trip the breaker open and check to see that dimension d is 4-1/8 inches plus or minus 1/8 on all three phases. (On breakers with more than four contacts per phase, dimension d is still measured to the second from top contact.)

Adjustment for dimension d is made by first removing pin (1-33) on each puffer. After loosening nut (1-42), increase (or decrease) effective length of rod end (1-40) by screwing (or unscrewing) it into piston (1-44). Adjust rod ends (1-40) on both puffers the same amount. Tighten nuts (1-42), replace pin (1-33), and check dimension d.

PART 5 - MAINTENANCE

5.1 GENERAL

Safety of the operator and continuity of electric service of loads connected to circuit breakers are dependent upon proper operation of the breakers. In order to keep circuit breakers in proper order, it is recommended that a routine service inspection should be made at six month or 2000 operation intervals, whichever comes first. The actual service interval and the amount of servicing required will usually be determined by the particular conditions at the installation and will be influenced by such things as the number of operations, number of fault interruptions, cleanliness of the equipment and past experience with the equipment.

Servicing is usually intended to cover adjusting, cleaning, lubricating, tightening, inspection, tests, etc. A permanent record is usually desirable and should list for each serial number, the date, operation counter reading, general condition of equipment, and work done by serviceman.

Be sure that the breaker and its mechanism is disconnected from all electric power and that the breaker is in the open position before any maintenance is attempted.

5.2 CONTACTS

Inspect all contacts frequently, depending on severity of service. Replace badly pitted or burned contacts before they are damaged to such an extent as to cause improper operation of the breaker.

5.3 BARRIER STACKS

The barrier stacks are fragile and should be handled carefully. The barrier stacks should be inspected for erosion of the plates in the areas of the slots. The stacks should be replaced when a milky glass is observed on the full length of the edges of most of the slots. They should be likewise replaced if plates are broken or cracked. When cleaning the breaker and cubicle, inspect for pieces of barrier stack refractory material which would obviously indicate breakage.

5.4 BREAKER TIMING

Check the contact adjustment and breaker timing, also check adjustments of auxiliary equipment and see that it functions properly. A comparison of breaker timing at any period of maintenance with that taken when the breaker was new will immediately indicate a condition of maladjustment or friction should the timing vary more than 1/2 cycles on opening or 2 cycles on closing with the same coils.

5.5 LUBRICATION

Lubrication is of the utmost importance and a special effort should be made to assure that all moving parts are kept clean and properly lubricated at all times. The disconnect hinge joint and the solenoid armature are lubricated with microfine dry graphite. Graphite should be rubbed in well and all excess carefully removed.

CAUTION: GRAPHITE MUST BE KEPT OFF INSULATION UNDER PENALTY OF REPLACEMENT, AS IT CANNOT BE SATISFACTORILY REMOVED.

Bearing Pins and other moving parts should be lightly lubricated with a light film of Beacon P-290 or equal. Needle bearings will in general not require frequent lubrication, but care should be taken to prevent entrance of dirt and foreign material during maintenance work. Mating surfaces of main and arcing contacts should not be lubricated.

5.6 MAINTENANCE GUIDE

Refer to the attached "Schedule of Checks and Adjustments", Appendix A, for a digest of pertinent instruction book information, a guide to simple and convenient maintenance procedures.

PART 6- REPLACEMENT PARTS

6.1 HOW TO ORDER

When ordering replacement parts, it is very important to give complete information. This information should include:

(1) Breaker serial number

(2) Number of pieces required

(3) Reference number

(4) Instruction book number

(5) Description of part (Use instruction book descriptions where possible)

(6) Rated voltage of all meters, relays, and coils ordered

(7) Rated amperes of all meters, relays, and coils ordered

(8) Rated voltage of breaker

(9) Rated amperes of breaker

The breaker serial number is necessary to determine the correct identity of a part; without this serial number, Allis-Chalmers Mfg. Co. cannot be sure of the correct identity of the desired parts.

If any doubt exists as to the instruction book reference or the description, a dimensional sketch of the desired part will help to properly identify it.

6.3 REPLACING PARTS

Before removing any part, observe its function and adjustment. By so doing, it is usually possible to avoid any appreciable amount of adjustment work after the installation of the replacement part.

CAUTION: BEFORE REMOVING ANY PART, MAKE SURE THAT THE BREAKER AND ITS OPERATING MECHANISM IS DISCONNECTED FROM ALL ELECTRIC POWER AND THAT THIS BREAKER IS IN THE OPEN POSITION.

6.3a PHASE BARRIERS (Fig. 1)

Lift wires of panel spring assembly (1-13) out of slots (1-14) to release panel (1-32). Lift and remove panel. Loosen center phase screw (1-23), remove screw (1-2), and remove barrier (1-25). The phase barrier assemblies (1-5) and (1-7) can now be lifted and removed from the breaker.

6.3b TILTING ARC CHUTES (Fig. 1)

Remove phase barriers (see Section 6.3a). Remove screws (1-23), (1-37) of each phase. Remove screws (1-39) to remove barrier (1-22). With arc chute support in place, tilt back the arc chutes.

After tilting arc chutes upright, and replacing barriers, be sure screws (1-23), (1-37), and (1-39) are tightened securely on all three phases.

6.3c BARRIER STACKS (Fig. 1)

Tilt back arc chutes (see Section 6.3b). Remove five screws (2-2), barrier (2-1), from each arc chute. Slide barrier stack (2-23) through top of arc chute.

When sliding a barrier stack into the arc chute, care should be taken to see that the end containing the Vee-shaped slots goes in first.

APPENDIX A

SCHEDULE OF CHECKS AND ADJUSTMENTS

This tabulation is intended to serve as a ready reference for servicing of this equipment. Other items may be added as experience dictates. For a thorough understanding of the breaker, it is recommended that the instruction book be studied.

1- Breaker should be prepared for servicing outside of its cubicle. Breaker must be in the open position and disconnected from electric power. Remove phase barriers (Section 6.3a) and tilt back arc chutes to expose breaker interior (Section 6.3b). Remove screws (1-23) (1-37), and (1-39), and barrier (1-22) prior to raising arc chutes.

2- Operate breaker manually to check general operation and freedom of movement.

3- Visually inspect all parts during all phases of servicing.

4- If a travel recording device is available, it will furnish an excellent indication of the mechanical operation of the breaker. Refer to Section 5.4.

5- Clean all parts of breaker. An air blower is useful in removing dust from generally inaccessible places.

6- Check motor coast per Section 4.2.

7- Check trip latch (4-27) adjustment per Section 4.4.

8- Check latch roll step screw (4-75) adjustment per Section 4.4.

9- Check closing latch (4-13) adjustment per Section 4.3.

10- Check trip solenoid (4-36) aftertravel per Section 4.6.

11- Check closing solenoid (4-37) aftertravel per Section 4.5.

12- Check control relay for proper action.

13- Operation counter is actuated by a spring which should be adjusted for minimum force by positioning of the counter arm. Record counter reading.

14- Check trip interlock plunger (1-18) per Section 4.10.

15- Check all wiring for frayed or broken wires, tighten all terminals.

16- Check all hardware for tightness. Note that Stover locknuts are used in many places. These nuts may be identified by the slightly egg-shaped hole on one end and the parallel grooves on the corresponding face of the nut.

17- Operate breaker manually and electrically. Check operation at minimum close and trip voltage if possible.

18- Check spring position switch for proper action per Section 4.7.

19- Remove disconnect arms as a unit by removing screw (3-24) and nut (3-14). Refer to Fig. 3. Carefully inspect all contact surfaces in hinge joint. Silver washer (3-25) and adjacent surfaces should be clean and free of roughness or galling. Lubricate silver washer and mating surfaces by rubbing in microfine dry graphite.used sparingly. Reassemble hinge joint. Tighten hinge joint per Section 4.12.

20- Check arcing contact hinge joint per Section 4.11.

21- Inspect condition of auxiliary switch contacts.

22- Inspect condition of control relay contacts.

23- Check contact alignment per Section 4.13.

24- Check contact lead per Section 4.14.

25- Check contact stroke per Section 4.15.

26- Check for barrier stack erosion per Section 5.3.

27- Check condition of contacts.

28- Reassemble breaker. Be sure screws (1-23),(1-37), and (1-39) are secured in each phase.

29- Check breaker in cubicle. Check general fit and line up. Check operation of trip interlock plunger in test position and fully inserted position. Check secondary wiring fingers for good contact. Check grounding contact for good contact.

30- GENERAL

The above points will provide a quick reference for maintenance procedures. Other items may be added as experience dictates. For a thorough understanding of the equipment, the instruction book should be studied. Refer to Part 5 for general comments on maintenance and lubrication.

ALLIS-CHALMERS MANUFACTURING COMPANY

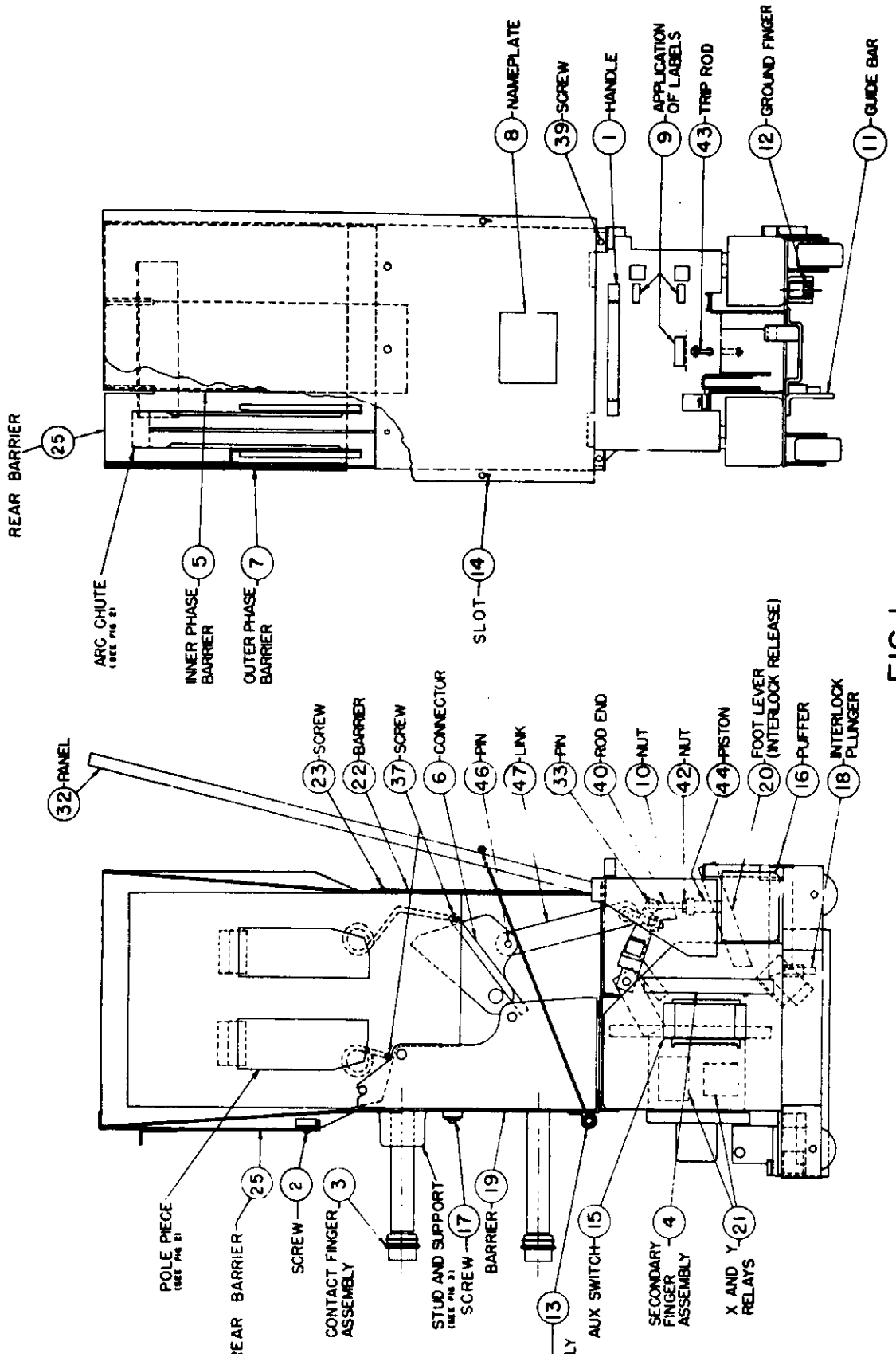


FIG. 1

TYPICAL MAGNETIC BREAKER

MAY 16, 1963

71-401-624-401

ALLIS-CHALMERS MANUFACTURING COMPANY

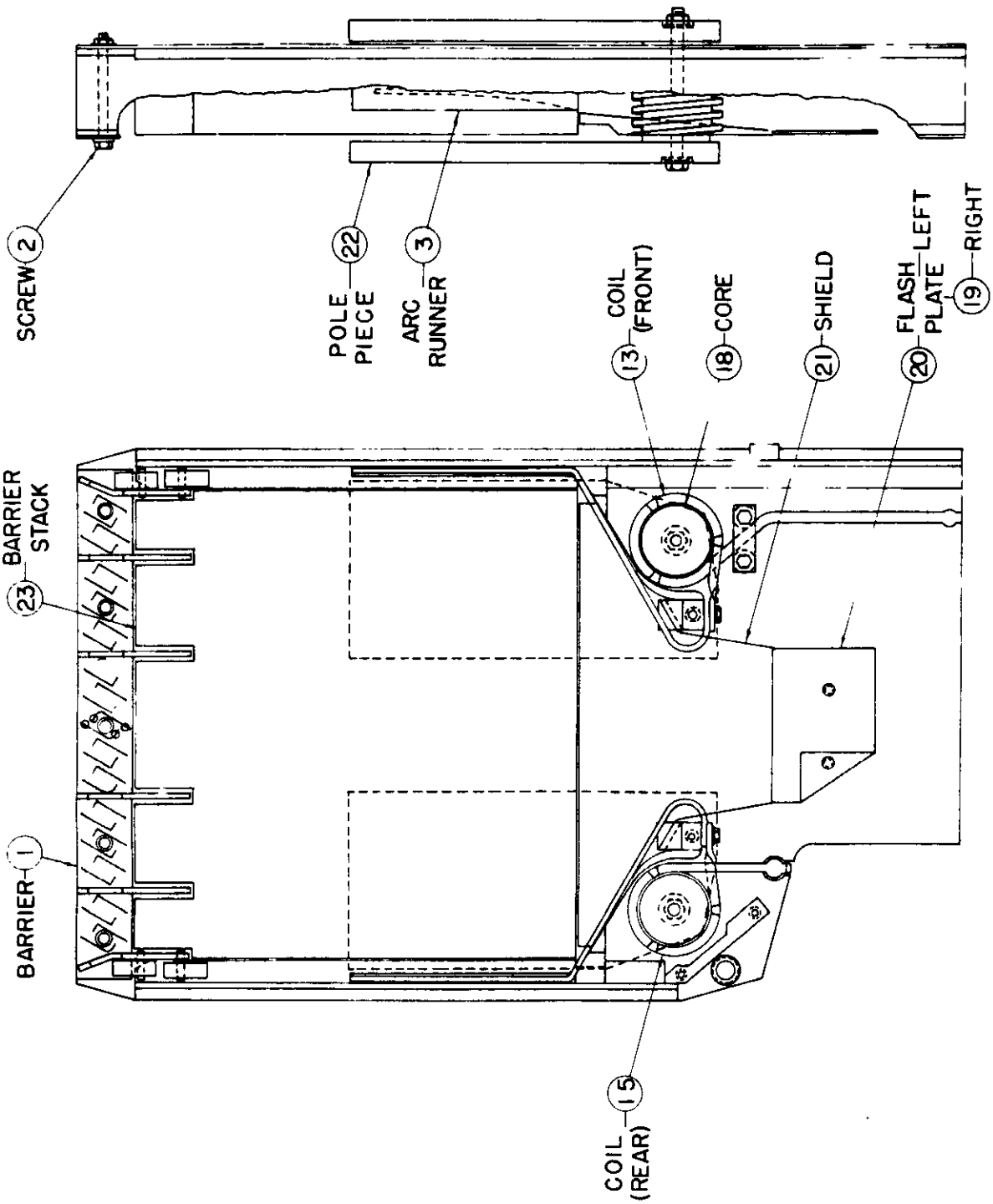


FIG 2

TYPICAL ARC CHUTE

MAY 16, 1963 71-401-631-401

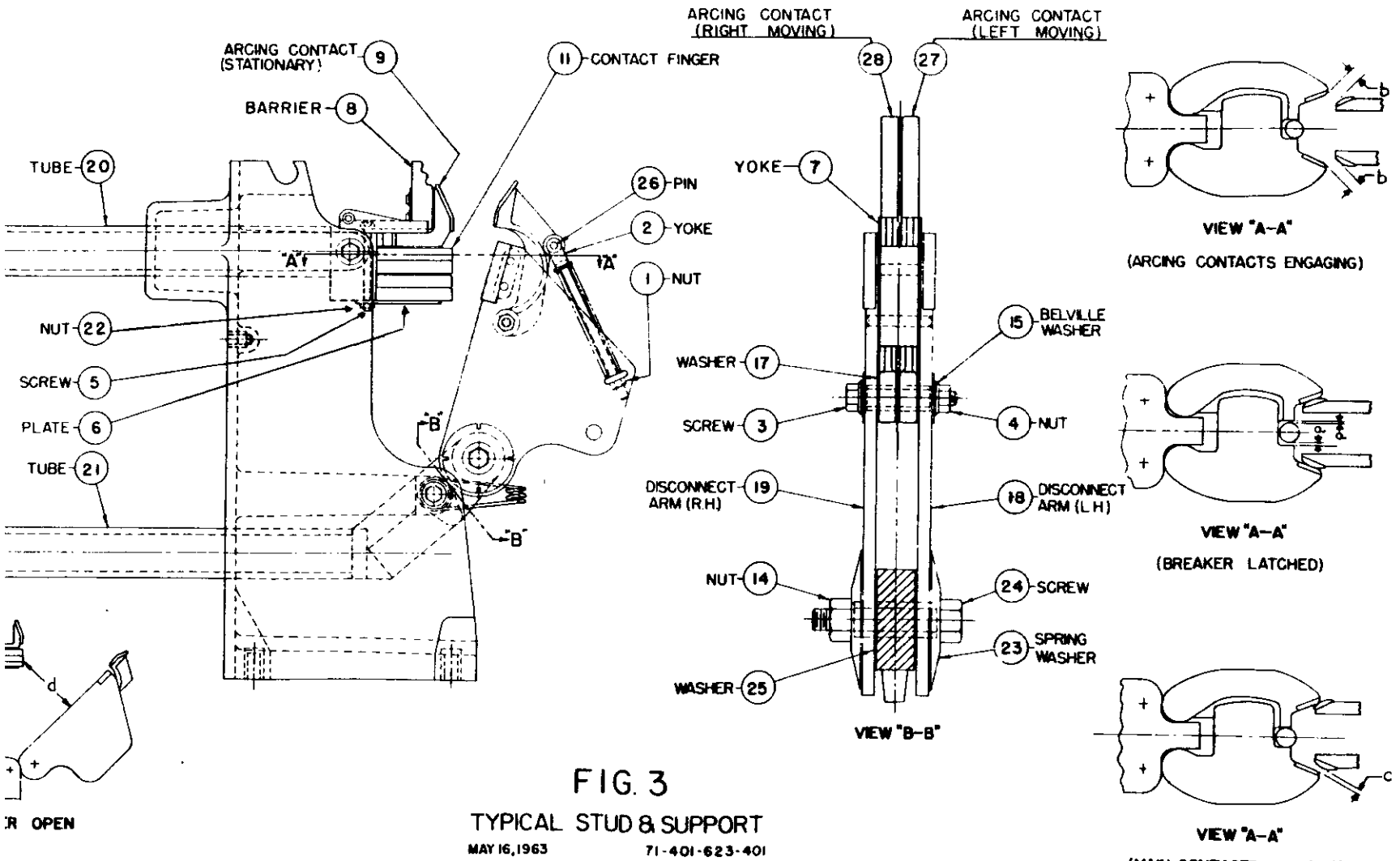


FIG. 3

TYPICAL STUD & SUPPORT

MAY 16, 1963 71-401-623-401

ALLIS-CHALMERS MANUFACTURING COMPANY

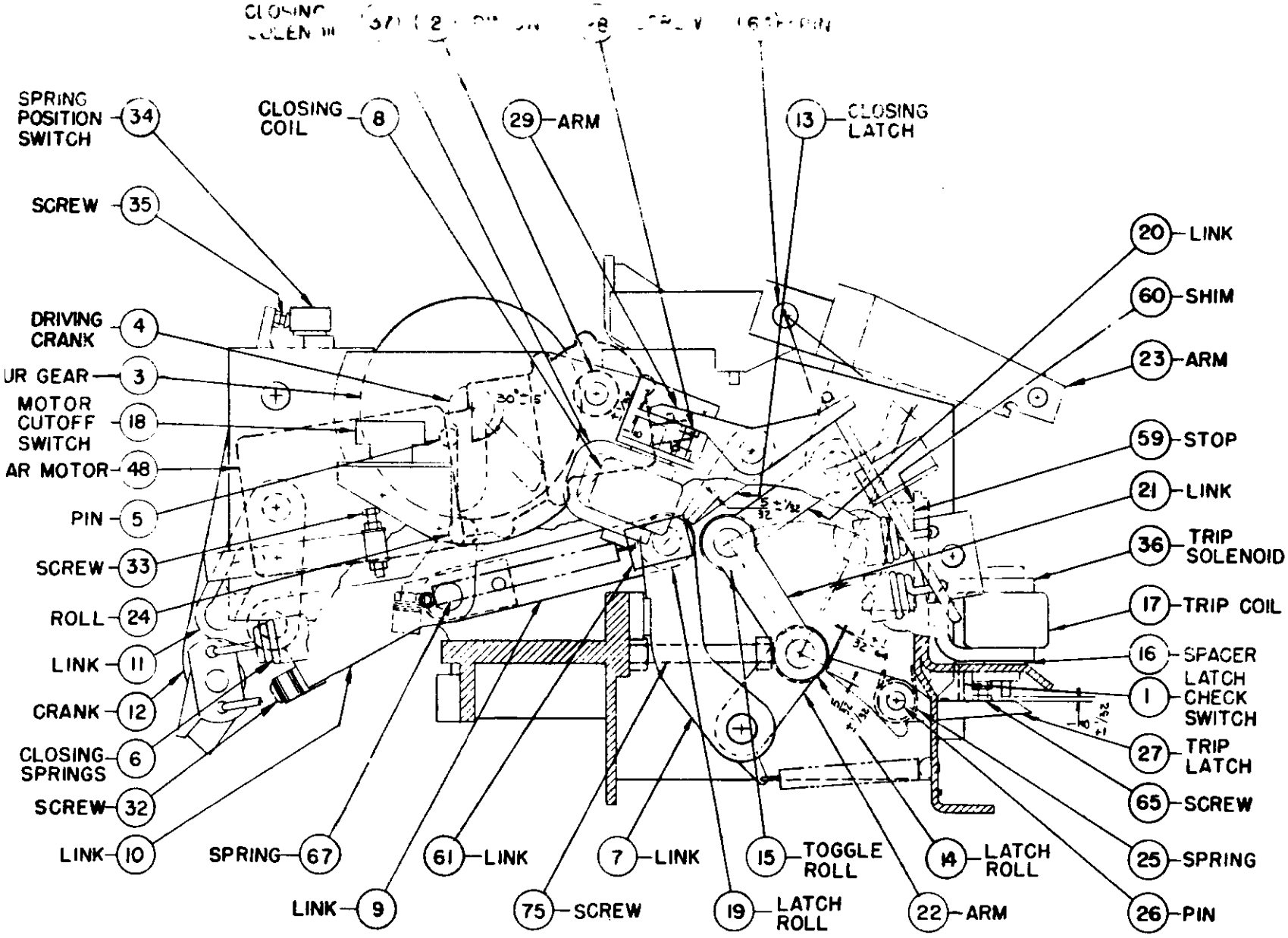


FIG. 4

TYPICAL OPERATOR

ALLIS-CHALMERS MANUFACTURING COMPANY

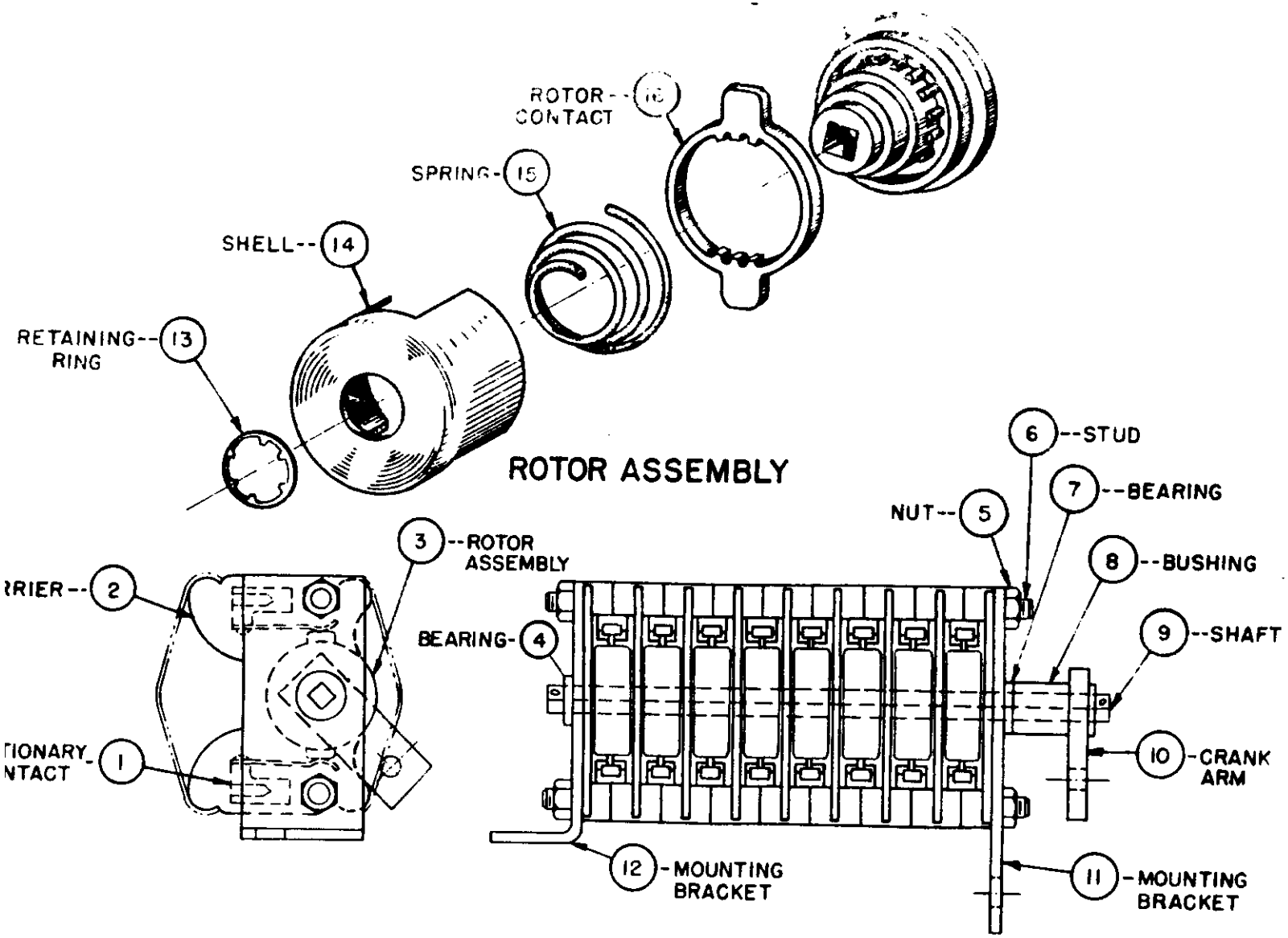


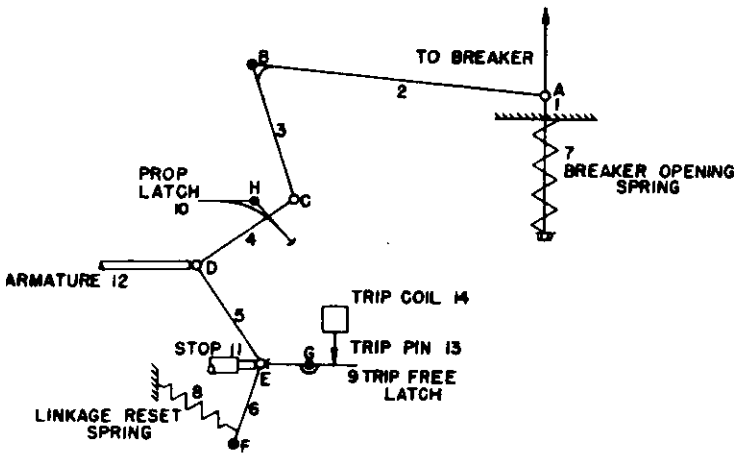
FIG. 11

TYPICAL AUXILIARY SWITCH

JULY 16, 1958

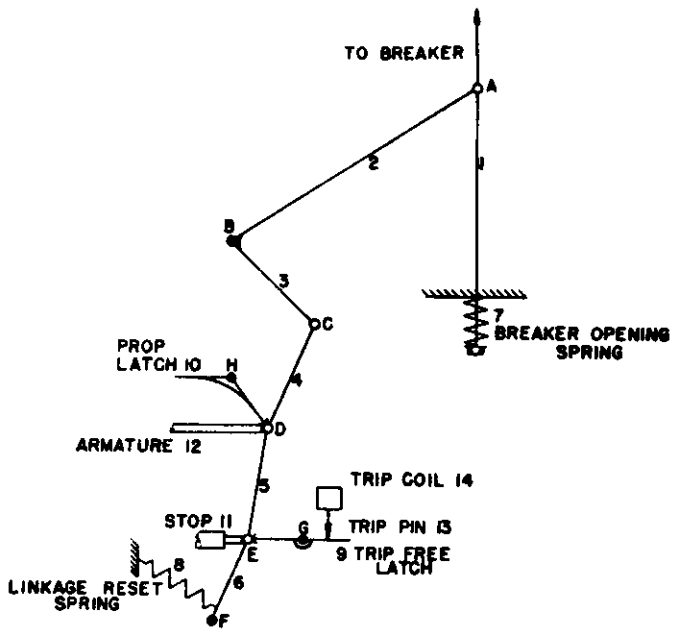
71-301-758

ALLIS-CHALMERS MANUFACTURING COMPANY



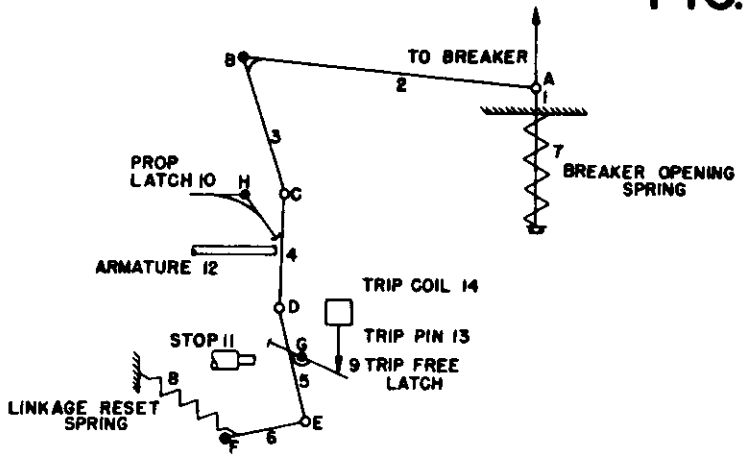
OPEN

FIG. 13



CLOSED

FIG. 14



TRIP FREE

FIG. 15

TYPICAL OPERATOR LINKAGE DIAGRAM

SEPTEMBER 9, 1953 71-400-246

ALLIS-CHALMERS MANUFACTURING COMPANY