RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

"De-ion"

AIR CIRCUIT BREAKERS

Types DB-75 and DB-100

600 Volts A-C
250 Volts D-C

Continuous Current Rating

DB-75	DB-100
2,000 Amperes	4,000 Amperes
2,500 Amperes	5,000 Amperes } D-C
3,000 Amperes	6,000 Amperes } only

Interrupting Rating

DB-75	DB-100
75,000 Amperes (600 V. A-C)	100,000 Amperes (600 V. A-C)
75,000 Amperes (250 V. D-C)	100,000 Amperes (250 V. D-C)
100,000 Amperes (240 V. A-C)	150,000 Amperes (240 V. A-C)

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR APPARATUS DEPARTMENTS
EAST PITTSBURGH PLANT • EAST PITTSBURGH, PA.
SUPERSEDES I.B. 35-240-1
APRIL, 1958
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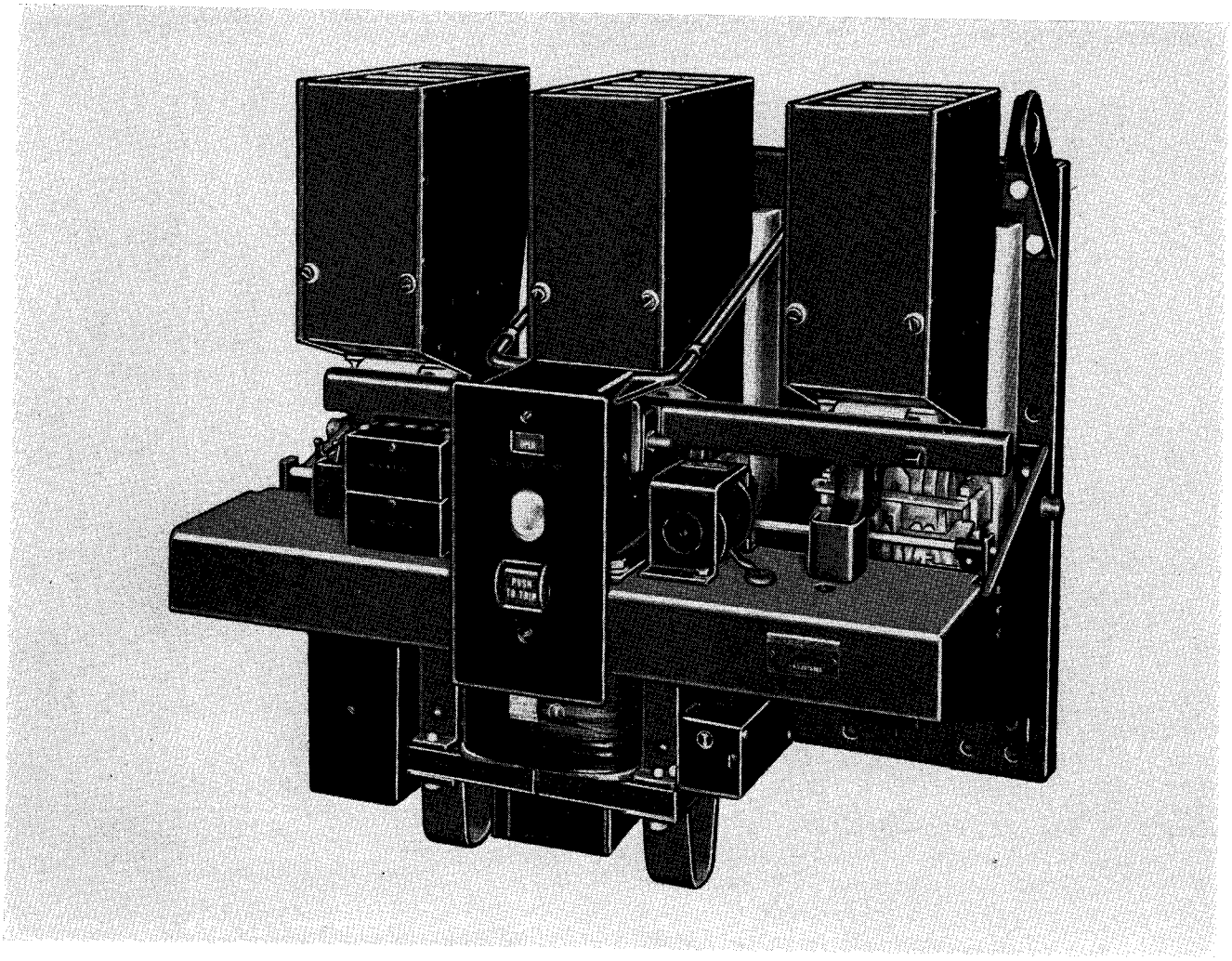
WESTINGHOUSE
TYPE "DB" AIR CIRCUIT BREAKERS

Type "DB" air circuit breaker is designed to give continuous and reliable service as the protective link between the power source and associated productive equipment. This breaker is built to operate with a minimum of maintenance, while at the same time its simplified construction permits maximum accessibility for inspection and adjustment when required. The ease with which attachments may be added or removed is an outstanding feature of the "DB" design.

For the greatest measure of safety to operating personnel and also to minimize maintenance requirements, the breaker should be mounted in an enclosure suitable to local operating conditions. A selection of standard enclosures is available for various applications.

●

Important: To assure proper functioning, inspect each breaker at regular intervals in accordance with a systematic maintenance schedule. The frequency and character of the inspections will for the most part be determined by the severity of the duty performed. The minimum requirements, however, should consist of a light monthly inspection, with a thorough inspection semi-annually. Occasional checks on calibration as well as on coordination and freedom of all moving parts, must be included in the maintenance schedule. Consult Westinghouse engineering and service personnel for recommendations pertaining to special operating or maintenance conditions.



RECEIVING, HANDLING AND STORING

TYPES "DB-75" AND "DB-100" AIR CIRCUIT BREAKERS are shipped in wooden crates with all attachments mounted in place.

Important: To avoid damage to the breakers, do not use hooks in handling.

Table No. 1
NET WEIGHTS OF 3 POLE BREAKER

DB-75	475 lbs
DB-100	525 lbs

Immediately upon receipt, examine shipment for any loss or damage incurred during shipment. If injury or rough handling is evident, file a damage claim at once with the transportation company and notify the nearest Westinghouse Sales Office.

When unpacking, be sure that no loose parts are missing or left in the packing material. Report all shortages at once. Blow out any dust or particles of packing material that may have accumulated on the circuit breaker parts. Do not remove the cardboard "dust guards" from top of the arc chutes until the breaker is to be placed in service.

INSPECTION

The "DB" breaker assembly consists of a co-ordinated group of sub-assemblies mounted on an aluminum supporting panel. The complete breaker assembly is to be mounted with the aluminum panel in a vertical position. All inspections for proper operation should, therefore, be made with the breaker in this position. Final inspection should preferably be made with the breaker in its permanent mounting.

Inspect the breaker as follows:

1. Lift trip finger by hand to make sure that it does not bind.

2. Remove any foreign particles from the hinge end of the moving contacts.

3. Insert the maintenance operating handle and slowly close the breaker.

a. Observe whether all parts are in proper alignment and move freely.

b. Be sure that the contacts are clean and properly aligned. The center finger of the stationary arcing contacts should have a slight lead.

c. The hinge end of the moving contact is lubricated with graphite grease and is therefore black. For a description of contact alignment refer to "CONTACTS", Page 9.

4. If the contacts are in alignment and all parts move freely, continue the closing until the breaker is latched.

5. Hold the maintenance operating handle down. Push the "Push to Trip" button to trip breaker.

a. The toggle linkage should collapse and the moving contact assembly move freely to the full open position. This should be followed by complete resetting of the links in the toggle mechanism as the handle is raised.

b. The links must always be free to move without friction or binding.

6. Check the attachments for operation in accordance with the appropriate instructions as given under "Maintenance". Part III of this book.

Note: It is not advisable to lubricate any parts of the breaker. The lubrication supplied during factory assembly is sufficient for years of service. The lubricant is of a special form which is used sparingly. The addition of oil will only promote the accumulation of dust and dirt.

STORING

If circuit breakers are not to be installed in their permanent locations at once, they should be carefully inspected for loose or damaged parts and then stored in a clean, dry place in an upright position to avoid damage to the 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 which are apt to absorb moisture. FOR SAFETY REASONS, STORE THE BREAKER IN THE OPEN POSITION.

INSTALLATION

Type "DB" circuit breakers are furnished as complete unit assemblies and the installation consists of: (1) bolting them to the supporting framework or structure; (2) connecting the current carrying cables or bus bars; and (3) completing any secondary control wiring that may be necessary.

Caution: During installation, the circuit breaker should be in the open position. Be sure to de-energize the load and control leads to be connected, and also the section of the switchboard where installation is being made.

Mounting dimensions and details of the front enclosure cutouts are shown in Figs. 1 and 1A.

To prevent distortion of the breaker panel, the supporting structure should be checked for alignment.

A manual closing handle is supplied with each order of DB-75 and DB-100 breakers. This handle is for maintenance only and in no case should it be used for closing the breaker when primary circuit is energized.

CONNECTIONS

Typical circuit breaker wiring diagrams are shown in Figs. 2 and 2A. The connecting cables or bus bars should have adequate current carrying capacity, or heat will be conducted to the circuit breaker resulting in possible excessive temperature rise. Connecting cables or bus bars must be supported so that the circuit breaker studs will not be subjected to unnecessary stresses.

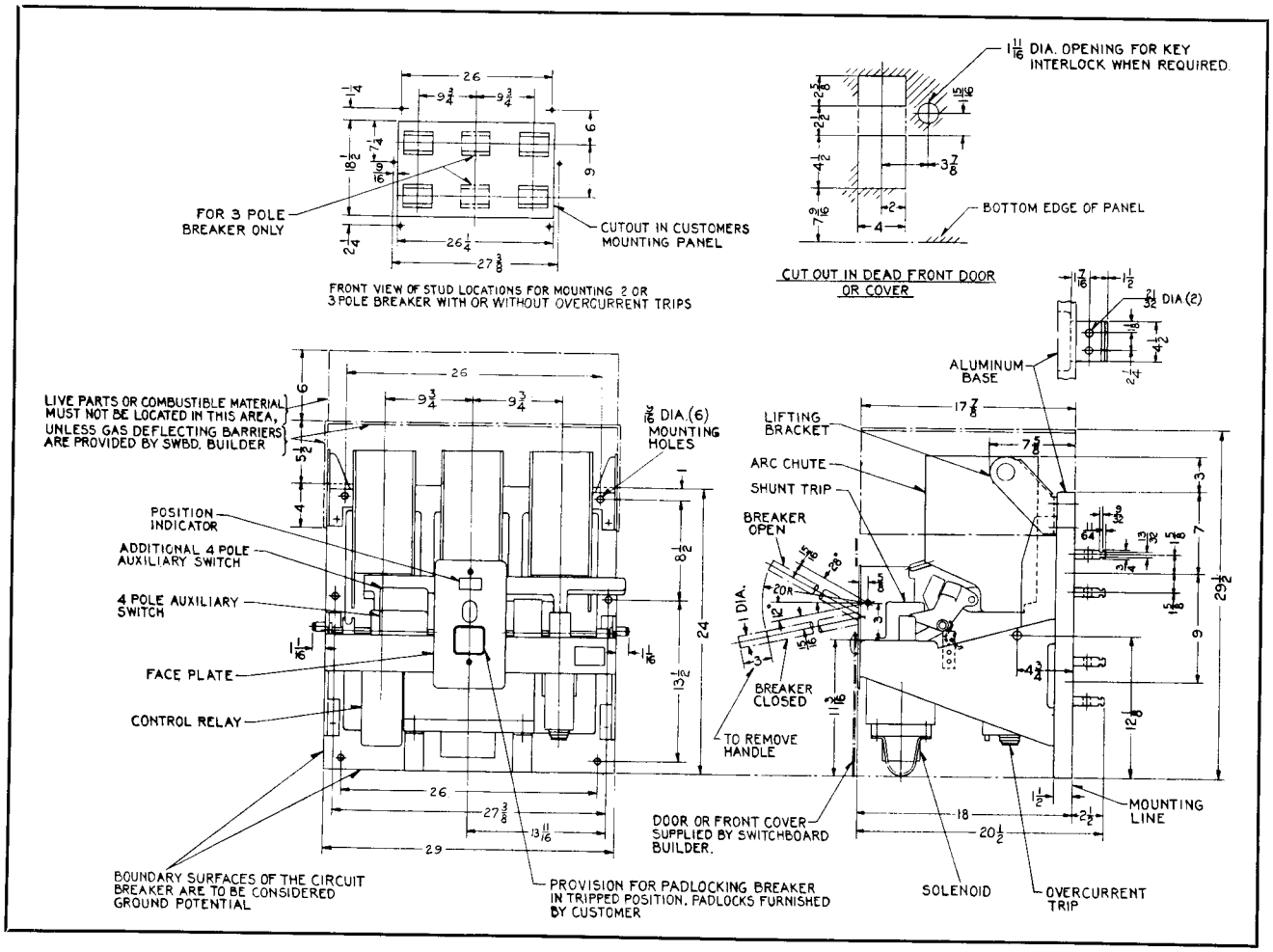


FIG. 1. Type DB-75 Air Circuit Breaker, Outline and Mounting Dimensions

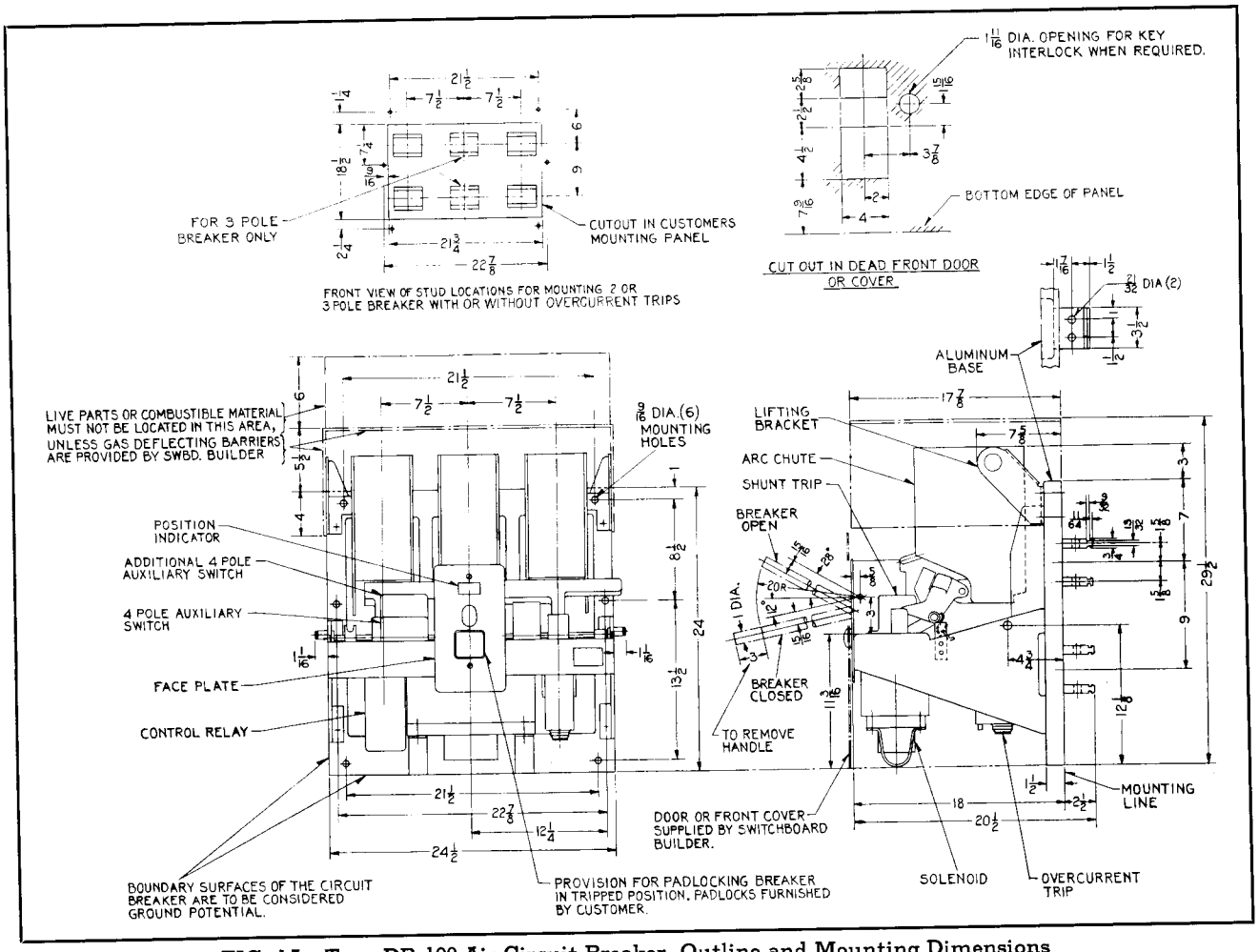


FIG. 1A. Type DB-100 Air Circuit Breaker, Outline and Mounting Dimensions

ENCLOSURES

The breaker is normally mounted in the enclosure along with accompanying bus work terminating in cable clamps. Where covers are mounted on enclosures, they are to be removed and drilled to provide for connecting cable. All connections should be clean, smooth and free from burrs to assume full contact area. They should be firmly clamped or bolted in place to prevent excessive heating. Cable must be adequately braced to withstand full short circuit currents.

PART THREE

MAINTENANCE

POLE UNIT

Each pole unit (Fig. 3) is mounted on a separate molded base. The molded bases are attached to the aluminum mounting panel and provide insulation for the breaker studs.

The upper stud and contact are attached to the molded base by two bolts. The moving contact arm is pivoted on the lower stud and is attached to the cross bar through an insulating link. The lower stud is fastened to the molded base by four bolts.

Contacts. (See Fig. 3.) The arcing contacts must touch first on closing and open last on opening.

Do not adjust one set of contacts without checking the complete sequence of all poles. With the breaker open proceed in the following order:

1. Turn adjusting nuts (A) on insulating link to vary main contact pressure. Use .005 feeler gauge, 1/4 inch wide by 6 inches long, inserted as shown in Fig. 4A to check clearance.

Feeler (X) above contact fingers insures that they have all been deflected. Feeler (Y) inserted below

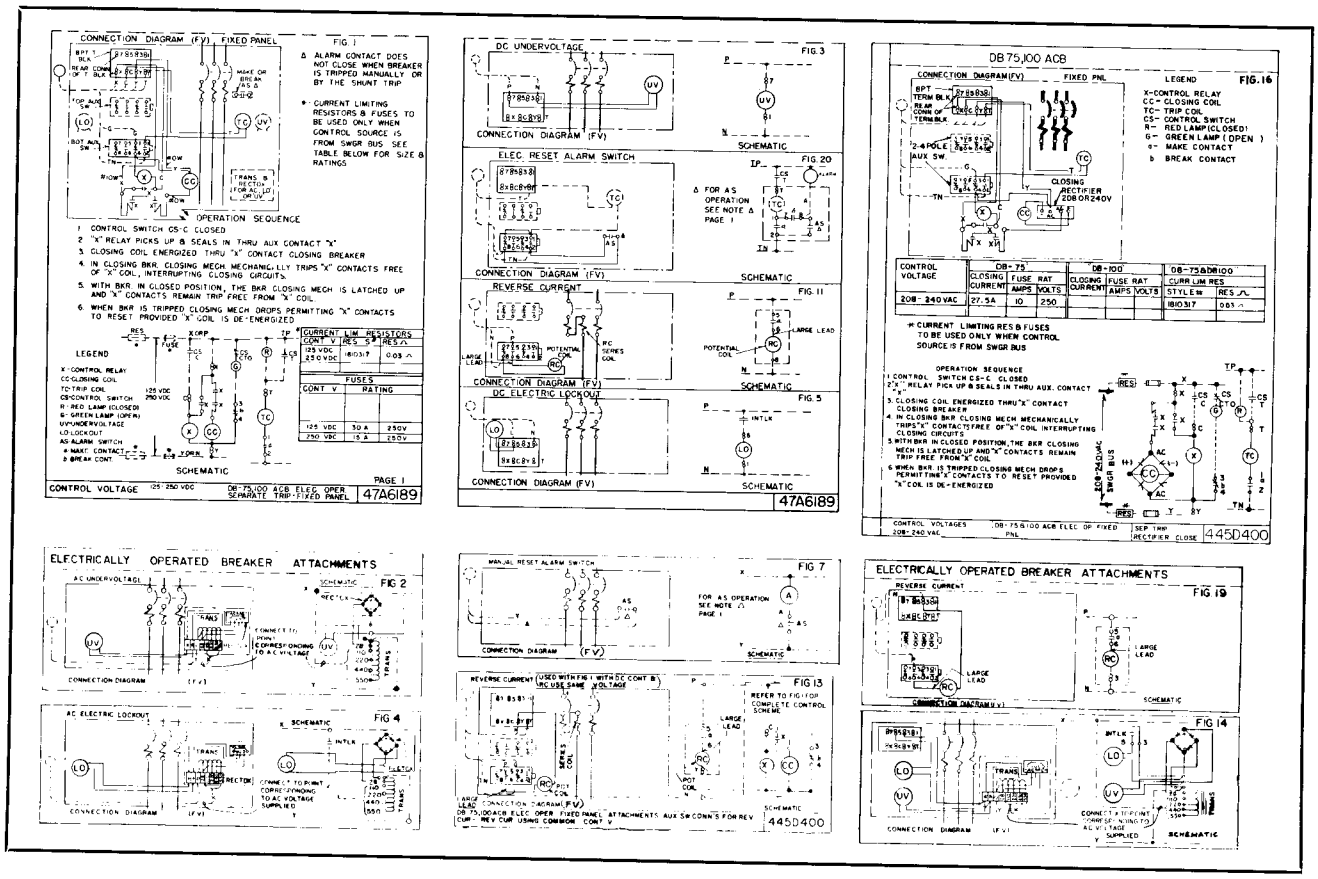


FIG. 2. Typical Wiring Diagrams

fingers insures that they have not gone solid.

2. With breaker closed and latched, apply pressure on each stationary arcing contact, part "a" of Fig. 4B. When spring is fully compressed or solid, clearance from moving arcing contact (b) should be 1/32 to 1/8 inch. Adjust by turning nuts (A) on insulating link—however, clearances of main contacts as described in part (1) **must** be maintained.

3. Check the above adjustments on all three poles. After all poles have been adjusted and with one set of arcing tips just touching, the clearance between the other two sets of arcing contacts should not exceed 1/8 inch.

Maintenance of Contacts. Rough or high spots should be removed with a file or sandpaper. When dressing contacts be sure to protect the hinged contact of all poles with a cloth to prevent foreign matter from lodging in the hinged contact.

Caution: All power must be removed when replacing, maintaining or adjusting contacts.

OPERATING MECHANISM

The operating mechanism (Fig. 3) is non-adjustable and consists of a series of non-ferrous links designed to secure low closing and tripping forces. To check for friction, with the breaker open, raise trip finger and slowly lower the closing handle. Release trip finger and slowly raise handle. The linkage should follow the handle without sticking and a "click" will be heard just before the handle reaches the full up position.

To remove the mechanism proceed as follows:

1. Remove the breaker cross bar.

2. Loosen the outboard bearings at the ends of the trip bar.

a. In reassembly, tighten bolts holding outboard bearings only when bearings have been adjusted to prevent any binding of trip shaft.

3. Remove the tension rods between the mechanism and aluminum panel.

4. Free the pin (J-3)* from the moving core. To free the pin, first remove the cotter pin from the spacer on the right side of the pin. Partially close the breaker until the pin lines up with two holes in the sides of the mechanism frame. Hold the moving core up, and then drive the pin to the right just far enough to clear the moving core rod. Lower the moving core until it hits its stop. Drive the pin to the left into its original position.

5. Remove the four mounting bolts.

* The first letter or number refers to the item and the second to the figure number. (Item J—Fig. No. 3.)

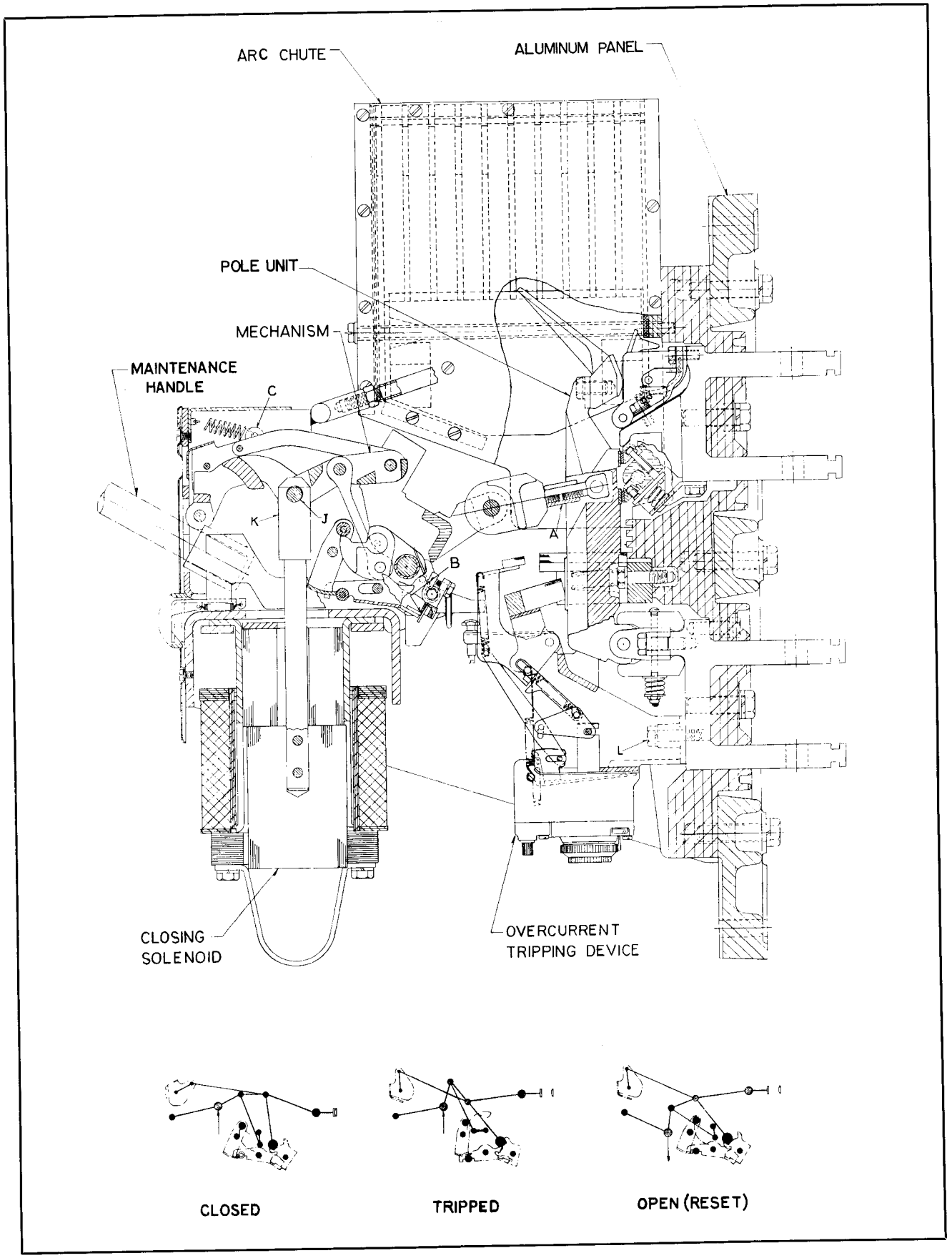


FIG. 3. Cross-Sectional View of Air Circuit Breaker

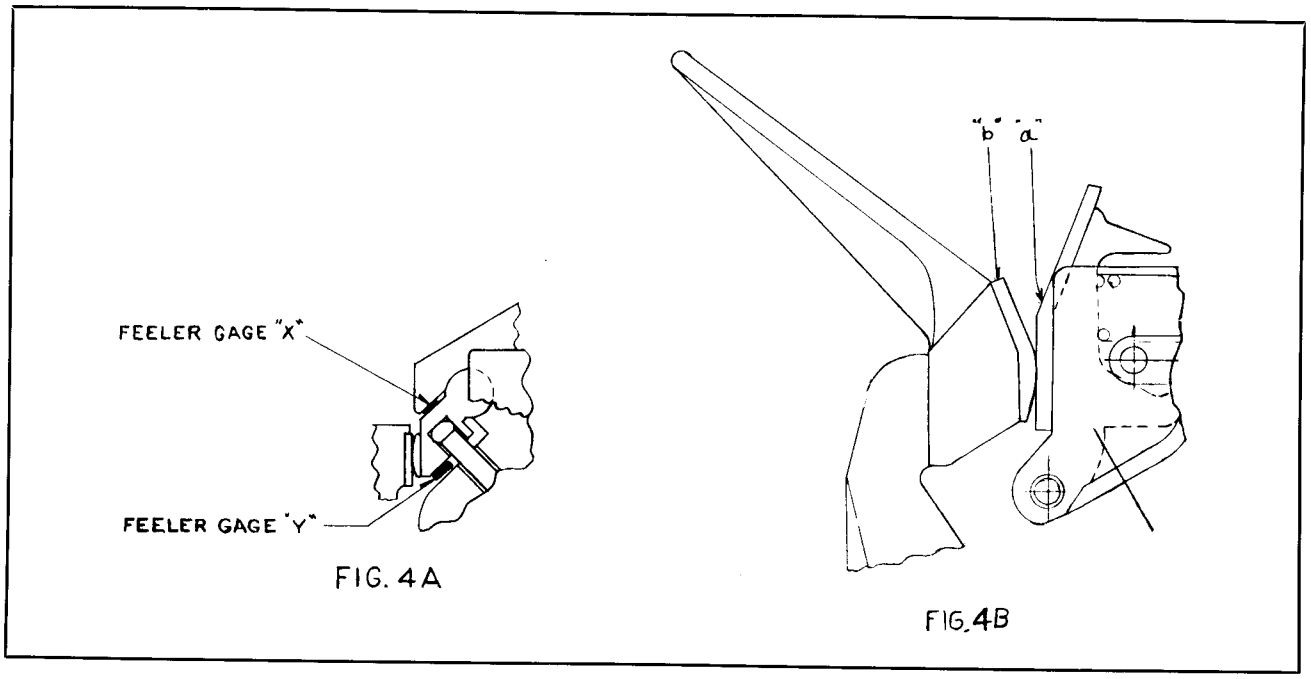


FIG. 4A

FIG. 4B

FIG. 4. Adjusting Limits of Main and Arcing Contacts

a. Caution: These bolts are also the mounting bolts for the closing solenoid; therefore, support the solenoid while removing the bolts.

6. Remove the mechanism.

7. Before assembling mechanism check sliding surfaces of two latches shown at "B", Fig. 3. These surfaces must be clean, free of burrs, and have not more than .035 inch clearance in the reset position. The mechanism is factory lubricated for life.

CLOSING SOLENOID

The closing solenoid (Fig. 5) is not adjustable. To remove the close coil, proceed as follows:

1. Caution: Remove the close coil circuit voltage.

2. Disconnect the wires from the close coil terminals.

3. Loosen the locking clip (4-5) on the bottom of the moving core.

4. Remove bolts (5), locking clip (4-5), and the relay trip bracket (6-5).

5. Remove bolts (3-5), and using a rawhide or plastic mallet remove the bottom stationary core (7-5).

6. Remove the coil.

7. After assembling coil and breaker, check proper co-ordination between breaker closing and relay tripping. Energize relay operating coil only, (Fig. 13), and manually close breaker very slowly. The relay contacts should trip free slightly before the position at which the mechanism pawl (C-3) drops in the latched position.

OVERCURRENT TRIPPING DEVICE

Description. The overcurrent tripping unit for the circuit breaker is an air delayed magnetic type of device. The time-current characteristics of the trip units are as follows:

1. Long delay and short delay.

2. Long delay and instantaneous.

3. Instantaneous.

The various ratings of each general type are of similar construction and differ only in springs and calibration.

The overcurrent tripping device can be removed from the breaker easily and replaced with another unit of the same or different rating without affecting the calibration of the units involved.

Construction. The mounting frame casting supports the two sub-assemblies of the trip unit. On the upper part of the frame are the two magnetic armatures and their associated links and brackets. Fastened to the lower part of the mounting frame is the moldarta box which contains the calibration springs, time delay elements and calibration knobs. This box is held to the mounting frame by two long screws at the bottom of the calibration box.

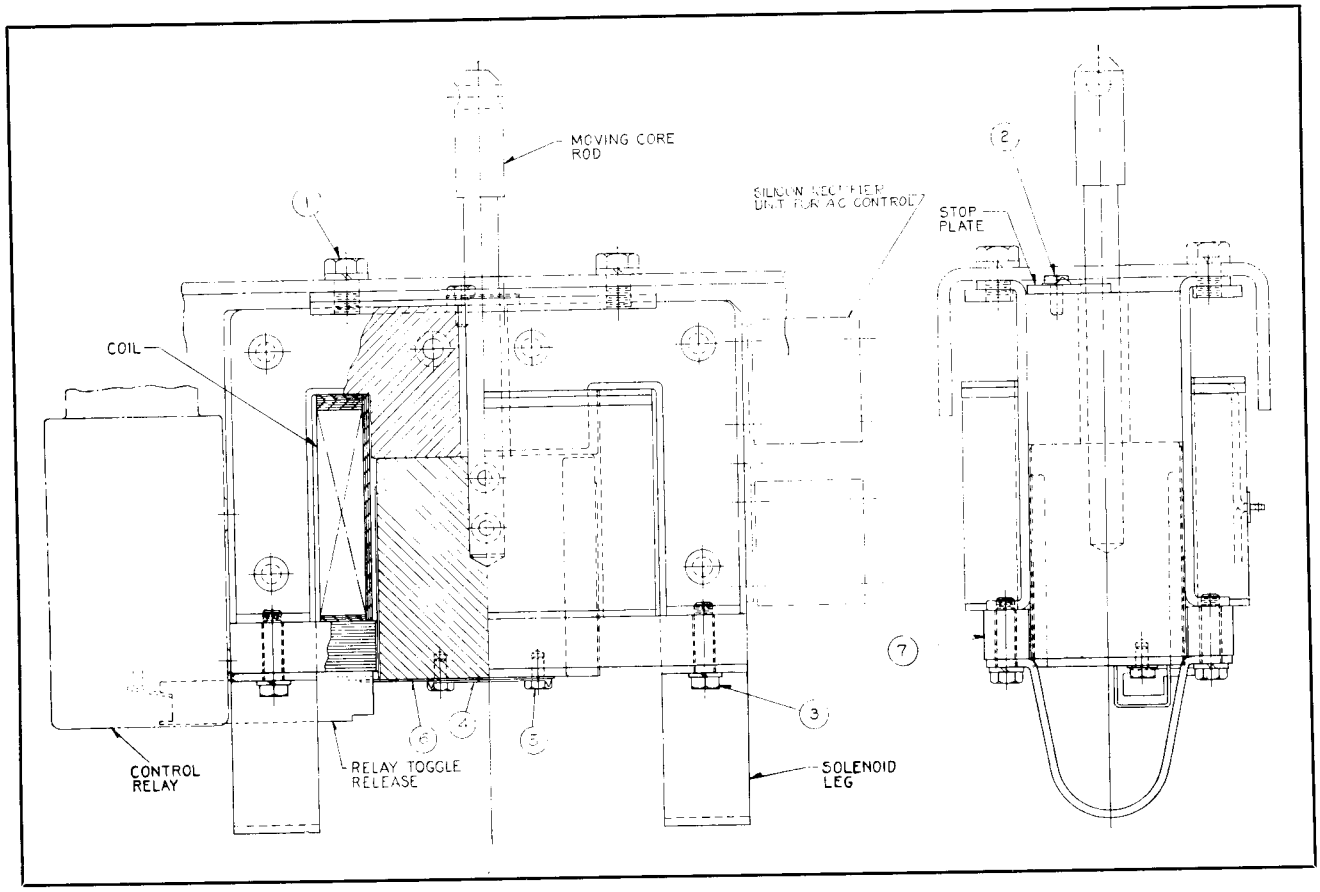


FIG. 5. Closing Solenoid Construction Details

Installation and Removal

Caution: Before removing or installing a tripping device, be sure that the breaker is in the open position and de-energized.

To remove an overcurrent tripping device from the breaker, loosen the two captive bolts at the bottom of the mounting frame (L-3) until they turn freely. Then loosen the two bolts at the top of the mounting frame while supporting the trip unit so that it does not fall. These two bolts clamp a slotted angle mounting bracket and merely have to be loosened; they do not have to be removed from the mounting frame. The trip unit is then free to be removed from the breaker by lowering it down behind the breaker platform.

To install a tripping device on a breaker, first make certain that the breaker is open and is not connected to live circuits. Then loosen the upper mounting bolts on the trip unit so that the bolts can slide into the slotted mounting brackets on the stationary yoke. Then install the trip unit from the bottom of the breaker, sliding it up behind the mechanism platform. Start the bottom two captive mounting bolts, but do not tighten completely. Next, align the trip unit so that the gaps between the tapered portions of the main armature are approximately equal when the main armature is closed. Then tighten all four mounting bolts securely.

Adjustment of Trip Screw. The trip screw mounted on the trip finger must be adjusted properly to obtain proper tripping.

Caution: Since this adjustment involves tripping the breaker, care must be taken to keep fingers and face away from all contact arms and operating linkage.

To proceed with the adjustment, turn the long time dial at the bottom of the calibration box counterclockwise to the stop so that the trip unit is set for minimum time delay. Then close the breaker and carefully reach under the mechanism with both hands and push the lower armature fully closed with the thumbs. Hold it closed for at least the minimum long delay time (20 to 40 seconds). If the breaker trips, reset the screw at the end of the tripping finger until the breaker just barely trips. Before re-adjusting the trip screw, make sure that the breaker is in the open position. After finding the position of the trip screw at which the breaker

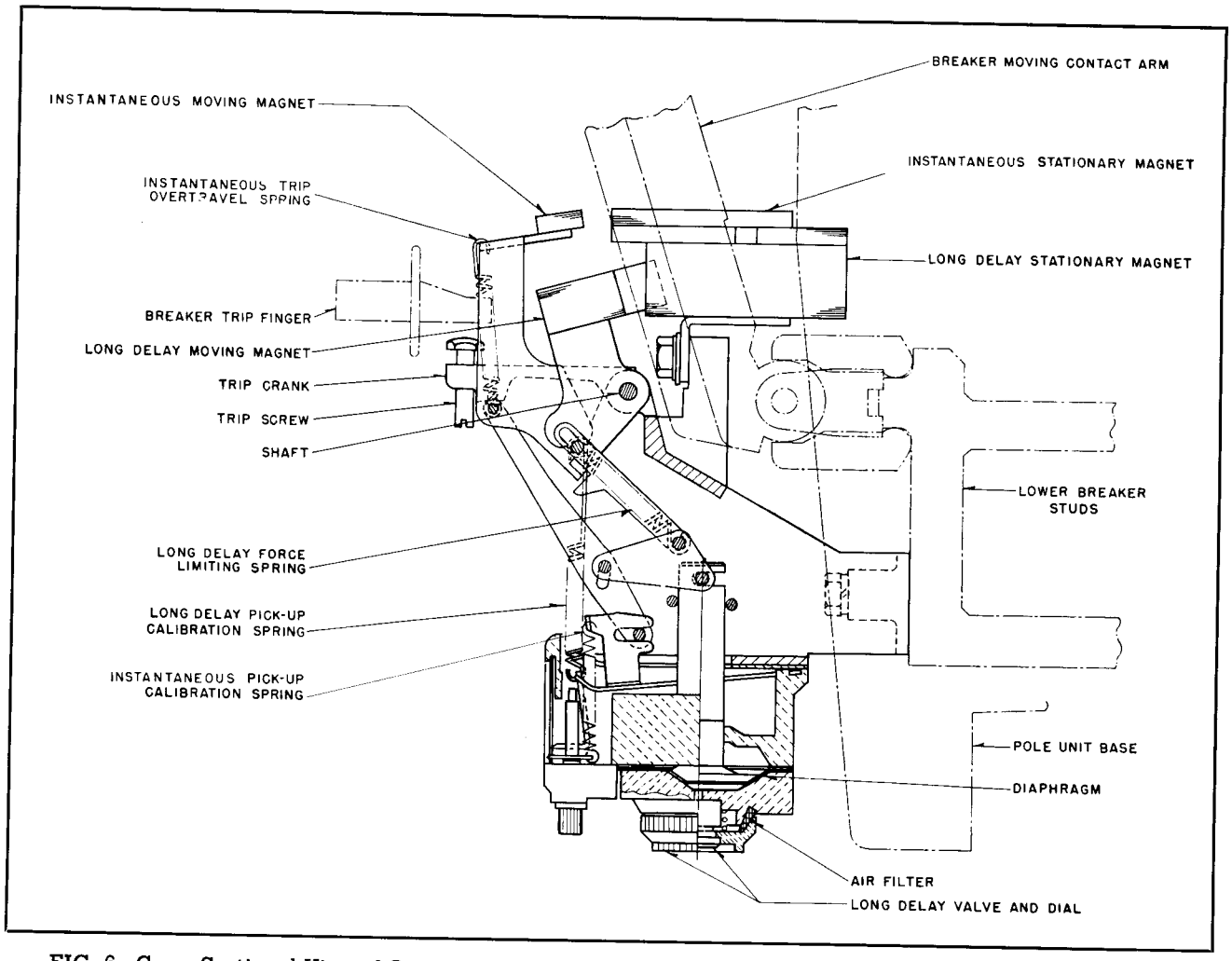


FIG. 6. Cross-Sectional View of Overcurrent Tripping Device with Long Delay and Instantaneous Elements

just trips, turn the screw exactly one full turn in the direction to trip the breaker sooner. Check to make sure that the breaker will trip when either armature is closed if long and instantaneous type trip units are used, or when both armatures are closed if long and short delay type trip units are used. The short delay armature is for timing only. Closing it alone will not trip the breaker.

Operation

Standard Overcurrent Tripping Device (Refer to Fig. 7A)

When a small overload current flows through the breaker pole unit conductor (R), it causes the moving armature (B) to be attracted toward the stationary core (A). The motion of the armature is retarded by the diaphragm (D) whose motion is in turn controlled by the amount of air admitted by the long time delay valve (F). After a time delay, determined by the setting of valve (F), the armature will have rotated the trip crank (J) far enough to trip the breaker by moving the trip lever (K). During this type of tripping, the tension spring (C) is not stressed beyond its normal length.

On larger overload currents, the action is essentially the same as above except that the moving armature (B) will close completely as soon as the overload is applied. When the armature closes, the tension spring (C) applies a force to diaphragm (D). After a time delay determined by valve (F), the diaphragm movement permits the spring to rotate the trip crank (J) far enough to trip the breaker by moving the trip lever (K).

Large fault currents cause the instantaneous armature (M) to close immediately. This armature lifts the trip crank (J) without any delaying action and trips the breaker.

Selective Overcurrent Tripping Device (Refer to Fig. 9A)

For small and intermediate overloads, the operation of this device is the same as for the standard

overcurrent tripping device. However, the selective overcurrent tripping device operates differently when large fault currents occur.

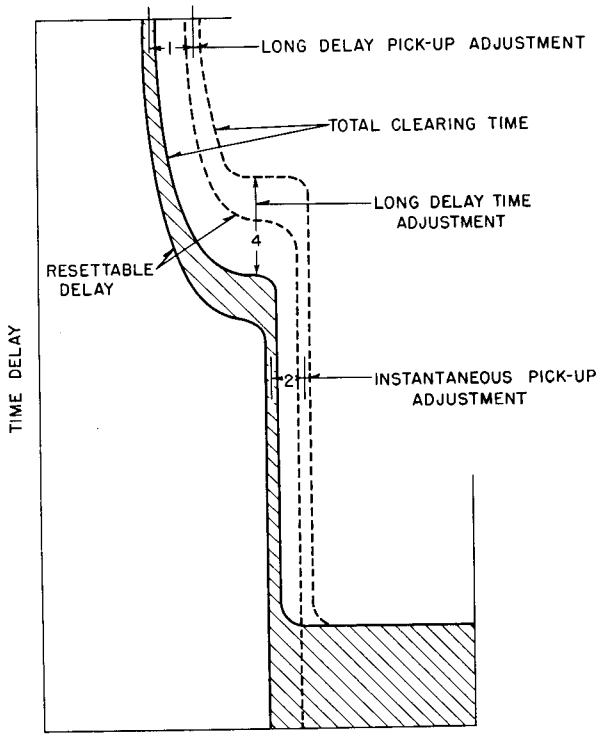
When the fault current is large enough to close the short delay armature (M), the linkage attached to the armature opens valve (P) which permits air to enter the diaphragm chamber at a much faster rate than through the long delay valve (F). Tripping is then accomplished by the same means as though a small overload had occurred. That is; the main armature (B) has closed, pulling on the tension spring (C) which is restrained by diaphragm (D) until sufficient air has entered valve (P) to permit the spring assembly (C) to lift crank (J) and trip the breaker by rotating the trip finger (K).

A discriminator arm is used on the selective overcurrent trip units to make the unit behave as an instantaneous type trip unit while the breaker is being closed and for a short interval of time after closing. This is achieved by having a discriminator latch connection between the short delay armature bracket and the trip crank. When this latch is engaged, the short delay armature will lift the trip crank directly if the current is greater than the short delay pick-up setting. If the current does not rise above this value, then the breaker remains closed and the discriminator arm disengages the discriminator latch so that the trip unit will then revert to its normal function as one having long and short time delay characteristics.

LEGEND:

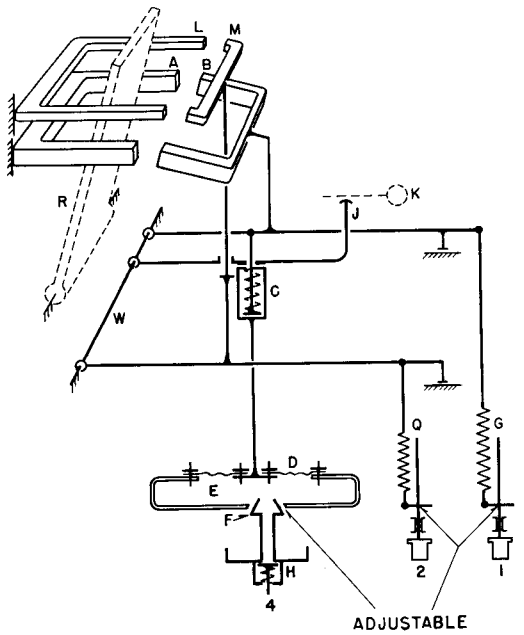
A-LONG DELAY STATIONARY MAGNET
B-LONG DELAY MOVING MAGNET
C-LONG DELAY FORCE LIMITING SPRING
D-DIAPHRAGM
E-AIR CHAMBER
F-LONG DELAY VALVE AND DIAL
G-LONG DELAY PICK-UP CALIBRATION SPRING
H-RESET VALVE
J-TRIP CRANK
K-BREAKER TRIP FINGER
L-INSTANTANEOUS STATIONARY MAGNET
M-INSTANTANEOUS MOVING MAGNET
Q-INSTANTANEOUS PICK-UP CALIBRATION SPRING
R-BREAKER MOVING CONTACT ARM
W-SHAFT

GUIDE BEARING
SOLID JOINT
PINNED JOINT
NO JOINT
STOP SURFACE



TYPICAL TRIPPING CHARACTERISTICS

FIGURE 7B



SCHEMATIC DIAGRAM

FIGURE 7A

FIG. 7. Schematic and Typical Time-Current Characteristics of Overcurrent Tripping Device with Long Delay and Instantaneous Elements

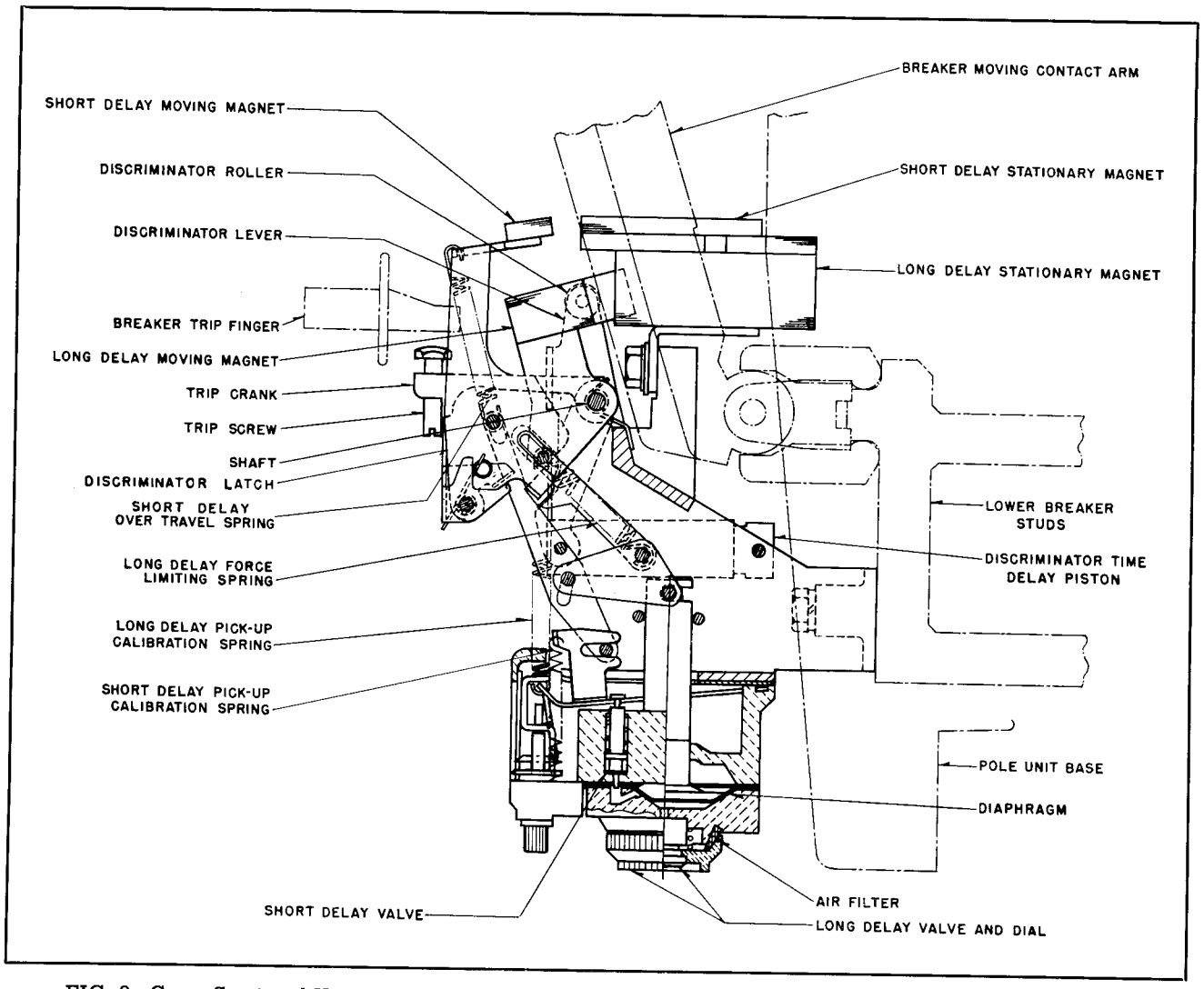


FIG. 8. Cross-Sectional View of Overcurrent Tripping Device with Long Delay and Short Delay Elements

Instantaneous Overcurrent Tripping Device (Single Element)

This device operates in an instantaneous manner to trip the breaker at any time when the current rises above the calibrated setting. The main armature (B) of Fig. 7A, is modified so that it lifts the crank (J) and trips the breaker directly. The operation is similar to the instantaneous trip of the standard overcurrent tripping device.

Time-Current Characteristics

Standard Overcurrent Tripping Device (Refer to Fig. 7B)

The long delay pick-up adjustment can change the position of the upper part of the curve through the range indicated by the number (1). This adjustment is accomplished by changing the tension on the spring which controls the force the long delay armature must overcome in order to close.

The long delay time adjustment can be used to shift the knee of the curve over the range indicated by the Number (4). This adjustment is changed by turning the knob, located at the bottom of the molded calibration box, which opens or closes the valve to control the amount of air entering the diaphragm chamber.

The instantaneous pick-up adjustment can shift the vertical part of the curve to the left or right as indicated by number (2). This is achieved by changing the spring force applied to the smaller instantaneous armature.

The flat portion of the curve at the bottom represents the minimum time for the breaker to clear when fault currents exceed ten times the trip unit rating.

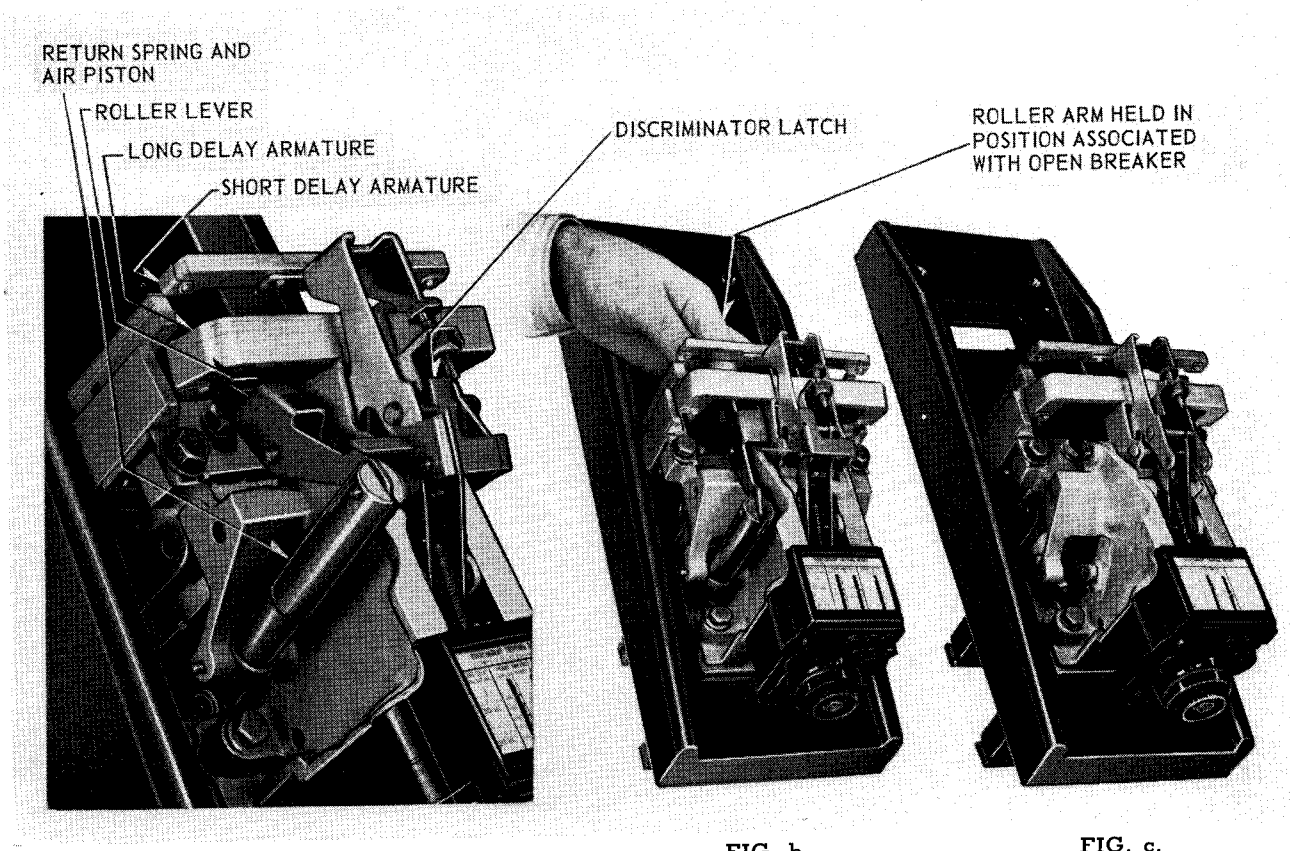


FIG. a.
Parts which Discriminate between:
A. Breaker in Closed Position
B. Breaker During Period of Closing

FIG. b.
Arranged for Long Delay and Short Delay Tripping

FIG. c.
Arranged for Long Delay and Instantaneous Tripping

FIG. 8A. Selective Overcurrent Trip Operations

Selective Overcurrent Tripping Device (Refer to Fig. 9B)

The time-current characteristic of this trip unit is the same as the standard device except that the position of the flat portion of the curve can be shifted as indicated by the number (3). This adjustment can be made by changing the setting of the short delay time on the calibration box. The adjustment controls the maximum opening of the short delay valve and thereby controls the tripping time when currents are high enough to operate the short delay armature.

Calibration. Overcurrent tripping devices of this general type must be calibrated by using a definite procedure and technique, as well as specialized equipment. Because few customers have access to such equipment, it is highly recommended that trip units be returned to the factory if it appears that they need to be calibrated.

Maintenance. In ordinary use, this trip unit needs very little maintenance. Any accumulation of dust should be blown off occasionally. No oil or lubricant should be applied to any of the pins or links. Do not disassemble the unit for cleaning purposes. In the event that major repair work is needed, it is advisable to return the unit to the factory.

CONTROL RELAY

The control relay (Fig. 11) mounts directly under the auxiliary switch. It is a single-coil, mechanical tripping device with the coil suitable for continuous duty. The operation sequence is outlined in Fig. 2, Page 10. The contacts should normally last the life of the breaker, but are replaceable if necessary.

The relay trip pin and relay toggle release are designed so that the relay trips at approximately the same time as the breaker latches. The relay is not adjustable.

Inspection. Make certain all circuits are not energized. Manually lift the core of the operating solenoid to the fully closed position. While still holding core in closed position, raise the relay trip pin. This should trip the relay causing the close

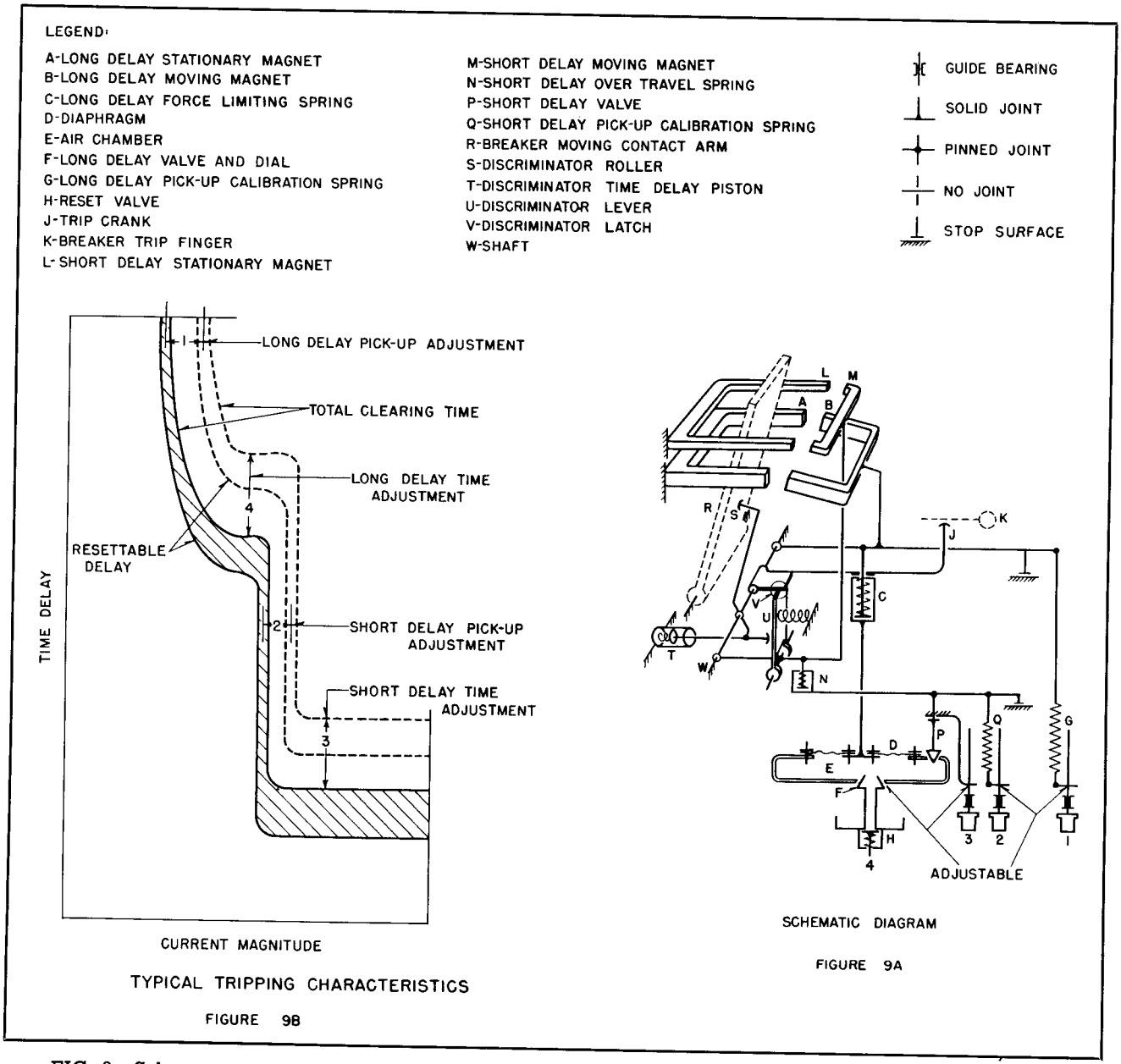


FIG. 9. Schematic and Typical Time-Current Characteristics of Overcurrent Tripping Device with Long Delay and Short Delay Elements

coil circuit to open. Release both core and trip pin. The relay linkage and trip pin should reset without any noticeable friction.

Maintenance. Remove screw in front cover plate. Remove cover by grasping it at the bottom and pull down and out. Check for loose screws, especially at contacts. Replace cover and check for loose mounting bolts.

SHUNT TRIP ATTACHMENT

The shunt trip (Fig. 12) mounts on top of the platform immediately to the right of the operating mechanism. It is non-adjustable and is intended for intermittent duty only. The shunt trip circuit must always be open by an auxiliary switch contact.

Inspection. With the breaker in the open position, manually pull the shunt trip moving core against the stationary core and manually attempt to close the breaker. The breaker should be trip free.

The trip rod of the shunt trip should have approximately 7/32 inch clearance to the trip rod clip.

Maintenance. Check for loose bolts and faulty coil.

UNDERVOLTAGE TRIP ATTACHMENT

The undervoltage trip (Fig. 13) mounts on top of the platform, to the right of the shunt trip. Its function is to trip the breaker when the voltage falls to between 30 and 60 percent of normal.

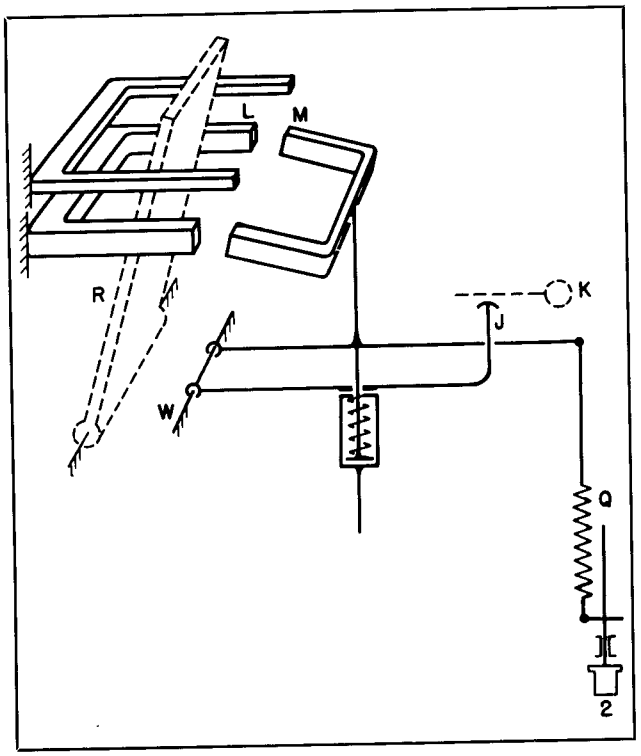


FIG. 10A. Schematic Diagram of Overcurrent Tripping Device with Instantaneous Element Only

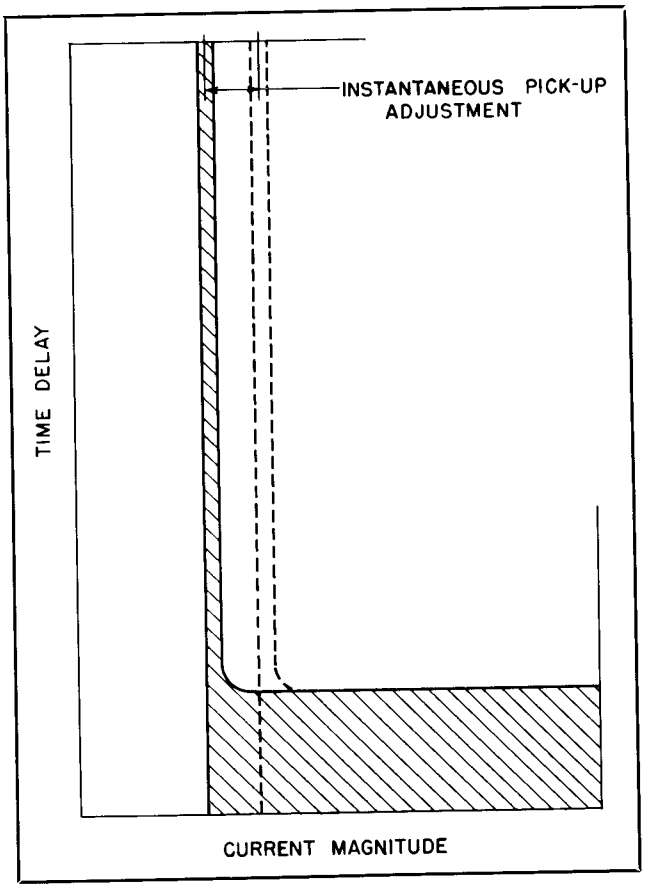


FIG. 10B. Typical Time-Current Characteristics of Overcurrent Tripping Device with Instantaneous Element Only

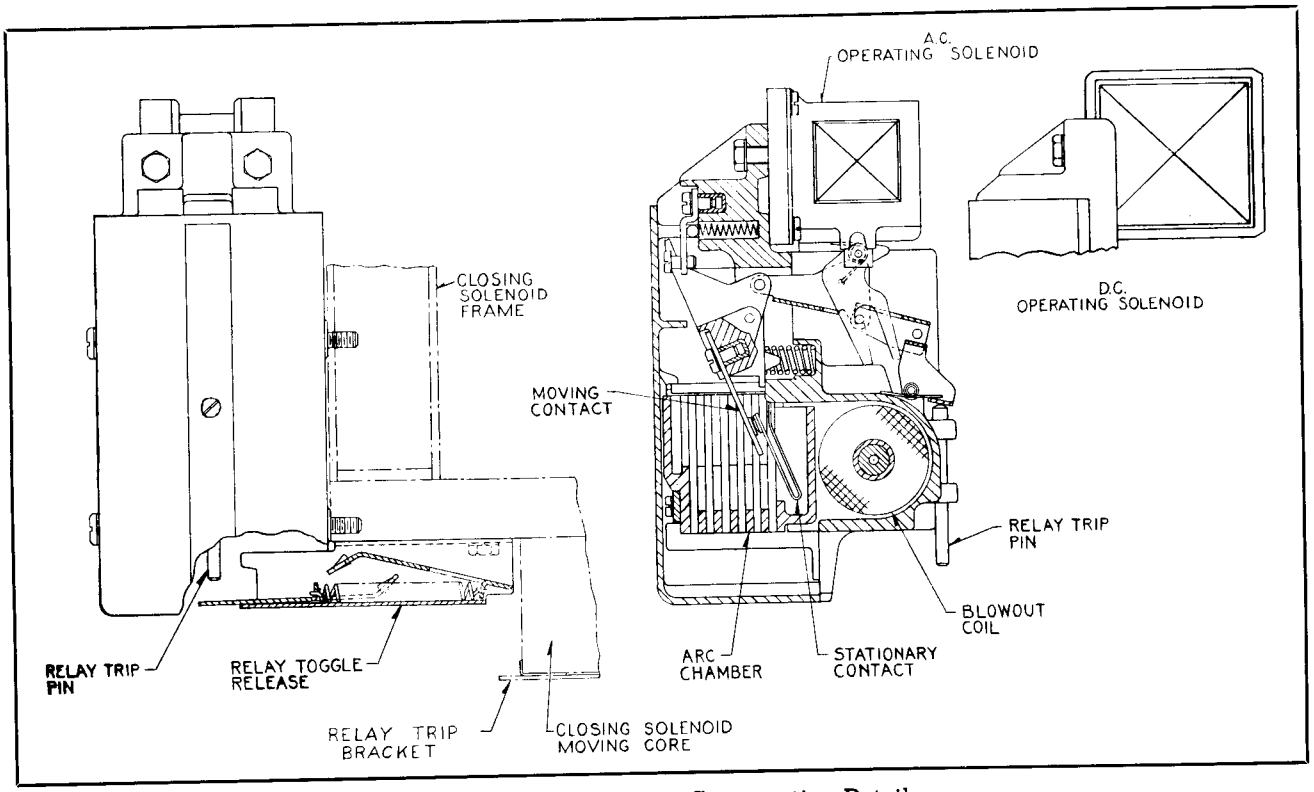


FIG. 11. Control Relay—Construction Details

The moving core is normally held magnetically against the stationary core to hold the rod and consequently the reset lever in the reset position. When the coil voltage is reduced sufficiently, the reset lever spring overcomes the magnetic attraction of the cores and rotates the reset lever clockwise. As the reset lever rotates, the pin pushes against the latch to release it from its latch plate. When the latch releases, the trip spring rotates the trip lever to trip the breaker. The linkage is reset by the cross bar as the breaker opens.

Always connect the coil to the line side of the breaker unless the attachment is equipped with time delay device. In this case, the time delay will delay the tripping of the breaker long enough to permit energization of the undervoltage coil from the load side. Do not use an auxiliary switch contact in the undervoltage circuit.

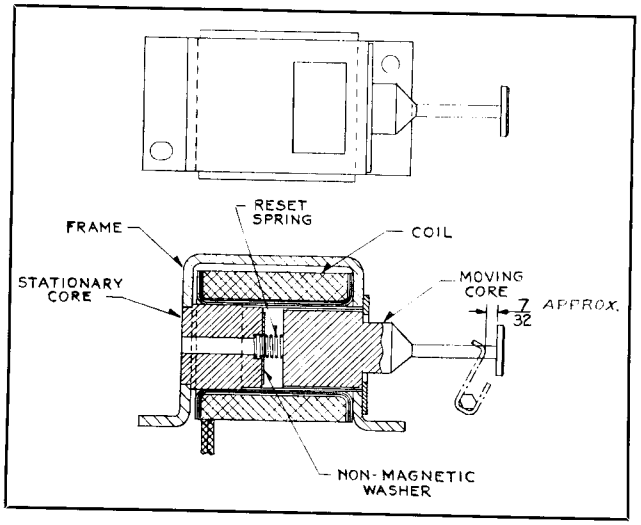


FIG. 12. Shunt Trip Attachment—Construction Details

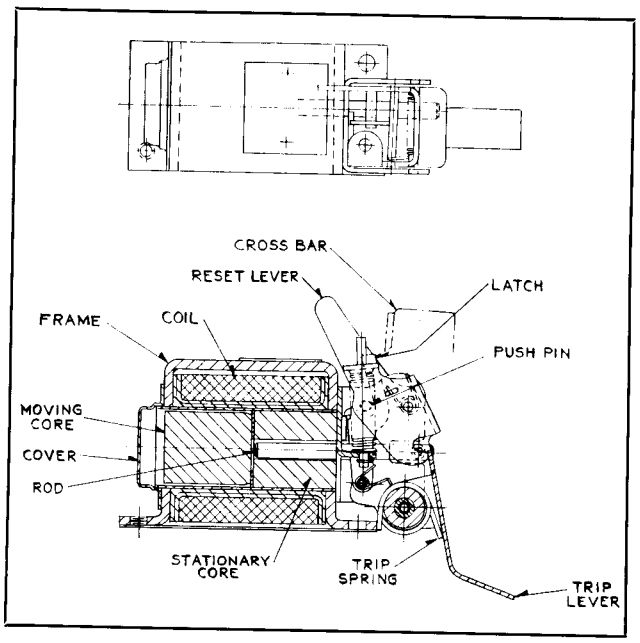


FIG. 13. Undervoltage Trip Attachment—Construction Details

UNDERVOLTAGE TIME DELAY ATTACHMENT

The undervoltage air dashpot time delay attachment (Fig. 14) mounts on the front of the undervoltage trip, replacing the moving core cover. The needle valve screw in the top regulates the opening through which the air is forced and hence the time

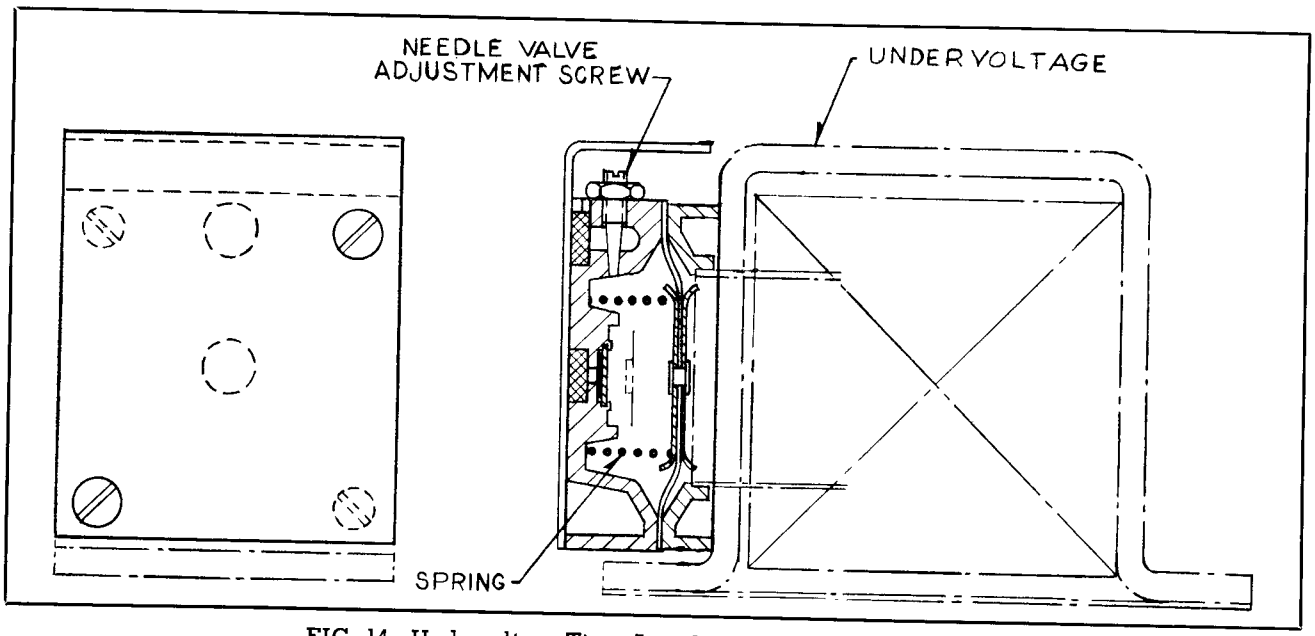


FIG. 14. Undervoltage Time Attachment—Construction Details

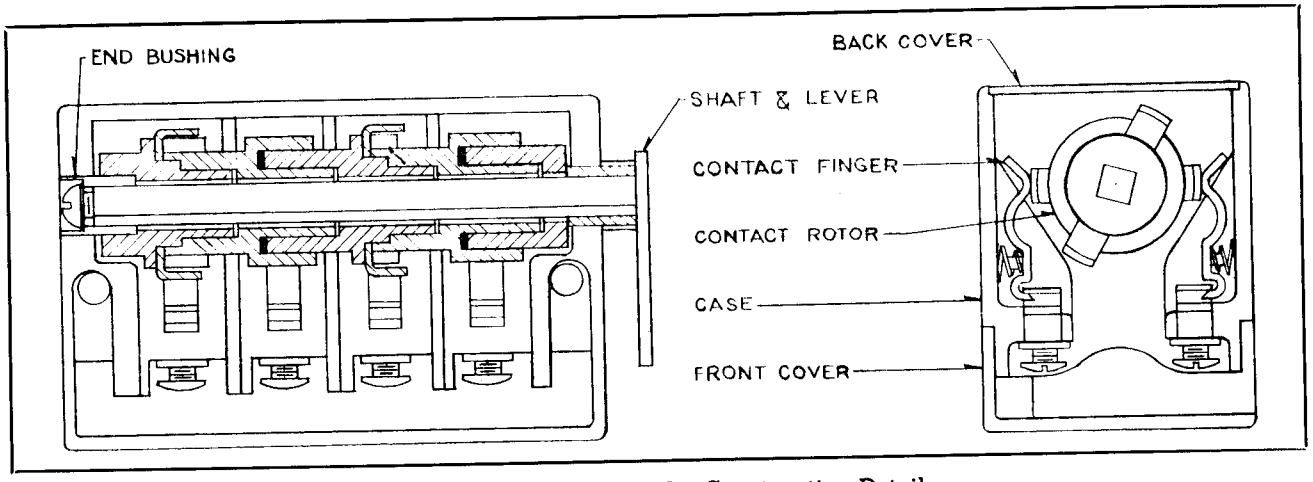


FIG. 15. Auxiliary Switch—Construction Details

delay. The attachment does not have a quick reset feature and therefore approximately one minute should be allowed between operations to permit complete resetting.

Inspection. Hold the U.V. trip lever down and close the breaker manually. Release the trip lever slowly, allowing the undervoltage trip spring to rotate the trip rod and trip the breaker after a time delay.

Caution: Do not use your fingers to hold and release the U.V. reset lever.

Maintenance. Check for loose bolts and faulty coils.

AUXILIARY SWITCH

The auxiliary switch (Fig. 15) mounts on top of the platform to the left of the operating mechanism. The contacts will carry 15 amperes continuously or 250 amperes for 3 seconds.

Table No. 3. INTERRUPTING CAPACITY

VOLTS	INTERRUPTING CAPACITY IN AMPS.	
	NON-INDUCTIVE CIRCUIT	INDUCTIVE CIRCUIT
125 V. D-C	11	6.25
250 V. D-C	2	1.75
115 V. A-C	75	15
450 V. A-C	25	5

The switch is a shaft-operated, 4-pole, rotary type normally having two "a" contacts (closed when the breaker is closed) and two "b" contacts (closed

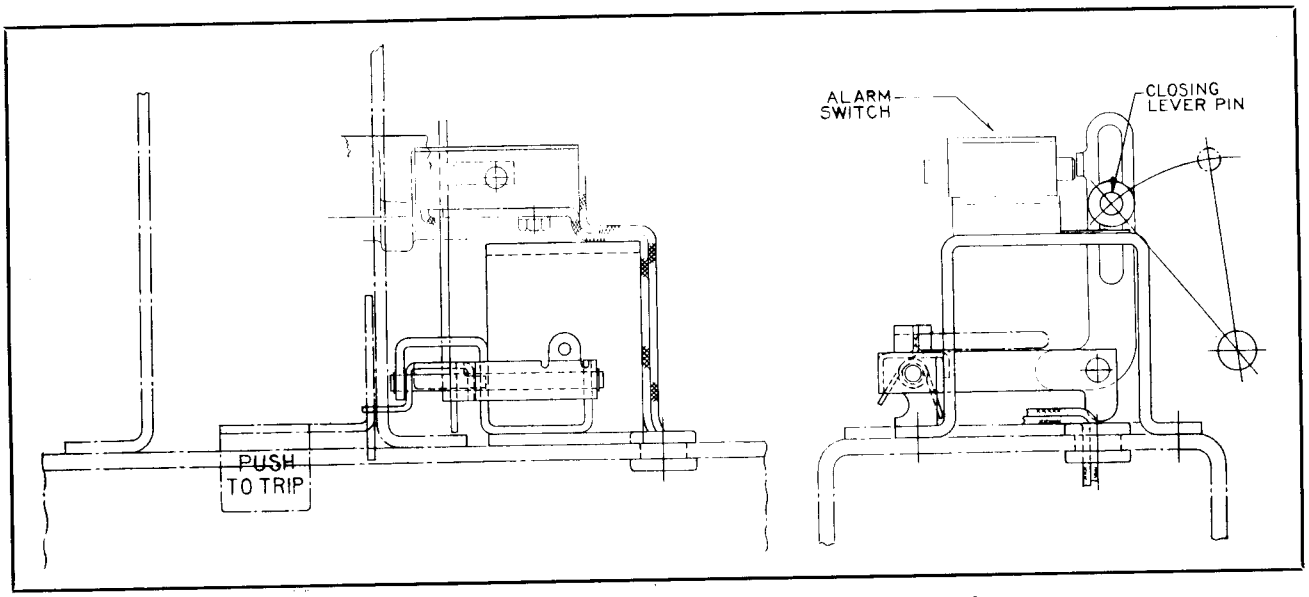


FIG. 16. Alarm Switch Attachment—Construction Details

when the breaker is open). The rotor operates through a 90-degree angle and is non-adjustable. However, the contacts may be changed from "a" to "b" or vice versa. To change, remove the switch from the platform, remove the back cover, shaft and end bushing. Remove the rotor and change the contacts as desired. Be sure to replace the shaft in the original position relative to one of the unchanged contacts.

Inspection. Remove the front cover and make sure contacts are touching well before the end of travel.

Maintenance. Check for loose bolts. Replace contacts if necessary.

ALARM SWITCH ATTACHMENT

The alarm switch (Fig. 16) is integrated with the shunt trip attachment and will energize the alarm circuit on all opening operations except those initiated through the push to trip button and shunt trip. The alarm switch may be reset manually by trip button or electrically by energizing the shunt trip coil (when electrical resetting has been provided). Closing the breaker also resets alarm switch.

Inspection. Close the breaker manually and then trip by trip button to be sure the alarm contact do not "make". Repeat the above procedure except trip by raising the O.C.T. trip finger. Note that the alarm contacts do make contact.

Maintenance. Clean the alarm contacts when necessary. Check for loose bolts.

ELECTRIC LOCKOUT ATTACHMENT

The electric lockout (Fig. 17) mounts on the top of the platform, on the extreme left side and behind the auxiliary switches. Its function is to hold the breaker open (trip free) until the lockout coil is energized. The lockout coil can be de-energized after closure of the breaker, if desired, without tripping the breaker.

Inspection. Attempt to close the breaker. The lockout should prevent closure of the breaker by

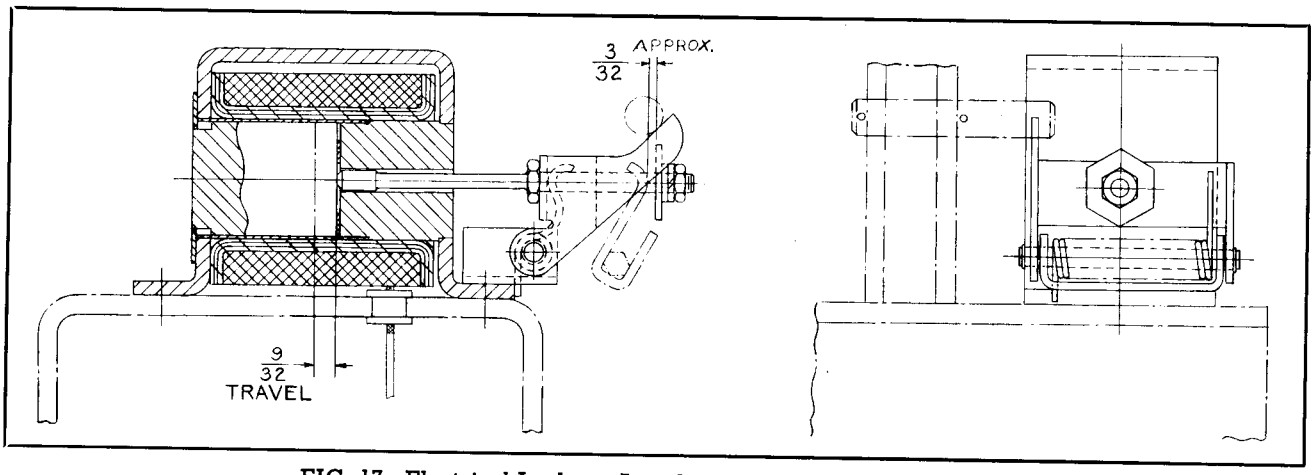


FIG. 17. Electrical Lockout Attachment—Construction Details

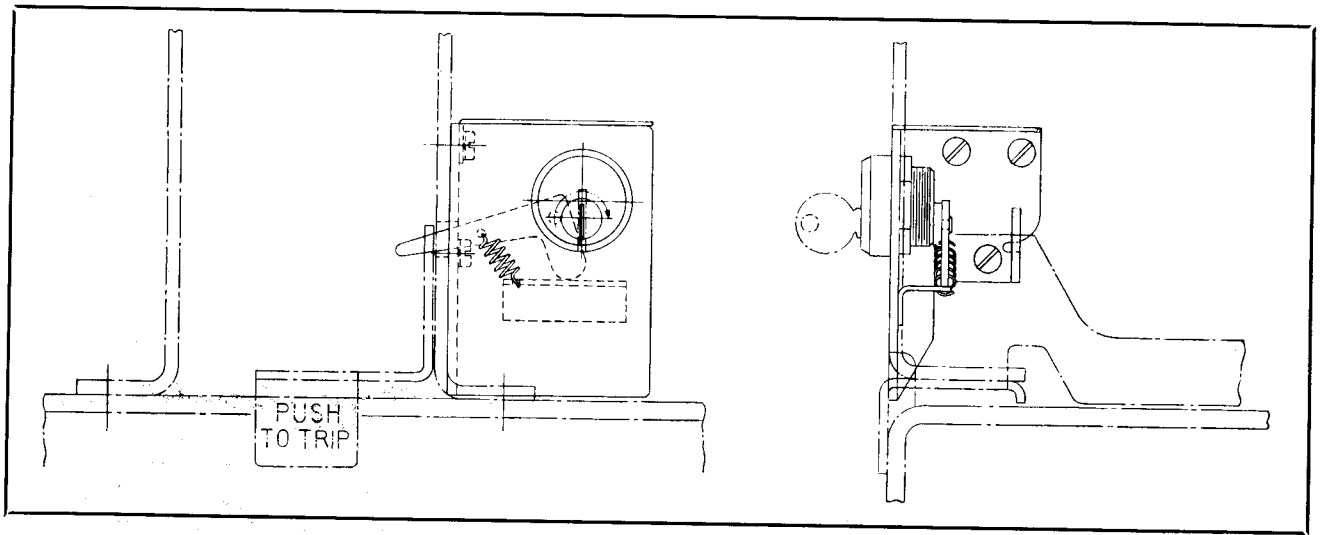


FIG. 18. Key Lock or Key Interlock Attachment—Construction Details

holding the trip rod in the trip free position. Holding the lockout armature in the closed position should permit closure of the breaker. Releasing the armature after closure should not trip the breaker.

Maintenance. The device is non-adjustable. Check for faulty coil and loose bolts.

KEY LOCK ATTACHMENT

The key lock (Fig. 18) mounts on the right side of the operating mechanism frame. The key can be removed in the open or closed position of the breaker.

Inspection. Push the trip button and turn key to the locked position. The key is then removable and the breaker is locked in the trip-free position. Replace key and rotate to the unlocked position to free breaker trip button. The key is also removed in this position.

Maintenance. The device is non-adjustable. Check for loose bolts only.

KEY INTERLOCK ATTACHMENT

The key interlock (Fig. 18) closed mounts on the right side of the operating mechanism frame. When the key interlock attachment is furnished, the key lock attachment cannot be supplied. With the key interlock attachment the key cannot be removed unless the breaker is locked in the open position.

Inspection. Push the trip button and turn key to the locked position. The key is then removable and the breaker is locked in the trip-free position. Replace the key and rotate to the unlocked position to free the breaker trip button. The key is not removable in this position.

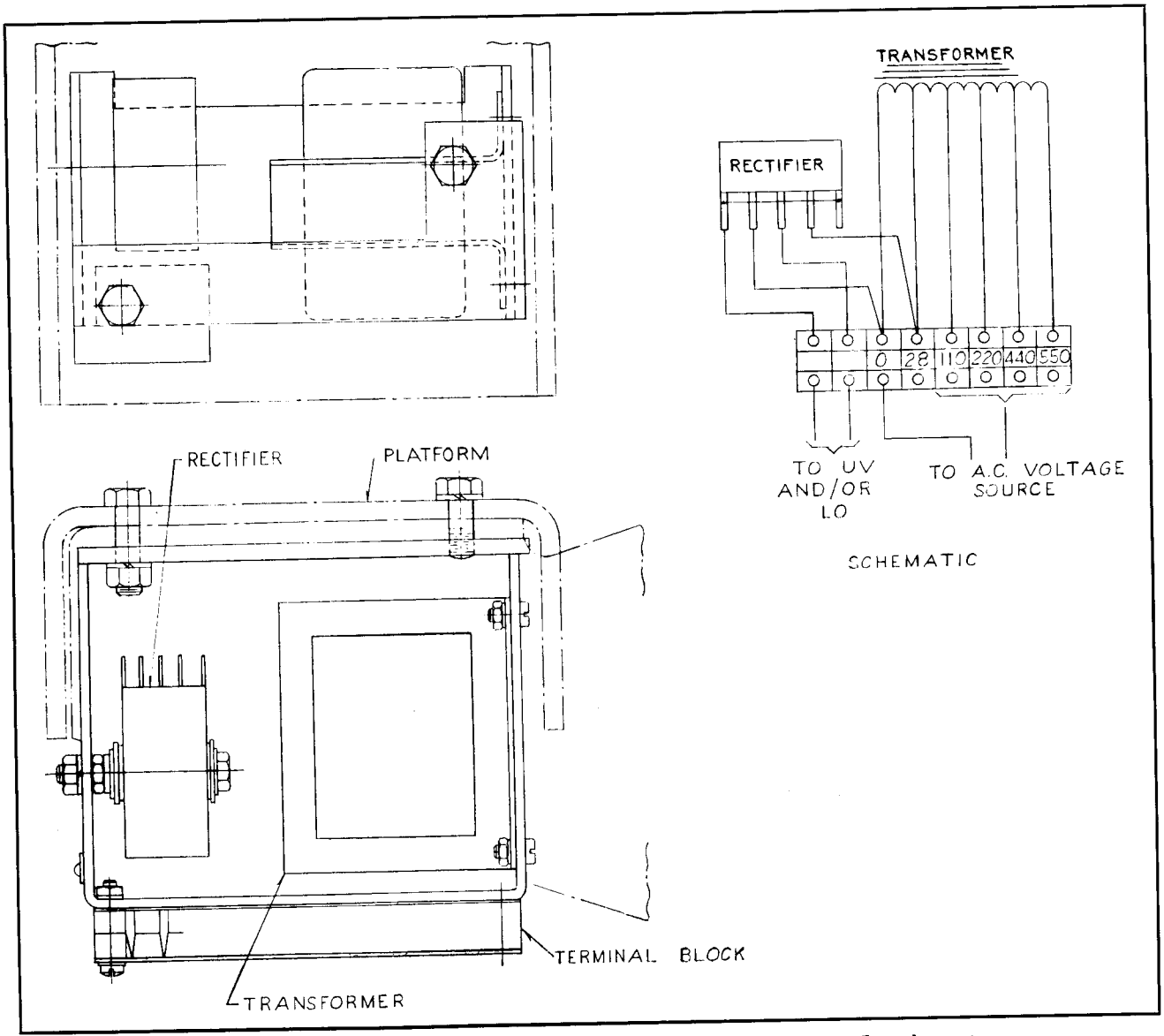


FIG. 19. Rectifier Unit for A-C Undervoltage and Electrical Lockout Attachments

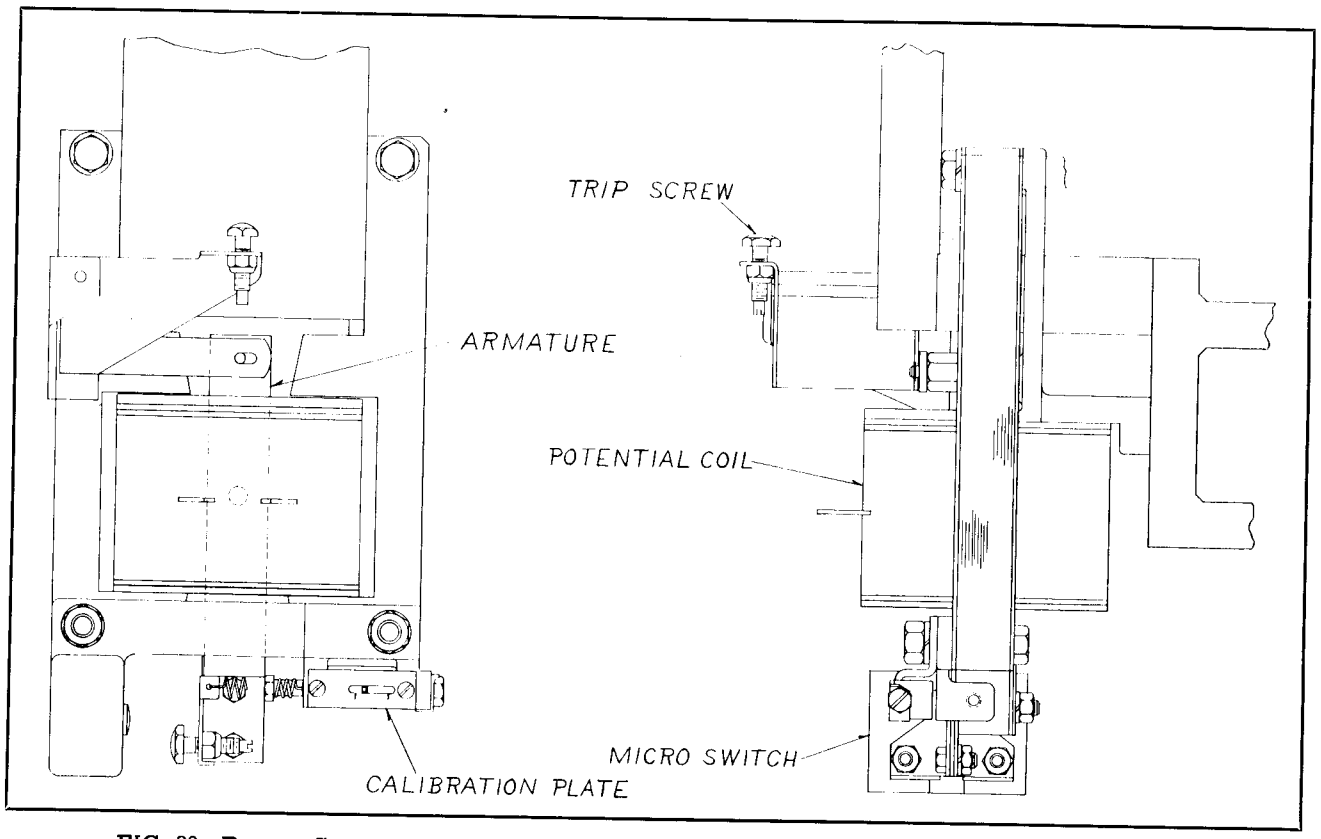


FIG. 20. Reverse Current Trip Attachment—Types "DB-75" and "DB-100" Air Circuit Breakers

Maintenance. The device is non-adjustable. Check for loose bolts and nuts only.

RECTIFIER UNIT FOR A-C UNDERVOLTAGE AND A-C ELECTRIC LOCKOUT ATTACHMENTS

When an a-c undervoltage attachment or an a-c electric lockout attachment or both are required, a RECTOX unit is mounted underneath the breaker platform under the undervoltage device as shown in Fig. 19. An auto-transformer is provided in the unit so that the common voltages for 60 cycles and 25 cycles can be connected to the appropriate terminal on the unit. A terminal block is mounted on the rectifier unit to facilitate all wiring.

Inspection. There are no moving parts. Make certain a-c incoming leads are connected to proper terminals.

Maintenance. Check for loose connections.

REVERSE CURRENT TRIP ATTACHMENT

To protect direct-current equipment from reverse currents, a reverse current trip attachment (Fig. 20) is installed in place of the center pole unit, making a two-pole breaker. This is a magnetic device influenced by two circuits. The first is the potential coil which magnetizes the armature and the second is the main current which magnetizes the frame. When current flows in the forward direction, armature movement is prevented by a stop. When the current reverses the armature rotates in the opposite direction and trips the breaker.

After tripping the reverse current, armature is reset by opening the potential coil circuit. For this reason the coil is always connected through an "a" contact of the auxiliary switch.

Calibration adjustment covers two ranges: 5 to 15 per cent or 10 to 25 per cent reverse current, based on normal current rating. Space is provided under the attachment for mounting switches for indicating lights or alarm devices.

Inspection. Close the breaker manually. Reach under platform and slowly move the armature toward the pole piece to trip the breaker. Armature should move without friction and should have approximately 1/32 inch overtravel after tripping. Adjustment can be made by turning trip screw. With breaker in open position move armature toward pole. An audible "click" should be heard from the switch before armature reaches stop position. Adjustment can be made at lower trip screw.

Maintenance. Check for loose bolts of attachment as well as bolting of associated connectors. Check potential coil for open circuits and to ground.

RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

"De-ion"

AIR CIRCUIT BREAKERS

Types DB-75, DB-100, and DBF-40

600 Volts A-C
250 Volts D-C

Continuous Current Rating

DB-75	DB-100
2,000 Amperes	4,000 Amperes
2,500 Amperes	5,000 Amperes } D-C
3,000 Amperes	6,000 Amperes } only

Interrupting Rating

DB-75	DB-100
75,000 Amperes (600 V. A-C)	100,000 Amperes (600 V. A-C)
75,000 Amperes (250 V. D-C)	100,000 Amperes (250 V. D-C)
100,000 Amperes (240 V. A-C)	150,000 Amperes (240 V. A-C)

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR APPARATUS DEPARTMENTS
EAST PITTSBURGH PLANT • EAST PITTSBURGH, PA.
SUPERSEDES I.B. 33-850-4 & 5A
MARCH, 1960
Printed in U.S.A.

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LIST OF ILLUSTRATIONS

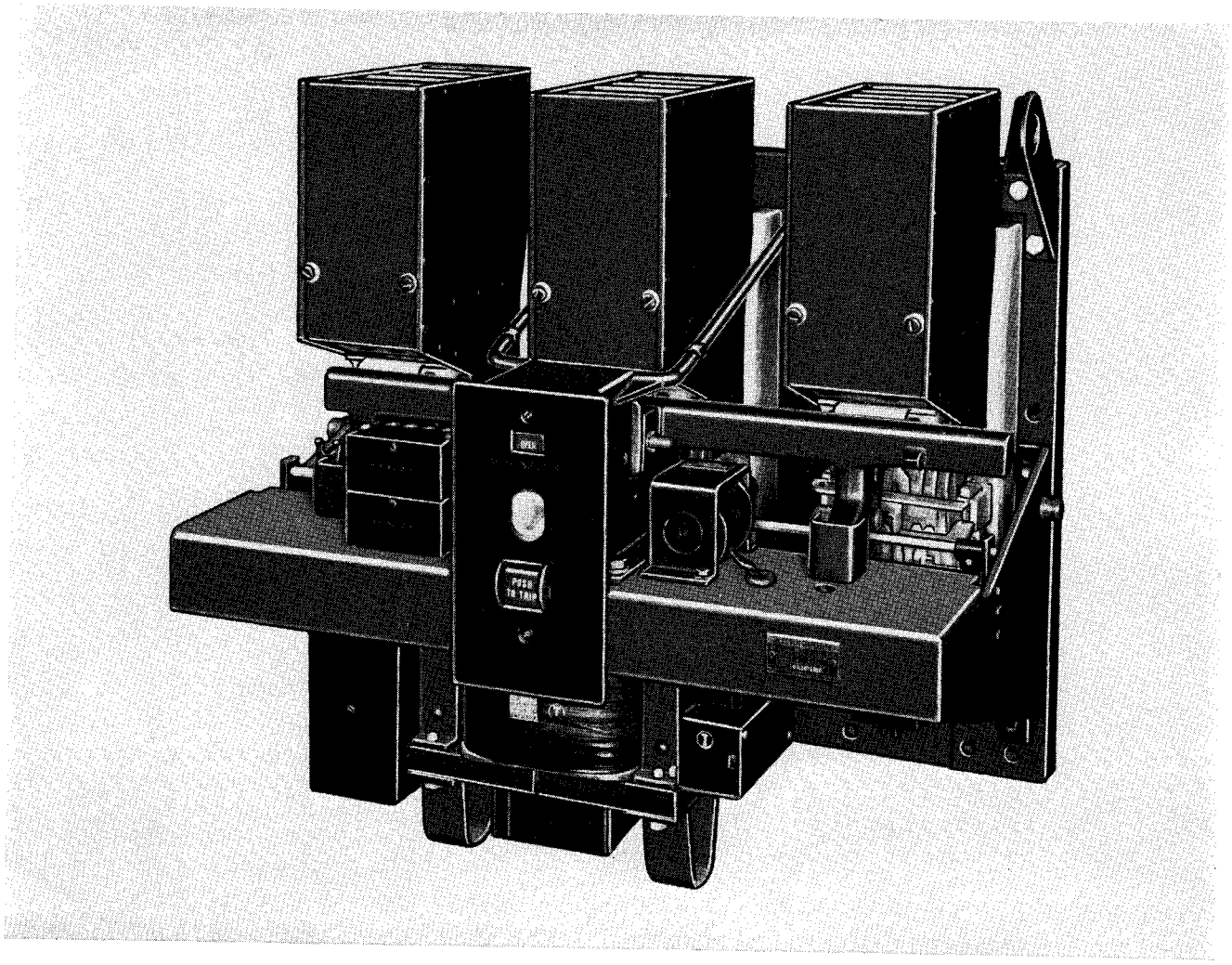
WESTINGHOUSE
TYPE "DB" AIR CIRCUIT BREAKERS

Type "DB" air circuit breaker is designed to give continuous and reliable service as the protective link between the power source and associated productive equipment. This breaker is built to operate with a minimum of maintenance, while at the same time its simplified construction permits maximum accessibility for inspection and adjustment when required. The ease with which attachments may be added or removed is an outstanding feature of the "DB" design.

For the greatest measure of safety to operating personnel and also to minimize maintenance requirements, the breaker should be mounted in an enclosure suitable to local operating conditions. A selection of standard enclosures is available for various applications.

●

Important: To assure proper functioning, inspect each breaker at regular intervals in accordance with a systematic maintenance schedule. The frequency and character of the inspections will for the most part be determined by the severity of the duty performed. The minimum requirements, however, should consist of a light monthly inspection, with a thorough inspection semi-annually. Occasional checks on calibration as well as on coordination and freedom of all moving parts, must be included in the maintenance schedule. Consult Westinghouse engineering and service personnel for recommendations pertaining to special operating or maintenance conditions.


OPEN
PUSH TO TRIP

RECEIVING, HANDLING AND STORING

TYPES "DB-75" AND "DB-100" AIR CIRCUIT BREAKERS are shipped in wooden crates with all attachments mounted in place.

Important: To avoid damage to the breakers, do not use hooks in handling.

Table No. 1
NET WEIGHTS OF 3 POLE BREAKER

DB-75	475 lbs
DB-100	525 lbs
DBF-40	550 lbs

Immediately upon receipt, examine shipment for any loss or damage incurred during shipment. If injury or rough handling is evident, file a damage claim at once with the transportation company and notify the nearest Westinghouse Sales Office.

When unpacking, be sure that no loose parts are missing or left in the packing material. Report all shortages at once. Blow out any dust or particles of packing material that may have accumulated on the circuit breaker parts. Do not remove the cardboard "dust guards" from top of the arc chutes until the breaker is to be placed in service.

INSPECTION

The "DB" breaker assembly consists of a co-ordinated group of sub-assemblies mounted on an aluminum supporting panel. The complete breaker assembly is to be mounted with the aluminum panel in a vertical position. All inspections for proper operation should, therefore, be made with the breaker in this position. Final inspection should preferably be made with the breaker in its permanent mounting.

Inspect the breaker as follows:

1. Lift trip finger by hand to make sure that it does not bind.

2. Remove any foreign particles from the hinge end of the moving contacts.

3. Insert the maintenance operating handle and slowly close the breaker.

a. Observe whether all parts are in proper alignment and move freely.

b. Be sure that the contacts are clean and properly aligned. The center finger of the stationary arcing contacts should have a slight lead.

c. The hinge end of the moving contact is lubricated with graphite grease and is therefore black. For a description of contact alignment refer to "CONTACTS", Page 13.

4. If the contacts are in alignment and all parts move freely, continue the closing until the breaker is latched.

5. Hold the maintenance operating handle down. Push the "Push to Trip" button to trip breaker.

a. The toggle linkage should collapse and the moving contact assembly move freely to the full open position. This should be followed by complete resetting of the links in the toggle mechanism as the handle is raised.

b. The links must always be free to move without friction or binding.

6. Check the attachments for operation in accordance with the appropriate instructions as given under "Maintenance", Part III of this book.

Note: It is not advisable to lubricate any parts of the breaker. The lubrication supplied during factory assembly is sufficient for years of service. The lubricant is of a special form which is used sparingly. The addition of oil will only promote the accumulation of dust and dirt.

STORING

If circuit breakers are not to be installed in their permanent locations at once, they should be carefully inspected for loose or damaged parts and then stored in a clean, dry place in an upright position to avoid damage to the 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 which are apt to absorb moisture. FOR SAFETY REASONS, STORE THE BREAKER IN THE OPEN POSITION.

INSTALLATION

Type "DB" circuit breakers are furnished as complete unit assemblies and the installation consists of: (1) bolting them to the supporting framework or structure; (2) connecting the current carrying cables or bus bars; and (3) completing any secondary control wiring that may be necessary.

Caution: During installation, the circuit breaker should be in the open position. Be sure to de-energize the load and control leads to be connected, and also the section of the switchboard where installation is being made.

Mounting dimensions and details of the front enclosure cutouts are shown in Figs. 1, 1A, and 1B.

To prevent distortion of the breaker panel, the supporting structure should be checked for alignment.

A manual closing handle is supplied with each order of DB-75 and DB-100 breakers. This handle is for maintenance only and in no case should it be used for closing the breaker when primary circuit is energized.

CONNECTIONS

Typical circuit breaker wiring diagrams are shown in Fig. 2. The connecting cables or bus bars should have adequate current carrying capacity, or heat will be conducted to the circuit breaker resulting in possible excessive temperature rise. Connecting cables or bus bars must be supported so that the circuit breaker studs will not be subjected to unnecessary stresses.

ENCLOSURES

The breaker is normally mounted in the enclosure along with accompanying bus work terminating in cable clamps. Where covers are mounted on enclosures, they are to be removed and drilled to provide for connecting cable. All connections should be clean, smooth and free from burrs to assume full contact area. They should be firmly clamped or bolted in place to prevent excessive heating. Cable must be adequately braced to withstand full short circuit currents.

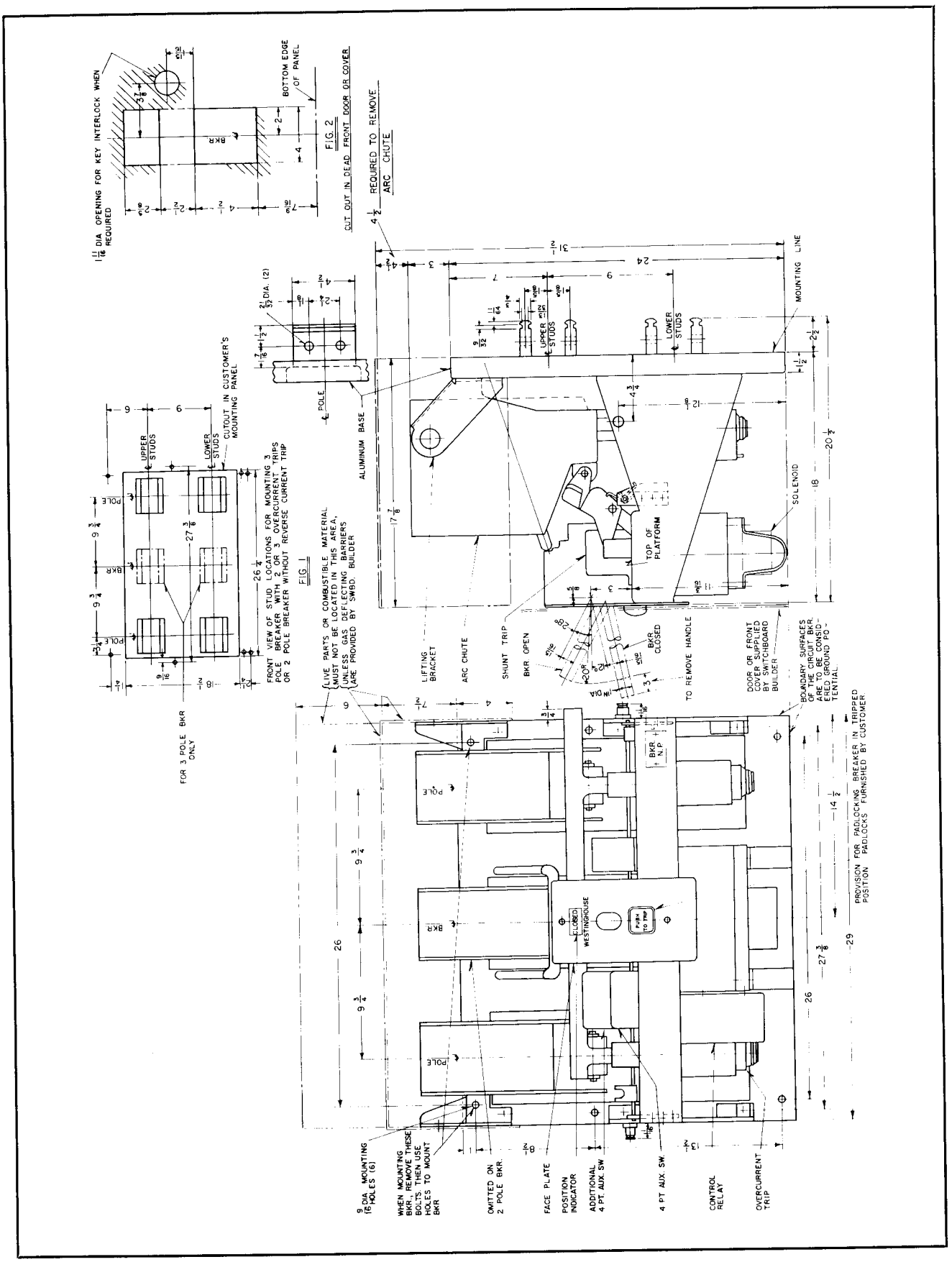


FIG. 1. Type DB-100 Air Circuit Breaker, Outline and Mounting Dimensions

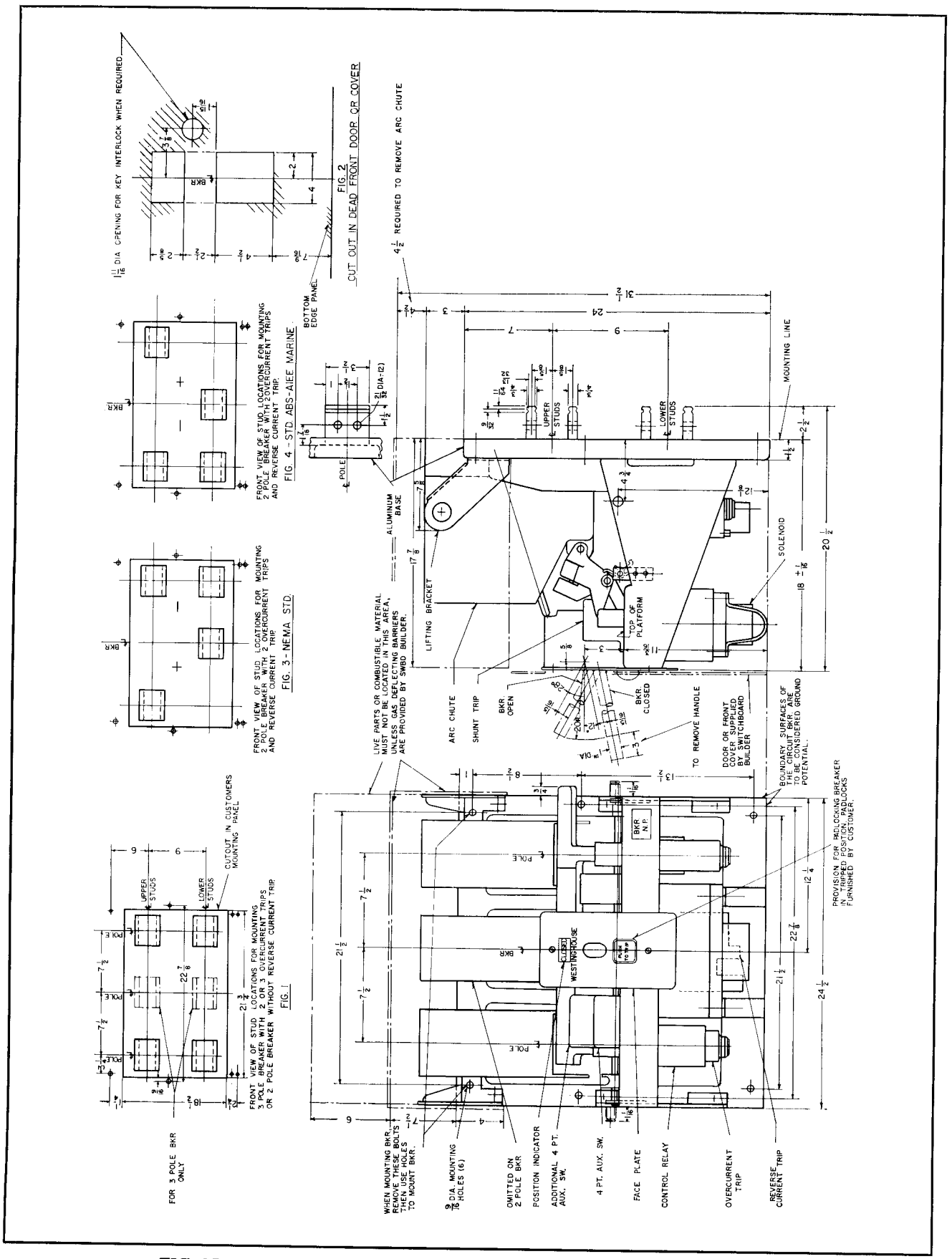


FIG. 1A. Type DB-75 Air Circuit Breaker, Outline and Mounting Dimensions

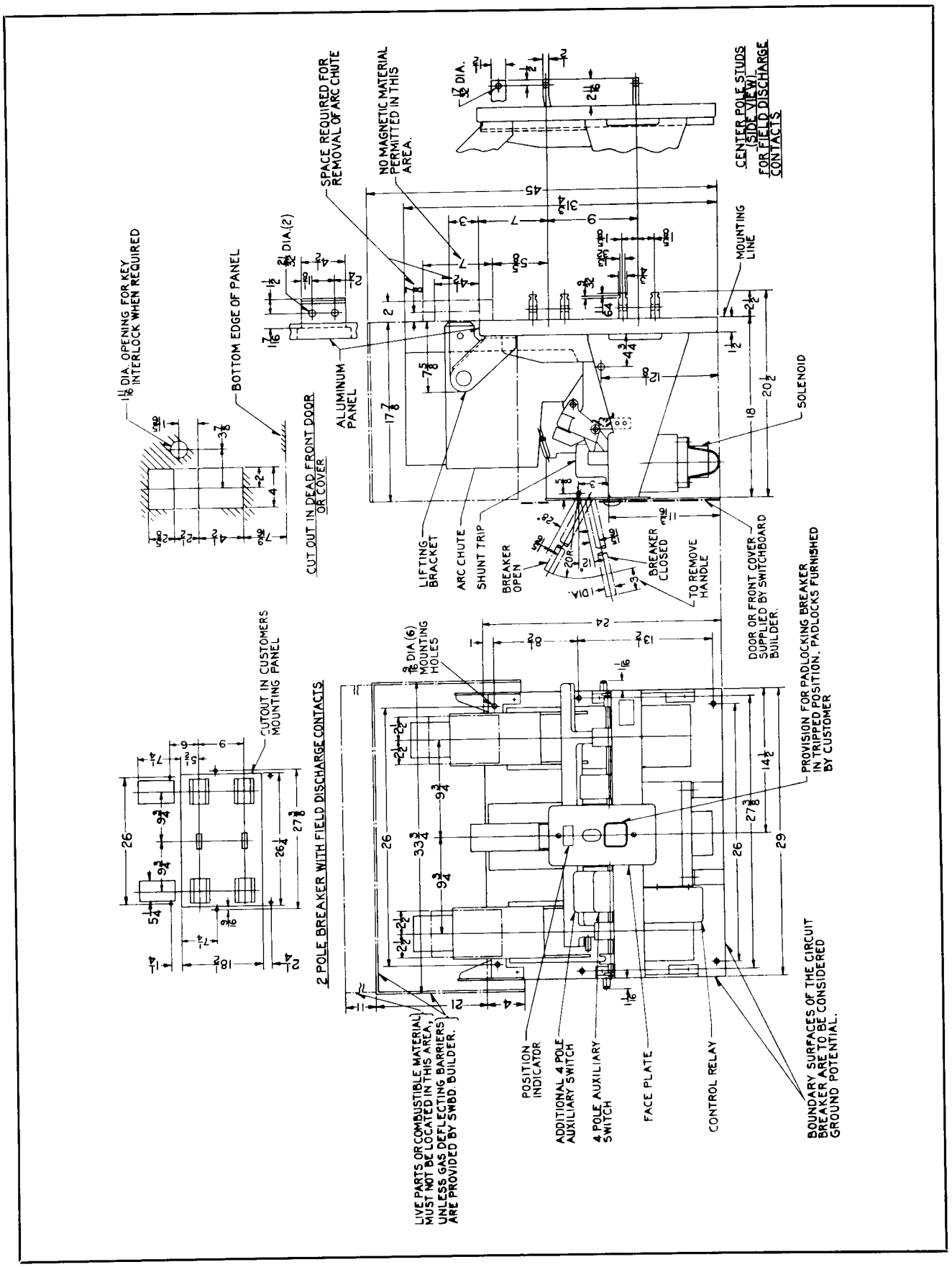
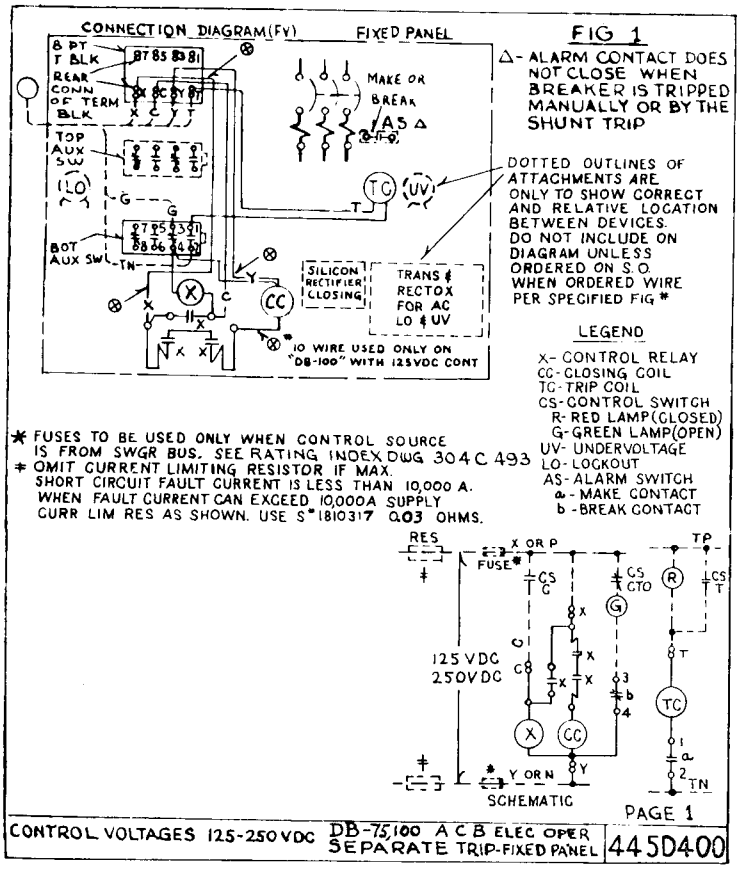


FIG. 1B. Type DBF-40 Outline and Mounting Dimensions



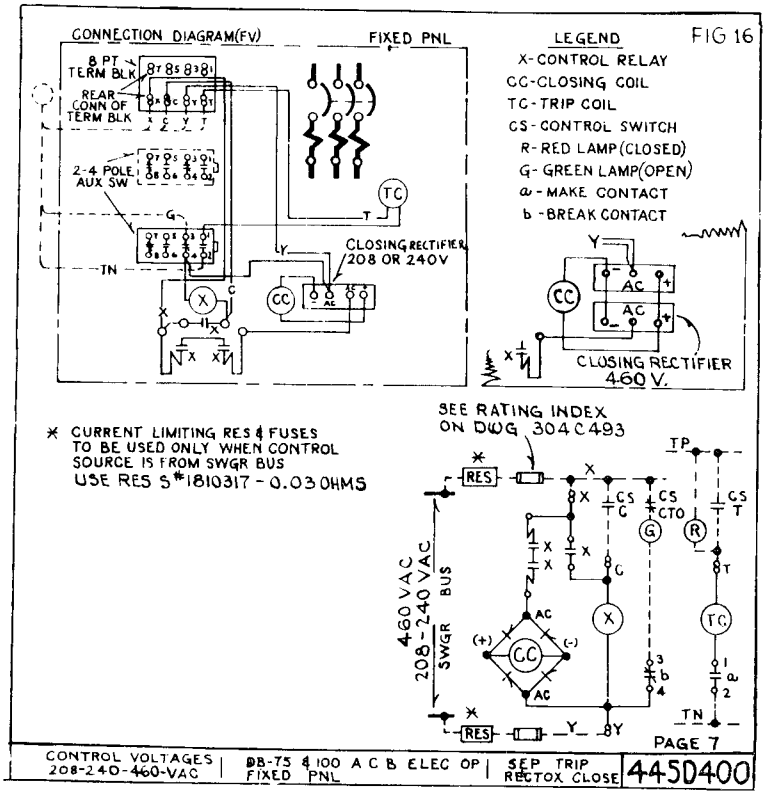


FIG. 2. Typical Wiring Diagrams

PART THREE

MAINTENANCE

POLE UNIT

Each pole unit (Fig. 3) is mounted on a separate molded base. The molded bases are attached to the aluminum mounting panel and provide insulation for the breaker studs.

The upper stud and contact are attached to the molded base by two bolts. The moving contact arm is pivoted on the lower stud and is attached to the cross bar through an insulating link. The lower stud is fastened to the molded base by four bolts.

Contacts. (See Fig. 3.) The arcing contacts must touch first on closing and open last on opening.

Do not adjust one set of contacts without checking the complete sequence of all poles. With the breaker open proceed in the following order:

1. Turn adjusting nuts (A) on insulating link to vary main contact pressure. Use .005 feeler gauge, 1/4 inch wide by 6 inches long, inserted as shown in Fig. 4A to check clearance.

Feeler (X) above contact fingers insures that they have all been deflected. Feeler (Y) inserted below fingers insures that they have not gone solid.

2. With breaker closed and latched, apply pressure on each stationary arcing contact, part "a" of Fig. 4B. When spring is fully compressed or solid, clearance from moving arcing contact (b) should be 1/32 to 1/8 inch. Adjust by turning nuts (A) on insulating link—however, clearances of main contacts as described in part (1) **must** be maintained.

3. Check the above adjustments on all three poles. After all poles have been adjusted and with one set of arcing tips just touching, the clearance between the other two sets of arcing contacts should not exceed 1/16 inch.

Maintenance of Contacts. Rough or high spots should be removed with a file or sandpaper. When dressing contacts be sure to protect the hinged contact of all poles with a cloth to prevent foreign matter from lodging in the hinged contact.

Caution: All power must be removed when replacing, maintaining or adjusting contacts.

OPERATING MECHANISM

The operating mechanism (Fig. 3) is non-adjustable and consists of a series of non-ferrous links designed to secure low closing and tripping forces. To check for friction, with the breaker open, raise trip finger and slowly lower the closing handle. Release trip finger and slowly raise handle. The linkage should follow the handle without sticking and a "click" will be heard just before the handle reaches the full up position.

To remove the mechanism proceed as follows:

1. Remove the breaker cross bar.

2. Loosen the outboard bearings at the ends of the trip bar.

a. In reassembly, tighten bolts holding outboard bearings only when bearings have been adjusted to prevent any binding of trip shaft.

3. Remove the tension rods between the mechanism and aluminum panel.

4. Free the pin (J-3)* from the moving core. To free the pin, first remove the cotter pin from the spacer on the right side of the pin. Partially close the breaker until the pin lines up with two holes in the sides of the mechanism frame. Hold the moving core up, and then drive the pin to the right just far enough to clear the moving core rod. Lower the moving core until it hits its stop. Drive the pin to the left into its original position.

5. Remove the four mounting bolts.

* The first letter or number refers to the item and the second to the figure number. (Item J—Fig. No. 3.)

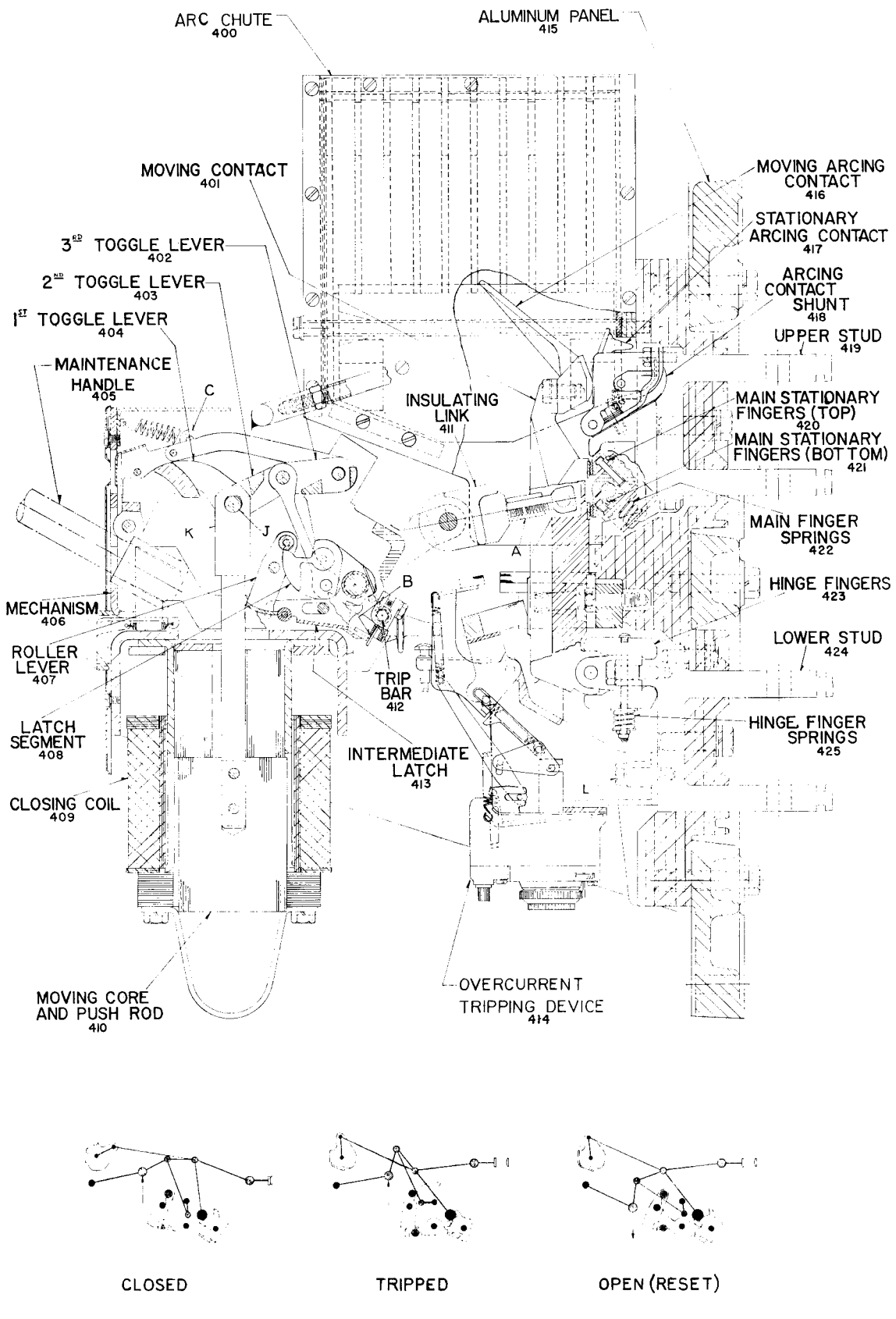


FIG. 3. Cross-Sectional View of Air Circuit Breaker

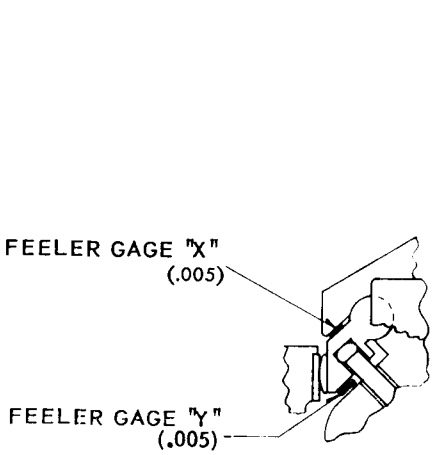


FIG. 4A

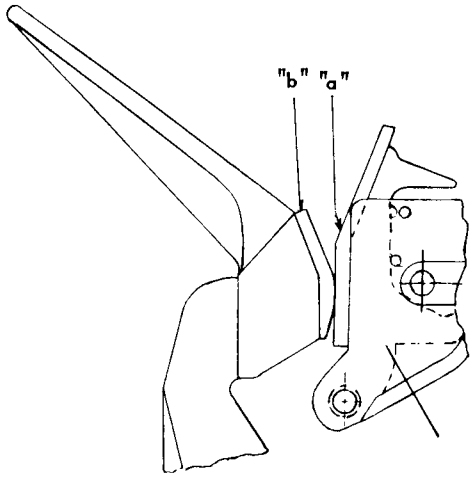


FIG. 4B

FIG. 4. Adjusting Limits of Main and Arcing Contacts

a. Caution: These bolts are also the mounting bolts for the closing solenoid; therefore, support the solenoid while removing the bolts.

6. Remove the mechanism.

7. Before assembling mechanism check sliding surfaces of two latches shown at "B", Fig. 3. These surfaces must be clean, free of burrs, and have not more than .035 inch clearance in the reset position.

The mechanism is factory lubricated for life.

CLOSING SOLENOID

The closing solenoid (Fig. 5) is non-adjustable. To remove the close coil, proceed as follows:

1. Caution: Remove the close coil circuit voltage.

2. Disconnect the wires from the close coil terminals.

3. Loosen the locking clip (4-5) on the bottom of the moving core.

BREAKER TYPE	CLOSING COIL BURDEN	NOMINAL CONTROL VOLTAGE	CLOSING AMPERES	TRIPPING AMPERES	RECOMMENDED CLOSING FUSE AMPERE RATING				FUSE STYLE NUMBER
					250 VOLT		600 VOLT		
					Standard NEC	Time Lag	Standard NEC	Time Lag	
DB-75	All	48 DC	..	4.9	..	..	..	..	.....
		125 DC	25	2.2	10	..	..	..	120A823H04
		250 DC	13	1.1	6	..	..	..	120A823H03
		230 AC	25	3.7	10	..	..	..	120A823H04
		460 AC	13	1.4	..	..	3	..	120A824H03
		575 AC	10	1.0	..	..	3	..	120A824H02
DB-100	All	24 DC	..	9.5	..	..	..	..	.....
		125 DC	40	2.2	15	..	..	..	120A823H05
		250 DC	23	1.1	10	..	..	..	120A823H04
		230 AC	40	3.7	10	..	..	..	120A823H05
		460 AC	23	1.4	..	..	6	..	120A824H04
		575 AC	15	1.0	..	..	3	..	120A824H03
		115 AC	..	7.3	..	..	..	..	.....

Note: For A-C closing use 3 KVA source or larger

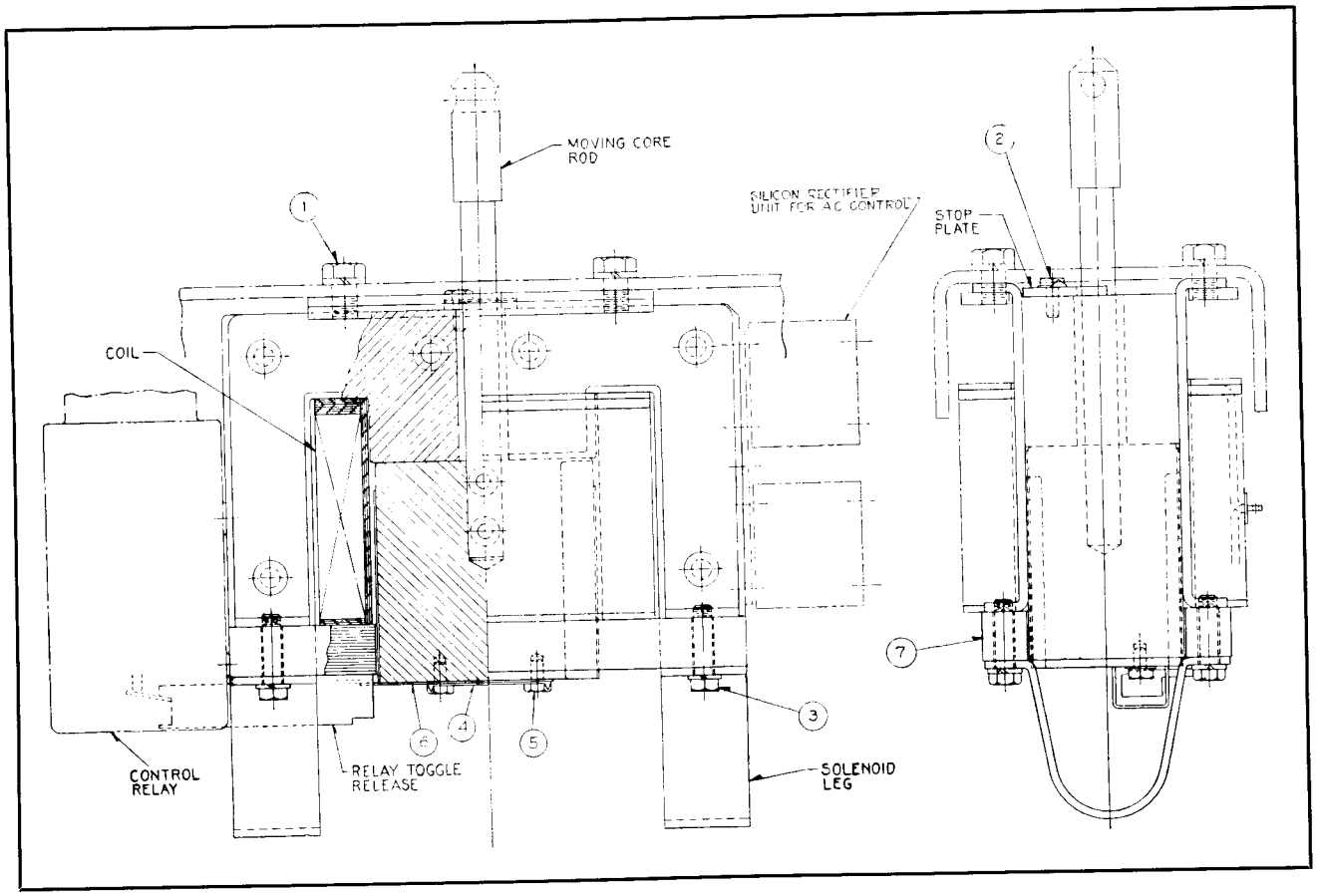


FIG. 5. Closing Solenoid Construction Details

4. Remove bolts (5), locking clip (4-5), and the relay trip bracket (6-5).

5. Remove bolts (3-5), and using a rawhide or plastic mallet remove the bottom stationary core (7-5).

6. Remove the coil.

7. After assembling coil and breaker, but before connecting the coil, check proper co-ordination between breaker closing and relay tripping. Energize relay operating coil only, (Fig. 11), and manually close breaker very slowly. The relay contacts should trip free slightly before the position at which the mechanism pawl (C-3) drops in the latched position.

OVERCURRENT TRIPPING DEVICE

Description. The overcurrent tripping device (Fig. 6), for the circuit breaker is an air delayed magnetic type of device. The time-current characteristics of the trip unit are as follows:

1. Long delay and short delay.

2. Long delay and instantaneous.

3. Instantaneous.

The various ratings of each general type are of similar construction and differ only in springs and calibration.

The overcurrent tripping device can be removed from the breaker easily and replaced with another unit of the same or different rating without affecting the calibration of the units involved.

Construction. The mounting frame casting supports the two sub-assemblies of the trip unit. On the upper part of the frame are the two magnetic armatures and their associated links and brackets. Fastened to the lower part of the mounting frame is the moldarta box which contains the calibration springs, time delay elements and calibration knobs. This box is held to the mounting frame by two long screws at the bottom of the calibration box.

Installation and Removal

Caution: Before removing or installing a tripping device, be sure that the breaker is in the open position and de-energized.

To remove an overcurrent tripping device from the breaker, loosen the two captive bolts at the bottom of the mounting frame (L-3) until they turn

freely. Then loosen the two bolts at the top of the mounting frame while supporting the trip unit so that it does not fall. These two bolts clamp a slotted angle mounting bracket and merely have to be loosened; they do not have to be removed from the mounting frame. The trip unit is then free to be removed from the breaker by lowering it down behind the breaker platform.

To install a tripping device on a breaker, first make certain that the breaker is open and is not connected to live circuits. Then loosen the upper mounting bolts on the trip unit so that the bolts can slide into the slotted mounting brackets on the stationary yoke. Then install the trip unit from the bottom of the breaker, sliding it up behind the mechanism platform. Start the bottom two captive mounting bolts, but do not tighten completely. Next, align the trip unit so that the gaps between the tapered portions of the main armature are approximately equal when the main armature is closed. Then tighten all four mounting bolts securely.

Adjustment of Trip Screw. The trip screw mounted on the trip finger must be adjusted properly to obtain proper tripping.

Caution: Since this adjustment involves tripping the breaker, care must be taken to keep fingers and face away from all contact arms and operating linkage.

To proceed with the adjustment, turn the long time dial at the bottom of the calibration box counterclockwise to the stop so that the trip unit is set for minimum time delay. Then close the breaker and carefully reach under the mechanism with both hands and push the lower armature fully closed with the thumbs. Hold it closed for at least the minimum long delay time (20 to 40 seconds). If the breaker trips, reset the screw at the end of the tripping finger until the breaker just barely trips. Before re-adjusting the trip screw, make sure that the breaker is in the open position. After finding the position of the trip screw at which the breaker

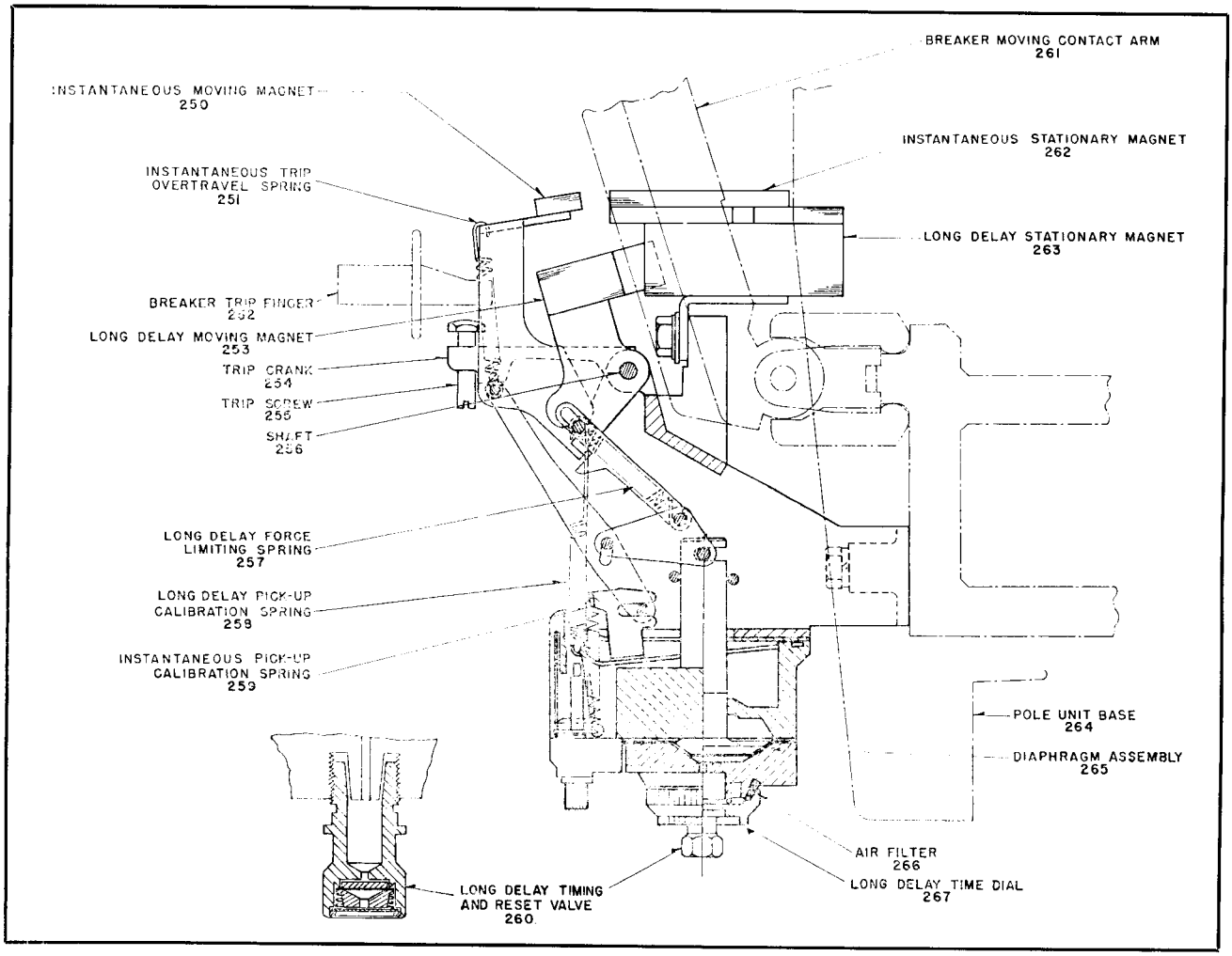


FIG. 6. Cross-Sectional View of Overcurrent Tripping Device with Long Delay and Instantaneous Elements

just trips, turn the screw exactly one full turn in the direction to trip the breaker sooner. Check to make sure that the breaker will trip when either armature is closed if long and instantaneous type trip units are used, or when both armatures are closed if long and short delay type trip units are used. The short delay armature is for timing only. Closing it alone will not trip the breaker.

Operation

Standard Overcurrent Tripping Device (Refer to Fig. 7A)

When a small overload current flows through the breaker pole unit conductor (R), it causes the moving armature (B) to be attracted toward the stationary core (A). The motion of the armature is retarded by the diaphragm (D) whose motion is in turn controlled by the amount of air admitted by the long time delay valve (F). After a time delay, determined by the setting of valve (F), the armature will have rotated the trip crank (J) far enough to trip the breaker by moving the trip lever (K). During this type of tripping, the tension spring (C) is not stressed beyond its normal length.

On larger overload currents, the action is essentially the same as above except that the moving armature (B) will close completely as soon as the overload is applied. When the armature closes, the

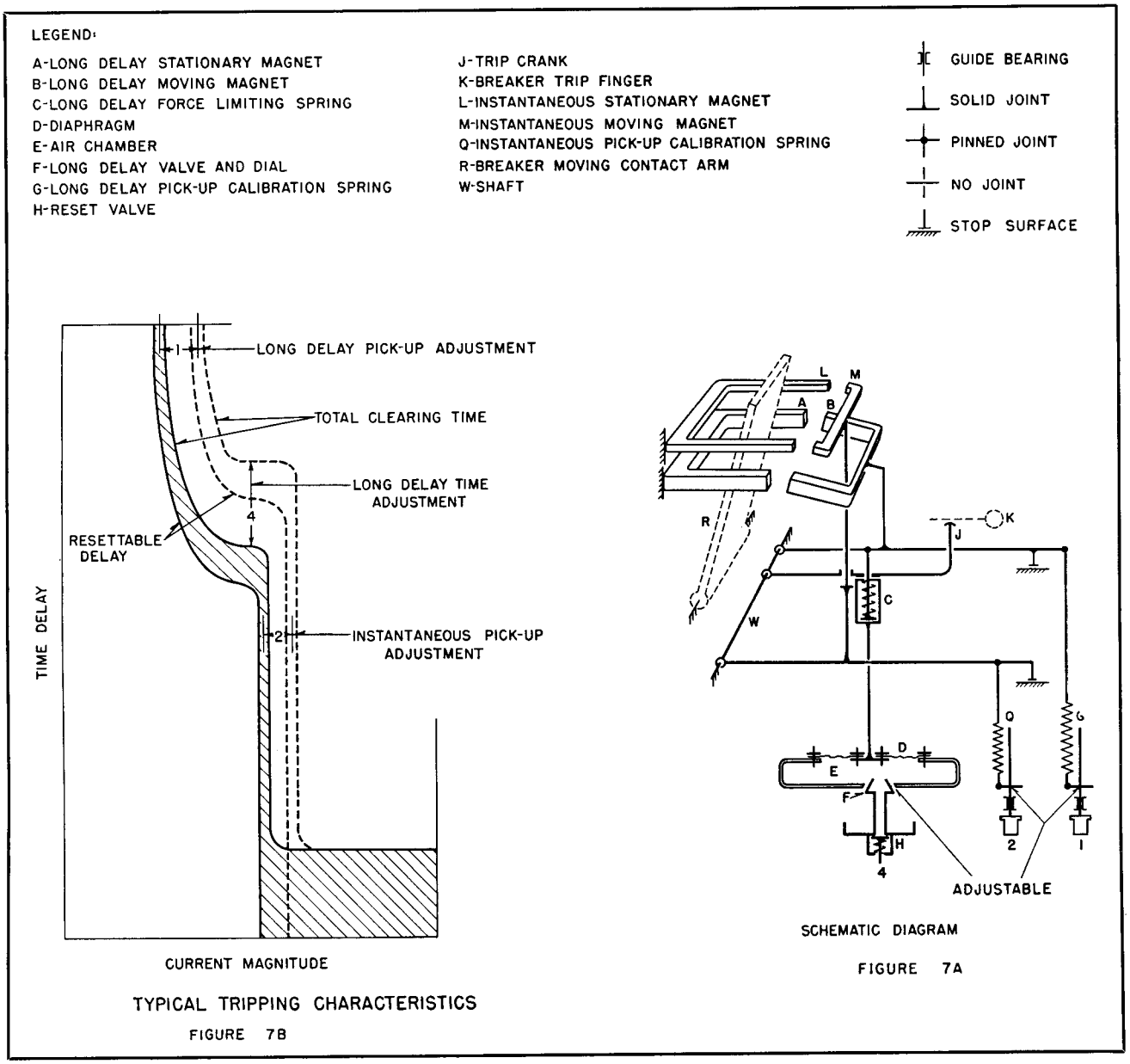


FIG. 7. Schematic and Typical Time-Current Characteristics of Overcurrent Tripping Device with Long Delay and Instantaneous Elements

tension spring (C) applies a force to diaphragm (D). After a time delay determined by valve (F), the diaphragm movement permits the spring to rotate the trip crank (J) far enough to trip the breaker by moving the trip lever (K).

Large fault currents cause the instantaneous armature (M) to close immediately. This armature lifts the trip crank (J) without any delaying action and trips the breaker.

Selective Overcurrent Tripping Device (Refer to Fig. 8 to 9)

For small and intermediate overloads, the operation of this device is the same as for the standard overcurrent tripping device. However, the selective overcurrent tripping device operates differently when large fault currents occur.

When the fault current is large enough to close the short delay armature (M), the linkage attached to the armature opens valve (P) which permits air to enter the diaphragm chamber at a much faster rate than through the long delay valve (F). Tripping is then accomplished by the same means as though a small overload had occurred. That is; the main armature (B) has closed, pulling on the tension spring (C) which is restrained by diaphragm (D) until sufficient air has entered valve (P) to permit the spring assembly (C) to lift crank (J) and trip the breaker by rotating the trip finger (K).

A discriminator arm is used on the selective overcurrent trip units to make the unit behave as an instantaneous type trip unit while the breaker is being closed and for a short interval of time after closing. This is achieved by having a discriminator latch connection between the short delay armature bracket and the trip crank. When this latch is engaged, the short delay armature will lift the trip crank directly if the current is greater than the short delay pick-up setting. If the current does not

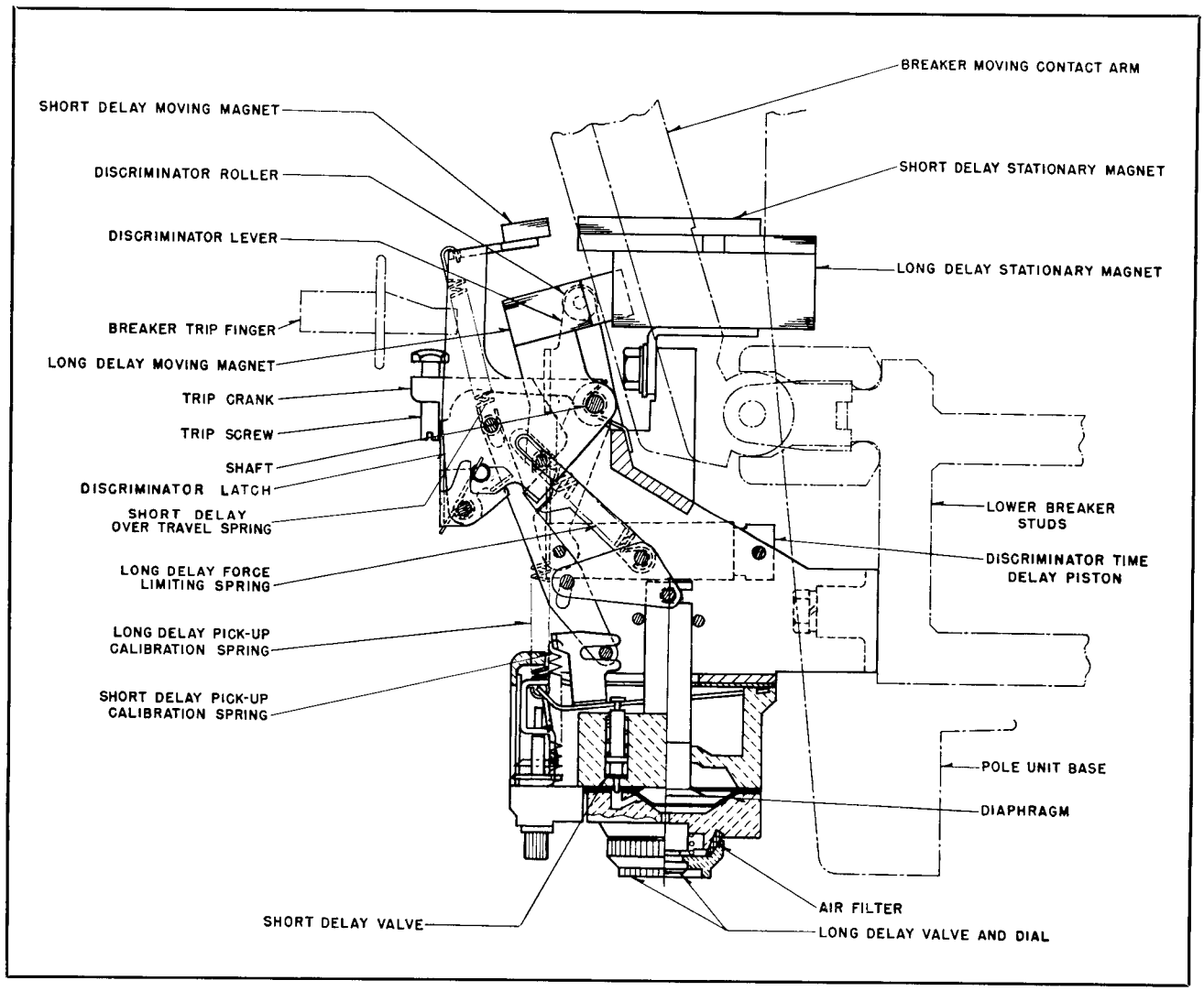


FIG. 8. Cross-Sectional View of Overcurrent Tripping Device with Long Delay and Short Delay Elements

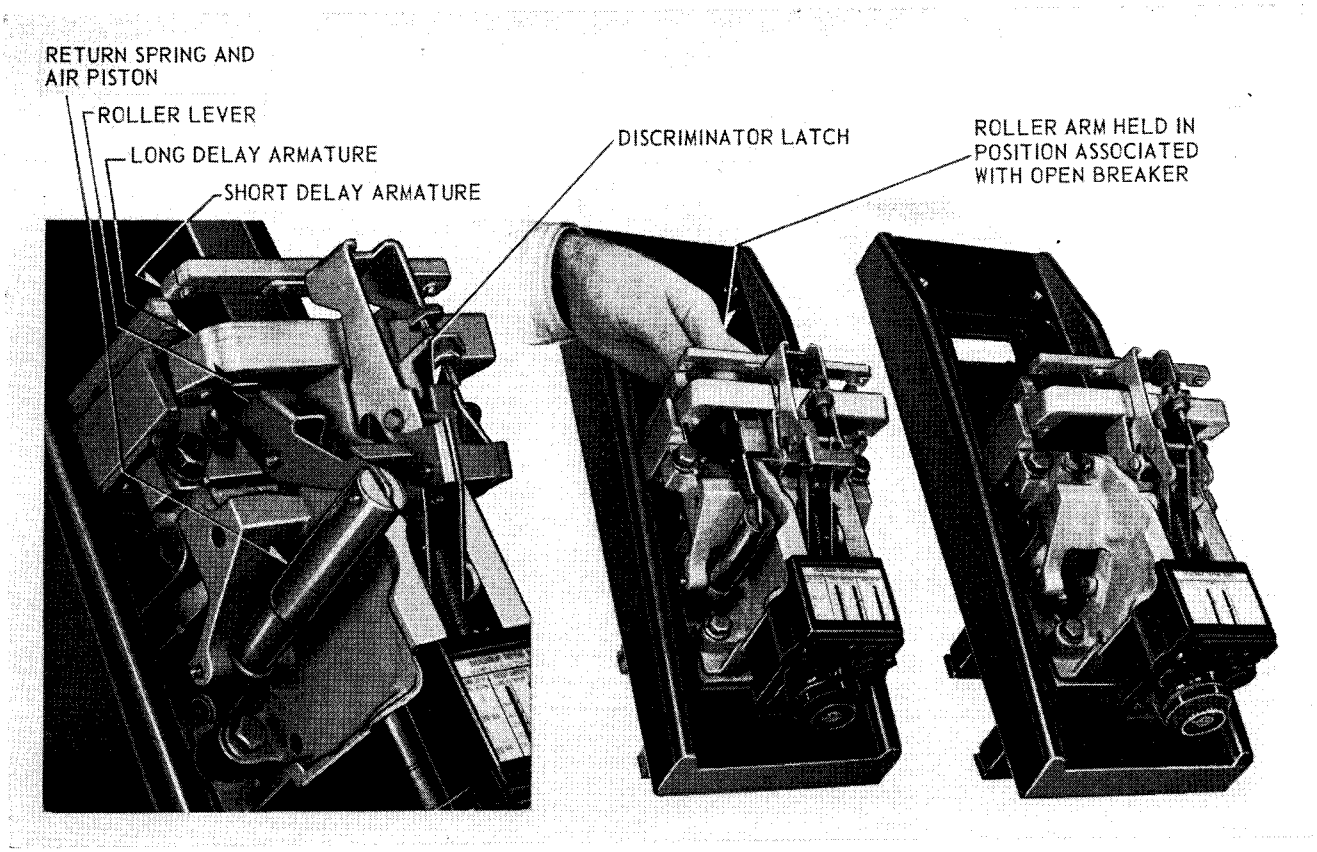


FIG. a.
Parts which Discriminate between:
A. Breaker in Closed Position
B. Breaker During Period of Closing

FIG. b.
Arranged for Long Delay and Short Delay Tripping

FIG. c.
Arranged for Long Delay and Instantaneous Tripping

FIG. 8A. Selective Overcurrent Trip Operations

rise above this value, then the breaker remains closed and the discriminator arm disengages the discriminator latch so that the trip unit will then revert to its normal function as one having long and short time delay characteristics.

Instantaneous Overcurrent Tripping Device (Single Element) Refer to Fig. 10

This device operates in an instantaneous manner to trip the breaker at any time when the current rises above the calibrated setting. The main armature (B) of Fig. 7A, is modified so that it lifts the crank (J) and trips the breaker directly. The operation is similar to the instantaneous trip of the standard overcurrent tripping device.

Time-Current Characteristics

Standard Overcurrent Tripping Device (Refer to Fig. 7B)

The long delay pick-up adjustment can change the position of the upper part of the curve through the range indicated by the number (1). This adjustment is accomplished by changing the tension on the spring which controls the force the long delay armature must overcome in order to close.

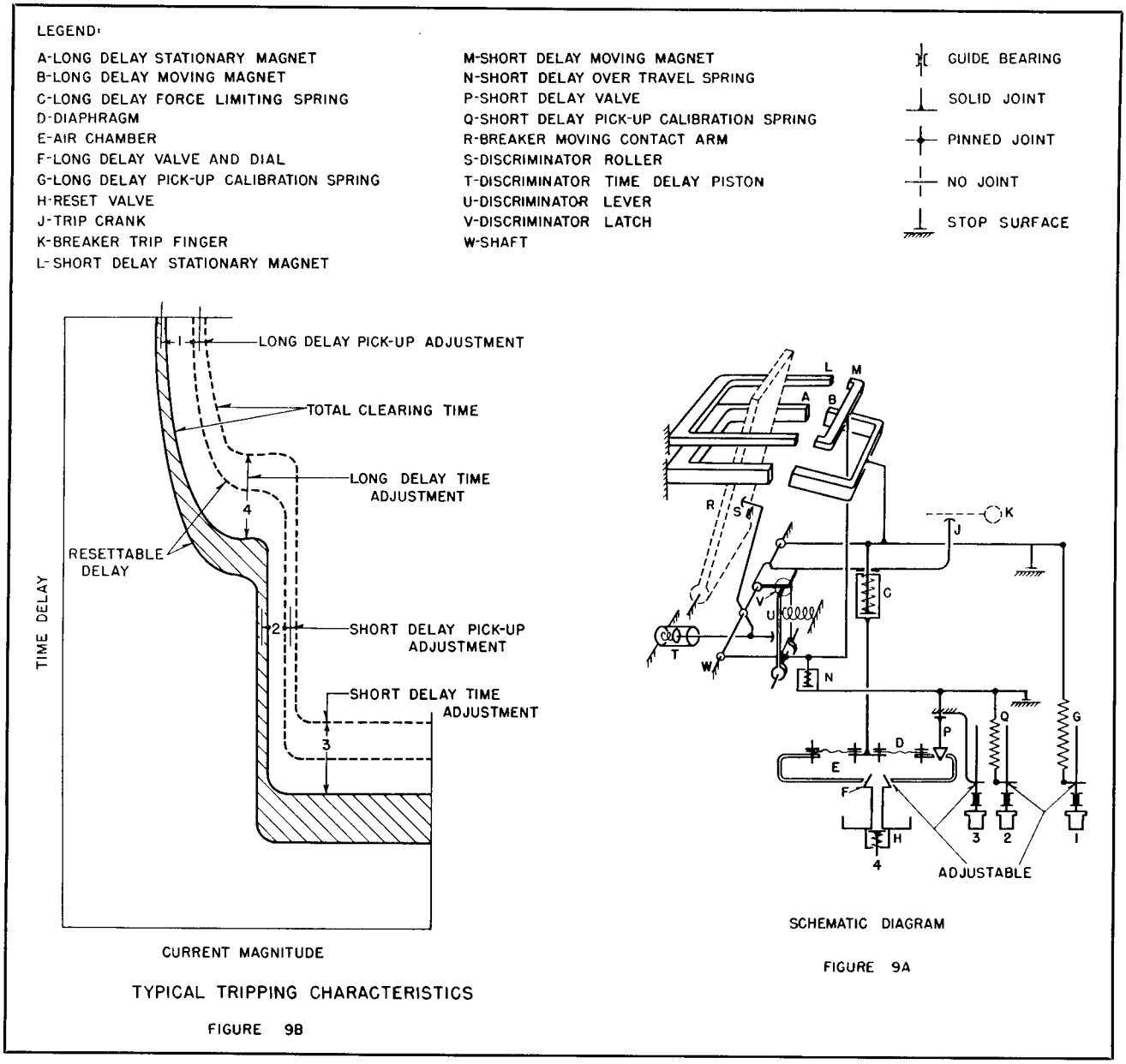
The long delay time adjustment can be used to shift the knee of the curve over the range indicated by the Number (4). This adjustment is changed by turning the knob, located at the bottom of the molded calibration box, which opens or closes the valve to control the amount of air entering the diaphragm chamber.

The instantaneous pick-up adjustment can shift the vertical part of the curve to the left or right as indicated by number (2). This is achieved by changing the spring force applied to the smaller instantaneous armature.

The flat portion of the curve at the bottom represents the minimum time for the breaker to clear when fault currents exceed ten times the trip unit rating.

Selective Overcurrent Tripping Device (Refer to Fig. 9B)

The time-current characteristic of this trip unit is the same as the standard device except that the



TYPICAL TRIPPING CHARACTERISTICS

FIGURE 9B

SCHEMATIC DIAGRAM

FIGURE 9A

FIG. 9. Schematic and Typical Time-Current Characteristics of Overcurrent Tripping Device with Long Delay and Short Delay Elements

position of the flat portion of the curve can be shifted as indicated by the number (3). This adjustment can be made by changing the setting of the short delay time on the calibration box. The adjustment controls the maximum opening of the short delay valve and thereby controls the tripping time when currents are high enough to operate the short delay armature.

Calibration. Overcurrent tripping devices of this general type must be calibrated by using a definite procedure and technique, as well as specialized equipment. Because few customers have access to such equipment, it is highly recommended that trip units be returned to the factory if it appears that they need to be calibrated.

Maintenance. In ordinary use, this trip unit needs very little maintenance. Any accumulation of dust should be blown off occasionally. No oil or lubricant should be applied to any of the pins or links. Do not disassemble the unit for cleaning purposes. In the event that major repair work is needed, it is advisable to return the unit to the factory.

CONTROL RELAY

The control relay (Fig. 11) mounts directly under the auxiliary switch. It is a single-coil, mechanical

tripping device with the coil suitable for continuous duty. The operation sequence is outlined in Fig. 2, Page 11. The contacts should normally last the life of the breaker, but are replaceable if necessary.

The relay trip pin and relay toggle release are designed so that the relay trips at approximately the same time as the breaker latches. The relay is not adjustable.

Inspection. Make certain all circuits are not energized. Manually lift the core of the operating solenoid to the fully closed position. While still holding core in closed position, raise the relay trip pin. This should trip the relay causing the close coil circuit to open. Release both core and trip pin. The relay linkage and trip pin should reset without any noticeable friction.

Maintenance. Remove screw in front cover plate. Remove cover by grasping it at the bottom and pull down and out. Check for loose screws, especially at contacts. Replace cover and check for loose mounting bolts.

SHUNT TRIP ATTACHMENT

The shunt trip (Fig. 12) mounts on top of the platform immediately to the right of the operating mechanism. It is non-adjustable and is intended for intermittent duty only. The shunt trip circuit must always be open by an auxiliary switch contact.

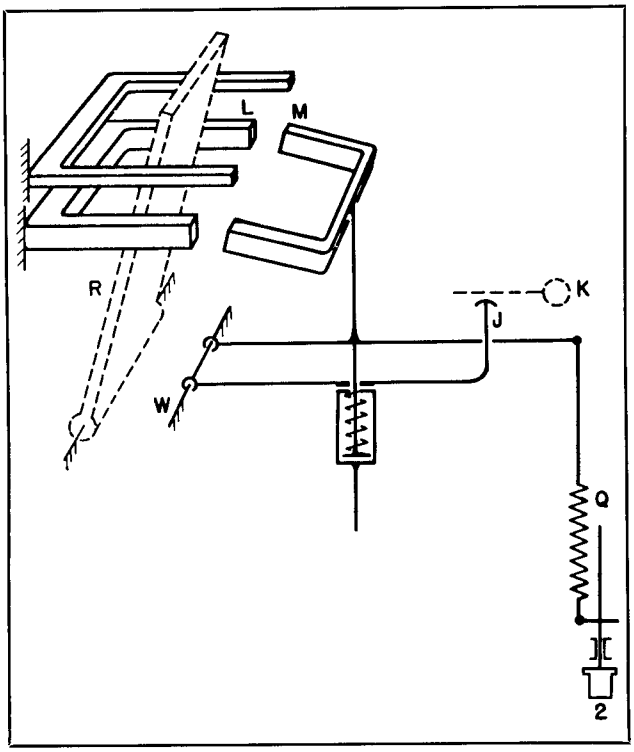


FIG. 10A. Schematic Diagram of Overcurrent Tripping Device with Instantaneous Element Only

Inspection. With the breaker in the open position, manually pull the shunt trip moving core against the stationary core and manually attempt to close the breaker. The breaker should be trip free.

The trip rod of the shunt trip should have approximately 7/32 inch clearance to the trip rod clip.

Maintenance. Check for loose bolts and faulty coil.

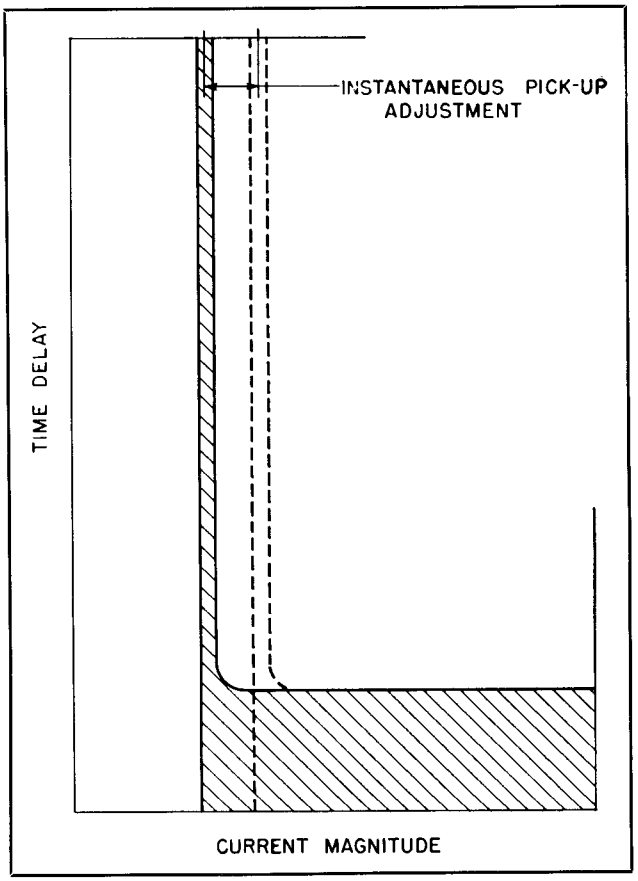


FIG. 10B. Typical Time-Current Characteristics of Overcurrent Tripping Device with Instantaneous Element Only

UNDERVOLTAGE TRIP ATTACHMENT

The undervoltage trip (Fig. 13) mounts on top of the platform, to the right of the shunt trip. Its function is to trip the breaker when the voltage falls to between 30 and 60 percent of normal.

The moving core is normally held magnetically against the stationary core to hold the rod and consequently the reset lever in the reset position. When the coil voltage is reduced sufficiently, the reset lever spring overcomes the magnetic attraction of the cores and rotates the reset lever clockwise. As the reset lever rotates, the pin pushes against the latch to release it from its latch plate.

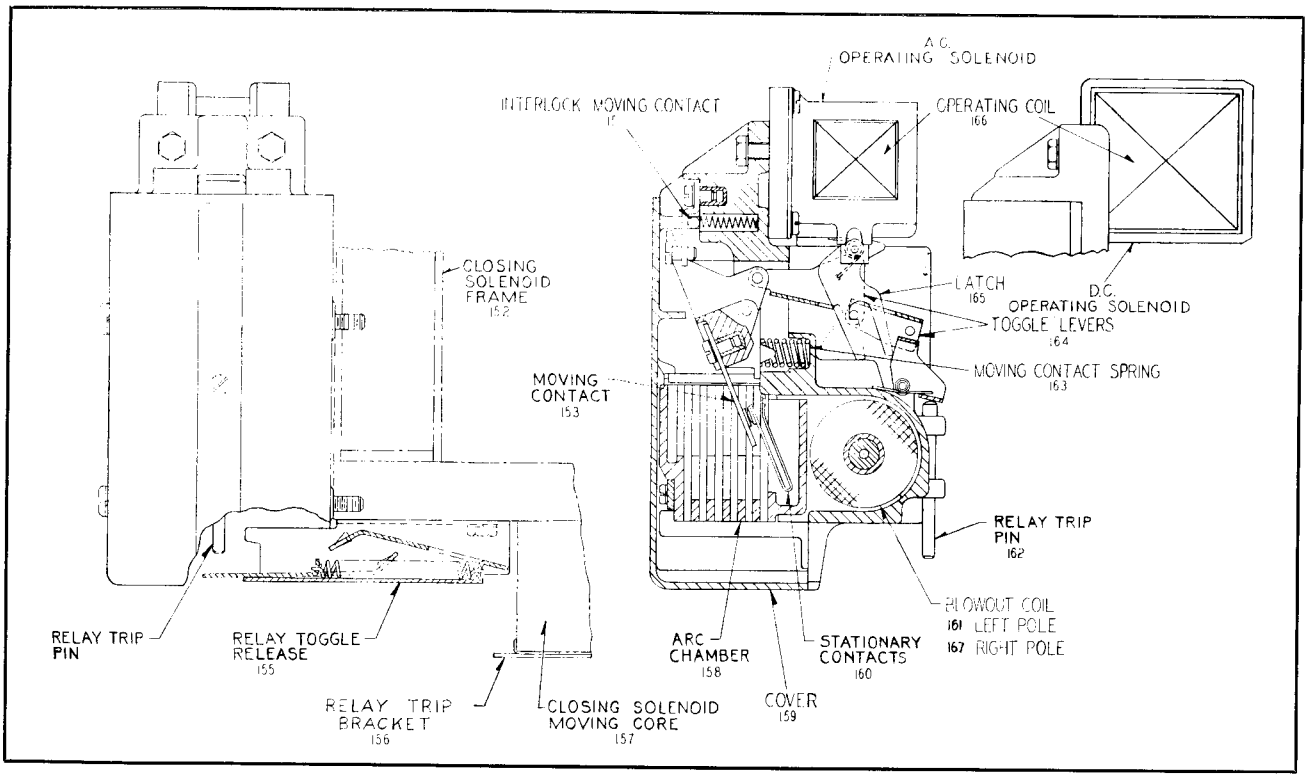


FIG. 11. Control Relay—Construction Details

When the latch releases, the trip spring rotates the trip lever to trip the breaker. The linkage is reset by the cross bar as the breaker opens.

Always connect the coil to the line side of the breaker unless the attachment is equipped with time delay device. In this case, the time delay will delay the tripping of the breaker long enough to permit energization of the undervoltage coil from the load side. Do not use an auxiliary switch contact in the undervoltage circuit.

UNDERVOLTAGE TIME DELAY ATTACHMENT

The undervoltage air dashpot time delay attachment (Fig. 14) mounts on the front of the undervoltage trip, replacing the moving core cover. The needle valve screw in the top regulates the opening through which the air is forced and hence the time delay. The attachment does not have a quick reset feature and therefore approximately one minute should be allowed between operations to permit complete resetting.

Inspection. Hold the U.V. trip lever down and close the breaker manually. Release the trip lever slowly, allowing the undervoltage trip spring to rotate the trip rod and trip the breaker after a time delay.

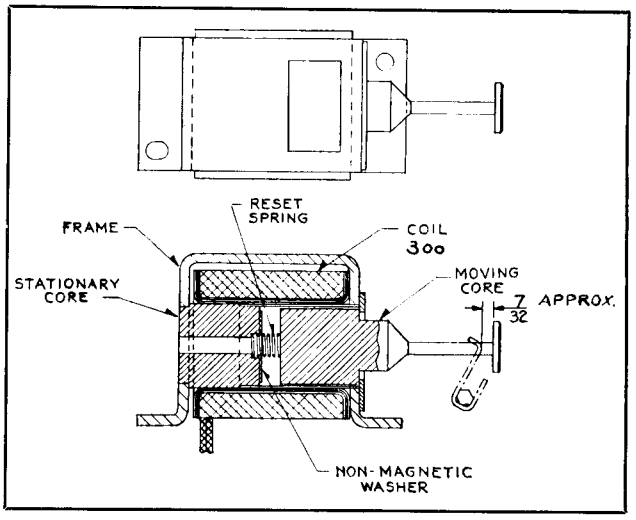


FIG. 12. Shunt Trip Attachment—Construction Details

Caution: Do not use your fingers to hold and release the U.V. reset lever.

Maintenance. Check for loose bolts and faulty coils.

AUXILIARY SWITCH

The auxiliary switch (Fig. 15) mounts on top of the platform to the left of the operating mechanism. The contacts will carry 15 amperes continuously or 250 amperes for 3 seconds.

The switch is a shaft-operated, 4-pole, rotary type normally having two "a" contacts (closed when the breaker is closed) and two "b" contacts (closed when the breaker is open). The rotor operates through a 90-degree angle and is non-adjustable. However, the contacts may be changed from "a" to "b" or vice versa. To change, remove the switch from the platform, remove the back cover, shaft and end bushing. Remove the rotor and change the contacts as desired. Be sure to replace the shaft in the original position relative to one of the unchanged contacts.

Table No. 3. INTERRUPTING CAPACITY

VOLTS	INTERRUPTING CAPACITY IN AMPS.	
	NON-INDUCTIVE CIRCUIT	INDUCTIVE CIRCUIT
125 V. D-C	11	6.25
250 V. D-C	2	1.75
115 V. A-C	75	15
450 V. A-C	25	5

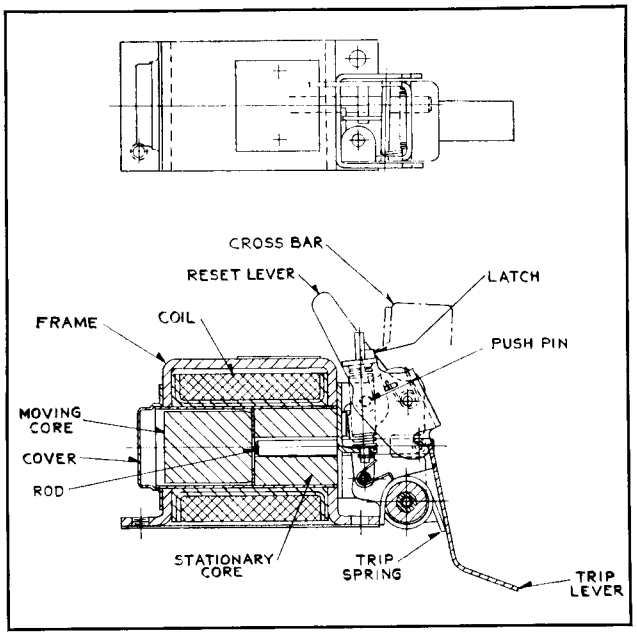


FIG. 13. Undervoltage Trip Attachment—Construction Details

Inspection. Remove the front cover and make sure contacts are touching well before the end of travel.

Maintenance. Check for loose bolts. Replace contacts if necessary.

ALARM SWITCH ATTACHMENT

The alarm switch (Fig. 16) is integrated with the shunt trip attachment and will energize the alarm circuit on all opening operations except those initiated through the push to trip button and shunt trip. The alarm switch may be reset manually by trip button or electrically by energizing the shunt trip coil (when electrical resetting has been provided). Closing the breaker also resets alarm switch.

Inspection. Close the breaker manually and then trip by trip button to be sure the alarm contact

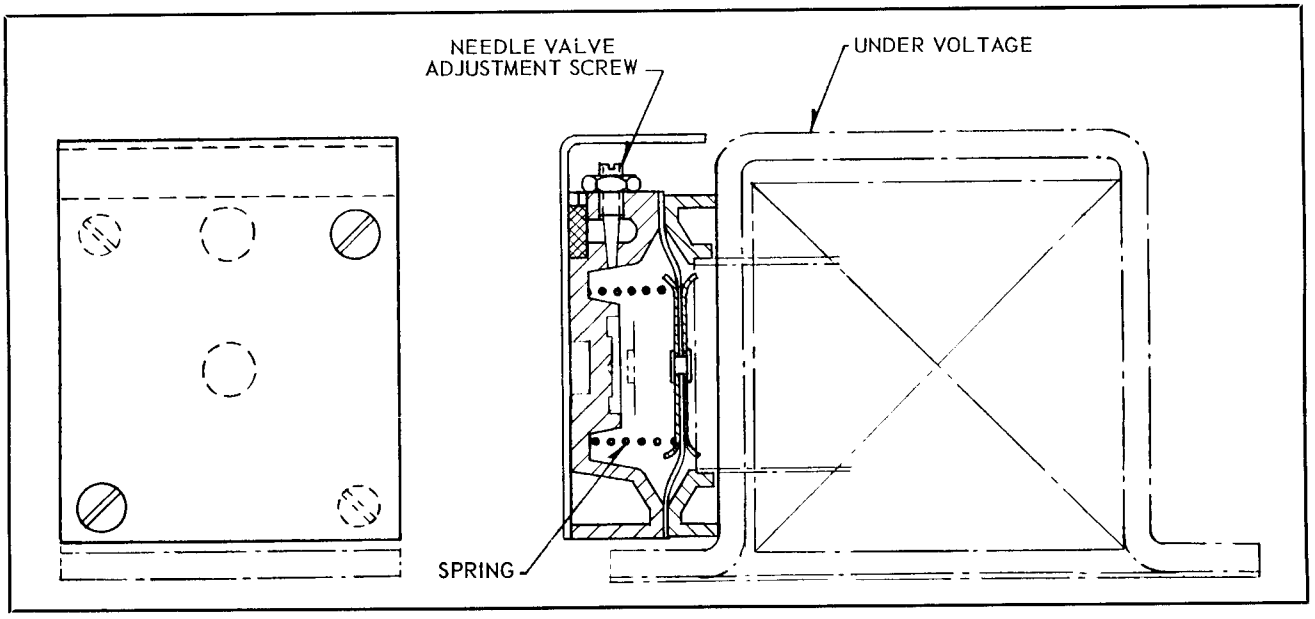


FIG. 14. Undervoltage Time Attachment—Construction Details

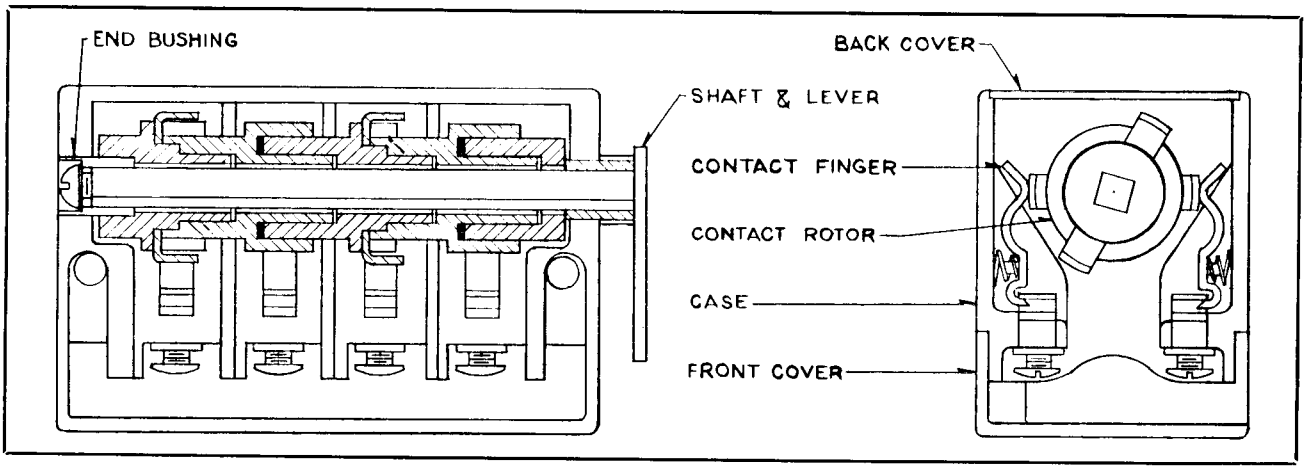


FIG. 15. Auxiliary Switch—Construction Details

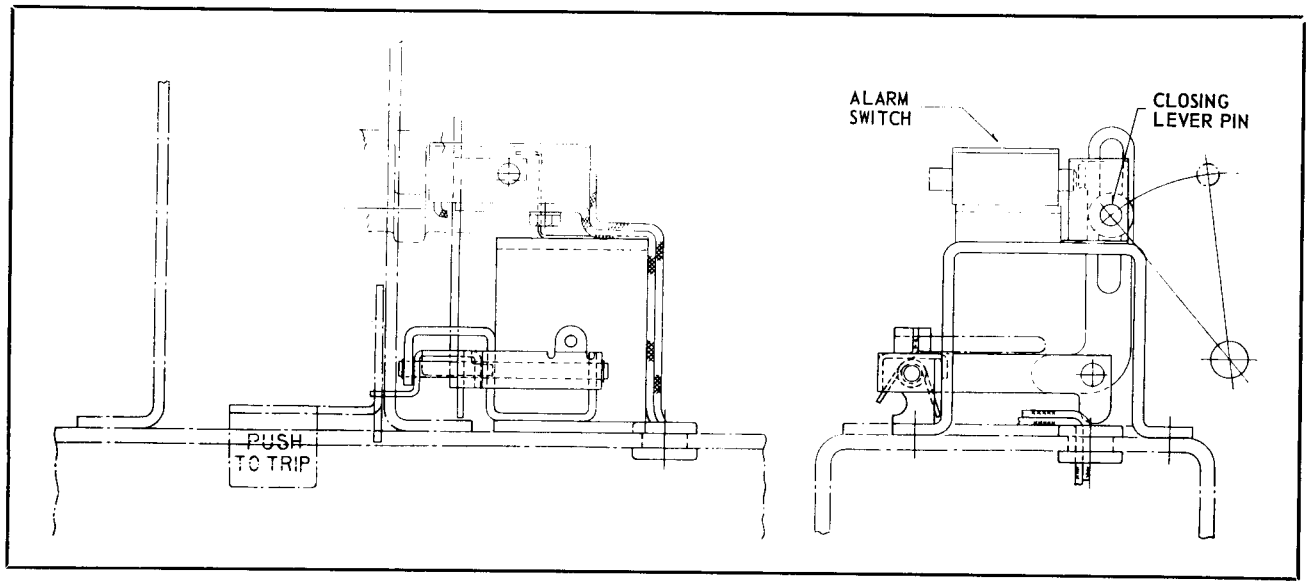


FIG. 16. Alarm Switch Attachment—Construction Details

do not "make". Repeat the above procedure except trip by raising the O.C.T. trip finger. Note that the alarm contacts do make contact.

Maintenance. Clean the alarm contacts when necessary. Check for loose bolts.

ELECTRIC LOCKOUT ATTACHMENT

The electric lockout (Fig. 17) mounts on the top of the platform, on the extreme left side and behind the auxiliary switches. Its function is to hold the breaker open (trip free) until the lockout coil is energized. The lockout coil can be de-energized after closure of the breaker, if desired, without tripping the breaker.

Inspection. Attempt to close the breaker. The lockout should prevent closure of the breaker by holding the trip rod in the trip free position. Hold ing the lockout armature in the closed position should permit closure of the breaker. Releasing the armature after closure should not trip the breaker.

Maintenance. The device is non-adjustable. Check for faulty coil and loose bolts.

KEY LOCK ATTACHMENT

The key lock (Fig. 18) mounts on the right side of the operating mechanism frame. The key can be removed in the open or closed position of the breaker.

Inspection. Push the trip button and turn key to the locked position. The key is then removable and the breaker is locked in the trip-free position. Replace key and rotate to the unlocked position to

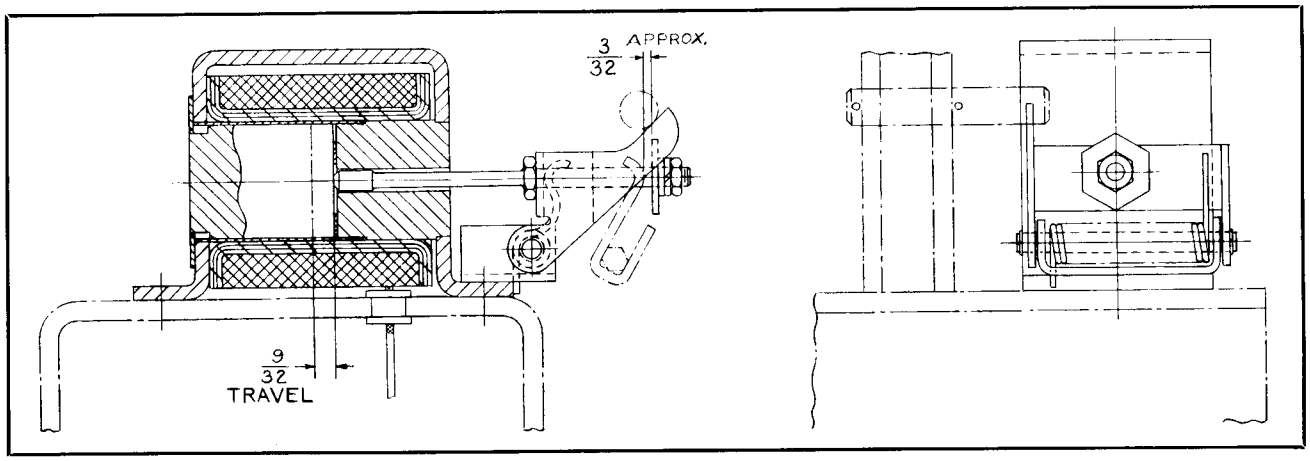


FIG. 17. Electrical Lockout Attachment—Construction Details

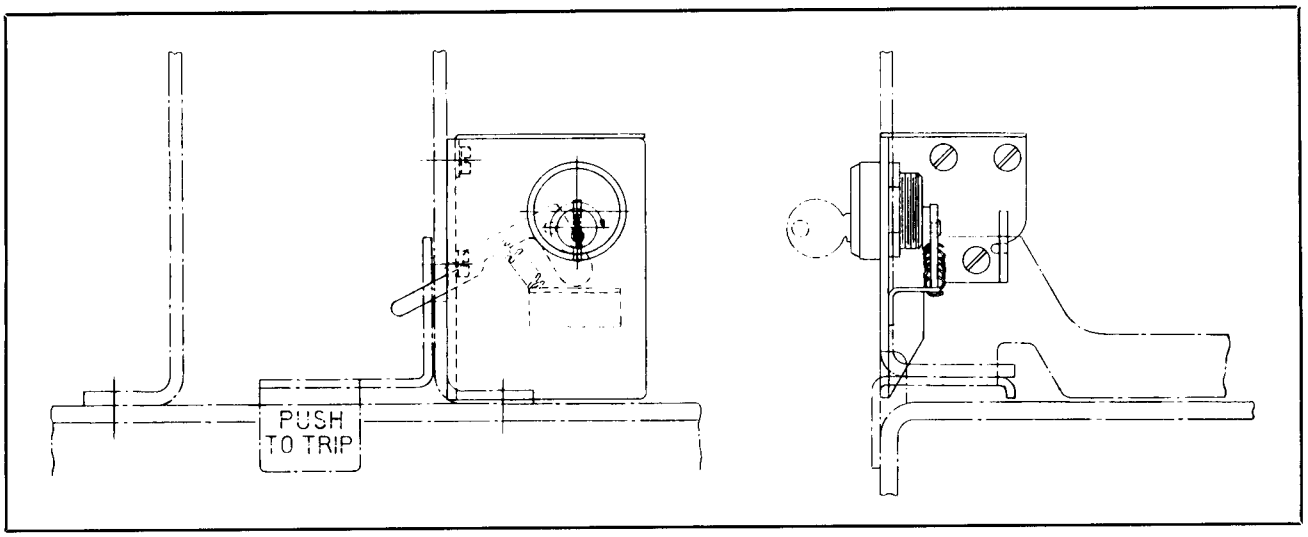


FIG. 18. Key Lock or Key Interlock Attachment—Construction Details

free breaker trip button. The key is also removed in this position.

Maintenance. The device is non-adjustable. Check for loose bolts only.

KEY INTERLOCK ATTACHMENT

The key interlock (Fig. 18) mounts on the right side of the operating mechanism frame. When the key interlock attachment is furnished, the key lock attachment cannot be supplied. With the key interlock attachment the key cannot be removed unless the breaker is locked in the open position.

Inspection. Push the trip button and turn key to the locked position. The key is then removable and the breaker is locked in the trip-free position. Replace the key and rotate to the unlocked position to free the breaker trip button. The key is not removable in this position.

Maintenance. The device is non-adjustable Check for loose bolts and nuts only.

RECTIFIER UNIT FOR A-C UNDERVOLTAGE AND A-C ELECTRIC LOCKOUT ATTACHMENTS

When an a-c undervoltage attachment or an a-c electric lockout attachment or both are required, a RECTOX unit is mounted underneath the breaker platform under the undervoltage device as shown in Fig. 19. An auto-transformer is provided in the unit so that the common voltages for 60 cycles and 25 cycles can be connected to the appropriate terminal on the unit. A terminal block is mounted on the rectifier unit to facilitate all wiring.

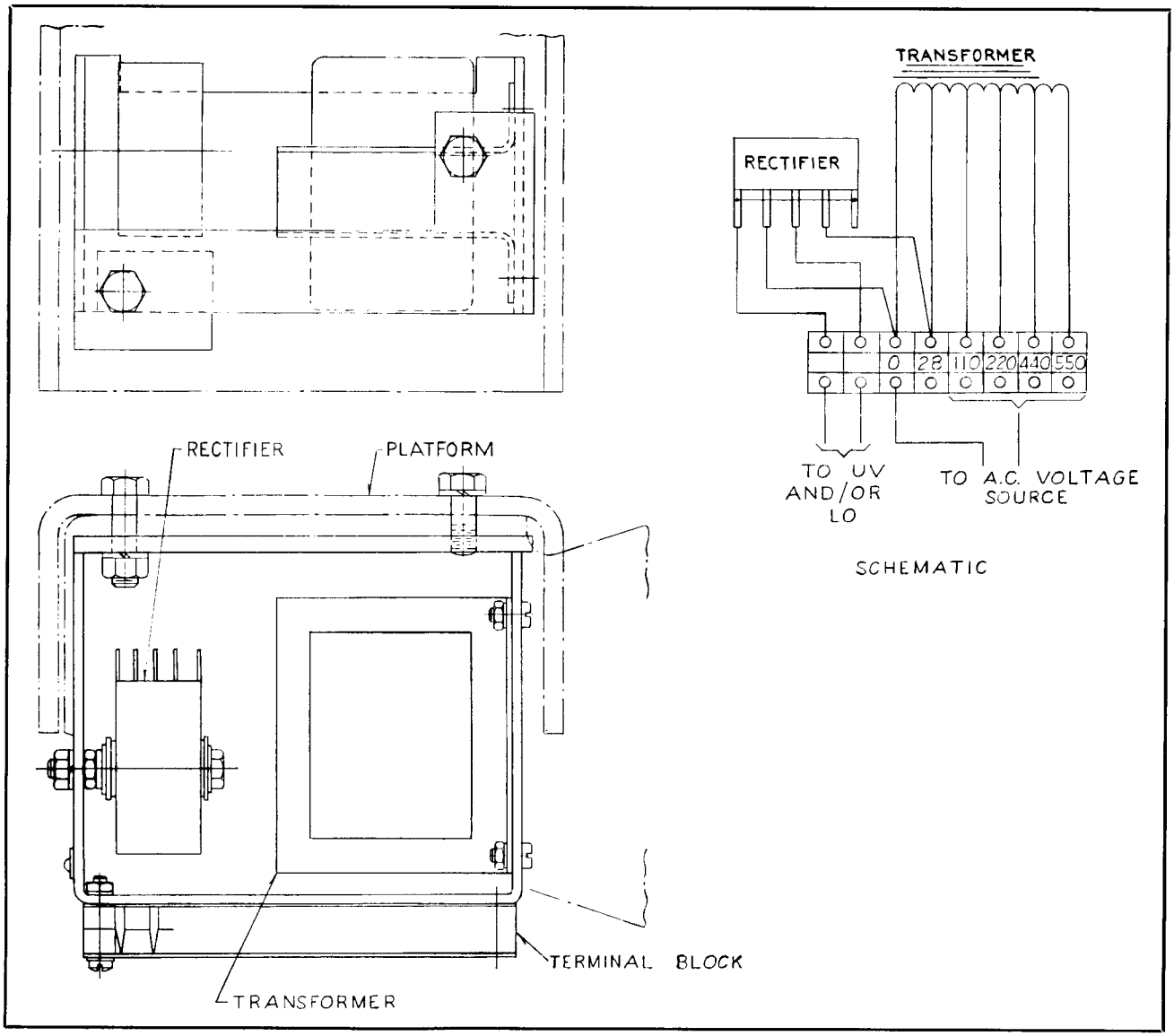


FIG. 19. Rectifier Unit for A-C Undervoltage and Electrical Lockout Attachments

Inspection. There are no moving parts. Make certain a-c incoming leads are connected to proper terminals.

Maintenance. Check for loose connections.

REVERSE CURRENT TRIP ATTACHMENT

To protect direct-current equipment from reverse currents, a reverse current trip attachment (Fig. 20) is installed in place of the center pole unit, making a two-pole breaker. This is a magnetic device influenced by two circuits. The first is the potential coil which magnetizes the armature and the second is the main current which magnetizes the frame. When current flows in the forward direction, armature movement is prevented by a stop. When the current reverses the armature rotates in the opposite direction and trips the breaker.

After tripping the reverse current, armature is reset by opening the potential coil circuit. For this reason the coil is always connected through an "a" contact of the auxiliary switch.

Calibration adjustment covers two ranges: 5 to 15 per cent or 10 to 25 per cent reverse current, based on normal current rating. Space is provided under the attachment for mounting switches for indicating lights or alarm devices.

Inspection. Close the breaker manually. Reach under platform and slowly move the armature toward the pole piece to trip the breaker. Armature

should move without friction and should have approximately 1/32 inch overtravel after tripping. Adjustment can be made by turning trip screw. With breaker in open position move armature toward pole. An audible "click" should be heard from the switch before armature reaches stop position. Adjustment can be made at lower trip screw.

Maintenance. Check for loose bolts of attachment as well as bolting of associated connectors. Check potential coil for open circuits and to ground.

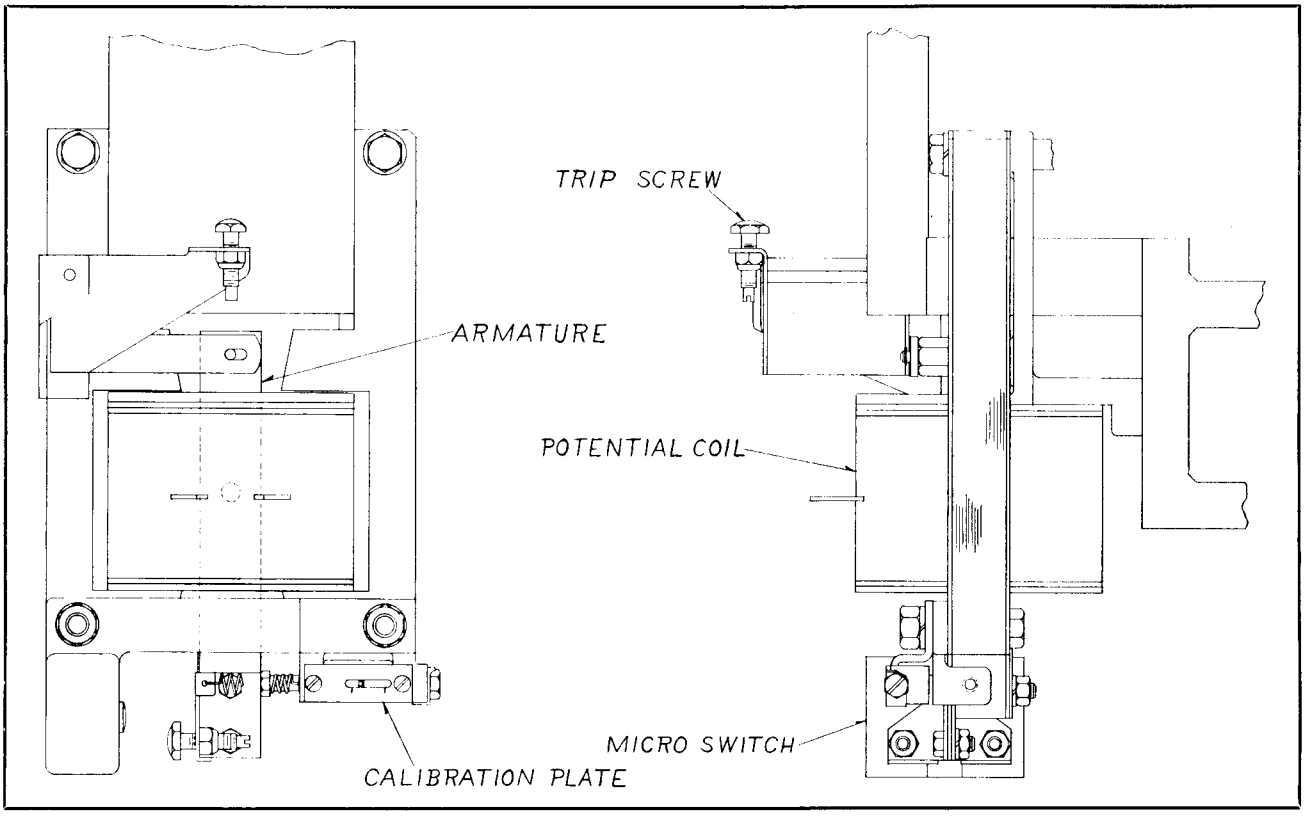


FIG. 20. Reverse Current Trip Attachment—Types "DB-75" and "DB-100" Air Circuit Breakers

FIELD DISCHARGE SWITCH

The DBF-40 breaker is a two-pole DB-100 breaker having special arc chutes and modified arcing contacts plus a field discharge switch mounted on the center pole (Fig. 21).

The field discharge switch is normally shipped with an overlap of approximately 1/32″ between the side pole contacts and the field discharge contact by following the adjustment steps shown in the figure.

Inspection. Remove the arc chutes, close the breaker manually to check for freedom of motion and to see that the field discharge adjustment is within 1/8″ open gap to 1/8″ overlap relative to the side poles.

Maintenance. Clean the contacts if necessary, check contact relationship and adjust if necessary. Check for loose bolts.

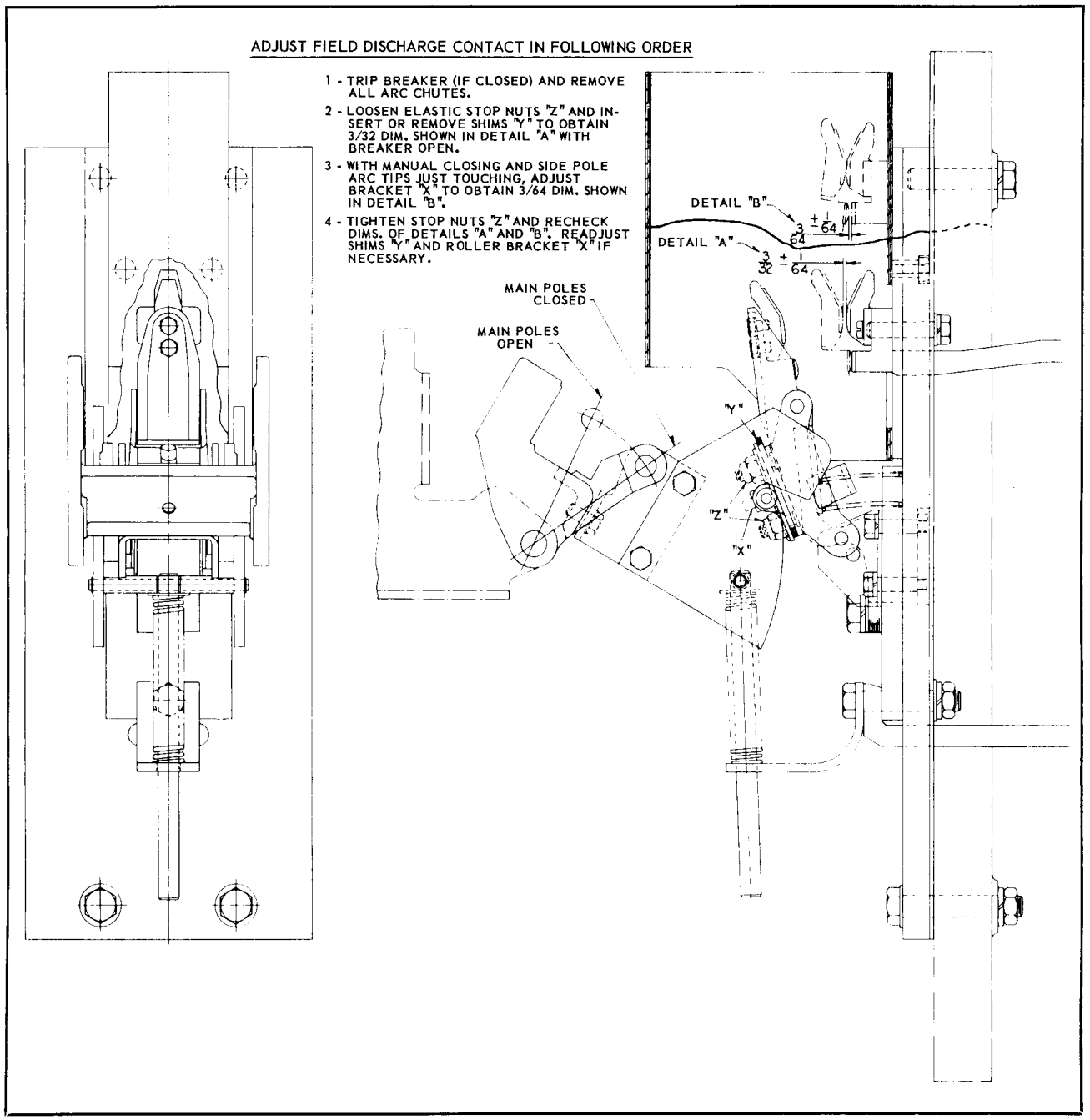


FIG. 21. Cross-Section View of Field Discharge Pole Unit

Recommended Spare Parts for DB-75 and DB-100 Air Breakers

NAME OF PART (ALWAYS GIVE BREAKER S. O. NUMBER)	STYLE NUMBER OR PREFERENCE	NUMBER PER BREAKER OF DEVICE	NUMBER RECOMMENDED For Breakers		
			1	2 to 5	6 up
AUXILIARY SWITCH	Fig. 15				
4 Pole Switch Unit	No. 187	1 or 2	..	1	2
Front Cover	No. 186	1	..	..	1
Contact Finger.....184	1397 624	8	..	4	8
Contact Segment.....185	1397 641	4	..	4	8
CONTROL RELAY	Fig. 11				
Operating Coil	No. 166	1	..	1	2
Blowout Coil and Circuit—L.P.	No. 161	1	..	1	2
Blowout Coil and Circuit—R.P.	No. 167	1	..	1	2
Moving Contact	No. 153	1	..	1	2
Stationary Contact	No. 160	2	..	2	4
Cover	No. 159	1	..	..	1
POLE UNIT	Fig. 3				
Stationary Arcing Contact	No. 417	3	3	6	12
Stationary Main Contact—Top	No. 420	12-DB75	..	12	24
	No. 420	15-DB100	..	15	30
Stationary Main Contact—Bottom	No. 421	12-DB75	..	12	24
	No. 421	15-DB100	..	15	30
Moving Arcing Contact	No. 416	3	3	6	12
Moving Main Contact	No. 401	3	..	1	3
ELECTRIC OPERATION					
Closing Coil	Fig 3. No. 409	1	..	1	2
Shunt Tripping Coil	Fig. 12. No. 300	1	..	1	2
Overcurrent Device Complete	Fig. 6	3	..	1	2
RETAINING RINGS—ASSORTMENT					
DB-75	497A346G04	1	1	2	3
DB-100	497A346G05	1	1	2	3

MEMORANDUM


WESTINGHOUSE
W