



INSTRUCTIONS

GEK-7308

**LOW VOLTAGE
POWER CIRCUIT BREAKERS
INSTALLATION AND OPERATION**

**TYPE
AKE & AKL**

SWITCHGEAR PRODUCTS DEPARTMENT

GENERAL  ELECTRIC

PHILADELPHIA, PA.

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection 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 General Electric Company.

INSTALLATION AND OPERATION
OF TYPE AKE AND AKL
POWER CIRCUIT BREAKERS

GENERAL INFORMATION

Basic AK type circuit breakers suitably modified and mounted on roll-out carriages are available to replace some AE and AL type breakers in Low Voltage draw-out switchgear. These breakers with minor modifications may later be installed in the modern AKD-5 type Low Voltage draw-out switchgear. When converting to AKD-5 draw-out equipment it is suggested that the local G.E. installation and service department be contacted. These instructions provide basic information for the installation of these breakers into the AE - AL type equipment. Additional instructions concerning minor modifications to the equipment to accommodate these breakers is available in kit form and is supplied with each replacement breaker. Information concerning the functional operation of the AK type breaker is included in GEK-7302 which these instructions supplement. Table I shows the breakers available as substitutes for AE and AL type breakers. In general, accessories available on the AL and AE type breakers are also available on the replacing AKE and AKL type breakers.

RECEIVING, HANDLING AND STORAGE

Refer to Instructions GEK-7302

INSTALLATION

The various types of breakers and those they replace are shown in Table I. In addition to the information shown in Table I, a check by the factory should have previously been made to ascertain the suitability of the cubicle to accept the replacement breaker. In view of the fact that there were several modifications of AL & AE equipment, it should not be assumed that the breaker received for one AL - AE equipment can necessarily be interchanged into other AE and AL equipment unless the factory has been contacted and concurs that the interchangeability is feasible. Before the initial installation is attempted, these instructions should be read through as should those instructions included as a kit with the breaker shipment. In some cases, the breaker primary disconnecting devices are designed to match the disconnects in the cubicle for a specific ampere rating and care must be exercised to prevent cross-matching of the breaker with the cubicle of a different ampere rating. For instance, no attempt should be made to install a 1600 ampere AKL-2-50 breaker into a cubicle designed to accommodate a 600 ampere AKL-2-50 breaker.

For successful substitution of the AK type breaker for AE or AL draw-out type breakers, the following conditions must exist.

1. A factory check has been made to assure the correct match between the specific equipment cubicle and the received breaker.
2. The compartment must be completely de-energized with respect to both the power system and the control wiring.
3. The kit type instructions, packed with the breaker, have been read and understood before any work is initiated.

AKE-25

CUBICLE PREPARATION

After the AKE-25 breaker has been ascertained to be the correct breaker for the cubicle, the instructions in kit form accompanying the breaker should be followed to prepare the cubicle for proper acceptance of the breaker. These instructions include the location of the cut-out for the breaker escutcheon in the front door. Where the substitute breaker has been equipped with 4th wire ground sensing, the instructions show the procedure for properly installing the disconnect.

AKE-25

Refer to Figure 1

BREAKER INSTALLATION

1. Raise the breaker to the level of the compartment by means of a suitable lifting device.
2. Carefully insert the breaker inverted T-shape guide rail under center of breaker, into the guide channel in the cubicle.
3. Push the breaker slowly back until the position stop bolt bears against the front of the position stop. Cast off any mechanical lifting device.
4. Push the manual trip button on the breaker escutcheon and check the indicator to be sure the breaker is open.
5. With the right hand raise the trip interlock and with the left hand push the stop trigger bolt to the left.
6. While holding the stop bolt trigger with the left hand, release the trip interlock and push the breaker slowly into the cubicle until the primary disconnect devices meet.

- 6a. When installing the breaker into the cubicle for the first time, visually check the alignment of the secondary disconnect and make minor adjustments where necessary if interference exists between the movable and stationary portion.
7. Release the stop bolt trigger and draw the breaker forward about 2 inches and then push the breaker smartly against the primary disconnects. The correct insertion will be signified by the bolt stop trigger moving to the right and the trip interlock lever dropping to the reset position.
- 7a. When installing the breaker into the cubicle for the first time check the correct engagement of the primary disconnects with a mirror and if the breaker is equipped with the 4th wire ground sensor disconnect, check for the proper engagement of these disconnects.

TO WITHDRAW THE BREAKER FROM THE HOUSING

1. Before opening the door, trip the breaker by pushing the manual trip button and check the indicator to be sure the breaker is in the open position.
2. With the right hand lift the trip interlock and with the left hand move the stop bolt trigger to the left.
3. While holding the bolt withdrawn, pull the breaker sharply forward to disengage the primary disconnects. The safety stop will prevent the breaker from pulling free from the compartment.
4. To place the breaker in position for inspection and test, release the stop bolt trigger when the breaker is disengaged from the primary disconnects and draw the breaker slowly forward until the stop bolt snaps into the test position stop.
5. For complete removal of the breaker, hold the stop bolt trigger until it makes contact with the stop. Then raise the safety catch to allow the breaker to be withdrawn from the compartment.

AKL-50

CUBICLE PREPARATION

After the AKL-50 breaker has been ascertained to be the correct breaker for the cubicle, the instruction kit accompanying the breaker should be followed to prepare the cubicle for proper acceptance of the breaker. These instructions include the following:

1. Replacing the horizontal spacing bar connecting the left and right racking arms.
2. On the 1600 ampere manual cubicle, modify the safety stop on the cubicle to allow insertion of the 1600 ampere breaker. The 1600 manual breaker is provided with an interference in the area of the cubicle safety stop to prevent its successful insertion into a 600 ampere cubicle. On both the 600 ampere and 1600 ampere electrical cubicles the secondary disconnect support must be modified in accordance with the kit instructions so that the proper breaker is rejected from that cubicle. These rejection features have been added to prevent dangerous insertion of one ampere rated breaker into a different ampere rated cubicle.
3. On 600 ampere installations, install the stationary disconnect adapters supplied with the kit.
4. Make prescribed cut out in the front door to accommodate the AKL-50 escutcheon.

5. Add roof liner as noted on installation drawing. (Manual only)
6. When the substitute breaker has been equipped with the 4th wire ground sensing device, the procedure shown for properly installing the disconnect in the cubicle for the 4th wire C.T. must be followed.

AKL-50 BREAKER INSTALLATION

(Manual) See Figure 2

1. Raise the breaker level of the compartment by means of a suitable lifting device. Insert the guide rail into the guide channel and push the breaker into the housing until the position stop bolt snaps into the notch in the position stop. Breaker is now in the test position.
- 1a. When installing a breaker equipped with secondary disconnects into the cubicle for the first time, remove the insulation barrier so that the movable **secondary** disconnects can be observed as they engage the stationary disconnects.
2. Push the manual trip button on the escutcheon and check the indicator to be sure the breaker is open.
3. Withdraw the stop bolt with the stop bolt trigger and push the breaker into the housing as far as possible.
- 3a. When installing the breaker into the cubicle for the first time and with the primary disconnects de-energized, check the successful operation of the trip interlock follower by closing the breaker while in the test position and pushing it toward the connected position. The trip interlock must cause the breaker to trip before the follower reaches the highest portion of the cubicle area.
4. Apply the rack out wrench on the hex operated shaft and turn clockwise. This will draw the rack arms forward and raise them to engage the hooks over the rack-out lugs mounted on the breaker frame.
5. With the wrench still in place, turn the operating shaft counter-clockwise to draw the breaker element into the housing and into engagement with the primary disconnects. The breaker is held in the operating position by the over-center position of the toggle. In the connected position, the trip interlock follower should be free of the housing cam to allow the breaker trip shaft to assume a reset position.

TO WITHDRAW THE BREAKER FROM THE HOUSING

1. Before opening the door, trip the breaker by pushing the manual trip button and check the indicator to be sure the breaker is in the open position.
2. Insert the rack out wrench on the operating shaft and turn clockwise. This raises the trip interlock linkage and holds the trip interlock follower in the trip position, pushes the breaker free of the primary disconnects and raises the rack arms to disengage the rack out lugs on the breaker.
3. While holding the rack arms in the raised position, withdraw the breaker sufficiently far to clear these arms; then reset the rack-out mechanism and remove the wrench.
4. Pull the breaker out until the stop bolt snaps into the notch in the position stop for the test position, or withdraw the stop bolt and raise the safety catch for complete removal of the breaker.

In the test position the trip interlock follower has travelled off the cubicle cam allowing the breaker to be closed for test purposes.

AKL-50 BREAKER INSTALLATION

(Electrical)

1. With the cubicle door open, raise the breaker slightly above the level of the cubicle roll-out pan. Release the stop bolt and withdraw the roll-out pan to the out position and remove the wing nuts from the mounting bolts. Be sure the stop bolt catches in the stop to prevent the pan from falling back into the cubicle.
2. Set the breaker down on the roll-out pan with the rear bottom frame under the keepers. Be sure the breaker frame rests flat on the pan and that the position studs and anchor bolts are properly seated. Replace and tighten the wing nuts on the mounting bolts.
3. Proceed to insert the breaker as outlined for the AKL manual breaker.

The electrical breaker may be removed following the same procedure as outlined for the AKL-50 manual breaker except that for complete removal the wing nuts must be removed and the breaker lifted from the roll-out pan.

AKL-75 and 100
CUBICLE PREPARATION

After the AKL-75 or 100 breaker has been ascertained to be the correct breaker for the cubicle, the instruction kit accompanying the breaker should be followed to prepare the cubicle for proper acceptance of the breaker. The instructions include the following:

1. Make prescribed cut out in the front door to accommodate the AKL-75 or AKL-100.
2. When the substitute breaker has been equipped with the 4th wire ground sensing device the procedure shown for properly installing the disconnect in the cubicle for the 4th wire C.T. must be followed.

AKL-75 and 100
BREAKER INSTALLATION

To install the AKL-75 and 100 breaker in the breaker compartment proceed as follows:

1. Roll the breaker truck into the compartment until the rack-out lugs stop against the pull-out block. See Figure 3.
2. Apply the rack-out wrench to the upper shaft and rotate counter-clockwise. As the jack-nut assemblies advance on the jack-screws, the pull-in forks ride up the rack mechanism cams and raise behind the rack-out lugs, to pull the breaker into the operation position.
3. To locate the breaker in the test position rack the breaker in until the pull-in fork is in the up position and the trip interlock follower has just made contact with the trip interlock cam, but has not ridden up the leading cam surface.
4. When the breaker movable primary disconnects meet the cubicle stationary primary disconnects, transfer the rack-out wrench from the upper shaft to the lower shaft to obtain a greater mechanical advantage.
5. Remove the rack-out wrench when the jack-nut assembly bears against the rear stop angle. The trip shield will drop forward on its pivot and release the trip interlock follower.

AKL-75 and 100

BREAKER REMOVAL

1. The breaker must be in the open position prior to withdrawal.
2. Apply the rack-out wrench to the lower shaft and rotate counter-clockwise. Transfer the rack-out wrench to the upper shaft when the primary disconnect devices disengage.
3. For inspection and test, stop the breaker at the position where the trip interlock follower has just ridden down the leading cam surface and the rack-out lugs are still held between the pull-out block and the pull-in fork.
4. For complete removal, continue as in step 2 until the jack-nut assemblies bear against the front stop bolt and the pull-in forks have released the rack-out lugs. The breaker can now be rolled out of the cubicle.

CONVERSION OF AKE AND AKL TYPE BREAKERS
FOR USE IN AKD-5 EQUIPMENT

In general, the AKE and AKL type breakers are readily convertible for use in AKD-5 type equipment by removing the mounting accessories required for the AL equipment, which are painted gray, and adding those accessories required for the AKD-5 equipment. Where possible, the accessories for mounting the breakers in AKD-5 equipment were included when the breakers were first assembled at the factory. In some cases, the accessories required for mounting the breaker in the AL equipment coincided with the space required for mounting the accessories required for the AKD-5 equipment, and in these cases the accessories for the AKD-5 equipment had to be omitted. On electrically operated breakers and on manually operated breakers with electrical accessories, the basic wiring is terminated at an intermediate terminal board and is extended from the terminal board to the secondary disconnects for the AE or AL wiring required. When converting these breakers for AKD-5 equipment it will be necessary to re-wire from the breaker intermediate terminal board to the newly supplied secondary disconnects for the AKD-5 installation. When converting to AKD-5 equipment, the factory should be consulted for the required parts and specific instructions applicable to the particular breaker involved. Once the breaker is converted for the new AKD-5 equipment, it is generally not recommended that it be alternately modified for AL and AKD-5 equipment. When contacting the factory for the conversion to AKD-5 equipment, furnish complete nameplate information for both the involved basic breaker and the roll-out tray on which it is mounted.

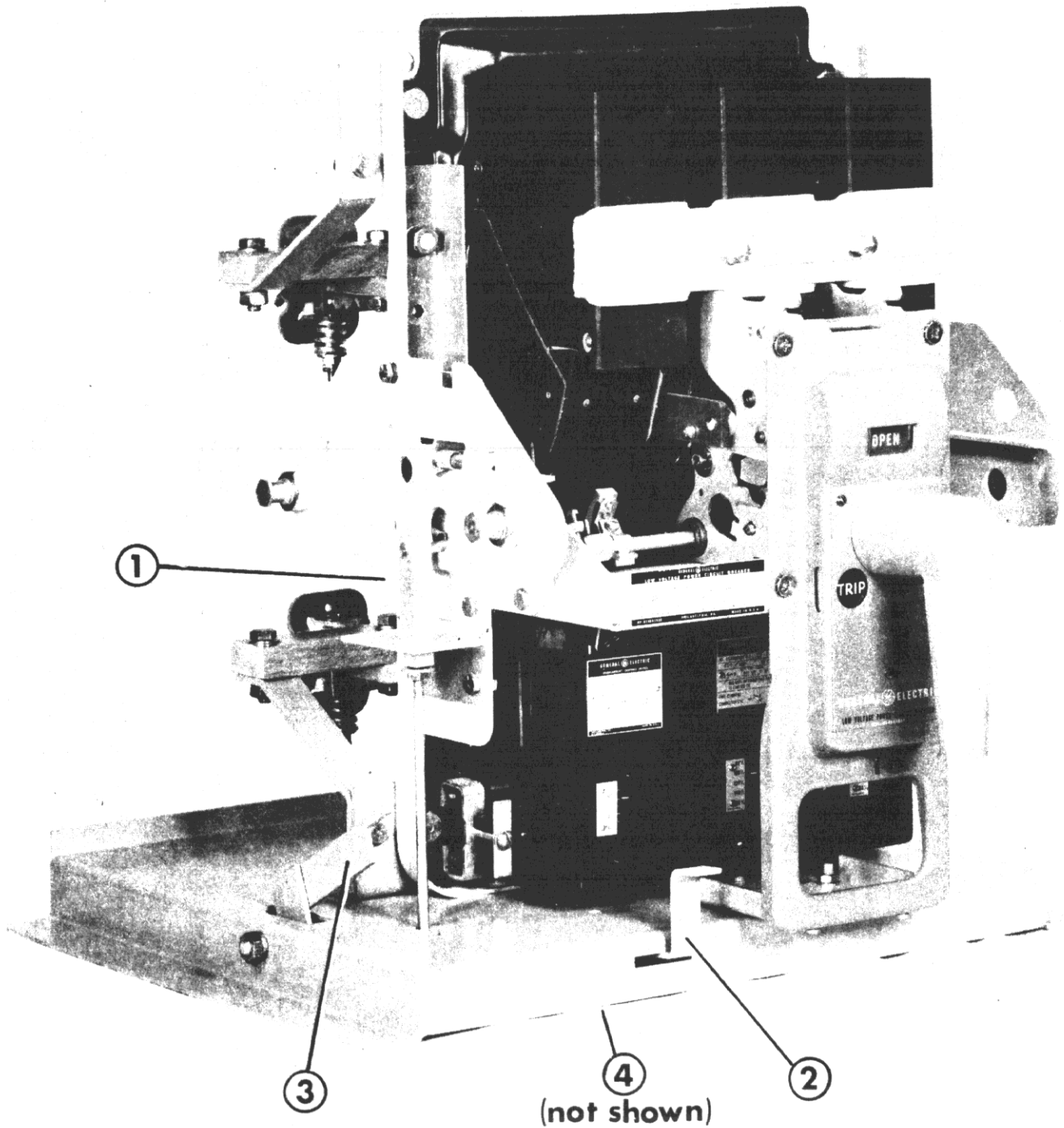


Figure 1 (8040716)

- | | |
|----------------------|----------------------------|
| 1. Trip Interlock | 3. Safety Catch |
| 2. Stop Bolt Trigger | 4. Guide Rail (Under tray) |

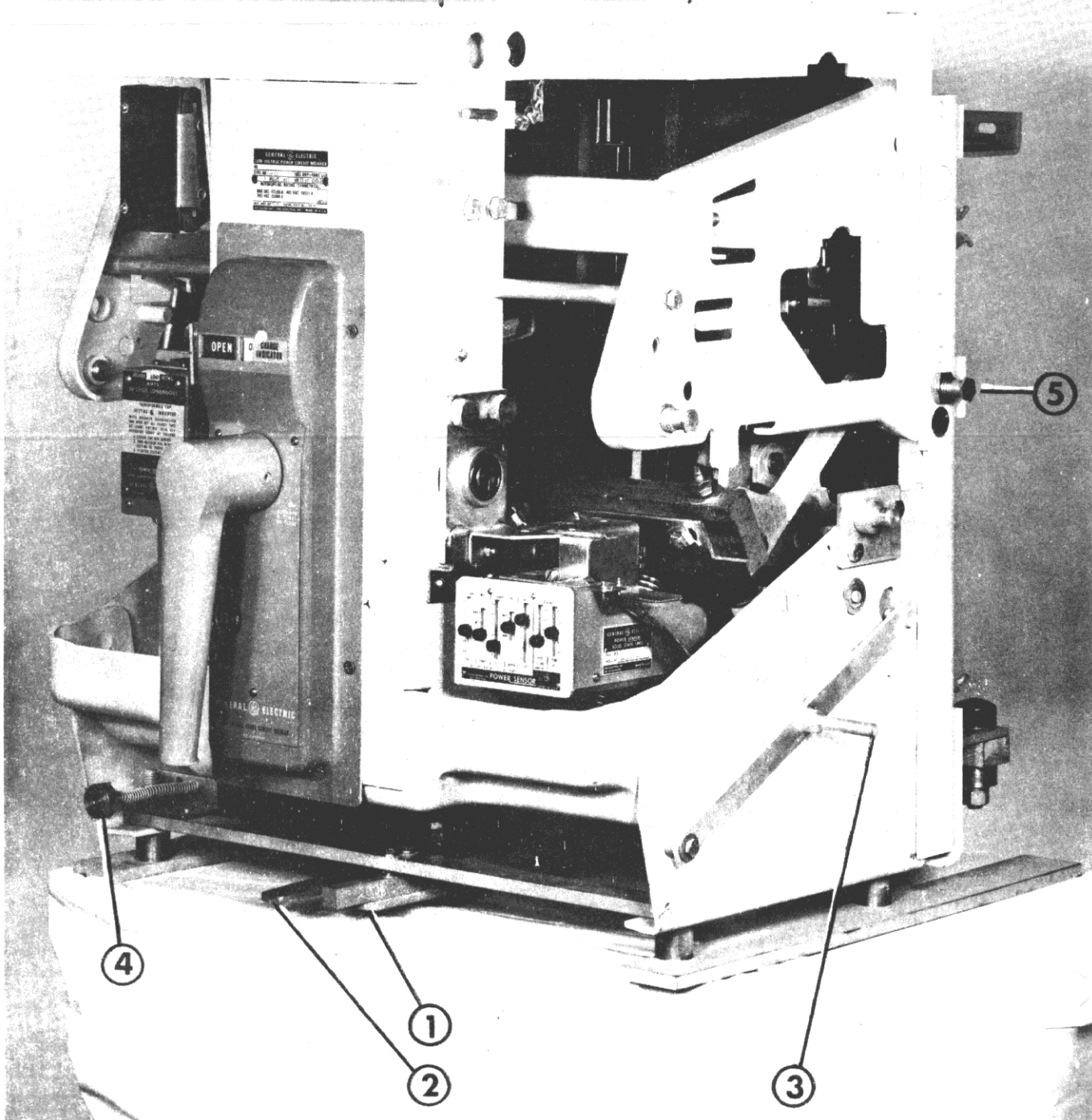


Figure 2 (8040819)

- | | |
|----------------------------|------------------|
| 1. Guide Rod | 4. Safety Catch |
| 2. Stop Bolt Trigger | 5. Rack-out Lugs |
| 3. Trip Interlock Follower | |

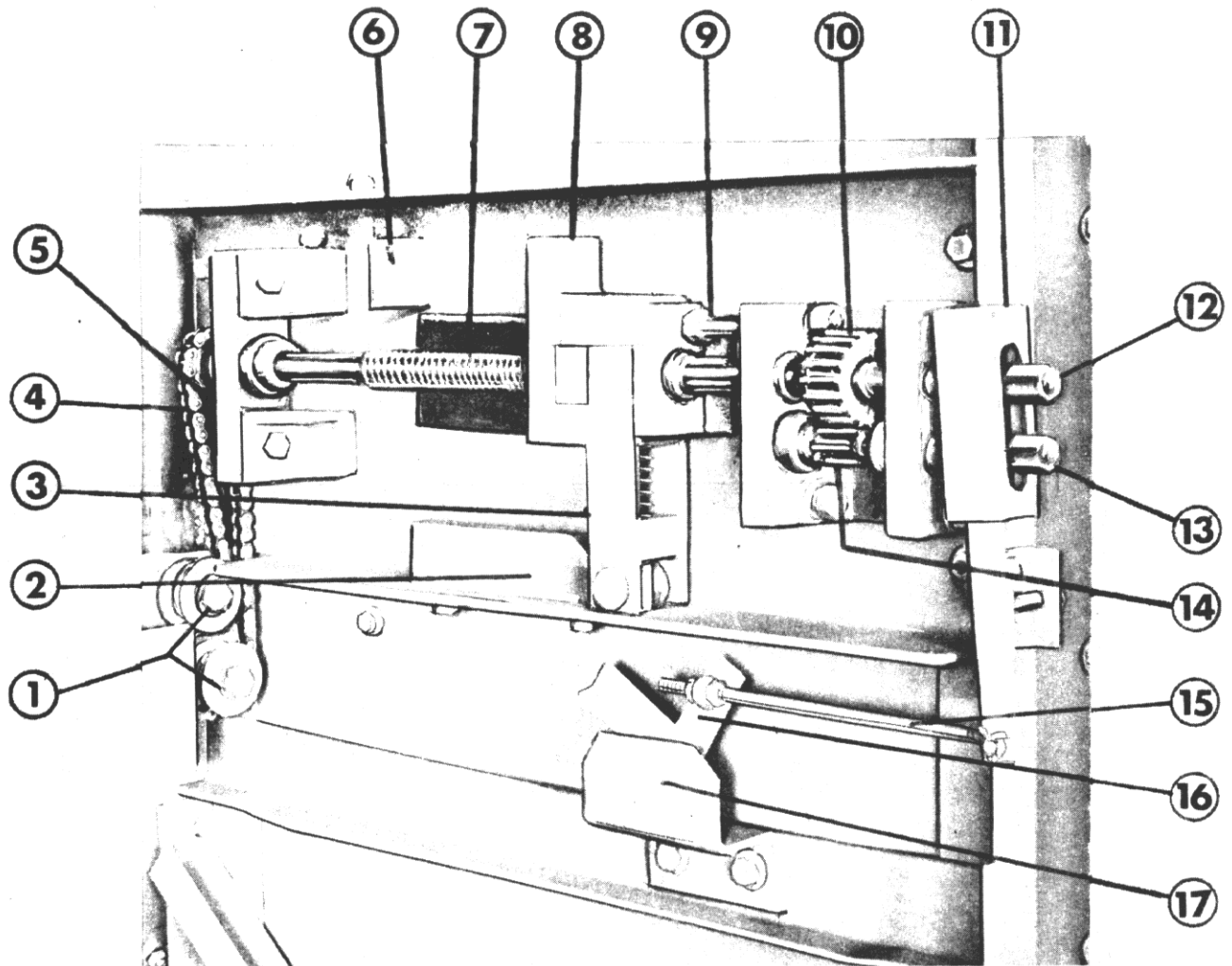


Figure 3 (354848)

Rack Out Mechanism-Operating Side For Type AL-2-75 Units

- | | |
|------------------------|-------------------------|
| 1. Chain Idlers | 9. Front Stop Bolt |
| 2. Rack Mechanism Cam | 10. Spur Gear |
| 3. Pull in Fork | 11. Trip Shield |
| 4. Chain | 12. Upper Shaft |
| 5. Sprocket | 13. Lower Counter Shaft |
| 6. Rear Stop Angle | 14. Pinion Rod |
| 7. Jack Screw Shaft | 15. Trip Interlock Rod |
| 8. Pull out Block | 16. Trip Interlock Link |
| 17. Trip Interlock Cam | |

TABLE I
AKE & AKL BREAKERS

LINE	REPLACEMENT ASSEMBLY	BASIC AK TYPE BKR.	OBSOLETE BREAKER	CUBICLE HEIGHT	CONTINUOUS		INTERRUPTION RATING		OPERATION
					BREAKER	TRIP DEVICE	SYM	ASYM	
1	AKE-25	AK-2A-25 or AK-3A-25	AE-1B or AE-1-25	30"	600	40-600	22,000	25,000	Man.or Elec.
2	AKE-25	AK-3A-25	AE-1-25	30"	600	40-225 200-600	22,000	25,000	Man.or Elec.
3 *	AKL-50	AKL-2A-50	AL-2-50	30"	600	200-600	42,000	50,000	Man.
4 *	AKL-50	AKL-3A-50	AL-2-50	30"	600	200-600 600-1600	42,000	50,000	Man.
5 *	AKL-50	AKL-2A-50	AL-2-50	30"	1600	200-1600	42,000	50,000	Man.
6 *	AKL-50	AKL-3A-50	AL-2-50	30"	1600	200-600 600-1600	42,000	50,000	Man.
7 **	AKL-50	AK-2A-50	AL-2-50	45"	600	200-600	42,000	50,000	Man.or Elec.
8 **	AKL-50	AK-3A-50	AL-2-50	45"	600	200-600 600-1600	42,000	50,000	Man.or Elec.
9 **	AKL-50	AK-2A-50	AL-2-50	45"	1600	200-1600	42,000	50,000	Man.or Elec.
10 **	AKL-50	AK-3A-50	AL-2-50	45"	1600	200-600 600-1600	42,000	50,000	Man.or Elec.
11 ***	AKL-75	AK-2A-75	AL-2-75	45"	2500	2000-3500	65,000	75,000	Elec.or Man.
12 ***	AKL-75	AK-3A-75	AL-2A-75	45"	2500	1500-3000	65,000	75,000	Elec.or Man.
13 ***	AKL-75	AK-2A-75	AL-2-75	45"	3000	2000-3000	65,000	75,000	Elec.or Man.
14 ***	AKL-75	AK-3A-75	AL-2-75	45"	3000	1500-3000	65,000	75,000	Elec.or Man.
15 ***	AKL-100	AK-2A-100	AL-2-100	45"	4000	2000-4000	85,000	100,000	Elec.or Man.
16 ***	AKL-100	AK-3A-100	AL-2-100	45"	4000	1500-4000	85,000	100,000	Elec.or Man.

* Lines 3 & 4 are not physically interchangeable with Lines 5 & 6.

** Lines 7 & 8 are not physically interchangeable with Lines 9 & 10.

*** Lines 11 & 12 are not physically interchangeable with Lines 13 & 14 or with Lines 15 & 16 and Lines 13 & 14 are not physically interchangeable with Lines 15 & 16.

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