IB-9.7.1
ISSUE A

POWER CIRCUIT BREAKERS—VACUUM

INSTRUCTIONS

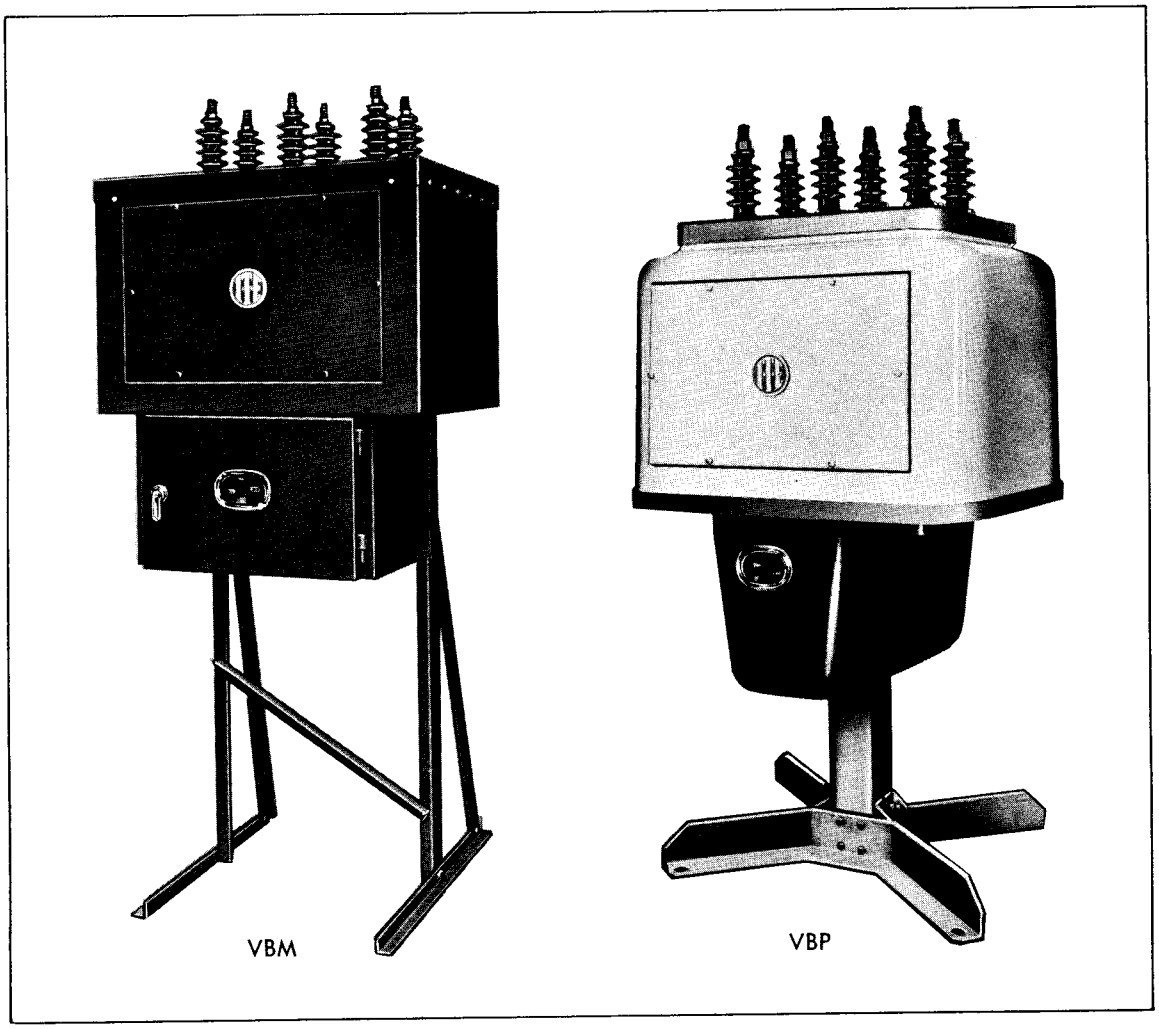
INSTALLATION, OPERATION AND MAINTENANCE

VBM-15-12 AND VBP-15-12 VACUUM BREAKERS

2400 to 15,500 Volts

600 Amperes Continuous Current-Carrying Capacity

12,000 Amperes RMS Symmetrical Interrupting Capacity



VBM VBP

I-T-E CIRCUIT BREAKER COMPANY

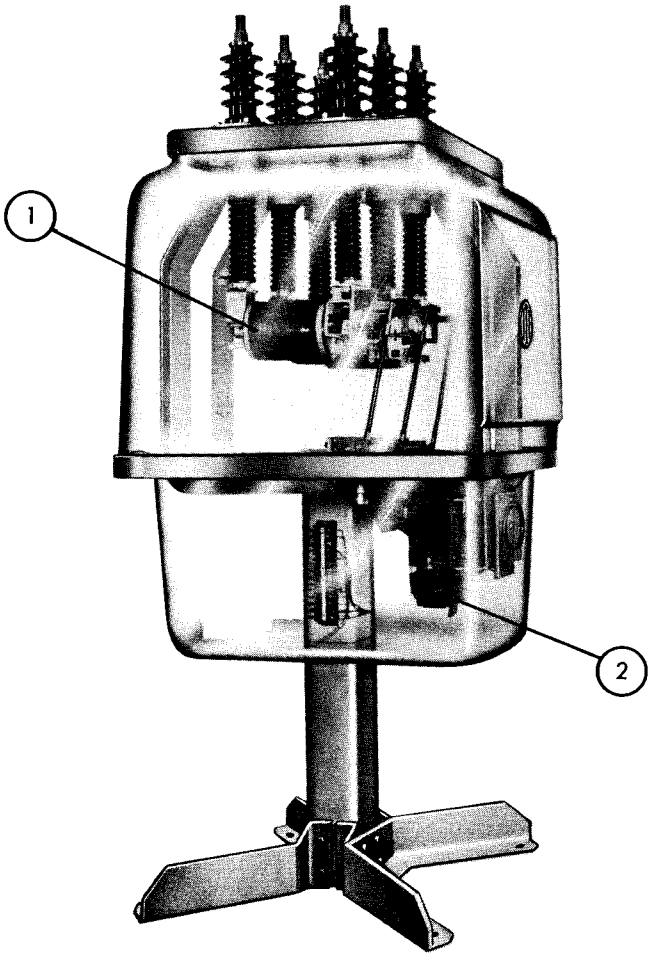
INSTRUCTIONS FOR INSTALLATION, OPERATION AND MAINTENANCE OF VBM-15-12 AND VBP-15-12 VACUUM BREAKERS

GENERAL

This manual provides instructions for the installation, operation and maintenance of models VBM-15-12, metal-housed, and VBP-15-12, plastic-housed, three-phase vacuum breakers.

It is recommended that this manual and the equipment drawings be reviewed before actual work is started on installing, operating and/or maintaining this equipment.

For a description of the I-T-E vacuum breaker and its functions, refer to I-T-E Catalog Section 9. 7.1



1. VACUUM INTERRUPTERS
2. STORED-ENERGY OPERATING MECHANISM

Fig. 1. Model VBP Non-Relayed Basic Vacuum Breaker with Plastic Housing. Phantom View with Interphase Barriers Removed.

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I. INSTALLATION AND OPERATION

RECEIVING AND INSPECTION

Upon receipt of the breaker, examine it for in-transit loss or damage. Look particularly for such things as bent frame, dented housing and chipped porcelain bushings. If loss or damage is evident, file a claim at once with the carrier and notify the I-T-E Circuit Breaker Company.

The breaker is shipped in contacts-closed position and should be handled and transported in this position to prevent damage to the interrupter contacts.

Hook eyes are provided on the top of the housing for a crane lift. After removing the front portion of the crate and all packing material, lift the unit from the remainder of the crate. If the breaker is a metal-housed model, attach the supporting frame in accordance with Figure 2 or Figure 3. Look on the bottom of both the high voltage compartment and the low voltage compartment for any parts that may have been broken from the assemblies during shipment.

NOTE: Use caution in uncrating as breaker will not stand upright without supporting frame.

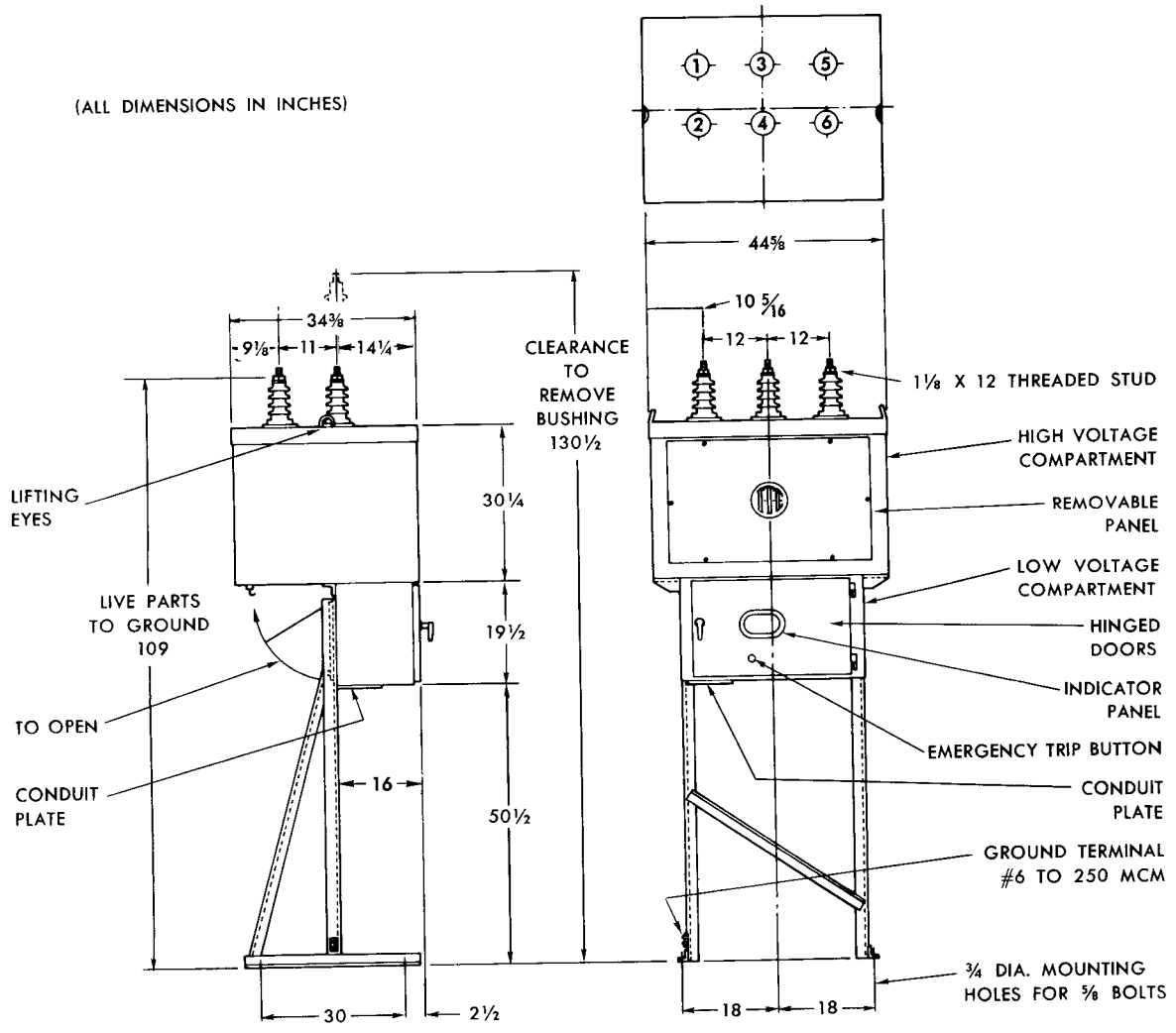


Fig. 2. Metal-Housed Non-Relayed Basic Breaker (Model VBM) Assembled for Station Mounting.

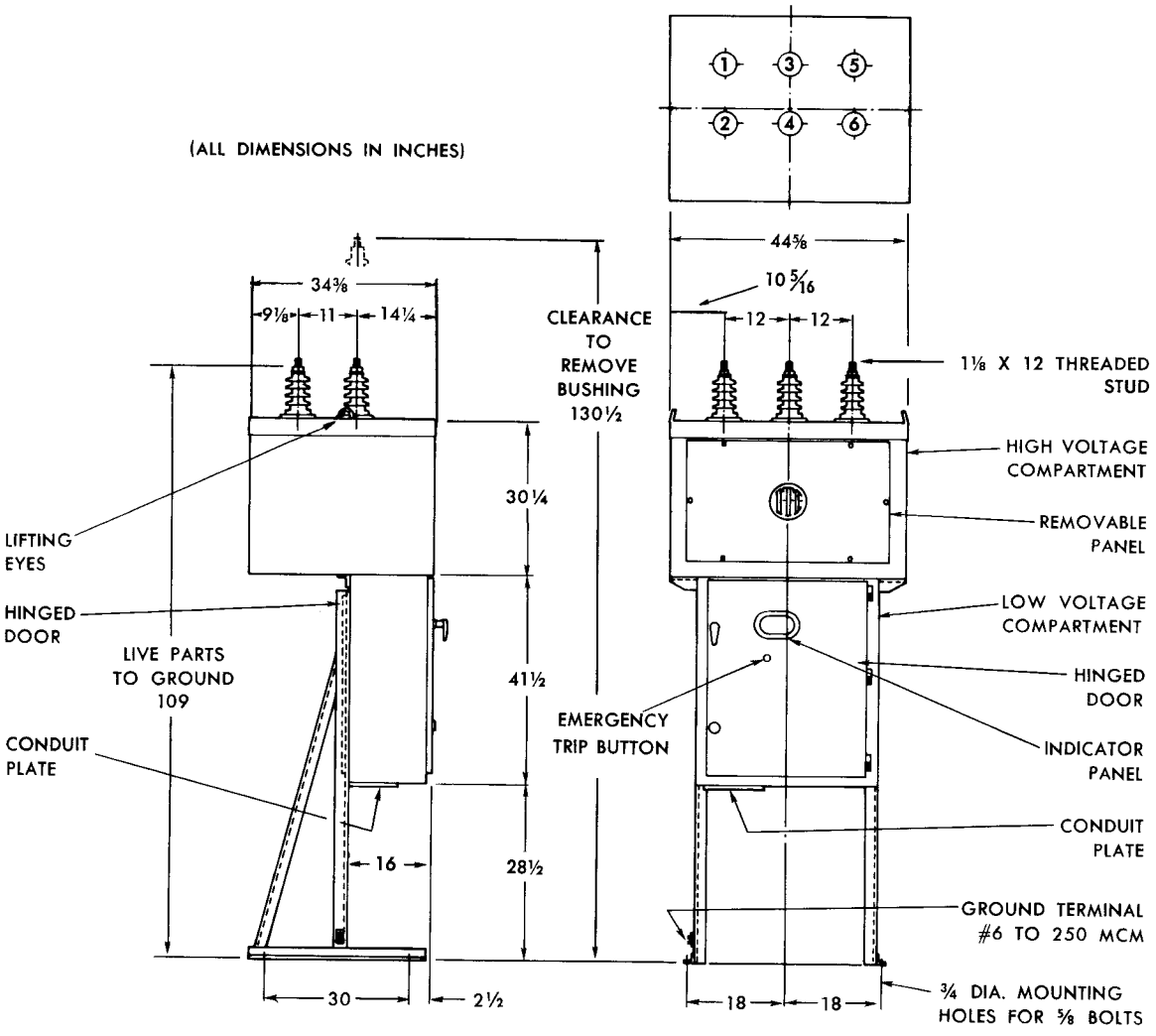


Fig. 3. Metal-Housed Relayed Non-Reclosing and Reclosing Feeder Breaker (Model VBM).

If the breaker is a plastic-housed model, it will be shipped with the standard pedestal and base assembled. If a pedestal extension has been ordered, it will be shipped in the same crate, but must be assembled at the site. Assemble as follows:

1. Uncrate the breaker and remove the pedestal extension from the crate.
2. Raise the total breaker assembly about 2 feet off the ground, using the hook eyes provided on top of the housing.
3. Unbolt the base and remove it from the pedestal.
4. Bolt the pedestal extension in place as shown in Figure 4 or 5.
5. Reassemble the base to the bottom of the pedestal extension.

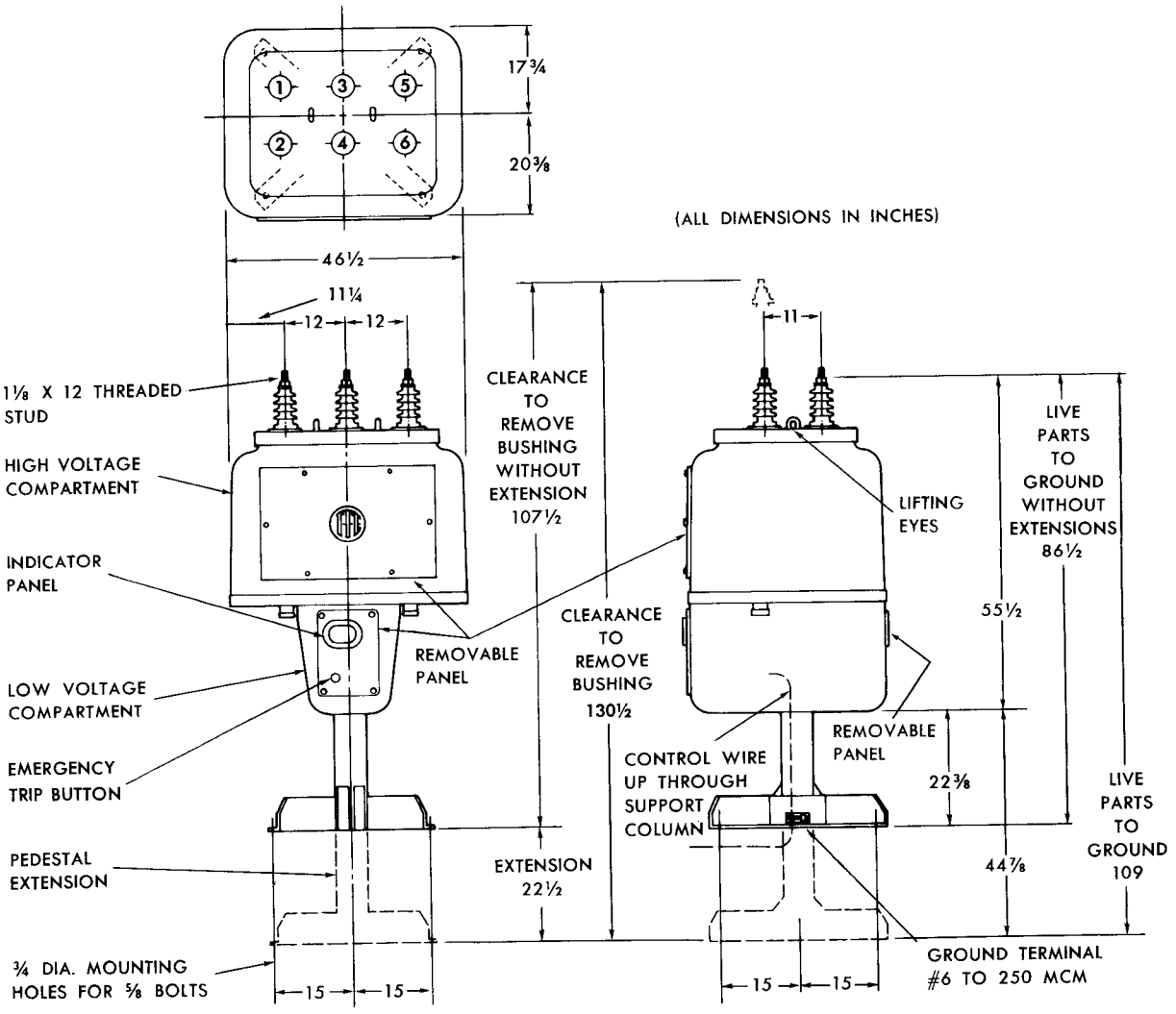


Fig. 4. Fiberglass-Housed Model VBP Non-Relayed Basic Breaker Assembled for Station Mounting.

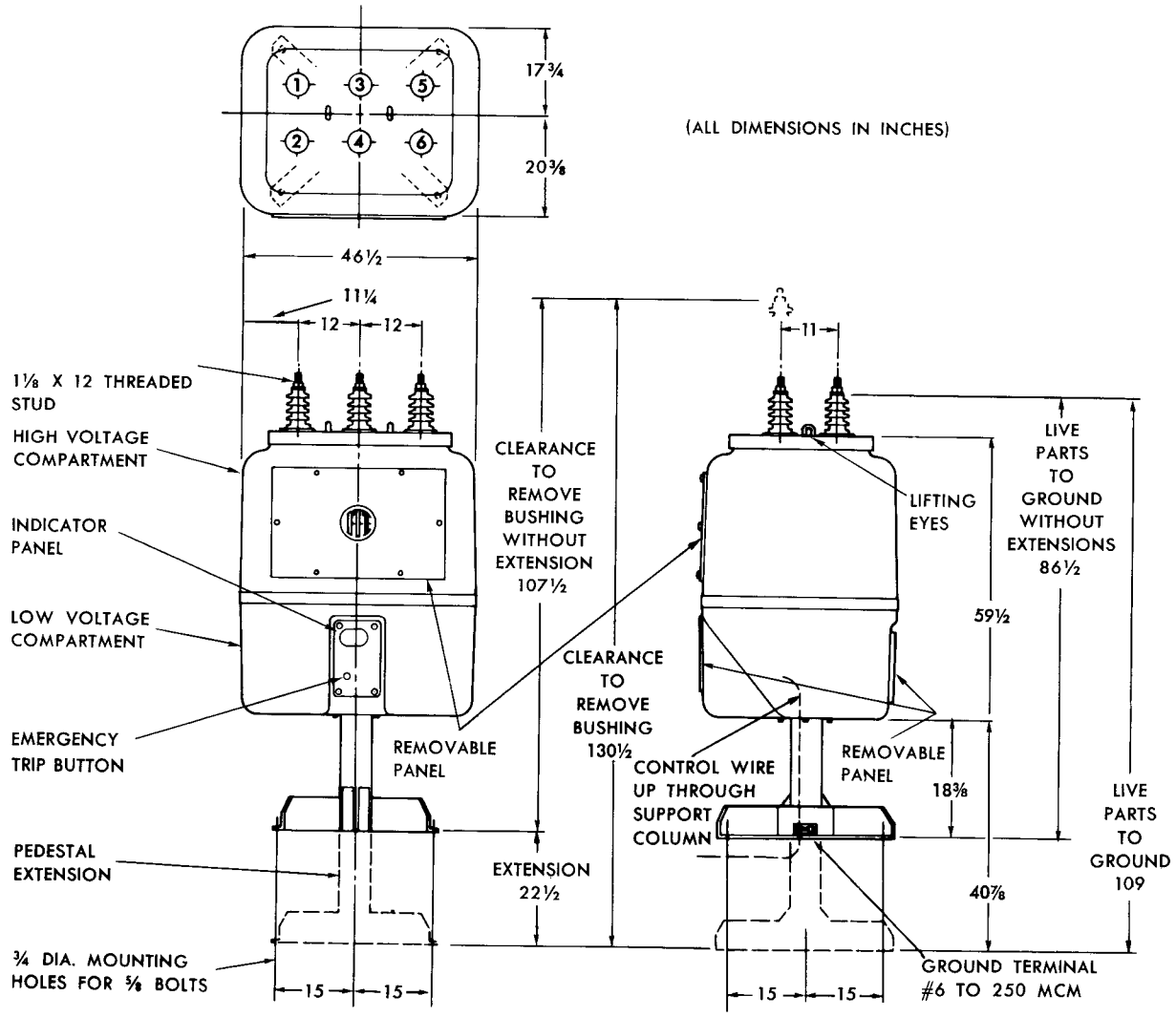


Fig. 5. Fiberglass-Housed Model VBP Relayed Non-Reclosing and Reclosing Feeder Breaker.

INSTALLATION

GENERAL

It is recommended that the breaker be installed with the closing and opening mechanisms discharged. However, if testing has charged these mechanisms, then it is necessary to discharge both the opening and closing springs of the stored-energy operating mechanism as follows:

1. Press the EMERGENCY TRIP LEVER located below the indicator panel. See Figure 6.
2. Reset EMERGENCY TRIP LEVER and lift the EMERGENCY CLOSE LEVER on the indicator panel. See Figure 6.
3. Push the EMERGENCY TRIP LEVER again.

Assuming that no control power is present, all operating springs will now be discharged and the main contacts will be in the open position.

MOUNTING

Because of the absence of shock during operation of the vacuum breaker, the foundation may be as simple as two parallel timber beams. If a concrete foundation is used, it should be level, but need not be of conventional depth construction. A floating pad that does not extend below the frost line is adequate.

The general configuration, dimensions, location of foundation bolts, power line connections, access panels or doors, and provisions for conduit connections needed to mount both breaker models are shown in Figures 2, 3, 4 and 5. Refer also to equipment drawings for specific installations.

The breaker should be positioned on the foundation so there is enough accessibility for manual operation and inspection. All lifting should be done with a sling that is hooked into the lifting eyes that are provided.

CONTROL WIRING

After the breaker is in position on its foundation, it is recommended that the control wiring be installed next. The supply wires should be large enough so that, with full control current flowing to the breaker, the voltage across the control terminals of the breaker will be within the following limits for the particular control voltage being used:

125 volts dc: 90 to 130 volts—10 amperes
115 volts ac: 95 to 125 volts—10 amperes
48 volts dc: 35 to 50 volts—25 amperes

NOTE: The above currents are peak inrush and wire size will be adequate if calculations are based on them. With the metal-housed model, the control conduit is brought into the low-voltage compartment through the removable conduit plate that is provided. (See Figures 2 & 3). With the plastic-housed model, the control conduit is brought in through the bottom of the hollow main pedestal (Figures 4 and 5).

CONTROL CONNECTIONS

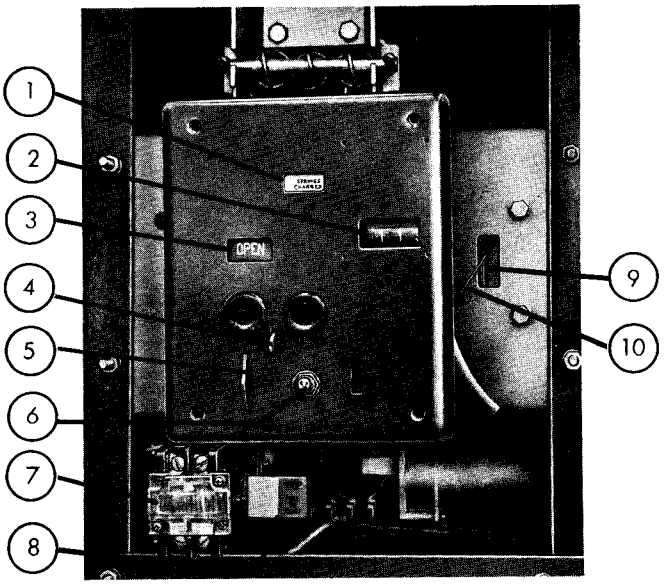
All control and bushing current transformer connections are made inside the low voltage compartment on the terminal boards provided. Figures 7 and 8 show typical schematic and connections diagrams. Refer to actual drawings for installation.

PRIMARY CONNECTIONS

The breaker bushings are supplied with 1⅛ x 12 threaded studs or with clamp-type connectors when specified. The bushings are not designed to carry unnecessary strains from cable or bus bar. Therefore, the primary leads should be supported in a manner to avoid such strains on the bushings. If possible, leads should be brought down from above. Standard practices concerning electrical clearance between primary leads and parts of the breaker should be followed.

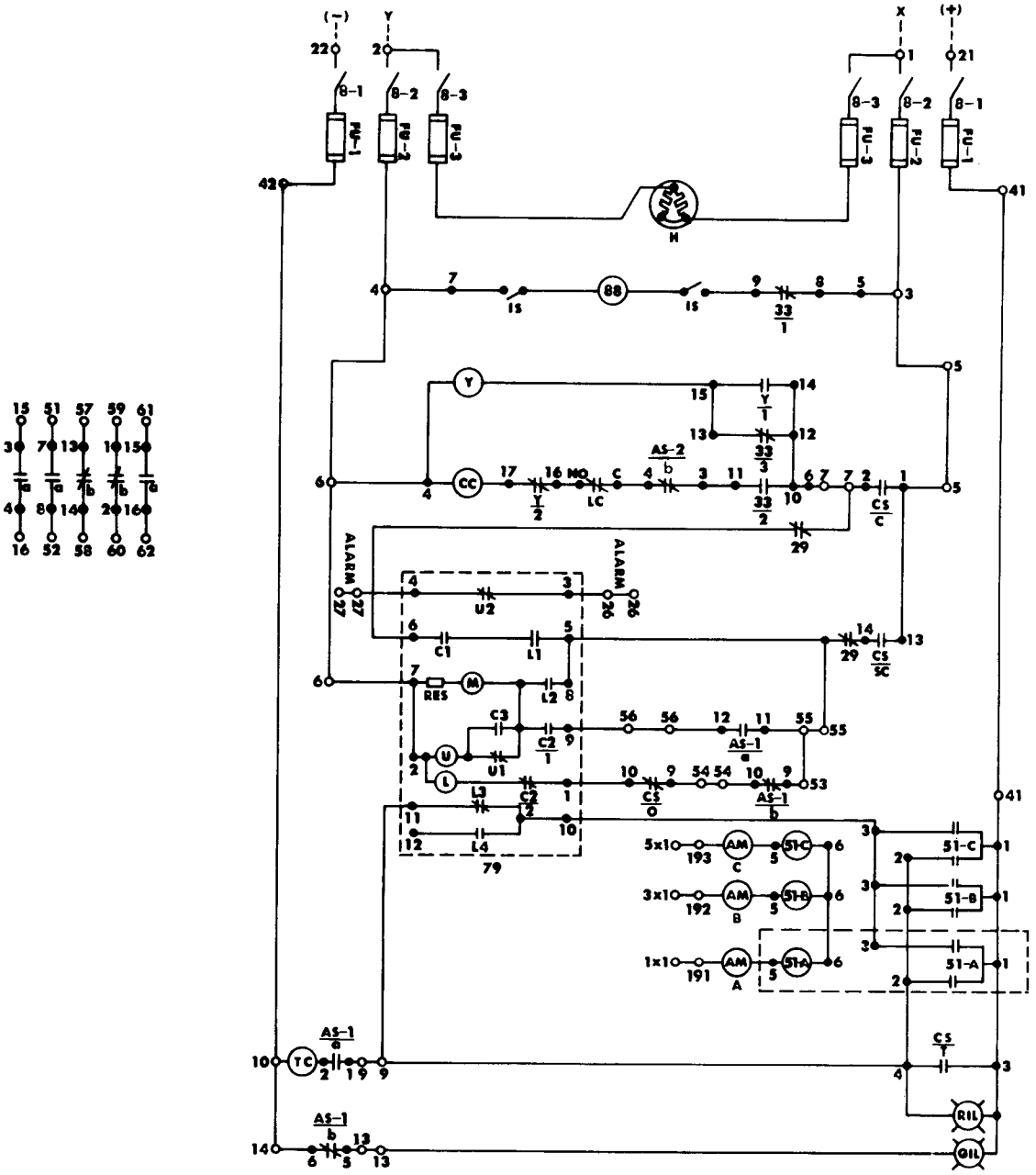
GROUND CONNECTIONS

The usual grounding practice is to connect a cable to the framework of the breaker and to the ground. A grounding pad with a bolted connector is provided on the breaker for this purpose . . . on the metal-housed model, it is located on one leg of the support frame . . . on the plastic-housed model, it is located on the pedestal base. The cable should be capable of carrying at least 25% of the continuous current rating of the breaker, but should not be smaller than 4/0.



1. CLOSING SPRING INDICATOR
2. OPERATION COUNTER
3. CONTACT POSITION INDICATOR
4. EMERGENCY CLOSE LEVER
5. PROVISION FOR PADLOCKING OPEN
6. MOTOR SWITCH
7. PERMISSIVE SWITCH (optional)
8. EMERGENCY TRIP LEVER
9. COUNTER OPERATOR ROD GUIDE
10. COUNTER OPERATOR ROD

Fig. 6. Operating Mechanism Indicator Panel.



DEVICE	DESCRIPTION	DEVICE	DESCRIPTION
8-1	TRIP POWER SWITCH	CC	CLOSING COIL
8-2	MOTOR & CLOSE POWER SWITCH	CS	CONTROL SWITCH
8-3	HEATER POWER SWITCH	FU	FUSE
29	ISOLATING SWITCH	GIL	GREEN INDICATING LIGHT
33	POSITION SWITCH	H	HEATER
51	PHASE OVERCURRENT RELAY	LC	LATCH-CHECKING SWITCH
79	RECLOSING RELAY	RIL	RED INDICATING LIGHT
88	AUXILIARY MOTOR	TB	TERMINAL BLOCK
a or b	AUXILIARY SWITCH	TC	TRIP COIL
AM	AMMETER	Y	ANTIPUMP RELAY
AS	AUXILIARY-SWITCH ASSEMBLY	IS	MOTOR ISOLATING SWITCH

Fig. 7. Typical Schematic Wiring Diagram for Reclosing Feeder Breaker. Refer to Drawings for Actual.

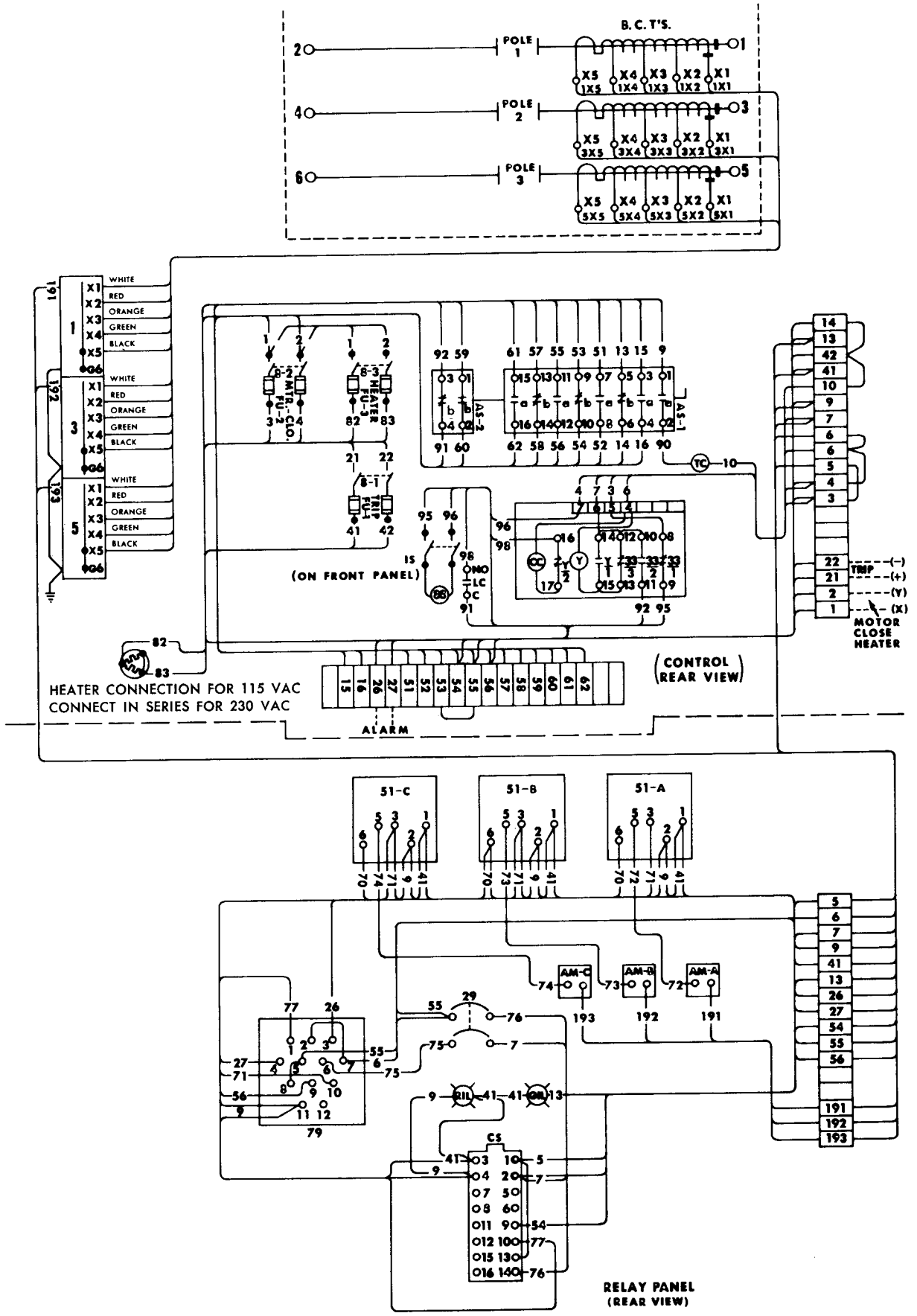


Fig. 8. Typical Connection Diagram for Reclosing Feeder Breaker (Rear View). Refer to Drawings for Actual.

PRE-OPERATION CHECKING

GENERAL

The breaker is not sensitive to deviations from true level, but, for sake of appearance, the level should be checked and corrected with shims if necessary. Make the following checks to be sure everything is in good order:

1. Examine the internal insulated wiring to be sure it has not been damaged during handling and installation.
2. Check to see that there are no loose nuts, washers, bolts, snap rings, cotter keys, terminal connections, etc.
3. Check that the conduit connections are properly installed and tightened.

Before energizing, the breaker should be given a 35-kV withstand test across open contacts to verify the integrity of the vacuum interrupters. A portable oil test set is a convenient way of doing this.

MANUAL OPERATION

The following procedure should be followed to check out the manual operation of the breaker:

A. Manual-Mechanical Operation

1. Open the motor power switch, Figure 6.
2. Manually charge the closing springs using the removable Maintenance Handle. Insert the handle in the two slots in the PAWL CARRIER (see Figure 9). Then raise and lower the handle in a pumping motion until the PAWL CARRIER no longer rotates the RATCHET WHEEL. The closing springs are now fully charged. Upon occasion, the MOTOR CRANK ARM may stop in such a position as to prevent a full racking stroke, requiring it to be rotated manually. If this happens, pry the motor crank arm off center with a large screw driver. You can move it either clockwise or counter-clockwise. The closing springs may then be charged as described above.
3. Close the main contacts by pushing up on the EMERGENCY CLOSE LEVER (see Figure 6).
4. Open the main contacts by pressing the EMERGENCY TRIP LEVER, Figure 6.

B. Manual-Electrical Operation

If the foregoing checks are satisfactory, the breaker is then ready for electrical operation.

1. Turn the MOTOR SWITCH (see Figure 6) to ON. This will charge the closing springs. The opening springs are charged by the discharge of the closing springs.
2. Close and open the breaker with control switch.
3. Close and open the breaker from the remote control switch (if used) and check the operation of any devices connected to the auxiliary switches.

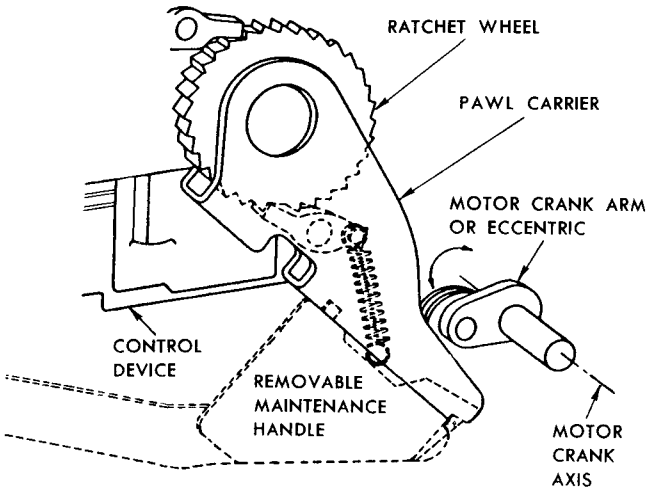


Fig. 9. How to Insert the Maintenance Handle.

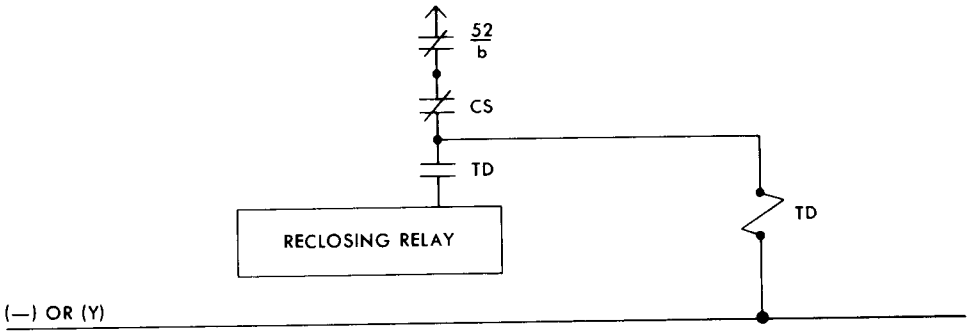
RECLOSING INTERVALS

Compared to oil breakers, vacuum breakers have exceptionally low inertia and are capable of reclosing in as little as three cycles. Therefore, the reclosing relay must *never* be set for a minimum reclosing interval of less than 20 cycles without de-rating the breaker. And generally, it's not practical to accurately set the reclosing relay for times less than one second.

If times of less than one second are desired for the first open interval, the circuitry shown in Figure 10 is recommended.

Subsequent open intervals (regardless of the length of the first open interval) should be set for a minimum of two seconds.

STD. RECLOSING RELAY CONNECTION



52/b "b" CONTACT ON BREAKER'S AUXILIARY SWITCH. CLOSED WHEN BREAKER IS OPEN.

CS NORMAL-AFTER-CLOSE CONTACT ON CONTROL SWITCH.

TD AGOSTAT TIME DELAY RELAY, MODEL 2412 TIME VARIABLE 0.1-1.0 SECONDS
TD CONTACT NORMALLY OPEN

Fig. 10 Auxiliary Relay Connection for Fast Reclose

MECHANICAL SAFETY LOCKOUT

To place breaker in Mechanical Lockout (Safety Lockout), push emergency trip lever below indicator panel and pull provision for padlocking. (See Figure 6, page 7). This makes it impossible to close the breaker either electrically or mechanically.

EMERGENCY OPERATING PROCEDURE

Should something happen that causes the control power to be lost, the breaker can be operated by mechanical means as follows:

1. To trip the breaker open:

   Depress the red TRIP button. On metal-based units, this button is on the control compartment door. On fiberglass units, it is located below the window in the lower compartment.

2. To close the breaker:

   Pull EMERGENCY TRIP LEVER to reset and lift the EMERGENCY CLOSE LEVER on the indicator panel. Mechanical trip defeats mechanical closing until reset.

NOTE: If the closing springs are discharged, manually charge them by following the procedure described under "Manual Operation" on page 10.

PERMISSIVE SWITCH

If specified, the emergency trip button may be combined with a permissive switch. This combination defeats all electrical and mechanical operations until manually reset. See Figure 6 for location.

II. MAINTENANCE AND ADJUSTMENTS

GENERAL

Maintenance ordinarily will not be required except after prolonged usage. The only normal inspection is a visual check of the contact wear indicator. However, periodic checks can be made if desired by removing the breaker from service. Such checks may include: high-pot tests on the vacuum interrupters, mechanical operating checks and calibration checks on the relays. Figure 11 indicates the adjustments that are necessary following component replacement, as well as recommended trouble-shooting procedures.

SPECIAL NOTE: For a general inspection of the high-voltage and low-voltage compartments, be sure that the breaker is disconnected from all electric power (both high and low voltage). After the power lines have been disconnected, attach grounding leads before touching any of the breaker parts. Be sure the framework is well grounded. Also, do not touch any of the operating parts until the operating springs have been discharged as described on Page 7.

ADJUSTMENTS FOLLOWING COMPONENT REPLACEMENT

Component	Adjustments Required
Vacuum Interrupter	(1) Contact travel (2) Contact wipe
Bushing Current Transformers	None required
Bushing Assembly	Check Contact Travel Check Contact Wipe
Charging Motor	None required
Shunt Trip	Check Operation
Latch Checking Switch	Check Operation
Mech. Control Device	Close latch release overtravel

TROUBLE SHOOTING PROCEDURE

Sympton	Solution
Mechanism will not latch closed	Check trip latch adjustment.
Mechanism will not close electrically	(1) If closing solenoid is functioning a. Check adjustment b. Check latch checking switch by shorting terminals, If trouble is corrected, adjust. (2) If closing solenoid is not functioning a. Check control wiring. b. If difficulty persists replace closing control relay.
Mechanism will not trip electrically	If the tripping solenoid is functioning, check adjustment. If tripping solenoid is not functioning, check control wiring. If difficulty persists, replace tripping solenoid.

Fig. 11. Adjustments and Trouble Shooting
Note: Perform steps in order listed.

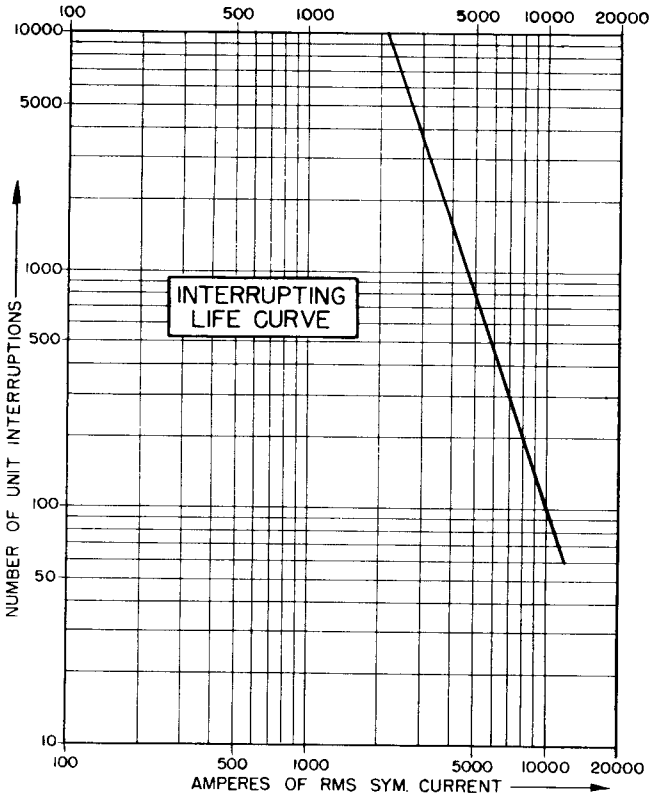


Fig. 12. Interrupting Life Curve.

INTERRUPTING LIFE CURVE IS BASED ON:

1. Three-phase grounded faults.
2. Sequences of four trips to lockout of two fast trips followed by two time-delay trips.
3. Open intervals of twenty cycles for the first, and two seconds for the second and third.
4. X/R of 16 for 10,000 to 12,000 amperes.

NOTE: Any lesser number of fast trips in the sequence, such as 1 fast and 3 time delay—1 fast and 2 time delay—0 fast and 1 to 4 time delay, will extend the interrupting life, as will longer than the basic open intervals or less than the X/R of 16.

CONTACT WEAR INDICATOR (Figure 13)

The WHITE BAND (42) just above the CONTACT PRESSURE SPRING (6) indicates the degree of contact wear. When a vacuum interrupter is new, the width of this band will be 1/8" (when the interrupter contacts are closed). As the contacts wear from erosion, this band will show less and less. When the point is reached where the WHITE BAND just disappears, the contacts have eroded 1/8" and the vacuum interrupter should be replaced.

Erosion is very slow . . . an estimate of operating life can be made from the INTERRUPTING LIFE DATA, Figure 12.

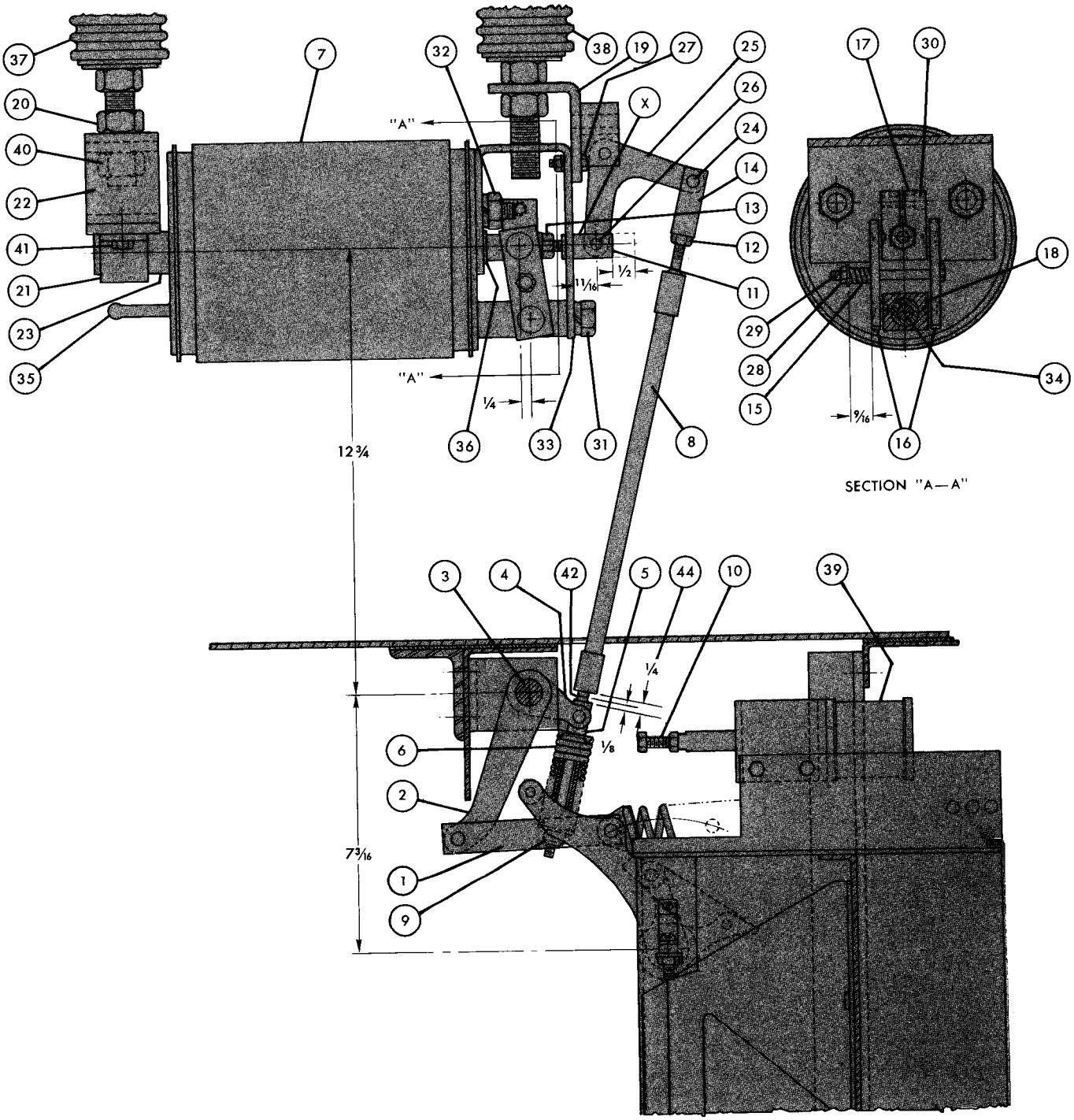


Fig. 13. Vacuum Interrupter and Mechanical Linkage.

CONTACT TRAVEL ADJUSTMENT (Figure 13)

Contact travel is adjusted only when a new vacuum interrupter is installed. This travel should be ½" ± 1/64" from full closed position to full open position and may be measured at (11). Adjustment is made by loosening the LOCK NUT (12) and turning the INSULATED OPERATING ROD (8) in the required direction.

CONTACT WIPE (Figure 13)

The contact "wipe"(44)is adjusted at the factory at ¼" with the breaker in the closed position and should be readjusted only when a new vacuum interrupter is installed. To close the contacts, the mechanism, through LINKS (1) and CRANK ARM (2), rotates the JACKSHAFT (3) in a clockwise direction. The SHORT CRANK ARMS (4) on each pole pull the INSULATED OPERATING ROD (8) down by a SLIDABLE HEAD (5) biased by CONTACT PRESSURE SPRING (6). When the primary contacts in the VACUUM INTERRUPTER (7) touch, the downward travel of the INSULATED OPERATING ROD (8) is stopped. At this point the SLIDABLE HEAD (5) is forcibly driven down, increasing the deflection of the CONTACT PRESSURE SPRING (6). With the contact travel properly adjusted, the wipe or overtravel may be adjusted by changing the total travel. Total travel from closed to open is controlled by the adjusting SCREW (10) on the BUFFER STOP PISTON (39).

TRIP LATCH ADJUSTMENT (Figure 14)

The TRIP LATCH ADJUSTING SCREW is located on the right hand side of the OPERATING MECHANISM HOUSING. To adjust the engagement of the TRIP LATCH, proceed as follows:

1. Back off the ADJUSTING SCREW (5) to assure excessive latch engagement.
2. Be sure there is trip spring clearance.
3. Close the breaker.
4. Turn the ADJUSTING SCREW down slowly until the TRIP LATCH (2) just releases, tripping the breaker.
5. Back off the ADJUSTING SCREW 1½ turns.
6. Be sure self-locking nut is seated properly.

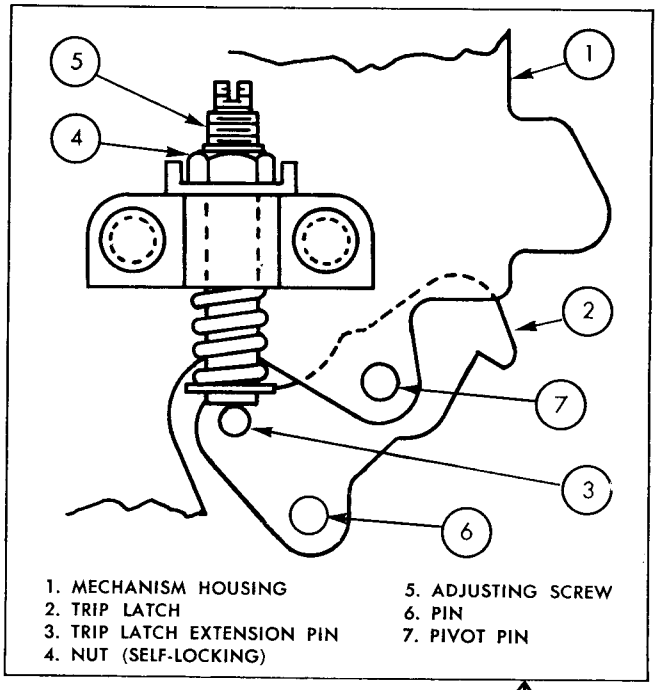
SHUNT TRIP ADJUSTMENT (Figure 15)

Excess trip travel:

1. Back off trip rod (1) until it will not trip the circuit breaker with the armature (6) pushed up as far as the travel will allow.
2. Close the circuit breaker.
3. Push up on the armature (6) at "A" as far as the armature travel will allow.
4. Hold the armature as positioned in step 3 and turn trip rod (1) down until the circuit breaker just trips.
5. Turn trip rod (1) down an additional 3 turns.

LATCH CHECKING SWITCH ADDITION AND ADJUSTMENT (Figure 16)

When adding a latch checking switch, the ACTUATING ARM projecting from the MICRO SWITCH is positioned over the TRIP EXTENSION. When adjusted properly, the MICRO SWITCH will operate (close) approximately .015" to .025" before the TRIP EXTENSION strikes the ADJUSTING SCREW. The actuating arm is flexible and is bent to make adjustment.



1. MECHANISM HOUSING
2. TRIP LATCH
3. TRIP LATCH EXTENSION PIN
4. NUT (SELF-LOCKING)
5. ADJUSTING SCREW
6. PIN
7. PIVOT PIN

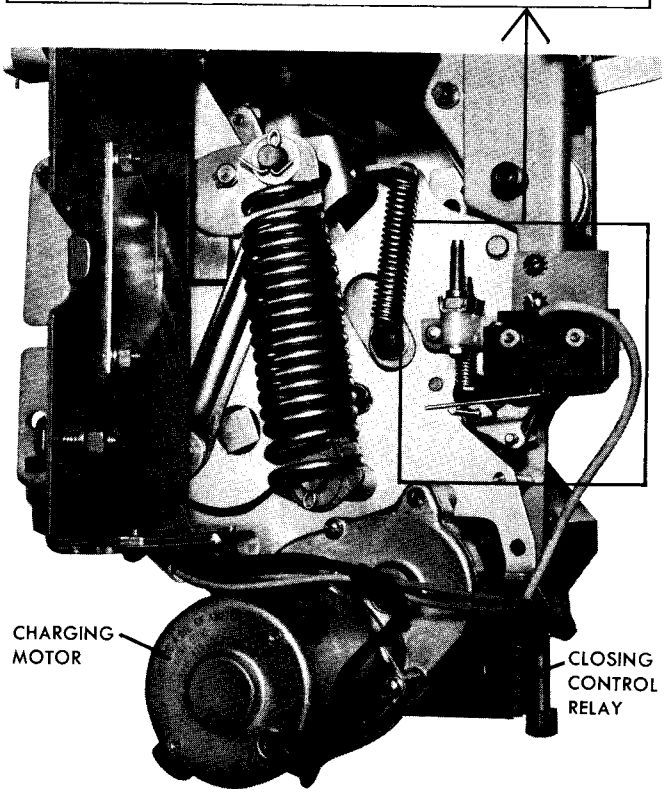


Fig. 14. Trip Latch Adjustment.

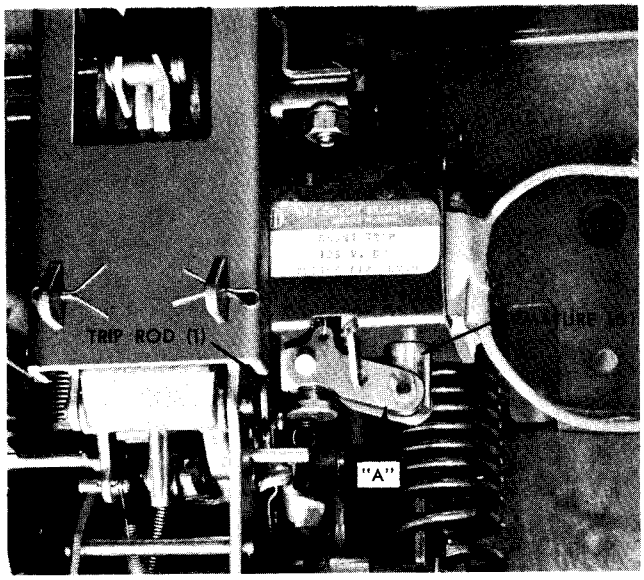


Fig. 15. Shunt Trip Adjustment.

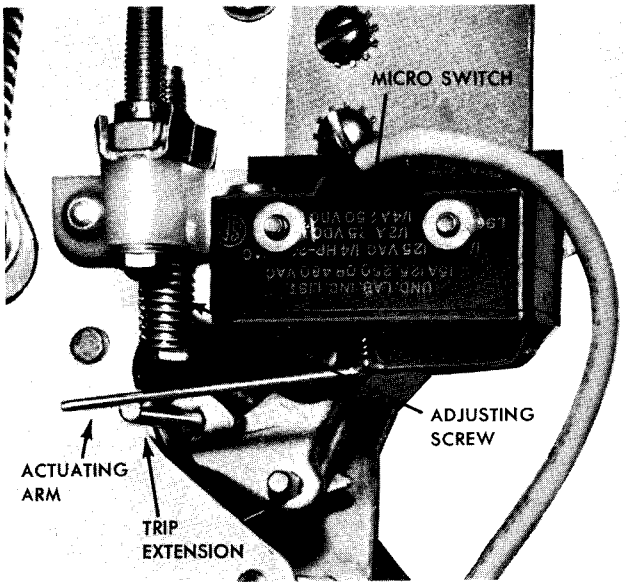


Fig. 16. Latch Checking Switch

CLOSE LATCH RELEASE OVERTRAVEL ADJUSTMENT (Figure 18)

The CLOSING CONTROL RELAY (Figure 17) of the OPERATING MECHANISM does not require any adjustment in the field. However, if the CLOSING CONTROL RELAY is ever replaced, the overtravel of the CLOSING LATCH RELEASE ROD (4) should be adjusted as described below. Do not attempt to adjust the internal relays or contacts of this device.

1. To remove the CLOSING CONTROL RELAY (Figures 14 and 17) disconnect all wires and apply marked tape for identification. Remove the two mounting screws at the bottom of the mechanism mounting plate. Observe how the old assembly disengages from positioning keys for removal and replace the new one in the same manner.

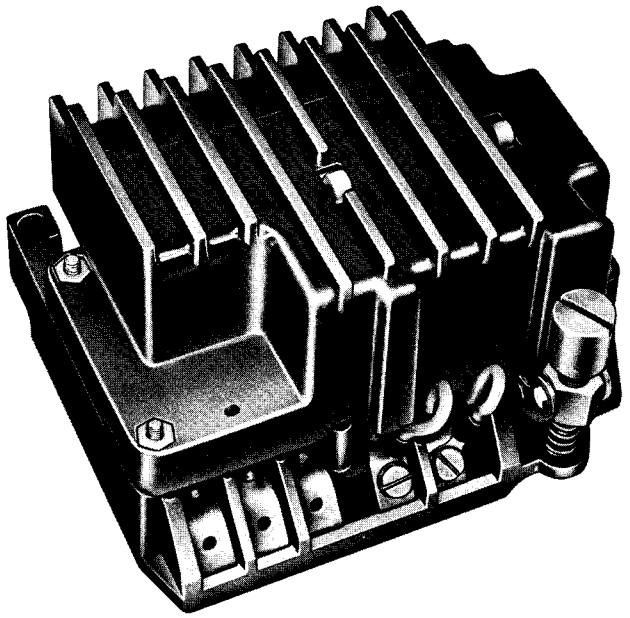
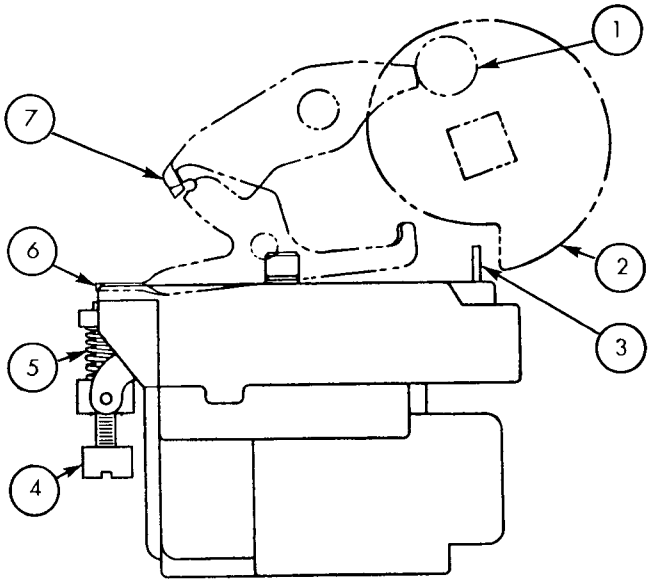


Fig. 17. Closing Control Relay

2. Back off the CLOSE LATCH RELEASE ROD (4) until it will not strike the SECONDARY CLOSE LATCH (6) when the EMERGENCY CLOSE LEVER (item 4, Figure 6, page 7) is lifted as far as its travel will allow.

3. With the closing springs charged and the EMERGENCY CLOSE LEVER held up as far as possible, turn the CLOSE LATCH RELEASE ROD (4) clockwise until the closing springs are released, closing the breaker.

4. Turn the CLOSE LATCH RELEASE ROD (4) one additional turn in the same direction.



1. ROLLER, CLOSE LATCH
2. CHARGING CAM
3. ACTUATOR, LIMIT SWITCH
4. CLOSE LATCH RELEASE ROD
5. SPRING, TRIP ROD
6. SECONDARY CLOSE LATCH
7. PRIMARY CLOSE LATCH

Fig. 18. Close Latch Overtravel Adjustment.

COMPONENT REPLACEMENT

VACUUM INTERRUPTER ASSEMBLY (Figure 19)

To remove the vacuum interrupter assembly, the breaker must be in the open position with closing and opening springs discharged. If the vacuum interrupter is to be removed temporarily, contact travel and wipe should be measured and maintained when interrupter is reinstalled. To remove an interrupter and avoid working against the CONTACT PRESSURE SPRING (6), proceed as follows:

1. Remove PIN (24). Here it is necessary to pry out the lower end of the BELL CRANK (25) at "X", with a thin bar, to relieve the pin load caused by atmospheric pressure on the interrupter moveable contact.
2. Loosen NUT (13) before removing PIN (26) to prevent transfer of torque to the interrupter's moving contact and bellows.
3. Remove PIN (26).
4. Loosen bolts holding CLAMP (21) approximately ⅛".
5. Loosen and remove SUPPORT BOLTS (27).
6. Lower front end below SUPPORT (19) and slide vacuum interrupter assembly toward you until interrupter STATIONARY CONTACT (23) is free of CLAMP (21) and remove.

After removing a vacuum interrupter assembly from the breaker, the current-carrying parts must be removed from it and installed on the new interrupter. For removal of external current-carrying parts from the interrupter assembly, proceed as follows:

1. Remove LINKS (16) and SPRING (15) by turning NUT (28) off BOLT (29).
2. Remove CLEVIS (11) and NUT (13) from the interrupter's moveable contact rod.
3. Loosen CONTACT BLOCK (17) by backing out LOCKING SCREW (30).
4. Remove BOLT (31) and NUTS (32).
5. Turn CONTACT BLOCK (17) counter-clockwise off contact rod which releases current-carrying SUPPORT PLATE (33) and CONTACT BLOCK (18).
6. Remove SPACER NUT (34).

Re-assemble current-carrying parts to the new vacuum interrupter as follows. Check to see that the contact surfaces on LINKS (16) and CONTACT BLOCKS (17) and (18) are not pitted and in good condition before assembling; otherwise use new parts.

1. Assemble SPACER NUT (34) on stud, making sure the SEAL TUBE (35) is in location as shown in Figure 19.
2. Slide CONTACT BLOCK (18) on SPACER NUT (34).
3. Assemble SUPPORT PLATE (33) and CONTACT BLOCK (17) together. Counterbored end of (17) goes toward vacuum interrupter and turn clockwise. *Important:* Be sure to include the NYLON BEARING (36) with SUPPORT PLATE (33).
4. Assemble BOLT (31) and NUTS (32) with lockwashers and secure.
5. Turn in CONTACT BLOCK (17) until the center of the tapered contact indent in each side is ¼" nearer to the interrupter than is the center of the tapered groove in CONTACT BLOCK (18) as shown. *Important:* Be sure the side surfaces of the CONTACT BLOCKS (17) and (18) line up with each other (i.e. form a common plane) and secure LOCKING BOLT (30). Loosen BOLT (31) and retighten if necessary.
6. Assemble current-carrying LINKS (16), BOLT (29), NUT (28) and SPRING (15) as shown in section A-A.
7. Assemble CLEVIS (11) with NUT (13) loosely as shown, avoiding transfer of torque to the moving contact and its bellows.

To replace interrupter assembly in breaker housing, JACK SHAFT (3) must be in the open position with the closing springs discharged.

Proceed as follows:

1. Hold the vacuum interrupter on a little slant and insert the interrupter STATIONARY CONTACT ROD (23) into the loosely-hanging CLAMP (21) and push back. Lift front end and insert SUPPORT BOLTS (27) which are tightened first, then secure CLAMP BOLTS (41).
2. Adjust CLEVIS (11) to 1 1/16" dimension, insert PIN (26) and tighten NUT (13). Operate CRANK ARM (25) by hand to be sure it is free—no binding.
3. Pry out lower end of BELL CRANK (25) at "X" to line up holes to insert PIN (24).
4. Operate mechanism to closed position and check contact wipe and position of white band as shown. This can be adjusted by loosening the LOCK NUT (12) at end of CLEVIS (14), rotating the INSULATED OPERATING ROD (8) in required direction and retightening the lock nut.
5. Operate 50 times to seat the new contacts and then repeat item 4.

Important. Be sure all bolts are tightened and pin retainers are in place after replacements and adjustments are made.

Mounting the vacuum interrupter with a minimum of residual stresses is achieved by securely attaching the vacuum interrupter assembly to SUPPORT BRACKET (19) and allowing it to sag due to its own weight. Then, with UPPER CONTACT NUT (20) run all the way up, assemble CLAMP (21) and current-carrying SUPPORT BRACKET (22) to the STATIONARY INTERRUPTER STUD (23). Cautiously lift this end until slight resistance is encountered and note the total deflection. Let this end down to the mid point of the two observed positions, run up LOWER CONTACT NUT (40) to hold SUPPORT BRACKET (22) in the selected position and tighten down with UPPER CONTACT NUT (20).

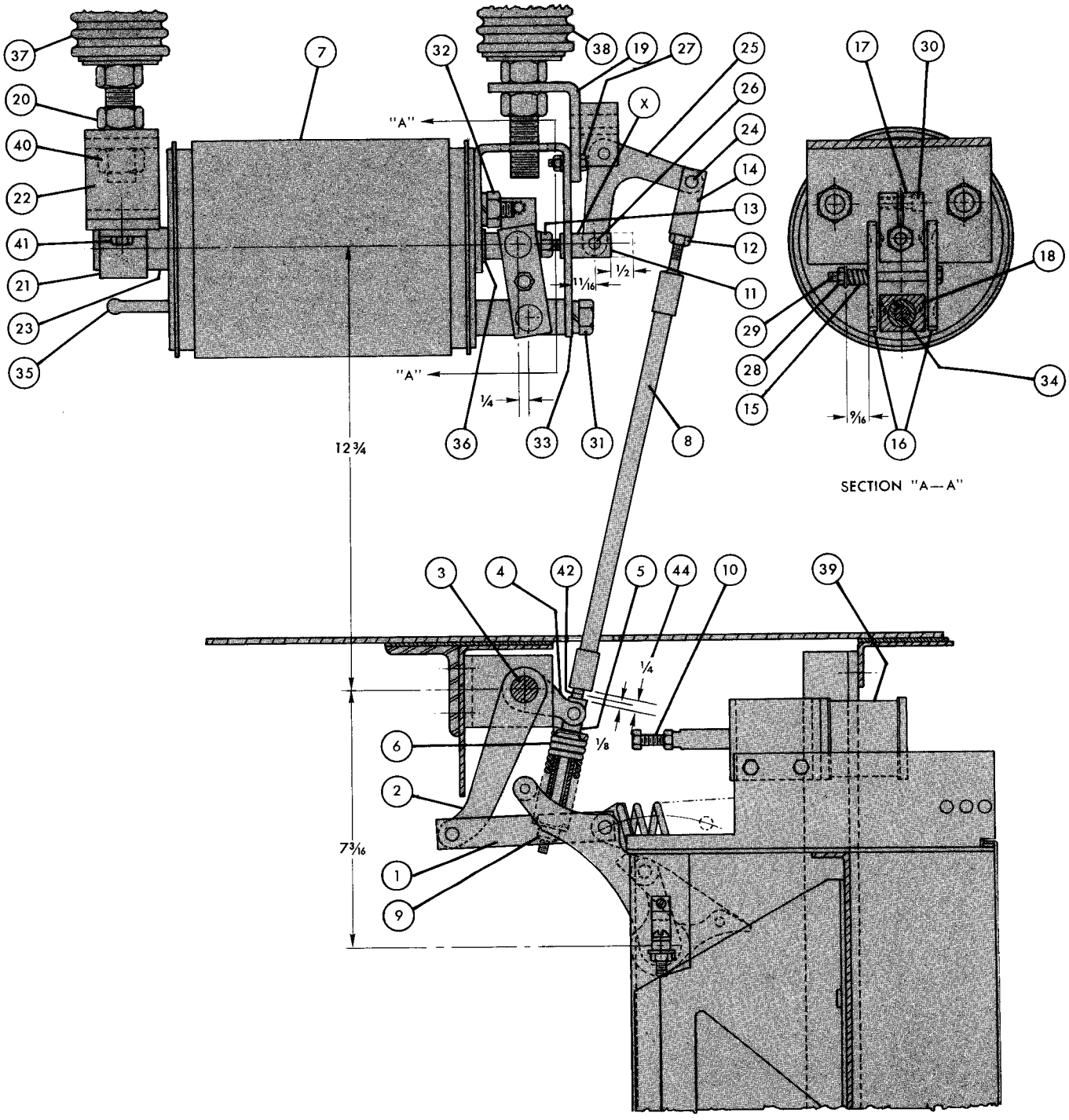


Fig. 19. Vacuum Interrupter and Mechanical Linkage.

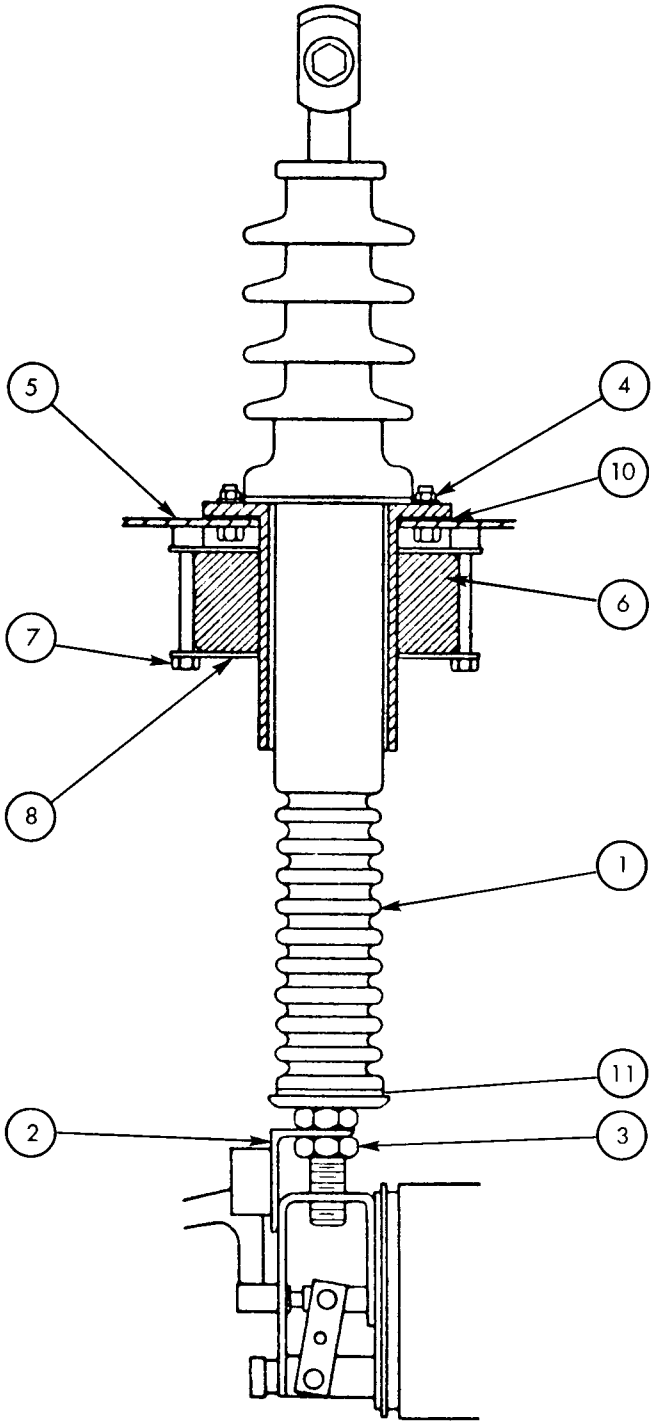


Fig. 20. Bushing Assembly and Bushing Current Transformers.

BUSHING CURRENT TRANSFORMERS (Figure 20)

The vacuum breaker has enough space to accomodate the following combination of bushing current transformers:

(1) 10L100 } 600/5, multi-ratio, relay accurracy.
(1) 10L50 }

To install or replace bushing current transformers, follow this procedure:

1. Remove the LOWER CONTACT NUT (3) at the bottom of BUSHING (1).

2. Remove the three FLANGE NUTS (4) that anchor the bushing to the top of the HOUSING (5).

3. Remove the electrical connections to the BUSHING CURRENT TRANSFORMERS (6).

4. Remove the two BOLTS (7) that hold the diamond-shaped SUPPORT PLATE (8) against the bottom of the bushing current transformers. It is now possible to gently lower the BUSHING CURRENT TRANSFORMER (6) to the bottom of the BUSHING (1).

5. Lift the BUSHING (1) a few inches, slide the BUSHING CURRENT TRANSFORMER (6) out from below the BUSHING. Slide the new bushing current transformer into position. Be sure to replace the SUPPORT PLATE (8).

6. In reverse order, anchor the BUSHING with the three flange NUTS (4), raise the BUSHING CURRENT TRANSFORMER (6) and SUPPORTING PLATE (8) to position and lock in position with two NUTS (7) on the supporting studs.

Connect the electrical leads to the BUSHING CURRENT TRANSFORMER and replace the LOWER CONTACT NUT (3) at the bottom of the BUSHING CONDUCTOR (11), locking it snugly.

BUSHING ASSEMBLY (Figures 19 and 20)

Any one of the six bushing assemblies (see Fig. 20) may be readily exchanged by removing the LOWER CONTACT NUT (3) that clamps the interrupter SUPPORT BRACKET (2), and then removing the three FLANGE NUTS (4).

When installing the new bushing assembly items (37) and (38) (see Fig. 19), observe the precaution described under "Vacuum Interrupter Assembly" so as to position the height of the SUPPORT BRACKET (22) in a manner to avoid strain upon the interrupter assembly.

When replacing both bushings of a particular phase, complete the exchange of one bushing assembly before working on the second bushing assembly, replacing BUSHING (38) first. When BUSHING (38) is replaced, it may be necessary to adjust OPERATING ROD (8) to compensate for a different bushing length. See the Section "Adjustments".

NOTE: Contact Travel should be measured before removal of bushing and should be maintained when new bushing is installed.

CHARGING MOTOR

The charging motor is located by a ROLL PIN and is supported by two MOUNTING SCREWS. To remove the motor, slide back the insulating sleeves on the motor leads and disconnect. Turn out the MOUNTING SCREWS and remove the motor. The ROLL PIN will remain attached to the motor assembly.

To replace the charging motor, locate it by inserting the ROLL PIN into the proper hole in the housing and replace the MOUNTING SCREWS. Connect the motor leads and slide the insulating sleeves over the connections.

RENEWAL PARTS

QUANTITY ON ONE BREAKER	DESCRIPTION	CATALOG NUMBER	REFERENCE PAGE	REFERENCE FIGURE	REFERENCE ITEM
3	Vacuum Interrupter Unit	509600	17	19	7
3	Moving Contact Current Transfer Block	163-388-001	17	19	17
3	Stationary Contact Current Transfer Block	163-387-001	17	19	18
6	Current Transfer Links	163-391-001	17	19	16
3	Insulated Connecting Link Operating Rod	208-427-301	17	19	8
1	Motor Switch	703270-A	7	6	6
1 1	Closing Control Relay for 115/125 V, a-c/d-c Control Closing Control Relay for 48 V, d-c Control	708392-T7 708392-T6	15	17	
3	Control Power Switches (2 pole)	309-763-302	8	7	
4	Fuse only—Chase Shawmut Tri-onic 15 Amperes	427028	8	7	
1	Mechanism Charging Motor	—	14	14	
1	Front Panel Glass	157-604-002	3	2	
6	Bushing, Hardware	308-124-302	18	20	
6	Bushing, Porcelain	308-124-305	18	20	
6	Bushing Gasket, Flange	164-068-001	18	20	
6	Bushing Gasket, Lower	157-774-001	18	20	
1	Heater, 115 V, ac	473134			
3	600/5 Multi Ratio BCT, Class 10L100	891025	18	20	6
1	Shunt Trip	891050	15	15	
1	10 Circuit AUX Switch	7000 32-K7			
1	Latch Checking Switch	309-391-301	15	16	

These instructions do not purport to cover all details or variations in equipment, nor to provide for every possible contingency to be met in connections with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the nearest I-T-E Sales Office.

I-T-E CIRCUIT BREAKER COMPANY

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