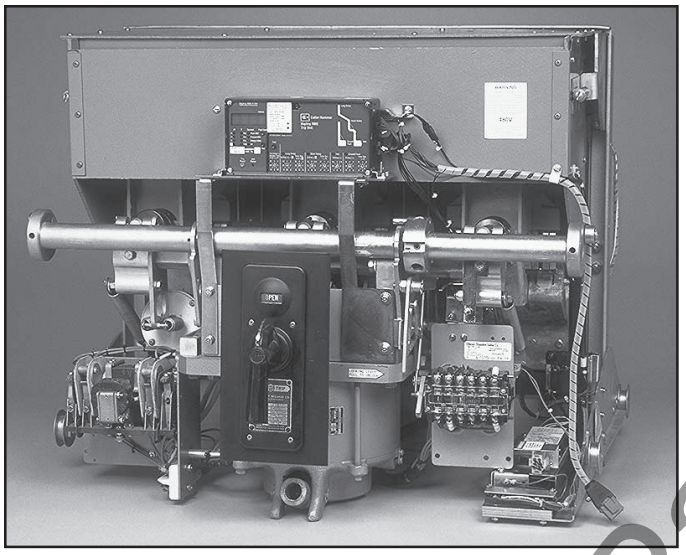
Digitrip Retrofit System for the ITE KD3000 and KE4000 Breakers



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 KD3000 and KE4000 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 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.

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 33-855-1), 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 workbench.

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. Lay out the components and hardware according to the steps outlined. The parts bags are labeled with the corresponding step number. The components and hardware will be used to complete each step in the Retrofit process.

STEP 2: REMOVING THE ORIGINAL COMPONENTS

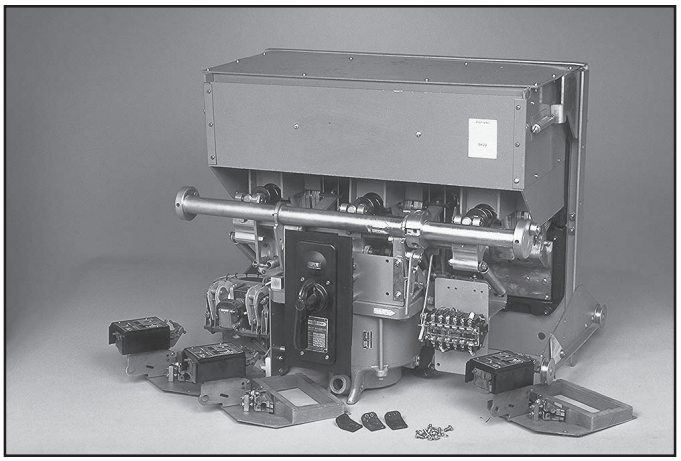


Fig. 1 Original Components Removed from the Breaker

Refer to the ITE KD3000 or KE4000 Instruction Manual, originally supplied with the Breaker, to perform the following procedures.

A. Remove and save the Arc Box.

B. Remove and save the three (3) Arc Chutes.

C. Disconnect the Pole Units from the Breaker Pole Shaft by removing the wrist pins that mount each Pole Unit to the Pole Shaft. Set the wrist pins aside for reinstallation later in this step.

D. Remove the four (4) bolts that secure the Breaker Mechanism to the Breaker Back Plate.

E. Disconnect any linkages and wiring that connect the Breaker Mechanism to the Breaker Back Plate. Set the Breaker Mechanism mounting hardware and any linkages or wiring aside for reinstallation later in this step.

F. Separate the Breaker Mechanism from the Breaker Back Plate.

G. Remove the three (3) bottom Finger Clusters. Set the Finger Clusters aside for reinstallation later in the retrofit Process.

H. Remove and scrap the three (3) Electromechanical Trip Units and the three (3) Trip Paddles.

I. Reassemble the Breaker following the steps in this section in reverse order. During reassembly, DO NOT reinstall the top Finger Clusters. They will be installed later in the Retrofit Process.

J. **Adjust the Main Contact and Arcing Contact Pressure** following the instructions given in the ITE KD3000 or KE4000 Instruction Manual, originally supplied with the Breaker.

STEP 3: INSTALLING THE SENSORS

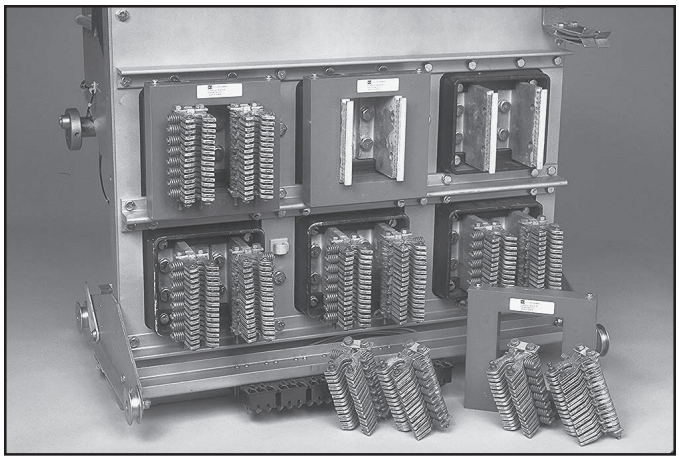


Fig. 2 Overview: Sensors Installed on the Breaker

A. Slide a Sensor over each of the top Breaker Stabs. Note that the terminals must face upwards and the Name Plate face away from the back of the Breaker.

NOTE: The Sensor terminals for the KD3000 are post type while the terminals for the KE4000 are screw type.

B. Reinstall the top Finger Clusters removed in Step 2.

STEP 4: INSTALLING THE DTA ASSEMBLY

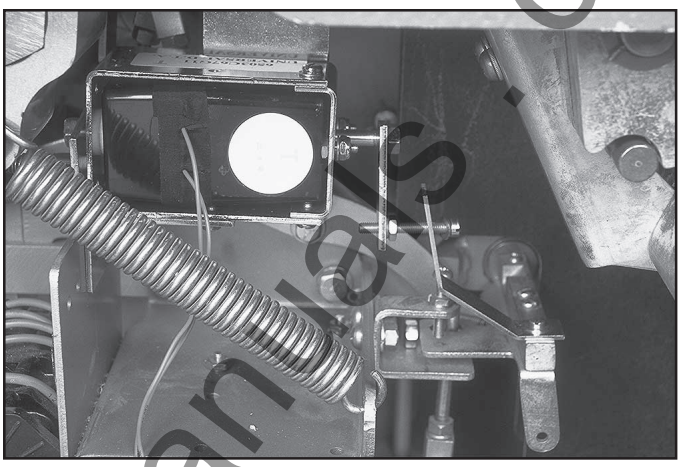


Fig. 3 Overview: DTA Installed in the Breaker

A. *For Kits Supplied with an Auxiliary Switch Only.* Mount the Auxiliary Switch Mounting Bracket to the DTA Assembly, as shown, using the (1) .164-32 × .375" and (1) .164-32 × .312" screws, (2) lock washers, and (2) flat washers provided. Note that the mounting location of the bracket is dependent on the Breaker being Retrofit.

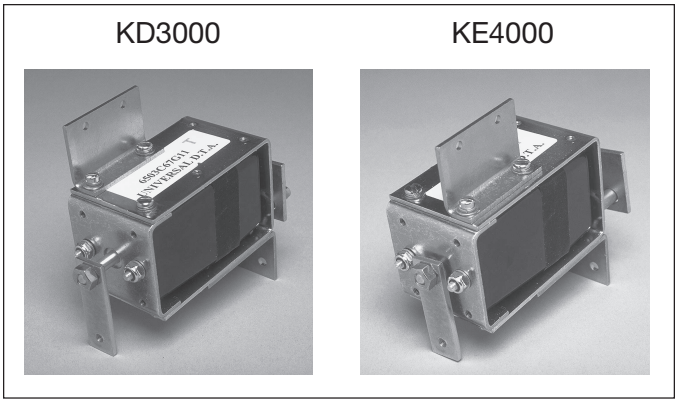


Fig. 4 Auxiliary Switch Mounting Bracket Position

B. Remove and scrap the existing hardware from the right end of the Breaker Trip Bar.

C. Align the Trip Tab Assembly with the hole on the right end of the Breaker Trip Bar. Secure the Trip Tab Assembly to the Breaker Trip Bar, as shown, using the (1) .190-32 × 1.50" screw, (2) flat washers, (1) lock washer, and (1) nut provided.

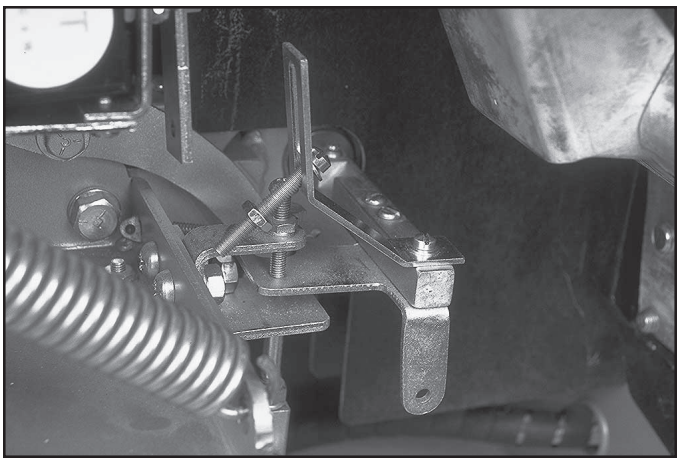


Fig. 5 Trip Tab Assembly Mounted to the Trip Bar

D. Apply Loc-Tite® 243 to the threads then thread the Trip Tab Assembly adjusting screw into the hole in the DTA Trip Finger.

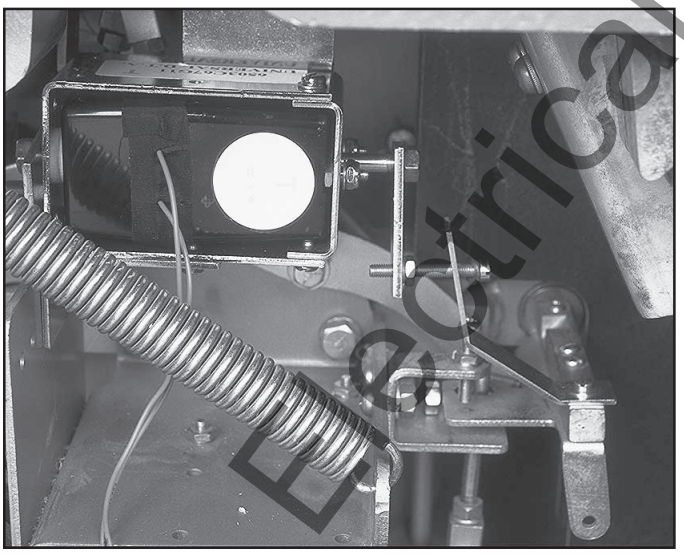


Fig. 6 Trip Tab Assembly Connected to the DTA Trip Finger

E. Align the DTA Assembly with the existing holes in the left side of the Auxiliary Switch Plate. Secure the DTA Assembly to the Auxiliary Switch Plate, as shown, using the (2) .190-32 × .500" screws, (4) flat washers, (2) lock washers, and (2) nuts provided.

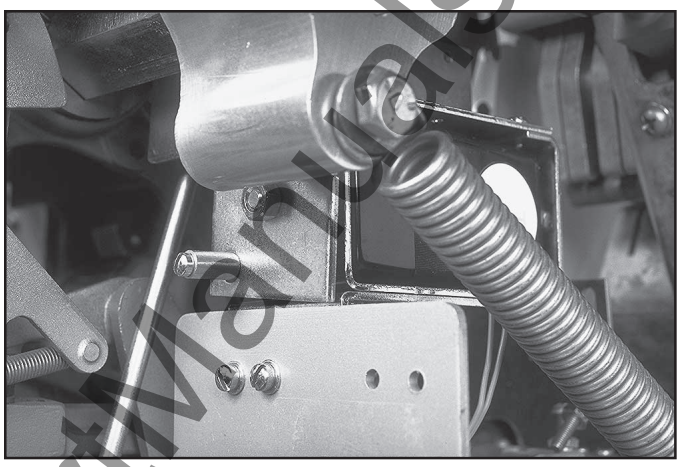


Fig. 7 DTA Assembly Mounted to the Auxiliary Switch Plate

F. Remove and scrap the existing hardware from the right side of the Breaker Cross Bar.

G. Mount the DTA Reset Arm to the Breaker Cross Bar, as shown, using the (1) .312-18 × 1.00" bolt, (1) lock washer, and (1) flat washer provided. Note that there is a slight difference in the shape of the DTA Reset Arm for the KD3000 and KE4000 Breakers.

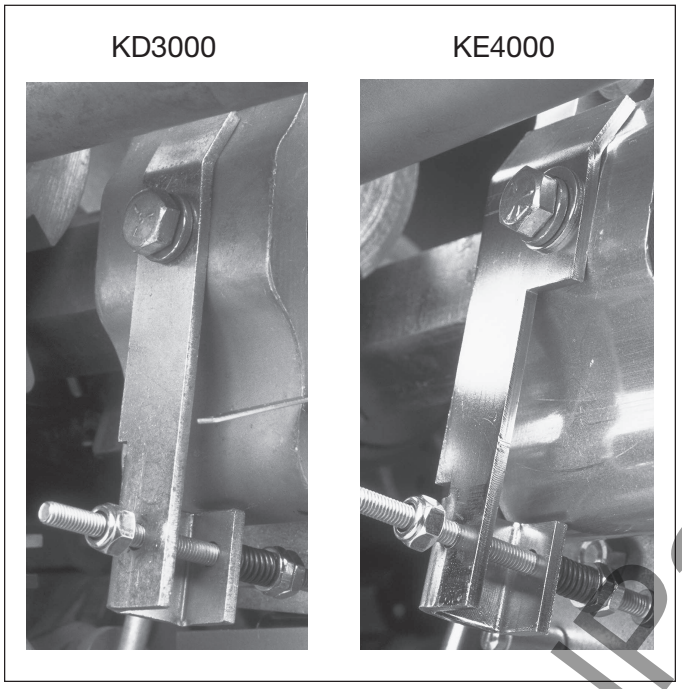


Fig. 8 DTA Reset Arm Mounting

H. Apply Loc-Tite® 243 to the threads then turn the nut on the Trip Tab Assembly adjusting screw until a gap of .09" is achieved between the Trip Tab Assembly and the flat washer on the adjusting screw.

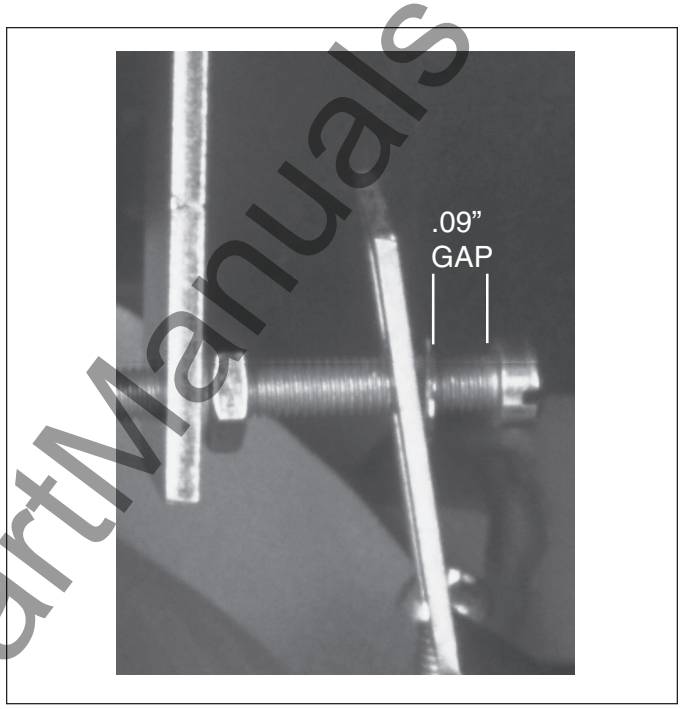


Fig. 9 Adjusting the Trip Tab Assembly Gap

STEP 5: DRILLING THE BREAKER FOR COMPONENT MOUNTING

A. Working from the front of the Breaker, drill a hole in the Breaker Back Plate near the bottom, left corner of the Breaker. This hole should be large enough to allow the Sensor Harness and, if applicable, the PT and HV Wires to exit the back of the Breaker and without causing damage to the wire insulation. The Sensor Harness and, if applicable, the PT and HV Wires will be routed through this hole later in the Retrofit process.

NOTE: On some Breakers, a small hole may already exist at this location. If this is the case, enlarge the existing hole sufficiently to allow the Sensor Harness and, if applicable, the PT and HV Wires to exit the back of the Breaker and without causing damage to the wire insulation.

B. *For Kits Supplied with a Breaker Mounted CPT Only.* Using Drilling Plan "A" for the appropriate Breaker, drill two (2) .219" diameter holes in the right Breaker Frame. These holes will be used later in the Retrofit process to mount the CPT Mounting Bracket.

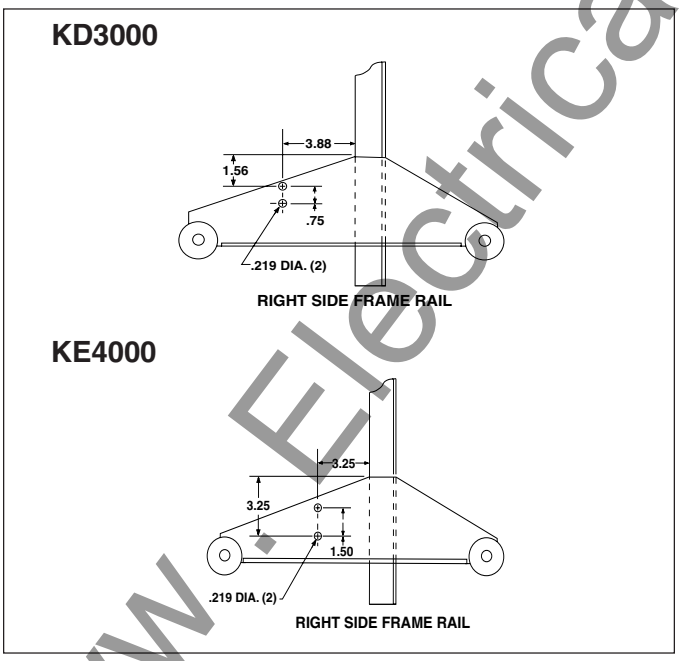


Fig. 10 Drilling Plan "A"

STEP 6: INSTALLING THE AUXILIARY CT MODULE ASSEMBLY

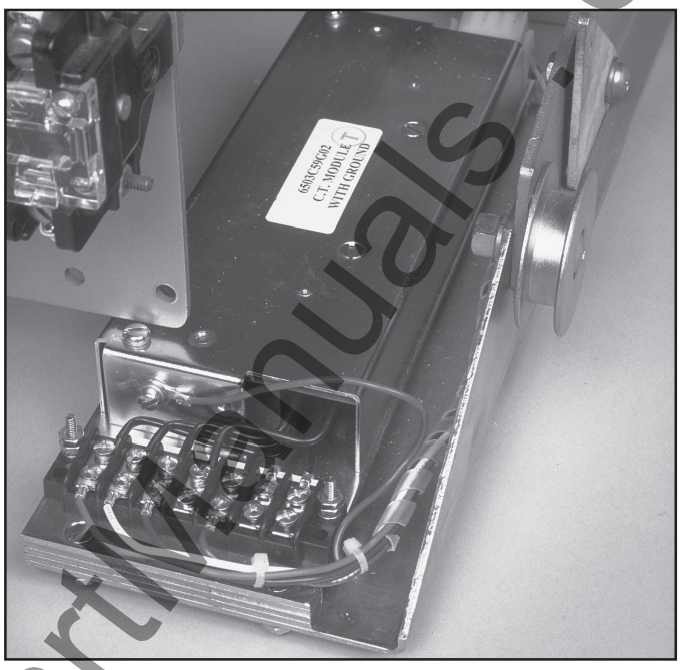


Fig. 11 Overview: Auxiliary CT Module Installed in the Breaker

A. Position three (3) spacers on each side of the Aux. CT Module Mounting Bracket, as shown.

B. Align the holes in the Aux. CT Module with the holes in the spacers and Aux. CT Module Mounting Bracket.

C. Secure the Aux. CT Module and spacers to the Aux. CT Module Mounting Bracket, as shown, using the (4) .190-32 × .875" flat head screws, (4) flat washers, (4) lock washers, and (4) nuts provided.

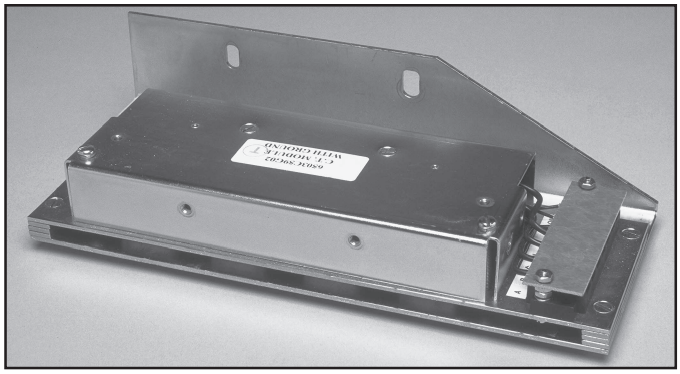


Fig. 12 Installing the Auxiliary CT Module Mounting Breaker

D. Connect the Aux. CT Harness to the Aux. CT Module.

E. Remove the cover from the 7-Point Terminal Block on the Aux. CT Module Assembly.

F. Connect the Sensor Harness to the proper terminals of the Aux. CT Module. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

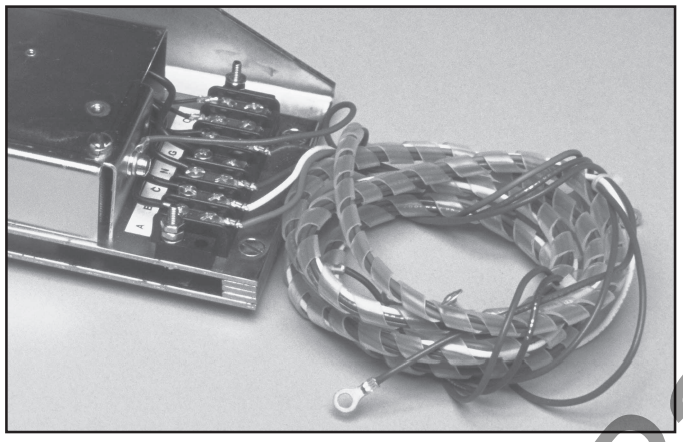


Fig. 13 Sensor Harness Connected to the Auxiliary CT Module

NOTE: The long tan and green wires are for a Remote Neutral Sensor on a 4W Ground Breaker. They should be removed if not required.

G. Connect the Sensor Harness ground wire to the Aux. CT Module, as shown, using the (1) .190-32 × .375" screw, (1) lock washer, and (1) flat washer supplied.

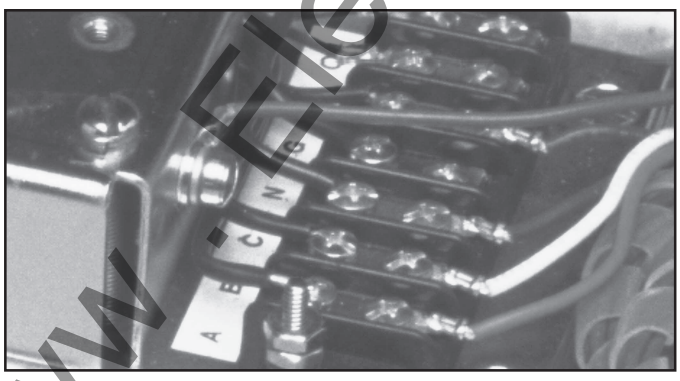


Fig. 14 Sensor Harness Ground Connection

H. Route the Sensor Harness along the right side of the Assembly, between the Aux. CT Module and the Aux. CT Module Mounting Bracket.

I. Remove and save the nuts and washers from the screws securing the right Roller and Locking Bracket.

J. Insert the Aux. CT Module Assembly into the bottom right corner of the Breaker. As it is being inserted, feed the Sensor Harness through the hole drilled in Step 5-A.

K. Align the Aux. CT Module Assembly with the screws mounting the right Roller and Locking Bracket. Secure the Aux. CT Module Assembly using the original hardware removed in Step 6-H.

Fig. 15 Auxiliary CT Mounted in the Breaker

L. Route the DTA Wires down towards the 7-Point Terminal Block on the Aux. CT Module Assembly. Connect the DTA Wires to the terminals of the Aux. CT Module: positive (+) wire to the OP terminal and the unmarked wire to the ON terminal.

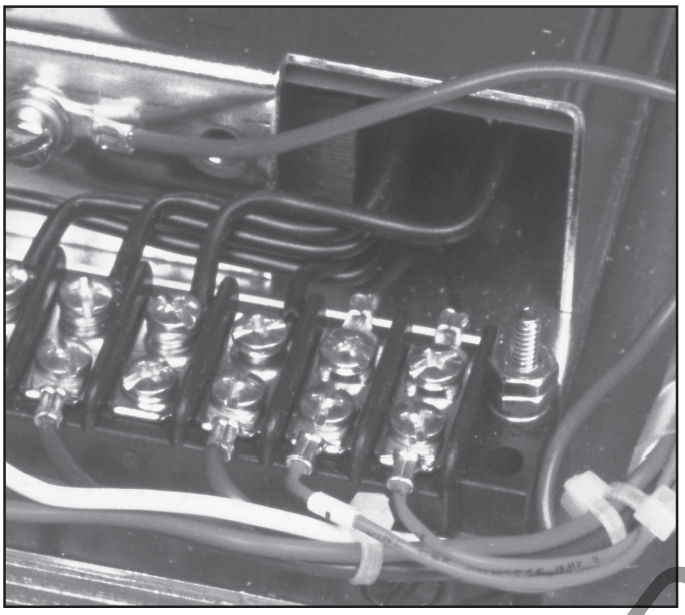


Fig. 16 DTA Wires Connected to the Auxiliary CT Module

M. Install the 7-Point Terminal Block Cover.

STEP 7: CONNECTING THE SENSOR HARNESS

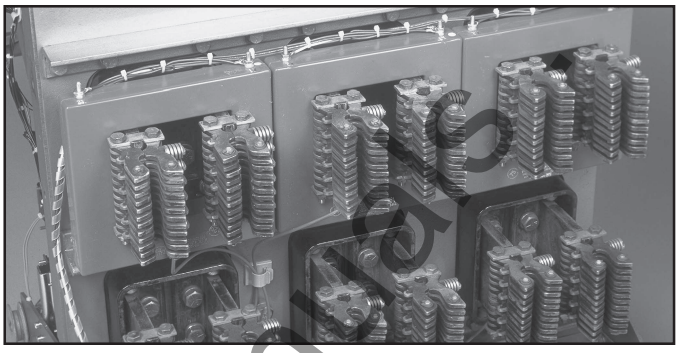


Fig. 17 Overview: Sensor Harness Installed in the Breaker

A. Route the Sensor Harness from the hole in the bottom right corner of the Breaker Back Plate up to the Sensors.

B. Connect the Ring Terminals of the Sensor Harness to the Sensors as shown. Refer to Section 12 of the Retrofit Application Data, supplied with the Retrofit Kit, for detailed wiring specifications.

Table 2 Sensor Taps Ratings

KD3000

Sensor Style No.	*Terminal Com.*	*Amps*
8259A23H01	X1-X2 =	3000 A

KE4000

Sensor Style No.	*Terminal Com.*	*Amps*
4A35822H01	X1-X2 =	4000 A

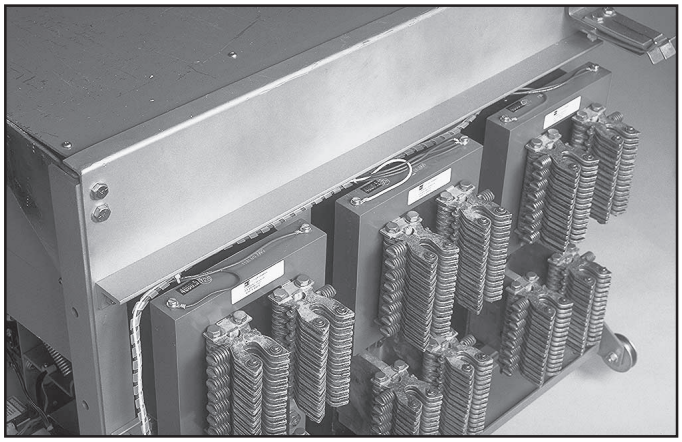


Fig. 18 Sensor Harness Connected to the Sensors

For Kits Supplied with a PT Module Only.

STEP 8: INSTALLING THE PT MODULE

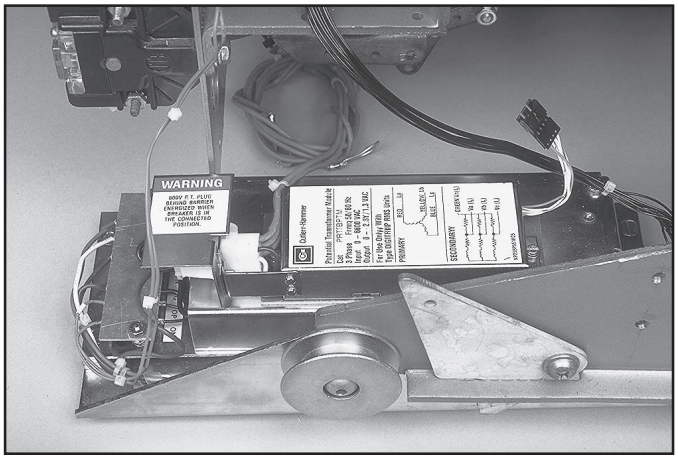


Fig. 19 Overview: PT Module Installed in the Breaker

A. Align the holes in the Glass Poly Insulation Plate with the holes in the top of the Aux. CT Module.

B. Align the holes in the PT Module with the holes in the Insulation Plate and the Aux. CT Module.

C. Secure the PT Module to the Aux. CT Module, as shown, using the (2) .138-32 × .375" screws, (2) lock washers, and (2) flat washers supplied.

D. Route the PT Wires through the hole in the bottom right corner of the Breaker Plate through which the Sensor Harness passes.

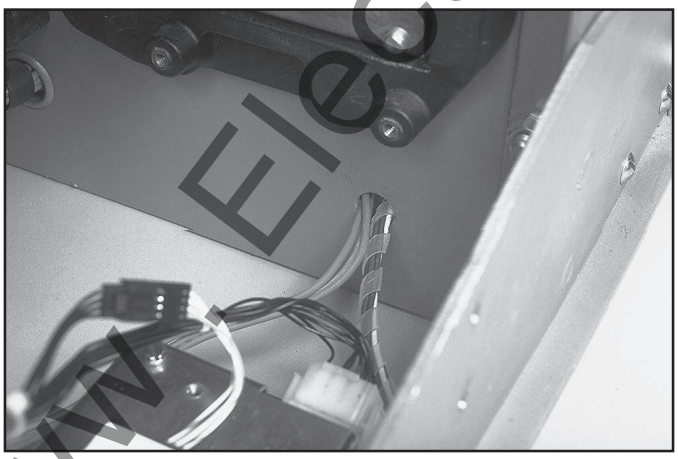


Fig. 20 Routing of the PT Wires

E. When viewed from the back of the Breaker, remove and save the bottom left .500" mounting hardware from each Finger Cluster.

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

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

G. The PT Wires are marked for connection to Phases 1, 2, and 3 with corresponding numbers. Route the PT Wires to a position suitable for attachment to the proper Finger Cluster. Move the PT Wire markers to a position where they will still be attached to the wires after cutting. Cut the wires to length, then strip an appropriate length of insulation from each PT Wire and install a .500" ring terminal to each PT Wire.

H. Connect each PT Wire to its corresponding Finger Cluster using the new flat washers supplied and the original mounting hardware removed in Step 8-E.

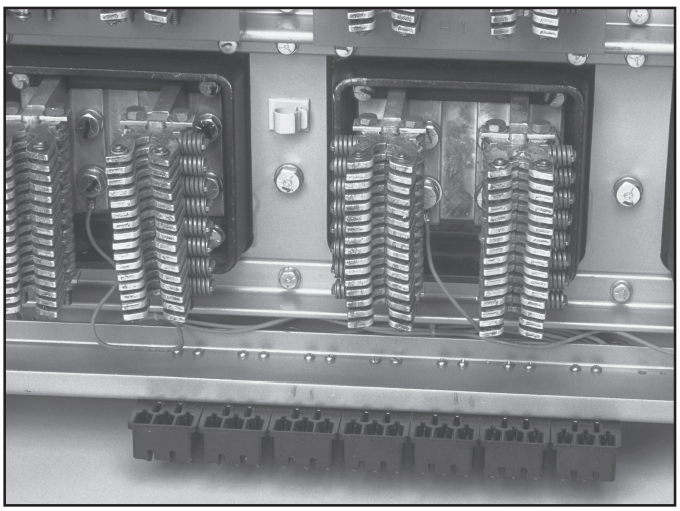


Fig. 21 PT Wires Connected to the Finger Clusters

STEP 9: INSTALLING THE TRIP UNIT

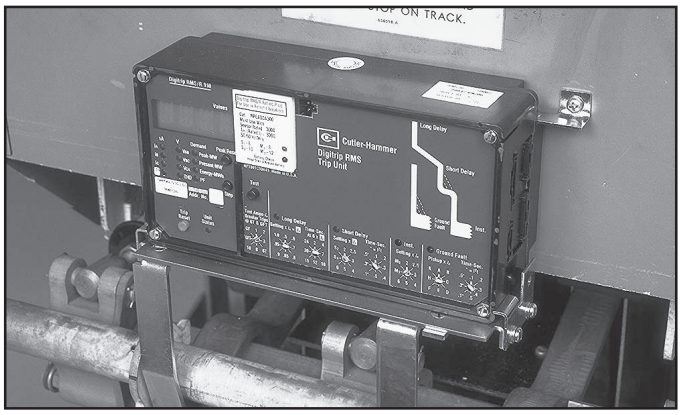


Fig. 22 Overview: Trip Unit Installed on the Breaker

A. Remove and scrap the four (4) bolts from the front of the Breaker Mechanism.

B. Remove and scrap the right, center screw from the center of the Arc Box.

C. Align the holes in the right and left Trip Unit Support Legs with the holes in the Trip Unit Mounting Platform, as shown. Secure the Support Legs to the Mounting Bracket using the (4) .190-32 × .625" flat head screws, (4) flat washers, (4) lock washers, and (4) nuts provided.

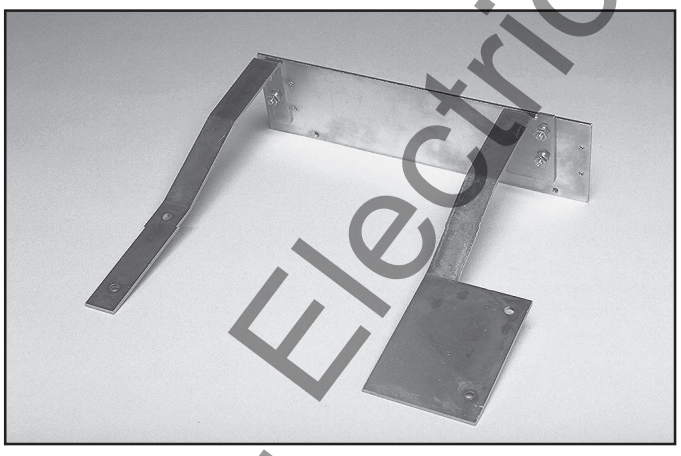


Fig. 23 Support Legs Secured to the Trip Unit Mounting Bracket

D. Align the holes in the Trip Unit Mounting Platform Assembly with the holes from which the hardware was removed in Step 9-A. Secure the Trip Unit Mounting Bracket to the front Breaker Mechanism, as shown, using the (4) .250-20 × .750" bolts, (4) lock washers, and (4) flat washers provided.

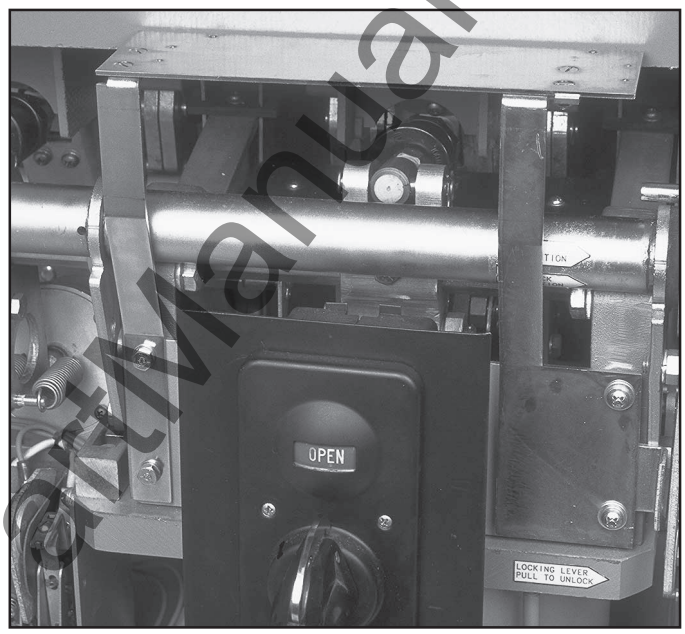


Fig. 24 Trip Unit Mounting Platform Assembly Installed on the Breaker

E. Install the Trip Unit on the top of the Trip Unit Mounting Platform Assembly, as shown, using the (2) .190-32 × 4.00" screws, (2) lock washers, and (2) flat washers supplied. Note that the Top Support Clip must be installed on the .190-32 × 4.00" screw before it is inserted through the Right Trip Unit mounting hole. Note also that the brass spacers are placed between the bottom of the Trip Unit and the top of the Trip Unit Mounting Bracket Assembly. Do not completely tighten the screws at this time.

F. Mount the Trip Unit Mounting Brackets to the Trip Unit Mounting Platform Assembly, as shown, using the (4) .164-32 × .375" screws, (4) lock washers, and (4) flat washers supplied, so they align with the slots and “pinch” the Trip Unit in place.

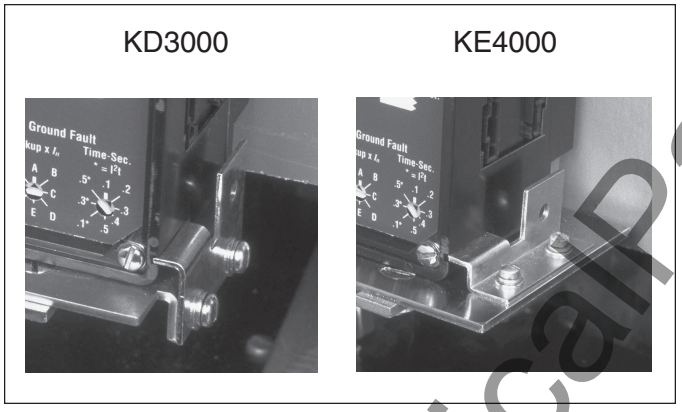


Fig. 25 Installation Mounting Bracket

G. Align the Top Support Clip with the hole in the center of the Arc Box from which the mounting hardware was removed in Step 9-B. Secure the Top Support Clip to the Arc Box, as shown, using the (1) .190-16 × .750" thread cutting screw, (1) lock washer, and (1) flat washer supplied.

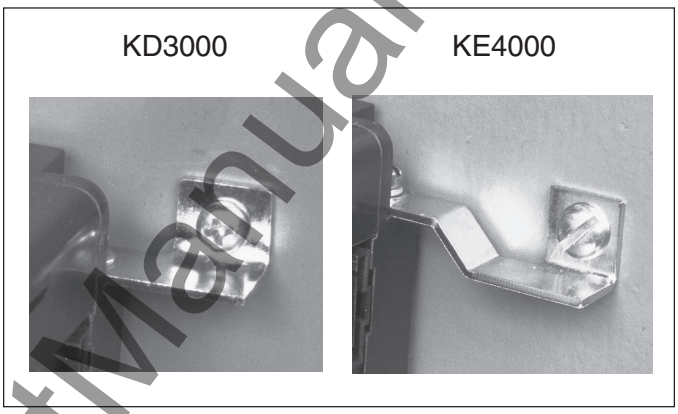


Fig. 26 Support Clip Installation

H. Fully tighten 4.00" screws that secure the Trip Unit to the Trip Unit Mounting Platform Assembly.

I. Remove the cover from the Trip Unit and install the Rating Plug. Replace the cover.

J. Install the Digitrip Nameplate to the top of the Trip Unit.

For Kits Supplied with a Breaker Mounted CPT Only.

STEP 10: INSTALLING THE BREAKER MOUNTED CPT

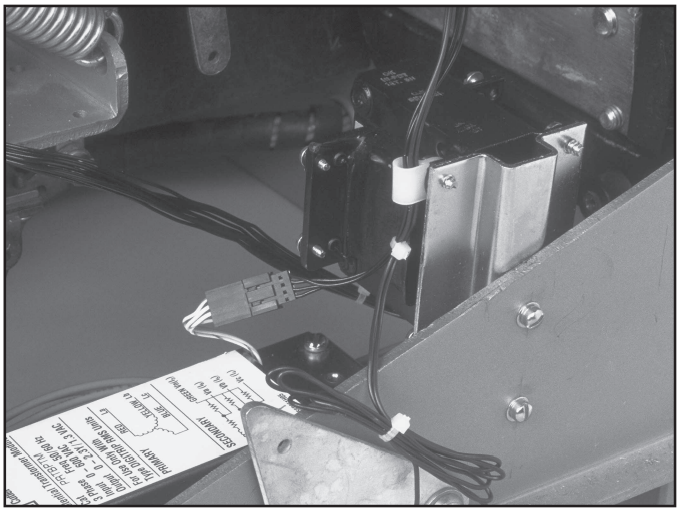


Fig. 27 Overview: CPT Installed in the Breaker

A. Align the CPT Mounting Bracket with the holes drilled in the right Breaker Frame in Step 5-B. Secure the CPT Mounting Bracket to the Breaker, as shown, using the (2) .190-32 × .625" screws, (4) flat washers, (2) lock washers, and (2) nuts provided.

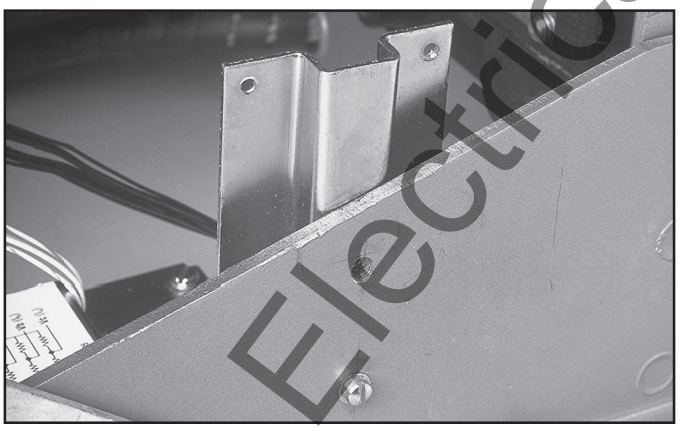


Fig. 28 Installing the CPT Mounting Bracket

B. Align the CPT with the holes in the CPT Mounting Bracket. Secure the CPT to the CPT Mounting Bracket using the (3) .190-32 × .500" thread cutting screws, (3) lock washers, and (3) flat washers provided. Do not install the top, front screw at this time. It will be installed later in this process.

NOTE: For ease of installation, it is advised that the bottom, rear screw (closest to the back of the Breaker) be installed first. This will provide access to this screw and allow the CPT to be"rotated" into position for the installation of the remaining screws.

C. The CPT Harness will connect the CPT to the Trip Unit. Temporarily position the plug-in connector of the CPT Harness near the right side of the Trip Unit. Route the CPT Harness down along the outside of the right Breaker frame to the CPT Assembly.

D. Cut the CPT Harness to a suitable length for connection to the CPT Terminals. Strip an appropriate length of insulation and attach a .138" ring terminal to each wire of the CPT harness. Connect the wires to the X1 and X2 terminals of the CPT Assembly.

E. Secure the CPT Harness to the CPT Assembly at the top, front corner, as shown, using the (1) wire clamp, (1) .190-32 × .500" thread cutting screw, (1) lock washer, and (1) flat washer provided.

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

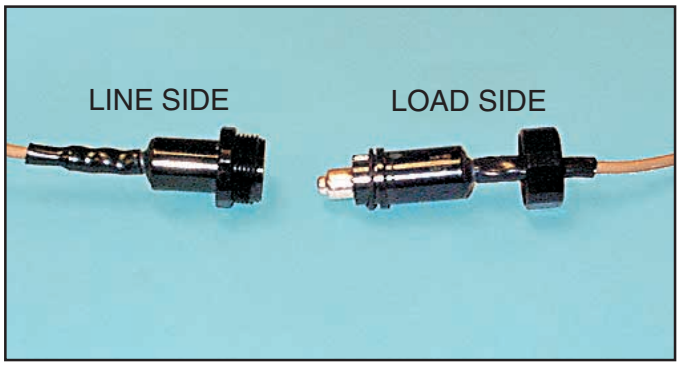


Fig. 29 Identification of the Line and Load Side HV Wires

NOTE: The Load 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 terminals on the CPT.

F. Position the HV Wire Fuses between the Aux. CT Module and the Aux. CT Module Mounting Bracket, as shown, then mark and cut the Load Side of each HV Wire. Strip an appropriate length of insulation 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 Table 3.)

Fig. 30 Location of the HV Fuses

Table 3 CPT Voltage Taps

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

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

G. Route the Line Side HV Wires through the same hole in the Breaker Back Plate as the Sensor Harness.

NOTE: The power convention of the ITE KD3000 and KE4000 Breakers is normally *Top* to *Bottom*, meaning the Top Breaker Stabs are on the *Line Side* of the Breaker and the Bottom Breaker Stabs are on the *Load Side*.

The 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.

H. Route the HV Line Side Wires up between the bottom Finger Clusters to the Phase 1 and 2, or Phase 2 and 3 top Finger Clusters.

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.

I. When viewed from the back of the Breaker, remove and save the bottom left .500" mounting hardware from the Phase 1 and 2, or Phase 2 and 3 top Finger Clusters.

J. Cut the HV Wires to the appropriate length for attachment to the Phase 1 and 2, or Phase 2 and 3 top Finger Clusters. Strip an appropriate length of insulation from each HV Wire and attach a .500" ring terminal.

K. Connect the HV Wires to the Finger Clusters using the new flat washers supplied and the original mounting hardware removed in Step 10-I.

L. Use the self-adhesive wire clamp provided to secure the HV wires to the Breaker Back Plate, as shown.

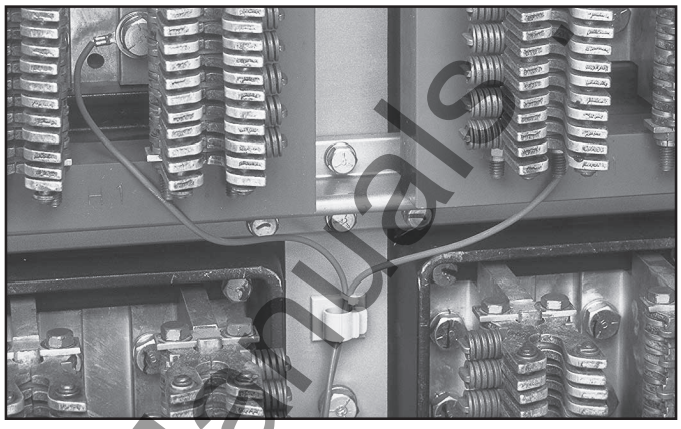


Fig. 31 HV Wires Connected to the Finger Clusters

M. 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.

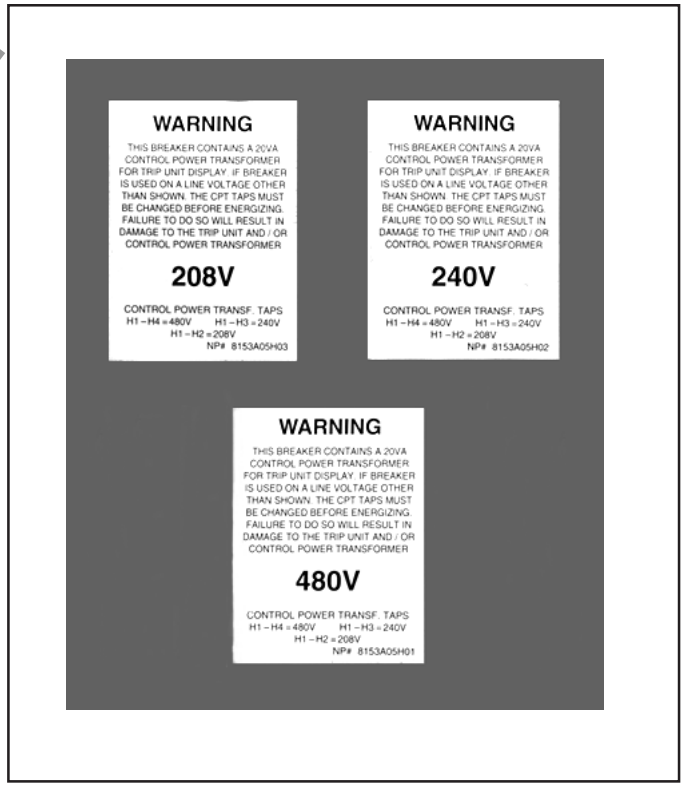


Fig. 32 Supplied CPT Voltage Labels

STEP 11: FINAL WIRING AND HARNESS CONNECTION

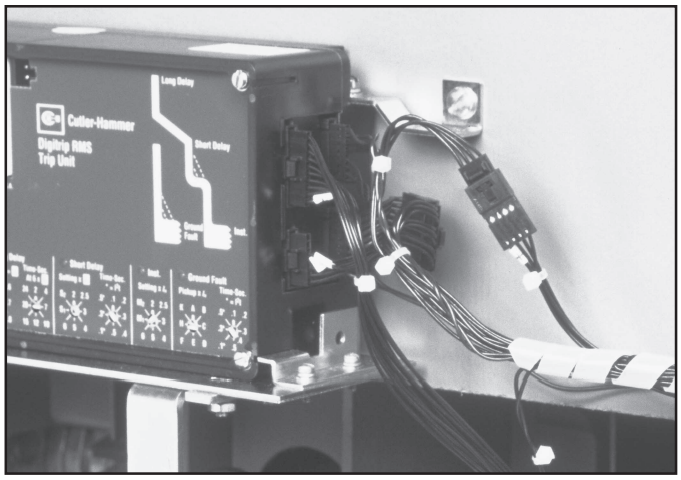


Fig. 33 Overview: Retrofit Final Wiring

A. Connect the External Harness to the Trip Unit.

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

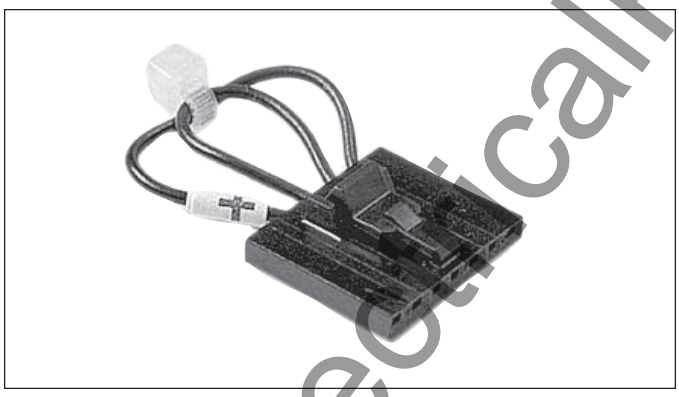


Fig. 34 510 Basic Kit External Harness Plug

B. Secure the Aux. CT Harness and the DTA Wires to the right Breaker Shelf, as shown, using the (1) wire clamp, (1) .190-32 × .375" screw, (2) flat washers, (1) lock washer, and (1) nut provided.

C. Route the Aux. CT Harness towards the top of the Breaker then connect it to the Trip Unit.

D. *For Kits Supplied with a PT Module Only.* Connect the PT Extension Harness to the PT Module.

Route the PT Extension Harness up along the right, outside of the Breaker to the Trip Unit, as shown. Using the wire ties provided, secure the PT Extension Harness to the Aux. CT Harness near the middle of the PT Module.

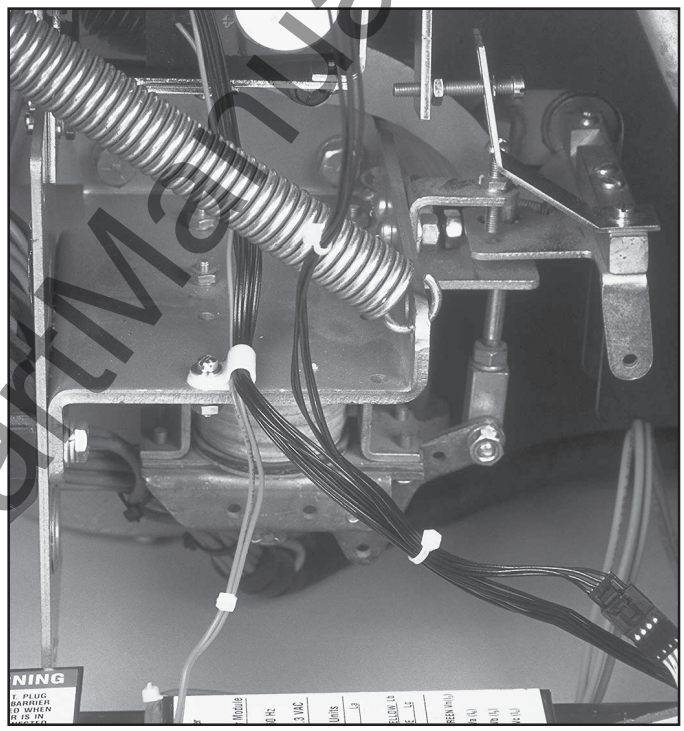


Fig. 35 Routing of the PT Extension Harness

E. *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, into the Breaker towards the top of the DTA Assembly. Connect one wire to the normally “Closed” terminal of the Microswitch and the other wire to the “Common” terminal.

Secure 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 provided.

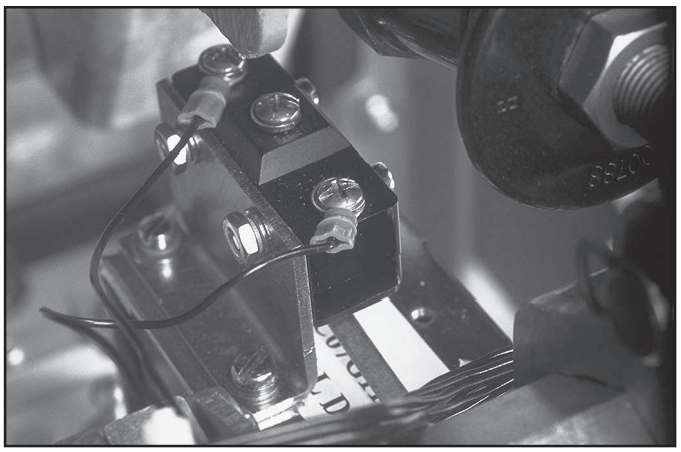
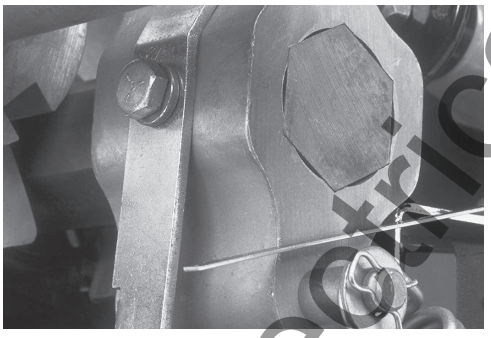


Fig. 36 Auxiliary Switch Connection and Mounting

NOTE: The exact mounting position of the Microswitch will depend on which breaker is being Retrofitted. Also note the orientation and placement of the Microswitch Arm.

KD3000



KE4000

Fig. 37 Placement of the Microswitch Arm

F. *For Kits Supplied with a Breaker Mounted CPT Only.* Remove the 9-position External Harness plug installed in the Trip Unit. Insert the black plug of the CPT Harness into the same receptacle in the Trip Unit. Reinsert the External Harness Plug just removed into the female receptacle on the CPT Harness.

G. Secure the CPT Wires and the PT Extension Harness to the right side of the Breaker, as shown, using the (1) wire clamp, (1) .164-32 × .750" thread cutting screw, (1) lock washer, and (1) flat washer provided.

H. Remove and scrap the original hardware from the bottom right corner of the Arc Box. Secure the External Harness to the Arc Box, as shown, using the (1) wire clamp, (1) .164-32 × .750" thread cutting screw, (1) lock washers, and (1) flat washer provided.

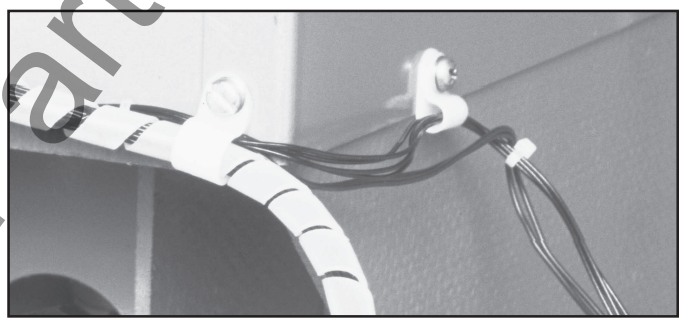


Fig. 38 Securing the Wiring and Harnesses

I. Use nylon wire ties provided to secure all wires and harnesses away from any moving parts within the Breaker.

STEP 12: TESTING THE BREAKER

A. Measure the force necessary to trip the Breaker at the point where the Trip Finger contacts the adjusting screw. The force necessary to trip the Breaker **MUST NOT EXCEED** 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 was created specifically for the "hundred" series (500, 600, 700, etc.) Retrofit Kits. Therefore certain sections and figures do not apply to the "ten" series (510, 610, 810, etc.) Retrofit Kits. Specifically, these are Sections 13 and 14, as well as Figures 3-2, 3-3, and 3-4.**

2. ***For All Kits Other Than 510 Basic.* If testing the Breaker with Short Delay or Ground Fault functions, be sure to either plug in the Cell Harness Assembly or use the Zone Interlock Shorting Plug. Failure to do so may result in shorter than expected trip times.**

3. ***For 810 and 910 Kits Only.* Without any power applied to the system (neither the 120 volt power supply nor the Aux. Power Module connected), plug the External Harness into the Cell Harness and check the impedance between COM 1 and COM 2. The impedance should be between one (1) and three (3) ohms. If the impedance is not within this range, trace the wiring and examine each connection to assure its integrity.**

   Confirm that the 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. Final External Harness connection will be performed in Step 13.

STEP 13: 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 14: INSTALLING THE RETROFITTED BREAKER IN THE CELL

⚠ WARNING

DO NOT LEAVE THE BREAKER IN AN INTERMEDIATE POSITION IN THE SWITCHGEAR CELL. ALWAYS LEAVE IT IN THE CONNECTED, DISCONNECTED, OR (OPTIONAL) TEST POSITION. FAILURE TO DO SO COULD LEAD TO IMPROPER POSITIONING OF THE BREAKER AND FLASHOVER, CAUSING DEATH, SERIOUS PERSONAL INJURY, AND / OR PROPERTY DAMAGE.

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

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

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

Digitrip Retrofit Kit Installation Components for ITE KD3000 and KE4000 Breakers

Step	Description	Style No.	Qty.	Comment
Step 3	Sensor		3	See Pick List
Step 4	DTA Assembly	8259A51G33	1	
	DTA Mounting Hardware	4A35824G11	1	
	.190-32 × .500 Lng. Screw Fil.		2	
	.190 Flat Washer Stl.		4	
	.190 Lock Washer Stl.		2	
	.190-32 Nut Hex Stl.		2	
	Trip Tab Assembly		1	
	Trip Tab Assembly Mounting Parts	4A35824G09	1	
	.190-32 × 1.50 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		2	
	.190 Lock Washer Stl.		1	
	.190-32 Nut Hex Stl.		1	
	Reset Arm Assembly		1	
	Reset Arm Assembly Mounting Parts	4A35824G10	1	
	.312-18 × 1.00 Lng. Hex Bolt		1	
	.312 Flat Washer Stl.		1	
	.312 Lock Washer Stl.		1	
	Loc-Tite® 243		1	
	Auxiliary Switch Kit	4A35824G02	1	
	Microswitch		1	
	Mounting Bracket		1	
	.164-32 × .375 Lng. Screw Fil.		1	
	.164-32 × .312 Lng. Screw Pan / Lock		1	
	.164 Flat Washer Stl.		2	Comm. Only
	.164 Lock Washer Stl.		1	
	.138-32 × 1.00 Lng. Screw Fil.		2	
	.138 Flat Washer Stl.		4	
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
Step 6	Aux. CT Module	6503C59G_	1	
	Aux. CT Harness	6502C84G02	1	
	Aux. CT Module Mounting Parts	4A35824G05	1	
	Mounting Bracket		1	
	Spacers		6	
	.190-32 × .875 Lng. Screw Flat		4	
	.190-32 × .375 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		5	
	.190 Lock Washer Stl.		5	
	.190-32 Nut Hex Stl.		4	

Digitrip Retrofit Kit Installation Components for ITE KD3000 and KE4000 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 7	Sensor Harness Parts	4A35824G12	1	
	Sensor Harness		1	
	Nylon Wire Ties		8	
Step 8	PT Module	6502C82G01	1	
	Ring Terminals (.190, .250, .312, .375, .500 - Each Size)		3	
	PT Module Mounting Parts	4A35824G06	1	
	Insulation Barrier		1	Comm. Only
	.500 Flat Washer Stl.		3	
	.138-32 × .375 Lng. Screw T. C.		2	
	.138 Flat Washer Stl.		2	
	.138 Lock Washer Stl.		2	
Step 9	Trip Unit		1	See Pick List
	Rating Plug		1	See Pick List
	Trip Unit Mounting Hardware	8259A51G11	1	
	.250-20 × .750 Lng. Hex Bolt		4	
	.250 Flat Washer Stl.		4	
	.250 Lock Washer Stl.		4	
	Trip Unit Assembly Parts	4A35824G07	1	
	Trip Unit Mounting		1	
	Support Leg L. H.		1	
	Support Leg R. H.		1	
	Top Support Clip		1	
	Support Clip		1	
	Support Clip		1	
	Spacer Brass		2	
	Digitrip Nameplate		1	KD3000 Only
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190-32 × .625 Lng. Screw Flat		4	
	.190-16 × .750 Lng. Screw T. C.		1	
	.190 Flat Washer Stl.		7	
	.190 Lock Washer Stl.		7	
	.190-32 Nut Hex Stl.		4	
	.164-32 × .375 Lng. Screw Fil.		4	
	.164 Flat Washer Stl.		4	
	.164 Lock Washer Stl.		4	

Digitrip Retrofit Kit Installation Components for ITE KD3000 and KE4000 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 9 (Cont.)	Trip Unit Assembly Parts	4A35824G08	1	
	Trip Unit Mounting		1	
	Support Leg L. H.		1	
	Support Leg R. H.		1	
	Top Support Clip		1	
	Support Clip		1	KE4000 Only
	Support Clip		1	
	Spacer Brass		2	
	Digitrip Nameplate		1	
	.190-32 × 4.00 Lng. Screw Fil.		2	
	.190-32 × .625 Lng. Screw Flat		4	
	.190-16 × .750 Lng. Screw T. C.		1	KD3000 Only
	.190 Flat Washer Stl.		7	
	.190 Lock Washer Stl.		7	
	.190-32 Nut Hex Stl.		4	KE4000 Only
	.164-32 × .375 Lng. Screw Fil.		4	
	.164 Flat Washer Stl.		4	
	.164 Lock Washer Stl.		4	
Step 10	Breaker Mounted CPT Kit	8259A91G05	1	
	CPT Mounting Parts	8259A51G20	1	
	Ring Terminals (.138, .190, .250, .312, .375, .500 - Each Size)		2	
	Mounting Bracket		1	
	.500 Flat Washer Stl.		2	
	.190-32 × .625 Lng. Screw Fil.		2	CPT Only
	.190-16 × .500 Lng. Screw T. C.		4	
	.190 Flat Washer		8	
	.190 Lock Washer		6	
	.190-32 Hex Nut Stl.		2	
	Nylon Wire Tie		8	
	Nylon Wire Clamp		1	From Step 11
Step 11	External Harness	6502C83G_	1	
	External Harness Parts	4A35824G13	1	
	.190-16 × .750 Lng. Screw T. C.		3	
	.190-32 × .375 Lng. Screw Fil.		1	
	.190 Flat Washer Stl.		5	
	.190 Lock Washer Stl.		4	
	.190-32 Nut Hex Stl.		1	
	.164-32 × .750 Lng. Screw Fil.		2	
	.164 Flat Washer Stl.		2	
	.164 Lock Washer Stl.		2	
	Nylon Wire Clamp		4	
	Nylon Wire Tie		8	

Digitrip Retrofit Kit Installation Components for ITE KD3000 and KE4000 Breakers (Continued)

Step	Description	Style No.	Qty.	Comment
Step 12	PT Extension Harness	6502C85G01	1	Comm. Only
(Cont.)	Auxiliary Switch Mounting Parts		1	
	.138-32 x 1.00 Lng. Screw Fil.		2	Comm. Only
	.138 Flat Washer Stl.		4	From Step 4
	.138 Lock Washer Stl.		2	
	.138-32 Nut Hex Stl.		2	
Step 13	Cell Harness	6503C57G__	1	All Except 500 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.

Table 4: 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

Table 5: Torque Values for Copper BUS Connectors and Screw Size Conversion

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

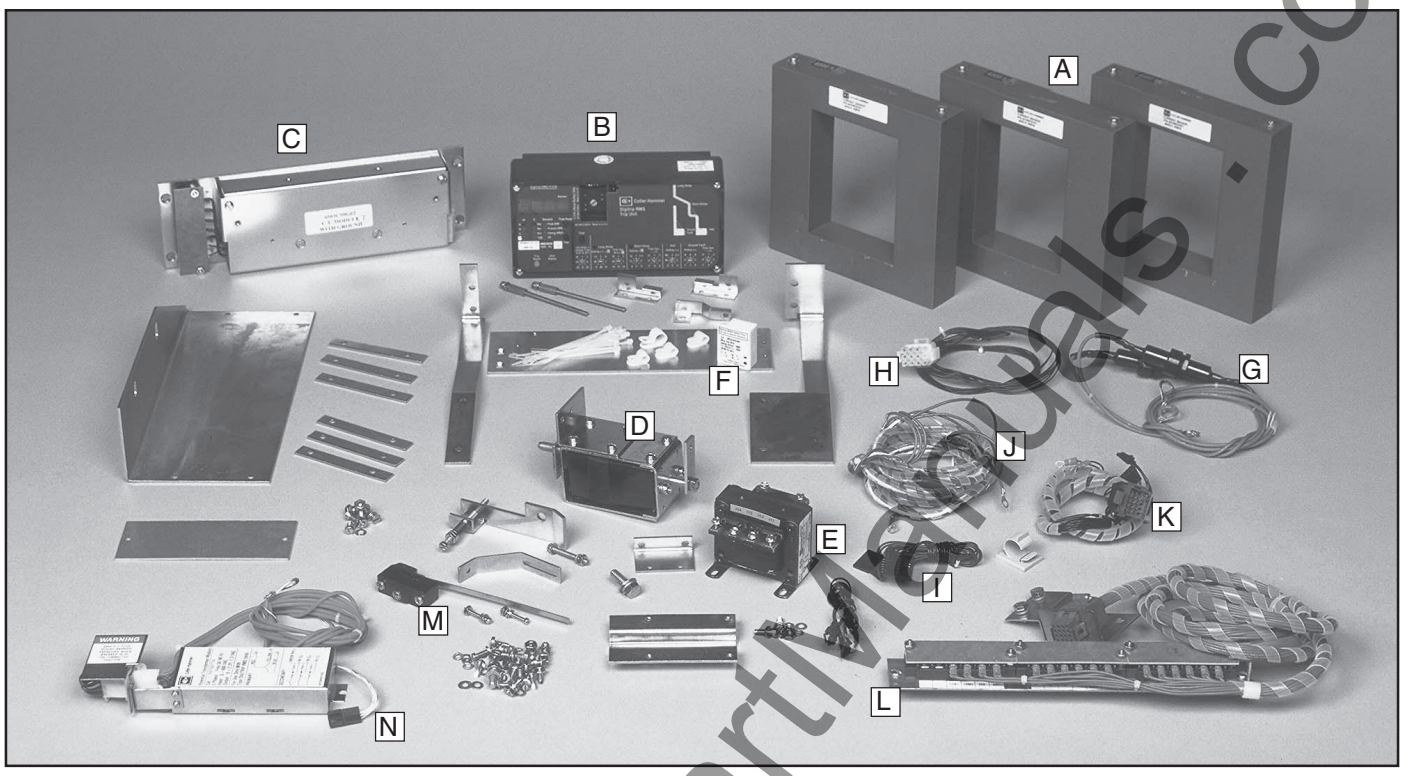


Fig. 39 Retrofit Components

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

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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Cutler-Hammer
Pittsburgh, Pennsylvania U.S.A.

Publication No. IL 33-KEK-2
October 2000
Printed in U.S.A./TBG00005