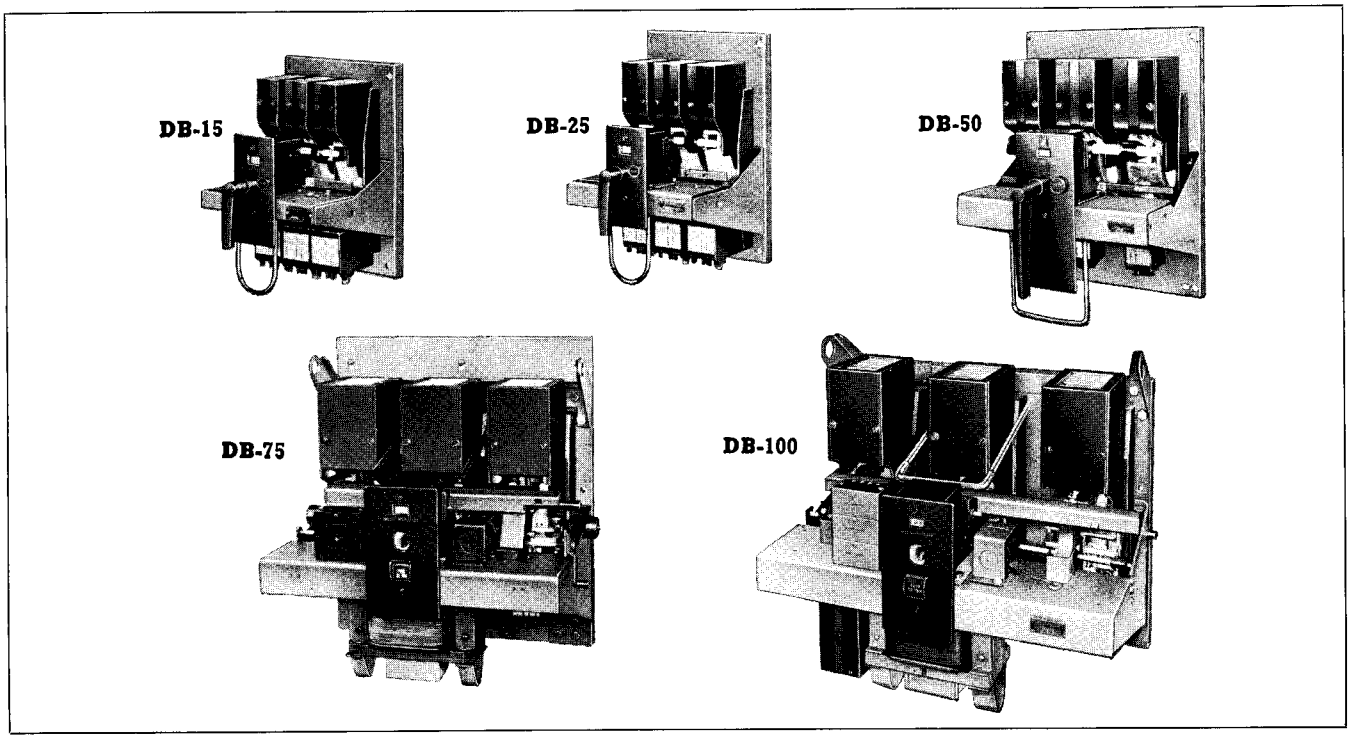
DB De-ion® circuit breakers

15-4000 amperes, a-c or d-c

manually or electrically operated • 2 or 3-pole
15,000 to 100,000 amp interrupting capacity



application

For protection of low-voltage a-c or d-c power distribution systems in industrial plants and electric utility station auxiliaries.

advantages

complete low-voltage air circuit breaker line: DB De-ion breakers are supplied in five basic sizes of two or three-pole design with a range of current ratings from 15 to 4000 amperes a-c or d-c.

application flexibility with choice of operating mechanisms: Standard DB breakers are equipped with either manual, manual-spring or electrical operating mechanisms. Optional attachments provide for modifications to suit any circuit protective scheme.

overcurrent tripping device: Standard tripping devices have long delay and instantaneous tripping characteristics—both independently adjustable. Selective trips have long and short delay characteristics—both independently adjustable.

variety of mountings: DB breakers can be supplied for fixed switchboard mounting or separate enclosures depending on the nature of the installation site, or in single unit one-high drawout assembly.

sub-assembly plan: Provides mounting of basic DB breaker and components on all metal base to form a single compact unit. The plan features factory-assembled, tested and stocked components, for improved service on a variety of DB breaker accessories.

3-position DB drawout breakers: Single unit one-high drawout stack-up units provide a factory-assembled standardized design for the make-up of low-voltage metal-enclosed switchgear.

selector guide

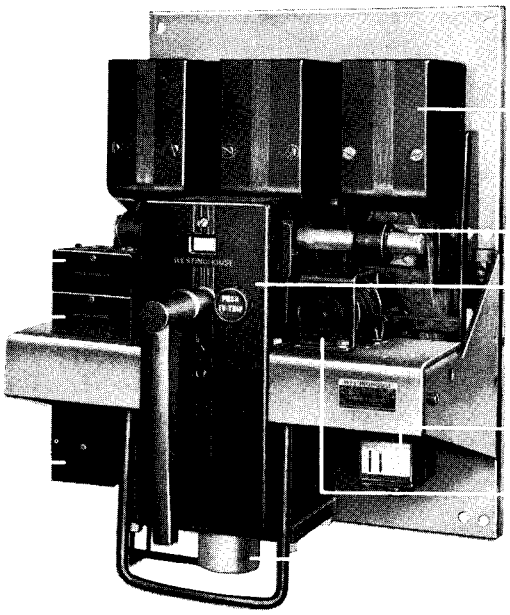
standard circuit breakers are calibrated from 80 to 160% of current rating

range of ratings: amperes, ac/d-c	type breaker	interrupting capacity, amperes at 600 v a-c, 250 v d-c†
15 to 225	DB-15	15,000
40 to 600	DB-25	25,000
200 to 1600	DB-50	50,000
2000 to 3000	DB-75	75,000
4000 a-c	DB-100	100,000
6000 d-c	DB-100	100,000

†For interrupting capacity at reduced voltages, see page 6.

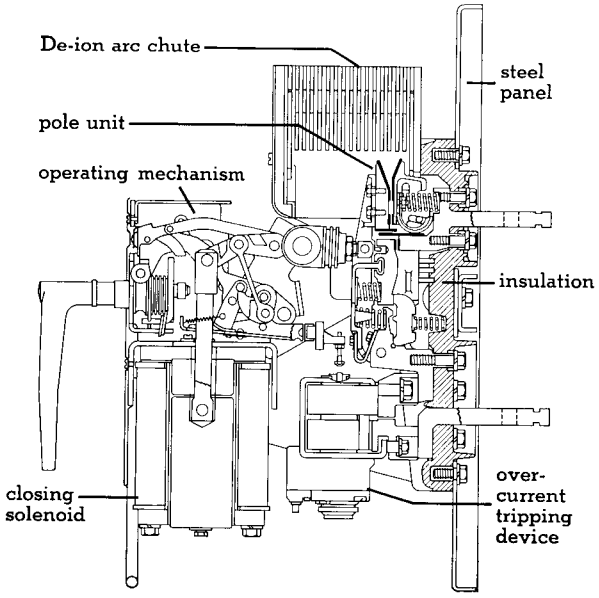
September, 1974
supersedes descriptive bulletin 33-850 dated May, 1965
mailed to: E, D, C/1954/DB

design features

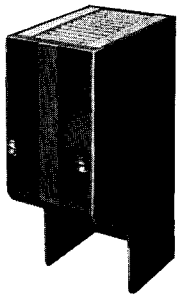


DB-50 breaker

All breakers have similar construction to the DB-50 breaker illustrated here and the same basic design modified to suit their sizes and ratings.

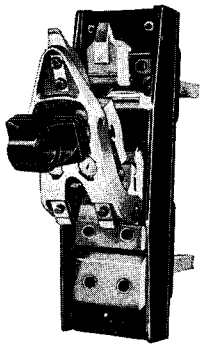


1 De-ion arc chutes (one per pole)

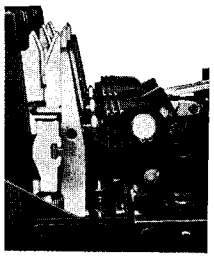


To prevent contact burning, arcs are quickly and positively interrupted. Strong magnetic fields pull the arc upward into the arc chute; rising gas blasts carry conducting particles out of the arc path to break the arc.

2 pole unit (2 or 3 supplied)



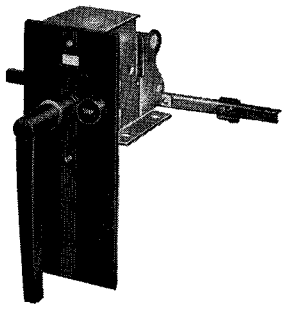
open position



closed position

All breakers have solid-block, silver-inlaid main contacts, insuring lasting current-carrying ability. Main contacts will not arc: When breaker opens, main contacts part first, then secondary contacts and finally arcing tips. When arcing tips break, arc flashes at the point and is blown into De-ion arc chute.

3 operating mechanism



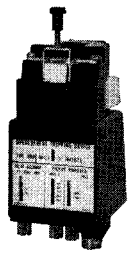
manually-operated breaker: Rotary operating handle operates the breaker directly or through a manual-spring closing mechanism.

electrically-operated breaker: Has solenoid closing, shunt trip, control relay and 4-pole auxiliary switch.

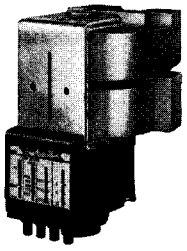
Mechanical indicator shows breaker position at all times.

Push to trip button with protective side brackets can be padlocked.

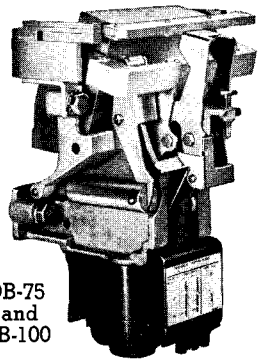
4 overcurrent tripping device
(one dual unit per pole)



DB-15 and DB-25



DB-50



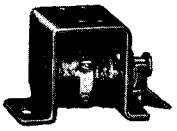
DB-75 and DB-100

motor protection or general duty: Breakers are supplied with tripping devices having long delay and instantaneous tripping characteristics—both independently adjustable.

selective tripping: Selective overcurrent trip devices have long and short delay tripping characteristics—both independently adjustable.

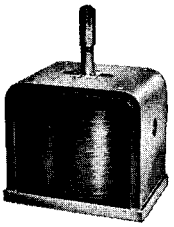
Each unit consists of a magnetically operated trip plunger delayed by an air diaphragm. Time delay is adjusted by controlling the size of orifice between chambers of the air unit.

attachments supplied with electrically-operated breakers



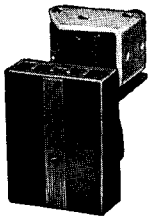
5 shunt trip (optional with manually-operated breakers)

Non-adjustable coil provided for remote tripping; intermittently rated.



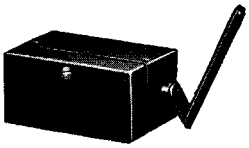
6 closing solenoid

D-c solenoid for DB-50, 75 and 100 breakers. Use Rectox® for a-c control. A-c solenoid for DB-15 to DB-25 breakers. Used also for d-c control.



7 control or closing relay

Consists of a cut-off contact and a seal-in contact to operate the closing solenoid.



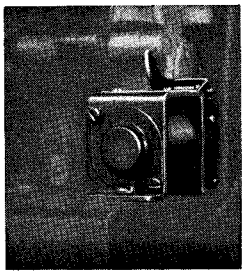
8 4-circuit auxiliary switch

Rotary switch consisting of two "a" contacts and two "b" contacts ("a" contacts are closed when breaker is closed; "b" contacts are open when breaker is closed).

9 8-point terminal block

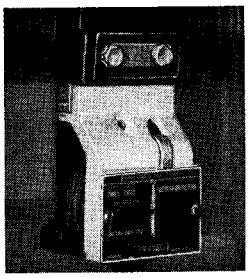
All attachment leads on separately enclosed and non-drawout breakers are connected to terminal block for easy access.

optional attachments



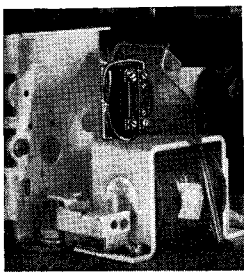
undervoltage trip

Trips breaker on loss of voltage and is automatically reset by breaker action. Attachment is available for instantaneous or time delay tripping.



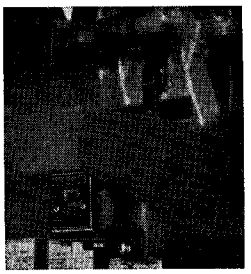
reverse current trip

Opens breaker upon a reversal of current in the circuit. This direct-current device is adjustable and may be set to trip at 5 to 25% reverse current, based on normal current rating.



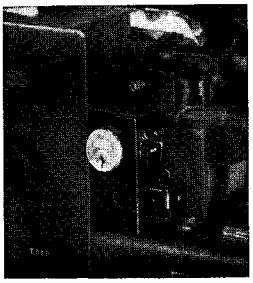
alarm switch

Closes to initiate alarm when breaker is tripped by an automatic tripping device (does not operate when breaker is tripped manually or by shunt trip).



electrical lockout

Holds breaker linkage in trip-free position to prevent closing until lockout is energized. After breaker is closed, de-energizing coil will not trip breaker.



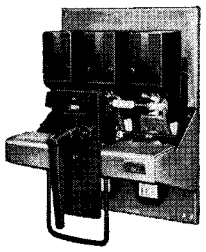
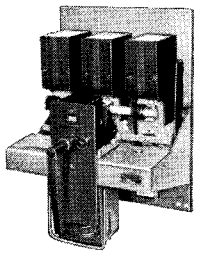
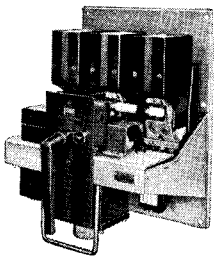
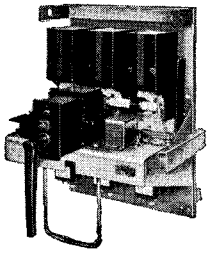
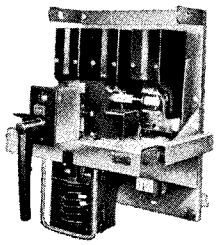
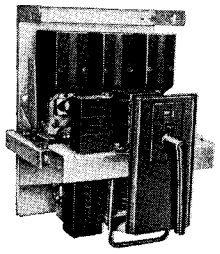
key interlock

Several designs available for interlocking two or more breakers.

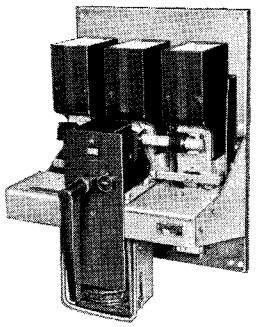
design features

choice of breaker closing mechanisms

To match application requirements, DB breakers are available with manual, manual-spring or electric solenoid closing mechanisms.

	manual closing	manual-spring closing	electric solenoid closing
for fixed position mounting			
for 3-position drawout mounting			

manual-spring closing mechanism



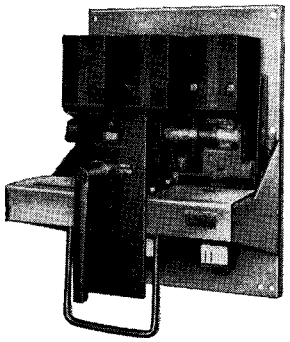
DB breaker with manual-spring closing mechanism

The manual-spring closing mechanism is available for the DB-15, DB-25 and DB-50 breakers. This spring mechanism assures rapid safe closing against all possible fault currents. The closing portion of the mechanism involves no latches or triggers. Simplicity, sturdiness and reliability are distinctive features of this mechanism.

sub-assembly plan • mountings • enclosures

The basic DB breaker and all components are mounted on an all-metal base to form a single compact unit. All parts are accessible for inspection and adjustment. Attachments can be added or removed easily; mounting holes are provided. This sub-assembly plan affords factory-assembled, tested and stocked components for quick assembly or changes of installed breakers—for ease of maintenance and most efficient breaker operation.

The design features illustrated on pages 2 and 3, of nine main components, illustrate the sub-assembly arrangement and its simplicity.

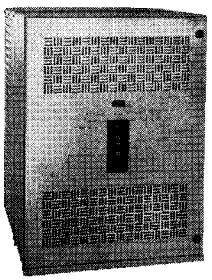


fixed mounting for switchboard use

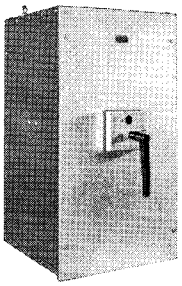
All-steel mounting panel of the basic DB breaker has mounting holes suitable for bolting to framework or switchboard. All breakers for switchboard fixed mounting are furnished with horizontal bar studs (vertical bars or round studs are not available). The breaker is supplied without front panels. Non-flanged front panel or hinged panel can be supplied as addition.

typical enclosures

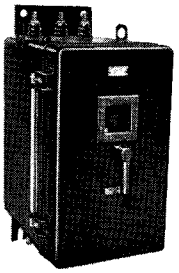
All enclosures, except DB-75 and DB-100, include clamp-type connectors for cables and cover interlocks. Ventilated, weather-proof, dust-tight and semi-dust-tight enclosures have suitable knockouts or entrance plates for conduit entrance. Submersible breakers are supplied complete with external porcelain bushings. (See page 8 for details.)



ventilated enclosure



weather-proof, dust-tight or semi-dust-tight enclosure



submersible enclosure

removable arrangements

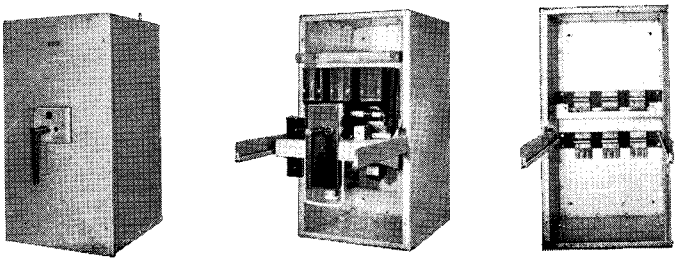
All breakers except the DB-75 and DB-100 are removable as a unit from all enclosures. Rail extensions as shown are provided.

All breakers are free-standing when removed.

a. Breaker with lifting rings for raising to mounting positions.

b. Breaker rolled forward on rail extension for easy test and inspection.

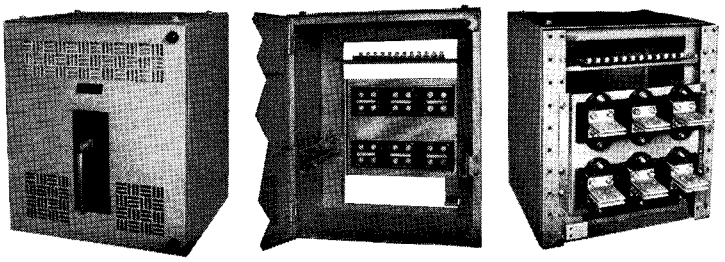
c. Breaker removed for access to cable connectors.



a **b** **c**

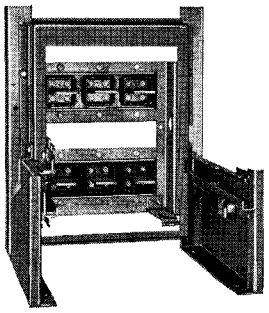
3-position drawout breakers
single unit • one-high

Single unit, one-high drawout stack-up units provide a factory-assembled standardized design for low-voltage metal-enclosed switchgear. In this 3-position arrangement, the door of the breaker compartment can be closed with the breaker in any of its three recognized positions—"connected", "test", "disconnected". The 3-position feature offers a new convenience and safety to operating and maintenance personnel and greater protection for the circuit breakers.

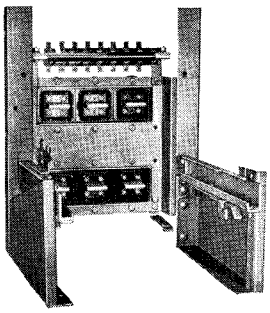


drawout breaker substructure

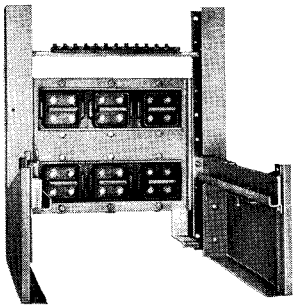
DB-15



DB-25



DB-50



wall mounting units

Large industrial plants having widely separated load locations often require isolated breaker units instead of a central distribution switchboard. Wall-mounted, low-voltage, drawout air circuit breaker units are designed to meet these requirements.

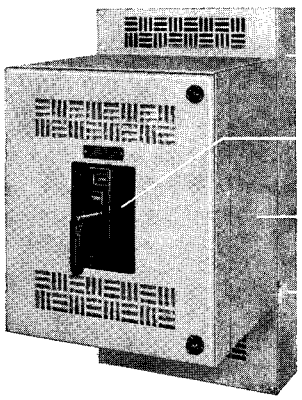
These individual units are available with air circuit breakers having interrupting capacities of 15,000, 25,000 and 50,000 amperes, manually or electrically operated. The housings are designed for cable entrances at either top or bottom. The units include all the safety and interlock features of standard, low-voltage drawout units.

1 Main housing for wall mounting with knockouts at top and bottom for conduits. Housing can be mounted in place and all cable connections made before breaker compartment is bolted in place.

2 Manually or electrically operated type DB-15, DB-25 or DB-50 three position drawout breaker element.

3 Breaker compartment includes door interlock, breaker position stops and all safety features of standard units.

4 External ground connection for solidly grounding housing and drawout welded frame.



individual unit type DB breaker for wall mounting

standard ratings

continuous current ratings • *standard ratings are calibrated 80 to 160% ratings*

rating range, amperes	breaker type	standard ratings, amperes
15-225	DB-15	15, 20, 30, 40, 50, 70, 90, 100, 125, 150, 175, 200 or 225
40-600	DB-25	40, 50, 70, 90, 100, 125, 150, 175, 200, 225, 250, 300, 350, 400, 500 or 600
200-1600	DB-50	200, 225, 250, 300, 350, 400, 500, 600, 800, 1000, 1200 or 1600▲
2000-3000	DB-75	2000, 2500, 3000
4000	DB-100	4000
6000 d-c	DB-100	6000 d-c

▲ 1600 ampere rating not available on non-ventilated enclosures

interrupting ratings

a-c or d-c service	line voltage	type breaker	minimum continuous current rating amperes	interrupting rating		maximum short circuit current at which breaker can be applied			
				asymmetrical amperes	symmetrical amperes	selective system		cascade system	
						asymmetrical amperes	symmetrical amperes	asymmetrical amperes	symmetrical amperes
a-c all values are 60 cycles (rms)	240 and below	DB-15	30	30,000	25,000	15,000	14,000	60,000	50,000
		DB-25	150	50,000	42,000	25,000	22,000	100,000	85,000
		DB-50	600	75,000	65,000	50,000	42,000	120,000	100,000
		DB-75	2000	100,000	85,000	75,000	65,000	150,000	130,000
		DB-100	4000	150,000	130,000	100,000	85,000	150,000	130,000
	241-480	DB-15	20	25,000	22,000	15,000	14,000	50,000	42,000
		DB-25	100	35,000	30,000	25,000	22,000	70,000	60,000
		DB-50	400	60,000	50,000	50,000	42,000	100,000	85,000
		DB-75	2000	75,000	65,000	75,000	65,000	100,000	85,000
		DB-100	4000	100,000	85,000	100,000	85,000	100,000	85,000
	481-600	DB-15	15	15,000	14,000	15,000	14,000	30,000	25,000
		DB-25	40	25,000	22,000	25,000	22,000	50,000	42,000
		DB-50	200	50,000	42,000	50,000	42,000	100,000	85,000
		DB-75	2000	75,000	65,000	75,000	65,000	100,000	85,000
		DB-100	4000	100,000	85,000	100,000	85,000	100,000	85,000
d-c	250 and below	DB-15	15	15,000	.....	.....	.....	.....	.....
		DB-25	40	25,000	.....	.....	.....	.....	.....
		DB-50	200	50,000	.....	.....	.....	.....	.....
		DB-75	2000	75,000	.....	.....	.....	.....	.....
		DB-100	4000	100,000	.....	.....	.....	.....	.....

overcurrent tripping devices

standard long delay and instantaneous device, and selective device		standard long delay and instantaneous device			selective trip device short delay settings			
long delay settings for DB-15, DB-25, DB-50, DB-75, and DB-100		instantaneous pickup in % of trip unit rating			pickup settings in % of trip unit rating			short delay, cycles for
pickup settings % rating	long delay, seconds	DB-15 and DB-25	DB-50	DB-75 and DB-100	DB-15 and DB-25	DB-50	DB-75 and DB-100	DB-15,DB-25 DB-50,DB-75 and DB-100
standard settings for feeder breakers (preferred)								
80-100-120-140-160	20 and 30	800 and 1200	800 and 1200	800 and 1200	500-750-1000	500-750-1000	500-750-1000	6, 14 and 30
standard settings for transformer secondary and main incoming line breakers (preferred)								
80-100-120-140-160	20 and 30	500 and 1000	500 and 1000	500 and 1000	500-750-1000	500-750-1000	500-750-1000	6, 14 and 30
optional settings available when specified (preferred)								
80-100-120-140-160	①25–150	...	200 and 350 or 250 and 400	... ...		200 and 350 or 250 and 400	②200 and 350 or ②250 and 400	6, 14 and 30
special settings (non-preferred) available on special request only								
80-100-120-140-160	12 and 20	800 and 1200	800 and 1200	800 and 1200	500-750-1000	500-750-1000	500-750-1000	6, 14 and 30
80-100-120-140-160	30 and 40	500 and 1000	800 and 1200	800 and 1200	500-750-1000	500-750-1000	500-750-1000	6, 14 and 30
80-100-120-140-160	40 and 60	500 and 800	500 and 1000	800 and 1200	500-750-1000	500-750-1000	500-750-1000	6, 14 and 30
80-100-120-140-160	①25–150	200 and 350 or 250 and 400	...	...	200 and 350 or 250 and 400	...	...	6, 14 and 30

① One calibrated mark between 25 and 150 seconds (specify mark) at 165% of trip unit rating.

② Lowest calibration must not be less than 5000 amperes.

standard control voltages for electrically controlled breakers and shunt trip and undervoltage trip attachments	d-c	a-c
	48, 125, 250	230, 460

standard potential coil voltages for reverse current trip and electrical lockout attachments	d-c
	125, 250

DB De-ion® circuit breakers

15-4000 amperes, a-c or d-c

manually or electrically operated • 2 or 3-pole
15,000 to 100,000 amp interrupting capacity

specification guide

for prices, refer to price lists 33-820 and 33-821

item	choice or specification
when ordering circuit breakers, specify:	
type	DB-15, DB-25, DB-50, DB-75 or DB-100
number poles	2 or 3
type of mounting	fixed (switchboard) ventilated enclosure weather-proof enclosure dust-tight enclosure semi-dust-tight enclosure submersible (watertight) enclosure single unit—one high
method of operation	manual, manual spring, or electric If electrical, specify control voltage, a-c or d-c, and frequency (see page 6)
circuit or service	voltage, a-c or d-c, and frequency (25-50 or 60 cycles)
ampere rating	(from table on page 6)
type of series trip attachment	one supplied per pole, choose and specify type: standard tripping device: long delay and instantaneous selective tripping device: long delay and short delay instantaneous tripping unit only.
when ordering attachments, specify:	
shunt trip (on manually operated breaker)	specify control voltage, d-c or a-c, and frequency (see page 6)
undervoltage trip	instantaneous or delayed specify control voltage, d-c or a-c and frequency (see page 6)
reverse current trip	specify voltage of potential coil (see page 6)
additional auxiliary switch	specify number of "a" and "b" circuits a: closed when breaker is closed b: open when breaker is closed **note:** All electrically operated breakers are supplied with one 4-circuit auxiliary switch (with two "a" and two "b" circuits).
alarm switch	manually or electrically reset
electrical lockout	specify voltage of potential coil (see page 6)
key interlock	specify ultimate user and destination

net weights in pounds

type	DB-15				DB-25				DB-50				DB-75		DB-100	
	manual		electrical		manual		electrical		manual		electrical		electrical		electrical	
	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole	2 pole	3 pole
switchboard (fixed)	60	70	75	85	80	90	100	110	220	280	295	355	415	475	445	525
ventilated ●	135	155	150	170	170	180	190	200	430	490	505	565	665	725	695	775
weather-proof ●	145	165	160	180	170	180	190	200	430	490	505	565	665	725	695	775
semi-dust-tight ●	135	155	150	170	170	180	190	200	430	490	505	565	...	...	...	...
dust-tight ●	145	165	160	180	170	180	190	200	430	490	505	565	...	...	...	...

● enclosed

dimensions, wiring data

type breaker	approximate overall dimensions, inches▲ A	B	C	conduit entrance	cable size range for clamp-type connectors
fixed mounting for switchboard • figure 1					
DB-15	17	16⅝	12	unit is unenclosed	studs only supplied: 1¼ x 1¼", 2¼" long; two 13/32" dia. connecting holes
DB-25	20	18¾	13	unit is unenclosed	studs only supplied: 1½ x ½", 2¼" long; two 17/32" dia. connecting holes
DB-50	27	23 7/16	19½	unit is unenclosed	studs only supplied: 3½ x ¾", 2⅞" long; two 21/32" dia. connecting holes
DB-75	31½	20½	24½	unit is unenclosed	3½" x ¾" x 2½" long
DB-100	31½	20½	29	unit is unenclosed	4½" x ¾" x 2½" long
ventilated or semi-dust-tight enclosure • figure 2					
DB-15	27½	25¼	16⅝	13⅜ x 7¾ drill plate	two #6 to 500 MCM conductors
DB-25	27½	25¼	16⅝	13⅜ x 7¾ drill plate	
DB-50	44	30½	23⅜	removable entrance plate top and bottom for drilling to accommodate desired conduit sizes: 19¼ x 7½"	from one #3 to four 500 MCM cables or any combination of four between three sizesI Buswork to be ordered separately.
DB-75	46½	38⅛	34		
DB-100	46½	38⅛	34		
dust-tight or weather-proof enclosure • figure 2					
DB-15	27½	27⅜	16⅝	20 5/16 x 7¾ drill plate	same as for ventilated enclosureI
DB-25	27½	27⅜	16⅝		
DB-50	44	32¼	23⅜		
DB-75	53	43⅛	34⅜		
DB-100	53	43⅛	34⅜		
single-unit wall mounted • figure 3					
DB-15	42	33	18	16¼ x 10 plate	2 per stud, 4/0 to 500 MCM—in top—out bottom
DB-25	42	33	18	16¼ x 10 plate	2 per stud—4/0 to 750 MCM—in top—out bottom
DB-50	56	39	26	23 x 9 plate	4 per stud—4/0 to 1000 MCM—in top—out bottom
submersible enclosure • figure 4					
DB-25	37½	25⅞	22¼	one porcelain bushing per pole top and bottom with threaded terminal studs, ¾"—16 threads, 1½" long and pipe plug outlet top and bottom, 1"—11½, for control wiring. Alternate arrangements available. Check factory.	same as for ventilated enclosure
DB-50	54½	33 1/16	30⅜	1½" x 12"	

I For cases where cables must by-pass, four 500 MCM cables per stud is maximum arrangement.
▲ For stack-up units refer to Headquarters.

figure 1

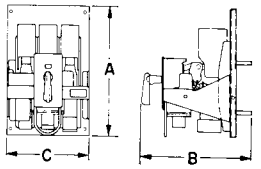


figure 2

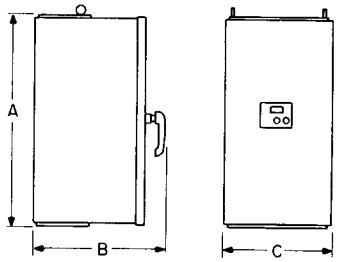


figure 3

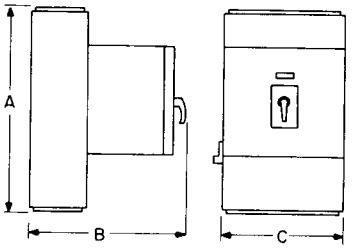
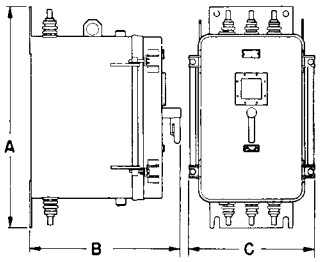


figure 4



further information

prices	price lists 33-820 and 33-821
instructions, official dimensions	DB-15, DB-25: instruction book 33-850—1 and 2F DB-50: instruction book 33-850—3D DB-75, DB-100: instruction book 33-850—4 and 5D

Westinghouse Electric Corporation
Switchgear Division • East Pittsburgh, Pa.
printed in U.S.A.

RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

De-ion®

AIR CIRCUIT BREAKERS

Types DB-15, DB-25 and DBF-6

600 Volts A-C
250 Volts D-C

Interrupting Rating

Type DB-15	Type DB-25
15,000 Amperes	25,000 Amperes

Rating of Series Coils

Type DB-15 (Amperes)	Type DB-25 (Amperes)
15, 20, 30, 40, 50, 70, 90, 100, 125, 150, 175, 200, 225	40, 50, 70, 90, 100, 125, 150, 175, 200, 225, 250, 300, 350, 400, 500, 600

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR APPARATUS DEPARTMENTS
EAST PITTSBURGH PLANT • EAST PITTSBURGH, PA.
SUPERSEDES I.B. 33-850-1 & 2C
SEPTEMBER, 1963
(Rep. 6-64) Printed in U.S.A.

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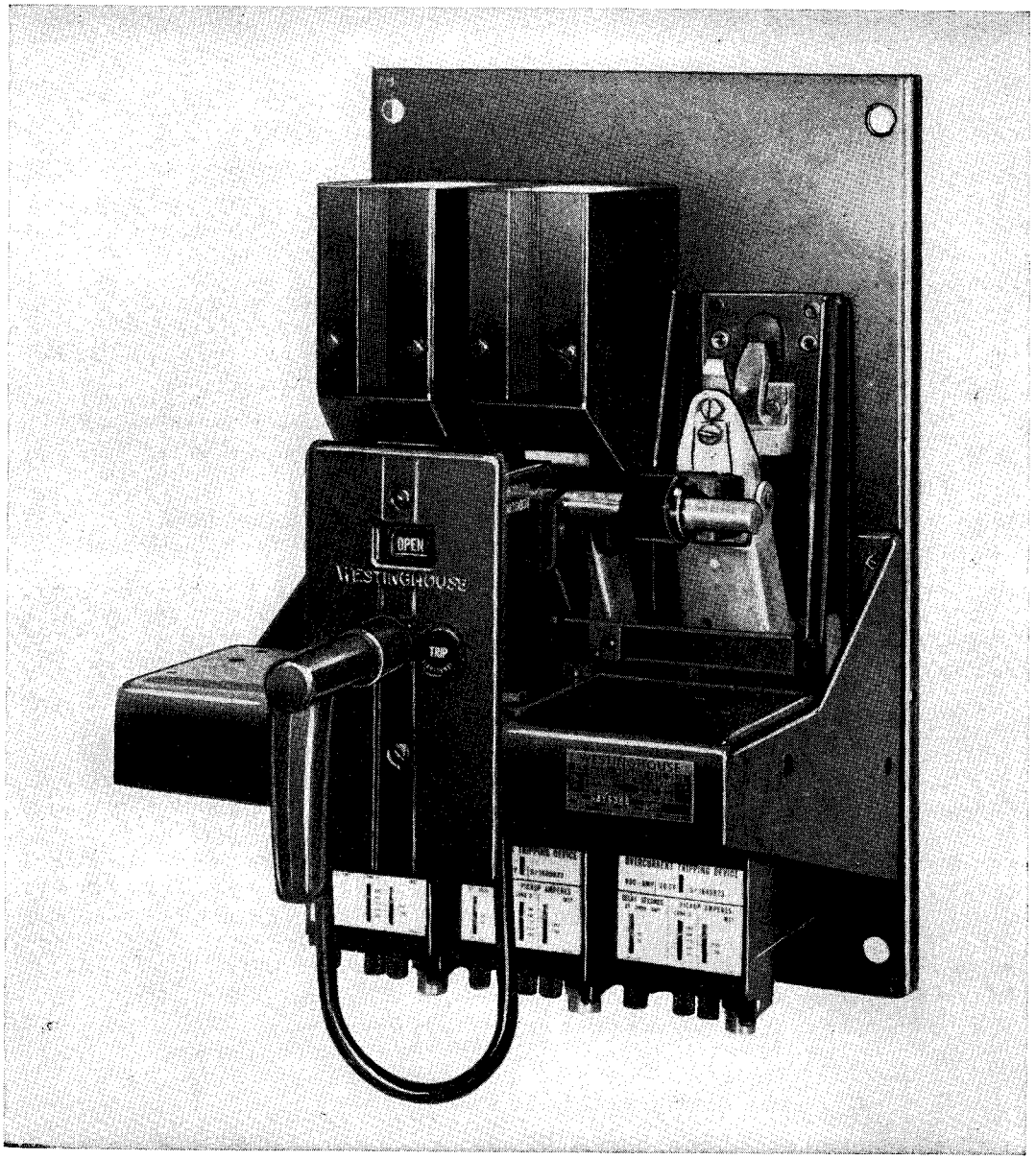
LIST OF ILLUSTRATIONS


OPEN
WESTINGHOUSE
TRIP

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.

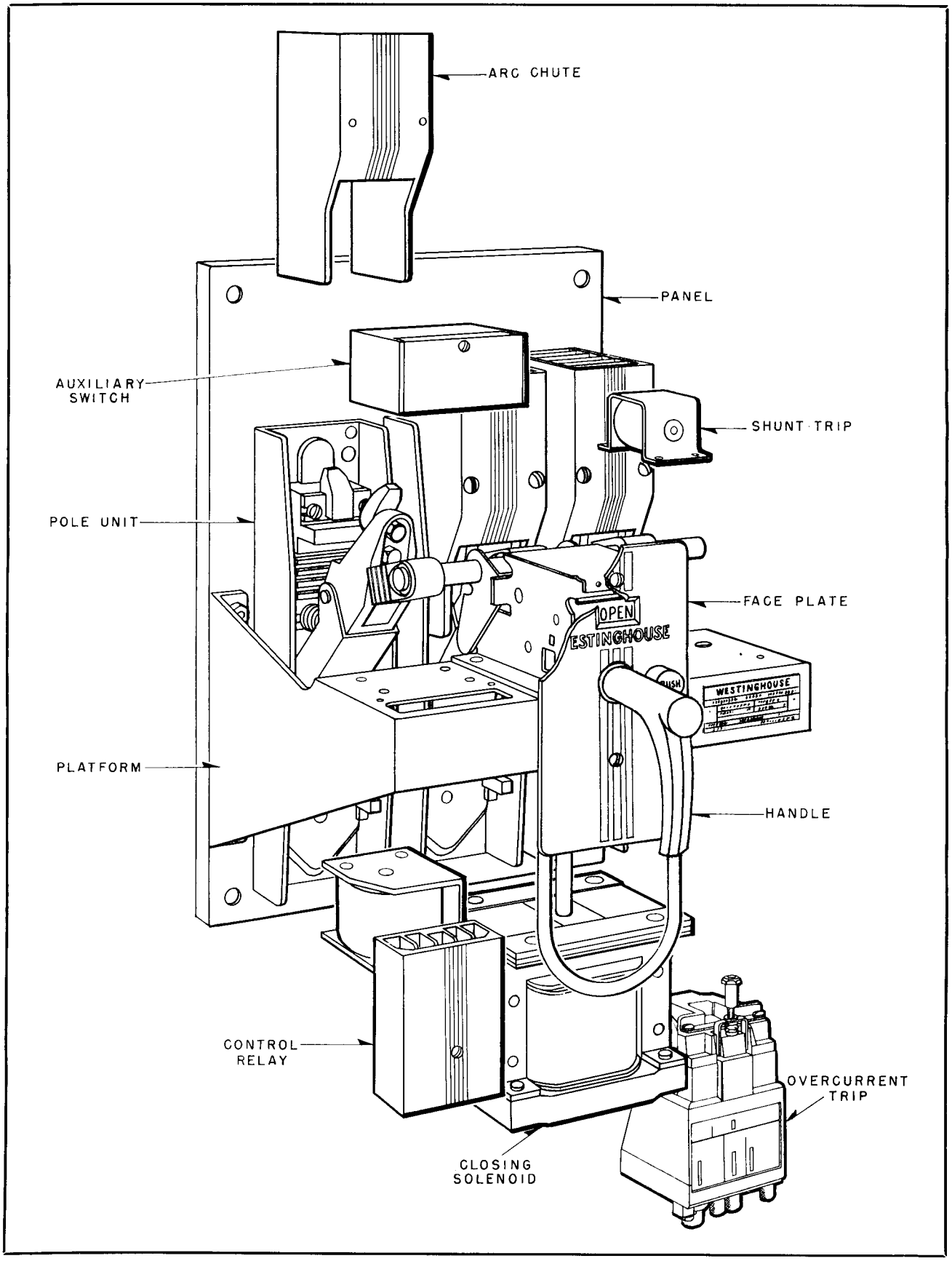


FIG. 1. Type "DB" Air Circuit Breaker—Exploded View

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 fixed breakers are given in Table No. 1 below. Add 15 lbs. for drawout breakers. Add 100 lbs. for enclosures on page 11.

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. Remove tape from top of arc chutes.

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 12.

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

4. Operate the push to trip button to open the contacts.

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 open 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.

6. The latchplate felt and roller lever of the operating mechanism should be lubricated approximately every 10,000 operations. Molybdenum disulfide mixed with oil (Westinghouse M8577-11) is recommended.

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.

Breakers in non-ventilated enclosures should have the cover opened or removed.

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, 3 and 4.

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. 8. 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 terminals and breaker arrangement are shown in Fig. 2. The same arrangement is used for all other enclosures except subway and explosion-proof. The mounting dimensions differ for these and should be obtained from the appropriate outline drawing.

The following procedure applies to all enclosures:

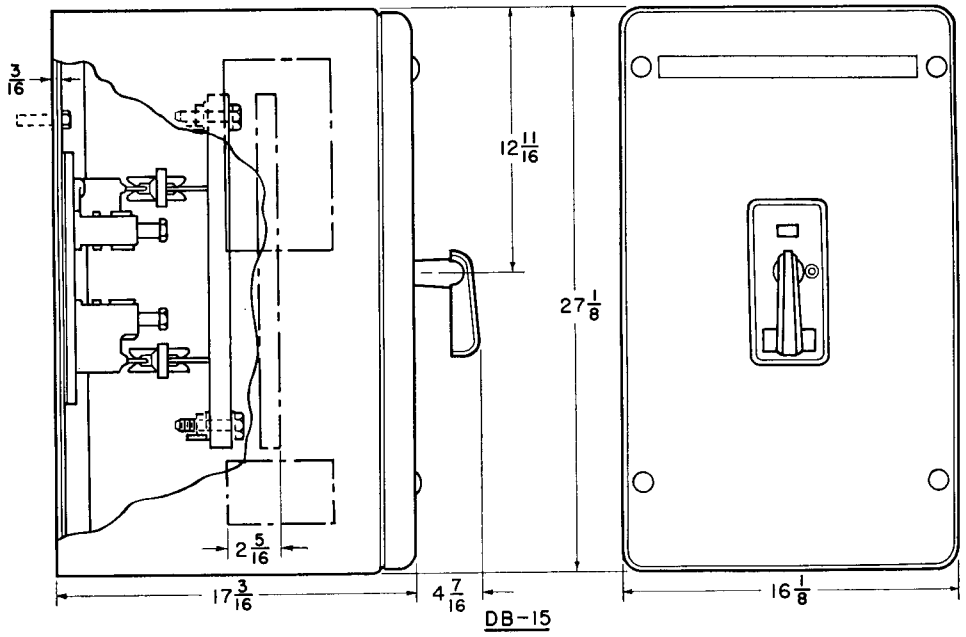
1. Connect the entrance cables first. Whenever possible, the power cables should be connected to the top terminals to remove voltage from the over-current attachments when the breaker is open. Tin the ends of the cable to prevent the formation of copper oxide. Tighten the clamp bolt securely and lock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

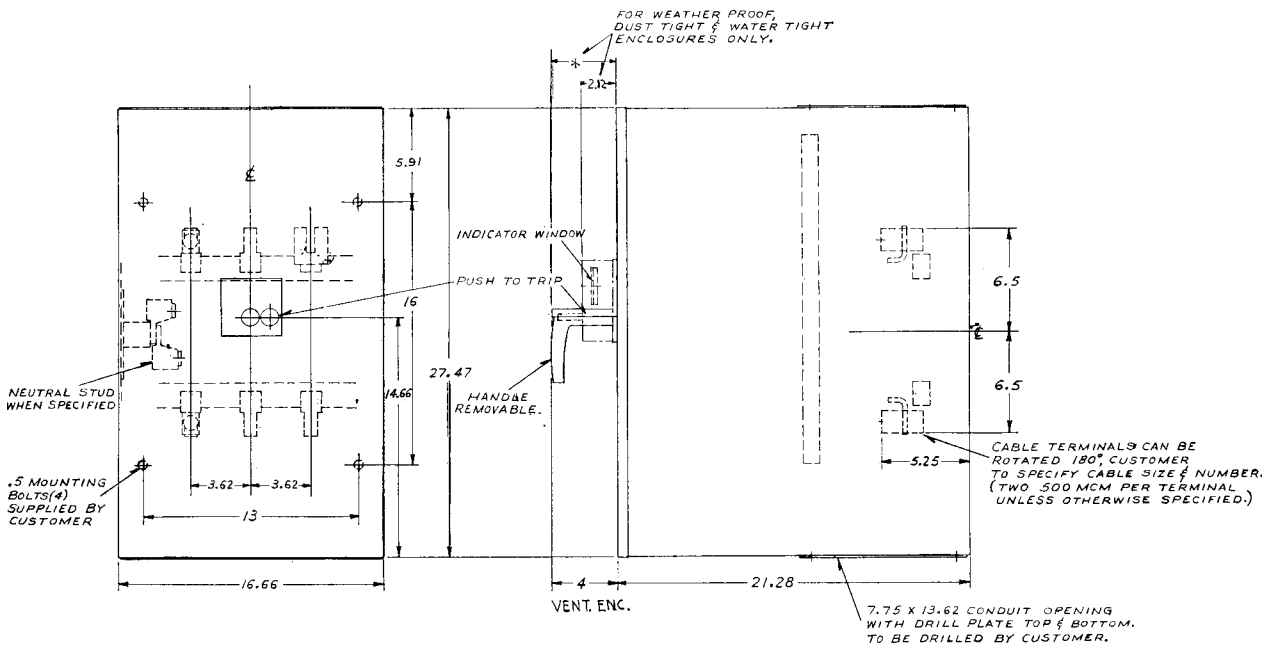
2. Control wires should run along the left side of the enclosure below the rail. Connect to the terminal block or auxiliary switch by running between the breaker platform and the rail in front of the wheel, after the breaker is bolted in place. When removing the breaker, disconnect the control wiring 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 finger clusters touch the cable bayonets, then use the two levering in handles to pry the breaker against the breaker stop bracket and bolt in place. Use the reverse sequence in removing the breaker. The rail extensions must be removed from the rails when levering the breaker in and out.

4. Always trip the breaker before removing it to avoid interrupting current on the cable bayonets. As a safety measure, a trip bar extension strikes a leaf spring on the enclosure rail to open the breaker while levering out.

The breaker is in the test position when the front wheels drop into the rail notches.





* This dimension should be 6.12

FIG. 2. Ventilated Enclosures—Outline Dimensions and Mounting Details

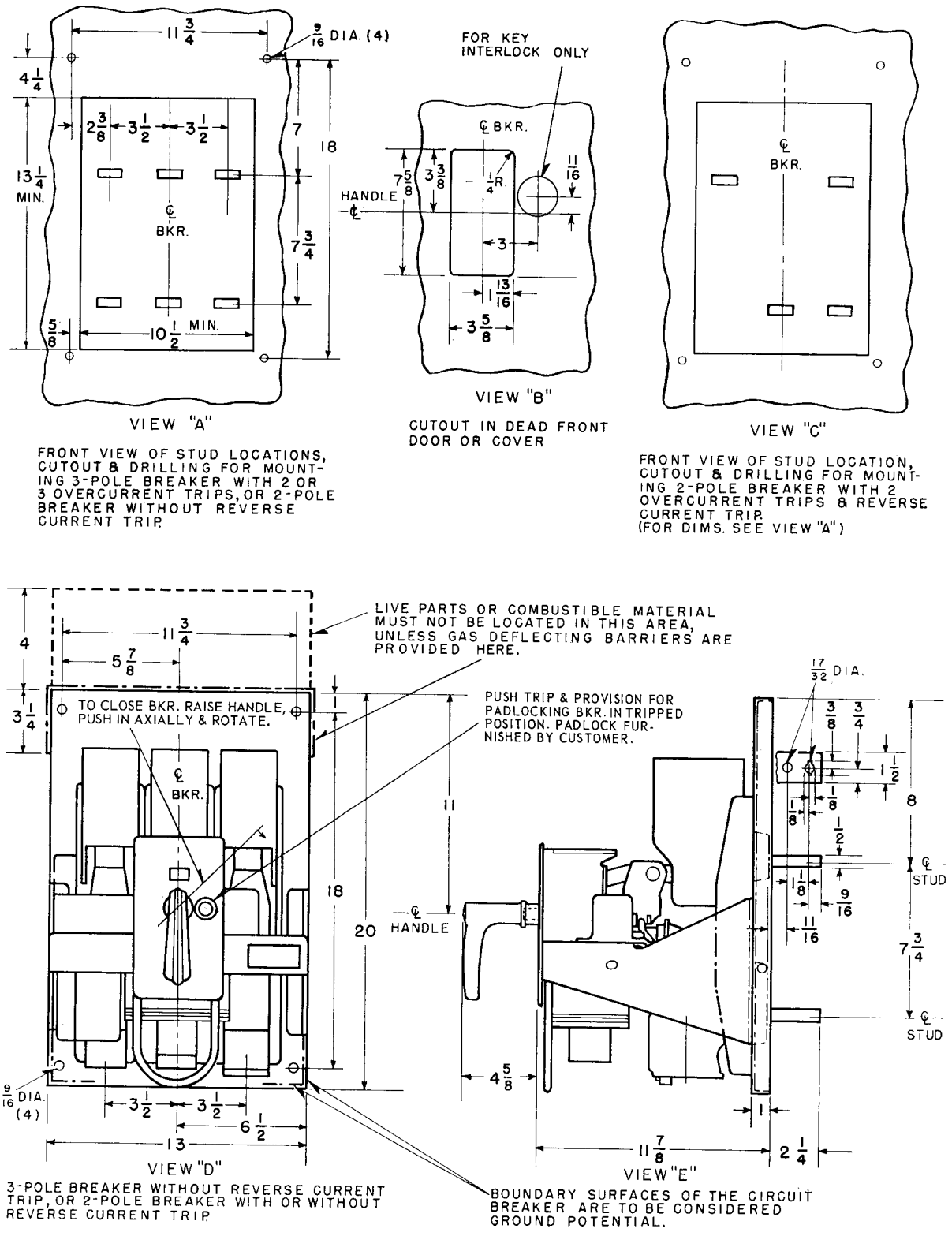
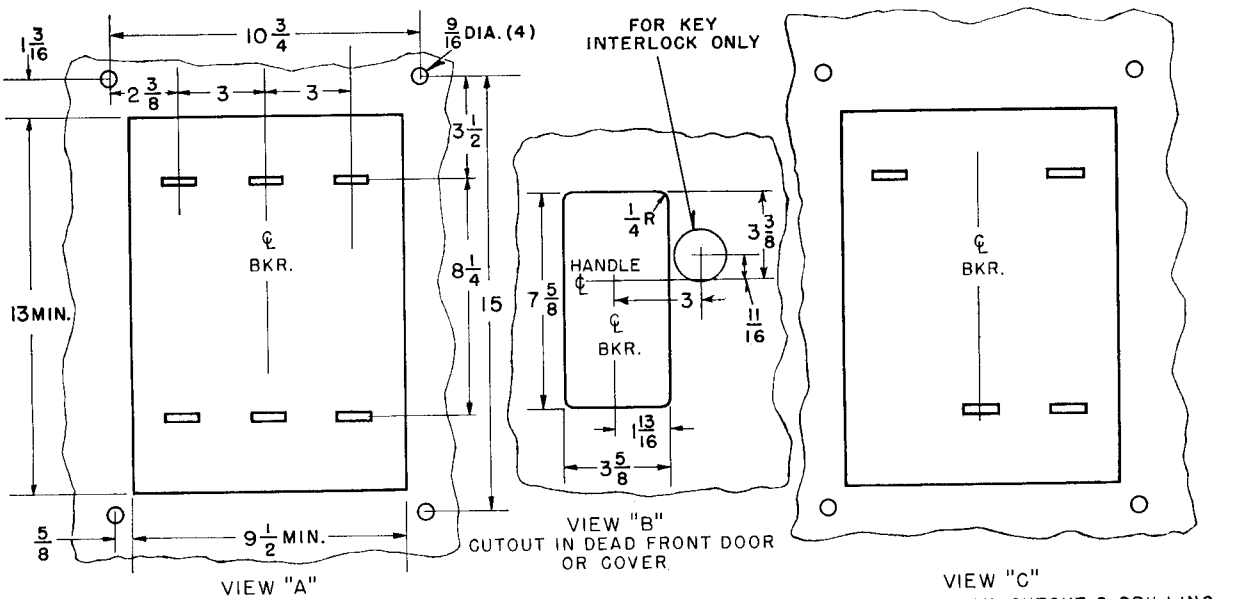
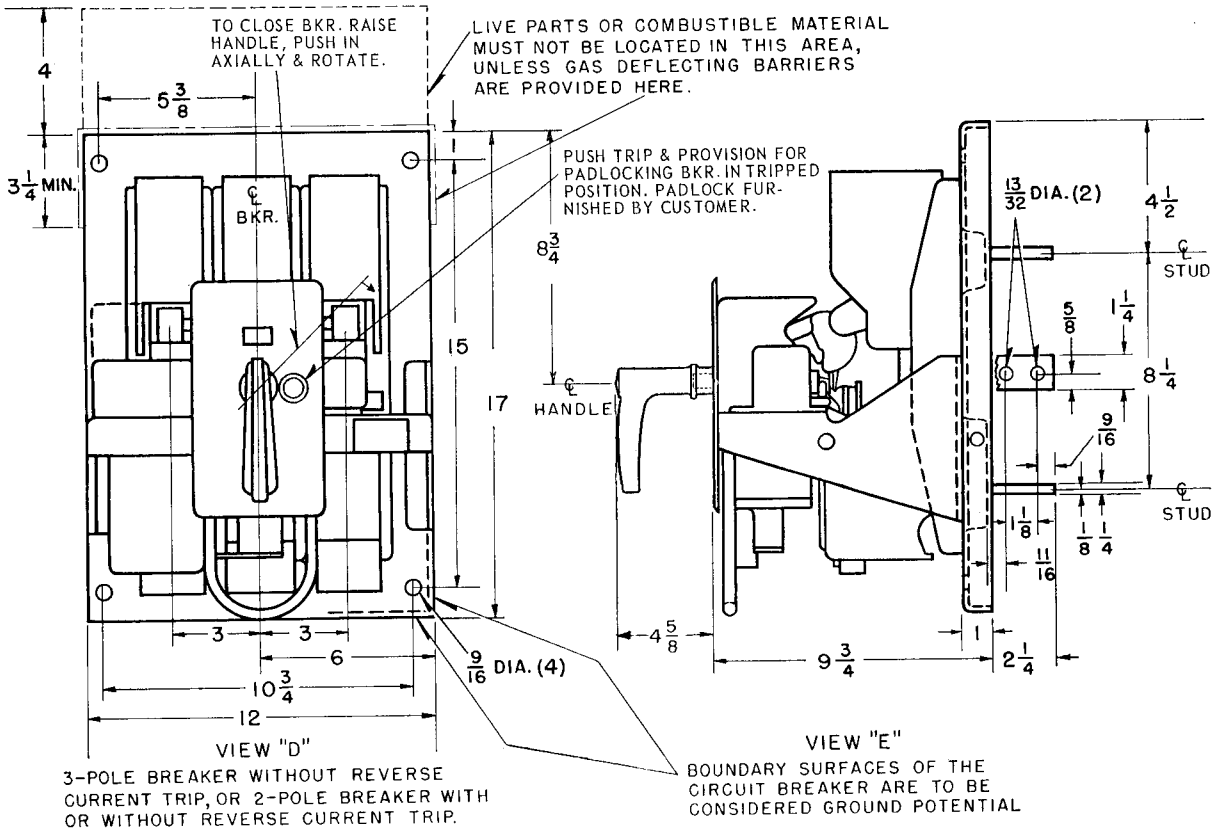


FIG. 3. DB-25 Outline Dimensions and Mounting Details



FRONT VIEW OF STUD LOCATIONS, CUTOUT & DRILLING FOR MOUNTING 3-POLE BREAKER WITH 2 OR 3 OVERCURRENT TRIPS, OR 2-POLE BREAKER WITHOUT REVERSE CURRENT TRIP

FRONT VIEW OF STUD LOCATION, CUTOUT & DRILLING FOR MOUNTING 2-POLE BREAKER WITH 2 OVERCURRENT TRIPS & REVERSE CURRENT TRIP (FOR DIMS. SEE VIEW "A")



3-POLE BREAKER WITHOUT REVERSE CURRENT TRIP, OR 2-POLE BREAKER WITH OR WITHOUT REVERSE CURRENT TRIP.

BOUNDARY SURFACES OF THE CIRCUIT BREAKER ARE TO BE CONSIDERED GROUND POTENTIAL

FIG. 4. DB-15 Outline Dimensions and Mounting Details

PART THREE

MAINTENANCE

POLE UNIT

Each pole unit is mounted on a separate molded base through which the breaker studs pass. (See Fig. 5). 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. 5). The DB-25 arcing contacts should touch first on closing, open last on opening, and have approximately a 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 3/32 to 1/8 inch gap between the armature plate and the steel link. 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 1/64-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.

Table No. 2. CLOSING SOLENOID CONTROL VOLTAGES, TRIPPING CURRENTS, CLOSING CURRENTS AND FUSE RATINGS

BREAKER TYPE	CLOSING COIL BURDEN	NOMINAL CONTROL VOLTAGE	CLOSING AMPERES	TRIPPING AMPERES	RECOMMENDED FUSE RATING AMPERE		FUSE STYLE NUMBER
					Standard NEC	Time Lag	
DB-15	All	12 D-C	...	18	..	...	.....
		125 D-C	17.5	2	10	...	120A823H04
		250 D-C	8.5	1	6	...	120A823H03
		230 A-C	30	.5	..	2.5	120A864G17
		460 A-C	15	.2	..	2.0	120A865G15
		575 A-C	12	.3	..	1.6	120A865G13
Ø DB-25	Std.	24 D-C	..	9.5	..	...	.....
		125 D-C	23	2	10	...	120A823H04
		250 D-C	10	1	6	...	120A823H03
		230 A-C	35	.5	..	8	120A864G27
		460 A-C	15	.2	..	2	120A865G15
		575 A-C	12	.3	..	1.6	120A865G13
	High	48 D-C	..	5	..	...	.....
		125 D-C	34	2	20	...	120A823G06
		250 D-C	15	1	6	...	120A823H03
		230 A-C	49	.5	..	8	120A864G27
		460 A-C	24	.2	..	2.25	120A865G16
		575 A-C	20	.3	..	2.25	120A865G16

* NOTE: For A-C closing use 3-kva source or larger.
Ø Standard close coils used when overcurrent tripping devices have instantaneous trip. Special close coils used when overcurrent tripping devices have short delay feature.

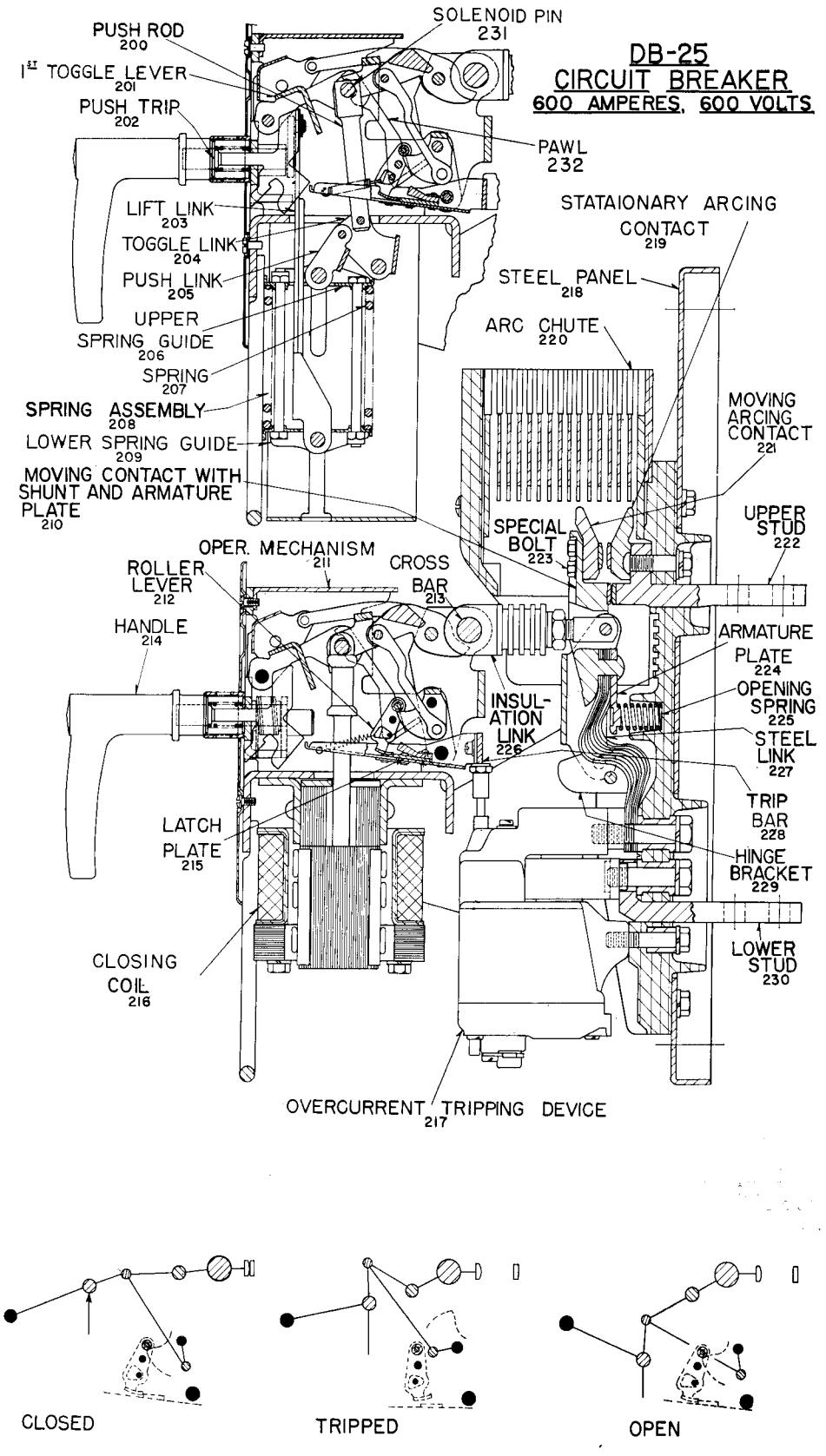


FIG. 5. Cross-Sectional View of Type DB-25 Circuit Breaker

OPERATING MECHANISM

The operating mechanism (see Fig. 5) is non-adjustable and consists of a series of 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.

The tripping load should not exceed 38 ounces measured at the trip bar.

CLOSING SPRING ASSEMBLY

The closing spring assembly is shown in the breaker closed position in Fig. 5. Assuming the breaker is in the open position, the following closing sequence applies:

Rotating the closing handle clockwise raises the lift link and lower spring guide to compress the closing spring. Near the end of the closing stroke the top end of the lift link strikes the first toggle lever to start the breaker closing. As the breaker closes the push rod raises the toggle link and push link out of toggle which permits the closing spring to complete the breaker closing.

Slow emergency operation to check the contact sequence can be obtained by exerting a slight closing pressure on the closing handle and simultaneously pushing forward on the breaker cross bar to start the breaker closing.

Maintenance. Oil the pins and slides every 10,000 operations.

CLOSING SOLENOID

The closing solenoid (see Fig. 5) 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 nominal voltage are listed in Table No. 2 on page 12.

OVERCURRENT TRIPPING DEVICE

The overcurrent tripping devices of the various ampere ratings are of the same general construction and size. They can be applied to the DB-15 circuit breaker in ratings of 15 to 225 amperes and to the DB-25 circuit breaker in ratings of 40 to 600 amperes.

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

The overcurrent tripping device, normally furnished for each pole of the circuit breaker, is designed for service on motor or general purpose feeder circuits or for service on systems where selective overcurrent tripping is desired. Figures 7A and 7B shows time-current characteristics of DB-15 and DB-25, circuit breakers equipped with typical overcurrent tripping devices, for selective tripping.

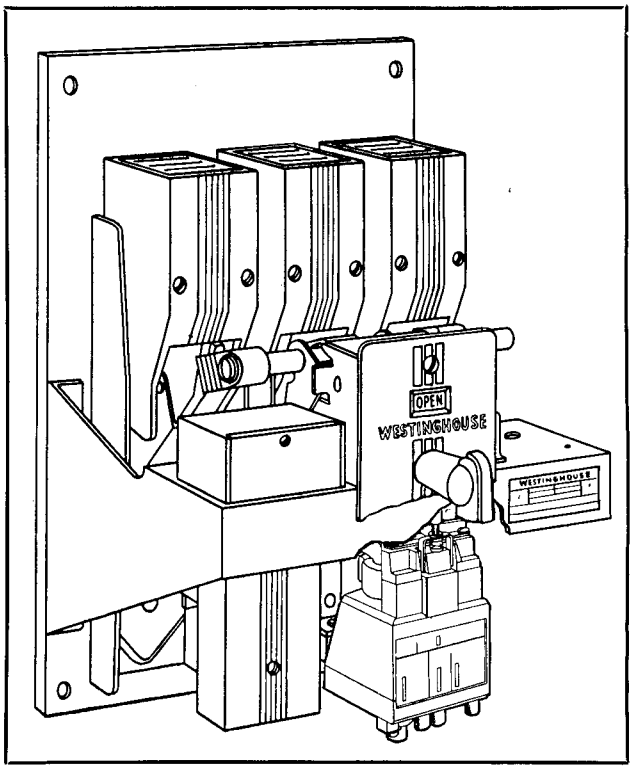


FIG. 6. Overcurrent Tripping Device—Location

Construction. The overcurrent tripping device is of the air delayed type with all elements adjustable. The adjustment knobs or parts likely to be touched while making adjustments of time or pickup current are electrically insulated. Fig. 6A shows a typical overcurrent tripping device ready for mounting on a breaker pole unit.

Loosening or removal of the reset valve requires recalibration of the long delay scale.

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 flexible 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 molded base of the tripping device. The mounting bolt sizes are shown in Table No. 3.

Table No. 3. MOUNTING BOLT SIZES

BOLT	DB-15	DB-25
	Thread Length	Thread Length
Top	½-13 x 1½"	½-13 x 2¼"
Center	½-13 x 1"	½-13 x 1¾"
Bottom	⅜-16 x 1"	⅜-16 x 1¾"

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.

To adjust the trip nut for proper tripping, first insert valve lever tool "B" or a 1/16 diameter rod, in the long delay calibration bracket (left slot) and raise the valve lever to its maximum position. This removes all of the time delay and permits the armature to operate easily. Then insert the push rod "A" Fig. 6A in the top slot of the calibration bracket and push the armature solidly against the yoke; close the breaker and adjust the trip nut to

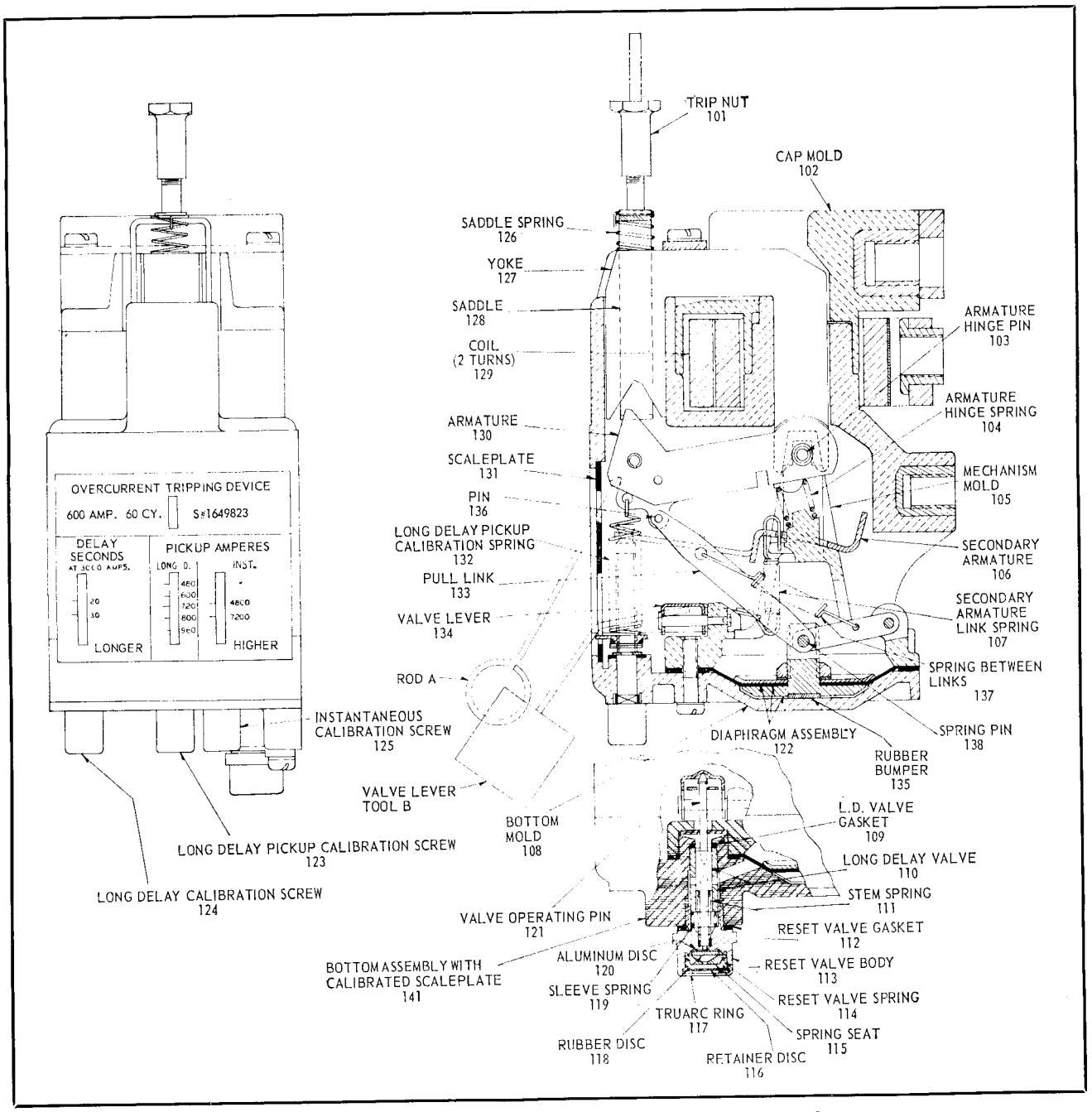


FIG. 6A. Overcurrent Tripping Device—Construction Details

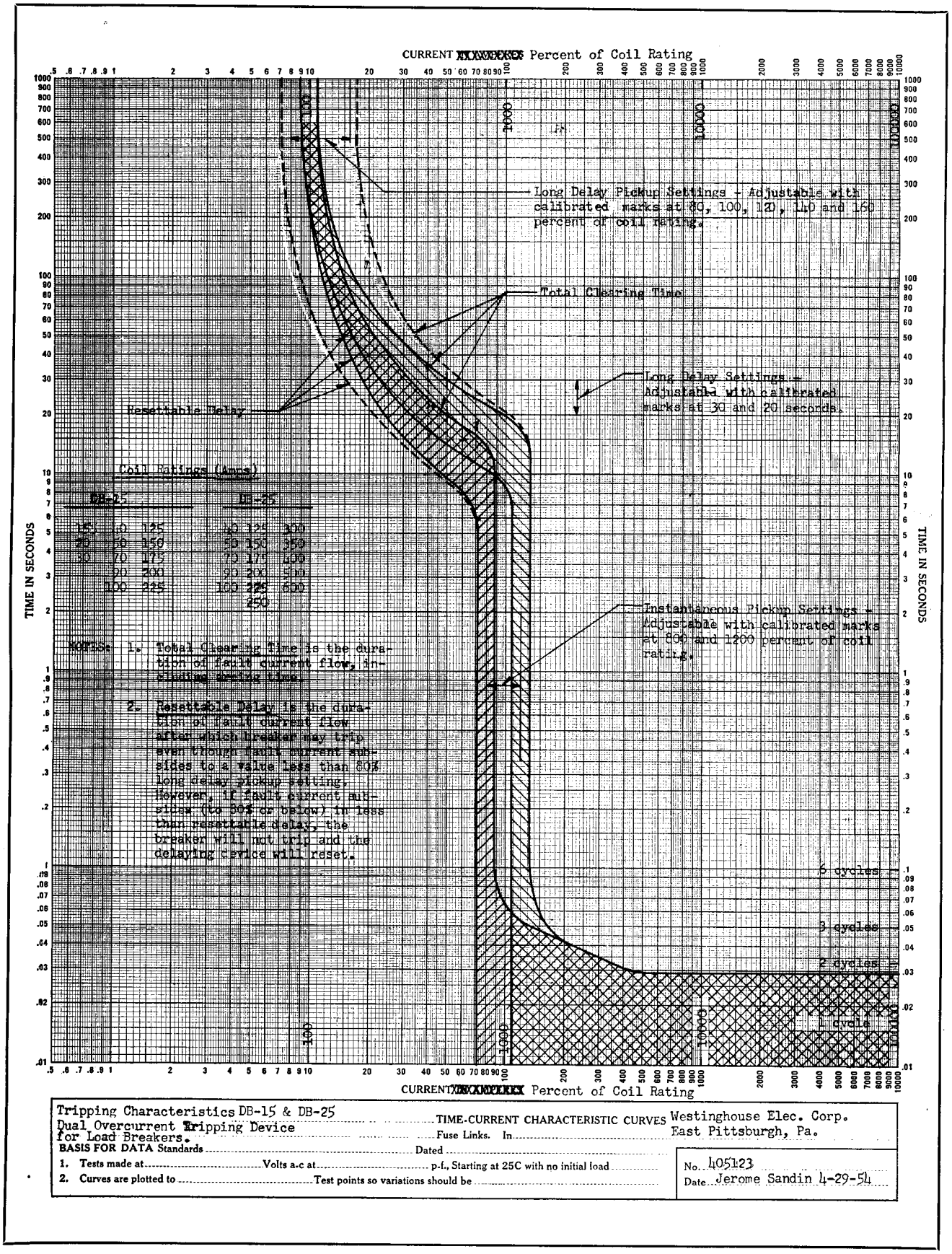
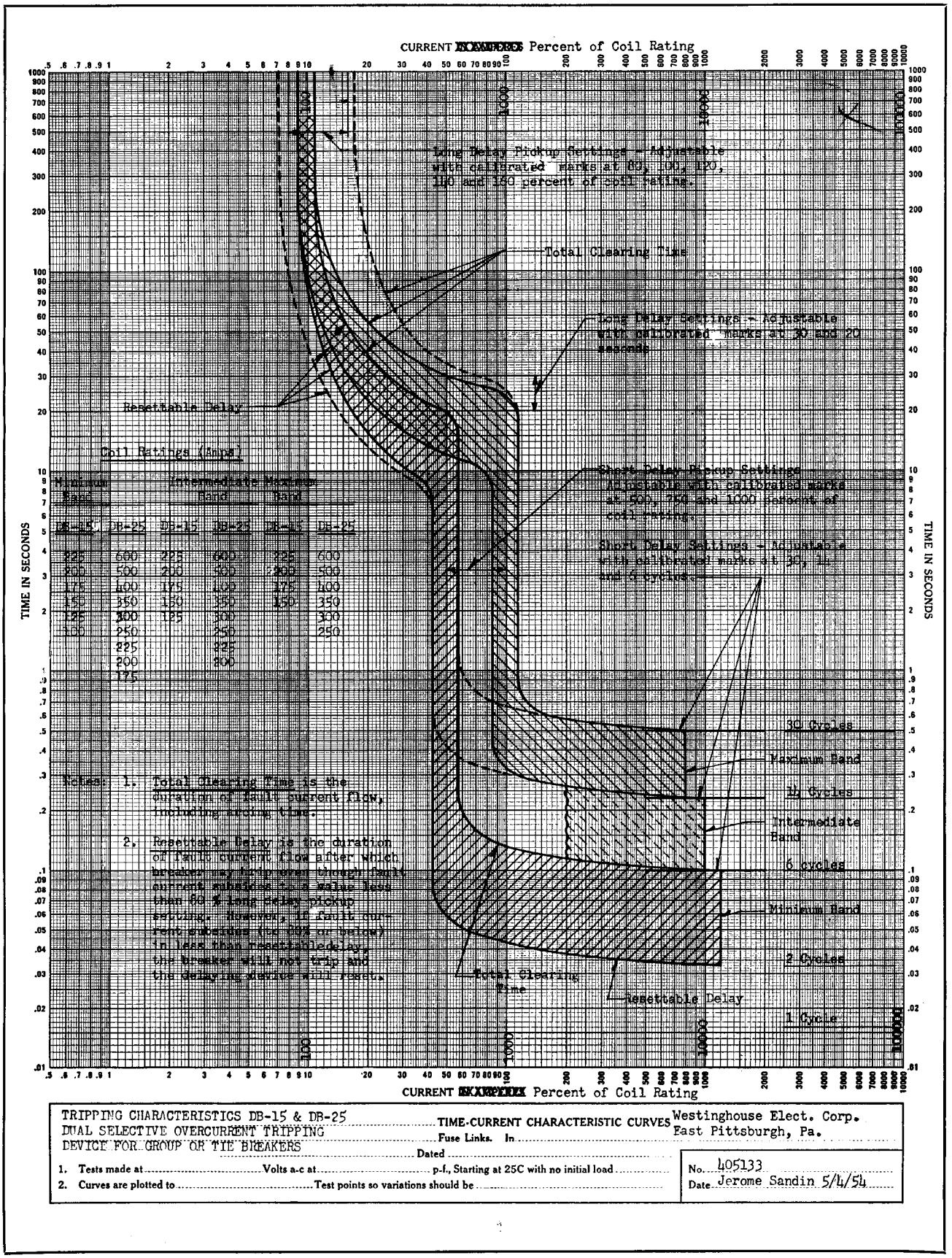


FIG. 7. Typical Tripping Characteristics of DB-15 and DB-25 Overcurrent Tripping Devices with Long Time Delay and Instantaneous Elements



TRIPPING CHARACTERISTICS DB-15 & DB-25 DUAL SELECTIVE OVERCURRENT TRIPPING DEVICE FOR GROUP OR TIE BREAKERS	TIME-CURRENT CHARACTERISTIC CURVES Fuse Links. In Dated	Westinghouse Elect. Corp. East Pittsburgh, Pa.
1. Tests made at Volts a-c at p-f., Starting at 25C with no initial load 2. Curves are plotted to Test points so variations should be		No. 405133 Date Jerome Sandin 5/4/54

FIG. 7A. Typical Tripping Characteristics DB-15 and DB-25 Dual Selective Overcurrent Tripping Device for Group and Tie Breakers.

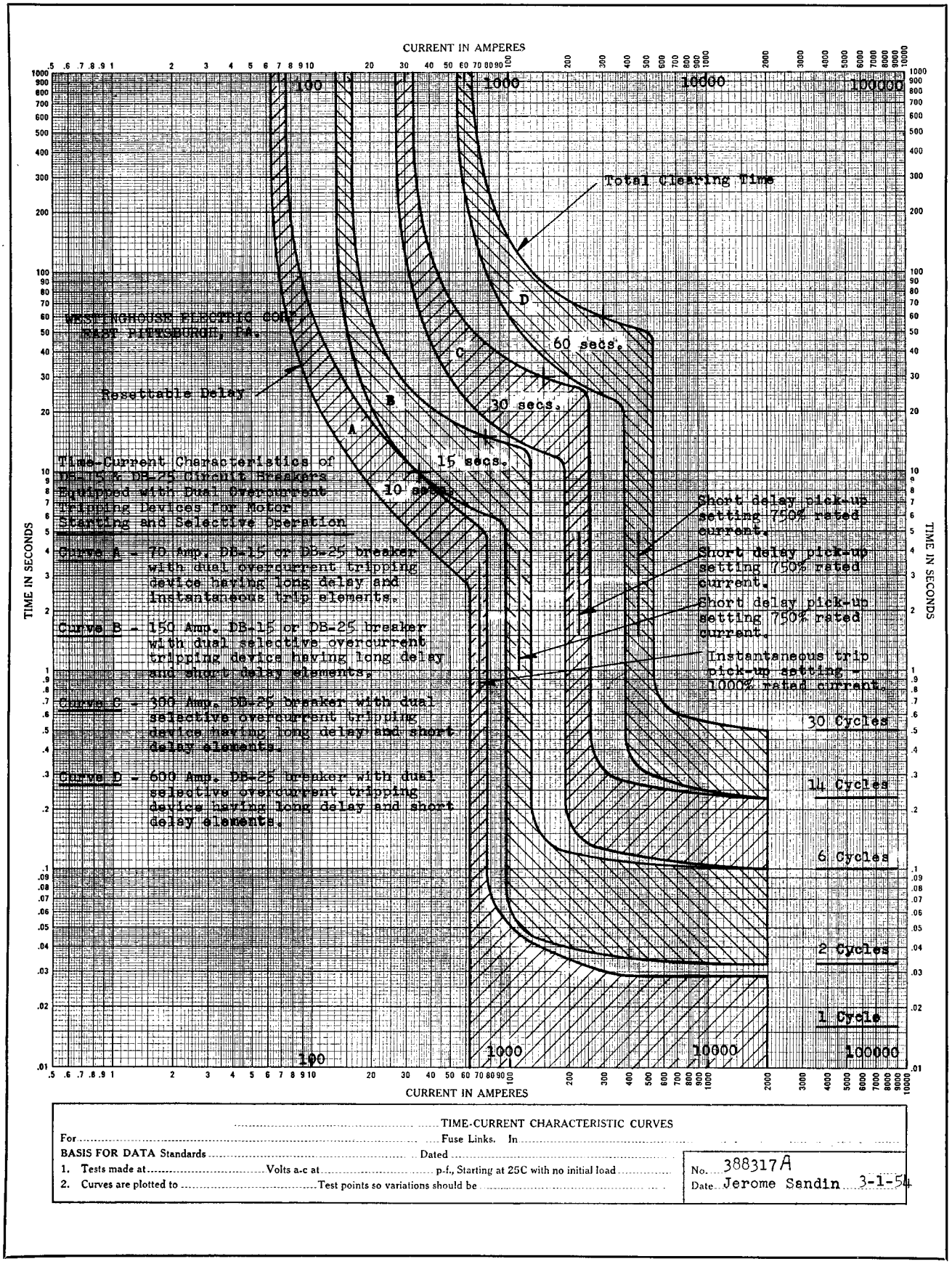
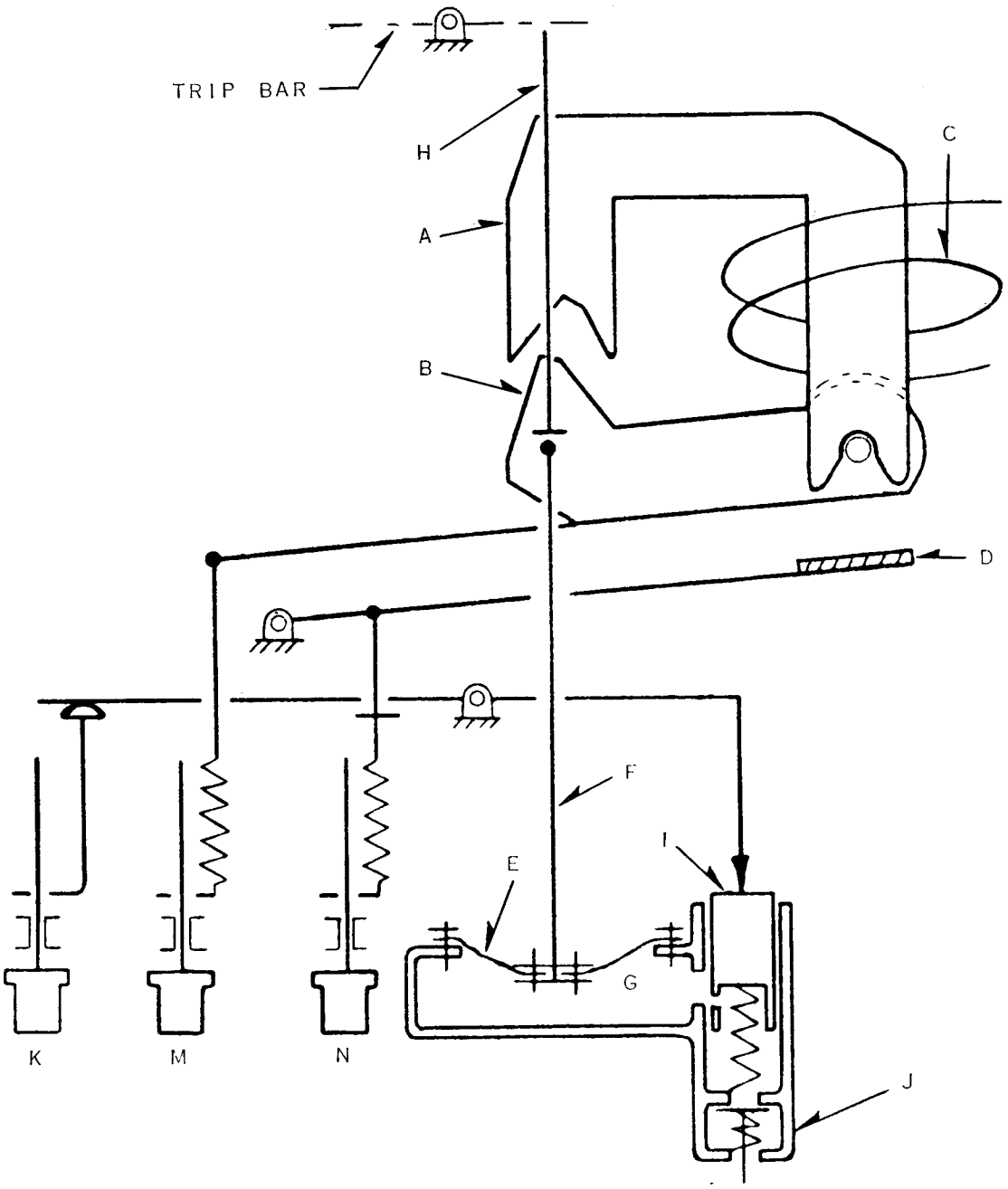
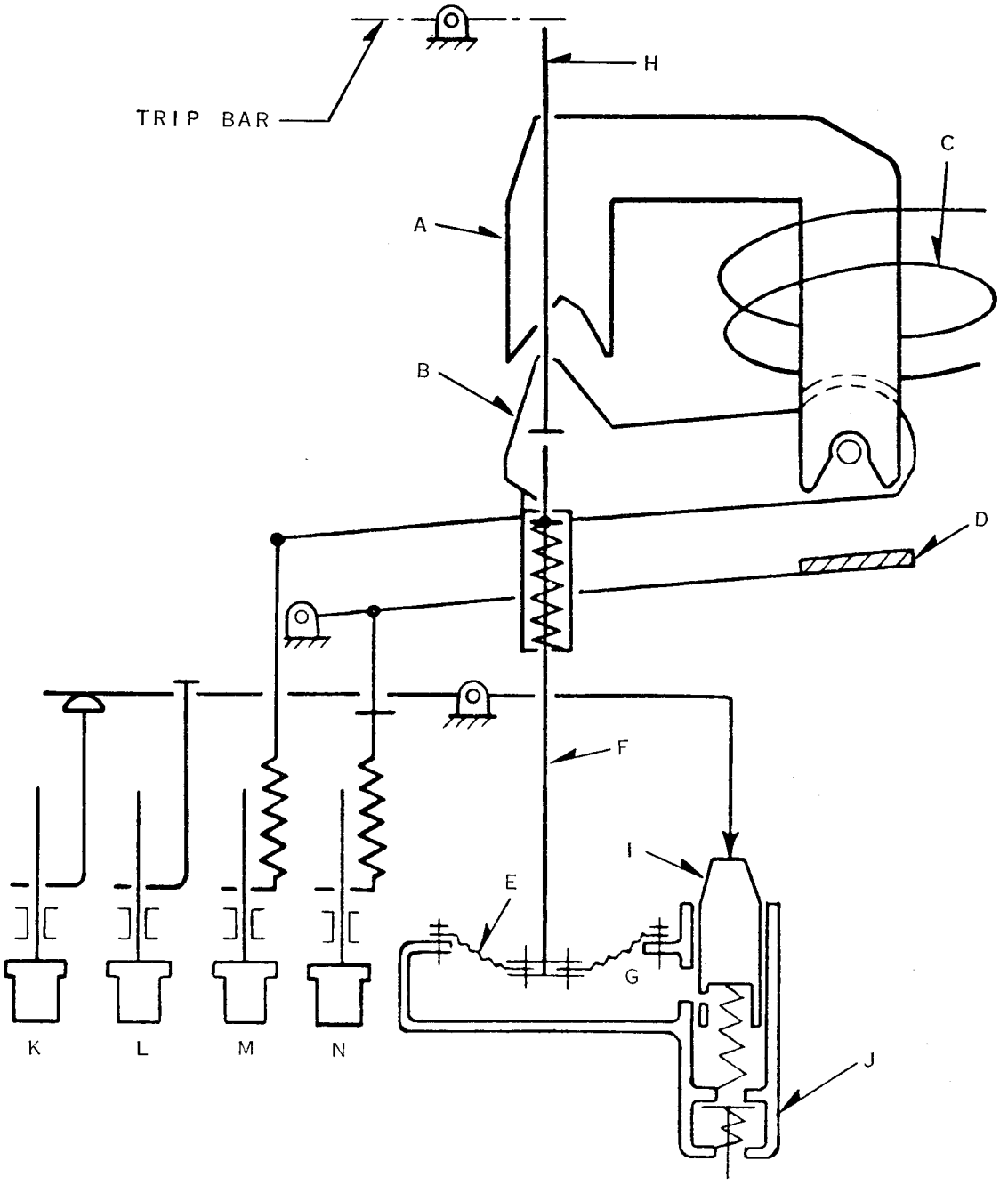


FIG. 7B. Typical Time-current Characteristics of DB-25 Circuit Breakers Equipped with Typical Overcurrent Tripping Devices for Motor Starting and Selective Operation



A - MAGNET YOKE
B - ARMATURE
C - SERIES COIL
D - SECONDARY ARMATURE
E - DIAPHRAM
F - PULL LINK
G - AIR CHAMBER
H - TRIP SADDLE
I - TIMING VALVE
J - RESET VALVE
K - LONG DELAY ADJUSTMENT
M - LONG DELAY PICK UP ADJUSTMENT
N - INSTANTANEOUS TRIP ADJUSTMENT

FIG. 7C. Schematic Diagram—Dual Overcurrent Series Tripping Device DB-15 and DB-25 Load Circuit Breakers



A - MAGNET YOKE
B - ARMATURE
C - SERIES COIL
D - SECONDARY ARMATURE
E - DIAPHRAM
F - PULL LINK
G - AIR CHAMBER
H - TRIP SADDLE
I - TIMING VALVE
J - RESET VALVE
K - LONG DELAY ADJUSTMENT
L - SHORT DELAY ADJUSTMENT
M - LONG DELAY PICK UP ADJUSTMENT
N - SHORT DELAY PICK UP ADJUSTMENT

FIG. 7D. Schematic Diagram—Dual Selective Overcurrent Series Tripping Device DB-15 and DB-25 Group or Tie Circuit Breakers

barely trip the breaker. Several trials may be necessary. Next turn the trip nut upwards three quarters turn to provide overtravel. This completes the adjustment as the trip nut is self locking. Special wrench S# 1809539 is recommended for adjusting the trip nut on the center pole.

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.

BOTTOM ASSEMBLY

The bottom assembly can be removed for repair or replacement without removing the complete overcurrent by removing the four corner 3/16" screws from the bottom of the overcurrent. The scaleplate is applicable to its own bottom assembly and should always be tied to it.

When replacing the bottom assembly make sure that the bronze armature hinge pin bushings have their flanges captive on the inside of the yoke side plates.

Operation

1—Dual Overcurrent Tripping Device for Load Breakers, Fig. 7C

Overload currents above the setting of the long delay pick-up adjustment (M) forces the armature (B) and the trip saddle (H) towards the trip bar of the circuit breaker. This upward movement of the armature (B) and diaphragm (E) reduces the pressure in chamber (G) causing air to be sucked in through the timing valve (I). The rate of travel of the trip saddle (H) is determined by the rate at which air is permitted to enter chamber (G) by valve (I). The reset valve (J) allows quick reset of the parts after the breaker has been tripped.

Short circuit currents above the setting of the instantaneous element as determined by adjustment (N) causes the secondary armature (D) to be attracted to the main armature (B). The upward movement of secondary armature (D) moves valve (I) to wide open position, which removes restraint on the movement of armature (B). The main armature (B) and trip saddle (H) move instantly to trip the breaker.

2—Dual Selective Overcurrent Tripping Device for Group and Tie Breakers, Fig. 7D

The operation of this selective device is the same as the dual overcurrent tripping device, except, that in this case, the long delay and instantaneous valve (I) in Figure 7C is replaced with a long delay and short delay valve (I) Figure 7D, which operates the same, except, when valve (I) Figure 7D is forced down by the secondary armature on fault currents it controls the size of orifice to give the tripping time required in the fault current short delay region.

Adjustment of Settings

Caution: As a safety measure, the breaker should be disconnected from the circuit before making any adjustment.

By turning the adjustment knobs K-M-N Fig. 7C and K-L-M-N Fig. 7D, the settings of the various time and pick-up elements can be changed. A clockwise movement of any one of the knobs will increase the setting and a counterclockwise movement will decrease the setting.

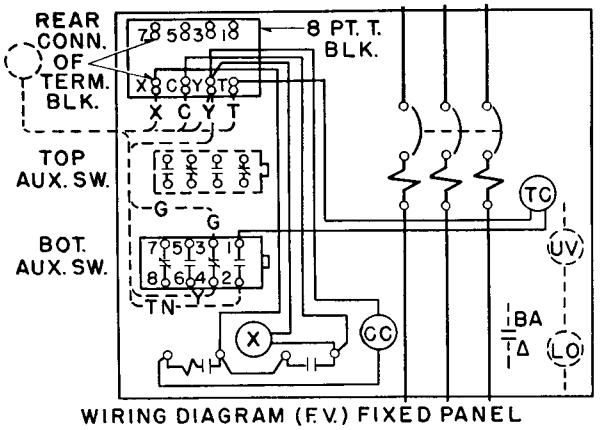
REPLACING OVERCURRENT DEVICES

Instruction for Replacing Sealed Oil Overcurrent Devices by Air Overcurrent Devices. Paragraphs 1 and 4 only are required for breakers shipped after March 1, 1954.

1. Remove the sealed oil overcurrent and discard the mounting bolts. The proper bolts for the insulated overcurrent are given in Table # 3.

2. Remove the lower studs and redrill the overcurrent bolt holes to $^{21}/_{32}$" (the bushing on the lower coil terminal must fit inside this hole). Replace when redrilled.

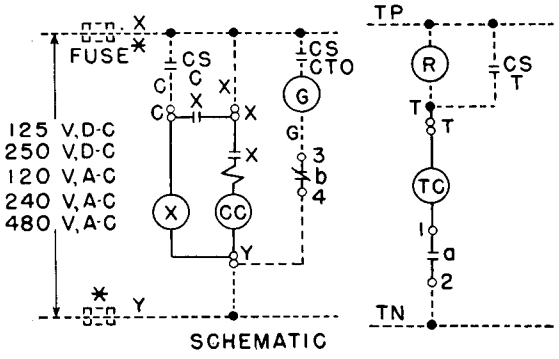
3. Loosen the three bolts holding the left and center pole units to the panel and remove and discard the present barriers (3P. breakers only). Install the new barriers. The new barriers are not symmetrical and consequently they cannot both be slipped under the center pole unit as was the case with the existing barriers. The DB-25 barriers S# 1736180 should be assembled with bumper blocks downwards; this requires one barrier to be slipped under the left pole unit and the other under the center pole unit. The DB-15 barriers S# 1736179 should be assembled with the beveled corners upwards, by following the above procedure.



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.



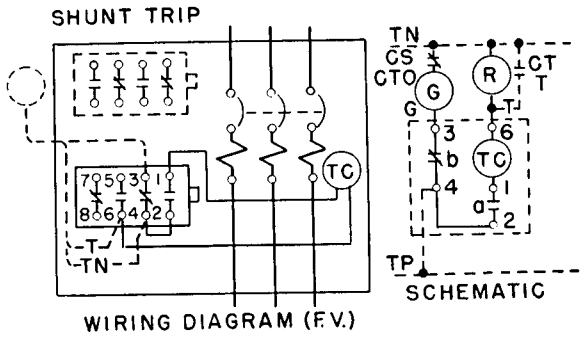
SCHEMATIC

LEGEND

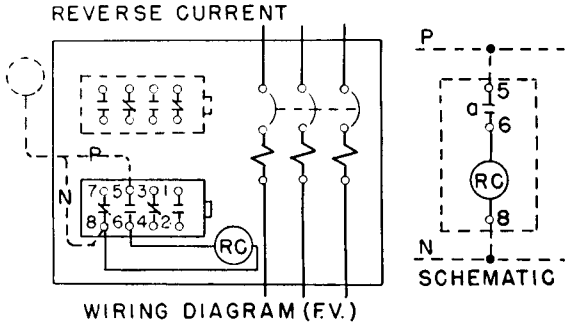
X-CONTROL RELAY
CC-CLOSING COIL
TC-TRIP COIL
CS-CONTROL SWITCH
R-RED LAMP (CLOSED)
G-GREEN LAMP (OPEN)
UV-UNDERVOLTAGE
LO-LOCKOUT
BA-ALARM SWITCH
a-MAKE CONTACT
b-BREAK CONTACT

Δ-ALARM CONTACT DOES NOT CLOSE WHEN BREAKER IS TRIPPED MANUALLY OR BY THE SHUNT TRIP

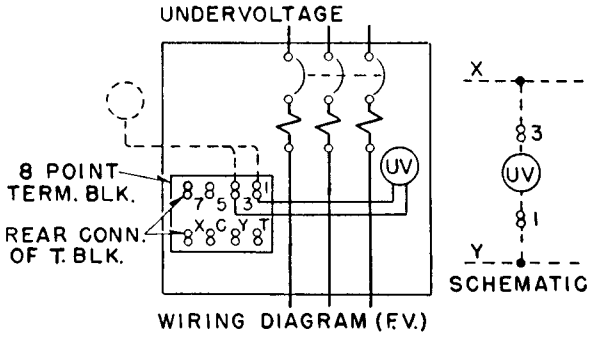
*-CURRENT LIMITING FUSES TO BE USED ONLY WHEN A-C CONTROL SOURCE IS FROM SWGR. BUS.



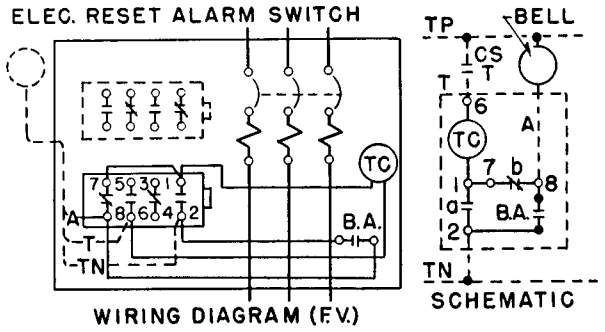
WIRING DIAGRAM (F.V.)



WIRING DIAGRAM (F.V.)



WIRING DIAGRAM (F.V.)



WIRING DIAGRAM (F.V.)

FIG. 8. Typical Wiring Diagrams—Type "DB" Circuit Breaker

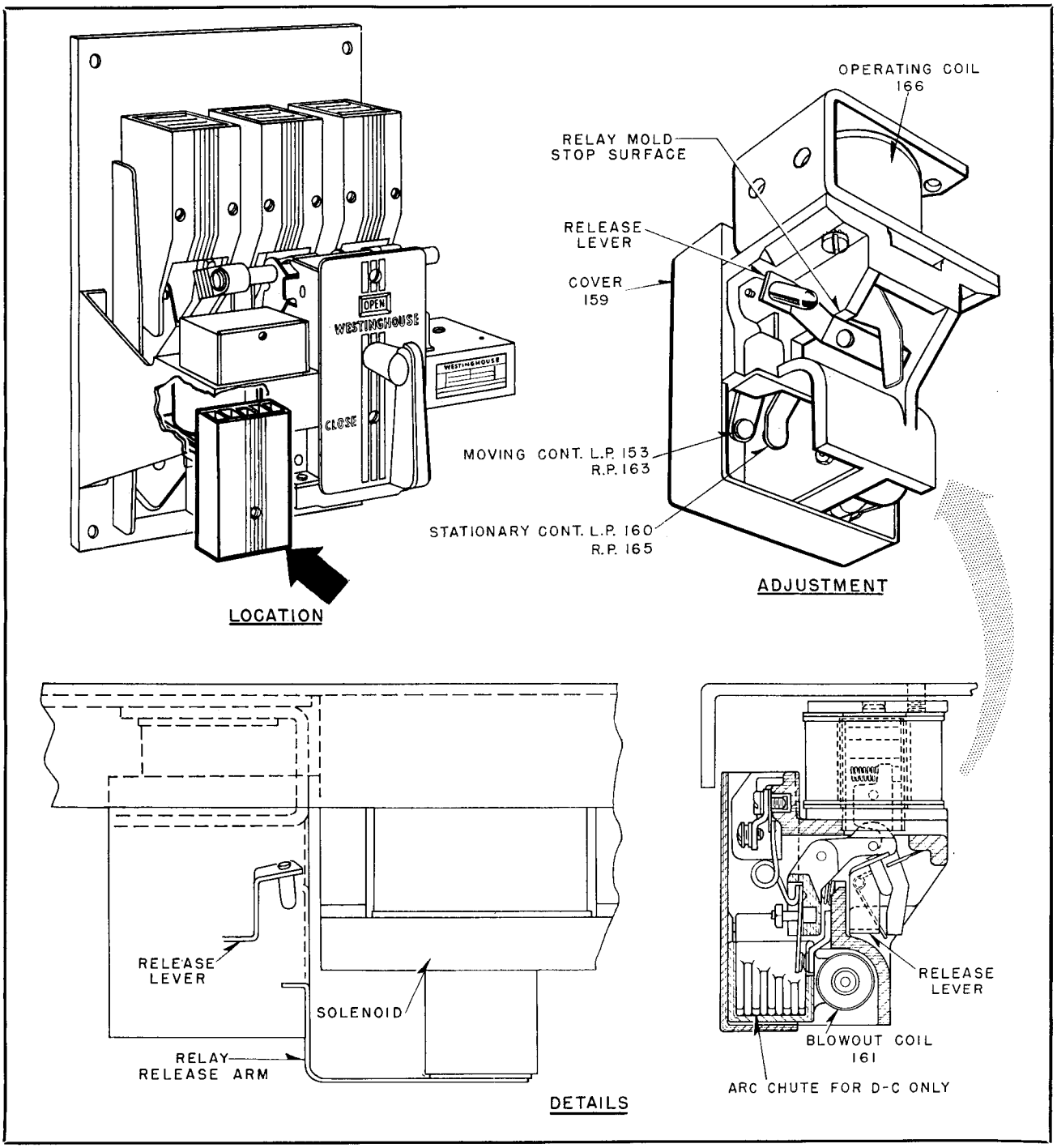


FIG. 9. Control Relay—Location, Adjustment, and Construction Details

4. Remove the operating mechanism from the platform and (a) remove and discard the molded trip fingers from the trip bar; (b) remove and discard the brass counterbalance from the bottom of the trip lever. Remount the operating mechanism.

5. If the breaker is equipped with a shunt trip attachment, remove and discard the trip lever from the shunt trip and replace with trip lever S# 1736189.

6. If the breaker is equipped with an electric lockout attachment remove and discard the 1/16 thick Micarta angle screwed to the electric lockout lifting plate. Insulation is not required with the insulated overcurrent device.

7. Loosen the control relay and solenoid mounting bolts on DB-15 breakers (if supplied) and tilt forwards slightly to permit easy installation of the

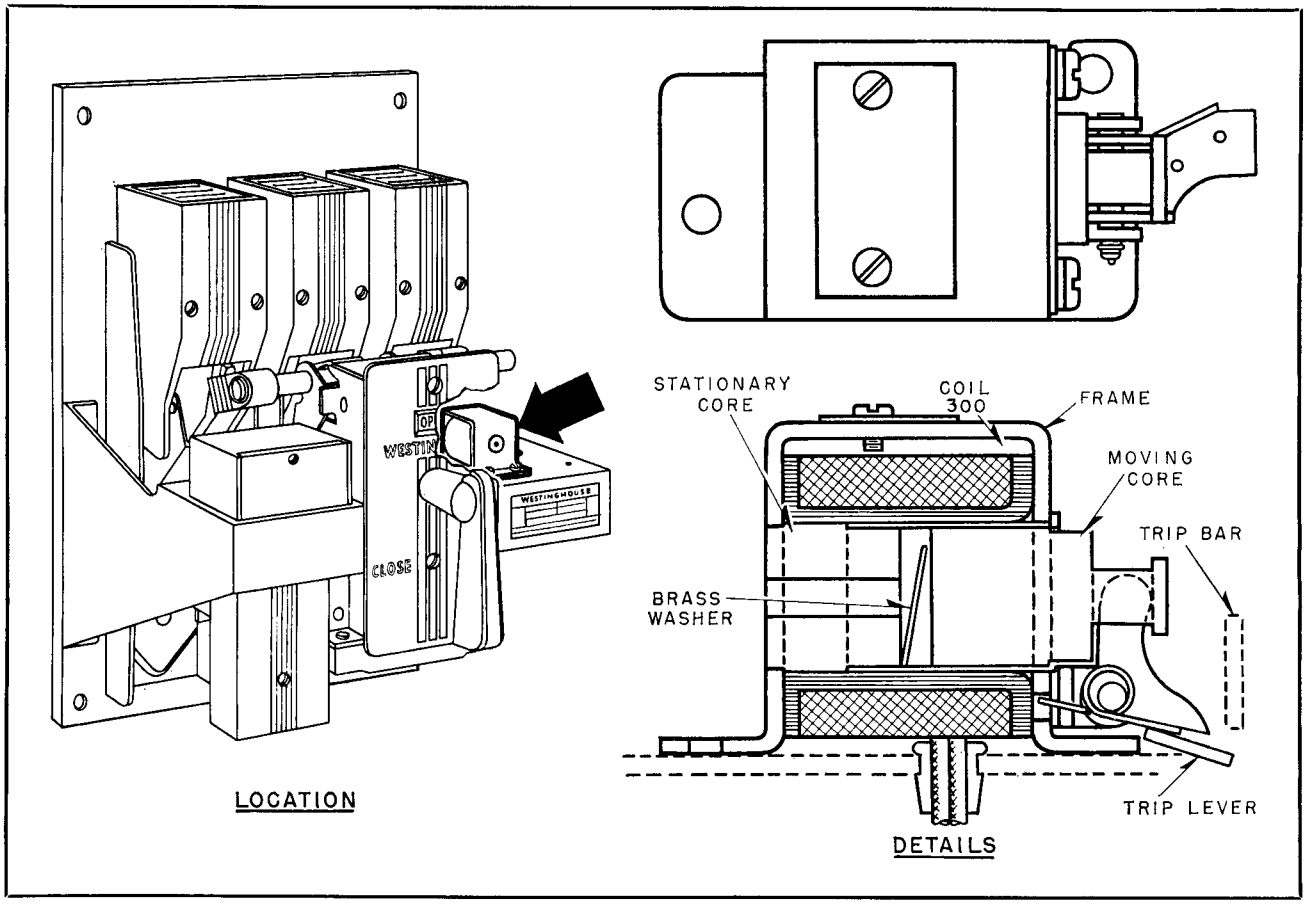


FIG. 10. Shunt Trip Attachment—Location and Construction Details

new overcurrents. Tighten all bolts after mounting the overcurrent device.

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. 8, page 22. The contacts should normally last the life of the breaker, but are replaceable if found necessary.

Check for correct adjustment by energizing the relay coil with the breaker in the closed position. If the relay contacts touch momentarily, and draw an arc, bend the release arm upward with a pair of pliers. After bending, make sure the vertical portion of the release arm does not rub either the relay mold or the solenoid frame.

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 12.

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 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. Turn the reset lever screw to secure approximately 14 oz. push out force on the moving core when the latch releases.

The moving core is normally held magnetically against the stationary core to hold the Micarta rod

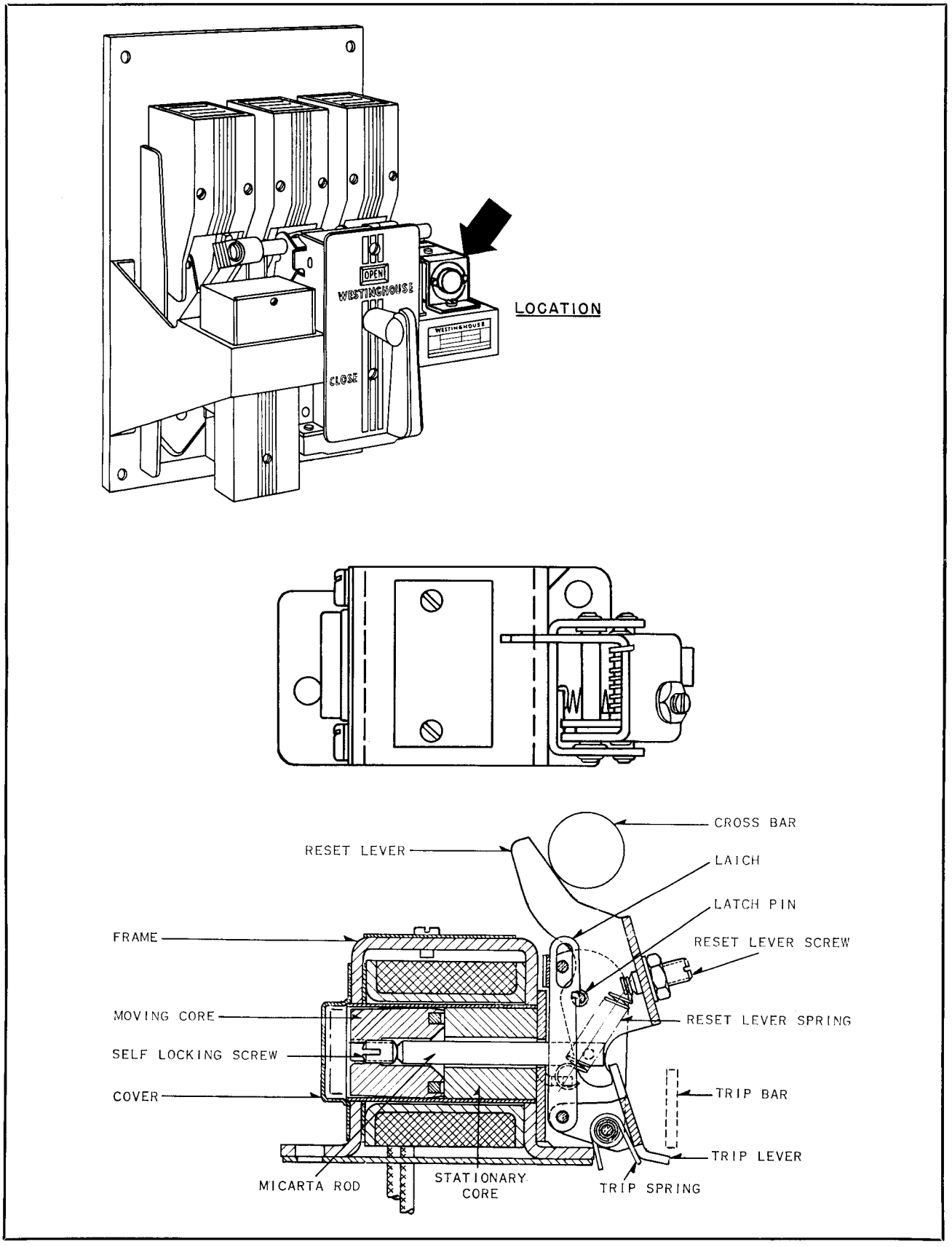


FIG. 11. Undervoltage Trip Attachment—Location and Construction Details

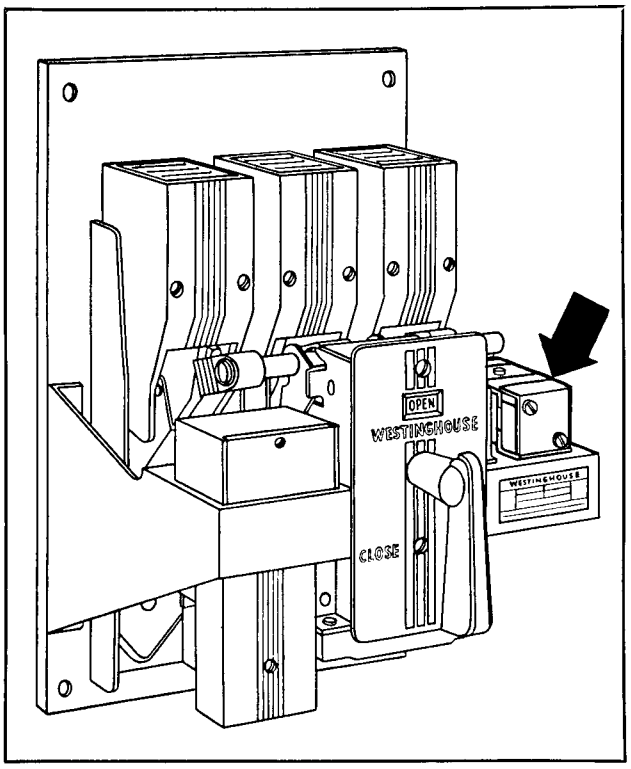


FIG. 12. Undervoltage Time Delay Attachment—Location

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, it carries with it the latch pin which rotates relative to the latch until the latch is released. 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.

The self-locking screw in the moving core is set at the factory and should not require adjustment. It is used to secure latch release when the moving core is 7/32 outside the frame. (Change to 5/16" when a time delay is used).

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.

The trip lever of the undervoltage should have approximately 1/16 inch clearance to the trip bar when the breaker is half way closed.

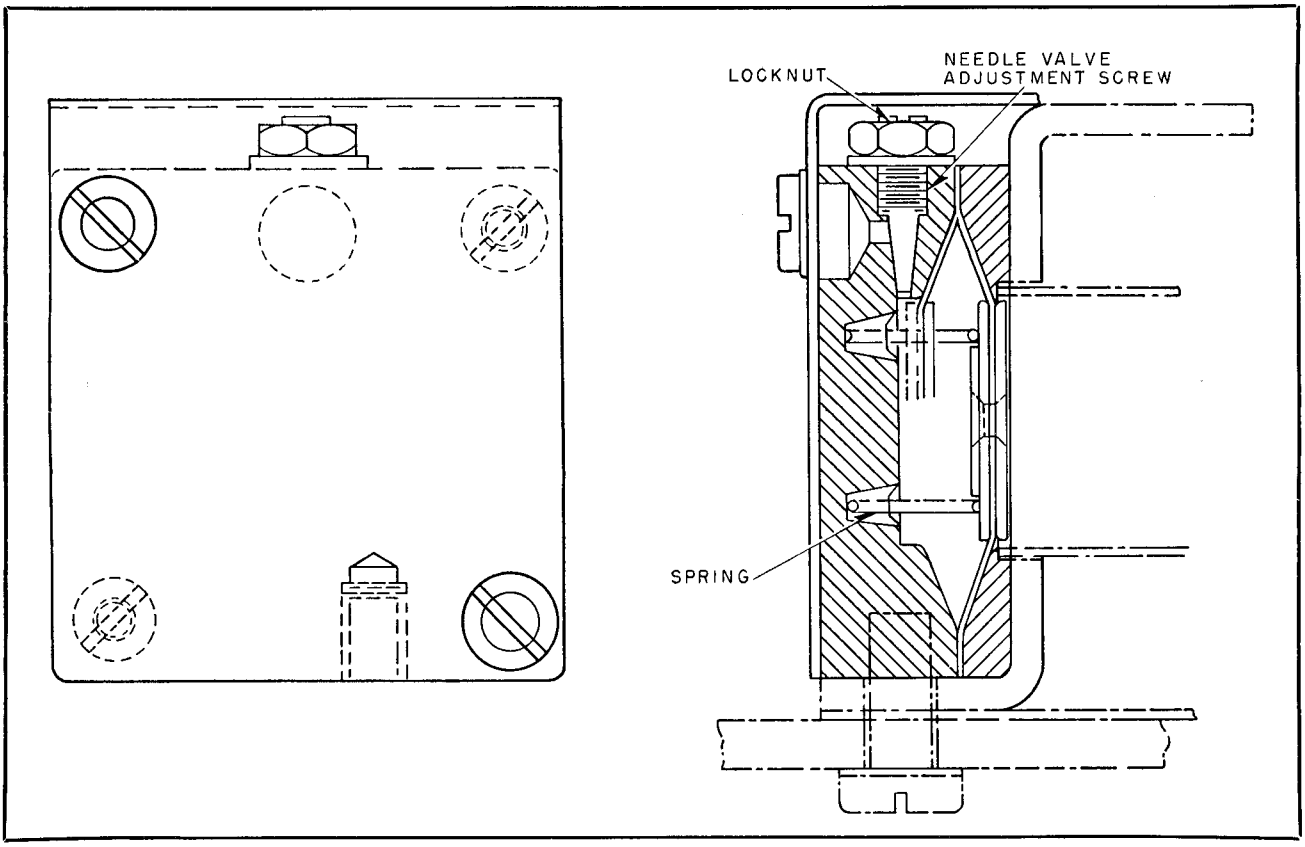


FIG. 12A. Undervoltage Time Delay Attachment—Construction Details

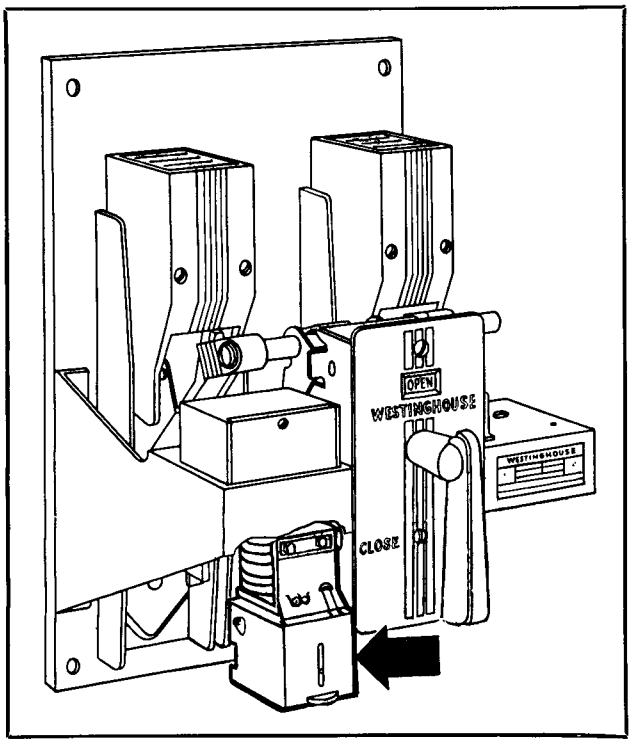


FIG. 13. Reverse Current Trip Attachment—Location

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 resetting. It is set to trip within 4 to 7 seconds.

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 FOR 2 P. D-C. BREAKER

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 direction of current flow in that pole is reversed.

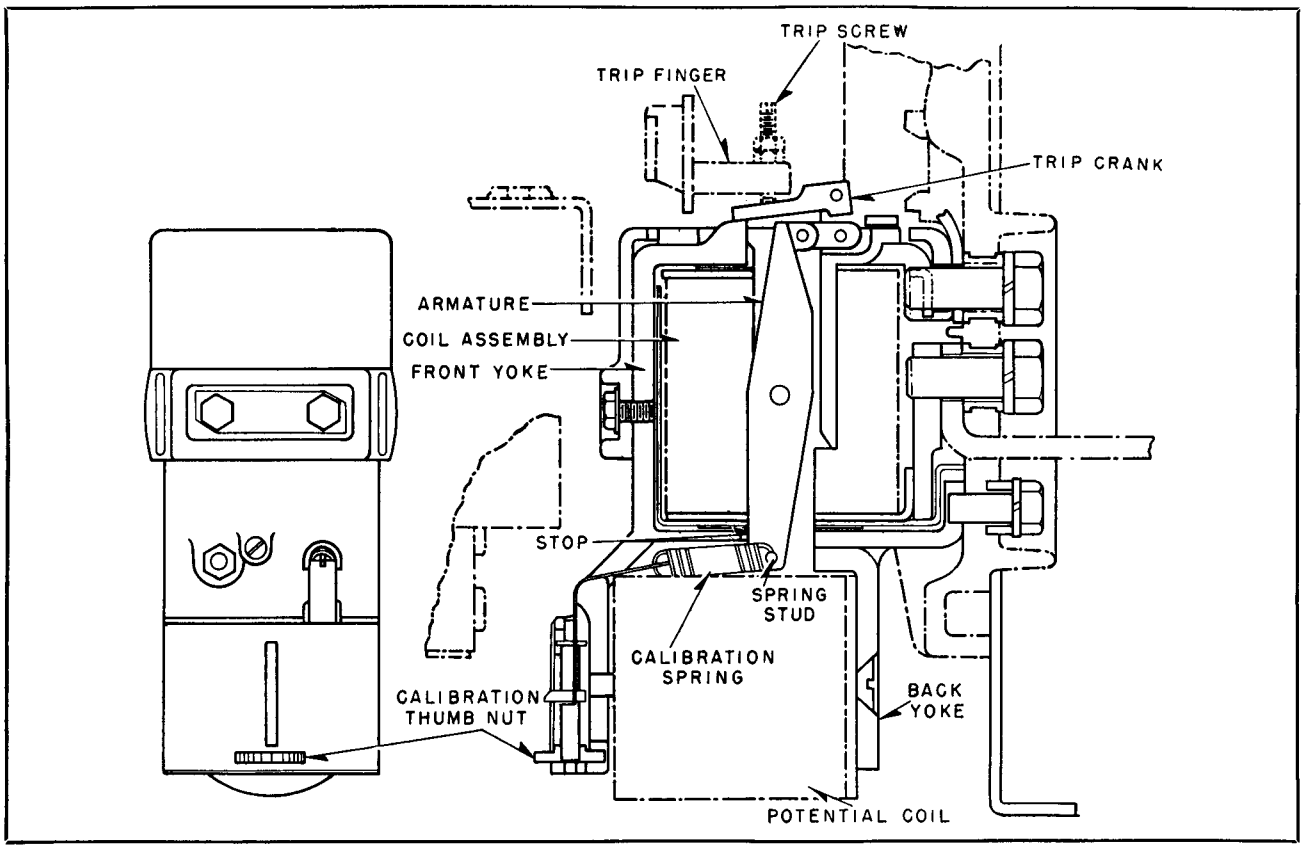
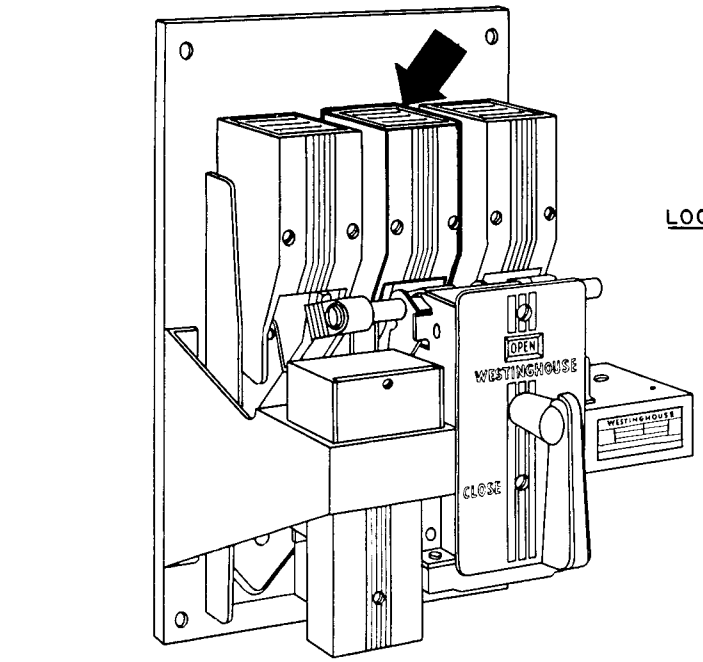
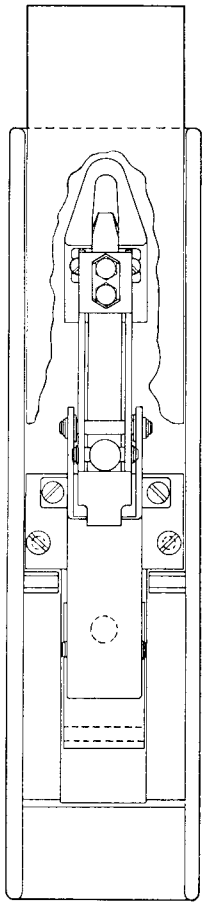
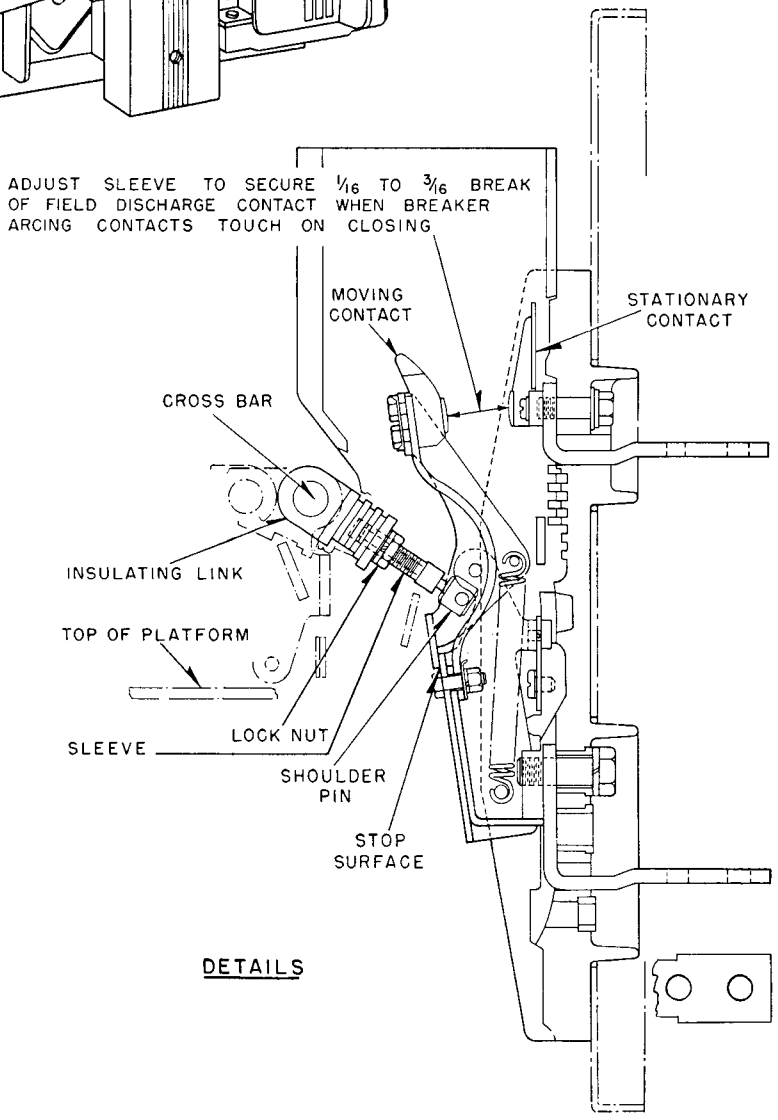


FIG. 13A. Reverse Current Trip Attachment—Construction Details



LOCATION





DETAILS

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

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.

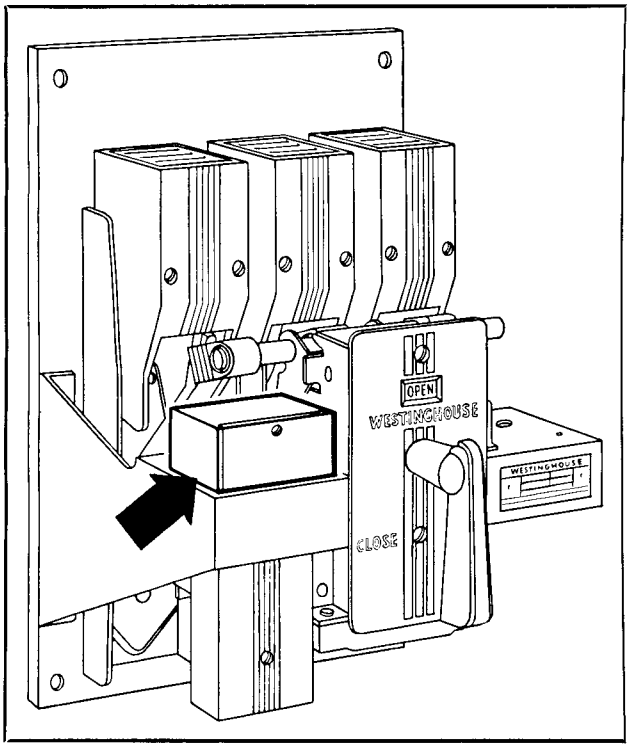


FIG. 15. Auxiliary Switch—Location

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 1/32-inch overtravel after tripping.

Final inspection should be made electrically, after the circuit connections are complete as shown in Fig. 8, page 22.

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

DBF-6 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 shipped with the gap setting shown in Fig. 14, for generator field protection. However, the gap setting can be reduced to zero or set to open after the breaker contacts close, if desired. 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 break distance is adjusted by loosening the lock nut and turning the sleeve in or out. Always leave a slight gap at the stop surface.

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

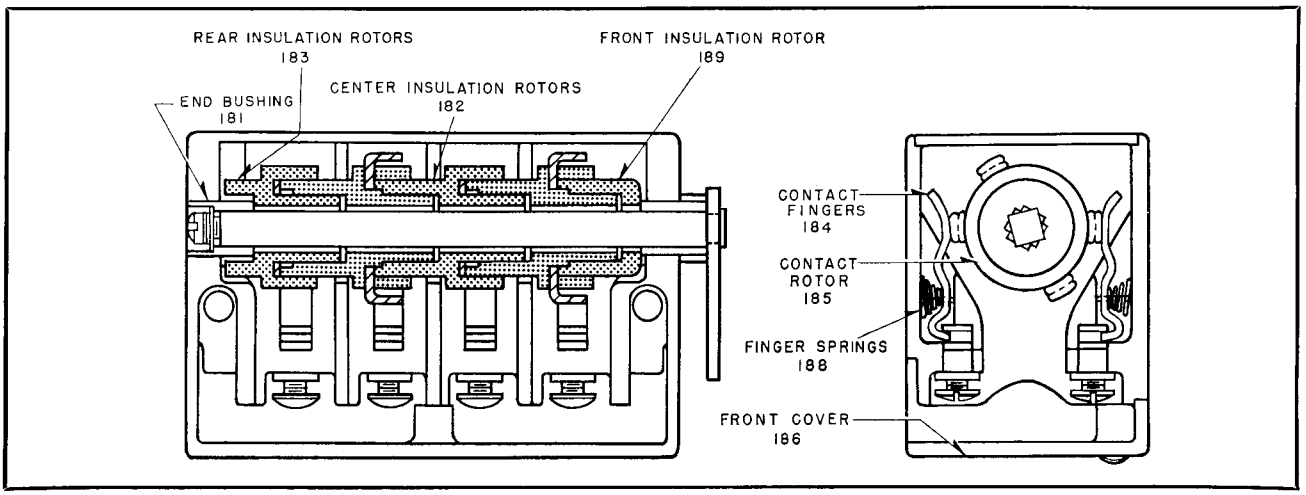


FIG. 15A. Auxiliary Switch—Construction Details

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.

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.

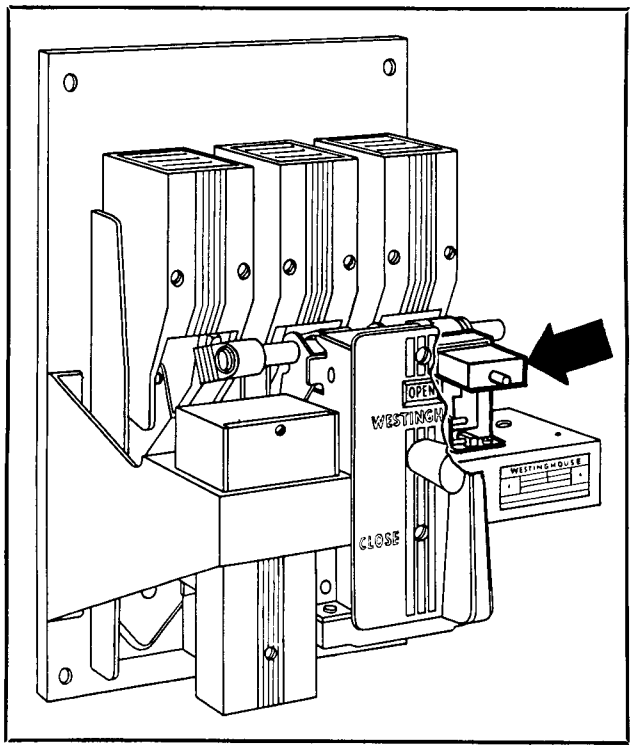


FIG. 16. Alarm Switch Attachment—Location

Table No. 4. 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

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.

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 trip button or shunt trip. The alarm switch may be reset manually

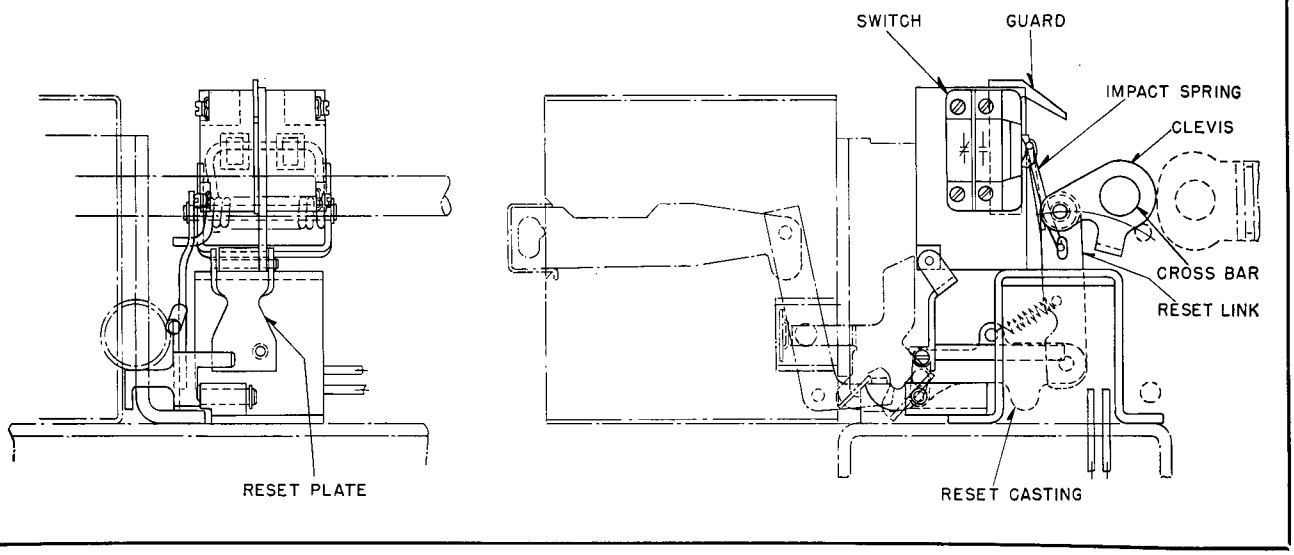


FIG. 16A. Alarm Switch Attachment—Construction Details

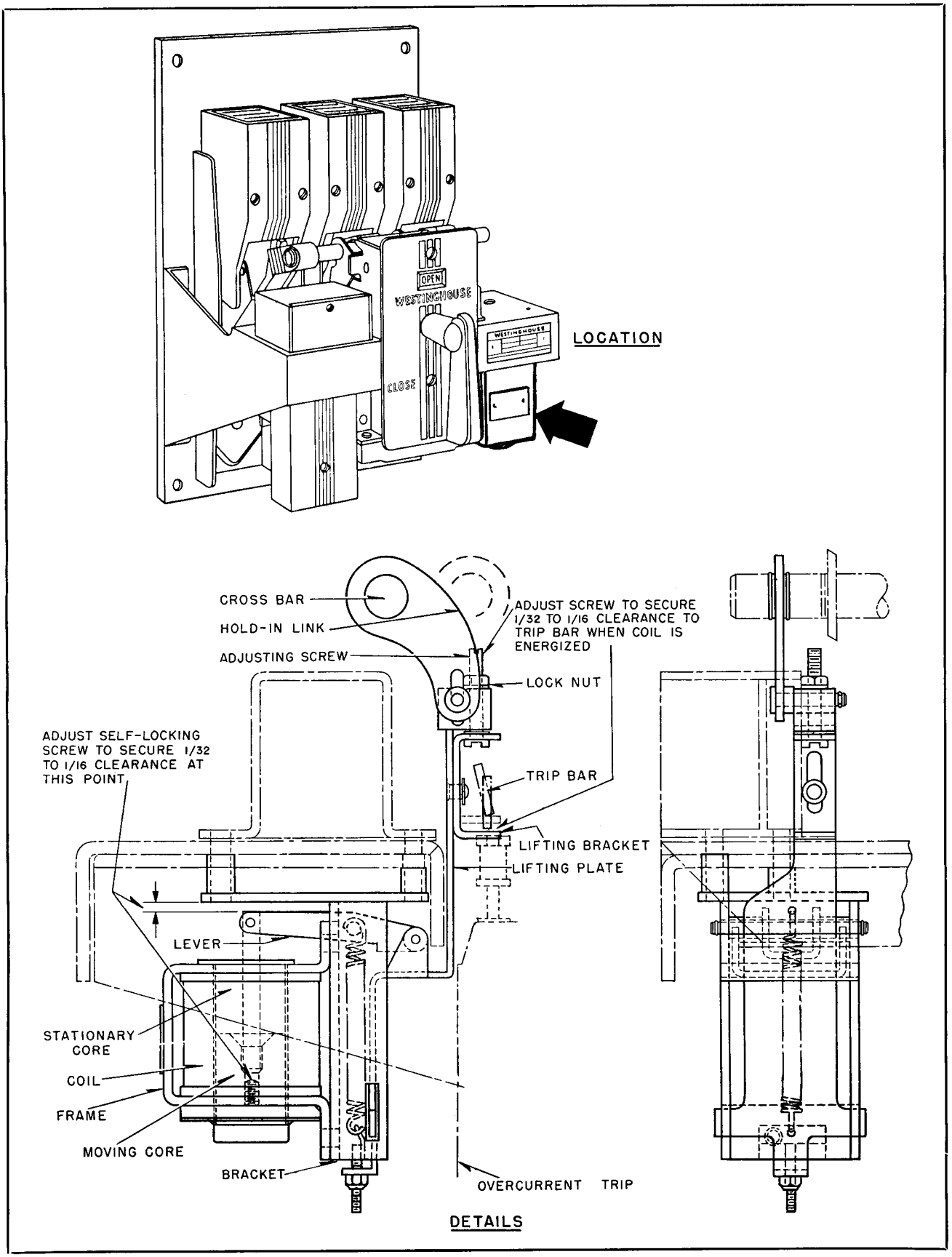


FIG. 17. Electric Lockout Attachment—Location and Construction Details

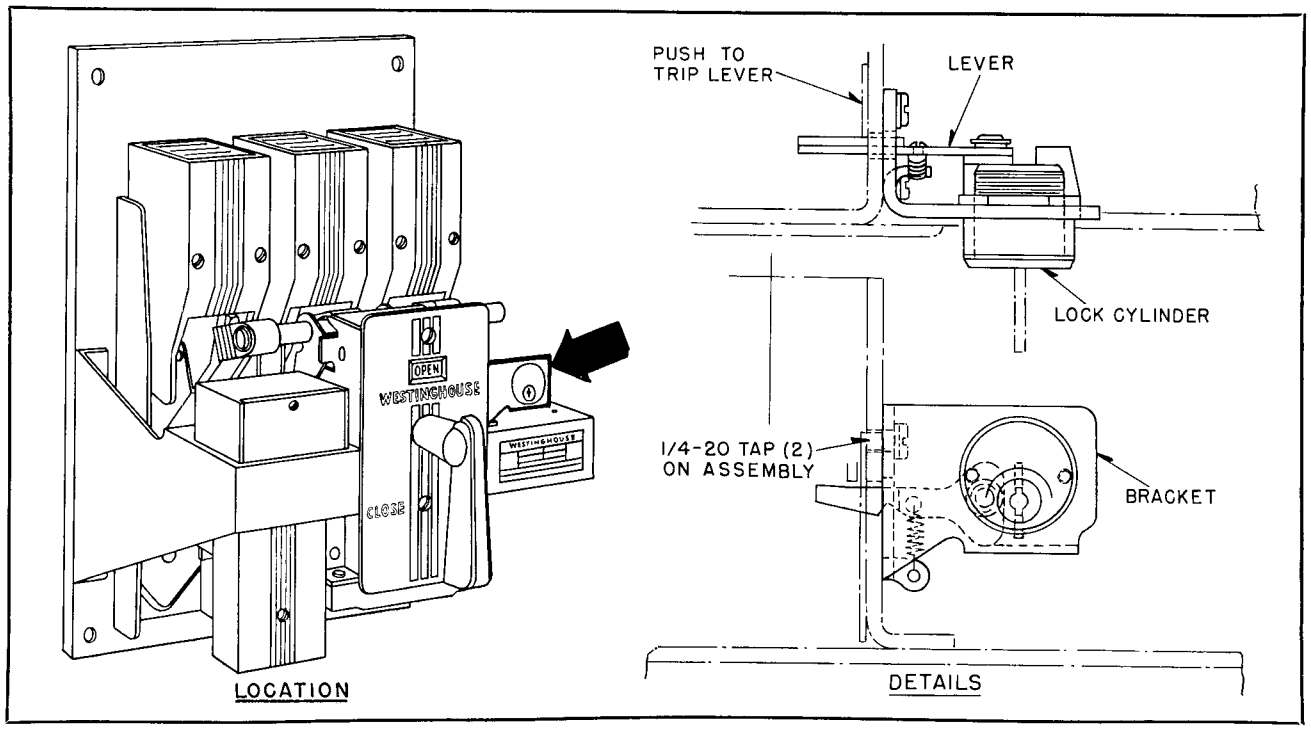


FIG. 18. Key Interlock Attachment—Location and Construction Details

by operating the push to trip button or electrically by energizing the shunt trip coil (when electrical resetting has been provided).

Inspection. Close the breaker manually and trip by the trip button 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. Pushing downward on the lifting plate should permit closure of the breaker. Releasing the lifting plate 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 1/32-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.

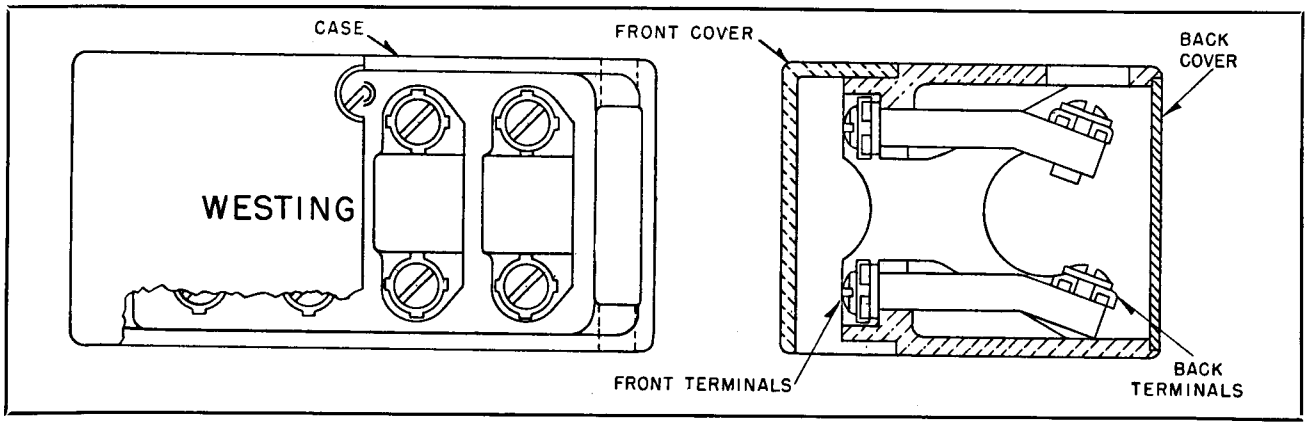


FIG. 19. Terminal Block Attachment—Construction Details

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 tripped position.

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

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

TERMINAL BLOCK

The eight point terminal block mounts on top of the auxiliary switch (see Fig. 19).

All internal wiring is connected to the back terminals, leaving the front terminals for the customer's wiring. The left side of the front cover is open to permit entrance of the customer's wires from the left side of the breaker.

Maintenance. Check for loose screws.

DBL-25 BREAKER

The DBL-25 breaker consists of a standard DB-25 breaker with special current limiting trigger fuses mounted on the top studs (Ref. Fig. 20).

The breaker should be trip free when a 3/16" thick spacer is placed between the end of the fuse trip button and Micarta lever "A". Adjust trip screw "C", if necessary, to secure this condition.

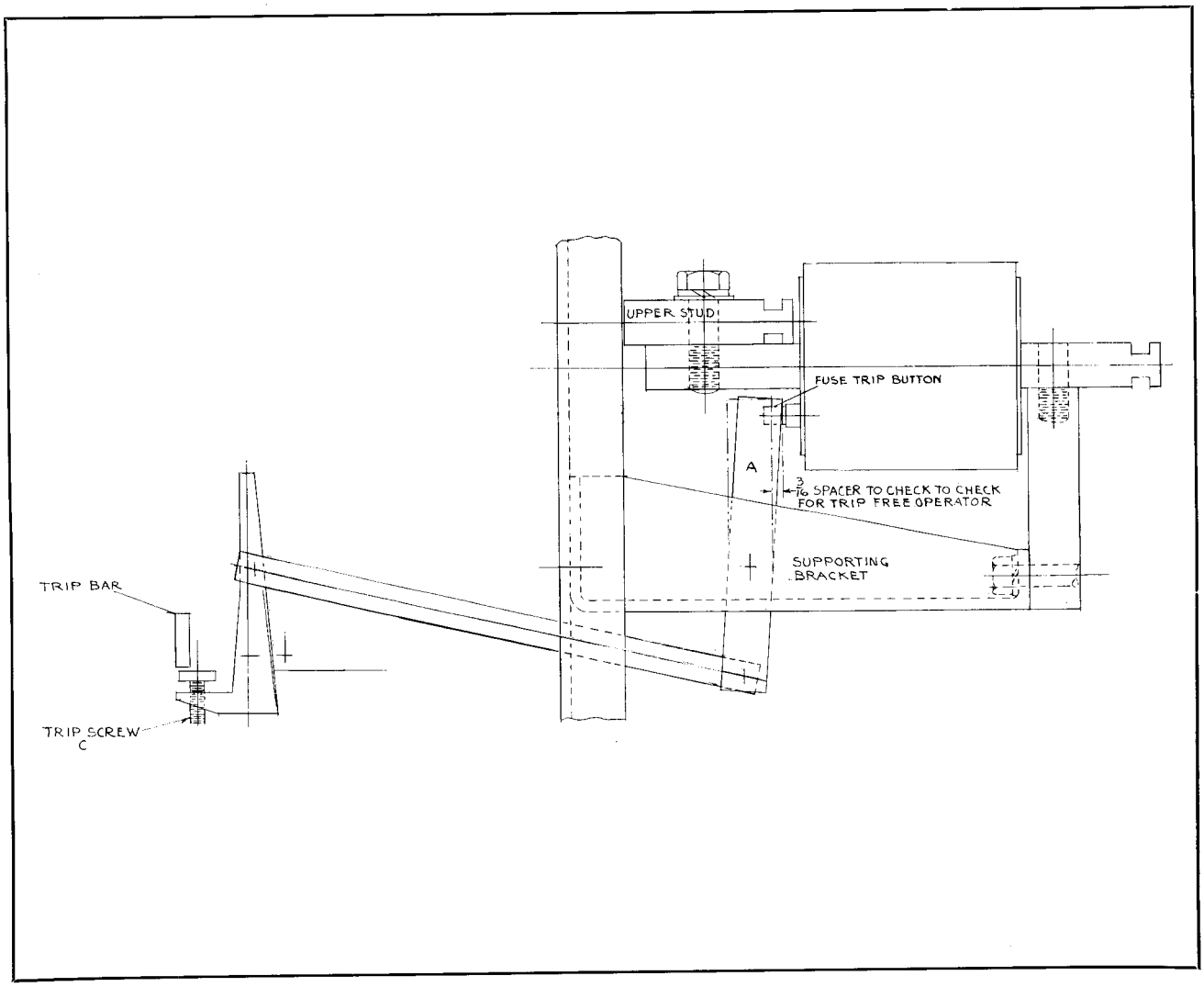


FIG. 20. Type "DBL" Air Circuit Breaker

Recommended Spare Parts for DB-15 and DB-25 Air Breakers

NAME OF PART (Always Give Breaker S. O. Reference)	STYLE NUMBER OR REFERENCE	NUMBER PER BREAKER OR DEVICE	NUMBER RECOMMENDED For Breakers		
			1	2 to 5	6 up
AUXILIARY SWITCH	Fig. 15A				
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 Rotor 185	1397 641	4	..	4	8
CONTROL RELAY	Fig. 9				
Operating Coil	No. 166	1	..	1	2
Blowout Coil & Circuit—D.C.	No. 161	1	..	1	2
Moving Contact—Left Pole	No. 153	1	..	2	4
Moving Contact—Right Pole	No. 163	1	..	1	2
Stationary Contact—Left Pole	No. 160	1	..	2	4
Stationary Contact—Right Pole	No. 165	1	..	1	2
Cover	No. 159	1	..	..	1
POLE UNIT	Fig. 5				
Stationary Arcing Contact	No. 219	3	3	6	12
Stationary Main Contact	No. 222	3	..	1	3
Moving Arcing Contact	No. 221	3	3	6	12
Moving Main Contact	No. 210	3	..	1	3
Opening Spring	No. 225	3	..	1	3
ELECTRIC OPERATION					
Closing Coil	Fig. 5 No. 216	1	..	1	2
Shunt Tripping Coil	Fig. 10 No. 300	1	..	1	2
OVERCURRENT DEVICE	Fig. 6A				
Bottom Assembly with Calibrated Scaleplate	No. 141	3	..	2	4
RETAINING RINGS—ASSORTMENT					
DB-15	497A346G01	1	1	2	3
DB-25	497A346G02	1	1	2	3

MEMORANDUM

RECEIVING • INSTALLATION • MAINTENANCE

INSTRUCTIONS

De-ion®

AIR CIRCUIT BREAKERS

Types DB-15, DB-25 and DBF-6

600 Volts A-C
250 Volts D-C

Interrupting Rating

Type DB-15	Type DB-25
15,000 Amperes	25,000 Amperes

Rating of Series Coils

Type DB-15 (Amperes)	Type DB-25 (Amperes)
15, 20, 30, 40, 50, 70, 90, 100, 125, 150, 175, 200, 225	40, 50, 70, 90, 100, 125, 150, 175, 200, 225, 250, 300, 350, 400, 500, 600

WESTINGHOUSE ELECTRIC CORPORATION
SWITCHGEAR APPARATUS DEPARTMENTS
EAST PITTSBURGH PLANT • EAST PITTSBURGH, PA.
SUPERSEDES I.B. 33-850-1 & 2A
APRIL, 1960
Printed in U.S.A.

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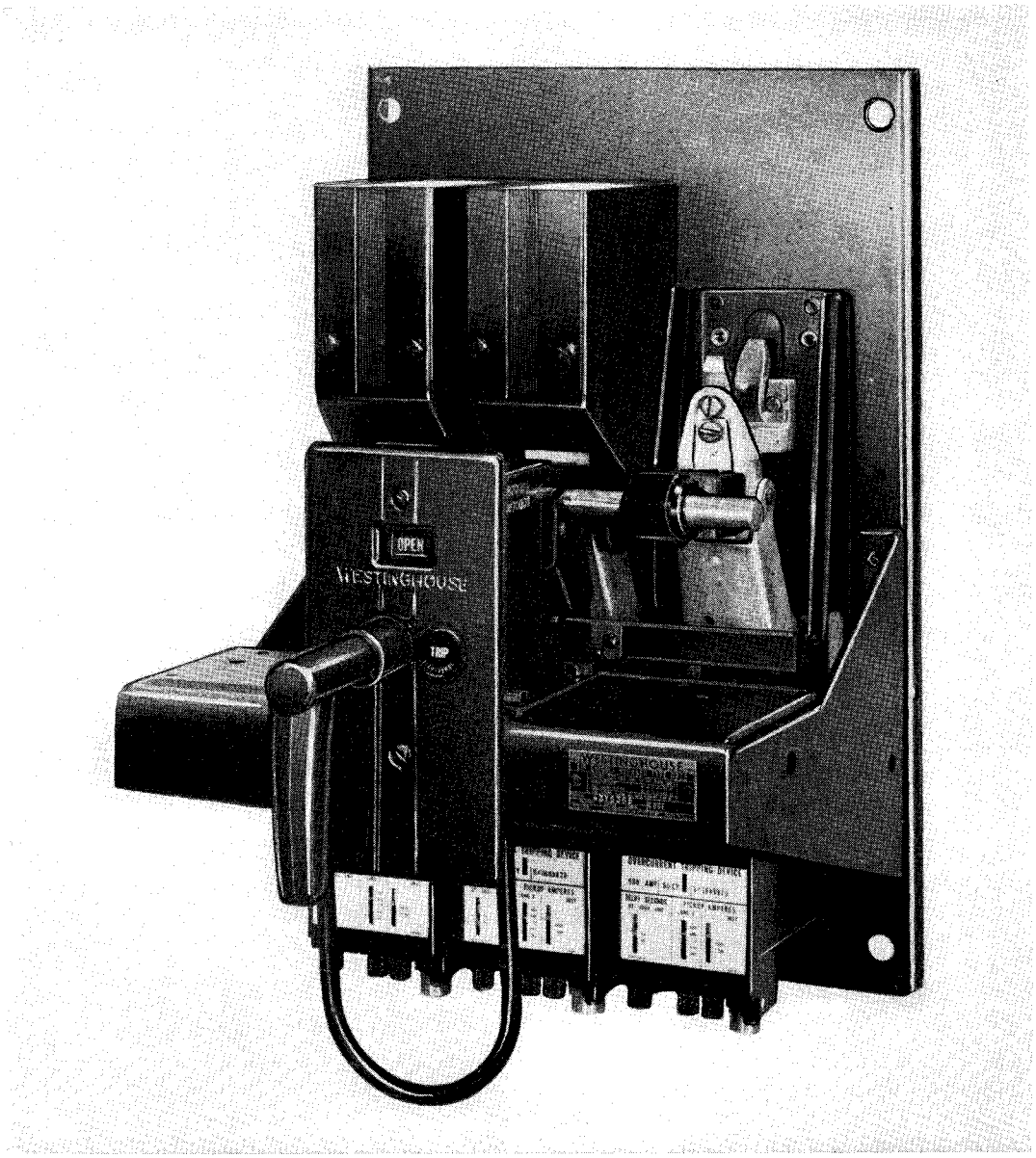

OPEN
WESTINGHOUSE
TRIP

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.

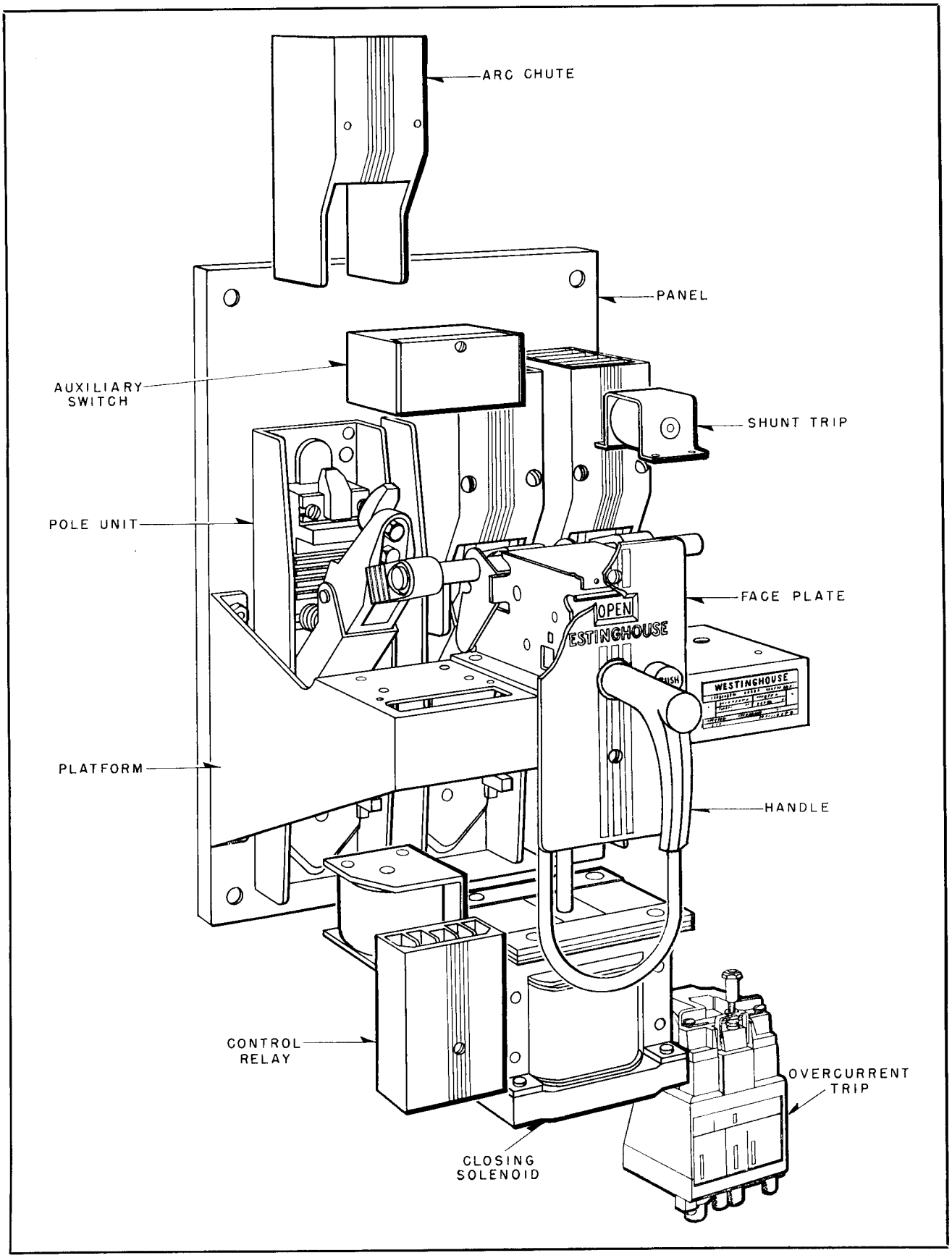


FIG. 1. Type "DB" Air Circuit Breaker—Exploded View

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 fixed breakers are given in Table No. 1 below. Add 15 lbs. for drawout breakers. Add 100 lbs. for enclosures on page 11.

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. Remove tape from top of arc chutes.

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 12.

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.

6. The latchplate felt and roller lever of the operating mechanism should be lubricated approximately every 10,000 operations. Molybdenum disulfide mixed with oil (Westinghouse M8577-11) is recommended.

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.

Breakers in non-ventilated enclosures should have the cover opened or removed.

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, 3 and 4.

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. 8. 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. 2 apply specifically to ventilated enclosures. The same arrangement is used for all other enclosures (weatherproof, subway, explosion-proof, dust tight and semi-dust tight) 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 overcurrent attachments when the breaker is open. The cables can be connected to the nearest terminal, or to the opposite terminal as shown in Fig. 2. 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. 2) 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.

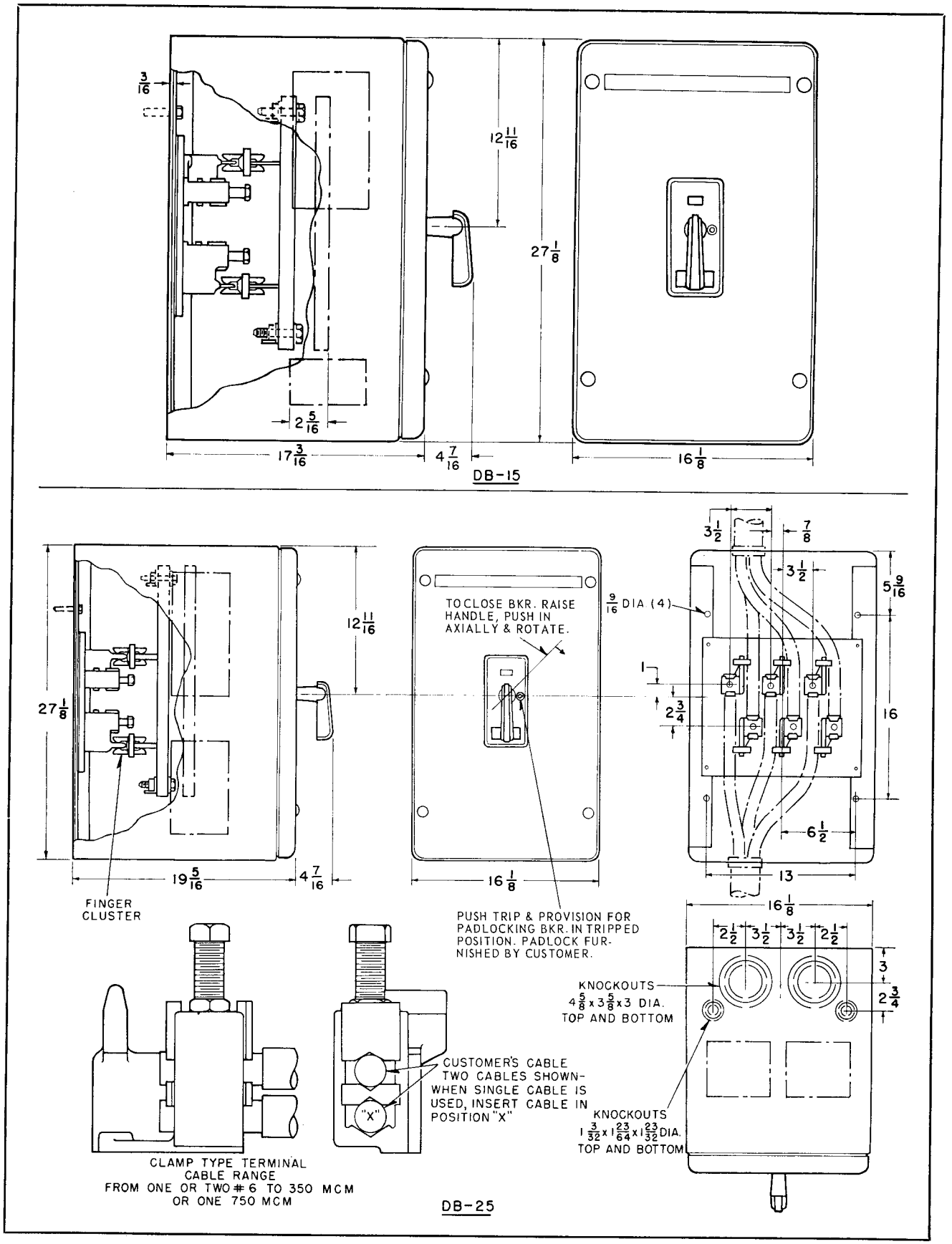


FIG. 2. Ventilated Enclosures—Outline Dimensions and Mounting Details

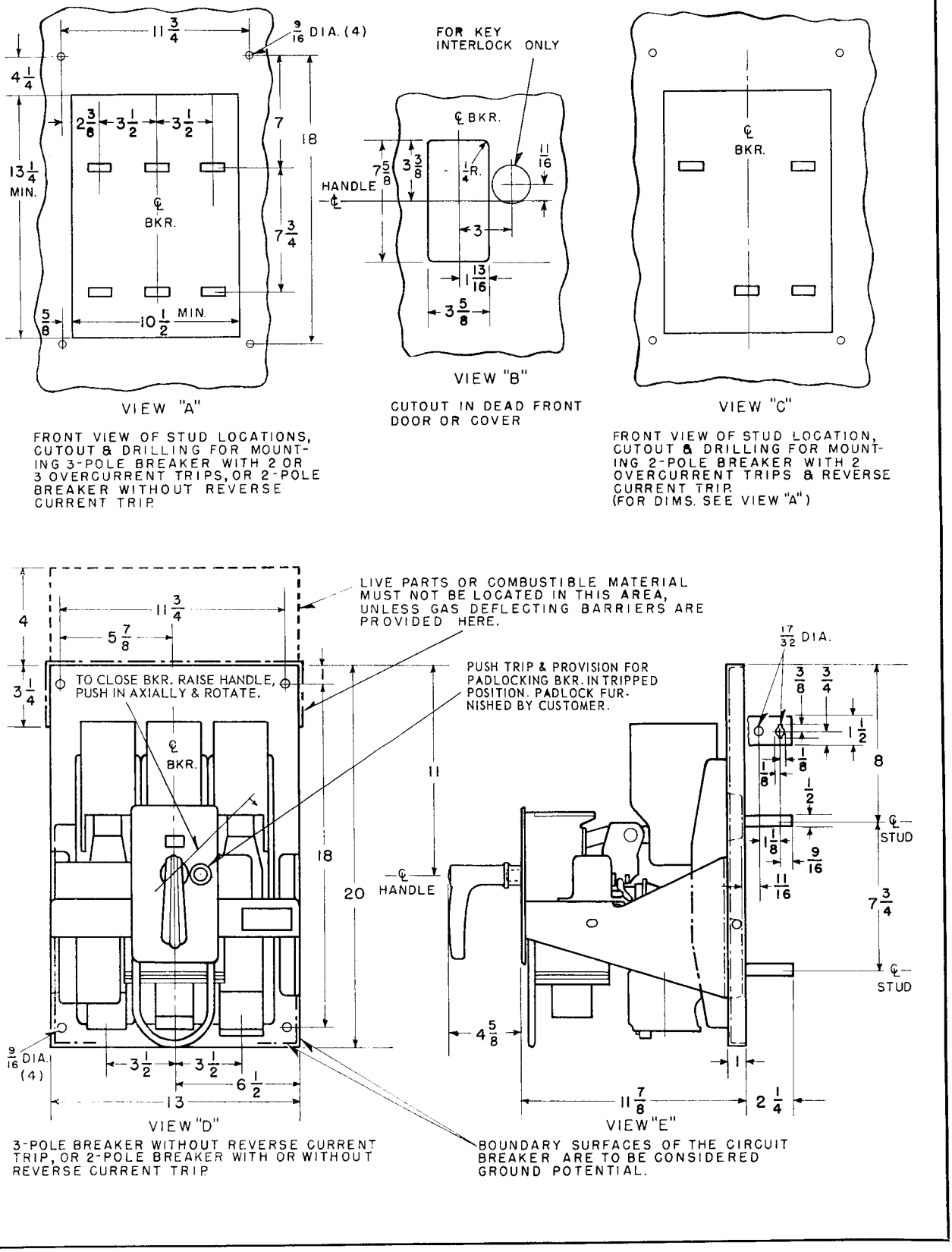


FIG. 3. DB-25 Outline Dimensions and Mounting Details

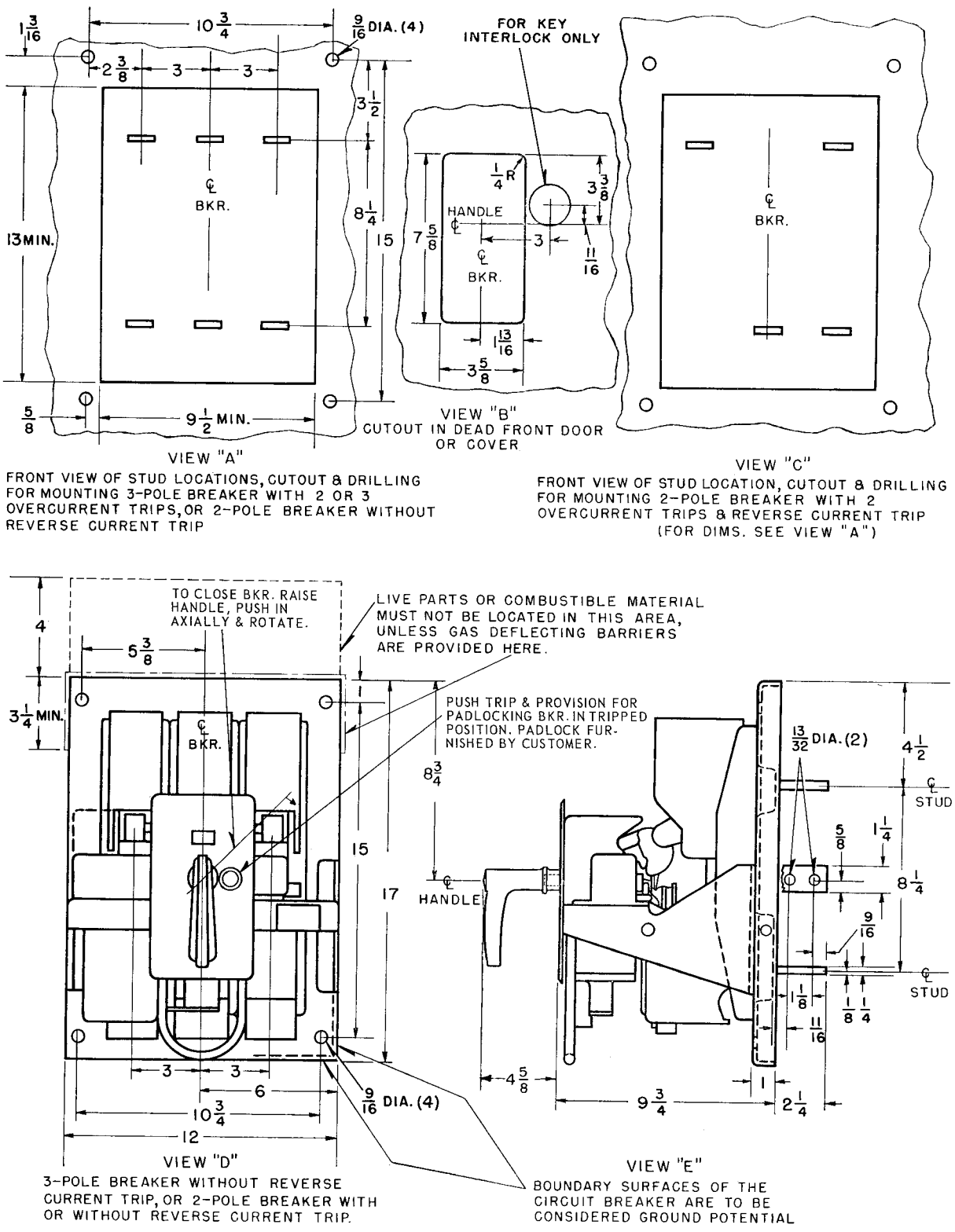


FIG. 4. DB-15 Outline Dimensions and Mounting Details

PART THREE

MAINTENANCE

POLE UNIT

Each pole unit is mounted on a separate molded base through which the breaker studs pass. (See Fig. 5). 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. 5). The DB-25 arcing contacts should touch first on closing, open last on opening, and have approximately a 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 3/32 to 1/8 inch gap between the armature plate and the steel link. 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 1/64-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.

Table No. 2. CLOSING SOLENOID CONTROL VOLTAGES, TRIPPING CURRENTS, CLOSING CURRENTS AND FUSE RATINGS

BREAKER TYPE	CLOSING COIL BURDEN	NOMINAL CONTROL VOLTAGE	CLOSING AMPERES	TRIPPING AMPERES	RECOMMENDED FUSE RATING AMPERE		FUSE STYLE NUMBER
					Standard NEC	Time Lag	
DB-15	All	12 D-C	...	18	..	...	.....
		125 D-C	17.5	2	10	...	120A823H04
		250 D-C	8.5	1	6	...	120A823H03
		230 A-C	30	.5	..	2.5	120A864G17
		460 A-C	15	.2	..	2.0	120A865G15
		575 A-C	12	.3	..	1.6	120A865G13
Ø DB-25	Std.	24 D-C	..	9.5	..	...	.....
		125 D-C	23	2	10	...	120A823H04
		250 D-C	10	1	6	...	120A823H03
		230 A-C	35	.5	..	8	120A864G27
		460 A-C	15	.2	..	2	120A865G15
		575 A-C	12	.3	..	1.6	120A865G13
	High	48 D-C	..	5	..	...	.....
		125 D-C	34	2	20	...	120A823G06
		250 D-C	15	1	6	...	120A823H03
		230 A-C	49	.5	..	8	120A864G27
		460 A-C	24	.2	..	2.25	120A865G16
		575 A-C	20	.3	..	2.25	120A865G16

* NOTE: For A-C closing use 3-kva source or larger.
Ø Standard close coils used when overcurrent tripping devices have instantaneous trip.
Special close coils used when overcurrent tripping devices have short delay feature.

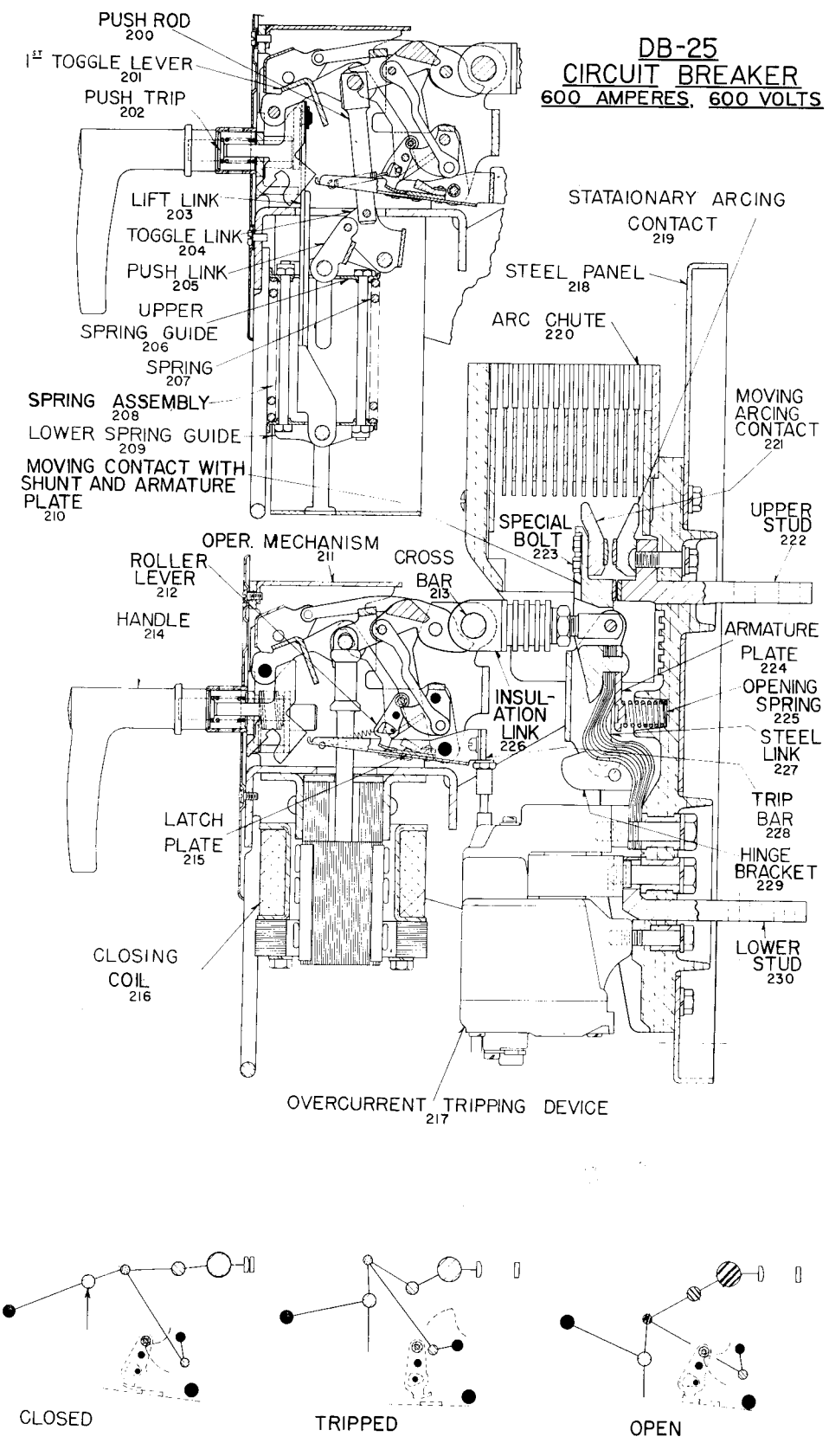


FIG. 5. Cross-Sectional View of Type DB-25 Circuit Breaker

OPERATING MECHANISM

The operating mechanism (see Fig. 5) 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.

The tripping load should not exceed 38 ounces measured at the trip bar.

CLOSING SPRING ASSEMBLY

The closing spring assembly is shown in the breaker closed position in Fig. 5. Assuming the breaker is in the open position, the following closing sequence applies:

Rotating the closing handle clockwise raises the lift link and lower spring guide to compress the closing spring. Near the end of the closing stroke the top end of the lift link strikes the first toggle lever to start the breaker closing. As the breaker closes the push rod raises the toggle link and push link out of toggle which permits the closing spring to complete the breaker closing.

Slow emergency operation to check the contact sequence can be obtained by exerting a slight closing pressure on the closing handle and simultaneously pushing forward on the breaker cross bar to start the breaker closing.

Maintenance. Oil the pins and slides every 10,000 operations.

CLOSING SOLENOID

The closing solenoid (see Fig. 5) 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 nominal voltage are listed in Table No. 2 on page 12.

OVERCURRENT TRIPPING DEVICE

The overcurrent tripping devices of the various ampere ratings are of the same general construction and size. They can be applied to the DB-15 circuit breaker in ratings of 15 to 225 amperes and to the DB-25 circuit breaker in ratings of 40 to 600 amperes.

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

The overcurrent tripping device, normally furnished for each pole of the circuit breaker, is designed for service on motor or general purpose feeder circuits or for service on systems where selective overcurrent tripping is desired. Figures 7A and 7B shows time-current characteristics of DB-15 and DB-25, circuit breakers equipped with typical overcurrent tripping devices, for selective tripping.

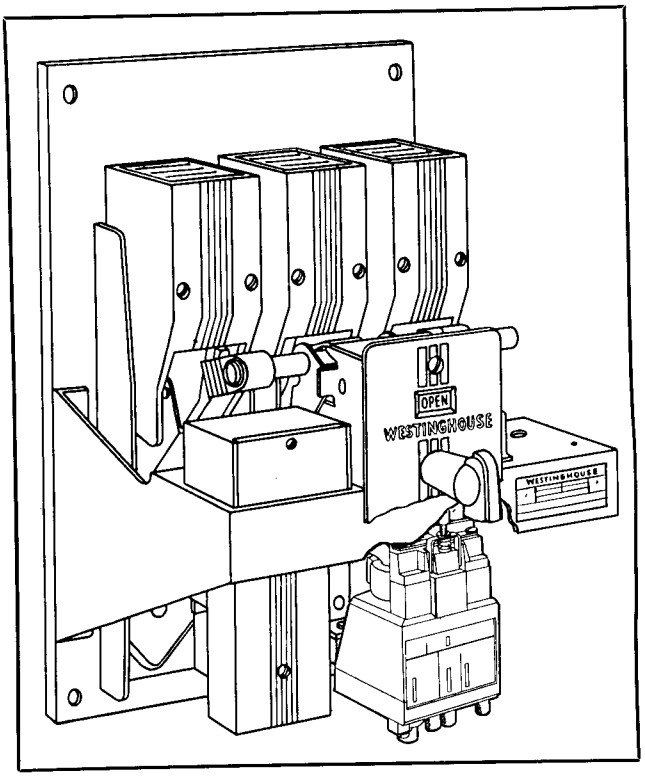


FIG. 6. Overcurrent Tripping Device—Location

Construction. The overcurrent tripping device is of the air delayed type with all elements adjustable. The adjustment knobs or parts likely to be touched while making adjustments of time or pickup current are electrically insulated. Fig. 6A shows a typical overcurrent tripping device ready for mounting on a breaker pole unit.

Loosening or removal of the reset valve requires recalibration of the long delay scale.

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 flexible 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 molded base of the tripping device. The mounting bolt sizes are shown in Table No. 3.

Table No. 3. MOUNTING BOLT SIZES

BOLT	DB-15	DB-25
	Thread Length	Thread Length
Top	½-13 x 1½"	½-13 x 2¼"
Center	½-13 x 1"	½-13 x 1¾"
Bottom	⅜-16 x 1"	⅜-16 x 1¾"

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.

To adjust the trip nut for proper tripping, first insert valve lever tool "B" or a 1/16 diameter rod, in the long delay calibration bracket (left slot) and raise the valve lever to its maximum position. This removes all of the time delay and permits the armature to operate easily. Then insert the push rod "A" Fig. 6A in the top slot of the calibration bracket and push the armature solidly against the yoke; close the breaker and adjust the trip nut to

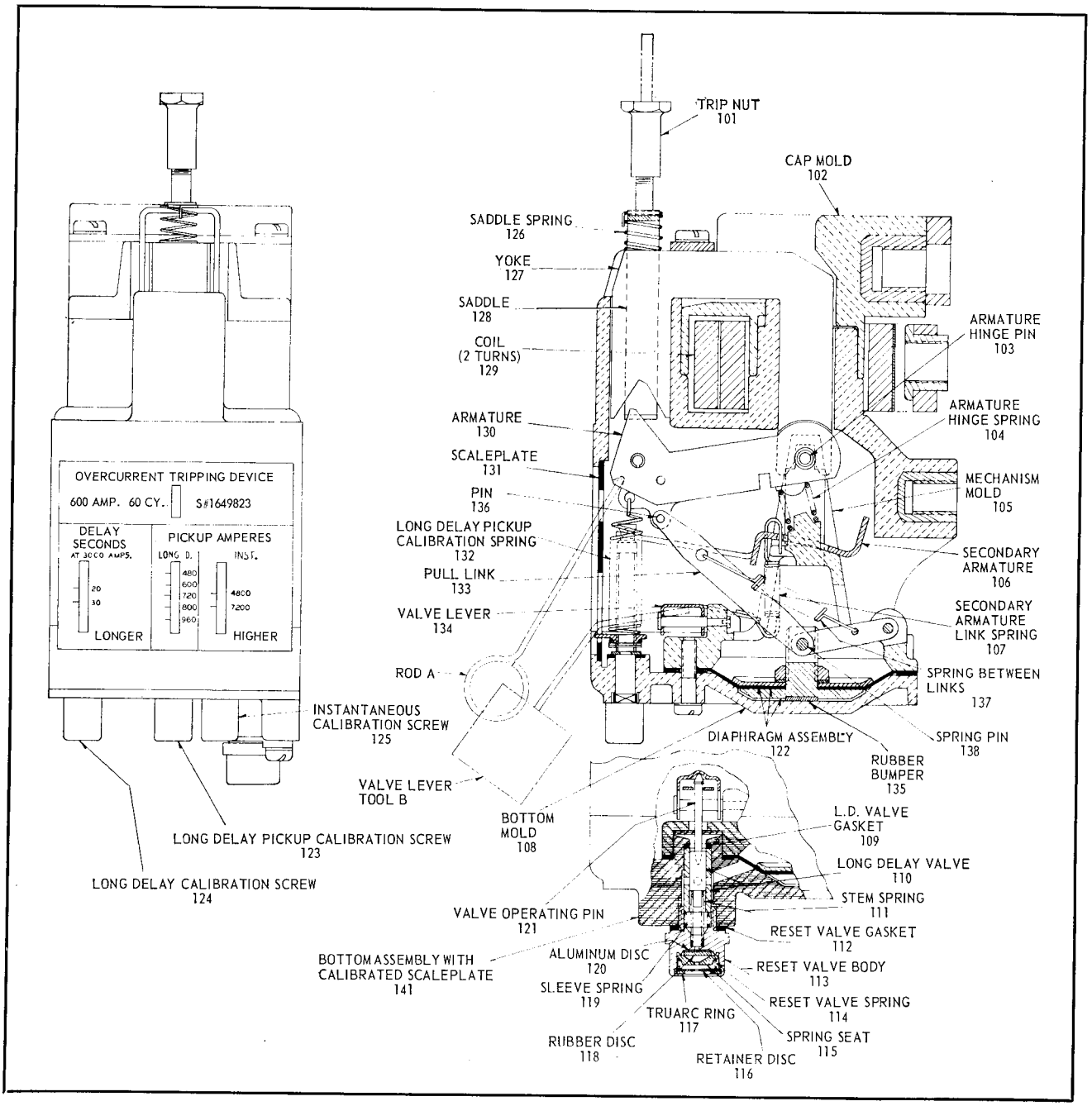


FIG. 6A. Overcurrent Tripping Device—Construction Details

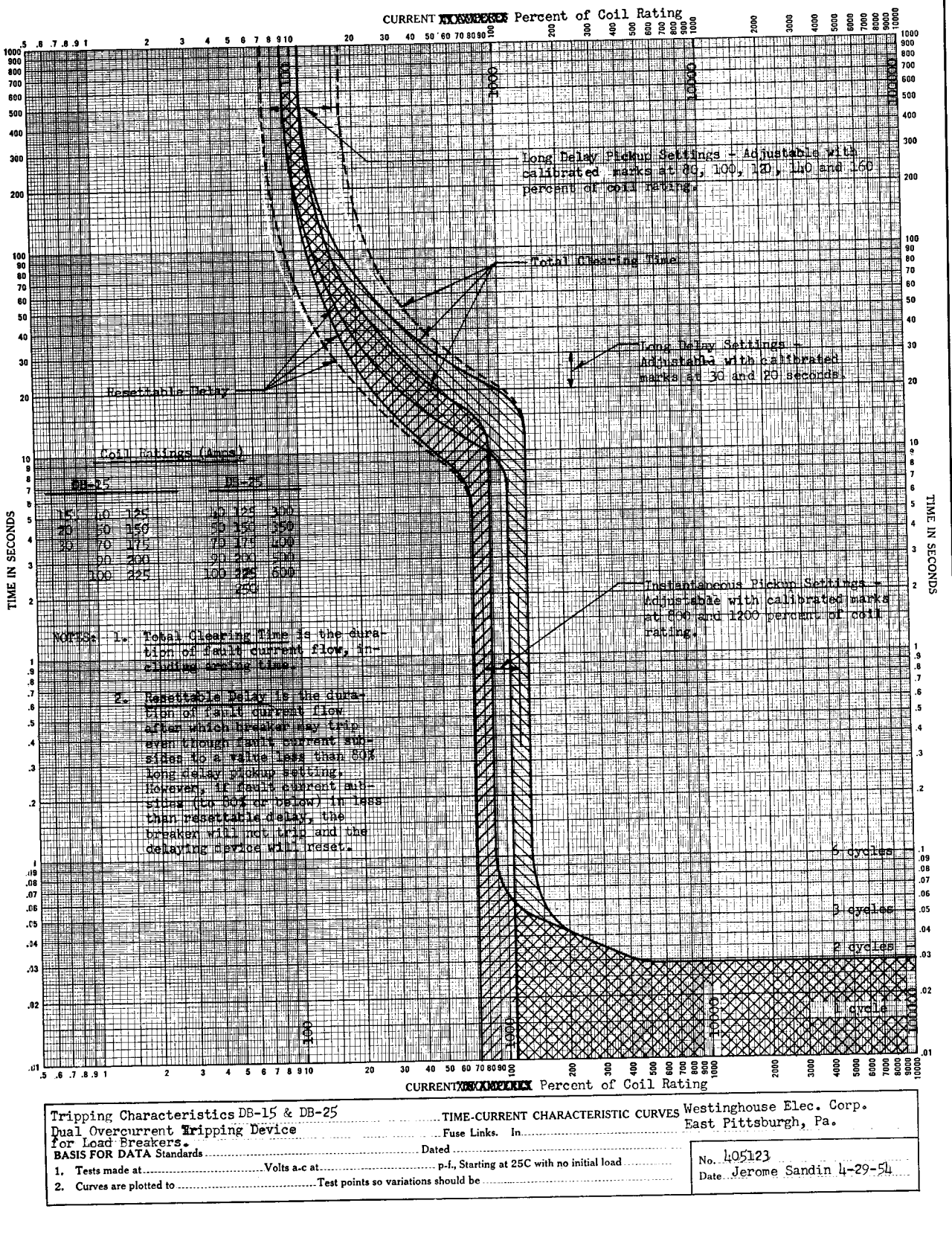
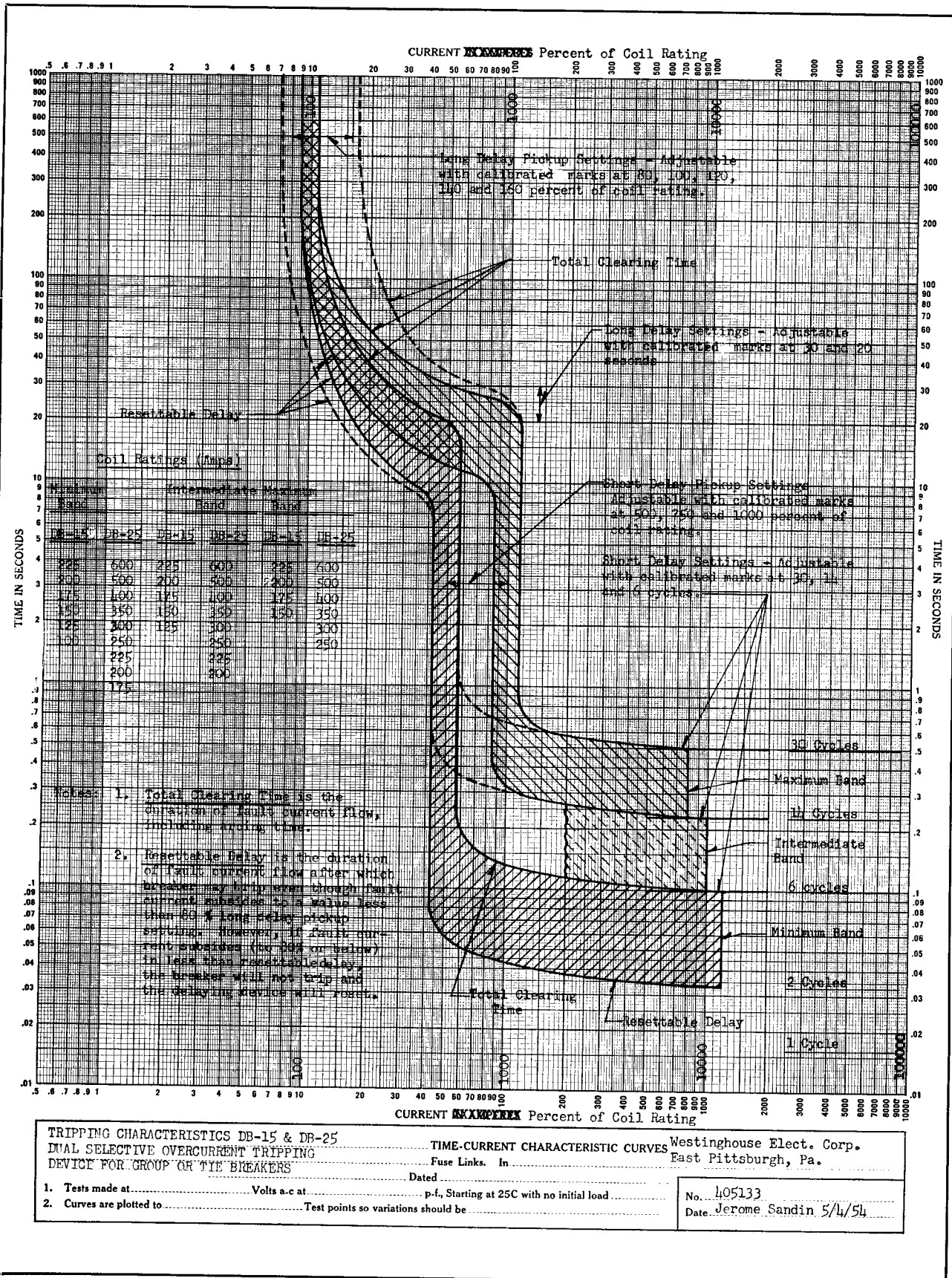


FIG. 7. Typical Tripping Characteristics of DB-15 and DB-25 Overcurrent Tripping Devices with Long Time Delay and Instantaneous Elements



TRIPPING CHARACTERISTICS DB-15 & DB-25 DUAL SELECTIVE OVERCURRENT TRIPPING DEVICE FOR GROUP OR TIE BREAKERS	TIME-CURRENT CHARACTERISTIC CURVES Fuse Links. In ..... Dated	Westinghouse Elect. Corp. East Pittsburgh, Pa.
1. Tests made at ..... Volts a-c at ..... p-f., Starting at 25C with no initial load ..... 2. Curves are plotted to ..... Test points so variations should be		No. 405133 Date Jerome Sandin 5/4/54

FIG. 7A. Typical Tripping Characteristics DB-15 and DB-25 Dual Selective Overcurrent Tripping Device for Group and Tie Breakers.

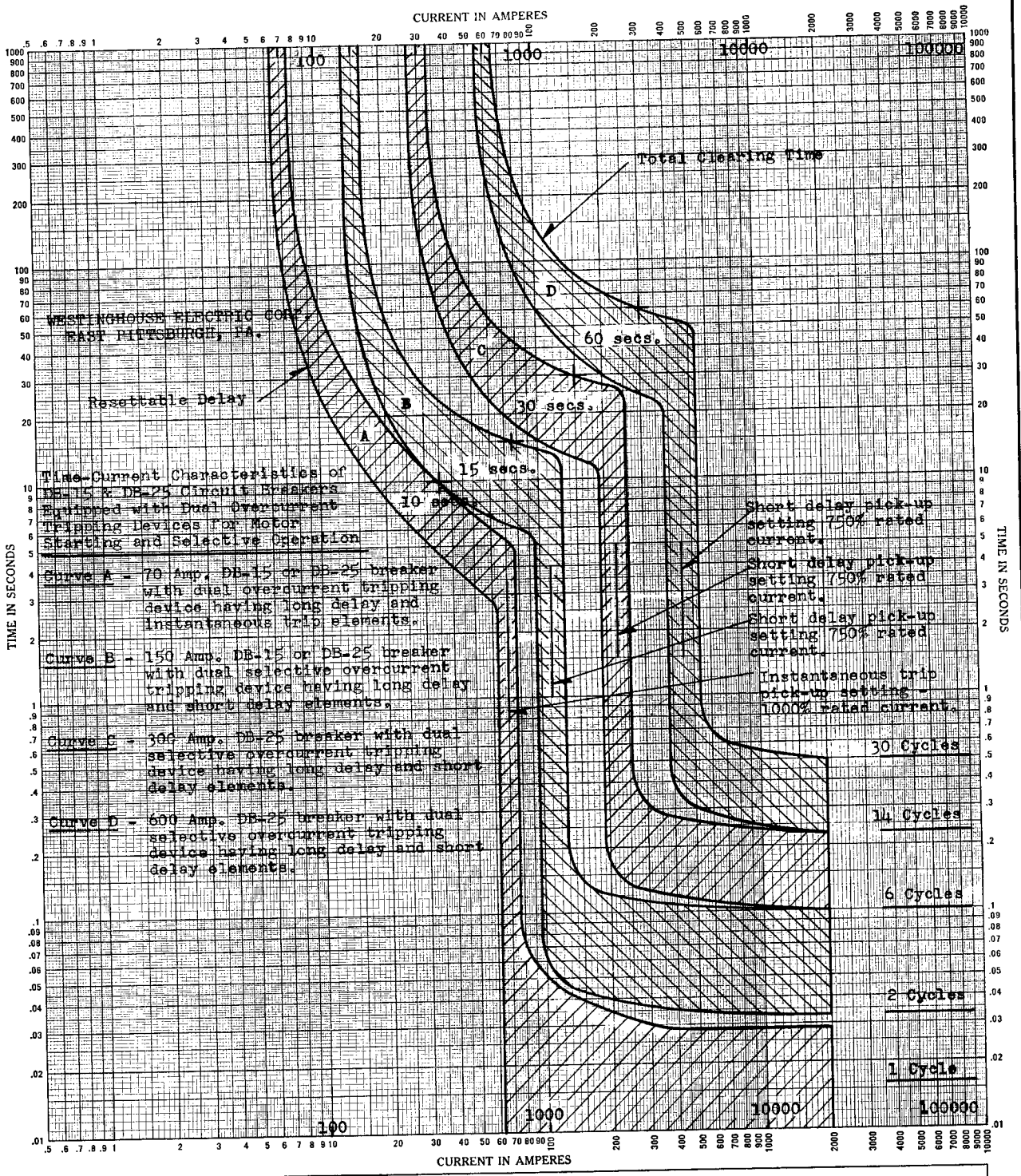
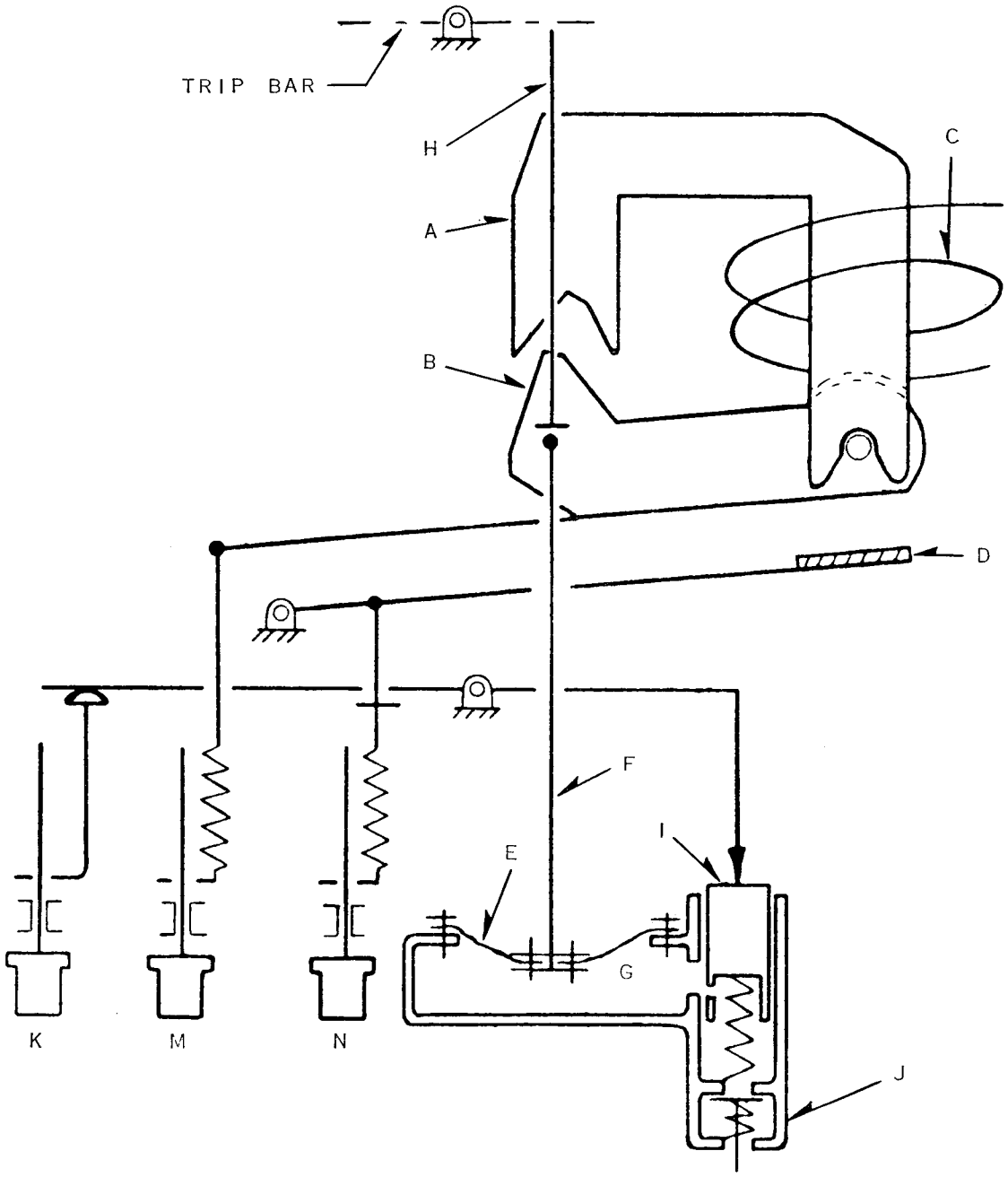
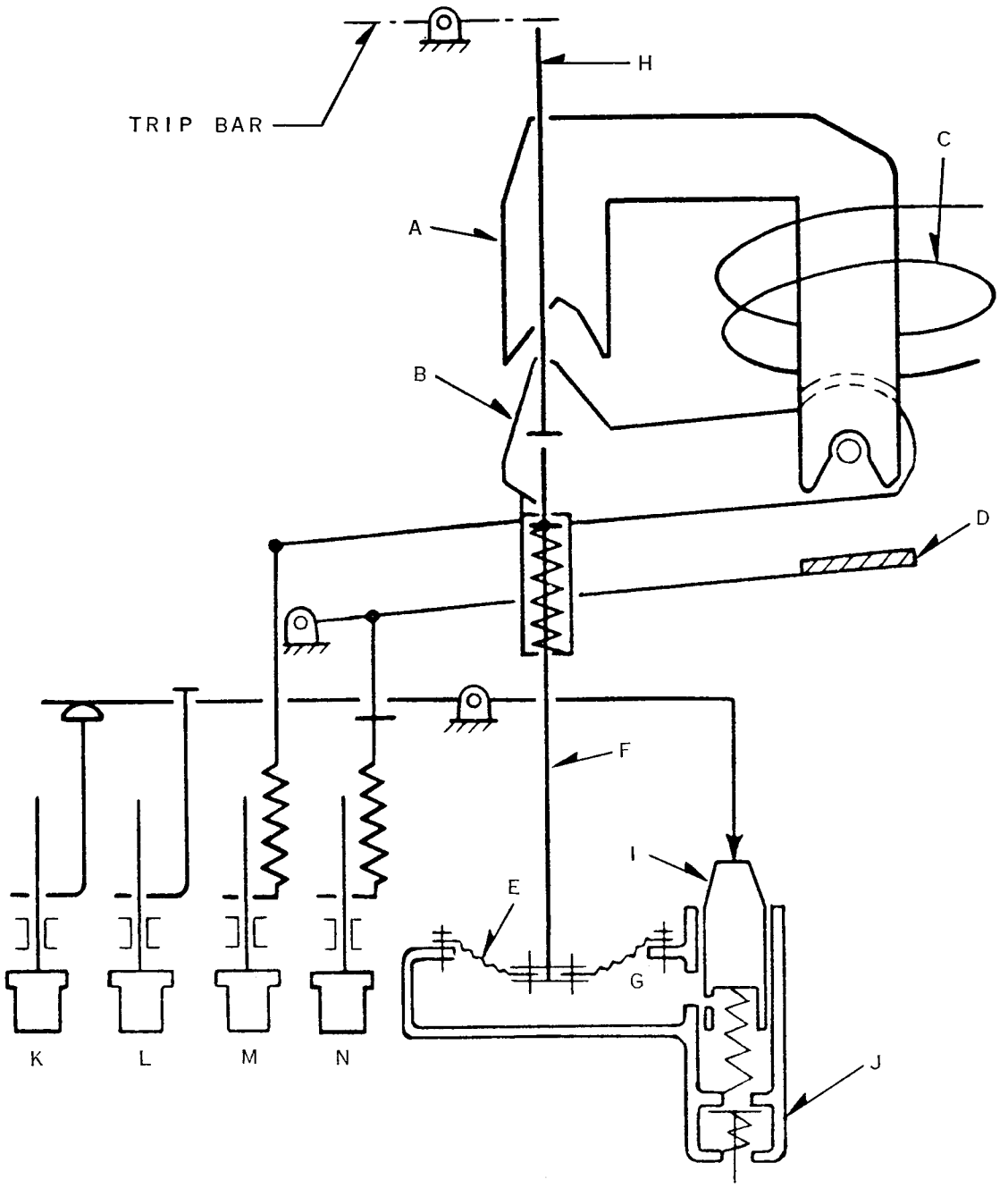


FIG. 7B. Typical Time-current Characteristics of DB-25 Circuit Breakers Equipped with Typical Overcurrent Tripping Devices for Motor Starting and Selective Operation



A - MAGNET YOKE
B - ARMATURE
C - SERIES COIL
D - SECONDARY ARMATURE
E - DIAPHRAM
F - PULL LINK
G - AIR CHAMBER
H - TRIP SADDLE
I - TIMING VALVE
J - RESET VALVE
K - LONG DELAY ADJUSTMENT
M - LONG DELAY PICK UP ADJUSTMENT
N - INSTANTANEOUS TRIP ADJUSTMENT

FIG. 7C. Schematic Diagram—Dual Overcurrent Series Tripping Device DB-15 and DB-25 Load Circuit Breakers



A - MAGNET YOKE
B - ARMATURE
C - SERIES COIL
D - SECONDARY ARMATURE
E - DIAPHRAM
F - PULL LINK
G - AIR CHAMBER
H - TRIP SADDLE
I - TIMING VALVE
J - RESET VALVE
K - LONG DELAY ADJUSTMENT
L - SHORT DELAY ADJUSTMENT
M - LONG DELAY PICK UP ADJUSTMENT
N - SHORT DELAY PICK UP ADJUSTMENT

FIG. 7D. Schematic Diagram—Dual Selective Overcurrent Series Tripping Device DB-15 and DB-25 Group or Tie Circuit Breakers

barely trip the breaker. Several trials may be necessary. Next turn the trip nut upwards three quarters turn to provide overtravel. This completes the adjustment as the trip nut is self locking. Special wrench S# 1809539 is recommended for adjusting the trip nut on the center pole.

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.

Time-Current Classification. The overcurrent tripping device can be furnished with either a short delay or an instantaneous element, or in any combination of two of the three tripping elements, namely long delay, short delay and instantaneous elements. The most popular overcurrent tripping devices are listed below:

1—Dual Overcurrent Tripping Device for Load Breakers

This device has an adjustable long delay and an adjustable instantaneous element and is suitable for service on motor or general purpose feeder circuits. A characteristic curve is shown in Fig. 7.

2—Dual Selective Overcurrent Tripping Device for Group or Tie Breakers

This device has an adjustable long delay and adjustable short delay element and is suitable for service on systems where selective overcurrent tripping is desired. Curves 7A and 7B show the time-current characteristics of these devices.

Operation

1—Dual Overcurrent Tripping Device for Load Breakers, Fig. 7C

Overload currents above the setting of the long delay pick-up adjustment (M) forces the armature (B) and the trip saddle (H) towards the trip bar of the circuit breaker. This upward movement of the armature (B) and diaphragm (E) reduces the pressure in chamber (G) causing air to be sucked in through the timing valve (I). The rate of travel of the trip saddle (H) is determined by the rate at which air is permitted to enter chamber (G) by valve (I). The reset valve (J) allows quick reset of the parts after the breaker has been tripped.

Short circuit currents above the setting of the instantaneous element as determined by adjustment (N) causes the secondary armature (D) to be attracted to the main armature (B). The upward movement of secondary armature (D) moves valve (I) to wide open position, which removes restraint on the movement of armature (B). The main armature (B) and trip saddle (H) move instantly to trip the breaker.

2—Dual Selective Overcurrent Tripping Device for Group and Tie Breakers, Fig. 7D

The operation of this selective device is the same as the dual overcurrent tripping device, except, that in this case, the long delay and instantaneous valve (I) in Figure 7C is replaced with a long delay and short delay valve (I) Figure 7D, which operates the same, except, when valve (I) Figure 7D is forced down by the secondary armature on fault currents it controls the size of orifice to give the tripping time required in the fault current short delay region.

Adjustment of Settings

Caution: As a safety measure, the breaker should be disconnected from the circuit before making any adjustment.

By turning the adjustment knobs K-M-N Fig. 7C and K-L-M-N Fig. 7D, the settings of the various time and pick-up elements can be changed. A clockwise movement of any one of the knobs will increase the setting and a counterclockwise movement will decrease the setting.

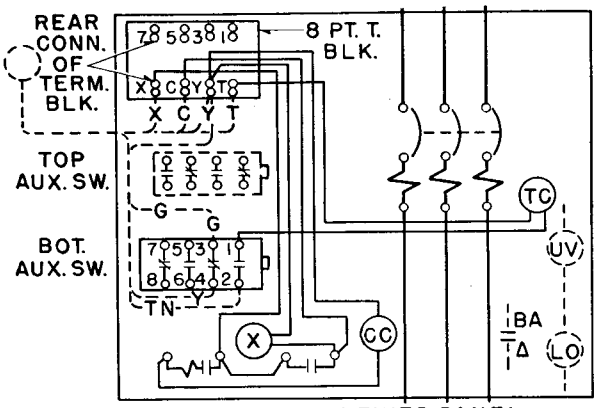
REPLACING OVERCURRENT DEVICES

Instruction for Replacing Sealed Oil Overcurrent Devices by Air Overcurrent Devices. Paragraphs 1 and 4 only are required for breakers shipped after March 1, 1954.

1. Remove the sealed oil overcurrent and discard the mounting bolts. The proper bolts for the insulated overcurrent are given in Table # 3.

2. Remove the lower studs and redrill the overcurrent bolt holes to $^{21}/_{32}$" (the bushing on the lower coil terminal must fit inside this hole). Replace when redrilled.

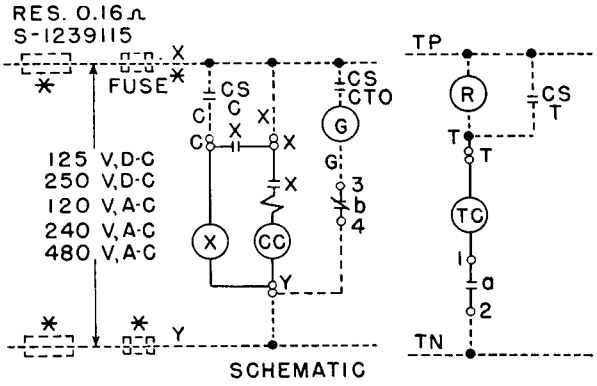
3. Loosen the three bolts holding the left and center pole units to the panel and remove and discard the present barriers (3P. breakers only). Install the new barriers. The new barriers are not symmetrical and consequently they cannot both be slipped under the center pole unit as was the case with the existing barriers. The DB-25 barriers S# 1736180 should be assembled with bumper blocks downwards; this requires one barrier to be slipped under the left pole unit and the other under the center pole unit. The DB-15 barriers S# 1736179 should be assembled with the beveled corners upwards, by following the above procedure.



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

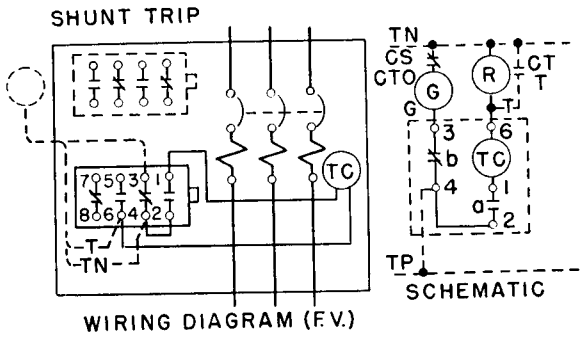
LEGEND

X-CONTROL RELAY
CC-CLOSING COIL
TC-TRIP COIL
CS-CONTROL SWITCH
R-RED LAMP (CLOSED)
G-GREEN LAMP (OPEN)
UV-UNDERVOLTAGE
LO-LOCKOUT
BA-ALARM SWITCH
a-MAKE CONTACT
b-BREAK CONTACT

Δ-ALARM CONTACT DOES NOT CLOSE WHEN BREAKER IS TRIPPED MANUALLY OR BY THE SHUNT TRIP.

*-CURRENT LIMITING RESISTORS & FUSES TO BE USED ONLY WHEN A-C CONTROL SOURCE IS FROM SWGR. BUS.

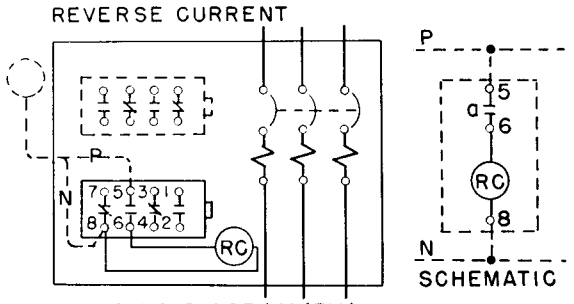
SHUNT TRIP



WIRING DIAGRAM (F.V.)

SCHEMATIC

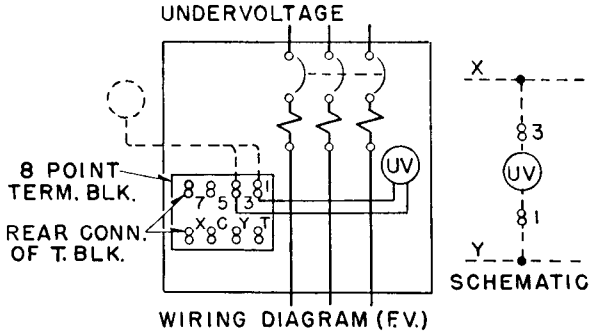
REVERSE CURRENT



WIRING DIAGRAM (F.V.)

SCHEMATIC

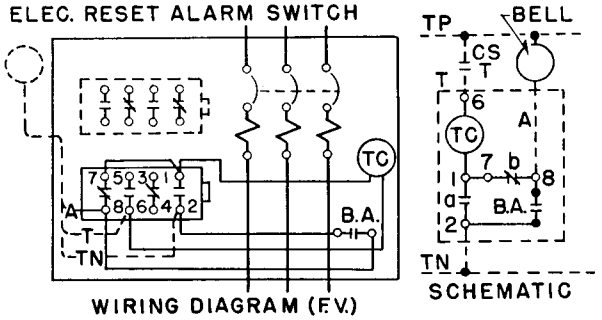
UNDERVOLTAGE



WIRING DIAGRAM (F.V.)

SCHEMATIC

ELEC. RESET ALARM SWITCH



WIRING DIAGRAM (F.V.)

SCHEMATIC

FIG. 8. Typical Wiring Diagrams—Type "DB" Circuit Breaker

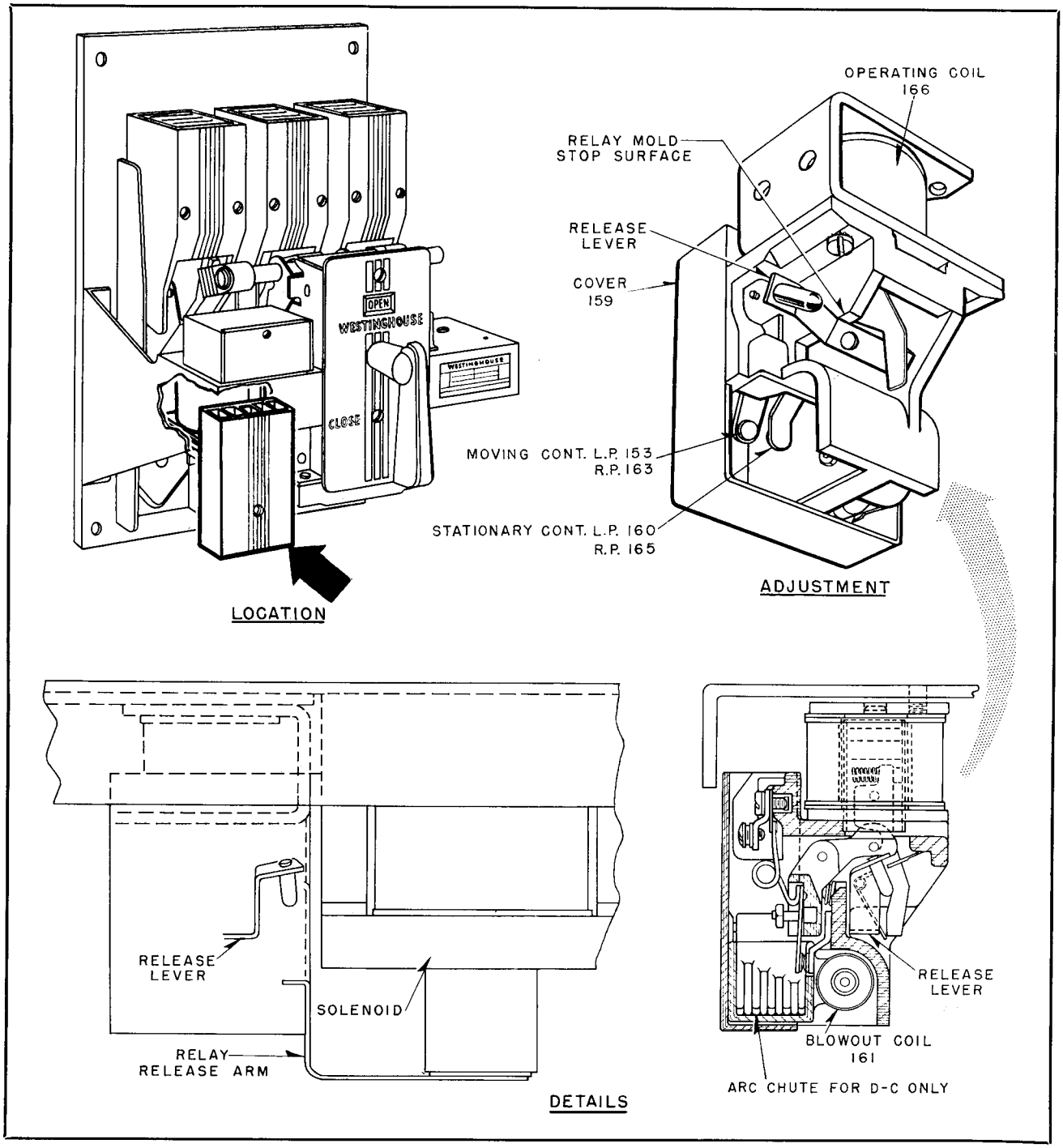


FIG. 9. Control Relay—Location, Adjustment, and Construction Details

4. Remove the operating mechanism from the platform and (a) remove and discard the molded trip fingers from the trip bar; (b) remove and discard the brass counterbalance from the bottom of the trip lever. Remount the operating mechanism.

5. If the breaker is equipped with a shunt trip attachment, remove and discard the trip lever from the shunt trip and replace with trip lever S# 1736189.

6. If the breaker is equipped with an electric lockout attachment remove and discard the 1/16 thick Micarta angle screwed to the electric lockout lifting plate. Insulation is not required with the insulated overcurrent device.

7. Loosen the control relay and solenoid mounting bolts on DB-15 breakers (if supplied) and tilt forwards slightly to permit easy installation of the

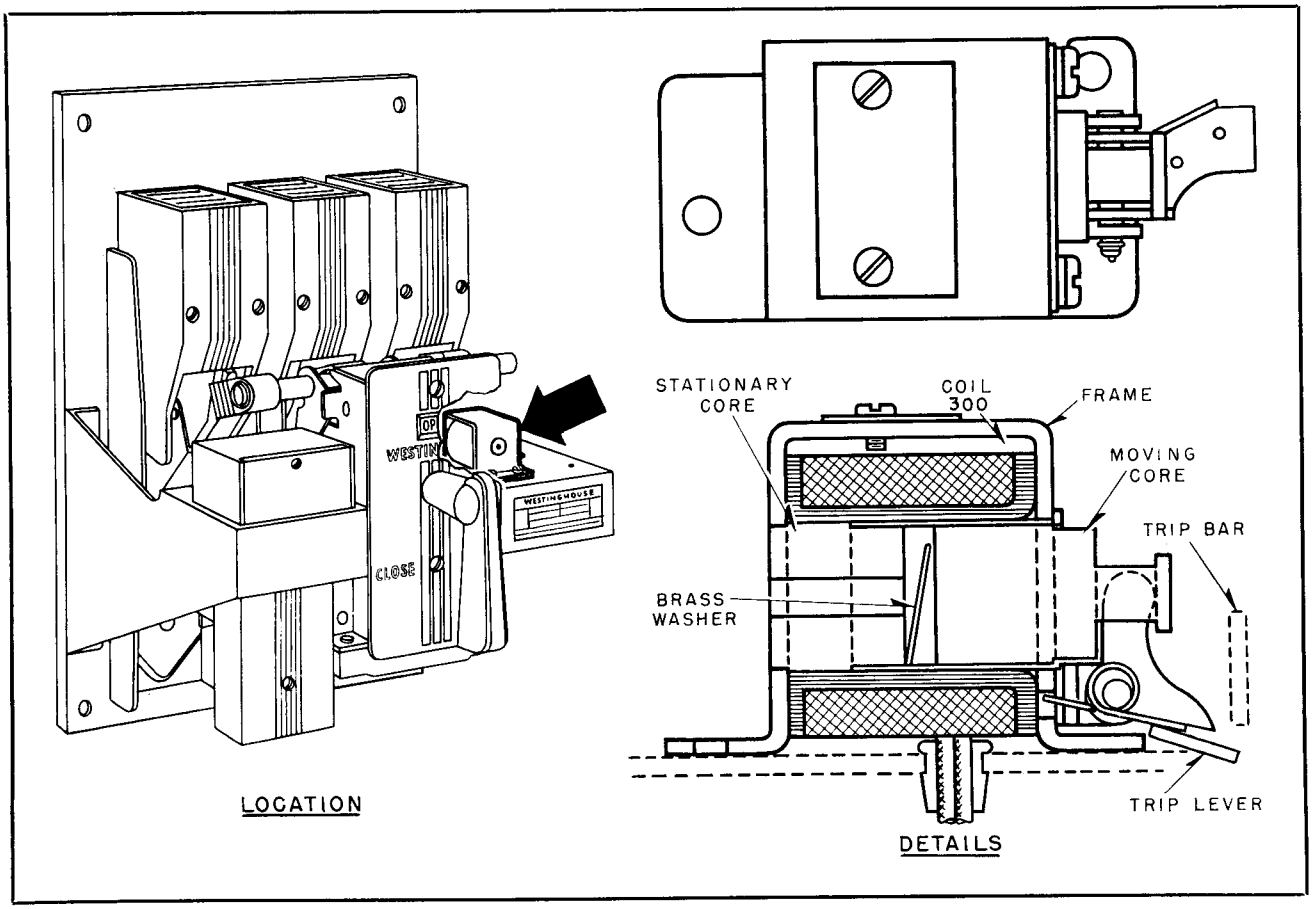


FIG. 10. Shunt Trip Attachment—Location and Construction Details

new overcurrents. Tighten all bolts after mounting the overcurrent device.

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. 8, page 22. The contacts should normally last the life of the breaker, but are replaceable if found necessary.

Check for correct adjustment by energizing the relay coil with the breaker in the closed position. If the relay contacts touch momentarily, and draw an arc, bend the release arm upward with a pair of pliers. After bending, make sure the vertical portion of the release arm does not rub either the relay mold or the solenoid frame.

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 12.

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 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. Turn the reset lever screw to secure approximately 14 oz. push out force on the moving core when the latch releases.

The moving core is normally held magnetically against the stationary core to hold the Micarta rod

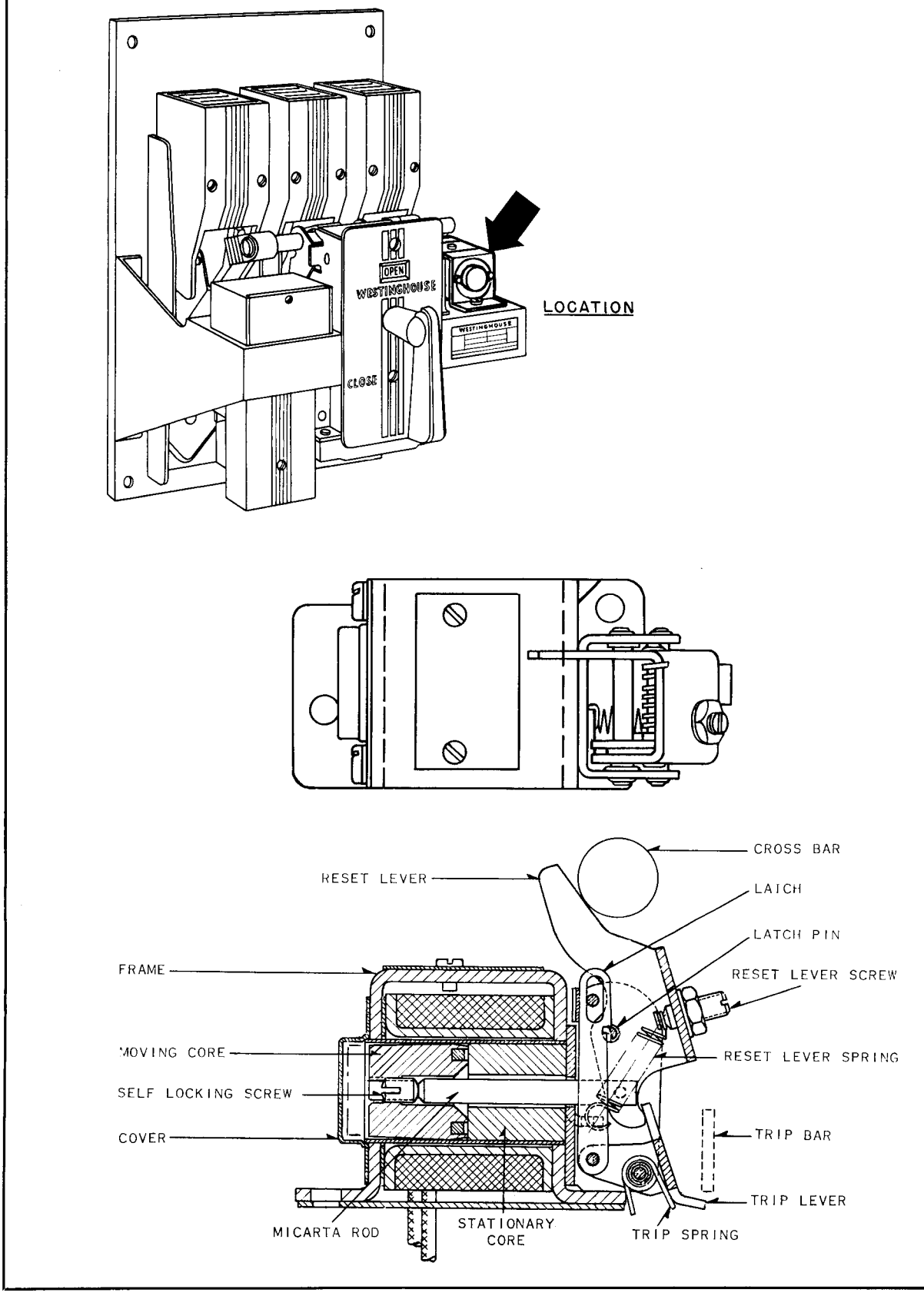


FIG. 11. Undervoltage Trip Attachment—Location and Construction Details

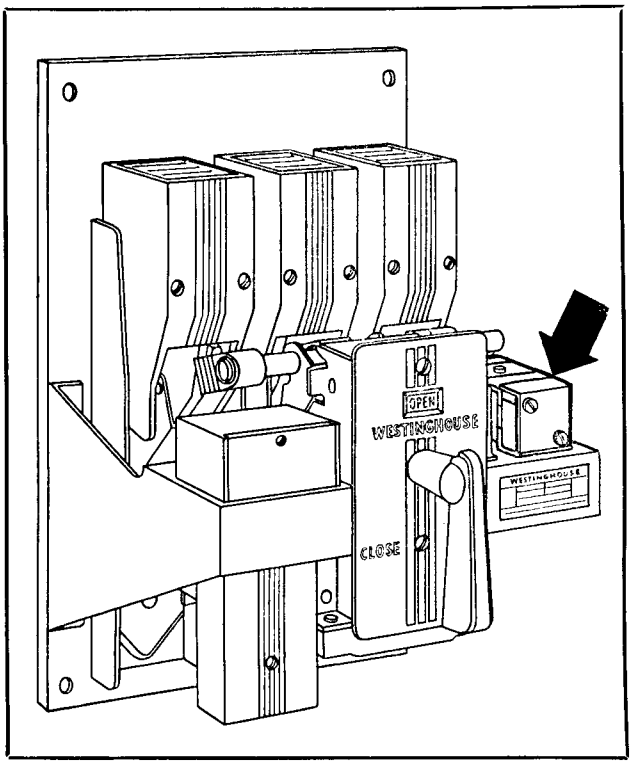


FIG. 12. Undervoltage Time Delay Attachment—Location

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, it carries with it the latch pin which rotates relative to the latch until the latch is released. 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.

The self-locking screw in the moving core is set at the factory and should not require adjustment. It is used to secure latch release when the moving core is 7/32 outside the frame.

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.

The trip lever of the undervoltage should have approximately 1/16 inch clearance to the trip bar when the breaker is half way closed.

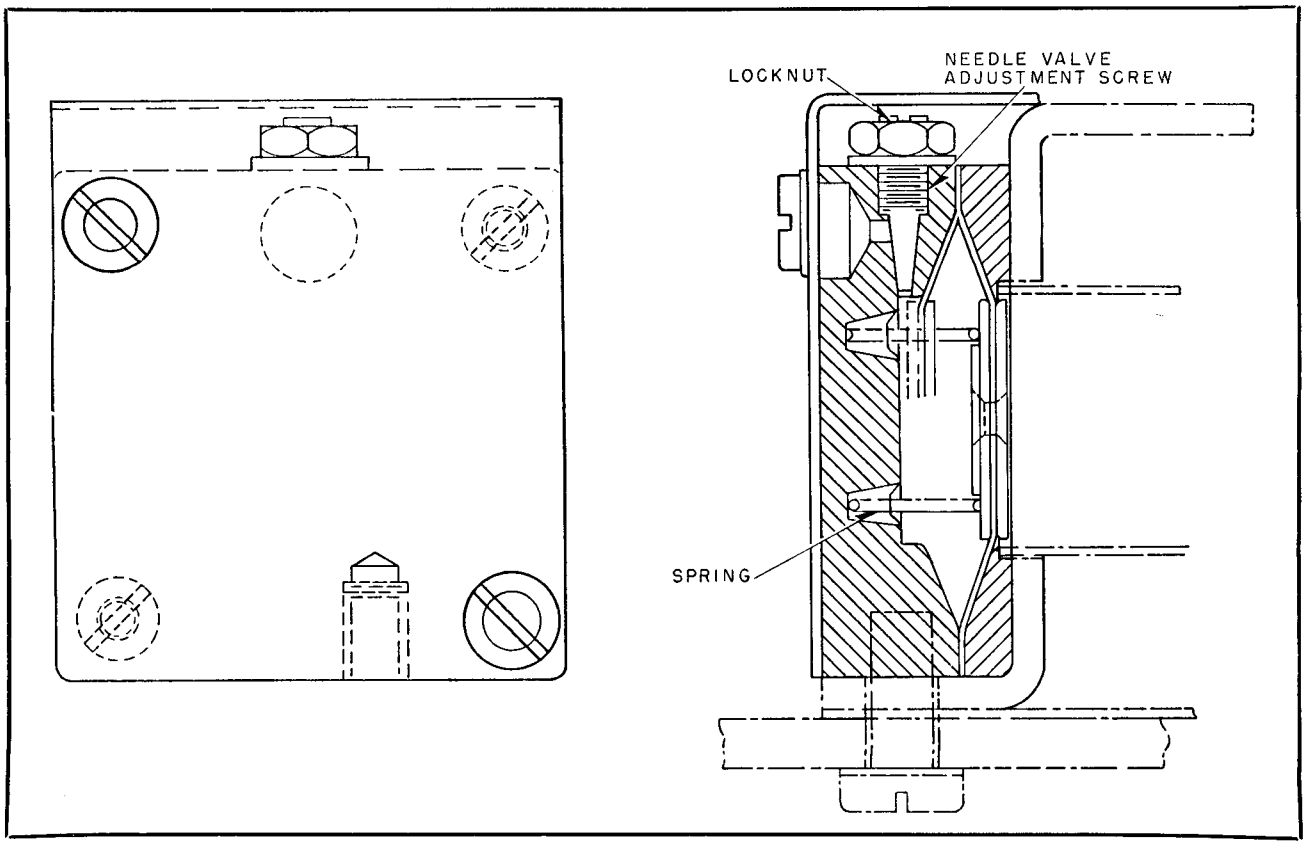


FIG. 12A. Undervoltage Time Delay Attachment—Construction Details

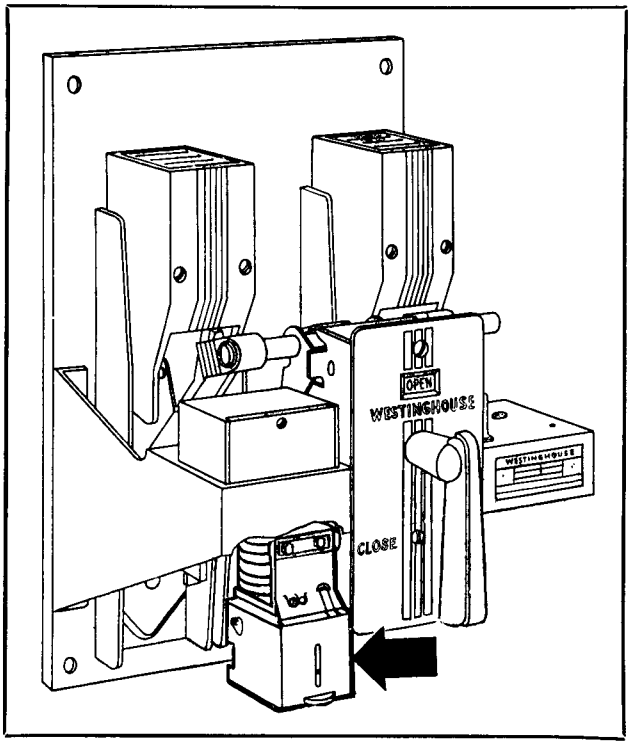


FIG. 13. Reverse Current Trip Attachment—Location

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 resetting. It is set to trip within 4 to 7 seconds.

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 FOR 2 P. D-C. BREAKER

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 direction of current flow in that pole is reversed.

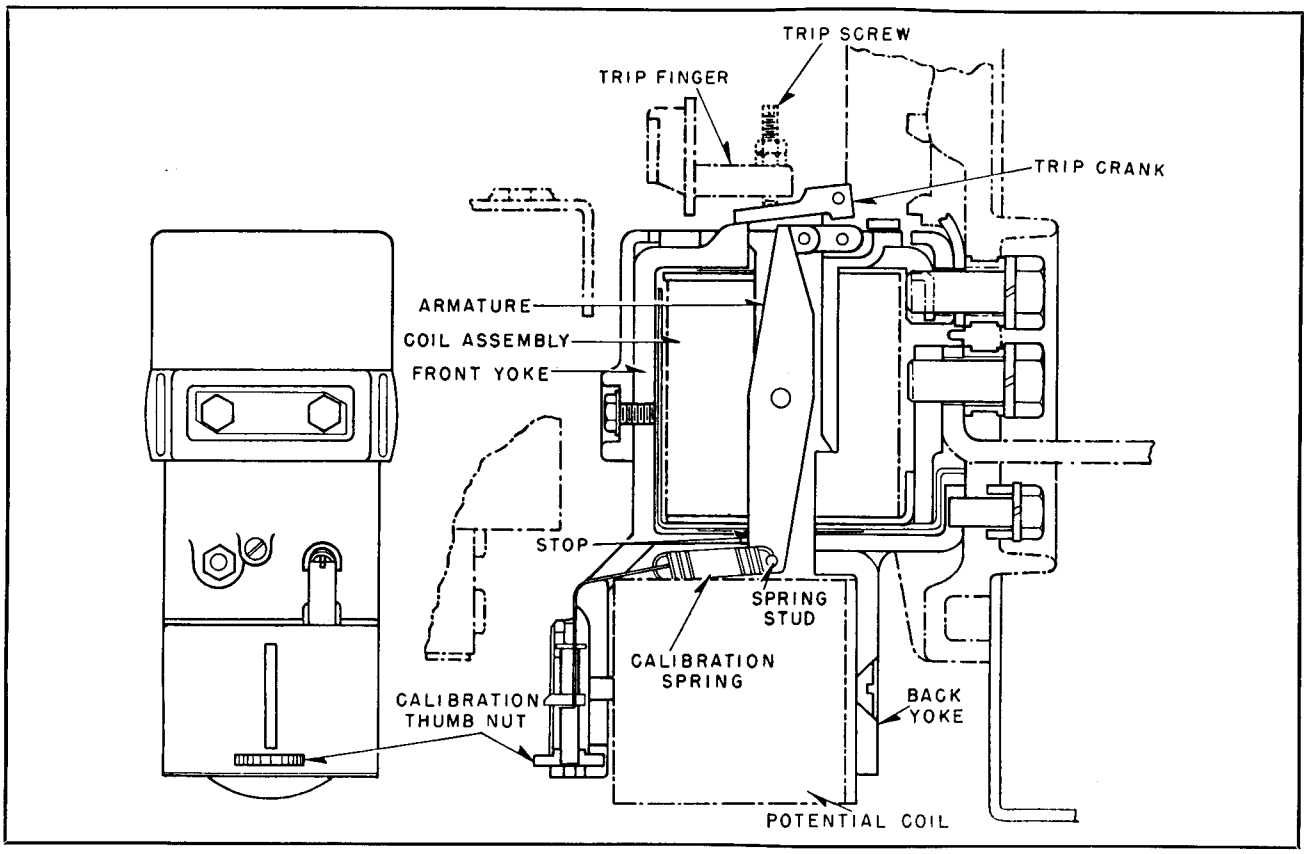
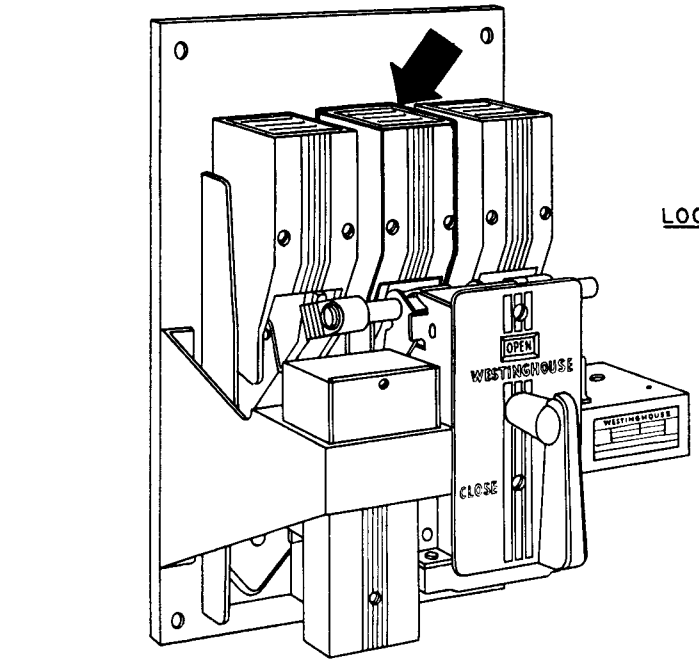
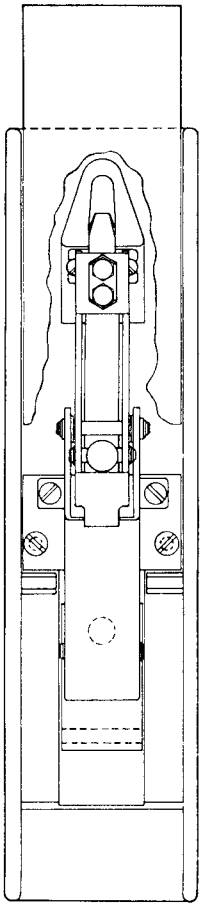
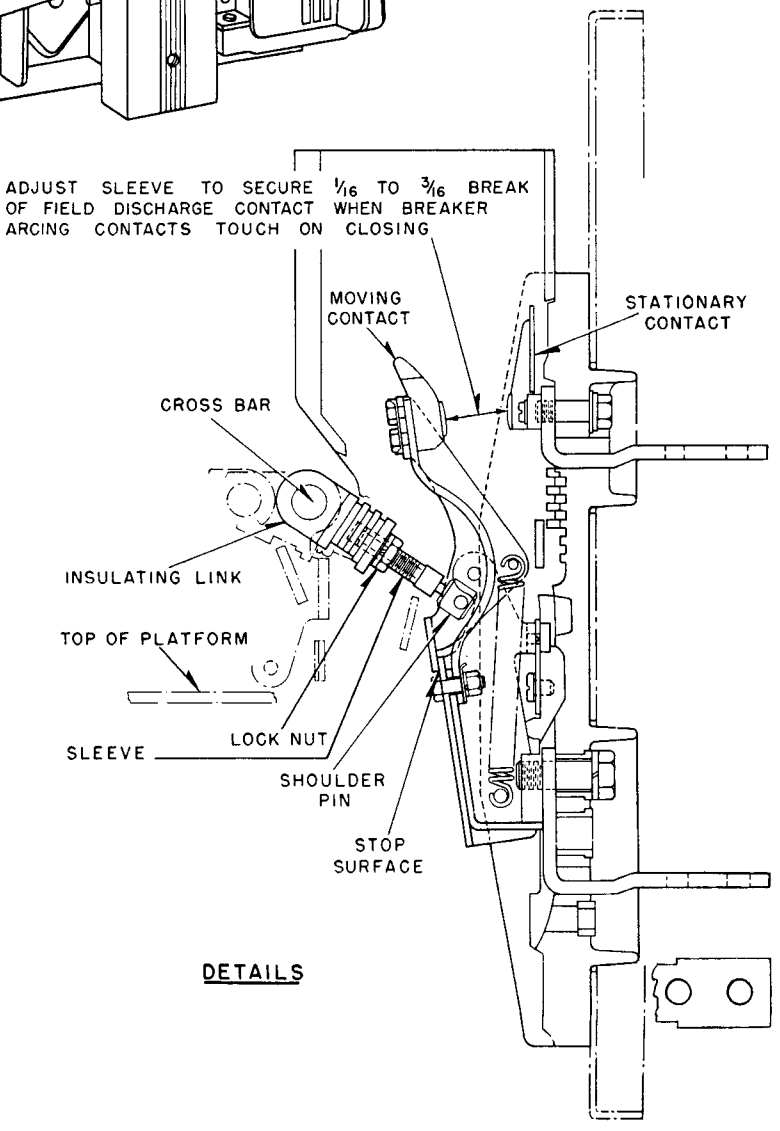


FIG. 13A. Reverse Current Trip Attachment—Construction Details



LOCATION





DETAILS

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

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.

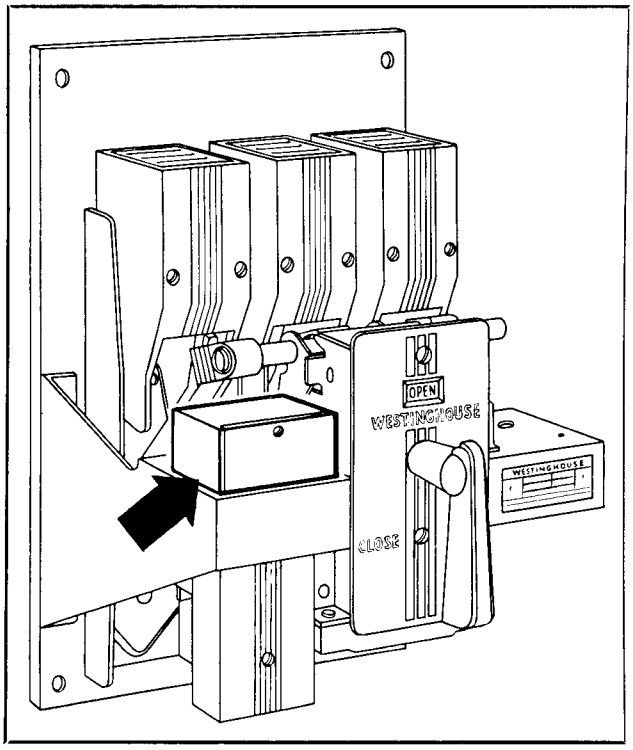


FIG. 15. Auxiliary Switch—Location

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 1/32-inch overtravel after tripping.

Final inspection should be made electrically, after the circuit connections are complete as shown in Fig. 8, page 22.

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

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 shipped with the gap setting shown in Fig. 14, for generator field protection. However, the gap setting can be reduced to zero or set to open after the breaker contacts close, if desired. 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 break distance is adjusted by loosening the lock nut and turning the sleeve in or out. Always leave a slight gap at the stop surface.

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

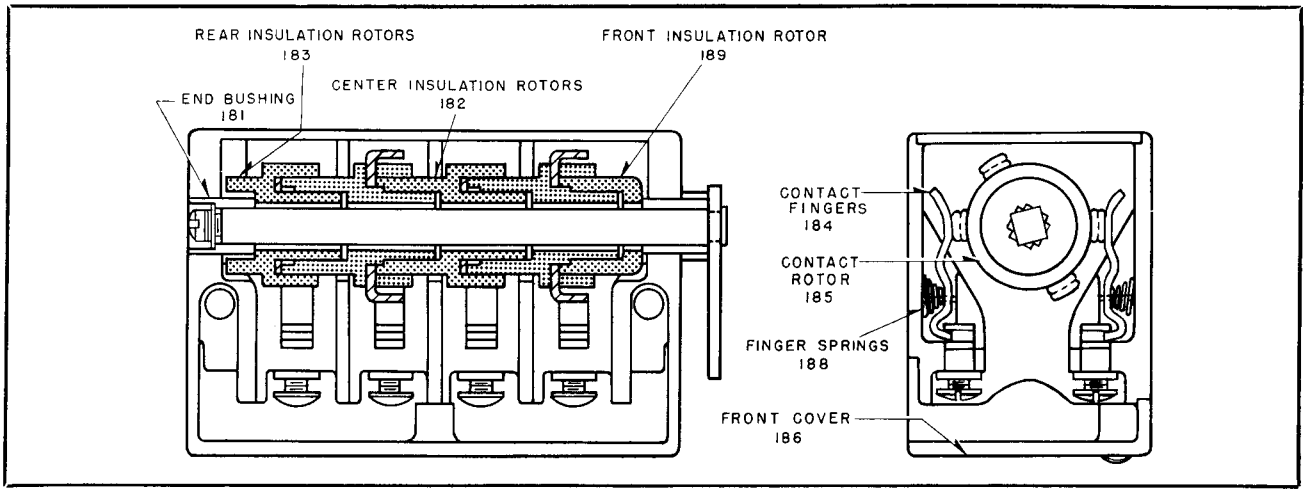


FIG. 15A. Auxiliary Switch—Construction Details

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.

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.

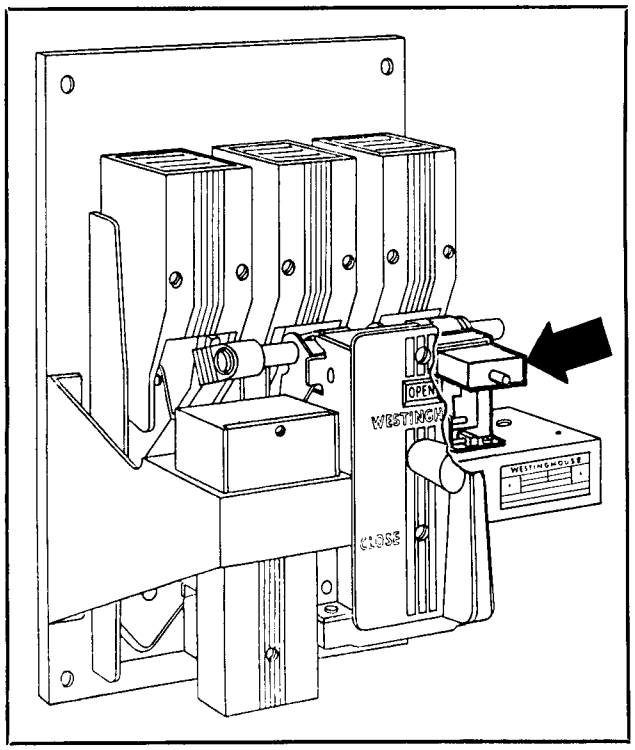


FIG. 16. Alarm Switch Attachment—Location

Table No. 4. 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

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.

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

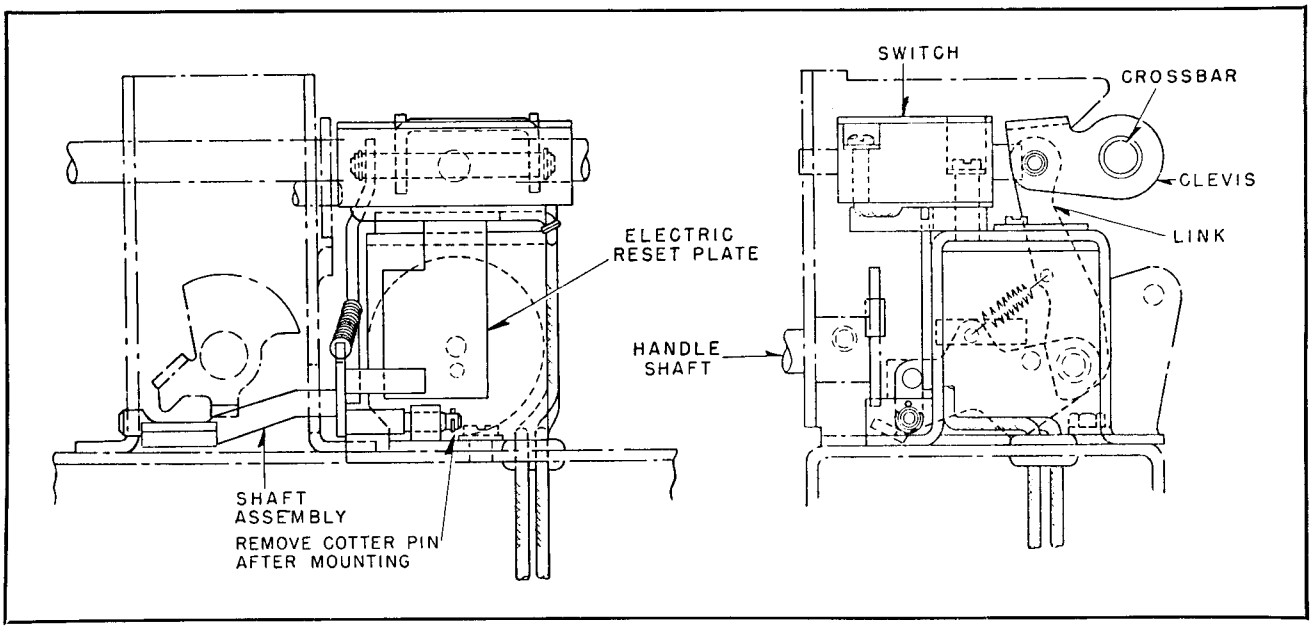


FIG. 16A. Alarm Switch Attachment—Construction Details

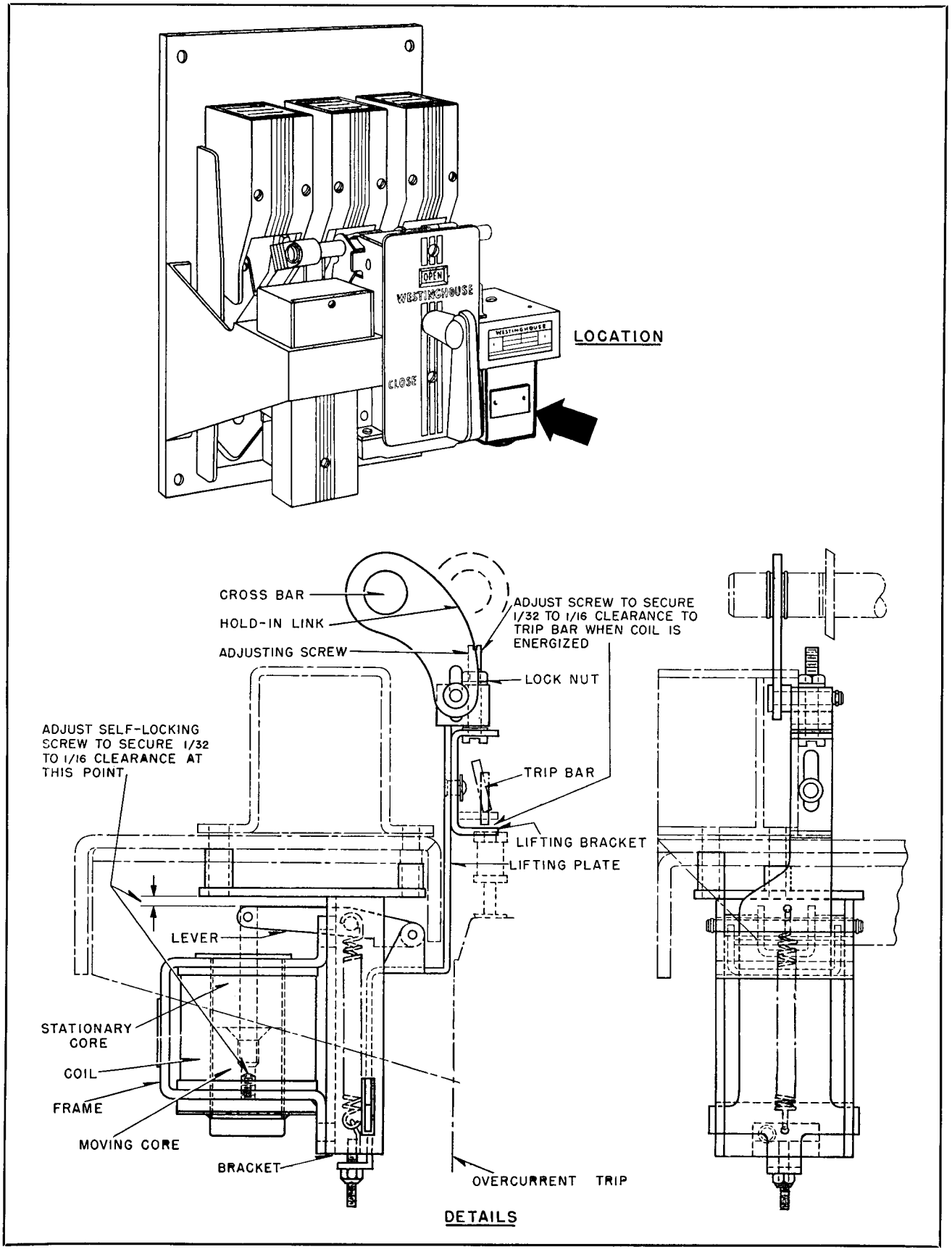


FIG. 17. Electric Lockout Attachment—Location and Construction Details

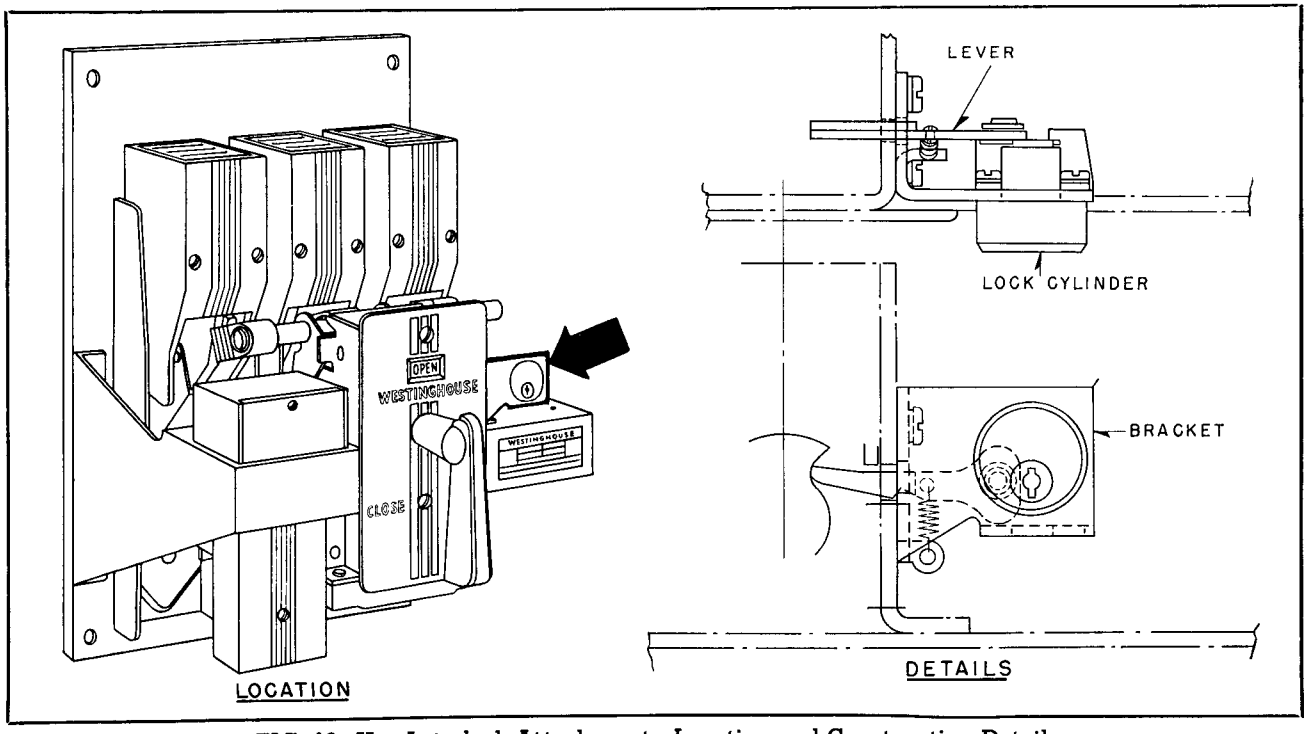


FIG. 18. Key Interlock Attachment—Location and Construction Details

by rotating the breaker handle to the tripped position, or electrically by energizing the shunt trip coil (when electrical resetting has been provided).

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. Pushing downward on the lifting plate should permit closure of the breaker. Releasing the lifting plate 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 1/32-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.

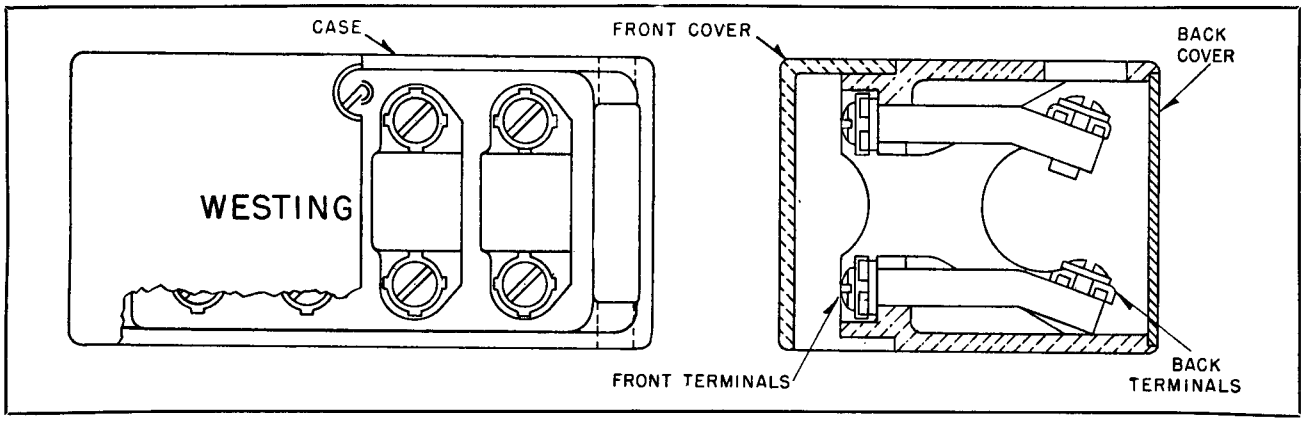


FIG. 19. Terminal Block Attachment—Construction Details

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 tripped 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.

TERMINAL BLOCK

The eight point terminal block mounts on top of the auxiliary switch (see Fig. 19).

All internal wiring is connected to the back terminals, leaving the front terminals for the customer's wiring. The left side of the front cover is open to permit entrance of the customer's wires from the left side of the breaker.

Maintenance. Check for loose screws.

Recommended Spare Parts for DB-15 and DB-25 Air Breakers

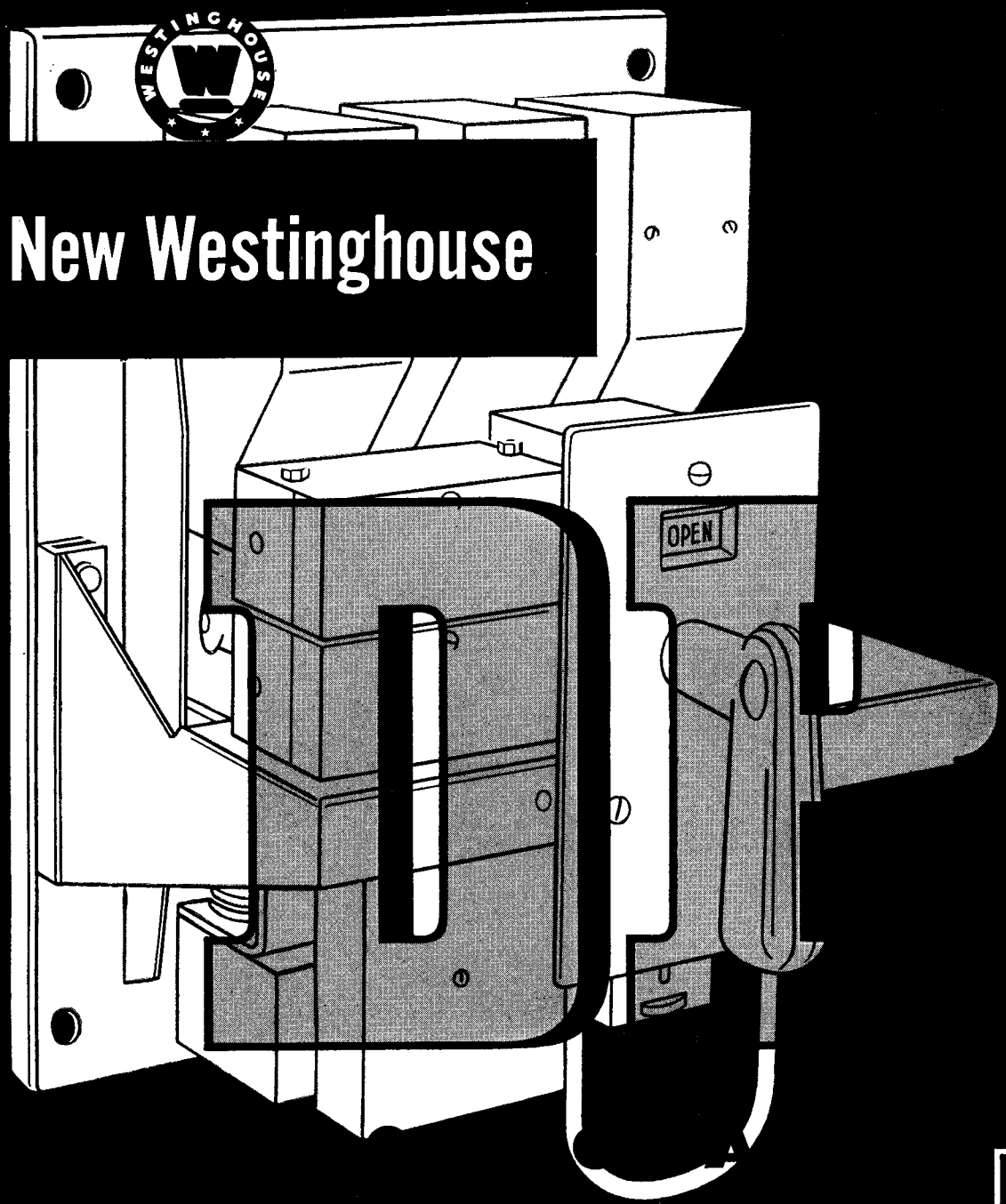
NAME OF PART (Always Give Breaker S. O. Reference)	STYLE NUMBER OR REFERENCE	NUMBER PER BREAKER OR DEVICE	NUMBER RECOMMENDED For Breakers		
			1	2 to 5	6 up
AUXILIARY SWITCH	Fig. 15A				
4 Pole Switch Unit	No. 187	1 or 2	..	1	2
Front Cover	No. 186	1	..	..	1
Contact Finger 184	1397 624	8	..	4	8
Contact Rotor 185	1397 641	4	..	4	8
CONTROL RELAY	Fig. 9				
Operating Coil	No. 166	1	..	1	2
Blowout Coil & Circuit—D.C.	No. 161	1	..	1	2
Moving Contact—Left Pole	No. 153	1	..	2	4
Moving Contact—Right Pole	No. 163	1	..	1	2
Stationary Contact—Left Pole	No. 160	1	..	2	4
Stationary Contact—Right Pole	No. 165	1	..	1	2
Cover	No. 159	1	..	..	1
POLE UNIT	Fig. 5				
Stationary Arcing Contact	No. 219	3	3	6	12
Stationary Main Contact	No. 222	3	..	1	3
Moving Arcing Contact	No. 221	3	3	6	12
Moving Main Contact	No. 210	3	..	1	3
Opening Spring	No. 225	3	..	1	3
ELECTRIC OPERATION					
Closing Coil	Fig. 5 No. 216	1	..	1	2
Shunt Tripping Coil	Fig. 10 No. 300	1	..	1	2
OVERCURRENT DEVICE	Fig. 6A				
Bottom Assembly with Calibrated Scaleplate	No. 141	3	..	2	4
RETAINING RINGS—ASSORTMENT					
DB-15	497A346G01	1	1	2	3
DB-25	497A346G02	1	1	2	3

MEMORANDUM

MEMORANDUM


WESTINGHOUSE

The New Westinghouse



IT'S A *Completely New* BREAKER

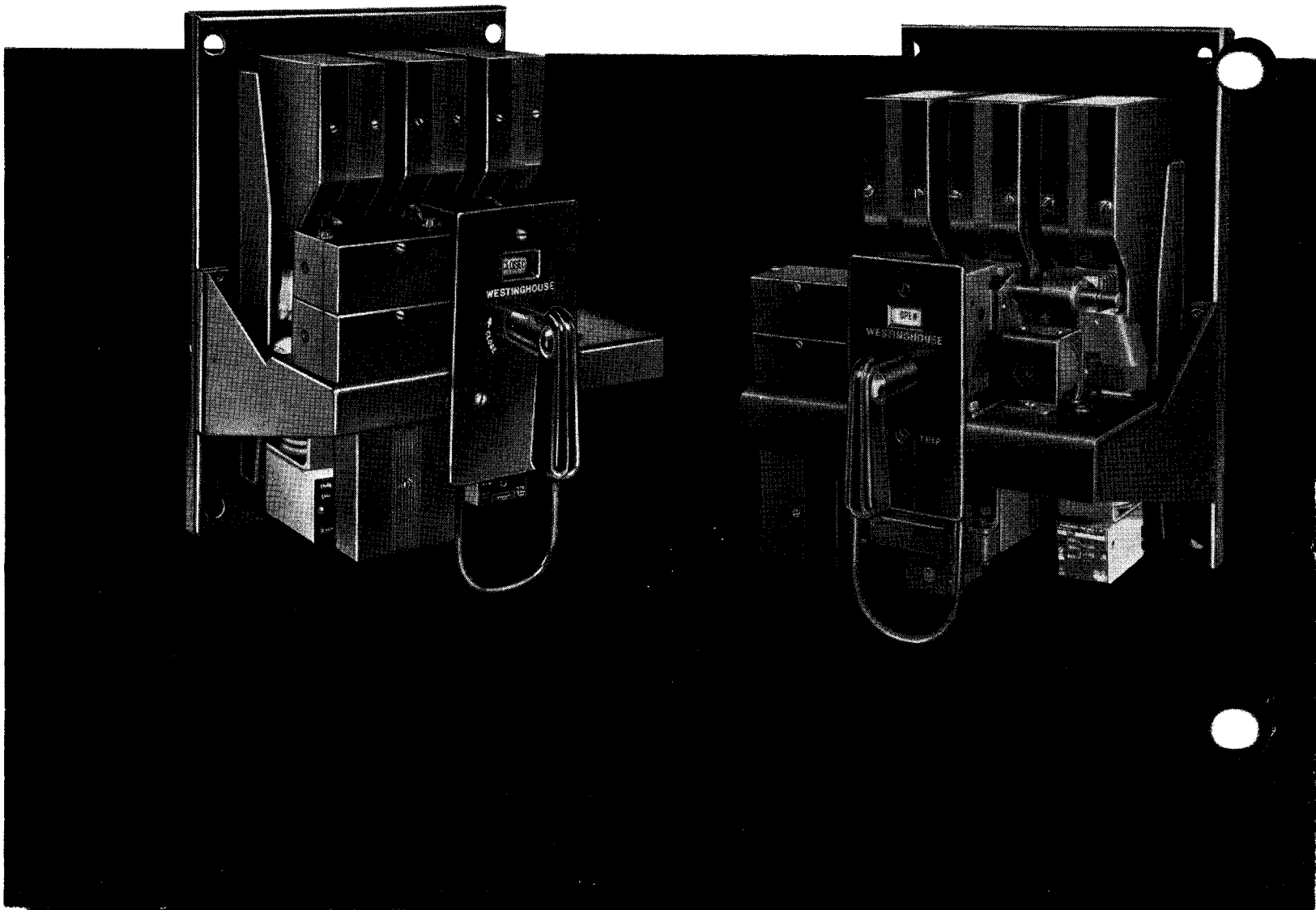
Marking another great forward stride in circuit breaker design is the new Westinghouse DB Low-Voltage Air Circuit Breaker. It's a completely new breaker . . . completely redesigned around a revolutionary, new tripping device that offers performance benefits heretofore unattainable in any single low-voltage interrupting device.

In a low-voltage system, the requirements for relatively long-time delay for motor starting and short-time delay for selectivity have, until now, involved two entirely different devices based on different operating principles. In the new DB Breaker you can specify both of these important features in a *single* overcurrent tripping mechanism.

In *any* single breaker, these features alone would spell superiority. But in the completely new DB Breaker, you get many more features which lead to greater flexibility, unusual reliability . . . the best in low-voltage system protection.

It's available in 2 frame sizes

MANUALLY OR SOLENOID OPERATED



IT OFFERS THESE UNIQUE PERFORMANCE BENEFITS

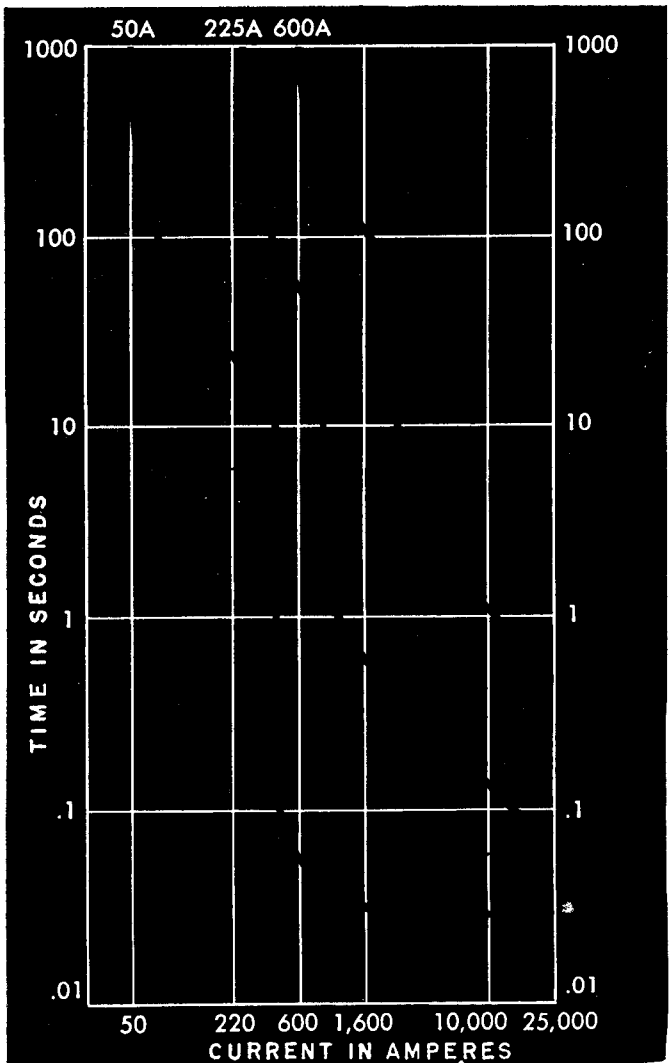
1. *Adequate short-time rating.* The design of the DB Breaker is such that short-circuit stresses tend to hold contacts closed, rather than open them. Breaker contacts, therefore, remain closed, or can be closed, on faults of any magnitude within the short-time rating of the breaker.

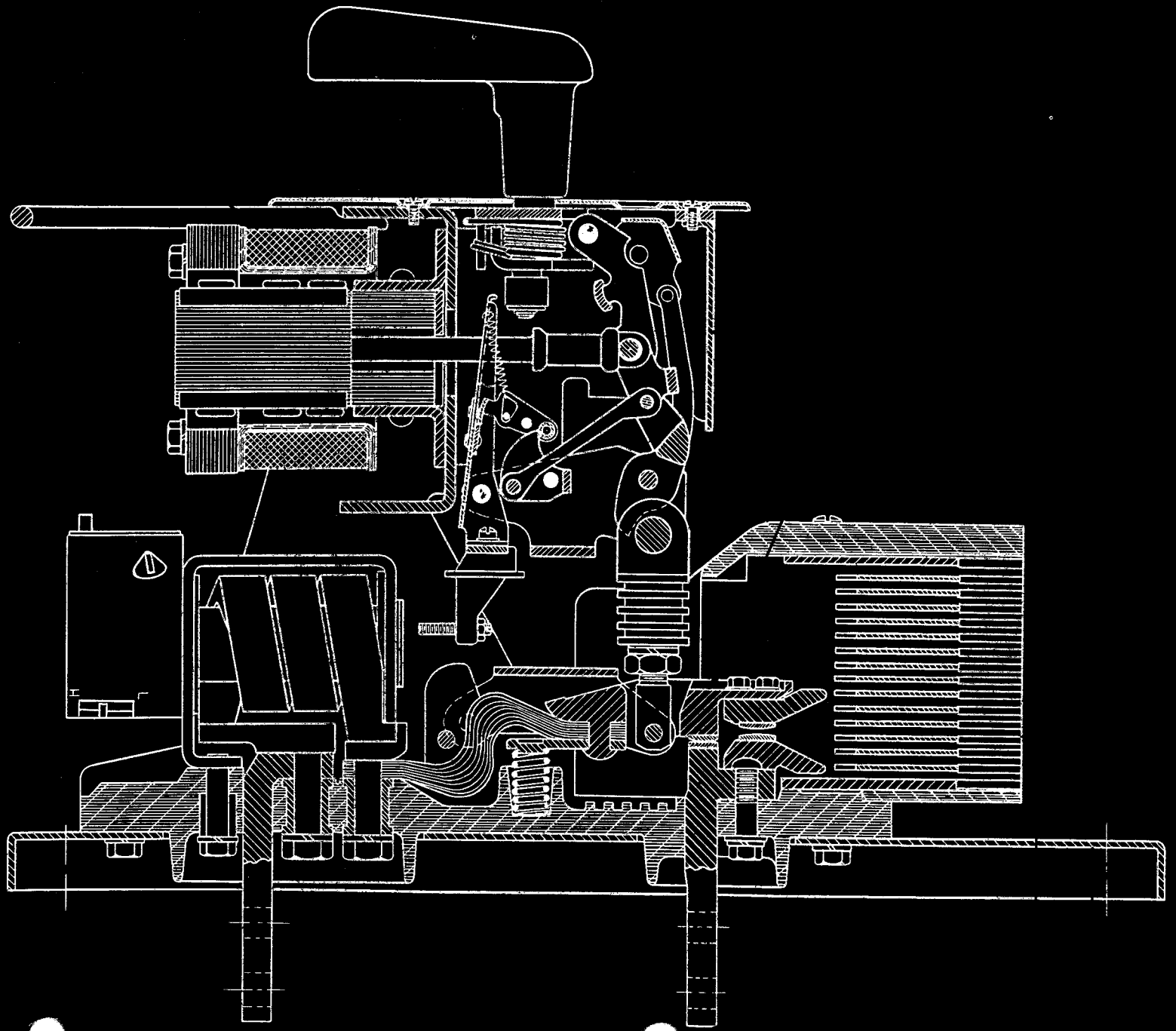
2. *Delayed overcurrent protection with instantaneous tripping on faults.* Overcurrent tripping devices on breakers intended for use on motor or general-purpose circuits include a long-time delay element and an instantaneous element. The long-time delay permits motors to be started and overloads to continue for short durations which will not damage the motor or circuit. Locked rotor currents or overloads of long duration are interrupted before damage is done.

Fault currents above locked rotor values are cleared rapidly by operation of the instantaneous trip.

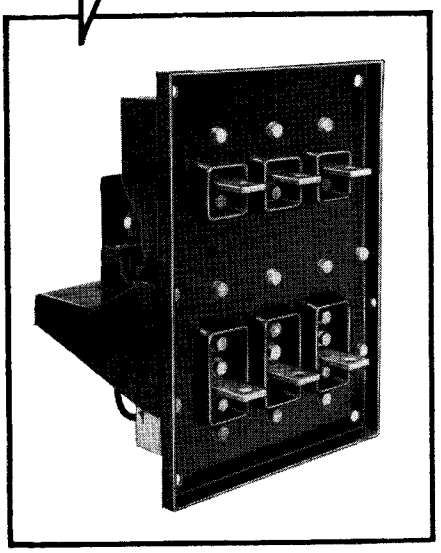
Curve A shows the long-time delay characteristics with the instantaneous trip operating at A. Unless otherwise specified, all breakers are equipped with this type of overcurrent device.

3. *Delayed overcurrent protection with short-time delay for selective operation on fault.* For use on feeder and back-up breakers, overcurrent trip units including both a long-time delay and a short-time delay element may be specified. By properly selecting the time-current characteristic for each breaker in the circuit, the breaker nearest the fault can be caused to function to remove an overcurrent condition; the breakers nearer the source will remain closed and continue to carry the remaining load current to unfaulted branches of the circuit. The time characteristics of breakers in a typical selective application are shown by Curves A, B, and C. Here a 50-ampere load breaker (Curve A) is provided with long-time delay with instantaneous trip for motor or general-purpose service. A 225-ampere feeder breaker (Curve B) is equipped with both long and short-time delay to obtain selectivity with the load breakers. A 600-ampere back-up breaker (Curve C), supplying power to the system, is equipped with long and short-time delay which will provide selectivity with the 225-ampere breaker and all other feeder breakers.

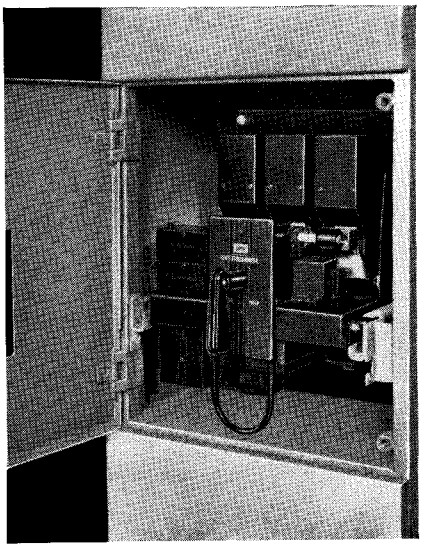




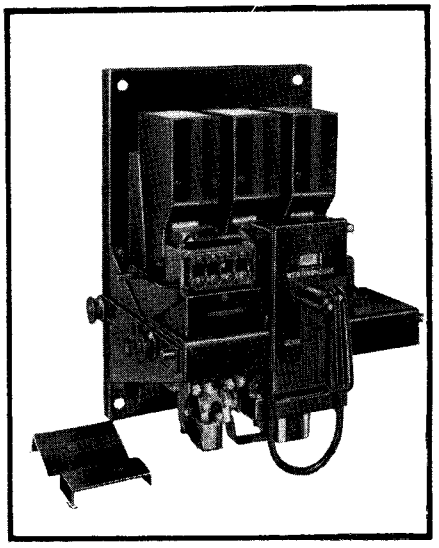
...creates a host of important construction features



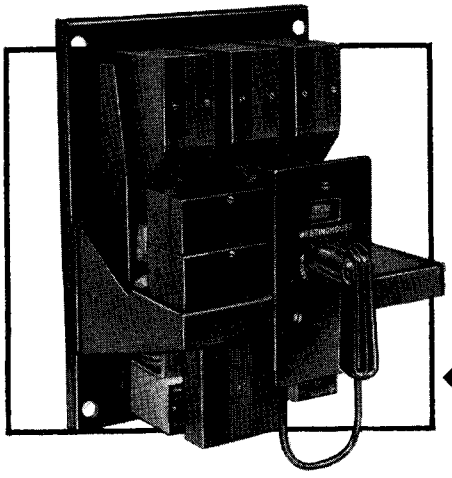
All-metal mounting base . . . provides a strong, rigid foundation for all parts.



Complete shielding of live parts . . . assures safety of operating personnel. There are separate enclosures for dust-proof, weatherproof, subway and explosion-proof applications.

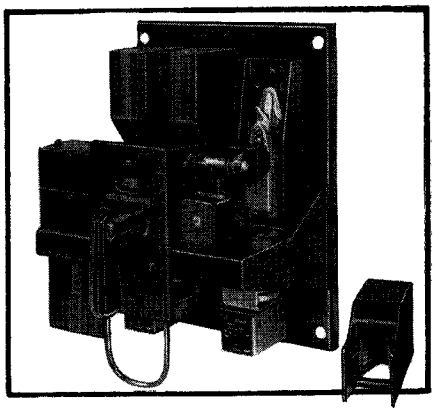


Rotary-type auxiliary switch. . . for dependability and accessibility.



Sub-assemblies can be easily removed as a unit . . . and standard attachments added to any existing breaker at any time without changing parts. The series overcurrent tripping device can be removed—without disturbing other parts —by loosening bolts on the back of the breaker.

Breaker is free standing when unmounted . . . to facilitate inspection, adjustment or disassembly.



Longer operating life . . .

All pins, important levers and links in the mechanism are made of hardened stainless steel to minimize wear and prevent corrosion.

"De-ion" arc interruption . . .

:ovides for quick arc extinction . . . longer contact life.

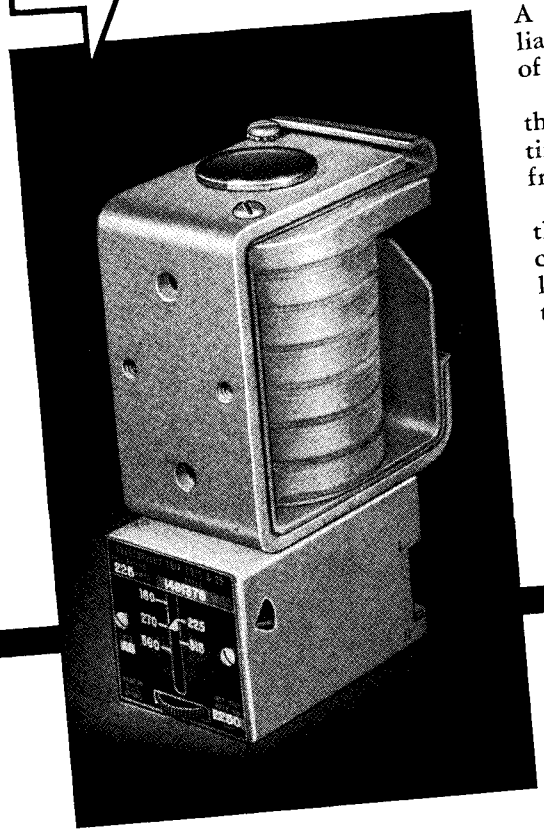
Easier installation . . .

Because it's a smaller breaker . . . easy to work around. Attachments can be easily added or removed. No drilling is required.

Extra dependability . . .

Thanks to a hermetically sealed tripping device that offers new reliability in breaker operation.

THE NEW OVERCURRENT TRIPPING DEVICE PROVIDES *better service continuity... greater reliability*



A completely new type of series tripping device provides greater reliability on overload tripping plus selective operation at high values of fault currents.

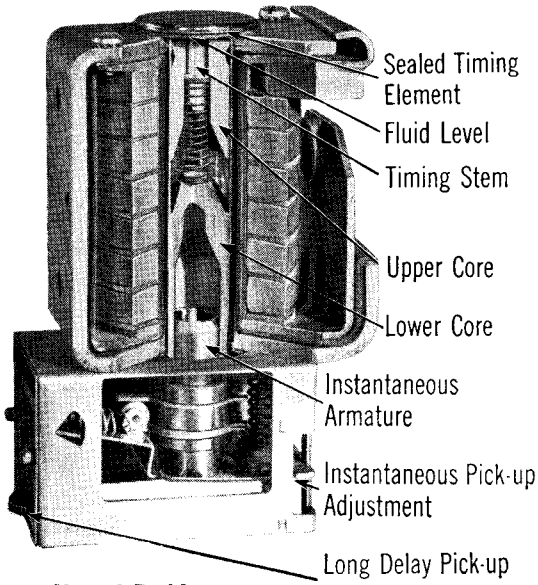
In operation, tripping force is delivered to the breaker latch by the upward movement of a hermetically-sealed tube into which the time-delay elements have been assembled and permanently protected from tampering.

In this novel arrangement, a fluid normally fills the space between the upper and lower cores in the sealed-tube assembly. During overcurrent conditions, the magnetic attraction between the upper and lower core causes the positive displacement of this fluid at a controlled rate which provides the inversely delayed time-current characteristic (see cutaway views below).

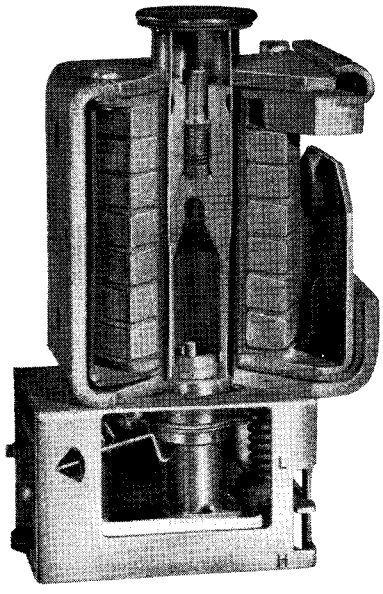
The instantaneous armature provides for instantaneous tripping of the breaker irrespective of any action within the sealed timing element. On currents above a predetermined value, the instantaneous armature is picked up by the magnetic action and bodily raises the complete sealed-tube assembly.

The short-time delay required for selectivity is obtained by the use of a by-pass valve in the timing stem.

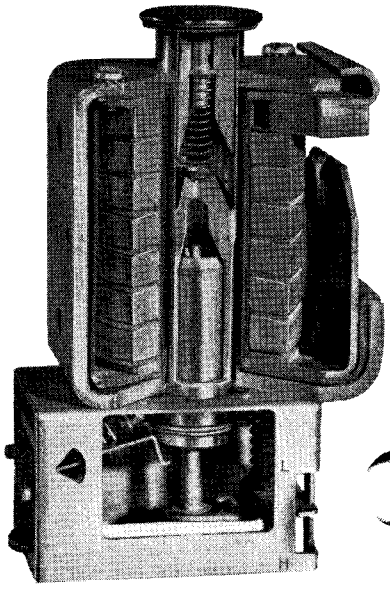
SEALED DELAY OVERCURRENT TRIPPING DEVICE



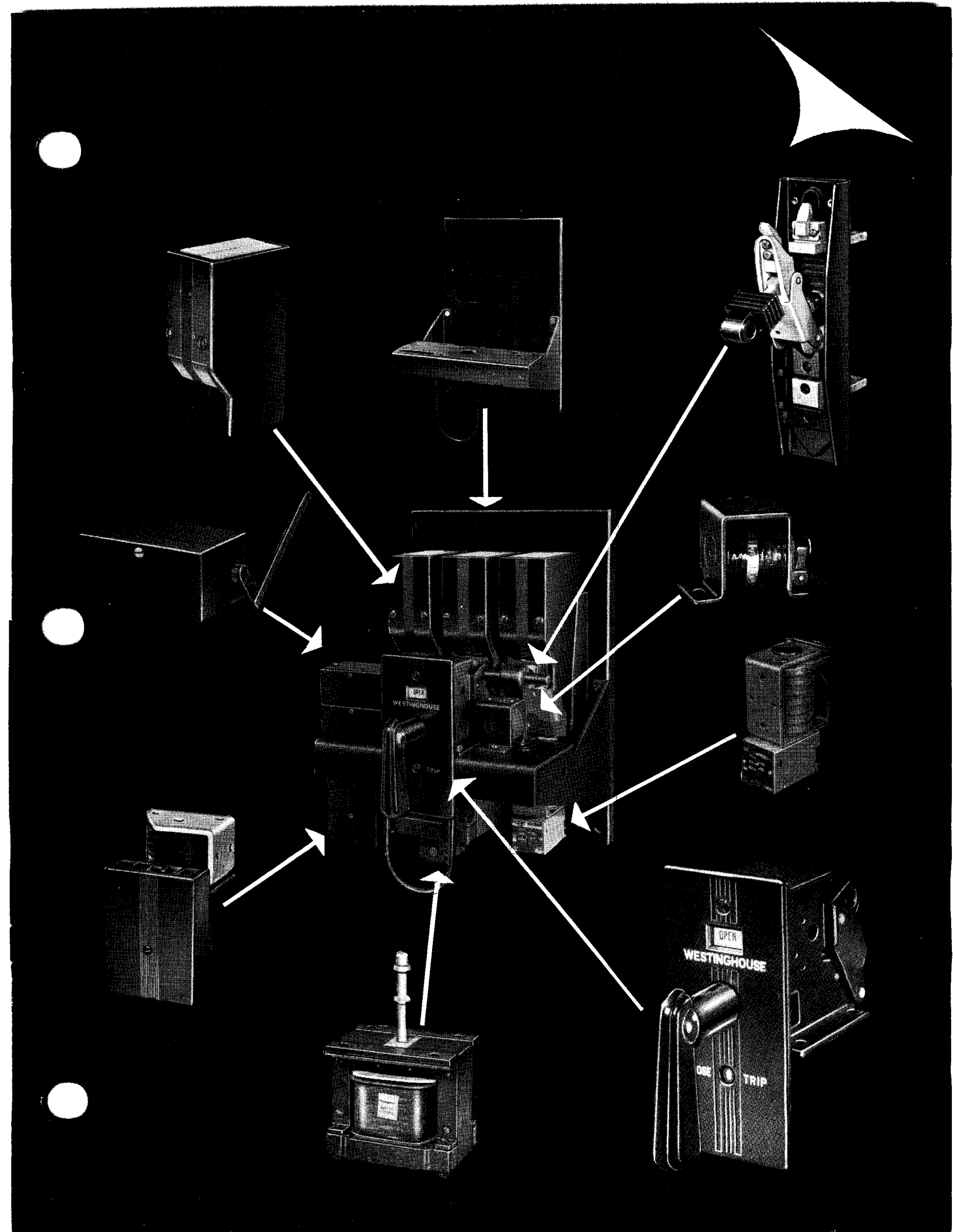
Normal Position

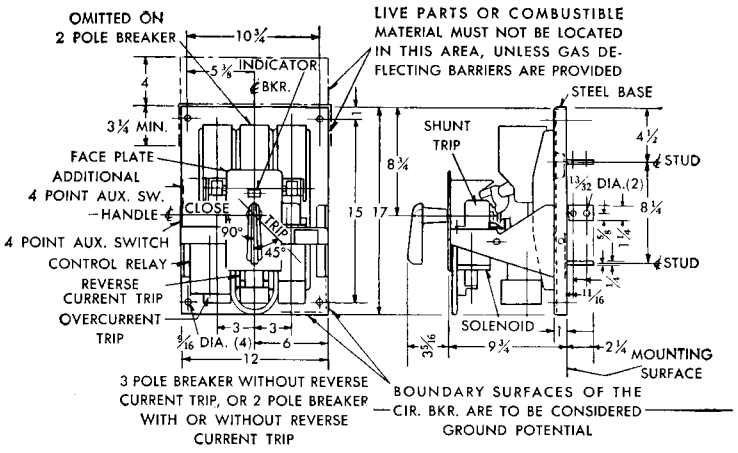


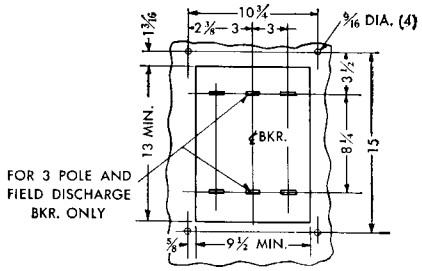
Delayed Tripping Operation



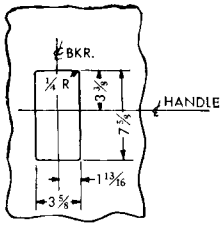
Instantaneous Tripping Operation


WESTINGHOUSE
OPEN
WESTINGHOUSE
CLOSE
TRIP



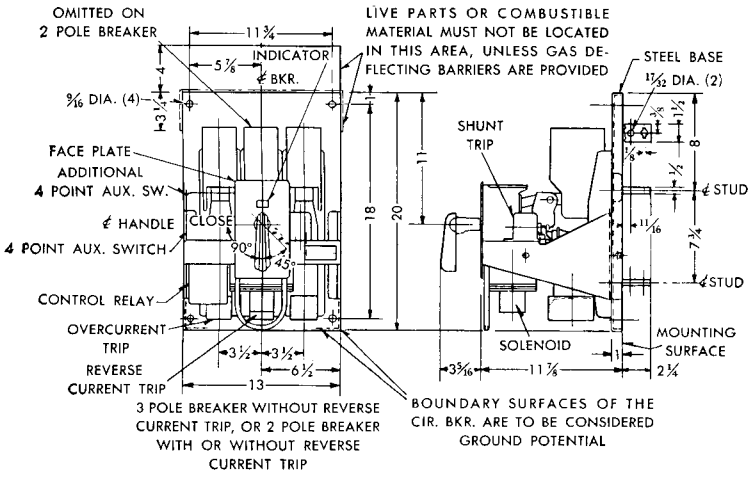


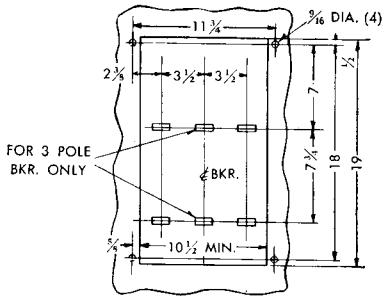
FRONT VIEW OF STUD LOCATIONS, CUTOUT & DRILLING FOR MOUNTING 3 POLE BREAKER WITH 2 OR 3 OVERCURRENT TRIPS, OR 2 POLE BREAKER WITHOUT REVERSE CURRENT TRIP



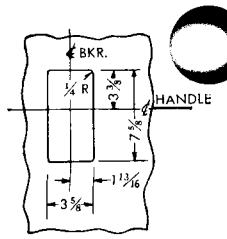
CUTOUT IN DEAD FRONT DOOR OR COVER

Type DB-15





FRONT VIEW OF STUD LOCATIONS, CUTOUT & DRILLING FOR MOUNTING 3 POLE BREAKER WITH 2 OR 3 OVERCURRENT TRIPS, OR 2 POLE BREAKER WITHOUT REVERSE CURRENT TRIP



CUTOUT IN DEAD FRONT DOOR OR COVER

Type DB-25

Dimensions are for reference only. For official dimensions, refer to nearest Westinghouse office.

WESTINGHOUSE ELECTRIC CORP., EAST PITTSBURGH, PA.