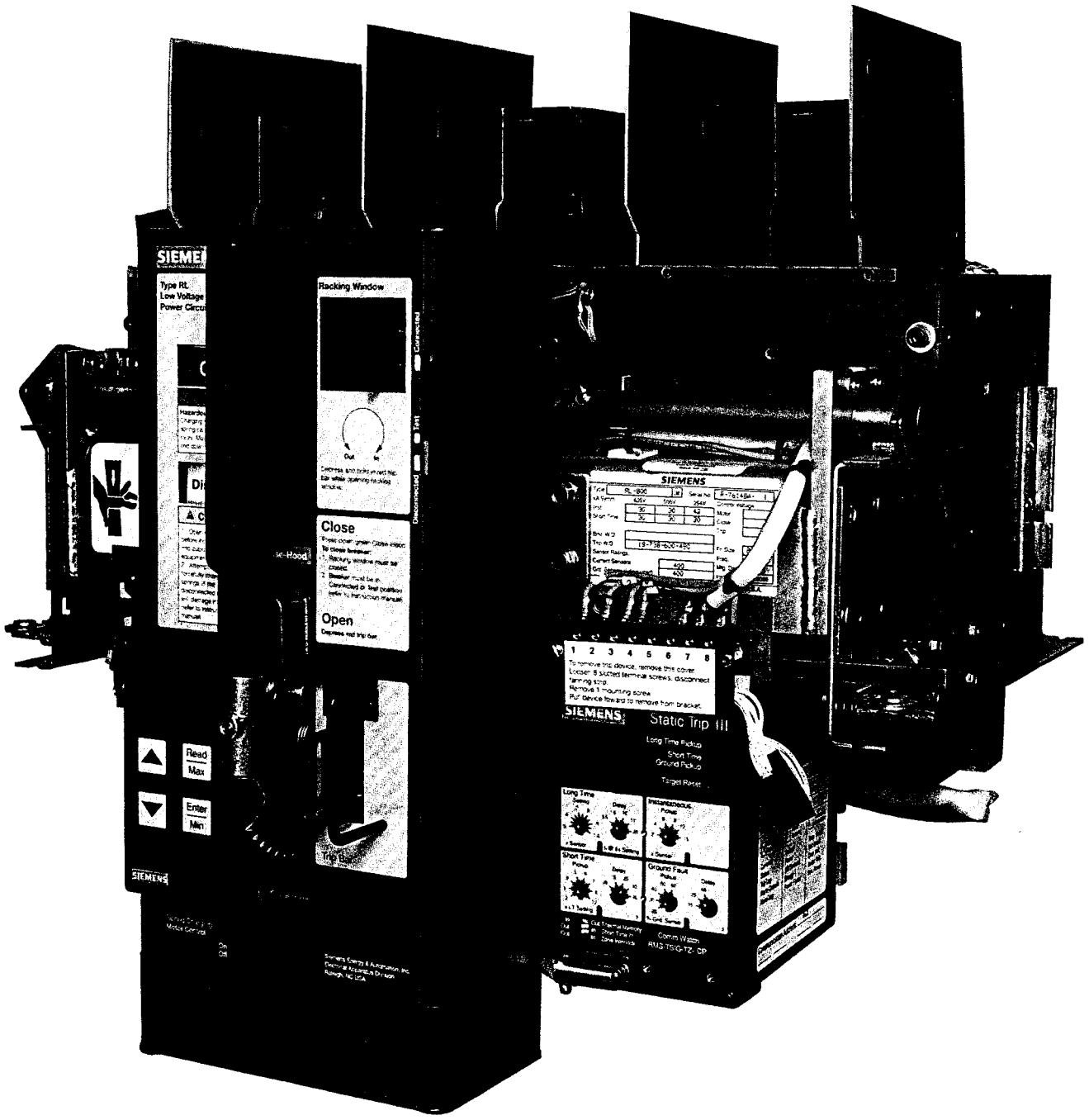
SIEMENS

Type RL Low Voltage Circuit Breakers

Instructions
Installation
Operation
Maintenance
SGIM-3068D



⚠ DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious personal injury or equipment or property damage.

Always de-energize and ground the equipment before maintenance. Read and understand this instruction manual before installing, operating, or maintaining the equipment. Maintenance should be performed only by qualified personnel. The use of unauthorized parts in the repair of the equipment or tampering by unqualified personnel will result in dangerous conditions which will cause death or serious personal injury or equipment or property damage. Follow all safety instructions contained herein.

IMPORTANT

The information contained herein is general in nature and not intended for specific application purposes. It does not relieve the user of responsibility to use sound practices in application, installation, operation, and maintenance of the equipment purchased. Siemens reserves the right to make changes in the specifications shown herein or to make improvements at any time without notice or obligations. Should a conflict arise between the general information contained in this publication and the contents of drawings or supplementary material or both, the latter shall take precedence.

QUALIFIED PERSON

For the purpose of this manual and product labels a qualified person is one who is familiar with the installation, construction, operation, or maintenance of the equipment and the hazards involved. In addition, this person has the following qualifications:

(a) **is trained and authorized** to energize, de-energize, clear, ground, and tag circuits and equipment in accordance with established safety practices.

(b) **is trained** in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses or face shields, flash clothing, etc., in accordance with established safety practices.

(c) **is trained** in rendering first aid.

NOTE

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 local Siemens sales office.

The contents of this instruction manual shall not become part of or modify any prior or existing agreement, commitment or relationship. The sales contract contains the entire obligation of Siemens Energy & Automation, Inc. The warranty contained in the contract between the parties is the sole warranty of Siemens Energy & Automation, Inc. Any statements contained herein do not create new warranties or modify the existing warranty.

Type RL Low Voltage Circuit Breakers

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Introduction and Safety

Introduction
The RL family of low voltage AC power circuit breakers is designed to meet all applicable ANSI, NEMA and IEEE standards. Successful application and operation of this equipment depends as much upon proper installation and maintenance by the user as it does upon careful design and manufacture by Siemens.

The purpose of this Instruction Manual is to assist the user in developing safe and efficient procedures for the installation, maintenance and use of the equipment.

Contact the nearest Siemens representative if any additional information is desired.

⚠ DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious personal injury or property damage.

To avoid electrical shock, burns and entanglement in moving parts, this equipment must be installed, operated and maintained only by qualified persons thoroughly familiar with the equipment, instruction manuals and drawings. Read and understand this instruction manual before using the equipment.

Qualified Person
For the purpose of this manual and product labels a **Qualified Person** is one who is familiar with the installation, construction or operation of the equipment and the hazards involved. In addition, this person has the following qualifications:

- Training and authorization to energize, de-energize, clear, ground and tag circuits and equipment in accordance with established safety practices.
- Training in the proper care and use of protective equipment such as rubber gloves, hard hat, safety glasses, face shields, flash clothing, etc., in accordance with established safety procedures.
- Training in rendering first aid.

Signal Words
The signal words "**Danger**", "**Warning**" and "**Caution**" used in this manual indicate the degree of hazard that may be encountered by the user. These words are defined as follows:

Danger - Indicates an imminently hazardous situation which, if not avoided, **will** result in death or serious injury.

Warning - Indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.

Caution - indicates a potentially hazardous situation which, if not avoided, **may** result in minor or moderate injury.

Dangerous Procedures
In addition to other procedures described in this manual as dangerous, user personnel must adhere to the following:

1. **Always work on de-energized equipment. Always de-energize a breaker, and remove it from the switchgear before performing any tests, maintenance or repair.**
2. **Always discharge energy from closing and opening (tripping) springs before performing maintenance on circuit breakers.**
3. **Always let an interlock device or safety mechanism perform its function without forcing or defeating the device.**

Field Service Operation
Siemens can provide competent, well-trained Field Service Representatives to provide technical guidance and advisory assistance for the installation, overhaul, repair and maintenance of Siemens equipment, processes and systems. Contact regional service centers, sales offices or the factory for details, or telephone Siemens Field Service at 1-800-241-4453.

Installation

Introduction
Type RL Low Voltage AC Power Circuit Breakers may be furnished for mounting in any one of three ways:
1. In switchboards or in metal enclosed switchgear of the drawout type;
2. In individual metal enclosures (drawout type);
3. For stationary mounting in the user's own enclosure or switchboard.

All RL circuit breakers are completely assembled, tested, and calibrated at the factory in a vertical position and must be so installed to operate properly. The user's primary connections must be adequately braced against the effects of short circuit currents to prevent overstressing the circuit breaker terminals.

Receiving and Inspection for Damage
IMPORTANT: Do not accept the statement from any driver that the damaged equipment was not properly packaged by shipper.

Do not sign Bill of Lading without notation of visible damage if observed. Our equipment packaging meets the rigid requirements established by the trucking industry. You must obtain carrier inspection within 15 days of receipt on damaged equipment.

Immediately upon receipt of this equipment, carefully remove all packing braces. Examine parts and check them against the packing list and note any damage incurred in transit. If damage is disclosed, a carrier inspection must be arranged for by consignee within 15 days of receipt of equipment. If equipment is shipped F.O.B. Destination, the consignee must obtain the original of the carrier inspection report and notify Siemens immediately.

Two shipping methods are used with RL circuit breakers:
1. Individually skidded with protective covering.
2. Within a cubicle.

Note all caution tags, remove any blocking, and open circuit breaker contacts before installation.

Storage
Whenever possible, install circuit breakers in their assigned switchgear compartments for storage. Follow instructions contained in the instruction manual for types R and SR Low Voltage Metal-Enclosed Switchgear, SG-3088. When the circuit breaker is stored separately, place the circuit breaker on a sturdy pallet. Secure the circuit breaker to the pallet, and cover with polyethylene film at least 10 mils thick. Also observe the following:
1. **Indoor Storage** - Whenever possible, store the circuit breaker indoors. The storage environment must be clean, dry and free of such conditions as construction dust, corrosive atmosphere, mechanical abuse and rapid temperature variations.
2. **Outdoor Storage** - OUTDOOR STORAGE IS NOT RECOMMENDED. When no other option is available, the circuit breaker must be completely covered and protected from rain, snow, dirt and all other contaminants.
3. **Space Heating** - Space heating must be used for *both indoor and outdoor* storage to prevent condensation and corrosion. Space heaters of approximately 100 watts per breaker are recommended. If the circuit breakers are stored inside their assigned switchgear compartments, and the switchgear is equipped with space heaters, the switchgear space heaters should be energized.

General
The RL Low Voltage AC Power Circuit Breaker is completely adjusted, tested and inspected before shipment. However, a careful check should be made to be certain that shipment or storage has not resulted in damage or change of adjustment. Circuit breakers and their enclosures should be installed in a clean, dry, well-ventilated area in which the atmosphere is free from destructive acid or alkali fumes. For stationary breakers and custom enclosures, the factory should be consulted for minimum clearances and required ventilation openings.

Before installing, make certain that the circuit breaker contacts are in the open position and that the closing springs are discharged. Be sure to lubricate primary and secondary disconnect fingers with Siemens electrical contact lubricant, part no. 15-171-370-002.

⚠DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious personal injury or property damage.

To avoid electrical shock, burns and entanglement in moving parts, this equipment must be installed, operated and maintained only by qualified persons thoroughly familiar with the equipment, instruction manuals and drawings.

⚠WARNING

Heavy weight overhead.

Can cause death, serious personal injury or property damage.

Always use approved lifting means to handle circuit breakers or fuse carriages. Follow instructions for use of lifting bar assembly. Avoid excessive speeds and sudden stops. Never lift a circuit breaker or fuse carriage above an area where personnel are located.

Installation (and Removal) Sequence

IMPORTANT: Be certain that you check points 1a through 1f below before placing circuit breaker in compartment.

1. Determine the correct switchgear compartment for each circuit breaker by checking the One-Line Diagram and Schematic Diagram furnished with the drawings. These drawings show the following for each circuit breaker compartment:
   a. Circuit breaker Type (RL-800, RL-1600 etc.)
   b. Trip "XFMR" or "SENSOR" rating
   c. Static Trip Type (RMS-TS-TZ, RMS-TIG-TZ etc.)
   d. Type of operator (Manual Operator-MO or Electrical Operator-EO)
   e. Circuit breaker wiring information.
   f. Special accessories (Undervoltage Trip, etc.)

2. On fused breakers, make sure trigger fuse linkage is reset. Breaker will remain trip free as long as this linkage is tripped. Refer to 'Open Fuse Trip Device' on **Page 20**.

3. If the circuit breaker was shipped separate from the cubicle, remove any blocking, trip the circuit breaker and move the racking mechanism to the DISCONNECT position.

4. To prepare circuit breaker for insertion into the cubicle, follow steps A-D of **Figure 1** on **Page 5**.

5. Push breaker to DISCONNECT position. Interlock bar prevents movement of breaker in cell, unless trip bar is depressed.

6. While holding the trip bar in, open the racking window and insert the racking crank.

7. Use crank to rack breaker into cell.

8. Check door iris for free movement while closing door,

9. **To remove circuit breaker, reverse the above procedures.**

10. After the circuit breaker is placed in the compartment, rack it to the TEST position.

11. Open the compartment door. Close and trip the circuit breaker. Refer to 'Operation', **Pages 6-10** for manually and electrically operated breakers.

    During the closing operation, observe that the contacts move freely without interference or rubbing between movable arcing contacts and parts of the arc chutes. Then refer to 'Operation', **Pages 6-10** for a detailed description of the circuit breaker operating characteristics before placing the circuit breaker in service. Make sure circuits are not energized.

12. Trip units and accessory devices should receive a thorough check before placing the circuit breaker in service. This check makes certain that adjustments are proper and parts are not damaged. Refer to 'Static Trip III Information and Instruction Guide', SG-3118.

13. Drawout circuit breakers are equipped with an interlock to prevent movement of a closed circuit breaker into or out of the CONNECT position. Circuit breaker interlock operation should be checked before it is energized. See 'Drawout Interlock', **Page 9**, and 'Spring Discharge Interlock', **Page 10**, for a description of these interlocks.

14. After completing the installation inspection, check the control wiring (if any) and test the insulation.

15. Close the compartment door. Rack the circuit breaker into the CONNECT position. Refer to 'Racking Mechanism', **Page 9**. Remove the racking crank and close the racking window.

16. The circuit breaker can now be closed to energize the circuit.

⚠WARNING

Heavy weight.

Can cause death, serious personal injury or property damage.

Use of a lifting device or crane will place heavy weights overhead. Avoid excessive speeds and sudden starts or stops.

Never lift a circuit breaker or fuse carriage over an area where personnel are located.

Installation

⚠DANGER

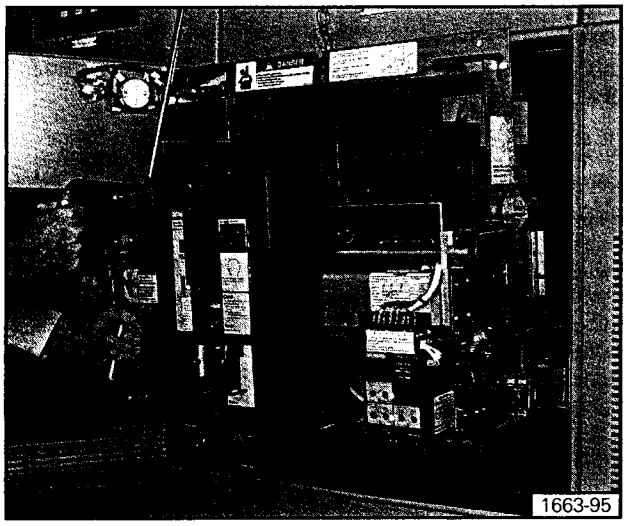
Heavy weight.

Can cause death, serious personal injury or property damage.

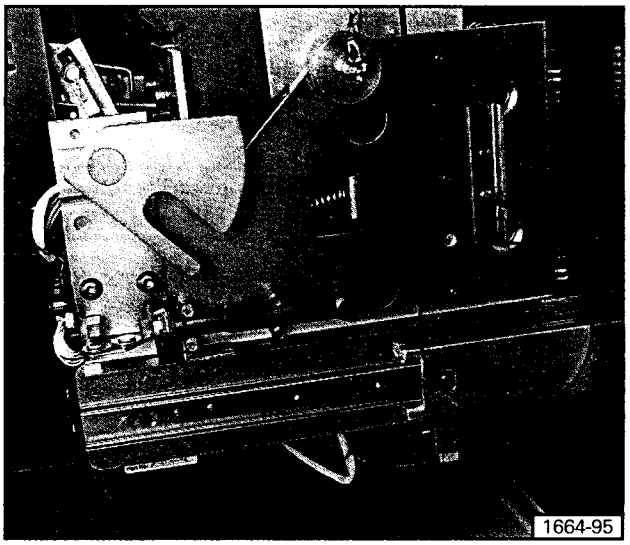
Use of a lifting device or crane will place heavy weights overhead. Avoid excessive speeds and sudden starts or stops.

Never lift a circuit breaker or fuse carriage over an area where personnel are located.

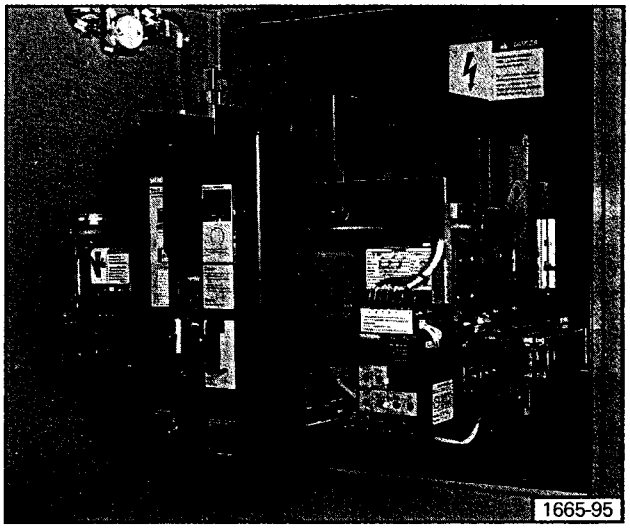
A) Attach lifting bar assembly to circuit breaker as shown above. Fasten locking screws through circuit breaker side plates and lifting plates.



B) Attach crane hook and insert crank into hoist mechanism eye. Raise breaker above compartment, and fully extend rails.



C) Lower breaker onto rails. **Important!** The rear of the breaker must be tilted downward so that the breaker engages the notch at the rear of the right hand rail (shown in circle).



D) Continue lowering until circuit breaker rests securely on the rails. Remove the lifting yoke. The circuit breaker is now ready for inserting into the cell.

Figure 1. Use of Lifting Bar Assembly to Handle Circuit Breakers or Fuse Carriages

Operation

Description
The continuous current and interrupting ratings of the circuit breakers are as shown on the circuit breaker rating label.

The circuit breakers are also available with integrally mounted current limiting fuses through 2000A frame size, and with separately mounted fuses for 3200A, 4000A, and 5000A frame size. For 800A, 1600A, and 2000A frame sizes the basic circuit breakers are the same with or without fuses. The fuses mount on a bracket that is bolted to the side plates and upper studs on the back of the circuit breaker. Due to this difference, fused circuit breakers are not interchangeable with unfused circuit breakers. The current limiting fuses increase the interruption rating to that of the fuses. Fused circuit breakers are identified as RLF-800, RLF-1600, RLF-2000, RLF-3200, RLF-4000, or RLF-5000. Fused circuit breakers are also equipped with an open fuse trip device to open the circuit breaker if one or more current limiting fuses open.

Note: Fused circuit breakers are not physically interchangeable with unfused breakers.

Unfused circuit breakers can also be supplied for stationary mounting in which the racking components are omitted and brackets are provided for mounting to a stationary frame.

All RL circuit breakers use the same basic closing mechanism or operator. The closing springs used vary between sizes.

Two configurations of the operator are available for charging the closing springs, manually charged or electrically charged. For electrical operators, a maintenance handle accessory can be used to charge the springs manually for maintenance or in an emergency. Optionally, a built-in manual spring charging handle can be provided.

The manual and electrical operators are identical except for the means of supplying energy to the closing springs. A double-toggle, trip-free mechanism is used. This means that the breaker contacts are free to open at any time if required, regardless of the position of the mechanism.

Precautions to be Observed in Operation
1. Read this Instruction Manual before installing or making any changes or adjustments on the circuit breaker.

2. Stored-energy closing springs may be charged with circuit breaker contacts in either the open or closed position. EXTREME CARE SHOULD BE TAKEN TO DISCHARGE THE SPRINGS BEFORE WORKING ON THE CIRCUIT BREAKER.

3. When closing manually operated breakers out of the compartment, the racking mechanism must be returned to the TEST position before the closing spring can be charged.

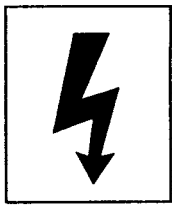
4. When charging manually operated breakers, always hold the handle firmly until it is returned to the normal vertical position. A ratchet insures that the spring charging operation must be completed once started.

5. Check current ratings, circuit breaker wiring information, circuit breaker type and trip device type, against the One-Line Diagram to assure that circuit breakers are located in the proper compartments within the switchgear.

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

7. Close the compartment door and secure door latch(es) prior to racking the circuit breaker to or from the CONNECT position. Also close and latch the door prior to closing the circuit breaker when in the CONNECT position. Once the circuit breaker is closed, keep the door closed.

8. **ONCE THE CIRCUIT BREAKER OR FUSE CARRIAGE IS ENERGIZED, DO NOT OPEN THE COMPARTMENT DOORS. PERFORM ANY REQUIRED OPERATIONS WITH EXTERNAL CONTROLS, WITH THE DOORS CLOSED AND SECURELY LATCHED.**



⚠WARNING

Hazardous voltages.

Can cause death, serious personal injury or property damage.

Keep compartment doors closed and securely latched when equipment is energized.

Manually Operated Circuit Breakers
The breaker has a center-mounted frame, so many of the latches and links are arranged in pairs. For descriptive purposes, they will be referred to as single items. Refer to **Figure 2** and **Table 1**. Detail A shows the position of the trip latch and toggle linkage when the circuit breaker is open and the closing springs are discharged.

Table 1. Operating Procedure for Manually Operated Circuit Breakers

Operation	Procedure
Charging Springs	Pull charging handle down all the way (approximately 120°) and return it to normal vertical position. (Engagement of pawl with ratchet teeth prevents handle reversal until the downward stroke is completed.)
Closing	Push down firmly on spring-release latch hood (50) after handle is returned to normal vertical position.
Tripping	Push in manual trip rod (94) OR If shunt trip is provided, operate external control switch (CS/T) to trip or open position. (See **Figure 3.**)

Movement of the charging handle downward rotates closing ratchet (140) against roller (43), thus pivoting closing cam (34) clockwise about pin (40). This extends the closing springs through link (41) and spring hanger (58). Rotation of cam (34) allows roller (27) in toggle linkage to be moved into position shown in Detail B. Kickoff spring (10) moves rollers away from the stop block (7). Then, the toggle linkage is moved by torsion spring until latch (15) clears trip flap (12). Spring (13) causes trip flap (12) to reset under latch (15). Trip flap (12) should normally stop against the front surface of latch (15).

When the closing springs are fully charged, roller (43) engages latch (47). Closing ratchet (140) engages a pawl in such a manner that the charging cam must complete the charging stroke before it can return to its normal position.

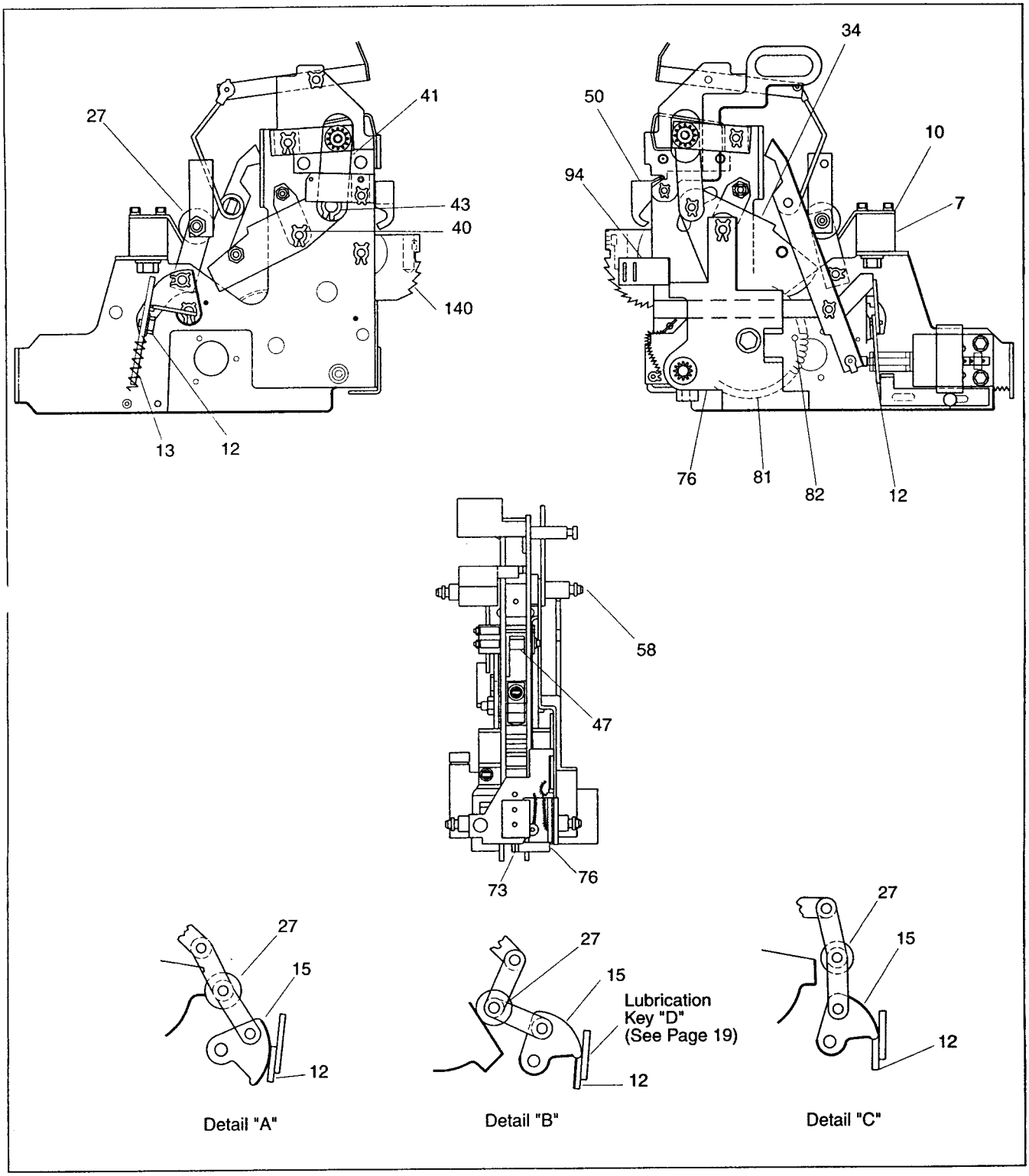


Figure 2. Circuit Breaker Operator

CC .....Circuit Breaker Closing Coil

TC.....Circuit Breaker (Shunt) Trip Coil

Y.....Aux. Closing Relay - Anti-Pump

MCO.....Motor Cutoff Switch

88 .....Spring Charging Motor

CS/C .....Control Switch - Close Contact

CS/T.....Control Switch Trip Contact

R.....Red Indicating Lamp

G.....Green Indicating Lamp

a .....Aux. Switch Contact - Open when Breaker is Open

b .....Aux. Switch Contact - Closed when Breaker is Open

MDS.....Motor Circuit ON-OFF Switch

⩓.....Secondary Disconnect

AL.....Alarm Contact

CB .....Connection Block

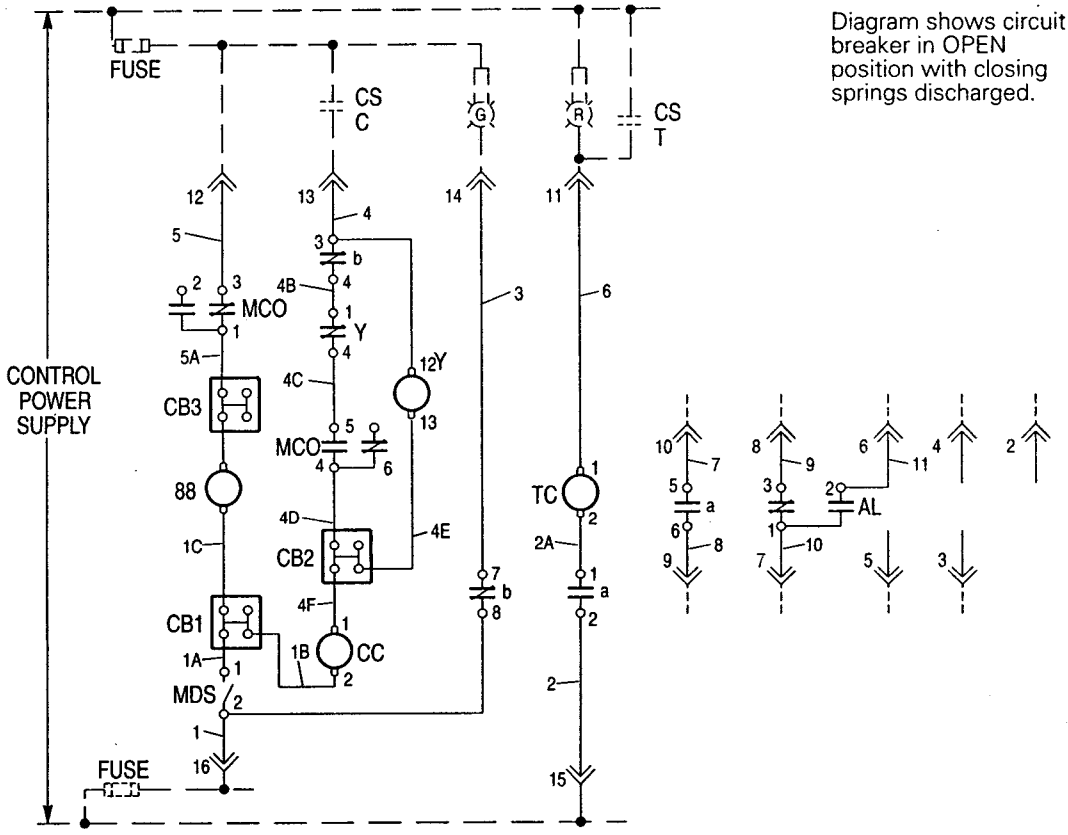


Figure 3. Typical Schematic — Electrically Operated Circuit Breakers.

With the charging handle in its normal upright position, the circuit breaker can be closed. By pressing firmly on hood (50), latch (47) will disengage roller (43). Then, closing springs cause closing cam (34) to rotate against the toggle rollers (27), moving the toggle into its upright position, as shown in detail C. The closing cycle can be interrupted at any point by operation of one of the tripping means. This will cause rotation of trip flap (12) to a position that releases latch (15), allowing toggle linkage to collapse to the position shown in detail A.

To manually open the circuit breaker, press in manual trip rod (94). This bar engages the top of trip flap (12), to disengage the latch (15).

Electrically Operated Circuit Breakers
The mechanism of the electrically operated circuit breaker is the same as the manually operated circuit breaker, except that the manual charging handle is replaced by a motor and gear system. Refer to **Figure 2** and **Table 2.** Power available to the control circuit will start the automatic charging cycle. The motor gear box pinion rotates gear (81) counterclockwise. Cam follower (82) engages an arm of wind and close cam (34), which rotates the cams in the same manner as for the manually charged circuit breaker. When the wind and close cam (34) reaches its charged position, the back of the cam engages switch lever (73), rotating the lever away from the switch operator. Gear switch lever (76) will still be holding the switch in the operate position and the motor will continue to run until the roll pins on the side of gear (81) lift lever (76) clear. This releases the motor cutoff switch (MCO). When the MCO switch opens, the motor stops, and the closing coil circuit is set up through one side of the MCO switch.

The circuit breaker can now be closed by depressing the latch hood (50) or by energizing the closing coil (CC) through the external close control switch (CS/C). When the close circuit is energized, the anti-pump (Y) relay is energized and opens the Y relay contact in the closing circuit. This prevents "pumping" or repeated attempts to close the circuit breaker if a tripping signal or fault is present. This would happen if the closing switch (CS/C) is bypassed by a short circuit, or if it is defective.

A combination manually and electrically operated circuit breaker is also available. This includes both the motor-gear charging system as well as the manual charge handle.

Note: Manual charging handle must be in vertical position during electrical charging.

Table 2. Operating Procedure for Electrically Operated Circuit Breakers

Operation	Procedure
Charging Springs	Energize control circuit.
Closing	After springs are charged, actuate external close control switch (CS/C), OR Push down firmly on spring-release latch hood (50) (after spring charging handle (if present) is returned to normal vertical position.)
Tripping	Actuate external control switch (CS/T) to trip or open position, OR Push in manual trip rod (94).

Drawout Interlock
A drawout circuit breaker mechanism includes:

1. Means to rack the circuit breaker in or out of the compartment.
2. Interlock to prevent racking a closed circuit breaker into or out of any position.
3 Interlock to prevent closing a circuit breaker until it is racked to the TEST or CONNECT position.
4. Interlock to prevent withdrawing a circuit breaker from the cubicle while the closing springs are charged.

Racking Mechanism
Refer to **Figure 4**. With the circuit breaker resting on the cubicle rails, the following sequence should be used to rack the circuit breaker into the cubicle.

1. Push trip bar in, open racking window and insert racking crank.

   Note: Racking window cannot be opened unless manual trip bar is pressed in. While the trip bar is pressed in, the circuit breaker is TRIP FREE and cannot be closed.

2. Using the racking crank, rotate the racking screw (105) counterclockwise until the racking shaft is in the DISCONNECT position. The racking clevis can now engage the racking pins in the cubicle. The circuit breaker should now be pushed along the rail into the DISCONNECT position. Double check that the racking clevises engage the pins on both sides of the cubicle.

3. Clockwise rotation of the racking screw will rack the breaker into the TEST position. At the TEST position, the racking window can be closed, allowing the trip bar to reset and the circuit breaker can be operated. Further racking will place the circuit breaker between the TEST and CONNECT positions. Between positions, the interlock bar will not engage the position holes of the cubicle. The breaker will be held TRIP FREE and cannot be closed.

   In the CONNECT position, the interlock will engage the cubicle hole and reset, allowing the circuit breaker to be closed. This prevents closing a circuit breaker which is not in the CONNECT or TEST position.

4. To withdraw the breaker from the CONNECT position, rotate the racking screw counterclockwise.

5. Before attempting to operate the circuit breaker, the position of the device should be checked with reference to the holes in the cubicle, to be certain that it is fully connected. See 'Adjustments', **Page 14** for proper procedure.

IMPORTANT: To avoid damage to the racking mechanism, when in the CONNECT position, do not forcefully rotate the racking crank clockwise.

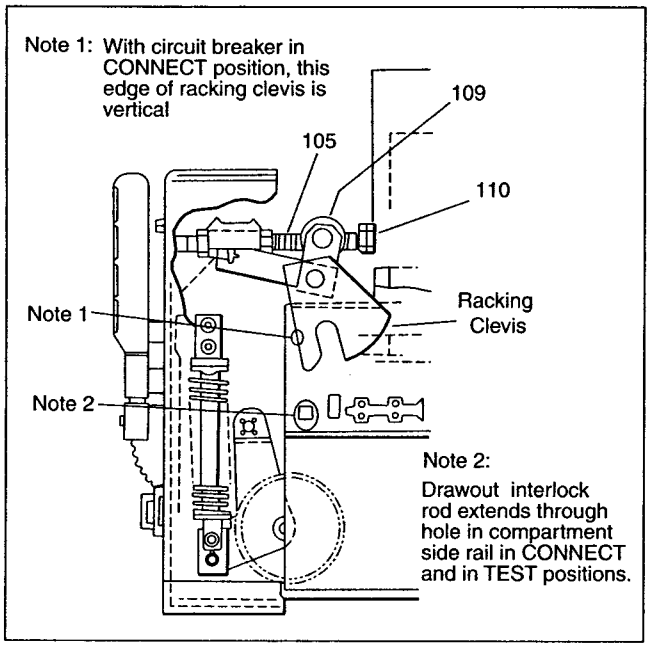


Figure 4. Detail of Typical Racking Mechanism

Spring Discharge Interlock

When racking the circuit breaker out to the DISCONNECT position, the closing springs will automatically discharge, at or before reaching the DISCONNECT position. The barrel nut (109) engages the spring interlock. This, in turn, is connected to the manual close hood which releases the closing springs.

IMPORTANT: On manually charged breakers, the close hood is interlocked to the manual charge cam, and must be clear before racking the circuit breaker to the DISCONNECT position. For this reason, the manual charge handle must be in the vertical position during racking.

Note: The racking mechanism must be returned to the TEST position before closing springs can be charged (either in the cubicle or when removed from the cubicle).

The spring discharge interlock produces TRIP FREE operation in which all of the stored energy of the springs is dissipated in the mechanism. It is preferable to turn the motor power off in the TEST position, close and trip the circuit breaker manually in that position, and then rack out in the normal manner.

Maintenance

General
For the safety of maintenance personnel as well as others who might be exposed to hazards associated with maintenance activities, the safety related work practices of NFPA 70E, parts II and III, should always be followed when working on electrical equipment. Maintenance personnel should be trained in the safety practices, procedures and requirements that pertain to their respective job assignments. This Instruction Manual should be reviewed and retained in a location readily accessible for reference during maintenance of this equipment.

The user must establish a periodic maintenance program to ensure trouble-free and safe operation. The frequency of inspection, periodic cleaning and preventive maintenance schedule will depend upon the operating conditions. NFPA Publication 70B, 'Electrical Equipment Maintenance' may be used as a guide to establish such a program. **A preventive maintenance program is not intended to cover reconditioning or major repair, but should be designed to reveal, if possible, the need for such actions in time to prevent malfunctions during operation.**

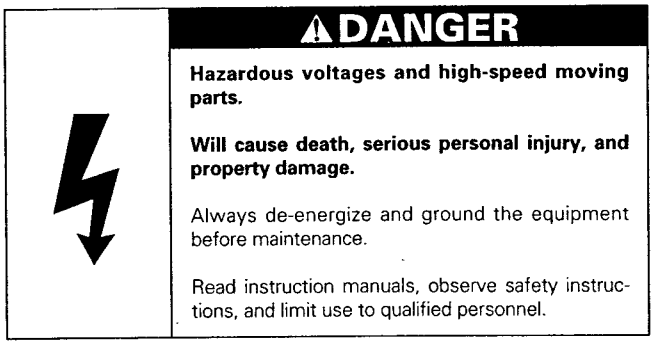
Service Conditions and Maintenance Intervals
'Usual' and 'Unusual' service conditions for Low Voltage Metal-Enclosed Switchgear are defined in ANSI C37.20.1, clauses 3 and 7.1. Generally, 'usual service conditions' are defined as an environment in which the equipment is not exposed to excessive dust, acid fumes, damaging chemicals, salt air, rapid or frequent changes in temperature, vibration, high humidity, or extremes of temperature.

This definition is subject to a variety of interpretations. Because of this, you are best served by adjusting maintenance and lubrication intervals based on your experience with the actual service environment.

The frequency of required maintenance depends on the nature of the service conditions; the more severe the conditions, the more frequently that maintenance is needed. **Table 3** gives service and lubrication intervals for type RL circuit breakers applied under ANSI 'Usual Service Conditions'. This table indicates that RL circuit breakers (with 'LM' in the type designation on the rating label) have a five (5) year maintenance interval.

Regardless of the length of the maintenance (lubrication) interval, the tripping system should be checked and exercised annually, and the circuit breaker should be inspected and exercised annually.

Always inspect a circuit breaker which has interrupted a heavy fault current.



⚠DANGER

Hazardous voltages and high-speed moving parts.

Will cause death, serious personal injury, and property damage.

Always de-energize and ground the equipment before maintenance.

Read instruction manuals, observe safety instructions, and limit use to qualified personnel.

⚠WARNING

Failure to properly maintain the equipment can result in death, serious injury or product failure, and can prevent successful functioning of connected apparatus.

The instructions contained herein should be carefully reviewed, understood, and followed.

The following maintenance procedures must be performed regularly:
- Recommended annual RL circuit breaker inspection procedure
- Recommended RL breaker maintenance and lubrication procedure.

The above list does not represent an exhaustive survey of maintenance steps necessary to ensure safe operation of the equipment. Particular applications may require further procedures. Should further information be desired or should particular problems arise which are not covered sufficiently for the user's purposes, the matter should be referred to the local Siemens sales office.

The use of unauthorized parts in the repair of the equipment, or tampering by unqualified personnel will result in dangerous conditions which can cause death, serious injury or equipment damage. Follow all safety instructions contained herein.

Lubrication
Lubrication should be a part of the servicing procedure. Old grease should be removed from bearing pins and other non-current carrying rotating or sliding surfaces. A thin film of lubricant should be applied in accordance with the 'Lubrication Chart', **Table 5**.

Apply lubricants with care to avoid getting grease on insulating members, since it may affect the dielectric strength. Faces of arcing contacts and faces of main contacts should not be lubricated. The rubbing surfaces (i.e., those surfaces without brazed-on contact tips) of the main contact fingers, arcing contact fingers, and hinge contact fingers should be lubricated with a coating of Siemens electrical contact lubricant, part no. 15-171-370-002. If dust or dirt has accumulated, disassembly may be necessary to clean and relubricate these points. See 'Contact Replacement', **Page 15** and 'Lubrication Chart', **Table 5**.

Maintenance

Recommended Annual RL Circuit Breaker Inspection Procedure
A suggested procedure to follow during Annual Inspections:

1. **De-energize the primary and control circuits.**

2. With the cubicle door closed, rack the circuit breaker to the DISCONNECT position.

3. Open the cubicle door, and remove the circuit breaker from the cubicle.

4. Rotate the racking screw to the TEST position (approximately 3 turns) to clear the spring discharge interlock, before attempting to charge closing springs. Exercise the circuit breaker through several close-open cycles. For electrically operated circuit breakers, operate the circuit breaker electrically. (Refer to the specific wiring information for your circuit breaker to determine where control voltage signals should be applied. Usually, spring charging power is connected between secondary disconnects SD12 and SD16, closing control power between SD13 and SD16, and tripping power between SD11 and SD15. Secondary disconnects are arranged with SD1 on top, and SD16 on the bottom). Examine the operation of the circuit breaker during these operations for any evidence of difficulty, erratic operation, etc.

5. Test the tripping system, using an appropriate test set, such as the Siemens Portable Static Trip Test Set, model PTS-4. Refer to 'Static Trip III Information and Instruction Guide', SG-3118, and 'Portable Test Set Instructions', SG-3138, for information on testing. The test should include tripping of the circuit breaker by the trip device. This confirms the functionality of the system, including the trip device and the tripping components.

6. Clean any accumulation of dust or dirt from the circuit breaker. For insulated parts, use a clean cloth saturated with a non-toxic cleaner, such as denatured alcohol.

7. Turn the racking screw to the DISCONNECT position, and reinstall the circuit breaker in the cubicle.

Recommended RL Breaker Maintenance and Lubrication Procedure
A suggested procedure to follow during maintenance and lubrication sessions:

1. **De-energize the primary and control circuits.**

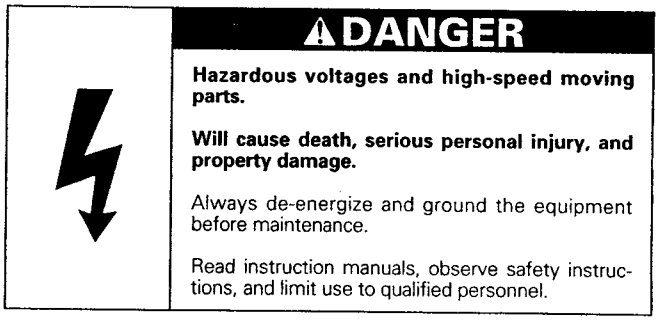
2. With the cubicle door closed, rack the circuit breaker to the DISCONNECT position.

3. Open the cubicle door, and remove the circuit breaker from the cubicle.

Table 3. Inspection and Maintenance Intervals (see **Note 1**)

Frame Size Amperes	Inspection Interval All Type RL Breakers	Maintenance & Lubrication Interval		Overhaul Interval
	Check & Exercise Tripping System Check & Exercise Circuit Breaker Mechanism	RL Breakers built before 6/91 (Number of operations, or time, whichever occurs first)	RL breakers built 6/91 or later (with "LM" in type designation- See **Note 2**)	All Type RL breakers (Number of Operations)
800	Annually	1750 operations/1 year	5 years	12500 operations
1600	Annually	500 operations/1 year	5 years	4000 operations
2000	Annually	500 operations/1 year	5 years	4000 operations
3200	Annually	250 operations/1 year	5 years	1500 operations
4000	Annually	250 operations/1 year	5 years	1500 operations
5000	Annually	250 operations/1 year	5 years	1500 operations

Notes:
1. Any circuit breaker which has interrupted a heavy fault current should be inspected according to the recommended procedure for maintenance and lubrication.
2. "LM" indicates Low Maintenance RL Breaker produced beginning June, 1991



4. Rotate the racking screw to the TEST position (approximately 3 turns) to clear the spring discharge interlock. This is necessary before the closing springs can be charged, and also makes removal of the arc chutes easier.

5. Remove arc chutes and examine arc chutes and circuit breaker contacts for burned, cracked, or broken parts.

   To remove arc chutes, proceed as follows:

   a. Remove mounting screws for holding clips, remove support and phase barriers.

   b. Lift arc chutes vertically to clear arc runners.

6. Inspect arc chutes for excessively burned arcing plates. Replace arc chutes under the following conditions:

   a. Copper-plated steel plates in the arc chutes measure less than 0.06" thickness for RL-800 through RLE-2000 circuit breakers.

   b. Copper-plated steel plates in the arc chutes measure less than 0.08" thickness for RL-3200 through RL-5000 circuit breakers.

7. Wipe the contacts with a clean cloth saturated with a non-toxic cleaning fluid, such as denatured alcohol.

   Replace badly burned or pitted contacts. (See 'Contact Replacement', **Page 15**, and 'Lubrication Chart', **Table 5**.) Do not lubricate faces of contacts.

9. Clean any accumulation of dust or dirt from the circuit breaker. For insulating parts, use a clean cloth saturated with a non-toxic cleaner, such as denatured alcohol.

10. Bearing pins and other sliding or rotating surfaces should be cleaned and then coated with a light film of grease. (See 'Lubrication Chart', **Table 5**.)

11. Perform a maintenance closing operation (see **Page 14** and **Table 4**) to check latch and linkage movement. (Be sure to rotate the racking screw to the TEST position to clear the spring discharge interlock before attempting to charge closing springs).

12. Check circuit breaker adjustments. (See 'Adjustments', **Page 14**.)

13. Exercise the circuit breaker through several close-open cycles. For electrically operated circuit breakers, operate the circuit breaker electrically. (Refer to the specific wiring information for your circuit breaker to determine where control voltage signals should be applied. Usually, spring charging power is connected between secondary disconnects SD12 and SD16, closing control power between SD13 and SD16, and tripping power between SD11 and SD15. Secondary disconnects are arranged with SD1 on top, and SD16 on the bottom). Examine the operation of the circuit breaker during these operations for any evidence of difficulty, erratic operation, etc.

14. Test the tripping system, using an appropriate test set, such as the Siemens Portable Static Trip Set, model PTS-4. Refer to 'Static Trip III Information and Instruction Guide', SG-3118, and 'Portable Test Set Instructions', SG-3138, for information on testing. The test should include tripping of the circuit breaker by the trip device. This confirms the functionality of the system, including the trip device and the tripping components.

15. Reinstall arc chutes. Close and open the circuit breaker to ensure that the arc chutes do not interfere with circuit breaker operation.

16. A megger test should be made on the high voltage circuit to be sure that all connections are free of undesired grounds. A megger test is also advisable on the control circuit.

17. A dielectric test, if possible, should be made on the high voltage (power) circuit for one minute at the appropriate test voltage. (Voltage transformers, control power transformers, surge arresters, and surge capacitors must be disconnected during this test).

Note: Do not perform dielectric tests on the Static Trip III tripping system. Refer to 'Static Trip III Information and Instruction Guide', SG-3118.

Rated voltage of circuit	Test voltage
480 or 600 volts	75% of 2200 = 1650 VAC
208 or 240 volts	75% of 1500 = 1125 VAC
Secondary & control circuits	75% of 1500 = 1125 VAC

Note: Certain control devices, such as motors and motor circuits, should be tested at 675 VAC. Electronic devices should be tested at the voltages specified in the instruction manual for the electronic device).

Dielectric tests are also recommended when new units are added to an existing installation, or after major field modifications. The equipment should be put in good condition prior to the field test. It is not expected that equipment shall be subjected to these tests after it has been stored for long periods of time or has accumulated a large amount of dust, moisture, or other contaminants without being first restored to good condition.

⚠CAUTION

Excessive test voltages may result in damage to equipment.

Do not perform dielectric tests at test voltages exceeding the ratings of the tested equipment.

18. Turn the racking screw to the DISCONNECT position, and reinstall the circuit breaker in the cubicle.

19. Log the details of the maintenance into a suitable record of circuit breaker maintenance for future use.

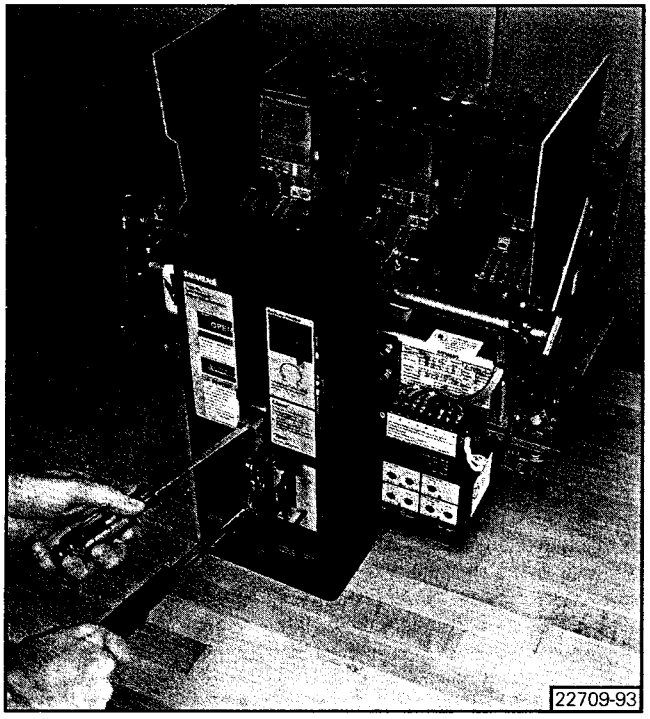


Figure 5. Maintenance Closing

Maintenance Closing

⚠ CAUTION

High-speed moving parts.

May cause personal injury.

When performing maintenance close operation, maintain a firm grip on the manual charging handle during the closing stroke to counteract the large force in the closing springs. If a firm grip (and heavy pressure) is not maintained, the circuit breaker may close suddenly, which will return the charging handle to the vertical position with considerable force.

IMPORTANT: The procedure in Table 4 should be used for maintenance closing only. The circuit breaker must be on a table with the arc chutes removed during any maintenance close operation. Maintain a firm grip on the manual charging handle during the closing stroke to counteract the large force in the closing springs. If a firm grip (and heavy pressure) is not maintained, the circuit breaker may close suddenly, which will return the charging handle to the vertical position with considerable force.

Note: Holding the spring release latch down prevents the stored-energy springs from propping in the charged position. Thus, when the handle is returned to the normal vertical position, the energy in the springs is released against the closing handle assembly. A firm grip must be maintained on the charging handle to counteract the energy stored in the charged closing springs. As the handle is slowly released to the normal vertical position, the main contacts are slowly moved to the closed position.

During inspection prior to installation, and for routine maintenance inspections, the circuit breaker contacts may be closed slowly to check clearances, contact adjustments, and movement of links and latches.

Electrically operated breakers normally do not have a manual charging handle, but it is available as a maintenance item. When the hole in the maintenance closing handle assembly is aligned with the holes in the operating mechanism frame, the pin which is attached to the cam is inserted. This pin holds the assembly in place and acts as a pivot point for the cam. After insertion of the maintenance closing handle assembly on the electrically operated breaker, the actual maintenance closing operation is the same for both the electrically operated and the manually operated circuit breaker. Refer to **Figure 5** and **Table 4**.

Table 4. Maintenance Closing

Operation	Procedure
Closing Contacts	1. Verify that racking mechanism is in TEST position. 2. Pull charging handle DOWN ALL THE WAY (approximately 120°). Do not allow charging handle to return toward the vertical position — keep the handle all the way down. 3. **Maintain firm grip and heavy pressure on charging handle to counteract force of charged closing springs!** Place blade of screwdriver between hood and spring release latch, and hold the latch in the DOWN position. 4. Slowly return charging handle to vertical position. Once charging handle starts to move, screwdriver may be removed. Observe contact, touch, mechanical operation, etc.
Opening Contacts	Push in manual trip rod.

Adjustments

After the circuit breaker is installed in the cubicle, and before attempting to operate, the connected position alignment must be checked. Two stop nuts are provided on the racking screw to set the connected position. These are adjusted by setting the angle of the racking clevis, as shown in **Figure 4**, and by tightening the nuts against the stop washer (109). The two nuts (110) should be locked against each other.

During maintenance inspections, the following items should be checked to ensure that the original settings are maintained:

IMPORTANT: The procedure in Table 4 should be used for maintenance closing only. The circuit breaker must be on a table with the arc chutes removed during any maintenance close operation. Maintain a firm grip on the manual charging handle during the closing stroke to counteract the large force in the closing springs. If a firm grip (and heavy pressure) is not maintained, the circuit breaker may close suddenly, which will return the charging handle to the vertical position with considerable force.

Main Contact Make (See **Figure 8**)
Compression of the contact fingers (46) must be between .093" and .125" (2.4-3.2mm). This is the difference between:
1. The measurement from the breaker base to the bottom edge of the finger contact surface when the breaker is open, and
2. The measurement in the same place when the breaker is closed.

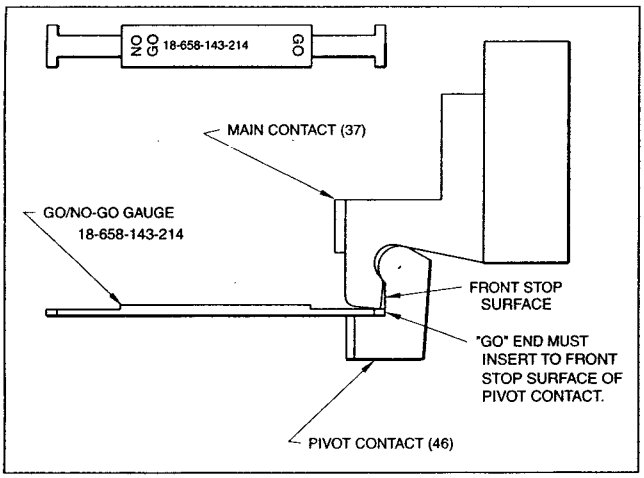
For RLE version breakers, the measurement is made .25" from the bottom edge of the finger contact surface.

For convenience, a GO/NO-GO feeler gauge (part no. 18-658-143-214) can be used to measure the gap between the contact finger (46) and the extruded portion of the upper contact assembly (37). This measurement is made with the breaker closed. The outside contacts (46) on each pole must be checked and adjusted, such that the GO end of the gauge can be inserted into the gap all the way to the front surface of the contact finger's vertical portion. The NO-GO end should not be able to be fully inserted. **Figure 6** shows the GO/NO-GO gauge and the manner in which it is inserted between the contact fingers (46) and the upper contact assembly (37). **Figure 7** shows use of the GO/NO-GO gauge on an RL circuit breaker.

Adjustment is provided by positioning screws (78) after loosening nuts (80). Counterclockwise rotation of screws (78) increases compression. Carefully torque nuts (80) to 30-60 inch-pounds after adjustment.

it is desired to check contact pressure, a push-type spring ɔale can be used to compress contact fingers (46) with breaker open. Contact pressure should be between 20 and 30 pounds (9.1-13.6 kg) on each finger.

Arcing Contact Make Adjustment of the arcing contacts is dependent on the adjustment of the main contact make (compression) as discussed in the previous paragraph. Arcing contact pressure should be between 20 and 40 pounds (9.1-18.2 kg) when checked with a pull-type spring scale at the base of the arcing contact tip insert with the circuit breaker contacts closed. Measure the pressure on each blade separately.



gure 6. Use of the GO/NO-GO Gauge to Check Main ɔontact Make (Compression)

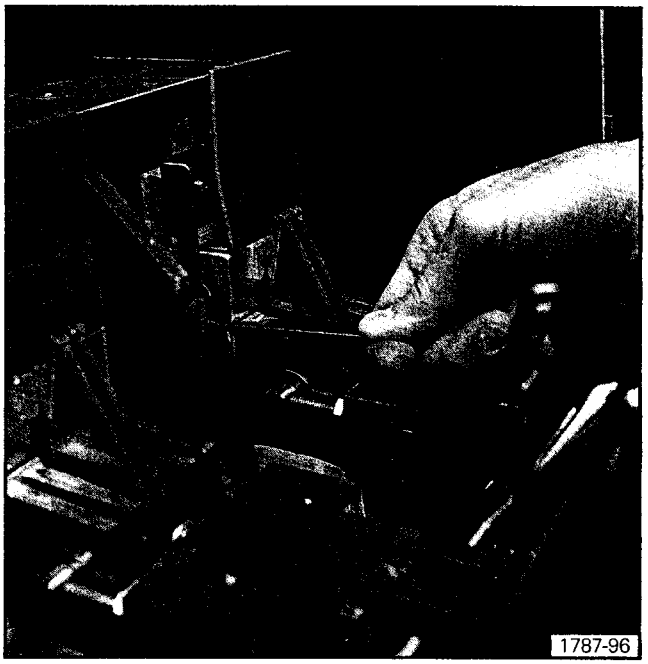


Figure 7. Check of Main Contact Make (Compression) Using GO/NO-GO Gauge

Contact Replacement (See **Figure 8**) The contact structure consists of main current carrying contacts and arcing contacts arranged so that initial contact make and final contact break is by means of the arcing contacts. The actual contact surfaces are clad with an alloy facing which greatly reduces mechanical wear and arc erosion.

When inspection of the alloy facing indicates that the contacts should be replaced, it should be noted that hinge contact fingers (53, 55), main contact fingers (46), and arcing contacts (61) are spring loaded. Therefore, care must be used in removal and installation of any of the contacts.

Main Contact Fingers (See **Figure 8**)
With the circuit breaker contacts open and the stored energy springs discharged, the main contact fingers (46) may be removed by loosening screws (44, 45) enough to relieve the compression on springs (47, 48). There are two springs behind each finger. It is important that they be positioned properly upon reinstallation. If difficulty is experienced in correctly positioning these springs, the upper and lower primary disconnects (168 **Figure 18**), may be removed from each phase and the circuit breaker tipped to rest on the ends of connectors (37) and (49). After the contact fingers are replaced, connector (37) should be positioned in the center of the slot in the molded base to assure correct alignment of the primary disconnect fingers.

Stationary Arcing Contact (See **Figure 8**)
The stationary arcing contact is a part of a connector (37) and may be replaced by proceeding as above. In this case, screws (44, 45) must be removed. However, to provide clearance for removal of connector the backpanel (33) may have to be loosened by removing screws (58, 59 and 23, **Figure 17**). By removing pin (98 and 99 **Figure 18**), the entire assembly can be lifted out.

Hinge Contact Fingers (See **Figure 8**)
Hinge contact fingers (53, 55) may be removed as follows:

Remove backpanel. Remove lower connector (49) and moving contacts by removing screws (59). The springs (54, 56) are unloaded by rotating the moving contacts toward a horizontal position relative to the stationary contact (49). Remove screws (70) to remove moving contacts. Slide fingers (53, 55) sideways to remove. Replace fingers by compressing spring (56, 54) in position and inserting the fingers from the side. Holding connector (49) in a vise aids the operation.

Movable Arcing and Main Contact (See **Figure 8**)
Either movable arcing contact (61), or main contact (62), or both, may be removed and replaced as follows:

IMPORTANT: Extreme care should be taken to hold the assembly firmly to retain spring seat (83, 84) and spring (81, 82) upon removal of the screws (78).

Remove lower connectors and moving contacts as described in the preceding section. The complete movable contact assembly may now be brought to the bench. The location of spacers should be noted. Loosen nuts (80) and remove screws (78) from pin (71), alternate several turns each side to prevent binding.

The movable arcing contact or main contact may now be replaced. Compress spring (81, 82) to engage screws (78). The reverse procedure is followed for reinstallation. Care should be taken to replace spacers correctly. Check alignment and adjustment of contacts upon reassembly.

Tripping Actuator Operation and Replacement
When the overcurrent trip device senses a circuit condition that requires the circuit breaker to open, it produces an output that is fed to the tripping actuator. This device then causes the circuit breaker contacts to open and isolate the circuit.

Mounted on the circuit breaker, the tripping actuator is held in a charged position by a permanent magnet. When the overcurrent trip device issues a trip signal, the coil of the tripping actuator is energized, which causes the magnetic flux to shift to a new path, releasing the stored energy of a spring located inside the tripping actuator. The spring provides the energy to trip the breaker, moving the trip-flap clear of the toggle latch.

If the spring-loaded armature does not reset during trip operation, spacer washers may be added to obtain positive reset of the armature. If adding spacers does not cause the armature to be reset, the tripping actuator should be replaced (if breaker mechanism is not at fault).

Note: Do not attempt to disassemble the tripping actuator as this may destroy the magnetic field set up by the permanent magnet and will render the actuator latch inoperative until magnetized.

When replacing a tripping actuator, the coil leads must be connected to the terminal block of the trip device in the correct polarity relationship.

Static Trip III Overcurrent Devices
The black lead of the coil must be connected to terminal 6, the red lead of the coil connected to terminal 7, and the blue lead of the coil to terminal 8 of the static trip device.

When the tripping actuator has been replaced, the circuit breaker should be tested to ensure proper operation of all components. Refer to 'Static Trip III Information and Instruction Guide', SG-3118, and 'Portable Test Set Instructions', SG-3138, for the information on testing the static tripping system on a circuit breaker.

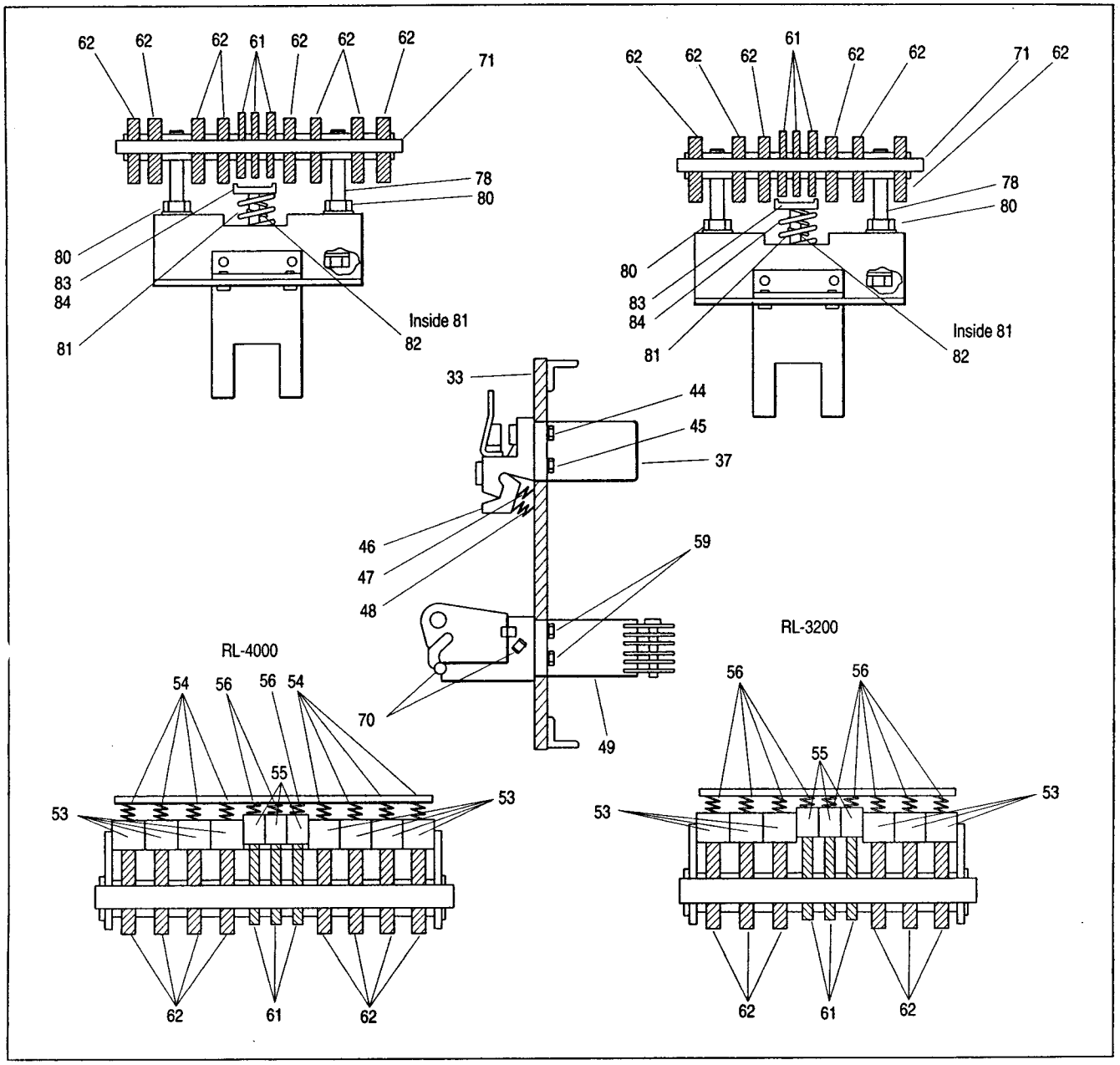


Figure 8. Typical Contact Assemblies

Motor Cutoff Switches (for Electrically Operated Circuit Breakers)

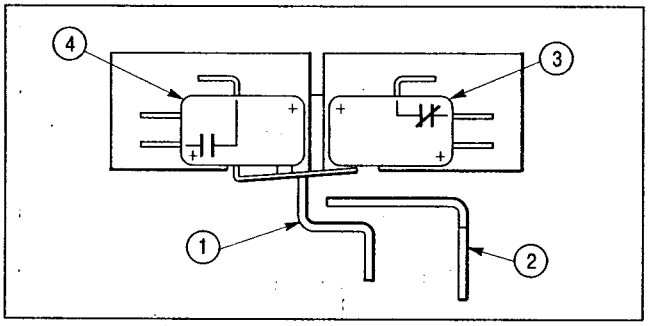


Figure 9a. Position 1. Springs discharged; motor in run position.

Position 1. Springs Discharged; Motor in Run Position.
(Note that **Figures 9a-9c** are depicted as viewed from below)

In **Figure 9a,** note that spring position lever (1) is forward, actuating both switches. Motor/gear position lever (2) is retracted. Motor cutoff switch (3) is closed. Application of power at this time will cause the motor to start, thereby charging the closing springs.

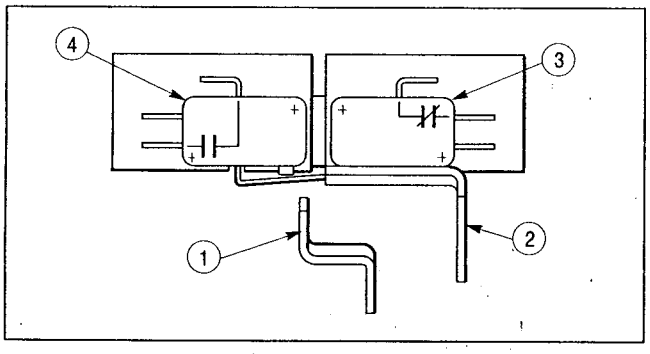


Figure 9b. Position 2. Springs charging; motor not yet cutoff.

Position 2. Springs Charging; Motor Not Yet Cutoff.
While the springs are charging the motor/gear position lever (2) moves forward, applying pressure to the switch actuating leaf. The spring position lever (1) retracts as the springs reach full charge. The motor cutoff switch (3) is closed and the motor is running.

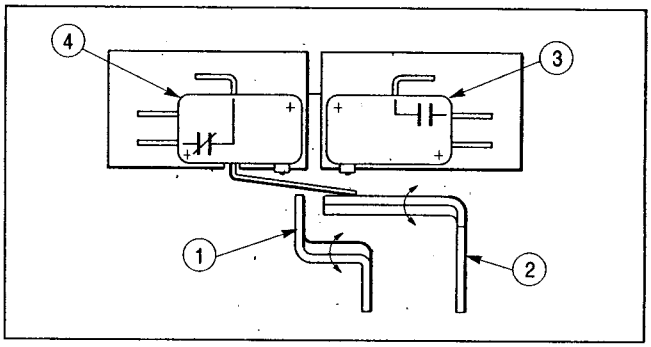


Figure 9c. Position 3. Springs charged; motor stopped.

Position 3. Springs Charged; Motor Stopped.
The springs have reached charged position. The motor/gear lever (2) has been retracted by roll pins on the large gear as the cam follower (82, **Figure 2**) on the large spur gear has disengaged from the wind and close cam (34, **Figure 2**). The motor cutoff switch (3) has opened, stopping the motor and the closing coil switch (4) has closed. Upon application of power to the closing circuit, the breaker will close. Switches then return to position 1 (**Figure 9a**).

Note: In position 3, there is clearance between both levers and the switch actuating leaf. Clearance may be minimal (approximately 1/64") or up to 1/16" (0.4-1.6mm). It is important to completely remove pressure from the switch actuating leaf to be sure that the switches are free to actuate. Adjustment is made by carefully bending the levers as indicated by arrows (items 1 and 2). Do not bend the switch actuating leaf.

IMPORTANT: If the motor cutoff switch (3) does not open, the motor will continue to run and the cam follower (82, Figure 2) will re-engage wind and close cam (34, Figure 2) jamming the entire mechanism, possibly stripping gears in the gear motor, blowing the control fuse, or damaging the motor. To free a jammed mechanism, it is necessary to either remove the gear motor, or, alternatively, to rotate gear by using a ratchet wrench with 13/16 inch 12-point socket to rotate the motor pinion just enough to free the jam.

The springs will discharge and the breaker closes when the gear motor pinion is disengaged from the gear.

Use the manual charging mechanism or the maintenance closing device to prevent this from happening. Move the manual handle towards the charge position, applying force to the closing springs, and allow the ratchet on charging cam to support load while the motor is removed. This prevents the closing springs from discharging when the motor is removed.

Table 5. Lubrication Chart

Lubrication Key	Parts Description	Maintenance & Lubrication	Overhaul
A	Contact bar hinge assembly Primary disconnect fingers, grounding contact Secondary disconnect fingers Rubbing surfaces of main and arcing contacts	Wipe clean and apply a film of Siemens contact lubricant (1) in a thin layer (approximately 1/32" thick)	
B	Sliding surfaces	Light application of Molycote 557 (2) or Anderol 732 (3)	Wipe clean and apply Molycote 557 (2) or Anderol 732 (3) liberally
C	Pivot pins, rotating parts such as drive pinion, gear, etc.	Light application of Anderol 732 (3)	Remove pins, clean, and apply Beacon P-325 (4) or Anderol 732 (3)
D	Ground surfaces such as latches, rollers, props, etc.	Wipe clean and spray with Molycote 557 (2) or Anderol 732 (3)	Wash clean and apply Anderol 732 (3) or Beacon P-325 (4)
E	Faces of main and arcing contacts	Do not lubricate	Do not lubricate
F	Springs	Wipe clean and spray with Molycote 557 (2)	Wipe clean and spray with Molycote 557 (2)
G	Dry pivot points	No lubrication required	No lubrication required

(1) Siemens contact lubricant: part number 15-171-370-002
(2) Molycote 557 spray lubricant: part number 15-171-270-001
(3) Anderol 732: part number 15-172-816-058
4) Beacon P-325: part number 15-337-131-001
(5) For lubrication procedure and recommendations, refer to 'Recommended RL Breaker Maintenance and Lubrication Procedure', on **Page 12**.

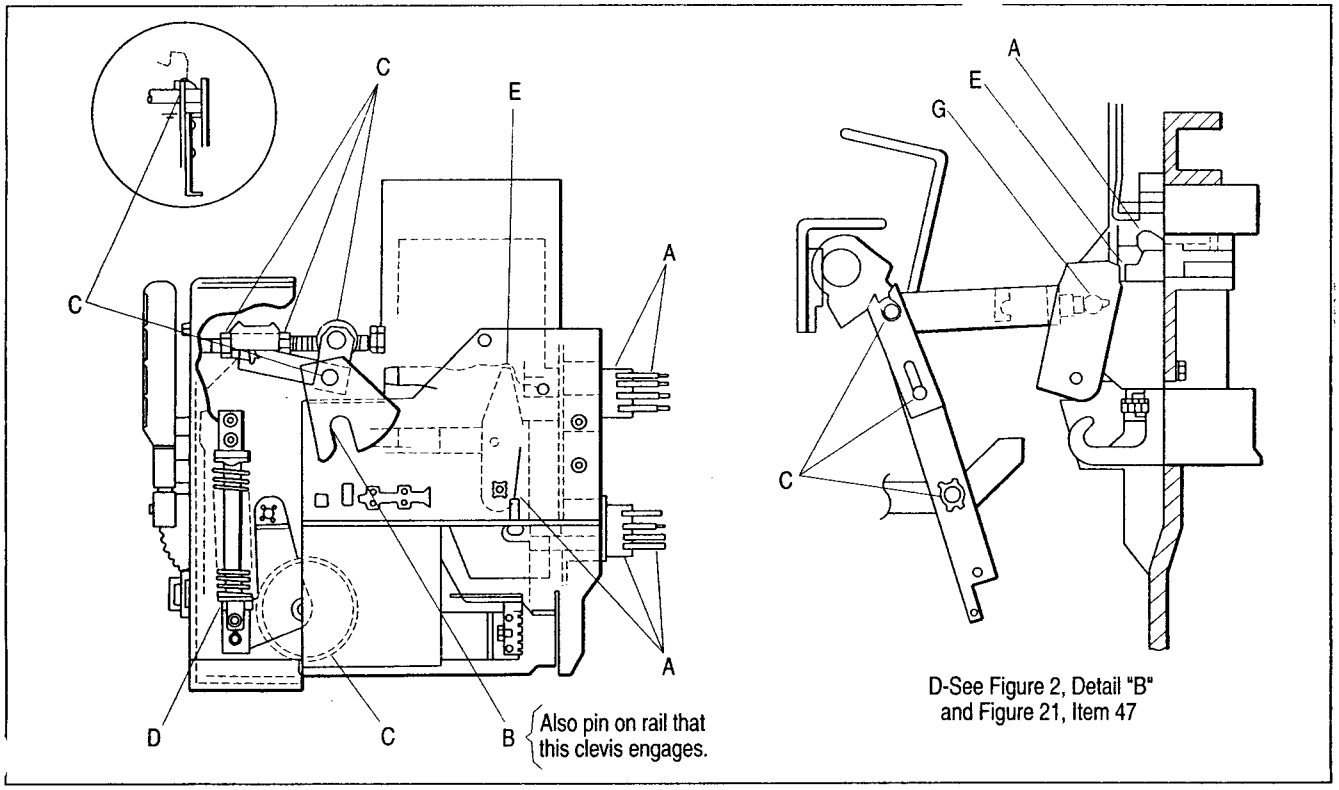


Figure 10. Lubrication Points on Circuit Breaker

Fuse Functions

Current Limiting Fuses
Current limiting (CL) fuses are used to increase the interrupting capacity beyond that of the breaker alone, or to the limit the fault "let-thru" current downstream of the fuse. The CL fuses used with the RL series of circuit breakers are **special purpose** fuses having NEMA Class "J" or Class "L" characteristics with an interrupting capacity of 200,000 Amperes RMS Symmetrical.

When fuse replacement is required, use only fuses as shown on Siemens drawing 71-142-200, having the same ratings as supplied with the circuit breaker. Different fuses may not properly mount on the breaker and may have different protective characteristics.

The current limiting fuses for the larger frame sizes (RLF-3200, RLF-4000, and RLF-5000) mount on a separate fuse drawout assembly. For complete description, see 'Fuse Carriage', beginning on **Page 22**.

Open Fuse Trip Device

⚠WARNING

Hazardous voltage.

Can cause death, serious personal injury, electrical shock burns, or property damage.

Line voltage may be present inside trigger fuse assembly. Do not remove trigger fuse cover when circuit breaker or fuse carriage is in the CONNECT position.

The Open Fuse Trip mechanism has three functions:
1. To trip the circuit breaker mechanically when a CL fuse has interrupted.

2. To indicate which phase CL fuse has interrupted. The plunger of the trigger fuse (13), indicates visually which phase CL fuse has interrupted.

3. To retain the breaker in the trip free position until the trigger fuse is replaced.

Each trigger fuse is wired in parallel with one of the CL fuses. When the CL fuse interrupts, its associated trigger fuse also opens, and releases a plunger which releases a precompressed spring contained in the trigger fuse housing. See **Figure 11**. On the integrally fused breakers (RLF-800 thru RLF-2000), this plunger operates arm (3) which moves the latch (12), releasing the spring-loaded lever (4). This rotates circuit breaker trip flap link (7). This trips the circuit breaker and holds the circuit breaker in the mechanical trip-free position.

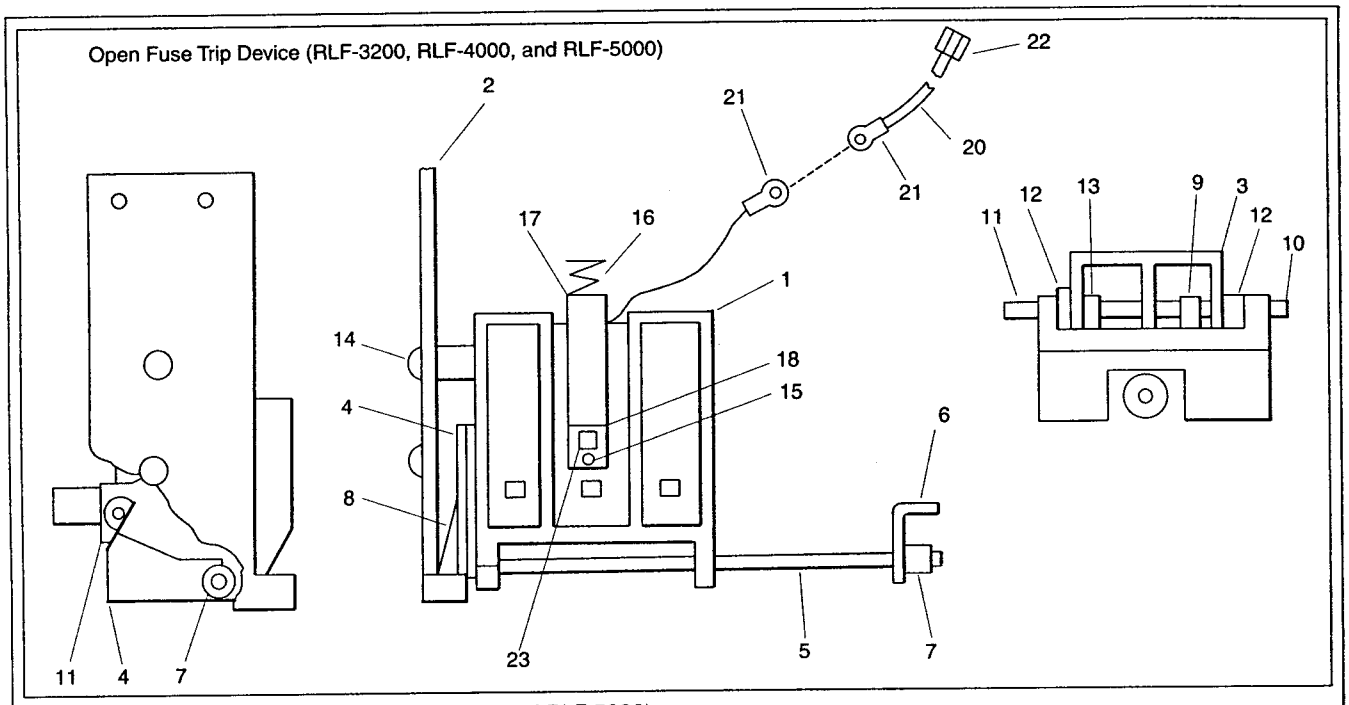
On large frame size circuit breakers (RLF-3200 thru RLF-5000) supplied with a separate fuse carriage, the trigger fuses are mounted on the fuse carriage, and are used for visual identification of the faulted phase. Tripping of the breaker is accomplished through a power supply connected across the main fuses of the fuse carriage. The voltage from this supply is applied through the secondary control wiring to the coil of a solenoid mounted open fuse trip device on the circuit breaker. The plunger of the solenoid operates arm (3). The balance of the operation is the same as for the trigger fuse operated device.

The circuit breaker will remain trip free (cannot be closed) until the trigger fuse has been replaced and the associated trip mechanism reset lever (4) has been manually reset (pushed up).

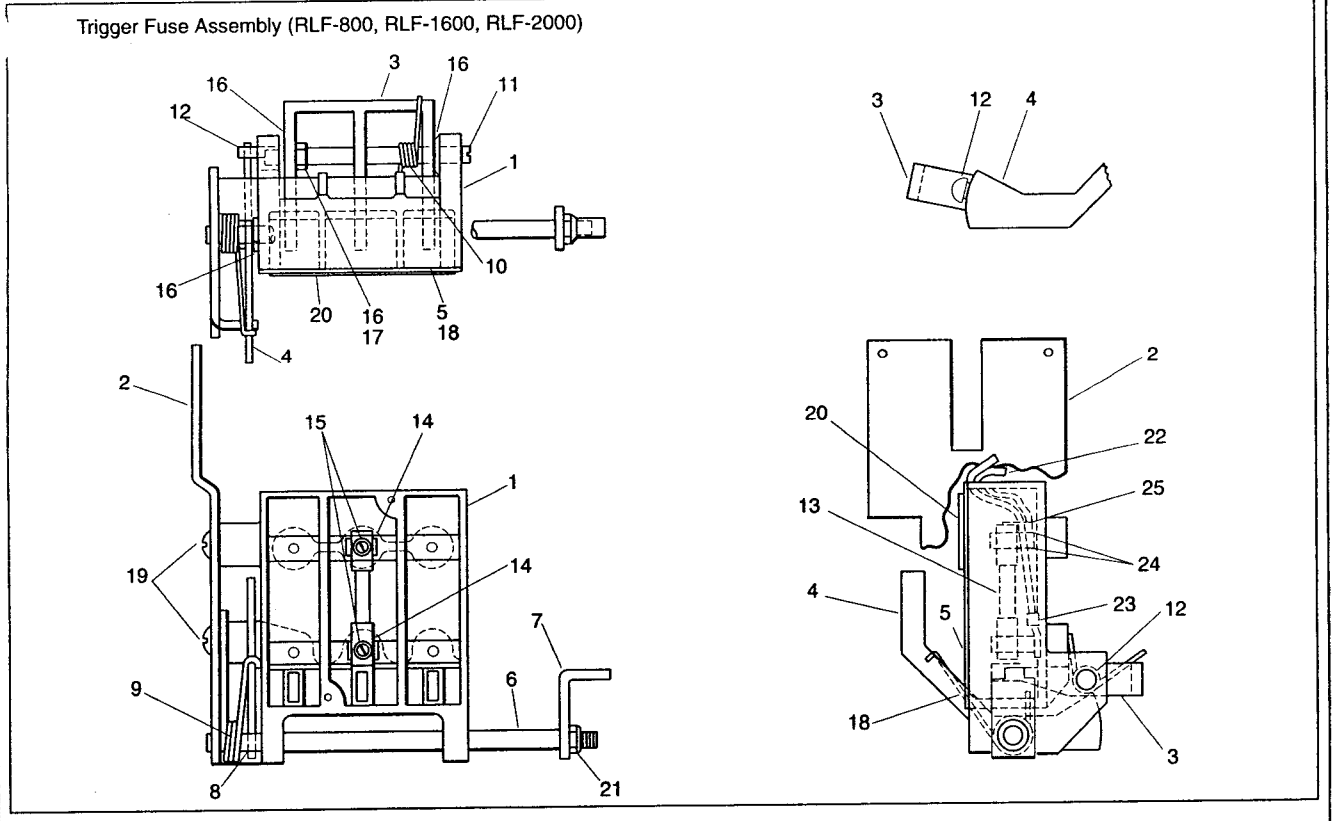
To remove the trigger fuse, remove screws (15), remove plastic cover (5), then the trigger fuse.

To install the trigger fuse, reverse the above procedure.

NOTE: The trigger fuse (13) must be inserted with the plunger facing arm (6). The gap dimension of 0.03" (0.8mm) maximum must be maintained for each fuse. Be sure to replace both the trigger fuse and its corresponding CL fuse before the breaker is reset.



Open Fuse Trip Device (RLF-3200, RLF-4000, and RLF-5000)



Trigger Fuse Assembly (RLF-800, RLF-1600, and RLF-2000)

Figure 11. Open Fuse Trip Device Views and Trigger Fuse Assembly Views

Fuse Carriage

Introduction
Type RFC-3200, RFC-4000, and RFC-5000 fuse carriages for use with Type RLF-3200, RLF-4000, and RLF-5000 circuit breakers are furnished for mounting in metal-enclosed switchgear of the drawout type. (See **Figures 12** and **13**). All fuse carriages are completely assembled, tested, and calibrated at the factory in a vertical position, and must be so installed to operate properly.

Description
The basic RL-3200, RL-4000, and RL-5000 unfused circuit breakers have continuous current ratings equal to their frame size (3200A, 4000A, or 5000A) or tripping transformer rating (whichever is lower), and interrupting ratings as shown in the descriptive bulletin.

When used in conjunction with the separately mounted type RFC fuse carriage, the circuit breaker designations become RLF-3200, RLF-4000, and RLF-5000. The fused breakers have an attachment that operates to open the circuit breaker when one or more of the current limiting fuses opens. The interruption rating of the combination of fuses and circuit breaker is increased to the interrupting rating of the fuses — 200,000 amperes symmetrical at 600 volts or less.

The continuous current rating may be restricted by the fuse size used. When equipped with 6000 amperes fuses, the RLF-4000 combination is rated at 4000 amperes continuous, and the RLF-5000 combination is rated 5000 amperes continuous. The RLF-3200 combination is rated at 3200 amperes continuous when equipped with 5000 ampere fuses. The circuit breaker continuous ratings are reduced when smaller rated fuses are used. (Refer to the catalog for application information.)

The type RFC fuse carriages are provided with open-fuse sensors connected to the open-fuse trip attachment which is mounted on the circuit breaker. This device opens the circuit breaker when one or more of the current-limiting fuses open.

Note: Tripping depends on voltage being developed across the open fuse by the power source. NO TRIPPING WILL OCCUR IF THE POWER CIRCUIT IS DE-ENERGIZED.

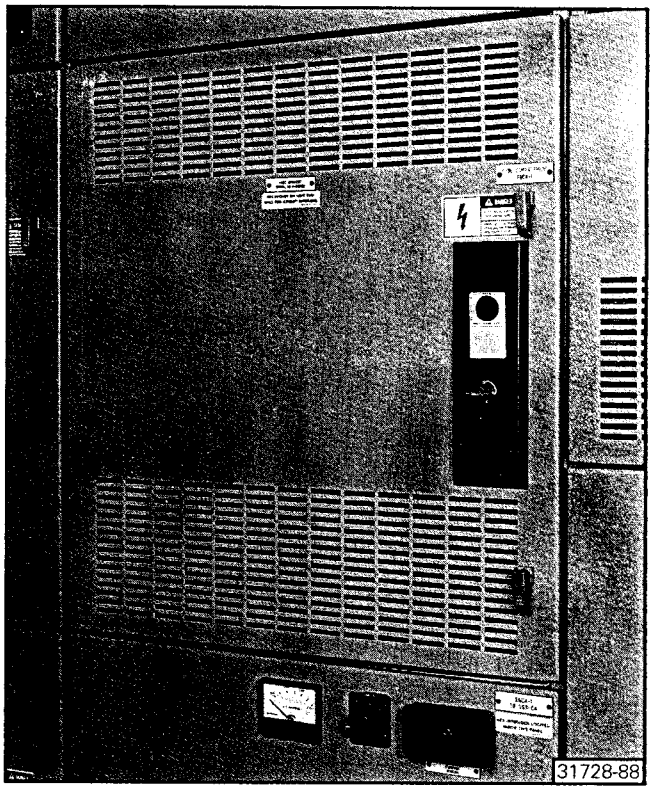


Figure 12. Fuse Carriage Compartment with Door Closed

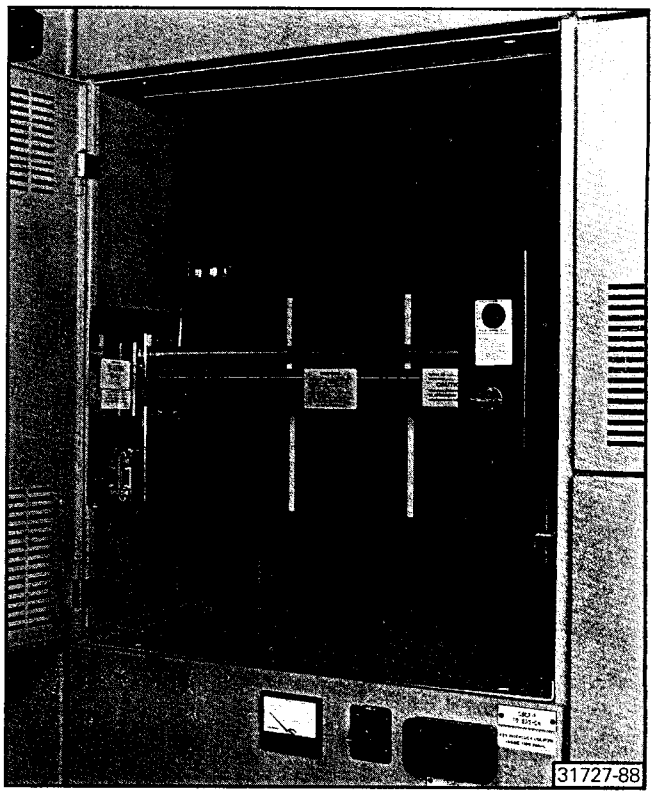


Figure 13. Fuse Carriage in Compartment with Door Open

Fuse Carriage

Precautions to be Observed in the Operation of RLF Circuit Breakers with RFC Fuse Carriages:

1. Read this Instruction Manual before installing or making any changes or adjustments.

2. As the closing springs on stored-energy breakers may be charged in either the circuit breaker open or closed position, extreme care should be taken to discharge all springs before working on the circuit breaker.

3. When charging springs of manually operated circuit breakers, always grasp charging handle firmly until it is returned to the normal vertical position.

4. Check current ratings, wiring information, circuit breaker type and static trip type against the one line diagram to assure that circuit breakers and fuses are located in the proper compartments within the switchgear.

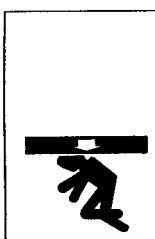
   Note: The separately mounted fuse carriage is equipped with a key interlock that requires that the fuse carriage be used in a specific compartment. Refer to nameplate on fuse carriage for compartment number.

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

6. Close the compartment door and secure the latches prior to racking to or from the CONNECT position. Also close compartment door prior to closing the circuit breaker when in the CONNECT position. Once the circuit breaker is closed, keep the door closed.

7. Once the circuit breaker or fuse carriage is energized, do not open the compartment doors. Perform any required operations with external controls, with the doors closed and securely latched.

Installation Sequence



⚠WARNING

Heavy weight overhead.

Can cause death, serious personal injury or property damage.

Always use approved lifting means to handle circuit breakers or fuse carriages. Follow instructions for use of lifting bar assembly. Avoid excessive speeds and sudden stops. Never lift a circuit breaker or fuse carriage above an area where personnel are located.

1. Take the key for the FUSE CARRIAGE from its associated CIRCUIT BREAKER compartment.

2. Using the proper lifting equipment and following the instructions (Steps A-D, **Figure 1** on **Page 5**) for circuit breaker installation, insert the FUSE CARRIAGE into its proper compartment. Observe labeling. Unlock the racking mechanism using the key from the circuit breaker compartment. Check that the racking clevises engage the pins on both sides of the compartment.

   Use the racking crank to rotate the racking screw in a clockwise direction until the fuse carriage reaches its CONNECT position.

3. Close the fuse carriage compartment door.

4. Operate the key interlock on the fuse carriage, which allows the key to be removed. Use the key to operate the key interlock in the associated CIRCUIT BREAKER cell.

5. Using lifting equipment, insert the circuit breaker into its compartment. Push the circuit breaker until the racking clevises engages the pins on both sides of the compartment. See 'Installation' (Steps A-D, **Figure 1** on **Page 5**), and steps 5-10 of the 'Installation (and Removal) Sequence' on **Page 4**.

6. Close and trip the circuit breaker. Refer to 'Operation', **Pages 6-10** for manually and electrically operated breakers.

   During the closing operation, observe that the contacts move freely without interference or rubbing between movable arcing contacts and parts of the arc chutes. Then refer to 'Operation', **Pages 6-10** for a detailed description of the circuit breaker operating characteristics before putting the circuit breaker in service.

7. Trip units and accessory devices should receive a thorough check prior to placing the circuit breaker in service to be certain that adjustments are correct and parts are not damaged. Refer to 'Static Trip III Information and Instruction Guide', SG-3118.

8. Drawout circuit breakers are equipped with a drawout interlock to prevent movement of a closed circuit breaker into or out of the CONNECT position. See 'Drawout Interlock', **Page 9** for a description of the interlock. Its operation should be checked before the circuit breaker is energized. The fuse carriages are interlocked with a key and lock system to assure that the circuit breaker is OPEN (see 'Key Interlock System', **Page 24**) before the fuse carriage can be racked in or out.

9. Upon completion of the installation inspection, the circuit breaker is ready to be energized after the control wiring, if any, is checked and the insulation tested. (Also see 'Testing Open Fuse Trip Attachment', **Page 25**).

10. Before racking the circuit breaker into the CONNECT position, check that the open fuse trip attachment is reset properly. If the attachment is correctly reset, close the compartment door, and rack the circuit breaker into the CONNECT position. Remove the racking crank and close the racking window. The circuit breaker can now be operated in its normal manner.

11. To remove the Circuit Breaker/Fuse Carriage, reverse the above procedures.

Fuse Functions

Fuses
Only special purpose fuses in accordance with Siemens drawing number 71-142-200 can be used with the circuit breaker/fuse carriage combination. Fuses which do not conform to this specification will not mount on the fuse carriage terminals.

Only fuses of the same current rating should be used for replacement of any open fuses.

Trigger Fuses and Open Fuse Trip Attachment

⚠WARNING

Hazardous voltage.

Can cause death, serious personal injury, electrical shock burns, or property damage.

Line voltage may be present inside trigger fuse assembly. Do not remove trigger fuse cover when circuit breaker or fuse carriage is in the CONNECT position.

The fuse carriage has provisions for mounting three trigger fuses that are connected in parallel with the main power fuses. They are used to indicate which of the power fuses opened under a system fault. Operation of the open-fuse trip attachment is indicated by movement of its reset handle to a horizontal position.

The breaker-mounted open-fuse trip attachment holds the circuit breaker in its tripped position, and the circuit breaker cannot be reclosed until the open-fuse trip attachment is reset manually. The trigger fuses should also be replaced when replacing the main power fuses if open phase indication is desired. The system will function normally if the trigger fuses are not replaced. However, phase indication will not be provided.

Use only Chase-Shawmut Type TI-600 trigger fuses in the indicator.

Key Interlock System (See **Figures 14** and **15**)
Each fuse carriage is equipped with an integral key-operated interlock for installation in a specific compartment. Interlocks prevent racking the fuse carriage in or out of the CONNECT position if its associated circuit breaker is not in its locked open position.

Once the circuit breaker is open, the key in the circuit breaker compartment can be rotated, lowering the locking bar to prevent closing the circuit breaker. The key can then be removed from the circuit breaker lock and transferred to the lock on the fuse carriage. The fuse carriage lock operates the slide interlock cover over the racking screw of the fuse carriage. Once the racking screw is exposed, the fuse carriage can be racked in or out using the racking handle. The key is retained in the lock when the fuse carriage is between the TEST and CONNECT positions.

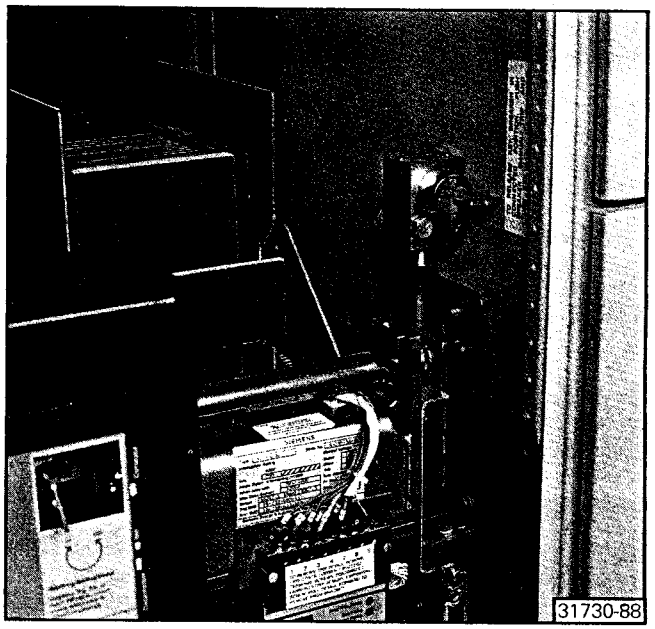


Figure 14. Key Interlock Located in Circuit Breaker Compartment

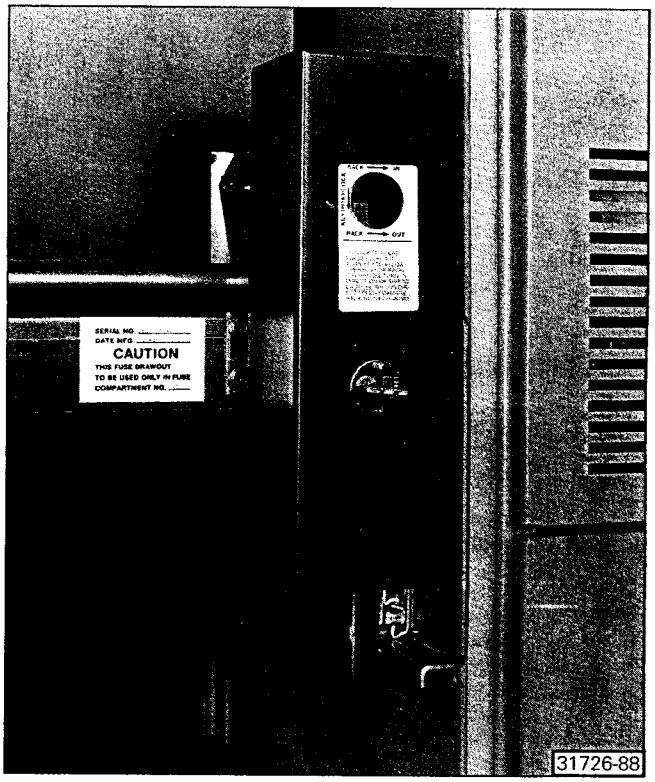
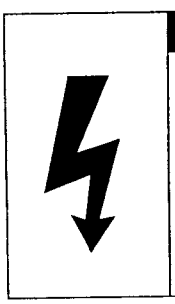


Figure 15. Fuse Carriage Key Interlock

Fuse Functions

Testing Open Fuse Trip Attachment
The open fuse trip attachment is operated by the voltage developed across the open fuse. This voltage is applied to a transformer and rectifier combination. The output of the rectifier is connected to the coil of the trip attachment on the circuit breaker through the secondary disconnects of the two devices. For testing, voltage is applied to the input of the transformers. To do this, the fuses must be open, or the transformer disconnected from the fuse. Otherwise, the fuse will short out the test source. For safety, the following procedure is recommended.



⚠WARNING

Hazardous voltage.

Can cause death, serious personal injury, electrical shock burns, or property damage.

Line voltage may be present inside trigger fuse assembly. Do not remove trigger fuse cover when circuit breaker or fuse carriage is in the CONNECT position.

1. Open the circuit breaker and rack it to its TEST position. Open the circuit breaker compartment door, remove the key from the interlock.

2. Use the key to unlock the fuse carriage racking mechanism. Rack the fuse carriage to its TEST position. At this point, the main disconnects are clear of the power circuit, while the secondary disconnects are still engaged. The key can now be rotated and removed from the fuse carriage racking mechanism lock.

3. Remove the safety barriers of the fuse carriage to allow access to the main power fuses. Disconnect the two small (No. 14 AWG) wires from the top terminals of the power fuses. Connect the two small wires of each phase together. Keep them insulated from the top of the fuse. Remove the trigger fuse cover and remove the trigger fuses.

4. Close the circuit breaker. Apply voltage to the terminals in the trigger fuse block, preferably from a variable transformer with a voltmeter, although 120 VAC can be used. The voltage is applied between the terminals where the trigger fuses were mounted, one phase at a time. The circuit breaker must trip at 120 VAC or less. Remove the voltage, reset the open fuse trip device on the circuit breaker and reclose the circuit breaker for the next test. Repeat the test for each of the three phases.

5. Replace the trigger fuses. Reconnect the two wires to the top of each power fuse terminal, and replace the safety barriers and covers, before racking the units back to the CONNECT position.

Maintenance
Occasional checking and cleaning of the circuit breaker and fuse carriage will promote long and trouble-free service. Periodic inspection and servicing should be included in the maintenance routine.

Refer to 'Maintenance', **Pages 11-16**, and 'Lubrication Chart', **Table 5**, for recommended inspection and maintenance procedures and lubrication instructions applicable to RLF fused circuit breakers and to RFC fuse carriages.

Optional Devices

Operation Counter
This option consists of a mechanically operated counter with a bracket that mounts at the bottom of the breaker mounted auxiliary switch. The counter arm connects through a spring to the switch operating arm. The counter is non-resettable. The breaker must have an auxiliary switch for installation of this option.

Maintenance Closing Device
This device is a manual charging handle assembly arranged for use as a maintenance tool. The charge link is spring loaded and retained to make insertion into the breaker frame less difficult and the pivot pin is retained by a chain. After charging the closing springs, the handle must be manually returned to the vertical position to allow closing the breaker.

Electrically Operated Interlock
This device is an additional solenoid that must be energized before the breaker can be closed. When the device is de-energized, the breaker is held TRIP FREE so that it cannot be closed either electrically or manually. The device is available for 48 or 125 VDC, or 120 VAC. The device is similar in construction and mounts in the same location as the undervoltage trip device. The electrically operated interlock has a mechanical link from the device to the main shaft of the breaker to hold the device in the picked-up position when the breaker is closed. Once closed, the device can be de-energized without tripping the breaker. There are no adjustments for pickup or dropout voltages of the device. The device is designed to be energized continuously.

Undervoltage Trip Device (late 1996 and after)
This device automatically trips the circuit breaker on loss of voltage. The device has time delay settings of instantaneous, and 1, 2, or 3 seconds. The rated input voltage, pickup voltage, and dropout voltage are selectable using DIP switches, as shown in the chart in **Figure 31**.

A 0.06" (1.5mm) gap should be maintained between flap extension and pull link when the device is energized. (See **Figure 31**).

The device includes an LED indicator. When the device is energized and operating normally, the LED flashes. If the voltage drops below the dropout voltage, the LED will be on continuously to indicate an impending trip. If the input voltage exceeds the rated voltage by approximately 15% (DC) or 5% (AC), the LED will be on continuously to indicate excessive voltage input.

The device includes an internal fuse. This fuse is not designed to protect the device, but rather, is intended to avoid damage to the user's control power supply in the event of failure of the undervoltage device. If the fuse is blown, damage to the undervoltage device is likely, and the device should be replaced.

Undervoltage Trip Device (Up to Late 1996)
This device automatically trips the circuit breaker on loss of voltage. Either instantaneous or time-delay operation can be supplied. A 0.06" (1.5mm) gap should be maintained between flap extension and pull link when the device is energized. The pickup and dropout adjustments are set so that the device picks up at a voltage of 85% or less and drops out between 30 and 60% of rated value. Devices with time-delay operation are available for 24, 48 or 125 VDC or for 120 VAC. Devices with instantaneous operation are available for 24, 48, 125, or 250 VDC or 120 or 240 VAC.

Note: On time-delay devices, pickup and dropout are individually adjustable and time delay is adjustable from 0.04 to 3 seconds (maximum 2 seconds on 24 VDC version).

Latch Check Switch
This option is a small switch mounted on a bracket. The switch operator is adjusted so the switch is operated by, and indicates the position of, the breaker trip flap. The latch check switch may be used in conjunction with the electrical interlock or undervoltage devices to delay the application of voltage to the close coil until the undervoltage or interlock device has picked up.

Static Trip III Overcurrent Device
The Static Trip III device mounts onto a slide-type bracket on the circuit breaker. To remove trip device, the terminal block cover located above it should be removed, exposing the terminal block screws. The lower row of screws can be loosened with a screwdriver allowing the terminal block fanning strip to be removed from the terminal block. Removal of the fanning strip exposes a mounting screw. This screw can be removed, allowing the trip device to be removed from the circuit breaker. To remove the trip device, pull the trip device towards the front of the circuit breaker. See 'StaticTrip III Information and Instruction Guide', SG-3118.

Bell Alarm Switch
This unit functions to operate a switch. A single-pole double-throw, or a double-pole double-throw switch is available. The switch operator is connected to, and operated by the tripping actuator. The switch operator remains tripped even when the actuator is reset by the circuit breaker. The switch operator must be reset either manually or by an additional optional electrical reset solenoid.

The contacts of the bell alarm switch can be connected in series with the circuit breaker closing coil, to provide a lockout feature to prevent reclosing after an overcurrent tripping operation.

Mechanical Lockout
This option consists of a manual reset for the tripping actuator, with the normal automatic reset disabled. The breaker is held trip free following an overcurrent trip, until manually reset.

Parts

Table of Contents

How to Use Your Parts Ordering Guide

1. Locate part or parts to be replaced in one of the figures in this manual.
2. Identify each part by item number, description, and part number. Give figure number in which part is shown.
3. Include breaker type, rating, and breaker serial number with your order.
4. Place order with your Siemens representative.
5. When ordering relays or other electrical parts, include control voltage (see recommended spare parts list for part numbers).

Ordering Example

Type RL-3200 Rated Continuous 3200A Serial Number R-88888A-2

Mode of Operation: Electrical

Instruction Manual SG3068-03

Figure	Item	Description	Part Number
17	6C	Apron	18-732-791-505
25	147	Pushrod	18-657-768-036
32	6	Bearing	71-141-995-001

IF REQUIRED PARTS ARE NOT IDENTIFIED IN THIS MANUAL —

1. Make a copy of the figure in which the part would appear.
2. Indicate with arrows or other markings location of part.
3. Describe required part and enclose sketch or photograph of part.
4. Include breaker type, rating, and breaker serial number with your order.
5. Place order with your Siemens representative.

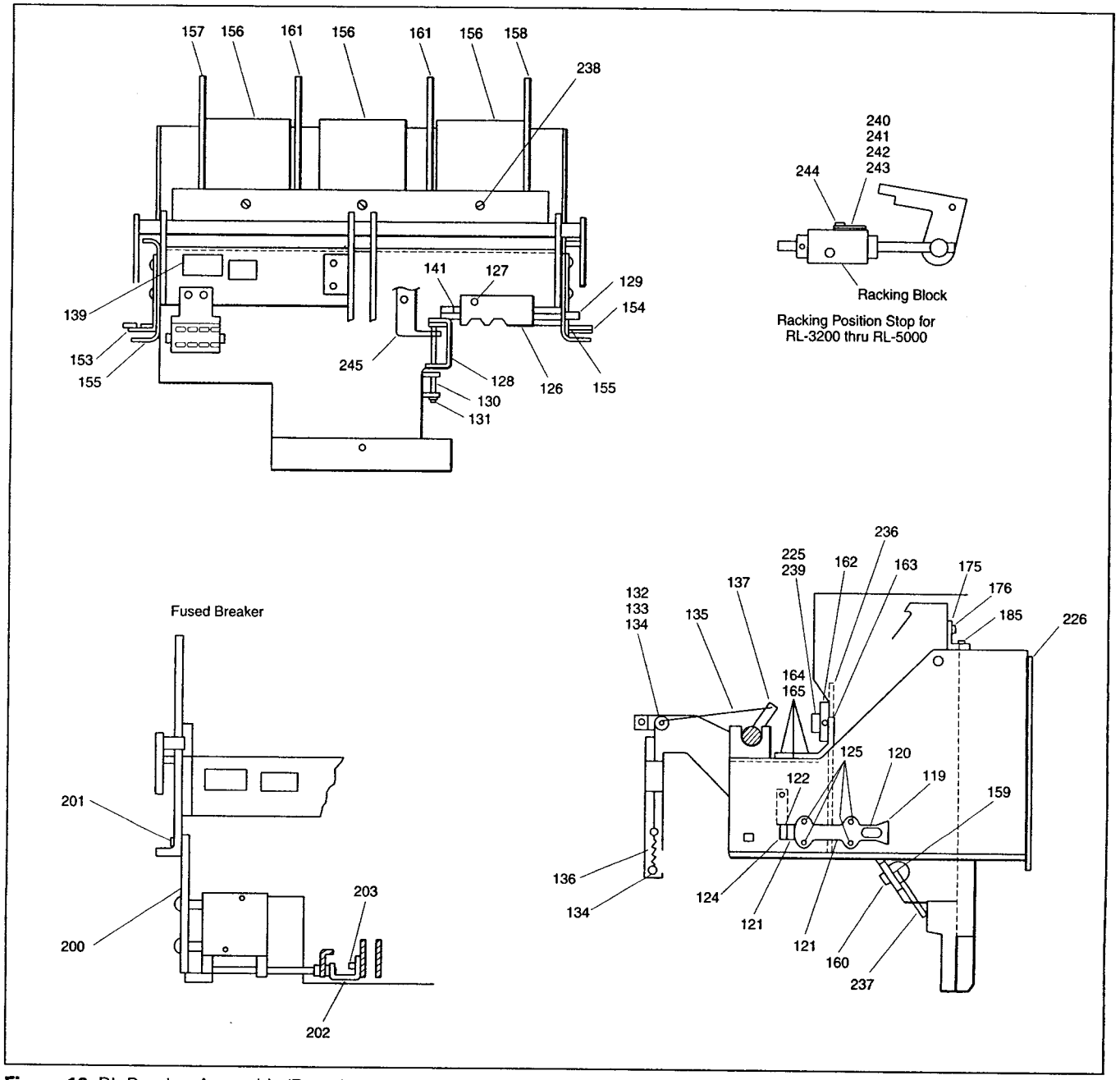


Figure 16. RL Breaker Assembly (Part 1)

Parts

Refer to **Figure 16.**

Item	Description	Part Number	Usage
119	PTO Support	18-732-790-004	
120	PTO Shaft	18-661-600-515	
121	Bearing	18-658-110-274	
122	PTO Arm Assy	18-733-500-518	
124	Cotter Pin	00-671-195-117	
125	Screw	15-171-399-049	
126	Bracket	18-398-936-003	
127	Screw	00-615-461-371	
128	Interlock assy	18-658-612-572	
129	Interlock Bar	18-733-482-001	
129A	Interlock Bar	18-733-482-002	RL-3200 thru RLE-4000
129B	Interlock Bar	18-733-482-005	RL-5000
130	Pin	18-658-110-329	
131	Sichsl	00-000-401-166	
132	Pulley Half 1	18-658-143-018	
133	Pulley Half 2	18-658-143-019	
134	Screw	15-171-399-008	
135	Cable Assy	18-732-791-806	
136	Spring	71-142-049-001	
137	Screw	15-171-074-010	
139	Label	18-658-024-193	
141	X Washer	00-659-055-156	
153	Detent Assy LH	18-732-791-551	
154	Detent Assy RH	18-732-791-550	
155	Spring	18-657-434-169	
156	Arc Chute	18-728-500-591	RL-800, RLE-800
156A	Arc Chute	18-732-792-501	RL-1600
156B	Arc Chute	18-398-789-503	RLE-2000, RL-2000
156C	Arc Chute	18-398-789-501	RL-3200
56D	Arc Chute	18-398-789-502	RL-4000, RLE-4000
156E	Arc Chute	18-732-790-557	RLI-800
156F	Arc Chute	18-398-289-581	RL-5000
157	Phase Barrier	18-398-937-001	
157A	Phase Barrier	18-398-937-003	RL-3200 thru RL-5000
157B	Phase Barrier	18-732-790-053	RLF-2000
158	Phase Barrier	18-398-937-002	
158A	Phase Barrier	18-398-937-004	RL-3200 thru RL-5000
158B	Phase Barrier	18-732-790-054	RLF-2000
159	Barrier	18-657-941-110	RL-800 to RL-1600
159A	Barrier	18-657-941-109	RLE-2000, RL-2000
159B	Barrier	18-657-962-124	RL-3200
159C	Barrier	18-657-962-123	RL-4000, RLE-4000
159D	Barrier	18-658-143-254	RL-5000
160	Plastic Rivet	00-671-501-070	
161	Barrier	18-657-941-108	

Item	Description	Part Number	Usage
161A	Barrier	18-657-962-122	RL-3200 thru RLE-4000
161B	Barrier	18-657-937-284	RLF-2000
162	Support	18-732-790-052	RL-800 thru RLI-800
162A	Support	18-732-790-055	RL-1600
162C	Support	18-732-790-056	RLE-2000, RL-2000
162D	Support	18-734-617-002	RL-3200
162E	Support	18-734-617-001	RL-4000, RLE-4000
162F	Support	18-734-617-003	RL-5000
163	Clip	18-658-110-308	RL-800 thru RLE-2000 (up to mid-1993)
163A	Knob	18-657-961-385	RL-3200 thru RLE-4000 (up to mid-1993)
163B	Lockwasher	00-655-047-240	RL-3200 thru RLE-4000 (up to mid-1993)
163C	Chute retainer assy.	18-658-143-563	(mid-1993 and after)
164	Screw	15-171-399-010	
165	Lockwasher	00-655-067-100	RL-800 thru RLE-2000
175	Angle	18-658-110-279	RLI-800, RLE-2000
176	Screw	00-615-650-218	RLI-800, RLE-2000
185	Screw	15-171-399-052	RLI-800, RLE-2000
200	Open Fuse Trip	18-399-796-501	RLF-800 thru RLF-2000
200A	Open Fuse Trip	18-399-805-501	RLF-3200 thru RLF-4000
200B	Open Fuse Trip	18-399-805-502	RLF-5000
201	Screw	15-171-399-010	All RLF
202	Bracket	18-657-961-338	RLF-3200 thru RLF-5000
203	Screw	15-171-399-010	RLF-3200 thru RLF-5000
225	Screw	00-615-471-373	RL-800 thru RLE-2000
226	Stud Brace	18-732-790-130	RLE-800, RLI-800
226A	Stud Brace	18-732-790-180	RLE-2000
236	Front Barrier	18-732-790-160	RLI-800
236A	Front Barrier	18-658-110-178	RLE-800
236B	Front Barrier	18-658-110-304	RLE-2000
236C	Front Barrier	18-752-300-121	RL-5000
237	Bottom Barrier	18-658-110-177	RLE-800, RLE-2000
237A	Bottom Barrier	18-658-143-384	RL-5000
238	Screw	00-615-650-218	RLI-800, RLE-800 RLE-2000
239	Lockwasher	00-655-067-140	
240	Shim	18-658-024-238	RL-3200 thru RL-5000
241	Shim	18-658-024-238	RL-3200 thru RL-5000
242	Shim	18-658-024-240	RL-3200 thru RL-5000
243	Shim	18-658-024-241	RL-3200 thru RL-5000
244	Screw	00-615-641-906	RL-3200 thru RL-5000
245	Pin Brace	18-658-145-005	

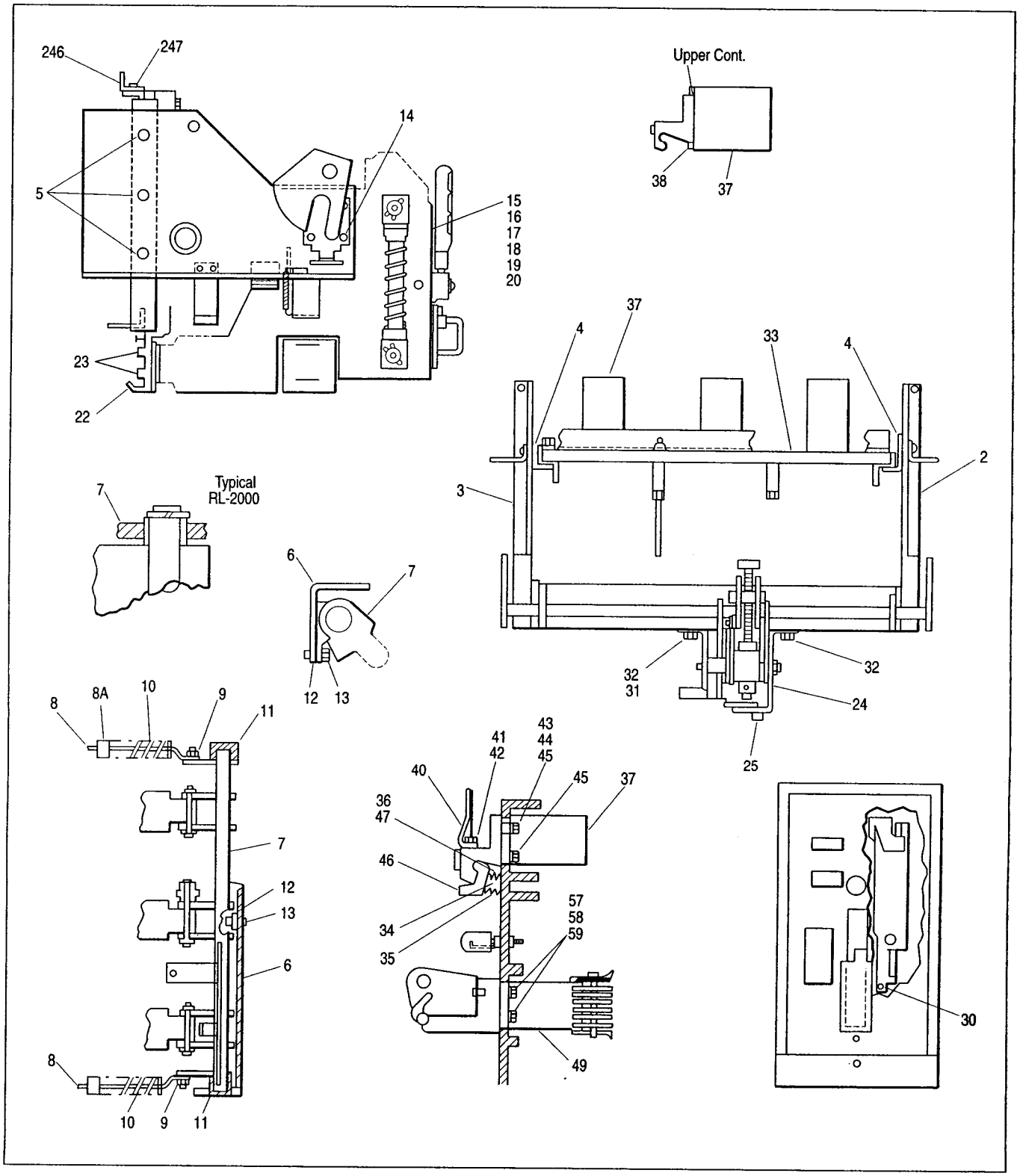


Figure 17. RL Breaker Assembly (Part 2)

Parts

Refer to **Figures 17** and **18**

Item	Description	Part Number	Usage
2	RH Sideplate	18-398-289-510	
3	LH Sideplate	18-398-288-002	
4	Angle	18-657-937-254	RL-3200, RL-4000
5	Screw	15-615-024-006	Drawout Only
6	Apron	18-732-791-504	RL-800, RLE-800 & RL-1600
6A	Apron	18-732-790-537	RLI-800
6B	Apron	18-732-791-521	RL-2000, RLE-2000
6C	Apron	18-732-791-505	RL-3200 thru RLE-4000
6D	Apron	18-752-300-553	RL-5000
7	Shaft	18-732-791-503	RL-800, RLE-800 & RL-1600
7A	Shaft	18-732-790-138	RLI-800
7B	Shaft	18-732-791-508	RLE-2000, RL-2000
7C	Shaft	18-732-791-509	RL-3200
7D	Shaft	18-732-791-510	RL-4000, RLE-4000
7E	Shaft	18-752-300-554	RL-5000
8	Spring Guide	18-732-790-008	
8A	Guide	18-658-110-250	RL-800 thru RLE-2000
9	X Washer	00-659-055-156	
10	Spring	71-141-799-001	
10A	Spring	71-142-123-001	RLI-800, RL-3200 thru RL-5000
11	Bearing	15-171-399-002	
12	Bearing Block	18-657-768-050	RL-800, RL-1600
12A	PR Stop	18-658-110-116	RLI-800
13	Screw	00-615-663-373	RL-800, RL-1600
13A	Screw	00-615-405-378	RLI-800
14	Screw	15-615-024-007	
15-20	Operator	See **Figure 21**	
22	Support	18-732-790-036	RL-3200 thru RL-5000
23	Screw	00-615-663-373	
24	Support	18-752-300-514	Drawout
24A	Support	18-752-300-002	Stationary
25	Shutter Assy	18-752-300-514	Drawout
25A	Shutter Assy	18-752-300-565	Stationary
30	Screw	00-615-345-214	
31	Screw	00-615-663-373	RL-800, RLI-800 & RL-1600
32	Screw	15-171-399-052	RLI-800, RL-2000 thru RL-4000
33	Backpanel	18-551-364-001	RL-800, RLE-800
33A	Backpanel	18-551-364-004	RLI-800
33B	Backpanel	18-551-364-002	RL-1600
33C	Backpanel	18-551-364-003	RL-2000
33D	Backpanel	18-551-364-006	RLE-2000
33E	Backpanel	18-398-288-006	RL-3200
33F	Backpanel	18-398-288-007	RL-4000, RLE-4000
33G	Backpanel	18-398-288-114	RL-5000
34	Roll Pin	00-671-177-321	RL-3200 thru RLE-4000
35	Roll Pin	00-671-177-313	RL-3200 thru RLE-4000
36	Rivet	00-671-251-085	RL-3200 thru RLE-4000
37	Upper Cont Assy.	18-732-788-501	RL-800, RLI-800 & RLE-800
37A	Upper Cont Assy.	18-732-788-502	RL-1600
37B	Upper Cont Assy.	18-732-791-511	RLE-2000, RL-2000 Left
37C	Upper Cont Assy	18-732-791-512	RLE-2000, RL-2000 Center
37D	Upper Cont Assy	18-732-791-513	RLE-2000, RL-2000 Right
37E	Upper Cont Assy	18-733-742-501	RLF-800
37F	Upper Cont Assy	18-733-742-502	RLF-1600
37G	Upper Cont Assy	18-732-791-526	RLF-2000 Left
37H	Upper Cont Assy	18-732-791-527	RLF-2000 Center
371	Upper Cont Assy	18-732-791-528	RLF-2000 Right
37J	Upper Cont Assy.	18-734-434-501	RL-800, RLE-800, RLI-800 Stationary
37K	Upper Cont Assy.	18-734-435-501	RL- 1600 Stationary
37L	Upper Cont Assy.	18-732-791-535	RL-2000, RLE-2000 Stationary Left
37M	Upper Cont Assy.	18-732-791-536	RL-2000, RLE-2000 Stationary Center
37N	Upper Cont Assy.	18-732-791-537	RL-2000, RLE-2000 Stationary Right
37O	Upper Cont Assy.	18-398-289-501	RL-3200
37P	Upper Cont Assy.	18-398-289-502	RL-4000, RLE-4000
37Q	Upper Cont Assy	18-398-289-580	RL-5000
38	Plastic Button	18-657-854-172	RL-4000, RLE-4000
40	Arc Runner	71-141-983-001	RL-800, RLE-800
40A	Arc Runner	18-732-790-173	RLI-800
40B	Arc Runner	71-142-053-001	RL-1600
40C	Arc Runner	18-657-939-202	RLE-2000, RL-2000
40D	Arc Runner	18-727-730-001	RL-3200
40E	Arc Runner	18-657-840-384	RL-4000, RLE-4000
40F	Arc Runner	18-732-790-175	RLE-2000
40G	Arc Runner	18-658-143-246	RL-5000
41	Screw	00-615-124-218	
41A	Screw	00-615-124-220	RLE-2000
42	Lockwasher	00-655-017-022	
43	Brace	18-657-941-293	RL-800, RLE-800
43A	Brace	18-657-941-299	RL-1600
43B	Washer	00-651-027-170	RL-3200 thru RLE-4000
44	Screw	15-171-399-048	RL-800, RLI-800 & RL-1600
44A	Screw	15-171-399-065	RLI-800
44B	Spacer	18-658-110-284	RLI-800
44C	Lockwasher	00-655-017-030	RL-3200 thru RLE-4000
45	Screw	15-171-399-011	
45A	Screw	00-611-315-426	RL-4000, RL-3200
46	Contact Assy	18-727-833-501	
46A	Contact Assy	18-732-790-599	All RLE (**Note 1**), RL-5000
47	Spring	71-141-173-001	
48	Spring	71-141-976-001	
49	Lower Cont Assy.	18-732-789-501	RL-800, RLE-800 & RLI-800
49A	Lower Cont Assy.	18-732-789-502	RL-1600
49B	Lower Cont Assy.	18-732-791-516	RLE-2000, RL-2000 Left
49C	Lower Cont Assy.	18-732-791-517	RLE-2000, RL-2000 Center
49D	Lower Cont Assy.	18-732-791-518	RLE-2000, RL-2000 Right
49E	Lower Cont Assy.	18-734-437-501	RL-800, RLE-800, RLI-800 Stationary
49F	Lower Cont Assy.	18-734-443-501	RL-1600 Stationary
49G	Lower Cont Assy.	18-732-791-538	RLE-2000, RL-2000 Stationary Left
49H	Lower Cont Assy.	18-732-791-539	RLE-2000, RL-2000 Stationary Center
49I	Lower Cont Assy.	18-732-791-540	RLE-2000, RL-2000 Stationary Right
49J	Lower Cont Assy.	18-732-791-519	RL-3200
49K	Lower Cont Assy.	18-732-791-520	RL-4000, RLE-4000
49L	Lower Cont Assy.	18-752-300-555	RL-5000
52	Spring Seat	18-658-143-247	RL-5000
57	Washer	00-651-027-170	RL-3200 thru RLE-4000
58	Lockwasher	00-655-017-030	RL-3200 thru RLE-4000
59	Screw	15-171-399-011	
59A	Screw	00-611-315-426	RL-3200 thru RLE-4000

Note 1: For RLE-800 manufactured prior to April, 1992, if replacing contact 46A, replace all contacts 46A for the affected phase, along with main contacts (62A, **Figure 20**). Order replacement kit 18-658-669-822.

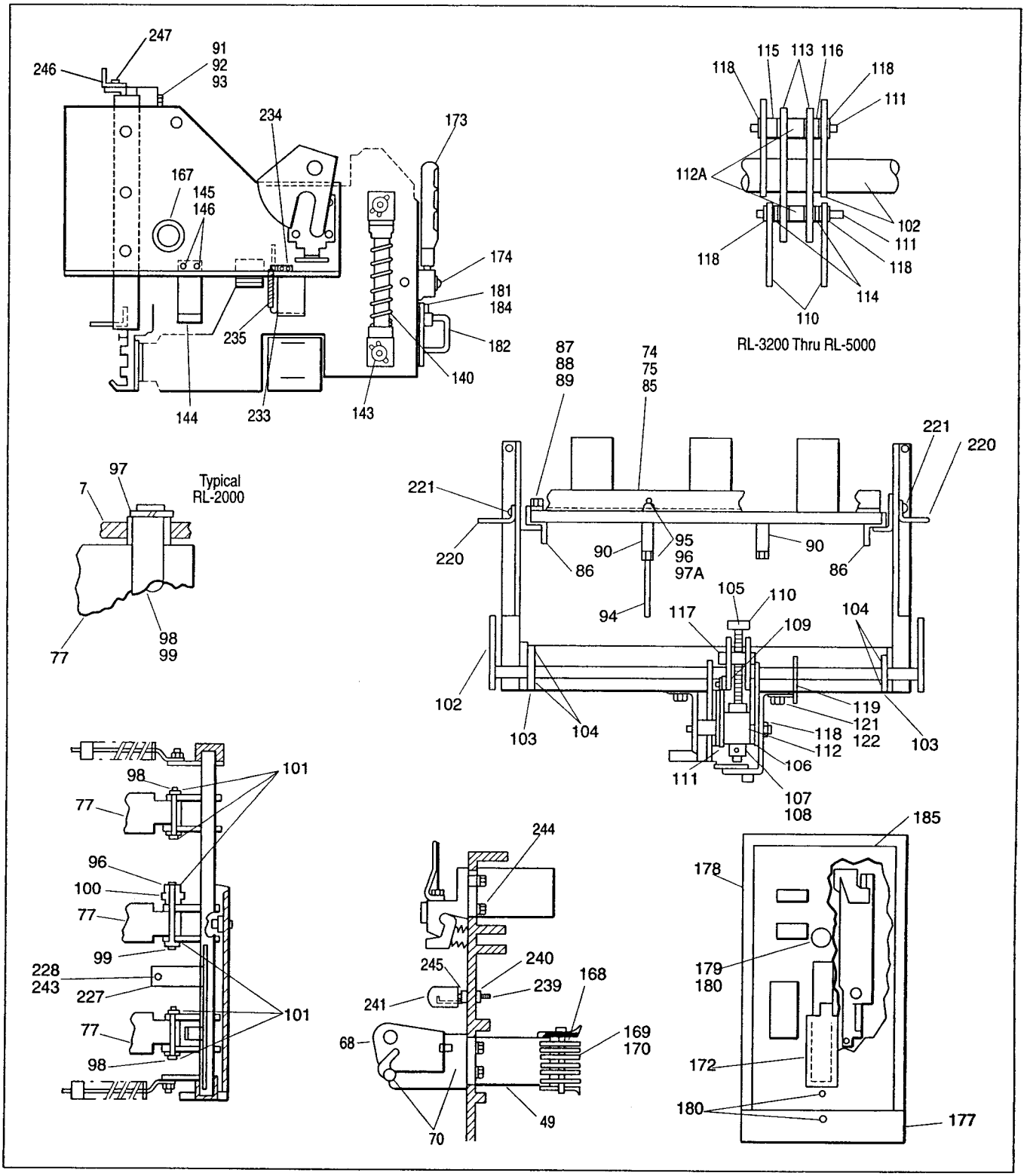


Figure 18. RL Breaker Assembly (Part 2-continued)

Parts

Refer to **Figures 17** and **18**

Item	Description	Part Number	Usage
68	Support	18-657-937-261	
68A	Support	18-657-940-150	RL-3200 thru RL-5000
70	Screw	00-615-663-373	
74	Screw	00-611-315-434	RL-3200 thru RL-5000
75	Nut	15-171-063-017	RL-3200 thru RL-5000
77	Pushrod	See **Figures 19-20**	
85	Angle	18-657-937-255	RL-3200 thru RL-5000
86	Angle Plastic	18-657-941-294	RL-3200
86A	Angle Plastic	18-657-941-062	RL-4000 thru RL-5000
87	Washer	00-651-027-170	RL-3200 thru RL-5000
88	Lockwasher	00-655-017-030	RL-3200 thru RL-5000
89	Screw	00-611-315-426	RL-3200
89A	Screw	00-611-315-428	RL-4000 thru RL-5000
90	Brace	18-657-937-256	RL-3200 thru RL-5000
91	Screw	00-611-315-396	RL-3200 thru RL-5000
92	Washer	00-651-027-139	RL-3200 thru RL-5000
93	Nut	15-171-063-016	RL-3200 thru RL-5000
94	Stud	14-135-915-008	RL-3200 thru RL-5000
95	Washer	00-651-027-139	RL-3200 thru RL-5000
96	Lockwasher	00-655-067-140	RL-3200 thru RL-5000
96A	Washer	00-651-007-900	RLE-2000, RL-2000
97	Bushing	18-657-765-395	RLE-2000, RL-2000
97A	Nut	00-631-059-104	RL-3200 thru RL-5000
98	Pin	18-747-678-006	
98A	Pin	18-727-832-001	RL-3200 thru RL-5000
99	Pin	18-747-678-011	
99A	Pin	18-727-832-002	RL-3200 thru RL-5000
100	Spacer	18-657-942-300	
100A	Spacer	18-727-838-002	RL-3200 thru RL-5000
101	Sichsl	00-000-401-166	
101A	X Washer	15-171-399-035	RL-3200 thru RL-5000
102	Racking Shaft	18-732-791-506	RL-800 thru RL-1600
102A	Racking Shaft	18-732-791-522	RLE-2000, RL-2000
102B	Racking Shaft	18-732-791-507	RL-3200 thru RLE-4000
102C	Racking Shaft	18-732-300-556	RL-5000
103	Retainer	15-171-399-012	RL-800 thru RL-1600
103A	Retainer	18-657-822-197	RL-2000 thru RL-5000
104	Screw	00-615-663-373	
105	Racking Screw	18-735-641-059	
105A	Racking Screw	18-735-641-060	RL-3200 thru RL-5000
106	Block	18-657-823-359	
106A	Block	18-658-024-237	RL-3200 thru RL-5000
107	Collar	18-658-110-024	
108	Drive Pin	18-658-110-036	
109	Washer	00-651-007-902	
109A	Washer	00-651-007-214	RL-3200 thru RL-5000
110	Nut	00-631-177-108	
110A	Link	18-657-942-092	RL-3200 thru RL-5000
111	Spacer	18-657-823-356	
111A	Pin	18-747-678-006	RL-3200 thru RL-5000
112	Spacer	18-731-274-002	
112A	Spacer	18-724-503-004	RL-3200 thru RL-5000
113	L-Link	18-657-941-297	RL-3200 thru RL-5000
114	Spacer	18-724-503-005	RL-2000 thru RL-5000
115	Spacer	18-731-274-001	RL-3200 thru RL-5000
116	Spacer	18-731-274-002	RL-3200 thru RL-5000
117	Barrel Nut	18-657-962-344	
118	Sichsl	00-000-401-166	
119	Support	18-752-300-141	RL-4000 thru RL-5000
121	Screw	00-615-114-373	RL-4000 thru RL-5000
122	Lockwasher	00-655-017-026	RL-4000 thru RL-5000

Item	Description	Part Number	Usage
140	Closing Spring	18-399-526-502	RL-800, RLE-800
140A	Closing Spring	18-399-526-503	RL-1600
140B	Closing Spring	18-398-297-504	RLI-800, RLE-2000 & RL-2000
140C	Closing Spring	18-726-870-501	RL-3200 thru RL-5000
143	Sichsl	00-000-401-141	
144	Ground Strap	18-657-916-579	Omitted on Stationary
145	Screw	15-171-399-010	Omitted on Stationary
146	Nut	00-633-059-210	Omitted on Stationary
167	Grommet	15-171-890-001	
168	Primary Disc	18-734-618-502	RL-800
168A	Primary Disc	18-732-790-594	RLE-800, RLI-800
168B	Primary Disc	18-734-618-501	RL-1600, RL-2000
168C	Primary Disc	18-732-790-551	RLE-2000
168D	Primary Disc	18-733-481-501	RL-3200
168E	Primary Disc	18-733-481-502	RL-4000, RLE-4000
168F	Primary Disc	18-752-300-596	RL-5000
169	Screw	00-615-114-373	RL-3200 thru RL-5000
170	Lockwasher	00-655-017-026	RL-3200 thru RL-5000
172	Cover Filler	18-658-133-032	EO versions only
173	Man. Chg. Handle	18-398-288-066	Manual charge only RL-800 thru RLE-2000
173A	Man. Chg. Handle	18-398-288-067	Manual charge only RL-3200 thru RL-5000
174	Set Screw	18-658-110-173	Manual charge only
177	Bottom Cover	18-736-830-501	RL-800 thru RLE-2000
177A	Bottom Cover	18-736-830-502	RL-3200 thru RL-5000
178	Cover	18-394-426-080	RL-800 thru RLE-2000
178A	Cover	18-394-426-079	RL-3200 thru RL-5000
179	Bumper	15-171-399-007	
180	Screw	15-171-399-010	
181	Clip	18-658-133-031	
182	Guard	18-748-962-001	
184	Screw	00-615-641-910	
185	Label	18-487-118-001	
185A	Label	18-487-117-001	Breaker Display Unit
185B	Label	18-487-908-001	
220	Bracket	18-734-436-001	Stationary
221	Screw	15-615-024-005	Stationary
227	Trip Shaft	18-732-790-528	RLI-800
228	Trip Wire	18-658-110-174	RLI-800
233	Spring Anchor	18-658-110-145	RLI-800
234	Screw	15-171-399-010	RLI-800
235	Spring	71-113-504-001	RLI-800
239	Stud	18-658-110-283	RLI-800
240	Nut	15-171-063-016	RLI-800
241	Spring Cover	18-398-288-061	RLI-800
243	Stop Nut	00-633-043-106	RLI-800
245	Spring	15-171-431-001	RLI-800
246	Angle	18-658-143-364	RL-5000
247	Screw	18-658-143-223	RL-5000

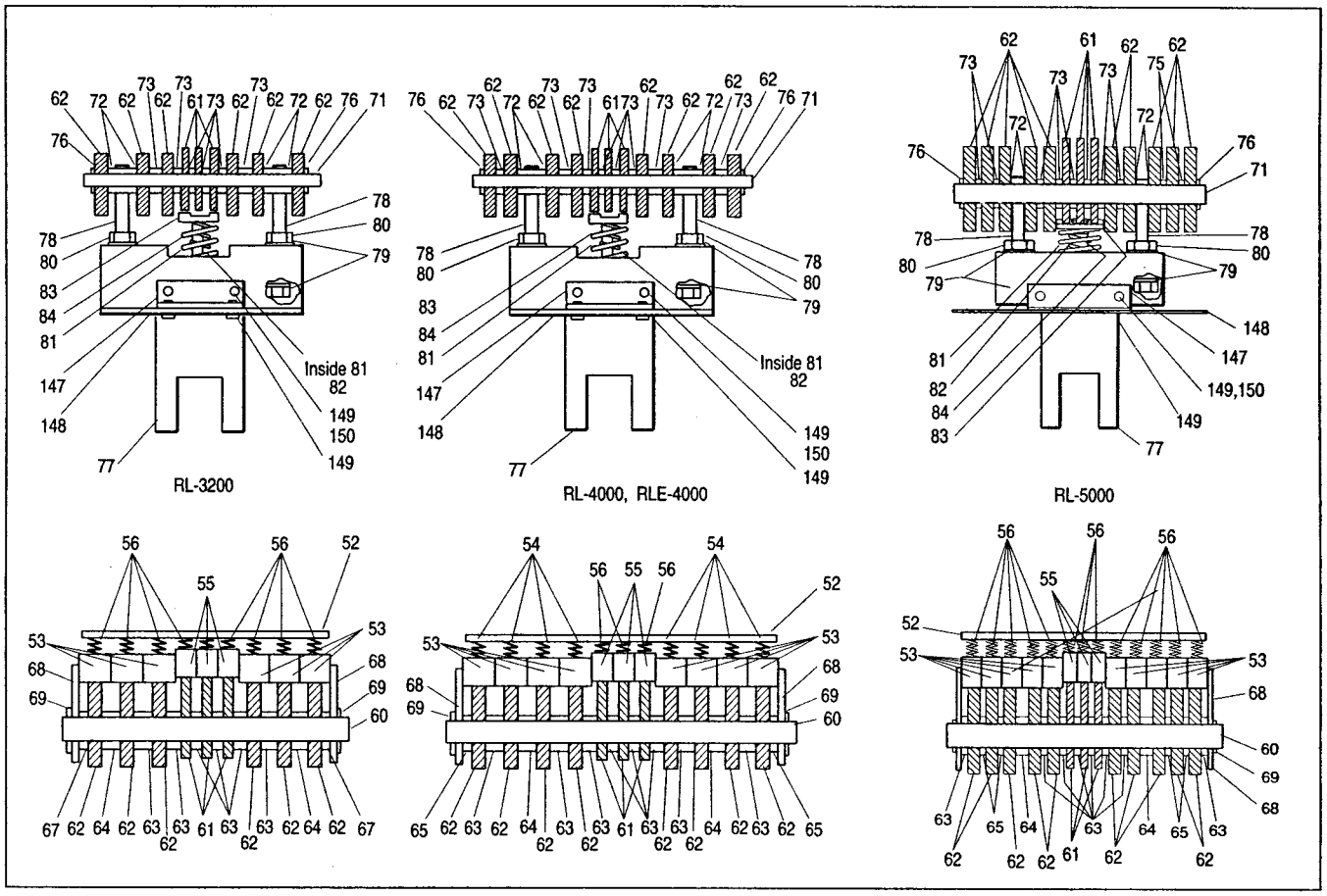


Figure 19. Contacts RL-3200 thru RL-5000

Refer to **Figure 19**

Item	Description	Part Number	Usage
52	Spring Seat	18-657-822-171	RL-3200
52A	Spring Seat	18-657-854-166	RL-4000. RLE-4000
52B	Spring Seat	18-658-143-247	RL-5000
53	Contact .531	18-727-825-002	
54	Spring	71-141-173-001	
55	Contact .38	18-727-825-001	
56	Spring	71-141-976-001	
60	Pin	18-750-059-002	RL-3200
60A	Pin	18-750-059-003	RL-4000, RLE-4000
60B	Pin	18-750-059-007	RL-5000
61	Arcing Contact	18-727-729-502	
62	Main Contact	18-727-729-503	
62A	Main Contact	18-732-790-598	All RLE, RL-5000
63	Spacer	18-755-707-004	
64	Spacer	18-755-707-008	
65	Spacer	18-747-707-005	RL-4000, RLE-4000
65A	Spacer	18-755-707-006	RL-5000
67	Washer	00-651-027-357	RL-3200
68	Support	18-657-940-150	
69	Sichsl	00-000-401-141	
71	Pin	18-657-937-279	RL-3200

Item	Description	Part Number	Usage
71A	Pin	18-657-937-280	RL-4000, RLE-4000
71B	Pin	18-658-143-253	RL-5000
72	Washer	18-657-941-295	
73	Spacer	18-755-707-001	
75	Nut	15-171-063-017	
76	Sichsl	00-000-401-166	RL-3200
76A	X Washer	00-659-055-250	
77	Pushrod	18-398-288-008	
78	Screw (Spec.)	18-657-937-268	
79	Washer	00-651-027-170	
80	Nut	00-631-143-205	
81	Spring	18-657-823-358	
82	Spring	71-141-799-001	
83	Spring Seat	18-657-822-184	
84	Spring Seat	18-657-822-196	
147	Barrier Sup	18-657-963-214	
148	Barrier	18-734-619-002	RL-3200
148A	Barrier	18-734-619-003	RL-4000, RLE-4000
148B	Barrier	18-734-619-004	RL-5000
149	Screw	15-171-074-010	
150	Lockwasher	00-655-067-060	

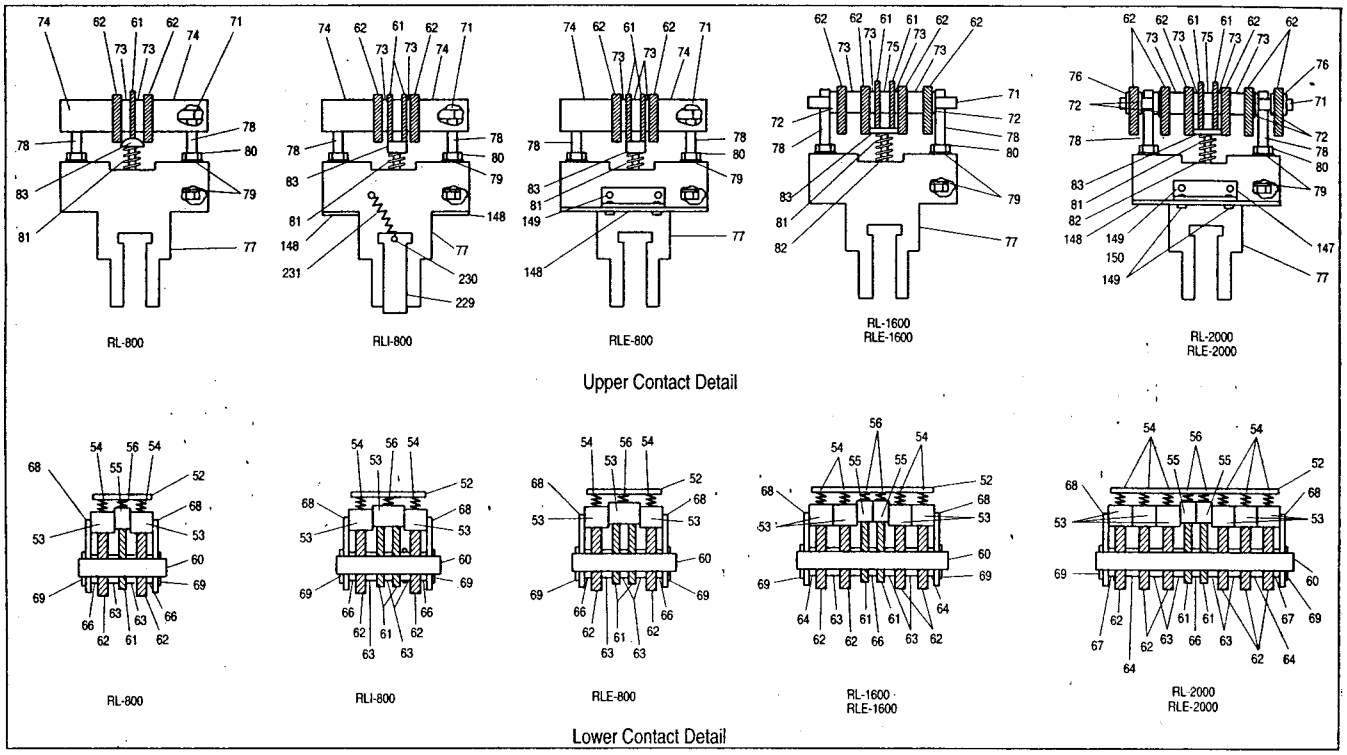


Figure 20. Contacts RL-800 thru RLE-2000

Refer to **Figure 20**

Item	Description	Part Number	Usage
52	Spring Seat	18-657-938-303	RL-800, RLE-800, RLI-800
52A	Spring Seat	18-657-938-304	RL-1600
52B	Spring Seat	18-657-938-305	RLE-2000, RL-2000
53	Contact .531	18-727-825-002	
53A	Contact	18-727-825-005	RLE-800, RLI-800
54	Spring	71-141-173-001	
55	Contact .38	18-727-825-001	
56	Spring	71-141-976-001	
60	Pin	18-750-059-005	RL-800, RLE-800 RLI-800
60A	Pin	18-750-059-001	RL-1600, RLE-1600
60B	Pin	18-750-059-006	RLE-2000, RL-2000
61	Arcing Contact	18-727-729-502	
61A	Arcing Contact	18-727-729-505	RLI-800
62	Main Contact	18-727-729-503	
62A	Main Contact	18-732-790-598	RLE-800, RLE-1600, RLE-2000 (**Note 1**)
63	Spacer	18-747-421-004	
63A	Washer	00-651-017-357	RLI-800, RLE-800
64	Spacer	18-755-707-007	RL-1600, RLE-1600
64A	Spacer	18-755-707-008	RL-2000,RLE-2000
66	Spacer	18-755-707-006	
67	Washer	00-651-027-357	RL-2000, RLE-2000
68	Support	18-657-937-261	
69	Sichsl	00-000-401-141	
71	Pin	18-657-922-147	RL-800 thru RL-1600
71A	Pin	18-657-937-278	RLE-2000, RL-2000
72	Washer	18-657-941-295	RL-1600 thru RLE-2000
73	Spacer	18-755-707-001	RL-800, RL-1600 thru RLE-2000
3A	Washer	00-651-027-286	RLI-800, RLE-800
74	Pin Cover Spacer	18-657-765-368	RL-800, RLI-800, RLE-800
75	Spacer	18-755-707-003	RL-1600 thru RLE-2000
76	Sichsl	00-000-401-141	RL-2000
76A	X-Washer	00-659-055-250	RLE-2000
77	Pushrod	18-398-288-056	(**Note 2**)
77A	Pushrod	18-398-288-054	RLI-800 (**Note 2**)
78	Screw (Spec.)	18-657-937-268	
79	Washer	00-651-007-910	
80	Nut	00-631-143-205	
81	Spring	18-658-110-147	(**Note 2**)
82	Spring	18-657-903-282	RL-1600, RLE-1600 RL-2000 (**Note 2**)
82A	Spring	71-141-799-001	RLE-2000 (**Note 2**)
83	Spring Seat	18-658-145-239	RL-800, RLE-800 (**Note 2**)
83A	Spring Seat	18-657-939-170	RL-1600 to RLE-2000 (**Note 2**)
83B	Spring Seat	18-658-583-522	RLI-800 (**Note 2**)
84	Washer	00-651-027-170	
147	Barrier Sups	18-657-963-214	RL-2000, RLE-2000
148	Barrier	18-734-619-001	RL-2000, RLE-2000
148A	Barrier	18-658-110-120	RLE-800 Left
148B	Barrier	18-658-110-121	RLE-800 Center
148C	Barrier	18-658-110-122	RLE-800 Right
148D	Barrier	18-658-110-285	RLI-800
149	Screw	15-171-074-010	RLE-800, RL-2000 RLE-2000
150	Lockwasher	00-655-067-060	RLE-800, RL-2000 RLE-2000
229	Latch Box	18-732-790-529	RLI-800
230	Cotter Pin	00-671-195-197	RLI-800
231	Spring	18-658-110-175	RLI-800

Note 1: For RLE-800 manufactured prior to April, 1992, if replacing main contact 62A, replace all contacts 62A for the affected phase, along with contacts 46A (**Figure 17**). Order replacement kit 18-658-669-822.

Note 2: Items 77, 81, 82, and 83 must be replaced together.

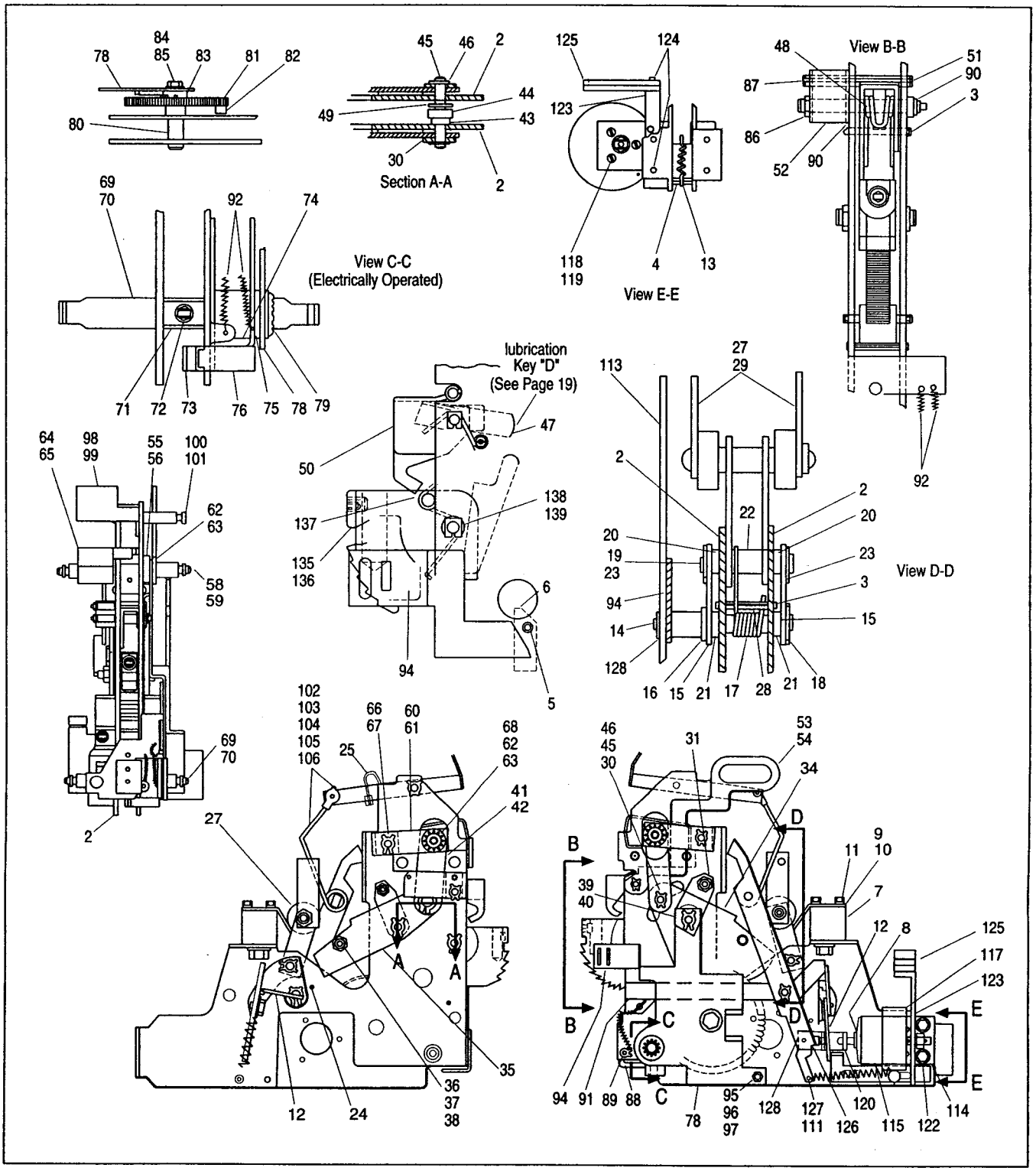


Figure 21. Operator

Parts

The following item numbers refer to **Figure 21** and are common parts used on all models except as noted.

Item	Description	Part Number	Usage
2	Frame	18-469-506-501	
3	Rollpin	00-671-176-195	
4	Rollpin	15-171-399-020	
5	Rollpin	15-171-399-021	
6	Pawl	18-658-024-123	
7	Stop Block	18-657-768-039	
8	Screw	15-171-259-004	
9	Back-Up	18-657-765-130	
10	Spring	18-657-768-038	
11	Screw	15-171-074-010	
12	Trip Flap Assy	18-727-727-504	
13	Spring	72-140-324-001	
14	Shoulder Pin	18-658-110-296	
15	Latch	18-658-110-325	
16	Washer	00-651-007-900	
17	Spring	18-657-768-033	
18	Sichsl	00-000-401-166	
19	Pin	18-747-678-004	
20	Spacer	18-657-823-356	
21	Bushing	18-657-765-397	
22	Spacer	18-658-110-344	
23	Sichsl	00-000-401-166	
24	Rollpin	15-171-233-008	
25	Spring	18-658-024-197	RL-3200 thru RL-5000
26	Washer	00-651-007-214	
27	Toggle Link Assy	18-732-790-565	RL-800 thru RL-2000
28	Tubing-heat shrink	18-658-143-095	
29	Toggle Link Assy	18-732-791-555	RL-3200 thru RL-5000
0	Bearing	18-658-110-330	
31	Spacer Link	18-657-768-372	
32	Screw	00-615-114-428	
33	Nut	15-171-063-017	
34	Cam Wind & Close	18-724-492-001	
35	Cam Close	18-724-493-001	
36	Spacer	18-657-768-053	
37	Screw	00-611-315-476	
38	Nut	15-171-063-018	
39	Pin	18-747-678-005	
40	Sichsl	00-000-401-166	
41	Link	18-658-110-321	RL-800 thru RL-2000
42	Link	18-657-961-340	RL-3200 thru RL-5000
43	Spacer	18-658-110-327	
44	Bearing	15-171-399-061	RL-800 thru RL-2000
45	Pin	18-747-678-008	
46	Sichsl	00-000-401-166	
47	Latch Assembly	18-657-765-564	
48	Spring	18-657-939-020	
49	Washer	00-651-007-214	
50	Close Hood Assy	18-657-943-560	
51	Pin	18-658-110-295	
52	Close Lever	18-657-768-020	
53	Spring Interlock	18-732-790-045	RL-800 thru RL-2000
54	Spring Interlock	18-657-852-575	RL-3200 thru RL-5000
55	Bumper	18-658-143-031	RL-800 thru RL-2000
56	Bumper	18-657-854-169	RL-3200 thru RL-5000
57	Bearing	00-813-109-037	RL-3200 thru RL-5000
58	Spring Hanger	18-658-110-292	RL-800 thru RL-2000
59	Spring Hanger	18-658-110-294	RL-3200 thru RL-5000
60	Guide Link	18-658-110-322	RL-800 thru RL-2000
61	Guide Link	18-657-854-171	RL-3200 thru RL-5000
62	Retainer	00-673-285-063	RL-800 thru RL-2000
63	Retainer	15-171-399-057	RL-3200 thru RL-5000
64	Flag	18-724-498-001	
5	Decal	18-657-800-116	
66	Pin	18-747-678-009	
67	Sichsl	00-000-401-166	
68	Bearing	18-658-110-320	Omit RL-3200, RL-4000
69	Spring Hanger	18-658-110-292	RL-800 thru RL-2000
70	Spring Hanger	18-658-110-293	RL-3200 thru RL-5000
71	Clip	18-657-768-014	
72	Screw	15-171-074-010	
73	Switch Lever	18-657-768-037	Elect Charge Only
74	Bearing Spacer	18-657-768-031	
75	Spacer	18-747-421-010	
76	Switch Lever	18-657-768-032	Elect Charge Only
78	Gear Brace	18-732-790-191	
79	Retainer	00-673-285-063	
80	Gear Pin	18-657-768-371	Elect Charge Only
81	Gear	18-724-505-501	Elect Charge Only
82	Cam Follower	18-657-768-026	Elect Charge Only
83	Spacer	18-658-024-151	Elect Charge Only
84	Screw	00-611-315-461	Elect Charge Only
85	Lockwasher	00-655-017-032	Elect Charge Only
86	Sichsl	00-000-401-166	
87	Rollpin	00-671-176-327	
88	Bracket	18-732-790-007	
89	Screw	15-171-074-010	
90	Washer	71-152-809-002	
91	Spring	15-837-455-002	
92	Spring	00-837-455-026	Elect Charge Only
94	Trip Bar	18-732-790-194	
95	Screw	00-611-315-384	
96	Spacer	18-733-309-001	
97	Nut	15-171-063-016	
98	Flag	18-728-500-005	
99	Decal	71-141-817-001	
100	Pin	18-747-678-015	
101	Sichsl	00-000-401-166	
102	Retainer Ring	00-673-173-018	
103	Rod End Clip	15-171-399-029	RL-800 thru RL-2000
104	Rod End Clip	15-171-399-003	RL-3200 thru RL-5000
105	Close Flag Link	18-733-435-001	RL-800 thru RL-2000
106	Close Flag Link	18-657-822-353	RL-3200 thru RL-5000
111	S Hook	18-658-110-305	800A Only
113	Reset Lever	18-734-620-502	
114	Actuator Bracket	18-657-768-022	
115	Actuator	18-809-575-507	
116	Washer	00-651-007-909	Non-Auto Only
117	Shield	18-657-937-287	Omit on 800A
118	Screw	00-615-513-220	
119	Lockwasher	00-655-067-100	
120	Reset Assembly	18-732-791-545	
121	Washer	72-140-000-001	
122	Screw	00-615-663-373	
123	Shield Support	18-657-939-200	Omit on 800A
124	Screw	15-171-399-025	Omit on 800A
125	Shield	18-657-940-182	Omit on 800A
126	Sichsl	00-000-401-158	
127	Spring	71-113-503-001	
128	X Washer	00-659-055-187	
135	Charge Cam	18-732-791-501	See **Note 1**
136	Charge Link	18-732-791-544	See **Note 1**
137	Spring	18-657-937-288	See **Note 1**
138	Pin	18-747-678-001	
139	Sichsl	00-000-401-166	
141	Hood lever	18-658-143-353	
142	Screw	15-171-074-007	

Note 1: Replace items 135, 136, and 137 together

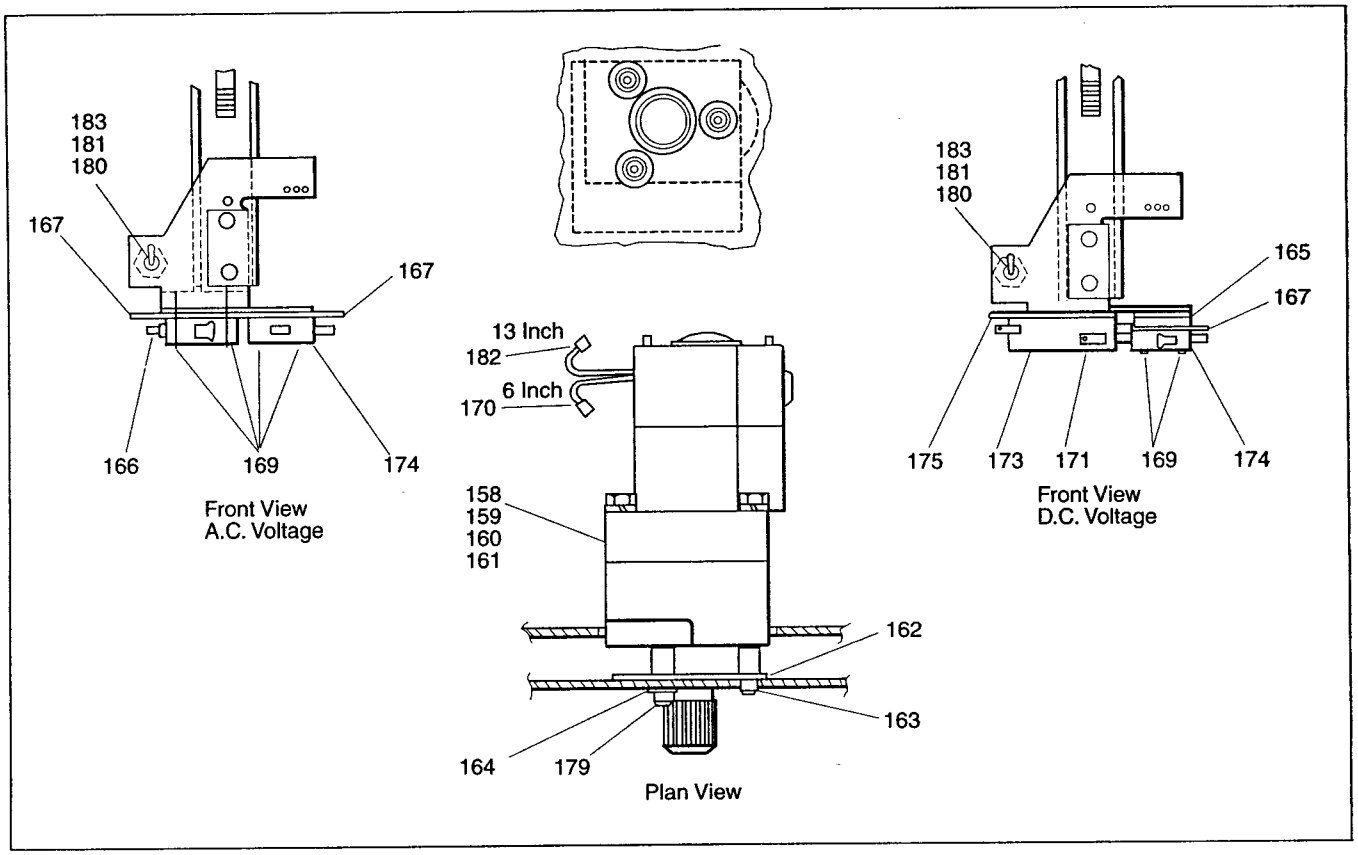


Figure 22. Motor Group

The following item numbers refer to **Figure 22,** and are common parts used on all models. (Ref 18-474-541-825/18-484-748-822)

Item	Description	Part Number	Usage
158	Motor 24 VDC	71-340-297-006	
159	Motor 48 VDC	71-340-297-005	
160	Motor 120 VAC and 125 VDC	71-340-297-001	
161	Motor 240 VAC and 250 VDC	71-340-297-002	
162	Spacer	18-657-768-030	
163	Screw	00-615-245-218	
164	Lockwasher	00-655-017-022	
165	Sw. Spacer	18-657-941-061	
168	Switch (AC)	15-171-399-013	
167	Insulator	18-657-783-362	
169	Screw	15-171-399-008	
170	Terminal, Faston	15-172-099-005	
171	Switch (DC)	15-171-323-003	
173	Screw	15-171-399-041	
174	Switch (AC & DC)	15-171-186-010	
175	Insulator	18-657-800-327	
179	Screw	00-615-124-220	
180	Toggle Switch	00-871-523-008	
181	Non-Turn Ring	15-171-399-047	
182	Terminal	15-172-099-023	
183	Screw	18-658-110-031	

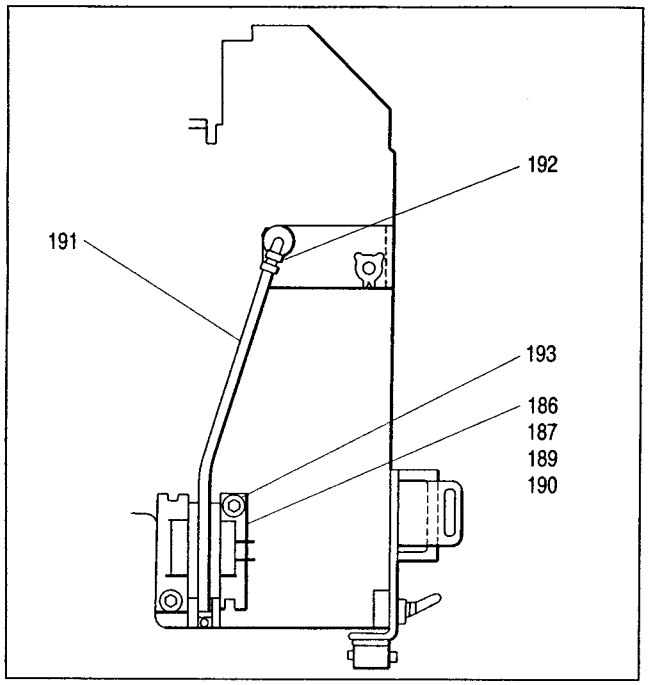


Figure 23. Close Solenoid Group

The following item numbers refer to **Figure 23**, and are common parts used on all models.

Item	Description	Part Number	Usage
186	Solenoid 24 VDC	18-724-513-006	
187	Solenoid 48 VDC and 120 VAC	18-724-513-001	
189	Solenoid 240 VAC and 125 VDC	18-724-513-002	
190	Solenoid 250 VDC	18-724-513-004	
191	Close Linkage	18-724-511-001	
192	Clip	15-171-399-003	
193	Screw	15-171-399-010	

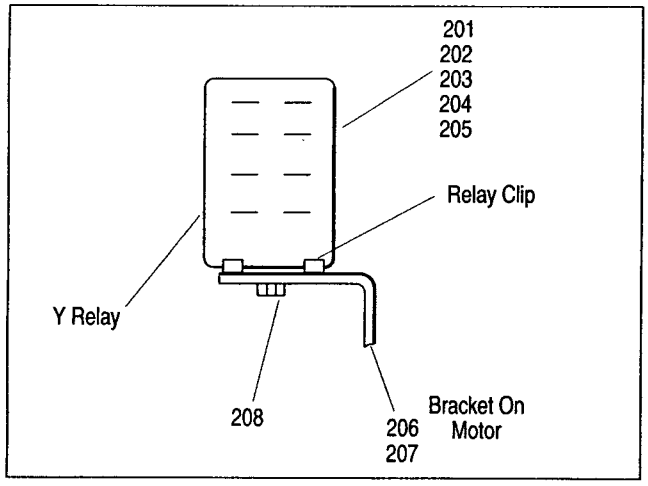


Figure 24A. Anti-Pump 'Y' Relay (Old Style)

The following item numbers refer to **Figure 24A**, and are common parts used on all models with old style 'Y' relay.

Item	Description	Part Number	Usage
201	Relay Y 48 VDC	15-171-399-027	
202	Relay Y 120 VAC	15-171-399-014	
203	Relay Y 240 VAC	15-171-399-015	
204	Relay Y 125 VDC	15-171-399-016	
205	Relay Y 250 VDC	15-171-399-017	Some applications require 2 of this relay
206	Bracket	18-657-961-290	
207	Nut	00-633-059-108	
208	Screw	15-171-094-010	

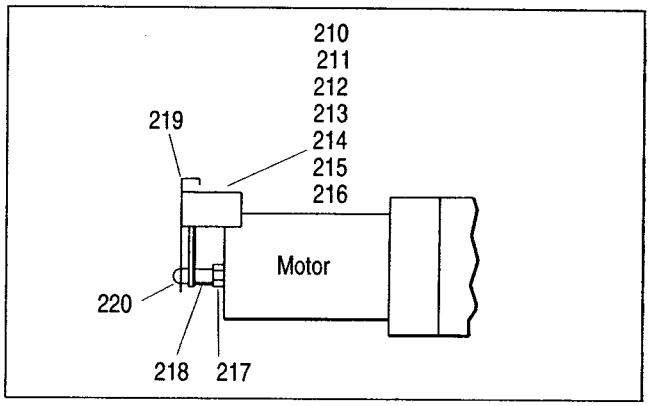


Figure 24B. Anti-Pump 'Y' Relay (New Style)

The following item numbers refer to **Figure 24B**, and are common parts used on all models with new style 'Y' relay.

Item	Description	Part Number	Usage
210	Relay Y 24 VDC	18-746-073-501	
211	Relay Y 48 VDC	18-746-073-502	
212	Relay Y 120 VAC/125 VDC	18-746-073-503	
213	Relay Y 240 VAC/250 VDC	18-746-073-504	
214	Relay Y 24 VDC	18-749-238-501	Remote Close
215	Relay Y 48 VDC	18-749-238-502	Remote Close
216	Relay Y 120 VAC/125 VDC	18-749-238-503	Remote Close
217	Nut	00-633-059-108	
218	Spacer	15-172-624-001	
219	Cover	18-732-790-210	
220	Screw	00-615-641-903	

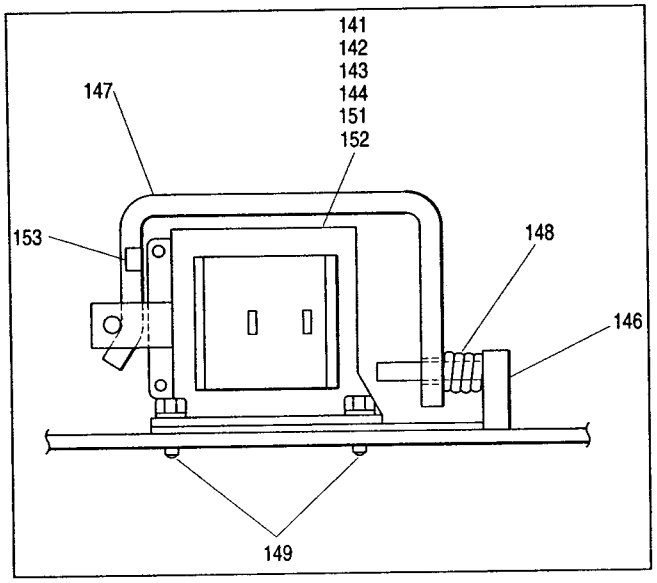


Figure 25. Shunt Trip Group

The following item numbers refer to **Figure 25**, and are common parts used on all models.

Item	Description	Part Number	Usage
141	Solenoid 48 VDC and 120 VAC	18-724-513-001	
142	Solenoid 240 VAC and 125 VDC	18-724-513-002	
143	Solenoid 24 VDC	18-724-513-006	
144	Solenoid 250 VDC	18-724-513-004	
146	Bracket	18-657-781-264	
147	Pushrod	18-657-768-036	
148	Spring	14-128-784-001	
149	Screw	15-171-399-010	
151	Solenoid 28 VDC	18-724-513-007	
152	Solenoid 32 VDC	18-724-513-008	
153	Clip	18-658-110-309	

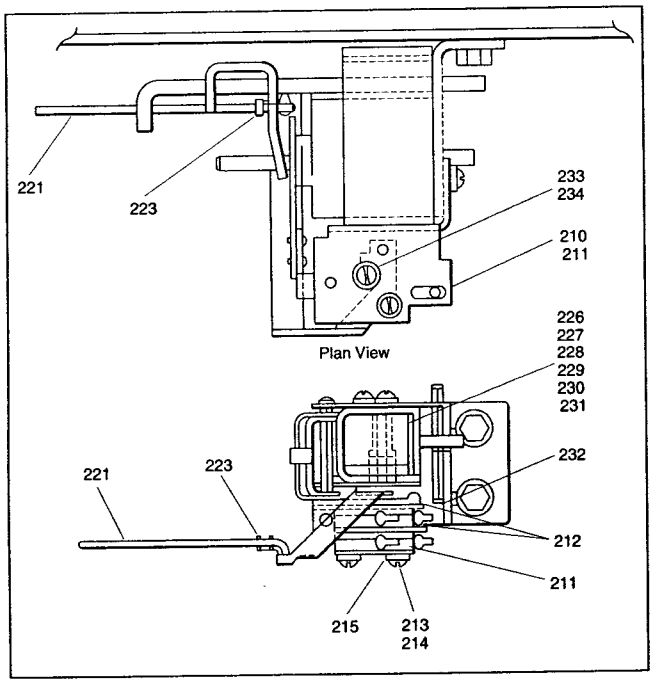


Figure 26. Bell Alarm Switch Group

The following item numbers refer to **Figure 26**, and are common parts used on all models.

Item	Description	Part Number	Usage
210	Bracket Assy	18-392-075-504	
211	Bracket Assy	18-805-296-502	Four switch
212	Switch	15-171-186-010	
213	Insulator	18-657-783-362	
214	Screw	15-171-399-008	Single Switch
215	Screw	00-615-471-082	
221	Manual Reset Rod	18-658-024-006	
226	Solenoid 24VDC Int	18-721-497-006	Elect Reset Option

Single Switch Assembly.....18-392-075-505
Dual Switch Assembly.....18-392-075-506
Four Switch Assembly.....18-805-296-501

Electrical Reset not Available for Four Switch Model.

Item	Description	Part Number	Usage
227	Solenoid 48VDC Int	18-721-497-005	Elect Reset Option
228	Solenoid 120VAC Int	18-721-497-001	Elect Reset Option
229	Solenoid 240VAC Int	18-721-497-003	Elect Reset Option
230	Solenoid 125VDC Int	18-721-497-002	Elect Reset Option
231	Solenoid 250VDC Int	18-721-497-004	Elect Reset Option
232	Rollpin	15-171-233-006	Elect Reset Option
233	Screw	00-615-471-120	Elect Reset Option
234	Lockwasher	00-655-047-060	Elect Reset Option

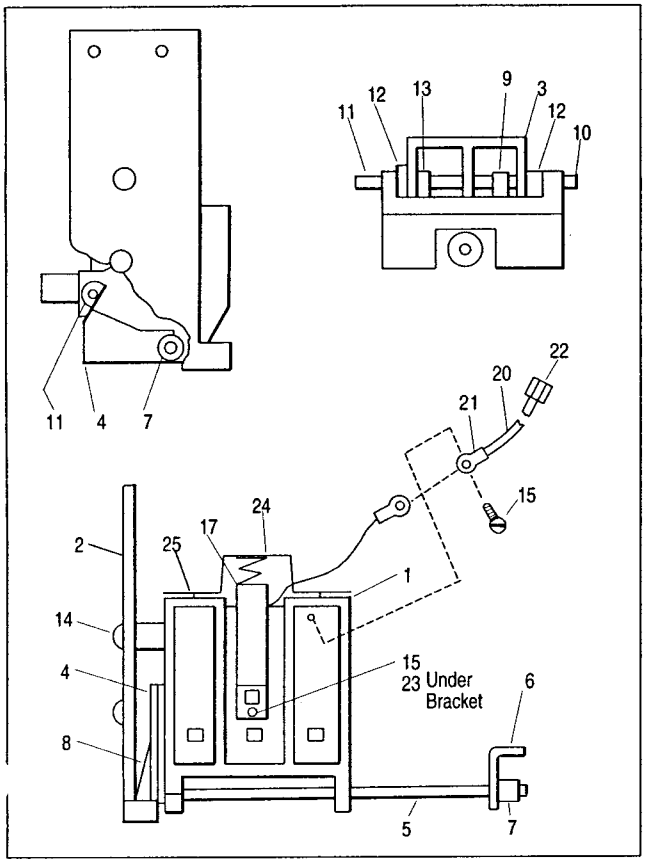


Figure 27. Blown Fuse Trip Assembly 18-399-805-501

The following items refer to **Figure 27**. Applies to RLF-3200, RLF-4000, and RLF-5000 fused models.

Item	Description	Part Number	Usage
1	Housing	18-734-445-001	
2	Base	18-657-961-284	
3	Lever	18-734-444-001	
4	Latch Plate	18-657-961-285	
5	Shaft	18-657-961-281	RLF-3200, RLF-4000
5A	Shaft	18-661-600-009	RLF-5000
6	Arm	18-657-961-288	
7	Spacer Nut	18-657-961-280	
8	Spring	18-657-961-279	
9	Spring	18-657-961-278	
10	Shaft	18-657-961-286	
11	Latch	18-657-961-283	
12	Washer	00-651-007-146	
13	Nut	00-631-143-204	
14	Screw	15-615-024-006	
15	Screw	00-615-641-904	
17	Solenoid Assy	18-658-583-569	
20	Wire	00-557-286-003	
21	Terminal	15-172-099-003	
22	Terminal	15-172-099-007	
23	Washer	00-651-027-072	
24	Wire Shield	18-658-143-100	
25	Screw	00-615-605-120	

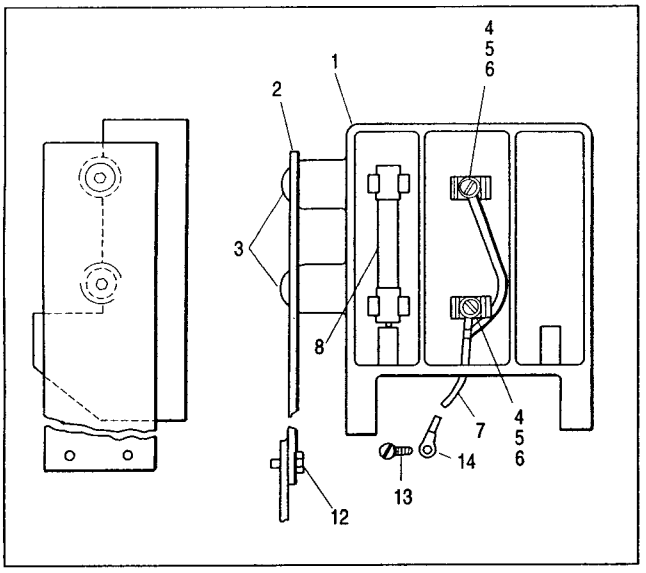


Figure 28. Open Fuse Indicator

The following items refer to **Figure 28**, and are common to all RFC fuse carriages:

Item	Description	Part Number	Usage
1	Fuse Housing	18-399-759-001	
2	Plate	18-657-961-276	
3	Screw	15-615-024-006	
4	Fuse Clip	18-732-790-159	
5	Sems Screw	00-615-641-904	
6	Terminal	15-172-099-003	
7	Wire #18	00-557-286-003	
8	Actuator Fuse	72-140-317-001	
12	Screws .25-20 (.62)	00-615-663-373	
13	#10-32 x.38 Sems	00-611-445-216	
14	Terminal	15-172-099-003	

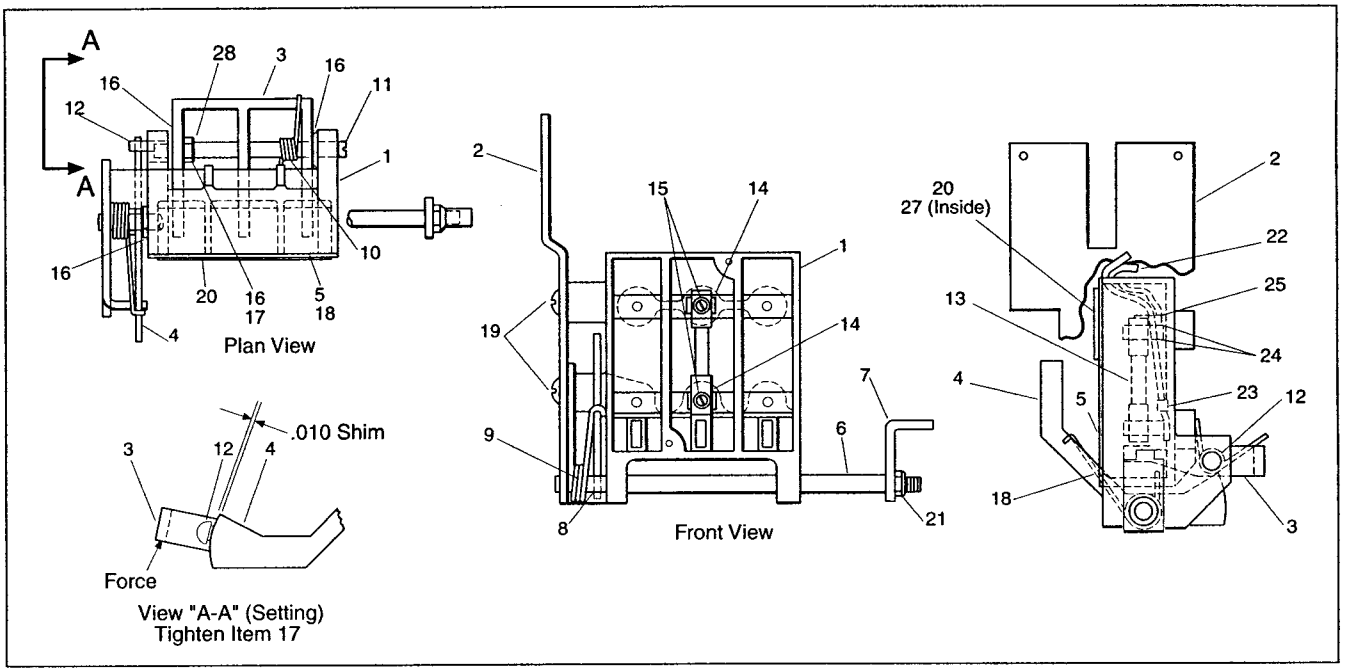


Figure 29. Trigger Fuse Assembly 18-399-796-501

The following items refer to **Figure 29**, and apply to RLF-800, RLF-1600 and RLF-2000.

Item	Description	Part Number	Usage
1	Housing	18-399-759-001	
2	Base	18-657-961-284	
3	Lever	18-734-444-001	
4	Latch Plate	18-657-961-285	
5	Cover	18-657-961-287	
6	Shaft	18-657-961-289	
7	Arm	18-657-961-288	
8	Spacer Nut	18-657-961-280	
9	Torsion Spring	18-657-961-279	
10	Torsion Spring	18-657-961-278	
11	Shaft	18-657-961-286	
12	Latch	18-657-961-283	
13	Actuator Fuse	72-140-317-001	
14	Fuse Clip	18-732-790-159	
15	#8-32 x .25 Screw	00-615-641-904	
16	Washer	00-651-007-146	
17	.25-28 Hex Nut	00-631-143-204	
18	#6-32 x .25 Screw	00-615-511-120	
19	.25-20 x .50 Screw	15-615-024-006	
20	Caution Label	15-171-185-002	
21	.25-28 Stopnut	00-633-025-216	
22	Wire #18	00-557-286-003	
23	Terminal	15-172-099-003	
24	Faston Tab	15-171-949-049	
25	Faston Terminal	15-172-099-007	
27	Label	18-658-024-196	
28	Lockwasher	00-655-067-140	

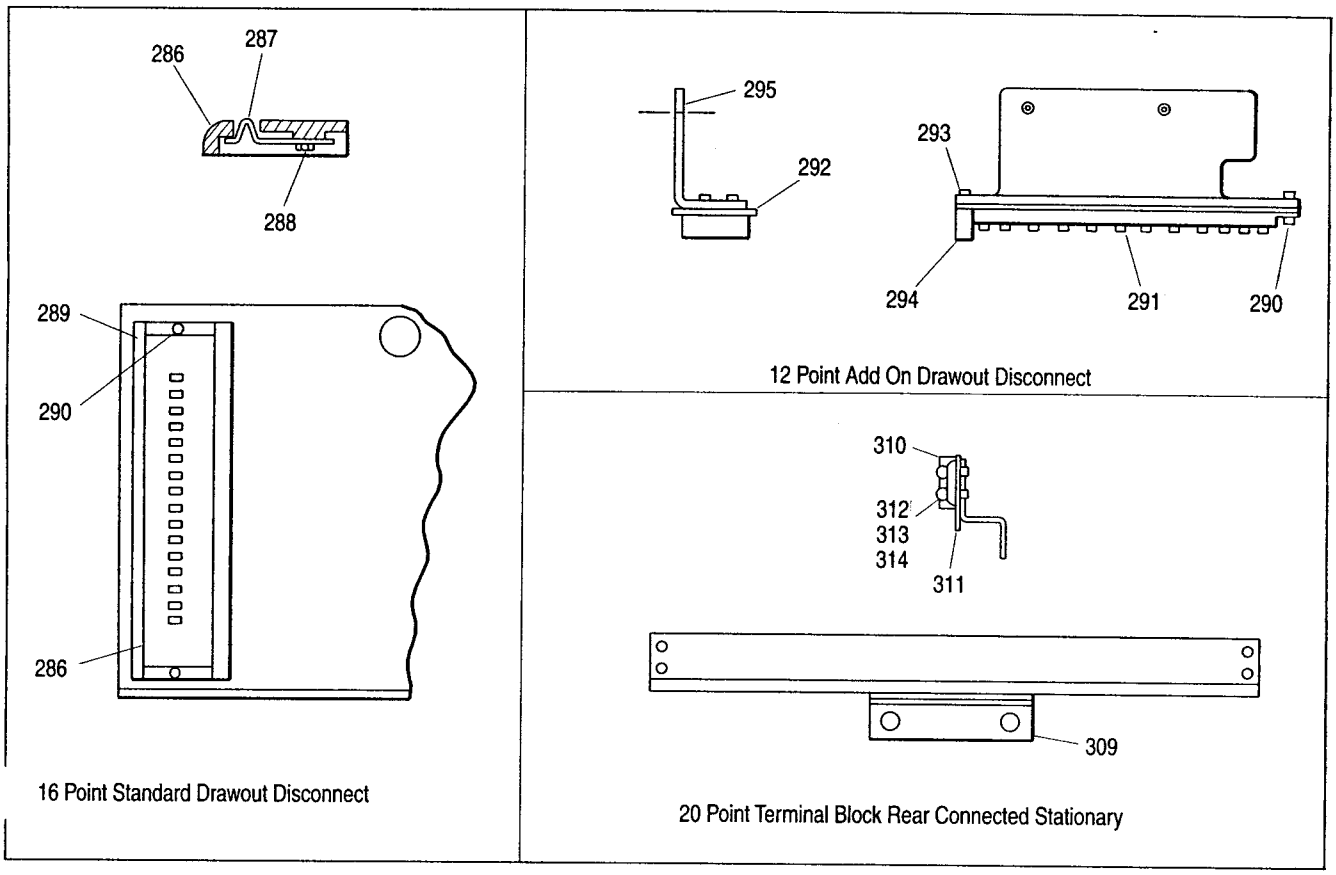


Figure 30. Secondary Disconnect Group

The following item numbers refer to **Figure 30**, and are common parts used on all models.

16 Point Drawout 18-398-790-501

Item	Description	Part Number	Usage
286	Block	18-398-288-004	
287	Contact	18-657-937-266	
288	Rivet	18-658-110-026	
289	Insulator	18-657-937-270	
290	Screw	15-171-399-010	

12 Point Add On Drawout 18-398-288-811 (to 2000A)
18-398-288-812 (3200 to 5000A)

Item	Description	Part Number	Usage
287	Contact	18-657-937-266	In Item 291
288	Rivet	18-658-110-026	In Item 291
290	Screw	15-171-399-010	
291	Block Assembly	18-732-790-572	
292	Insulator	18-658-110-331	
293	Screw	15-171-074-010	
294	Clip	18-658-110-271	RL-800 thru RLE-2000
295	Support	18-732-790-176	RL-3200 thru RL-5000
295A	Support	18-732-790-177	

20 Point Stationary 18-732-791-556

Item	Description	Part Number	Usage
309	Bracket	18-732-790-043	RL-800 thru RL-2000 stationary
310	Block	15-171-051-009	RL-800 thru RL-2000 stationary
311	Marking Strip	15-857-036-002	RL-800 thru RL-2000 stationary
312	Screw	00-615-471-178	RL-800 thru RL-2000 stationary
313	Lockwasher	00-655-047-080	RL-800 thru RL-2000 stationary
314	Washer	00-651-027-072	RL-800 thru RL-2000 stationary

16 Point Stationary Front Conn. 18-752-300-501 (LH)
18-752-300-536 (RH)

Item	Description	Part Number	Usage
317	Bracket (LH)	18-658-143-060	Stationary only
317A	Bracket (RH)	18-658-143-138	Stationary only
318	Terminal Block	15-171-051-015	Stationary only
319	Screw	00-615-581-174	Stationary only
320	Screw	00-615-663-373	Stationary only
321	Screw	15-171-074-012	Stationary only

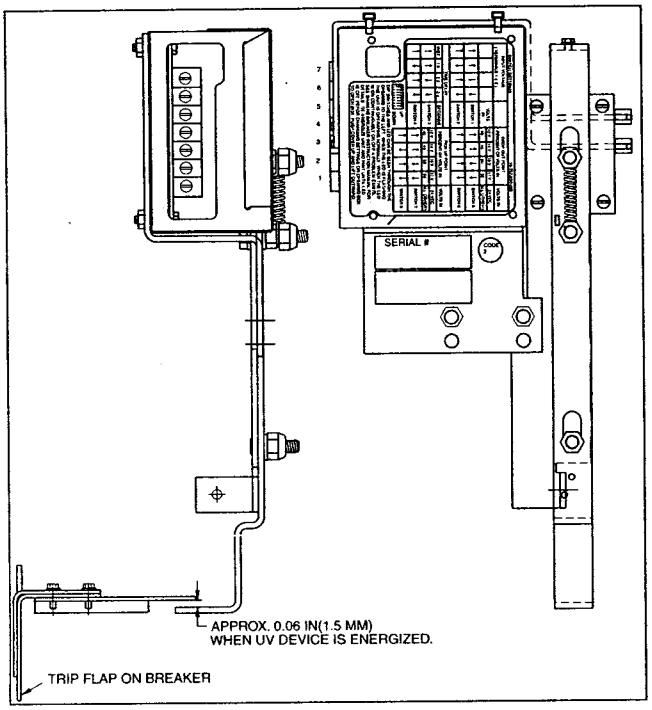


Figure 31A. Undervoltage Trip Device (Late 1996 and after)

The following part numbers refer to **Figure 31C**, and are used on all models with old style undervoltage trip device (prior to late 1996).

Undervoltage Device (adjustable time delay) (prior to late 1996)

Part Number	V_1 Dropout Voltage	V_2 Pickup Voltage	V_3 Rated Voltage	Time Delay
18-474-540-501	60 VAC	100 VAC	120 VAC	3 Sec
18-474-540-502	24 VDC	40 VDC	48 VDC	3 Sec
18-474-540-503	62 VDC	105 VDC	125 VDC	3 Sec
18-474-540-504	60 VAC	100 VAC	120 VAC	0
18-474-540-505	24 VDC	48 VDC	48 VDC	0
18-474-540-506	62 VDC	105 VDC	125 VDC	0
18-474-540-507	12 VDC	20 VDC	24 VDC	2 Sec
18-474-540-508	12 VDC	20 VDC	24 VDC	0

Undervoltage Device (instantaneous only) (prior to late 1996)

Part Number	V_1 Dropout Voltage	V_2 Pickup Voltage	V_3 Rated Voltage	Time Delay
18-803-348-501	60 VAC 62 VDC	102 VAC 100 VDC	120 VAC 125 VDC	None
18-803-348-502	120 VAC 120 VDC	204 VAC 212 VDC	240 VAC 250 VDC	None
18-803-348-503	24 VDC	41 VDC	48 VDC	None
18-803-348-504	12 VDC	20 VDC	24 VDC	None

The following item numbers refer to **Figure 31A**, and are common parts used on all models with new style undervoltage trip device (late 1996 and after).

Item	Description	Part Number	Usage
1	UV Device Assy	18-758-324-501	
16	Screw	15-171-074-010	
17	Trip Flap extension	18-657-854-174	
18	Support Angle	18-658-143-321	

DIP SWITCH SETTINGS

INPUT VOLTAGE (TERMINALS 1 & 2)					DROP OUT POINT PERCENT OF VOLTS IN				VOLTS IN
120 VAC	125 VDC	48 VDC	24 VDC	VOLTS IN	12 V 40%	14 V 45%	16 V 50%	17 V 56%	24 VDC ALL OTHERS
↓	↓	↑	↑	SWITCH 1	↓	↓	↑	↑	SWITCH 5
↓	↑	↓	↑	SWITCH 2	↓	↑	↓	↑	SWITCH 6
TIME DELAY					PICK UP POINT PERCENT OF VOLTS IN				VOLTS IN
					22 V	21 V	20 V	19 V	24 VDC
INST	1.0	2.0	3.0	SECONDS	80%	73%	67%	60%	ALL OTHERS
↓	↓	↑	↑	SWITCH 3	↓	↓	↑	↑	SWITCH 7
↓	↑	↓	↑	SWITCH 4	↓	↑	↓	↑	SWITCH 8

12345678 UP-ON DOWN

DIP SWITCHES AND LED CAN BE SEEN THROUGH THE OPENING TO THE LEFT. WHEN THE LED IS FLASHING, THE UNIT IS OPERATING NORMALLY. WHEN THE LED IS ON CONTINUOUSLY OR OFF A PROBLEM EXISTS. SEE BREAKER INSTRUCTION MANUAL FOR DETAILS. DE-ENERGIZE UNIT AND WAIT UNTIL LED IS OFF BEFORE CHANGING SETTINGS OR OPENING COVER. TO OPEN COVER, PUSH COVER UP AND LIFT OUTWARD.

Figure 31B. Settings Chart for Undervoltage Trip Device (late 1996 and after)

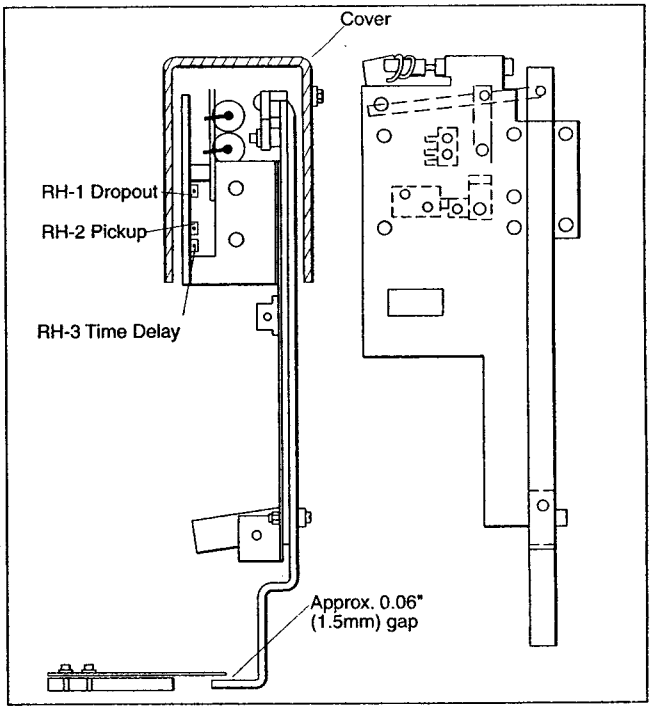


Figure 31C. Undervoltage Trip Device (Prior to late 1996)

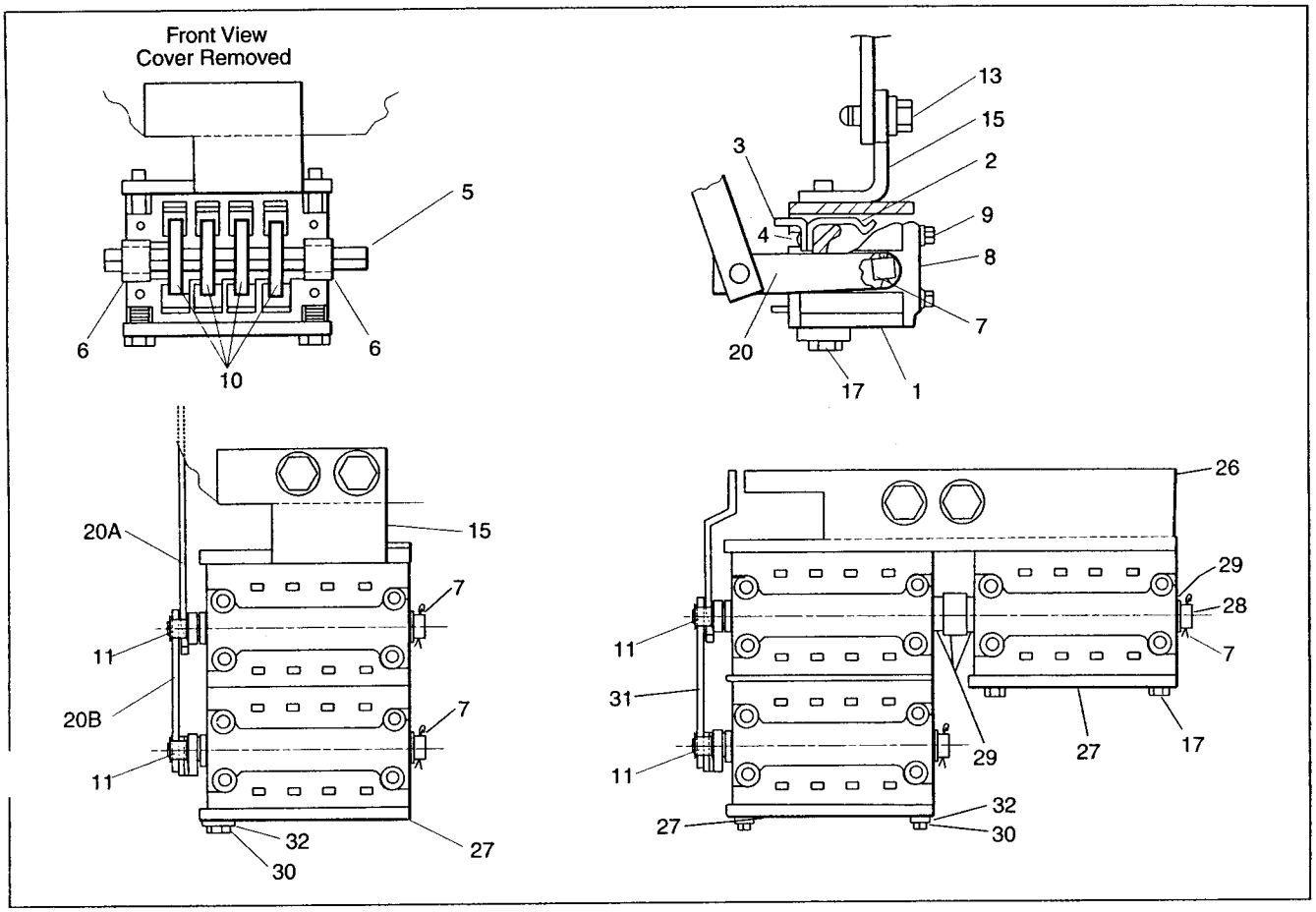


Figure 32. Auxiliary Switch Group

The following item numbers refer to **Figure 32**, and are common parts used on all models.

Item	Description	Part Number	Usage
1	Case	71-240-524-001	
2	Contact	71-141-994-001	
3	Terminal	15-171-949-049	
4	Screw	00-615-641-904	
5	Shaft	18-729-789-001	
6	Bearing	71-141-995-001	
7	Cotter Pin	00-671-195-049	
8	Cover	71-141-952-001	
9	Screw	15-171-074-001	
10	Rotor	18-657-961-381	
11	Retainer	15-171-399-055	
12	X Washer	00-659-055-156	

Item	Description	Part Number	Usage
13	Screw	00-615-663-373	
15	Bracket	18-658-143-036	Single and Dual
17	Screw	15-171-399-045	Single and Triple
20	Arm Assembly	18-732-791-562	Single
20A	Arm Assembly	18-752-300-513	Dual
20B	Arm	18-732-790-570	Triple
26	Bracket	18-732-790-178	Triple
27	Retainer	18-658-110-275	Triple
28	Shaft	18-658-110-290	Triple
29	Bearing	18-658-110-274	Triple
30	Screw	00-611-315-398	Triple and Dual
32	Lockwasher	00-655-067-140	Triple and Dual

Single Switch Assembly.....18-398-788-501
Dual Switch Assembly.....18-398-788-506
Triple Switch Assembly.....18-817-175-500

Contacts are adjustable.
Undervoltage Trip not available with Triple Switch Version for RL-800 thru RLE-2000.

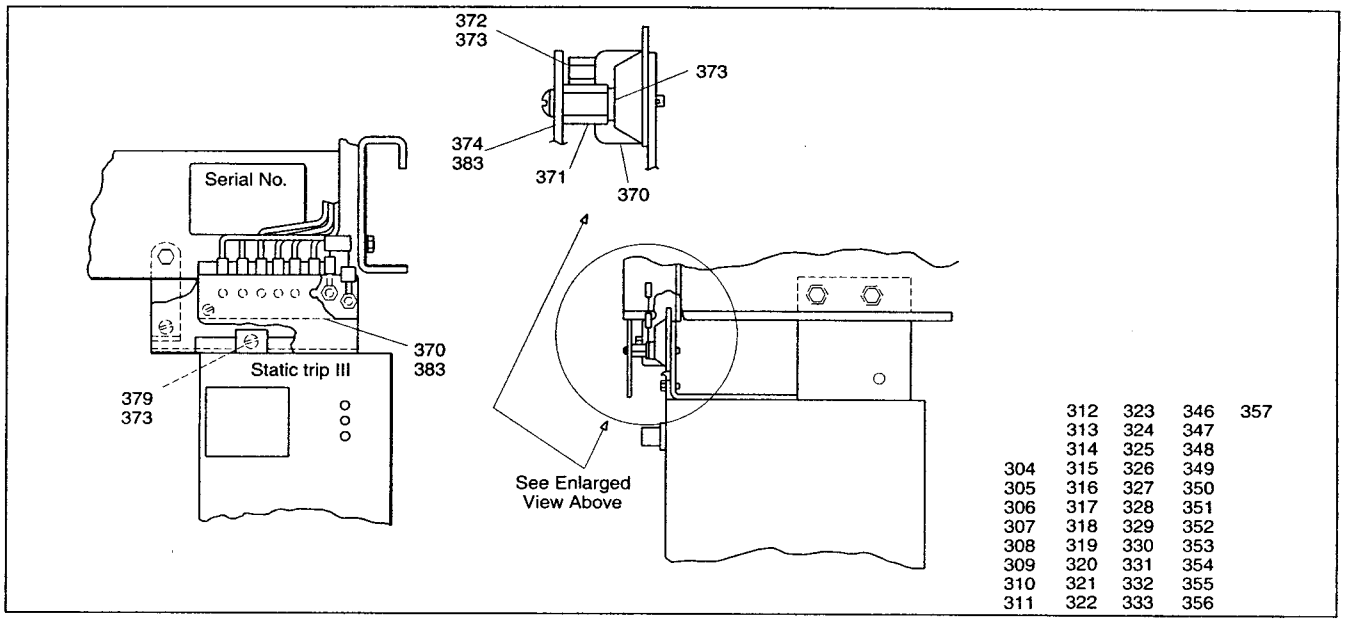


Figure 33. Static Trip Group

The following item numbers refer to **Figure 33**, and are common parts used on all models.

Item	Description	Part Number	Usage
304	RMS-TI-T	18-483-905-504	18-751-349-504
305	RMS-TS-TZ	18-483-905-505	18-751-349-505
306	RMS-TSI-TZ	18-483-905-506	18-751-349-506
307	RMS-TIG-TZ	18-483-905-507	18-751-349-507
308	RMS-TSG-TZ	18-483-905-508	18-751-349-508
309	RMS-TSIG-TZ	18-483-905-509	18-751-349-509
310	RMS-TI-TC	18-483-905-510	18-751-349-510
311	RMS-TS-TZC	18-483-905-511	18-751-349-511
312	RMS-TSI-TZC	18-483-905-512	18-751-349-512
313	RMS-TIG-TZC	18-483-905-513	18-751-349-513
314	RMS-TSG-TZC	18-483-905-514	18-751-349-514
315	RMS-TSIG-TZC	18-483-905-515	18-751-349-515
316	RMS-TI-TCN	18-483-905-516	18-751-349-516
317	RMS-TS-TZ-CN	18-483-905-517	18-751-349-517
318	RMS-TSI-TZ-CN	18-483-905-518	18-751-349-518
319	RMS-TIG-TZ-CN	18-483-905-519	18-751-349-519
320	RMS-TSG-TZ-CN	18-483-905-520	18-751-349-520
321	RMS-TSIG-TZ-CN	18-483-905-521	18-751-349-521
322	RMS-TI-T-CP	18-483-905-522	18-751-349-522
323	RMS-TS-TZ-CP	18-483-905-523	18-751-349-523
324	RMS-TSI-TZ-CP	18-483-905-524	18-751-349-524
325	RMS-TIG-TZ-CP	18-483-905-525	18-751-349-525
326	RMS-TSG-TZ-CP	18-483-905-526	18-751-349-526
327	RMS-TSIG-TZ-CP	18-483-905-527	18-751-349-527
328	RMS-TI-T-CNP	18-483-905-528	18-751-349-528
329	RMS-TS-TZ-CNP	18-483-905-529	18-751-349-529
330	RMS-TSI-TZ-CNP	18-483-905-530	18-751-349-530
331	RMS-TIG-TZ-CNP	18-483-905-531	18-751-349-531
332	RMS-TSG-TZ-CNP	18-483-905-532	18-751-349-532
333	RMS-TSIG-TZ-CNP	18-483-905-533	18-751-349-533
346	RMS-TI-T-CPX	18-483-905-546	18-751-349-546
347	RMS-TS-TZ-CPX	18-483-905-547	18-751-349-547
348	RMS-TSI-TZ-CPX	18-483-905-548	18-751-349-548
349	RMS-TIG-TZ-CPX	18-483-905-549	18-751-349-549
350	RMS-TSG-TZ-CPX	18-483-905-550	18-751-349-550
351	RMS-TSIG-TZ-CPX	18-483-905-551	18-751-349-551
352	RMS-TI-T-CNPX	18-483-905-552	18-751-349-552
353	RMS-TS-TZ-CNPX	18-483-905-553	18-751-349-553
354	RMS-TSI-TZ-CNPX	18-483-905-554	18-751-349-554
355	RMS-TIG-TZ-CNPX	18-483-905-555	18-751-349-555
356	RMS-TSG-TZ-CNPX	18-483-905-556	18-751-349-556
357	RMS-TSIG-TZ-CNPX	18-483-905-557	18-751-349-557

Item	Description	Part Number	Usage
370	Terminal Block	15-171-051-010	
371	Standoff Screw	18-657-465-036	
371A	Standoff Screw	18-658-143-026	Neutral Metering
372	Terminal Screw	18-657-465-035	
373	Lockwasher	00-655-047-060	
374	Cover	18-658-100-045	
374A	Cover	18-658-143-027	Neutral Metering
379	Screw	00-615-641-901	
383	Label	18-658-100-046	

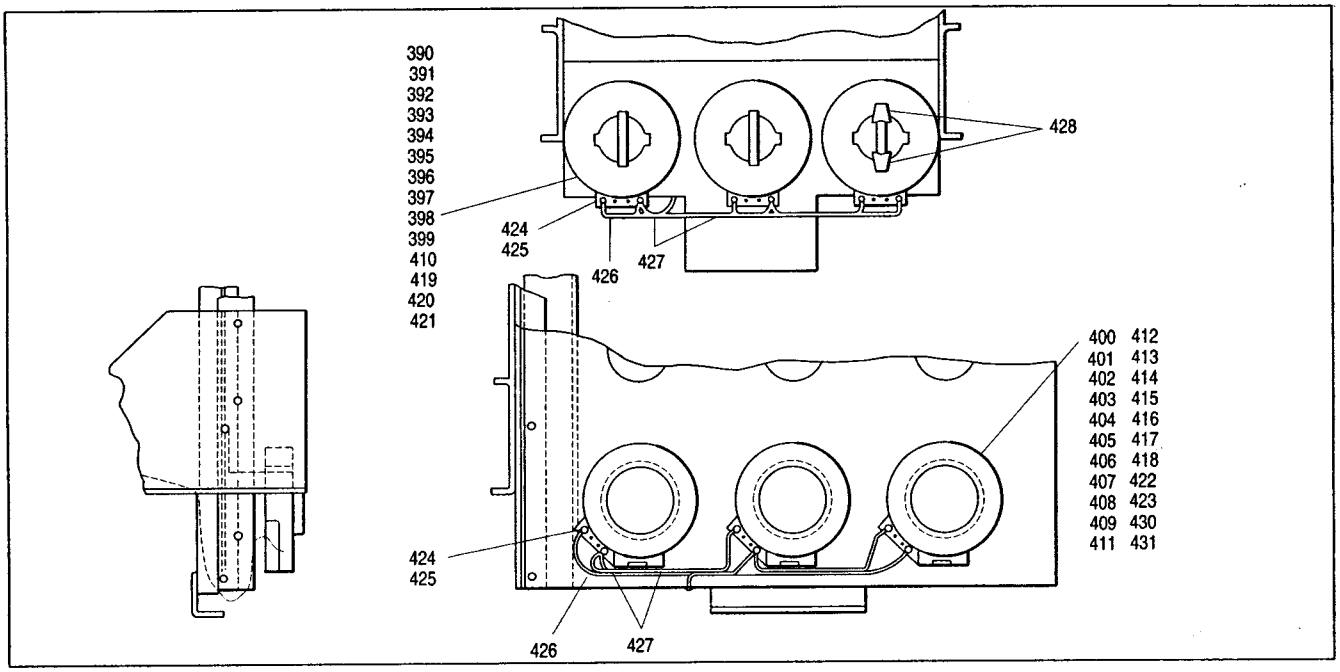


Figure 34. Tripping Transformer Group

The following items refer to **Figure 34**, RL Breakers with Static Trip III Trip Device. For further information on Static Trip III Trip Device, refer to 'Static Trip III Information and Instruction Guide', SG-3118.

Single Winding Transformer

Item	Description	Part Number	Usage
390	Trip transformer-80A	61-300-053-527	to RL-2000
391	Trip transformer-150A	61-300-053-501	to RLE-2000
392	Trip transformer-200A	61-300-053-502	to RLE-2000
393	Trip transformer-300A	61-300-053-503	to RLE-2000
394	Trip transformer-400A	61-300-053-504	to RLE-2000
395	Trip transformer-600A	61-300-053-505	to RLE-2000
396	Trip transformer-800A	61-300-053-506	to RLE-2000
397	Trip transformer-1200A	61-300-053-507	RL-1600 to RLE-2000
398	Trip transformer-1600A	61-300-053-508	RL-1600 to RLE-2000
399	Trip transformer-2000A	61-300-053-509	RL-2000 to RLE-2000
400	Trip transformer-1200A	61-300-053-510	RL-3200
401	Trip transformer-1600A	61-300-053-511	RL-3200
402	Trip transformer-2000A	61-300-053-512	RL-3200
403	Trip transformer-2400A	61-300-053-525	RL-3200
404	Trip transformer-3000A	61-300-053-526	RL-3200
405	Trip transformer-3200A	61-300-053-513	RL-3200
406	Trip transformer-1600A	61-300-053-514	RL-4000, RLE-4000
407	Trip transformer-2000A	61-300-053-515	RL-4000, RLE-4000
408	Trip transformer-3200A	61-300-053-516	RL-4000, RLE-4000
409	Trip transformer-4000A	61-300-053-517	RL-4000, RLE-4000
430	Trip transformer-5000A	61-300-053-530	RL-5000

Dual Winding-Separate 2000A Ground Winding

Item	Description	Part Number	Usage
410	Trip Transformer-2000A	61-300-059-509	RL-2000, RLE-2000
411	Trip Transformer-1200A	61-300-059-501	RL-3200
412	Trip Transformer-1600A	61-300-059-502	RL-3200
413	Trip Transformer-2000A	61-300-059-503	RL-3200
414	Trip Transformer-3200A	61-300-059-504	RL-3200
415	Trip Transformer-1600A	61-300-059-505	RL-4000, RLE-4000
416	Trip Transformer-2000A	61-300-059-506	RL-4000, RLE-4000
417	Trip Transformer-3200A	61-300-059-507	RL-4000, RLE-4000
418	Trip Transformer-4000A	61-300-059-508	RL-4000. RLE-4000
431	Trip Transformer-5000A	61-300-059-511	RL-5000

Dual Winding Tapped Configuration (See **Figure 35**)

Item	Description	Part Number	Usage
419	Trip Transformer Taps for 200/400/600/800A	61-300-065-501	RL-800, RLE-800, RLI-800
420	Trip Transformer Taps for 400/800/1200/1600A	61-300-065-502	RL-1600, RL-2000
421	Trip Transformer Taps for 500/1000/1500/2000A	61-300-065-503	RL-2000 - RLE-2000
422	Trip Transformer Taps for 800/1600/2400/3200A	61-300-065-504	RL-3200
423	Trip Transformer Taps for 1000/2000/3000/4000A	61-300-065-505	RL-4000, RLE-4000

Hardware Common to All Versions

Item	Description	Part Number	Usage
424	Terminal	15-172-099-003	
425	Screw 10-32	00-615-649-216	
426	Wire #18	00-557-286-003	
427	Tyrap	00-857-271-230	
428	Spacer	18-658-024-052	RL-800, RLI-800, RLE-800
429	Screw 6-32	00-615-641-901	Dual Winding Ground

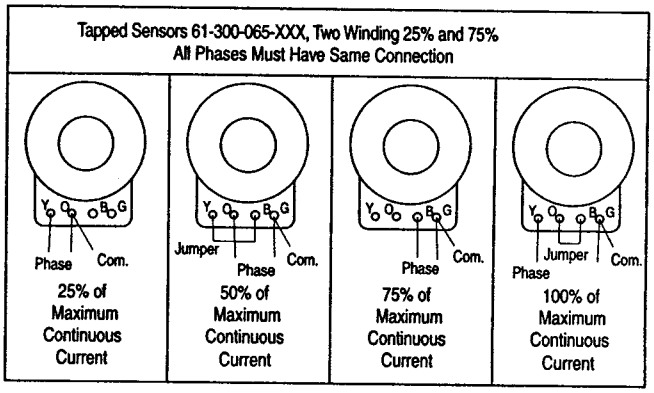


Figure 35. Tapped Sensor Connections

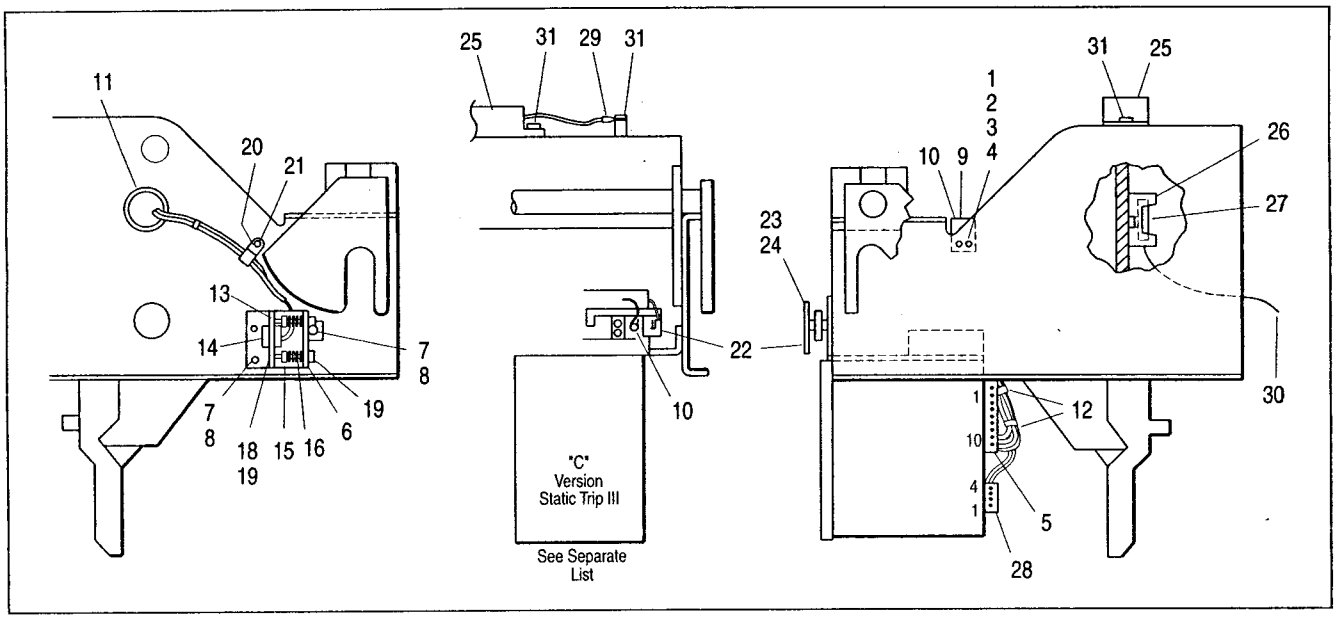


Figure 36. Communications Options Group

The following item numbers refer to **Figure 36**, and are common parts used on all models. (Ref. 18-398-289-551/-565)

n	Description	Part Number	Usage
1	Switch	00-000-466-771	
2	Insulator	18-658-110-126	
3	Screw	00-615-471-130	
4	Nut	00-633-043-106	
5	Plug 10 Pt	18-658-143-057	
6	Plug Bracket	18-732-790-142	
7	Screw	15-171-399-010	
8	Nut	00-633-059-210	
9	Terminal	15-172-099-007	
10	Terminal	15-172-099-001	
11	Grommet Mtg	15-171-890-001	
12	Tyrap	00-857-271-230	
13	Guide Plate	18-658-110-152	
14	Sub-D 15 Pin	15-172-245-015	
15	Pin Guide	18-658-110-151	
16	Spring	71-141-173-001	
18	Screw	00-615-471-072	
19	Lockwasher	00-655-017-014	
20	Cable Hanger	00-857-275-006	
21	Screw	00-615-581-174	
22	Term. Conn	18-732-790-592	Neutral Metering
23	Cover	18-658-143-027	Neutral Metering
24	Standoff	18-658-143-026	Neutral Metering
25	PT Module	18-817-157-501	
26	Fuse Block	15-172-704-001	
27	Fuse	15-172-704-002	
28	Plug 4 Pin	18-658-143-058	
29	Terminal	15-172-099-004	
30	Terminal	15-172-099-022	
31	Screw #10	15-171-399-010	
32	Screw #6	00-615-641-903	

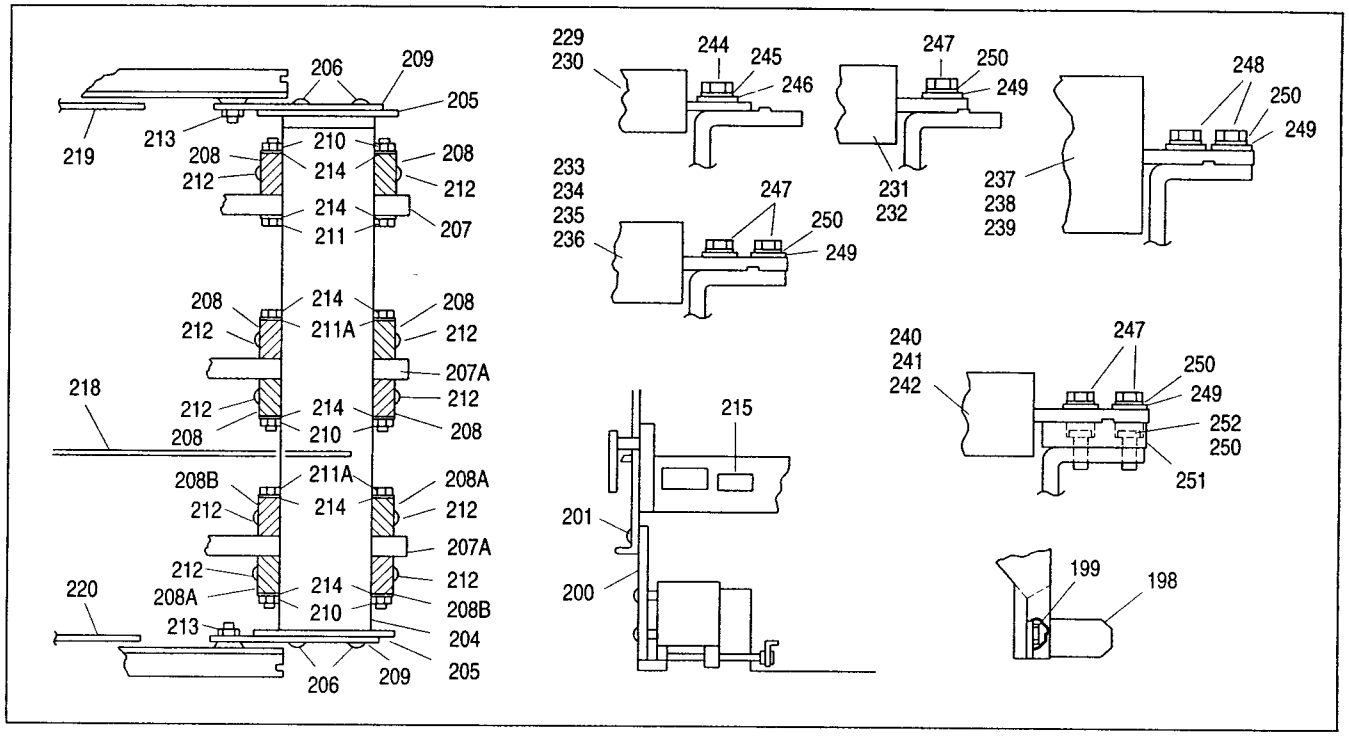


Figure 37. Integrally Fused Breakers

The following items refer to **Figure 37**. Used on RLF-800 thru RLF-2000 Breakers.

Item	Description	Part Number	Usage
198	Bracket	18-657-937-283	
199	Screw	15-171-399-011	
200	Open Fuse Trip	18-399-796-501	See **Figure 29**
201	Screw	15-171-399-010	
204	Insulator	18-732-790-025	
205	Insulator	18-657-947-202	
206	Screw	15-615-024-004	
207	Connector	18-657-942-090	RLF-800
207A	Connector	18-657-942-091	
208	Bracket	18-398-288-010	
208A	Bracket	18-399-523-001	RLF-2000
208B	Bracket	18-399-523-002	RLF-2000
209	Bracket	18-732-790-026	
210	Nut	15-171-063-016	
211	Screw	00-615-114-388	RLF-800
211A	Screw	00-611-315-395	
212	Screw	15-171-399-011	
213	Nut	00-631-059-104	
214	Washer	00-651-007-146	
215	Label	18-657-765-208	
218	Barrier	18-657-937-284	RLF-2000
219	Barrier	18-732-790-053	RLF-2000
220	Barrier	18-732-790-054	RLF-2000
229	Fuse 250A	71-142-200-001	
230	Fuse 400A	71-142-200-002	
231	Fuse 600A	71-142-200-003	
232	Fuse 800A	71-142-200-004	
233	Fuse 1000A	71-142-200-013	
234	Fuse 1200A	71-142-200-005	
235	Fuse 1600A	71-142-200-006	
236	Fuse 2000A	71-142-200-007	
237	Fuse 2500A	71-142-200-008	
238	Fuse 3000A	71-142-200-009	

Item	Description	Part Number	Usage
239	Fuse 4000A	71-142-200-010	
240	Fuse 1600A	71-142-200-015	Welder fuse
241	Fuse 2000A	71-142-200-016	Welder fuse
242	Fuse 2500A	71-142-200-019	Welder fuse
244	Screw	00-611-315-421	
245	Lockwasher	00-655-017-030	
246	Washer	00-615-007-900	
247	Screw	00-611-315-546	
248	Screw	00-611-315-548	
249	Washer	00-651-007-285	
250	Lockwasher	00-655-017-036	
251	Adapter	18-732-791-586	
252	Screw	00-615-114-542	

Breaker Type	Maximum Fuse Size
RLF-800	1600A
RLF-1600	3000A
RLF-2000	4000A

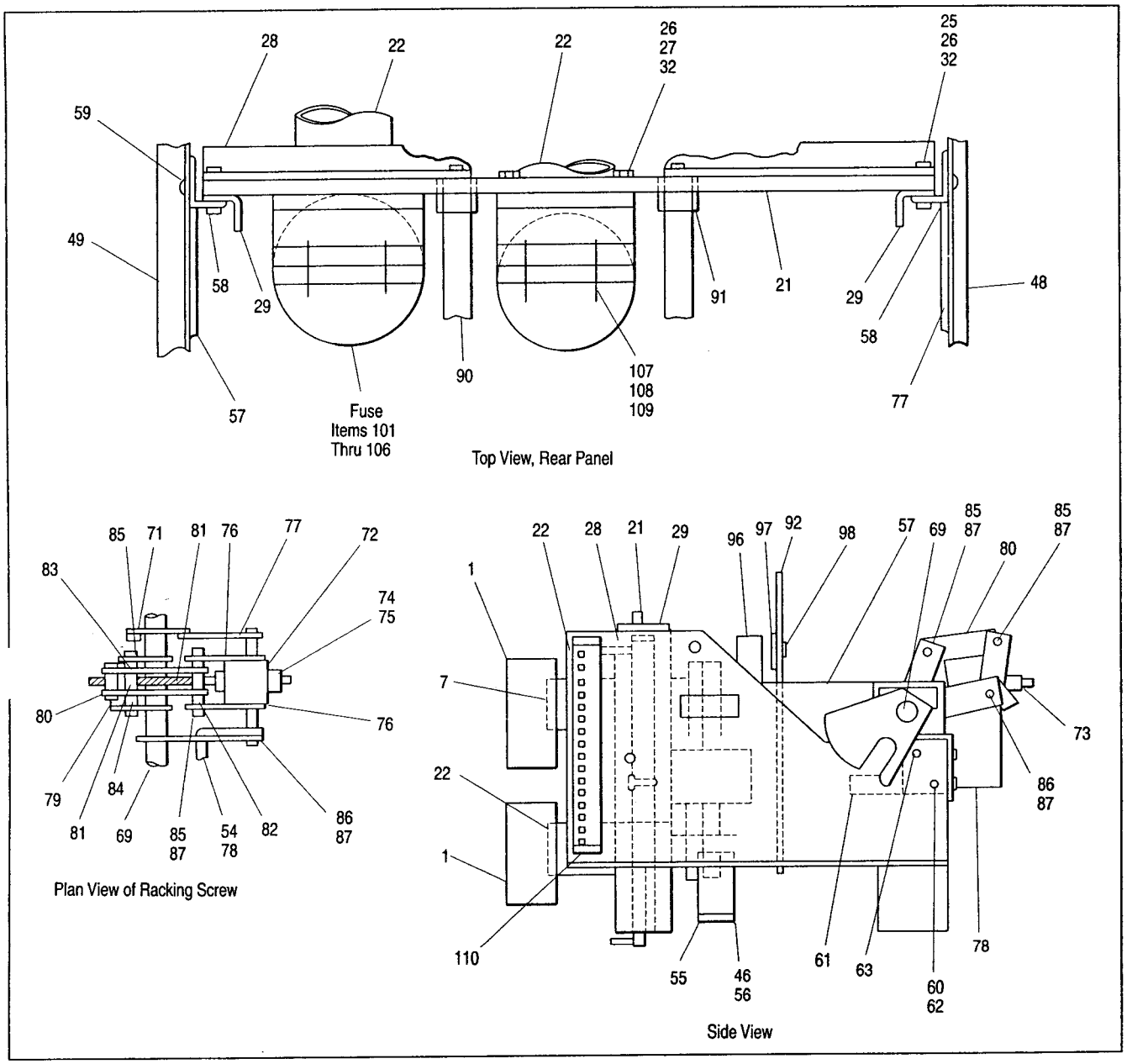


Figure 38. Fuse Carriage Outline

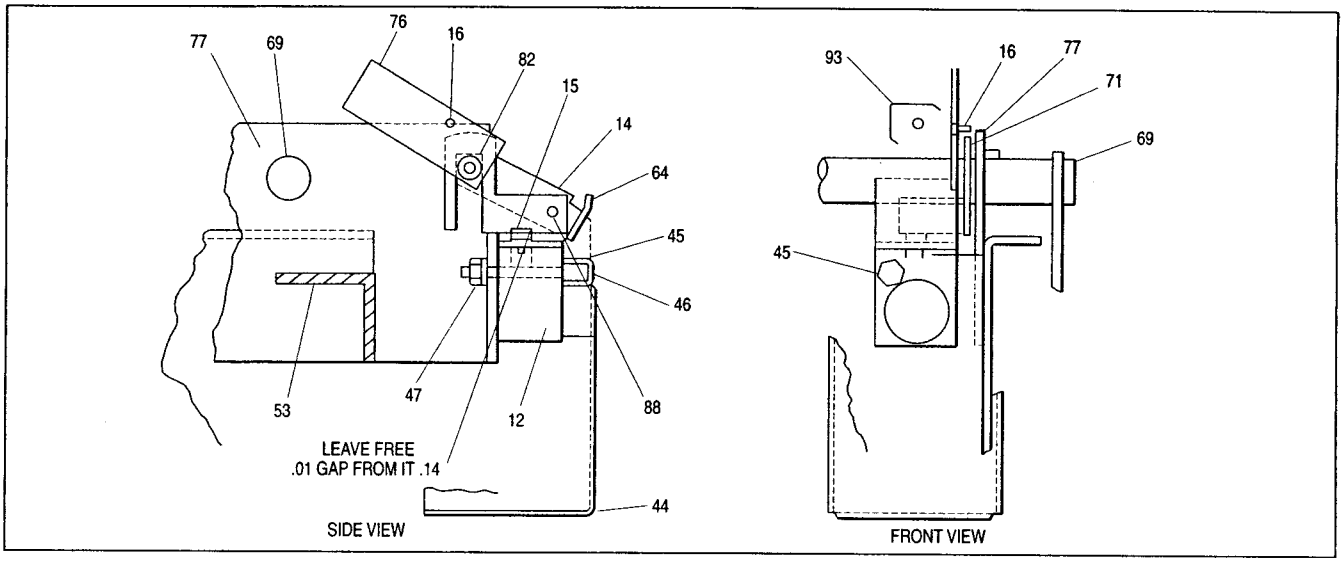


Figure 39. Key Interlock Mounting

The following items refer to **Figures 38** and **39**, and are common to RFC-3200, RFC-4000, and RFC-5000 fuse carriages (except as noted) (Ref. 18-474-533-506/-805/-401):

Item	Description	Part Number	Usage
1	Primary Contact	18-733-481-501	RFC-3200
1A	Primary Contact	18-733-481-502	RFC-4000
1B	Primary Contact	18-752-300-596	RFC-5000
7	Screw	00-613-114-373	
12	Key Interlock	00-675-535-311	
14	Interlock Clip	18-657-765-372	
15	.25-20 x.5 Screw	15-171-738-003	
16	Rivet (.188 x.50)	18-657-824-128	
21	Base Plate	18-399-521-001	RFC-3200
21A	Base Plate	18-398-939-001	RFC-4000
21B	Base Plate	18-398-288-163	RFC-5000
22	Contact Assy	18-399-274-502	RFC-3200
22A	Contact Assy	18-399-274-501	RFC-4000
22B	Contact Assy	18-818-391-507	RFC-5000
25	Screw	00-611-315-548	
26	Lockwasher .312	00-655-017-030	
27	Washer .312	00-651-027-170	
28	Angle	18-657-937-255	RFC-3200, RFC-4000
28A	Angle	18-658-143-248	RFC-5000
29	Angle Glastic	18-657-941-062	
32	Cap Screw	00-611-315-426	
44	Cover	18-744-871-001	
45	Spec Screw	18-657-855-247	
46	Screw No. 10 (.5)	15-171-399-010	
47	Nut (.375-16)	15-171-063-018	
48	Side Plate RH	18-398-289-510	
49	Side Plate LH	18-398-288-002	
53	Apron Assy	18-733-745-501	RFC-3200, RFC-4000
53A	Apron Assy	18-733-745-502	RFC-5000
54	Screw .25-20 (.62)	00-615-663-373	
55	Ground Bar	18-657-916-579	
56	Nut	00-633-059-210	
57	Rack Shaft Support	18-733-744-002	
58	Angle	18-657-937-254	
59	Screw	15-615-024-006	
60	Screw	00-615-015-468	
61	Bracket	18-657-942-199	
62	Nut	15-171-063-018	
63	Screw	15-615-024-007	
64	Shutter	18-657-765-373	

Item	Description	Part Number	Usage
69	Rack Shaft Assy	18-733-820-501	RFC-3200, RFC-4000
69A	Rack Shaft Assy	18-733-820-502	RFC-5000
71	Retainer	18-657-822-197	
72	Racking Block	18-657-823-359	
73	Racking Screw	18-735-641-060	
74	Collar	18-658-110-024	
75	Roll Pin	18-658-110-036	
76	Link	18-657-961-200	
77	Rack Shaft Support	18-733-744-001	
78	Screw Brace	18-657-942-197	
79	Barrel Nut	18-657-962-344	
80	Link	18-657-941-297	
81	Spacer (.5)	18-724-503-004	
82	Spacer (.310)	18-724-503-005	
83	Spacer(.19)	18-731-274-002	
84	Spacer (.46)	18-731-274-001	
85	Pin .375 x (1.94)	18-724-501-012	
86	Pin	18-747-678-010	
87	Sichsl	00-000-401-166	
88	Screw	15-171-074-010	
89	Link	18-657-942-092	
90	Brace	18-657-942-196	
91	Roll Pin .188 x I.25	00-671-176-319	
92	Barrier	18-733-821-002	RFC-3200, RFC-4000
92A	Barrier	18-752-300-133	RFC-5000
93	Label (Racking)	18-657-765-385	
96	Open Fuse Indicator	See **Figure 28**	
97	Cover	18-657-961-277	
98	Screw, Self Tap	00-615-605-120	
101	Fuse 2000A	71-142-000-007	
102	Fuse 2500A	71-142-000-008	
103	Fuse 3000A	71-742-000-009	
104	Fuse 4000A	71-142-000-010	
105	Fuse 5000A	71-142-000-011	
106	Fuse 6000A	71-142-000-012	
107	Screw	00-611-315-548	2000A fuse only
108	Screw	00-611-315-550	All other fuses
109	Rd. Washer	00-651-007-300	
110	Secy Disconnect	18-398-790-501	

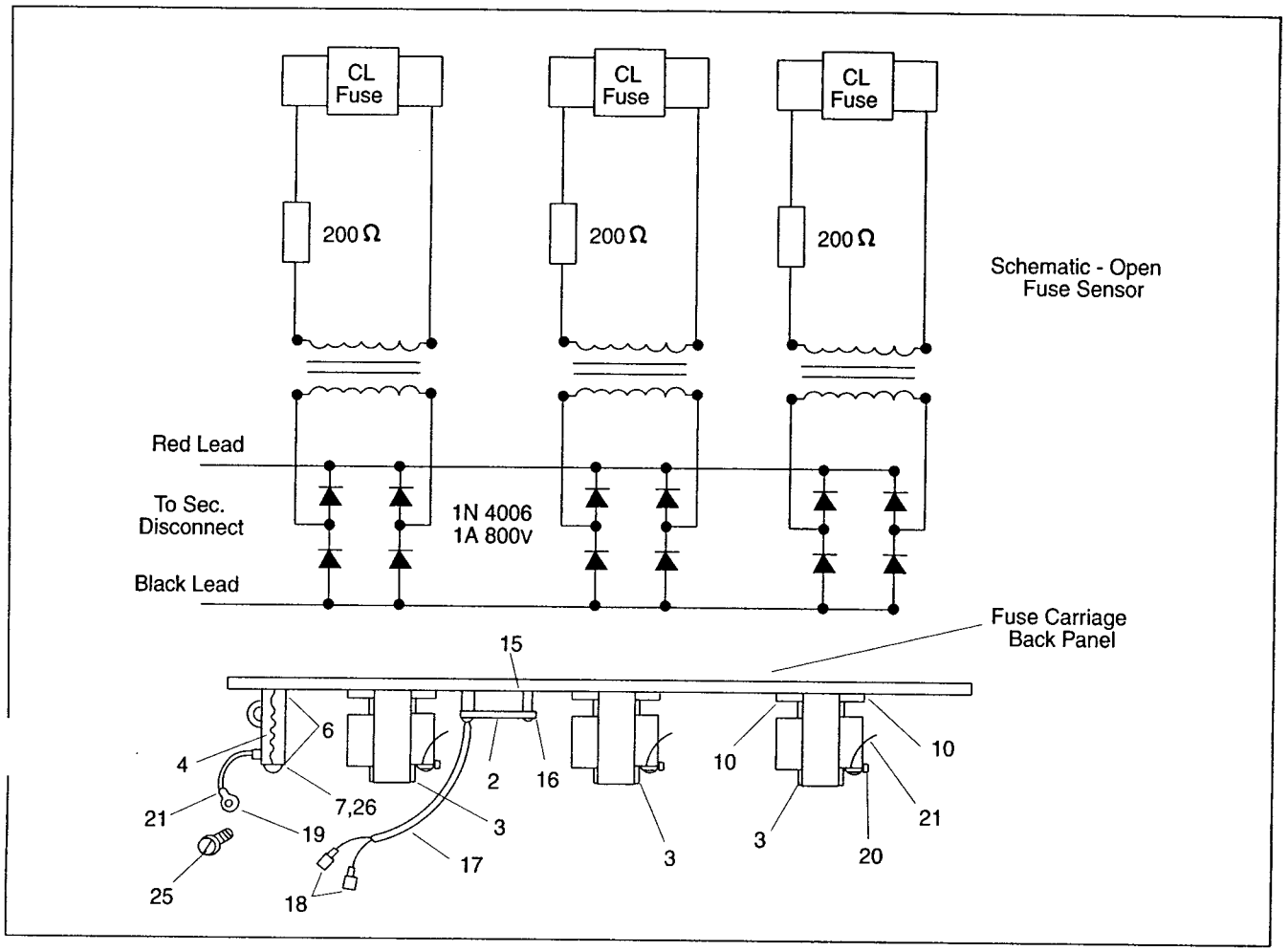


Figure 40. Open Fuse Sensor

The following items refer to **Figure 40**, and are common to all fuse carriages:

Item	Description	Part Number	Usage
2	Circuit Board Assy.	18-730-037-502	
3	Transformer	18-657-855-365	
4	Resistor (200Ω 25W)	00-875-401-201	
6	Washer (Centering)	14-105-442-001	
7	Screw #10 x 2.5	00-615-635-237	
10	Screw #10x .5	00-615-644-218	
15	Spacer	15-171-772-001	
16	Screw #6 x .62	00-615-648-126	
17	Insulation	00-413-615-182	
18	Terminal	15-171-099-007	
19	Terminal #10 Ring	15-172-099-003	
20	Terminal #6 Ring	15-172-099-001	
21	Wire # 18	00-557-286-003	
23	Tyrap	00-857-271-230	
24	Tyrap Mtq Plate	00-857-271-750	
25	# 10-32 x .38 Sems	00-611-445-216	
26	Lockwasher #10	00-655-067-100	

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