



RECEIVING • INSTALLATION • MAINTENANCE
INSTRUCTIONS

"De-ion"
AIR CIRCUIT BREAKERS
Types DB-15 and DB-25

600 Volts A-C

250 Volts D-C

Interrupting Rating

Type DB-15
15,000 Amperes

Type DB-25
25,000 Amperes

Rating of Series Coils

Type DB-15
(Amperes)
 15, 20, 25, 35, 50,
 70, 90, 100, 125,
 150, 175, 200, 225

Type DB-25
(Amperes)
 35, 50, 70, 90, 100, 125,
 150, 175, 200, 225, 250,
 300, 350, 400, 500, 600

WESTINGHOUSE ELECTRIC CORPORATION

SWITCHGEAR DIVISION

EAST PITTSBURGH PLANT
 NEW INFORMATION

EAST PITTSBURGH, PA.
 EFFECTIVE SEPTEMBER, 1949

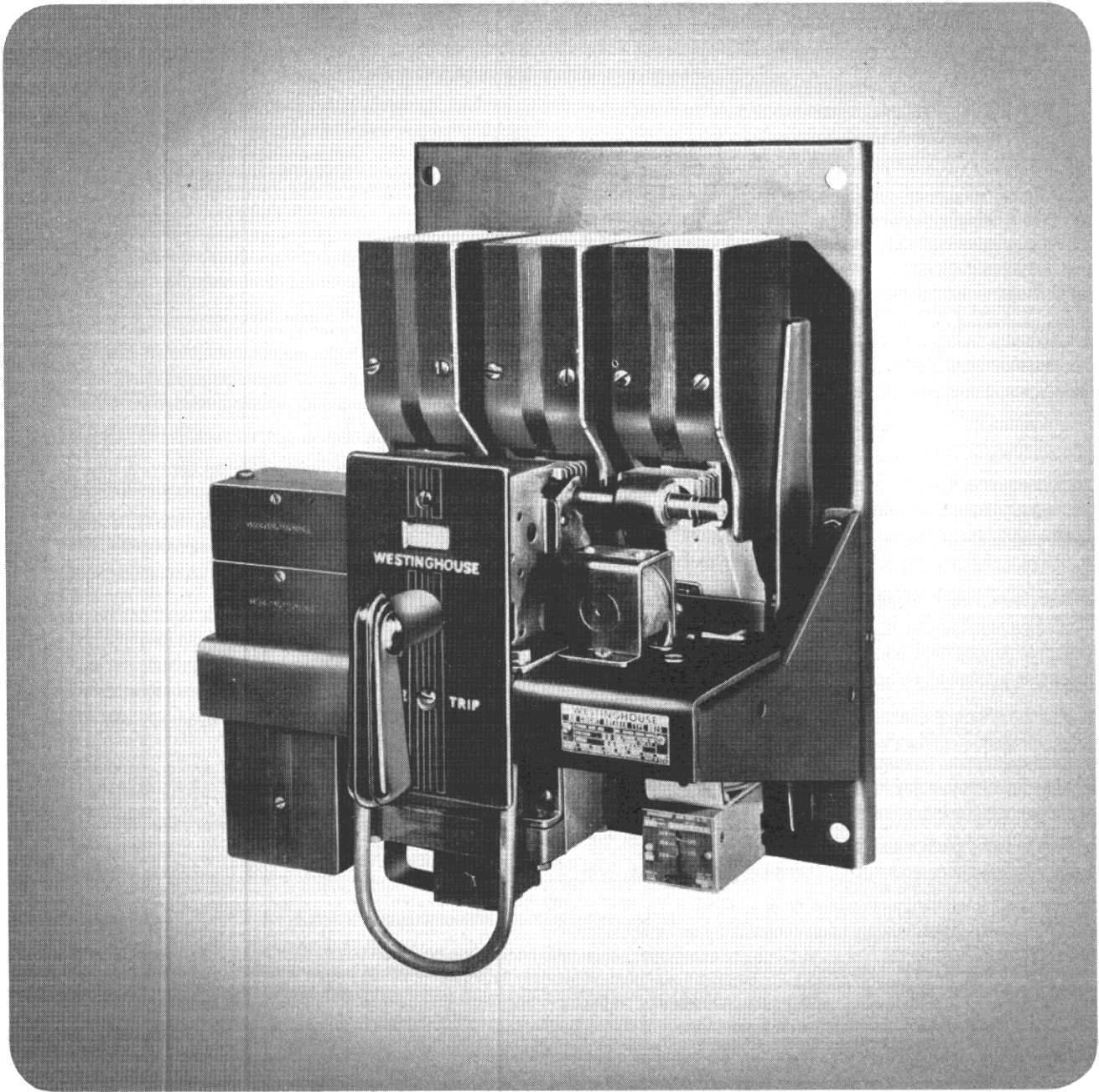
Printed in U.S.A.

TABLE OF CONTENTS

Part One	RECEIVING, HANDLING AND STORING	Page 7
Inspection		7
Storing		7
Part Two	INSTALLATION	Pages 8-12
Connections		8
Enclosures		8
Part Three	MAINTENANCE	Pages 13-28
Pole Unit		13
Contacts		13
Maintenance of Contacts		13
Operating Mechanism		13
Closing Solenoid		13
Overcurrent Tripping Device		15
Classification as to Time-Current Characteristics		15
Operation		16
Adjustment of Calibration Settings		18
Installation and Removal		18
Maintenance		18
Control Relay		19
Shunt Trip Attachment		20
Undervoltage Trip Attachment		20
Undervoltage Time Delay Attachment		22
Reverse Current Trip Attachment		22
Field Discharge Switch		25
Auxiliary Switch		25
Alarm Switch Attachment		26
Electric Lockout Attachment		26
Key Interlock Attachment		28

LIST OF ILLUSTRATIONS

Figure	Page
1 Type "DB" Air Circuit Breaker—Exploded View	6
2 DB-15 Outline Dimensions and Mounting Details	9
3 DB-25 Outline Dimensions and Mounting Details	10
4 Typical Wiring Diagrams—Type "DB" Circuit Breaker	11
5 Ventilated Enclosures—Outline Dimensions and Mounting Details	12
6 Cross-Sectional View of Type DB-25 Circuit Breaker	14
7 Overcurrent Tripping Device—Location	15
7A Overcurrent Tripping Device—Construction Details	15
8 Tripping Characteristics of DB-15 and DB-25 Overcurrent Tripping Devices with Long Time Delay and Instantaneous Elements	16
8A Time-Current Characteristics of DB-25 Circuit Breakers Equipped with Typical Overcurrent Tripping Devices for Motor Starting and Selective Operation	17
9 Control Relay—Location, Adjustment, and Construction Details	19
10 Shunt Trip Attachment—Location and Construction Details	20
11 Undervoltage Trip Attachment—Location and Construction Details	21
12 Undervoltage Time Delay Attachment—Location	22
12A Undervoltage Time Delay Attachment—Construction Details	22
13 Reverse Current Trip Attachment—Location	23
13A Reverse Current Trip Attachment—Construction Details	23
14 Field Discharge Switch—Location and Construction Details	24
15 Auxiliary Switch—Location	25
15A Auxiliary Switch—Construction Details	25
16 Alarm Switch Attachment—Location	26
16A Alarm Switch Attachment—Construction Details	26
17 Electric Lockout Attachment—Location and Construction Details	27
18 Key Interlock Attachment—Location and Construction Details	28



Westinghouse

TYPE "DB" AIR CIRCUIT BREAKER

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.

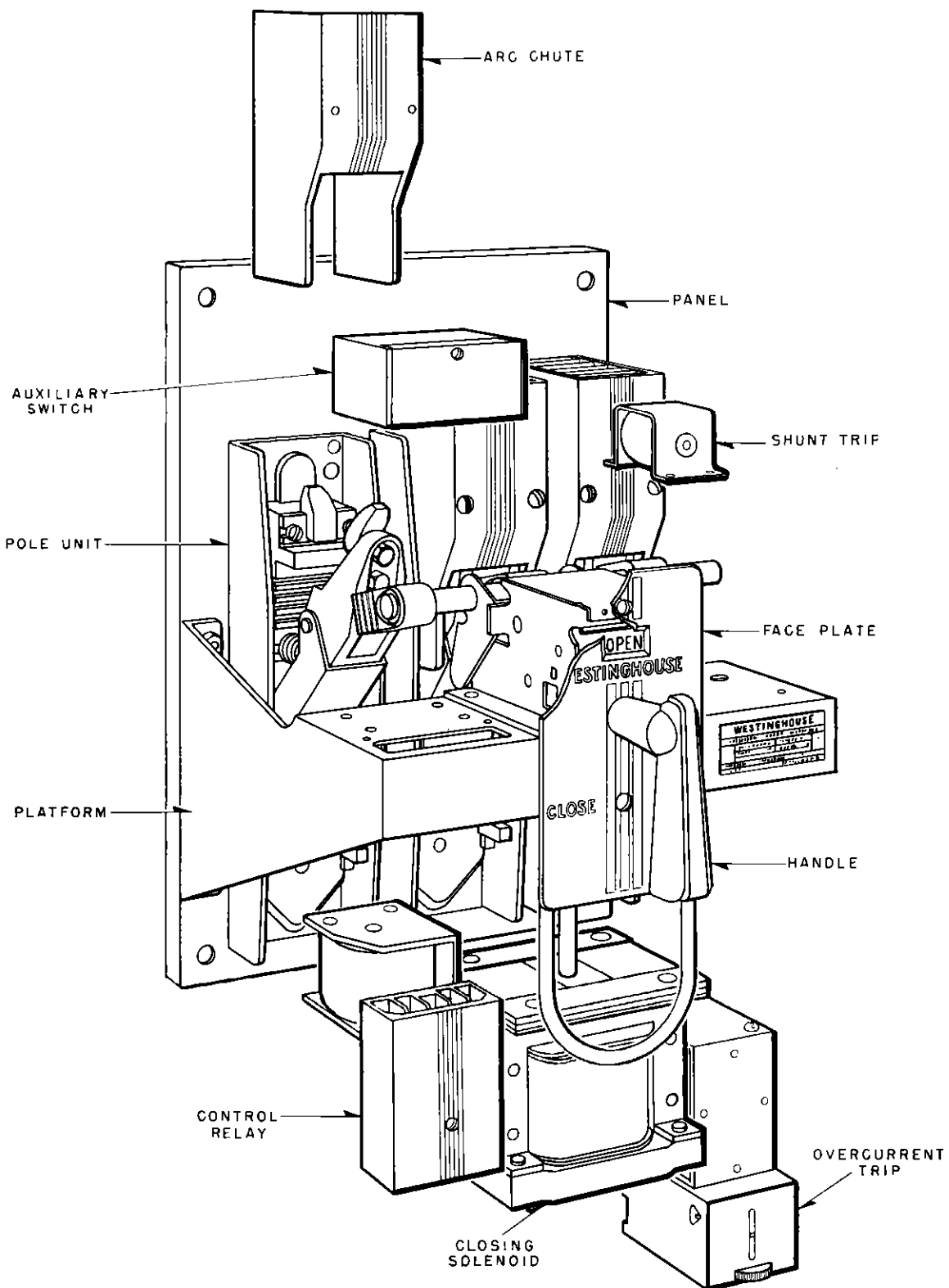


FIG. 1. Type "DB" Air Circuit Breaker—Exploded View

RECEIVING, HANDLING AND STORING

Type "DB" air circuit breakers, with all attachments mounted in place, are shipped in wooden crates or cardboard containers.

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

Net weights of Types DB-15 and DB-25 are given in Table No. 1 below.

Table No. 1. NET WEIGHTS

TYPE	DB-15		DB-25	
	2-Pole	3-Pole	2-Pole	3-Pole
Manual	60 lbs.	70 lbs.	80 lbs.	90 lbs.
Electric	75 lbs.	85 lbs.	100 lbs.	110 lbs.

Immediately upon receipt, examine the shipment for any loss or damage incurred during transit. 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.

INSPECTION

The "DB" breaker assembly consists of a coordinated group of sub-assemblies mounted on a steel supporting panel. (See Fig. 1). The complete breaker assembly is to be mounted with the steel 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. Raise and lower the trip bar by hand to make sure that it does not bind.
2. Rotate the manual operating handle slowly in a clockwise direction to move the contacts toward the closed position.

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

b. Make certain that the studs have not been forced out of alignment.

c. Be sure that the contacts are clean and properly aligned. For a description of contact alignment, refer to "Contacts", page 13.

3. If the contacts are in alignment and all parts move freely, continue the clockwise rotation until the breaker is latched.

4. Return the manual operating handle to the neutral position, then rotate counterclockwise to trip the breaker.

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

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

5. Check the attachments for operation in accordance with the appropriate instructions as given under "Maintenance", Part Three 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 location 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 that are apt to absorb moisture.

PART TWO

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 the installation is being made.

Mounting dimensions and details of front enclosure cutouts are shown in Figs. 2 and 3.

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

CONNECTIONS

Typical circuit breaker wiring diagrams are shown in Fig. 4. The connecting cables or bus bars should have adequate current-carrying capacity, otherwise, 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.

The circuit breaker studs and all connections should be clean, smooth, and free from burrs to assure full contact area. They should be firmly clamped or bolted in place to prevent excessive heating.

ENCLOSURES

The terminal panel and breaker arrangement shown in Fig. 5 apply specifically to ventilated enclosures. The same arrangement is used for all other enclosures (weatherproof, subway, and explosion-proof) except that the mounting dimensions

differ and should be obtained from the appropriate outline drawing.

The following procedure applies to all enclosures:

1. Connect the entrance cables first. Whenever possible, the power cables should be connected to the top terminals to remove voltage from the over-current attachments when the breaker is open. The cables can be connected to the nearest terminal, or to the opposite terminal as shown in Fig. 5. Tin the ends of the cable to prevent the formation of copper oxide. Tighten the clamp bolt securely and lock with the lock nut.

2. Control wires should run along the left side of the enclosure below the rail. Connect to the terminal block or auxiliary switch by running between the breaker platform and the rail in front of the wheel, after the breaker is bolted in place. When removing the breaker, disconnect the control wiring from the terminal block or auxiliary switch and lay in the bottom of the enclosure, out of the way of the breaker.

3. Roll the breaker into the enclosure until the four mounting bolts engage the mounting brackets. The mounting bolts are used as jacks to pry the finger clusters into engagement with the terminals, and consequently each bolt should be tightened $\frac{1}{4}$ inch in succession until the breaker panel is tight against the mounting brackets. The same procedure should be followed in removing the breaker, i.e., remove each bolt $\frac{1}{4}$ inch in succession until they drop free.

4. Always rotate the operating handle to the tripped position before removing the front cover. A trip rod (not shown in Fig. 5) holds the breaker trip free when the front cover is off. When operating the breaker in the test position (front wheels engaging the slot in the rail), it is unnecessary to hold this rod in manually to secure closure of the breaker. When fastening the cover in place, draw the four cover bolts down firmly. Compression springs prevent loosening of these bolts.

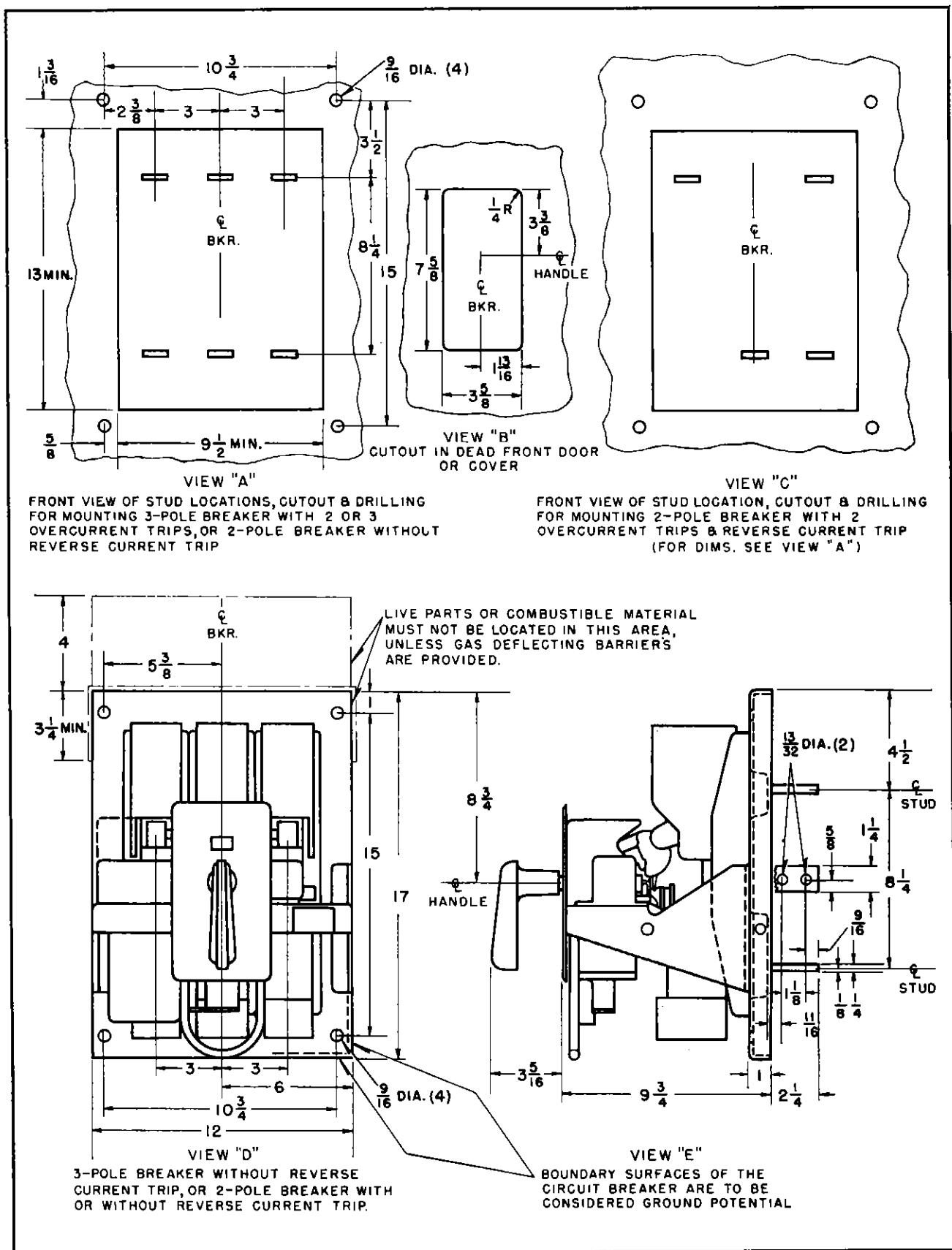


FIG. 2. DB-15 Outline Dimensions and Mounting Details

INSTALLATION.

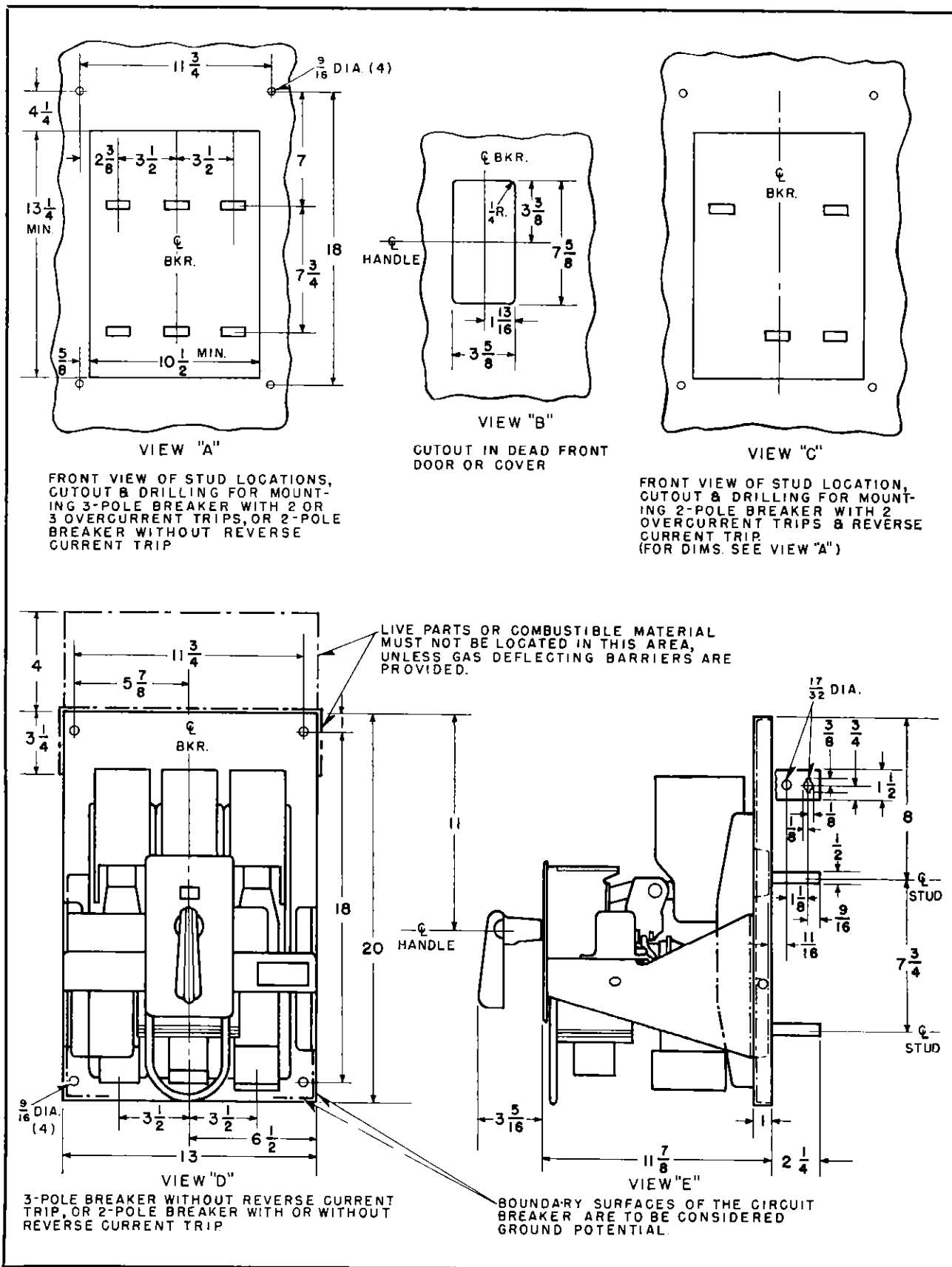
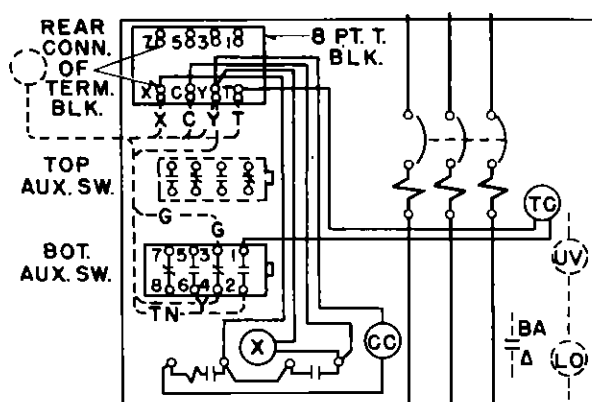


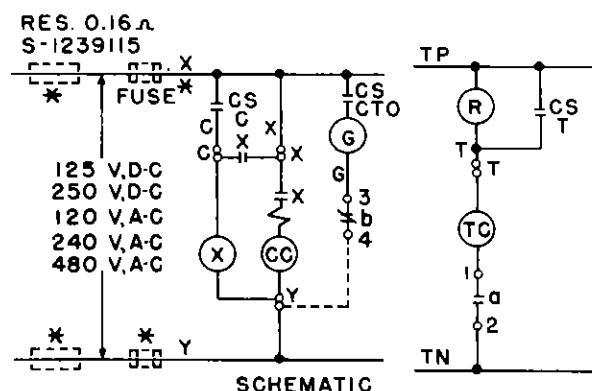
FIG. 3. DB-25 Outline Dimensions and Mounting Details



WIRING DIAGRAM (F.V.) FIXED PANEL

OPERATION SEQUENCE

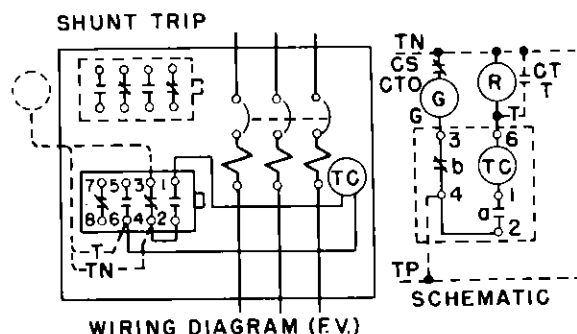
1. CONTROL SW. CS-C CLOSED.
2. "X" RELAY PICKS UP & SEALS IN THRU AUX. CONTACT "X".
3. CLOSING COIL ENERGIZED THRU "X" CONTACT CLOSING BREAKER.
4. IN CLOSING BKR. CLOSING MECH. MECHANICALLY TRIPS "X" CONTACTS FREE OF "X" COIL, INTERRUPTING CLOSING CIRCUITS.
5. WITH BKR. IN CLOSED POSITION, THE BKR. CLOSING MECH. IS LATCHED UP AND "X" CONTACTS REMAIN TRIP FREE FROM "X" COIL.
6. WHEN BKR. IS TRIPPED, CLOSING MECH. DROPS, PERMITTING "X" CONTACTS TO RESET PROVIDED "X" COIL IS DEENERGIZED.



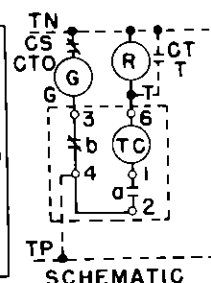
SCHEMATIC

LEGEND

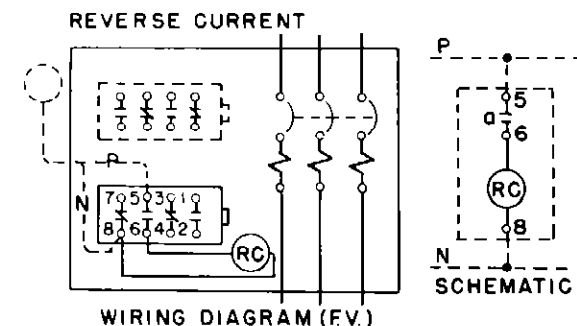
- | | |
|---------------------|---|
| X-CONTROL RELAY | Δ-ALARM CONTACT DOES NOT CLOSE WHEN BREAKER IS TRIPPED MANUALLY OR BY THE SHUNT TRIP |
| CC-CLOSING COIL | |
| TC-TRIP COIL | |
| CS-CONTROL SWITCH | |
| R-RED LAMP (CLOSED) | |
| G-GREEN LAMP (OPEN) | |
| UV-UNDERVOLTAGE | *-CURRENT LIMITING RESISTORS & FUSES TO BE USED ONLY WHEN A-C CONTROL SOURCE IS FROM SWGR. BUS. |
| LO-LOCKOUT | |
| BA-ALARM SWITCH | |
| a-MAKE CONTACT | |
| b-BREAK CONTACT | |



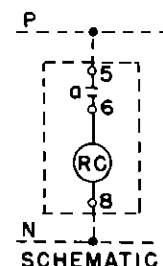
WIRING DIAGRAM (F.V.)



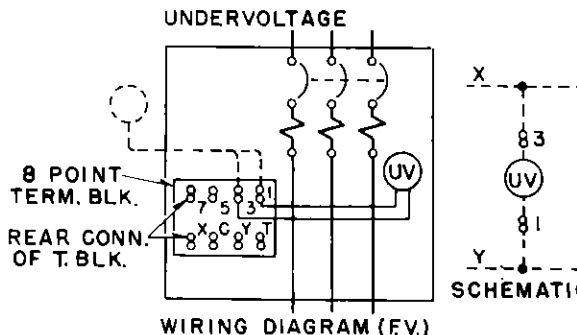
SCHEMATIC



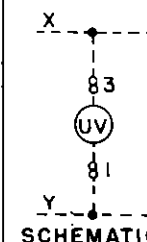
WIRING DIAGRAM (F.V.)



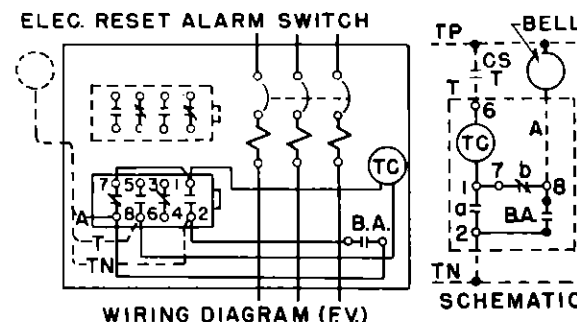
SCHEMATIC



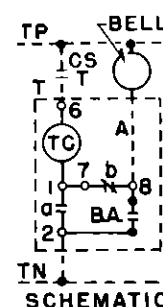
WIRING DIAGRAM (F.V.)



SCHEMATIC



WIRING DIAGRAM (F.V.)



SCHEMATIC

FIG. 4. Typical Wiring Diagrams—Type "DB" Circuit Breaker

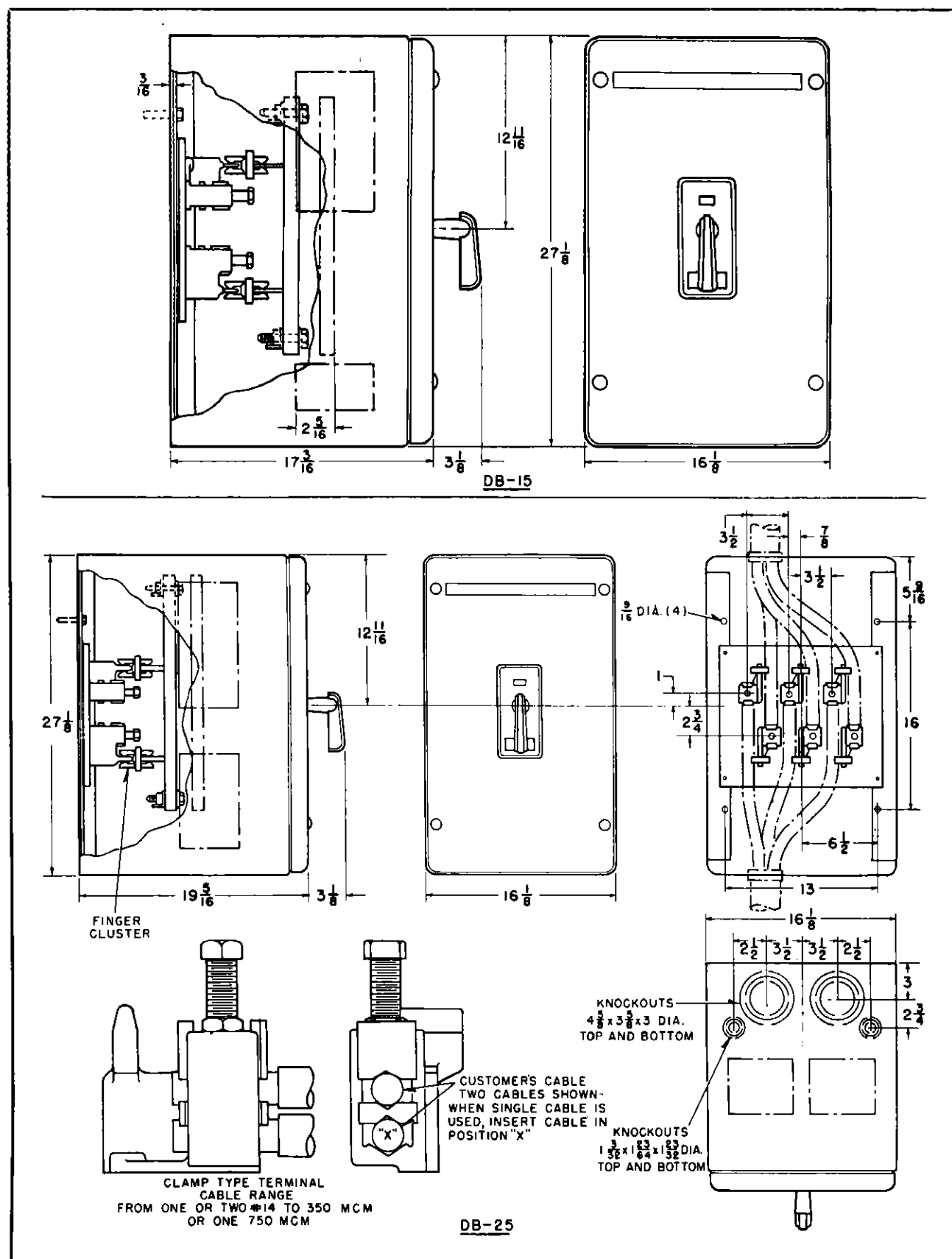


FIG. 5. Ventilated Enclosures—Outline Dimensions and Mounting Details

MAINTENANCE

POLE UNIT

Each pole unit is mounted on a separate molded base through which the breaker studs pass. (See Fig. 6). The molded bases are attached to the steel mounting panel and provide insulation for the breaker studs.

The upper stud and contact are attached to the molded base by one bolt. The moving contact is pivoted on the molded base and attached to the cross bar through insulating links. The series coil and lower stud are fastened to the molded base by three bolts.

Contacts. (See Fig. 6). The DB-25 arcing contacts should touch first on closing, open last on opening, and have approximately a $\frac{3}{32}$ -inch gap when the breaker is completely closed. This gap is adjusted by removing the cross bar and screwing the insulating link in or out on the stud. Be sure to tighten the lock nuts after each adjustment.

The DB-15 contacts are adjusted to obtain $\frac{1}{4}$ -inch horizontal travel of the cross bar after the contacts first touch. As the contacts burn away it will be necessary to adjust as described above for the DB-25.

Do not over-adjust as this will cause the opening spring to compress to the solid position and thus increase the closing effort. Check for over-adjustment by manually pulling the moving contact away from the stationary contact, with the breaker in the closed position. It should be possible to obtain at least $\frac{1}{8}$ -inch gap between contacts.

Maintenance of Contacts. Rough or high spots should be removed with a file or sandpaper. To replace the arcing contacts, open the breaker, remove the arc chutes and then the stationary arcing contacts. Close the breaker and remove the moving arcing contacts. The new contacts can then be added in the reverse order.

Caution: All power should be removed when changing, maintaining or adjusting contacts.

OPERATING MECHANISM

The operating mechanism (see Fig. 6) is non-adjustable and consists of a series of stainless steel links designed to secure low closing and tripping forces. To check for friction, raise the trip bar and slowly rotate the manual operating handle in close and trip direction. The linkage should follow the handle without sticking.

A small quantity of oil is placed on the handle shaft, the roller lever roller, and the latch plate at the factory. The tripping load should not exceed 14 ounces measured at the trip screw.

CLOSING SOLENOID

The closing solenoid (see Fig. 6) is non-adjustable. It is designed for intermittent duty only. Check for loose bolts.

The minimum permissible control voltages at the terminal of the closing coil, and the closing currents at normal voltage are listed in Table No. 2 below.

Table No. 2. CLOSING SOLENOID CONTROL VOLTAGES AND CLOSING CURRENTS

NOMINAL VOLTAGE	MINIMUM VOLTAGE AT COIL TERMINALS		*CLOSING CURRENT IN AMPERES AT NOMINAL VOLTAGE FOR 3-POLE BREAKERS		
	Close	Trip	DB-15 Close	DB-25 Close	DB-15 and DB-25 Trip
12 V, D-C	...	7	18
24 V, D-C	...	14	9.5
48 V, D-C	...	28	5
125 V, D-C	90	70	20	30	2
250 V, D-C	180	140	10	15	1
110 V, 60 Cy	90	90	60	70	1
220 V, 60 Cy	180	180	30	35	.5
440 V, 60 Cy	360	360	15	20	.2

*NOTE: For A-C closing use 3-kva source or larger; for 2-pole breakers use a multiplier of .6

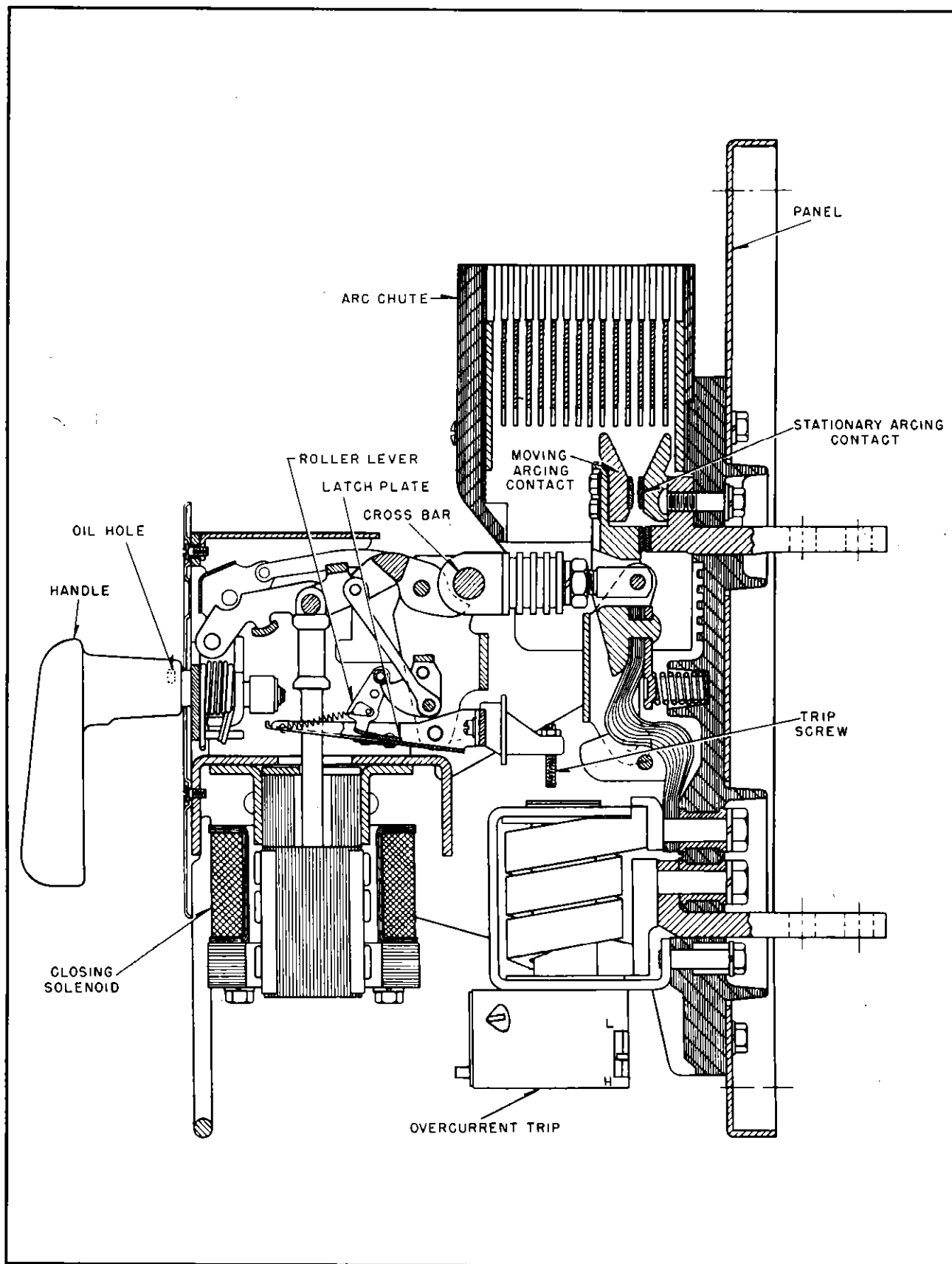


FIG. 6. Cross-Sectional View of Type DB-25 Circuit Breaker

OVERCURRENT TRIPPING DEVICE

The overcurrent tripping devices of the various ampere ratings are of the same general construction and size. (See Figs. 7 and 7A). These tripping devices are made in ratings ranging from 15 to 600

amperes. Tripping devices of any of these ratings can be applied to the DB-25 circuit breaker while tripping devices of ampere ratings up to a maximum of 225 amperes can be applied to the DB-15 circuit breaker.

The overcurrent tripping devices can easily be removed from the breaker and replaced with another unit of different rating or of the same rating without danger of the calibrations changing.

Classification as to Time-Current Characteristics. The overcurrent tripping devices have time delay or instantaneous elements or both for the purpose of tripping the breaker in a predetermined time when overloads or short circuits occur. These tripping devices have trip elements of one of the combinations listed below:

1. *Standard Device.* Long time delay and instantaneous elements as per Fig. 8 with adjustable pick-up for both elements.

2. *Selective Devices.* Long time delay and short time delay elements with adjustable long time delay pick-up. Curves B, C and D of Fig. 8A show typical curves of these devices. The short time delay pick-up must be selected in advance to meet the requirements of the application.

3. *Special Device.* Adjustable instantaneous element only.

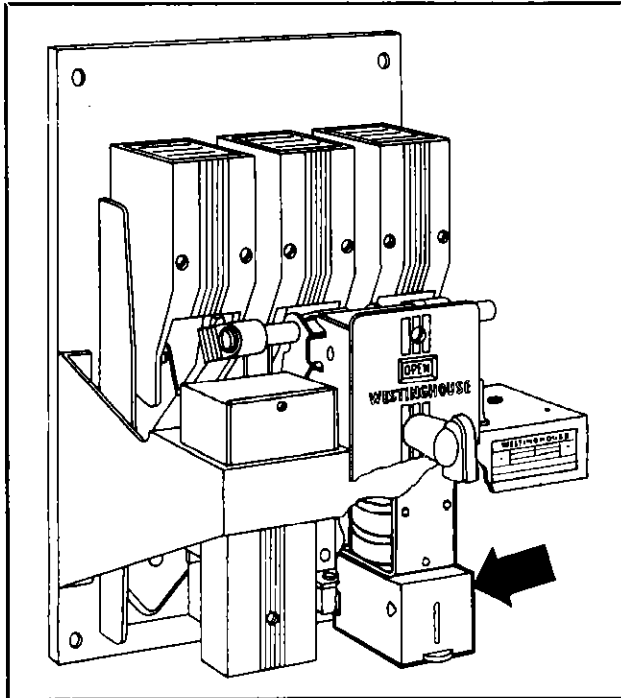


FIG. 7. Overcurrent Tripping Device—Location

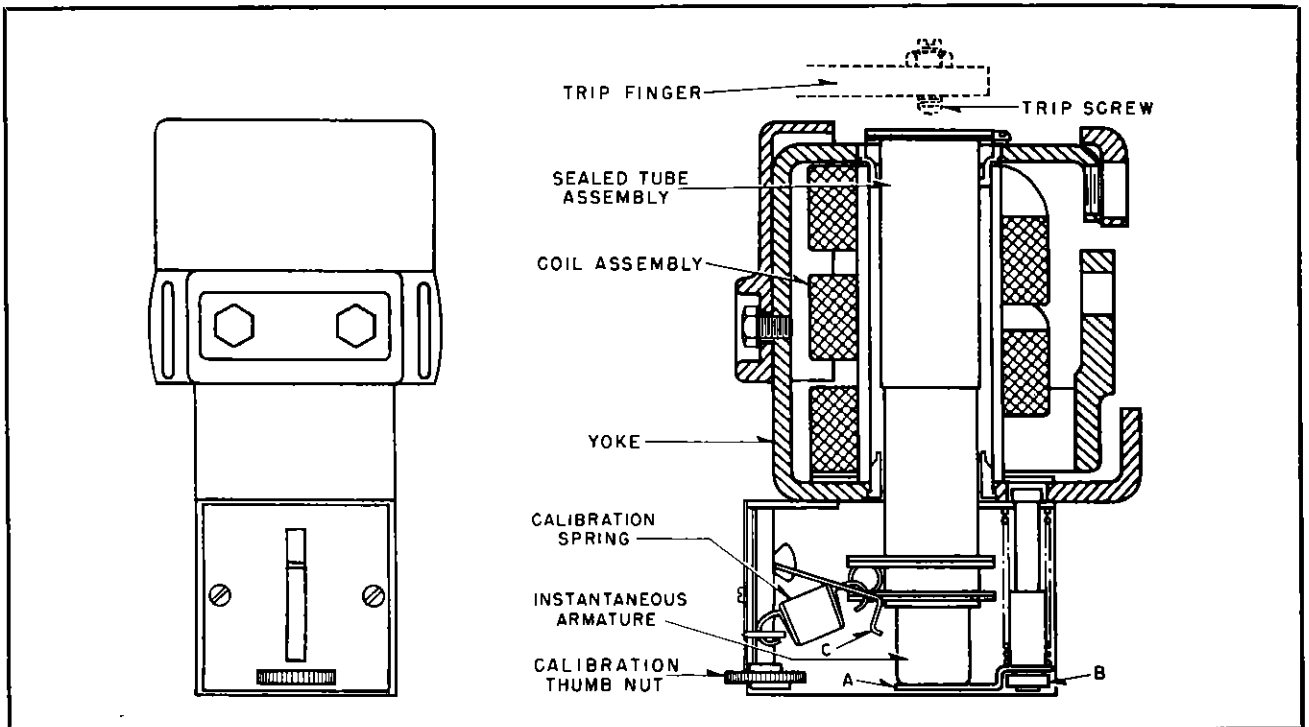


FIG. 7A. Overcurrent Tripping Device—Construction Details

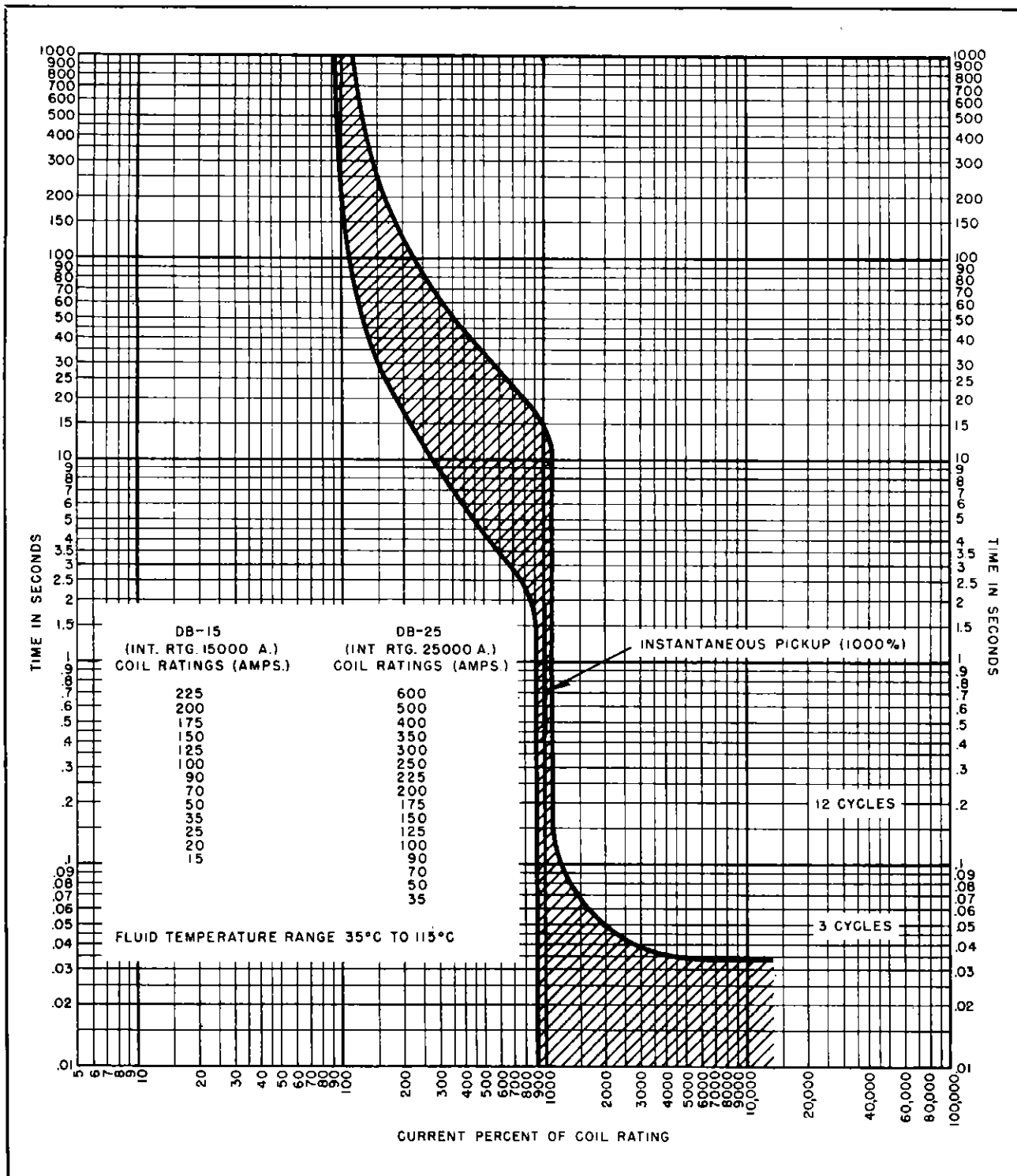


FIG. 8. Tripping Characteristics of DB-15 and DB-25 Overcurrent Tripping Devices with Long Time Delay and Instantaneous Elements

Operation. The long time delay is obtained by positive displacement of a fluid in a hermetically sealed tube through a timing stem located in the upper magnetic core. Attraction between the upper and lower cores provides the pressure on the fluid

which causes the displacement, and raises the tube.

The instantaneous armature provides for instantaneous tripping of the breaker irrespective of any action within the sealed tube. On currents above the prescribed value, the instantaneous armature is

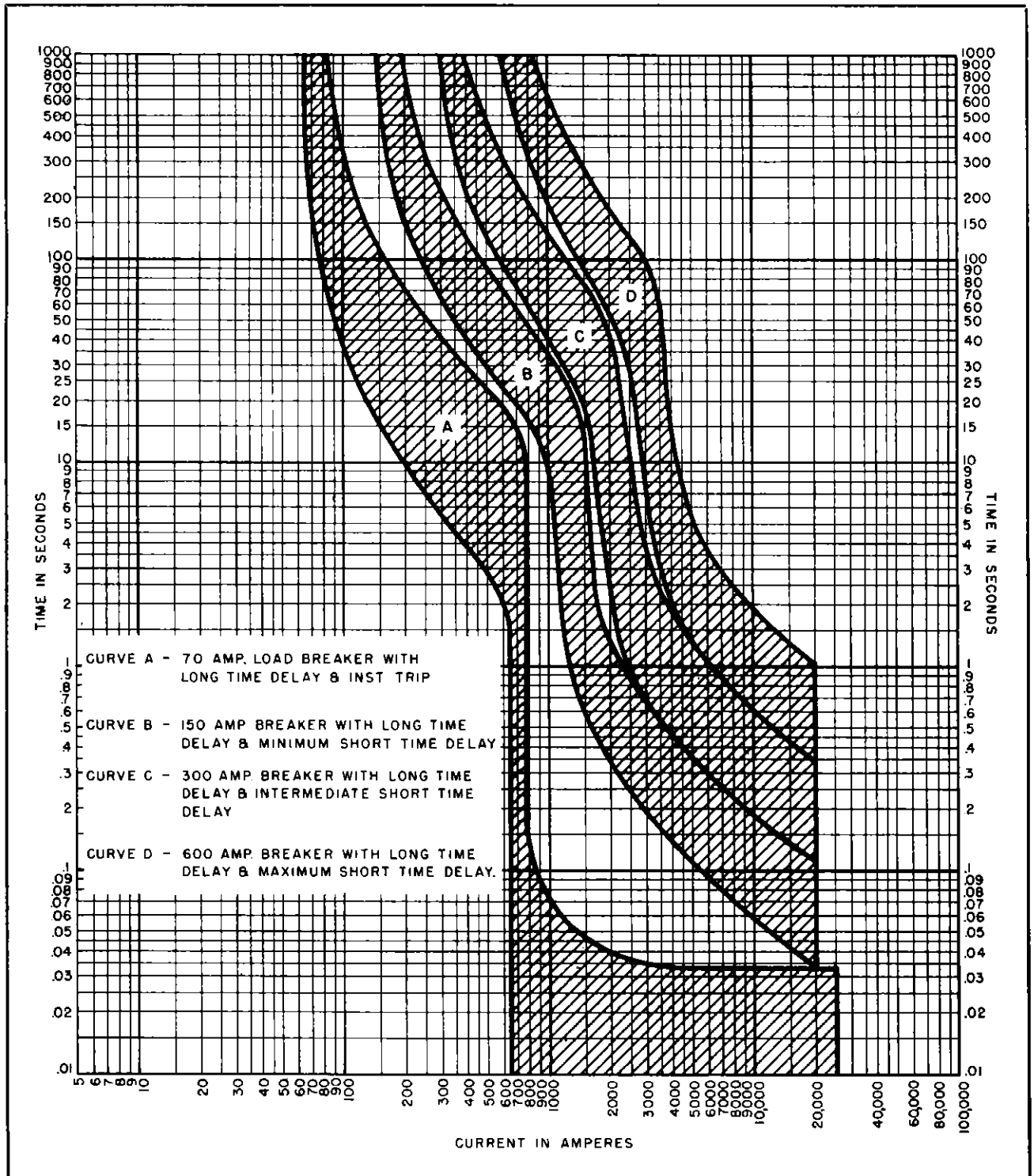


FIG. 8A. Time-current Characteristics of DB-25 Circuit Breakers Equipped with Typical Overcurrent Tripping Devices for Motor Starting and Selective Operation

picked up by flux inside of the lower core after it has saturated and bodily raises the sealed tube which trips the breaker.

The short time delay is obtained by the use of a pressure-operated by-pass valve in the timing stem.

Otherwise, the construction and operation of the tripping device embodying this delay is the same as described above for the device with the long time delay.

After the breaker has been tripped with time

delay, the internal parts of the sealed tube take from one half to one minute to reset. The breaker can then be closed and the tripping device will give the required time delay. If the breaker is closed on load current before the parts of the sealed tube are reset, the breaker may trip out instantly.

Adjustment of Calibration Settings.

1. Long Time Delay Element. As a safety measure, the breaker should be disconnected from the circuit before making any adjustment.

The calibration settings of the long time delay element are marked on the nameplate located on the lower front of the trip unit. The settings are in amperes and are equivalent to 80, 100, 120, 140 and 160 percent of the coil rating. To increase the calibration setting, turn the adjustable wheel at the lower end of the nameplate counterclockwise. To decrease the setting, turn the wheel clockwise. The long time delay calibration marker should not be adjusted to less than 80 percent setting or greater than 160 percent setting, otherwise, incorrect operation of the tripping device may occur.

2. Instantaneous Trip Element. The calibration setting in amperes for the instantaneous trip element is located on the lower right side of the tripping device. Standard tripping devices have a single calibration setting at 1000 percent of the coil rating.

The calibration setting can be adjusted by lifting the support plate (A, Fig. 7A) and turning nut (B, Fig. 7A) clockwise to lower the setting, and counterclockwise to raise the setting. The calibration setting must not be adjusted to less than 500 percent setting or greater than 1500 percent setting. The 500 percent setting is approximately $\frac{1}{4}$ inch above the 1000 percent setting and the 1500 percent setting is approximately $\frac{3}{32}$ inch below the 1000 percent setting.

Installation and Removal. To install an overcurrent tripping device, first make sure the lower end of the flexible conductor is in the recessed pocket of the molded base directly above the lower breaker stud. Then place the trip unit so that the top terminal of the tripping device is over the flexi-

ble conductor and the lower tripping device terminal is over the lower breaker stud. Insert the three bolts into the rear of the base and thread them tightly into the terminals and yoke of the tripping device. The two top bolts for mounting the tripping device to a DB-15 breaker are standard $\frac{1}{2}$ -inch hexagon head steel bolts $1\frac{1}{4}$ inches long and the lower bolt is a standard $\frac{3}{8}$ -inch hexagon head steel bolt $\frac{3}{4}$ inch long. The bolts for the DB-25 breaker are of the same size except the two top bolts are 2 inches long and the lower bolt is $1\frac{1}{2}$ inches long. Use one lock washer only, under the head of each of these bolts. Care should be taken to make sure that bolts longer than called for above are not used, otherwise, the ends of the bolts may jam against the coil and short circuit some of the turns.

The trip screw mounted on the trip finger above the sealed tube (see Fig. 7A) should be adjusted after mounting the tripping device so there is approximately a $\frac{3}{8}$ -inch space between the tube and the screw. Then check for overtravel of the tube by pushing upward on lever (C, Fig. 7A) to raise the tube and trip the breaker. The tube should overtravel approximately $\frac{1}{32}$ inch after the breaker has tripped. Turn the trip screw if necessary to obtain the overtravel.

To remove an overcurrent tripping device from the breaker, remove the three bolts which hold the tripping device to the breaker base. Before removing the last bolt, hold the tripping device to prevent it from falling.

Maintenance. The sealed tube (see Fig. 7A) should move upward freely on overload without undue friction and after it has tripped the breaker, it should immediately drop until the flange resets against the magnetic frame.

To maintain, push upward on the calibration lever (C, Fig. 7A) as indicated by the arrow, to raise the tube. The tube should go up freely except for the force exerted by the calibration springs and it should drop when released. If the tube does not move freely, add graphite or preferably molybdenum bisulphide to the surface of the tube which is exposed when the tube is raised.

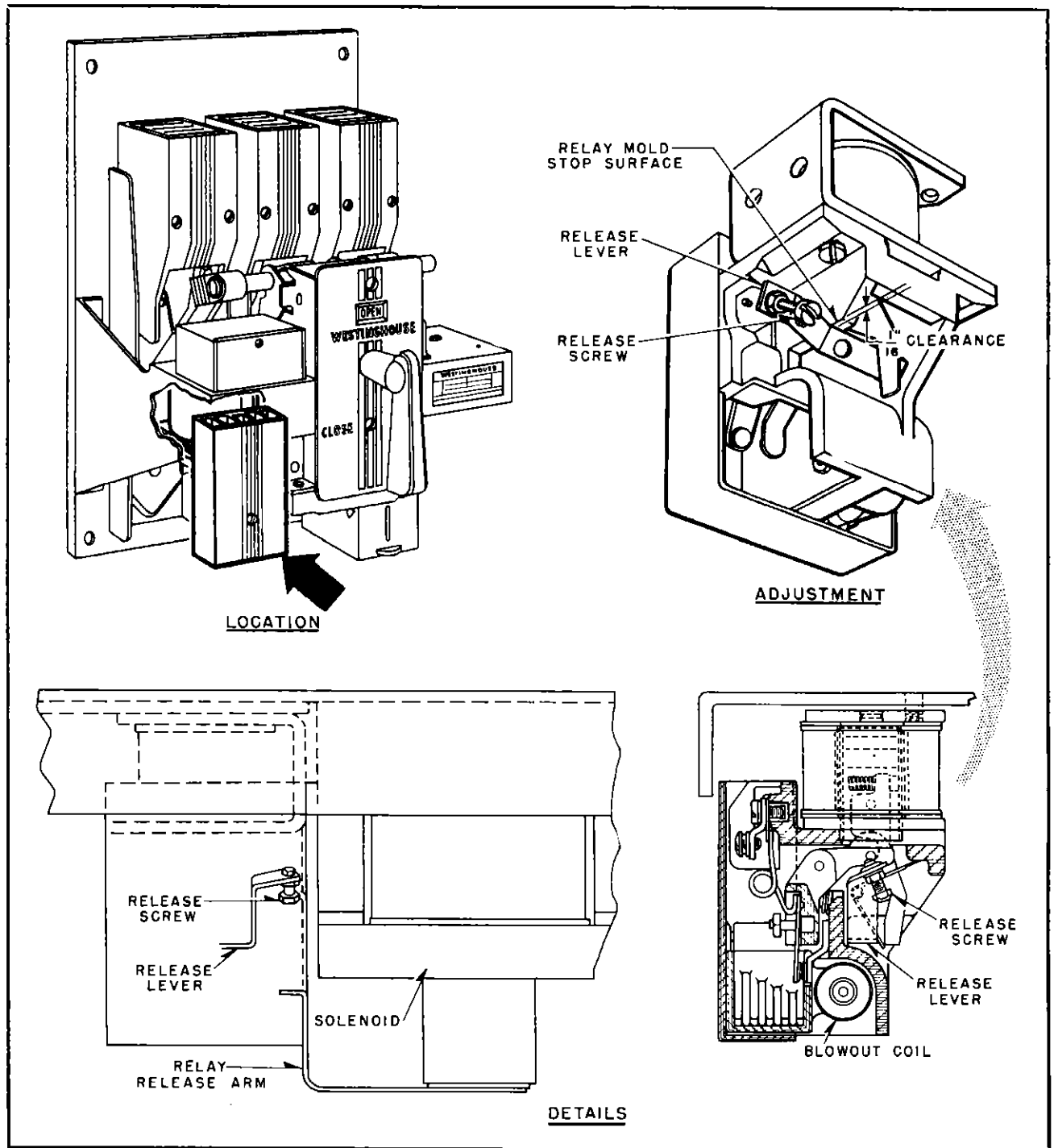


FIG. 9. Control Relay—Location, Adjustment, and Construction Details

CONTROL RELAY

The control relay mounts directly under the auxiliary switch (see Fig. 9). It is a single-coil, mechanically-tripped device with the coil suitable for continuous energization. The operation sequence is outlined in Fig. 4, page 11. The contacts should

normally last the life of the breaker, but are replaceable if found necessary.

The release screw (see Fig. 9) should be maintained in adjustment to release the relay contacts when the release lever is approximately $\frac{1}{16}$ inch from its stop surface on the relay mold, with the breaker closed.

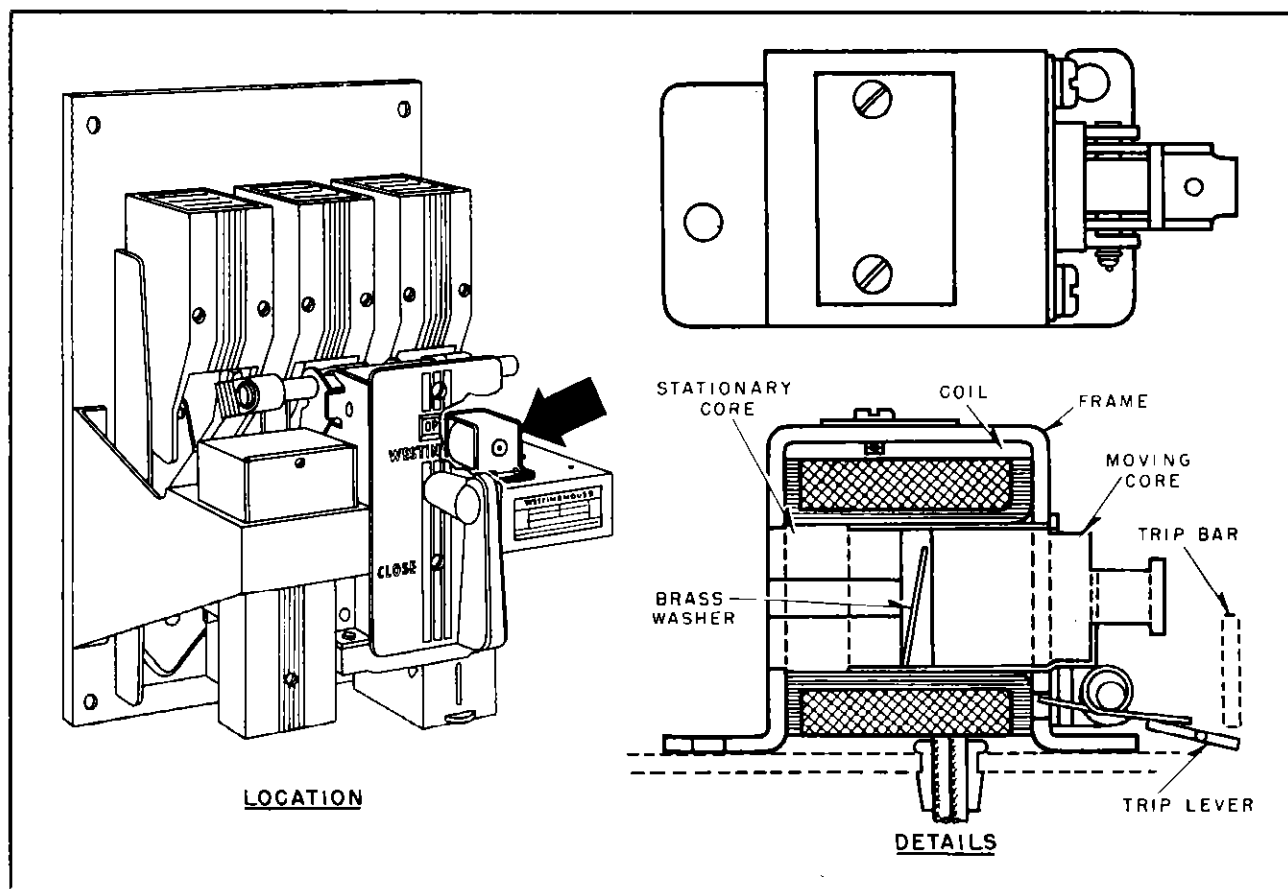


FIG. 10. Shunt Trip Attachment—Location and Construction Details

SHUNT TRIP ATTACHMENT

The shunt trip mounts on top of the platform immediately to the right of the operating mechanism. (See Fig. 10).

It is non-adjustable and is intended for intermittent duty only. The shunt trip circuit must always be opened by an auxiliary switch contact. Tripping currents are tabulated in Table No. 2, page 13.

Inspection. With the breaker in the open position, manually push the moving core against the stationary core and rotate the breaker handle to the closed position. The breaker should be trip free.

The trip lever of the shunt trip should have approximately a $\frac{1}{16}$ -inch clearance to the trip bar.

Maintenance. Check for loose bolts and faulty coils.

UNDERVOLTAGE TRIP ATTACHMENT

The undervoltage trip mounts on top of the platform, to the right of the shunt trip. (See Fig. 11). Its function is to trip the breaker when the voltage falls to between 30 to 60 percent of normal. Turning the reset lever screw inward reduces the reset lever

spring load and consequently raises the drop-out voltage. Turning the screw out lowers the drop-out voltage.

The moving core is normally held magnetically against the stationary core to hold the Micarta 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, a pin pushes against the latch to release it from its latch plate. When the latch releases, the trip spring rotates the trip lever counterclockwise to trip the breaker. The linkage is reset by the cross bar as the breaker opens. Fig. 11 shows the cross bar in the open position of the breaker.

Always connect the coil to the line side of the breaker unless the attachment is equipped with a 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.

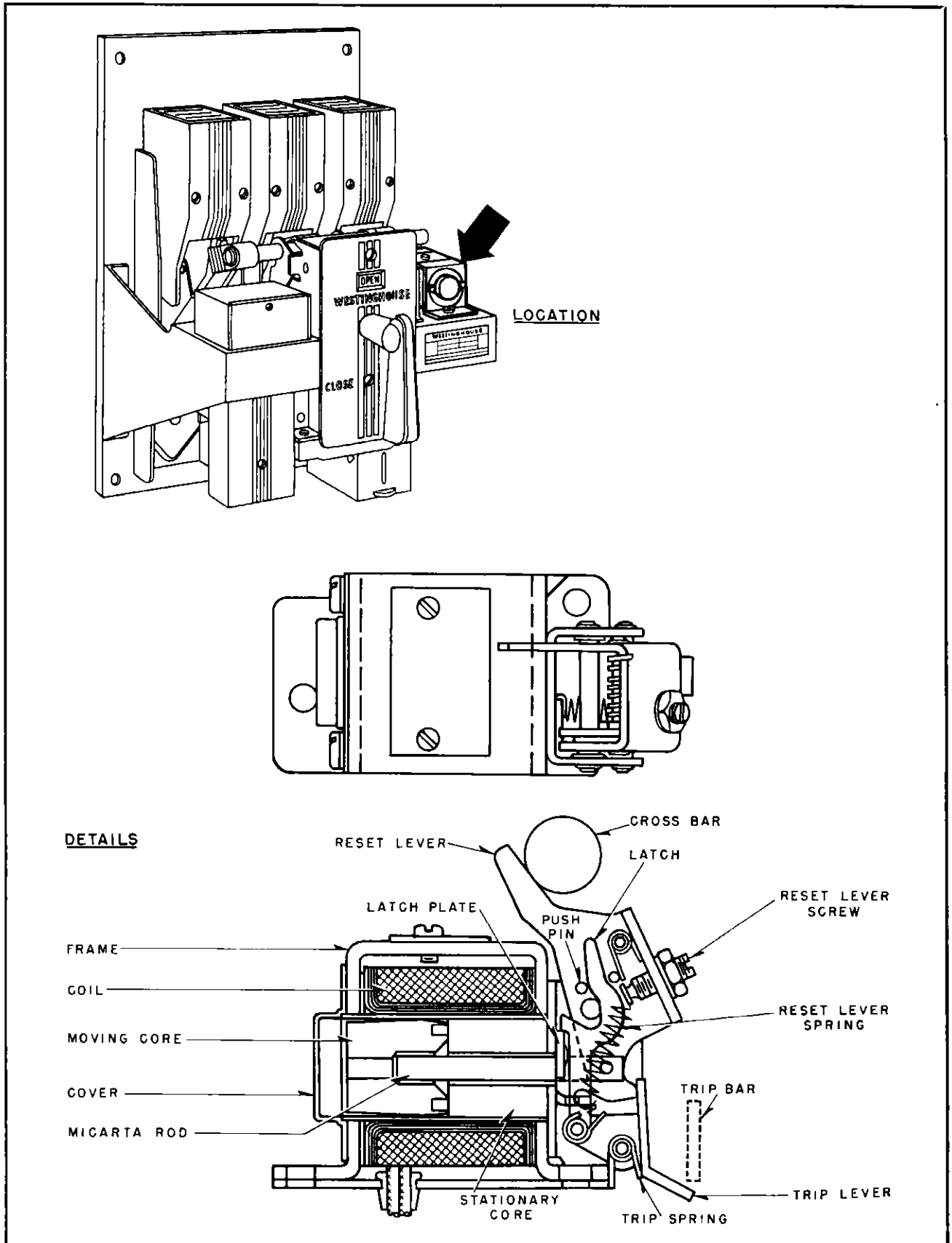


FIG. 11. Undervoltage Trip Attachment—Location and Construction Details

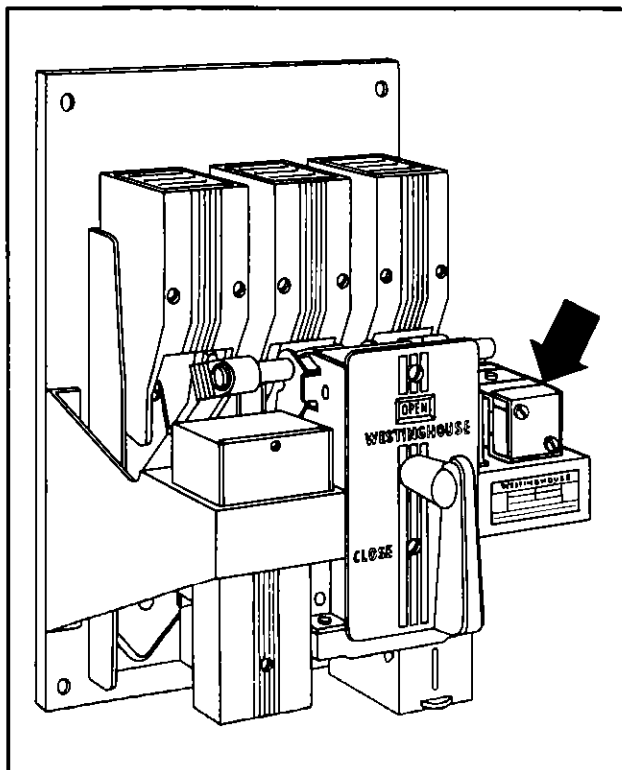


FIG. 12. Undervoltage Time Delay Attachment—Location

UNDERVOLTAGE TIME DELAY ATTACHMENT

The undervoltage air dashpot time delay attachment mounts on the front of the undervoltage trip, replacing the moving core cover. (See Fig. 12). The needle valve screw in the top regulates the opening through which the air is forced and consequently the time delay. (See Fig. 12A). The attachment does not have a quick reset feature and therefore approximately one minute should be allowed between operations to permit complete re-setting.

Inspection. Hold the trip bar down and close the breaker manually. Release the trip bar slowly, allowing the undervoltage trip spring to raise the trip bar and trip the breaker.

Maintenance. Check for loose bolts and faulty coils.

REVERSE CURRENT TRIP ATTACHMENT

This attachment mounts directly on the center molded pole unit base, in the space ordinarily occupied by the overcurrent attachment. (See Figs. 13 and 13A). It is used to trip the breaker when the

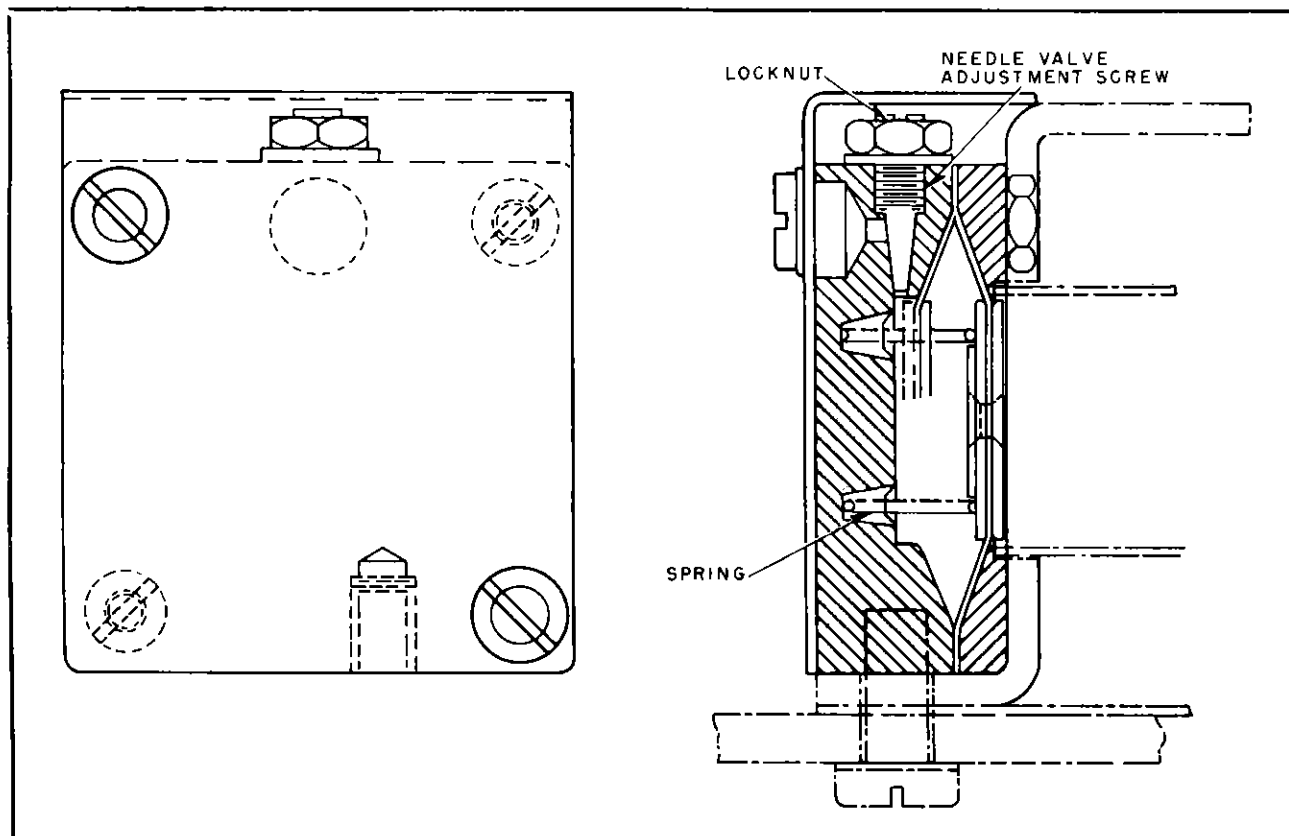


FIG. 12A. Undervoltage Time Delay Attachment—Construction Details

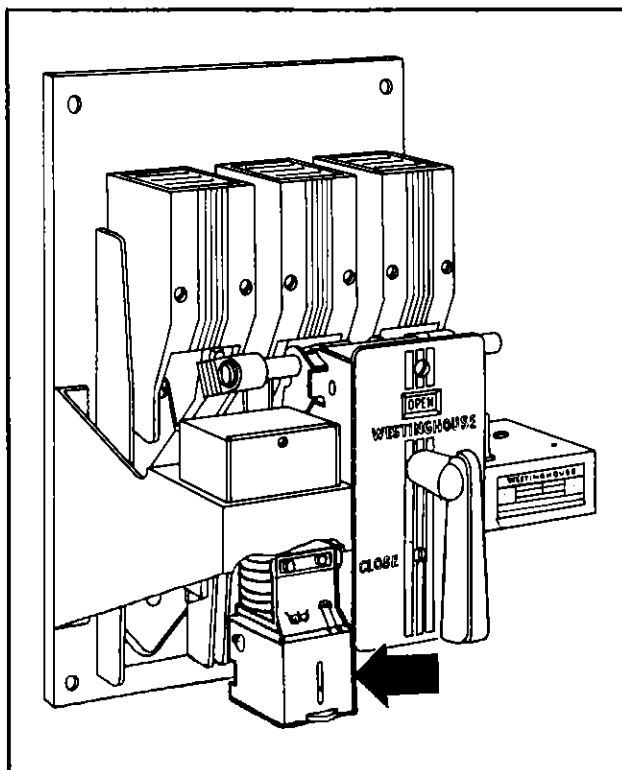


FIG. 13. Reverse Current Trip Attachment—Location

direction of current flow in that pole is reversed. When the series coil current is flowing in the forward direction, armature movement is prevented by a stop. When the series coil current is reversed, the armature rotates in the opposite direction to trip the breaker. Calibration adjustment covers 5 to 25 percent reverse current, based on normal current rating.

After tripping, the reverse current armature is reset by opening the potential coil circuit. For this purpose an "a" contact of the breaker auxiliary switch should be connected in series with the potential coil.

Inspection. Close the breaker manually, and push backward on the spring stud located on the bottom of the armature, to trip the breaker. The armature should move without friction, and should have approximately $\frac{1}{32}$ -inch overtravel after tripping.

Final inspection should be made electrically, after the circuit connections are complete as shown in Fig. 4, page 11.

Maintenance. Remove all power from the breaker and repeat the mechanical inspection given above. Check for loose bolts and open circuit in potential coil.

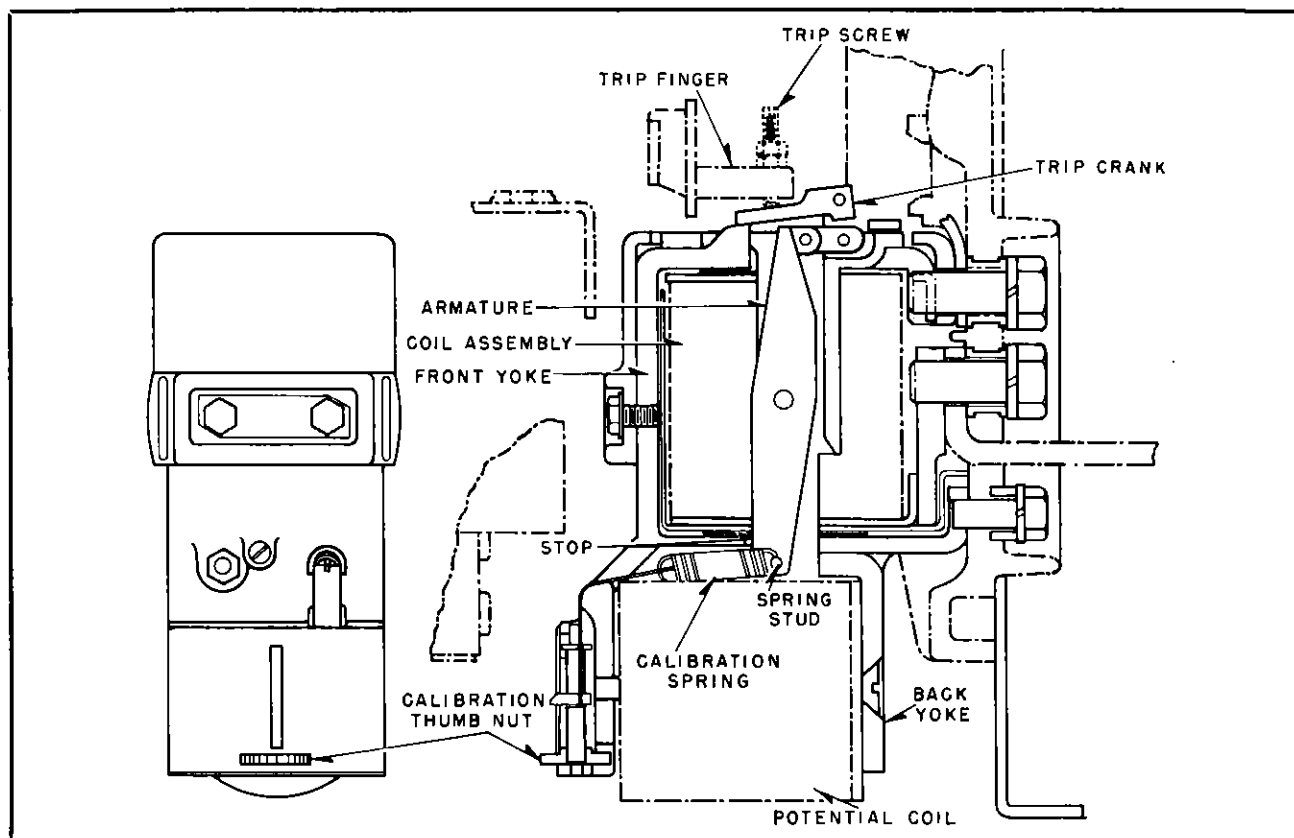


FIG. 13A. Reverse Current Trip Attachment—Construction Details

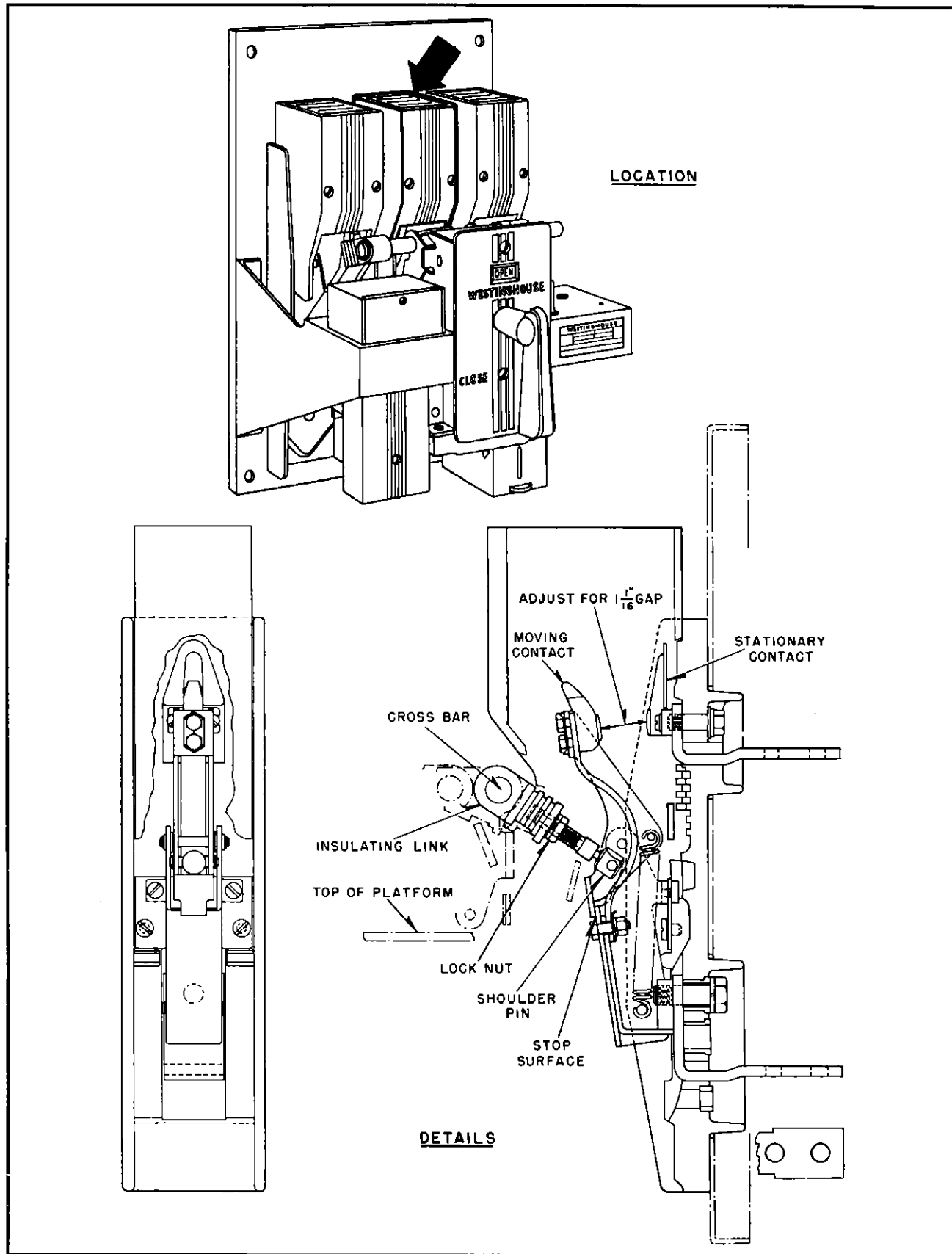


FIG. 14. Field Discharge Switch—Location and Construction Details

FIELD DISCHARGE SWITCH

The field discharge switch is ordinarily used with a two-pole breaker, and mounts on the center moulded pole unit base. (See Fig. 14). The switch is designed to close approximately simultaneously with the opening of the breaker contacts. An arc chute is always supplied to interrupt motor starting secondary currents.

Inspection. Remove the arc chute, close the breaker manually and check for freedom of motion. The contact gap should be approximately $1\frac{1}{16}$ inches. The gap is adjusted by loosening the locking nut and turning the sleeve in or out. Always leave a slight gap at the stop surface.

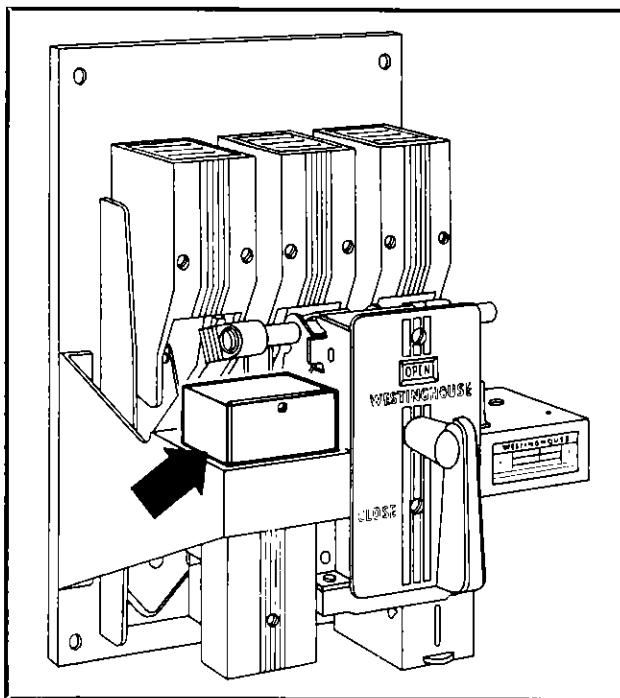


FIG. 15. Auxiliary Switch—Location

Maintenance. Remove power from the breaker, clean the contacts if necessary, check the contact gap and adjust if necessary. Check for loose bolts.

AUXILIARY SWITCH

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

Table No. 3. INTERRUPTING CAPACITY

VOLTS	INTERRUPTING CAPACITY IN AMPERES	
	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 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 60-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 the contacts are touching well before the end of travel.

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

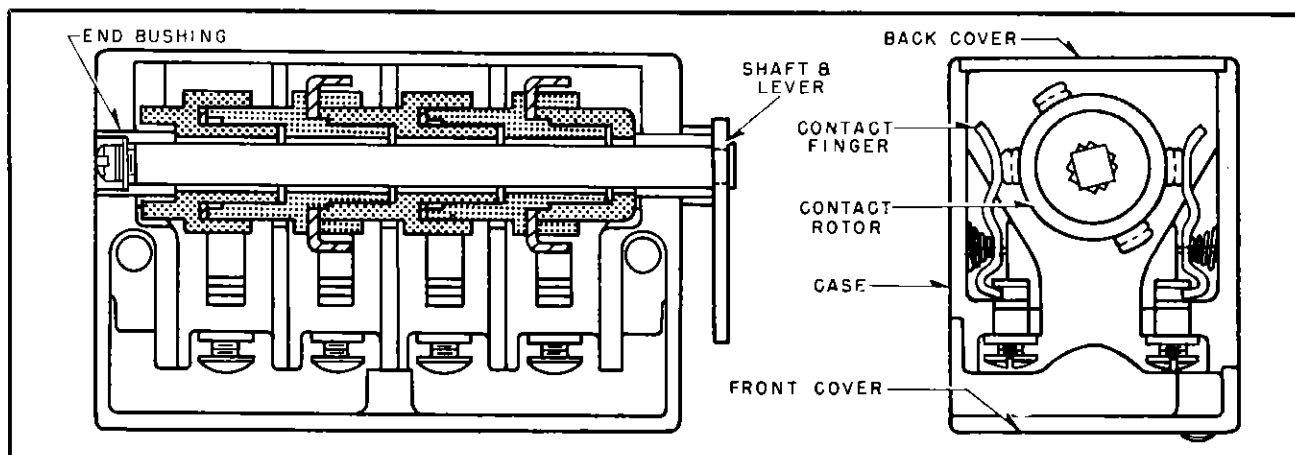


FIG. 15A. Auxiliary Switch—Construction Details

ALARM SWITCH ATTACHMENT

The alarm switch mounts above the shunt trip attachment (see Figs. 16 and 16A) and will energize the alarm circuit on all opening operations excepting those initiated through the breaker handle or shunt trip. The alarm switch may be reset manually by rotating the breaker handle to the tripped position, or electrically by energizing the shunt trip coil (when electrical resetting has been provided).

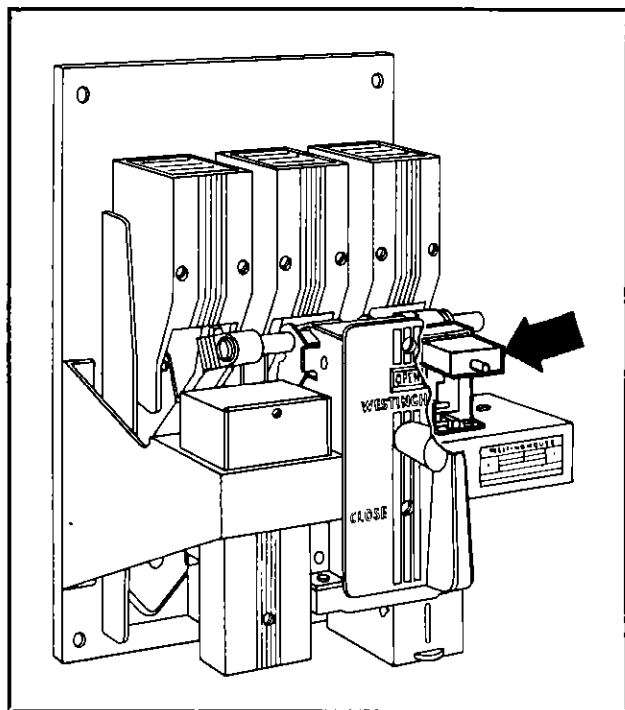


FIG. 16. Alarm Switch Attachment—Location

Inspection. Close the breaker manually and trip by rotating the breaker handle to be sure the alarm contacts do not "make". Repeat the above procedure except trip by raising the trip bar and 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 mounts on the underside of the platform directly below the undervoltage trip attachment. (See Fig. 17). 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.

Inspection. Rotate the breaker handle to the closed position. The lockout should prevent closure of the breaker by holding the trip bar 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 lifting bracket can be moved vertically on the lifting plate by the adjusting screw. This adjustment is made to obtain approximately $\frac{1}{16}$ -inch clearance between the lifting bracket and the bottom of the trip bar, with the lockout coil energized. Check for open-circuited coil; also check for loose bolts and nuts.

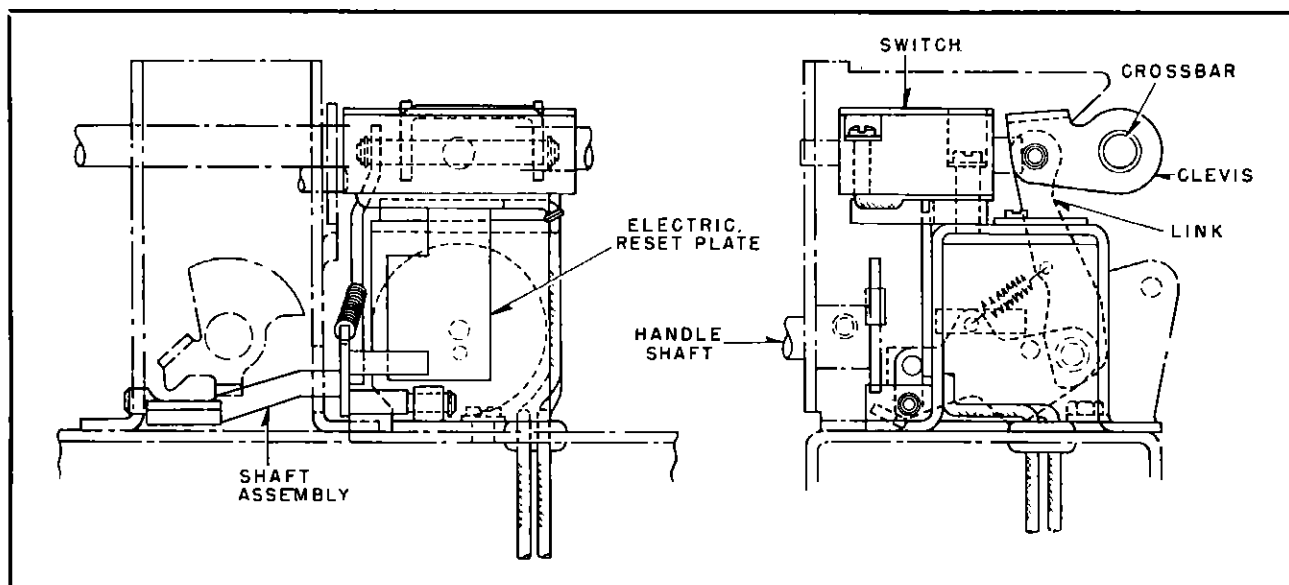


FIG. 16A. Alarm Switch Attachment—Construction Details

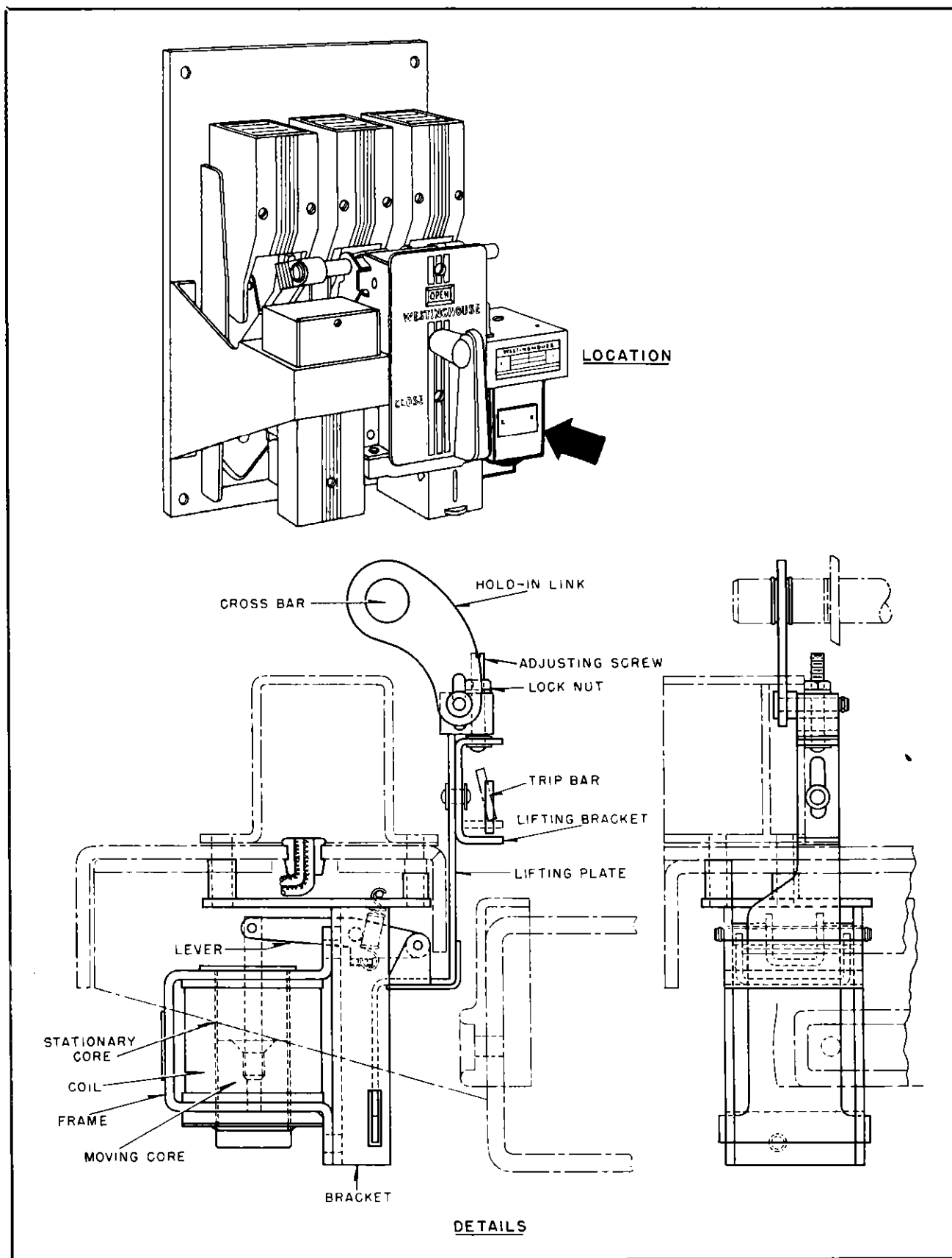


FIG. 17. Electric Lockout Attachment—Location and Construction Details

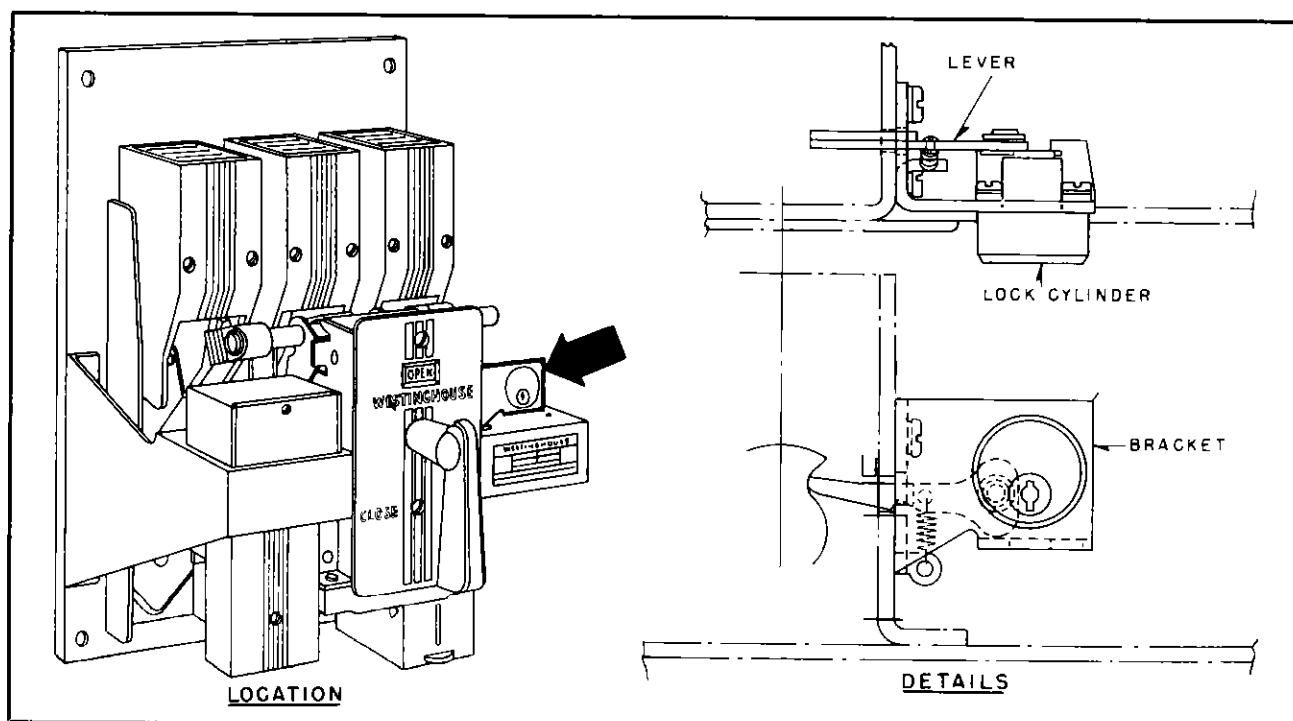


FIG. 18. Key Interlock Attachment—Location and Construction Details

KEY INTERLOCK ATTACHMENT

The key interlock mounts on the right side of the operating mechanism frame. (See Fig. 18). The key cannot be removed unless the breaker is locked in the open position.

Inspection. Rotate the breaker handle to the tripped position and turn the key to the locked

position. The key is then removable and the breaker handle is locked in the tripped position. Replace the key, apply force in the counterclockwise direction to the breaker handle and rotate the key to the unlocked position to free the breaker handle.

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