



## Digitrip Retrofit System for the ITE-LX-1600 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.**



# Digitrip Retrofit System for the ITE-LX-1600 Series Breakers

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## INTRODUCTION

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, PowerNet communications, energy monitoring capabilities, power factors, and harmonic content measurements.

Table 1 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 Table 1. It is

important that the Retrofitter understands 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.

**Table 1 Available Retrofit Kits**

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 33-855-2), 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 area.

**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 three (3) 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. Layout 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 ITE LX-1600 Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

- A. Elevate and support the front of the Breaker to allow adequate clearance to access the original Electromechanical Trip Units and mounting hardware.
- B. Remove and scrap the three Electromechanical Trip Units and mounting hardware from the bottom front of the Breaker. Lower the front of the Breaker back down to the work surface.

**STEP 3: DRILLING THE MOUNTING HOLES IN THE BREAKER FRAME**

- A. Place the Aux. CT Module Mounting Platform onto the bottom Breaker Frame. Position the Aux. CT Module Mounting Platform so the back edge of the Platform is 3.50" from the Breaker Back Plate.

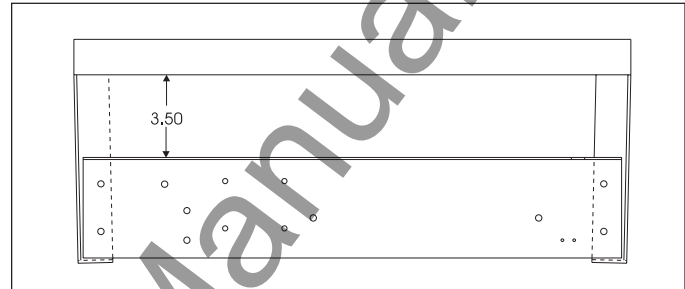


Fig. 1 Drilling Plan "A".

- B. Using the four (4) pre-drilled holes in the Aux. CT Module Mounting Platform as a guide, mark the location of the holes on the bottom of the Breaker Frame
- C. Remove the Aux. CT Module Mounting Platform from the Breaker, then drill four (4) .265" diameter holes in the bottom Breaker Frame. These holes will be used later in the Retrofit process to secure the Aux. CT Module Mounting Platform to the bottom Breaker Frame.

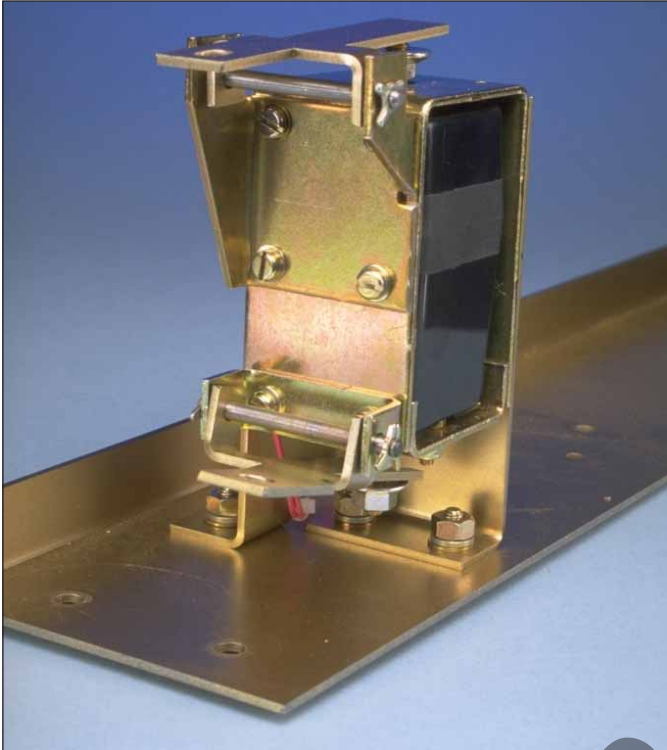
**STEP 4: INSTALLING THE DTA ASSEMBLY**

Fig. 2 Overview: DTA Mounted to the Aux. CT Module Mounting Platform.

- A. Apply Loc-Tite® 243 to the threads, then mount the DTA Assembly to the Aux. CT Module Mounting Platform as shown, using the (3) .250-20 × .625" bolts, (6) flat washers, (3) lock washers, and (3) nuts supplied. Note that the bolts, with flat washers installed, must be inserted from the bottom of the Aux. CT Module Mounting Platform.

**STEP 5: MOUNTING THE TRIP UNIT TO THE AUX. CT MODULE**

Fig. 3 Overview: Trip Unit mounted to the Aux. CT Module.

- A. Align the Trip Unit with the holes in the top of the Aux. CT Module. Secure the Trip Unit to the Aux. CT Module using the (2) .190-32 × 4.00" screws, (2) lock washers, (2) flat washers, and (2) brass spacers supplied. Note that the brass spacers are used between the bottom of the Trip Unit and the top of the Aux. CT Module.
- B. Align the left and right Trip Unit Support Clips with the slots in the sides of the Trip Unit. Secure the Trip Unit Support Clips to the Aux. CT Module using the (4) .190-32 × .375" screws, (4) lock washers, and (4) flat washers supplied.
- C. Remove the Trip Unit Cover and install the Rating Plug. Replace the cover.

## STEP 6: INSTALLING THE TRIP UNIT / AUX. CT MODULE ASSEMBLY

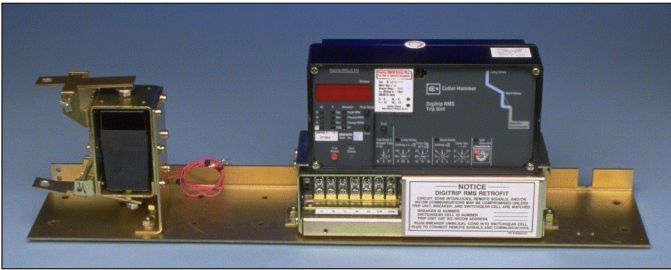


Fig. 4 Overview: Trip Unit & Aux. CT Module installed on the Mounting Platform.

- A. Align the Trip Unit / Aux. CT Module Assembly with the pre-drilled holes in the Aux. CT Module Mounting Platform, as shown. Secure the Trip Unit / Aux. CT Module Assembly to the Aux. CT Module Mounting Platform using the (2) .250-20 × .625" bolts, (2) flat washers, (2) lock washers, and (2) nuts supplied. Note that the mounting bolts must be inserted from the bottom of the Mounting Platform.
- B. *For Kits Supplied With a PT Module Only:* Align the PT Module with the pre-drilled holes in the Glass Poly Insulation Barrier, as shown. Secure the PT Module to the Insulation Barrier using the (2) .138-32 × .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.



Fig. 5 PT Module installed on the Installation Barrier.

- C. Align the Glass Poly Insulation Barrier with the holes in the back of the Aux. CT Module. Secure the Glass Poly Insulation Barrier to the Aux. CT Module, as shown, using the (2) .190-32 × .500" screws, (2) lock washers, and (2) flat washers supplied.



Fig. 6 Insulation Barrier attached to the Aux. CT Module.

- D. Connect the Aux. CT Harness to the Aux. CT Module plug. Plug the other end of the Aux. CT Harness into its receptacle on the right side of the Trip Unit.
- E. 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.
- F. Connect the Sensor Harness ground wire (with ring terminal) to the Aux. CT Module, as shown, using the (1) .190-16 × .500" screw, (1) lock washer, and (1) flat washer supplied. Route the Sensor Harness between the Trip Unit / Aux. CT Module Assembly and the Glass Poly Insulation Barrier. Final Sensor Harness connections will be made later in the Retrofit process.



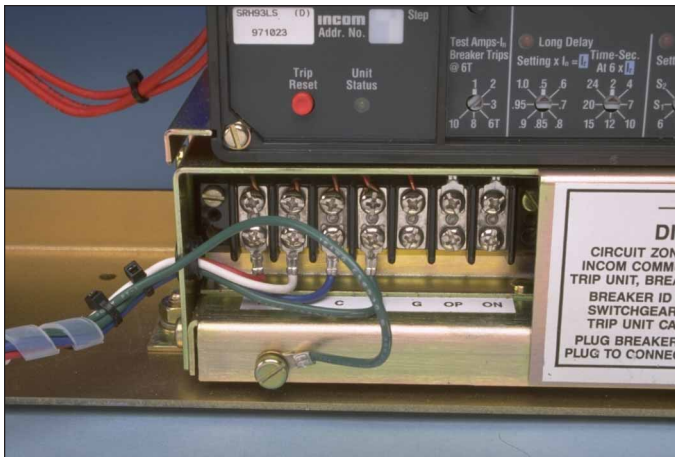


Fig. 7 Ground Wire connected to the Aux. CT Module.

- G. Route the DTA Wires over to the Aux. CT Module. Connect the “+” DTA Wire to the “OP” terminal and the unmarked wire to the “ON” terminal on the Aux. CT Module.
- H. Connect the External Harness to the Trip Unit. Refer to the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

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

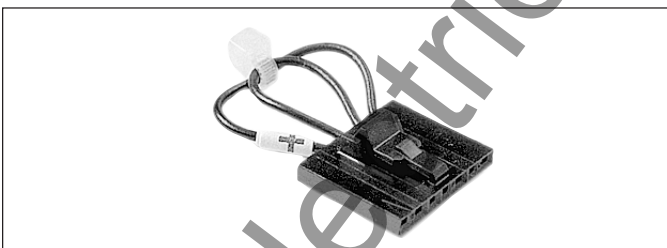


Fig. 8 510 Kit External Harness Shorting Plug.

- I. *For Kits Supplied With a PT Module Only:* Plug the connector from the PT Module into its receptacle on the External Harness.
- J. Secure the External Harness to the Aux. CT Module Mounting Platform, as shown, using the (2) wire clamps, (2) .138-32 x .500" thread cutting screws, (2) lock washers, and (2) flat washers supplied.



Fig. 9 External Harness connected to the Trip Unit.

For Kits Supplied With An Auxiliary Switch Only.

### STEP 7: INSTALLING THE AUXILIARY SWITCH

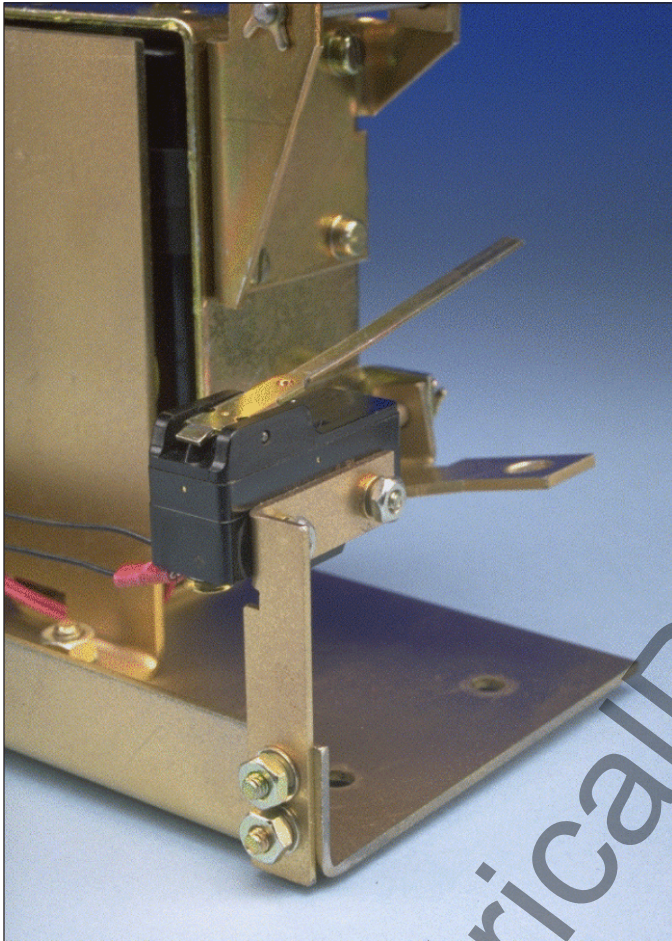


Fig. 10 Overview: Auxiliary Switch installed on the Mounting Platform.

- A. Cut 2.75" off the end of the Microswitch Arm.
- B. Mount the Microswitch to the Auxiliary Switch Mounting Bracket, as shown, using the (2) .138-32 × 1.00" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.
- C. Route the two (2) wires with ring terminals from the External Harness between the Trip Unit and Glass Poly Insulation Barrier to the Auxiliary Switch Assembly. Connect one (1) wire to the normally open terminal and the other wire to the common terminal.

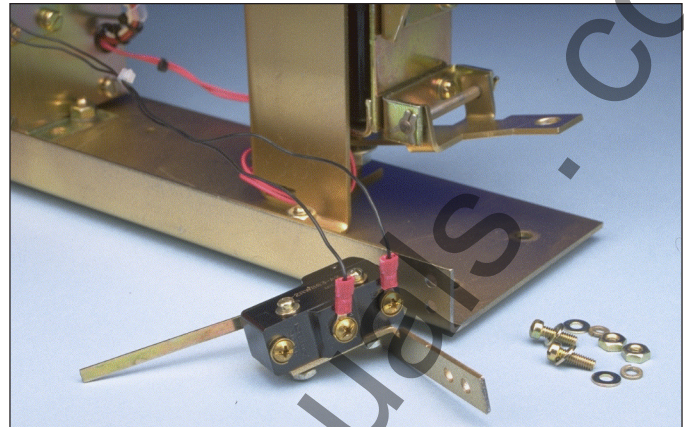


Fig. 11 External Harness Wires connected to the Auxiliary Switch Assembly.

- D. Mount the Auxiliary Switch Assembly to the Aux. CT Module Mounting Platform, as shown, using the (2) .164-32 × .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

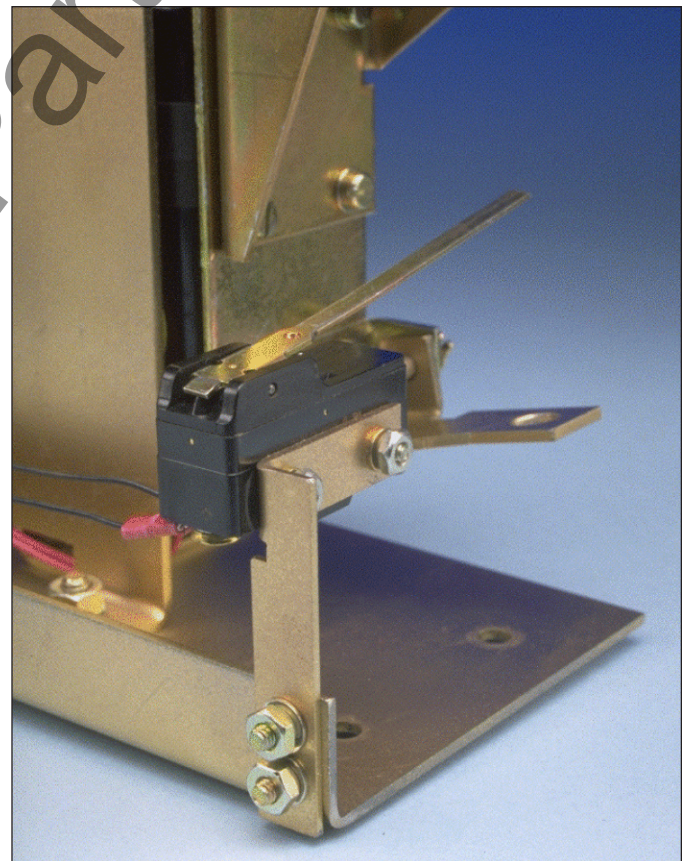


Fig. 12 Auxiliary Switch Assembly installed on the Mounting Platform.

For Kits Supplied with a Breaker Mounted CPT Only.

**STEP 8: MOUNTING THE BREAKER MOUNTED CPT**

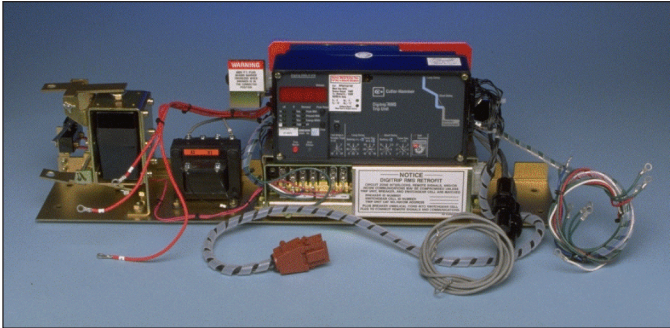


Fig. 13 Overview: Breaker Mounted CPT installed on the Mounting Platform.

A. Align the holes in the Breaker Mounted CPT with the predrilled holes in the Aux. CT Module Mounting Platform, as shown. Secure the Breaker Mounted CPT to the Aux. CT Module Mounting Platform using the (4) .190-32 x .500" screws, (8) flat washers, (4) lock washers, and (4) nuts supplied. Note that the mounting screws must be inserted from the bottom of the Mounting Platform and that the X1 and X2 terminals must face the front of the Mounting Platform.

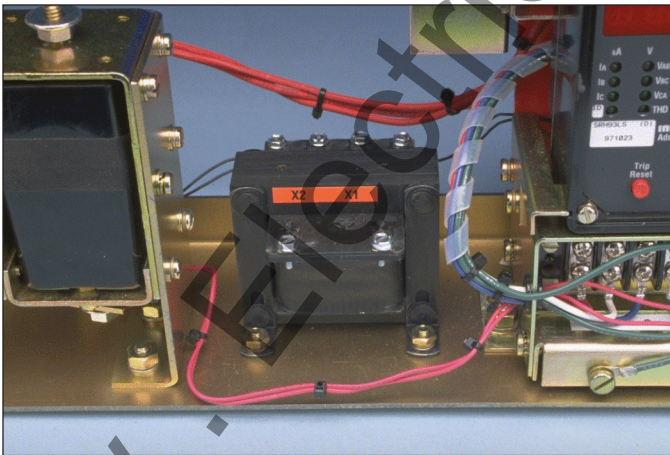


Fig. 14 Correct orientation of the CPT Module.

- B. Remove the 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.
- C. Route the CPT Harness between the Trip Unit and Insulation Barrier to the Breaker Mounted CPT. Strip .250" of insulation and attach a .138" ring terminal to each wire of the CPT Harness. Connect the CPT Harness wires to the X1 and X2 terminals of the CPT.

**Table 2 CPT Low Voltage Taps for Standard and Special Order CPTs**

<i>Standard CPT (Style #9A10037G01 &amp; G02)</i>	
120 Voltage Required	CPT Terminals Used
Secondary Circuit	X1 & X2
<i>Special Order 575 Volt CPT (Style #9A10037G03 &amp; G04)</i>	
Secondary Circuit	X1 & X2

**NOTE:** Leave the mounting hardware closest to the "X1" terminal loose at this time. It will be used to secure the HV and CPT Wires in the next steps.

**NOTE:** The Load Side HV Wires are longer than necessary and are cut during the following step. Before cutting the wires, be sure that sufficient length is left so that the HV Wire Fuses are accessible and that the connections can be made to the correct "H" terminals on the CPT.

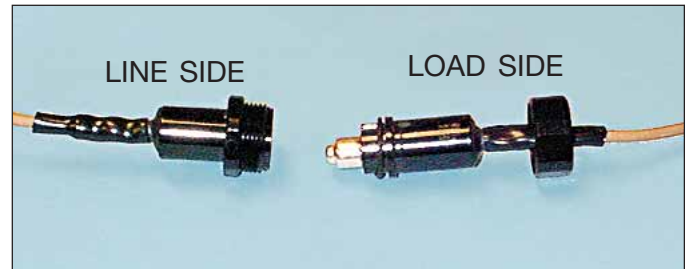


Fig. 15 Identification of the Line and Load Side HV Wires.

D. Position the fuses on the High Voltage (HV) Wires in an accessible location. Route the HV Wires between the Trip Unit and Insulation Barrier to the Breaker Mounted CPT, then cut the Load Side of each HV Wire to an appropriate length. Strip .250" from the Load Side HV Wires and attach a .138" ring terminal to each. Attach the HV Wires to the CPT terminals to achieve the required voltage (see the following table). The HV Wires will be connected to the Breaker Stabs later in the Retrofit Process. See the supplied SL for CPT and TAP details.

**Table 3 CPT High Voltage Taps.**

<b>Standard CPT (Style #9A10037G01 &amp; G02)</b>	
<i>Voltage Required</i>	<i>CPT Terminals Used</i>
480 Volt Circuit	H1 & H4
240 Volt Circuit	H2 & H4
208 Volt Circuit	H3 & H4
<b>Special Order 575 Volt CPT (Style #9A10037G03 &amp; G04)</b>	
575 Volt Circuit	H1 & H4
460 Volt Circuit	H2 & H4
230 Volt Circuit	H3 & H4

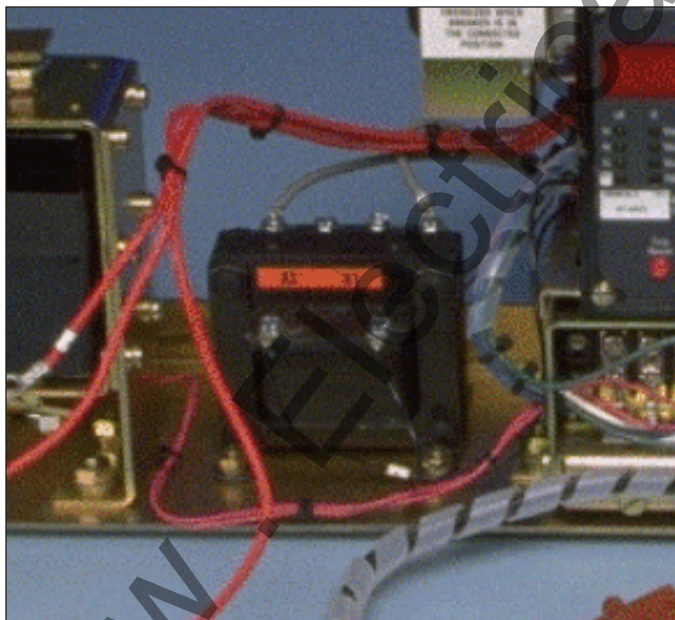


Fig. 16 CPT Harness and HV Wires connected to the CPT.

**STEP 9: INSTALLING THE AUX. CT MODULE MOUNTING PLATFORM ASSEMBLY**

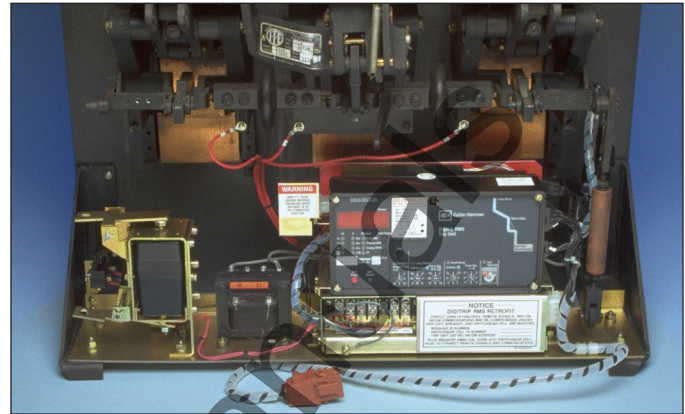


Fig. 17 Overview: Aux. CT Module Assembly installed in the Breaker.

A. For Kits Supplied With a PT Module Only: Set the Aux. CT Module Mounting Platform Assembly in front of the Breaker. Route the PT Wires to a position suitable for connection to the inside Breaker Phase Frames. The PT Wires are marked for connection to Phases 1, 2, and 3 with corresponding numbers.

**NOTE:** Before cutting the PT Wires verify the Phase Convention used on this Breaker Application.

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 .190" ring terminal on each wire. Secure each PT Wire to the appropriate Phase Frame, as shown, using the existing threaded holes and the (3) .164-32 x .375" screws, (3) lock washers, and (3) flat washers supplied.



Fig. 18 PT Wires connected to the Phase Frames.

- B. While keeping all wires clear, slide the Aux. CT Module Mounting Platform Assembly into the bottom of the Breaker. Align the holes in the Aux. CT Module Mounting Platform Assembly with the holes drilled in the Breaker Frame in Step 3-C. Secure the Aux. CT Module Mounting Platform Assembly to the Breaker Frame, as shown, using the (4) .250-20 x .750" bolts, (8) flat washers, (4) lock washers, and (4) nuts supplied. Note that the bolts must be inserted from the bottom of the Breaker. Therefore, the front of the Breaker must be raised to allow the bolts and flat washers to be installed.

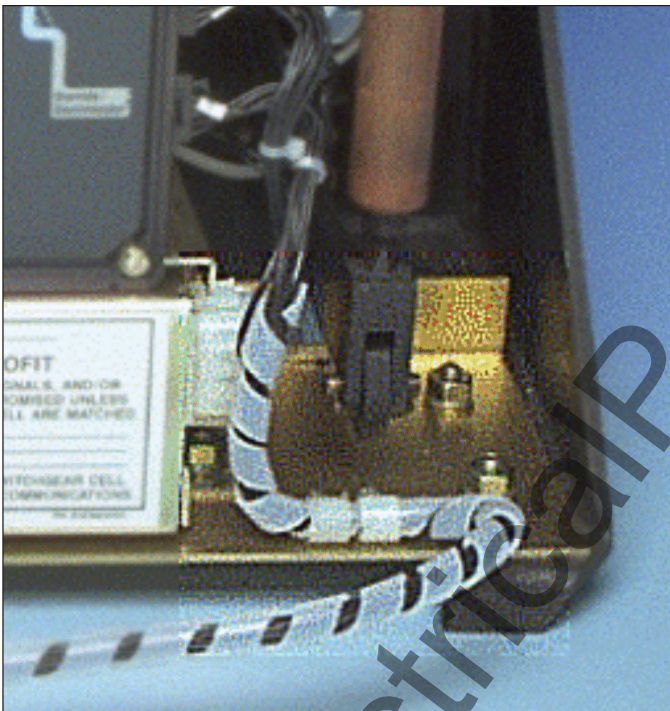


Fig. 19 Correct orientation of the Mounting Hardware.

## STEP 10: CONNECTING THE RESET AND TRIP ASSEMBLIES

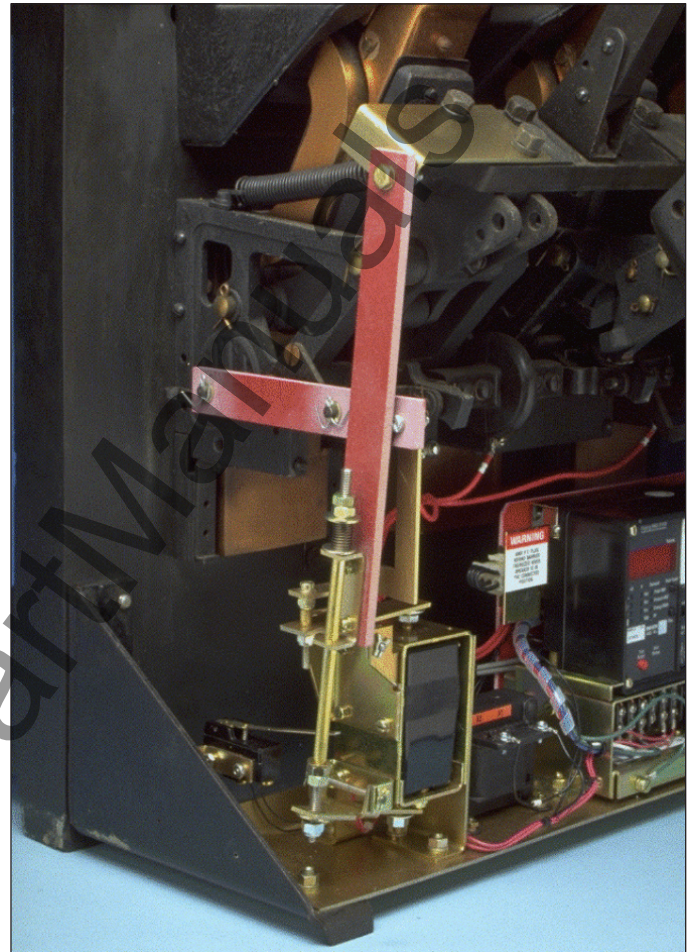


Fig. 20 Overview: Reset and Trip Assemblies Installed in the Breaker.

- A. Remove and scrap the cotter pins securing the original Pivot Pins on the left side of the Breaker Trip Mechanism. Remove and save the Pivot Pins.
- B. Remove the lock nut and brass spacer from the adjustment screw on the bottom of the Trip Assembly.
- C. Insert the Trip Assembly adjustment screw into the hole in the Trip Arm on the DTA as shown. Install the brass spacer and lock nut.

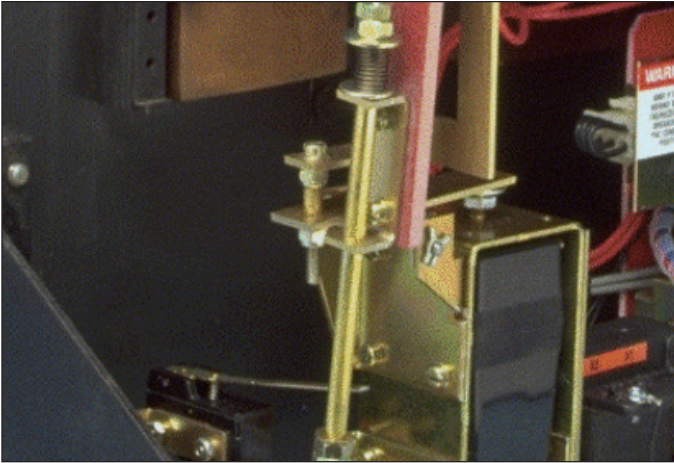


Fig. 21 Correct orientation of the Trip Adjustment Hardware.

- D. Align the holes in the Trip Assembly Glass Poly Bar with the holes in the Breaker Trip Mechanism from which the Pivot Pins were removed in Step 10-A.
- E. Secure the Trip Assembly Glass Poly Bar to the Breaker Trip Mechanism using the (4) flat washers and (2) cotter pins supplied. Note that a flat washer must be installed on both sides of the Trip Assembly Glass Poly Bar.

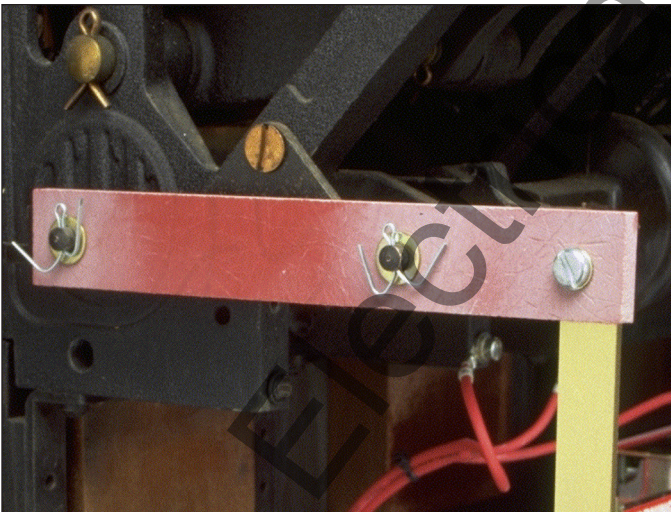


Fig. 22 Trip Assembly Bar installed in the Breaker.

- F. Remove and save the two (2) original bolts from the left end of the Connecting Link Bar. Note that the third bolt is not removed.

- G. Remove the lock nut and large flat washer from the end of the Reset Assembly Shaft.
- H. Insert the Reset Shaft into the hole in the Reset Lever on the DTA, as shown. Reinstall the large flat washer and lock nut so that three (3) to four (4) threads are showing on the bottom of the Reset Shaft. Final adjustment will be made later in the Retrofit Process.

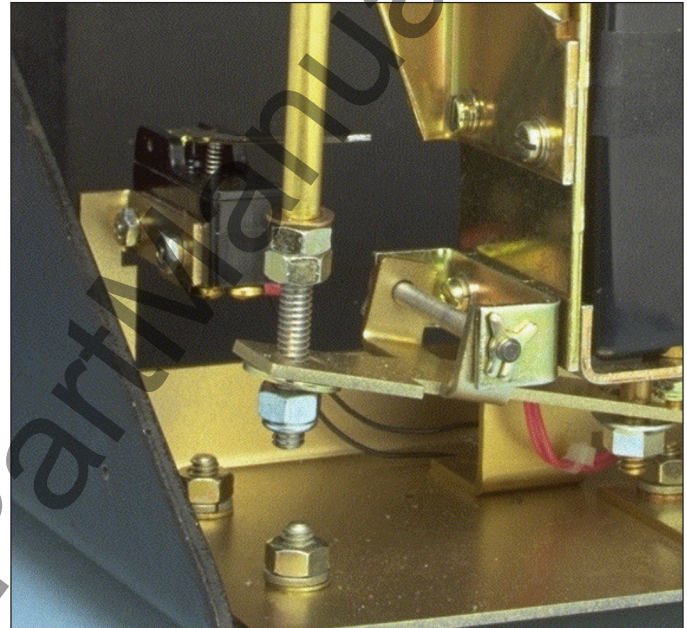


Fig. 23 Reset Shaft connected to the DTA Assembly.

- I. Align the Reset Assembly Pivot Bracket with the holes in the Connecting Link Bar. Secure the Pivot Bracket to the Connecting Link Bar, as shown, using the original hardware.

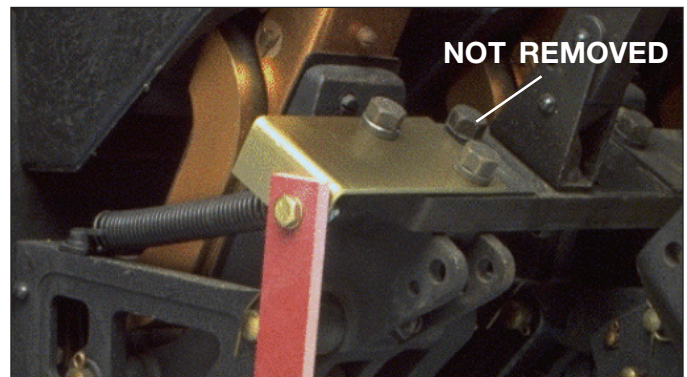


Fig. 24 Reset Assembly Pivot Bracket installed in the Breaker.

### STEP 11: ADJUSTING THE RESET AND TRIP ASSEMBLIES

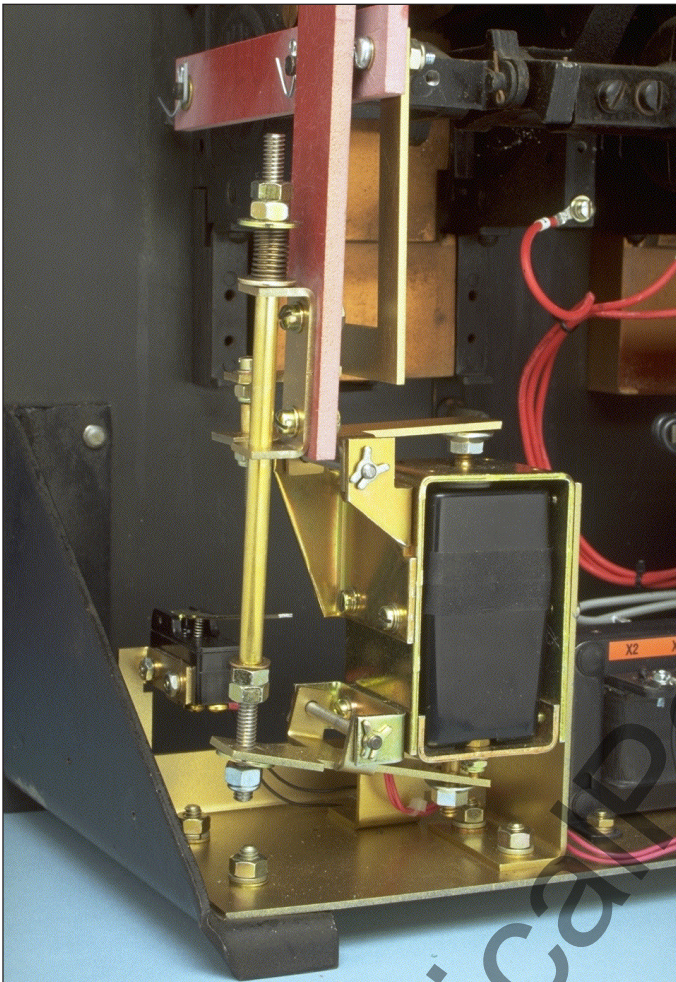


Fig. 25 Overview: Adjusting the Reset and Trip Assembly.

**NOTE:** Final adjustments to the Reset and Trip Assemblies are performed with the Breaker in the OPEN position.

- A. Measure the cage height (compressed spring length) of the spring on the Reset Shaft. The cage height should be .63". If the cage height is not correct, loosen the lock nut on the top of the Reset Shaft. Turn the adjusting nut until the required cage height is achieved. Tighten the lock nut.

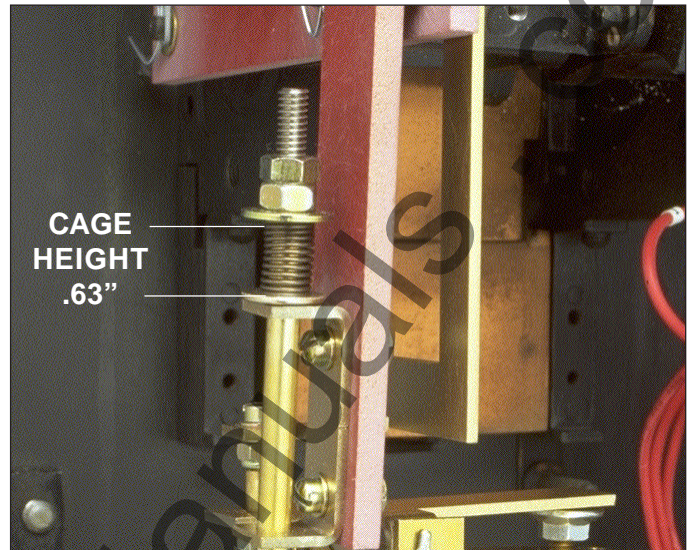


Fig. 26 Reset Cage Height.

- B. Measure the gap between the flat surface of the flange nut on the top of the DTA Shaft and the bottom surface of the Trip Arm. The gap should be .09 to .12". If the gap is not within this range, back off the flange nut and apply Loc-Tite® 243 to the threads of the DTA Shaft. Adjust the flange nut until the gap is within the acceptable range.

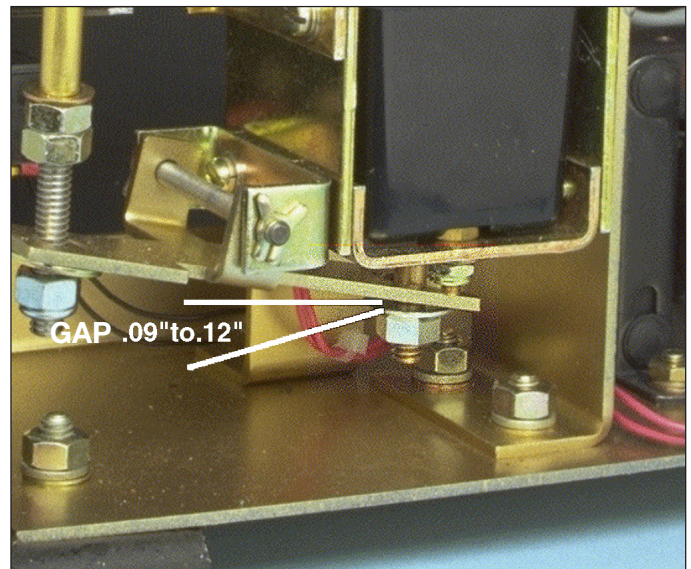


Fig. 27 Trip Gap Adjustment.

For Kits Supplied with a Breaker Mounted CPT Only.

## STEP 12: CONNECTING THE HV WIRES TO THE BREAKER STABS

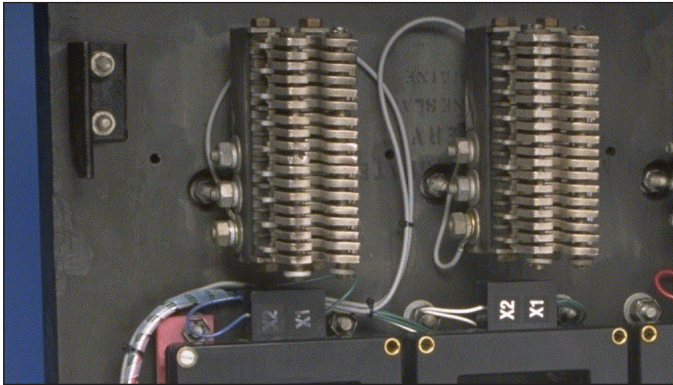


Fig. 28 Overview: HV Wires installed in the Breaker.

- Route the Line Side HV Wires to the right rear of the Breaker, then through the existing hole on the Breaker Back Plate, as shown.
- Route the HV Wires along the rear of the Breaker to the top Finger Clusters.

**NOTE:** The power convention of the ITE LX 1600 Series Breakers is normally *Top to Bottom*, meaning the Top Breaker Phase Frames are on the *Line Side* of the Breaker and the Bottom Breaker Stabs are on the *Load Side*.

The 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 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.

- Remove one (1) bolt securing the Finger Cluster to the Breaker Stab from either the Phase 1 and Phase 2, or Phase 2 and Phase 3 Finger Clusters.
- Cut the HV Wires to the appropriate length for attachment to the appropriate Breaker Stabs. Strip .250" from each HV Wire and attach a .250" ring terminal. Using the hardware removed in Step 12-C, connect the HV Wires to the appropriate Breaker Stabs.
- Install the appropriate CPT Voltage Label in a clearly visible location on the Breaker.

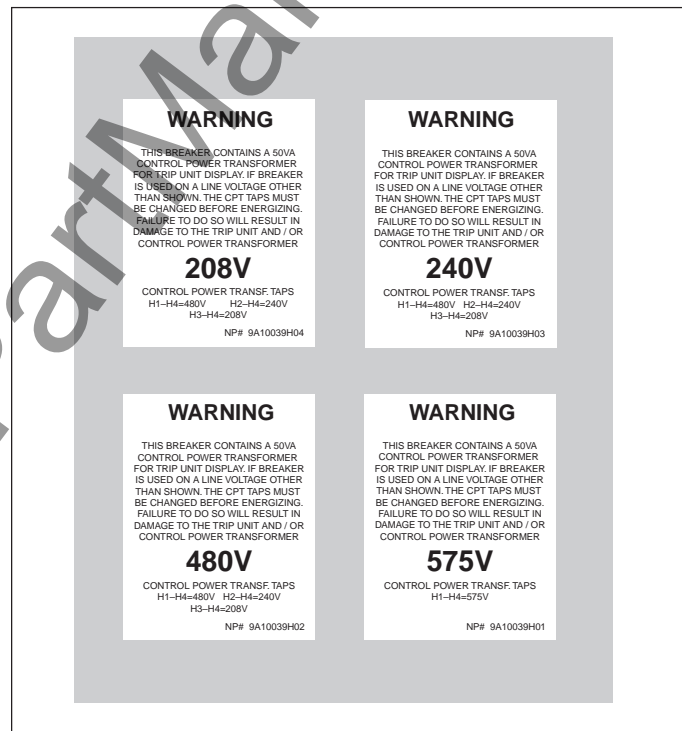


Fig. 29 Supplied CPT Labels.



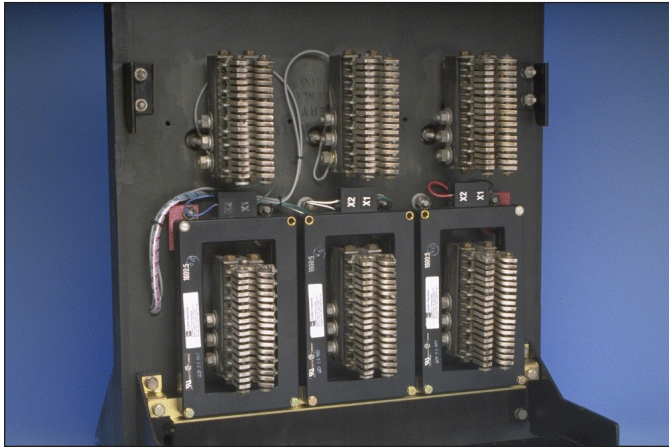
**STEP 13: INSTALLING THE SENSORS**

Fig. 30 Overview: Sensors installed on the Breaker.

- A. Route the Sensor Harness to the right rear of the Breaker, then through the existing hole on the Breaker Back Plate, as shown.

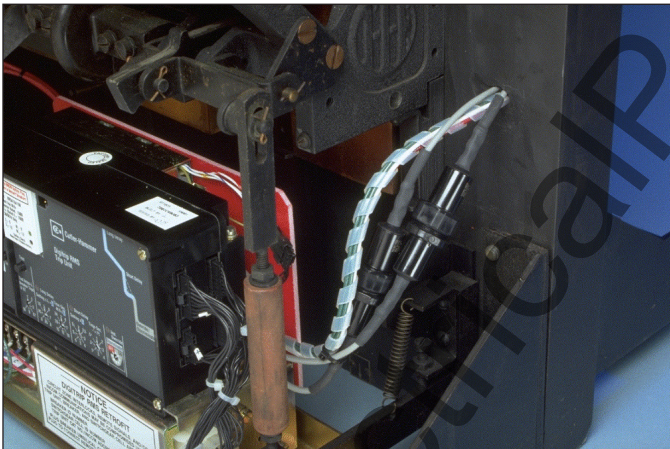


Fig. 31 Routing of the Sensor Harness.

- B. Secure the "Z" Mounting Brackets to the Sensor Mounting Angle, as shown, using the (2) .375-16 x 1.00" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.
- C. Mount the Sensors to the Sensor Mounting Angle, as shown, using the (6) .250-20 x 1.75" screws, (12) flat washers, (6) lock washers, and (6) nuts supplied.

- D. Install the (2) .190-32 nylon screws, (4) flat washers, (2) lock washers, and (2) nuts in the upper left and right corners of the Sensor Assembly. Do not tighten the nuts at this time.



Fig. 32 Sensors mounted to the Mounting Bracket.

- E. Mount the (2) Glass Poly Sensor Mounting Plates, as shown, to the Breaker Frame, using the original hardware.

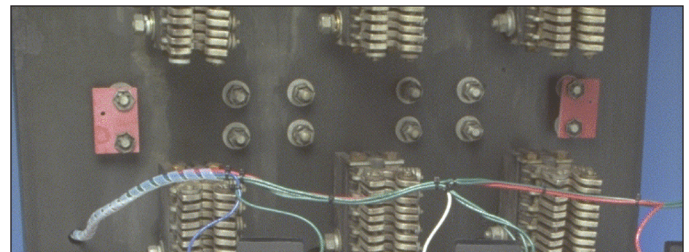


Fig. 33 Sensor Mounting Plates installed on the Breaker.

- F. With the Sensor Assembly resting on the work surface, close to the Breaker, connect the ring terminals of the Sensor Harness to the Sensors. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

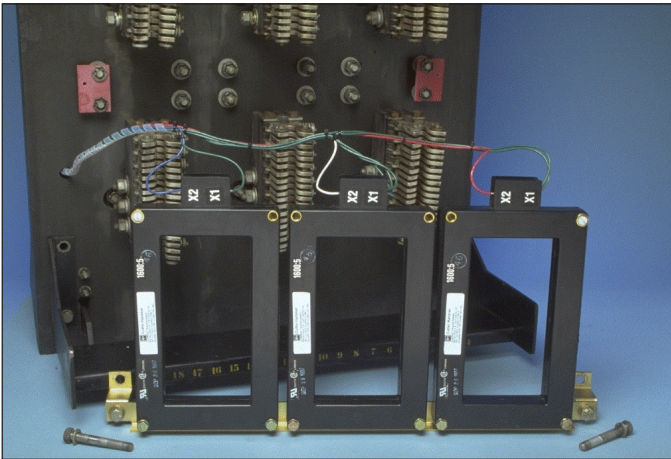


Fig. 34 Sensor Assembly ready for mounting.

- G. Remove the top bolts securing the Secondary Contact Rack near the bottom of the Breaker. Mount the Sensor Assembly to the Breaker Frame, as shown, using the hardware.

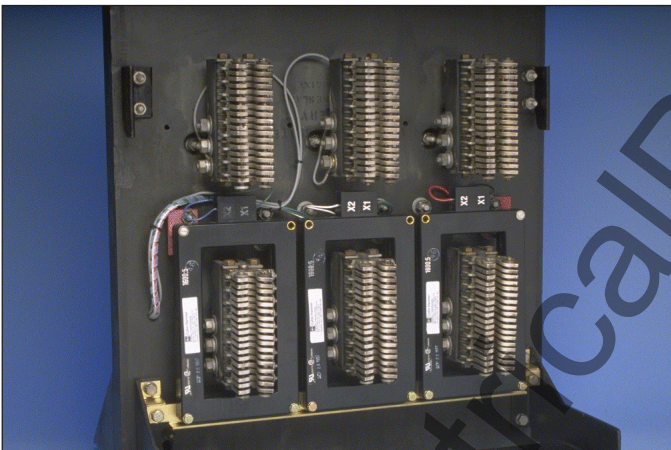


Fig. 35 Sensor Assembly installed on the Breaker.

- H. Turn the two (2) nylon screws, located in the upper corners of the Sensor Assembly, until they have started in the threaded holes in the Glass Poly Sensor Mounting Plates. Continue turning the screws until the Sensor Assembly is parallel to the Breaker Back Plate. Do not over-tighten the screws. Once the Sensor Assembly is parallel to the Breaker Back Plate, tighten the nuts previously installed on the nylon screws against the Sensors to lock the screws in place.

#### STEP 14: TESTING THE BREAKER

- A. Measure the force necessary to trip the Breaker at the point where the DTA Shaft contacts the Trip Finger. The force necessary to trip the Breaker **MUST NOT EXCEED** 3 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-33-855-3, May 2001), 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:

- 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.
- 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 PowerNet 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.**

*For Kits Supplied With a Cell Harness Only.*

#### **STEP 15: 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.

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**STEP 16: INSTALLING THE RETROFITTED  
BREAKER IN THE CELL**

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** WARNING**

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**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 the ITE LX-1600 Series Breakers**

Step	Description	Style No.	Qty.	Comment
Step 3	Aux. CT Module Mounting Platform	From Step 6	1	
Step 4	DTA Assembly	4A35773G35	1	
	DTA Mounting Hardware	4A35773G12	1	
	.250-20 × .625" Lng. Hex Bolt		3	
	.250 Flat Washer Stl.		6	
	.250 Lock Washer Stl.		3	
	.250-20 Nut Hex Stl.		3	
	Loc-Tite® 243		1	
	Step 5	Trip Unit		1
	Rating Plug		1	See Pick List
	Aux. CT Module	6502C786__	1	
	Trip Unit Mounting Parts	4A35773G06	1	
	Trip Unit Support Clip L.H.		1	
	Trip Unit Support Clip R.H.		1	
	.190-32 × .375 Lng. Screw Flat		4	
	.190 Flat Washer Stl.		6	
	.190 Lock Washer Stl.		6	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	Brass Spacer		2	
Step 6	Aux. CT Module Assembly Parts	4A35773G05	1	
	Aux. CT Module Mounting Platform		1	
	Glass Poly Insulation Barrier		1	
	.250-20 × .625 Lng. Hex Bolt		2	
	.250-20 × .750 Lng. Hex Bolt		4	
	.250 Flat Washer Stl.		12	
	.250 Lock Washer Stl.		6	
	.250-20 Nut Hex Stl.		6	
	.190-32 × .500 Lng. Screw Flat		2	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		2	
	PT Module	6502C82G01	1	} Comm. Only
	.138-32 × .500 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	Ring Terminals (.190, .250, .312, .375, .500)	Each Size	2	
	Aux. CT Harness	6502C84G01	1	
	Sensor Harness	From Step 13	1	
	External Harness	6502C83G__	1	Except 510 Basic
	External Harness Mounting Parts	4A35773G08	1	
.190-16 × .500 Lng. Screw T.C.		1		
.190 Flat Washer Stl.		1		
.190 Lock Washer Stl.		1		
.138-32 × .500 Lng. Screw T.C.		2		
.138 Flat Washer Stl.		2		

## Digitrip Retrofit Kit Installation Components for the ITE LX-1600 Series Breakers

Step	Description	Style No.	Qty.	Comment
	.138 Lock Washer Stl.		2	
	Wire Clamps		2	
Step 7	Aux. Switch Kit	4A35773G02	1	Comm. Only
	Microswitch		1	
	Mounting Bracket		1	
	.164-32 × .500 Long Screw Fil.		2	
	.164-32 × .375 Long Screw Fil.		3	
	.164 Flat Washer Stl.		7	
	.164 Lock Washer Stl.		5	
	.164-32 Nut Hex Stl.		2	
	.138-32 × 1.00 Long Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
Step 8	Breaker Mounted CPT Kit	9A10037G	1	CPT Only
	Ring Terminals (.138, .190, .250, .312, .375, .500)	Each Size	2	
	HV Wire		2	
	Warning Label (208, 240, 480, & 575 Volts Each)		1	
	Breaker Mounted CPT Mounting Parts	4A35773G20	1	
	.190-32 × .500 Screw Fil.		4	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		4	
	.190-32 Nut Hex Stl.		4	
Step 9	Aux. CT Module Platform Mounting		1	
	.250-20 × .750 Lng. Hex Bolt	From Step 6	4	
	.250 Flat Washer Stl.	From Step 6	8	
	.250 Lock Washer Stl.	From Step 6	4	
	.250-20 Nut Hex Stl.	From Step 6	4	
	.164-32 × .375 Lng. Screw Fil.		3	
	.164 Flat Washer Stl.		3	
	.164 Lock Washer Stl.		3	
Step 10	DTA Reset Parts	4A35773G11	1	
	Reset Assembly		1	
	DTA Trip Parts	4A35773G10	1	
	.250 Flat Washer		4	
	.062 × .75 Cotter Pin		2	
Step 12	.250 Ring Terminal	From Step 8	2	Comm. Only
Step 13	Sensor		3	See Pick List
	Sensor Mounting Parts	4A355773G07	1	
	Sensor Harness		1	
	Sensor Mounting Angle		1	
	Sensor Mounting "Z" Bracket		2	
	Sensor Mounting Plate		2	
	.375-16 × 1.00 Lng. Hex Bolt		2	
	.375 Flat Washer Stl.		4	

**Digitrip Retrofit Kit Installation Components for the ITE LX-1600 Series Breakers**

Step	Description	Style No.	Qty.	Comment
	.375 Lock Washer Stl.		2	
	.375-160 Nut Hex Stl.		2	
	.250-20 × 1.75 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		12	
	.250 Lock Washer Stl.		6	
	.250-20 Nut Hex Stl.		6	
	.190-32 × 2.00 Screw Nylon Pan		2	
	.190 Flat Washer Stl.		4	
	.190 Lock Washer Stl.		2	
	.190-32 Nut Hex Stl.		2	
Step 15	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.

**Table 4 Torque Values for General Mounting and Screw Size Conversion**

<i>Decimal Size (in)</i>	<i>Standard Size</i>	<i>Torque (in-lbs)</i>	<i>Torque (ft-lbs)</i>
.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

**Table 5 Torque Values for Copper BUS Connectors**

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



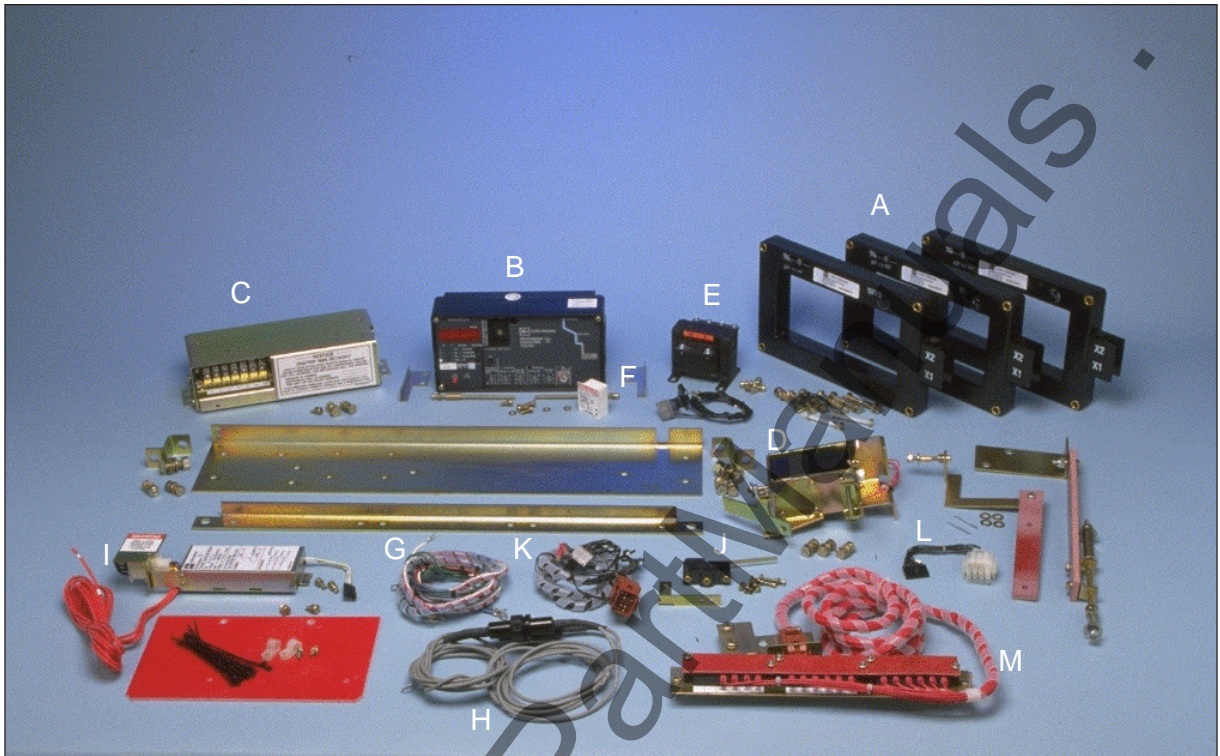


Fig. 36 Retrofit Components

- |                        |                                 |
|------------------------|---------------------------------|
| A. Sensors             | H. HV Wires                     |
| B. Trip Unit           | I. PT Module                    |
| C. Auxiliary CT Module | J. Auxiliary Switch             |
| D. DTA Assembly        | K. External Harness             |
| E. Breaker Mounted CPT | L. Auxiliary CT Harness         |
| F. Rating Plug         | M. Cell Terminal Block Assembly |
| G. Sensor Harness      |                                 |

Notes

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Notes

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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

*The instructions for installation, testing, maintenance, or repair herein are provided for the use of the product in general commercial applications and may not be appropriate for use in nuclear applications. Additional instructions may be available upon specific request to replace, amend, or supplement these instructions to qualify them for use with the product in safety-related applications in a nuclear facility.*

The information, recommendations, descriptions, and safety notations in this document are based on Cutler-Hammer's experience and judgement with respect to Retrofitting of Power Breakers. This information should not be considered to be all inclusive or covering all contingencies. If further information is required, Cutler-Hammer should be consulted.

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