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TYPE LX CIRCUIT BREAKERS AND U-RE-LITES

INSTALLATION, OPERATION & MAINTENANCE

INSTRUCTION BOOK 1250

I-T-E CIRCUIT BREAKER COMPANY
19th AND HAMILTON STREETS
PHILADELPHIA 30, PA

Printed in U. S. A.

Supersedes LX Instruction Book 1250
Form 183

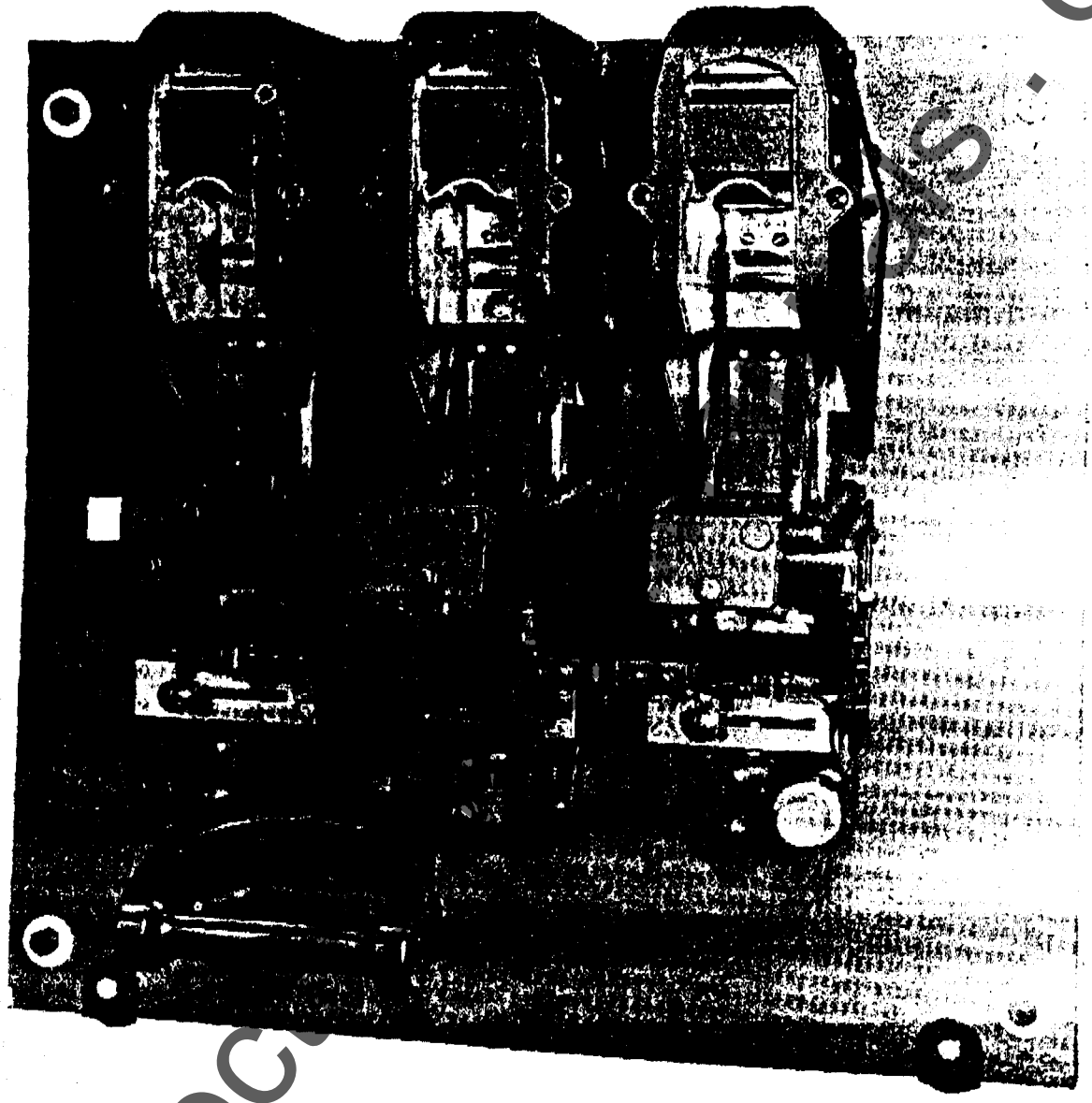

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FIG. 1—TYPE LX MANUALLY OPERATED CIRCUIT BREAKER

INSTRUCTIONS FOR INSTALLATION OPERATION AND MAINTENANCE OF TYPE LX CIRCUIT BREAKERS AND U-RE-LITES

INTRODUCTION

This instruction book should be read and its contents followed for the installation, operation and maintenance of type LX circuit breakers. This book should be filed in a convenient place together with all information relative to switchgear. By following these instructions, the operator can prolong the life and usefulness of the equipment.

GENERAL MOUNTING CONSTRUCTION

"U-RE-LITE" is the term applied to an I-T-E circuit breaker enclosed within a steel box. The contacts may be closed or opened by a handle on the outside of the enclosure. The box may be easily removed for inspection of the apparatus.

U-RE-LITES are PULL-BOX MOUNTED when they are supported on a back box so that they can be secured to a wall or column. U-RE-LITES are PANEL MOUNTED when the circuit breaker base or mounting frame is secured to a panel with the studs extending through for back connection.

TRANSPORTATION

All types of LX switchgear prior to shipment, are carefully tested, inspected and crated at the factory. Every crate is plainly marked at convenient places with crate number and position. When size or other reasons make it necessary to divide the equipment for shipment, the unit number of the particular equipment enclosed is also marked on the crate, along with its weight.

Immediately upon receipt of the switchgear an examination should be made for any damage, or loss sustained during transportation. Check the contents against the packing list before discarding any packing material. If any shortage of material is discovered, notify the nearest I-T-E Circuit Breaker Company Office or Representative at once.

If it is found that the shipment has been damaged through indications of rough handling, claim for damage should be filed at once with the carrier, and the I-T-E Circuit Breaker Company promptly notified. Information as to the damaged parts, part number, crate number, purchase order number, etc., should accompany the claim.

The I-T-E Circuit Breaker Company is not responsible for damage after delivery of goods to the carrier. However, if this Company is notified of such claims, there are forms available to lend assistance in securing any adjustment.

UNPACKING

U-RE-LITES (Pull box mounted). The packing case for a pull box mounted U-RE-LITE is shown in section (Figure 2). Felt and corrugated paper act as cushions and protect the enameled surfaces. To remove the case cover and the padded blocking boards, attach a rope sling under the handle and lift the breaker from the case. **CAUTION:** Be sure that the rope sling rests up against the handle and does not interfere with the protruding closing mechanism trigger.

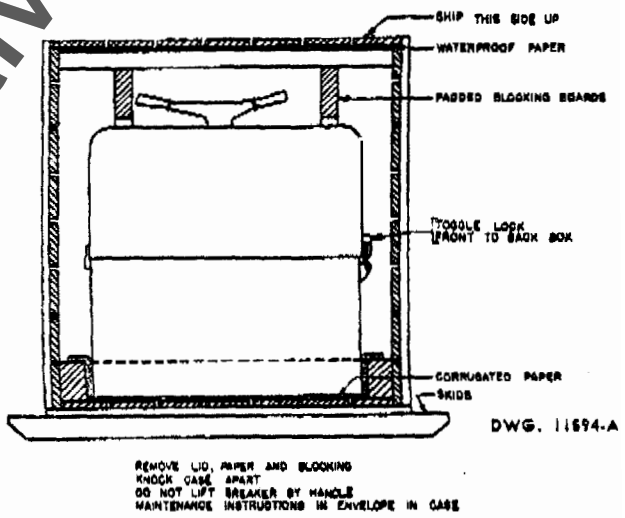

FIG. 2—TYPE LX PULL BOX MOUNTED U-RE-LITE IN PACKING CASE.

U-RE-LITES (Panel mounted). The packing case for a panel mounted U-RE-LITE is shown in Figure 3. Felt and corrugated paper act as cushions and protect the enameled surfaces. The breakers are shipped with their panels vertical. Turn stenciled side of the case up before unpacking. To remove the circuit breaker from the packing case, remove the stenciled side, attach a rope sling under the handle and lift the breaker from the case. **CAUTION:** Be sure that the rope sling rests up against the handle and does not interfere with the protruding closing mechanism trigger.

OPEN TYPE CIRCUIT BREAKER: Open type circuit breakers are packed in the case shown in section (Figure 3). The breakers are shipped with their panels vertical. Turn stenciled side of case up before unpacking. To remove the circuit breaker from the packing case, remove the stenciled side, attach a rope sling to the connector bar (Figure 4) and lift the breaker from its packing case.

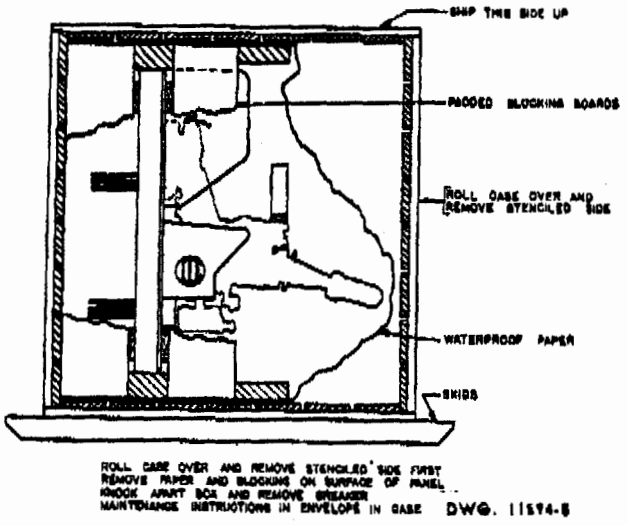

FIG. 3—OPEN TYPE LX CIRCUIT BREAKER IN PACKING CASE. DWG.

ACCESSORIES: Some of the circuit breaker devices require supplies and accessories. If these are necessary, they will be found securely attached to the apparatus. Care should be taken to see that they are removed and held in stock for the installation of the circuit breaker:

STORAGE: If it is found necessary to store the equipment for any length of time, the following precautions should be taken.

(1) Uncrate the breaker, examine and make sure no loose parts are missing or left in the packing material.

(2) Cover any part of the circuit breaker susceptible to rust with heavy oil or grease.

(3) Store in a clean dry place with moderate temperature and cover with heavy wrapping paper to prevent deposits of dirt or foreign matter from settling on movable parts and electrical contact surfaces.

SAFETY PRECAUTIONS

Before making any adjustments or replacements, make certain that all control circuits have been DE-ENERGIZED. If the circuit breaker is rigidly mounted, DE-ENERGIZE bus. Disconnect cables from leads, if there is a power source on the load side.

INSTALLATION

U-RE-LITES (Pull box mounted). In making the installation of the pull box mounted type, the circuit breaker should be removed from the pull box to facilitate mounting and pulling of cables. The circuit breaker is held in the welded pull box frame by four ½" bolts. Care should be taken in removing the breaker to eliminate possible damage to the auxiliary switch, or the overcurrent device.

With the circuit breaker removed, the pull box should be mounted with the cover latch at the bottom using four ½" diameter bolts. Care should be taken to see that the supporting surface is even and approximately vertical. Protect the breaker from dirt or damage during installation of pull box and cables. When the pull box is mounted properly and the cables are pulled into position, the circuit breaker and panel may be lifted into its proper position.

The cables are connected through lugs which are supplied as standard equipment. The circuit breaker should then be placed in the frame and securely fastened with four ½" bolts.

U-RE-LITES (Panel mounted), **OPEN TYPE CIRCUIT BREAKERS:** The panel mounted U-Re-Lite and open type circuit breakers are mounted on slate panels. This panel is suitable for mounting on the customer's supporting frame-work or steel panel. The supporting frame-work, either pipe or steel panel, should be prepared in accordance with working drawings furnished with the circuit breaker. The panel is mounted on the supporting frame by four ½" diameter bolts. The cover must be removed from the U-Re-Lite circuit breaker before installation.

WIRING

MANUAL OPERATED: The wiring of the main circuits should be in exact accordance with the diagram accompanying the breaker. Care should be taken to see that the line cables are connected to the upper studs. Proper lugs are furnished with the pull box mounted type U-Re-Lites.

ELECTRICALLY OPERATED TYPE: In addition to the main wiring the control circuits must be installed in exact accordance with the diagram. Adequate size wires should be used in the control circuits to insure proper operation.

The pull box or mounting frame must be properly connected to a good ground. A lug is provided on the left side of the pull box for this purpose.

GENERAL

The circuit breaker may have one, two, three, or more poles which are opened and closed simultaneously. A single throwing arm closes the breaker and a single latch mechanism holds the breaker closed regardless of the number of poles. The operating arms of all poles for multipole breakers are rigidly tied together by an insulating connector bar.

MAIN CONTACTS

DESCRIPTION: The bridge consisting of spring copper laminations initially stressed between plates, engages the upper and lower contacts to carry the load current. This bridge is mounted on a bridge arm pivoted between a pair of housings and is moved in and out of engagement by a force multiplying system of toggles. The bridge is secured to the bridge arm by two cap screws which hold it against adjusting shim plates.

MAINTENANCE: During the final closing movement of the breaker, the inner laminations of the bridge should slide 3/32" along the upper and lower contacts and the entire area should be engaged. If the wipe is less than this, due to wear, remove the bridge and place a shim between the bridge and the bronze plate. If this wipe is not corrected, the bridge may heat enough to destroy the spring of the copper, necessitating the installation of a new bridge. Do not use abrasive or metal polish on contacts, wipe with a clean rag, moistened with carbon tetra-chloride. The voltage drop between the stationary contacts should be 6 to 10 millivolts when the breaker is carrying its rated load.

SHUNT AND ARCING CONTACTS

The stationary shunt contact consists of a formed copper plate which serves also as a conductor and support for the arcing contact. The arcing contact is welded to the shunt contact which in turn is bolted to the top of the upper terminal.

The moving shunt contact and arcing contact are supported by levers mounted in the upper end of the contact arm. Flexible conductors carry the current to the shunt and arcing contacts.

MAINTENANCE: Severe operating conditions may result in excessive burning of the arc quencher and of the arcing and shunt contacts. Arc quenchers that have been badly burned by arcing should be replaced. To replace stationary shunt and arcing contacts, remove arc quencher, slip iron core from behind shunt contacts, and remove attaching screw by passing screw driver through holes in top of shunt contact.

To replace moving shunt and arcing contacts, remove two pins through flanges in the upper end of contact arm and two screws through back of arm. The arcing contact and the support and conductor to which it is welded must be replaced as a unit. The shunt contact is attached to its support by two screws. In replacing the arcing contact spring note that it is attached to the conductor washer plate by a screw which fits over a projection in back of the arcing contact support.

The shunt contact spring is attached to the contact support by a screw which may be removed after the contact is removed, and to the contact arm by a single screw.

OPERATING MECHANISM

(Refer to Figure 4.) It is required with a circuit breaker that all poles close and open simultaneously. Therefore the poles connected by a connector bar insures this simultaneous operation.

As one external force is applied for closing, and one latching mechanism is required, these particular functions are enclosed in the construction of only one pole for multi-pole breakers. The non-operating poles contain only the arcing structure, main current carrying parts, over-current trip devices, and toggle system associated with these poles. The operating pole contains in addition to the parts, associated with a non-operating pole the closing arm, operating arm, and the latching and tripping members.

With a trip-free breaker, it is necessary to be able to trip the breaker open, regardless of the position of the closing handle. To accomplish this, two latching systems are used. One latching system is associated with freeing the operating from the closing mechanism. The other latching system is designed to hold the breaker in the final closed position.

To close the breaker, the manual closing handle is first lifted to allow the trip free trigger to engage the trip free trigger roller. The trip free trigger tripper falls in place which locks the trip free trigger in position over a roller.

When the handle is pressed down, it becomes necessary that the operating arm casting to which roller is attached, follow the motion of the closing arm to which the trip free trigger tripper is attached. The operating arm acting as a part of the toggle system, co-operate with a toggle to force the bridge arm

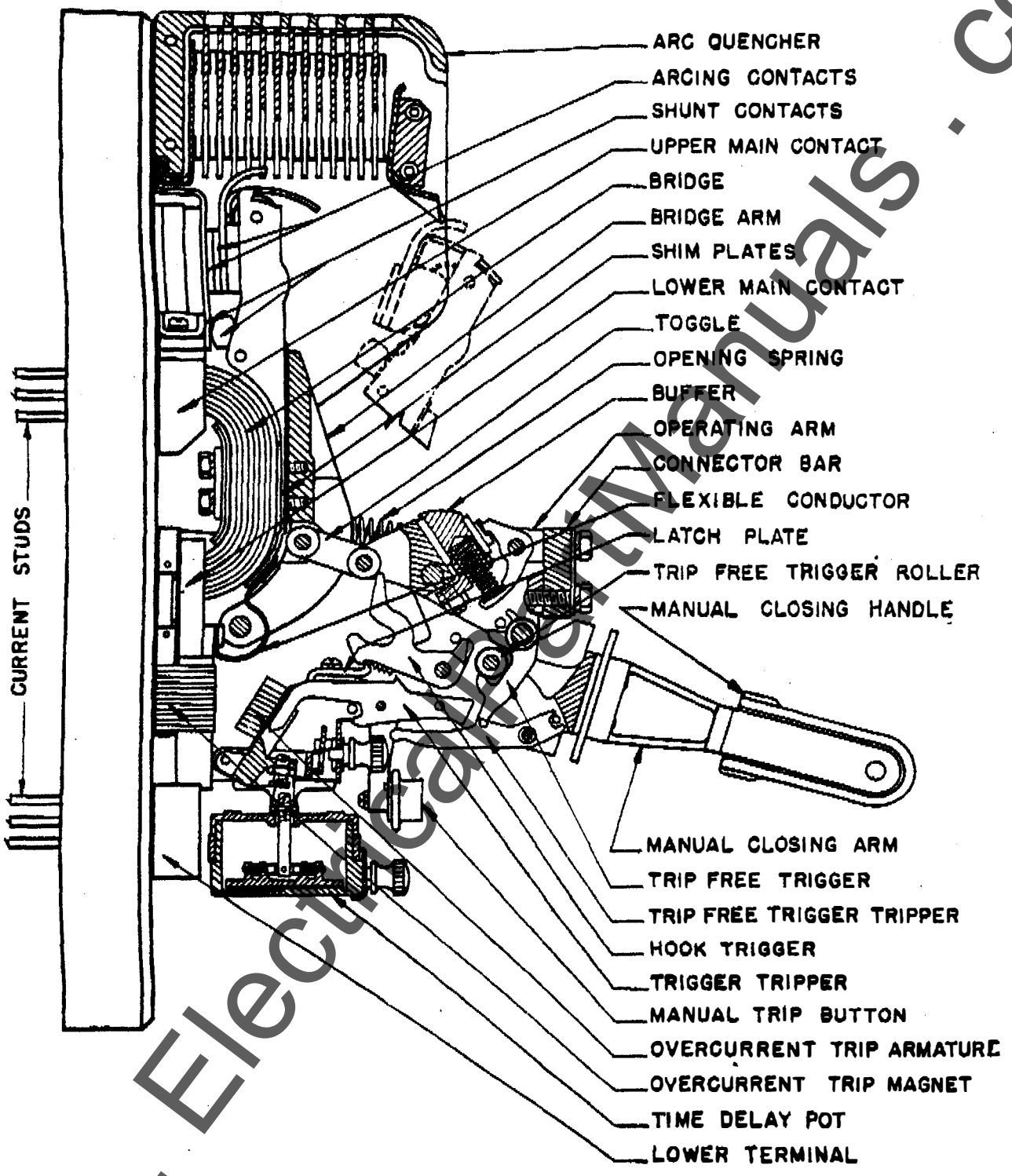

FIG. 4—TYPE LX CIRCUIT BREAKER. ARC QUENCHER, CONTACTS, MECHANISM AND OVERCURRENT TRIP DEVICE

towards a closed contact position. The bridge arm pivoted on a pin is shown with a flexible conductor.

At any point of the closing stroke, the trip free trigger tripper may be made to release the trip free trigger, and the trip free trigger roller to free the toggle system from the closing arm. At the end of the closing stroke, when the contacts are fully engaged, the hook trigger mounted on a stationary pin engages a latch plate. Until the hook trigger engages the latch plate, the handle could be backed off allowing the contacts to open, as slowly as the handle is moved (this procedure may damage the breaker). With the hook trigger engaged the breaker may be opened only through the unlatching of the trip free mechanism.

The breaker may be tripped from a closed position, by the action of the trigger tripper on the trip free trigger tripper. The trigger tripper is carried on a pivoted insulated tripper bar which extends the entire width of the breaker. This tripper bar may be operated on the overcurrent armature associated with any one of the poles, the manual trip button, or by any auxiliary devices, such as a shunt trip, undervoltage trip, or reverse current trip.

When the breaker trips open from a fully closed position, the hook trigger remains engaged with the latch plate, which locks the manual closing arm in a down position.

During an opening motion, however, a pin on the operating arm strikes the hook trigger which unlatches the latch plate and frees the closing arm. The closing arm may be lifted to reengage the trip free latching mechanism and the operating arm.

All latches are inspected at the factory. No adjustments should be required.

The buffer located on the operating arm, operates as a self-energizing friction stop.

MAINTENANCE: During inspection be sure that all parts are free with no gummed oil on the pins, springs active, and cotter pins in place. See that latch surfaces are smooth and the tripper bar connections are tight.

CLOSING OPERATION

MANUALLY OPERATED CIRCUIT BREAKERS: To close the open type circuit breaker, lift the handle to its limit and then press down with enough force and speed to close the breaker smartly but without slamming. A manual trip button is provided on all manually operated breakers.

To close the U-Re-Lite type circuit breaker, lift trigger beneath handle, rotate handle clockwise to permit latches to engage, then counter-clockwise to close. The breaker is tripped manually by lifting the trigger beneath the U-Re-Lite handle and rotating handle clockwise.

A breaker equipped with back-up trip will trip if the closing motion of the handle is not continuous and smooth. A breaker that has opened on operation of back-up trip may be reclosed if the closing motion is continuous. Do not, however, mistake automatic electrical tripping for tripping on back-up trip.

ELECTRICALLY OPERATED CIRCUIT BREAKERS: Type LX circuit breakers can be furnished for electrical operation. Solenoid mechanisms are standard and when the control voltage is a-c are equipped with proper rectifiers.

All solenoid mechanisms are equipped with air cushion checks to control speed of closing and impact. The mechanisms are mechanically trip free from the circuit breaker at any point of the closing stroke. Electrically operated breakers are equipped with a non-repeat trip free relay. Also included are: a shunt trip device for remote tripping of a timed "b" switch to operate the trip free relay and a six-contact auxiliary switch.

OVERCURRENT TRIP DEVICE

DESCRIPTION: The overcurrent trip may be instantaneous or with time delay. Refer to Figure 5.

A conductor passes from the lower stationary main contact around a laminated magnet and through the panel to the current studs. A laminated armature fastened on a pivot arm is attracted to the magnet. An extension of the pivoted arm strikes the tail of the trigger tripper to open the breaker.

The surfaces of both the sucker and the cup bottom are in the shape of a two blade fan so that the surfaces are only partly in contact. Oil in the cup causes the sucker plate to be restrained momentarily when an overload occurs. The knob serves to turn and lock the cup in position.

MAINTENANCE: The normal air gap between the armature and the magnet is adjusted by clamp block sliding in the horizontal slot of the calibration adjusting plate.

Marks on the front of the supporting ring indicate the time delay position. Zero gives instantaneous tripping and three gives maximum time delay. When a heavy duty time delay is furnished, the full areas of the sucker and cup are engaged and no time adjustment is provided.

Before putting breaker into service, clean cup and sucker thoroughly with a volatile solvent. To disassemble the cup remove the lock screw, loosen the knob, and unscrew the cup from the lid. Do not change screw adjustment between sucker and armature arm. Be careful not to damage surfaces as the delaying action will be changed. When reassembling be sure that holes are in perfect alignment, insert in the lock screw hole the proper oil from the container supplied and replace the lock screw. A half ounce of oil is sufficient. Set the calibration pointer at the proper tripping current, turn the cup to the desired time delay index and clamp.

The time delay cup should be cleaned once a year otherwise its service might be impaired. When fresh oil is required send circuit breaker name plate data with order for new oil to factory.

SPARE PARTS: It is recommended that sufficient spare parts be carried in stock to enable the operators of circuit breakers to promptly replace any worn, broken or damaged parts. Should renewal parts be required, refer to Renewal Parts Bulletin 46917-A.

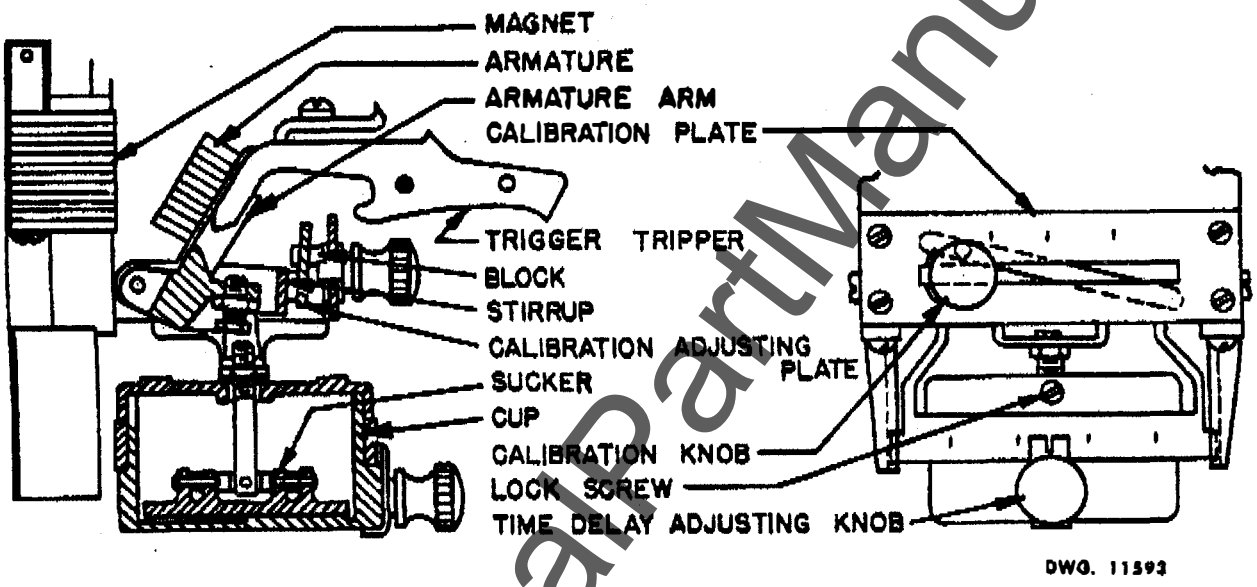

FIG. 5—TYPE LX OVERCURRENT TRIP WITH TIME DELAY.