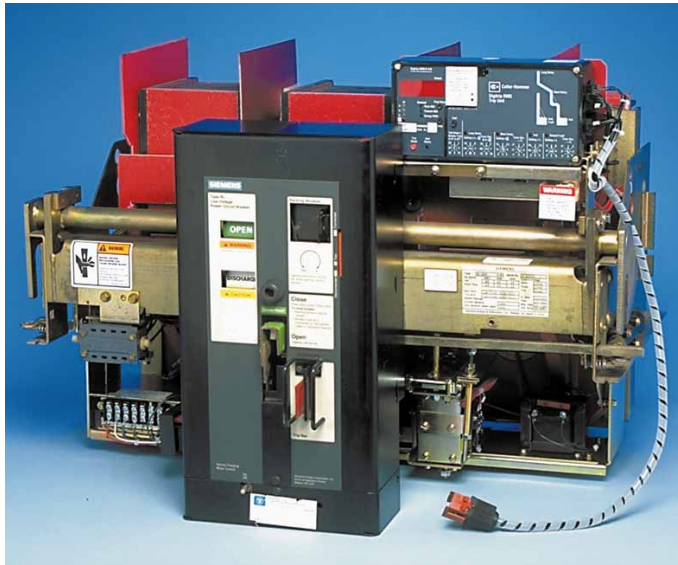




## Digitrip Retrofit System for the Siemens-Allis RL-4000 & RL-3200 Series Breakers



### SAFETY PRECAUTIONS



#### WARNING

**POWER CIRCUIT BREAKERS ARE EQUIPPED WITH HIGH SPEED, HIGH ENERGY OPERATING MECHANISMS. THE BREAKERS AND THEIR ENCLOSURES ARE DESIGNED WITH SEVERAL BUILT-IN INTERLOCKS AND SAFETY FEATURES INTENDED TO PROVIDE SAFE AND PROPER OPERATING SEQUENCES. TO PROVIDE MAXIMUM PROTECTION FOR PERSONNEL ASSOCIATED WITH THE INSTALLATION, OPERATION, AND MAINTENANCE OF THESE BREAKERS, THE FOLLOWING PRACTICES MUST BE FOLLOWED. FAILURE TO FOLLOW THESE PRACTICES MAY RESULT IN DEATH, PERSONAL INJURY, OR PROPERTY DAMAGE.**

- Only qualified persons, as defined in the National Electric Code, who are familiar with the installation and maintenance of power circuit breakers and their associated switchgear assemblies should perform any work associated with these breakers.

- Completely read and understand all instructions before attempting any installation, operation, maintenance, or modification of these breakers.
- **Always turn off and lock out the power source feeding the breaker prior to attempting any installation, maintenance, or modification of the breaker. Do not use the circuit breaker as the sole means for isolating a high voltage circuit. Follow all lockout and tagging rules of the National Electric Code and all other applicable codes, regulations, and work rules.**
- Do not work on a closed breaker or a breaker with the closing springs charged. Trip (open) the breaker and be sure the stored energy springs are discharged before performing any work. The breaker may trip open or the charging springs may discharge, causing crushing or cutting injuries.
- For drawout breakers, trip (open), and then remove the breaker to a well-lit work area before beginning work.
- Do not perform any maintenance: including breaker charging, closing, tripping, or any other function which could cause significant movement of the breaker while it is on the extension rails. Doing so may cause the breaker to slip from the rails and fall, potentially causing severe personal injury to those in the vicinity.
- **Do not leave the breaker in an intermediate position in the switchgear cell. Always leave it in the connected, disconnected, or (optional) test position. Failure to do so could lead to improper positioning of the breaker and flashover, causing death, serious personal injury, and / or property damage.**
- **Do not defeat any safety interlock. Such interlocks are intended to protect personnel and equipment from damage due to flashover and exposed contacts. Defeating an interlock could lead to death, severe personal injury, and / or property damage.**

Cutler-Hammer Digitrip Retrofit Kits are available in a number of configurations that provide a wide range of features. The Digitrip System starts with the 510 Basic Kit which offers true RMS sensing, overcurrent protection, and self-testing features. Advanced Digitrip Retrofit Kits feature zone interlocking, digital alphanumeric displays, remote alarm signals, IMPACC communications, energy monitoring capabilities, power factors, and harmonic content measurements.

The following table provides a quick reference of the components supplied with each level of Retrofit Kit. Before beginning the Retrofit process, take a minute to review the information contained in the table. It is important that the Retrofitter understand

which level of Retrofit Kit is to be installed and which components are included with the Kit.

The instructions contained in this manual cover the installation of all levels of Retrofit Kit. If the Kit you are installing does not contain a certain component, skip the instructions for that component and proceed to the next.

Throughout the Retrofit process, refer to the Torque Tables at the back of this manual for specific torque values.

If you have any questions concerning the Retrofit Kit and / or the Retrofit process, contact Cutler-Hammer at 1-800-937-5487.

Components	510 Basic	510 with Zone Interlock	610	810	910
Trip Unit					
Rating Plug					
Auxiliary Current Transformer (CT) Module					
Auxiliary CT Harness					
Sensors					
Sensor Harness					
Direct Trip Actuator (DTA)					
Mounting Brackets and Hardware					
External Harness	Plug	1 Connector Harness	2 Connector Harness	4 Connector Harness	4 Connector Harness
Cell Harness					
Breaker Mounted Control Power Transformer (CPT)					
Potential Transformer (PT) Module					
Auxiliary Switch					

### Step 1: General Breaker Preparation

Before attempting to remove the Breaker from the Cell or perform any Retrofit Operation, be sure to read and understand the Safety Precautions section of this manual. In addition, be sure to read and understand the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Retrofit Application Data - Publication AD 33-855-1), supplied with the Digitrip Retrofit Kit.



#### WARNING

**DO NOT ATTEMPT TO INSTALL OR PERFORM MAINTENANCE ON EQUIPMENT WHILE IT IS ENERGIZED. SEVERE PERSONAL INJURY OR DEATH CAN RESULT FROM CONTACT WITH ENERGIZED EQUIPMENT. VERIFY THAT NO VOLTAGE IS PRESENT BEFORE PROCEEDING.**

- A. Trip the Breaker and remove it from the Cell. Move the Breaker to a clean, well-lit work bench.

**NOTE: It is the responsibility of the Retrofitter to insure that the Breaker and all original components are in good condition. Visually inspect all Breaker components for signs of damage or wear. If any signs of damage or wear are detected for components not included in the Retrofit kit, secure the necessary replacement parts before beginning the Retrofit process.**

The force necessary to trip the Breaker should not exceed twenty (20) lbs.

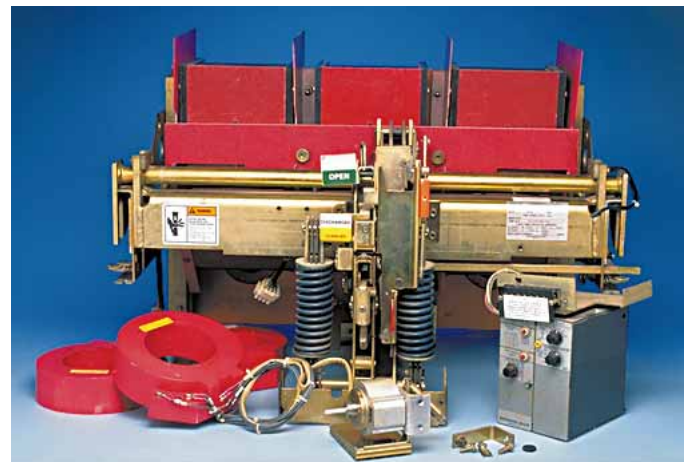
**NOTE: It is the responsibility of the Retrofitter to insure that the proper, manufacturer's recommended crimping tools and terminals are used for each type of connector. It is also the responsibility of the Retrofitter to insure that all wire preparations, connections, strippings, terminations, and wiring techniques are performed according to the latest IEEE, NEC, and / or NEMA industry standards, specifications, codes, and guidelines.**

To begin the Retrofit process, refer to the components list at the end of this manual. Lay out the components and hardware according to the steps outlined. The parts bags are labeled with the corresponding step number. The components and hardware will be used to complete each step in the Retrofit process.

### Step 2: Removing the Original Components

Follow the Siemens-Allis RL-4000 or RL-3200 Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

- A. Remove and save the Finger Clusters and mounting hardware. These will be reinstalled later in the Retrofit process.
- B. Remove and scrap the original Sensors and Sensor Harness.
- C. Remove and save the Front Cover and mounting hardware. These will be reinstalled later in the Retrofit process.
- D. Remove and scrap the original Trip Actuator and mounting bracket.
- E. Remove and scrap the original Trip Unit and mounting hardware. Save the two (2) bolts that secured the right side of the Trip Unit for use later in the Retrofit process.

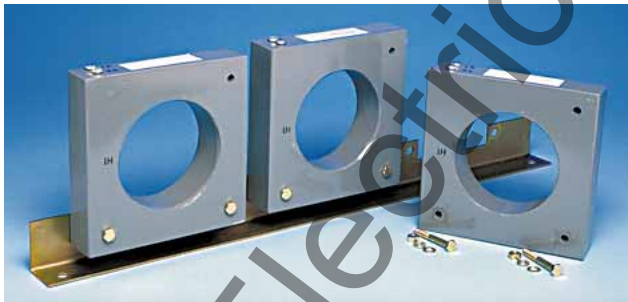


### Step 3: Installing the Sensors

Steps A through G for RL-4000 Breakers Only.  
For RL-3200 Breakers, refer to Steps H through K.

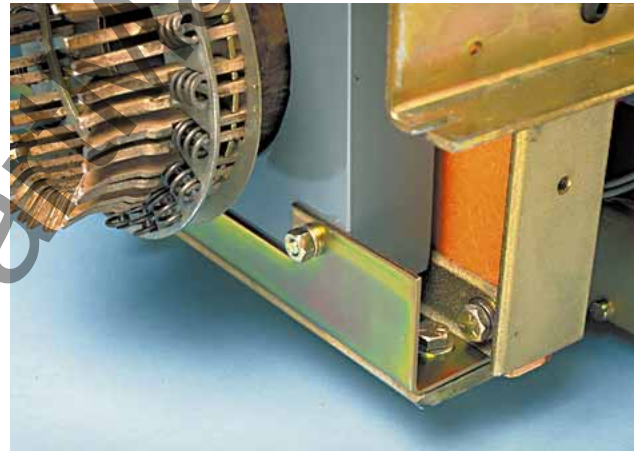


- A. Align the Sensors with the pre-drilled holes in the Sensor Mounting Bracket. Note that the Sensor Terminals must be facing upwards.
- B. Secure the Sensors to the Sensor Mounting Bracket, as shown, using the (6) .250-20 x 2.00" bolts, (12) flat washers, (6) lock washers, and (6) nuts provided.



- C. Slide the Sensor Assembly over the bottom Breaker Stabs and against the Breaker Back Plate.

- D. Using the Sensor Mounting Bracket as a template, mark the location of the Sensor Mounting Bracket holes on the angle at the bottom of the Breaker Back Plate.
- E. Remove the Sensor Assembly. At the locations just marked, drill two (2) .438" holes in the angle at the bottom of the Breaker Back Plate.
- F. Reinstall the Sensor Assembly over the Breaker Stabs. Secure the Sensor Assembly to the Breaker using the (2) .375-16 x 1.00" bolts, (4) flat washers, (2) lock washers, and (2) nuts provided.



- G. Using the original mounting hardware, reinstall the Finger Clusters onto the bottom Breaker Stabs.

**NOTE: For Kits Supplied with a PT Module Only. Do not reinstall the Finger Clusters at this time. They will be installed later in the Retrofit Process.**

Steps H through K for RL-3200 Breakers Only.  
For RL-4000 Breakers, refer to Steps A through G.



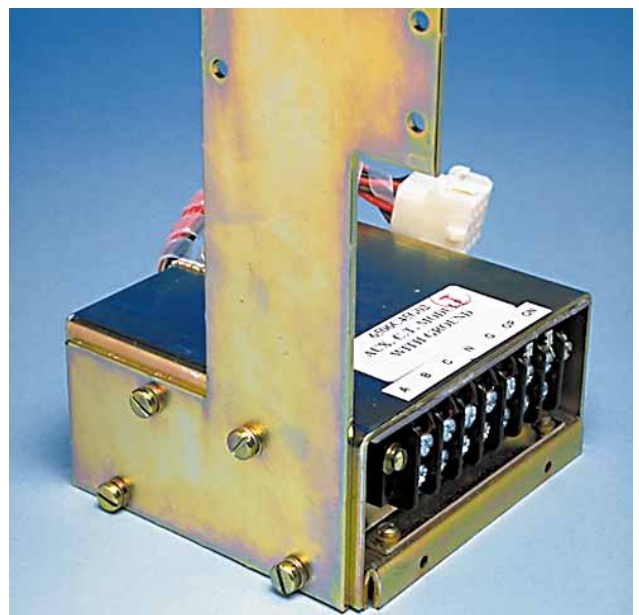
- H. Slide a Sensor over each of the bottom Breaker Stabs.
- I. Align the Sensors so the terminals are pointing towards the top of the Breaker.
- J. Secure the Sensors to the Breaker Stabs by tightening the three (3) set screws on each Sensor.
- K. Using the original mounting hardware, reinstall the Finger Clusters onto the bottom Breaker Stabs.

**NOTE: For Kits Supplied with a PT Module Only.** Do not reinstall the Finger Clusters at this time. They will be installed later in the Retrofit Process.

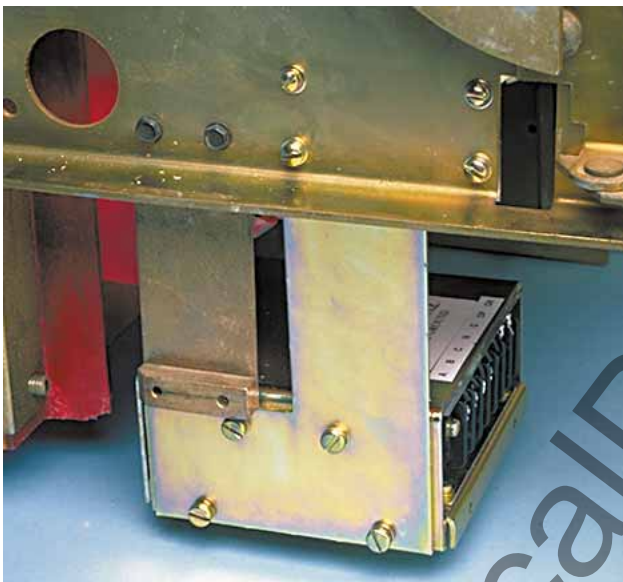
**Step 4: Installing the Auxiliary CT. Module Assembly**



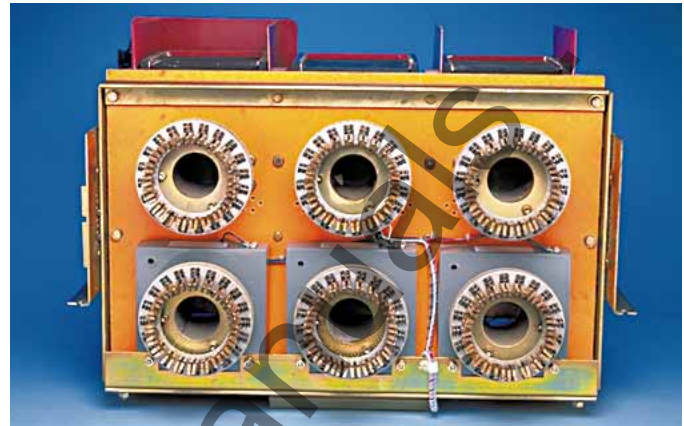
- A. Remove and save the two (2) existing screws from the left side of the Aux. CT Module.
- B. Align the Aux. CT Module Mounting Bracket with the four (4) holes in the left side of the Aux. CT Module, as shown.
- C. Secure the mounting bracket to the Aux. CT Module, as shown, using the two (2) original screws and the (2) .190-16 x .500" thread cutting screws, (2) lock washers, and (2) flat washers provided.



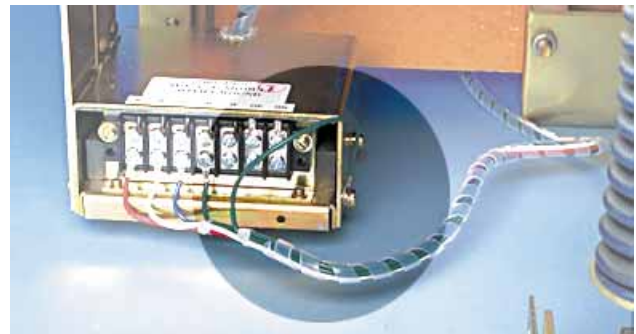
- D. Align the Aux. CT Module Assembly with the existing holes in the left Breaker Frame as shown.
- E. Secure the Aux. CT Module Assembly to the left Breaker Frame using the (2) .190-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts, and the (2) .164-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts provided. Note that the .190 hardware is used in the top mounting holes.



### Step 5: Installing the Sensor Harness

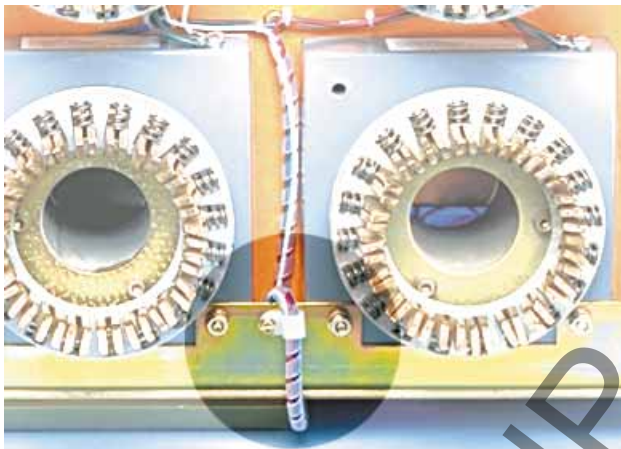


- A. Connect the Sensor Harness to the proper terminals on the Aux. CT Module. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.
- B. Remove and save the front screw from the right side of the Aux. CT Module. Using the screw just removed, connect the green ground wire from the Sensor Harness (with ring terminal) to the side of the Aux. CT Module.

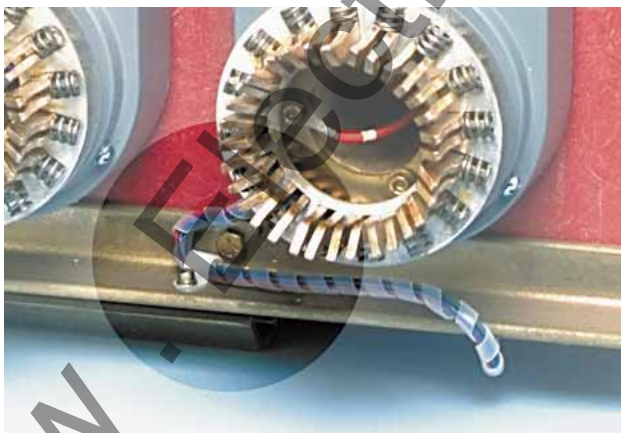


- C. Route the Sensor Harness from the Aux. CT Module towards the back of the Breaker, under the Breaker Back Plate, then up towards the Sensors. Insure that the Sensor Harness is clear of any moving parts within the Breaker.

- D. Connect the ring terminals of the Sensor Harness to the Sensors as shown. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.
- E. *For RL-4000 Breakers Only.* Secure the Sensor Harness to the Sensor Mounting Bracket, as shown, using the wire clamp and (1) .190-16 x .500" thread cutting screw, (1) lock washer, and (1) flat washer provided.



- F. *For RL-3200 Breakers Only.* Secure the Sensor Harness to the angle on the bottom of the Breaker Back Plate, as shown, using the wire clamp and (1) .190-32 x .500" screw, (1) lock washer, and (1) flat washer provided.



**Step 6: Installing the Reset Linkage**

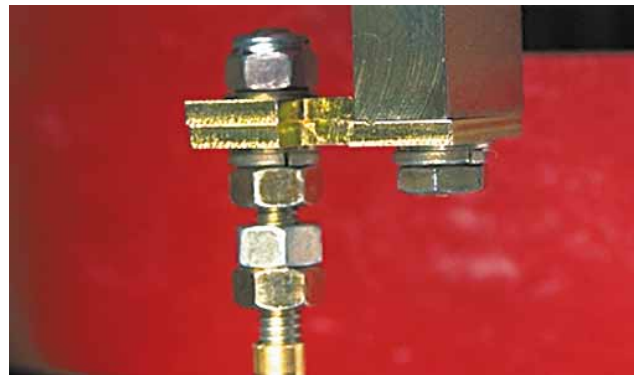


- A. Remove and scrap the original "X" washers securing the Wrist Pin of the Phase 3 Pole Shaft.
- B. Partially slide the pin through the Insulation Link until there is sufficient clearance to insert the Reset Linkage.

**NOTE: Do not completely remove the pin. It is under slight spring tension.**

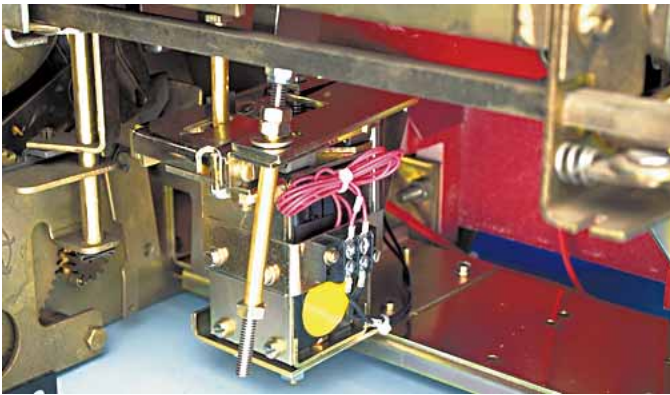
- C. Align the Reset Linkage with the pin and Insulation Link of the Phase 3 Pole Shaft.

**NOTE: The Reset Linkage for the RL-4000 is slightly offset to provide clearance.**

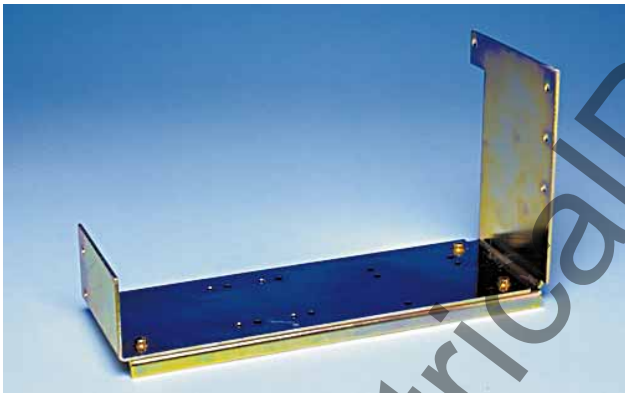


- D. With the Reset Linkage aligned with the pin, slide the pin back into the Insulation Link. Secure the pin using the (2) .500" "X" washers provided.

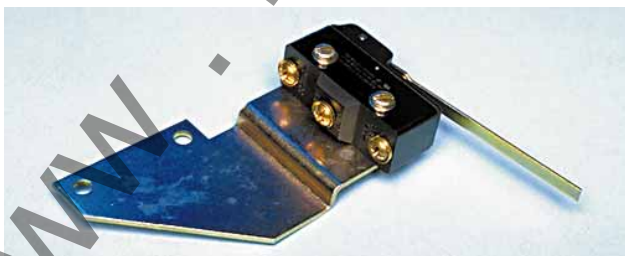
### Step 7: Installing the DTA Assembly



- A. Assemble the right and left DTA Mounting Brackets, as shown, using the (3) .190-32 x .500" screws, (6) flat washers, (3) lock washers, and (3) nuts provided. Note that the left bracket is placed on top of the right bracket.



- B. *For Kits Supplied With An Auxiliary Switch Only.* Cut 2.88" off the end of the Microswitch arm. Align the Microswitch with the holes in the Aux. Switch Mounting Bracket, as shown, then secure the Microswitch to the bracket using the (2) .138-32 x 1.00" screws, (4) flat washers, (2) lock washers, and (2) nuts provided.



Align the Aux. Switch Assembly with the holes along the front right side DTA Mounting Bracket Assembly, as shown. Secure the Aux. Switch Assembly to the DTA Mounting Bracket using the (2) .190-32 x .750" screws, (8) flat washers, (4) lock washers, and (4) nuts provided.

**NOTE:** The extra flat washers and nuts are used to space the Aux. Switch Assembly out from the DTA Mounting Bracket Assembly. The hardware order is: screw with flat washer through the DTA Mounting Bracket Assembly; flat washer, lock washer, and nut to secure the screw to the DTA Mounting Bracket Assembly; then flat washer, Aux. Switch Mounting Bracket, flat washer, lock washer, and nut to secure the Aux. Switch Assembly to the DTA Mounting Bracket.



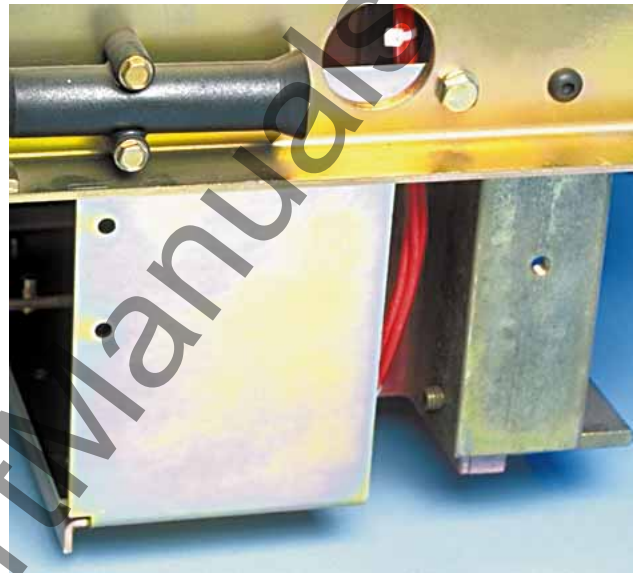
- C. Reinstall the mounting bolts that secured the original Trip Unit into the holes in the PTO Assembly. Secure the top of the PTO Assembly using the original bolts and the (2) .190" flat washers, (2) lock washers, and (2) nuts provided.
- D. Place the DTA Mounting Bracket Assembly into the Breaker near the right rear corner.
- E. *For Kits Supplied With An Auxiliary Switch Only.* The Microswitch arm must be below the PTO Linkage.



- F. Align the DTA Mounting Bracket Assembly with the existing hole in the right Breaker Frame as shown.

**NOTE:** There is an extra hole near the top, front of the DTA Assembly right Mounting Bracket Assembly. This hole is meant to go over the bottom rear bolt securing the Trip Linkage Tube and help align the DTA Mounting Bracket Assembly.

- G. Secure the right side of the DTA Mounting Bracket Assembly to the Breaker using the (1) .250-20 x .750" bolt, (2) flat washers, (1) lock washer, and (1) nut provided.

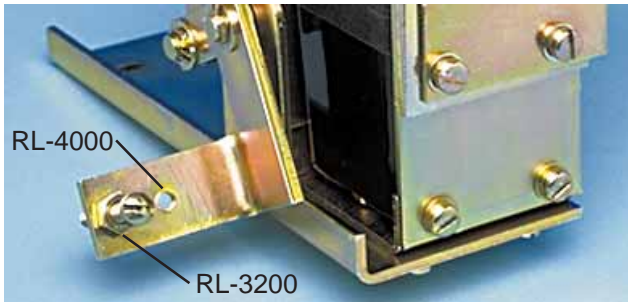


- H. Align the holes in the left side of the DTA Mounting Bracket Assembly with the existing holes in the Breaker Center Frame (used to mount the original Trip Actuator). Secure the left side of the DTA Mounting Bracket Assembly using the (2) .250-20 x .625" bolts, (2) lock washers, and (2) flat washers provided.



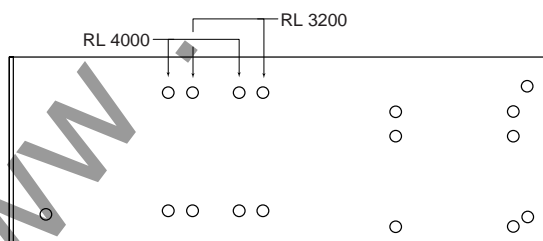
- I. *For RL-4000 Breakers Only.* Insure that the DTA Adjusting Screw is in the inside hole in the Trip Arm.

*For RL-3200 Breakers Only.* Insure that the DTA Adjusting Screw is in the outside hole in the Trip Arm.

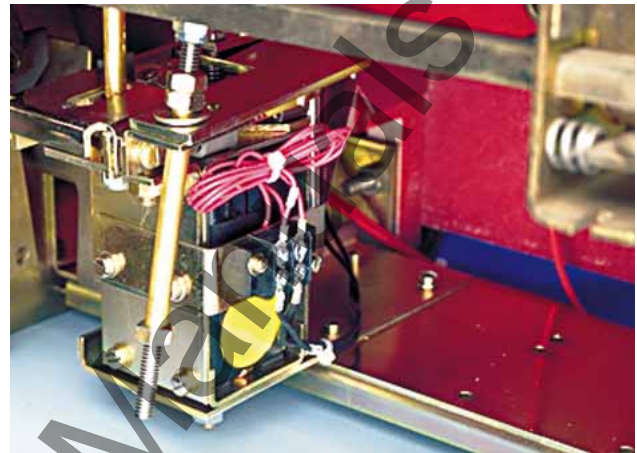


- J. Remove and save the bottom nut and brass spacer from the Reset Linkage Shaft. Insure that the large flat washer remains on the shaft.
- K. Align then insert the Reset Linkage into the cutout in the Reset Arm on the DTA Assembly. As you are sliding the Reset Linkage into the cutout on the Reset Arm, rotate the DTA Assembly so the DTA Mounting Plate rests on the DTA Mounting Bracket Assembly.
- L. Reinstall the brass spacer and nut on the Reset Linkage Shaft. Do not tighten at this time.
- M. Align the holes in the DTA Mounting Plate with the holes in the DTA Mounting Bracket Assembly.

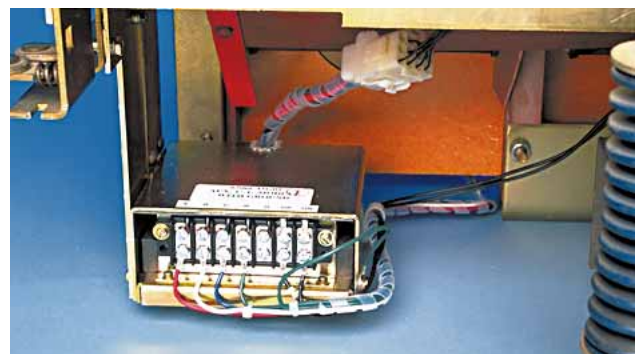
**NOTE: Depending on the Breaker being Retrofit (RL-4000 or RL-3200), the mounting position for the DTA Assembly will differ. Refer to the following drawing for the correct mounting position.**



- N. Secure the DTA Assembly to the DTA Mounting Bracket Assembly, as shown, using the (4) .190-32 x .625" screws, (8) flat washers, (4) lock washers, and (4) nuts provided.



- O. Connect the DTA Extension Harness to the 2-Point terminal block on the DTA Assembly. Route the DTA Extension Harness from the DTA, along the back of the Breaker, to the terminals on the Aux. CT Module. Insure that the DTA Extension Harness is clear of all moving parts within the Breaker.
- P. Connect the wire from the DTA Extension Harness marked with the "+" to the "OP" terminal and the unmarked wire to the "ON" terminal.
- Q. Remove and save the rear screw from the right side of the Aux. CT Module. Using the screw just removed and the wire clamp supplied, secure the Sensor Harness and the DTA Extension Harness to the side of the Aux. CT Module.



**Step 8: Adjusting the DTA**

- A. Loosen the jam nut above the brass spacer on the Reset Linkage Shaft.
- B. With the Breaker in the OPEN position, adjust the nuts above and below the brass spacer on the Reset Linkage Shaft until a gap of .070" is achieved between the plates on the top of the DTA Assembly. Back off the nuts, apply Loc-Tite® 242 to the threads in the area of the bottom adjusting and top jam nuts, then readjust and tighten the nuts. Double check the gap.

**WARNING**

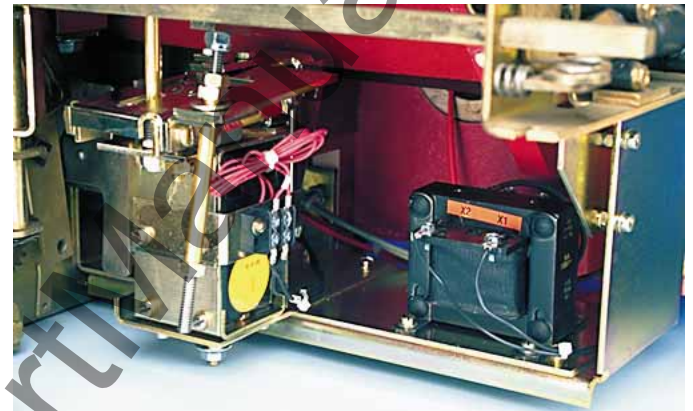
The following steps must be performed with the Breaker in the CLOSED position. Guard against the Breaker unintentionally OPENING during these steps. Keep hands and fingers away from moving parts within the Breaker.

- C. CLOSE the Breaker. With the Breaker in the CLOSED position, loosen the lock nut on the adjusting screw in the Trip Arm. Turn the adjusting screw until a gap of .06 to .09" is achieved between the head of the screw and the Trip Lever.
- D. Apply Loc-Tite® 242 to the threads of the adjusting screw then tighten the lock nut.



- E. Return the Breaker to the OPEN position.

*For Kits Supplied With A Breaker Mounted CPT Only.*

**Step 9: Installing the Breaker Mounted CPT**

- A. Align the Breaker Mounted CPT with the holes in the DTA Mounting Bracket Assembly, as shown. Secure the Breaker Mounted CPT to the DTA Mounting Bracket Assembly using the (4) .190-32 x .625" screws, (8) flat washers, (4) lock washers, and (4) nuts provided.



**NOTE: The CPT terminals (X1 and X2) should be oriented towards the front of the Breaker.**

B. The CPT Harness will connect the CPT to the Trip Unit. Temporarily position the plug-in connection of the CPT Harness near the top right corner of the Breaker. Route the CPT Harness down along the right inside of the Breaker to the CPT, making sure the harness is clear of all moving parts within the Breaker. Cut the harness to a suitable length for attachment to the CPT.

C. Strip .250" of insulation and attach a .138" ring terminal to each wire of the CPT Harness. Connect the wires to the X1 and X2 terminals of the CPT.

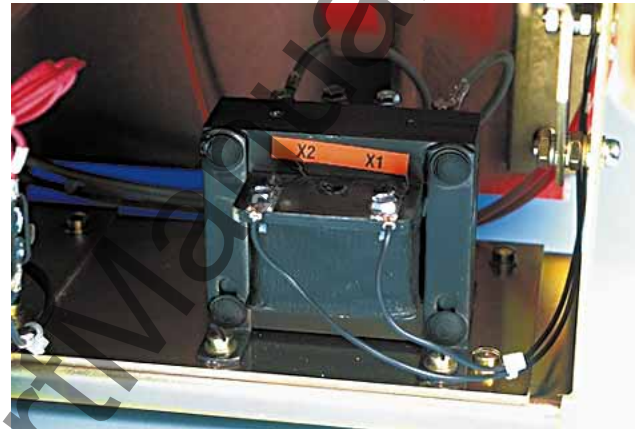
**NOTE: The HV Wires have a LOAD Side and a LINE Side. The HV Wires must be installed in the correct orientation during the following procedure. For the purpose of identification, the words "Load Side" are marked on the female fuse receptacle of each HV Wire.**



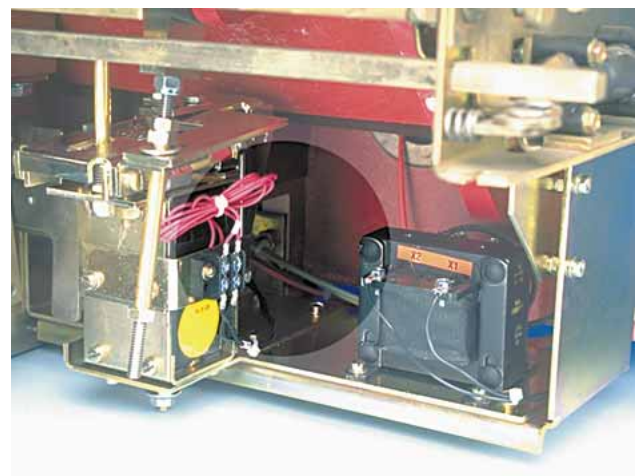
D. Strip .250" of insulation and attach a .138" ring terminal to each Load Side HV Wire. Attach the Load Side HV Wires to the CPT terminals to achieve the required voltage. (See the following table.)

Voltage Required	CPT Terminals Used
480 Volt Circuit	H1 & H4
240 Volt Circuit	H1 & H3
208 Volt Circuit	H1 & H2

**NOTE: The terminals to which the Load Side HV wires are connected determine the voltage of the CPT which, in turn, limits the voltage of the Breaker. Verify that the line voltage of the circuit matches the CPT voltage BEFORE putting the Breaker into service.**



E. Temporarily position the HV Fuses inside the Breaker, behind the DTA Assembly, in an accessible location.



**Note: The power convention of the RL-4000 and RL-3200 Breakers is normally Top to Bottom, meaning the Top Breaker Stabs are on the Line Side of the Breaker and the Bottom Breaker Stabs are on the Load Side.**

The Line Side HV Wires from the CPT MUST BE ATTACHED to the Line Side of the Breaker. If it is determined that the power flow for the Breaker application is opposite the normal convention, the Line Side HV Wires must be attached to the Bottom Breaker Stabs.

**NOTE:** The Line Side HV Wires are longer than necessary and are cut during the following steps. Before cutting the wires, be sure that sufficient length is left so that the connections can be made to the correct Breaker Stabs.

- F. Insuring that the HV Wires are clear of all moving parts within the Breaker, route the Line Side HV Wires across the inside of the Breaker to the left side. Then route them up and out of the Breaker and back towards the top Breaker Stabs.
- G. Drill and tap the Phase 1 & 2 or Phase 2 & 3 Breaker Stabs to accept .190-32 x .375" screws.

**NOTE:** Care should be taken to insure that no drill shavings fall into the Breaker.

- H. Cut the Line Side HV Wires to the appropriate length for attachment to the appropriate top Breaker Stabs. Strip .250" from each Line Side HV Wire and attach a .190" ring terminal.

- I. Connect the Line Side HV Wires to the Phase 1 & 2 or Phase 2 & 3 Breaker Stabs, using the holes just drilled and tapped and the (2) .190-32 x .375" screws, (2) flat washers, and (2) lock washers provided.

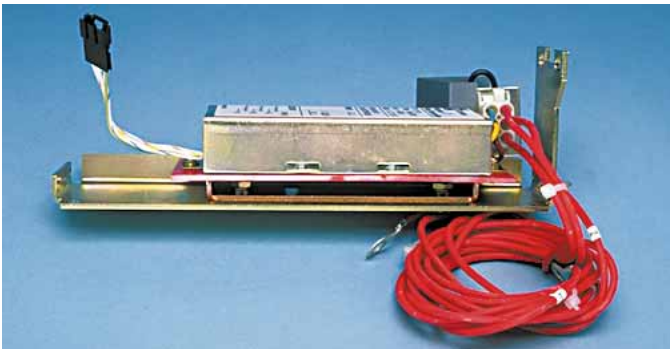


- J. Attach the appropriate label for the Breaker in a clearly visible position. Three (3) labels are included with the CPT, one (1) for 480 Volt, one (1) for 240 Volt, and one (1) for 208 Volt systems.



For Kits Supplied With A PT Module Only.

### Step 10 Installing the PT Module on the Trip Unit Mounting Bracket



- A. Scrap the Warning Label Plate and "L" Bracket. Rotate the connector 90° then reconnect it to the PT Module, as shown.
- B. Using the original mounting hardware, install the new guard and label plate as shown.

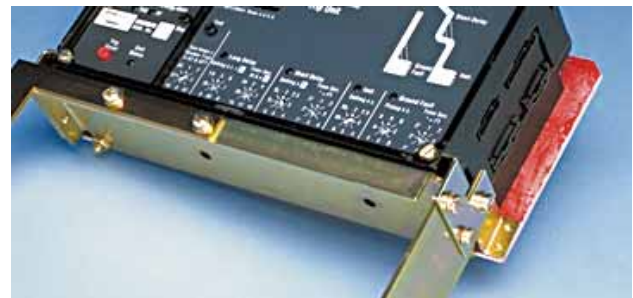


- C. Align the PT Module Mounting Bracket with the holes in the Trip Unit Mounting Bracket. Secure the PT Module Mounting Bracket to the Trip Unit Mounting Bracket using the (2) .164-32 x .500" flat head screws, (2) flat washers, (2) lock washers, and (2) nuts provided.
- D. Align the Glass Poly Insulation and the PT Module with the holes in the PT Module Mounting Bracket. Secure the Insulation and PT Module to the PT Module Mounting Bracket using the (2) .138-32 x .375" screws, (2) lock washers, and (2) flat washers provided.

### Step 11 Preparing the Trip Unit Assembly

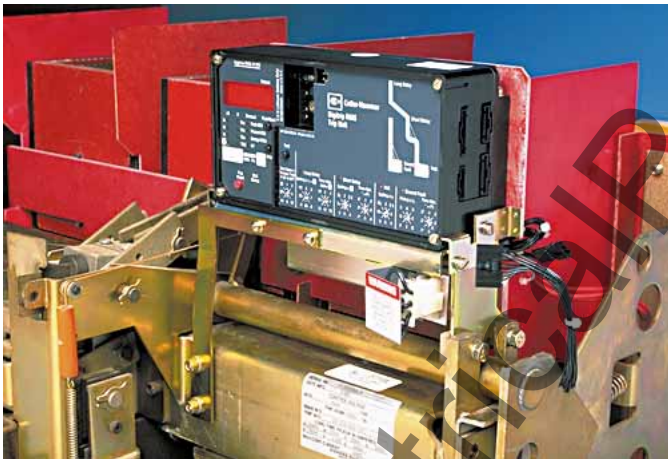


- A. Align the "L" Support Bracket with the holes in the front of the Trip Unit Mounting Bracket. Secure the "L" Bracket to Trip Unit Mounting Bracket, using the (2) .190-32 x .500" screws, (4) flat washers, (2) lock washers, and (2) nuts provided.
- B. Align the Trip Unit with the holes in the Trip Unit Mounting Bracket. Insert the (2) Brass Spacers provided in the notches at the rear of the Trip Unit. Secure the Trip Unit to the Trip Unit Mounting Bracket using the (2) .190-32 x 4.00" screws, (4) flat washers, (2) lock washers, and (2) nuts provided. Note that the screws are inserted from the top of the Trip Unit.
- C. Secure the Trip Unit Support Clips to either side of the Trip Unit, as shown, using the (4) .164-32 x .312" screws, (4) lock washers, and (4) flat washers provided. The Support Clips must be installed so that they engage the slots in the sides of the Trip Unit.



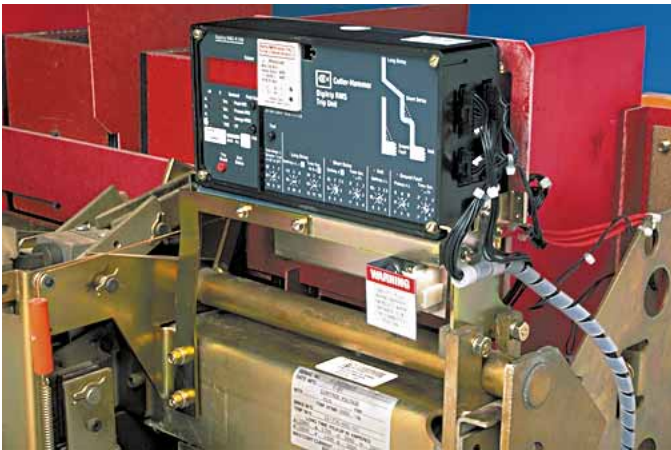
- D. Secure the Mounting Clips to the Glass Poly Insulation Barrier, as shown, using the (2) .112-40 x .250" screws, (4) lock washers, and (4) flat washers provided.
- E. Secure the Insulation Barrier Assembly to the Trip Unit Support Clips, as shown, using the (2) .164-32 x .312" screws, (2) lock washers, and (2) flat washers provided.
- F. Remove the Trip Unit Cover and install the Rating Plug provided with the Retrofit Kit. Reinstall the Trip Unit Cover.
- G. Install the Digitrip Nameplate to the top of the Trip Unit.
- D. Secure the left Trip Unit Assembly Mounting Bracket to the Breaker Front Plate using the (2) .250-20 x .625" cap bolts, (2) lock washers, and (2) flat washers provided.
- E. Sandwich the right Trip Unit Assembly Mounting Bracket between the right Breaker Bearing and Bearing Cap. Secure the right Trip Unit Mounting Bracket and Bearing Cap using the (2) .250-20 x 1.00" bolts, (2) lock washers, and (2) flat washers provided.

### Step 12. Installing the Trip Unit Assembly

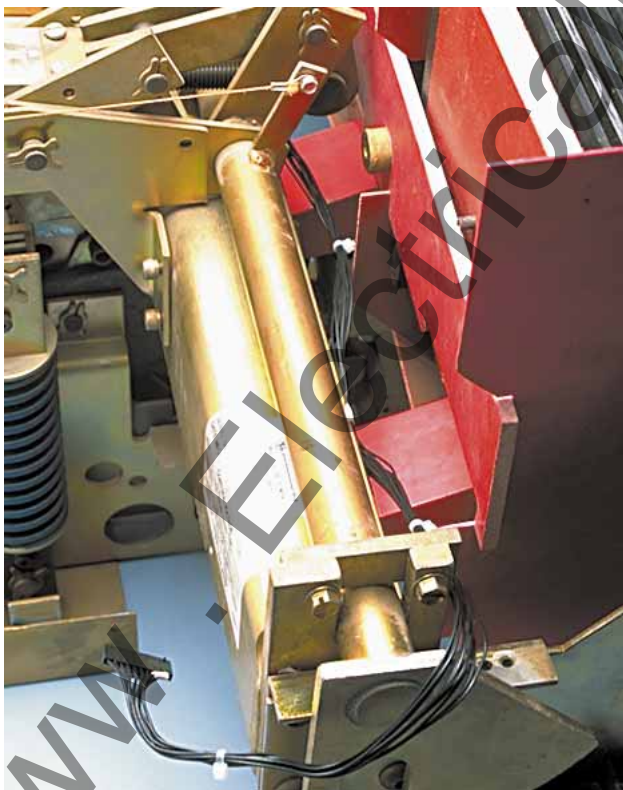


- A. Remove and scrap the hardware securing the right Breaker Bearing Cap to the right Breaker Bearing. Save the Bearing Cap for use later in this step.
- B. Remove and scrap the hardware securing the right side of the top Center Breaker Frame to the Breaker Platform.
- C. Align the holes in the Trip Unit Assembly Mounting Brackets with the existing holes in the Breaker Center Frame and the right Breaker Bearing.

### Step 13: Final Wiring and Harness Connection



- A. Connect the Aux. CT Harness to its receptacle on the Trip Unit.
- B. Route the Aux. CT Harness along the inside edge of the Breaker Platform, then down to the Aux. CT Module Assembly. Connect the plug on the Aux. CT Module to the pigtail on the Aux. CT Module.



- C. Connect the External Harness to the Trip Unit.
- D. Remove and scrap the hardware securing the right Trip Unit Support Bracket to the Trip Unit Assembly.
- E. Secure the External Harness to the Trip Unit Mounting and right Support Brackets, as shown, using the (2) .138-32 x .375" screws, (2) lock washers, (2) flat washers, and the (2) wire clamps supplied.

**NOTE: For 510 Basic Retrofit Kits, the External Harness is the plug pictured here. It is to be plugged into the right side of the Trip Unit.**



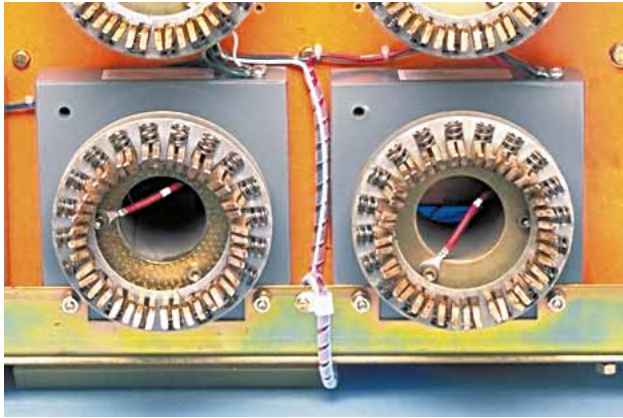
- F. *For Kits Supplied With A PT Module Only.* Route the PT Wires to the right Breaker Frame, then down inside the Breaker towards the Breaker Stabs.

Refer to Section 7-3, Power Flow Convention of the Retrofit Application Data, supplied with the Retrofit Kit for additional wiring information and to verify the Phase Convention used on this Breaker Application.

**Note: Before cutting the PT Wires, verify the Phase Convention used on the Breaker Application.**

Route the PT Wires through the center holes of each Breaker Stab. Position them for attachment to the Breaker Stabs using the hardware used to secure the Finger Clusters. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to length, strip each wire .250", and install a .250" ring terminal on each wire.

Reinstall the Finger Clusters, removed in Step 2, using the original mounting hardware. Use one of the mounting bolts securing each Finger Cluster to secure the PT Wires to the Breaker Stabs.



- G. *For Kits Supplied With An Aux. Switch Only.* Route the two (2) wires (with ring terminals) from the External Harness towards the Auxiliary Switch mounted on the DTA Assembly. Connect one (1) wire to the normally "Open" terminal and the other wire to the "Common" terminal.



- H. *For Kits Supplied With A CPT Only.* Remove the 9-position External Harness plug installed in the Trip Unit. Insert the black plug of the CPT Harness into the same receptacle in the Trip Unit. Reinsert the External Harness Plug just removed into the female receptacle on the CPT Harness.
- I. Use the nylon wire ties provided to secure all wires and harnesses away from any moving parts within the Breaker.

#### Step 14: Reinstalling the Front Cover

- A. Follow the Siemens-Allis RL-4000 Instruction Manual, originally supplied with the Breaker to reinstall the Front Cover.

#### Step 15: Testing the Breaker

- A. Measure the force necessary to trip the Breaker at the point where the Trip Finger contacts the adjusting screw. The force necessary to trip the Breaker **MUST NOT EXCEED** 20 lbs.
- B. The Retrofit must be tested using primary injection. Refer to Section 8 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* (Publication AD 33-855-1, June 1997), supplied with the Retrofit Kit, for detailed testing procedures and specifications. For test information specific to the Trip Unit, refer to the IL publication supplied with the Retrofit Kit (see the Pick List for the IL number).
- C. While Section 8 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers* provides the information necessary for testing the Breaker, please keep the following notes in mind when reviewing other sections of the publication.

**Caution:** When all testing is complete, the Trip Unit must be reset. Failure to do so may cause the Battery in the Rating Plug to run down.

#### Notes:

1. Publication AD 33-855-1 was created specifically for the "hundred" series (500, 600, 700, etc.) Retrofit Kits. Therefore certain sections and figures do not apply to the "ten" series (510, 610, 810, etc.) Retrofit Kits. Specifically, these are Sections 13 and 14, as well as Figures 3-2, 3-3, and 3-4.

2. **For All Kits Other Than 510 Basic.** If testing the Breaker with Short Delay or Ground Fault functions, be sure to either plug in the Cell Harness Assembly or use the Zone Interlock Shorting Plug. Failure to do so may result in shorter than expected trip times.
3. **For 810 and 910 Kits Only.** Without any power applied to the system (neither the 120 volt power supply nor the Aux. Power Module connected), plug the External Harness into the Cell Harness and check the impedance between COM 1 and COM 2. The impedance should be between one (1) and three (3) ohms. If the impedance is not within this range, trace the wiring and examine each connection to assure its integrity.

Confirm that the IMPACC communication wiring is correct by following the procedures detailed in Section 7.4 of the *Instructions for the Application of Digitrip RMS Retrofit Kits on Power Circuit Breakers*. Note that for 810 and 910 Kits, the impedance between COM 1 and COM 2 should be between one (1) and three (3) ohms.

When testing is complete, disconnect the External Harness from the Cell Harness. Final External Harness connection will be performed later in the Retrofit Process.

#### Step 16: Mounting the Cell Harness

- A. The Cell Harness is to be mounted in the Breaker Cell. The connector end is to be mounted on the right front side of the Cell, in a location suitable for connection with the External Harness. The Terminal Blocks can be mounted anywhere space is available in the Cell as long as connection to the External Harness can be made.

- B. Route the Cell Harness wiring to keep it away from any moveable parts within the Cell Housing.

#### Step 17: Installing the Retrofitted Breaker in the Cell



#### WARNING

Do not leave the Breaker in an intermediate position in the switchgear cell. Always leave it in the **CONNECTED**, **DISCONNECTED**, or (Optional) **TEST** position. Failure to do so could lead to improper positioning of the Breaker and flashover, causing death, serious personal injury, and / or property damage.

**NOTE:** It is the responsibility of the Retrofitter to insure proper Breaker / Cell fit. When racking the Breaker into the Connected position, the Retrofitter **MUST FOLLOW BOTH** the manufacturer's instructions and the customer's safety standards and procedures for racking a Breaker into the Connected position.

- A. With the Breaker in the Open position and the springs discharged, slowly rack the Breaker into the Connected position, making sure there is no interference or binding. The Breaker should rack smoothly and without mechanical interference between any Breaker and Cell parts. The Retrofitter will feel some resistance when the primary fingers connect onto the stabs of the Cell. This is normal.

However, if any unusual resistance is detected that could be abnormal interference between Breaker and Cell parts, stop immediately and move the Breaker out of the Connected position. Examine what is causing the interference and correct the situation.

**Digitrip Retrofit Kit Installation Components for Siemens-Allis RL-4000 & RL-3200 Breakers**

Step	Description	Style No.	Qty.	Comment
Step 3	Sensor		3	See Pick List
	Sensor Mounting Parts	4A35819G05	1	RL-4000 Only
	Mounting Bracket		1	
	.350-16 × 1.00 Lng. Hex Bolt		2	
	.350 Flat Washer		4	
	.350 Lock Washer		2	
	.350-16 Nut Hex Stil.		2	
	.250-20 × 2.00 Lng. Hex Bolt		6	
	.250 Flat Washer		12	
	.250 Lock Washer		6	
	.250-20 Nut Hex Stil.		6	
Step 4	Aux. CT Module Assembly	6506C45G	1	
	Aux. CT Module Mounting Parts	4A35819G10	1	
	Mounting Bracket		1	
	.190-16 × .500 Lng. Screw T. C.		2	
	.190-32 × .500 Lng. Screw Stil.		2	
	.190 Flat Washer		6	
	.190 Lock Washer		4	
	.190-32 Nut Hex Stil.		2	
	.164-32 × .500 Lng. Screw Stil.		2	
	.164 Flat Washer		4	
	.164 Lock Washer		2	
.164-32 Nut Hex Stil.		2		
Step 5	Sensor Harness Mounting Parts	4A35819G14	1	
	Sensor Harness		1	
	.190-16 × .500 Lng. Screw T. C.		1	RL-4000 Only
	.190-32 × .500 Lng. Screw Stil.		1	RL-3200 Only
	.190 Flat Washer		1	
	.190 Lock Washer		1	
	Wire Clamp Nylon		2	
Step 6	Trip Reset Parts	4A35819G08	1	RL-4000 Only
	Reset Assembly		1	
	.500" "X" Washer		2	
	Trip Reset Parts	4A35819G09	1	RL-3200 Only
	Reset Assembly		1	
	.500" "X" Washer		2	

**Digitrip Retrofit Kit Installation Components for Siemens-Allis RL-4000 & RL-3200 Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 7	DTA Assembly	4A35819G33	1	
	DTA Mounting Bracket Parts	4A35819G06	1	
	Mounting Bracket R. H		1	
	Mounting Bracket L. H		1	
	.250-20 × .750 Lng. Hex Bolt		1	
	.250-20 × .625 Lng. Hex Bolt		2	
	.250 Flat Washer		4	
	.250 Lock Washer		3	
	.250-20 Nut Hex Stil.		1	
	.190-32 × .500 Lng. Screw Fil.		3	
	.190 Flat Washer		8	
	.190 Lock Washer		5	
	.190-32 Nut Hex Stil.		5	
	Aux. Switch Kit	4A35819G02	1	
	Microswitch		1	
	Mounting Bracket		1	
	.190-32 × .750 Lng. Screw Fil.		2	
	.190 Flat Washer		8	
	.190 Lock Washer		4	
	.190-32 Nut Hex Stil.		4	
.138-32 × 1.00 Lng. Screw Pan		2		
.138 Flat Washer		4		
.138 Lock Washer		2		
.138-32 Nut Hex Stil.		2		
DTA Assembly Mounting Parts	4A35819G07	1		
.190-32 × .625 Lng. Screw Fil.		4		
.190 Flat Washer		8		
.190 Lock Washer		4		
.190-32 Nut Hex Stil.		4		
Loc-Tite® 242		1		
DTA Extension Harness (From Step 13)		1		
Step 8	Loc-Tite® 242 (From Step 7)		1	
Step 9	Breaker Mounted CPT Kit	8259A91G05	1	CPT Only
	Ring Terminals (.138, .190, .250, .375, .500 - Each Size)		2	
	CPT Mounting Parts	4A35819G20	1	CPT Only
	.190-32 × .625 Lng. Screw Fil.		4	
	.190-32 × .375 Lng. Screw Fil.		2	
	.190 Flat Washer		10	
	.190 Lock Washer		6	
	.190-32 Nut Hex Stil.		6	

**Digitrip Retrofit Kit Installation Components for Siemens-Allis RL-4000 & RL-3200 Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 10	PT Module	6502C82G01	1	} PT Module Only
	Ring Terminals (.190, .250, .312, .375, .500 - Each Size)		3	
	PT Module Mounting Parts	4A35819G11	1	
	Mounting Bracket		1	
	Glass Poly Insulation		1	
	Plug Guard and Label		1	
	.164-32 x .500 Lng. Screw F. H.		2	
	.164 Flat Washer		2	
	.164 Lock Washer		2	
	.164-32 Nut Hex Stil.		2	
	.138-32 x .375 Lng. Screw Fil.		2	
	.138 Flat Washer		2	
	.138 Lock Washer		2	
	Step 11	Trip Unit		
Rating Plug			1	See Pick List
Trip Unit Assembly Parts		4A35819G12	1	
Mounting Bracket			1	
Support "L" Bracket			1	
Support Clip R. H.			1	
Support Clip L. H.			1	
Mounting Clip			2	
Brass Spacer			2	
.190-32 x 4.00 Lng. Screw Fil.			2	
.190-32 x .500 Lng. Screw Fil.			2	
.190 Flat Washer			8	
.190 Lock Washer			4	
.190-32 Nut Hex Stil.			4	
.164-32 x .500 Lng. Screw Pan			2	
.164-32 x .312 Lng. Screw Pan			6	
.164 Flat Washer			6	
.164 Lock Washer			2	
.112-40 x .250 Lng. Screw Fil.			4	
.112 Flat Washer			4	
.112 Lock Washer		4		
Step 12	Trip Unit Mounting Parts	4A35819G13	1	
	.250-20 x 1.00 Lng. Hex Bolt		2	
	.250-20 x .625 Lng. Cap Bolt		2	
	.250 Flat Washer		4	
	.250 Lock Washer		4	

**Digitrip Retrofit Kit Installation Components for Siemens-Allis RL-4000 & RL-3200 Breakers (Continued)**

Step	Description	Style No.	Qty.	Comment
Step 13	Aux. CT Harness Parts	4A35819G15	1	
	Aux. CT Harness	6502C84G__	1	
	DTA Extension Harness		1	
	.138-32 x .375 Lng. Screw Fil.		2	
	.138 Flat Washer		2	
	.138 Lock Washer		2	
	Wire Clamp Nylon		2	
	Wire Tie Nylon		12	
	External Harness	6502C83G__	1	
	Step 16	Cell Harness	6503C57G__	1

NOTE: Due to the wide vintage of Breakers and multiple functions of the Retrofit components, some excess hardware may be left when the Retrofit is complete.

**Torque Values for General Mounting and Screw Size Conversion**

Decimal Size (in)	Standard Size	Torque (in-lbs)	Torque (ft-lbs)
.112	4-40	10	0.8
.138	6-32	18	1.5
.164	8-32	36	3.0
.190	10-32	46	3.8
.250	1/4-20	100	8.3
.312	5/16-18	206	17.2
.375	3/8-16	356	29.7
.438	7/16-14	572	47.7
.500	1/2-13	856	71.3

**Torque Values for Copper BUS Connectors**

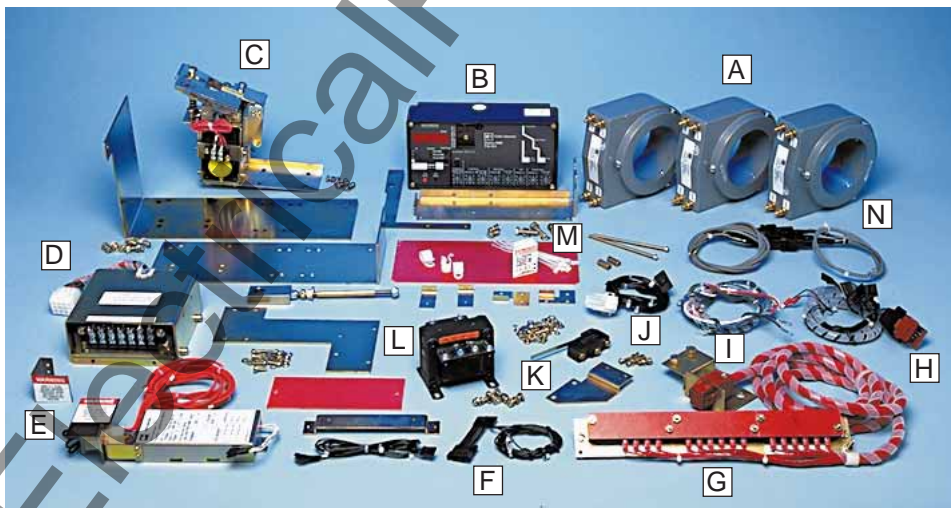
Decimal Size (in)	Standard Size	Torque (in-lbs)	Torque (ft-lbs)
.250	1/4-20	60	5
.312	5/16-18	144	12
.375	3/8-16	240	20
.500	1/2-13	600	50

RL-4000



- |                               |                                 |
|-------------------------------|---------------------------------|
| A. Sensors                    | H. External Harness             |
| B. Trip Unit                  | I. Sensor Harness               |
| C. Direct Trip Actuator (DTA) | J. CPT Transformer              |
| D. Aux. CT Module             | K. Cell Terminal Block Assembly |
| E. PT Module                  | L. Aux. CT Harness              |
| F. Aux. Switch                | M. Rating Plug                  |
| G. PT Extension Harness       | N. HV Wires                     |

RL-3200



- |                                 |                     |
|---------------------------------|---------------------|
| A. Sensors                      | H. External Harness |
| B. Trip Unit                    | I. Sensor Harness   |
| C. Direct Trip Actuator (DTA)   | J. Aux. CT Harness  |
| D. Aux. CT Module               | K. Aux. Switch      |
| E. PT Module                    | L. CPT Transformer  |
| F. PT Extension Harness         | M. Rating Plug      |
| G. Cell Terminal Block Assembly | N. HV Wires         |

We wish to thank you for purchasing the Digitrip Retrofit System. Digitrip Retrofit Kits are designed and manufactured in America with pride. All the components are engineered to fit the existing Circuit Breaker with little or no modifications to the existing Breaker. However due to the wide variety and vintage of Breakers in use today, an occasional problem may arise. Please contact us with any questions, comments or concerns.

Phone: 1-800-937-5487 Fax. (724) 779-5899

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## Cutler-Hammer

130 Commonwealth Drive  
Warrendale, PA 15086