INSTRUCTIONS

for

the Installation, Care and Operation of Circuit Breakers and Accessories

TYPE LA-15A and LA-25A
MANUAL STORED-ENERGY
AIR CIRCUIT BREAKER

BOOK BWX-6559-1

These instructions are not intended to cover all details or variations that may be encountered in connection with the installation, operation, and maintenance of this equipment.
Should additional information be desired contact the Allis-Chalmers Mfg. Company.

ALLIS-CHALMERS MFG. CO.

BOSTON WORKS • BOSTON • MASS.

ALLIS-CHALMERS MANUFACTURING COMPANY

INDEX TO INSTRUCTION BOOK
COVERING
TYPE LA-15A & LA-25A MANUAL STORED-ENERGY BREAKER

LIST OF ILLUSTRATIONS

Instructions
For the Installation and Operation
of
Allis-Chalmers Type "LA"
Low Voltage Air Circuit Breakers
and Auxiliary Equipment

Part I
GENERAL INFORMATION

A. INTRODUCTION. The type "LA" air circuit breakers may be used in metal enclosed switchgear, on open type switchboards, or separately mounted in individual housings. All "LA" breakers are completely assembled, tested and calibrated at the factory in a vertical position and must be so installed to operate properly. Customer's primary connections should be adequately braced against the effects of short-circuit currents to prevent overstressing the breaker terminals.

B. WARRANTY. Allis-Chalmers' "LA" air circuit breakers are warranted to be free of defects in material and workmanship for a period of one year after delivery to the original purchaser. This warranty is limited to the furnishing of any part which to our satisfaction has been proven defective. Allis-Chalmers will not in any case assume responsibility for allied equipment of any kind.

C. RECEIVING AND INSPECTION FOR DAMAGE. Immediately upon receipt of this equipment, carefully remove all packing traces and examine parts, checking them against the packing list and noting any damages incurred in transit. If such is disclosed, a damage claim should be filed at once with the transportation company and Allis-Chalmers notified.

D. STORAGE. When breakers are not to be put into immediate use, they should be wrapped or covered to provide protection from plaster, concrete dust and other foreign matter. Breakers should not be exposed to the action of corrosive gases and moisture. In areas of high humidity or temperature fluctuations, space heaters or the equivalent should be provided. Circuit breakers should be handled carefully at all times.

E. CAUTIONS TO BE OBSERVED IN THE INSTALLATION AND OPERATION OF "LA" CIRCUIT BREAKERS.

1. Do not attempt to operate breaker or insert in cubicle until all packing traces have been removed.

2. Read Instruction Book before making any changes or adjustments on the breaker.

3. Do not interchange parts of trip devices - to do so may change calibrations.

4. On manually operated breakers, always operate closing handle quickly and decisively.

5. Check current ratings and serial numbers against single line diagram to assure that breakers are properly located in switchgear at installation.

6. Check the alignment of the secondary disconnect fingers to insure against misalignment due to possible distortion of fingers during shipment and handling.

7. Once the breaker is energized, it should not be touched, except for operating, since most of the component parts are also energized.

F. INSTALLATION. The "LA" air circuit breaker is completely adjusted, tested, and inspected at the factory before shipment and no additional adjustment should be necessary when installing. However, a careful check should be made to be certain that shipment and storage has not resulted in damage or change of adjustment. Circuit breakers should be installed in a clean, dry, well-ventilated place in which the atmosphere is free from destructive acid or alkali fumes. Mount open-type breakers high enough to prevent injury to personnel either from circuit interruption or from moving parts during automatic opening of the breaker. Allow sufficient space to permit access for cleaning and inspection. Also allow sufficient clearance to insulating barrier above the breaker to prevent damage from arcing. Before installing, make certain that the breaker contacts are in the open position.

After the breaker is installed in position, close it manually to check proper functioning of the mechanism and contacts. (CAUTION: MAKE SURE CIRCUIT IS NOT ENERGIZED.) During the closing operation, observe that the contacts move freely without interference or rubbing between movable arcing contacts and parts of the arc chutes. Refer to Part II of the Instruction Book for a detailed description of the circuit breaker operating characteristics.

Trip units and accessory devices should receive a thorough check prior to placing the breaker in service to be certain that adjustments are proper and parts are not damaged.

Cubicle mounted breakers of the drawout type are equipped with a drawout interlock to prevent movement of a closed breaker into or out of the "CONNECT" position. See Part II of the Instruction Book for a description of the interlock. Its operation should be checked before the breaker is energized.

Upon completion of the installation inspection, the breaker is ready to be energized after the control wiring, if any, is checked and the insulation tested.

G. MAINTENANCE. Occasional checking and cleaning of the breaker will promote long and trouble-free service. A periodic inspection and servicing should be included in the breaker maintenance routine.

Needle bearings are packed with a special lubricant and should require no further attention. Bearing pins and other sliding or rotating areas should be wiped with a light film of "Aero Lubriplate" (Manufactured by Fiske Brothers Refining Co.). Greasing should be done with care because excess grease tends to collect dirt which in time might make operation sluggish and affect the dielectric strength of insulating members.

If the circuit breaker is not operated during extended periods, the breaker should not remain in either the closed or open position any longer than six months. Maintenance opening and closing operations should be made to insure freedom of movement of all parts.

PART II-A

OPERATING MECHANISM

A. DESCRIPTION AND FUNCTION. The operating mechanism is the medium used to transmit power from the stored-energy closing springs to the contact structure to close the breaker. It is a "trip-free" mechanism; that is, the breaker contacts are free to open at any time, if required, regardless of the position of the mechanism or the force being applied.

When the circuit breaker contacts are open, the operating mechanism is in the "trip-free" position. Clockwise rotation of the closing handle engages pin (2-12) with cam (2-13) and rotates the cam against the roller attached to main closing cam (2-8). This cam is moved downward by continued rotation of the closing handle thus compressing the charging springs through yoke (2-6). As main closing cam (2-8) is driven downward, the lower end of main toggle link (2-50) is free to move to the left. This permits the latches to reset. The springs reach the fully-charged position at the high point of the cam surface on cam (2-13). When the roller rides over the high point of the cam surface, the energy in the springs is released. Main closing cam (2-8) is raised against cam follower (2-51) and moves the top of main toggle link (2-50) to the right, thus closing the breaker contacts. Prop latch (2-49) engages latch pin (2-5) in main closing cam (2-8) holding the linkage in the latch position.

Opening of the breaker is accomplished by the release of trip latch (2-44) by action of various trip devices or the manual trip button. Trip levers (2-46) and (2-48), which are biased latches, are thus released and permitted to rotate clockwise. The lower end of main toggle link (2-50) is now free to move to the right, permitting the force of the stationary main contact springs and springs (2-9) to move the top of this link to the left, thus opening the breaker contacts.

B. MAINTENANCE CLOSING. The following method should be used for maintenance closing the breaker during service inspections. The breaker should be out of service, and care must be taken to keep hands clear of the contact structure and other moving parts.

1. Remove closing handle and breaker front cover.
2. Move top of pawl (2-16) to the left as far as it will go.
3. Replace closing handle and rotate it slowly in the clockwise direction observing trip latch (2-44), secondary trip lever (2-46), and primary trip lever (2-48) at the same time.
4. Continue to rotate the handle clockwise, while holding it firmly, until the latches reset. Just beyond this point, the stop in the ratchet will engage the lower end of the pawl and prevent further clockwise rotation.
5. Reverse the direction of handle rotation to counterclockwise. The handle will now be resisting the force of the stored-energy closing springs and must be held firmly.
6. As the handle is rotated counterclockwise, the contacts will move toward the closed position and at the same time the energy in the stored-energy springs will be gradually released. (If the contacts do not move during this step, it is an indication that the latches have not reset. See Step #4).

7. When the contacts are fully closed, prop latch (2-49) will latch on pin (2-5). (If the prop latch does not engage readily, a screwdriver can be used to raise yoke (2-6) slightly to assist in latching.)

8. It will be necessary to actuate the red trip button to open the breaker contacts.

9. Before the cover can be replaced, the top of pawl (2-16) must be moved to the right.

C. MAINTENANCE AND ADJUSTMENT. A semi-annual inspection and servicing is usually sufficient; however, in cases where unfavorable atmospheric conditions exist, more frequent inspections are recommended. In any case, the total number of breaker operations between servicing should not exceed 1750.

The following items are listed for convenience in maintaining the operating mechanism in good condition:

1. Trip Latch Adjustment. Trip latch (2-44) should have a tripping force of 2 to 6 ounces, as measured at right angles to a 3/4" radius (pulling in line with the centerline of screw (2-40). Force may be changed by positioning slotted end of spring (2-39) clockwise to decrease tripping force and counterclockwise to increase the tripping force.

   Trip latch (2-44) engagement on secondary trip lever (2-46) roll should be 3/16" ± 1/64". Measurement is from the leading edge of trip latch face to the mean line of contact on the trip lever roll. Adjustment is obtained by the positioning of a fixed stop in the mechanism frame.

2. Trip Latch Roll Adjustment. Trip latch roll on screw (2-40) should have 1/32" clearance (adjusted to the nearest turn) to trip block (2-45) with the trip block against its stop. Adjustment is obtained by positioning screw (2-40).

3. Operating Mechanism Removal. The operator may be removed from the breaker by disconnecting opening springs (2-9) and contact operating arms (2-52), and removing screws (2-24), carefully noting number of shims (2-25) under each screw. Shims (2-25) are used to adjust main contacts (see Part III) and must not be changed for any other reason. When reassembling, the mechanism should be in the trip-free position. After reassembly, check trip latch adjustments and main contact adjustments. Check mechanism for ease of operation and freedom from binds.

4. Yoke Adjustment. With the breaker closed and latched, the nut on the threaded rod of yoke (2-6) should be flush with the bottom plate.

5. Interlock Adjustment. Cubicle mounted breakers of the drawout type are equipped with a drawout interlock. If a closed breaker is racked in toward "connect position," it should trip shortly after it passes the "test position" indicator. It will then be impossible to close the breaker until it reaches the "connect position." As a closed breaker is racked out, it should trip after approximately 5/16" travel, and it will be impossible to close the breaker again until the "test position" is reached.

   If the interlock does not function as described, adjustment may be made by positioning the acorn nut of the interlock plunger.

PART III-A

CONTACT STRUCTURE

A. DESCRIPTION AND FUNCTION. The contact structure consists of main current carrying contacts and arcing contacts arranged so that contact make and break is by means of the arcing contacts. The main contacts are not subjected to arcing. Arcing contact surfaces are clad with an arcing alloy which greatly reduces mechanical wear and arc erosion. A positive wiping action of the arcing contacts prevents welding and sticking when interrupting high currents.

Both the stationary and the movable arcing contacts have arc runners which lead the arc away from the contact surfaces. This prolongs contact life as well as aiding arc interruption.

The main current carrying contacts are silver plated and have a positive wiping action. This insures high conductivity and maintains the current carrying areas clean, smooth and free from pitting or hammering. When the main contacts make, the first point of contact is at the lower end of contact finger (2A-10). Further motion causes this contact finger to rotate in its socket, causing the contact point to move up toward the "knee" of the contact, and separating the initial contact point.

When the breaker is called upon to interrupt a current, the main contacts (2A-10) and (2A-2) separate, transferring the current to the arcing contacts (2A-1) and (2A-3) without arcing. When the arcing contacts part, an arc is drawn between the contact surfaces. Due to the inherent magnetic and thermal effects of the arc, it will rapidly move upwards along the arc runners and into the arc chutes (2-30) (2-29) where it is extinguished.

B. MAINTENANCE, ADJUSTMENT AND REPLACEMENT. A semi-annual inspection and servicing is usually sufficient; however, in cases where unfavorable atmospheric conditions exist, more frequent inspections are recommended. In any case, the total number of breaker operations between servicing should not exceed 1750.

The following Items are listed for convenience in maintaining the contact structure in good condition:

1. General. Check main contacts for cleanliness. (They should not be dressed.) Check arcing contacts for wear and arc erosion. Contacts should be replaced if arcing alloy shows indications of wearing through before next inspection. With arcing contacts (2A-1) and (2A-3) just touching, if a 5/16" diameter rod cannot be passed between stationary contact fingers (2A-10) and movable main contact (2A-2), arcing contacts should be replaced.

2. Contact Adjustment. Arcing contacts (2A-1) and 2A-3) do not require adjustment. Main contacts (2A-10) and (2A-2) are factory adjusted and should not require field adjustment unless parts have been disassembled. Adjustment is obtained by use of shims (2-25) between the operator frame (2-20) and the breaker frame (2-31). Main contacts are in proper adjustment when there is a clearance of 1/32" to 3/32" between the bottom of the stationary main contact (2A-10) and the face of the movable main contact (2A-2) with the breaker closed. All contact fingers (2A-10) should be in contact at the "knee" of the contact and open at the bottom. Be certain that there is after-travel in springs (2A-9) with the breaker closed.

3. Arcing Contact Hinge Tension. Spring washers (2A-25) should be compressed to give a pull of 2.6 lbs., to 3.2 lbs., with arcing contact just out of contact and arcing contact spring (2A-21) removed. Measurement can be made by attaching a spring scale just below the contact surface and the pull applied approximately perpendicular to the contact surface. Adjustment is made by positioning nut (2A-26) on screw (2A-23).

4. Movable Arcing Contact Replacement. The movable arcing contacts (2A-1) may be replaced, after removing arc chutes (2-29)(2-30), by removing hardware and spring washers (2A-25) at the hinge joint of the arcing contact. In reassembling, make certain that the hinge tension is correct as outlined above.

5. Stationary Arcing Contact Replacement. The stationary arcing contact (2A-3) may be replaced, after removing arc chutes, merely by removal of nut (2A-5). Replacement is obvious and no adjustment is required.

6. Movable Main Contact Replacement. The outer phase main contacts (2A-2) may be replaced, after removal of arc chutes, as follows: Loosen screws (2-32) which hold bearing plate (2-47) on both ends of shaft (2A-19). Remove screws (2A-17) which hold cap (2A-18) on shaft. Remove cap from shaft and rotate movable main contact away from hinge contact fingers (2A-14). Since the hinge joint contact fingers and the main contact are under spring pressure, care must be used not to score or damage the contact surface. Any single phase may be removed without removing the other phases. However, to remove the center phase, the operating mechanism must be removed. In replacing the movable contacts, be certain that the face of the movable main contact is lined up with the stationary main contact block before tightening the caps.

7. Stationary Main Contact Replacement. To remove the lower hinge contact block (2A-13), first remove movable contact assembly (2A-2), as outlined above, then screws (2A-7). To remove upper main contact block (2A-6), first remove movable main contact (2A-2), then screws (2A-7) permitting the contact block (2A-6) and stationary arcing contact (2A-3) to be removed as a group. Once the above members are removed, it is a simple matter to replace contact fingers (2A-14) and (2A-10). Remove fingers under a cloth or other shield to prevent springs from flying free. A screwdriver may be used to work springs and fingers to the ends of the block for removal. Care should be taken not to damage contact fingers. Note that lower spring (2A-12) consists of a double (inner and outer) spring, while spring (2A-9) is a single spring. During reassembly of upper and lower contact blocks, there are no special adjustments to observe; however, alignment between the three phases is important.

PIIA 7.2

PART IV

SERIES OVERCURRENT PROTECTIVE DEVICES

A. DESCRIPTION AND FUNCTION. Series overcurrent trip devices function to trip the breaker whenever the current exceeds a predetermined value. The device includes a series coil, magnetic circuit, and a sealed oil time-delay device arranged per Figure 12.

The available trip elements are as follows:

Long-Time Delay Element: -for use with the instantaneous trip and/or the short-time delay element. The pick-up setting is adjustable in the field to 80, 100, 120, 140 or 160% of the continuous current rating of the trip coil. Settings in excess of 100% do not permit the continuous current rating to exceed 100% of the series coil rating.

Short-Time Delay Element: -for use with the long-time delay element on selective trip systems. The pick-up setting is adjustable in the field to 500, 750, or 1000% of the continuous current rating of the trip coil. On special applications, it is possible to add the instantaneous element to this combination.

Instantaneous Trip Element: -for use as noted above or as a single element. The pick-up is adjustable in the field between 500 and 1500% of the continuous current rating of the coil.

The devices are factory adjusted and should not be disturbed in the field without proper equipment and knowledge of the device. The time-delay devices are not interchangeable and are marked for identification as follows: The long-time delay device cover is red, while the short-time delay device cover is green. The time-delay band adjustments are made by locating plunger (12-1) in the proper hole on the trip element extensions. To decrease time band move plunger location closer to shaft (12-4) and to increase move away from shaft. The maximum, intermediate, and minimum time bands are marked by white bands on the trip element. All of the band locations are progressive, and intermediate settings may be made for finer selectivity.

The pick-up calibration is selected by rotating knob (12-2) which moves the calibration label (12-3) to the required setting.

The operation of the long-time delay element (12-15) is as follows: When the magnetic pull on the armature (12-15) increases due to an overcurrent condition in the series coil (12-7), the armature (12-15) will pick up and rotate about shaft (12-4). This magnetic attraction must overcome the tension in the pickup spring (12-20) and also displace the silicone oil in time-delay device (12-14) from the lower chamber to the upper chamber through the controlled metering element (12-12). As the armature closes the gap to the core (12-8), it engages trip block (2-44) and trips the breaker. When the breaker has tripped, the armature will reset due to tension in the pickup spring. The short-time delay element functions in the same manner, with the major difference being the controlled metering element.

B. INSPECTION, MAINTENANCE & REPLACEMENT. The series trip device should be inspected prior to being put in service to see that the pick-up calibration and time-delay band selections are in accordance with the application requirements. The device leaves the factory with the following setting unless otherwise specified in the purchase order:

(a) Long-time delay element set at 100% pick-up, intermediate time band
(b) Short-time delay element set at 750% pick-up, intermediate time band
(c) Instantaneous trip element set at 800% pick-up

The following procedure for removing the series trip device and changing coils on the "LA" circuit breaker up through 600 amperes should be used:

1. From the rear of the breaker, remove screws (2-35) which hold one side of series coil to connector (2-33).

2. Remove screws (2-32) and pull connector (2-33) through rear window of molded base.

3. Remove screws (2-34) holding other leg of series coil to the lower contact block.

4. Remove four mounting bolts (2-36).

4a. To separately remove a single phase unit, bypass Step 4 and instead remove four screws that mount the unit to the base plate.

5. Detach four screws (12-5) and lift core assembly (12-8). Slide coil (12-7) off and replace with new coil.

6. Reassemble by reversing the preceding steps. Care must be taken to insure that the two lower screws holding the core in the assembly next to the armature shaft be securely tightened before the top screws are tightened.

On "LA" circuit breakers 800 thru 4000 amperes, the overcurrent coils are linked to the inductive series coils mounted in the rear of the breaker. The leads must be disconnected to remove the series trip assembly. To remove the series trip device and change coils, disconnect the coil lead in the rear of the breaker and then follow steps 4 thru 6 previously mentioned.

To remove time-delay devices (12-14) or (12-19) remove either side plate from the single phase assembly, detach the plunger (12-1) from the trip element extension and slide the device out of the top of the assembly. The time-delay device is a sealed unit and cannot be repaired in the field. The calibration labels (12-3) and calibration label locking screw (12-25) should not be disturbed at any time. Parts of individual devices, such as pick-up springs and calibration lables, must not be interchanged between devices, or calibrations will be lost.

PART V

THERMAL OVERCURRENT PROTECTIVE DEVICE

A. <u>DESCRIPTION AND FUNCTION.</u> Thermal magnetic trip devices function to trip the breaker whenever the current exceeds a predetermined value. This device includes a series coil, magnetic circuit, bimetallic element, heater coil, and a secondary coil arranged per Figure 13.

These devices are factory adjusted and should not be disturbed in the field without proper equipment and knowledge of the device. The pickup setting is adjustable in the field to 80, 100, or 120% of the continuous current rating. This selection is made by rotating knob (13-6) to the required setting. Settings in excess of 100% do not permit the continuous current rating to exceed 100% of the series coil rating.

Because of the inherent time delay of this device it is equipped with instantaneous trip armature (13-21), to provide high-overload protection, which is factory set between 800 to 1200% of the continuous current rating of the coil. This instantaneous element requires calibration to change the pick-up value. To adjust, loosen screw (13-22) and increase or decrease tension in pickup spring (13-20) by rotating bracket (13-23) about locking screw (13-17).

The thermal magnetic trip armature (13-19) functions to trip the breaker in the following manner: When an overcurrent exists in the series coil (13-12), it causes a similar overcurrent in the secondary coil (13-9). This overcurrent generates heat to bimetallic element (13-3) by means of heater coil (13-2) which surrounds this element. The heat generated causes the free end of the bimetallic element (13-3) to rotate along with cam (13-5). The rotation of this cam releases the thermal trip armature (13-19) which was restrained by roller (13-7) working against this cam. Upon being released, the thermal armature rotates on shaft (13-10) so as to close the air gap through which it is electromagnetically attracted to the core assembly (13-13). As the thermal armature (13-19) closes this gap, it picks up and engages the trip block (2-44) to trip the breaker. The breaker having tripped, the thermal armature is returned to its latched position by return spring (13-18). A short time interval may be required to completely reset cam (13-5) after trip cycle is completed to permit cooling of bimetallic element.

B. <u>INSPECTION, MAINTENANCE AND REPLACEMENT.</u> The thermal trip device should be inspected prior to being put in service to insure that the pickup calibration is in accordance with the application requirements. The device leaves the factory with the following setting unless otherwise specified in the purchase order:

(a) Thermal magnetic trip element set at 100% pickup
(b) Instantaneous trip element set at 1200% pickup

The following procedure for removing the thermal trip device and changing coils on "LA" circuit breakers up through 600 amperes should be used:

1. From the rear of the breaker, remove screws (2-35) which hold one side of series coil to connector (2-33).

2. Remove screws (2-32) and pull connector (2-33) through rear window of molded base.

3. Remove screws (2-34) holding other leg of series coil to the lower contact block.

4. Remove four mounting bolts (2-36).

4a. To separately remove a single phase unit, ty-pass step 4 and instead remove four screws that mount the unit to the base plate.

5. Detach four screws (13-11) and lift core assembly (13-13). Slide coil (13-12) off and replace with new coil.

6. Reassemble by reversing the preceding steps. Care must be taken to insure that the two lower screws holding the core in the assembly next to the armature shaft be securely tightened before the top screws are tightened.

On "LA" circuit breakers, 800 through 4000 amperes, the overcurrent coils are linked to the inductive series coils mounted in the rear of the breaker. The leads must be disconnected to remove the series trip assembly. To remove the thermal trip device and change coils, disconnect the coil lead and follow steps 4 through 6 noted above. Other parts of the device should not be removed or disassembled since to do so will disturb the calibration.

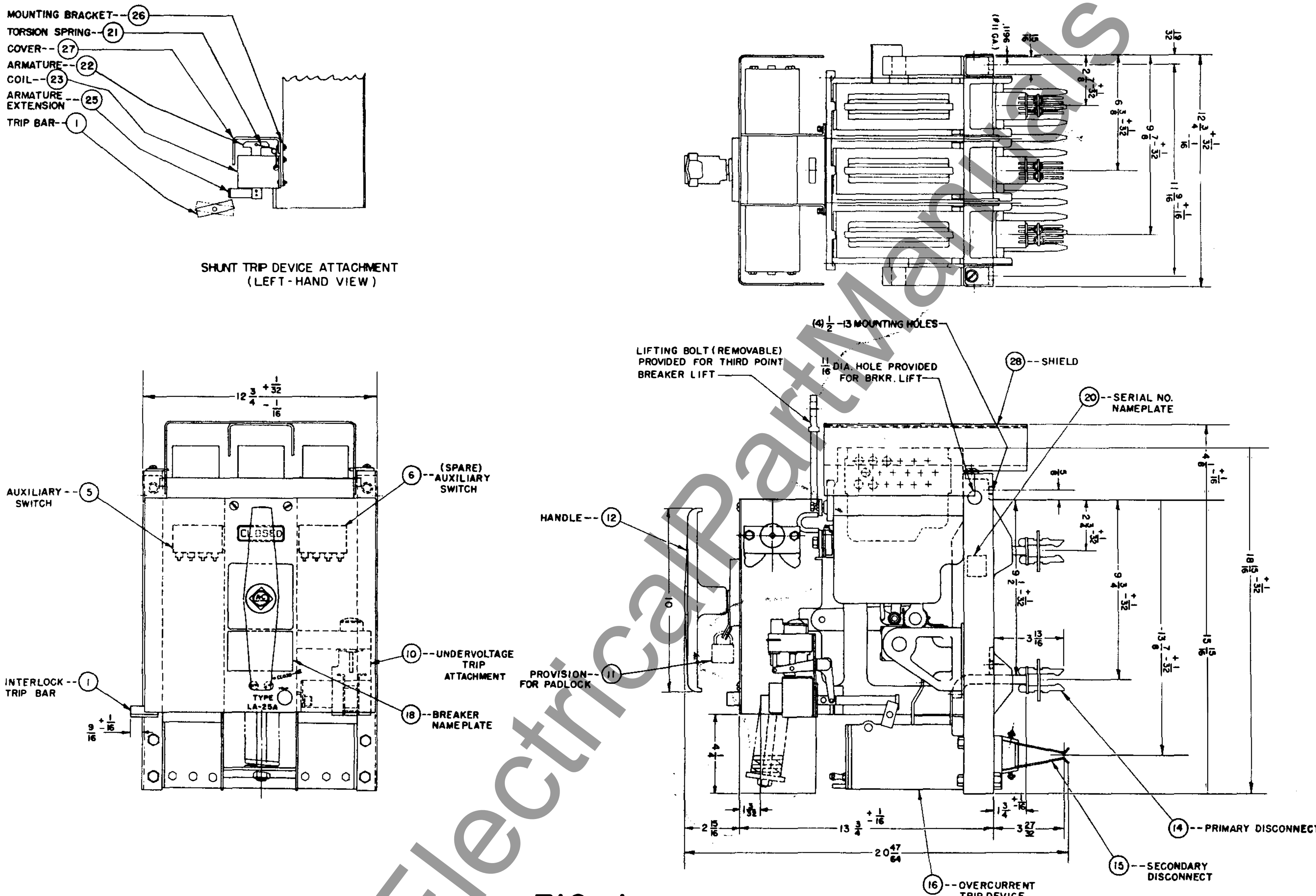

FIG-1

LA-25A MANUAL STORED-ENERGY BREAKER OUTLINE

MAY 9,1960 71-540-110

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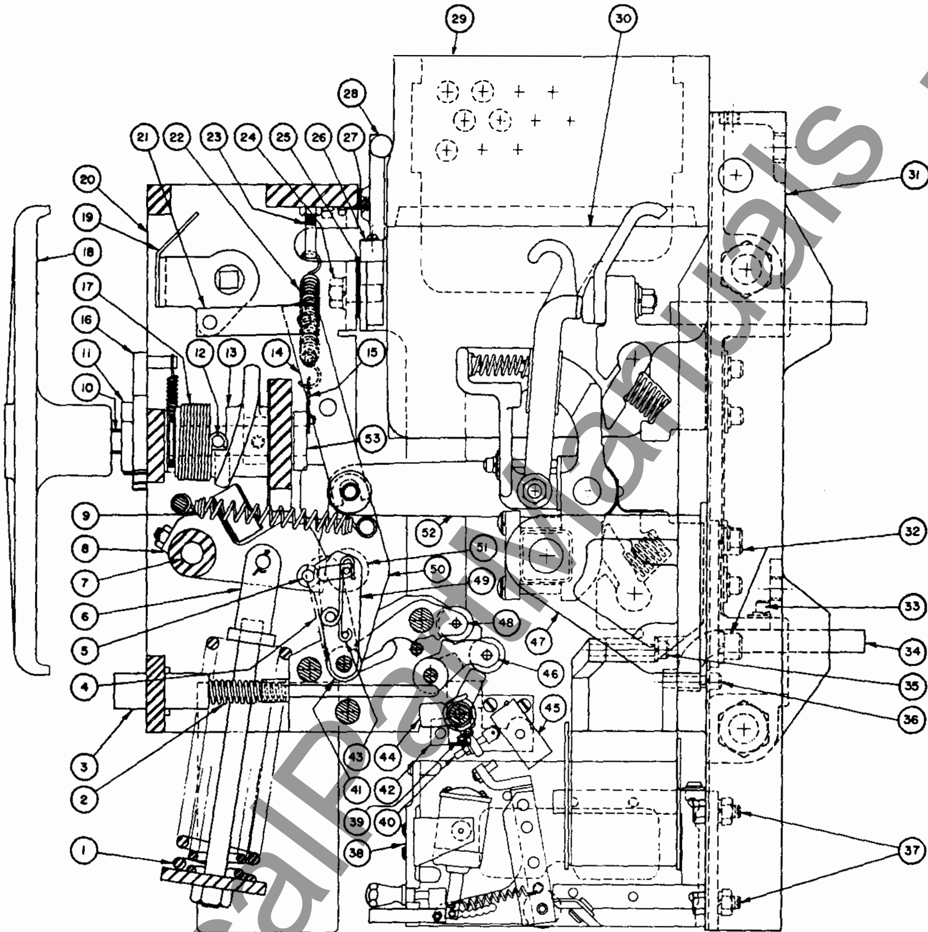


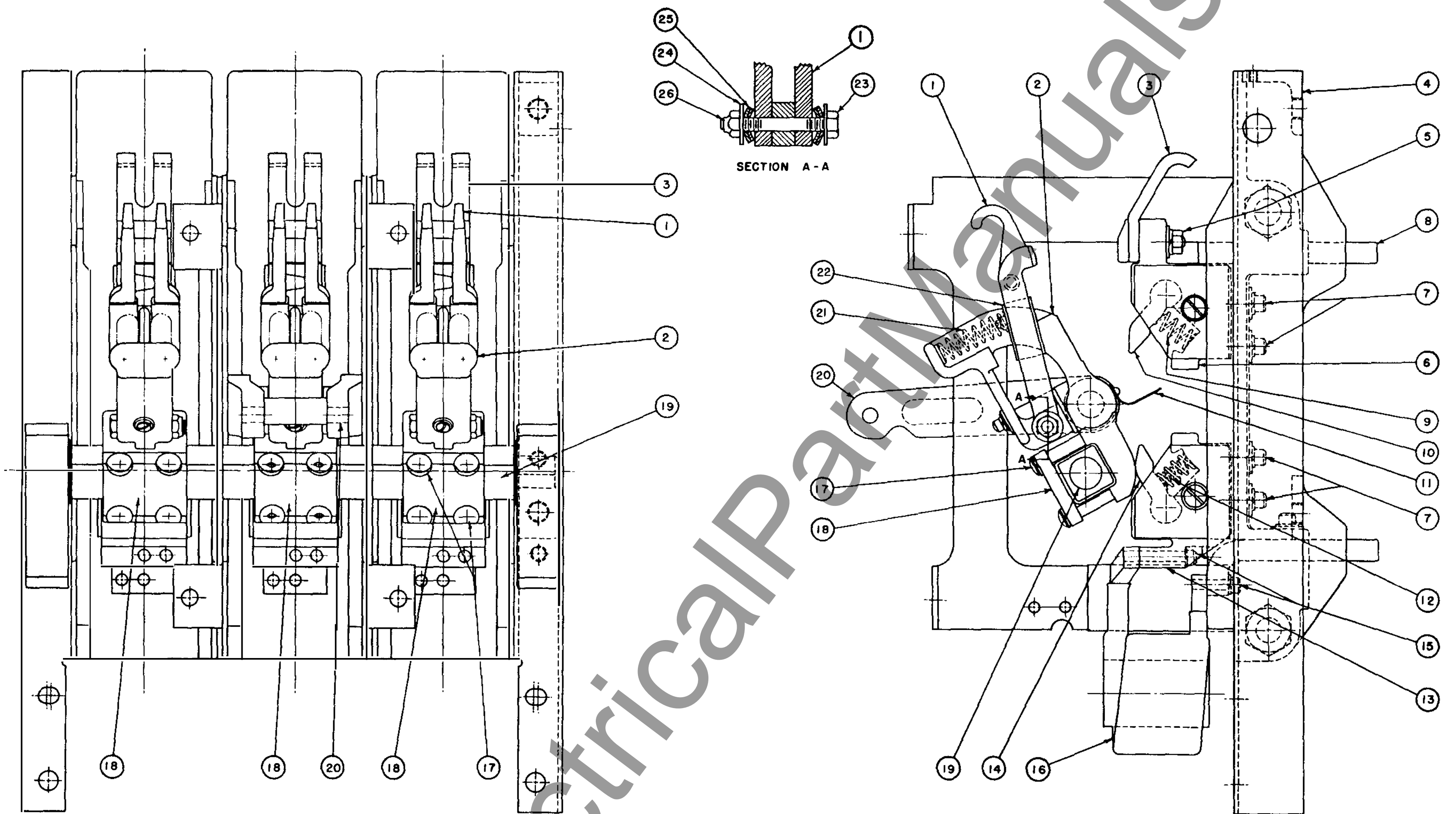
1. CLOSING SPRINGS
2. MANUAL TRIP SPRING
3. MANUAL TRIP BUTTON
4. ROCKING LINK
5. LATCH PIN
6. YOKE
7. SHAFT
8. MAIN CLOSING CAM
9. OPENING SPRINGS
10. SHAFT
11. RATCHET
12. PIN
13. CAM
14. LINK
15. LINKS
16. PAWL
17. TORSION SPRING
18. CLOSING HANDLE
19. OPEN-CLOSE INDICATOR
20. OPERATING MECHANISM FRAME
21. INDICATOR LINK
22. SPRING
23. STUD
24. SCREW
25. CONTACT ADJUSTING SHIMS
26. ARC CHUTE SUPPORT (LOWER)
27. SCREW
28. ARC CHUTE SUPPORT (UPPER)
29. ARC CHUTES (UPPER)
30. ARC CHUTES (LOWER)
31. PANEL ASSEMBLY
32. SCREWS
33. SCREWS
34. CONNECTORS
35. SCREWS
36. SCREWS
37. SCREWS
38. OVERCURRENT TRIP DEVICE
39. TRIP LATCH ADJUSTING SPRING
40. TRIP LATCH ADJUSTING SCREW
41. NEEDLE BEARING
42. MANUAL TRIP BLOCK
43. PROP LATCH SPRING
44. TRIP LATCH
45. TRIP BLOCK
46. SECONDARY TRIP LEVER
47. BEARING PLATE
48. PRIMARY TRIP LEVER
49. PROP LATCH
50. MAIN TOGGLE LINK
51. CAM FOLLOWER
52. CONTACT OPERATING ARMS
53. BUSHING

FIG. 2

LA-25A MANUAL STORED-ENERGY BREAKER

MAY 13, 1960

71-540-111



1. MOVABLE ARCING CONTACT
2. MOVABLE MAIN CONTACT
3. STATIONARY ARCING CONTACT & ARC RUNNER
4. BASE ASSEMBLY
5. NUT
6. STATIONARY MAIN CONTACT BLOCK
7. SCREW
8. STUD CONNECTOR
9. MAIN CONTACT SPRING
10. MAIN CONTACT FINGER
11. SHIELD
12. HINGE CONTACT SPRINGS
13. HINGE CONTACT BLOCK
14. HINGE CONTACT FINGER
15. SCREW
16. SERIES COIL
17. SCREW
18. CAP
19. MAIN OPERATING SHAFT
20. CONTACT OPERATING ARM
21. ARCING CONTACT SPRING
22. ARCING CONTACT INSULATOR
23. SCREW
24. RETAINING WASHER
25. SPRING WASHER
26. NUT

FIG. 2A

LA-25A 600 AMPERE BREAKER PANEL ASSEMBLY

SEPTEMBER 16, 1957 — 71-540-092

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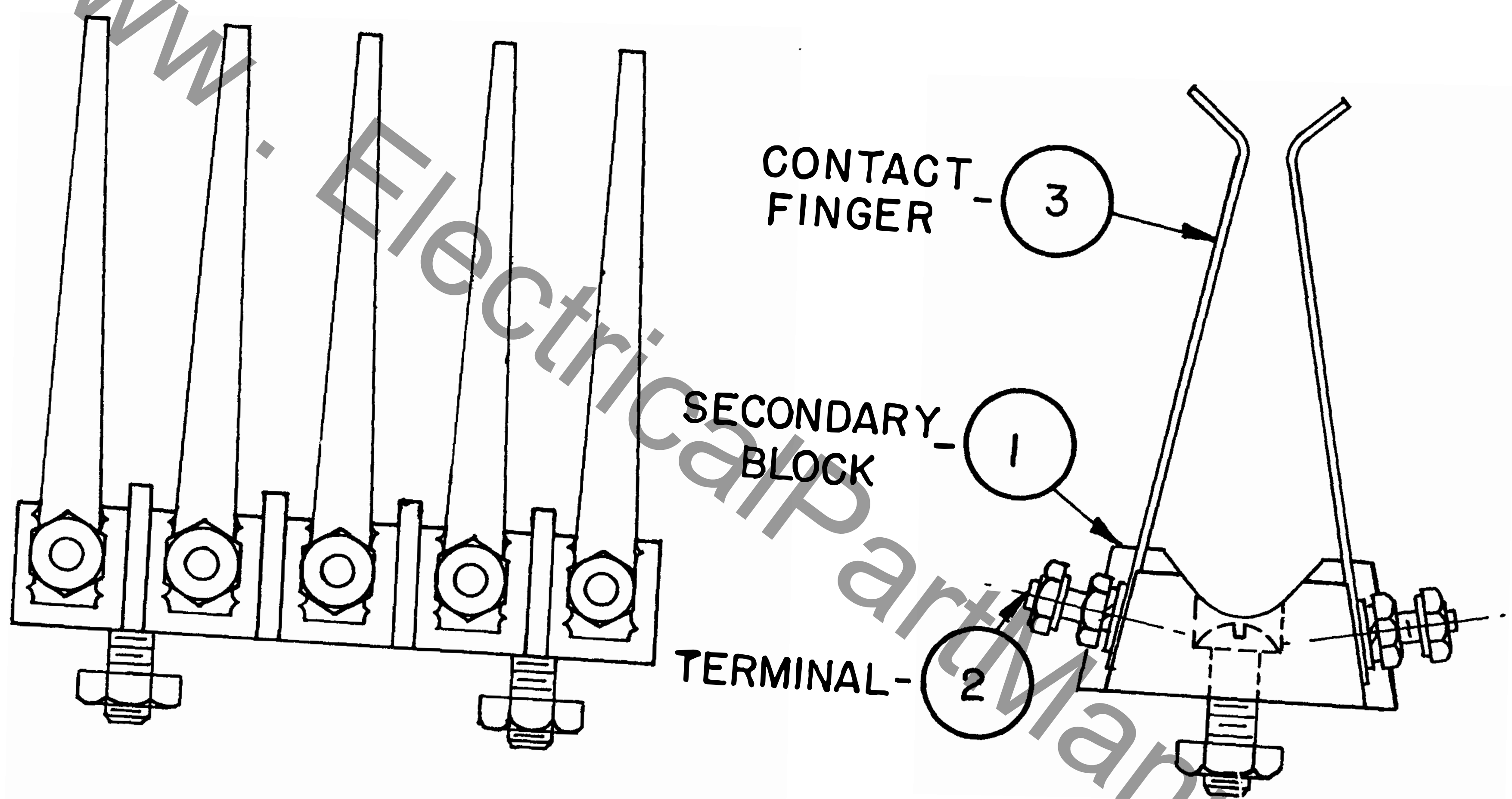
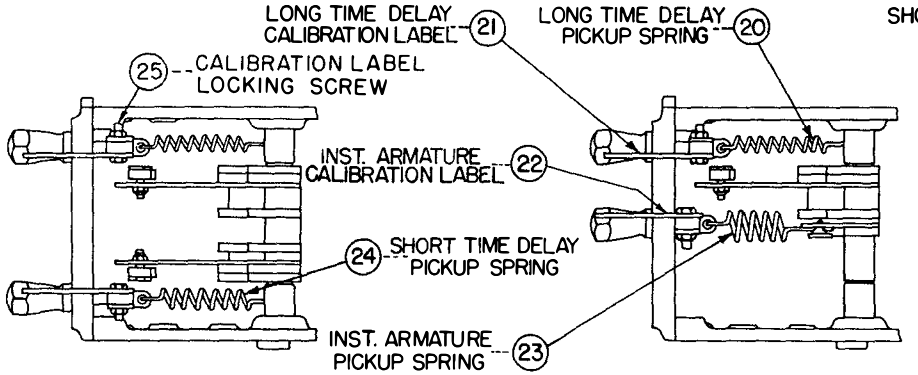


FIG. 8

TYPICAL SECONDARY DISCONNECT ASSEMBLY

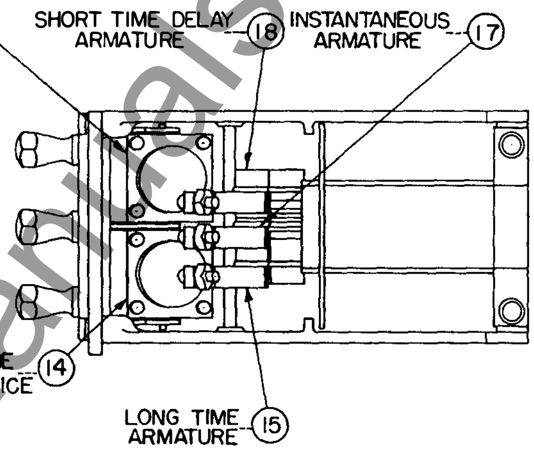
JULY 31, 1958

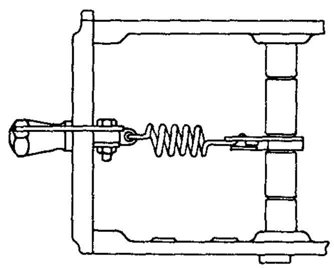
71-240-366



BOTTOM VIEW
DUAL SELECTIVE TRIP DEVICE
(LONG & SHORT TIME ELEMENTS)

BOTTOM VIEW
DUAL MAGNETIC TRIP DEVICE
(LONG TIME & INSTANTANEOUS ELEMENTS)





BOTTOM VIEW
SERIES INSTANTANEOUS TRIP DEVICE
(ADJUSTABLE 100-200% PICKUP)

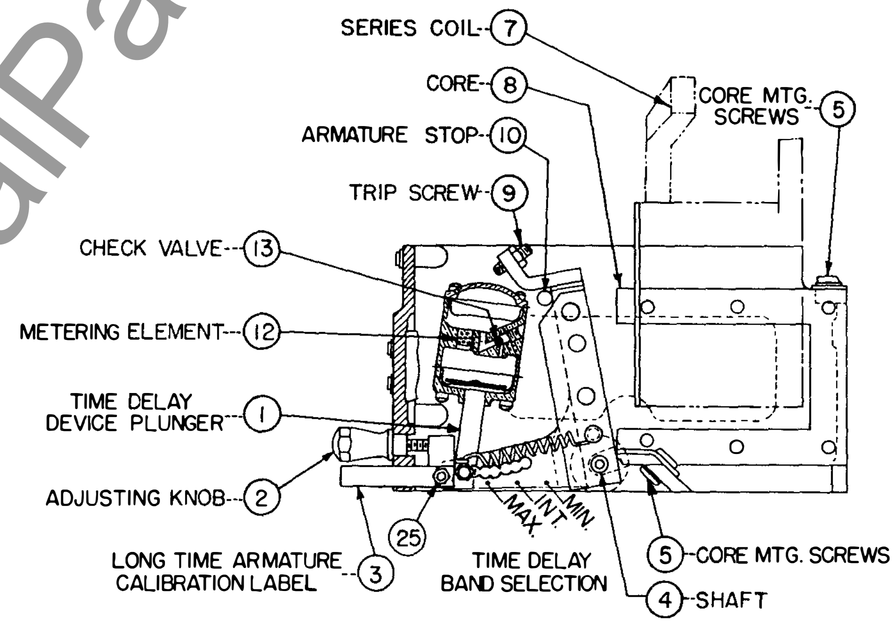


FIG. 12
SERIES OVERCURRENT TRIP DEVICE
"LA" TYPE BREAKERS

JUNE 6, 1957

71-440-077

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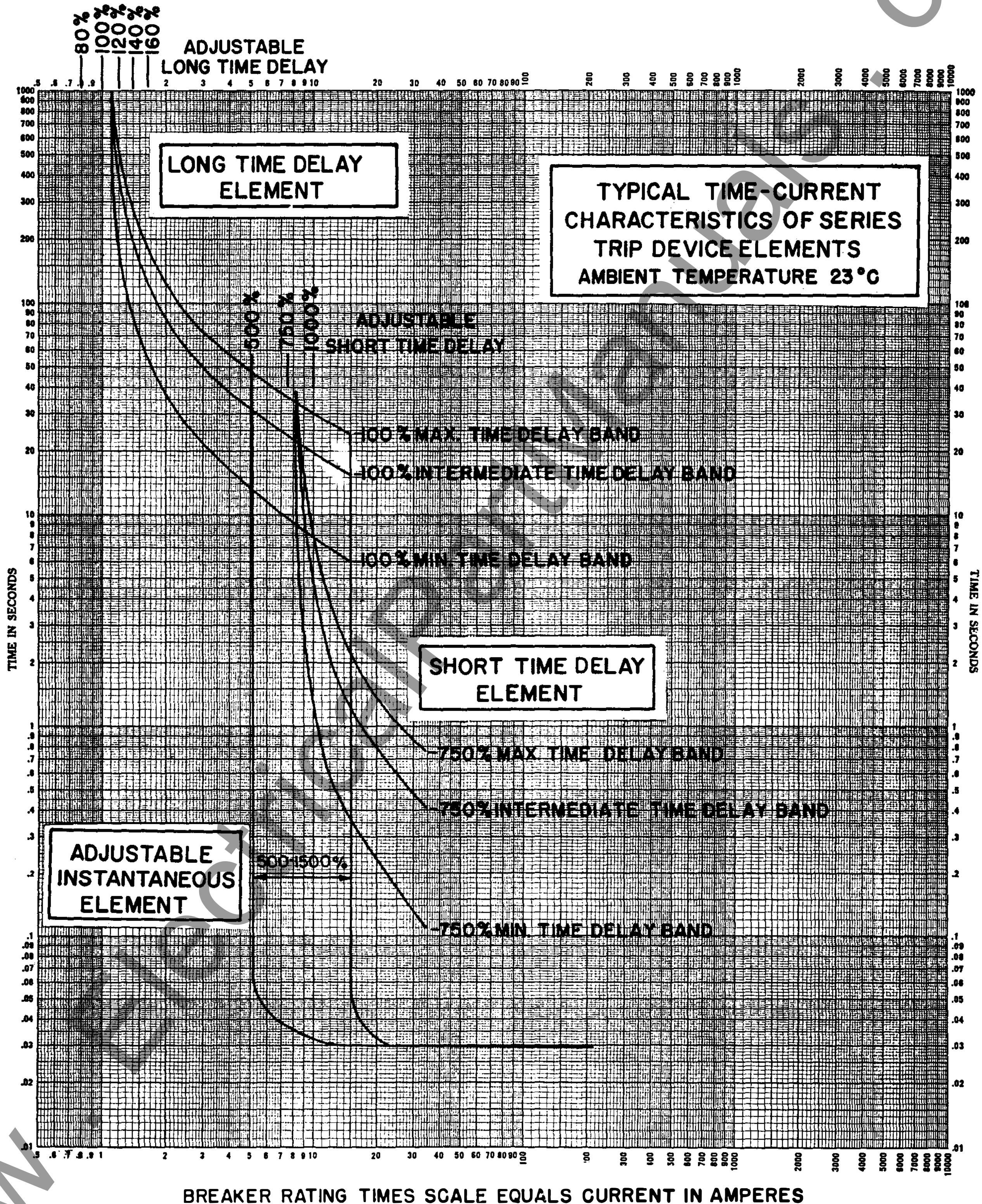
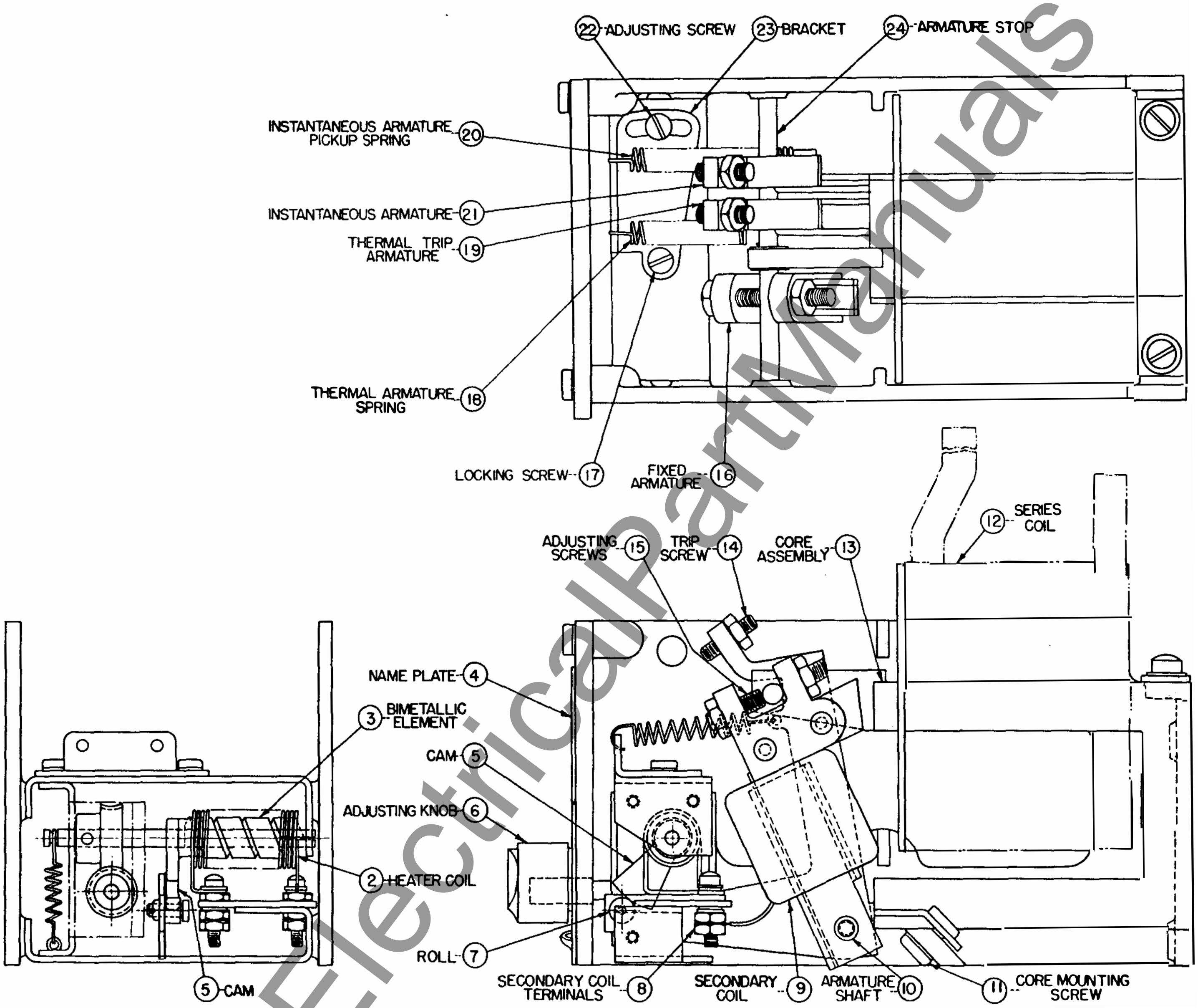


FIG. 16D

TIME CURRENT CURVES OF SERIES TRIP ELEMENT

APRIL 7, 1960 71-340-214



THERMAL MAGNETIC OVERCURRENT
TRIP DEVICE
FIG. 13

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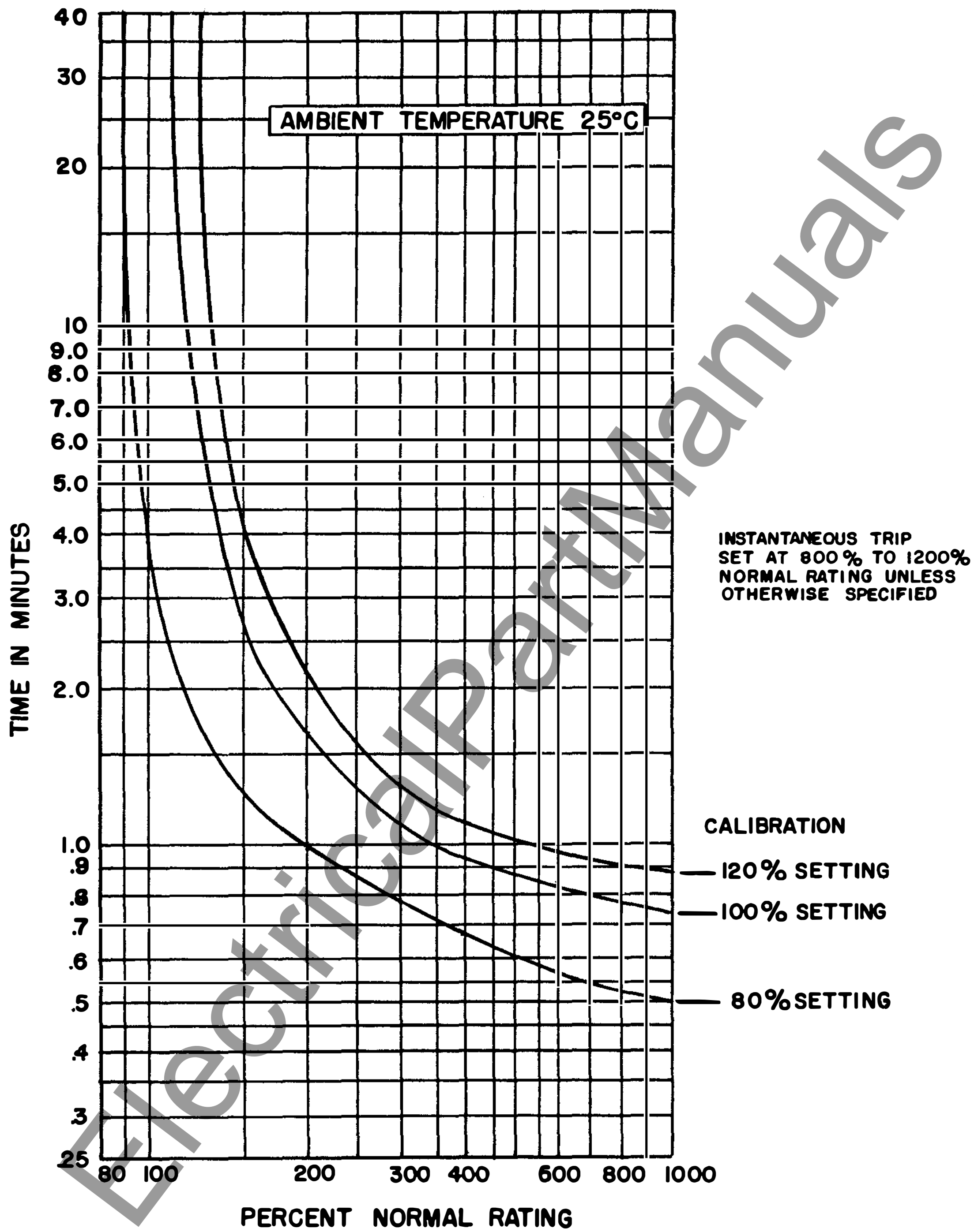

FIG. 17A

TYPICAL TIME CURRENT CURVE
THERMAL TRIP DEVICE

NOV. 4, 1955 71-240-179

INSTRUCTIONS

for

the Installation, Care and Operation of Circuit Breakers and Accessories

TYPE LA-15A and LA-25A
MANUAL STORED-ENERGY
AIR CIRCUIT BREAKER

BOOK BWX-6559

These instructions are not intended to cover all details or variations that may be encountered in connection with the installation, operation, and maintenance of this equipment.
Should additional information be desired contact the Allis-Chalmers Mfg. Company.

ALLIS-CHALMERS MFG. CO.

BOSTON WORKS • BOSTON • MASS.

ALLIS-CHALMERS MANUFACTURING COMPANY

INDEX TO INSTRUCTION BOOK
COVERING
TYPE LA-25A MANUAL STORED-ENERGY BREAKER

LIST OF ILLUSTRATIONS

Instructions
For the Installation and Operation
of
Allis-Chalmers Type "LA"
Low Voltage Air Circuit Breakers
and Auxiliary Equipment

Part I
GENERAL INFORMATION

A. INTRODUCTION. The type "LA" air circuit breakers may be used in metal enclosed switchgear, on open type switchboards, or separately mounted in individual housings. All "LA" breakers are completely assembled, tested and calibrated at the factory in a vertical position and must be so installed to operate properly. Customer's primary connections should be adequately braced against the effects of short-circuit currents to prevent overstressing the breaker terminals.

B. WARRANTY. Allis-Chalmers' "LA" air circuit breakers are warranted to be free of defects in material and workmanship for a period of one year after delivery to the original purchaser. This warranty is limited to the furnishing of any part which to our satisfaction has been proven defective. Allis-Chalmers will not in any case assume responsibility for allied equipment of any kind.

C. RECEIVING AND INSPECTION FOR DAMAGE. Immediately upon receipt of this equipment, carefully remove all packing traces and examine parts, checking them against the packing list and noting any damages incurred in transit. If such is disclosed, a damage claim should be filed at once with the transportation company and Allis-Chalmers notified.

D. STORAGE. When breakers are not to be put into immediate use, they should be wrapped or covered to provide protection from plaster, concrete dust and other foreign matter. Breakers should not be exposed to the action of corrosive gases and moisture. In areas of high humidity or temperature fluctuations, space heaters or the equivalent should be provided. Circuit breakers should be handled carefully at all times.

E. CAUTIONS TO BE OBSERVED IN THE INSTALLATION AND OPERATION OF "LA" CIRCUIT BREAKERS.

1. Do not attempt to operate breaker or insert in cubicle until all packing traces have been removed.

2. Read Instruction Book before making any changes or adjustments on the breaker.

3. Do not interchange parts of trip devices - to do so may change calibrations.

4. On manually operated breakers, always operate closing handle quickly and decisively.

5. Check current ratings and serial numbers against single line diagram to assure that breakers are properly located in switchgear at installation.

6. Check the alignment of the secondary disconnect fingers to insure against misalignment due to possible distortion of fingers during shipment and handling.

7. Once the breaker is energized, it should not be touched, except for operating, since most of the component parts are also energized.

F. INSTALLATION. The "LA" air circuit breaker is completely adjusted, tested, and inspected at the factory before shipment and no additional adjustment should be necessary when installing. However, a careful check should be made to be certain that shipment and storage has not resulted in damage or change of adjustment. Circuit breakers should be installed in a clean, dry, well-ventilated place in which the atmosphere is free from destructive acid or alkali fumes. Mount open-type breakers high enough to prevent injury to personnel either from circuit interruption or from moving parts during automatic opening of the breaker. Allow sufficient space to permit access for cleaning and inspection. Also allow sufficient clearance to insulating barrier above the breaker to prevent damage from arcing. Before installing, make certain that the breaker contacts are in the open position.

After the breaker is installed in position, close it manually to check proper functioning of the mechanism and contacts. (CAUTION: MAKE SURE CIRCUIT IS NOT ENERGIZED.) During the closing operation, observe that the contacts move freely without interference or rubbing between movable arcing contacts and parts of the arc chutes. Refer to Part II of the Instruction Book for a detailed description of the circuit breaker operating characteristics.

Trip units and accessory devices should receive a thorough check prior to placing the breaker in service to be certain that adjustments are proper and parts are not damaged.

Cubicle mounted breakers of the drawout type are equipped with a drawout interlock to prevent movement of a closed breaker into or out of the "CONNECT" position. See Part II of the Instruction Book for a description of the interlock. Its operation should be checked before the breaker is energized.

Upon completion of the installation inspection, the breaker is ready to be energized after the control wiring, if any, is checked and the insulation tested.

G. MAINTENANCE. Occasional checking and cleaning of the breaker will promote long and trouble-free service. A periodic inspection and servicing should be included in the breaker maintenance routine.

Needle bearings are packed with a special lubricant and should require no further attention. Bearing pins and other sliding or rotating areas should be wiped with a light film of "Aero Lubriplate" (Manufactured by Fiske Brothers Refining Co.). Greasing should be done with care because excess grease tends to collect dirt which in time might make operation sluggish and affect the dielectric strength of insulating members.

If the circuit breaker is not operated during extended periods, the breaker should not remain in either the closed or open position any longer than six months. Maintenance opening and closing operations should be made to insure freedom of movement of all parts.

I-6560-Pt.2

PART II-A

OPERATING MECHANISM

A. DESCRIPTION AND FUNCTION. The operating mechanism is the medium used to transmit power from the stored-energy closing springs to the contact structure to close the breaker. It is a "trip-free" mechanism; that is the breaker contacts are free to open at any time, if required, regardless of the position of the mechanism or the force being applied.

When the circuit breaker contacts are open, the operating mechanism is in the "trip-free" position. Clockwise rotation of the closing handle engages pin (2-12) with cam (2-13) and rotates the cam against the roller attached to main closing cam (2-8). This cam is moved downward by continued rotation of the closing handle thus compressing the charging springs through yoke (2-6). As main closing cam (2-8) is driven downward, the lower end of main toggle link (2-50) is free to move to the left. This permits the latches to reset. The springs reach the fully-charged position at the high point of the cam surface on cam (2-13). When the roller rides over the high point of the cam surface, the energy in the springs is released. Main closing cam (2-8) is raised against cam follower (2-51) and moves the top of main toggle link (2-50) to the right, thus closing the breaker contacts. Prop latch (2-49) engages latch pin (2-5) in main closing cam (2-8) holding the linkage in the latch position.

Opening of the breaker is accomplished by the release of trip latch (2-44) by action of various trip devices or the manual trip button. Trip levers (2-46) and (2-48), which are biased latches, are thus released and permitted to rotate clockwise. The lower end of main toggle link (2-50) is now free to move to the right, permitting the force of the stationary main contact springs and springs (2-9) to move the top of this link to the left, thus opening the breaker contacts.

B. MAINTENANCE CLOSING. The following method should be used for maintenance closing the breaker during service inspections. The breaker should be out of service, and care must be taken to keep hands clear of the contact structure and other moving parts.

1. Remove closing handle and breaker front cover.

2. Move top of pawl (2-16) to the left thus disengaging it from ratchet (2-11).

3. Replace closing handle and rotate it slowly in the clockwise direction observing trip latch (2-44), secondary trip lever (2-46), and primary trip lever (2-48) at the same time.

4. Continue to rotate the handle clockwise, while holding it firmly, until the latches reset.

5. At this point, reverse the direction of handle rotation to counterclockwise. The handle will now be resisting the force of the stored-energy closing springs and must be held firmly and moved slowly.

   CAUTION: This is a critical point in the direction of handle rotation. Rotation in a clockwise direction beyond the point where the latches just reset will cause the breaker to close quickly as in a normal closing operation.

6. As the handle is rotated counterclockwise, the contacts will move toward the closed position and at the same time the energy in the stored-energy springs will be gradually released. (If the contacts do not move during this step, it is an indication that the latches have not reset. See step #4).

7. When the contacts are fully closed, prop latch (2-49) will latch on pin (2-5). (If the prop latch does not engage readily, a screwdriver can be used to raise yoke (2-6) slightly to assist in latching.)

8. It will be necessary to actuate the red trip button to open the breaker contacts.

9. Before the cover can be replaced, pawl (2-16) must be moved to the right.

C. MAINTENANCE AND ADJUSTMENT. A semi-annual inspection and servicing is usually sufficient; however, in cases where unfavorable atmospheric conditions exist, more frequent inspections are recommended. In any case, the total number of breaker operations between servicing should not exceed 1750.

The following items are listed for convenience in maintaining the operating mechanism in good condition:

1. Trip Latch Adjustment. Trip latch (2-44) should have a tripping force of 2 to 6 ounces, as measured at right angles to a 3/4" radius (pulling in line with the centerline of screw (2-40). Force may be changed by positioning slotted end of spring (2-39) clockwise to decrease tripping force and counterclockwise to increase the tripping force.

   Trip latch (2-44) engagement on secondary trip lever (2-46) roll should be 3/16" ± 1/64. Measurement is from the leading edge of trip latch face to the mean line of contact on the trip lever roll. Adjustment is obtained by the positioning of a fixed stop in the mechanism frame.

2. Trip Latch Roll Adjustment. Trip latch roll on screw (2-40) should have 1/32" clearance (adjusted to the nearest turn) to trip block (2-45) with the trip block against its stop. Adjustment is obtained by positioning screw (2-40).

3. Operating Mechanism Removal. The operator may be removed from the breaker by disconnecting opening springs (2-9) and contact operating arms (2-52), and removing screws (2-24), carefully noting number of shims (2-25) under each screw. Shims (2-25) are used to adjust main contacts (see Part III) and must not be changed for any other reason. When reassembling, the mechanism should be in the trip-free position. After reassembly, check trip latch adjustments and main contact adjustments. Check mechanism for ease of operation and freedom from binds.

4. Yoke Adjustment. With the breaker closed and latched, the nut on the threaded rod of yoke (2-6) should be flush with the bottom plate.

5. Interlock Adjustment. Cubicle mounted breakers of the drawout type are equipped with a drawout interlock. If a closed breaker is racked in toward "connect position," it should trip shortly after it passes the "test position" indicator. It will then be impossible to close the breaker until it reaches the "connect position." As a closed breaker is racked out, it should trip after approximately 5/16" travel, and it will be impossible to close the breaker again until the "test position" is reached.

   If the interlock does not function as described, adjustment may be made by positioning the acorn nut of the interlock plunger.

11-A Pg.2

PART III-A

CONTACT STRUCTURE

A. DESCRIPTION AND FUNCTION. The contact structure consists of main current carrying contacts and arcing contacts arranged so that contact make and break is by means of the arcing contacts. The main contacts are not subjected to arcing. Arcing contact surfaces are clad with an arcing alloy which greatly reduces mechanical wear and arc erosion. A positive wiping action of the arcing contacts prevents welding and sticking when interrupting high currents.

Both the stationary and the movable arcing contacts have arc runners which lead the arc away from the contact surfaces. This prolongs contact life as well as aiding arc interruption.

The main current carrying contacts are silver plated and have a positive wiping action. This insures high conductivity and maintains the current carrying areas clean, smooth and free from pitting or hammering. When the main contacts make, the first point of contact is at the lower end of contact finger (2A-10). Further motion causes this contact finger to rotate in its socket, causing the contact point to move up toward the "knee" of the contact, and separating the initial contact point.

When the breaker is called upon to interrupt a current, the main contacts (2A-10) and (2A-2) separate, transferring the current to the arcing contacts (2A-1) and (2A-3) without arcing. When the arcing contacts part, an arc is drawn between the contact surfaces. Due to the inherent magnetic and thermal effects of the arc, it will rapidly move upwards along the arc runners and into the arc chutes (2-30) (2-29) where it is extinguished.

B. MAINTENANCE, ADJUSTMENT AND REPLACEMENT. A semi-annual inspection and servicing is usually sufficient; however, in cases where unfavorable atmospheric conditions exist, more frequent inspections are recommended. In any case, the total number of breaker operations between servicing should not exceed 1750.

The following Items are listed for convenience in maintaining the contact structure in good condition:

1. General. Check main contacts for cleanliness. (They should not be dressed.) Check arcing contacts for wear and arc erosion. Contacts should be replaced if arcing alloy shows indications of wearing through before next inspection. With arcing contacts (2A-1) and (2A-3) just touching, if a 5/16" diameter rod cannot be passed between stationary contact fingers (2A-10) and movable main contact (2A-2), arcing contacts should be replaced.

2. Contact Adjustment. Arcing contacts (2A-1) and 2A-3) do not require adjustment. Main contacts (2A-10) and (2A-2) are factory adjusted and should not require field adjustment unless parts have been disassembled. Adjustment is obtained by use of shims (2-25) between the operator frame (2-20) and the breaker frame (2-31). Main contacts are in proper adjustment when there is a clearance of 1/32" to 3/32" between the bottom of the stationary main contact (2A-10) and the face of the movable main contact (2A-2) with the breaker closed. All contact fingers (2A-10) should be in contact at the "knee" of the contact and open at the bottom. Be certain that there is after-travel in springs (2A-9) with the breaker closed.

3. Arcing Contact Hinge Tension. Spring washers (2A-25) should be compressed to give a pull of 2.6 lbs., to 3.2 lbs., with arcing contact just out of contact and arcing contact spring (2A-21) removed. Measurement can be made by attaching a spring scale just below the contact surface and the pull applied approximately perpendicular to the contact surface. Adjustment is made by positioning nut (2A-26) on screw (2A-23).

4. Movable Arcing Contact Replacement. The movable arcing contacts (2A-1) may be replaced, after removing arc chutes (2-29)(2-30), by removing hardware and spring washers (2A-25) at the hinge joint of the arcing contact. In reassembling, make certain that the hinge tension is correct as outlined above.

5. Stationary Arcing Contact Replacement. The stationary arcing contact (2A-3) may be replaced, after removing arc chutes, merely by removal of nut (2A-5). Replacement is obvious and no adjustment is required.

6. Movable Main Contact Replacement. The outer phase main contacts (2A-2) may be replaced, after removal of arc chutes, as follows: Loosen screws (2-32) which hold bearing plate (2-47) on both ends of shaft (2A-19). Remove screws (2A-17) which hold cap (2A-18) on shaft. Remove cap from shaft and rotate movable main contact away from hinge contact fingers (2A-14). Since the hinge joint contact fingers and the main contact are under spring pressure, care must be used not to score or damage the contact surface. Any single phase may be removed without removing the other phases. However, to remove the center phase, the operating mechanism must be removed. In replacing the movable contacts, be certain that the face of the movable main contact is lined up with the stationary main contact block before tightening the caps.

7. Stationary Main Contact Replacement. To remove the lower hinge contact block (2A-13), first remove movable contact assembly (2A-2), as outlined above, then screws (2A-7). To remove upper main contact block (2A-6), first remove movable main contact (2A-2), then screws (2A-7) permitting the contact block (2A-6) and stationary arcing contact (2A-3) to be removed as a group. Once the above members are removed, it is a simple matter to replace contact fingers (2A-14) and (2A-10). Remove fingers under a cloth or other shield to prevent springs from flying free. A screwdriver may be used to work springs and fingers to the ends of the block for removal. Care should be taken not to damage contact fingers. Note that lower spring (2A-12) consists of a double (inner and outer) spring, while spring (2A-9) is a single spring. During reassembly of upper and lower contact blocks, there are no special adjustments to observe; however, alignment between the three phases is important.

PART IV

SERIES OVERCURRENT PROTECTIVE DEVICES

A. DESCRIPTION AND FUNCTION. Series overcurrent trip devices function to trip the breaker whenever the current exceeds a predetermined value. The device includes a series coil, magnetic circuit, and a sealed oil time-delay device arranged per Figure 12.

The available trip elements are as follows:

Long-Time Delay Element: -for use with the instantaneous trip and/or the short-time delay element. The pick-up setting is adjustable in the field to 80, 100, 120, 140 or 160% of the continuous current rating of the trip coil. Settings in excess of 100% do not permit the continuous current rating to exceed 100% of the series coil rating.

Short-Time Delay Element: -for use with the long-time delay element on selective trip systems. The pick-up setting is adjustable in the field to 500, 750, or 1000% of the continuous current rating of the trip coil. On special applications, it is possible to add the instantaneous element to this combination.

Instantaneous Trip Element: -for use as noted above or as a single element. The pick-up is adjustable in the field between 500 and 1500% of the continuous current rating of the coil.

The devices are factory adjusted and should not be disturbed in the field without proper equipment and knowledge of the device. The time-delay devices are not interchangeable and are marked for identification as follows: The long-time delay device cover is red, while the short-time delay device cover is green. The time-delay band adjustments are made by locating plunger (12-1) in the proper hole on the trip element extensions. To decrease time band move plunger location closer to shaft (12-4) and to increase move away from shaft. The maximum, intermediate, and minimum time bands are marked by white bands on the trip element. All of the band locations are progressive, and intermediate settings may be made for finer selectivity.

The pick-up calibration is selected by rotating knob (12-2) which moves the calibration label (12-3) to the required setting.

The operation of the long-time delay element (12-15) is as follows: When the magnetic pull on the armature (12-15) increases due to an overcurrent condition in the series coil (12-7), the armature (12-15) will pick up and rotate about shaft (12-4). This magnetic attraction must overcome the tension in the pickup spring (12-20) and also displace the silicone oil in time-delay device (12-14) from the lower chamber to the upper chamber through the controlled metering element (12-12). As the armature closes the gap to the core (12-8), it engages trip block (2-44) and trips the breaker. When the breaker has tripped, the armature will reset due to tension in the pickup spring. The short-time delay element functions in the same manner, with the major difference being the controlled metering element.

B. INSPECTION, MAINTENANCE & REPLACEMENT. The series trip device should be inspected prior to being put in service to see that the pick-up calibration and time-delay band selections are in accordance with the application requirements. The device leaves the factory with the following setting unless otherwise specified in the purchase order:

(a) Long-time delay element set at 100% pick-up, intermediate time band
(b) Short-time delay element set at 750% pick-up, intermediate time band
(c) Instantaneous trip element set at 800% pick-up

The following procedure for removing the series trip device and changing coils on the "LA" circuit breaker up through 600 amperes should be used:

1. From the rear of the breaker, remove screws (2-35) which hold one side of series coil to connector (2-33).

2. Remove screws (2-32) and pull connector (2-33) through rear window of molded base.

3. Remove screws (2-34) holding other leg of series coil to the lower contact block.

4. Remove four mounting bolts (2-36).

4a. To separately remove a single phase unit, bypass Step 4 and instead remove four screws that mount the unit to the base plate.

5. Detach four screws (12-5) and lift core assembly (12-8). Slide coil (12-7) off and replace with new coil.

6. Reassemble by reversing the preceding steps. Care must be taken to insure that the two lower screws holding the core in the assembly next to the armature shaft be securely tightened before the top screws are tightened.

On "LA" circuit breakers 800 thru 4000 amperes, the overcurrent coils are linked to the inductive series coils mounted in the rear of the breaker. The leads must be disconnected to remove the series trip assembly. To remove the series trip device and change coils, disconnect the coil lead in the rear of the breaker and then follow steps 4 thru 6 previously mentioned.

To remove time-delay devices (12-14) or (12-19) remove either side plate from the single phase assembly, detach the plunger (12-1) from the trip element extension and slide the device out of the top of the assembly. The time-delay device is a sealed unit and cannot be repaired in the field. The calibration labels (12-3) and calibration label locking screw (12-25) should not be disturbed at any time. Parts of individual devices, such as pick-up springs and calibration lables, must not be interchanged between devices, or calibrations will be lost.

PART V

THERMAL OVERCURRENT PROTECTIVE DEVICE

A. DESCRIPTION AND FUNCTION. Thermal magnetic trip devices function to trip the breaker whenever the current exceeds a predetermined value. This device includes a series coil, magnetic circuit, bimetallic element, heater coil, and a secondary coil arranged per Figure 13.

These devices are factory adjusted and should not be disturbed in the field without proper equipment and knowledge of the device. The pickup setting is adjustable in the field to 80, 100, or 120% of the continuous current rating. This selection is made by rotating knob (13-6) to the required setting. Settings in excess of 100% do not permit the continuous current rating to exceed 100% of the series coil rating.

Because of the inherent time delay of this device it is equipped with instantaneous trip armature (13-21), to provide high-overload protection, which is factory set between 800 to 1200% of the continuous current rating of the coil. This instantaneous element requires calibration to change the pick-up value. To adjust, loosen screw (13-22) and increase or decrease tension in pickup spring (13-20) by rotating bracket (13-23) about locking screw (13-17).

The thermal magnetic trip armature (13-19) functions to trip the breaker in the following manner: When an overcurrent exists in the series coil (13-12), it causes a similar overcurrent in the secondary coil (13-9). This overcurrent generates heat to bimetallic element (13-3) by means of heater coil (13-2) which surrounds this element. The heat generated causes the free end of the bimetallic element (13-3) to rotate along with cam (13-5). The rotation of this cam releases the thermal trip armature (13-19) which was restrained by roller (13-7) working against this cam. Upon being released, the thermal armature rotates on shaft (13-10) so as to close the air gap through which it is electromagnetically attracted to the core assembly (13-13). As the thermal armature (13-19) closes this gap, it picks up and engages the trip block (2-44) to trip the breaker. The breaker having tripped, the thermal armature is returned to its latched position by return spring (13-18). A short time interval may be required to completely reset cam (13-5) after trip cycle is completed to permit cooling of bimetallic element.

B. INSPECTION, MAINTENANCE AND REPLACEMENT. The thermal trip device should be inspected prior to being put in service to insure that the pickup calibration is in accordance with the application requirements. The device leaves the factory with the following setting unless otherwise specified in the purchase order:

(a) Thermal magnetic trip element set at 100% pickup
(b) Instantaneous trip element set at 1200% pickup

The following procedure for removing the thermal trip device and changing coils on "LA" circuit breakers up through 600 amperes should be used:

1. From the rear of the breaker, remove screws (2-35) which hold one side of series coil to connector (2-33).

2. Remove screws (2-32) and pull connector (2-33) through rear window of molded base.

3. Remove screws (2-34) holding other leg of series coil to the lower contact block.

4. Remove four mounting bolts (2-36).

4a. To separately remove a single phase unit, ty-pass step 4 and instead remove four screws that mount the unit to the base plate.

5. Detach four screws (13-11) and lift core assembly (13-13). Slide coil (13-12) off and replace with new coil.

6. Reassemble by reversing the preceding steps. Care must be taken to insure that the two lower screws holding the core in the assembly next to the armature shaft be securely tightened before the top screws are tightened.

On "LA" circuit breakers, 800 through 4000 amperes, the overcurrent coils are linked to the inductive series coils mounted in the rear of the breaker. The leads must be disconnected to remove the series trip assembly. To remove the thermal trip device and change coils, disconnect the coil lead and follow steps 4 through 6 noted above. Other parts of the device should not be removed or disassembled since to do so will disturb the calibration.

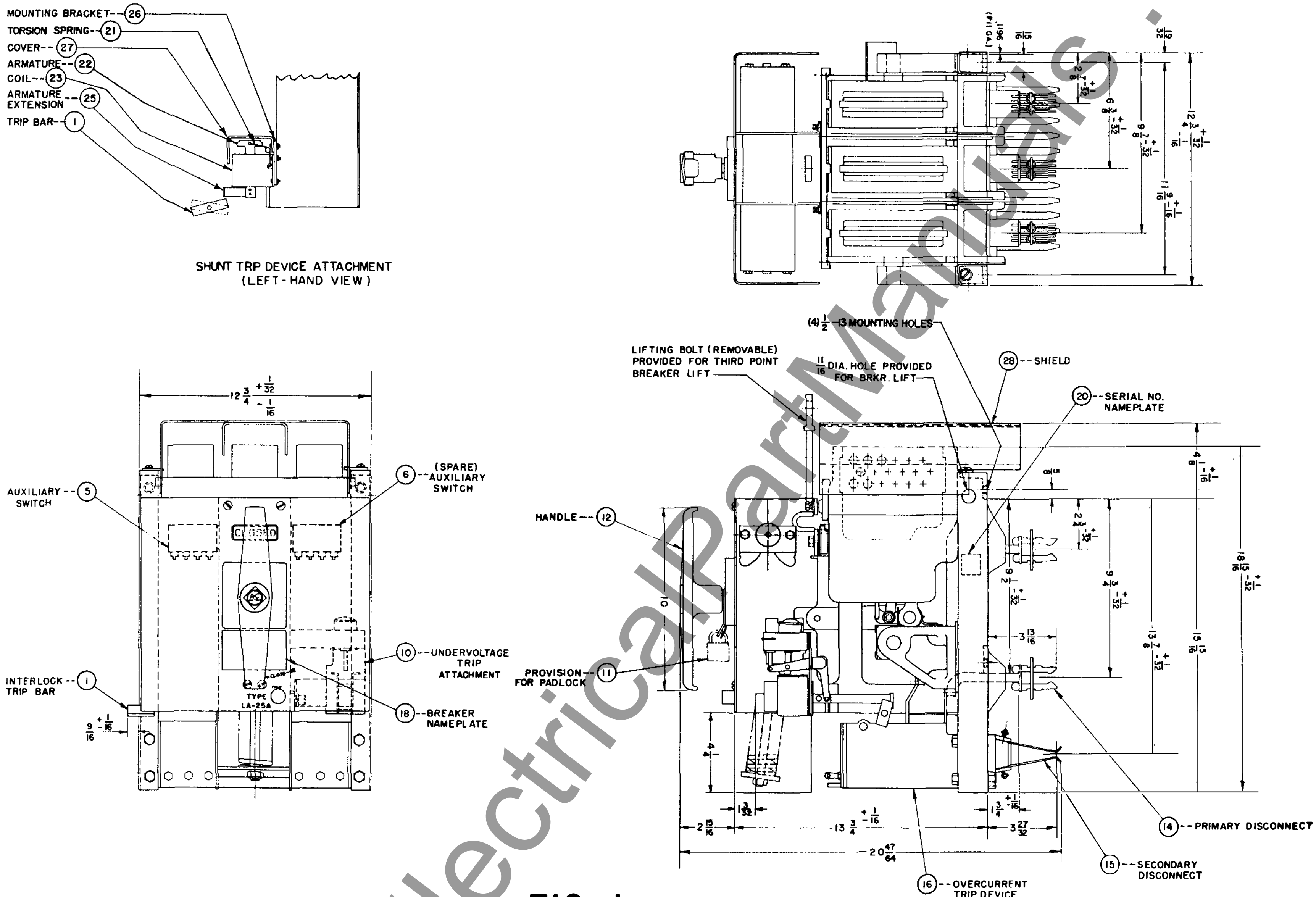

FIG-1

LA-25A MANUAL STORED-ENERGY BREAKER OUTLINE

MAY 9,1960 71-540-110

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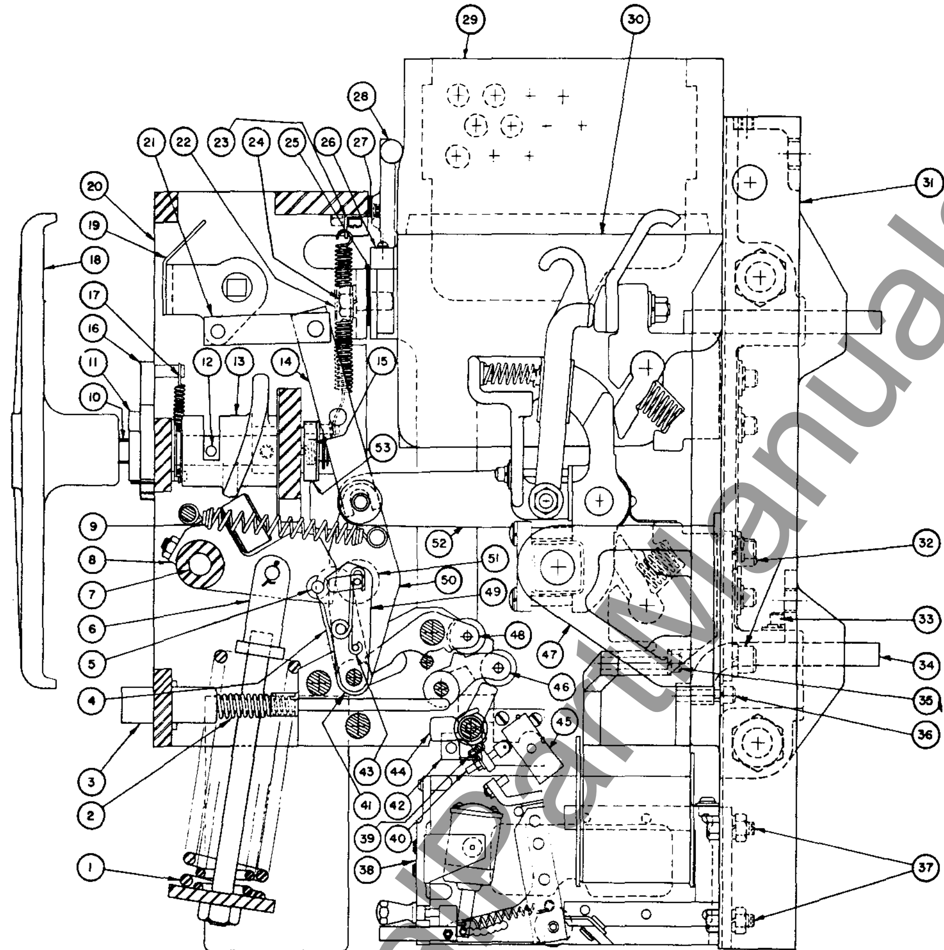


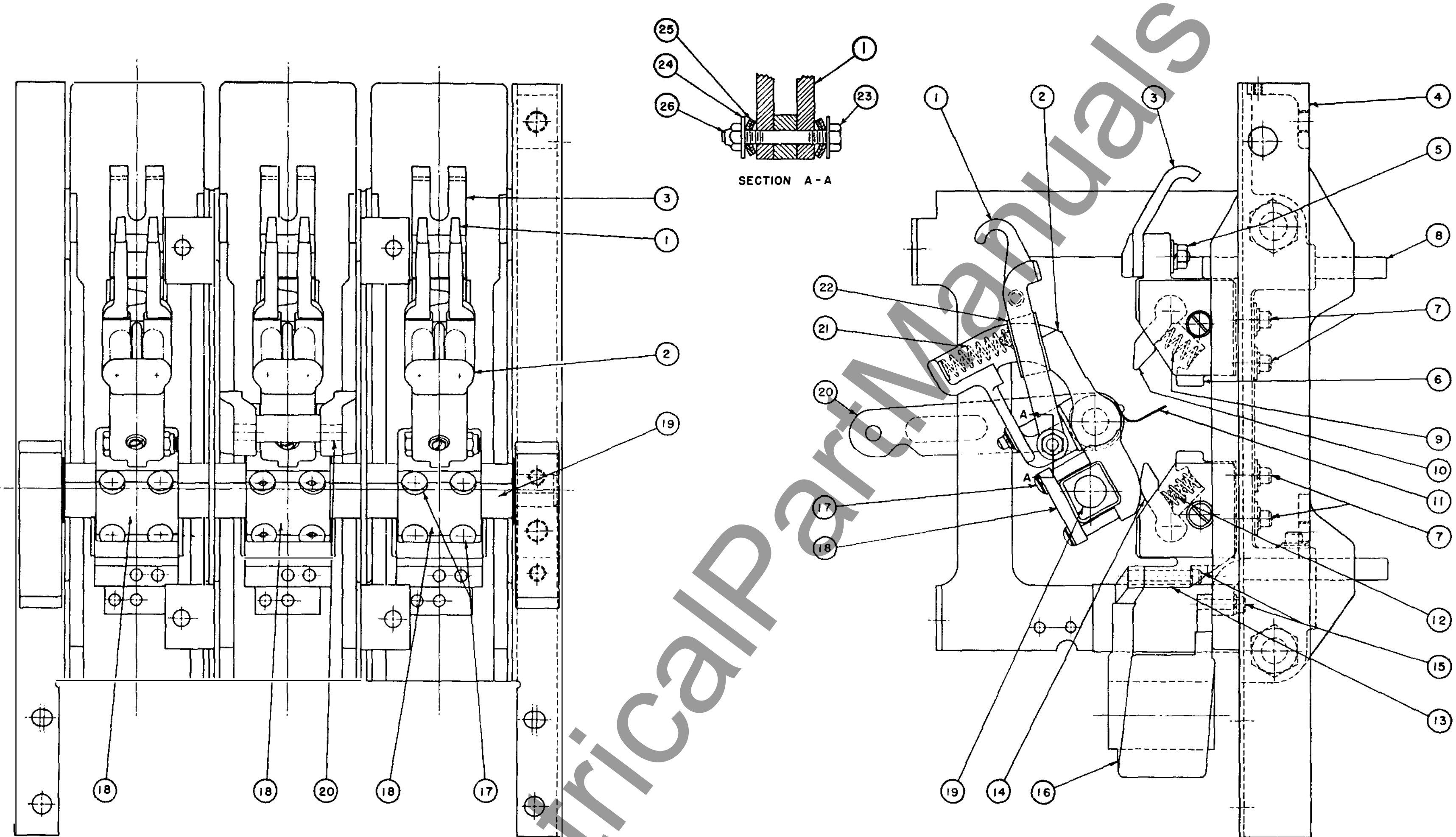
1. CLOSING SPRINGS
2. MANUAL TRIP SPRING
3. MANUAL TRIP BUTTON
4. ROCKING LINK
5. LATCH PIN
6. YOKE
7. SHAFT
8. MAIN CLOSING CAM
9. OPENING SPRINGS
10. SHAFT
11. RATCHET
12. PIN
13. CAM
14. LINK
15. TORSION SPRING
16. PAWL
17. SPRING
18. CLOSING HANDLE
19. OPEN-CLOSE INDICATOR
20. OPERATING MECHANISM FRAME
21. INDICATOR LINK
22. SPRING
23. CLIP
24. SCREW
25. CONTACT ADJUSTING SHIMS
26. ARC CHUTE SUPPORT (LOWER)
27. SCREW
28. ARC CHUTE SUPPORT (UPPER)
29. ARC CHUTES (UPPER)
30. ARC CHUTES (LOWER)
31. PANEL ASSEMBLY
32. SCREWS
33. SCREWS
34. CONNECTORS
35. SCREWS
36. SCREWS
37. SCREWS
38. OVERCURRENT TRIP DEVICE
39. TRIP LATCH ADJUSTING SPRING
40. TRIP LATCH ADJUSTING SCREW
41. NEEDLE BEARING
42. MANUAL TRIP BLOCK
43. PROP LATCH SPRING
44. TRIP LATCH
45. TRIP BLOCK
46. SECONDARY TRIP LEVER
47. BEARING PLATE
48. PRIMARY TRIP LEVER
49. PROP LATCH
50. MAIN TOGGLE LINK
51. CAM FOLLOWER
52. CONTACT OPERATING ARMS
53. BUSHING

FIG. 2

LA-25A MANUAL STORED-ENERGY BREAKER

JUNE 23, 1960

71-540-112



1. MOVABLE ARCING CONTACT
2. MOVABLE MAIN CONTACT
3. STATIONARY ARCING CONTACT & ARC RUNNER
4. BASE ASSEMBLY
5. NUT
6. STATIONARY MAIN CONTACT BLOCK
7. SCREW
8. STUD CONNECTOR
9. MAIN CONTACT SPRING
10. MAIN CONTACT FINGER
11. SHIELD
12. HINGE CONTACT SPRINGS
13. HINGE CONTACT BLOCK
14. HINGE CONTACT FINGER
15. SCREW
16. SERIES COIL
17. SCREW
18. CAP
19. MAIN OPERATING SHAFT
20. CONTACT OPERATING ARM
21. ARCING CONTACT SPRING
22. ARCING CONTACT INSULATOR
23. SCREW
24. RETAINING WASHER
25. SPRING WASHER
26. NUT

FIG. 2A

LA-25A 600 AMPERE BREAKER PANEL ASSEMBLY

SEPTEMBER 16, 1957 71-540-092

ALLIS-CHALMERS MANUFACTURING COMPANY

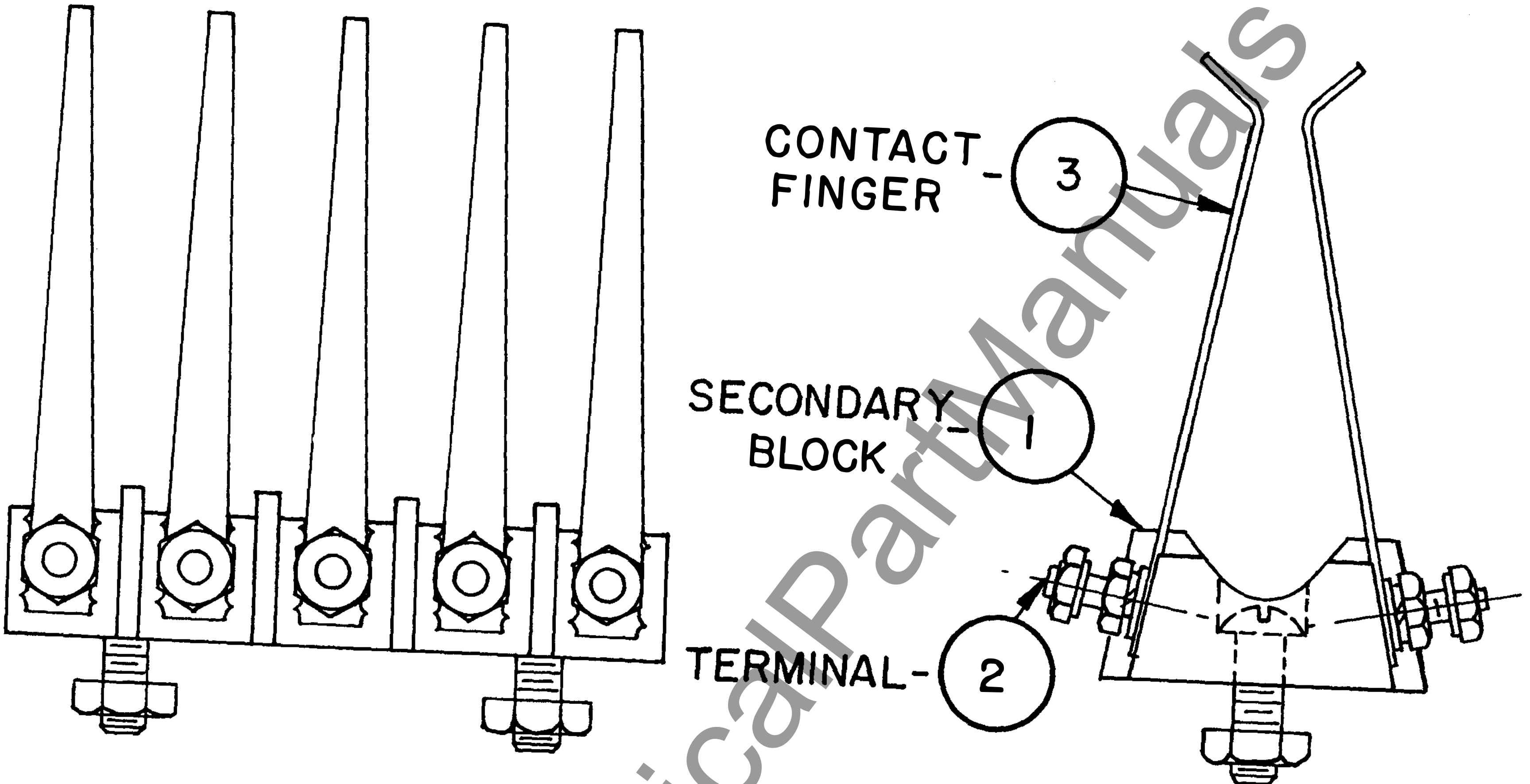


FIG. 8

TYPICAL SECONDARY DISCONNECT ASSEMBLY

JULY 31, 1958

71-240-366

ALLIS-CHALMERS MANUFACTURING COMPANY

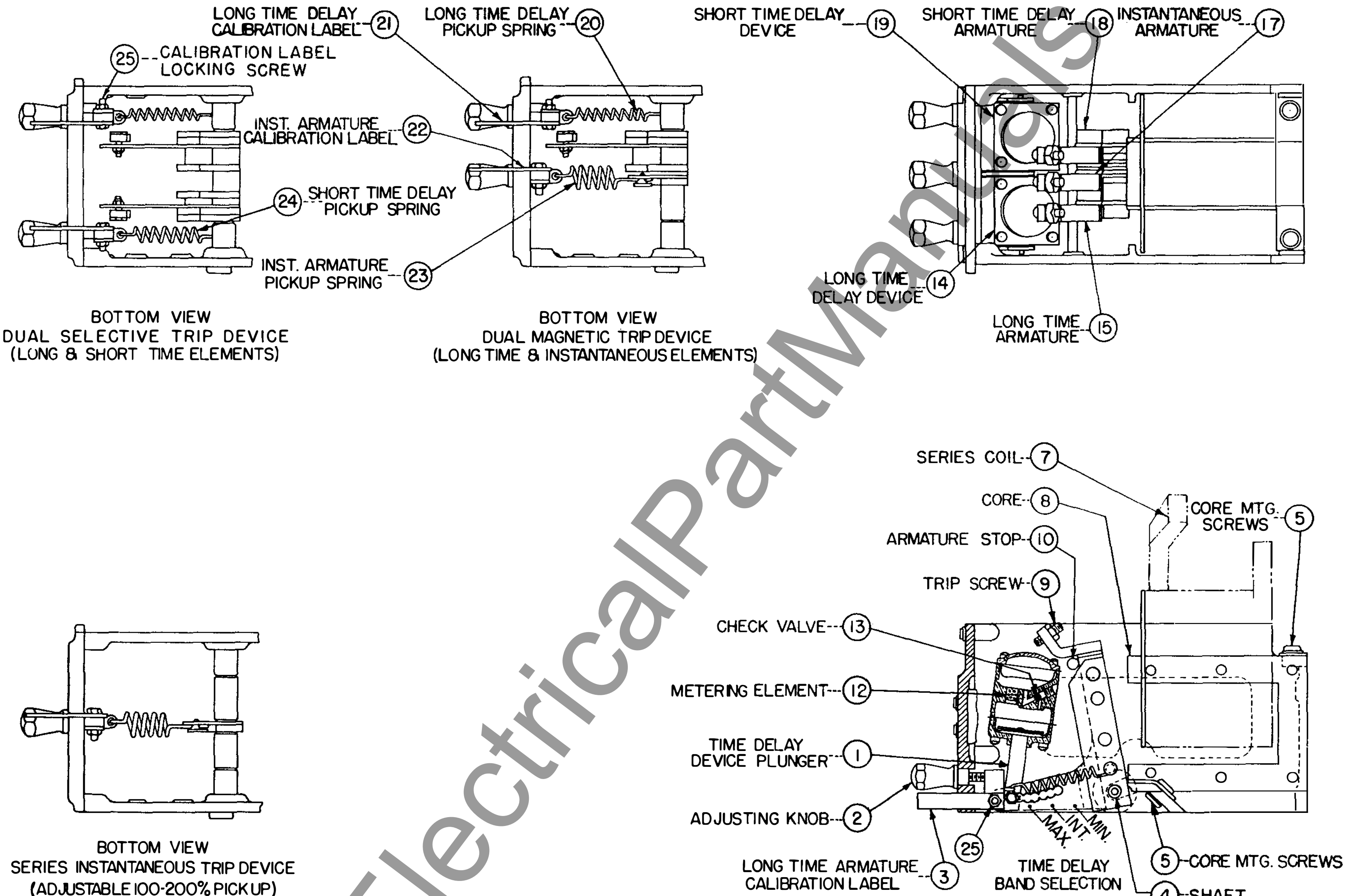


FIG. 12
SERIES OVERCURRENT TRIP DEVICE
"LA" TYPE BREAKERS

JUNE 6, 1957

71-440-077

ALLIS-CHALMERS MANUFACTURING COMPANY

ALLIS-CHALMERS MANUFACTURING COMPANY

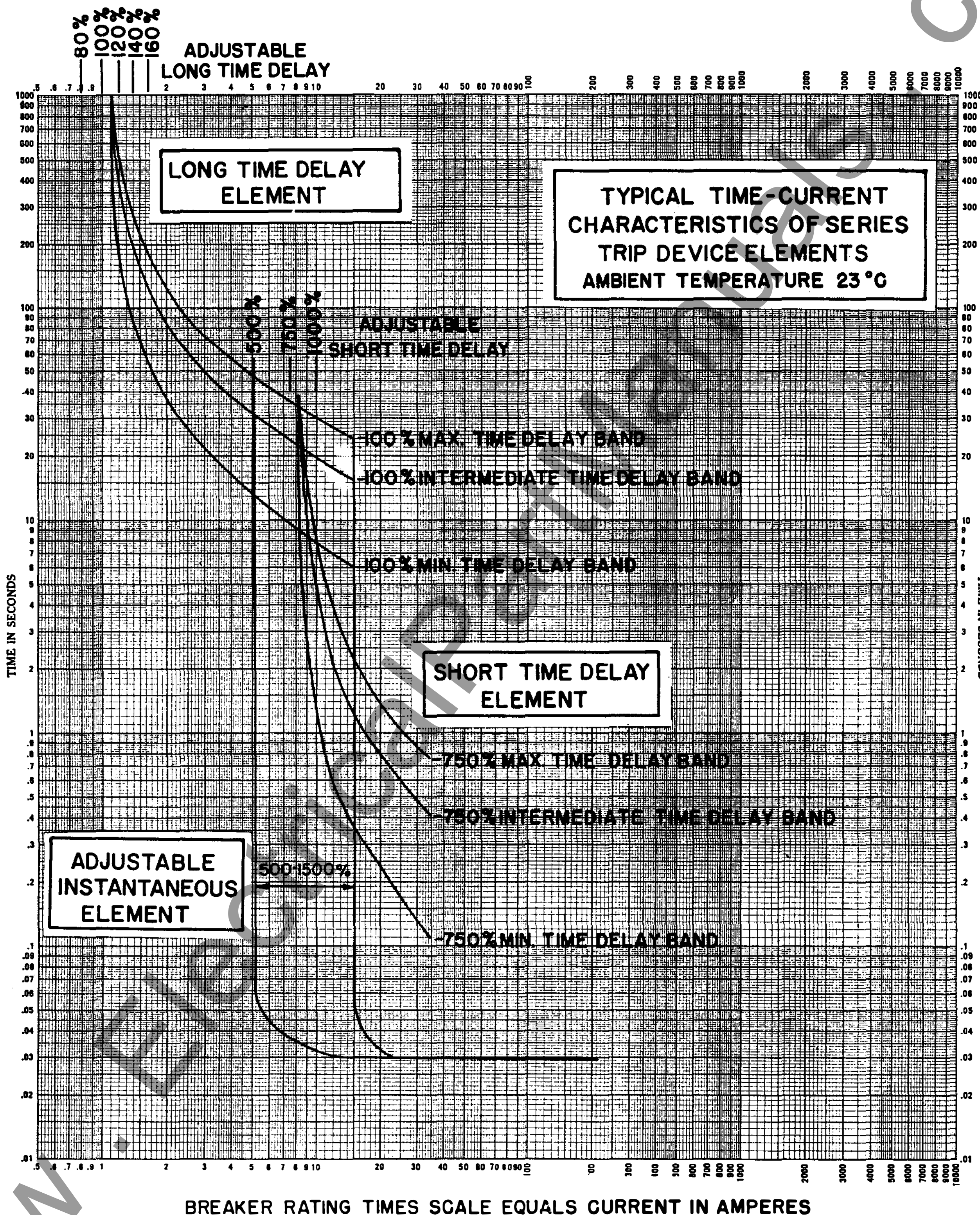
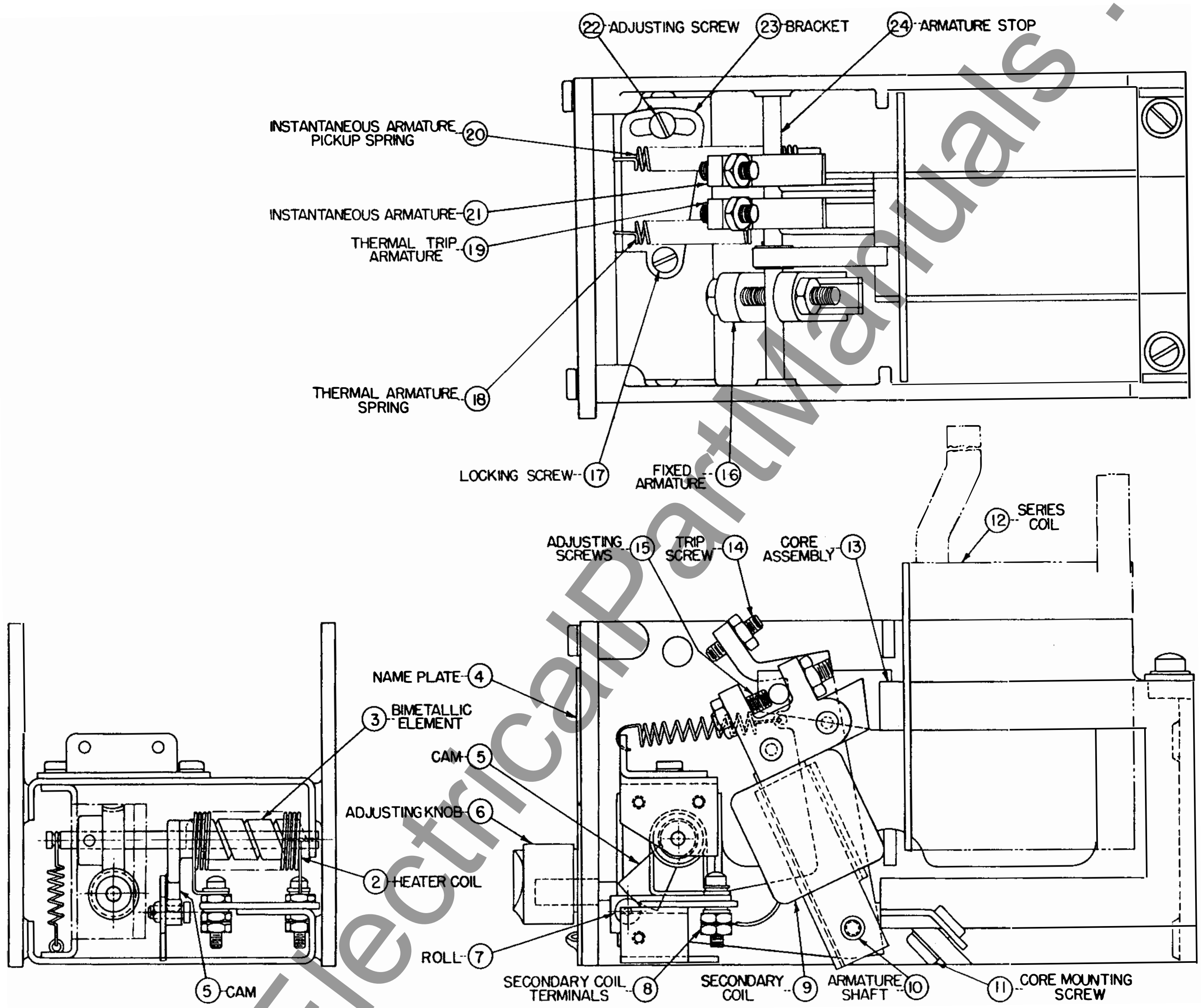


FIG. 16D

TIME CURRENT CURVES OF SERIES TRIP ELEMENT

APRIL 7, 1960 71-340-214



THERMAL MAGNETIC OVERCURRENT
TRIP DEVICE
FIG. 13

JUNE 6, 1957 71-540-083

ALLIS-CHALMERS MANUFACTURING COMPANY

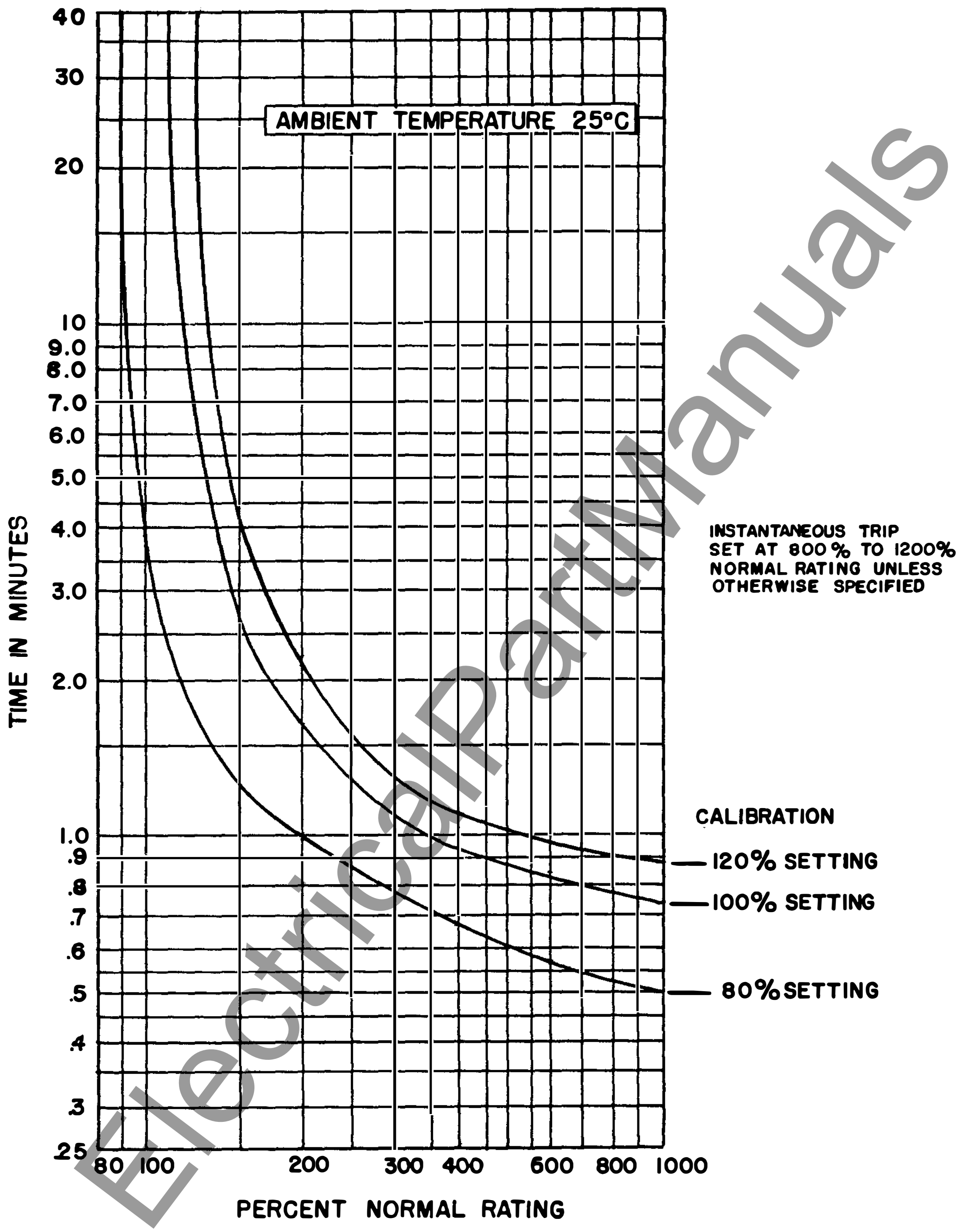


FIG. 17A

TYPICAL TIME CURRENT CURVE
THERMAL TRIP DEVICE

NOV. 4, 1955 71-240-179