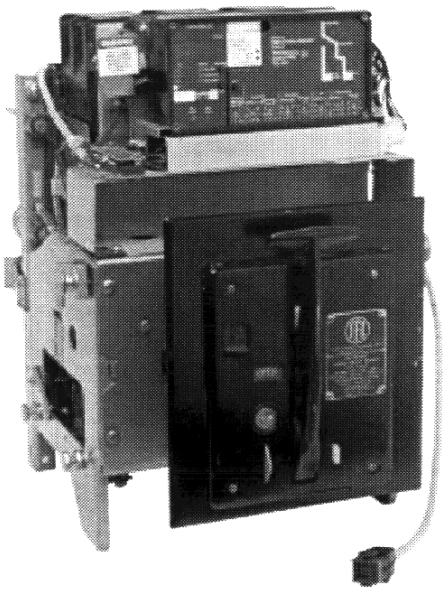
Digitrip Retrofit System for the ITE K-Line Breakers: K-225 (Black or Red), K-600 (Black or Red), and KDON-600 (Black or Red)



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					

Before Beginning the Retrofit Process Identify the Breaker and the Retrofit Kit

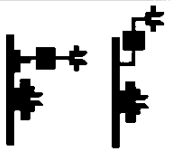
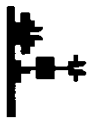
It is important to verify exactly which version of ITE K-Line Breaker(s) is to be Retrofitted and to insure that the correct Cutler-Hammer Retrofit Kit(s) was ordered. Each Breaker must be identified using all of the following sources:

1. Name Plate Information;
2. Back Plate Color;
3. Type of Finger Clusters (Rectangular or Round);
4. Fuse Use and Configuration (Horizontal or Vertical).

Please refer to the following chart and verify that the first three characters of the Retrofit Kit Code Number correspond to the Breaker being Retrofitted.

Follow the Icons to a Successful Retrofit

During certain parts of the Retrofit Process, procedures may differ depending on the version of the Breaker being Retrofitted. To enable the Retrofitter to quickly identify the correct procedures for the Breaker, Icon(s) will appear. Simply follow only the instructions identified by the Icon for the Breaker being Retrofitted.

Breaker Rating	Back Plate Color[1]	Desired Sensor Location	Finger Cluster Type	Fuse Location	Fuse Configuration	Retrofit Kit Code	ICON
Non-Fused							
K-225	Black or Red	Top	N.A.	None	N.A.	K22	
K-600	Black or Red	Top	N.A.	None	N.A.	K26	
Top Mounted Horizontal and Vertical Fused							
KDON-600[2]	Black or Red	Bottom	N.A.	Top	Horizontal or Vertical	K46	
Bottom Mounted Horizontal Fused							
KDON-600[2]	Black or Red	Top	N.A.	Bottom	Horizontal	K26	

NOTES:
1. Black or Red refers to the color of the Breaker Back Plate.
2. If specified during ordering, special Trip Unit Brackets have been supplied for some older models of the KDON-600 Black Breaker equipped with trigger fuses. If the Brackets are needed but were not ordered, contact Cutler-Hammer at: 1-800-937-5487.

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.

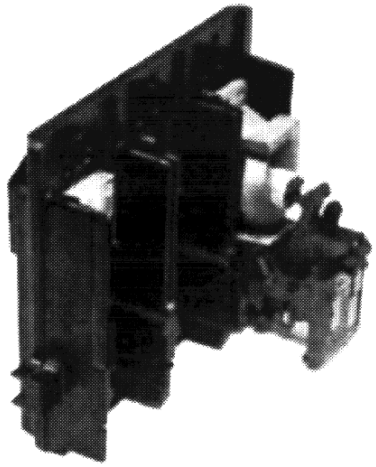
NOTE: It is the responsibility of the Retrofitter to insure that the Breaker and all original components are in good condition. Visually inspect all Breaker components for signs of damage or wear. If any signs of damage or wear are detected for components not included in the Retrofit Kit, secure the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

The force necessary to trip the Breaker should not exceed three (3) lbs.

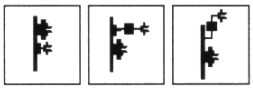
To begin the Retrofit Process, refer to the components list at the end of this manual. Lay out the components and hardware according to the steps outlined. The components and hardware will be used to complete each step in the Retrofit Process.

Step 2: Removing the Original Electromechanical Trip Units

NOTE: For all photographs contained within this manual, an ITE K-600 Black Breaker (without trigger fuses or original Auxiliary Switch) was used as the subject. Depending on the version and age of the Breaker being Retrofitted, some components / views may differ from those depicted in the manual.



A. For Breakers equipped with a Secondary Contact Bracket, move the back of the Breaker near the edge of the work bench. Remove the two screws securing the top of the Secondary Contact Bracket. Loosen the two bottom screws then rotate the bracket down over edge of work bench.

B. 

Remove the "E" clips then the pins securing the Finger Clusters to the Bottom Breaker Stabs. Remove the Finger Clusters. Set all parts aside for reinstallation later in the Retrofit Process.

Note the orientation of the existing fuses. Follow the ITE K-225 / 600 Instruction Manual, originally supplied with the Breaker, and remove the fuses, fuse mountings, and associated hardware from the bottom Breaker Stabs. Set all parts aside for reinstallation later in the Retrofit Process.

C. Remove the five Phillips head screws securing the bottom Glastic Molding to the Breaker.

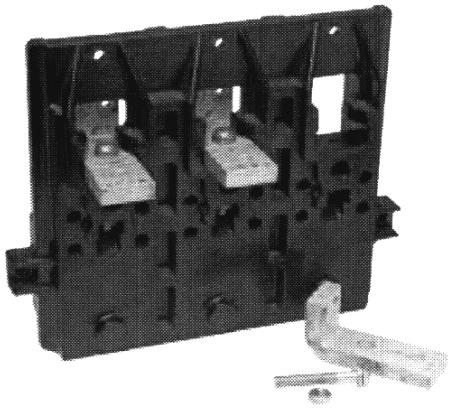
D. Remove the six hex screws securing the three copper pieces to the Breaker Pole Assembly.

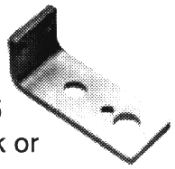
E. Remove the Glastic Molding, with the attached Electromechanical Trip Units, from the Breaker.

F. Working from the rear of the assembly, remove the Electromechanical Trip Units by carefully drilling out the four .190" screws that secure each Trip Unit to the Molding.

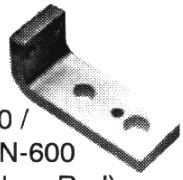
G. Remove the three screws securing the Copper Extensions then remove the Trip Units from the Molding.

Step 3: Installing the Copper Connectors





K-255 (Black or Red)

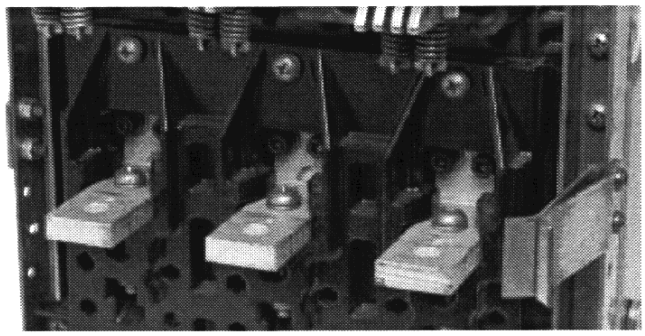


K-600 / KDON-600 (Black or Red)

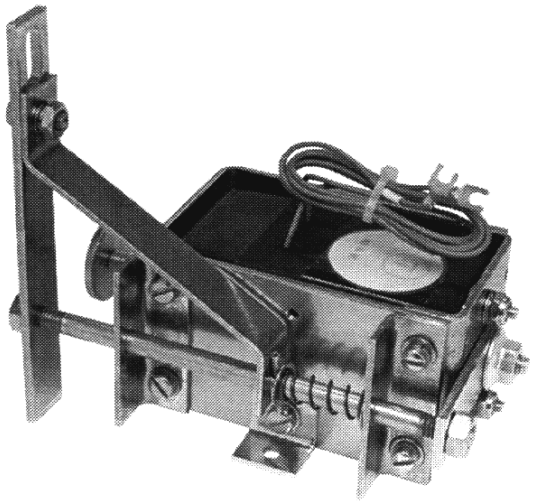
A. Install a new Copper Connector, with the short leg facing upwards, in each opening of the Glastic Molding using the three screws removed in Step 2-G.

B. Install the Glastic Molding Assembly back into the Breaker using the five Phillips head screws removed during Step 2-C.

C. Secure each new Copper Connector to each existing Copper Contact using the (6) .312-18 × 1.12" (.312-18 × .88" on K-225) hex cap bolts, (6) lock washers, and (6) flat washers supplied.



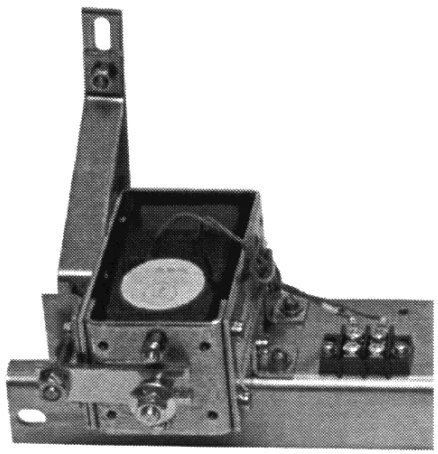
Step 4: Installing the DTA Assembly on the Mounting Angle



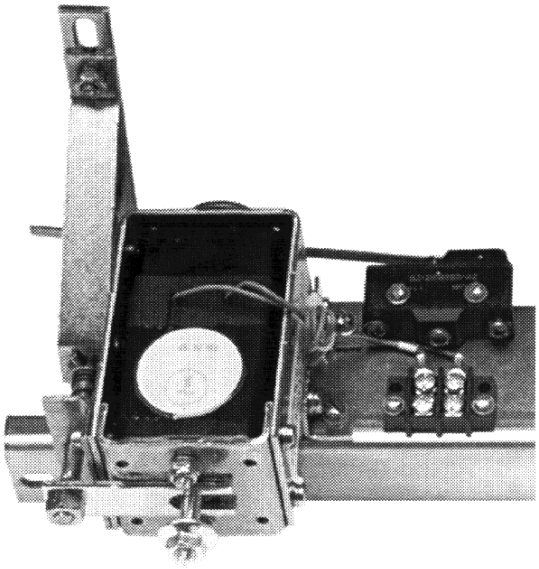
A. Apply Loc-Tite® 242 to the threads then mount the DTA Assembly to the Mounting Angle as shown using the (3) .164-32 × .500" screws, (3) lock washers, (6) flat washers, and (3) nuts supplied.

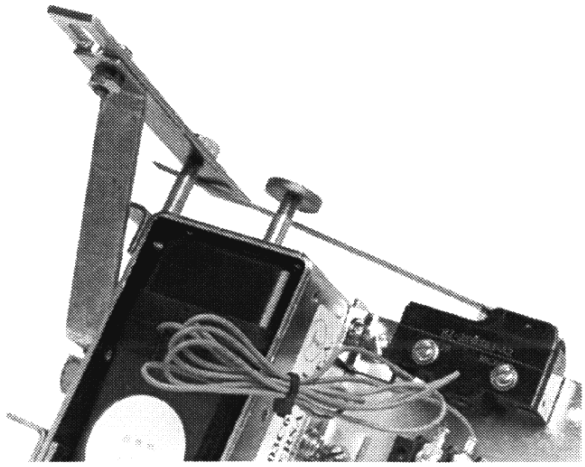
B. Mount the 2-Point Terminal Block to the Mounting Angle as shown using the (2) .138-32 × .750" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

C. Connect the DTA Wires to the two (2) top terminals of the 2-Point Terminal Block.



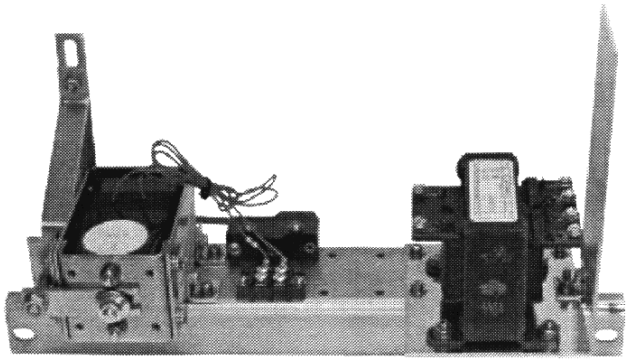
D. *For Kits Supplied with an Auxiliary Switch Only.* Mount the Auxiliary Switch to the DTA Mounting Angle as shown using the (2) .138-32 × 1.25" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied. Make sure the Auxiliary Switch Arm is under the Reset Assembly and activates when the DTA Reset is pushed down.



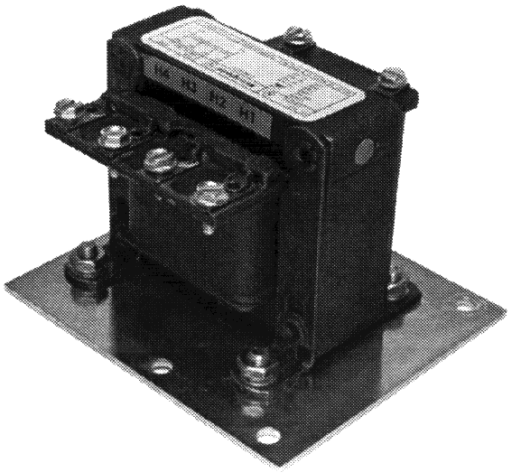


For Kits Supplied with a Breaker Mounted CPT Only.

Step 5: Installing the Breaker Mounted CPT on the DTA Mounting Angle



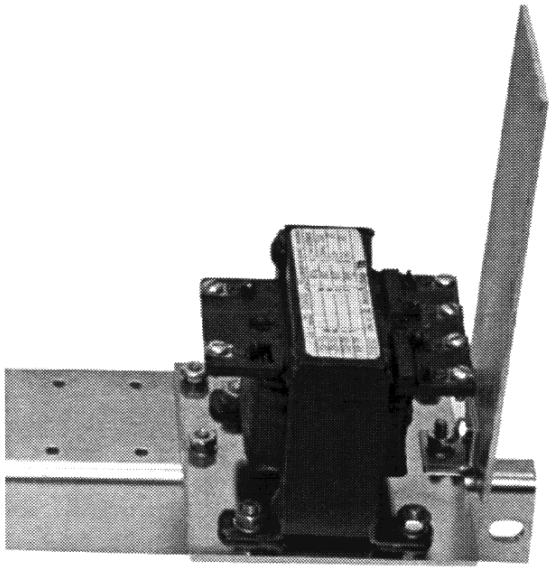
A. Mount the Breaker Mounted CPT to the CPT Mounting Plate as shown using the (2) .190-32 × .500" flat head screws, (2) .190-32 × .500" filister head screws, (6) flat washers, (4) lock washers, and (4) nuts supplied. Note the orientation of the CPT to the holes in the Mounting Plate. The CPT must be mounted in this orientation.



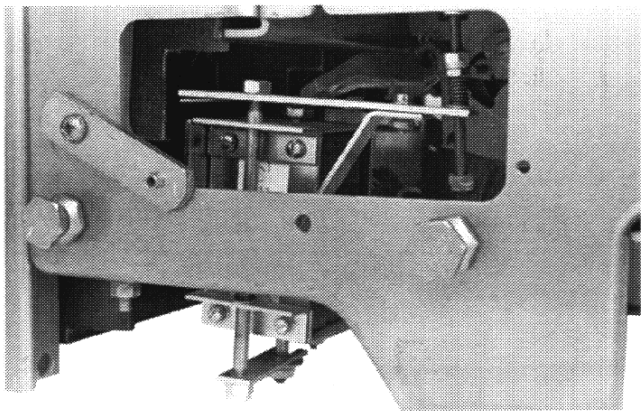
B. Align the holes in the CPT Mounting Plate with the holes in the DTA Mounting Angle as shown. Secure the left side of the CPT Mounting Plate to the DTA Mounting Angle using the (2) .164-32 × .625" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

C. Align the holes in the Mounting Bracket with the holes in the CPT Mounting Plate and the DTA Mounting Angle. Secure the Mounting Bracket using the (2) .164-32 × .625" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

D. Attach the Insulating Barrier to the Mounting Bracket as shown using the (2) .164-32 × .312" screws w/lock washers and (2) flat washers supplied.



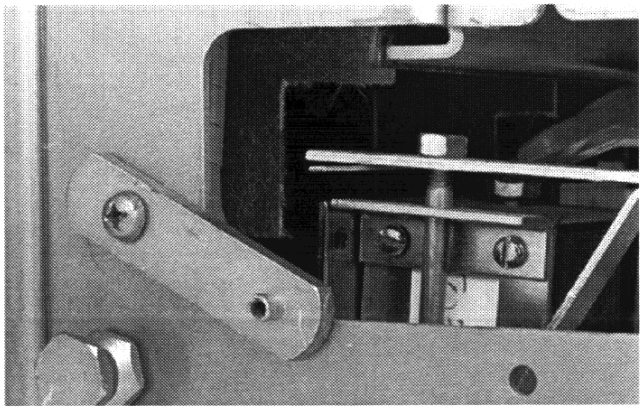
Step 6: Installing the DTA Assembly in the Breaker



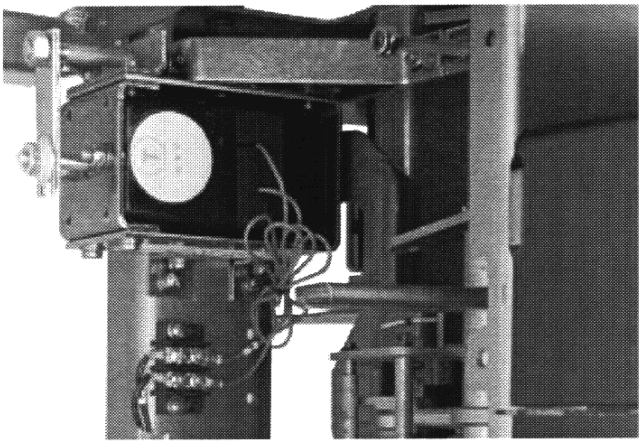
A. Carefully lay the Breaker over on its right side.

B. Working from the bottom of the Breaker, drill a .312" diameter hole in each of the bottom Breaker Flanges 2.00" from the Breaker Back Plate.

C. Cut a notch in the front, bottom corner of the left Phase Barrier to provide operating clearance for the DTA Assembly. The notch should measure approximately 1 1/4" high by 1" deep.



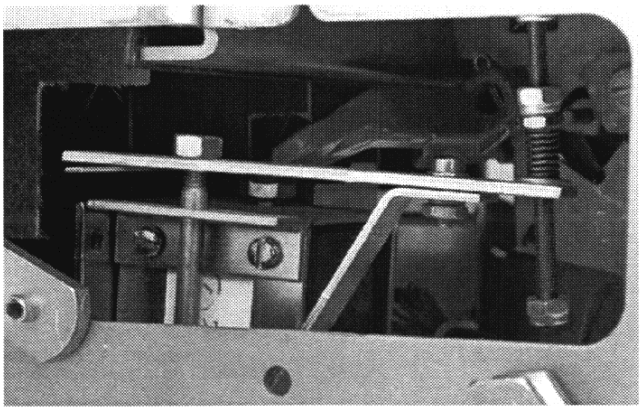
D. Mount the DTA Assembly on the inside of the bottom Breaker Flanges using the holes just drilled and the (2) .250-20 × .750" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



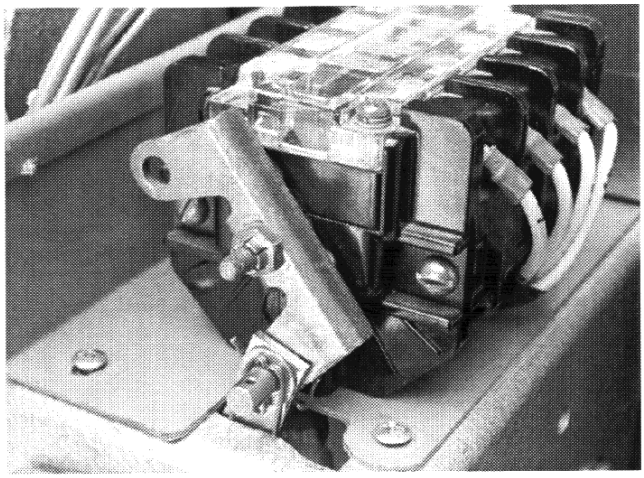
E. If the Breaker is equipped with a original left hand Auxiliary Switch, observe the Drive Link orientation then remove and scrap the Drive Link.

F. Install the tension spring and (1) flat washer on the threaded end of the new Breaker Reset Assembly supplied with the Retrofit Kit.

G. Insert the threaded end of the Reset Rod Assembly into the slot in the Reset Assembly.

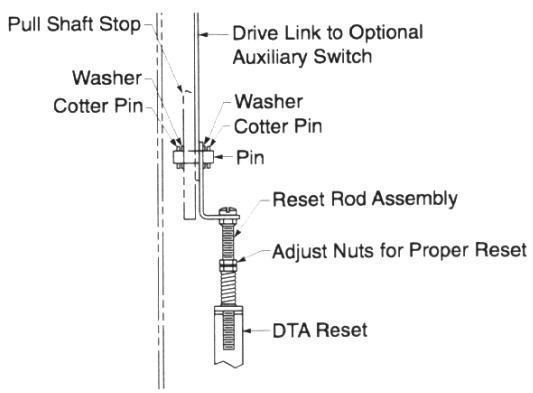


H. Connect the new Auxiliary Switch Drive Link to the left hand Auxiliary Switch (be sure to install it in the same orientation as original) using the (2) pins, (4) .250 flat washers, and (4) .06 × .88" cotter pins supplied.



I. Working from the bottom of the Breaker, align the holes in the Drive Link and the Reset Rod Assembly with the hole in the Pull Shaft Stop as shown. It may be necessary to slightly compress the spring on the Reset Rod to achieve proper alignment.

Connect the Drive Link and Reset Rod Assembly to the Pull Shaft Stop using the (1) pin, (2) .250 flat washers, and (2) .06 × .88" cotter pins supplied.



J. Carefully return the Breaker to its upright position.

K. If the DTA Shaft touches the work bench surface, shim the DTA Assembly Mounting Angle up from the bottom Breaker Flanges using the square spacers supplied. Use one (1) or two (2) spacers per side as required.

L. **CLOSE** the Breaker.

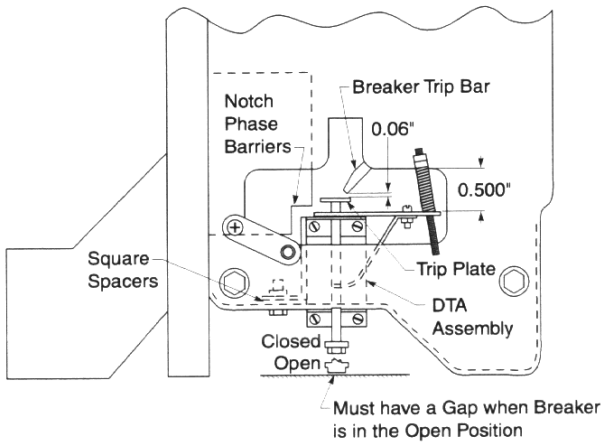
WARNING

Guard against the Breaker unintentionally OPENING during the following step. Keep hands and fingers away from moving parts within the Breaker.

M. Apply Loc-Tite® 242 to the threads of the DTA-Shaft then adjust the Trip Plate on the top of the Shaft so that there is a .06" gap between it and the Breaker Trip Bar.

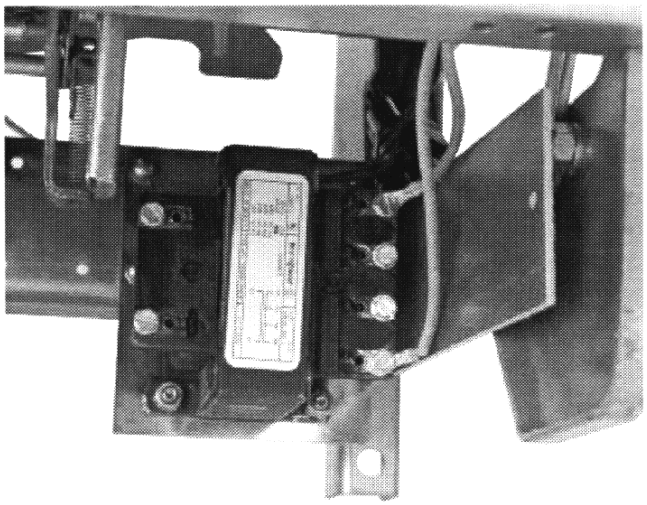
N. Return the Breaker to the **OPEN** position.

O. Adjust the nuts on the Auxiliary Switch Drive Link until the Drive Link Spring length is .500".



For Kits Supplied with a Breaker Mounted CPT only.

Step 7: Connecting the CPT to the Breaker Stabs



A. Position the fuses in an accessible location then mark and cut the Load Side of each High Voltage Fused Wire (HV Wire). Strip .250" from each Load Side HV Wire 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.)

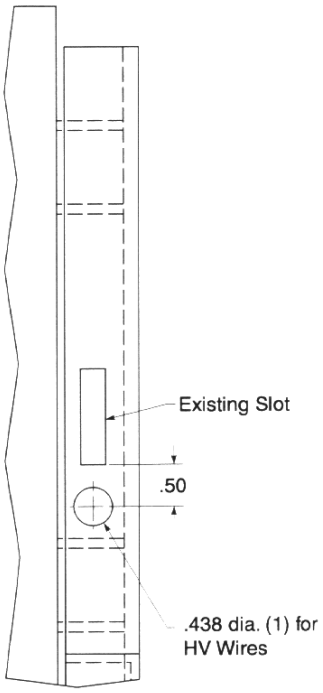
Voltage Required	CPT Terminals Used
480 Volt Circuit	H1 & H4
240 Volt Circuit	H1 & H3
208 Volt Circuit	H1 & H2

NOTE: The power convention of the ITE K-225 / K-600 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 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.

B. Drill a .438" diameter hole in the right Breaker Channel (See Drilling Plan "A").

Drilling Plan "A" – Front View

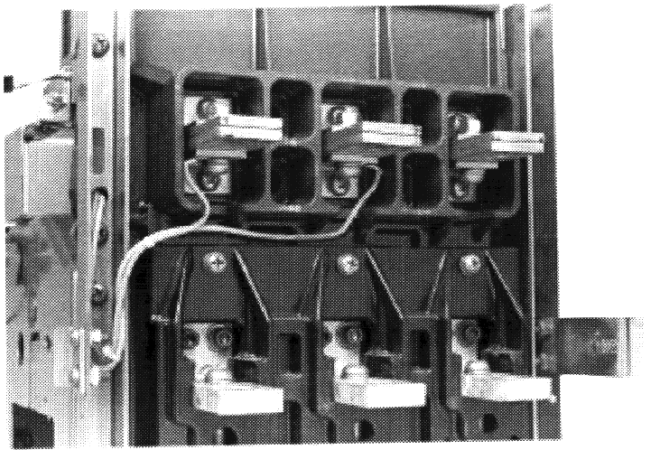


C. Route the HV Wires up through the Breaker, then through the hole just drilled towards the Phase 1 and 2, or 2 and 3 Top Breaker Stabs.

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 HV Wire Fuses are accessible from the front of the Breaker and that the connections can be made to the correct Breaker Stabs.

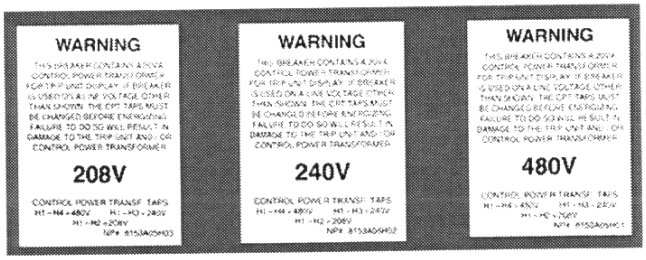
D. Remove the nuts and lock washers from the screws securing the Phase 1 and 2, or 2 and 3 Top Breaker Stabs to the Back Plate.

E. Cut the HV Wires to the appropriate length for attachment to the Phase 1 and 2, or 2 and 3 Top Breaker Stabs. Strip .250" from each HV Wire and attach a .375" ring terminal. Connect the HV Wires to the Breaker Stabs using the original screws, lock washers, and nuts.

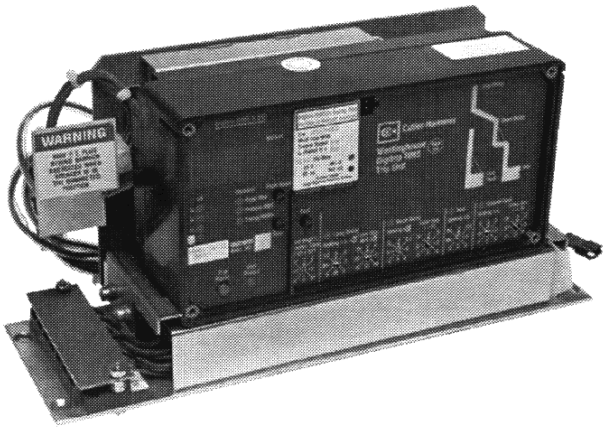


F. Use the nylon wire ties provided to dress the HV Wires and keep them away from any moving parts within the Breaker.

G. 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.

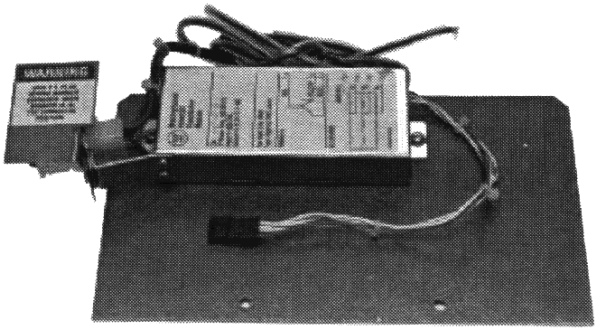


Step 8: Preparing the Trip Unit Assembly

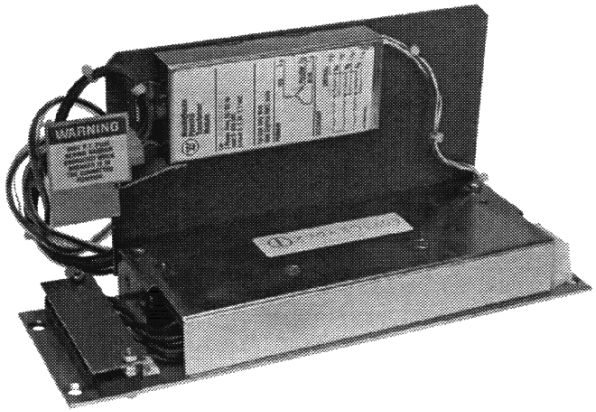


A. *For Kits Supplied with a PT Module Only.* Mount the PT Module to the Glass Poly Barrier as shown using the (2) .138-32 × .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied.

B. Mount the Glass Poly Barrier to the back of Aux. CT Module using the using the (2) .190-32 × .380" screws, (2) flat washers, and (2) lock washers supplied.

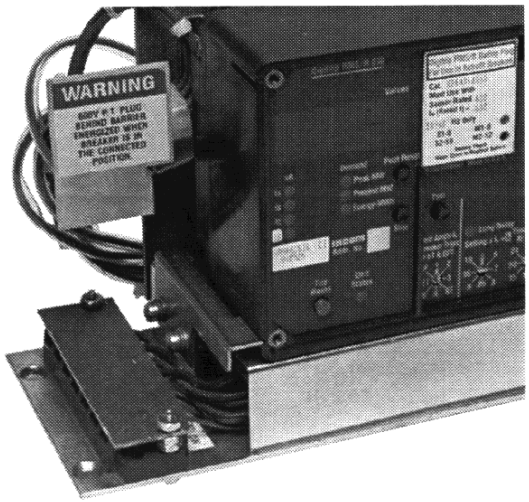


For Kits Supplied with a PT Module Only. The Glass Poly Barrier must be mounted so the PT Module will face the rear of the Trip Unit when mounted.



C. Mount the Trip Unit to the top of the Aux. CT Module as shown using the (2) .190-32 × 4.00" screws, (2) lock washers, (2) flat washers, and (2) spacers supplied. Note that the spacers are positioned between the top of the Aux. CT Module and the bottom of the Trip Unit. Do not tighten the screws at this time.

D. Mount the left and right Trip Unit Support Clips to the sides of the Aux. CT Module and into the bottom front slots in the Trip Unit as shown. Secure using the (4) .190-32 × .375" screws, (4) flat washers, and (4) lock washers supplied.



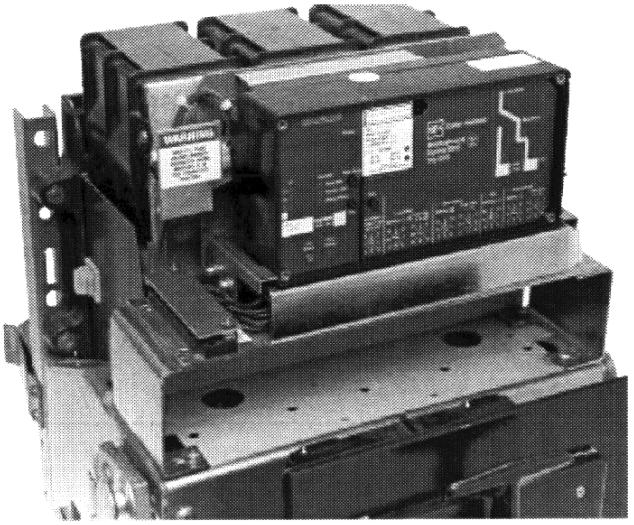
E. Secure the Trip Unit by tightening the 4.00" screws installed in Step 8-B.

F. Remove the Trip Unit Cover and install the Rating Plug supplied with the Retrofit Kit. Reinstall the Cover.

G. Install the Aux. CT Harness between the Trip Unit and the Aux. CT Module.

H. Install the Digitrip Nameplate on the top of the Trip Unit.

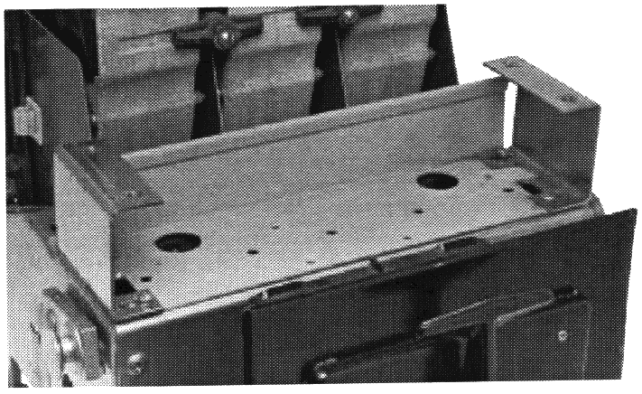
Step 9: Installing the Trip Unit on the Breaker



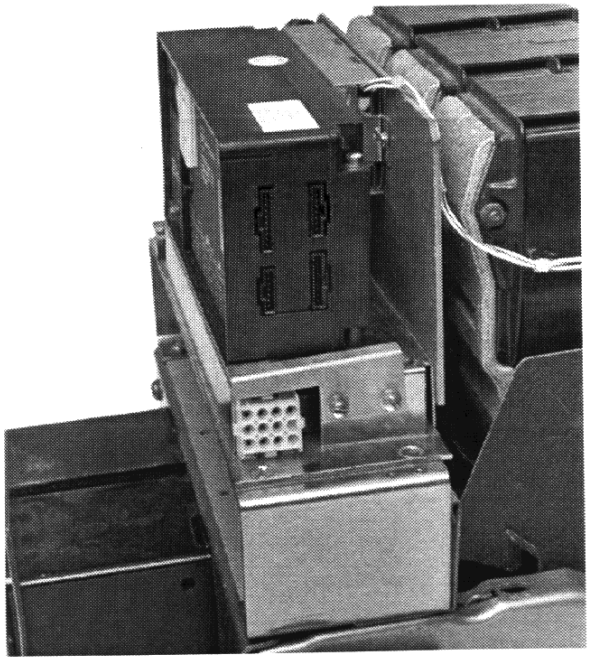
A. Remove and scrap the two (2) screws from the left and right side of Breaker Platform.

B. Mount the left and right Trip Unit Mounting Brackets on top of the Breaker Platform, flush with the end of the Breaker using the (4) .190-18 × .500" thread cutting screws, (4) lock washers, and (4) flat washers supplied.

NOTE: If specified during ordering, special Trip Unit Mounting Brackets (taller then the standard brackets) have been supplied for some older models of the KDON-600 Black Breaker equipped with trigger fuses. If the Brackets are needed but were not ordered, contact Cutler-Hammer at: 1-800-937-5487.

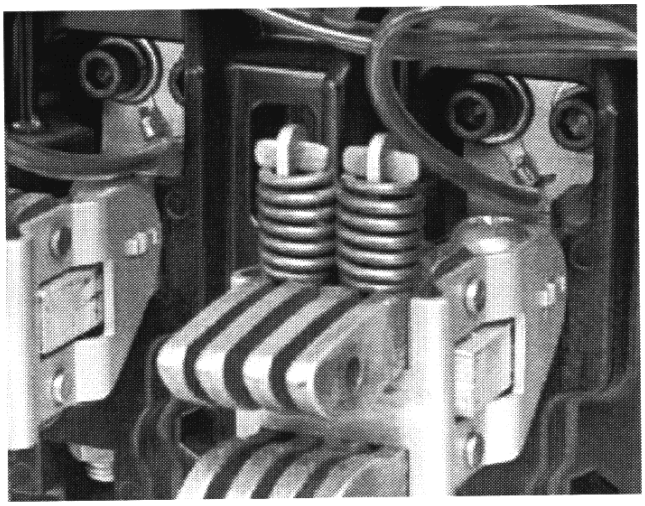


C. Mount the Trip Unit Assembly to the Mounting Brackets using the (4) .190-32 × .375" flat head screws supplied.



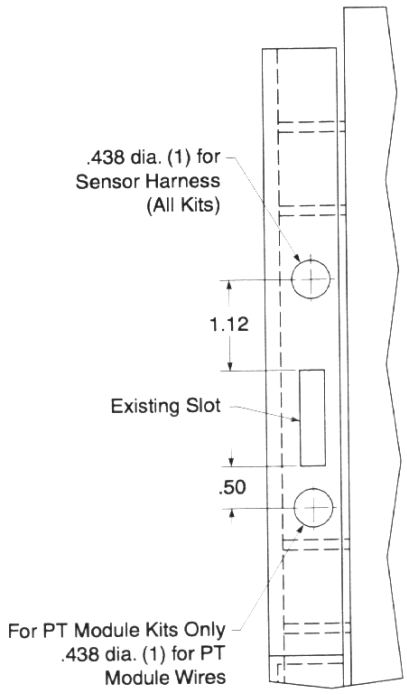
For Kits Supplied with a PT Module Only.

Step 10: Connecting the PT Wires

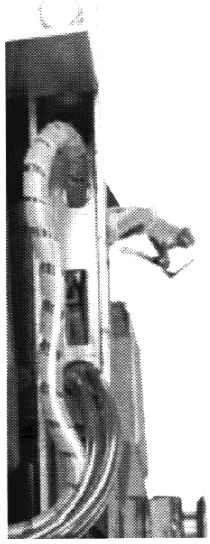


A. Drill a .438" diameter hole in the left Breaker Channel (See Drilling Plan "B").

Drilling Plan "B"– Front View



B. Cut and install the insulated tubing supplied on each PT Wire. Route the three (3) PT wires from the PT Module to the left rear of the Breaker, through the hole just drilled in Step 10-A, then down towards the Breaker Stabs.



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 the Breaker Application.

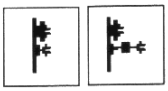
C. Route the PT Wires to a position suitable for attachment to the proper Phase Breaker Stab. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to length, strip each wire .250", and install a .250" ring terminal to each PT Wire.

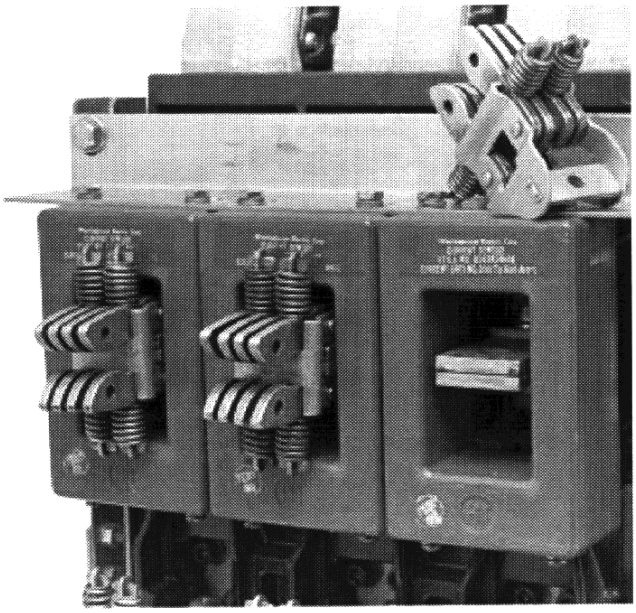
D. Remove the hex bolts and lock washers securing the selected Breaker Stabs to the Back Plate.

E. Connect each PT Wire to its corresponding Breaker Stab using the hardware removed in Step D.

Attention: Before proceeding, it is necessary to verify which Step 11 is to be followed for correct installation of the Sensors. This is done by referring to the Icon(s) with each step.

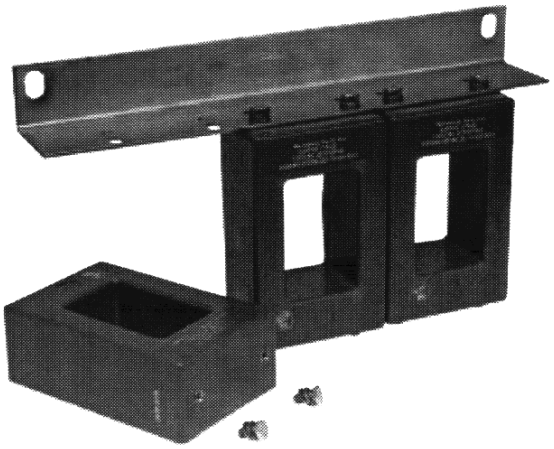
Step 11: Installing the Sensors





A. Remove the "E" clips and pins securing the Finger Clusters to the top Breaker Stabs. Remove the Finger Clusters.

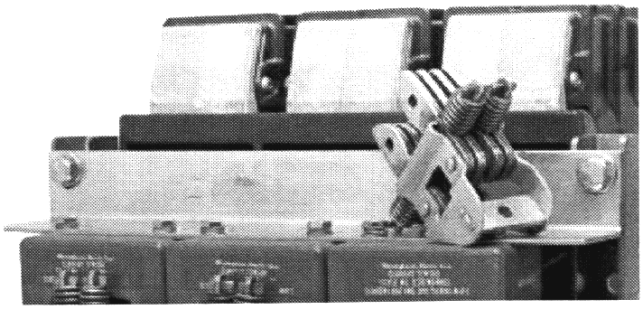
B. Apply Loc-Tite® 242 to the threads then secure the Sensors to the Mounting Angle using the (6) .250-20 × .500" bolts, (6) lock washers, and (6) flat washers supplied.



C. Slide the Sensor Assemblies over the top Breaker Stabs. Do not secure the Sensor Mounting Angle to the Breaker at this time.

D. Reinstall the top Finger Clusters using the original hardware.

E. Mount the Sensor Mounting Angle on the top rear of the Breaker as shown. Secure the Mounting Angle using the (2) .375-16 × 2.25" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied.



F. 

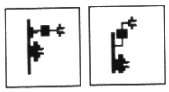
Reinstall the bottom Finger Clusters (removed in Step 2-B) using the original hardware.

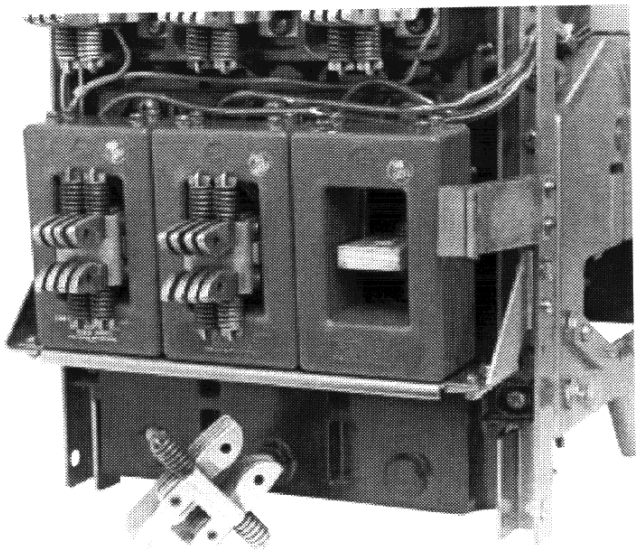
Reinstall the original fuses, fuse mountings, and associated hardware (removed in Step 2-B) on the bottom Breaker Stabs. Refer to the ITE K-225 / 600 Instruction Manual, originally supplied with the Breaker for more information.

G. For Breakers equipped with a Secondary Contact Bracket, rotate the Secondary Contact Bracket to its original position (loosened in Step 2-A). Secure it by reinstalling the original top screws and tightening the bottom screws.

Attention: Before proceeding, it is necessary to verify which Step 11 is to be followed for correct installation of the Sensors. This is done by referring to the Icon(s) with each step.

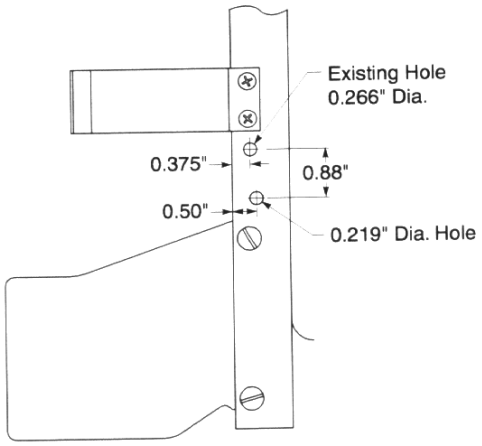
Step 11: Installing the Sensors





A. Drill one .219" diameter hole in each side of the rear Breaker Frame (See Drilling Plan "C").

Drilling Plan "C"



B. Mount a Sensor Mounting Bracket to each side of the Breaker Frame. Use (2) .250-20 × .750" bolts, (4) flat washers, (2) lock washers, and (2) nuts supplied in the existing holes. Use (2) .190-32 × .500" screws, (4) flat washers, (2) lock washers, and (2) nuts supplied in the holes just drilled.

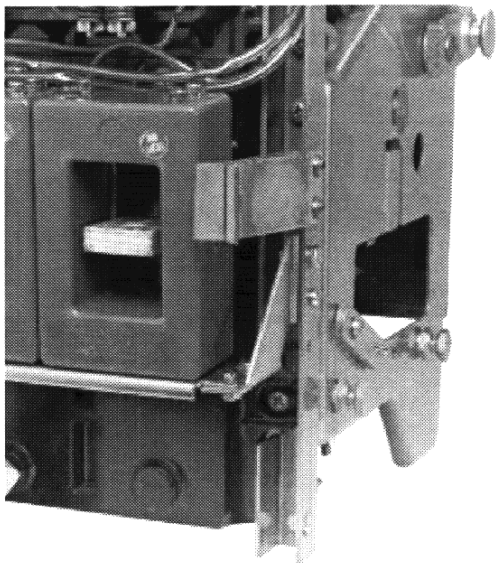
C. Apply Loc-Tite® 242 to the threads then secure the Sensors to the Mounting Platform using the (6) .250-20 × .500" bolts, (6) lock washers, and (6) flat washers supplied.

NOTE: It may be necessary to loosen the screws holding the Grounding Contact (located on the side of the Breaker Frame)-in order to properly position the Sensor on the Phase 1 Breaker Stab. After Sensor is in place retighten the screws holding the Grounding Contact.

D. Slide the Sensor Assemblies over the bottom Breaker Stabs. Be sure the Mounting Platform is above the surface of the Sensor Mounting Brackets. Do not secure the Sensor Mounting Platform to the Mounting Brackets at this time.

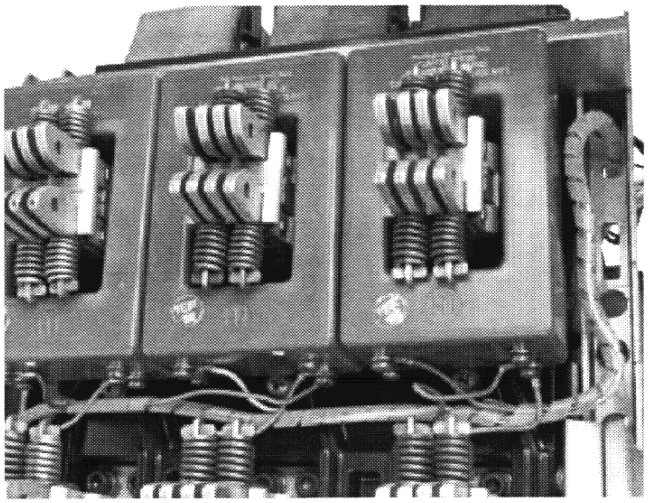
E. Reinstall the bottom Finger Clusters (removed in Step 2-B) using the original hardware.

F. Mount the Sensor Mounting Platform to the Sensor Mounting Brackets using the (4) .190-32 × .500" screws, (4) flat washers and (4) lock washers supplied.



G. For Breakers equipped with a Secondary Contact Bracket, rotate the Secondary Contact Bracket, loosened in Step 2-A, to its original position. Secure it by reinstalling the original top screws and tightening the bottom screws.

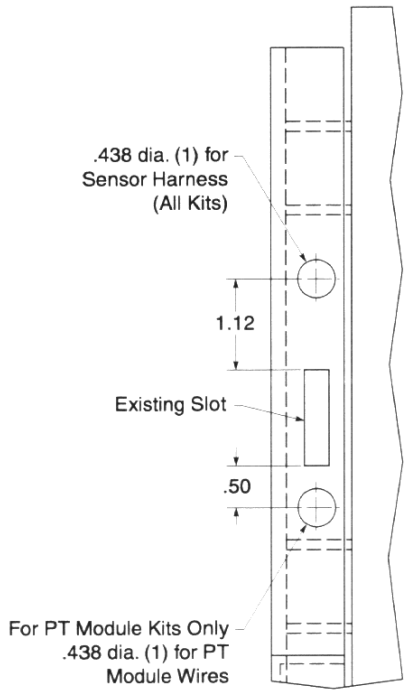
Step 12: Connecting the Sensor Harness and the DTA Harness



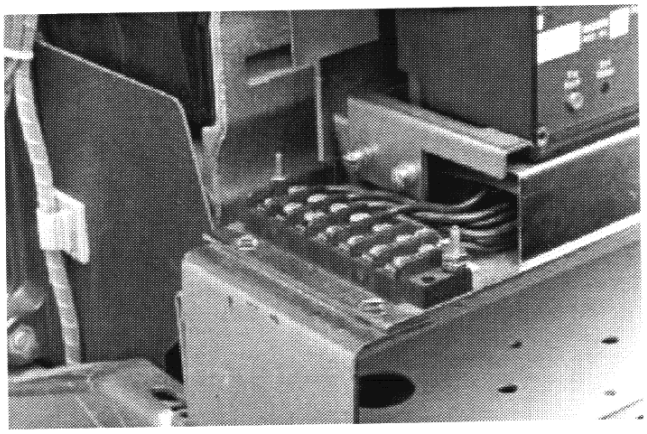
A. Drill a .438" diameter hole in the left Breaker Channel (See Drilling Plan B).

NOTE: Cover the Sensors before drilling the hole.

Drilling Plan "B" – Front View

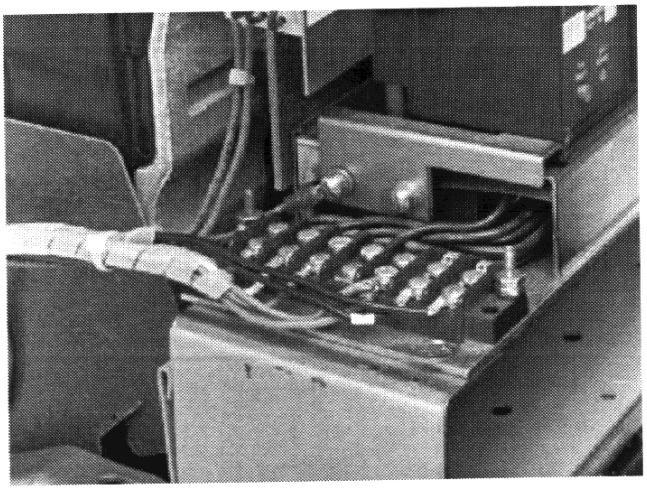


B. Remove the 7-Point Terminal Block Cover from the left side of the Aux. CT Module.

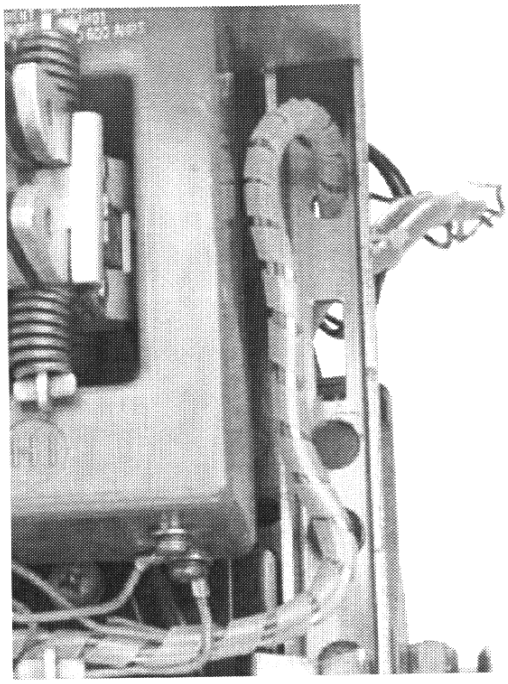


C. Connect the Sensor Harness to the proper terminals of the 7-Point Terminal Block. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

Connect the green ground wire from the Sensor Harness (with the ring terminal) to the rear screw of the left Trip Unit Support Clip.



D. Route the Sensor Harness towards the left rear of the Breaker, then through the hole drilled in Step 12-A.



E. 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.

Depending on the Sensors supplied with the Retrofit Kit, the following conventions apply.

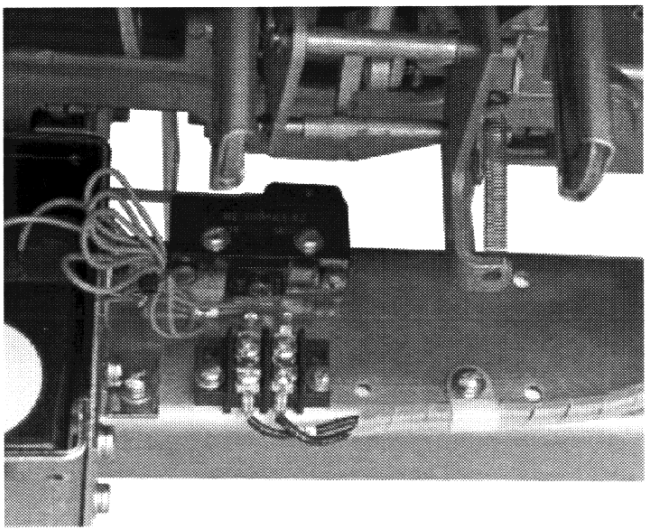
Sensor Style No.

8189A07H01:	X1-X2	= 200 A
	X1-X3	= 225 A
8187A54H01:	X1-X2	= 200 A
	X2-X4	= 400 A
	X1-X4	= 600 A

For Kits Supplied with a PT Module Only. 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.

F. Connect the "+" wire of the DTA Harness to the "OP" terminal of the 7-Point Terminal Block and the unmarked wire to the "ON" terminal. Reinstall the 7-Point Terminal Cover.

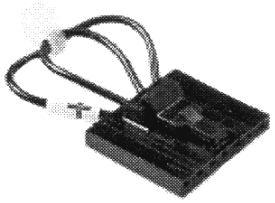
G. Route the DTA Harness down to the 2-Point Terminal Block mounted to the DTA Assembly. Connect the "+" wire to the same terminal as the "+" wire from the DTA. Connect the unmarked wire to the same terminal as the unmarked wire from the DTA.



H. Use the nylon wire ties provided to dress all wires and harnesses to keep them away from any moving parts within the Breaker.

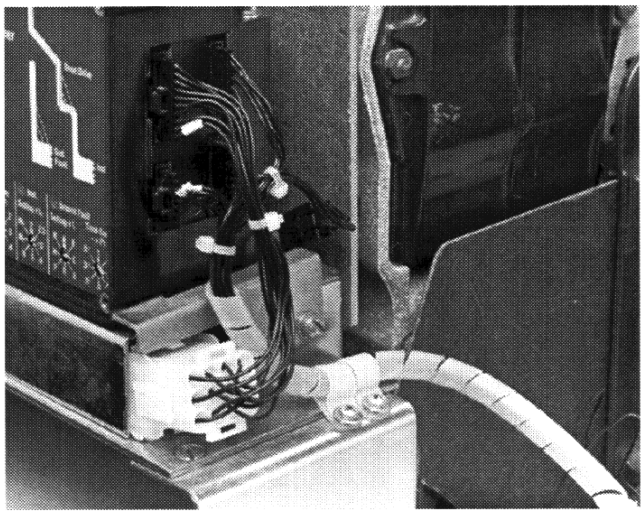
Step 13: Connecting the External Harness and Optional Components

A. Connect the External Harness to the Trip Unit.



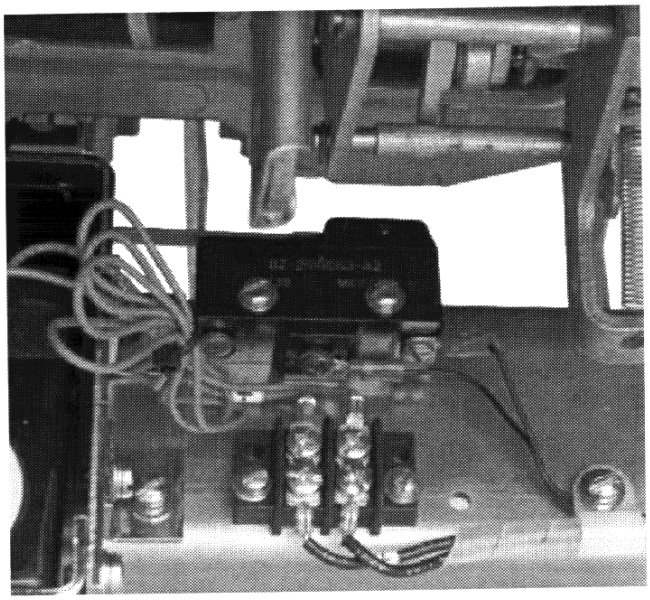
NOTE: For 510 Basic Kits, the External Harness is the plug pictured above. It is to be plugged into the right side of the Trip Unit.

B. Secure the External Harness to the two (2) pre-drilled holes in the upper right corner of the Trip Unit Mounting Bracket using the (2) nylon wire clamps and the (2) .138 × .380" thread cutting screws supplied.



C. *For Kits Supplied with a PT Module Only.* Connect the PT Harness to the External Harness.

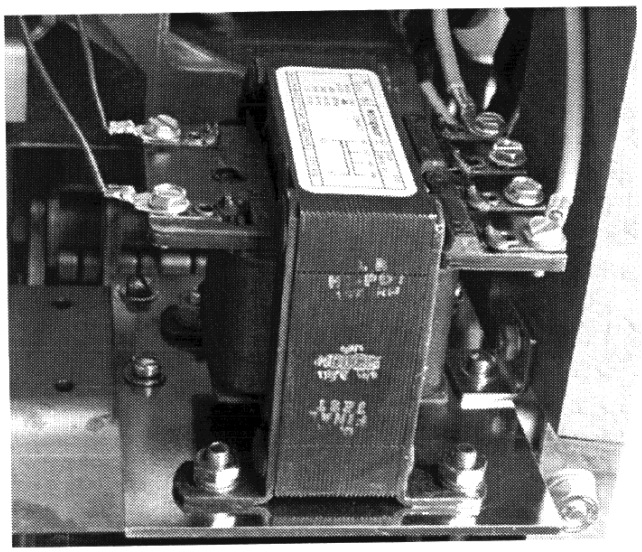
D. *For Kits Supplied with an Auxiliary Switch Only.* Connect the External Harness to the Auxiliary Switch by routing the two (2) wires (with ring terminals) from the External Harness to the Auxiliary Switch mounted on the DTA Assembly. Connect one (1) wire to the normally "Open" terminal and the other wire to the "Common" terminal of the Auxiliary Switch.



E. *For Kits Supplied with a Breaker Mounted CPT Only.* Remove the External Harness plug installed in the bottom rear socket on the right side of the Trip Unit. Insert the black plug of the CPT Harness into the same socket. Reinsert the External Harness plug just removed into the female receptacle on the CPT Harness.

Route the two (2) wires down through the Breaker to the X1 and X2 terminals of the CPT. Assure that the wires are clear of any moving parts within the Breaker.

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



F. Use the nylon wire ties provided to dress all wires and harnesses to keep them away from any moving parts within the Breaker.

Step 14: Testing the Breaker

A. Measure the force necessary to trip the Breaker at the point where the DTA flange nut 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 33-855-1, 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 Kts. 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 1 and 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 communicating 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 1 and 3 ohms.

   When the test is complete, disconnect the External Harness from the Cell Harness. Final External Harness Connection will be performed in Section 15.

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.

Step 16: 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 the 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 K-225 (Black or Red), K-600 (Black or Red), and KDON-600 (Black or Red) Breakers

Step	Description	Style No.	Qty.	Comment
Step 3	Copper Connector	8259A13G01	3	K-225 Black & Red Kits
	Copper Connector	8259A13G02	3	K-600 Black &Red Kits
	.312-18 × .88 Hex Cap Screw		6	K-225 Kits
	.312-18 × 1.12 Hex Cap Screw		6	K-600 Kits
	.312 Flat Washer Stl.		6	
	.312 Lock Washer Stl.		6	
Step 4	DTA Assembly	8259A11G33	1	
	DTA Subassembly Parts	8259A11G06	1	
	2-Point Terminal Block		1	
	DTA Mounting Angle		1	
	.164-32 × .500 Lng. Screw		3	
	.164 Flat Washer Stl.		6	
	.164 Lock Washer Stl.		3	
	.164-32 Nut Hex Stl.		3	
	.138-32 × .750 Lng Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	

Digitrip Retrofit Kit Installation Components for the ITE K-225 (Black or Red), K-600 (Black or Red), and KDON-600 (Black or Red) Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 4 (Cont'd)	Aux. Switch Kit	8259A11G02	1	
	Microswitch		1	
	.138-32 × 1.25 Lng Screw Fil.		2	Comm. Only
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
	Loc-Tite® 242		1	
Step 5	Breaker Mounted CPT Kit	8259A91G05	1	CPT Only
	Ring Terminals (.138, .190, .250, .312, .375, .500)		2	Each Size
	CPT Mounting Parts	8259A11G20	1	
	Mounting Plate		1	
	Insulation		1	
	Mounting Bracket		1	
	.190-32 × .500 Lng. Screw Fil.		2	
	.190-32 × .500 Lng. Screw Flat		2	
	.190 Flat Washer Stl.		6	CPT Only
	.190 Lock Washer Stl.		4	
	.190-32 Nut Hex Stl.		4	
	.164-32 × .312 Lng. Screw W/Lock Washer		2	
	.164-32 × .625 Lng. Screw Fil		4	
	.164 Flat Washer Stl.		10	
	.164 Lock Washer Stl.		4	
	.164-32 Nut Hex Stl.		4	
Step 6	DTA Mounting Hardware	8259A11G08	1	
	.250-20 × .750 Lng. Hex Bolt		2	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		2	
	.250-20 Nut Hex Stl.		2	
	Square Spacers		4	
	Breaker Reset Parts	8259A11G07	1	
	Aux. Switch Drive Link		1	
	Reset Rod Assembly		1	
	Reset Pin		2	
	.250 Flat Washer Stl.		4	
	.06 × .88 Cotter Pin		4	

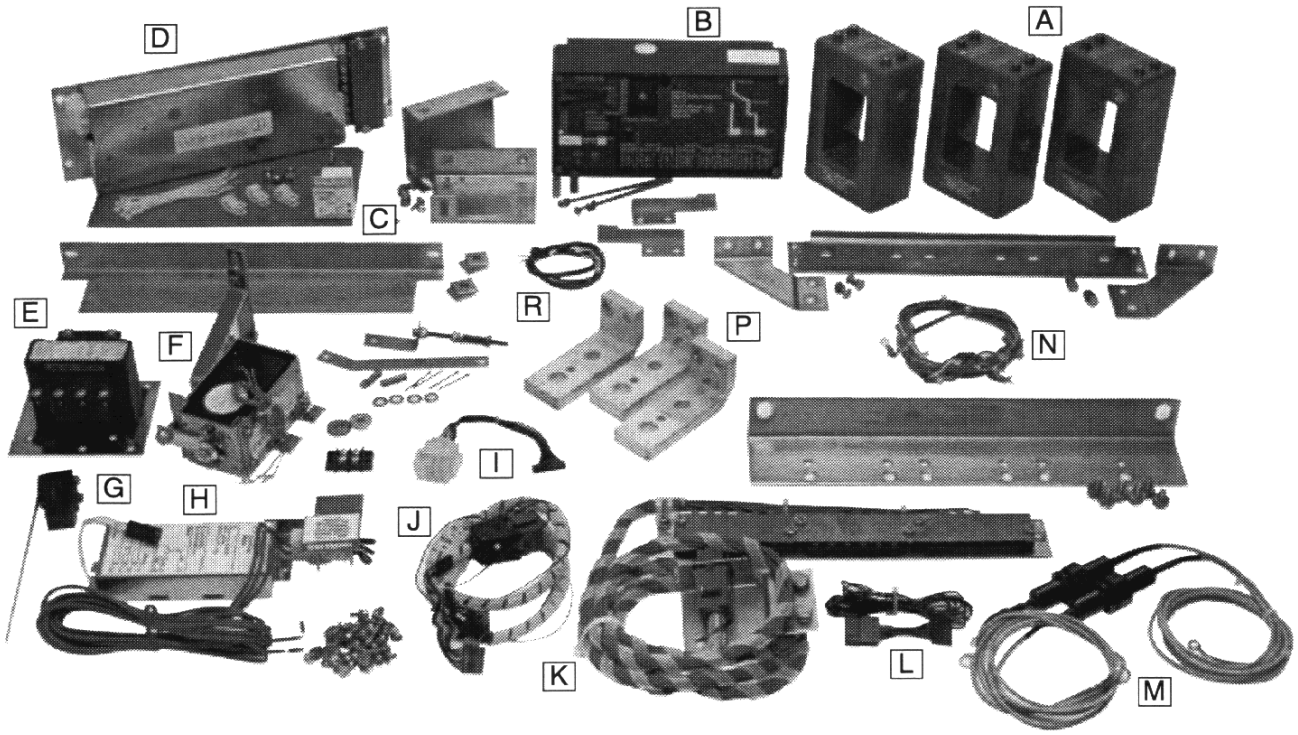
Digitrip Retrofit Kit Installation Components for the ITE K-225 (Black or Red), K-600 (Black or Red), and KDON-600 (Black or Red) Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 8	Trip Unit		1	See Pick List
	Rating Plug		1	See Pick List
	Aux. CT Module	6503C59G__	1	
	Aux. CT Harness	6502C84G01	1	
	Trip Unit Assembly Parts	8259A11G09	1	
	Trip Unit Support Bracket R. H.		1	
	Trip Unit Support Bracket L. H.		1	
	Barrier		1	
	Digitrip Nameplate		1	
	Spacer Brass		2	
	.190-32 × 4.00 Lng. Screw		2	
	.190-32 × .375 Lng. Screw		6	
	.190 Flat Washer Stl.		8	
	.190 Lock Washer Stl.		8	
	PT Module	6502C82G01	1	Comm. Only
	.138-32 × .500 Lng. Screw		2	Comm. Only
	.138 Flat Washer Stl.		4	Comm. Only
	.138 Lock Washer Stl.		2	Comm. Only
	.138-32 Nut Hex Stl.		2	Comm. Only
	Ring Terminals (.190, .250, .312, .375, .500)		3	Each Size
Step 9	Trip Unit Mounting Parts	8259A11G10	1	
	Trip Unit Mounting Bracket		2	
	.190-18 × .500 Lng. Screw T. C.		4	
	.190-32 × .375 Lng Screw F. H.		4	
	.190 Flat Washer Stl.		4	
	.190 Lock Washer Stl.		4	
Step 10	.160 I. D. × 60" Insulated Tubing		1	Comm. Only

Digitrip Retrofit Kit Installation Components for the ITE K-225 (Black or Red), K-600 (Black or Red), and KDON-600 (Black or Red) Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 11	Sensor		3	See Pick List
	Sensor Mounting Parts	8259A11G04	1	
	Sensor Mounting Bracket		1	
	.250-20 × .500 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		6	
	.250 Lock Washer Stl.		6	
	.375 Wide Washer Stl.		4	
	.375-16 × 2.00 Lng. Hex Bolt		2	
	.375 Flat Washer Stl.		4	
	.375 Lock Washer Stl.		2	
	.375-16 Nut Hex Stl.		2	
	Loc-Tite® 242		1	
Step 11	Sensor		3	See Pick List
	Sensor Mounting Parts	8259A11G14	1	
	Sensor Mounting Platform		1	
	Left Hand Sensor Mounting Bracket		1	
	Right Hand Sensor Mounting Bracket		1	
	.250-20 × .750 Lng. Hex Bolt		2	
	.250-20 × .500 Lng. Hex Bolt		6	
	.250 Flat Washer Stl.		10	
	.250 Lock Washer Stl.		8	
	.250-20 Nut Hex Stl.		2	
	.190-32 × .500 Lng. Screw Fil.		6	
	.190 Flat Washer Stl.		12	
	.190 Lock Washer Stl.		6	
	.190-32 Nut Hex Stl.		6	
	Loc-Tite® 242		1	
Step 12	Sensor Harness Parts	8259A11G11	1	
	Sensor Harness		1	
	Wire Tie Nylon		12	
	.160 I. D. × 60" Insulated Tubing		1	Comm. Only
	DTA Harness		1	
Step 13	External Harness	6502C83G__	1	
	External Harness Parts	8259A11G12	1	
	Wire Clamp		2	
	.138 × .380 Lng. Screw T. C.		2	
Step 15	Cell Harness	6503C57G__	1	Except 510 Basic

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



A. Sensors
B. Trip Unit
C. Rating Plug
D. Aux. CT Module
E. CPT Kit (Optional)
F. Direct Trip Actuator (DTA)
G. Aux. Switch
H. PT Module
I. Aux. CT Harness
J. External Harness
K. Cell Terminal Block Assembly
L. Associated Parts of CPT Kit
M. CPT HV Wires
N. Sensor Harness
P. Copper Adapters
R. DTA Harness

Torque Values for General Mounting

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

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.

NO WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY, OR WARRANTIES ARISING FROM COURSE OF DEALING OR USAGE OF TRADE, ARE MADE REGARDING THE INFORMATION, RECOMMENDATIONS AND DESCRIPTIONS CONTAINED HEREIN. In no event will Cutler-Hammer be responsible to the user in contract, in tort (including negligence), strict liability or otherwise, for any special, indirect, incidental, or consequential damage or loss whatsoever, including but not limited to damage to or loss of use of equipment, plant or power system, cost of capital, loss of profits or revenues, cost of replacement power, additional expenses in the use of existing power facilities, or claims against the user by its customers resulting from the use of the information, recommendations, and descriptions contained herein.

Cutler-Hammer
130 Commonwealth Drive
Warrendale, PA 15086

Effective August, 1998
Printed in U.S.A. - K

EATON